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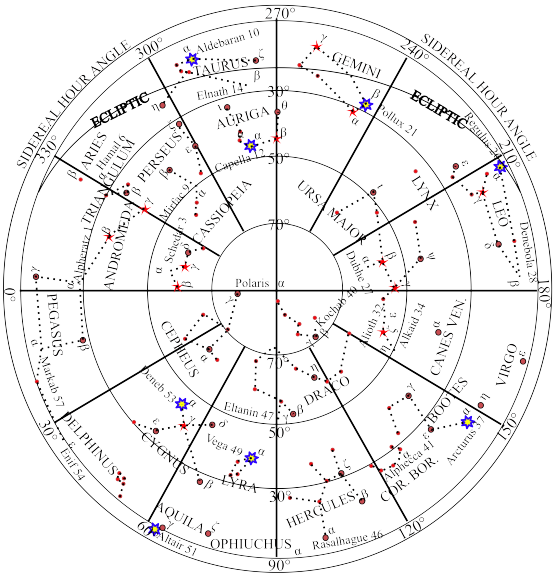

The Nautical Almanac

2018

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January 01, 02 ,03 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	100°35.8	181°17.1	-23°37.9	238°36.7	-15°13.7	235°49.0	-15°53.1	189°05.5	-22°31.9
1	115°38.2	196°16.2	-23°37.7	253°37.6	-15°14.2	250°51.0	-15°53.2	204°07.6	-22°31.9
2	130°40.7	211°15.2	-23°37.6	268°38.5	-15°14.7	265°53.0	-15°53.3	219°09.8	-22°31.9
3	145°43.2	226°14.2	-23°37.5	283°39.5	-15°15.1	280°55.1	-15°53.4	234°11.9	-22°31.9
4	160°45.6	241°13.2	-23°37.4	298°40.4	-15°15.6	295°57.1	-15°53.5	249°14.1	-22°31.9
5	175°48.1	256°12.3	-23°37.3	313°41.3	-15°16.1	310°59.2	-15°53.6	264°16.2	-22°31.9
6	190°50.6	271°11.3	-23°37.2	328°42.2	-15°16.6	326°01.2	-15°53.8	279°18.4	-22°31.9
7	205°53.0	286°10.3	-23°37.1	343°43.2	-15°17.0	341°03.3	-15°53.9	294°20.5	-22°31.9
8	220°55.5	301°09.4	-23°36.9	358°44.1	-15°17.5	356°05.3	-15°54.0	309°22.6	-22°31.9
9	235°58.0	316°08.4	-23°36.8	13°45.0	-15°18.0	11°07.3	-15°54.1	324°24.8	-22°31.9
10	251°00.4	331°07.4	-23°36.7	28°45.9	-15°18.5	26°09.4	-15°54.2	339°26.9	-22°31.9
11	266°02.9	346°06.5	-23°36.6	43°46.9	-15°18.9	41°11.4	-15°54.3	354°29.1	-22°31.8
12	281°05.3	1°05.5	-23°36.5	58°47.8	-15°19.4	56°13.5	-15°54.4	9°31.2	-22°31.8
13	296°07.8	16°04.5	-23°36.3	73°48.7	-15°19.9	71°15.5	-15°54.6	24°33.4	-22°31.8
14	311°10.3	31°03.6	-23°36.2	88°49.6	-15°20.4	86°17.6	-15°54.7	39°35.5	-22°31.8
15	326°12.7	46°02.6	-23°36.1	103°50.6	-15°20.8	101°19.6	-15°54.8	54°37.7	-22°31.8
16	341°15.2	61°01.6	-23°36.0	118°51.5	-15°21.3	116°21.7	-15°54.9	69°39.8	-22°31.8
17	356°17.7	76°00.7	-23°35.8	133°52.4	-15°21.8	131°23.7	-15°55.0	84°42.0	-22°31.8
18	11°20.1	90°59.7	-23°35.7	148°53.3	-15°22.3	146°25.7	-15°55.1	99°44.1	-22°31.8
19	26°22.6	105°58.7	-23°35.6	163°54.3	-15°22.7	161°27.8	-15°55.2	114°46.3	-22°31.8
20	41°25.1	120°57.8	-23°35.4	178°55.2	-15°23.2	176°29.8	-15°55.4	129°48.4	-22°31.8
21	56°27.5	135°56.8	-23°35.3	193°56.1	-15°23.7	191°31.9	-15°55.5	144°50.6	-22°31.8
22	71°30.0	150°55.8	-23°35.2	208°57.0	-15°24.1	206°33.9	-15°55.6	159°52.7	-22°31.8
23	86°32.5	165°54.9	-23°35.0	223°57.9	-15°24.6	221°36.0	-15°55.7	174°54.9	-22°31.8
Mer.pass.:17:14		v-1.0 d0.1 m-3.8		v0.9 d-0.5 m1.5		v2.0 d-0.1 m-1.7		v2.1 d0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	101°34.9	180°53.9	-23°34.9	238°58.9	-15°25.1	236°38.0	-15°55.8	189°57.0	-22°31.8
1	116°37.4	195°52.9	-23°34.7	253°59.8	-15°25.6	251°40.1	-15°55.9	204°59.2	-22°31.8
2	131°39.8	210°52.0	-23°34.6	269°00.7	-15°26.0	266°42.1	-15°56.0	220°01.3	-22°31.8
3	146°42.3	225°51.0	-23°34.5	284°01.6	-15°26.5	281°44.2	-15°56.2	235°03.5	-22°31.8
4	161°44.8	240°50.0	-23°34.3	299°02.6	-15°27.0	296°46.2	-15°56.3	250°05.6	-22°31.8
5	176°47.2	255°49.1	-23°34.2	314°03.5	-15°27.4	311°48.3	-15°56.4	265°07.7	-22°31.8
6	191°49.7	270°48.1	-23°34.0	329°04.4	-15°27.9	326°50.3	-15°56.5	280°09.9	-22°31.8
7	206°52.2	285°47.1	-23°33.9	344°05.3	-15°28.4	341°52.3	-15°56.6	295°12.0	-22°31.8
8	221°54.6	300°46.2	-23°33.7	359°06.3	-15°28.9	356°54.4	-15°56.7	310°14.2	-22°31.8
9	236°57.1	315°45.2	-23°33.6	14°07.2	-15°29.3	11°56.4	-15°56.8	325°16.3	-22°31.8
10	251°59.6	330°44.2	-23°33.4	29°08.1	-15°29.8	26°58.5	-15°56.9	340°18.5	-22°31.8
11	267°02.0	345°43.3	-23°33.3	44°09.0	-15°30.3	42°00.5	-15°57.1	355°20.6	-22°31.8
12	282°04.5	0°42.3	-23°33.1	59°09.9	-15°30.7	57°02.6	-15°57.2	10°22.8	-22°31.8
13	297°07.0	15°41.4	-23°33.0	74°10.9	-15°31.2	72°04.6	-15°57.3	25°24.9	-22°31.8
14	312°09.4	30°40.4	-23°32.8	89°11.8	-15°31.7	87°06.7	-15°57.4	40°27.1	-22°31.8
15	327°11.9	45°39.4	-23°32.7	104°12.7	-15°32.1	102°08.7	-15°57.5	55°29.2	-22°31.8
16	342°14.3	60°38.5	-23°32.5	119°13.6	-15°32.6	117°10.8	-15°57.6	70°31.4	-22°31.8
17	357°16.8	75°37.5	-23°32.3	134°14.6	-15°33.1	132°12.8	-15°57.7	85°33.5	-22°31.8
18	12°19.3	90°36.5	-23°32.2	149°15.5	-15°33.6	147°14.9	-15°57.9	100°35.7	-22°31.8
19	27°21.7	105°35.6	-23°32.0	164°16.4	-15°34.0	162°16.9	-15°58.0	115°37.8	-22°31.8
20	42°24.2	120°34.6	-23°31.9	179°17.3	-15°34.5	177°19.0	-15°58.1	130°40.0	-22°31.8
21	57°26.7	135°33.6	-23°31.7	194°18.2	-15°35.0	192°21.0	-15°58.2	145°42.1	-22°31.8
22	72°29.1	150°32.7	-23°31.5	209°19.2	-15°35.4	207°23.1	-15°58.3	160°44.3	-22°31.8
23	87°31.6	165°31.7	-23°31.4	224°20.1	-15°35.9	222°25.1	-15°58.4	175°46.4	-22°31.8
Mer.pass.:17:10		v-1.0 d0.1 m-3.8		v0.9 d-0.5 m1.5		v2.0 d-0.1 m-1.7		v2.1 d0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	102°34.1	180°30.8	-23°31.2	239°21.0	-15°36.4	237°27.2	-15°58.5	190°48.6	-22°31.8
1	117°36.5	195°29.8	-23°31.0	254°21.9	-15°36.8	252°29.2	-15°58.6	205°50.7	-22°31.8
2	132°39.0	210°28.8	-23°30.8	269°22.8	-15°37.3	267°31.3	-15°58.8	220°52.9	-22°31.8
3	147°41.5	225°27.9	-23°30.7	284°23.8	-15°37.8	282°33.3	-15°58.9	235°55.0	-22°31.8
4	162°43.9	240°26.9	-23°30.5	299°24.7	-15°38.2	297°35.4	-15°59.0	250°57.2	-22°31.8
5	177°46.4	255°25.9	-23°30.3	314°25.6	-15°38.7	312°37.4	-15°59.1	265°59.3	-22°31.8
6	192°48.8	270°25.0	-23°30.1	329°26.5	-15°39.2	327°39.5	-15°59.2	281°01.5	-22°31.8
7	207°51.3	285°24.0	-23°30.0	344°27.4	-15°39.6	342°41.5	-15°59.3	296°03.6	-22°31.8
8	222°53.8	300°23.1	-23°29.8	359°28.4	-15°40.1	357°43.6	-15°59.4	311°05.7	-22°31.8
9	237°56.2	315°22.1	-23°29.6	14°29.3	-15°40.6	12°45.6	-15°59.5	326°07.9	-22°31.8
10	252°58.7	330°21.1	-23°29.4	29°30.2	-15°41.0	27°47.7	-15°59.6	341°10.0	-22°31.8
11	268°01.2	345°20.2	-23°29.2	44°31.1	-15°41.5	42°49.7	-15°59.8	356°12.2	-22°31.8
12	283°03.6	0°19.2	-23°29.1	59°32.0	-15°42.0	57°51.8	-15°59.9	11°14.3	-22°31.8
13	298°06.1	15°18.3	-23°28.9	74°33.0	-15°42.4	72°53.8	-15°60.0	26°16.5	-22°31.8
14	313°08.6	30°17.3	-23°28.7	89°33.9	-15°42.9	87°55.9	-16°00.1	41°18.6	-22°31.8
15	328°11.0	45°16.3	-23°28.5	104°34.8	-15°43.3	102°57.9	-16°00.2	56°20.8	-22°31.8
16	343°13.5	60°15.4	-23°28.3	119°35.7	-15°43.8	117°60.0	-16°00.3	71°22.9	-22°31.8
17	358°16.0	75°14.4	-23°28.1	134°36.6	-15°44.3	133°02.0	-16°00.4	86°25.1	-22°31.8
18	13°18.4	90°13.5	-23°27.9	149°37.6	-15°44.7	148°04.1	-16°00.5	101°27.2	-22°31.8
19	28°20.9	105°12.5	-23°27.7	164°38.5	-15°45.2	163°06.2	-16°00.6	116°29.4	-22°31.8
20	43°23.3	120°11.5	-23°27.5	179°39.4	-15°45.7	178°08.2	-16°00.8	131°31.5	-22°31.8
21	58°25.8	135°10.6	-23°27.4	194°40.3	-15°46.1	193°10.3	-16°00.9	146°33.7	-22°31.8
22	73°28.3	150°09.6	-23°27.2	209°41.2	-15°46.6	208°12.3	-16°01.0	161°35.8	-22°31.8
23	88°30.7	165°08.7	-23°27.0	224°42.2	-15°47.1	223°14.4	-16°01.1	176°38.0	-22°31.8
Mer.pass.:17:06		v-1.0 d0.2 m-3.8		v0.9 d-0.5 m1.5		v2.1 d-0.1 m-1.7		v2.1 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.3	29°11.5
Ankaa	353°12.7	-42°12.8
Schedar	349°36.9	56°38.3
Diphda	348°52.7	-17°53.5
Achernar	335°24.4	-57°09.2
Hamal	327°57.2	23°32.8
Polaris	316°06.7	89°20.6
Akamar	315°15.8	-40°14.3
Menkar	314°11.6	4°09.4
Mirfak	308°35.5	49°55.5
Aldebaran	290°45.6	16°32.6
Rigel	281°08.8	-8°11.1
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°42.9	-1°11.7
Betelgeuse	270°57.6	7°24.4
Canopus	263°54.2	-52°42.5
Sirius	258°30.6	-16°44.5
Adara	255°09.7	-28°60.0
Procyon	244°56.1	5°10.7
Pollux	243°23.5	27°58.7
Avior	234°16.1	-59°34.0
Suhail	222°49.8	-43°30.3
Miaplacidus	221°38.2	-69°47.3
Alphard	217°52.8	-8°44.3
Regulus	207°40.0	11°52.6
Dubhe	193°47.7	61°39.0
Denebola	182°30.4	14°28.3
Gienah	175°49.0	-17°38.3
Acrux	173°05.7	-63°11.5
Gacrux	171°57.3	-57°12.5
Alioth	166°18.1	55°51.5
Spica	158°28.1	-11°15.1
Alcaid	152°56.7	49°13.3
Hadar	148°43.7	-60°27.1
Menkent	148°04.1	-36°27.2
Arcturus	145°52.9	19°05.7
Rigil Kent.	139°47.8	-60°54.1
Zubenelg.	137°02.2	-16°06.7
Kochab	137°20.9	74°04.8
Alphecca	126°08.7	26°39.3
Antares	112°22.8	-26°28.0
Atria	107°22.3	-69°03.2
Sabik	102°09.3	-15°44.6
Shaula	96°18.1	-37°06.7
Rasalhague	96°04.0	12°33.0
Etamin	90°45.2	51°29.3
Kaus Aust.	83°40.1	-34°22.3
Vega	80°37.3	38°48.1
Nunki	75°54.9	-26°16.3
Altair	62°05.6	8°55.0
Peacock	53°15.0	-56°40.6
Deneb	49°29.8	45°20.9
Enif	33°44.4	9°57.5
Alnair	27°40.3	-46°52.6
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.9
Markab	13°35.4	15°18.2

2018/1/1	**SHA**	**Mer.pass**
Venus	80°41.3	11:56
Mars	138°00.9	08:05
Jupiter	135°13.2	08:16
Saturn	88°29.7	11:22

2018/1/2	**SHA**	**Mer.pass**
Venus	79°19.0	11:57
Mars	137°24.0	08:04
Jupiter	135°03.1	08:12
Saturn	88°22.1	11:19

2018/1/3	**SHA**	**Mer.pass**
Venus	77°56.7	11:59
Mars	136°46.9	08:02
Jupiter	134°53.1	08:09
Saturn	88°14.5	11:15

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°10.0	-23°01.1	16°05.7	3.3	19°19.2	3.6	61.4
1	194°09.7	-23°00.9	30°27.9	3.2	19°22.7	3.5	61.4
2	209°09.5	-23°00.7	44°50.1	3.2	19°26.2	3.4	61.4
3	224°09.2	-23°00.5	59°12.2	3.1	19°29.5	3.2	61.4
4	239°08.9	-23°00.3	73°34.3	3.1	19°32.6	3.1	61.4
5	254°08.6	-23°00.1	87°56.4	3.0	19°35.6	2.9	61.4
6	269°08.3	-22°59.9	102°18.4	3.0	19°38.4	2.8	61.4
7	284°08.0	-22°59.7	116°40.4	3.0	19°41.1	2.6	61.4
8	299°07.7	-22°59.5	131°02.3	2.9	19°43.6	2.5	61.4
9	314°07.4	-22°59.3	145°24.2	2.9	19°46.0	2.3	61.4
10	329°07.1	-22°59.1	159°46.1	2.9	19°48.2	2.2	61.5
11	344°06.8	-22°58.9	174°08.0	2.8	19°50.3	2.0	61.5
12	359°06.5	-22°58.7	188°29.8	2.8	19°52.3	1.9	61.5
13	14°06.2	-22°58.5	202°51.6	2.8	19°54.0	1.7	61.5
14	29°05.9	-22°58.3	217°13.4	2.8	19°55.7	1.5	61.5
15	44°05.6	-22°58.0	231°35.1	2.7	19°57.1	1.4	61.5
16	59°05.3	-22°57.8	245°56.9	2.7	19°58.4	1.2	61.5
17	74°05.1	-22°57.6	260°18.6	2.7	19°59.6	1.1	61.5
18	89°04.8	-22°57.4	274°40.3	2.7	20°00.6	0.9	61.5
19	104°04.5	-22°57.2	289°02.0	2.7	20°01.5	0.8	61.5
20	119°04.2	-22°57.0	303°23.7	2.7	20°02.2	0.6	61.5
21	134°03.9	-22°56.8	317°45.4	2.7	20°02.7	0.5	61.5
22	149°03.6	-22°56.5	332°07.0	2.7	20°03.1	0.3	61.5
23	164°03.3	-22°56.3	346°28.7	2.7	20°03.3	0.2	61.5
	SD.=16.3	d=0.2	S.D.=16.7				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°03.0	-22°56.1	0°50.4	2.7	20°03.4	-0.0	61.5
1	194°02.7	-22°55.9	15°12.1	2.7	20°03.3	-0.2	61.5
2	209°02.4	-22°55.7	29°33.8	2.7	20°03.1	-0.3	61.5
3	224°02.1	-22°55.4	43°55.4	2.7	20°02.7	-0.5	61.5
4	239°01.8	-22°55.2	58°17.1	2.7	20°02.1	-0.6	61.5
5	254°01.6	-22°55.0	72°38.8	2.7	20°01.4	-0.8	61.5
6	269°01.3	-22°54.8	87°00.6	2.7	20°00.6	-0.9	61.5
7	284°01.0	-22°54.5	101°22.3	2.7	19°59.5	-1.1	61.5
8	299°00.7	-22°54.3	115°44.0	2.8	19°58.4	-1.2	61.5
9	314°00.4	-22°54.1	130°05.8	2.8	19°57.1	-1.4	61.5
10	329°00.1	-22°53.9	144°27.6	2.8	19°55.6	-1.6	61.4
11	343°59.8	-22°53.6	158°49.4	2.8	19°53.9	-1.7	61.4
12	358°59.5	-22°53.4	173°11.2	2.9	19°52.2	-1.9	61.4
13	13°59.2	-22°53.2	187°33.1	2.9	19°50.2	-2.0	61.4
14	28°59.0	-22°52.9	201°55.0	2.9	19°48.1	-2.2	61.4
15	43°58.7	-22°52.7	216°16.9	2.9	19°45.9	-2.3	61.4
16	58°58.4	-22°52.5	230°38.9	3.0	19°43.5	-2.5	61.4
17	73°58.1	-22°52.2	245°00.9	3.0	19°41.0	-2.6	61.4
18	88°57.8	-22°52.0	259°22.9	3.1	19°38.3	-2.8	61.4
19	103°57.5	-22°51.8	273°45.0	3.1	19°35.4	-2.9	61.4
20	118°57.2	-22°51.5	288°07.1	3.1	19°32.5	-3.1	61.3
21	133°56.9	-22°51.3	302°29.3	3.2	19°29.3	-3.2	61.3
22	148°56.6	-22°51.1	316°51.5	3.2	19°26.0	-3.4	61.3
23	163°56.4	-22°50.8	331°13.8	3.3	19°22.6	-3.5	61.3
	SD.=16.3	d=0.2	S.D.=16.8				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°56.1	-22°50.6	345°36.1	3.3	19°19.0	-3.6	61.3
1	193°55.8	-22°50.4	359°58.4	3.4	19°15.3	-3.8	61.3
2	208°55.5	-22°50.1	14°20.8	3.4	19°11.5	-3.9	61.3
3	223°55.2	-22°49.9	28°43.3	3.5	19°07.5	-4.1	61.2
4	238°54.9	-22°49.6	43°05.8	3.6	19°03.3	-4.2	61.2
5	253°54.6	-22°49.4	57°28.4	3.6	18°59.0	-4.4	61.2
6	268°54.3	-22°49.1	71°51.0	3.7	18°54.6	-4.5	61.2
7	283°54.1	-22°48.9	86°13.8	3.7	18°50.1	-4.6	61.2
8	298°53.8	-22°48.7	100°36.5	3.8	18°45.4	-4.8	61.1
9	313°53.5	-22°48.4	114°59.3	3.9	18°40.5	-4.9	61.1
10	328°53.2	-22°48.2	129°22.2	3.9	18°35.6	-5.0	61.1
11	343°52.9	-22°47.9	143°45.2	4.0	18°30.5	-5.2	61.1
12	358°52.6	-22°47.7	158°08.2	4.1	18°25.2	-5.3	61.1
13	13°52.3	-22°47.4	172°31.4	4.1	18°19.9	-5.4	61.0
14	28°52.1	-22°47.2	186°54.5	4.2	18°14.4	-5.6	61.0
15	43°51.8	-22°46.9	201°17.8	4.3	18°08.8	-5.7	61.0
16	58°51.5	-22°46.7	215°41.1	4.4	18°03.0	-5.8	61.0
17	73°51.2	-22°46.4	230°04.5	4.4	17°57.1	-5.9	60.9
18	88°50.9	-22°46.2	244°28.0	4.5	17°51.1	-6.1	60.9
19	103°50.6	-22°45.9	258°51.5	4.6	17°45.0	-6.2	60.9
20	118°50.3	-22°45.7	273°15.2	4.7	17°38.8	-6.3	60.9
21	133°50.1	-22°45.4	287°38.9	4.8	17°32.4	-6.4	60.8
22	148°49.8	-22°45.1	302°02.7	4.8	17°25.9	-6.5	60.8
23	163°49.5	-22°44.9	316°26.6	4.9	17°19.3	-6.7	60.8
	SD.=16.3	d=0.2	S.D.=16.7				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:23	10:39	–:–	–:–	13:29	15:46
70	08:04	09:48	–:–	–:–	14:21	16:04
68	07:49	09:16	–:–	–:–	14:53	16:19
66	07:37	08:52	10:26	13:43	15:16	16:32
64	07:26	08:34	09:48	14:20	15:35	16:42
62	07:17	08:18	09:22	14:46	15:50	16:51
60	07:09	08:05	09:02	15:07	16:03	16:59
58	07:02	07:54	08:45	15:23	16:14	17:06
56	06:55	07:44	08:31	15:37	16:24	17:13
54	06:50	07:35	08:19	15:50	16:33	17:19
52	06:44	07:28	08:08	16:00	16:41	17:24
50	06:39	07:20	07:58	16:10	16:48	17:29
45	06:28	07:05	07:38	16:30	17:04	17:41
40	06:18	06:52	07:22	16:46	17:17	17:51
35	06:09	06:40	07:08	17:00	17:28	17:60
30	06:00	06:30	06:56	17:12	17:38	18:08
20	05:44	06:12	06:35	17:33	17:57	18:24
10	05:28	05:55	06:17	17:51	18:14	18:40
0	05:12	05:38	06:00	18:08	18:30	18:56
-10	04:53	05:20	05:43	18:25	18:48	19:15
-20	04:31	05:00	05:25	18:43	19:08	19:37
-30	04:03	04:36	05:03	19:05	19:32	20:05
-35	03:44	04:21	04:50	19:18	19:47	20:23
-40	03:22	04:03	04:36	19:32	20:05	20:46
-45	02:52	03:41	04:18	19:50	20:27	21:15
-50	02:09	03:12	03:56	20:11	20:55	21:58
-52	01:43	02:58	03:46	20:22	21:10	22:24
-54	01:04	02:41	03:34	20:34	21:27	23:02
-56	–:–	02:19	03:20	20:47	21:48	–:–
-58	–:–	01:52	03:04	21:03	22:15	–:–
-60	–:–	01:09	02:45	21:23	22:56	–:–

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	–:–	–:–	–:–	–:–	–:–
70	12:08	13:15	15:25	10:38	11:45	11:47
68	13:19	14:26	16:06	09:27	10:34	11:05
66	13:56	15:03	16:34	08:50	09:57	10:37
64	14:22	15:29	16:55	08:24	09:31	10:15
62	14:43	15:49	17:12	08:04	09:10	09:57
60	14:60	16:06	17:26	07:47	08:53	09:43
58	15:14	16:20	17:38	07:33	08:39	09:30
56	15:26	16:32	17:49	07:21	08:27	09:19
54	15:37	16:43	17:58	07:10	08:16	09:10
52	15:46	16:52	18:06	07:01	08:07	09:01
50	15:55	17:00	18:14	06:53	07:58	08:54
45	16:13	17:18	18:29	06:35	07:40	08:37
40	16:27	17:33	18:42	06:20	07:26	08:24
35	16:40	17:45	18:53	06:08	07:13	08:12
30	16:51	17:56	19:03	05:57	07:02	08:02
20	17:10	18:14	19:19	05:39	06:43	07:45
10	17:26	18:30	19:34	05:23	06:27	07:29
0	17:41	18:45	19:47	05:08	06:12	07:15
-10	17:57	19:00	20:01	04:53	05:56	07:01
-20	18:13	19:16	20:15	04:37	05:40	06:45
-30	18:32	19:35	20:31	04:18	05:21	06:27
-35	18:43	19:45	20:41	04:07	05:10	06:17
-40	18:56	19:58	20:52	03:55	04:57	06:05
-45	19:11	20:12	21:04	03:41	04:42	05:51
-50	19:29	20:30	21:20	03:23	04:24	05:34
-52	19:38	20:38	21:27	03:15	04:15	05:26
-54	19:48	20:48	21:35	03:05	04:05	05:16
-56	19:59	20:58	21:44	02:55	03:54	05:06
-58	20:11	21:10	21:54	02:43	03:41	04:55
-60	20:26	21:24	22:05	02:29	03:27	04:41

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
1	03:20	03:34	12:03	23:56	11:24	14(99%)
2	03:48	04:02	12:04	01:00	12:28	15(100%)
3	04:16	04:30	12:04	01:00	13:31	16(97%)

January 04, 05 ,06 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	103°33.2	180°07.7	-23°26.8	239°43.1	-15°47.5	238°16.4	-16°01.2	191°40.1	-22°31.8
1	118°35.7	195°06.7	-23°26.6	254°44.0	-15°48.0	253°18.5	-16°01.3	206°42.3	-22°31.8
2	133°38.1	210°05.8	-23°26.4	269°44.9	-15°48.4	268°20.5	-16°01.4	221°44.4	-22°31.8
3	148°40.6	225°04.8	-23°26.2	284°45.8	-15°48.9	283°22.6	-16°01.5	236°46.6	-22°31.8
4	163°43.1	240°03.9	-23°25.9	299°46.8	-15°49.4	298°24.6	-16°01.6	251°48.7	-22°31.8
5	178°45.5	255°02.9	-23°25.7	314°47.7	-15°49.8	313°26.7	-16°01.8	266°50.9	-22°31.8
6	193°48.0	270°02.0	-23°25.5	329°48.6	-15°50.3	328°28.7	-16°01.9	281°53.0	-22°31.8
7	208°50.5	285°01.0	-23°25.3	344°49.5	-15°50.8	343°30.8	-16°02.0	296°55.2	-22°31.8
8	223°52.9	300°00.0	-23°25.1	359°50.4	-15°51.2	358°32.9	-16°02.1	311°57.3	-22°31.8
9	238°55.4	314°59.1	-23°24.9	14°51.3	-15°51.7	13°34.9	-16°02.2	326°59.5	-22°31.7
10	253°57.8	329°58.1	-23°24.7	29°52.3	-15°52.1	28°37.0	-16°02.3	342°01.6	-22°31.7
11	269°00.3	344°57.2	-23°24.5	44°53.2	-15°52.6	43°39.0	-16°02.4	357°03.8	-22°31.7
12	284°02.8	359°56.2	-23°24.3	59°54.1	-15°53.1	58°41.1	-16°02.5	12°05.9	-22°31.7
13	299°05.2	14°55.3	-23°24.1	74°55.0	-15°53.5	73°43.1	-16°02.6	27°08.1	-22°31.7
14	314°07.7	29°54.3	-23°23.8	89°55.9	-15°54.0	88°45.2	-16°02.7	42°10.2	-22°31.7
15	329°10.2	44°53.3	-23°23.6	104°56.8	-15°54.4	103°47.2	-16°02.9	57°12.4	-22°31.7
16	344°12.6	59°52.4	-23°23.4	119°57.8	-15°54.9	118°49.3	-16°03.0	72°14.5	-22°31.7
17	359°15.1	74°51.4	-23°23.2	134°58.7	-15°55.4	133°51.4	-16°03.1	87°16.7	-22°31.7
18	14°17.6	89°50.5	-23°23.0	149°59.6	-15°55.8	148°53.4	-16°03.2	102°18.8	-22°31.7
19	29°20.0	104°49.5	-23°22.7	165°00.5	-15°56.3	163°55.5	-16°03.3	117°21.0	-22°31.7
20	44°22.5	119°48.6	-23°22.5	180°01.4	-15°56.7	178°57.5	-16°03.4	132°23.1	-22°31.7
21	59°24.9	134°47.6	-23°22.3	195°02.3	-15°57.2	193°59.6	-16°03.5	147°25.3	-22°31.7
22	74°27.4	149°46.7	-23°22.1	210°03.3	-15°57.7	209°01.6	-16°03.6	162°27.4	-22°31.7
23	89°29.9	164°45.7	-23°21.8	225°04.2	-15°58.1	224°03.7	-16°03.7	177°29.6	-22°31.7
Mer.pass.:17:02		v-1.0 d0.2 m-3.8		v0.9 d-0.5 m1.5		v2.1 d-0.1 m-1.7		v2.1 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	104°32.3	179°44.7	-23°21.6	240°05.1	-15°58.6	239°05.8	-16°03.8	192°31.7	-22°31.7
1	119°34.8	194°43.8	-23°21.4	255°06.0	-15°59.0	254°07.8	-16°04.0	207°33.9	-22°31.7
2	134°37.3	209°42.8	-23°21.1	270°06.9	-15°59.5	269°09.9	-16°04.1	222°36.0	-22°31.7
3	149°39.7	224°41.9	-23°20.9	285°07.8	-15°60.0	284°11.9	-16°04.2	237°38.2	-22°31.7
4	164°42.2	239°40.9	-23°20.7	300°08.8	-16°00.4	299°14.0	-16°04.3	252°40.3	-22°31.7
5	179°44.7	254°40.0	-23°20.4	315°09.7	-16°00.9	314°16.1	-16°04.4	267°42.5	-22°31.7
6	194°47.1	269°39.0	-23°20.2	330°10.6	-16°01.3	329°18.1	-16°04.5	282°44.6	-22°31.7
7	209°49.6	284°38.1	-23°20.0	345°11.5	-16°01.8	344°20.2	-16°04.6	297°46.8	-22°31.7
8	224°52.1	299°37.1	-23°19.7	0°12.4	-16°02.2	359°22.2	-16°04.7	312°48.9	-22°31.7
9	239°54.5	314°36.2	-23°19.5	15°13.3	-16°02.7	14°24.3	-16°04.8	327°51.1	-22°31.7
10	254°57.0	329°35.2	-23°19.2	30°14.3	-16°03.2	29°26.3	-16°04.9	342°53.2	-22°31.7
11	269°59.4	344°34.3	-23°19.0	45°15.2	-16°03.6	44°28.4	-16°05.0	357°55.4	-22°31.7
12	285°01.9	359°33.3	-23°18.8	60°16.1	-16°04.1	59°30.5	-16°05.1	12°57.5	-22°31.7
13	300°04.4	14°32.4	-23°18.5	75°17.0	-16°04.5	74°32.5	-16°05.3	27°59.7	-22°31.7
14	315°06.8	29°31.4	-23°18.3	90°17.9	-16°05.0	89°34.6	-16°05.4	43°01.8	-22°31.7
15	330°09.3	44°30.5	-23°18.0	105°18.8	-16°05.4	104°36.6	-16°05.5	58°04.0	-22°31.7
16	345°11.8	59°29.5	-23°17.8	120°19.7	-16°05.9	119°38.7	-16°05.6	73°06.1	-22°31.7
17	0°14.2	74°28.6	-23°17.5	135°20.7	-16°06.3	134°40.8	-16°05.7	88°08.3	-22°31.7
18	15°16.7	89°27.6	-23°17.3	150°21.6	-16°06.8	149°42.8	-16°05.8	103°10.4	-22°31.7
19	30°19.2	104°26.7	-23°17.0	165°22.5	-16°07.3	164°44.9	-16°05.9	118°12.6	-22°31.7
20	45°21.6	119°25.7	-23°16.8	180°23.4	-16°07.7	179°47.0	-16°06.0	133°14.7	-22°31.7
21	60°24.1	134°24.8	-23°16.5	195°24.3	-16°08.2	194°49.0	-16°06.1	148°16.9	-22°31.7
22	75°26.6	149°23.8	-23°16.2	210°25.2	-16°08.6	209°51.1	-16°06.2	163°19.0	-22°31.7
23	90°29.0	164°22.9	-23°16.0	225°26.2	-16°09.1	224°53.1	-16°06.3	178°21.2	-22°31.7
Mer.pass.:16:59		v-1.0 d0.2 m-3.8		v0.9 d-0.5 m1.5		v2.1 d-0.1 m-1.7		v2.1 d0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	105°31.5	179°21.9	-23°15.7	240°27.1	-16°09.5	239°55.2	-16°06.4	193°23.3	-22°31.7
1	120°33.9	194°21.0	-23°15.5	255°28.0	-16°10.0	254°57.3	-16°06.5	208°25.5	-22°31.7
2	135°36.4	209°20.0	-23°15.2	270°28.9	-16°10.4	269°59.3	-16°06.7	223°27.6	-22°31.7
3	150°38.9	224°19.1	-23°14.9	285°29.8	-16°10.9	285°01.4	-16°06.8	238°29.8	-22°31.7
4	165°41.3	239°18.1	-23°14.7	300°30.7	-16°11.3	300°03.5	-16°06.9	253°31.9	-22°31.7
5	180°43.8	254°17.2	-23°14.4	315°31.6	-16°11.8	315°05.5	-16°07.0	268°34.1	-22°31.7
6	195°46.3	269°16.2	-23°14.1	330°32.5	-16°12.2	330°07.6	-16°07.1	283°36.2	-22°31.7
7	210°48.7	284°15.3	-23°13.9	345°33.5	-16°12.7	345°09.6	-16°07.2	298°38.4	-22°31.7
8	225°51.2	299°14.3	-23°13.6	0°34.4	-16°13.1	0°11.7	-16°07.3	313°40.5	-22°31.6
9	240°53.7	314°13.4	-23°13.3	15°35.3	-16°13.6	15°13.8	-16°07.4	328°42.7	-22°31.6
10	255°56.1	329°12.4	-23°13.1	30°36.2	-16°14.0	30°15.8	-16°07.5	343°44.8	-22°31.6
11	270°58.6	344°11.5	-23°12.8	45°37.1	-16°14.5	45°17.9	-16°07.6	358°47.0	-22°31.6
12	286°01.0	359°10.5	-23°12.5	60°38.0	-16°15.0	60°20.0	-16°07.7	13°49.1	-22°31.6
13	301°03.5	14°09.6	-23°12.2	75°38.9	-16°15.4	75°22.0	-16°07.8	28°51.3	-22°31.6
14	316°06.0	29°08.6	-23°12.0	90°39.9	-16°15.9	90°24.1	-16°07.9	43°53.4	-22°31.6
15	331°08.4	44°07.7	-23°11.7	105°40.8	-16°16.3	105°26.2	-16°08.0	58°55.6	-22°31.6
16	346°10.9	59°06.8	-23°11.4	120°41.7	-16°16.8	120°28.2	-16°08.2	73°57.7	-22°31.6
17	1°13.4	74°05.8	-23°11.1	135°42.6	-16°17.2	135°30.3	-16°08.3	88°59.9	-22°31.6
18	16°15.8	89°04.9	-23°10.8	150°43.5	-16°17.7	150°32.3	-16°08.4	104°02.0	-22°31.6
19	31°18.3	104°03.9	-23°10.6	165°44.4	-16°18.1	165°34.4	-16°08.5	119°04.2	-22°31.6
20	46°20.8	119°03.0	-23°10.3	180°45.3	-16°18.6	180°36.5	-16°08.6	134°06.3	-22°31.6
21	61°23.2	134°02.0	-23°10.0	195°46.2	-16°19.0	195°38.5	-16°08.7	149°08.5	-22°31.6
22	76°25.7	149°01.1	-23°09.7	210°47.2	-16°19.5	210°40.6	-16°08.8	164°10.6	-22°31.6
23	91°28.2	164°00.1	-23°09.4	225°48.1	-16°19.9	225°42.7	-16°08.9	179°12.8	-22°31.6
Mer.pass.:16:55		v-0.9 d0.3 m-3.8		v0.9 d-0.5 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.5
Ankaa	353°12.7	-42°12.8
Schedar	349°36.9	56°38.3
Diphda	348°52.7	-17°53.5
Achernar	335°24.4	-57°09.2
Hamal	327°57.2	23°32.8
Polaris	316°07.8	89°20.6
Akamar	315°15.8	-40°14.3
Menkar	314°11.6	4°09.4
Mirfak	308°35.6	49°55.5
Aldebaran	290°45.5	16°32.6
Rigel	281°08.8	-8°11.1
Capella	280°29.4	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°42.9	-1°11.7
Betelgeuse	270°57.6	7°24.4
Canopus	263°54.2	-52°42.5
Sirius	258°30.6	-16°44.5
Adara	255°09.7	-28°60.0
Procyon	244°56.1	5°10.7
Pollux	243°23.5	27°58.7
Avior	234°16.1	-59°34.0
Suhail	222°49.7	-43°30.3
Miaplacidus	221°38.1	-69°47.3
Alphard	217°52.8	-8°44.3
Regulus	207°40.0	11°52.6
Dubhe	193°47.7	61°39.0
Denebola	182°30.4	14°28.2
Gienah	175°49.0	-17°38.4
Acrux	173°05.7	-63°11.5
Gacrux	171°57.3	-57°12.5
Alioth	166°18.1	55°51.5
Spica	158°28.0	-11°15.1
Alcaid	152°56.6	49°13.3
Hadar	148°43.6	-60°27.2
Menkent	148°04.0	-36°27.2
Arcturus	145°52.9	19°05.6
Rigil Kent.	139°47.8	-60°54.1
Zubenelg.	137°02.2	-16°06.8
Kochab	137°20.8	74°04.8
Alphecca	126°08.7	26°39.3
Antares	112°22.8	-26°28.0
Atria	107°22.3	-69°03.2
Sabik	102°09.3	-15°44.6
Shaula	96°18.1	-37°06.7
Rasalhague	96°03.9	12°33.0
Etamin	90°45.2	51°29.3
Kaus Aust.	83°40.1	-34°22.3
Vega	80°37.3	38°48.1
Nunki	75°54.9	-26°16.3
Altair	62°05.6	8°55.0
Peacock	53°15.0	-56°40.6
Deneb	49°29.8	45°20.8
Enif	33°44.4	9°57.5
Alnair	27°40.3	-46°52.6
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.9
Markab	13°35.4	15°18.2

2018/1/4	**SHA**	**Mer.pass**
Venus	76°34.5	12:00
Mars	136°09.9	08:01
Jupiter	134°43.2	08:06
Saturn	88°06.9	11:12

2018/1/5	**SHA**	**Mer.pass**
Venus	75°12.4	12:02
Mars	135°32.8	07:59
Jupiter	134°33.4	08:03
Saturn	87°59.4	11:08

2018/1/6	**SHA**	**Mer.pass**
Venus	73°50.4	12:03
Mars	134°55.6	07:58
Jupiter	134°23.7	07:59
Saturn	87°51.8	11:05

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°49.2	-22°44.6	330°50.5	5.0	17°12.6	-6.8	60.8
1	193°48.9	-22°44.4	345°14.6	5.1	17°05.8	-6.9	60.7
2	208°48.6	-22°44.1	359°38.7	5.2	16°58.8	-7.0	60.7
3	223°48.4	-22°43.9	14°02.9	5.3	16°51.8	-7.1	60.7
4	238°48.1	-22°43.6	28°27.2	5.3	16°44.6	-7.2	60.6
5	253°47.8	-22°43.3	42°51.6	5.4	16°37.3	-7.3	60.6
6	268°47.5	-22°43.1	57°16.1	5.5	16°29.9	-7.4	60.6
7	283°47.2	-22°42.8	71°40.7	5.6	16°22.5	-7.5	60.6
8	298°46.9	-22°42.5	86°05.3	5.7	16°14.9	-7.6	60.5
9	313°46.7	-22°42.3	100°30.1	5.8	16°07.2	-7.7	60.5
10	328°46.4	-22°42.0	114°54.9	5.9	15°59.4	-7.8	60.5
11	343°46.1	-22°41.8	129°19.9	6.0	15°51.5	-7.9	60.4
12	358°45.8	-22°41.5	143°44.9	6.1	15°43.5	-8.0	60.4
13	13°45.5	-22°41.2	158°10.0	6.2	15°35.4	-8.1	60.4
14	28°45.3	-22°40.9	172°35.2	6.3	15°27.2	-8.2	60.3
15	43°45.0	-22°40.7	187°00.5	6.3	15°18.9	-8.3	60.3
16	58°44.7	-22°40.4	201°25.9	6.4	15°10.5	-8.4	60.3
17	73°44.4	-22°40.1	215°51.4	6.5	15°02.1	-8.5	60.2
18	88°44.1	-22°39.9	230°16.9	6.6	14°53.5	-8.6	60.2
19	103°43.9	-22°39.6	244°42.6	6.7	14°44.9	-8.7	60.2
20	118°43.6	-22°39.3	259°08.4	6.8	14°36.1	-8.8	60.1
21	133°43.3	-22°39.0	273°34.2	6.9	14°27.3	-8.9	60.1
22	148°43.0	-22°38.8	288°00.2	7.0	14°18.4	-8.9	60.1
23	163°42.7	-22°38.5	302°26.2	7.1	14°09.5	-9.0	60.0
	SD.=16.3	d=0.3			S.D.=16.6		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°42.5	-22°38.2	316°52.4	7.2	14°00.4	-9.1	60.0
1	193°42.2	-22°37.9	331°18.6	7.3	13°51.3	-9.2	60.0
2	208°41.9	-22°37.7	345°45.0	7.4	13°42.1	-9.2	59.9
3	223°41.6	-22°37.4	0°11.4	7.5	13°32.8	-9.3	59.9
4	238°41.3	-22°37.1	14°37.9	7.6	13°23.4	-9.4	59.8
5	253°41.1	-22°36.8	29°04.5	7.7	13°14.0	-9.5	59.8
6	268°40.8	-22°36.6	43°31.2	7.8	13°04.5	-9.5	59.8
7	283°40.5	-22°36.3	57°58.0	7.8	12°54.9	-9.6	59.7
8	298°40.2	-22°36.0	72°24.9	7.9	12°45.3	-9.7	59.7
9	313°39.9	-22°35.7	86°51.9	8.0	12°35.6	-9.7	59.7
10	328°39.7	-22°35.4	101°19.0	8.1	12°25.8	-9.8	59.6
11	343°39.4	-22°35.1	115°46.2	8.2	12°16.0	-9.9	59.6
12	358°39.1	-22°34.9	130°13.4	8.3	12°06.1	-9.9	59.5
13	13°38.8	-22°34.6	144°40.8	8.4	11°56.1	-10.0	59.5
14	28°38.6	-22°34.3	159°08.2	8.5	11°46.1	-10.0	59.5
15	43°38.3	-22°34.0	173°35.8	8.6	11°36.1	-10.1	59.4
16	58°38.0	-22°33.7	188°03.4	8.7	11°25.9	-10.1	59.4
17	73°37.7	-22°33.4	202°31.1	8.8	11°15.8	-10.2	59.3
18	88°37.5	-22°33.1	216°58.9	8.9	11°05.5	-10.3	59.3
19	103°37.2	-22°32.8	231°26.8	8.9	10°55.3	-10.3	59.3
20	118°36.9	-22°32.5	245°54.8	9.0	10°44.9	-10.4	59.2
21	133°36.6	-22°32.2	260°22.9	9.1	10°34.6	-10.4	59.2
22	148°36.4	-22°32.0	274°51.0	9.2	10°24.1	-10.4	59.1
23	163°36.1	-22°31.7	289°19.3	9.3	10°13.7	-10.5	59.1
	SD.=16.3	d=0.3			S.D.=16.4		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°35.8	-22°31.4	303°47.6	9.4	10°03.1	-10.5	59.1
1	193°35.5	-22°31.1	318°16.1	9.5	9°52.6	-10.6	59.0
2	208°35.3	-22°30.8	332°44.6	9.6	9°42.0	-10.6	59.0
3	223°35.0	-22°30.5	347°13.2	9.6	9°31.4	-10.7	58.9
4	238°34.7	-22°30.2	1°41.8	9.7	9°20.7	-10.7	58.9
5	253°34.4	-22°29.9	16°10.6	9.8	9°10.0	-10.7	58.9
6	268°34.2	-22°29.6	30°39.4	9.9	8°59.2	-10.8	58.8
7	283°33.9	-22°29.3	45°08.4	10.0	8°48.4	-10.8	58.8
8	298°33.6	-22°29.0	59°37.4	10.0	8°37.6	-10.8	58.7
9	313°33.3	-22°28.7	74°06.5	10.1	8°26.8	-10.9	58.7
10	328°33.1	-22°28.4	88°35.6	10.2	8°15.9	-10.9	58.7
11	343°32.8	-22°28.1	103°04.9	10.3	8°05.0	-10.9	58.6
12	358°32.5	-22°27.8	117°34.2	10.4	7°54.0	-11.0	58.6
13	13°32.2	-22°27.5	132°03.6	10.4	7°43.1	-11.0	58.5
14	28°32.0	-22°27.2	146°33.1	10.5	7°32.1	-11.0	58.5
15	43°31.7	-22°26.9	161°02.7	10.6	7°21.1	-11.0	58.5
16	58°31.4	-22°26.5	175°32.3	10.7	7°10.0	-11.1	58.4
17	73°31.2	-22°26.2	190°02.0	10.7	6°59.0	-11.1	58.4
18	88°30.9	-22°25.9	204°31.8	10.8	6°47.9	-11.1	58.3
19	103°30.6	-22°25.6	219°01.6	10.9	6°36.8	-11.1	58.3
20	118°30.3	-22°25.3	233°31.6	11.0	6°25.6	-11.1	58.2
21	133°30.1	-22°25.0	248°01.6	11.0	6°14.5	-11.1	58.2
22	148°29.8	-22°24.7	262°31.6	11.1	6°03.3	-11.2	58.2
23	163°29.5	-22°24.4	277°01.8	11.2	5°52.2	-11.2	58.1
	SD.=16.3	d=0.3			S.D.=16.1		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:19	10:30	–:–	–:–	13:42	15:52
70	08:01	09:43	–:–	–:–	14:29	16:10
68	07:47	09:12	11:29	12:42	14:59	16:24
66	07:35	08:49	10:20	13:51	15:22	16:36
64	07:25	08:31	09:45	14:27	15:40	16:46
62	07:16	08:17	09:19	14:52	15:55	16:55
60	07:08	08:04	08:60	15:12	16:07	17:03
58	07:01	07:53	08:43	15:28	16:18	17:10
56	06:55	07:43	08:30	15:41	16:28	17:16
54	06:49	07:35	08:18	15:53	16:36	17:22
52	06:44	07:27	08:07	16:04	16:44	17:27
50	06:39	07:20	07:58	16:13	16:51	17:32
45	06:28	07:05	07:38	16:33	17:06	17:43
40	06:18	06:52	07:22	16:49	17:19	17:53
35	06:09	06:41	07:08	17:02	17:30	18:02
30	06:01	06:30	06:57	17:14	17:40	18:10
20	05:45	06:12	06:36	17:35	17:58	18:26
10	05:30	05:56	06:18	17:52	18:15	18:41
0	05:13	05:39	06:02	18:09	18:31	18:58
-10	04:55	05:22	05:45	18:26	18:49	19:16
-20	04:33	05:02	05:26	18:44	19:09	19:38
-30	04:05	04:38	05:05	19:05	19:32	20:05
-35	03:47	04:23	04:53	19:18	19:47	20:23
-40	03:25	04:06	04:38	19:32	20:04	20:45
-45	02:56	03:44	04:21	19:49	20:26	21:14
-50	02:14	03:16	03:60	20:11	20:54	21:56
-52	01:49	03:02	03:49	20:21	21:08	22:20
-54	01:13	02:45	03:38	20:32	21:25	22:56
-56	–:–	02:25	03:24	20:46	21:45	–:–
-58	–:–	01:58	03:09	21:01	22:11	–:–
-60	–:–	01:19	02:50	21:20	22:49	–:–

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	16:57	19:12	21:12	12:21	12:02	11:49
70	17:32	19:30	21:21	11:45	11:41	11:38
68	17:56	19:45	21:28	11:19	11:25	11:28
66	18:15	19:57	21:35	10:59	11:12	11:21
64	18:30	20:07	21:40	10:43	11:01	11:14
62	18:43	20:15	21:44	10:30	10:52	11:08
60	18:54	20:22	21:48	10:18	10:44	11:03
58	19:03	20:28	21:51	10:08	10:37	10:59
56	19:11	20:34	21:54	09:60	10:30	10:55
54	19:18	20:39	21:57	09:52	10:25	10:52
52	19:25	20:43	21:60	09:45	10:20	10:48
50	19:31	20:47	22:02	09:38	10:15	10:45
45	19:43	20:56	22:07	09:25	10:05	10:39
40	19:54	21:03	22:11	09:14	09:56	10:34
35	20:02	21:10	22:14	09:04	09:49	10:29
30	20:10	21:15	22:17	08:55	09:43	10:25
20	20:23	21:25	22:22	08:41	09:32	10:18
10	20:35	21:33	22:27	08:28	09:22	10:11
0	20:46	21:41	22:31	08:16	09:12	10:05
-10	20:57	21:48	22:36	08:03	09:03	09:59
-20	21:08	21:56	22:40	07:50	08:53	09:53
-30	21:21	22:06	22:46	07:35	08:41	09:45
-35	21:29	22:11	22:49	07:26	08:35	09:41
-40	21:38	22:17	22:52	07:16	08:27	09:36
-45	21:48	22:24	22:56	07:04	08:18	09:30
-50	21:60	22:33	23:01	06:50	08:07	09:23
-52	22:05	22:37	23:03	06:43	08:02	09:20
-54	22:12	22:41	23:05	06:35	07:56	09:16
-56	22:19	22:46	23:08	06:27	07:50	09:12
-58	22:26	22:51	23:11	06:17	07:43	09:08
-60	22:35	22:57	23:14	06:06	07:35	09:03

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
4	04:43	04:57	12:04	02:01	14:30	17(92%)
5	05:10	05:24	12:05	02:59	15:26	18(84%)
6	05:37	05:50	12:05	03:52	16:18	19(75%)

January 07, 08 ,09 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	106°30.6	178°59.2	-23°09.1	240°49.0	-16°20.4	240°44.7	-16°09.0	194°14.9	-22°31.6
1	121°33.1	193°58.3	-23°08.8	255°49.9	-16°20.8	255°46.8	-16°09.1	209°17.1	-22°31.6
2	136°35.5	208°57.3	-23°08.5	270°50.8	-16°21.3	270°48.9	-16°09.2	224°19.2	-22°31.6
3	151°38.0	223°56.4	-23°08.3	285°51.7	-16°21.7	285°50.9	-16°09.3	239°21.4	-22°31.6
4	166°40.5	238°55.4	-23°08.0	300°52.6	-16°22.1	300°53.0	-16°09.4	254°23.5	-22°31.6
5	181°42.9	253°54.5	-23°07.7	315°53.5	-16°22.6	315°55.1	-16°09.5	269°25.7	-22°31.6
6	196°45.4	268°53.6	-23°07.4	330°54.4	-16°23.0	330°57.1	-16°09.6	284°27.8	-22°31.6
7	211°47.9	283°52.6	-23°07.1	345°55.4	-16°23.5	345°59.2	-16°09.7	299°30.0	-22°31.6
8	226°50.3	298°51.7	-23°06.8	0°56.3	-16°23.9	1°01.3	-16°09.8	314°32.1	-22°31.6
9	241°52.8	313°50.7	-23°06.5	15°57.2	-16°24.4	16°03.3	-16°10.0	329°34.3	-22°31.6
10	256°55.3	328°49.8	-23°06.2	30°58.1	-16°24.8	31°05.4	-16°10.1	344°36.4	-22°31.6
11	271°57.7	343°48.8	-23°05.9	45°59.0	-16°25.3	46°07.5	-16°10.2	359°38.6	-22°31.6
12	287°00.2	358°47.9	-23°05.6	60°59.9	-16°25.7	61°09.5	-16°10.3	14°40.8	-22°31.6
13	302°02.7	13°47.0	-23°05.3	76°00.8	-16°26.2	76°11.6	-16°10.4	29°42.9	-22°31.6
14	317°05.1	28°46.0	-23°05.0	91°01.7	-16°26.6	91°13.7	-16°10.5	44°45.1	-22°31.6
15	332°07.6	43°45.1	-23°04.6	106°02.6	-16°27.1	106°15.8	-16°10.6	59°47.2	-22°31.6
16	347°10.0	58°44.2	-23°04.3	121°03.6	-16°27.5	121°17.8	-16°10.7	74°49.4	-22°31.6
17	2°12.5	73°43.2	-23°04.0	136°04.5	-16°28.0	136°19.9	-16°10.8	89°51.5	-22°31.6
18	17°15.0	88°42.3	-23°03.7	151°05.4	-16°28.4	151°22.0	-16°10.9	104°53.7	-22°31.6
19	32°17.4	103°41.3	-23°03.4	166°06.3	-16°28.9	166°24.0	-16°11.0	119°55.8	-22°31.6
20	47°19.9	118°40.4	-23°03.1	181°07.2	-16°29.3	181°26.1	-16°11.1	134°58.0	-22°31.6
21	62°22.4	133°39.5	-23°02.8	196°08.1	-16°29.7	196°28.2	-16°11.2	150°00.1	-22°31.6
22	77°24.8	148°38.5	-23°02.5	211°09.0	-16°30.2	211°30.2	-16°11.3	165°02.3	-22°31.5
23	92°27.3	163°37.6	-23°02.1	226°09.9	-16°30.6	226°32.3	-16°11.4	180°04.4	-22°31.5
Mer.pass.:16:51		v-0.9 d0.3 m-3.8		v0.9 d-0.4 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	107°29.8	178°36.6	-23°01.8	241°10.8	-16°31.1	241°34.4	-16°11.5	195°06.6	-22°31.5
1	122°32.2	193°35.7	-23°01.5	256°11.7	-16°31.5	256°36.5	-16°11.6	210°08.7	-22°31.5
2	137°34.7	208°34.8	-23°01.2	271°12.7	-16°32.0	271°38.5	-16°11.7	225°10.9	-22°31.5
3	152°37.1	223°33.8	-23°00.9	286°13.6	-16°32.4	286°40.6	-16°11.8	240°13.0	-22°31.5
4	167°39.6	238°32.9	-23°00.5	301°14.5	-16°32.9	301°42.7	-16°11.9	255°15.2	-22°31.5
5	182°42.1	253°32.0	-23°00.2	316°15.4	-16°33.3	316°44.7	-16°12.0	270°17.3	-22°31.5
6	197°44.5	268°31.0	-22°59.9	331°16.3	-16°33.7	331°46.8	-16°12.1	285°19.5	-22°31.5
7	212°47.0	283°30.1	-22°59.6	346°17.2	-16°34.2	346°48.9	-16°12.3	300°21.6	-22°31.5
8	227°49.5	298°29.2	-22°59.2	1°18.1	-16°34.6	1°50.9	-16°12.4	315°23.8	-22°31.5
9	242°51.9	313°28.2	-22°58.9	16°19.0	-16°35.1	16°53.0	-16°12.5	330°25.9	-22°31.5
10	257°54.4	328°27.3	-22°58.6	31°19.9	-16°35.5	31°55.1	-16°12.6	345°28.1	-22°31.5
11	272°56.9	343°26.4	-22°58.2	46°20.8	-16°35.9	46°57.2	-16°12.7	0°30.3	-22°31.5
12	287°59.3	358°25.4	-22°57.9	61°21.7	-16°36.4	61°59.2	-16°12.8	15°32.4	-22°31.5
13	303°01.8	13°24.5	-22°57.6	76°22.7	-16°36.8	77°01.3	-16°12.9	30°34.6	-22°31.5
14	318°04.3	28°23.6	-22°57.2	91°23.6	-16°37.3	92°03.4	-16°13.0	45°36.7	-22°31.5
15	333°06.7	43°22.6	-22°56.9	106°24.5	-16°37.7	107°05.5	-16°13.1	60°38.9	-22°31.5
16	348°09.2	58°21.7	-22°56.6	121°25.4	-16°38.2	122°07.5	-16°13.2	75°41.0	-22°31.5
17	3°11.6	73°20.8	-22°56.2	136°26.3	-16°38.6	137°09.6	-16°13.3	90°43.2	-22°31.5
18	18°14.1	88°19.8	-22°55.9	151°27.2	-16°39.0	152°11.7	-16°13.4	105°45.3	-22°31.5
19	33°16.6	103°18.9	-22°55.5	166°28.1	-16°39.5	167°13.8	-16°13.5	120°47.5	-22°31.5
20	48°19.0	118°18.0	-22°55.2	181°29.0	-16°39.9	182°15.8	-16°13.6	135°49.6	-22°31.5
21	63°21.5	133°17.0	-22°54.8	196°29.9	-16°40.4	197°17.9	-16°13.7	150°51.8	-22°31.5
22	78°24.0	148°16.1	-22°54.5	211°30.8	-16°40.8	212°20.0	-16°13.8	165°53.9	-22°31.5
23	93°26.4	163°15.2	-22°54.2	226°31.7	-16°41.2	227°22.0	-16°13.9	180°56.1	-22°31.5
Mer.pass.:16:47		v-0.9 d0.3 m-3.8		v0.9 d-0.4 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	108°28.9	178°14.2	-22°53.8	241°32.6	-16°41.7	242°24.1	-16°14.0	195°58.2	-22°31.5
1	123°31.4	193°13.3	-22°53.5	256°33.5	-16°42.1	257°26.2	-16°14.1	211°00.4	-22°31.5
2	138°33.8	208°12.4	-22°53.1	271°34.5	-16°42.6	272°28.3	-16°14.2	226°02.5	-22°31.5
3	153°36.3	223°11.5	-22°52.8	286°35.4	-16°43.0	287°30.3	-16°14.3	241°04.7	-22°31.5
4	168°38.7	238°10.5	-22°52.4	301°36.3	-16°43.4	302°32.4	-16°14.4	256°06.8	-22°31.5
5	183°41.2	253°09.6	-22°52.0	316°37.2	-16°43.9	317°34.5	-16°14.5	271°09.0	-22°31.5
6	198°43.7	268°08.7	-22°51.7	331°38.1	-16°44.3	332°36.6	-16°14.6	286°11.2	-22°31.4
7	213°46.1	283°07.7	-22°51.3	346°39.0	-16°44.8	347°38.7	-16°14.7	301°13.3	-22°31.4
8	228°48.6	298°06.8	-22°51.0	1°39.9	-16°45.2	2°40.7	-16°14.8	316°15.5	-22°31.4
9	243°51.1	313°05.9	-22°50.6	16°40.8	-16°45.6	17°42.8	-16°14.9	331°17.6	-22°31.4
10	258°53.5	328°05.0	-22°50.3	31°41.7	-16°46.1	32°44.9	-16°15.0	346°19.8	-22°31.4
11	273°56.0	343°04.0	-22°49.9	46°42.6	-16°46.5	47°47.0	-16°15.1	1°21.9	-22°31.4
12	288°58.5	358°03.1	-22°49.5	61°43.5	-16°46.9	62°49.0	-16°15.2	16°24.1	-22°31.4
13	304°00.9	13°02.2	-22°49.2	76°44.4	-16°47.4	77°51.1	-16°15.3	31°26.2	-22°31.4
14	319°03.4	28°01.3	-22°48.8	91°45.3	-16°47.8	92°53.2	-16°15.4	46°28.4	-22°31.4
15	334°05.9	43°00.3	-22°48.4	106°46.2	-16°48.3	107°55.3	-16°15.5	61°30.5	-22°31.4
16	349°08.3	57°59.4	-22°48.1	121°47.1	-16°48.7	122°57.3	-16°15.6	76°32.7	-22°31.4
17	4°10.8	72°58.5	-22°47.7	136°48.1	-16°49.1	137°59.4	-16°15.7	91°34.8	-22°31.4
18	19°13.2	87°57.6	-22°47.3	151°49.0	-16°49.6	153°01.5	-16°15.8	106°37.0	-22°31.4
19	34°15.7	102°56.6	-22°47.0	166°49.9	-16°50.0	168°03.6	-16°15.9	121°39.2	-22°31.4
20	49°18.2	117°55.7	-22°46.6	181°50.8	-16°50.4	183°05.7	-16°16.0	136°41.3	-22°31.4
21	64°20.6	132°54.8	-22°46.2	196°51.7	-16°50.9	198°07.7	-16°16.1	151°43.5	-22°31.4
22	79°23.1	147°53.9	-22°45.8	211°52.6	-16°51.3	213°09.8	-16°16.2	166°45.6	-22°31.4
23	94°25.6	162°52.9	-22°45.5	226°53.5	-16°51.7	228°11.9	-16°16.3	181°47.8	-22°31.4
Mer.pass.:16:43		v-0.9 d0.3 m-3.8		v0.9 d-0.4 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.5
Ankaa	353°12.8	-42°12.8
Schedar	349°37.0	56°38.3
Diphda	348°52.7	-17°53.5
Achernar	335°24.5	-57°09.2
Hamal	327°57.2	23°32.8
Polaris	316°09.1	89°20.6
Akamar	315°15.8	-40°14.4
Menkar	314°11.6	4°09.4
Mirfak	308°35.6	49°55.5
Aldebaran	290°45.6	16°32.6
Rigel	281°08.8	-8°11.1
Capella	280°29.4	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°42.9	-1°11.7
Betelgeuse	270°57.6	7°24.4
Canopus	263°54.2	-52°42.6
Sirius	258°30.6	-16°44.5
Adara	255°09.7	-28°60.0
Procyon	244°56.1	5°10.7
Pollux	243°23.5	27°58.7
Avior	234°16.1	-59°34.0
Suhail	222°49.7	-43°30.3
Miaplacidus	221°38.1	-69°47.4
Alphard	217°52.8	-8°44.3
Regulus	207°40.0	11°52.6
Dubhe	193°47.7	61°39.0
Denebola	182°30.3	14°28.2
Gienah	175°49.0	-17°38.4
Acrux	173°05.6	-63°11.6
Gacrux	171°57.3	-57°12.5
Alioth	166°18.1	55°51.5
Spica	158°28.0	-11°15.1
Alcaid	152°56.6	49°13.3
Hadar	148°43.6	-60°27.2
Menkent	148°04.0	-36°27.2
Arcturus	145°52.9	19°05.6
Rigil Kent.	139°47.7	-60°54.1
Zubenelg.	137°02.1	-16°06.8
Kochab	137°20.8	74°04.7
Alphecca	126°08.7	26°39.3
Antares	112°22.7	-26°28.0
Atria	107°22.2	-69°03.2
Sabik	102°09.3	-15°44.6
Shaula	96°18.1	-37°06.7
Rasalhague	96°03.9	12°33.0
Etamin	90°45.2	51°29.3
Kaus Aust.	83°40.1	-34°22.3
Vega	80°37.3	38°48.1
Nunki	75°54.9	-26°16.3
Altair	62°05.6	8°55.0
Peacock	53°15.0	-56°40.6
Deneb	49°29.8	45°20.8
Enif	33°44.4	9°57.5
Alnair	27°40.3	-46°52.6
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.9
Markab	13°35.4	15°18.1

2018/1/7	**SHA**	**Mer.pass**
Venus	72°28.6	12:05
Mars	134°18.4	07:56
Jupiter	134°14.1	07:56
Saturn	87°44.3	11:01

2018/1/8	**SHA**	**Mer.pass**
Venus	71°06.9	12:06
Mars	133°41.1	07:55
Jupiter	134°04.6	07:53
Saturn	87°36.8	10:58

2018/1/9	**SHA**	**Mer.pass**
Venus	69°45.4	12:08
Mars	133°03.7	07:53
Jupiter	133°55.2	07:49
Saturn	87°29.3	10:55

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°29.3	-22°24.1	291°32.0	11.2	5°41.0	-11.2	58.1
1	193°29.0	-22°23.7	306°02.3	11.3	5°29.8	-11.2	58.0
2	208°28.7	-22°23.4	320°32.6	11.4	5°18.6	-11.2	58.0
3	223°28.4	-22°23.1	335°03.0	11.4	5°07.3	-11.2	58.0
4	238°28.2	-22°22.8	349°33.5	11.5	4°56.1	-11.2	57.9
5	253°27.9	-22°22.5	4°04.0	11.6	4°44.9	-11.2	57.9
6	268°27.6	-22°22.2	18°34.6	11.6	4°33.6	-11.3	57.8
7	283°27.4	-22°21.9	33°05.3	11.7	4°22.4	-11.3	57.8
8	298°27.1	-22°21.5	47°36.0	11.8	4°11.1	-11.3	57.8
9	313°26.8	-22°21.2	62°06.8	11.8	3°59.8	-11.3	57.7
10	328°26.6	-22°20.9	76°37.7	11.9	3°48.5	-11.3	57.7
11	343°26.3	-22°20.6	91°08.6	11.9	3°37.3	-11.3	57.6
12	358°26.0	-22°20.2	105°39.6	12.0	3°26.0	-11.3	57.6
13	13°25.8	-22°19.9	120°10.6	12.1	3°14.7	-11.3	57.6
14	28°25.5	-22°19.6	134°41.7	12.1	3°03.4	-11.3	57.5
15	43°25.2	-22°19.3	149°12.8	12.2	2°52.2	-11.3	57.5
16	58°25.0	-22°18.9	163°44.0	12.2	2°40.9	-11.3	57.4
17	73°24.7	-22°18.6	178°15.2	12.3	2°29.6	-11.3	57.4
18	88°24.4	-22°18.3	192°46.5	12.3	2°18.3	-11.3	57.4
19	103°24.2	-22°18.0	207°17.9	12.4	2°07.1	-11.3	57.3
20	118°23.9	-22°17.6	221°49.3	12.4	1°55.8	-11.3	57.3
21	133°23.6	-22°17.3	236°20.7	12.5	1°44.6	-11.3	57.2
22	148°23.4	-22°17.0	250°52.2	12.5	1°33.3	-11.2	57.2
23	163°23.1	-22°16.7	265°23.8	12.6	1°22.1	-11.2	57.2
	SD.=16.3	d=0.3	S.D.=15.8				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°22.8	-22°16.3	279°55.4	12.6	1°10.8	-11.2	57.1
1	193°22.6	-22°16.0	294°27.0	12.7	0°59.6	-11.2	57.1
2	208°22.3	-22°15.7	308°58.7	12.7	0°48.4	-11.2	57.1
3	223°22.0	-22°15.3	323°30.4	12.8	0°37.2	-11.2	57.0
4	238°21.8	-22°15.0	338°02.2	12.8	0°26.0	-11.2	57.0
5	253°21.5	-22°14.7	352°34.0	12.8	0°14.9	-11.2	56.9
6	268°21.2	-22°14.3	7°05.9	12.9	0°03.7	-11.2	56.9
7	283°21.0	-22°14.0	21°37.8	12.9	-0°07.4	-11.1	56.9
8	298°20.7	-22°13.6	36°09.7	13.0	-0°18.6	-11.1	56.8
9	313°20.4	-22°13.3	50°41.7	13.0	-0°29.7	-11.1	56.8
10	328°20.2	-22°13.0	65°13.7	13.0	-0°40.8	-11.1	56.8
11	343°19.9	-22°12.6	79°45.8	13.1	-0°51.9	-11.1	56.7
12	358°19.7	-22°12.3	94°17.9	13.1	-1°02.9	-11.1	56.7
13	13°19.4	-22°11.9	108°50.0	13.1	-1°14.0	-11.0	56.6
14	28°19.1	-22°11.6	123°22.2	13.2	-1°25.0	-11.0	56.6
15	43°18.9	-22°11.3	137°54.4	13.2	-1°36.0	-11.0	56.6
16	58°18.6	-22°10.9	152°26.6	13.2	-1°47.0	-11.0	56.5
17	73°18.3	-22°10.6	166°58.8	13.3	-1°57.9	-10.9	56.5
18	88°18.1	-22°10.2	181°31.1	13.3	-2°08.9	-10.9	56.5
19	103°17.8	-22°09.9	196°03.5	13.3	-2°19.8	-10.9	56.4
20	118°17.6	-22°09.5	210°35.8	13.4	-2°30.7	-10.9	56.4
21	133°17.3	-22°09.2	225°08.2	13.4	-2°41.5	-10.8	56.4
22	148°17.0	-22°08.8	239°40.6	13.4	-2°52.3	-10.8	56.3
23	163°16.8	-22°08.5	254°13.0	13.4	-3°03.2	-10.8	56.3
	SD.=16.3	d=0.3	S.D.=15.6				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°16.5	-22°08.1	268°45.5	13.5	-3°13.9	-10.8	56.3
1	193°16.3	-22°07.8	283°18.0	13.5	-3°24.7	-10.7	56.2
2	208°16.0	-22°07.4	297°50.5	13.5	-3°35.4	-10.7	56.2
3	223°15.7	-22°07.1	312°23.0	13.5	-3°46.1	-10.7	56.2
4	238°15.5	-22°06.7	326°55.6	13.6	-3°56.8	-10.7	56.1
5	253°15.2	-22°06.4	341°28.2	13.6	-4°07.4	-10.6	56.1
6	268°15.0	-22°06.0	356°00.8	13.6	-4°18.0	-10.6	56.1
7	283°14.7	-22°05.7	10°33.4	13.6	-4°28.6	-10.6	56.0
8	298°14.4	-22°05.3	25°06.0	13.6	-4°39.2	-10.5	56.0
9	313°14.2	-22°05.0	39°38.7	13.7	-4°49.7	-10.5	56.0
10	328°13.9	-22°04.6	54°11.3	13.7	-5°00.1	-10.5	55.9
11	343°13.7	-22°04.2	68°44.0	13.7	-5°10.6	-10.4	55.9
12	358°13.4	-22°03.9	83°16.7	13.7	-5°21.0	-10.4	55.9
13	13°13.2	-22°03.5	97°49.5	13.7	-5°31.4	-10.4	55.8
14	28°12.9	-22°03.2	112°22.2	13.7	-5°41.7	-10.3	55.8
15	43°12.6	-22°02.8	126°55.0	13.8	-5°52.0	-10.3	55.8
16	58°12.4	-22°02.4	141°27.7	13.8	-6°02.3	-10.2	55.8
17	73°12.1	-22°02.1	156°00.5	13.8	-6°12.5	-10.2	55.7
18	88°11.9	-22°01.7	170°33.3	13.8	-6°22.7	-10.2	55.7
19	103°11.6	-22°01.4	185°06.1	13.8	-6°32.9	-10.1	55.7
20	118°11.4	-22°01.0	199°38.9	13.8	-6°43.0	-10.1	55.6
21	133°11.1	-22°00.6	214°11.7	13.8	-6°53.0	-10.1	55.6
22	148°10.9	-22°00.3	228°44.5	13.8	-7°03.1	-10.0	55.6
23	163°10.6	-21°59.9	243°17.4	13.8	-7°13.1	-10.0	55.6
	SD.=16.3	d=0.4	S.D.=15.3				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:15	10:19	–:–	–:–	13:55	15:59
70	07:58	09:36	–:–	–:–	14:38	16:16
68	07:44	09:08	11:09	13:05	15:06	16:30
66	07:32	08:46	10:13	14:01	15:28	16:41
64	07:23	08:29	09:40	14:34	15:45	16:51
62	07:14	08:14	09:16	14:58	15:60	16:60
60	07:07	08:02	08:57	15:17	16:12	17:07
58	06:60	07:51	08:41	15:33	16:22	17:14
56	06:54	07:42	08:28	15:46	16:32	17:20
54	06:48	07:34	08:16	15:58	16:40	17:26
52	06:43	07:26	08:06	16:08	16:48	17:31
50	06:38	07:19	07:57	16:17	16:54	17:35
45	06:28	07:04	07:38	16:36	17:09	17:46
40	06:18	06:52	07:22	16:52	17:22	17:56
35	06:09	06:41	07:09	17:05	17:33	18:04
30	06:01	06:31	06:57	17:17	17:43	18:12
20	05:46	06:13	06:37	17:37	18:00	18:28
10	05:31	05:57	06:19	17:54	18:17	18:43
0	05:15	05:41	06:03	18:10	18:33	18:59
-10	04:57	05:24	05:46	18:27	18:50	19:17
-20	04:35	05:04	05:28	18:45	19:09	19:38
-30	04:08	04:41	05:08	19:06	19:33	20:05
-35	03:50	04:26	04:55	19:18	19:47	20:23
-40	03:28	04:09	04:41	19:32	20:04	20:44
-45	03:00	03:48	04:24	19:49	20:25	21:13
-50	02:19	03:20	04:03	20:09	20:52	21:53
-52	01:56	03:07	03:53	20:19	21:06	22:16
-54	01:22	02:50	03:42	20:31	21:22	22:48
-56	–:–	02:31	03:29	20:44	21:41	–:–
-58	–:–	02:06	03:14	20:59	22:06	–:–
-60	–:–	01:30	02:55	21:17	22:41	–:–

	Moonrise			**Moonset**		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	23:03	–:–	00:50	11:38	11:29	11:19
70	23:05	–:–	00:45	11:34	11:30	11:26
68	23:07	–:–	00:41	11:30	11:31	11:32
66	23:08	–:–	00:37	11:27	11:32	11:37
64	23:09	–:–	00:35	11:24	11:33	11:41
62	23:10	–:–	00:32	11:22	11:34	11:45
60	23:10	–:–	00:30	11:20	11:34	11:49
58	23:11	–:–	00:28	11:18	11:35	11:51
56	23:12	–:–	00:26	11:16	11:35	11:54
54	23:12	–:–	00:25	11:15	11:36	11:56
52	23:13	–:–	00:23	11:13	11:36	11:59
50	23:13	–:–	00:22	11:12	11:37	12:01
45	23:14	–:–	00:19	11:09	11:38	12:05
40	23:15	–:–	00:17	11:07	11:38	12:08
35	23:16	–:–	00:15	11:05	11:39	12:12
30	23:16	–:–	00:13	11:03	11:39	12:14
20	23:18	–:–	00:11	11:00	11:40	12:19
10	23:19	–:–	00:08	10:57	11:41	12:23
0	23:20	–:–	00:06	10:55	11:42	12:27
-10	23:20	–:–	00:03	10:52	11:42	12:31
-20	23:22	–:–	00:01	10:49	11:43	12:35
-30	23:23	23:58	–:–	10:46	11:44	12:40
-35	23:23	23:56	–:–	10:44	11:45	12:43
-40	23:24	23:55	–:–	10:42	11:45	12:46
-45	23:25	23:53	–:–	10:39	11:46	12:50
-50	23:26	23:50	–:–	10:36	11:46	12:54
-52	23:27	23:49	–:–	10:35	11:47	12:56
-54	23:27	23:48	–:–	10:33	11:47	12:58
-56	23:28	23:46	–:–	10:32	11:48	13:01
-58	23:28	23:45	–:–	10:30	11:48	13:04
-60	23:29	23:43	23:58	10:27	11:49	13:07

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
7	06:03	06:16	12:06	04:43	17:07	20(65%)
8	06:29	06:41	12:06	05:30	17:53	21(55%)
9	06:54	07:06	12:07	06:16	18:38	22(44%)

January 10, 11 ,12 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	109°28.0	177°52.0	-22°45.1	241°54.4	-16°52.2	243°14.0	-16°16.4	196°49.9	-22°31.4
1	124°30.5	192°51.1	-22°44.7	256°55.3	-16°52.6	258°16.1	-16°16.6	211°52.1	-22°31.4
2	139°33.0	207°50.2	-22°44.3	271°56.2	-16°53.0	273°18.1	-16°16.7	226°54.2	-22°31.4
3	154°35.4	222°49.3	-22°43.9	286°57.1	-16°53.5	288°20.2	-16°16.8	241°56.4	-22°31.4
4	169°37.9	237°48.3	-22°43.6	301°58.0	-16°53.9	303°22.3	-16°16.9	256°58.5	-22°31.4
5	184°40.4	252°47.4	-22°43.2	316°58.9	-16°54.3	318°24.4	-16°17.0	272°00.7	-22°31.4
6	199°42.8	267°46.5	-22°42.8	331°59.8	-16°54.8	333°26.5	-16°17.1	287°02.8	-22°31.4
7	214°45.3	282°45.6	-22°42.4	347°00.7	-16°55.2	348°28.5	-16°17.2	302°05.0	-22°31.4
8	229°47.7	297°44.7	-22°42.0	2°01.6	-16°55.6	3°30.6	-16°17.3	317°07.2	-22°31.4
9	244°50.2	312°43.7	-22°41.6	17°02.5	-16°56.1	18°32.7	-16°17.4	332°09.3	-22°31.4
10	259°52.7	327°42.8	-22°41.2	32°03.4	-16°56.5	33°34.8	-16°17.5	347°11.5	-22°31.4
11	274°55.1	342°41.9	-22°40.8	47°04.3	-16°56.9	48°36.9	-16°17.6	2°13.6	-22°31.3
12	289°57.6	357°41.0	-22°40.5	62°05.3	-16°57.4	63°38.9	-16°17.7	17°15.8	-22°31.3
13	305°00.1	12°40.1	-22°40.1	77°06.2	-16°57.8	78°41.0	-16°17.8	32°17.9	-22°31.3
14	320°02.5	27°39.1	-22°39.7	92°07.1	-16°58.2	93°43.1	-16°17.9	47°20.1	-22°31.3
15	335°05.0	42°38.2	-22°39.3	107°08.0	-16°58.7	108°45.2	-16°18.0	62°22.2	-22°31.3
16	350°07.5	57°37.3	-22°38.9	122°08.9	-16°59.1	123°47.3	-16°18.1	77°24.4	-22°31.3
17	5°09.9	72°36.4	-22°38.5	137°09.8	-16°59.5	138°49.3	-16°18.2	92°26.5	-22°31.3
18	20°12.4	87°35.5	-22°38.1	152°10.7	-16°60.0	153°51.4	-16°18.3	107°28.7	-22°31.3
19	35°14.8	102°34.6	-22°37.7	167°11.6	-17°00.4	168°53.5	-16°18.4	122°30.9	-22°31.3
20	50°17.3	117°33.6	-22°37.3	182°12.5	-17°00.8	183°55.6	-16°18.5	137°33.0	-22°31.3
21	65°19.8	132°32.7	-22°36.9	197°13.4	-17°01.3	198°57.7	-16°18.6	152°35.2	-22°31.3
22	80°22.2	147°31.8	-22°36.5	212°14.3	-17°01.7	213°59.8	-16°18.7	167°37.3	-22°31.3
23	95°24.7	162°30.9	-22°36.1	227°15.2	-17°02.1	229°01.8	-16°18.8	182°39.5	-22°31.3
Mer.pass.:16:39		v-0.9 d0.4 m-3.8		v0.9 d-0.4 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	110°27.2	177°30.0	-22°35.7	242°16.1	-17°02.5	244°03.9	-16°18.9	197°41.6	-22°31.3
1	125°29.6	192°29.1	-22°35.3	257°17.0	-17°03.0	259°06.0	-16°19.0	212°43.8	-22°31.3
2	140°32.1	207°28.1	-22°34.8	272°17.9	-17°03.4	274°08.1	-16°19.1	227°45.9	-22°31.3
3	155°34.6	222°27.2	-22°34.4	287°18.8	-17°03.8	289°10.2	-16°19.2	242°48.1	-22°31.3
4	170°37.0	237°26.3	-22°34.0	302°19.7	-17°04.3	304°12.3	-16°19.3	257°50.2	-22°31.3
5	185°39.5	252°25.4	-22°33.6	317°20.6	-17°04.7	319°14.4	-16°19.3	272°52.4	-22°31.3
6	200°42.0	267°24.5	-22°33.2	332°21.5	-17°05.1	334°16.4	-16°19.4	287°54.6	-22°31.3
7	215°44.4	282°23.6	-22°32.8	347°22.4	-17°05.6	349°18.5	-16°19.5	302°56.7	-22°31.3
8	230°46.9	297°22.7	-22°32.4	2°23.3	-17°06.0	4°20.6	-16°19.6	317°58.9	-22°31.3
9	245°49.3	312°21.8	-22°32.0	17°24.2	-17°06.4	19°22.7	-16°19.7	333°01.0	-22°31.3
10	260°51.8	327°20.9	-22°31.5	32°25.1	-17°06.8	34°24.8	-16°19.8	348°03.2	-22°31.3
11	275°54.3	342°19.9	-22°31.1	47°26.0	-17°07.3	49°26.9	-16°19.9	3°05.3	-22°31.3
12	290°56.7	357°19.0	-22°30.7	62°26.9	-17°07.7	64°28.9	-16°20.0	18°07.5	-22°31.3
13	305°59.2	12°18.1	-22°30.3	77°27.8	-17°08.1	79°31.0	-16°20.1	33°09.6	-22°31.2
14	321°01.7	27°17.2	-22°29.8	92°28.7	-17°08.5	94°33.1	-16°20.2	48°11.8	-22°31.2
15	336°04.1	42°16.3	-22°29.4	107°29.6	-17°09.0	109°35.2	-16°20.3	63°14.0	-22°31.2
16	351°06.6	57°15.4	-22°29.0	122°30.5	-17°09.4	124°37.3	-16°20.4	78°16.1	-22°31.2
17	6°09.1	72°14.5	-22°28.6	137°31.4	-17°09.8	139°39.4	-16°20.5	93°18.3	-22°31.2
18	21°11.5	87°13.6	-22°28.1	152°32.3	-17°10.3	154°41.5	-16°20.6	108°20.4	-22°31.2
19	36°14.0	102°12.7	-22°27.7	167°33.2	-17°10.7	169°43.6	-16°20.7	123°22.6	-22°31.2
20	51°16.5	117°11.8	-22°27.3	182°34.1	-17°11.1	184°45.6	-16°20.8	138°24.7	-22°31.2
21	66°18.9	132°10.9	-22°26.9	197°35.0	-17°11.5	199°47.7	-16°20.9	153°26.9	-22°31.2
22	81°21.4	147°09.9	-22°26.4	212°35.9	-17°12.0	214°49.8	-16°21.0	168°29.0	-22°31.2
23	96°23.8	162°09.0	-22°26.0	227°36.8	-17°12.4	229°51.9	-16°21.1	183°31.2	-22°31.2
Mer.pass.:16:35		v-0.9 d0.4 m-3.8		v0.9 d-0.4 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	111°26.3	177°08.1	-22°25.6	242°37.7	-17°12.8	244°54.0	-16°21.2	198°33.4	-22°31.2
1	126°28.8	192°07.2	-22°25.1	257°38.6	-17°13.2	259°56.1	-16°21.3	213°35.5	-22°31.2
2	141°31.2	207°06.3	-22°24.7	272°39.6	-17°13.7	274°58.2	-16°21.4	228°37.7	-22°31.2
3	156°33.7	222°05.4	-22°24.2	287°40.5	-17°14.1	290°00.3	-16°21.5	243°39.8	-22°31.2
4	171°36.2	237°04.5	-22°23.8	302°41.4	-17°14.5	305°02.4	-16°21.6	258°42.0	-22°31.2
5	186°38.6	252°03.6	-22°23.4	317°42.3	-17°14.9	320°04.4	-16°21.7	273°44.1	-22°31.2
6	201°41.1	267°02.7	-22°22.9	332°43.2	-17°15.3	335°06.5	-16°21.8	288°46.3	-22°31.2
7	216°43.6	282°01.8	-22°22.5	347°44.1	-17°15.8	350°08.6	-16°21.9	303°48.5	-22°31.2
8	231°46.0	297°00.9	-22°22.0	2°45.0	-17°16.2	5°10.7	-16°22.0	318°50.6	-22°31.2
9	246°48.5	311°60.0	-22°21.6	17°45.9	-17°16.6	20°12.8	-16°22.1	333°52.8	-22°31.2
10	261°51.0	326°59.1	-22°21.1	32°46.8	-17°17.0	35°14.9	-16°22.2	348°54.9	-22°31.2
11	276°53.4	341°58.2	-22°20.7	47°47.7	-17°17.5	50°17.0	-16°22.3	3°57.1	-22°31.2
12	291°55.9	356°57.3	-22°20.2	62°48.6	-17°17.9	65°19.1	-16°22.4	18°59.2	-22°31.2
13	306°58.3	11°56.4	-22°19.8	77°49.5	-17°18.3	80°21.2	-16°22.5	34°01.4	-22°31.2
14	322°00.8	26°55.5	-22°19.3	92°50.4	-17°18.7	95°23.3	-16°22.6	49°03.5	-22°31.1
15	337°03.3	41°54.6	-22°18.9	107°51.3	-17°19.2	110°25.3	-16°22.7	64°05.7	-22°31.1
16	352°05.7	56°53.7	-22°18.4	122°52.2	-17°19.6	125°27.4	-16°22.8	79°07.9	-22°31.1
17	7°08.2	71°52.8	-22°18.0	137°53.1	-17°20.0	140°29.5	-16°22.9	94°10.0	-22°31.1
18	22°10.7	86°51.9	-22°17.5	152°54.0	-17°20.4	155°31.6	-16°23.0	109°12.2	-22°31.1
19	37°13.1	101°51.0	-22°17.1	167°54.9	-17°20.8	170°33.7	-16°23.1	124°14.3	-22°31.1
20	52°15.6	116°50.1	-22°16.6	182°55.8	-17°21.3	185°35.8	-16°23.2	139°16.5	-22°31.1
21	67°18.1	131°49.2	-22°16.1	197°56.7	-17°21.7	200°37.9	-16°23.3	154°18.6	-22°31.1
22	82°20.5	146°48.3	-22°15.7	212°57.6	-17°22.1	215°40.0	-16°23.4	169°20.8	-22°31.1
23	97°23.0	161°47.4	-22°15.2	227°58.5	-17°22.5	230°42.1	-16°23.4	184°23.0	-22°31.1
Mer.pass.:16:31		v-0.9 d0.4 m-3.8		v0.9 d-0.4 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.5
Ankaa	353°12.8	-42°12.8
Schedar	349°37.0	56°38.3
Diphda	348°52.7	-17°53.5
Achernar	335°24.5	-57°09.2
Hamal	327°57.2	23°32.8
Polaris	316°10.2	89°20.6
Akamar	315°15.8	-40°14.4
Menkar	314°11.7	4°09.4
Mirfak	308°35.6	49°55.5
Aldebaran	290°45.6	16°32.6
Rigel	281°08.8	-8°11.1
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°42.9	-1°11.7
Betelgeuse	270°57.6	7°24.4
Canopus	263°54.2	-52°42.6
Sirius	258°30.6	-16°44.5
Adara	255°09.7	-29°00.0
Procyon	244°56.1	5°10.7
Pollux	243°23.5	27°58.8
Avior	234°16.1	-59°34.1
Suhail	222°49.7	-43°30.3
Miaplacidus	221°38.1	-69°47.4
Alphard	217°52.8	-8°44.3
Regulus	207°40.0	11°52.6
Dubhe	193°47.6	61°39.0
Denebola	182°30.3	14°28.2
Gienah	175°49.0	-17°38.4
Acrux	173°05.6	-63°11.6
Gacrux	171°57.2	-57°12.5
Alioth	166°18.0	55°51.5
Spica	158°28.0	-11°15.1
Alcaid	152°56.6	49°13.3
Hadar	148°43.5	-60°27.2
Menkent	148°04.0	-36°27.2
Arcturus	145°52.9	19°05.6
Rigil Kent.	139°47.7	-60°54.1
Zubenelg.	137°02.1	-16°06.8
Kochab	137°20.7	74°04.7
Alphecca	126°08.6	26°39.3
Antares	112°22.7	-26°28.0
Atria	107°22.2	-69°03.2
Sabik	102°09.3	-15°44.6
Shaula	96°18.1	-37°06.7
Rasalhague	96°03.9	12°33.0
Etamin	90°45.2	51°29.2
Kaus Aust.	83°40.1	-34°22.3
Vega	80°37.3	38°48.1
Nunki	75°54.9	-26°16.3
Altair	62°05.6	8°55.0
Peacock	53°15.0	-56°40.6
Deneb	49°29.8	45°20.8
Enif	33°44.4	9°57.5
Alnair	27°40.3	-46°52.6
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.9
Markab	13°35.4	15°18.1

2018/1/1	**SHA**	**Mer.pass**
Venus	68°24.0	12:09
Mars	132°26.4	07:52
Jupiter	133°45.9	07:46
Saturn	87°21.9	10:51

2018/1/1	**SHA**	**Mer.pass**
Venus	67°02.8	12:11
Mars	131°48.9	07:50
Jupiter	133°36.8	07:43
Saturn	87°14.5	10:48

2018/1/1	**SHA**	**Mer.pass**
Venus	65°41.8	12:12
Mars	131°11.4	07:49
Jupiter	133°27.7	07:39
Saturn	87°07.0	10:44

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°10.3	-21°59.5	257°50.2	13.8	-7°23.0	-9.9	55.5
1	193°10.1	-21°59.2	272°23.1	13.9	-7°32.9	-9.9	55.5
2	208°09.8	-21°58.8	286°55.9	13.9	-7°42.8	-9.8	55.5
3	223°09.6	-21°58.4	301°28.8	13.9	-7°52.6	-9.8	55.4
4	238°09.3	-21°58.0	316°01.6	13.9	-8°02.4	-9.8	55.4
5	253°09.1	-21°57.7	330°34.5	13.9	-8°12.1	-9.7	55.4
6	268°08.8	-21°57.3	345°07.4	13.9	-8°21.8	-9.7	55.4
7	283°08.6	-21°56.9	359°40.3	13.9	-8°31.4	-9.6	55.3
8	298°08.3	-21°56.6	14°13.1	13.9	-8°41.0	-9.6	55.3
9	313°08.1	-21°56.2	28°46.0	13.9	-8°50.6	-9.5	55.3
10	328°07.8	-21°55.8	43°18.9	13.9	-9°00.1	-9.5	55.3
11	343°07.6	-21°55.4	57°51.8	13.9	-9°09.6	-9.4	55.2
12	358°07.3	-21°55.1	72°24.6	13.9	-9°19.0	-9.4	55.2
13	13°07.1	-21°54.7	86°57.5	13.9	-9°28.3	-9.3	55.2
14	28°06.8	-21°54.3	101°30.4	13.9	-9°37.6	-9.3	55.2
15	43°06.5	-21°53.9	116°03.2	13.9	-9°46.9	-9.2	55.1
16	58°06.3	-21°53.5	130°36.1	13.9	-9°56.1	-9.2	55.1
17	73°06.0	-21°53.2	145°09.0	13.9	-10°05.3	-9.1	55.1
18	88°05.8	-21°52.8	159°41.8	13.9	-10°14.4	-9.1	55.1
19	103°05.5	-21°52.4	174°14.7	13.8	-10°23.4	-9.0	55.0
20	118°05.3	-21°52.0	188°47.5	13.8	-10°32.4	-9.0	55.0
21	133°05.0	-21°51.6	203°20.4	13.8	-10°41.4	-8.9	55.0
22	148°04.8	-21°51.2	217°53.2	13.8	-10°50.3	-8.9	55.0
23	163°04.5	-21°50.9	232°26.0	13.8	-10°59.1	-8.8	55.0
	SD.=16.3	d=0.4	S.D.=15.1				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°04.3	-21°50.5	246°58.8	13.8	-11°07.9	-8.8	54.9
1	193°04.0	-21°50.1	261°31.6	13.8	-11°16.7	-8.7	54.9
2	208°03.8	-21°49.7	276°04.5	13.8	-11°25.4	-8.7	54.9
3	223°03.6	-21°49.3	290°37.2	13.8	-11°34.0	-8.6	54.9
4	238°03.3	-21°48.9	305°10.0	13.8	-11°42.6	-8.5	54.8
5	253°03.1	-21°48.5	319°42.8	13.8	-11°51.1	-8.5	54.8
6	268°02.8	-21°48.1	334°15.6	13.8	-11°59.5	-8.4	54.8
7	283°02.6	-21°47.8	348°48.3	13.7	-12°07.9	-8.4	54.8
8	298°02.3	-21°47.4	3°21.0	13.7	-12°16.3	-8.3	54.8
9	313°02.1	-21°47.0	17°53.8	13.7	-12°24.5	-8.3	54.7
10	328°01.8	-21°46.6	32°26.5	13.7	-12°32.8	-8.2	54.7
11	343°01.6	-21°46.2	46°59.2	13.7	-12°40.9	-8.1	54.7
12	358°01.3	-21°45.8	61°31.9	13.7	-12°49.0	-8.1	54.7
13	13°01.1	-21°45.4	76°04.5	13.7	-12°57.1	-8.0	54.7
14	28°00.8	-21°45.0	90°37.2	13.7	-13°05.1	-8.0	54.7
15	43°00.6	-21°44.6	105°09.8	13.6	-13°13.0	-7.9	54.6
16	58°00.3	-21°44.2	119°42.5	13.6	-13°20.8	-7.8	54.6
17	73°00.1	-21°43.8	134°15.1	13.6	-13°28.6	-7.8	54.6
18	87°59.9	-21°43.4	148°47.7	13.6	-13°36.4	-7.7	54.6
19	102°59.6	-21°43.0	163°20.3	13.6	-13°44.0	-7.6	54.6
20	117°59.4	-21°42.6	177°52.8	13.6	-13°51.6	-7.6	54.6
21	132°59.1	-21°42.2	192°25.4	13.5	-13°59.2	-7.5	54.5
22	147°58.9	-21°41.8	206°57.9	13.5	-14°06.7	-7.4	54.5
23	162°58.6	-21°41.4	221°30.4	13.5	-14°14.1	-7.4	54.5
	SD.=16.3	d=0.4	S.D.=15.0				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°58.4	-21°41.0	236°02.9	13.5	-14°21.4	-7.3	54.5
1	192°58.2	-21°40.6	250°35.4	13.5	-14°28.7	-7.2	54.5
2	207°57.9	-21°40.2	265°07.8	13.4	-14°35.9	-7.2	54.5
3	222°57.7	-21°39.8	279°40.3	13.4	-14°43.0	-7.1	54.4
4	237°57.4	-21°39.4	294°12.7	13.4	-14°50.1	-7.0	54.4
5	252°57.2	-21°39.0	308°45.1	13.4	-14°57.1	-7.0	54.4
6	267°56.9	-21°38.6	323°17.5	13.4	-15°04.1	-6.9	54.4
7	282°56.7	-21°38.2	337°49.9	13.4	-15°10.9	-6.8	54.4
8	297°56.5	-21°37.8	352°22.2	13.3	-15°17.7	-6.8	54.4
9	312°56.2	-21°37.3	6°54.5	13.3	-15°24.5	-6.7	54.4
10	327°56.0	-21°36.9	21°26.8	13.3	-15°31.1	-6.6	54.3
11	342°55.7	-21°36.5	35°59.1	13.3	-15°37.7	-6.6	54.3
12	357°55.5	-21°36.1	50°31.4	13.3	-15°44.3	-6.5	54.3
13	12°55.3	-21°35.7	65°03.6	13.2	-15°50.7	-6.4	54.3
14	27°55.0	-21°35.3	79°35.8	13.2	-15°57.1	-6.3	54.3
15	42°54.8	-21°34.9	94°08.0	13.2	-16°03.4	-6.3	54.3
16	57°54.5	-21°34.5	108°40.2	13.2	-16°09.6	-6.2	54.3
17	72°54.3	-21°34.0	123°12.4	13.1	-16°15.8	-6.1	54.3
18	87°54.1	-21°33.6	137°44.5	13.1	-16°21.9	-6.0	54.2
19	102°53.8	-21°33.2	152°16.6	13.1	-16°27.9	-6.0	54.2
20	117°53.6	-21°32.8	166°48.7	13.1	-16°33.8	-5.9	54.2
21	132°53.4	-21°32.4	181°20.8	13.1	-16°39.7	-5.8	54.2
22	147°53.1	-21°31.9	195°52.8	13.0	-16°45.4	-5.7	54.2
23	162°52.9	-21°31.5	210°24.8	13.0	-16°51.2	-5.7	54.2
	SD.=16.3	d=0.4	S.D.=14.9				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:09	10:08	–:–	–:–	14:09	16:07
70	07:53	09:29	–:–	–:–	14:48	16:23
68	07:40	09:02	10:53	13:24	15:14	16:36
66	07:29	08:41	10:05	14:12	15:35	16:47
64	07:20	08:25	09:34	14:42	15:52	16:57
62	07:12	08:11	09:11	15:05	16:05	17:05
60	07:05	07:59	08:53	15:23	16:17	17:12
58	06:58	07:49	08:38	15:38	16:27	17:18
56	06:52	07:40	08:25	15:51	16:36	17:24
54	06:47	07:32	08:14	16:02	16:44	17:29
52	06:42	07:25	08:04	16:12	16:52	17:34
50	06:37	07:18	07:55	16:21	16:58	17:39
45	06:27	07:04	07:37	16:40	17:13	17:49
40	06:18	06:51	07:21	16:55	17:25	17:58
35	06:09	06:41	07:08	17:08	17:35	18:07
30	06:01	06:31	06:57	17:19	17:45	18:15
20	05:47	06:14	06:37	17:39	18:02	18:29
10	05:32	05:58	06:20	17:56	18:18	18:44
0	05:16	05:42	06:04	18:12	18:34	18:60
-10	04:58	05:25	05:48	18:28	18:51	19:17
-20	04:37	05:06	05:30	18:45	19:09	19:38
-30	04:11	04:43	05:10	19:05	19:32	20:05
-35	03:53	04:29	04:58	19:17	19:46	20:22
-40	03:32	04:12	04:44	19:31	20:03	20:43
-45	03:05	03:52	04:28	19:47	20:23	21:10
-50	02:25	03:25	04:07	20:08	20:50	21:49
-52	02:03	03:12	03:58	20:17	21:03	22:11
-54	01:33	02:56	03:47	20:28	21:19	22:41
-56	00:32	02:37	03:34	20:41	21:37	23:35
-58	–:–	02:13	03:19	20:55	22:00	–:–
-60	–:–	01:41	03:02	21:13	22:32	–:–

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	02:35	04:21	06:14	11:08	10:55	10:36
70	02:22	03:60	05:38	11:22	11:18	11:13
68	02:13	03:43	05:13	11:33	11:35	11:40
66	02:04	03:30	04:53	11:43	11:50	11:60
64	01:58	03:19	04:38	11:51	12:02	12:16
62	01:52	03:09	04:25	11:58	12:12	12:29
60	01:47	03:01	04:14	12:04	12:20	12:41
58	01:42	02:55	04:04	12:09	12:28	12:51
56	01:38	02:48	03:56	12:13	12:35	12:59
54	01:35	02:43	03:49	12:18	12:41	13:07
52	01:32	02:38	03:42	12:22	12:46	13:14
50	01:29	02:33	03:36	12:25	12:51	13:20
45	01:22	02:24	03:24	12:33	13:02	13:34
40	01:17	02:16	03:13	12:39	13:11	13:45
35	01:13	02:09	03:04	12:44	13:19	13:55
30	01:09	02:03	02:57	12:49	13:25	14:03
20	01:02	01:53	02:43	12:58	13:37	14:18
10	00:56	01:44	02:31	13:05	13:47	14:31
0	00:51	01:35	02:20	13:12	13:57	14:43
-10	00:45	01:27	02:10	13:19	14:07	14:55
-20	00:39	01:18	01:58	13:27	14:17	15:07
-30	00:33	01:08	01:45	13:35	14:29	15:22
-35	00:29	01:02	01:37	13:40	14:36	15:31
-40	00:25	00:56	01:29	13:46	14:44	15:40
-45	00:20	00:48	01:19	13:52	14:53	15:52
-50	00:14	00:39	01:07	13:60	15:04	16:06
-52	00:11	00:35	01:01	14:04	15:09	16:12
-54	00:08	00:30	00:55	14:08	15:15	16:19
-56	00:05	00:25	00:48	14:12	15:21	16:28
-58	00:02	00:20	00:40	14:17	15:28	16:37
-60	–:–	00:13	00:32	14:23	15:36	16:47

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
10	07:19	07:31	12:07	07:01	19:23	23(35%)
11	07:43	07:55	12:07	07:46	20:08	24(26%)
12	08:07	08:18	12:08	08:31	20:54	25(18%)

January 13, 14 ,15 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	112°25.4	176°46.5	-22°14.8	242°59.4	-17°22.9	245°44.2	-16°23.5	199°25.1	-22°31.1
1	127°27.9	191°45.6	-22°14.3	258°00.3	-17°23.4	260°46.3	-16°23.6	214°27.3	-22°31.1
2	142°30.4	206°44.7	-22°13.8	273°01.1	-17°23.8	275°48.4	-16°23.7	229°29.4	-22°31.1
3	157°32.8	221°43.8	-22°13.4	288°02.0	-17°24.2	290°50.5	-16°23.8	244°31.6	-22°31.1
4	172°35.3	236°42.9	-22°12.9	303°02.9	-17°24.6	305°52.5	-16°23.9	259°33.7	-22°31.1
5	187°37.8	251°42.0	-22°12.4	318°03.8	-17°25.0	320°54.6	-16°24.0	274°35.9	-22°31.1
6	202°40.2	266°41.1	-22°12.0	333°04.7	-17°25.5	335°56.7	-16°24.1	289°38.1	-22°31.1
7	217°42.7	281°40.2	-22°11.5	348°05.6	-17°25.9	350°58.8	-16°24.2	304°40.2	-22°31.1
8	232°45.2	296°39.3	-22°11.0	3°06.5	-17°26.3	6°00.9	-16°24.3	319°42.4	-22°31.1
9	247°47.6	311°38.4	-22°10.5	18°07.4	-17°26.7	21°03.0	-16°24.4	334°44.5	-22°31.1
10	262°50.1	326°37.5	-22°10.1	33°08.3	-17°27.1	36°05.1	-16°24.5	349°46.7	-22°31.1
11	277°52.6	341°36.7	-22°09.6	48°09.2	-17°27.5	51°07.2	-16°24.6	4°48.8	-22°31.1
12	292°55.0	356°35.8	-22°09.1	63°10.1	-17°28.0	66°09.3	-16°24.7	19°51.0	-22°31.1
13	307°57.5	11°34.9	-22°08.6	78°11.0	-17°28.4	81°11.4	-16°24.8	34°53.2	-22°31.0
14	322°59.9	26°34.0	-22°08.2	93°11.9	-17°28.8	96°13.5	-16°24.9	49°55.3	-22°31.0
15	338°02.4	41°33.1	-22°07.7	108°12.8	-17°29.2	111°15.6	-16°25.0	64°57.5	-22°31.0
16	353°04.9	56°32.2	-22°07.2	123°13.7	-17°29.6	126°17.7	-16°25.1	79°59.6	-22°31.0
17	8°07.3	71°31.3	-22°06.7	138°14.6	-17°30.0	141°19.8	-16°25.2	95°01.8	-22°31.0
18	23°09.8	86°30.4	-22°06.2	153°15.5	-17°30.5	156°21.9	-16°25.3	110°04.0	-22°31.0
19	38°12.3	101°29.5	-22°05.7	168°16.4	-17°30.9	171°24.0	-16°25.4	125°06.1	-22°31.0
20	53°14.7	116°28.6	-22°05.2	183°17.3	-17°31.3	186°26.1	-16°25.5	140°08.3	-22°31.0
21	68°17.2	131°27.7	-22°04.8	198°18.2	-17°31.7	201°28.2	-16°25.5	155°10.4	-22°31.0
22	83°19.7	146°26.9	-22°04.3	213°19.1	-17°32.1	216°30.3	-16°25.6	170°12.6	-22°31.0
23	98°22.1	161°26.0	-22°03.8	228°20.0	-17°32.5	231°32.4	-16°25.7	185°14.7	-22°31.0
Mer.pass.:16:27		v-0.9 d0.5 m-3.8		v0.9 d-0.4 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	113°24.6	176°25.1	-22°03.3	243°20.9	-17°33.0	246°34.5	-16°25.8	200°16.9	-22°31.0
1	128°27.1	191°24.2	-22°02.8	258°21.8	-17°33.4	261°36.6	-16°25.9	215°19.1	-22°31.0
2	143°29.5	206°23.3	-22°02.3	273°22.7	-17°33.8	276°38.7	-16°26.0	230°21.2	-22°31.0
3	158°32.0	221°22.4	-22°01.8	288°23.6	-17°34.2	291°40.8	-16°26.1	245°23.4	-22°31.0
4	173°34.4	236°21.5	-22°01.3	303°24.5	-17°34.6	306°42.9	-16°26.2	260°25.5	-22°31.0
5	188°36.9	251°20.7	-22°00.8	318°25.4	-17°35.0	321°45.0	-16°26.3	275°27.7	-22°31.0
6	203°39.4	266°19.8	-22°00.3	333°26.3	-17°35.4	336°47.1	-16°26.4	290°29.9	-22°31.0
7	218°41.8	281°18.9	-21°59.8	348°27.2	-17°35.9	351°49.2	-16°26.5	305°32.0	-22°31.0
8	233°44.3	296°18.0	-21°59.3	3°28.1	-17°36.3	6°51.3	-16°26.6	320°34.2	-22°31.0
9	248°46.8	311°17.1	-21°58.8	18°29.0	-17°36.7	21°53.4	-16°26.7	335°36.3	-22°31.0
10	263°49.2	326°16.2	-21°58.3	33°29.9	-17°37.1	36°55.5	-16°26.8	350°38.5	-22°31.0
11	278°51.7	341°15.3	-21°57.8	48°30.8	-17°37.5	51°57.6	-16°26.9	5°40.6	-22°30.9
12	293°54.2	356°14.5	-21°57.3	63°31.7	-17°37.9	66°59.7	-16°27.0	20°42.8	-22°30.9
13	308°56.6	11°13.6	-21°56.8	78°32.6	-17°38.3	82°01.8	-16°27.0	35°45.0	-22°30.9
14	323°59.1	26°12.7	-21°56.3	93°33.5	-17°38.7	97°03.9	-16°27.1	50°47.1	-22°30.9
15	339°01.6	41°11.8	-21°55.8	108°34.4	-17°39.2	112°06.0	-16°27.2	65°49.3	-22°30.9
16	354°04.0	56°10.9	-21°55.3	123°35.3	-17°39.6	127°08.1	-16°27.3	80°51.4	-22°30.9
17	9°06.5	71°10.1	-21°54.8	138°36.1	-17°40.0	142°10.2	-16°27.4	95°53.6	-22°30.9
18	24°08.9	86°09.2	-21°54.3	153°37.0	-17°40.4	157°12.3	-16°27.5	110°55.8	-22°30.9
19	39°11.4	101°08.3	-21°53.7	168°37.9	-17°40.8	172°14.4	-16°27.6	125°57.9	-22°30.9
20	54°13.9	116°07.4	-21°53.2	183°38.8	-17°41.2	187°16.5	-16°27.7	141°00.1	-22°30.9
21	69°16.3	131°06.5	-21°52.7	198°39.7	-17°41.6	202°18.6	-16°27.8	156°02.2	-22°30.9
22	84°18.8	146°05.7	-21°52.2	213°40.6	-17°42.0	217°20.7	-16°27.9	171°04.4	-22°30.9
23	99°21.3	161°04.8	-21°51.7	228°41.5	-17°42.4	232°22.8	-16°28.0	186°06.6	-22°30.9
Mer.pass.:16:23		v-0.9 d0.5 m-3.8		v0.9 d-0.4 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	114°23.7	176°03.9	-21°51.2	243°42.4	-17°42.9	247°24.9	-16°28.1	201°08.7	-22°30.9
1	129°26.2	191°03.0	-21°50.6	258°43.3	-17°43.3	262°27.0	-16°28.2	216°10.9	-22°30.9
2	144°28.7	206°02.1	-21°50.1	273°44.2	-17°43.7	277°29.1	-16°28.3	231°13.0	-22°30.9
3	159°31.1	221°01.3	-21°49.6	288°45.1	-17°44.1	292°31.2	-16°28.4	246°15.2	-22°30.9
4	174°33.6	236°00.4	-21°49.1	303°46.0	-17°44.5	307°33.3	-16°28.4	261°17.4	-22°30.9
5	189°36.1	250°59.5	-21°48.5	318°46.9	-17°44.9	322°35.4	-16°28.5	276°19.5	-22°30.9
6	204°38.5	265°58.6	-21°48.0	333°47.8	-17°45.3	337°37.5	-16°28.6	291°21.7	-22°30.9
7	219°41.0	280°57.8	-21°47.5	348°48.7	-17°45.7	352°39.6	-16°28.7	306°23.8	-22°30.9
8	234°43.4	295°56.9	-21°47.0	3°49.6	-17°46.1	7°41.7	-16°28.8	321°26.0	-22°30.8
9	249°45.9	310°56.0	-21°46.4	18°50.5	-17°46.5	22°43.8	-16°28.9	336°28.2	-22°30.8
10	264°48.4	325°55.1	-21°45.9	33°51.4	-17°46.9	37°45.9	-16°29.0	351°30.3	-22°30.8
11	279°50.8	340°54.3	-21°45.4	48°52.3	-17°47.3	52°48.0	-16°29.1	6°32.5	-22°30.8
12	294°53.3	355°53.4	-21°44.8	63°53.2	-17°47.8	67°50.1	-16°29.2	21°34.6	-22°30.8
13	309°55.8	10°52.5	-21°44.3	78°54.0	-17°48.2	82°52.2	-16°29.3	36°36.8	-22°30.8
14	324°58.2	25°51.7	-21°43.8	93°54.9	-17°48.6	97°54.3	-16°29.4	51°39.0	-22°30.8
15	340°00.7	40°50.8	-21°43.2	108°55.8	-17°49.0	112°56.4	-16°29.5	66°41.1	-22°30.8
16	355°03.2	55°49.9	-21°42.7	123°56.7	-17°49.4	127°58.5	-16°29.5	81°43.3	-22°30.8
17	10°05.6	70°49.0	-21°42.2	138°57.6	-17°49.8	143°00.6	-16°29.6	96°45.4	-22°30.8
18	25°08.1	85°48.2	-21°41.6	153°58.5	-17°50.2	158°02.8	-16°29.7	111°47.6	-22°30.8
19	40°10.5	100°47.3	-21°41.1	168°59.4	-17°50.6	173°04.9	-16°29.8	126°49.8	-22°30.8
20	55°13.0	115°46.4	-21°40.5	184°00.3	-17°51.0	188°07.0	-16°29.9	141°51.9	-22°30.8
21	70°15.5	130°45.6	-21°40.0	199°01.2	-17°51.4	203°09.1	-16°30.0	156°54.1	-22°30.8
22	85°17.9	145°44.7	-21°39.5	214°02.1	-17°51.8	218°11.2	-16°30.1	171°56.2	-22°30.8
23	100°20.4	160°43.8	-21°38.9	229°03.0	-17°52.2	233°13.3	-16°30.2	186°58.4	-22°30.8
Mer.pass.:16:19		v-0.9 d0.5 m-3.8		v0.9 d-0.4 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.5
Ankaa	353°12.8	-42°12.8
Schedar	349°37.0	56°38.3
Diphda	348°52.8	-17°53.5
Achernar	335°24.5	-57°09.2
Hamal	327°57.2	23°32.8
Polaris	316°11.3	89°20.6
Akamar	315°15.8	-40°14.4
Menkar	314°11.7	4°09.4
Mirfak	308°35.6	49°55.5
Aldebaran	290°45.6	16°32.6
Rigel	281°08.8	-8°11.1
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°42.9	-1°11.7
Betelgeuse	270°57.6	7°24.4
Canopus	263°54.2	-52°42.6
Sirius	258°30.6	-16°44.5
Adara	255°09.7	-29°00.0
Procyon	244°56.1	5°10.7
Pollux	243°23.5	27°58.8
Avior	234°16.1	-59°34.1
Suhail	222°49.7	-43°30.3
Miaplacidus	221°38.1	-69°47.4
Alphard	217°52.7	-8°44.3
Regulus	207°39.9	11°52.6
Dubhe	193°47.6	61°39.0
Denebola	182°30.3	14°28.2
Gienah	175°49.0	-17°38.4
Acrux	173°05.5	-63°11.6
Gacrux	171°57.2	-57°12.5
Alioth	166°18.0	55°51.5
Spica	158°28.0	-11°15.2
Alcaid	152°56.5	49°13.3
Hadar	148°43.5	-60°27.2
Menkent	148°04.0	-36°27.2
Arcturus	145°52.8	19°05.6
Rigil Kent.	139°47.6	-60°54.1
Zubenelg.	137°02.1	-16°06.8
Kochab	137°20.7	74°04.7
Alphecca	126°08.6	26°39.3
Antares	112°22.7	-26°28.0
Atria	107°22.1	-69°03.2
Sabik	102°09.3	-15°44.6
Shaula	96°18.1	-37°06.7
Rasalhague	96°03.9	12°33.0
Etamin	90°45.2	51°29.2
Kaus Aust.	83°40.1	-34°22.3
Vega	80°37.3	38°48.1
Nunki	75°54.9	-26°16.3
Altair	62°05.6	8°55.0
Peacock	53°15.0	-56°40.6
Deneb	49°29.8	45°20.8
Enif	33°44.4	9°57.5
Alnair	27°40.3	-46°52.6
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.9
Markab	13°35.4	15°18.1

2018/1/1	**SHA**	**Mer.pass**
Venus	64°21.0	12:14
Mars	130°33.9	07:48
Jupiter	133°18.7	07:36
Saturn	86°59.7	10:41

2018/1/1	**SHA**	**Mer.pass**
Venus	63°00.5	12:15
Mars	129°56.3	07:46
Jupiter	133°09.9	07:33
Saturn	86°52.3	10:37

2018/1/1	**SHA**	**Mer.pass**
Venus	61°40.2	12:16
Mars	129°18.7	07:45
Jupiter	133°01.1	07:29
Saturn	86°45.0	10:34

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°52.6	-21°31.1	224°56.9	13.0	-16°56.8	-5.6	54.2
1	192°52.4	-21°30.7	239°28.8	13.0	-17°02.3	-5.5	54.2
2	207°52.2	-21°30.3	254°00.8	12.9	-17°07.8	-5.4	54.2
3	222°51.9	-21°29.8	268°32.7	12.9	-17°13.2	-5.4	54.2
4	237°51.7	-21°29.4	283°04.7	12.9	-17°18.6	-5.3	54.1
5	252°51.5	-21°29.0	297°36.5	12.9	-17°23.8	-5.2	54.1
6	267°51.2	-21°28.6	312°08.4	12.9	-17°29.0	-5.1	54.1
7	282°51.0	-21°28.1	326°40.3	12.8	-17°34.0	-5.0	54.1
8	297°50.8	-21°27.7	341°12.1	12.8	-17°39.1	-5.0	54.1
9	312°50.5	-21°27.3	355°43.9	12.8	-17°44.0	-4.9	54.1
10	327°50.3	-21°26.9	10°15.7	12.8	-17°48.8	-4.8	54.1
11	342°50.1	-21°26.4	24°47.5	12.8	-17°53.6	-4.7	54.1
12	357°49.8	-21°26.0	39°19.2	12.7	-17°58.3	-4.6	54.1
13	12°49.6	-21°25.6	53°50.9	12.7	-18°02.9	-4.6	54.1
14	27°49.4	-21°25.1	68°22.6	12.7	-18°07.4	-4.5	54.1
15	42°49.1	-21°24.7	82°54.3	12.7	-18°11.9	-4.4	54.1
16	57°48.9	-21°24.3	97°26.0	12.6	-18°16.2	-4.3	54.1
17	72°48.7	-21°23.9	111°57.6	12.6	-18°20.5	-4.2	54.0
18	87°48.4	-21°23.4	126°29.2	12.6	-18°24.7	-4.2	54.0
19	102°48.2	-21°23.0	141°00.8	12.6	-18°28.8	-4.1	54.0
20	117°48.0	-21°22.5	155°32.4	12.6	-18°32.8	-4.0	54.0
21	132°47.7	-21°22.1	170°03.9	12.5	-18°36.8	-3.9	54.0
22	147°47.5	-21°21.7	184°35.5	12.5	-18°40.6	-3.8	54.0
23	162°47.3	-21°21.2	199°07.0	12.5	-18°44.4	-3.7	54.0
	SD.=16.3	d=0.4	S.D.=14.8				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°47.0	-21°20.8	213°38.5	12.5	-18°48.1	-3.6	54.0
1	192°46.8	-21°20.4	228°09.9	12.5	-18°51.7	-3.6	54.0
2	207°46.6	-21°19.9	242°41.4	12.4	-18°55.2	-3.5	54.0
3	222°46.3	-21°19.5	257°12.8	12.4	-18°58.6	-3.4	54.0
4	237°46.1	-21°19.0	271°44.3	12.4	-19°02.0	-3.3	54.0
5	252°45.9	-21°18.6	286°15.7	12.4	-19°05.2	-3.2	54.0
6	267°45.7	-21°18.2	300°47.0	12.4	-19°08.4	-3.1	54.0
7	282°45.4	-21°17.7	315°18.4	12.4	-19°11.5	-3.0	54.0
8	297°45.2	-21°17.3	329°49.7	12.3	-19°14.5	-3.0	54.0
9	312°45.0	-21°16.8	344°21.1	12.3	-19°17.4	-2.9	54.0
10	327°44.7	-21°16.4	358°52.4	12.3	-19°20.2	-2.8	54.0
11	342°44.5	-21°15.9	13°23.7	12.3	-19°23.0	-2.7	54.0
12	357°44.3	-21°15.5	27°54.9	12.3	-19°25.6	-2.6	54.0
13	12°44.1	-21°15.0	42°26.2	12.3	-19°28.2	-2.5	54.0
14	27°43.8	-21°14.6	56°57.4	12.2	-19°30.6	-2.4	54.0
15	42°43.6	-21°14.1	71°28.7	12.2	-19°33.0	-2.3	54.0
16	57°43.4	-21°13.7	85°59.9	12.2	-19°35.3	-2.2	54.0
17	72°43.2	-21°13.2	100°31.1	12.2	-19°37.5	-2.2	54.0
18	87°42.9	-21°12.8	115°02.3	12.2	-19°39.6	-2.1	54.0
19	102°42.7	-21°12.3	129°33.4	12.2	-19°41.6	-2.0	53.9
20	117°42.5	-21°11.9	144°04.6	12.2	-19°43.5	-1.9	53.9
21	132°42.3	-21°11.4	158°35.7	12.1	-19°45.4	-1.8	53.9
22	147°42.0	-21°11.0	173°06.9	12.1	-19°47.1	-1.7	53.9
23	162°41.8	-21°10.5	187°38.0	12.1	-19°48.8	-1.6	53.9
	SD.=16.3	d=0.4	S.D.=14.7				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°41.6	-21°10.1	202°09.1	12.1	-19°50.3	-1.5	53.9
1	192°41.4	-21°09.6	216°40.2	12.1	-19°51.8	-1.4	53.9
2	207°41.1	-21°09.2	231°11.3	12.1	-19°53.2	-1.3	53.9
3	222°40.9	-21°08.7	245°42.4	12.1	-19°54.5	-1.2	53.9
4	237°40.7	-21°08.3	260°13.4	12.1	-19°55.7	-1.2	53.9
5	252°40.5	-21°07.8	274°44.5	12.0	-19°56.8	-1.1	53.9
6	267°40.3	-21°07.3	289°15.5	12.0	-19°57.8	-1.0	53.9
7	282°40.0	-21°06.9	303°46.5	12.0	-19°58.8	-0.9	53.9
8	297°39.8	-21°06.4	318°17.6	12.0	-19°59.6	-0.8	53.9
9	312°39.6	-21°06.0	332°48.6	12.0	-20°00.3	-0.7	53.9
10	327°39.4	-21°05.5	347°19.6	12.0	-20°01.0	-0.6	53.9
11	342°39.2	-21°05.0	1°50.6	12.0	-20°01.5	-0.5	54.0
12	357°38.9	-21°04.6	16°21.6	12.0	-20°02.0	-0.4	54.0
13	12°38.7	-21°04.1	30°52.6	12.0	-20°02.4	-0.3	54.0
14	27°38.5	-21°03.6	45°23.6	12.0	-20°02.6	-0.2	54.0
15	42°38.3	-21°03.2	59°54.5	12.0	-20°02.8	-0.1	54.0
16	57°38.1	-21°02.7	74°25.5	12.0	-20°02.9	-0.0	54.0
17	72°37.8	-21°02.2	88°56.5	12.0	-20°02.9	0.0	54.0
18	87°37.6	-21°01.8	103°27.4	12.0	-20°02.8	0.1	54.0
19	102°37.4	-21°01.3	117°58.4	12.0	-20°02.7	0.2	54.0
20	117°37.2	-21°00.8	132°29.4	12.0	-20°02.4	0.3	54.0
21	132°37.0	-21°00.4	147°00.3	12.0	-20°02.0	0.4	54.0
22	147°36.7	-20°59.9	161°31.3	12.0	-20°01.5	0.5	54.0
23	162°36.5	-20°59.4	176°02.2	11.9	-20°01.0	0.6	54.0
	SD.=16.3	d=0.5	S.D.=14.7				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:03	09:56	–:–	–:–	14:23	16:16
70	07:48	09:21	–:–	–:–	14:58	16:31
68	07:36	08:56	10:38	13:41	15:23	16:43
66	07:25	08:36	09:56	14:23	15:42	16:54
64	07:16	08:21	09:28	14:51	15:58	17:02
62	07:09	08:07	09:06	15:12	16:11	17:10
60	07:02	07:56	08:49	15:29	16:23	17:17
58	06:56	07:46	08:35	15:44	16:32	17:23
56	06:50	07:38	08:22	15:56	16:41	17:28
54	06:45	07:30	08:12	16:07	16:49	17:33
52	06:40	07:23	08:02	16:17	16:56	17:38
50	06:36	07:16	07:53	16:25	17:02	17:43
45	06:26	07:02	07:35	16:43	17:16	17:52
40	06:17	06:51	07:20	16:58	17:28	18:01
35	06:09	06:40	07:08	17:11	17:38	18:09
30	06:02	06:31	06:57	17:22	17:47	18:17
20	05:47	06:14	06:38	17:40	18:04	18:31
10	05:33	05:59	06:21	17:57	18:20	18:46
0	05:17	05:43	06:05	18:13	18:35	19:01
-10	05:00	05:27	05:50	18:28	18:51	19:18
-20	04:40	05:08	05:32	18:45	19:10	19:38
-30	04:13	04:46	05:13	19:05	19:32	20:04
-35	03:57	04:32	05:01	19:17	19:46	20:21
-40	03:36	04:16	04:48	19:30	20:02	20:41
-45	03:09	03:56	04:32	19:46	20:22	21:08
-50	02:32	03:30	04:12	20:06	20:47	21:45
-52	02:11	03:17	04:02	20:15	21:00	22:06
-54	01:43	03:02	03:52	20:25	21:15	22:33
-56	00:57	02:44	03:40	20:37	21:32	23:16
-58	–:–	02:22	03:25	20:51	21:54	–:–
-60	–:–	01:52	03:09	21:08	22:23	–:–

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	08:41	–:–	–:–	09:46	–:–	–:–
70	07:18	09:03	–:–	11:08	11:02	–:–
68	06:40	08:02	09:09	11:47	12:03	12:35
66	06:14	07:27	08:29	12:15	12:38	13:15
64	05:53	07:02	08:01	12:35	13:03	13:43
62	05:37	06:43	07:40	12:52	13:23	14:04
60	05:23	06:27	07:23	13:06	13:39	14:21
58	05:11	06:13	07:08	13:18	13:53	14:36
56	05:01	06:02	06:56	13:29	14:05	14:48
54	04:52	05:51	06:45	13:38	14:15	14:59
52	04:44	05:42	06:36	13:46	14:24	15:09
50	04:37	05:34	06:27	13:54	14:33	15:17
45	04:22	05:17	06:09	14:10	14:50	15:35
40	04:09	05:03	05:54	14:23	15:04	15:50
35	03:59	04:51	05:42	14:34	15:17	16:03
30	03:49	04:41	05:31	14:44	15:27	16:14
20	03:33	04:23	05:12	15:01	15:45	16:32
10	03:19	04:08	04:56	15:15	16:01	16:49
0	03:06	03:53	04:41	15:29	16:16	17:04
-10	02:53	03:39	04:26	15:43	16:31	17:19
-20	02:40	03:23	04:09	15:57	16:47	17:36
-30	02:24	03:06	03:51	16:14	17:05	17:54
-35	02:15	02:56	03:40	16:24	17:16	18:05
-40	02:05	02:44	03:28	16:35	17:28	18:18
-45	01:53	02:30	03:13	16:49	17:42	18:32
-50	01:38	02:14	02:55	17:05	18:00	18:50
-52	01:31	02:06	02:47	17:12	18:08	18:59
-54	01:23	01:57	02:38	17:21	18:18	19:08
-56	01:15	01:48	02:27	17:30	18:28	19:19
-58	01:05	01:36	02:15	17:41	18:40	19:31
-60	00:55	01:24	02:01	17:54	18:54	19:45

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
13	08:30	08:41	12:08	09:17	21:41	26(11%)
14	08:52	09:03	12:09	10:04	22:28	27(6%)
15	09:14	09:24	12:09	10:52	23:16	28(2%)

January 16, 17 ,18 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	115°22.9	175°43.0	-21°38.4	244°03.9	-17°52.6	248°15.4	-16°30.3	202°00.6	-22°30.8
1	130°25.3	190°42.1	-21°37.8	259°04.8	-17°53.0	263°17.5	-16°30.4	217°02.7	-22°30.8
2	145°27.8	205°41.2	-21°37.3	274°05.7	-17°53.4	278°19.6	-16°30.5	232°04.9	-22°30.8
3	160°30.3	220°40.4	-21°36.7	289°06.6	-17°53.8	293°21.7	-16°30.5	247°07.0	-22°30.8
4	175°32.7	235°39.5	-21°36.2	304°07.5	-17°54.2	308°23.8	-16°30.6	262°09.2	-22°30.7
5	190°35.2	250°38.6	-21°35.6	319°08.3	-17°54.6	323°25.9	-16°30.7	277°11.4	-22°30.7
6	205°37.7	265°37.8	-21°35.1	334°09.2	-17°55.1	338°28.0	-16°30.8	292°13.5	-22°30.7
7	220°40.1	280°36.9	-21°34.5	349°10.1	-17°55.5	353°30.2	-16°30.9	307°15.7	-22°30.7
8	235°42.6	295°36.0	-21°33.9	4°11.0	-17°55.9	8°32.3	-16°31.0	322°17.8	-22°30.7
9	250°45.0	310°35.2	-21°33.4	19°11.9	-17°56.3	23°34.4	-16°31.1	337°20.0	-22°30.7
10	265°47.5	325°34.3	-21°32.8	34°12.8	-17°56.7	38°36.5	-16°31.2	352°22.2	-22°30.7
11	280°50.0	340°33.5	-21°32.3	49°13.7	-17°57.1	53°38.6	-16°31.3	7°24.3	-22°30.7
12	295°52.4	355°32.6	-21°31.7	64°14.6	-17°57.5	68°40.7	-16°31.4	22°26.5	-22°30.7
13	310°54.9	10°31.7	-21°31.2	79°15.5	-17°57.9	83°42.8	-16°31.5	37°28.7	-22°30.7
14	325°57.4	25°30.9	-21°30.6	94°16.4	-17°58.3	98°44.9	-16°31.5	52°30.8	-22°30.7
15	340°59.8	40°30.0	-21°30.0	109°17.3	-17°58.7	113°47.0	-16°31.6	67°33.0	-22°30.7
16	356°02.3	55°29.1	-21°29.5	124°18.2	-17°59.1	128°49.1	-16°31.7	82°35.1	-22°30.7
17	11°04.8	70°28.3	-21°28.9	139°19.1	-17°59.5	143°51.3	-16°31.8	97°37.3	-22°30.7
18	26°07.2	85°27.4	-21°28.3	154°19.9	-17°59.9	158°53.4	-16°31.9	112°39.5	-22°30.7
19	41°09.7	100°26.6	-21°27.8	169°20.8	-18°00.3	173°55.5	-16°32.0	127°41.6	-22°30.7
20	56°12.2	115°25.7	-21°27.2	184°21.7	-18°00.7	188°57.6	-16°32.1	142°43.8	-22°30.7
21	71°14.6	130°24.9	-21°26.6	199°22.6	-18°01.1	203°59.7	-16°32.2	157°45.9	-22°30.7
22	86°17.1	145°24.0	-21°26.1	214°23.5	-18°01.5	219°01.8	-16°32.3	172°48.1	-22°30.7
23	101°19.5	160°23.1	-21°25.5	229°24.4	-18°01.9	234°03.9	-16°32.4	187°50.3	-22°30.6
Mer.pass.:16:15		v-0.9 d0.5 m-3.8		v0.9 d-0.4 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	116°22.0	175°22.3	-21°24.9	244°25.3	-18°02.3	249°06.0	-16°32.4	202°52.4	-22°30.6
1	131°24.5	190°21.4	-21°24.3	259°26.2	-18°02.7	264°08.2	-16°32.5	217°54.6	-22°30.6
2	146°26.9	205°20.6	-21°23.8	274°27.1	-18°03.1	279°10.3	-16°32.6	232°56.8	-22°30.6
3	161°29.4	220°19.7	-21°23.2	289°28.0	-18°03.5	294°12.4	-16°32.7	247°58.9	-22°30.6
4	176°31.9	235°18.9	-21°22.6	304°28.9	-18°03.9	309°14.5	-16°32.8	263°01.1	-22°30.6
5	191°34.3	250°18.0	-21°22.0	319°29.8	-18°04.3	324°16.6	-16°32.9	278°03.2	-22°30.6
6	206°36.8	265°17.1	-21°21.5	334°30.6	-18°04.7	339°18.7	-16°33.0	293°05.4	-22°30.6
7	221°39.3	280°16.3	-21°20.9	349°31.5	-18°05.1	354°20.8	-16°33.1	308°07.6	-22°30.6
8	236°41.7	295°15.4	-21°20.3	4°32.4	-18°05.5	9°23.0	-16°33.2	323°09.7	-22°30.6
9	251°44.2	310°14.6	-21°19.7	19°33.3	-18°05.9	24°25.1	-16°33.2	338°11.9	-22°30.6
10	266°46.7	325°13.7	-21°19.1	34°34.2	-18°06.3	39°27.2	-16°33.3	353°14.1	-22°30.6
11	281°49.1	340°12.9	-21°18.5	49°35.1	-18°06.7	54°29.3	-16°33.4	8°16.2	-22°30.6
12	296°51.6	355°12.0	-21°18.0	64°36.0	-18°07.1	69°31.4	-16°33.5	23°18.4	-22°30.6
13	311°54.0	10°11.2	-21°17.4	79°36.9	-18°07.4	84°33.5	-16°33.6	38°20.5	-22°30.6
14	326°56.5	25°10.3	-21°16.8	94°37.8	-18°07.8	99°35.6	-16°33.7	53°22.7	-22°30.6
15	341°59.0	40°09.5	-21°16.2	109°38.7	-18°08.2	114°37.8	-16°33.8	68°24.9	-22°30.6
16	357°01.4	55°08.6	-21°15.6	124°39.6	-18°08.6	129°39.9	-16°33.9	83°27.0	-22°30.6
17	12°03.9	70°07.8	-21°15.0	139°40.4	-18°09.0	144°42.0	-16°33.9	98°29.2	-22°30.5
18	27°06.4	85°06.9	-21°14.4	154°41.3	-18°09.4	159°44.1	-16°34.0	113°31.4	-22°30.5
19	42°08.8	100°06.1	-21°13.8	169°42.2	-18°09.8	174°46.2	-16°34.1	128°33.5	-22°30.5
20	57°11.3	115°05.2	-21°13.2	184°43.1	-18°10.2	189°48.3	-16°34.2	143°35.7	-22°30.5
21	72°13.8	130°04.4	-21°12.6	199°44.0	-18°10.6	204°50.5	-16°34.3	158°37.9	-22°30.5
22	87°16.2	145°03.5	-21°12.0	214°44.9	-18°11.0	219°52.6	-16°34.4	173°40.0	-22°30.5
23	102°18.7	160°02.7	-21°11.4	229°45.8	-18°11.4	234°54.7	-16°34.5	188°42.2	-22°30.5
Mer.pass.:16:11		v-0.9 d0.6 m-3.8		v0.9 d-0.4 m1.4		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	117°21.1	175°01.9	-21°10.8	244°46.7	-18°11.8	249°56.8	-16°34.6	203°44.3	-22°30.5
1	132°23.6	190°01.0	-21°10.2	259°47.6	-18°12.2	264°58.9	-16°34.6	218°46.5	-22°30.5
2	147°26.1	205°00.2	-21°09.6	274°48.4	-18°12.6	280°01.0	-16°34.7	233°48.7	-22°30.5
3	162°28.5	219°59.3	-21°09.0	289°49.3	-18°13.0	295°03.2	-16°34.8	248°50.8	-22°30.5
4	177°31.0	234°58.5	-21°08.4	304°50.2	-18°13.4	310°05.3	-16°34.9	263°53.0	-22°30.5
5	192°33.5	249°57.6	-21°07.8	319°51.1	-18°13.8	325°07.4	-16°35.0	278°55.2	-22°30.5
6	207°35.9	264°56.8	-21°07.2	334°52.0	-18°14.2	340°09.5	-16°35.1	293°57.3	-22°30.5
7	222°38.4	279°56.0	-21°06.6	349°52.9	-18°14.6	355°11.6	-16°35.2	308°59.5	-22°30.5
8	237°40.9	294°55.1	-21°06.0	4°53.8	-18°14.9	10°13.8	-16°35.3	324°01.7	-22°30.5
9	252°43.3	309°54.3	-21°05.4	19°54.7	-18°15.3	25°15.9	-16°35.3	339°03.8	-22°30.5
10	267°45.8	324°53.4	-21°04.8	34°55.6	-18°15.7	40°18.0	-16°35.4	354°06.0	-22°30.5
11	282°48.3	339°52.6	-21°04.2	49°56.5	-18°16.1	55°20.1	-16°35.5	9°08.1	-22°30.4
12	297°50.7	354°51.7	-21°03.5	64°57.3	-18°16.5	70°22.2	-16°35.6	24°10.3	-22°30.4
13	312°53.2	9°50.9	-21°02.9	79°58.2	-18°16.9	85°24.4	-16°35.7	39°12.5	-22°30.4
14	327°55.6	24°50.1	-21°02.3	94°59.1	-18°17.3	100°26.5	-16°35.8	54°14.6	-22°30.4
15	342°58.1	39°49.2	-21°01.7	110°00.0	-18°17.7	115°28.6	-16°35.9	69°16.8	-22°30.4
16	358°00.6	54°48.4	-21°01.1	125°00.9	-18°18.1	130°30.7	-16°36.0	84°19.0	-22°30.4
17	13°03.0	69°47.6	-21°00.5	140°01.8	-18°18.5	145°32.8	-16°36.0	99°21.1	-22°30.4
18	28°05.5	84°46.7	-20°59.8	155°02.7	-18°18.9	160°35.0	-16°36.1	114°23.3	-22°30.4
19	43°08.0	99°45.9	-20°59.2	170°03.6	-18°19.2	175°37.1	-16°36.2	129°25.5	-22°30.4
20	58°10.4	114°45.0	-20°58.6	185°04.4	-18°19.6	190°39.2	-16°36.3	144°27.6	-22°30.4
21	73°12.9	129°44.2	-20°58.0	200°05.3	-18°20.0	205°41.3	-16°36.4	159°29.8	-22°30.4
22	88°15.4	144°43.4	-20°57.4	215°06.2	-18°20.4	220°43.5	-16°36.5	174°32.0	-22°30.4
23	103°17.8	159°42.5	-20°56.7	230°07.1	-18°20.8	235°45.6	-16°36.6	189°34.1	-22°30.4
Mer.pass.:16:07		v-0.8 d0.6 m-3.8		v0.9 d-0.4 m1.3		v2.1 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.4
Ankaa	353°12.8	-42°12.8
Schedar	349°37.0	56°38.3
Diphda	348°52.8	-17°53.5
Achernar	335°24.5	-57°09.2
Hamal	327°57.2	23°32.8
Polaris	316°12.5	89°20.6
Akamar	315°15.9	-40°14.4
Menkar	314°11.7	4°09.4
Mirfak	308°35.6	49°55.5
Aldebaran	290°45.6	16°32.6
Rigel	281°08.8	-8°11.1
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°42.9	-1°11.7
Betelgeuse	270°57.6	7°24.4
Canopus	263°54.2	-52°42.6
Sirius	258°30.5	-16°44.5
Adara	255°09.7	-29°00.0
Procyon	244°56.1	5°10.7
Pollux	243°23.5	27°58.8
Avior	234°16.1	-59°34.1
Suhail	222°49.7	-43°30.3
Miaplacidus	221°38.1	-69°47.4
Alphard	217°52.7	-8°44.3
Regulus	207°39.9	11°52.6
Dubhe	193°47.5	61°39.0
Denebola	182°30.3	14°28.2
Gienah	175°48.9	-17°38.4
Acrux	173°05.5	-63°11.6
Gacrux	171°57.2	-57°12.5
Alioth	166°18.0	55°51.5
Spica	158°27.9	-11°15.2
Alcaid	152°56.5	49°13.2
Hadar	148°43.4	-60°27.2
Menkent	148°03.9	-36°27.2
Arcturus	145°52.8	19°05.6
Rigil Kent.	139°47.6	-60°54.1
Zubenelg.	137°02.1	-16°06.8
Kochab	137°20.6	74°04.7
Alphecca	126°08.6	26°39.3
Antares	112°22.7	-26°28.0
Atria	107°22.1	-69°03.2
Sabik	102°09.2	-15°44.6
Shaula	96°18.0	-37°06.7
Rasalhague	96°03.9	12°32.9
Etamin	90°45.2	51°29.2
Kaus Aust.	83°40.1	-34°22.3
Vega	80°37.3	38°48.0
Nunki	75°54.8	-26°16.3
Altair	62°05.6	8°55.0
Peacock	53°15.0	-56°40.6
Deneb	49°29.8	45°20.8
Enif	33°44.4	9°57.5
Alnair	27°40.3	-46°52.5
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.9
Markab	13°35.4	15°18.1

2018/1/1	**SHA**	**Mer.pass**
Venus	60°20.1	12:18
Mars	128°41.0	07:43
Jupiter	132°52.5	07:26
Saturn	86°37.7	10:30

2018/1/1	**SHA**	**Mer.pass**
Venus	59°00.3	12:19
Mars	128°03.3	07:42
Jupiter	132°44.0	07:23
Saturn	86°30.4	10:27

2018/1/1	**SHA**	**Mer.pass**
Venus	57°40.7	12:21
Mars	127°25.5	07:40
Jupiter	132°35.7	07:19
Saturn	86°23.2	10:24

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°36.3	-20°59.0	190°33.2	11.9	-20°00.3	0.7	54.0
1	192°36.1	-20°58.5	205°04.1	11.9	-19°59.6	0.8	54.0
2	207°35.9	-20°58.0	219°35.1	11.9	-19°58.8	0.9	54.0
3	222°35.7	-20°57.5	234°06.0	11.9	-19°57.8	1.0	54.0
4	237°35.5	-20°57.1	248°36.9	11.9	-19°56.8	1.1	54.0
5	252°35.2	-20°56.6	263°07.9	12.0	-19°55.7	1.2	54.0
6	267°35.0	-20°56.1	277°38.9	12.0	-19°54.5	1.3	54.0
7	282°34.8	-20°55.6	292°09.8	12.0	-19°53.2	1.3	54.0
8	297°34.6	-20°55.2	306°40.8	12.0	-19°51.8	1.4	54.0
9	312°34.4	-20°54.7	321°11.7	12.0	-19°50.3	1.5	54.0
10	327°34.2	-20°54.2	335°42.7	12.0	-19°48.7	1.6	54.0
11	342°34.0	-20°53.7	350°13.7	12.0	-19°47.1	1.7	54.0
12	357°33.7	-20°53.2	4°44.6	12.0	-19°45.3	1.8	54.0
13	12°33.5	-20°52.8	19°15.6	12.0	-19°43.5	1.9	54.0
14	27°33.3	-20°52.3	33°46.6	12.0	-19°41.5	2.0	54.0
15	42°33.1	-20°51.8	48°17.6	12.0	-19°39.5	2.1	54.1
16	57°32.9	-20°51.3	62°48.6	12.0	-19°37.4	2.2	54.1
17	72°32.7	-20°50.8	77°19.6	12.0	-19°35.1	2.3	54.1
18	87°32.5	-20°50.3	91°50.6	12.0	-19°32.8	2.4	54.1
19	102°32.3	-20°49.9	106°21.6	12.0	-19°30.4	2.4	54.1
20	117°32.0	-20°49.4	120°52.6	12.0	-19°27.9	2.5	54.1
21	132°31.8	-20°48.9	135°23.7	12.0	-19°25.4	2.6	54.1
22	147°31.6	-20°48.4	149°54.7	12.0	-19°22.7	2.7	54.1
23	162°31.4	-20°47.9	164°25.8	12.1	-19°19.9	2.8	54.1
	SD.=16.3	d=0.5	S.D.=14.7				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°31.2	-20°47.4	178°56.8	12.1	-19°17.1	2.9	54.1
1	192°31.0	-20°46.9	193°27.9	12.1	-19°14.1	3.0	54.1
2	207°30.8	-20°46.5	207°59.0	12.1	-19°11.1	3.1	54.1
3	222°30.6	-20°46.0	222°30.1	12.1	-19°08.0	3.2	54.1
4	237°30.4	-20°45.5	237°01.2	12.1	-19°04.8	3.3	54.1
5	252°30.2	-20°45.0	251°32.3	12.1	-19°01.5	3.3	54.1
6	267°30.0	-20°44.5	266°03.4	12.1	-18°58.1	3.4	54.2
7	282°29.7	-20°44.0	280°34.6	12.2	-18°54.6	3.5	54.2
8	297°29.5	-20°43.5	295°05.7	12.2	-18°51.0	3.6	54.2
9	312°29.3	-20°43.0	309°36.9	12.2	-18°47.4	3.7	54.2
10	327°29.1	-20°42.5	324°08.1	12.2	-18°43.6	3.8	54.2
11	342°28.9	-20°42.0	338°39.3	12.2	-18°39.8	3.9	54.2
12	357°28.7	-20°41.5	353°10.5	12.2	-18°35.9	4.0	54.2
13	12°28.5	-20°41.0	7°41.7	12.2	-18°31.9	4.0	54.2
14	27°28.3	-20°40.5	22°13.0	12.3	-18°27.8	4.1	54.2
15	42°28.1	-20°40.0	36°44.2	12.3	-18°23.6	4.2	54.2
16	57°27.9	-20°39.5	51°15.5	12.3	-18°19.4	4.3	54.2
17	72°27.7	-20°39.0	65°46.8	12.3	-18°15.0	4.4	54.2
18	87°27.5	-20°38.5	80°18.1	12.3	-18°10.6	4.5	54.3
19	102°27.3	-20°38.0	94°49.4	12.3	-18°06.1	4.6	54.3
20	117°27.1	-20°37.5	109°20.8	12.3	-18°01.4	4.6	54.3
21	132°26.9	-20°37.0	123°52.1	12.4	-17°56.8	4.7	54.3
22	147°26.7	-20°36.5	138°23.5	12.4	-17°52.0	4.8	54.3
23	162°26.5	-20°36.0	152°54.9	12.4	-17°47.1	4.9	54.3
	SD.=16.3	d=0.5	S.D.=14.8				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°26.3	-20°35.5	167°26.3	12.4	-17°42.2	5.0	54.3
1	192°26.1	-20°35.0	181°57.7	12.4	-17°37.2	5.1	54.3
2	207°25.9	-20°34.5	196°29.2	12.5	-17°32.1	5.1	54.3
3	222°25.7	-20°34.0	211°00.6	12.5	-17°26.9	5.2	54.3
4	237°25.5	-20°33.5	225°32.1	12.5	-17°21.6	5.3	54.4
5	252°25.3	-20°33.0	240°03.6	12.5	-17°16.3	5.4	54.4
6	267°25.1	-20°32.5	254°35.2	12.5	-17°10.8	5.5	54.4
7	282°24.9	-20°32.0	269°06.7	12.6	-17°05.3	5.5	54.4
8	297°24.7	-20°31.4	283°38.3	12.6	-16°59.7	5.6	54.4
9	312°24.5	-20°30.9	298°09.8	12.6	-16°54.1	5.7	54.4
10	327°24.3	-20°30.4	312°41.4	12.6	-16°48.3	5.8	54.4
11	342°24.1	-20°29.9	327°13.1	12.6	-16°42.5	5.9	54.4
12	357°23.9	-20°29.4	341°44.7	12.6	-16°36.6	5.9	54.4
13	12°23.7	-20°28.9	356°16.3	12.7	-16°30.6	6.0	54.5
14	27°23.5	-20°28.4	10°48.0	12.7	-16°24.6	6.1	54.5
15	42°23.3	-20°27.9	25°19.7	12.7	-16°18.4	6.2	54.5
16	57°23.1	-20°27.3	39°51.4	12.7	-16°12.2	6.3	54.5
17	72°22.9	-20°26.8	54°23.2	12.7	-16°05.9	6.3	54.5
18	87°22.7	-20°26.3	68°54.9	12.8	-15°59.6	6.4	54.5
19	102°22.5	-20°25.8	83°26.7	12.8	-15°53.1	6.5	54.5
20	117°22.3	-20°25.3	97°58.5	12.8	-15°46.6	6.6	54.5
21	132°22.1	-20°24.8	112°30.3	12.8	-15°40.0	6.6	54.6
22	147°21.9	-20°24.2	127°02.2	12.9	-15°33.4	6.7	54.6
23	162°21.7	-20°23.7	141°34.1	12.9	-15°26.6	6.8	54.6
	SD.=16.3	d=0.5	S.D.=14.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:56	09:43	–:–	–:–	14:38	16:25
70	07:42	09:12	11:42	12:39	15:09	16:39
68	07:30	08:49	10:24	13:57	15:32	16:51
66	07:21	08:30	09:47	14:34	15:50	17:00
64	07:12	08:16	09:21	14:60	16:05	17:08
62	07:05	08:03	09:01	15:20	16:18	17:16
60	06:59	07:52	08:44	15:36	16:28	17:22
58	06:53	07:43	08:31	15:50	16:38	17:28
56	06:48	07:35	08:19	16:02	16:46	17:33
54	06:43	07:27	08:09	16:12	16:53	17:38
52	06:38	07:21	07:59	16:21	17:00	17:42
50	06:34	07:14	07:51	16:30	17:06	17:46
45	06:25	07:01	07:34	16:47	17:20	17:56
40	06:16	06:50	07:19	17:01	17:31	18:04
35	06:09	06:40	07:07	17:13	17:41	18:12
30	06:01	06:31	06:56	17:24	17:50	18:19
20	05:47	06:14	06:38	17:42	18:06	18:33
10	05:33	05:59	06:22	17:59	18:21	18:47
0	05:19	05:44	06:06	18:14	18:36	19:02
-10	05:02	05:28	05:51	18:29	18:52	19:18
-20	04:42	05:10	05:34	18:46	19:09	19:38
-30	04:16	04:49	05:15	19:05	19:31	20:03
-35	04:00	04:35	05:04	19:16	19:44	20:19
-40	03:40	04:19	04:51	19:29	20:00	20:39
-45	03:14	04:00	04:35	19:44	20:19	21:05
-50	02:38	03:35	04:16	20:03	20:44	21:40
-52	02:19	03:23	04:07	20:12	20:56	21:60
-54	01:53	03:08	03:57	20:22	21:10	22:24
-56	01:15	02:51	03:45	20:34	21:27	23:01
-58	–:–	02:30	03:32	20:47	21:48	–:–
-60	–:–	02:03	03:16	21:02	22:14	–:–

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	–:–	–:–	11:43	–:–	–:–	14:59
70	11:12	11:01	10:55	12:12	14:02	15:46
68	09:51	10:14	10:24	13:32	14:49	16:16
66	09:14	09:43	10:01	14:10	15:19	16:38
64	08:47	09:20	09:43	14:36	15:42	16:56
62	08:26	09:02	09:28	14:57	15:60	17:10
60	08:09	08:47	09:16	15:14	16:15	17:23
58	07:55	08:34	09:05	15:28	16:27	17:33
56	07:43	08:23	08:55	15:40	16:38	17:42
54	07:32	08:13	08:47	15:50	16:48	17:50
52	07:23	08:04	08:39	15:59	16:56	17:57
50	07:15	07:56	08:32	16:08	17:04	18:04
45	06:57	07:39	08:18	16:26	17:20	18:18
40	06:42	07:26	08:06	16:40	17:33	18:29
35	06:30	07:14	07:55	16:52	17:45	18:39
30	06:19	07:04	07:46	17:03	17:54	18:47
20	06:00	06:46	07:31	17:21	18:11	19:02
10	05:44	06:31	07:17	17:37	18:26	19:15
0	05:29	06:17	07:04	17:52	18:40	19:27
-10	05:14	06:02	06:51	18:07	18:53	19:38
-20	04:57	05:47	06:38	18:23	19:08	19:51
-30	04:39	05:29	06:22	18:41	19:24	20:05
-35	04:28	05:19	06:13	18:51	19:34	20:14
-40	04:16	05:07	06:02	19:03	19:45	20:23
-45	04:01	04:53	05:50	19:17	19:58	20:34
-50	03:43	04:37	05:35	19:35	20:14	20:47
-52	03:35	04:29	05:28	19:43	20:21	20:53
-54	03:25	04:20	05:20	19:52	20:29	21:00
-56	03:15	04:10	05:11	20:02	20:38	21:08
-58	03:02	03:58	05:01	20:14	20:48	21:16
-60	02:48	03:45	04:50	20:27	21:00	21:26

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
16	09:35	09:45	12:09	11:40	00:04	29(0%)
17	09:55	10:05	12:10	12:28	00:04	0(0%)
18	10:15	10:25	12:10	13:15	00:51	1(2%)

January 19, 20 ,21 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	118°20.3	174°41.7	-20°56.1	245°08.0	-18°21.2	250°47.7	-16°36.6	204°36.3	-22°30.4
1	133°22.8	189°40.9	-20°55.5	260°08.9	-18°21.6	265°49.8	-16°36.7	219°38.5	-22°30.4
2	148°25.2	204°40.0	-20°54.9	275°09.8	-18°22.0	280°51.9	-16°36.8	234°40.6	-22°30.4
3	163°27.7	219°39.2	-20°54.2	290°10.7	-18°22.4	295°54.1	-16°36.9	249°42.8	-22°30.4
4	178°30.1	234°38.4	-20°53.6	305°11.6	-18°22.7	310°56.2	-16°37.0	264°44.9	-22°30.4
5	193°32.6	249°37.5	-20°53.0	320°12.4	-18°23.1	325°58.3	-16°37.1	279°47.1	-22°30.3
6	208°35.1	264°36.7	-20°52.3	335°13.3	-18°23.5	341°00.4	-16°37.2	294°49.3	-22°30.3
7	223°37.5	279°35.9	-20°51.7	350°14.2	-18°23.9	356°02.6	-16°37.2	309°51.4	-22°30.3
8	238°40.0	294°35.0	-20°51.1	5°15.1	-18°24.3	11°04.7	-16°37.3	324°53.6	-22°30.3
9	253°42.5	309°34.2	-20°50.4	20°16.0	-18°24.7	26°06.8	-16°37.4	339°55.8	-22°30.3
10	268°44.9	324°33.4	-20°49.8	35°16.9	-18°25.1	41°08.9	-16°37.5	354°57.9	-22°30.3
11	283°47.4	339°32.6	-20°49.2	50°17.8	-18°25.5	56°11.1	-16°37.6	10°00.1	-22°30.3
12	298°49.9	354°31.7	-20°48.5	65°18.7	-18°25.8	71°13.2	-16°37.7	25°02.3	-22°30.3
13	313°52.3	9°30.9	-20°47.9	80°19.5	-18°26.2	86°15.3	-16°37.8	40°04.4	-22°30.3
14	328°54.8	24°30.1	-20°47.2	95°20.4	-18°26.6	101°17.4	-16°37.8	55°06.6	-22°30.3
15	343°57.2	39°29.2	-20°46.6	110°21.3	-18°27.0	116°19.6	-16°37.9	70°08.8	-22°30.3
16	358°59.7	54°28.4	-20°46.0	125°22.2	-18°27.4	131°21.7	-16°38.0	85°10.9	-22°30.3
17	14°02.2	69°27.6	-20°45.3	140°23.1	-18°27.8	146°23.8	-16°38.1	100°13.1	-22°30.3
18	29°04.6	84°26.8	-20°44.7	155°24.0	-18°28.2	161°26.0	-16°38.2	115°15.3	-22°30.3
19	44°07.1	99°25.9	-20°44.0	170°24.9	-18°28.5	176°28.1	-16°38.3	130°17.4	-22°30.3
20	59°09.6	114°25.1	-20°43.4	185°25.7	-18°28.9	191°30.2	-16°38.3	145°19.6	-22°30.3
21	74°12.0	129°24.3	-20°42.7	200°26.6	-18°29.3	206°32.3	-16°38.4	160°21.8	-22°30.2
22	89°14.5	144°23.5	-20°42.1	215°27.5	-18°29.7	221°34.5	-16°38.5	175°23.9	-22°30.2
23	104°17.0	159°22.7	-20°41.4	230°28.4	-18°30.1	236°36.6	-16°38.6	190°26.1	-22°30.2
Mer.pass.:16:04		v-0.8 d0.6 m-3.8		v0.9 d-0.4 m1.3		v2.1 d-0.1 m-1.8		v2.2 d0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	119°19.4	174°21.8	-20°40.8	245°29.3	-18°30.5	251°38.7	-16°38.7	205°28.3	-22°30.2
1	134°21.9	189°21.0	-20°40.1	260°30.2	-18°30.8	266°40.8	-16°38.8	220°30.4	-22°30.2
2	149°24.4	204°20.2	-20°39.5	275°31.1	-18°31.2	281°43.0	-16°38.8	235°32.6	-22°30.2
3	164°26.8	219°19.4	-20°38.8	290°32.0	-18°31.6	296°45.1	-16°38.9	250°34.8	-22°30.2
4	179°29.3	234°18.5	-20°38.2	305°32.8	-18°32.0	311°47.2	-16°39.0	265°36.9	-22°30.2
5	194°31.7	249°17.7	-20°37.5	320°33.7	-18°32.4	326°49.4	-16°39.1	280°39.1	-22°30.2
6	209°34.2	264°16.9	-20°36.8	335°34.6	-18°32.8	341°51.5	-16°39.2	295°41.3	-22°30.2
7	224°36.7	279°16.1	-20°36.2	350°35.5	-18°33.1	356°53.6	-16°39.3	310°43.4	-22°30.2
8	239°39.1	294°15.3	-20°35.5	5°36.4	-18°33.5	11°55.8	-16°39.3	325°45.6	-22°30.2
9	254°41.6	309°14.4	-20°34.9	20°37.3	-18°33.9	26°57.9	-16°39.4	340°47.8	-22°30.2
10	269°44.1	324°13.6	-20°34.2	35°38.2	-18°34.3	42°00.0	-16°39.5	355°49.9	-22°30.2
11	284°46.5	339°12.8	-20°33.5	50°39.0	-18°34.7	57°02.1	-16°39.6	10°52.1	-22°30.2
12	299°49.0	354°12.0	-20°32.9	65°39.9	-18°35.0	72°04.3	-16°39.7	25°54.3	-22°30.2
13	314°51.5	9°11.2	-20°32.2	80°40.8	-18°35.4	87°06.4	-16°39.8	40°56.4	-22°30.2
14	329°53.9	24°10.4	-20°31.5	95°41.7	-18°35.8	102°08.5	-16°39.8	55°58.6	-22°30.1
15	344°56.4	39°09.6	-20°30.9	110°42.6	-18°36.2	117°10.7	-16°39.9	71°00.8	-22°30.1
16	359°58.9	54°08.7	-20°30.2	125°43.5	-18°36.6	132°12.8	-16°40.0	86°02.9	-22°30.1
17	15°01.3	69°07.9	-20°29.5	140°44.3	-18°36.9	147°14.9	-16°40.1	101°05.1	-22°30.1
18	30°03.8	84°07.1	-20°28.9	155°45.2	-18°37.3	162°17.1	-16°40.2	116°07.3	-22°30.1
19	45°06.2	99°06.3	-20°28.2	170°46.1	-18°37.7	177°19.2	-16°40.3	131°09.4	-22°30.1
20	60°08.7	114°05.5	-20°27.5	185°47.0	-18°38.1	192°21.3	-16°40.3	146°11.6	-22°30.1
21	75°11.2	129°04.7	-20°26.8	200°47.9	-18°38.5	207°23.5	-16°40.4	161°13.8	-22°30.1
22	90°13.6	144°03.9	-20°26.2	215°48.8	-18°38.8	222°25.6	-16°40.5	176°15.9	-22°30.1
23	105°16.1	159°03.1	-20°25.5	230°49.7	-18°39.2	237°27.7	-16°40.6	191°18.1	-22°30.1
Mer.pass.:16:00		v-0.8 d0.7 m-3.8		v0.9 d-0.4 m1.3		v2.1 d-0.1 m-1.8		v2.2 d0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	120°18.6	174°02.2	-20°24.8	245°50.5	-18°39.6	252°29.9	-16°40.7	206°20.3	-22°30.1
1	135°21.0	189°01.4	-20°24.1	260°51.4	-18°40.0	267°32.0	-16°40.8	221°22.5	-22°30.1
2	150°23.5	204°00.6	-20°23.5	275°52.3	-18°40.4	282°34.1	-16°40.8	236°24.6	-22°30.1
3	165°26.0	218°59.8	-20°22.8	290°53.2	-18°40.7	297°36.3	-16°40.9	251°26.8	-22°30.1
4	180°28.4	233°59.0	-20°22.1	305°54.1	-18°41.1	312°38.4	-16°41.0	266°29.0	-22°30.1
5	195°30.9	248°58.2	-20°21.4	320°55.0	-18°41.5	327°40.5	-16°41.1	281°31.1	-22°30.1
6	210°33.3	263°57.4	-20°20.7	335°55.8	-18°41.9	342°42.7	-16°41.2	296°33.3	-22°30.0
7	225°35.8	278°56.6	-20°20.1	350°56.7	-18°42.2	357°44.8	-16°41.3	311°35.5	-22°30.0
8	240°38.3	293°55.8	-20°19.4	5°57.6	-18°42.6	12°46.9	-16°41.3	326°37.6	-22°30.0
9	255°40.7	308°55.0	-20°18.7	20°58.5	-18°43.0	27°49.1	-16°41.4	341°39.8	-22°30.0
10	270°43.2	323°54.2	-20°18.0	35°59.4	-18°43.4	42°51.2	-16°41.5	356°42.0	-22°30.0
11	285°45.7	338°53.4	-20°17.3	51°00.3	-18°43.7	57°53.4	-16°41.6	11°44.1	-22°30.0
12	300°48.1	353°52.6	-20°16.6	66°01.2	-18°44.1	72°55.5	-16°41.7	26°46.3	-22°30.0
13	315°50.6	8°51.8	-20°15.9	81°02.0	-18°44.5	87°57.6	-16°41.7	41°48.5	-22°30.0
14	330°53.1	23°50.9	-20°15.2	96°02.9	-18°44.9	102°59.8	-16°41.8	56°50.6	-22°30.0
15	345°55.5	38°50.1	-20°14.5	111°03.8	-18°45.2	118°01.9	-16°41.9	71°52.8	-22°30.0
16	0°58.0	53°49.3	-20°13.8	126°04.7	-18°45.6	133°04.0	-16°42.0	86°55.0	-22°30.0
17	16°00.5	68°48.5	-20°13.2	141°05.6	-18°46.0	148°06.2	-16°42.1	101°57.1	-22°30.0
18	31°02.9	83°47.7	-20°12.5	156°06.5	-18°46.4	163°08.3	-16°42.1	116°59.3	-22°30.0
19	46°05.4	98°46.9	-20°11.8	171°07.3	-18°46.7	178°10.4	-16°42.2	132°01.5	-22°30.0
20	61°07.8	113°46.1	-20°11.1	186°08.2	-18°47.1	193°12.6	-16°42.3	147°03.7	-22°30.0
21	76°10.3	128°45.3	-20°10.4	201°09.1	-18°47.5	208°14.7	-16°42.4	162°05.8	-22°30.0
22	91°12.8	143°44.5	-20°09.7	216°10.0	-18°47.9	223°16.9	-16°42.5	177°08.0	-22°29.9
23	106°15.2	158°43.7	-20°09.0	231°10.9	-18°48.2	238°19.0	-16°42.5	192°10.2	-22°29.9
Mer.pass.:15:56		v-0.8 d0.7 m-3.8		v0.9 d-0.4 m1.3		v2.1 d-0.1 m-1.8		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.4
Ankaa	353°12.8	-42°12.8
Schedar	349°37.1	56°38.3
Diphda	348°52.8	-17°53.5
Achernar	335°24.6	-57°09.2
Hamal	327°57.2	23°32.8
Polaris	316°13.9	89°20.6
Akamar	315°15.9	-40°14.4
Menkar	314°11.7	4°09.4
Mirfak	308°35.6	49°55.5
Aldebaran	290°45.6	16°32.6
Rigel	281°08.8	-8°11.1
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°42.9	-1°11.7
Betelgeuse	270°57.6	7°24.4
Canopus	263°54.2	-52°42.6
Sirius	258°30.5	-16°44.5
Adara	255°09.7	-29°00.1
Procyon	244°56.1	5°10.7
Pollux	243°23.5	27°58.8
Avior	234°16.1	-59°34.1
Suhail	222°49.7	-43°30.4
Miaplacidus	221°38.1	-69°47.4
Alphard	217°52.7	-8°44.3
Regulus	207°39.9	11°52.6
Dubhe	193°47.5	61°39.0
Denebola	182°30.3	14°28.2
Gienah	175°48.9	-17°38.4
Acrux	173°05.5	-63°11.6
Gacrux	171°57.1	-57°12.5
Alioth	166°17.9	55°51.5
Spica	158°27.9	-11°15.2
Alcaid	152°56.5	49°13.2
Hadar	148°43.4	-60°27.2
Menkent	148°03.9	-36°27.2
Arcturus	145°52.8	19°05.6
Rigil Kent.	139°47.6	-60°54.1
Zubenelg.	137°02.0	-16°06.8
Kochab	137°20.5	74°04.7
Alphecca	126°08.6	26°39.2
Antares	112°22.6	-26°28.0
Atria	107°22.0	-69°03.2
Sabik	102°09.2	-15°44.6
Shaula	96°18.0	-37°06.7
Rasalhague	96°03.9	12°32.9
Etamin	90°45.2	51°29.2
Kaus Aust.	83°40.0	-34°22.3
Vega	80°37.3	38°48.0
Nunki	75°54.8	-26°16.3
Altair	62°05.6	8°55.0
Peacock	53°15.0	-56°40.6
Deneb	49°29.8	45°20.8
Enif	33°44.4	9°57.5
Alnair	27°40.3	-46°52.5
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.9
Markab	13°35.5	15°18.1

2018/1/1	**SHA**	**Mer.pass**
Venus	56°21.4	12:22
Mars	126°47.7	07:39
Jupiter	132°27.4	07:16
Saturn	86°16.0	10:20

2018/1/2	**SHA**	**Mer.pass**
Venus	55°02.4	12:23
Mars	126°09.9	07:38
Jupiter	132°19.3	07:12
Saturn	86°08.8	10:17

2018/1/2	**SHA**	**Mer.pass**
Venus	53°43.7	12:25
Mars	125°32.0	07:36
Jupiter	132°11.3	07:09
Saturn	86°01.7	10:13

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°21.5	-20°23.2	156°05.9	12.9	-15°19.8	6.8	54.6
1	192°21.3	-20°22.7	170°37.8	12.9	-15°12.9	6.9	54.6
2	207°21.1	-20°22.2	185°09.8	12.9	-15°06.0	7.0	54.6
3	222°20.9	-20°21.6	199°41.7	13.0	-14°59.0	7.1	54.6
4	237°20.7	-20°21.1	214°13.7	13.0	-14°51.9	7.1	54.6
5	252°20.5	-20°20.6	228°45.6	13.0	-14°44.7	7.2	54.7
6	267°20.4	-20°20.1	243°17.7	13.0	-14°37.5	7.3	54.7
7	282°20.2	-20°19.5	257°49.7	13.0	-14°30.2	7.3	54.7
8	297°20.0	-20°19.0	272°21.7	13.1	-14°22.8	7.4	54.7
9	312°19.8	-20°18.5	286°53.8	13.1	-14°15.4	7.5	54.7
10	327°19.6	-20°18.0	301°25.9	13.1	-14°07.9	7.5	54.7
11	342°19.4	-20°17.4	315°58.0	13.1	-14°00.3	7.6	54.7
12	357°19.2	-20°16.9	330°30.1	13.1	-13°52.6	7.7	54.8
13	12°19.0	-20°16.4	345°02.2	13.2	-13°44.9	7.7	54.8
14	27°18.8	-20°15.8	359°34.4	13.2	-13°37.2	7.8	54.8
15	42°18.6	-20°15.3	14°06.6	13.2	-13°29.3	7.9	54.8
16	57°18.4	-20°14.8	28°38.8	13.2	-13°21.4	7.9	54.8
17	72°18.3	-20°14.2	43°11.0	13.2	-13°13.5	8.0	54.8
18	87°18.1	-20°13.7	57°43.2	13.2	-13°05.5	8.1	54.9
19	102°17.9	-20°13.2	72°15.5	13.3	-12°57.4	8.1	54.9
20	117°17.7	-20°12.6	86°47.7	13.3	-12°49.2	8.2	54.9
21	132°17.5	-20°12.1	101°20.0	13.3	-12°41.0	8.2	54.9
22	147°17.3	-20°11.6	115°52.3	13.3	-12°32.7	8.3	54.9
23	162°17.1	-20°11.0	130°24.6	13.3	-12°24.4	8.4	54.9
	SD.=16.3	d=0.5			S.D.=14.9		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°16.9	-20°10.5	144°57.0	13.3	-12°16.0	8.4	55.0
1	192°16.8	-20°10.0	159°29.3	13.4	-12°07.6	8.5	55.0
2	207°16.6	-20°09.4	174°01.7	13.4	-11°59.1	8.5	55.0
3	222°16.4	-20°08.9	188°34.1	13.4	-11°50.5	8.6	55.0
4	237°16.2	-20°08.3	203°06.5	13.4	-11°41.9	8.7	55.0
5	252°16.0	-20°07.8	217°38.9	13.4	-11°33.2	8.7	55.0
6	267°15.8	-20°07.3	232°11.3	13.4	-11°24.4	8.8	55.1
7	282°15.6	-20°06.7	246°43.8	13.5	-11°15.6	8.8	55.1
8	297°15.5	-20°06.2	261°16.2	13.5	-11°06.8	8.9	55.1
9	312°15.3	-20°05.6	275°48.7	13.5	-10°57.9	8.9	55.1
10	327°15.1	-20°05.1	290°21.2	13.5	-10°48.9	9.0	55.1
11	342°14.9	-20°04.6	304°53.7	13.5	-10°39.9	9.0	55.1
12	357°14.7	-20°04.0	319°26.2	13.5	-10°30.9	9.1	55.2
13	12°14.5	-20°03.5	333°58.7	13.5	-10°21.8	9.1	55.2
14	27°14.4	-20°02.9	348°31.3	13.5	-10°12.6	9.2	55.2
15	42°14.2	-20°02.4	3°03.8	13.6	-10°03.4	9.2	55.2
16	57°14.0	-20°01.8	17°36.4	13.6	-9°54.1	9.3	55.2
17	72°13.8	-20°01.3	32°08.9	13.6	-9°44.8	9.3	55.3
18	87°13.6	-20°00.7	46°41.5	13.6	-9°35.4	9.4	55.3
19	102°13.5	-20°00.2	61°14.1	13.6	-9°26.0	9.4	55.3
20	117°13.3	-19°59.6	75°46.7	13.6	-9°16.6	9.5	55.3
21	132°13.1	-19°59.1	90°19.3	13.6	-9°07.1	9.5	55.3
22	147°12.9	-19°58.5	104°51.9	13.6	-8°57.5	9.6	55.4
23	162°12.7	-19°58.0	119°24.5	13.6	-8°47.9	9.6	55.4
	SD.=16.3	d=0.5			S.D.=15.0		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°12.6	-19°57.4	133°57.2	13.6	-8°38.3	9.7	55.4
1	192°12.4	-19°56.9	148°29.8	13.6	-8°28.6	9.7	55.4
2	207°12.2	-19°56.3	163°02.4	13.6	-8°18.8	9.8	55.4
3	222°12.0	-19°55.8	177°35.1	13.6	-8°09.1	9.8	55.5
4	237°11.8	-19°55.2	192°07.7	13.7	-7°59.2	9.8	55.5
5	252°11.7	-19°54.7	206°40.4	13.7	-7°49.4	9.9	55.5
6	267°11.5	-19°54.1	221°13.1	13.7	-7°39.5	9.9	55.5
7	282°11.3	-19°53.5	235°45.7	13.7	-7°29.5	10.0	55.5
8	297°11.1	-19°53.0	250°18.4	13.7	-7°19.6	10.0	55.6
9	312°11.0	-19°52.4	264°51.0	13.7	-7°09.5	10.0	55.6
10	327°10.8	-19°51.9	279°23.7	13.7	-6°59.5	10.1	55.6
11	342°10.6	-19°51.3	293°56.4	13.7	-6°49.4	10.1	55.6
12	357°10.4	-19°50.7	308°29.1	13.7	-6°39.2	10.2	55.6
13	12°10.3	-19°50.2	323°01.7	13.7	-6°29.1	10.2	55.7
14	27°10.1	-19°49.6	337°34.4	13.7	-6°18.9	10.2	55.7
15	42°09.9	-19°49.1	352°07.1	13.7	-6°08.6	10.3	55.7
16	57°09.7	-19°48.5	6°39.7	13.7	-5°58.3	10.3	55.7
17	72°09.6	-19°47.9	21°12.4	13.7	-5°48.0	10.3	55.8
18	87°09.4	-19°47.4	35°45.0	13.7	-5°37.7	10.4	55.8
19	102°09.2	-19°46.8	50°17.7	13.7	-5°27.3	10.4	55.8
20	117°09.1	-19°46.2	64°50.3	13.6	-5°16.9	10.4	55.8
21	132°08.9	-19°45.7	79°23.0	13.6	-5°06.5	10.5	55.8
22	147°08.7	-19°45.1	93°55.6	13.6	-4°56.0	10.5	55.9
23	162°08.5	-19°44.5	108°28.2	13.6	-4°45.5	10.5	55.9
	SD.=16.3	d=0.6			S.D.=15.1		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:48	09:31	–:–	–:–	14:52	16:35
70	07:35	09:02	11:05	13:18	15:21	16:48
68	07:24	08:41	10:10	14:13	15:42	16:59
66	07:16	08:24	09:37	14:46	15:59	17:07
64	07:08	08:10	09:13	15:09	16:13	17:15
62	07:01	07:58	08:55	15:28	16:24	17:22
60	06:55	07:48	08:39	15:43	16:35	17:28
58	06:50	07:39	08:26	15:56	16:43	17:33
56	06:45	07:31	08:15	16:08	16:51	17:38
54	06:40	07:24	08:05	16:18	16:58	17:42
52	06:36	07:18	07:56	16:26	17:05	17:47
50	06:32	07:12	07:48	16:34	17:11	17:50
45	06:23	06:59	07:31	16:51	17:23	17:59
40	06:15	06:48	07:18	17:05	17:34	18:07
35	06:08	06:39	07:06	17:16	17:44	18:15
30	06:01	06:30	06:56	17:27	17:52	18:21
20	05:47	06:14	06:38	17:44	18:08	18:35
10	05:34	05:60	06:22	17:60	18:22	18:48
0	05:20	05:45	06:07	18:15	18:37	19:02
-10	05:04	05:30	05:53	18:29	18:52	19:18
-20	04:44	05:13	05:36	18:45	19:09	19:37
-30	04:19	04:51	05:18	19:04	19:30	20:02
-35	04:04	04:38	05:07	19:15	19:43	20:18
-40	03:44	04:23	04:54	19:27	19:58	20:37
-45	03:20	04:04	04:39	19:42	20:17	21:01
-50	02:45	03:40	04:21	20:00	20:40	21:35
-52	02:27	03:29	04:12	20:09	20:52	21:53
-54	02:03	03:15	04:03	20:18	21:06	22:16
-56	01:30	02:59	03:52	20:29	21:21	22:48
-58	–:–	02:39	03:39	20:42	21:40	–:–
-60	–:–	02:14	03:24	20:57	22:05	–:–

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	11:18	11:04	10:52	17:00	18:50	20:35
70	10:51	10:46	10:42	17:27	19:05	20:43
68	10:30	10:33	10:34	17:46	19:18	20:50
66	10:13	10:21	10:28	18:02	19:28	20:55
64	09:60	10:12	10:22	18:15	19:36	20:59
62	09:48	10:04	10:17	18:26	19:44	21:03
60	09:38	09:57	10:12	18:35	19:50	21:06
58	09:30	09:50	10:09	18:43	19:55	21:09
56	09:22	09:45	10:05	18:50	20:00	21:12
54	09:15	09:40	10:02	18:56	20:04	21:14
52	09:09	09:35	09:59	19:02	20:08	21:16
50	09:04	09:31	09:57	19:07	20:12	21:18
45	08:52	09:22	09:51	19:18	20:19	21:22
40	08:42	09:15	09:46	19:27	20:26	21:26
35	08:33	09:09	09:42	19:35	20:31	21:29
30	08:26	09:03	09:39	19:41	20:36	21:31
20	08:13	08:53	09:32	19:53	20:44	21:36
10	08:01	08:45	09:27	20:03	20:52	21:40
0	07:51	08:36	09:22	20:13	20:58	21:43
-10	07:40	08:28	09:16	20:22	21:05	21:47
-20	07:28	08:20	09:11	20:32	21:12	21:51
-30	07:15	08:10	09:05	20:44	21:20	21:55
-35	07:08	08:04	09:01	20:50	21:25	21:58
-40	06:59	07:57	08:57	20:58	21:30	22:00
-45	06:49	07:50	08:52	21:06	21:36	22:04
-50	06:37	07:41	08:46	21:17	21:43	22:07
-52	06:31	07:36	08:44	21:21	21:46	22:09
-54	06:24	07:32	08:41	21:27	21:50	22:11
-56	06:17	07:26	08:37	21:32	21:54	22:13
-58	06:09	07:21	08:34	21:39	21:58	22:15
-60	06:00	07:14	08:30	21:46	22:03	22:18

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
19	10:34	10:43	12:10	14:01	01:38	2(5%)
20	10:52	11:01	12:11	14:47	02:24	3(10%)
21	11:10	11:18	12:11	15:32	03:09	4(17%)

January 22, 23 ,24 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	121°17.7	173°42.9	-20°08.3	246°11.8	-18°48.6	253°21.1	-16°42.6	207°12.3	-22°29.9
1	136°20.2	188°42.1	-20°07.6	261°12.6	-18°49.0	268°23.3	-16°42.7	222°14.5	-22°29.9
2	151°22.6	203°41.3	-20°06.9	276°13.5	-18°49.4	283°25.4	-16°42.8	237°16.7	-22°29.9
3	166°25.1	218°40.6	-20°06.2	291°14.4	-18°49.7	298°27.6	-16°42.9	252°18.8	-22°29.9
4	181°27.6	233°39.8	-20°05.4	306°15.3	-18°50.1	313°29.7	-16°43.0	267°21.0	-22°29.9
5	196°30.0	248°39.0	-20°04.7	321°16.2	-18°50.5	328°31.8	-16°43.0	282°23.2	-22°29.9
6	211°32.5	263°38.2	-20°04.0	336°17.0	-18°50.8	343°34.0	-16°43.1	297°25.4	-22°29.9
7	226°35.0	278°37.4	-20°03.3	351°17.9	-18°51.2	358°36.1	-16°43.2	312°27.5	-22°29.9
8	241°37.4	293°36.6	-20°02.6	6°18.8	-18°51.6	13°38.3	-16°43.3	327°29.7	-22°29.9
9	256°39.9	308°35.8	-20°01.9	21°19.7	-18°52.0	28°40.4	-16°43.4	342°31.9	-22°29.9
10	271°42.3	323°35.0	-20°01.2	36°20.6	-18°52.3	43°42.5	-16°43.4	357°34.0	-22°29.9
11	286°44.8	338°34.2	-20°00.5	51°21.5	-18°52.7	58°44.7	-16°43.5	12°36.2	-22°29.9
12	301°47.3	353°33.4	-19°59.8	66°22.3	-18°53.1	73°46.8	-16°43.6	27°38.4	-22°29.9
13	316°49.7	8°32.6	-19°59.1	81°23.2	-18°53.4	88°49.0	-16°43.7	42°40.5	-22°29.8
14	331°52.2	23°31.8	-19°58.3	96°24.1	-18°53.8	103°51.1	-16°43.7	57°42.7	-22°29.8
15	346°54.7	38°31.0	-19°57.6	111°25.0	-18°54.2	118°53.3	-16°43.8	72°44.9	-22°29.8
16	1°57.1	53°30.2	-19°56.9	126°25.9	-18°54.5	133°55.4	-16°43.9	87°47.1	-22°29.8
17	16°59.6	68°29.5	-19°56.2	141°26.8	-18°54.9	148°57.5	-16°44.0	102°49.2	-22°29.8
18	32°02.1	83°28.7	-19°55.5	156°27.6	-18°55.3	163°59.7	-16°44.1	117°51.4	-22°29.8
19	47°04.5	98°27.9	-19°54.7	171°28.5	-18°55.6	179°01.8	-16°44.1	132°53.6	-22°29.8
20	62°07.0	113°27.1	-19°54.0	186°29.4	-18°56.0	194°04.0	-16°44.2	147°55.7	-22°29.8
21	77°09.4	128°26.3	-19°53.3	201°30.3	-18°56.4	209°06.1	-16°44.3	162°57.9	-22°29.8
22	92°11.9	143°25.5	-19°52.6	216°31.2	-18°56.8	224°08.3	-16°44.4	178°00.1	-22°29.8
23	107°14.4	158°24.7	-19°51.8	231°32.0	-18°57.1	239°10.4	-16°44.5	193°02.3	-22°29.8
Mer.pass.:15:52		v-0.8 d0.7 m-3.8		v0.9 d-0.4 m1.3		v2.1 d-0.1 m-1.8		v2.2 d0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	122°16.8	173°23.9	-19°51.1	246°32.9	-18°57.5	254°12.5	-16°44.5	208°04.4	-22°29.8
1	137°19.3	188°23.2	-19°50.4	261°33.8	-18°57.9	269°14.7	-16°44.6	223°06.6	-22°29.8
2	152°21.8	203°22.4	-19°49.7	276°34.7	-18°58.2	284°16.8	-16°44.7	238°08.8	-22°29.8
3	167°24.2	218°21.6	-19°48.9	291°35.6	-18°58.6	299°19.0	-16°44.8	253°10.9	-22°29.8
4	182°26.7	233°20.8	-19°48.2	306°36.4	-18°59.0	314°21.1	-16°44.9	268°13.1	-22°29.7
5	197°29.2	248°20.0	-19°47.5	321°37.3	-18°59.3	329°23.3	-16°44.9	283°15.3	-22°29.7
6	212°31.6	263°19.2	-19°46.7	336°38.2	-18°59.7	344°25.4	-16°45.0	298°17.5	-22°29.7
7	227°34.1	278°18.5	-19°46.0	351°39.1	-19°00.1	359°27.6	-16°45.1	313°19.6	-22°29.7
8	242°36.6	293°17.7	-19°45.3	6°40.0	-19°00.4	14°29.7	-16°45.2	328°21.8	-22°29.7
9	257°39.0	308°16.9	-19°44.5	21°40.9	-19°00.8	29°31.9	-16°45.2	343°24.0	-22°29.7
10	272°41.5	323°16.1	-19°43.8	36°41.7	-19°01.1	44°34.0	-16°45.3	358°26.1	-22°29.7
11	287°43.9	338°15.3	-19°43.1	51°42.6	-19°01.5	59°36.2	-16°45.4	13°28.3	-22°29.7
12	302°46.4	353°14.6	-19°42.3	66°43.5	-19°01.9	74°38.3	-16°45.5	28°30.5	-22°29.7
13	317°48.9	8°13.8	-19°41.6	81°44.4	-19°02.2	89°40.5	-16°45.6	43°32.7	-22°29.7
14	332°51.3	23°13.0	-19°40.9	96°45.3	-19°02.6	104°42.6	-16°45.6	58°34.8	-22°29.7
15	347°53.8	38°12.2	-19°40.1	111°46.1	-19°03.0	119°44.7	-16°45.7	73°37.0	-22°29.7
16	2°56.3	53°11.4	-19°39.4	126°47.0	-19°03.3	134°46.9	-16°45.8	88°39.2	-22°29.7
17	17°58.7	68°10.7	-19°38.6	141°47.9	-19°03.7	149°49.0	-16°45.9	103°41.4	-22°29.7
18	33°01.2	83°09.9	-19°37.9	156°48.8	-19°04.1	164°51.2	-16°45.9	118°43.5	-22°29.6
19	48°03.7	98°09.1	-19°37.1	171°49.7	-19°04.4	179°53.3	-16°46.0	133°45.7	-22°29.6
20	63°06.1	113°08.3	-19°36.4	186°50.5	-19°04.8	194°55.5	-16°46.1	148°47.9	-22°29.6
21	78°08.6	128°07.6	-19°35.6	201°51.4	-19°05.1	209°57.6	-16°46.2	163°50.0	-22°29.6
22	93°11.0	143°06.8	-19°34.9	216°52.3	-19°05.5	224°59.8	-16°46.3	178°52.2	-22°29.6
23	108°13.5	158°06.0	-19°34.2	231°53.2	-19°05.9	240°01.9	-16°46.3	193°54.4	-22°29.6
Mer.pass.:15:48		v-0.8 d0.7 m-3.8		v0.9 d-0.4 m1.3		v2.1 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	123°16.0	173°05.2	-19°33.4	246°54.1	-19°06.2	255°04.1	-16°46.4	208°56.6	-22°29.6
1	138°18.4	188°04.5	-19°32.7	261°54.9	-19°06.6	270°06.2	-16°46.5	223°58.7	-22°29.6
2	153°20.9	203°03.7	-19°31.9	276°55.8	-19°07.0	285°08.4	-16°46.6	239°00.9	-22°29.6
3	168°23.4	218°02.9	-19°31.1	291°56.7	-19°07.3	300°10.5	-16°46.6	254°03.1	-22°29.6
4	183°25.8	233°02.2	-19°30.4	306°57.6	-19°07.7	315°12.7	-16°46.7	269°05.3	-22°29.6
5	198°28.3	248°01.4	-19°29.6	321°58.5	-19°08.0	330°14.8	-16°46.8	284°07.4	-22°29.6
6	213°30.8	263°00.6	-19°28.9	336°59.3	-19°08.4	345°17.0	-16°46.9	299°09.6	-22°29.6
7	228°33.2	277°59.9	-19°28.1	352°00.2	-19°08.8	0°19.1	-16°46.9	314°11.8	-22°29.6
8	243°35.7	292°59.1	-19°27.4	7°01.1	-19°09.1	15°21.3	-16°47.0	329°14.0	-22°29.6
9	258°38.2	307°58.3	-19°26.6	22°02.0	-19°09.5	30°23.5	-16°47.1	344°16.1	-22°29.5
10	273°40.6	322°57.5	-19°25.8	37°02.8	-19°09.8	45°25.6	-16°47.2	359°18.3	-22°29.5
11	288°43.1	337°56.8	-19°25.1	52°03.7	-19°10.2	60°27.8	-16°47.3	14°20.5	-22°29.5
12	303°45.5	352°56.0	-19°24.3	67°04.6	-19°10.6	75°29.9	-16°47.3	29°22.6	-22°29.5
13	318°48.0	7°55.2	-19°23.6	82°05.5	-19°10.9	90°32.1	-16°47.4	44°24.8	-22°29.5
14	333°50.5	22°54.5	-19°22.8	97°06.4	-19°11.3	105°34.2	-16°47.5	59°27.0	-22°29.5
15	348°52.9	37°53.7	-19°22.0	112°07.2	-19°11.6	120°36.4	-16°47.6	74°29.2	-22°29.5
16	3°55.4	52°53.0	-19°21.3	127°08.1	-19°12.0	135°38.5	-16°47.6	89°31.3	-22°29.5
17	18°57.9	67°52.2	-19°20.5	142°09.0	-19°12.3	150°40.7	-16°47.7	104°33.5	-22°29.5
18	34°00.3	82°51.4	-19°19.7	157°09.9	-19°12.7	165°42.8	-16°47.8	119°35.7	-22°29.5
19	49°02.8	97°50.7	-19°19.0	172°10.8	-19°13.1	180°45.0	-16°47.9	134°37.9	-22°29.5
20	64°05.3	112°49.9	-19°18.2	187°11.6	-19°13.4	195°47.1	-16°47.9	149°40.0	-22°29.5
21	79°07.7	127°49.1	-19°17.4	202°12.5	-19°13.8	210°49.3	-16°48.0	164°42.2	-22°29.5
22	94°10.2	142°48.4	-19°16.7	217°13.4	-19°14.1	225°51.5	-16°48.1	179°44.4	-22°29.5
23	109°12.7	157°47.6	-19°15.9	232°14.3	-19°14.5	240°53.6	-16°48.2	194°46.6	-22°29.4
Mer.pass.:15:44		v-0.8 d0.8 m-3.8		v0.9 d-0.4 m1.3		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.4
Ankaa	353°12.8	-42°12.8
Schedar	349°37.1	56°38.3
Diphda	348°52.8	-17°53.5
Achernar	335°24.6	-57°09.2
Hamal	327°57.2	23°32.8
Polaris	316°15.3	89°20.6
Akamar	315°15.9	-40°14.4
Menkar	314°11.7	4°09.4
Mirfak	308°35.6	49°55.5
Aldebaran	290°45.6	16°32.6
Rigel	281°08.8	-8°11.2
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°42.9	-1°11.7
Betelgeuse	270°57.6	7°24.4
Canopus	263°54.3	-52°42.6
Sirius	258°30.5	-16°44.5
Adara	255°09.7	-29°00.1
Procyon	244°56.1	5°10.7
Pollux	243°23.5	27°58.8
Avior	234°16.1	-59°34.1
Suhail	222°49.7	-43°30.4
Miaplacidus	221°38.0	-69°47.5
Alphard	217°52.7	-8°44.3
Regulus	207°39.9	11°52.6
Dubhe	193°47.5	61°39.0
Denebola	182°30.2	14°28.2
Gienah	175°48.9	-17°38.4
Acrux	173°05.4	-63°11.6
Gacrux	171°57.1	-57°12.5
Alioth	166°17.9	55°51.5
Spica	158°27.9	-11°15.2
Alcaid	152°56.4	49°13.2
Hadar	148°43.4	-60°27.2
Menkent	148°03.9	-36°27.2
Arcturus	145°52.8	19°05.6
Rigil Kent.	139°47.5	-60°54.1
Zubenelg.	137°02.0	-16°06.8
Kochab	137°20.5	74°04.7
Alphecca	126°08.5	26°39.2
Antares	112°22.6	-26°28.0
Atria	107°22.0	-69°03.2
Sabik	102°09.2	-15°44.6
Shaula	96°18.0	-37°06.7
Rasalhague	96°03.8	12°32.9
Etamin	90°45.1	51°29.2
Kaus Aust.	83°40.0	-34°22.3
Vega	80°37.3	38°48.0
Nunki	75°54.8	-26°16.3
Altair	62°05.6	8°55.0
Peacock	53°15.0	-56°40.6
Deneb	49°29.8	45°20.8
Enif	33°44.4	9°57.5
Alnair	27°40.3	-46°52.5
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.9
Markab	13°35.5	15°18.1

2018/1/2	**SHA**	**Mer.pass**
Venus	52°25.2	12:26
Mars	124°54.0	07:35
Jupiter	132°03.4	07:06
Saturn	85°54.6	10:10

2018/1/2	**SHA**	**Mer.pass**
Venus	51°07.1	12:27
Mars	124°16.1	07:33
Jupiter	131°55.7	07:02
Saturn	85°47.6	10:06

2018/1/2	**SHA**	**Mer.pass**
Venus	49°49.3	12:28
Mars	123°38.1	07:32
Jupiter	131°48.1	06:59
Saturn	85°40.6	10:03

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°08.4	-19°44.0	123°00.9	13.6	-4°34.9	10.5	55.9
1	192°08.2	-19°43.4	137°33.5	13.6	-4°24.4	10.6	55.9
2	207°08.0	-19°42.8	152°06.1	13.6	-4°13.8	10.6	56.0
3	222°07.9	-19°42.3	166°38.7	13.6	-4°03.2	10.6	56.0
4	237°07.7	-19°41.7	181°11.3	13.6	-3°52.5	10.7	56.0
5	252°07.5	-19°41.1	195°43.8	13.6	-3°41.9	10.7	56.0
6	267°07.4	-19°40.6	210°16.4	13.6	-3°31.2	10.7	56.1
7	282°07.2	-19°40.0	224°49.0	13.5	-3°20.4	10.7	56.1
8	297°07.0	-19°39.4	239°21.5	13.5	-3°09.7	10.8	56.1
9	312°06.9	-19°38.8	253°54.0	13.5	-2°58.9	10.8	56.1
10	327°06.7	-19°38.3	268°26.5	13.5	-2°48.2	10.8	56.2
11	342°06.5	-19°37.7	282°59.0	13.5	-2°37.3	10.8	56.2
12	357°06.3	-19°37.1	297°31.5	13.5	-2°26.5	10.8	56.2
13	12°06.2	-19°36.5	312°03.9	13.4	-2°15.7	10.9	56.2
14	27°06.0	-19°36.0	326°36.4	13.4	-2°04.8	10.9	56.3
15	42°05.9	-19°35.4	341°08.8	13.4	-1°53.9	10.9	56.3
16	57°05.7	-19°34.8	355°41.2	13.4	-1°43.0	10.9	56.3
17	72°05.5	-19°34.2	10°13.6	13.4	-1°32.1	10.9	56.3
18	87°05.4	-19°33.7	24°46.0	13.4	-1°21.1	10.9	56.4
19	102°05.2	-19°33.1	39°18.3	13.3	-1°10.2	11.0	56.4
20	117°05.0	-19°32.5	53°50.6	13.3	-0°59.2	11.0	56.4
21	132°04.9	-19°31.9	68°22.9	13.3	-0°48.2	11.0	56.5
22	147°04.7	-19°31.3	82°55.2	13.3	-0°37.2	11.0	56.5
23	162°04.5	-19°30.7	97°27.4	13.2	-0°26.2	11.0	56.5
	SD.=16.3	d=0.6	S.D.=15.3				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°04.4	-19°30.2	111°59.6	13.2	-0°15.2	11.0	56.5
1	192°04.2	-19°29.6	126°31.8	13.2	-0°04.2	11.0	56.6
2	207°04.1	-19°29.0	141°04.0	13.2	0°06.9	11.0	56.6
3	222°03.9	-19°28.4	155°36.1	13.1	0°17.9	11.1	56.6
4	237°03.7	-19°27.8	170°08.2	13.1	0°29.0	11.1	56.6
5	252°03.6	-19°27.2	184°40.3	13.1	0°40.1	11.1	56.7
6	267°03.4	-19°26.7	199°12.4	13.0	0°51.2	11.1	56.7
7	282°03.2	-19°26.1	213°44.4	13.0	1°02.2	11.1	56.7
8	297°03.1	-19°25.5	228°16.3	13.0	1°13.3	11.1	56.8
9	312°02.9	-19°24.9	242°48.3	12.9	1°24.4	11.1	56.8
10	327°02.8	-19°24.3	257°20.2	12.9	1°35.5	11.1	56.8
11	342°02.6	-19°23.7	271°52.1	12.9	1°46.6	11.1	56.8
12	357°02.5	-19°23.1	286°23.9	12.8	1°57.7	11.1	56.9
13	12°02.3	-19°22.5	300°55.7	12.8	2°08.8	11.1	56.9
14	27°02.1	-19°21.9	315°27.5	12.7	2°20.0	11.1	56.9
15	42°02.0	-19°21.3	329°59.2	12.7	2°31.1	11.1	57.0
16	57°01.8	-19°20.8	344°30.9	12.7	2°42.2	11.1	57.0
17	72°01.7	-19°20.2	359°02.6	12.6	2°53.3	11.1	57.0
18	87°01.5	-19°19.6	13°34.2	12.6	3°04.4	11.1	57.1
19	102°01.4	-19°19.0	28°05.8	12.5	3°15.5	11.1	57.1
20	117°01.2	-19°18.4	42°37.3	12.5	3°26.6	11.1	57.1
21	132°01.0	-19°17.8	57°08.8	12.5	3°37.6	11.1	57.1
22	147°00.9	-19°17.2	71°40.2	12.4	3°48.7	11.1	57.2
23	162°00.7	-19°16.6	86°11.6	12.4	3°59.8	11.1	57.2
	SD.=16.2	d=0.6	S.D.=15.4				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°00.6	-19°16.0	100°42.9	12.3	4°10.9	11.1	57.2
1	192°00.4	-19°15.4	115°14.2	12.3	4°21.9	11.1	57.3
2	207°00.3	-19°14.8	129°45.5	12.2	4°33.0	11.0	57.3
3	222°00.1	-19°14.2	144°16.7	12.2	4°44.0	11.0	57.3
4	236°60.0	-19°13.6	158°47.8	12.1	4°55.0	11.0	57.4
5	251°59.8	-19°13.0	173°18.9	12.1	5°06.0	11.0	57.4
6	266°59.7	-19°12.4	187°50.0	12.0	5°17.0	11.0	57.4
7	281°59.5	-19°11.8	202°21.0	12.0	5°28.0	11.0	57.5
8	296°59.4	-19°11.2	216°51.9	11.9	5°39.0	11.0	57.5
9	311°59.2	-19°10.6	231°22.8	11.9	5°49.9	10.9	57.5
10	326°59.1	-19°10.0	245°53.7	11.8	6°00.9	10.9	57.5
11	341°58.9	-19°09.4	260°24.5	11.8	6°11.8	10.9	57.6
12	356°58.8	-19°08.8	274°55.2	11.7	6°22.7	10.9	57.6
13	11°58.6	-19°08.2	289°25.8	11.6	6°33.6	10.9	57.6
14	26°58.5	-19°07.6	303°56.5	11.6	6°44.4	10.8	57.7
15	41°58.3	-19°06.9	318°27.0	11.5	6°55.2	10.8	57.7
16	56°58.2	-19°06.3	332°57.5	11.5	7°06.1	10.8	57.7
17	71°58.0	-19°05.7	347°27.9	11.4	7°16.8	10.8	57.8
18	86°57.9	-19°05.1	1°58.3	11.3	7°27.6	10.7	57.8
19	101°57.7	-19°04.5	16°28.6	11.3	7°38.3	10.7	57.8
20	116°57.6	-19°03.9	30°58.8	11.2	7°49.0	10.7	57.9
21	131°57.4	-19°03.3	45°29.0	11.1	7°59.7	10.7	57.9
22	146°57.3	-19°02.7	59°59.1	11.1	8°10.4	10.6	57.9
23	161°57.1	-19°02.1	74°29.2	11.0	8°21.0	10.6	58.0
	SD.=16.2	d=0.6	S.D.=15.6				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:39	09:18	–:–	–:–	15:07	16:46
70	07:28	08:52	10:41	13:44	15:32	16:57
68	07:18	08:33	09:56	14:28	15:52	17:07
66	07:10	08:17	09:27	14:57	16:08	17:15
64	07:03	08:04	09:05	15:19	16:20	17:22
62	06:57	07:53	08:48	15:36	16:31	17:28
60	06:51	07:43	08:34	15:51	16:41	17:33
58	06:46	07:35	08:21	16:03	16:49	17:38
56	06:41	07:28	08:11	16:14	16:57	17:43
54	06:37	07:21	08:01	16:23	17:03	17:47
52	06:33	07:15	07:53	16:31	17:09	17:51
50	06:30	07:09	07:45	16:39	17:15	17:55
45	06:21	06:57	07:29	16:55	17:27	18:03
40	06:14	06:47	07:16	17:08	17:37	18:10
35	06:07	06:37	07:05	17:19	17:47	18:17
30	06:00	06:29	06:55	17:29	17:55	18:24
20	05:47	06:14	06:38	17:46	18:10	18:36
10	05:35	06:00	06:22	18:01	18:24	18:49
0	05:21	05:46	06:08	18:15	18:37	19:03
-10	05:05	05:32	05:54	18:30	18:52	19:18
-20	04:47	05:15	05:38	18:45	19:09	19:37
-30	04:23	04:54	05:21	19:03	19:29	20:01
-35	04:07	04:42	05:10	19:13	19:41	20:16
-40	03:49	04:27	04:58	19:25	19:56	20:34
-45	03:25	04:09	04:44	19:39	20:14	20:58
-50	02:52	03:46	04:26	19:57	20:36	21:30
-52	02:35	03:35	04:18	20:05	20:48	21:47
-54	02:14	03:22	04:08	20:14	21:00	22:08
-56	01:45	03:07	03:58	20:25	21:15	22:35
-58	00:54	02:48	03:46	20:36	21:33	23:21
-60	–:–	02:26	03:32	20:50	21:55	–:–

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	10:42	10:32	10:22	22:21	–:–	00:08
70	10:38	10:34	10:31	22:22	–:–	00:02
68	10:35	10:36	10:37	22:22	23:57	–:–
66	10:33	10:38	10:43	22:23	23:53	–:–
64	10:30	10:39	10:48	22:23	23:50	–:–
62	10:29	10:40	10:52	22:24	23:47	–:–
60	10:27	10:41	10:56	22:24	23:44	–:–
58	10:25	10:42	10:59	22:25	23:42	–:–
56	10:24	10:43	11:02	22:25	23:40	–:–
54	10:23	10:43	11:05	22:25	23:38	–:–
52	10:22	10:44	11:07	22:26	23:37	–:–
50	10:21	10:45	11:10	22:26	23:35	–:–
45	10:18	10:46	11:14	22:26	23:32	–:–
40	10:17	10:47	11:19	22:27	23:29	–:–
35	10:15	10:48	11:22	22:27	23:27	–:–
30	10:14	10:49	11:25	22:27	23:25	–:–
20	10:11	10:50	11:31	22:28	23:21	–:–
10	10:09	10:52	11:36	22:28	23:18	–:–
0	10:07	10:53	11:40	22:29	23:15	–:–
-10	10:05	10:54	11:45	22:29	23:12	23:57
-20	10:03	10:55	11:50	22:30	23:09	23:51
-30	10:00	10:57	11:56	22:30	23:06	23:43
-35	09:59	10:58	11:59	22:30	23:03	23:39
-40	09:57	10:59	12:03	22:30	23:01	23:34
-45	09:55	11:00	12:07	22:31	22:58	23:28
-50	09:53	11:02	12:12	22:31	22:55	23:21
-52	09:52	11:03	12:15	22:31	22:54	23:18
-54	09:51	11:03	12:17	22:31	22:52	23:15
-56	09:50	11:04	12:20	22:32	22:50	23:11
-58	09:49	11:05	12:24	22:32	22:48	23:07
-60	09:47	11:06	12:28	22:32	22:46	23:02

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
22	11:27	11:35	12:11	16:17	03:55	5(26%)
23	11:43	11:50	12:11	17:03	04:40	6(35%)
24	11:58	12:05	12:12	17:51	05:27	7(45%)

January 25, 26 ,27 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	124°15.1	172°46.9	-19°15.1	247°15.1	-19°14.8	255°55.8	-16°48.2	209°48.7	-22°29.4
1	139°17.6	187°46.1	-19°14.3	262°16.0	-19°15.2	270°57.9	-16°48.3	224°50.9	-22°29.4
2	154°20.0	202°45.3	-19°13.6	277°16.9	-19°15.6	286°00.1	-16°48.4	239°53.1	-22°29.4
3	169°22.5	217°44.6	-19°12.8	292°17.8	-19°15.9	301°02.2	-16°48.5	254°55.3	-22°29.4
4	184°25.0	232°43.8	-19°12.0	307°18.7	-19°16.3	316°04.4	-16°48.5	269°57.4	-22°29.4
5	199°27.4	247°43.1	-19°11.2	322°19.5	-19°16.6	331°06.5	-16°48.6	284°59.6	-22°29.4
6	214°29.9	262°42.3	-19°10.5	337°20.4	-19°17.0	346°08.7	-16°48.7	300°01.8	-22°29.4
7	229°32.4	277°41.6	-19°09.7	352°21.3	-19°17.3	1°10.9	-16°48.8	315°04.0	-22°29.4
8	244°34.8	292°40.8	-19°08.9	7°22.2	-19°17.7	16°13.0	-16°48.8	330°06.1	-22°29.4
9	259°37.3	307°40.0	-19°08.1	22°23.1	-19°18.0	31°15.2	-16°48.9	345°08.3	-22°29.4
10	274°39.8	322°39.3	-19°07.3	37°23.9	-19°18.4	46°17.3	-16°49.0	0°10.5	-22°29.4
11	289°42.2	337°38.5	-19°06.5	52°24.8	-19°18.7	61°19.5	-16°49.1	15°12.7	-22°29.4
12	304°44.7	352°37.8	-19°05.8	67°25.7	-19°19.1	76°21.7	-16°49.1	30°14.8	-22°29.4
13	319°47.1	7°37.0	-19°05.0	82°26.6	-19°19.5	91°23.8	-16°49.2	45°17.0	-22°29.3
14	334°49.6	22°36.3	-19°04.2	97°27.4	-19°19.8	106°26.0	-16°49.3	60°19.2	-22°29.3
15	349°52.1	37°35.5	-19°03.4	112°28.3	-19°20.2	121°28.1	-16°49.4	75°21.4	-22°29.3
16	4°54.5	52°34.8	-19°02.6	127°29.2	-19°20.5	136°30.3	-16°49.4	90°23.6	-22°29.3
17	19°57.0	67°34.0	-19°01.8	142°30.1	-19°20.9	151°32.5	-16°49.5	105°25.7	-22°29.3
18	34°59.5	82°33.3	-19°01.0	157°30.9	-19°21.2	166°34.6	-16°49.6	120°27.9	-22°29.3
19	50°01.9	97°32.5	-19°00.2	172°31.8	-19°21.6	181°36.8	-16°49.7	135°30.1	-22°29.3
20	65°04.4	112°31.8	-18°59.4	187°32.7	-19°21.9	196°38.9	-16°49.7	150°32.3	-22°29.3
21	80°06.9	127°31.0	-18°58.6	202°33.6	-19°22.3	211°41.1	-16°49.8	165°34.4	-22°29.3
22	95°09.3	142°30.3	-18°57.9	217°34.5	-19°22.6	226°43.3	-16°49.9	180°36.6	-22°29.3
23	110°11.8	157°29.5	-18°57.1	232°35.3	-19°23.0	241°45.4	-16°49.9	195°38.8	-22°29.3
Mer.pass.:15:40		v-0.8 d0.8 m-3.8		v0.9 d-0.4 m1.3		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	125°14.3	172°28.8	-18°56.3	247°36.2	-19°23.3	256°47.6	-16°50.0	210°41.0	-22°29.3
1	140°16.7	187°28.0	-18°55.5	262°37.1	-19°23.7	271°49.7	-16°50.1	225°43.1	-22°29.3
2	155°19.2	202°27.3	-18°54.7	277°38.0	-19°24.0	286°51.9	-16°50.2	240°45.3	-22°29.2
3	170°21.6	217°26.5	-18°53.9	292°38.8	-19°24.4	301°54.1	-16°50.2	255°47.5	-22°29.2
4	185°24.1	232°25.8	-18°53.1	307°39.7	-19°24.7	316°56.2	-16°50.3	270°49.7	-22°29.2
5	200°26.6	247°25.1	-18°52.3	322°40.6	-19°25.1	331°58.4	-16°50.4	285°51.8	-22°29.2
6	215°29.0	262°24.3	-18°51.5	337°41.5	-19°25.4	347°00.6	-16°50.5	300°54.0	-22°29.2
7	230°31.5	277°23.6	-18°50.7	352°42.3	-19°25.8	2°02.7	-16°50.5	315°56.2	-22°29.2
8	245°34.0	292°22.8	-18°49.9	7°43.2	-19°26.1	17°04.9	-16°50.6	330°58.4	-22°29.2
9	260°36.4	307°22.1	-18°49.1	22°44.1	-19°26.5	32°07.0	-16°50.7	346°00.6	-22°29.2
10	275°38.9	322°21.3	-18°48.2	37°45.0	-19°26.8	47°09.2	-16°50.7	1°02.7	-22°29.2
11	290°41.4	337°20.6	-18°47.4	52°45.8	-19°27.2	62°11.4	-16°50.8	16°04.9	-22°29.2
12	305°43.8	352°19.9	-18°46.6	67°46.7	-19°27.5	77°13.5	-16°50.9	31°07.1	-22°29.2
13	320°46.3	7°19.1	-18°45.8	82°47.6	-19°27.9	92°15.7	-16°51.0	46°09.3	-22°29.2
14	335°48.8	22°18.4	-18°45.0	97°48.5	-19°28.2	107°17.9	-16°51.0	61°11.4	-22°29.2
15	350°51.2	37°17.6	-18°44.2	112°49.3	-19°28.6	122°20.0	-16°51.1	76°13.6	-22°29.1
16	5°53.7	52°16.9	-18°43.4	127°50.2	-19°28.9	137°22.2	-16°51.2	91°15.8	-22°29.1
17	20°56.1	67°16.2	-18°42.6	142°51.1	-19°29.2	152°24.4	-16°51.3	106°18.0	-22°29.1
18	35°58.6	82°15.4	-18°41.8	157°52.0	-19°29.6	167°26.5	-16°51.3	121°20.2	-22°29.1
19	51°01.1	97°14.7	-18°41.0	172°52.9	-19°29.9	182°28.7	-16°51.4	136°22.3	-22°29.1
20	66°03.5	112°14.0	-18°40.1	187°53.7	-19°30.3	197°30.9	-16°51.5	151°24.5	-22°29.1
21	81°06.0	127°13.2	-18°39.3	202°54.6	-19°30.6	212°33.0	-16°51.5	166°26.7	-22°29.1
22	96°08.5	142°12.5	-18°38.5	217°55.5	-19°31.0	227°35.2	-16°51.6	181°28.9	-22°29.1
23	111°10.9	157°11.7	-18°37.7	232°56.4	-19°31.3	242°37.4	-16°51.7	196°31.0	-22°29.1
Mer.pass.:15:36		v-0.7 d0.8 m-3.8		v0.9 d-0.4 m1.2		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	126°13.4	172°11.0	-18°36.9	247°57.2	-19°31.7	257°39.5	-16°51.8	211°33.2	-22°29.1
1	141°15.9	187°10.3	-18°36.1	262°58.1	-19°32.0	272°41.7	-16°51.8	226°35.4	-22°29.1
2	156°18.3	202°09.5	-18°35.2	277°59.0	-19°32.4	287°43.9	-16°51.9	241°37.6	-22°29.1
3	171°20.8	217°08.8	-18°34.4	292°59.9	-19°32.7	302°46.0	-16°52.0	256°39.8	-22°29.1
4	186°23.3	232°08.1	-18°33.6	308°00.7	-19°33.0	317°48.2	-16°52.0	271°41.9	-22°29.1
5	201°25.7	247°07.4	-18°32.8	323°01.6	-19°33.4	332°50.4	-16°52.1	286°44.1	-22°29.0
6	216°28.2	262°06.6	-18°31.9	338°02.5	-19°33.7	347°52.5	-16°52.2	301°46.3	-22°29.0
7	231°30.6	277°05.9	-18°31.1	353°03.4	-19°34.1	2°54.7	-16°52.3	316°48.5	-22°29.0
8	246°33.1	292°05.2	-18°30.3	8°04.2	-19°34.4	17°56.9	-16°52.3	331°50.7	-22°29.0
9	261°35.6	307°04.4	-18°29.5	23°05.1	-19°34.8	32°59.0	-16°52.4	346°52.8	-22°29.0
10	276°38.0	322°03.7	-18°28.6	38°06.0	-19°35.1	48°01.2	-16°52.5	1°55.0	-22°29.0
11	291°40.5	337°03.0	-18°27.8	53°06.9	-19°35.4	63°03.4	-16°52.5	16°57.2	-22°29.0
12	306°43.0	352°02.2	-18°27.0	68°07.7	-19°35.8	78°05.6	-16°52.6	31°59.4	-22°29.0
13	321°45.4	7°01.5	-18°26.1	83°08.6	-19°36.1	93°07.7	-16°52.7	47°01.6	-22°29.0
14	336°47.9	22°00.8	-18°25.3	98°09.5	-19°36.5	108°09.9	-16°52.8	62°03.7	-22°29.0
15	351°50.4	37°00.1	-18°24.5	113°10.3	-19°36.8	123°12.1	-16°52.8	77°05.9	-22°29.0
16	6°52.8	51°59.3	-18°23.6	128°11.2	-19°37.2	138°14.2	-16°52.9	92°08.1	-22°29.0
17	21°55.3	66°58.6	-18°22.8	143°12.1	-19°37.5	153°16.4	-16°53.0	107°10.3	-22°29.0
18	36°57.7	81°57.9	-18°22.0	158°13.0	-19°37.8	168°18.6	-16°53.0	122°12.5	-22°28.9
19	52°00.2	96°57.2	-18°21.1	173°13.8	-19°38.2	183°20.8	-16°53.1	137°14.6	-22°28.9
20	67°02.7	111°56.5	-18°20.3	188°14.7	-19°38.5	198°22.9	-16°53.2	152°16.8	-22°28.9
21	82°05.1	126°55.7	-18°19.5	203°15.6	-19°38.9	213°25.1	-16°53.2	167°19.0	-22°28.9
22	97°07.6	141°55.0	-18°18.6	218°16.5	-19°39.2	228°27.3	-16°53.3	182°21.2	-22°28.9
23	112°10.1	156°54.3	-18°17.8	233°17.3	-19°39.5	243°29.4	-16°53.4	197°23.4	-22°28.9
Mer.pass.:15:32		v-0.7 d0.8 m-3.8		v0.9 d-0.3 m1.2		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.4
Ankaa	353°12.8	-42°12.8
Schedar	349°37.1	56°38.3
Diphda	348°52.8	-17°53.5
Achernar	335°24.6	-57°09.2
Hamal	327°57.2	23°32.8
Polaris	316°16.7	89°20.6
Akamar	315°15.9	-40°14.4
Menkar	314°11.7	4°09.4
Mirfak	308°35.7	49°55.5
Aldebaran	290°45.6	16°32.5
Rigel	281°08.8	-8°11.2
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°42.9	-1°11.7
Betelgeuse	270°57.6	7°24.4
Canopus	263°54.3	-52°42.6
Sirius	258°30.6	-16°44.5
Adara	255°09.7	-29°00.1
Procyon	244°56.1	5°10.6
Pollux	243°23.5	27°58.8
Avior	234°16.1	-59°34.2
Suhail	222°49.7	-43°30.4
Miaplacidus	221°38.0	-69°47.5
Alphard	217°52.7	-8°44.3
Regulus	207°39.9	11°52.6
Dubhe	193°47.4	61°39.0
Denebola	182°30.2	14°28.2
Gienah	175°48.9	-17°38.4
Acrux	173°05.4	-63°11.6
Gacrux	171°57.1	-57°12.6
Alioth	166°17.9	55°51.5
Spica	158°27.9	-11°15.2
Alcaid	152°56.4	49°13.2
Hadar	148°43.3	-60°27.2
Menkent	148°03.9	-36°27.2
Arcturus	145°52.8	19°05.6
Rigil Kent.	139°47.5	-60°54.1
Zubenelg.	137°02.0	-16°06.8
Kochab	137°20.4	74°04.7
Alphecca	126°08.5	26°39.2
Antares	112°22.6	-26°28.1
Atria	107°22.0	-69°03.2
Sabik	102°09.2	-15°44.6
Shaula	96°18.0	-37°06.7
Rasalhague	96°03.8	12°32.9
Etamin	90°45.1	51°29.2
Kaus Aust.	83°40.0	-34°22.3
Vega	80°37.3	38°48.0
Nunki	75°54.8	-26°16.3
Altair	62°05.6	8°55.0
Peacock	53°15.0	-56°40.5
Deneb	49°29.8	45°20.7
Enif	33°44.4	9°57.5
Alnair	27°40.3	-46°52.5
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.8
Markab	13°35.5	15°18.1

2018/1/2	**SHA**	**Mer.pass**
Venus	48°31.7	12:30
Mars	123°00.0	07:31
Jupiter	131°40.7	06:55
Saturn	85°33.6	09:59

2018/1/2	**SHA**	**Mer.pass**
Venus	47°14.5	12:31
Mars	122°22.0	07:29
Jupiter	131°33.3	06:52
Saturn	85°26.7	09:56

2018/1/2	**SHA**	**Mer.pass**
Venus	45°57.6	12:32
Mars	121°43.8	07:28
Jupiter	131°26.1	06:48
Saturn	85°19.8	09:52

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°57.0	-19°01.5	88°59.2	10.9	8°31.5	10.6	58.0
1	191°56.8	-19°00.8	103°29.1	10.9	8°42.1	10.5	58.0
2	206°56.7	-19°00.2	117°58.9	10.8	8°52.6	10.5	58.1
3	221°56.6	-18°59.6	132°28.7	10.7	9°03.1	10.5	58.1
4	236°56.4	-18°59.0	146°58.4	10.7	9°13.5	10.4	58.1
5	251°56.3	-18°58.4	161°28.1	10.6	9°23.9	10.4	58.2
6	266°56.1	-18°57.8	175°57.6	10.5	9°34.3	10.3	58.2
7	281°56.0	-18°57.2	190°27.1	10.5	9°44.6	10.3	58.2
8	296°55.8	-18°56.5	204°56.6	10.4	9°54.9	10.3	58.3
9	311°55.7	-18°55.9	219°25.9	10.3	10°05.2	10.2	58.3
10	326°55.6	-18°55.3	233°55.2	10.2	10°15.4	10.2	58.3
11	341°55.4	-18°54.7	248°24.4	10.2	10°25.5	10.1	58.4
12	356°55.3	-18°54.1	262°53.5	10.1	10°35.6	10.1	58.4
13	11°55.1	-18°53.4	277°22.6	10.0	10°45.7	10.0	58.4
14	26°55.0	-18°52.8	291°51.6	9.9	10°55.7	10.0	58.5
15	41°54.8	-18°52.2	306°20.5	9.9	11°05.7	9.9	58.5
16	56°54.7	-18°51.6	320°49.3	9.8	11°15.6	9.9	58.5
17	71°54.6	-18°51.0	335°18.0	9.7	11°25.5	9.8	58.6
18	86°54.4	-18°50.3	349°46.7	9.6	11°35.3	9.8	58.6
19	101°54.3	-18°49.7	4°15.3	9.6	11°45.0	9.7	58.6
20	116°54.1	-18°49.1	18°43.8	9.5	11°54.7	9.7	58.7
21	131°54.0	-18°48.5	33°12.2	9.4	12°04.4	9.6	58.7
22	146°53.9	-18°47.8	47°40.6	9.3	12°14.0	9.6	58.7
23	161°53.7	-18°47.2	62°08.8	9.2	12°23.5	9.5	58.8
	SD.=16.2	d=0.6	S.D.=15.8				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°53.6	-18°46.6	76°37.0	9.1	12°33.0	9.4	58.8
1	191°53.5	-18°46.0	91°05.1	9.1	12°42.4	9.4	58.8
2	206°53.3	-18°45.3	105°33.2	9.0	12°51.7	9.3	58.9
3	221°53.2	-18°44.7	120°01.1	8.9	13°01.0	9.2	58.9
4	236°53.1	-18°44.1	134°29.0	8.8	13°10.2	9.2	58.9
5	251°52.9	-18°43.4	148°56.7	8.7	13°19.3	9.1	59.0
6	266°52.8	-18°42.8	163°24.4	8.6	13°28.4	9.0	59.0
7	281°52.6	-18°42.2	177°52.0	8.6	13°37.4	9.0	59.0
8	296°52.5	-18°41.5	192°19.5	8.5	13°46.4	8.9	59.1
9	311°52.4	-18°40.9	206°47.0	8.4	13°55.2	8.8	59.1
10	326°52.2	-18°40.3	221°14.3	8.3	14°04.0	8.8	59.1
11	341°52.1	-18°39.6	235°41.6	8.2	14°12.8	8.7	59.2
12	356°52.0	-18°39.0	250°08.8	8.1	14°21.4	8.6	59.2
13	11°51.8	-18°38.4	264°35.9	8.0	14°30.0	8.5	59.2
14	26°51.7	-18°37.7	279°02.9	8.0	14°38.5	8.4	59.3
15	41°51.6	-18°37.1	293°29.8	7.9	14°46.9	8.4	59.3
16	56°51.5	-18°36.5	307°56.6	7.8	14°55.2	8.3	59.3
17	71°51.3	-18°35.8	322°23.4	7.7	15°03.4	8.2	59.4
18	86°51.2	-18°35.2	336°50.0	7.6	15°11.6	8.1	59.4
19	101°51.1	-18°34.6	351°16.6	7.5	15°19.7	8.0	59.4
20	116°50.9	-18°33.9	5°43.1	7.4	15°27.7	7.9	59.5
21	131°50.8	-18°33.3	20°09.5	7.4	15°35.6	7.9	59.5
22	146°50.7	-18°32.6	34°35.8	7.3	15°43.4	7.8	59.5
23	161°50.5	-18°32.0	49°02.0	7.2	15°51.1	7.7	59.5
	SD.=16.2	d=0.6	S.D.=16.0				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°50.4	-18°31.4	63°28.2	7.1	15°58.7	7.6	59.6
1	191°50.3	-18°30.7	77°54.2	7.0	16°06.3	7.5	59.6
2	206°50.2	-18°30.1	92°20.2	6.9	16°13.7	7.4	59.6
3	221°50.0	-18°29.4	106°46.1	6.8	16°21.0	7.3	59.7
4	236°49.9	-18°28.8	121°11.9	6.8	16°28.3	7.2	59.7
5	251°49.8	-18°28.2	135°37.6	6.7	16°35.4	7.1	59.7
6	266°49.7	-18°27.5	150°03.2	6.6	16°42.5	7.0	59.8
7	281°49.5	-18°26.9	164°28.7	6.5	16°49.4	6.9	59.8
8	296°49.4	-18°26.2	178°54.2	6.4	16°56.3	6.8	59.8
9	311°49.3	-18°25.6	193°19.6	6.3	17°03.0	6.7	59.9
10	326°49.1	-18°24.9	207°44.9	6.2	17°09.6	6.6	59.9
11	341°49.0	-18°24.3	222°10.1	6.2	17°16.2	6.5	59.9
12	356°48.9	-18°23.6	236°35.2	6.1	17°22.6	6.4	59.9
13	11°48.8	-18°23.0	251°00.2	6.0	17°28.9	6.3	60.0
14	26°48.7	-18°22.3	265°25.2	5.9	17°35.1	6.1	60.0
15	41°48.5	-18°21.7	279°50.1	5.8	17°41.2	6.0	60.0
16	56°48.4	-18°21.0	294°14.9	5.8	17°47.2	5.9	60.1
17	71°48.3	-18°20.4	308°39.6	5.7	17°53.0	5.8	60.1
18	86°48.2	-18°19.7	323°04.2	5.6	17°58.8	5.7	60.1
19	101°48.0	-18°19.1	337°28.8	5.5	18°04.4	5.6	60.1
20	116°47.9	-18°18.4	351°53.3	5.5	18°09.9	5.5	60.2
21	131°47.8	-18°17.8	6°17.7	5.4	18°15.3	5.3	60.2
22	146°47.7	-18°17.1	20°42.1	5.3	18°20.6	5.2	60.2
23	161°47.6	-18°16.5	35°06.3	5.2	18°25.7	5.1	60.2
	SD.=16.2	d=0.6	S.D.=16.3				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:30	09:05	11:39	12:47	15:21	16:57
70	07:20	08:42	10:21	14:05	15:44	17:07
68	07:11	08:24	09:43	14:43	16:02	17:15
66	07:04	08:10	09:17	15:09	16:17	17:23
64	06:57	07:57	08:57	15:29	16:29	17:29
62	06:51	07:47	08:41	15:45	16:39	17:34
60	06:46	07:38	08:27	15:58	16:48	17:39
58	06:42	07:30	08:16	16:10	16:55	17:44
56	06:38	07:23	08:06	16:20	17:02	17:48
54	06:34	07:17	07:57	16:29	17:09	17:52
52	06:30	07:11	07:49	16:37	17:14	17:56
50	06:27	07:06	07:42	16:44	17:20	17:59
45	06:19	06:55	07:26	16:59	17:31	18:07
40	06:12	06:45	07:14	17:12	17:41	18:14
35	06:05	06:36	07:03	17:23	17:49	18:20
30	05:59	06:28	06:53	17:32	17:57	18:26
20	05:47	06:14	06:37	17:48	18:11	18:38
10	05:35	06:00	06:23	18:03	18:25	18:50
0	05:22	05:47	06:09	18:16	18:38	19:03
-10	05:07	05:33	05:55	18:30	18:52	19:18
-20	04:49	05:17	05:40	18:44	19:08	19:36
-30	04:26	04:57	05:23	19:02	19:28	19:59
-35	04:11	04:45	05:13	19:11	19:39	20:13
-40	03:53	04:31	05:02	19:23	19:53	20:31
-45	03:30	04:14	04:48	19:36	20:10	20:54
-50	02:59	03:52	04:31	19:53	20:32	21:24
-52	02:43	03:41	04:23	20:01	20:43	21:40
-54	02:24	03:29	04:14	20:10	20:55	21:59
-56	01:58	03:15	04:04	20:19	21:09	22:24
-58	01:19	02:58	03:53	20:31	21:25	23:00
-60	–:–	02:37	03:40	20:44	21:46	–:–

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	10:11	09:56	09:29	02:01	04:04	06:27
70	10:27	10:23	10:20	01:47	03:38	05:37
68	10:40	10:44	10:53	01:36	03:19	05:05
66	10:50	11:00	11:17	01:27	03:04	04:42
64	10:59	11:14	11:36	01:19	02:51	04:24
62	11:07	11:25	11:51	01:12	02:40	04:09
60	11:13	11:35	12:04	01:07	02:31	03:57
58	11:19	11:44	12:15	01:02	02:24	03:46
56	11:25	11:51	12:25	00:57	02:17	03:37
54	11:29	11:58	12:34	00:53	02:11	03:28
52	11:33	12:04	12:42	00:50	02:05	03:21
50	11:37	12:10	12:49	00:47	01:60	03:14
45	11:46	12:22	13:04	00:40	01:49	03:00
40	11:53	12:32	13:16	00:34	01:40	02:49
35	11:59	12:40	13:27	00:29	01:33	02:39
30	12:04	12:48	13:36	00:24	01:26	02:30
20	12:14	13:01	13:52	00:17	01:14	02:15
10	12:22	13:12	14:06	00:10	01:04	02:02
0	12:30	13:23	14:20	00:04	00:55	01:50
-10	12:38	13:34	14:33	–:–	00:45	01:37
-20	12:46	13:46	14:48	–:–	00:35	01:24
-30	12:56	13:59	15:04	–:–	00:24	01:10
-35	13:02	14:07	15:14	–:–	00:17	01:01
-40	13:08	14:16	15:25	–:–	00:10	00:51
-45	13:16	14:27	15:38	–:–	00:01	00:40
-50	13:25	14:39	15:54	23:51	–:–	00:26
-52	13:29	14:45	16:01	23:46	–:–	00:19
-54	13:34	14:52	16:10	23:41	–:–	00:12
-56	13:39	14:59	16:19	23:35	–:–	00:04
-58	13:45	15:08	16:30	23:28	23:56	–:–
-60	13:51	15:17	16:42	23:21	23:45	–:–

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
25	12:12	12:19	12:12	18:42	06:16	8(56%)
26	12:26	12:32	12:12	19:36	07:08	9(67%)
27	12:38	12:45	12:12	20:33	08:04	10(78%)

January 28, 29 ,30 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	127°12.5	171°53.6	-18°16.9	248°18.2	-19°39.9	258°31.6	-16°53.5	212°25.5	-22°28.9
1	142°15.0	186°52.8	-18°16.1	263°19.1	-19°40.2	273°33.8	-16°53.5	227°27.7	-22°28.9
2	157°17.5	201°52.1	-18°15.3	278°20.0	-19°40.6	288°36.0	-16°53.6	242°29.9	-22°28.9
3	172°19.9	216°51.4	-18°14.4	293°20.8	-19°40.9	303°38.1	-16°53.7	257°32.1	-22°28.9
4	187°22.4	231°50.7	-18°13.6	308°21.7	-19°41.2	318°40.3	-16°53.7	272°34.3	-22°28.9
5	202°24.9	246°50.0	-18°12.7	323°22.6	-19°41.6	333°42.5	-16°53.8	287°36.4	-22°28.9
6	217°27.3	261°49.3	-18°11.9	338°23.5	-19°41.9	348°44.7	-16°53.9	302°38.6	-22°28.9
7	232°29.8	276°48.5	-18°11.0	353°24.3	-19°42.2	3°46.8	-16°53.9	317°40.8	-22°28.8
8	247°32.2	291°47.8	-18°10.2	8°25.2	-19°42.6	18°49.0	-16°54.0	332°43.0	-22°28.8
9	262°34.7	306°47.1	-18°09.3	23°26.1	-19°42.9	33°51.2	-16°54.1	347°45.2	-22°28.8
10	277°37.2	321°46.4	-18°08.5	38°26.9	-19°43.3	48°53.4	-16°54.2	2°47.3	-22°28.8
11	292°39.6	336°45.7	-18°07.6	53°27.8	-19°43.6	63°55.5	-16°54.2	17°49.5	-22°28.8
12	307°42.1	351°45.0	-18°06.8	68°28.7	-19°43.9	78°57.7	-16°54.3	32°51.7	-22°28.8
13	322°44.6	6°44.2	-18°05.9	83°29.6	-19°44.3	93°59.9	-16°54.4	47°53.9	-22°28.8
14	337°47.0	21°43.5	-18°05.1	98°30.4	-19°44.6	109°02.1	-16°54.4	62°56.1	-22°28.8
15	352°49.5	36°42.8	-18°04.2	113°31.3	-19°44.9	124°04.2	-16°54.5	77°58.3	-22°28.8
16	7°52.0	51°42.1	-18°03.4	128°32.2	-19°45.3	139°06.4	-16°54.6	93°00.4	-22°28.8
17	22°54.4	66°41.4	-18°02.5	143°33.1	-19°45.6	154°08.6	-16°54.6	108°02.6	-22°28.8
18	37°56.9	81°40.7	-18°01.7	158°33.9	-19°45.9	169°10.8	-16°54.7	123°04.8	-22°28.8
19	52°59.4	96°40.0	-18°00.8	173°34.8	-19°46.3	184°13.0	-16°54.8	138°07.0	-22°28.7
20	68°01.8	111°39.3	-17°59.9	188°35.7	-19°46.6	199°15.1	-16°54.8	153°09.2	-22°28.7
21	83°04.3	126°38.6	-17°59.1	203°36.5	-19°46.9	214°17.3	-16°54.9	168°11.3	-22°28.7
22	98°06.7	141°37.8	-17°58.2	218°37.4	-19°47.3	229°19.5	-16°55.0	183°13.5	-22°28.7
23	113°09.2	156°37.1	-17°57.4	233°38.3	-19°47.6	244°21.7	-16°55.0	198°15.7	-22°28.7
Mer.pass.:15:28		v-0.7 d0.8 m-3.8		v0.9 d-0.3 m1.2		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	128°11.7	171°36.4	-17°56.5	248°39.2	-19°47.9	259°23.9	-16°55.1	213°17.9	-22°28.7
1	143°14.1	186°35.7	-17°55.6	263°40.0	-19°48.3	274°26.0	-16°55.2	228°20.1	-22°28.7
2	158°16.6	201°35.0	-17°54.8	278°40.9	-19°48.6	289°28.2	-16°55.2	243°22.3	-22°28.7
3	173°19.1	216°34.3	-17°53.9	293°41.8	-19°48.9	304°30.4	-16°55.3	258°24.4	-22°28.7
4	188°21.5	231°33.6	-17°53.0	308°42.7	-19°49.3	319°32.6	-16°55.4	273°26.6	-22°28.7
5	203°24.0	246°32.9	-17°52.2	323°43.5	-19°49.6	334°34.8	-16°55.5	288°28.8	-22°28.7
6	218°26.5	261°32.2	-17°51.3	338°44.4	-19°49.9	349°36.9	-16°55.5	303°31.0	-22°28.7
7	233°28.9	276°31.5	-17°50.4	353°45.3	-19°50.3	4°39.1	-16°55.6	318°33.2	-22°28.7
8	248°31.4	291°30.8	-17°49.6	8°46.1	-19°50.6	19°41.3	-16°55.7	333°35.4	-22°28.6
9	263°33.9	306°30.1	-17°48.7	23°47.0	-19°50.9	34°43.5	-16°55.7	348°37.5	-22°28.6
10	278°36.3	321°29.4	-17°47.8	38°47.9	-19°51.3	49°45.7	-16°55.8	3°39.7	-22°28.6
11	293°38.8	336°28.7	-17°47.0	53°48.8	-19°51.6	64°47.8	-16°55.9	18°41.9	-22°28.6
12	308°41.2	351°28.0	-17°46.1	68°49.6	-19°51.9	79°50.0	-16°55.9	33°44.1	-22°28.6
13	323°43.7	6°27.3	-17°45.2	83°50.5	-19°52.3	94°52.2	-16°56.0	48°46.3	-22°28.6
14	338°46.2	21°26.6	-17°44.3	98°51.4	-19°52.6	109°54.4	-16°56.1	63°48.5	-22°28.6
15	353°48.6	36°25.9	-17°43.5	113°52.2	-19°52.9	124°56.6	-16°56.1	78°50.6	-22°28.6
16	8°51.1	51°25.2	-17°42.6	128°53.1	-19°53.3	139°58.8	-16°56.2	93°52.8	-22°28.6
17	23°53.6	66°24.5	-17°41.7	143°54.0	-19°53.6	155°00.9	-16°56.3	108°55.0	-22°28.6
18	38°56.0	81°23.8	-17°40.8	158°54.9	-19°53.9	170°03.1	-16°56.3	123°57.2	-22°28.6
19	53°58.5	96°23.1	-17°40.0	173°55.7	-19°54.2	185°05.3	-16°56.4	138°59.4	-22°28.6
20	69°01.0	111°22.4	-17°39.1	188°56.6	-19°54.6	200°07.5	-16°56.5	154°01.6	-22°28.5
21	84°03.4	126°21.7	-17°38.2	203°57.5	-19°54.9	215°09.7	-16°56.5	169°03.7	-22°28.5
22	99°05.9	141°21.0	-17°37.3	218°58.3	-19°55.2	230°11.9	-16°56.6	184°05.9	-22°28.5
23	114°08.4	156°20.3	-17°36.4	233°59.2	-19°55.6	245°14.0	-16°56.7	199°08.1	-22°28.5
Mer.pass.:15:24		v-0.7 d0.9 m-3.8		v0.9 d-0.3 m1.2		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	129°10.8	171°19.6	-17°35.5	249°00.1	-19°55.9	260°16.2	-16°56.7	214°10.3	-22°28.5
1	144°13.3	186°18.9	-17°34.7	264°00.9	-19°56.2	275°18.4	-16°56.8	229°12.5	-22°28.5
2	159°15.7	201°18.2	-17°33.8	279°01.8	-19°56.5	290°20.6	-16°56.9	244°14.7	-22°28.5
3	174°18.2	216°17.5	-17°32.9	294°02.7	-19°56.9	305°22.8	-16°56.9	259°16.8	-22°28.5
4	189°20.7	231°16.8	-17°32.0	309°03.6	-19°57.2	320°25.0	-16°57.0	274°19.0	-22°28.5
5	204°23.1	246°16.1	-17°31.1	324°04.4	-19°57.5	335°27.2	-16°57.1	289°21.2	-22°28.5
6	219°25.6	261°15.5	-17°30.2	339°05.3	-19°57.8	350°29.3	-16°57.1	304°23.4	-22°28.5
7	234°28.1	276°14.8	-17°29.3	354°06.2	-19°58.2	5°31.5	-16°57.2	319°25.6	-22°28.5
8	249°30.5	291°14.1	-17°28.4	9°07.0	-19°58.5	20°33.7	-16°57.3	334°27.8	-22°28.4
9	264°33.0	306°13.4	-17°27.6	24°07.9	-19°58.8	35°35.9	-16°57.3	349°30.0	-22°28.4
10	279°35.5	321°12.7	-17°26.7	39°08.8	-19°59.2	50°38.1	-16°57.4	4°32.1	-22°28.4
11	294°37.9	336°12.0	-17°25.8	54°09.7	-19°59.5	65°40.3	-16°57.4	19°34.3	-22°28.4
12	309°40.4	351°11.3	-17°24.9	69°10.5	-19°59.8	80°42.5	-16°57.5	34°36.5	-22°28.4
13	324°42.9	6°10.6	-17°24.0	84°11.4	-20°00.1	95°44.7	-16°57.6	49°38.7	-22°28.4
14	339°45.3	21°09.9	-17°23.1	99°12.3	-20°00.5	110°46.8	-16°57.6	64°40.9	-22°28.4
15	354°47.8	36°09.3	-17°22.2	114°13.1	-20°00.8	125°49.0	-16°57.7	79°43.1	-22°28.4
16	9°50.2	51°08.6	-17°21.3	129°14.0	-20°01.1	140°51.2	-16°57.8	94°45.3	-22°28.4
17	24°52.7	66°07.9	-17°20.4	144°14.9	-20°01.4	155°53.4	-16°57.8	109°47.4	-22°28.4
18	39°55.2	81°07.2	-17°19.5	159°15.7	-20°01.7	170°55.6	-16°57.9	124°49.6	-22°28.4
19	54°57.6	96°06.5	-17°18.6	174°16.6	-20°02.1	185°57.8	-16°58.0	139°51.8	-22°28.4
20	70°00.1	111°05.8	-17°17.7	189°17.5	-20°02.4	200°60.0	-16°58.0	154°54.0	-22°28.4
21	85°02.6	126°05.2	-17°16.8	204°18.3	-20°02.7	216°02.2	-16°58.1	169°56.2	-22°28.3
22	100°05.0	141°04.5	-17°15.9	219°19.2	-20°03.0	231°04.4	-16°58.2	184°58.4	-22°28.3
23	115°07.5	156°03.8	-17°15.0	234°20.1	-20°03.4	246°06.6	-16°58.2	200°00.6	-22°28.3
Mer.pass.:15:20		v-0.7 d0.9 m-3.8		v0.9 d-0.3 m1.2		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.4
Ankaa	353°12.8	-42°12.8
Schedar	349°37.1	56°38.3
Diphda	348°52.8	-17°53.5
Achernar	335°24.6	-57°09.1
Hamal	327°57.2	23°32.8
Polaris	316°17.8	89°20.6
Akamar	315°15.9	-40°14.4
Menkar	314°11.7	4°09.4
Mirfak	308°35.7	49°55.5
Aldebaran	290°45.6	16°32.5
Rigel	281°08.8	-8°11.2
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°42.9	-1°11.7
Betelgeuse	270°57.6	7°24.4
Canopus	263°54.3	-52°42.7
Sirius	258°30.6	-16°44.6
Adara	255°09.7	-29°00.1
Procyon	244°56.0	5°10.6
Pollux	243°23.4	27°58.8
Avior	234°16.1	-59°34.2
Suhail	222°49.7	-43°30.4
Miaplacidus	221°38.0	-69°47.5
Alphard	217°52.7	-8°44.3
Regulus	207°39.9	11°52.6
Dubhe	193°47.4	61°39.0
Denebola	182°30.2	14°28.2
Gienah	175°48.8	-17°38.4
Acrux	173°05.4	-63°11.6
Gacrux	171°57.0	-57°12.6
Alioth	166°17.8	55°51.5
Spica	158°27.8	-11°15.2
Alcaid	152°56.4	49°13.2
Hadar	148°43.3	-60°27.2
Menkent	148°03.8	-36°27.2
Arcturus	145°52.7	19°05.6
Rigil Kent.	139°47.4	-60°54.1
Zubenelg.	137°02.0	-16°06.8
Kochab	137°20.4	74°04.7
Alphecca	126°08.5	26°39.2
Antares	112°22.6	-26°28.1
Atria	107°21.9	-69°03.2
Sabik	102°09.2	-15°44.6
Shaula	96°18.0	-37°06.7
Rasalhague	96°03.8	12°32.9
Etamin	90°45.1	51°29.1
Kaus Aust.	83°40.0	-34°22.3
Vega	80°37.2	38°48.0
Nunki	75°54.8	-26°16.3
Altair	62°05.6	8°55.0
Peacock	53°15.0	-56°40.5
Deneb	49°29.8	45°20.7
Enif	33°44.4	9°57.5
Alnair	27°40.3	-46°52.5
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.8
Markab	13°35.5	15°18.1

2018/1/2	**SHA**	**Mer.pass**
Venus	44°41.0	12:33
Mars	121°05.7	07:26
Jupiter	131°19.1	06:45
Saturn	85°13.0	09:49

2018/1/2	**SHA**	**Mer.pass**
Venus	43°24.8	12:34
Mars	120°27.5	07:25
Jupiter	131°12.2	06:41
Saturn	85°06.2	09:45

2018/1/3	**SHA**	**Mer.pass**
Venus	42°08.8	12:35
Mars	119°49.3	07:24
Jupiter	131°05.4	06:38
Saturn	84°59.5	09:42

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°47.4	-18°15.8	49°30.5	5.2	18°30.7	5.0	60.3
1	191°47.3	-18°15.2	63°54.6	5.1	18°35.6	4.8	60.3
2	206°47.2	-18°14.5	78°18.7	5.0	18°40.4	4.7	60.3
3	221°47.1	-18°13.8	92°42.6	4.9	18°45.1	4.6	60.3
4	236°47.0	-18°13.2	107°06.6	4.9	18°49.6	4.5	60.4
5	251°46.8	-18°12.5	121°30.4	4.8	18°54.0	4.3	60.4
6	266°46.7	-18°11.9	135°54.2	4.7	18°58.3	4.2	60.4
7	281°46.6	-18°11.2	150°17.9	4.7	19°02.4	4.1	60.4
8	296°46.5	-18°10.6	164°41.5	4.6	19°06.4	3.9	60.5
9	311°46.4	-18°09.9	179°05.1	4.5	19°10.3	3.8	60.5
10	326°46.3	-18°09.2	193°28.6	4.5	19°14.0	3.7	60.5
11	341°46.1	-18°08.6	207°52.1	4.4	19°17.6	3.5	60.5
12	356°46.0	-18°07.9	222°15.4	4.4	19°21.1	3.4	60.5
13	11°45.9	-18°07.2	236°38.8	4.3	19°24.4	3.3	60.6
14	26°45.8	-18°06.6	251°02.1	4.3	19°27.6	3.1	60.6
15	41°45.7	-18°05.9	265°25.3	4.2	19°30.7	3.0	60.6
16	56°45.6	-18°05.3	279°48.5	4.1	19°33.6	2.8	60.6
17	71°45.5	-18°04.6	294°11.6	4.1	19°36.4	2.7	60.7
18	86°45.3	-18°03.9	308°34.6	4.0	19°39.0	2.6	60.7
19	101°45.2	-18°03.3	322°57.7	4.0	19°41.5	2.4	60.7
20	116°45.1	-18°02.6	337°20.6	3.9	19°43.8	2.3	60.7
21	131°45.0	-18°01.9	351°43.6	3.9	19°46.1	2.1	60.7
22	146°44.9	-18°01.3	6°06.4	3.9	19°48.1	2.0	60.7
23	161°44.8	-18°00.6	20°29.3	3.8	19°50.0	1.9	60.8
	SD.=16.2	d=0.7	S.D.=16.4				

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	176°44.7	-17°59.9	34°52.1	3.8	19°51.8	1.7	60.8
1	191°44.6	-17°59.3	49°14.8	3.7	19°53.5	1.6	60.8
2	206°44.4	-17°58.6	63°37.6	3.7	19°54.9	1.4	60.8
3	221°44.3	-17°57.9	78°00.3	3.7	19°56.3	1.3	60.8
4	236°44.2	-17°57.3	92°22.9	3.6	19°57.5	1.1	60.8
5	251°44.1	-17°56.6	106°45.5	3.6	19°58.5	1.0	60.9
6	266°44.0	-17°55.9	121°08.1	3.6	19°59.4	0.8	60.9
7	281°43.9	-17°55.2	135°30.7	3.5	20°00.2	0.7	60.9
8	296°43.8	-17°54.6	149°53.2	3.5	20°00.8	0.5	60.9
9	311°43.7	-17°53.9	164°15.7	3.5	20°01.2	0.4	60.9
10	326°43.6	-17°53.2	178°38.2	3.5	20°01.5	0.2	60.9
11	341°43.5	-17°52.5	193°00.7	3.5	20°01.7	0.1	60.9
12	356°43.4	-17°51.9	207°23.1	3.4	20°01.7	-0.1	61.0
13	11°43.2	-17°51.2	221°45.6	3.4	20°01.6	-0.2	61.0
14	26°43.1	-17°50.5	236°08.0	3.4	20°01.3	-0.4	61.0
15	41°43.0	-17°49.8	250°30.4	3.4	20°00.8	-0.5	61.0
16	56°42.9	-17°49.2	264°52.8	3.4	20°00.2	-0.7	61.0
17	71°42.8	-17°48.5	279°15.2	3.4	19°59.5	-0.8	61.0
18	86°42.7	-17°47.8	293°37.6	3.4	19°58.6	-1.0	61.0
19	101°42.6	-17°47.1	307°59.9	3.4	19°57.5	-1.1	61.0
20	116°42.5	-17°46.4	322°22.3	3.4	19°56.3	-1.3	61.0
21	131°42.4	-17°45.8	336°44.7	3.4	19°55.0	-1.4	61.0
22	146°42.3	-17°45.1	351°07.0	3.4	19°53.5	-1.6	61.0
23	161°42.2	-17°44.4	5°29.4	3.4	19°51.9	-1.7	61.0
	SD.=16.2	d=0.7	S.D.=16.6				

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°42.1	-17°43.7	19°51.8	3.4	19°50.1	-1.9	61.1
1	191°42.0	-17°43.0	34°14.2	3.4	19°48.1	-2.0	61.1
2	206°41.9	-17°42.4	48°36.6	3.4	19°46.0	-2.2	61.1
3	221°41.8	-17°41.7	62°59.0	3.4	19°43.8	-2.3	61.1
4	236°41.7	-17°41.0	77°21.4	3.4	19°41.4	-2.5	61.1
5	251°41.6	-17°40.3	91°43.8	3.4	19°38.8	-2.6	61.1
6	266°41.5	-17°39.6	106°06.3	3.5	19°36.1	-2.8	61.1
7	281°41.4	-17°38.9	120°28.7	3.5	19°33.3	-2.9	61.1
8	296°41.3	-17°38.3	134°51.2	3.5	19°30.3	-3.1	61.1
9	311°41.2	-17°37.6	149°13.7	3.5	19°27.2	-3.2	61.1
10	326°41.1	-17°36.9	163°36.3	3.5	19°23.9	-3.3	61.1
11	341°41.0	-17°36.2	177°58.8	3.6	19°20.5	-3.5	61.1
12	356°40.9	-17°35.5	192°21.4	3.6	19°16.9	-3.6	61.1
13	11°40.8	-17°34.8	206°44.0	3.6	19°13.2	-3.8	61.1
14	26°40.7	-17°34.1	221°06.7	3.7	19°09.4	-3.9	61.1
15	41°40.6	-17°33.4	235°29.4	3.7	19°05.4	-4.1	61.1
16	56°40.5	-17°32.7	249°52.1	3.7	19°01.2	-4.2	61.1
17	71°40.4	-17°32.1	264°14.8	3.8	18°57.0	-4.3	61.1
18	86°40.3	-17°31.4	278°37.6	3.8	18°52.5	-4.5	61.1
19	101°40.2	-17°30.7	293°00.4	3.9	18°48.0	-4.6	61.1
20	116°40.1	-17°30.0	307°23.3	3.9	18°43.3	-4.8	61.1
21	131°40.0	-17°29.3	321°46.2	3.9	18°38.5	-4.9	61.0
22	146°39.9	-17°28.6	336°09.2	4.0	18°33.5	-5.0	61.0
23	161°39.8	-17°27.9	350°32.2	4.0	18°28.4	-5.2	61.0
	SD.=16.2	d=0.7	S.D.=16.7				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:20	08:52	10:55	13:32	15:36	17:08
70	07:11	08:31	10:02	14:25	15:56	17:17
68	07:03	08:15	09:30	14:57	16:12	17:24
66	06:57	08:02	09:07	15:20	16:26	17:31
64	06:51	07:50	08:48	15:39	16:37	17:36
62	06:46	07:41	08:33	15:54	16:46	17:41
60	06:41	07:33	08:21	16:06	16:54	17:46
58	06:37	07:25	08:10	16:17	17:02	17:50
56	06:33	07:19	08:01	16:26	17:08	17:54
54	06:30	07:13	07:52	16:35	17:14	17:57
52	06:27	07:08	07:45	16:42	17:19	18:00
50	06:24	07:03	07:38	16:49	17:24	18:03
45	06:16	06:52	07:23	17:03	17:35	18:10
40	06:10	06:43	07:11	17:15	17:44	18:17
35	06:04	06:34	07:01	17:26	17:52	18:23
30	05:58	06:27	06:52	17:35	17:60	18:28
20	05:47	06:13	06:36	17:50	18:13	18:40
10	05:35	06:01	06:23	18:04	18:26	18:51
0	05:23	05:48	06:10	18:17	18:38	19:04
-10	05:08	05:34	05:56	18:30	18:52	19:18
-20	04:51	05:19	05:42	18:44	19:07	19:35
-30	04:29	04:60	05:26	18:60	19:26	19:57
-35	04:15	04:48	05:16	19:09	19:37	20:11
-40	03:58	04:35	05:05	19:20	19:51	20:28
-45	03:36	04:18	04:52	19:33	20:07	20:49
-50	03:07	03:58	04:36	19:49	20:27	21:18
-52	02:52	03:48	04:29	19:56	20:37	21:33
-54	02:33	03:36	04:20	20:05	20:49	21:50
-56	02:10	03:23	04:11	20:14	21:02	22:13
-58	01:38	03:07	04:00	20:24	21:17	22:43
-60	00:18	02:47	03:48	20:37	21:36	00:09

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	–:–	–:–	–:–	–:–	–:–
70	10:19	10:35	12:24	07:42	09:36	09:59
68	11:12	11:57	13:19	06:49	08:14	09:03
66	11:45	12:35	13:53	06:17	07:36	08:29
64	12:09	13:02	14:17	05:53	07:09	08:05
62	12:28	13:23	14:36	05:34	06:48	07:45
60	12:44	13:40	14:52	05:19	06:31	07:29
58	12:58	13:54	15:05	05:06	06:17	07:16
56	13:09	14:06	15:17	04:54	06:05	07:04
54	13:19	14:17	15:27	04:44	05:54	06:54
52	13:28	14:27	15:36	04:36	05:44	06:44
50	13:37	14:35	15:44	04:28	05:36	06:36
45	13:54	14:53	16:01	04:11	05:18	06:19
40	14:08	15:08	16:15	03:57	05:03	06:04
35	14:20	15:21	16:27	03:45	04:51	05:52
30	14:31	15:32	16:37	03:35	04:40	05:41
20	14:49	15:50	16:55	03:18	04:21	05:23
10	15:05	16:07	17:10	03:02	04:05	05:07
0	15:20	16:22	17:25	02:48	03:49	04:52
-10	15:35	16:38	17:39	02:34	03:34	04:37
-20	15:51	16:54	17:55	02:18	03:18	04:21
-30	16:09	17:13	18:12	02:01	02:59	04:02
-35	16:20	17:24	18:23	01:51	02:48	03:51
-40	16:33	17:37	18:34	01:39	02:35	03:39
-45	16:47	17:52	18:48	01:26	02:20	03:24
-50	17:05	18:10	19:05	01:09	02:02	03:06
-52	17:14	18:18	19:13	01:01	01:53	02:57
-54	17:23	18:28	19:22	00:52	01:44	02:48
-56	17:34	18:39	19:32	00:43	01:33	02:37
-58	17:46	18:51	19:43	00:32	01:21	02:25
-60	18:00	19:06	19:56	00:19	01:06	02:10

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
28	12:50	12:56	12:12	21:34	09:03	11(87%)
29	13:01	13:07	12:13	22:37	10:05	12(94%)
30	13:12	13:17	12:13	23:39	11:08	13(98%)

January 31, 01 ,02 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	130°10.0	171°03.1	-17°14.1	249°21.0	-20°03.7	261°08.7	-16°58.3	215°02.7	-22°28.3
1	145°12.4	186°02.4	-17°13.2	264°21.8	-20°04.0	276°10.9	-16°58.4	230°04.9	-22°28.3
2	160°14.9	201°01.7	-17°12.3	279°22.7	-20°04.3	291°13.1	-16°58.4	245°07.1	-22°28.3
3	175°17.3	216°01.1	-17°11.4	294°23.6	-20°04.6	306°15.3	-16°58.5	260°09.3	-22°28.3
4	190°19.8	231°00.4	-17°10.5	309°24.4	-20°05.0	321°17.5	-16°58.5	275°11.5	-22°28.3
5	205°22.3	245°59.7	-17°09.6	324°25.3	-20°05.3	336°19.7	-16°58.6	290°13.7	-22°28.3
6	220°24.7	260°59.0	-17°08.7	339°26.2	-20°05.6	351°21.9	-16°58.7	305°15.9	-22°28.3
7	235°27.2	275°58.4	-17°07.7	354°27.0	-20°05.9	6°24.1	-16°58.7	320°18.1	-22°28.3
8	250°29.7	290°57.7	-17°06.8	9°27.9	-20°06.3	21°26.3	-16°58.8	335°20.2	-22°28.3
9	265°32.1	305°57.0	-17°05.9	24°28.8	-20°06.6	36°28.5	-16°58.9	350°22.4	-22°28.2
10	280°34.6	320°56.3	-17°05.0	39°29.6	-20°06.9	51°30.7	-16°58.9	5°24.6	-22°28.2
11	295°37.1	335°55.7	-17°04.1	54°30.5	-20°07.2	66°32.9	-16°59.0	20°26.8	-22°28.2
12	310°39.5	350°55.0	-17°03.2	69°31.4	-20°07.5	81°35.1	-16°59.1	35°29.0	-22°28.2
13	325°42.0	5°54.3	-17°02.3	84°32.3	-20°07.9	96°37.3	-16°59.1	50°31.2	-22°28.2
14	340°44.5	20°53.6	-17°01.4	99°33.1	-20°08.2	111°39.5	-16°59.2	65°33.4	-22°28.2
15	355°46.9	35°53.0	-17°00.4	114°34.0	-20°08.5	126°41.6	-16°59.3	80°35.6	-22°28.2
16	10°49.4	50°52.3	-16°59.5	129°34.9	-20°08.8	141°43.8	-16°59.3	95°37.7	-22°28.2
17	25°51.8	65°51.6	-16°58.6	144°35.7	-20°09.1	156°46.0	-16°59.4	110°39.9	-22°28.2
18	40°54.3	80°50.9	-16°57.7	159°36.6	-20°09.4	171°48.2	-16°59.4	125°42.1	-22°28.2
19	55°56.8	95°50.3	-16°56.8	174°37.5	-20°09.8	186°50.4	-16°59.5	140°44.3	-22°28.2
20	70°59.2	110°49.6	-16°55.8	189°38.3	-20°10.1	201°52.6	-16°59.6	155°46.5	-22°28.2
21	86°01.7	125°48.9	-16°54.9	204°39.2	-20°10.4	216°54.8	-16°59.6	170°48.7	-22°28.1
22	101°04.2	140°48.3	-16°54.0	219°40.1	-20°10.7	231°57.0	-16°59.7	185°50.9	-22°28.1
23	116°06.6	155°47.6	-16°53.1	234°40.9	-20°11.0	246°59.2	-16°59.8	200°53.1	-22°28.1
Mer.pass.:15:16		v-0.7 d0.9 m-3.8		v0.9 d-0.3 m1.2		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	131°09.1	170°46.9	-16°52.2	249°41.8	-20°11.3	262°01.4	-16°59.8	215°55.2	-22°28.1
1	146°11.6	185°46.3	-16°51.2	264°42.7	-20°11.7	277°03.6	-16°59.9	230°57.4	-22°28.1
2	161°14.0	200°45.6	-16°50.3	279°43.5	-20°12.0	292°05.8	-16°59.9	245°59.6	-22°28.1
3	176°16.5	215°44.9	-16°49.4	294°44.4	-20°12.3	307°08.0	-17°00.0	261°01.8	-22°28.1
4	191°19.0	230°44.3	-16°48.5	309°45.3	-20°12.6	322°10.2	-17°00.1	276°04.0	-22°28.1
5	206°21.4	245°43.6	-16°47.5	324°46.1	-20°12.9	337°12.4	-17°00.1	291°06.2	-22°28.1
6	221°23.9	260°42.9	-16°46.6	339°47.0	-20°13.2	352°14.6	-17°00.2	306°08.4	-22°28.1
7	236°26.3	275°42.3	-16°45.7	354°47.9	-20°13.6	7°16.8	-17°00.3	321°10.6	-22°28.1
8	251°28.8	290°41.6	-16°44.7	9°48.7	-20°13.9	22°19.0	-17°00.3	336°12.8	-22°28.0
9	266°31.3	305°40.9	-16°43.8	24°49.6	-20°14.2	37°21.2	-17°00.4	351°14.9	-22°28.0
10	281°33.7	320°40.3	-16°42.9	39°50.5	-20°14.5	52°23.4	-17°00.4	6°17.1	-22°28.0
11	296°36.2	335°39.6	-16°41.9	54°51.3	-20°14.8	67°25.6	-17°00.5	21°19.3	-22°28.0
12	311°38.7	350°38.9	-16°41.0	69°52.2	-20°15.1	82°27.8	-17°00.6	36°21.5	-22°28.0
13	326°41.1	5°38.3	-16°40.1	84°53.1	-20°15.4	97°30.0	-17°00.6	51°23.7	-22°28.0
14	341°43.6	20°37.6	-16°39.1	99°53.9	-20°15.8	112°32.2	-17°00.7	66°25.9	-22°28.0
15	356°46.1	35°37.0	-16°38.2	114°54.8	-20°16.1	127°34.4	-17°00.7	81°28.1	-22°28.0
16	11°48.5	50°36.3	-16°37.3	129°55.7	-20°16.4	142°36.6	-17°00.8	96°30.3	-22°28.0
17	26°51.0	65°35.6	-16°36.3	144°56.5	-20°16.7	157°38.8	-17°00.9	111°32.5	-22°28.0
18	41°53.4	80°35.0	-16°35.4	159°57.4	-20°17.0	172°41.0	-17°00.9	126°34.7	-22°28.0
19	56°55.9	95°34.3	-16°34.5	174°58.3	-20°17.3	187°43.2	-17°01.0	141°36.8	-22°28.0
20	71°58.4	110°33.7	-16°33.5	189°59.1	-20°17.6	202°45.4	-17°01.1	156°39.0	-22°27.9
21	87°00.8	125°33.0	-16°32.6	205°00.0	-20°17.9	217°47.6	-17°01.1	171°41.2	-22°27.9
22	102°03.3	140°32.4	-16°31.6	220°00.9	-20°18.2	232°49.8	-17°01.2	186°43.4	-22°27.9
23	117°05.8	155°31.7	-16°30.7	235°01.7	-20°18.6	247°52.0	-17°01.2	201°45.6	-22°27.9
Mer.pass.:15:12		v-0.7 d0.9 m-3.8		v0.9 d-0.3 m1.2		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	132°08.2	170°31.0	-16°29.7	250°02.6	-20°18.9	262°54.2	-17°01.3	216°47.8	-22°27.9
1	147°10.7	185°30.4	-16°28.8	265°03.5	-20°19.2	277°56.4	-17°01.4	231°50.0	-22°27.9
2	162°13.2	200°29.7	-16°27.9	280°04.3	-20°19.5	292°58.6	-17°01.4	246°52.2	-22°27.9
3	177°15.6	215°29.1	-16°26.9	295°05.2	-20°19.8	308°00.8	-17°01.5	261°54.4	-22°27.9
4	192°18.1	230°28.4	-16°26.0	310°06.1	-20°20.1	323°03.1	-17°01.5	276°56.6	-22°27.9
5	207°20.6	245°27.8	-16°25.0	325°06.9	-20°20.4	338°05.3	-17°01.6	291°58.8	-22°27.9
6	222°23.0	260°27.1	-16°24.1	340°07.8	-20°20.7	353°07.5	-17°01.7	307°00.9	-22°27.9
7	237°25.5	275°26.5	-16°23.1	355°08.7	-20°21.0	8°09.7	-17°01.7	322°03.1	-22°27.9
8	252°27.9	290°25.8	-16°22.2	10°09.5	-20°21.3	23°11.9	-17°01.8	337°05.3	-22°27.8
9	267°30.4	305°25.2	-16°21.2	25°10.4	-20°21.7	38°14.1	-17°01.8	352°07.5	-22°27.8
10	282°32.9	320°24.5	-16°20.3	40°11.3	-20°22.0	53°16.3	-17°01.9	7°09.7	-22°27.8
11	297°35.3	335°23.9	-16°19.3	55°12.1	-20°22.3	68°18.5	-17°02.0	22°11.9	-22°27.8
12	312°37.8	350°23.2	-16°18.4	70°13.0	-20°22.6	83°20.7	-17°02.0	37°14.1	-22°27.8
13	327°40.3	5°22.6	-16°17.4	85°13.9	-20°22.9	98°22.9	-17°02.1	52°16.3	-22°27.8
14	342°42.7	20°21.9	-16°16.5	100°14.7	-20°23.2	113°25.1	-17°02.1	67°18.5	-22°27.8
15	357°45.2	35°21.3	-16°15.5	115°15.6	-20°23.5	128°27.3	-17°02.2	82°20.7	-22°27.8
16	12°47.7	50°20.6	-16°14.6	130°16.5	-20°23.8	143°29.5	-17°02.3	97°22.9	-22°27.8
17	27°50.1	65°20.0	-16°13.6	145°17.3	-20°24.1	158°31.7	-17°02.3	112°25.1	-22°27.8
18	42°52.6	80°19.3	-16°12.6	160°18.2	-20°24.4	173°33.9	-17°02.4	127°27.3	-22°27.8
19	57°55.1	95°18.7	-16°11.7	175°19.1	-20°24.7	188°36.2	-17°02.4	142°29.4	-22°27.7
20	72°57.5	110°18.1	-16°10.7	190°19.9	-20°25.0	203°38.4	-17°02.5	157°31.6	-22°27.7
21	87°60.0	125°17.4	-16°09.8	205°20.8	-20°25.3	218°40.6	-17°02.6	172°33.8	-22°27.7
22	103°02.4	140°16.8	-16°08.8	220°21.7	-20°25.6	233°42.8	-17°02.6	187°36.0	-22°27.7
23	118°04.9	155°16.1	-16°07.8	235°22.5	-20°25.9	248°45.0	-17°02.7	202°38.2	-22°27.7
Mer.pass.:15:08		v-0.7 d0.9 m-3.8		v0.9 d-0.3 m1.2		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.4
Ankaa	353°12.9	-42°12.8
Schedar	349°37.1	56°38.3
Diphda	348°52.8	-17°53.5
Achernar	335°24.7	-57°09.1
Hamal	327°57.2	23°32.8
Polaris	316°19.2	89°20.6
Akamar	315°15.9	-40°14.4
Menkar	314°11.7	4°09.4
Mirfak	308°35.7	49°55.5
Aldebaran	290°45.6	16°32.5
Rigel	281°08.8	-8°11.2
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°42.9	-1°11.7
Betelgeuse	270°57.6	7°24.4
Canopus	263°54.3	-52°42.7
Sirius	258°30.6	-16°44.6
Adara	255°09.7	-29°00.1
Procyon	244°56.0	5°10.6
Pollux	243°23.4	27°58.8
Avior	234°16.1	-59°34.2
Suhail	222°49.6	-43°30.4
Miaplacidus	221°38.0	-69°47.5
Alphard	217°52.7	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.4	61°39.0
Denebola	182°30.2	14°28.2
Gienah	175°48.8	-17°38.5
Acrux	173°05.3	-63°11.7
Gacrux	171°57.0	-57°12.6
Alioth	166°17.8	55°51.5
Spica	158°27.8	-11°15.2
Alcaid	152°56.3	49°13.2
Hadar	148°43.2	-60°27.2
Menkent	148°03.8	-36°27.2
Arcturus	145°52.7	19°05.6
Rigil Kent.	139°47.4	-60°54.1
Zubenelg.	137°01.9	-16°06.8
Kochab	137°20.3	74°04.7
Alphecca	126°08.5	26°39.2
Antares	112°22.6	-26°28.1
Atria	107°21.8	-69°03.1
Sabik	102°09.1	-15°44.6
Shaula	96°17.9	-37°06.7
Rasalhague	96°03.8	12°32.9
Etamin	90°45.1	51°29.1
Kaus Aust.	83°40.0	-34°22.3
Vega	80°37.2	38°48.0
Nunki	75°54.8	-26°16.3
Altair	62°05.6	8°55.0
Peacock	53°14.9	-56°40.5
Deneb	49°29.8	45°20.7
Enif	33°44.4	9°57.4
Alnair	27°40.3	-46°52.5
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.8
Markab	13°35.5	15°18.1

2018/1/3	**SHA**	**Mer.pass**
Venus	40°53.2	12:36
Mars	119°11.0	07:22
Jupiter	130°58.8	06:34
Saturn	84°52.8	09:38

2018/2/1	**SHA**	**Mer.pass**
Venus	39°37.8	12:37
Mars	118°32.7	07:21
Jupiter	130°52.3	06:31
Saturn	84°46.2	09:35

2018/2/2	**SHA**	**Mer.pass**
Venus	38°22.8	12:38
Mars	117°54.4	07:19
Jupiter	130°46.0	06:27
Saturn	84°39.6	09:31

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	176°39.7	-17°27.2	4°55.2	4.1	18°23.1	-5.3	61.0
1	191°39.6	-17°26.5	19°18.3	4.1	18°17.8	-5.4	61.0
2	206°39.6	-17°25.8	33°41.5	4.2	18°12.2	-5.6	61.0
3	221°39.5	-17°25.1	48°04.7	4.2	18°06.6	-5.7	61.0
4	236°39.4	-17°24.4	62°28.0	4.3	18°00.8	-5.8	61.0
5	251°39.3	-17°23.7	76°51.3	4.3	17°54.9	-6.0	61.0
6	266°39.2	-17°23.0	91°14.7	4.4	17°48.9	-6.1	61.0
7	281°39.1	-17°22.3	105°38.1	4.5	17°42.7	-6.2	61.0
8	296°39.0	-17°21.6	120°01.6	4.5	17°36.5	-6.3	60.9
9	311°38.9	-17°20.9	134°25.1	4.6	17°30.1	-6.5	60.9
10	326°38.8	-17°20.2	148°48.7	4.6	17°23.5	-6.6	60.9
11	341°38.7	-17°19.5	163°12.4	4.7	17°16.9	-6.7	60.9
12	356°38.6	-17°18.8	177°36.1	4.8	17°10.1	-6.8	60.9
13	11°38.5	-17°18.1	191°59.9	4.8	17°03.2	-7.0	60.9
14	26°38.5	-17°17.4	206°23.8	4.9	16°56.2	-7.1	60.9
15	41°38.4	-17°16.7	220°47.8	5.0	16°49.1	-7.2	60.9
16	56°38.3	-17°16.0	235°11.8	5.0	16°41.8	-7.3	60.8
17	71°38.2	-17°15.3	249°35.8	5.1	16°34.5	-7.4	60.8
18	86°38.1	-17°14.6	263°60.0	5.2	16°27.0	-7.5	60.8
19	101°38.0	-17°13.9	278°24.2	5.3	16°19.4	-7.6	60.8
20	116°37.9	-17°13.2	292°48.5	5.3	16°11.7	-7.7	60.8
21	131°37.8	-17°12.5	307°12.8	5.4	16°03.9	-7.9	60.7
22	146°37.8	-17°11.8	321°37.3	5.5	15°56.0	-8.0	60.7
23	161°37.7	-17°11.1	336°01.8	5.5	15°48.0	-8.1	60.7
	SD.=16.2	d=0.7			S.D.=16.6		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	176°37.6	-17°10.4	350°26.4	5.6	15°39.9	-8.2	60.7
1	191°37.5	-17°09.7	4°51.0	5.7	15°31.7	-8.3	60.7
2	206°37.4	-17°09.0	19°15.8	5.8	15°23.3	-8.4	60.6
3	221°37.3	-17°08.3	33°40.6	5.9	15°14.9	-8.5	60.6
4	236°37.2	-17°07.5	48°05.5	5.9	15°06.4	-8.6	60.6
5	251°37.2	-17°06.8	62°30.5	6.0	14°57.8	-8.7	60.6
6	266°37.1	-17°06.1	76°55.5	6.1	14°49.1	-8.8	60.6
7	281°37.0	-17°05.4	91°20.6	6.2	14°40.3	-8.9	60.5
8	296°36.9	-17°04.7	105°45.9	6.3	14°31.4	-8.9	60.5
9	311°36.8	-17°04.0	120°11.1	6.3	14°22.4	-9.0	60.5
10	326°36.7	-17°03.3	134°36.5	6.4	14°13.3	-9.1	60.5
11	341°36.7	-17°02.6	149°02.0	6.5	14°04.1	-9.2	60.4
12	356°36.6	-17°01.9	163°27.5	6.6	13°54.9	-9.3	60.4
13	11°36.5	-17°01.1	177°53.1	6.7	13°45.5	-9.4	60.4
14	26°36.4	-17°00.4	192°18.8	6.7	13°36.1	-9.5	60.4
15	41°36.3	-16°59.7	206°44.6	6.8	13°26.6	-9.5	60.3
16	56°36.3	-16°59.0	221°10.5	6.9	13°17.0	-9.6	60.3
17	71°36.2	-16°58.3	235°36.4	7.0	13°07.4	-9.7	60.3
18	86°36.1	-16°57.6	250°02.4	7.1	12°57.7	-9.8	60.3
19	101°36.0	-16°56.8	264°28.5	7.2	12°47.8	-9.8	60.2
20	116°35.9	-16°56.1	278°54.7	7.2	12°38.0	-9.9	60.2
21	131°35.9	-16°55.4	293°21.0	7.3	12°28.0	-10.0	60.2
22	146°35.8	-16°54.7	307°47.4	7.4	12°18.0	-10.1	60.1
23	161°35.7	-16°54.0	322°13.8	7.5	12°07.9	-10.1	60.1
	SD.=16.2	d=0.7			S.D.=16.6		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	176°35.6	-16°53.2	336°40.3	7.6	11°57.7	-10.2	60.1
1	191°35.6	-16°52.5	351°06.9	7.6	11°47.5	-10.3	60.1
2	206°35.5	-16°51.8	5°33.6	7.7	11°37.2	-10.3	60.0
3	221°35.4	-16°51.1	20°00.4	7.8	11°26.9	-10.4	60.0
4	236°35.3	-16°50.4	34°27.3	7.9	11°16.5	-10.4	60.0
5	251°35.3	-16°49.6	48°54.2	8.0	11°06.0	-10.5	59.9
6	266°35.2	-16°48.9	63°21.2	8.1	10°55.5	-10.6	59.9
7	281°35.1	-16°48.2	77°48.3	8.1	10°44.9	-10.6	59.9
8	296°35.0	-16°47.5	92°15.5	8.2	10°34.3	-10.7	59.8
9	311°35.0	-16°46.7	106°42.8	8.3	10°23.6	-10.7	59.8
10	326°34.9	-16°46.0	121°10.1	8.4	10°12.8	-10.8	59.8
11	341°34.8	-16°45.3	135°37.6	8.5	10°02.1	-10.8	59.7
12	356°34.7	-16°44.6	150°05.1	8.5	9°51.2	-10.9	59.7
13	11°34.7	-16°43.8	164°32.6	8.6	9°40.3	-10.9	59.7
14	26°34.6	-16°43.1	179°00.3	8.7	9°29.4	-11.0	59.6
15	41°34.5	-16°42.4	193°28.1	8.8	9°18.4	-11.0	59.6
16	56°34.4	-16°41.7	207°55.9	8.9	9°07.4	-11.0	59.6
17	71°34.4	-16°40.9	222°23.8	8.9	8°56.4	-11.1	59.5
18	86°34.3	-16°40.2	236°51.8	9.0	8°45.3	-11.1	59.5
19	101°34.2	-16°39.5	251°19.8	9.1	8°34.1	-11.2	59.5
20	116°34.2	-16°38.7	265°48.0	9.2	8°23.0	-11.2	59.4
21	131°34.1	-16°38.0	280°16.2	9.3	8°11.8	-11.2	59.4
22	146°34.0	-16°37.3	294°44.5	9.3	8°00.5	-11.3	59.3
23	161°34.0	-16°36.6	309°12.9	9.4	7°49.2	-11.3	59.3
	SD.=16.2	d=0.7			S.D.=16.4		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:10	08:39	10:27	14:01	15:50	17:19
70	07:02	08:20	09:45	14:43	16:08	17:27
68	06:55	08:05	09:17	15:11	16:23	17:33
66	06:49	07:53	08:56	15:32	16:35	17:39
64	06:44	07:43	08:40	15:49	16:45	17:44
62	06:40	07:34	08:26	16:02	16:54	17:48
60	06:36	07:27	08:14	16:14	17:01	17:52
58	06:32	07:20	08:04	16:24	17:08	17:56
56	06:29	07:14	07:55	16:33	17:14	17:59
54	06:26	07:08	07:47	16:41	17:19	18:02
52	06:23	07:03	07:40	16:48	17:24	18:05
50	06:20	06:59	07:34	16:54	17:29	18:08
45	06:14	06:49	07:20	17:08	17:39	18:14
40	06:08	06:40	07:09	17:19	17:48	18:20
35	06:02	06:32	06:59	17:29	17:55	18:25
30	05:57	06:25	06:50	17:37	18:02	18:31
20	05:46	06:13	06:36	17:52	18:15	18:41
10	05:35	06:01	06:22	18:05	18:27	18:52
0	05:23	05:48	06:10	18:17	18:39	19:04
-10	05:10	05:35	05:58	18:29	18:52	19:17
-20	04:53	05:21	05:44	18:43	19:06	19:34
-30	04:32	05:03	05:28	18:58	19:24	19:55
-35	04:18	04:52	05:19	19:07	19:35	20:08
-40	04:02	04:39	05:09	19:18	19:47	20:24
-45	03:41	04:23	04:57	19:30	20:03	20:44
-50	03:14	04:04	04:42	19:45	20:22	21:12
-52	02:60	03:54	04:34	19:52	20:32	21:25
-54	02:43	03:43	04:27	19:59	20:42	21:42
-56	02:22	03:31	04:18	20:08	20:55	22:02
-58	01:55	03:16	04:08	20:18	21:09	22:28
-60	01:10	02:58	03:56	20:29	21:26	23:09

	Moonrise			Moonset		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	13:40	16:13	18:23	10:53	10:23	10:08
70	14:34	16:39	18:37	09:58	09:55	09:52
68	15:06	16:59	18:48	09:25	09:35	09:39
66	15:30	17:14	18:57	09:00	09:18	09:29
64	15:49	17:27	19:04	08:41	09:04	09:20
62	16:04	17:37	19:11	08:25	08:53	09:13
60	16:17	17:47	19:16	08:12	08:43	09:06
58	16:28	17:54	19:21	08:00	08:34	09:00
56	16:37	18:01	19:26	07:50	08:27	08:55
54	16:45	18:08	19:29	07:42	08:20	08:50
52	16:53	18:13	19:33	07:34	08:14	08:46
50	16:60	18:18	19:36	07:27	08:08	08:42
45	17:14	18:29	19:43	07:11	07:56	08:34
40	17:26	18:38	19:49	06:59	07:46	08:27
35	17:36	18:46	19:54	06:48	07:37	08:21
30	17:45	18:52	19:58	06:38	07:30	08:15
20	18:00	19:04	20:05	06:22	07:16	08:06
10	18:13	19:14	20:12	06:08	07:05	07:58
0	18:26	19:24	20:18	05:54	06:54	07:50
-10	18:38	19:33	20:24	05:40	06:43	07:42
-20	18:51	19:43	20:31	05:26	06:31	07:34
-30	19:06	19:55	20:38	05:09	06:17	07:24
-35	19:15	20:01	20:42	04:59	06:09	07:18
-40	19:25	20:09	20:47	04:48	06:00	07:12
-45	19:37	20:18	20:53	04:35	05:49	07:04
-50	19:51	20:28	20:59	04:19	05:36	06:55
-52	19:57	20:33	21:02	04:11	05:30	06:51
-54	20:04	20:38	21:06	04:03	05:24	06:46
-56	20:12	20:44	21:10	03:53	05:16	06:41
-58	20:22	20:51	21:14	03:42	05:08	06:35
-60	20:32	20:58	21:18	03:30	04:58	06:29

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
31	13:21	13:26	12:13	00:39	12:10	14(100%)
1	13:30	13:34	12:13	00:39	13:08	15(99%)
2	13:38	13:41	12:13	01:36	14:04	16(95%)

February 03, 04 ,05 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	133°07.4	170°15.5	-16°06.9	250°23.4	-20°26.3	263°47.2	-17°02.7	217°40.4	-22°27.7
1	148°09.8	185°14.8	-16°05.9	265°24.3	-20°26.6	278°49.4	-17°02.8	232°42.6	-22°27.7
2	163°12.3	200°14.2	-16°05.0	280°25.1	-20°26.9	293°51.6	-17°02.9	247°44.8	-22°27.7
3	178°14.8	215°13.6	-16°04.0	295°26.0	-20°27.2	308°53.8	-17°02.9	262°47.0	-22°27.7
4	193°17.2	230°12.9	-16°03.0	310°26.9	-20°27.5	323°56.0	-17°03.0	277°49.2	-22°27.7
5	208°19.7	245°12.3	-16°02.1	325°27.7	-20°27.8	338°58.3	-17°03.0	292°51.4	-22°27.7
6	223°22.2	260°11.6	-16°01.1	340°28.6	-20°28.1	354°00.5	-17°03.1	307°53.6	-22°27.7
7	238°24.6	275°11.0	-16°00.1	355°29.5	-20°28.4	9°02.7	-17°03.1	322°55.8	-22°27.6
8	253°27.1	290°10.4	-15°59.2	10°30.3	-20°28.7	24°04.9	-17°03.2	337°58.0	-22°27.6
9	268°29.5	305°09.7	-15°58.2	25°31.2	-20°29.0	39°07.1	-17°03.3	353°00.1	-22°27.6
10	283°32.0	320°09.1	-15°57.2	40°32.0	-20°29.3	54°09.3	-17°03.3	8°02.3	-22°27.6
11	298°34.5	335°08.5	-15°56.3	55°32.9	-20°29.6	69°11.5	-17°03.4	23°04.5	-22°27.6
12	313°36.9	350°07.8	-15°55.3	70°33.8	-20°29.9	84°13.7	-17°03.4	38°06.7	-22°27.6
13	328°39.4	5°07.2	-15°54.3	85°34.6	-20°30.2	99°16.0	-17°03.5	53°08.9	-22°27.6
14	343°41.9	20°06.5	-15°53.3	100°35.5	-20°30.5	114°18.2	-17°03.6	68°11.1	-22°27.6
15	358°44.3	35°05.9	-15°52.4	115°36.4	-20°30.8	129°20.4	-17°03.6	83°13.3	-22°27.6
16	13°46.8	50°05.3	-15°51.4	130°37.2	-20°31.1	144°22.6	-17°03.7	98°15.5	-22°27.6
17	28°49.3	65°04.6	-15°50.4	145°38.1	-20°31.4	159°24.8	-17°03.7	113°17.7	-22°27.6
18	43°51.7	80°04.0	-15°49.4	160°39.0	-20°31.7	174°27.0	-17°03.8	128°19.9	-22°27.5
19	58°54.2	95°03.4	-15°48.5	175°39.8	-20°32.0	189°29.2	-17°03.8	143°22.1	-22°27.5
20	73°56.7	110°02.8	-15°47.5	190°40.7	-20°32.3	204°31.5	-17°03.9	158°24.3	-22°27.5
21	88°59.1	125°02.1	-15°46.5	205°41.6	-20°32.6	219°33.7	-17°04.0	173°26.5	-22°27.5
22	104°01.6	140°01.5	-15°45.5	220°42.4	-20°32.9	234°35.9	-17°04.0	188°28.7	-22°27.5
23	119°04.0	155°00.9	-15°44.5	235°43.3	-20°33.2	249°38.1	-17°04.1	203°30.9	-22°27.5
Mer.pass.:15:05		v-0.6 d1.0 m-3.8		v0.9 d-0.3 m1.2		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	134°06.5	170°00.2	-15°43.6	250°44.2	-20°33.5	264°40.3	-17°04.1	218°33.1	-22°27.5
1	149°09.0	184°59.6	-15°42.6	265°45.0	-20°33.8	279°42.5	-17°04.2	233°35.3	-22°27.5
2	164°11.4	199°59.0	-15°41.6	280°45.9	-20°34.1	294°44.8	-17°04.2	248°37.5	-22°27.5
3	179°13.9	214°58.3	-15°40.6	295°46.7	-20°34.4	309°47.0	-17°04.3	263°39.7	-22°27.5
4	194°16.4	229°57.7	-15°39.6	310°47.6	-20°34.7	324°49.2	-17°04.4	278°41.8	-22°27.5
5	209°18.8	244°57.1	-15°38.7	325°48.5	-20°35.0	339°51.4	-17°04.4	293°44.0	-22°27.4
6	224°21.3	259°56.5	-15°37.7	340°49.3	-20°35.3	354°53.6	-17°04.5	308°46.2	-22°27.4
7	239°23.8	274°55.8	-15°36.7	355°50.2	-20°35.6	9°55.8	-17°04.5	323°48.4	-22°27.4
8	254°26.2	289°55.2	-15°35.7	10°51.1	-20°35.9	24°58.1	-17°04.6	338°50.6	-22°27.4
9	269°28.7	304°54.6	-15°34.7	25°51.9	-20°36.2	40°00.3	-17°04.6	353°52.8	-22°27.4
10	284°31.2	319°54.0	-15°33.7	40°52.8	-20°36.5	55°02.5	-17°04.7	8°55.0	-22°27.4
11	299°33.6	334°53.3	-15°32.7	55°53.7	-20°36.8	70°04.7	-17°04.8	23°57.2	-22°27.4
12	314°36.1	349°52.7	-15°31.7	70°54.5	-20°37.1	85°06.9	-17°04.8	38°59.4	-22°27.4
13	329°38.5	4°52.1	-15°30.8	85°55.4	-20°37.4	100°09.2	-17°04.9	54°01.6	-22°27.4
14	344°41.0	19°51.5	-15°29.8	100°56.2	-20°37.7	115°11.4	-17°04.9	69°03.8	-22°27.4
15	359°43.5	34°50.9	-15°28.8	115°57.1	-20°38.0	130°13.6	-17°05.0	84°06.0	-22°27.4
16	14°45.9	49°50.2	-15°27.8	130°58.0	-20°38.2	145°15.8	-17°05.0	99°08.2	-22°27.3
17	29°48.4	64°49.6	-15°26.8	145°58.8	-20°38.5	160°18.0	-17°05.1	114°10.4	-22°27.3
18	44°50.9	79°49.0	-15°25.8	160°59.7	-20°38.8	175°20.3	-17°05.1	129°12.6	-22°27.3
19	59°53.3	94°48.4	-15°24.8	176°00.6	-20°39.1	190°22.5	-17°05.2	144°14.8	-22°27.3
20	74°55.8	109°47.8	-15°23.8	191°01.4	-20°39.4	205°24.7	-17°05.3	159°17.0	-22°27.3
21	89°58.3	124°47.1	-15°22.8	206°02.3	-20°39.7	220°26.9	-17°05.3	174°19.2	-22°27.3
22	105°00.7	139°46.5	-15°21.8	221°03.1	-20°40.0	235°29.1	-17°05.4	189°21.4	-22°27.3
23	120°03.2	154°45.9	-15°20.8	236°04.0	-20°40.3	250°31.4	-17°05.4	204°23.6	-22°27.3
Mer.pass.:15:01		v-0.6 d1.0 m-3.8		v0.9 d-0.3 m1.1		v2.2 d-0.1 m-1.8		v2.2 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	135°05.6	169°45.3	-15°19.8	251°04.9	-20°40.6	265°33.6	-17°05.5	219°25.8	-22°27.3
1	150°08.1	184°44.7	-15°18.8	266°05.7	-20°40.9	280°35.8	-17°05.5	234°28.0	-22°27.3
2	165°10.6	199°44.0	-15°17.8	281°06.6	-20°41.2	295°38.0	-17°05.6	249°30.2	-22°27.3
3	180°13.0	214°43.4	-15°16.8	296°07.5	-20°41.5	310°40.3	-17°05.6	264°32.4	-22°27.2
4	195°15.5	229°42.8	-15°15.8	311°08.3	-20°41.8	325°42.5	-17°05.7	279°34.6	-22°27.2
5	210°18.0	244°42.2	-15°14.8	326°09.2	-20°42.1	340°44.7	-17°05.8	294°36.8	-22°27.2
6	225°20.4	259°41.6	-15°13.8	341°10.1	-20°42.4	355°46.9	-17°05.8	309°39.0	-22°27.2
7	240°22.9	274°41.0	-15°12.8	356°10.9	-20°42.6	10°49.2	-17°05.9	324°41.2	-22°27.2
8	255°25.4	289°40.4	-15°11.8	11°11.8	-20°42.9	25°51.4	-17°05.9	339°43.4	-22°27.2
9	270°27.8	304°39.8	-15°10.8	26°12.6	-20°43.2	40°53.6	-17°06.0	354°45.6	-22°27.2
10	285°30.3	319°39.1	-15°09.8	41°13.5	-20°43.5	55°55.8	-17°06.0	9°47.8	-22°27.2
11	300°32.8	334°38.5	-15°08.8	56°14.4	-20°43.8	70°58.1	-17°06.1	24°50.0	-22°27.2
12	315°35.2	349°37.9	-15°07.8	71°15.2	-20°44.1	86°00.3	-17°06.1	39°52.2	-22°27.2
13	330°37.7	4°37.3	-15°06.8	86°16.1	-20°44.4	101°02.5	-17°06.2	54°54.4	-22°27.2
14	345°40.1	19°36.7	-15°05.8	101°17.0	-20°44.7	116°04.7	-17°06.2	69°56.6	-22°27.1
15	0°42.6	34°36.1	-15°04.8	116°17.8	-20°45.0	131°07.0	-17°06.3	84°58.7	-22°27.1
16	15°45.1	49°35.5	-15°03.8	131°18.7	-20°45.3	146°09.2	-17°06.4	100°00.9	-22°27.1
17	30°47.5	64°34.9	-15°02.7	146°19.5	-20°45.5	161°11.4	-17°06.4	115°03.1	-22°27.1
18	45°50.0	79°34.3	-15°01.7	161°20.4	-20°45.8	176°13.6	-17°06.5	130°05.3	-22°27.1
19	60°52.5	94°33.7	-15°00.7	176°21.3	-20°46.1	191°15.9	-17°06.5	145°07.5	-22°27.1
20	75°54.9	109°33.1	-14°59.7	191°22.1	-20°46.4	206°18.1	-17°06.6	160°09.7	-22°27.1
21	90°57.4	124°32.4	-14°58.7	206°23.0	-20°46.7	221°20.3	-17°06.6	175°11.9	-22°27.1
22	105°59.9	139°31.8	-14°57.7	221°23.9	-20°47.0	236°22.6	-17°06.7	190°14.1	-22°27.1
23	121°02.3	154°31.2	-14°56.7	236°24.7	-20°47.3	251°24.8	-17°06.7	205°16.3	-22°27.1
Mer.pass.:14:57		v-0.6 d1.0 m-3.8		v0.9 d-0.3 m1.1		v2.2 d-0.1 m-1.9		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.4
Ankaa	353°12.9	-42°12.8
Schedar	349°37.2	56°38.3
Diphda	348°52.8	-17°53.5
Achernar	335°24.7	-57°09.1
Hamal	327°57.3	23°32.8
Polaris	316°20.7	89°20.6
Akamar	315°15.9	-40°14.4
Menkar	314°11.7	4°09.4
Mirfak	308°35.7	49°55.5
Aldebaran	290°45.6	16°32.5
Rigel	281°08.8	-8°11.2
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°43.0	-1°11.7
Betelgeuse	270°57.7	7°24.4
Canopus	263°54.3	-52°42.7
Sirius	258°30.6	-16°44.6
Adara	255°09.7	-29°00.1
Procyon	244°56.0	5°10.6
Pollux	243°23.4	27°58.8
Avior	234°16.1	-59°34.2
Suhail	222°49.6	-43°30.4
Miaplacidus	221°38.0	-69°47.5
Alphard	217°52.7	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.3	61°39.0
Denebola	182°30.2	14°28.2
Gienah	175°48.8	-17°38.5
Acrux	173°05.3	-63°11.7
Gacrux	171°57.0	-57°12.6
Alioth	166°17.8	55°51.5
Spica	158°27.8	-11°15.2
Alcaid	152°56.3	49°13.2
Hadar	148°43.2	-60°27.2
Menkent	148°03.8	-36°27.3
Arcturus	145°52.7	19°05.5
Rigil Kent.	139°47.3	-60°54.2
Zubenelg.	137°01.9	-16°06.8
Kochab	137°20.2	74°04.7
Alphecca	126°08.4	26°39.2
Antares	112°22.5	-26°28.1
Atria	107°21.8	-69°03.1
Sabik	102°09.1	-15°44.6
Shaula	96°17.9	-37°06.7
Rasalhague	96°03.8	12°32.9
Etamin	90°45.1	51°29.1
Kaus Aust.	83°39.9	-34°22.3
Vega	80°37.2	38°48.0
Nunki	75°54.8	-26°16.3
Altair	62°05.6	8°54.9
Peacock	53°14.9	-56°40.5
Deneb	49°29.8	45°20.7
Enif	33°44.4	9°57.4
Alnair	27°40.3	-46°52.5
Fomalhaut	15°20.9	-29°31.8
Scheat	13°50.6	28°10.8
Markab	13°35.5	15°18.1

2018/2/3	**SHA**	**Mer.pass**
Venus	37°08.1	12:40
Mars	117°16.0	07:18
Jupiter	130°39.8	06:24
Saturn	84°33.0	09:28

2018/2/4	**SHA**	**Mer.pass**
Venus	35°53.7	12:41
Mars	116°37.6	07:17
Jupiter	130°33.8	06:20
Saturn	84°26.6	09:24

2018/2/5	**SHA**	**Mer.pass**
Venus	34°39.6	12:42
Mars	115°59.2	07:15
Jupiter	130°27.9	06:17
Saturn	84°20.1	09:21

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°33.9	-16°35.8	323°41.3	9.5	7°37.9	-11.3	59.3
1	191°33.8	-16°35.1	338°09.8	9.6	7°26.6	-11.3	59.2
2	206°33.7	-16°34.4	352°38.4	9.6	7°15.3	-11.4	59.2
3	221°33.7	-16°33.6	7°07.1	9.7	7°03.9	-11.4	59.2
4	236°33.6	-16°32.9	21°35.8	9.8	6°52.5	-11.4	59.1
5	251°33.5	-16°32.2	36°04.6	9.8	6°41.0	-11.4	59.1
6	266°33.5	-16°31.4	50°33.5	9.9	6°29.6	-11.5	59.0
7	281°33.4	-16°30.7	65°02.5	10.0	6°18.1	-11.5	59.0
8	296°33.3	-16°30.0	79°31.5	10.1	6°06.6	-11.5	59.0
9	311°33.3	-16°29.2	94°00.6	10.1	5°55.1	-11.5	58.9
10	326°33.2	-16°28.5	108°29.7	10.2	5°43.5	-11.5	58.9
11	341°33.1	-16°27.7	122°59.0	10.3	5°32.0	-11.6	58.9
12	356°33.1	-16°27.0	137°28.3	10.3	5°20.4	-11.6	58.8
13	11°33.0	-16°26.3	151°57.6	10.4	5°08.8	-11.6	58.8
14	26°33.0	-16°25.5	166°27.1	10.5	4°57.3	-11.6	58.7
15	41°32.9	-16°24.8	180°56.6	10.5	4°45.7	-11.6	58.7
16	56°32.8	-16°24.0	195°26.1	10.6	4°34.0	-11.6	58.7
17	71°32.8	-16°23.3	209°55.8	10.7	4°22.4	-11.6	58.6
18	86°32.7	-16°22.6	224°25.5	10.7	4°10.8	-11.6	58.6
19	101°32.6	-16°21.8	238°55.2	10.8	3°59.2	-11.6	58.5
20	116°32.6	-16°21.1	253°25.0	10.8	3°47.5	-11.6	58.5
21	131°32.5	-16°20.3	267°54.9	10.9	3°35.9	-11.6	58.5
22	146°32.5	-16°19.6	282°24.8	11.0	3°24.2	-11.6	58.4
23	161°32.4	-16°18.9	296°54.8	11.0	3°12.6	-11.6	58.4
	SD.=16.2	d=0.7			S.D.=16.2		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°32.3	-16°18.1	311°24.9	11.1	3°01.0	-11.6	58.3
1	191°32.3	-16°17.4	325°55.0	11.1	2°49.3	-11.6	58.3
2	206°32.2	-16°16.6	340°25.2	11.2	2°37.7	-11.6	58.3
3	221°32.2	-16°15.9	354°55.4	11.3	2°26.0	-11.6	58.2
4	236°32.1	-16°15.1	9°25.7	11.3	2°14.4	-11.6	58.2
5	251°32.0	-16°14.4	23°56.0	11.4	2°02.8	-11.6	58.1
6	266°32.0	-16°13.6	38°26.4	11.4	1°51.1	-11.6	58.1
7	281°31.9	-16°12.9	52°56.9	11.5	1°39.5	-11.6	58.1
8	296°31.9	-16°12.1	67°27.4	11.5	1°27.9	-11.6	58.0
9	311°31.8	-16°11.4	81°57.9	11.6	1°16.3	-11.6	58.0
10	326°31.7	-16°10.6	96°28.5	11.6	1°04.7	-11.6	57.9
11	341°31.7	-16°09.9	110°59.2	11.7	0°53.1	-11.6	57.9
12	356°31.6	-16°09.1	125°29.9	11.7	0°41.6	-11.6	57.9
13	11°31.6	-16°08.4	140°00.7	11.8	0°30.0	-11.5	57.8
14	26°31.5	-16°07.6	154°31.5	11.8	0°18.5	-11.5	57.8
15	41°31.5	-16°06.9	169°02.3	11.9	0°07.0	-11.5	57.7
16	56°31.4	-16°06.1	183°33.2	11.9	-0°04.5	-11.5	57.7
17	71°31.4	-16°05.4	198°04.1	12.0	-0°16.0	-11.5	57.7
18	86°31.3	-16°04.6	212°35.1	12.0	-0°27.5	-11.5	57.6
19	101°31.2	-16°03.9	227°06.2	12.1	-0°39.0	-11.4	57.6
20	116°31.2	-16°03.1	241°37.2	12.1	-0°50.4	-11.4	57.5
21	131°31.1	-16°02.4	256°08.3	12.1	-1°01.8	-11.4	57.5
22	146°31.1	-16°01.6	270°39.5	12.2	-1°13.2	-11.4	57.5
23	161°31.0	-16°00.9	285°10.7	12.2	-1°24.6	-11.4	57.4
	SD.=16.2	d=0.7			S.D.=15.9		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°31.0	-16°00.1	299°41.9	12.3	-1°35.9	-11.3	57.4
1	191°30.9	-15°59.4	314°13.2	12.3	-1°47.2	-11.3	57.4
2	206°30.9	-15°58.6	328°44.5	12.3	-1°58.5	-11.3	57.3
3	221°30.8	-15°57.8	343°15.9	12.4	-2°09.8	-11.3	57.3
4	236°30.8	-15°57.1	357°47.3	12.4	-2°21.0	-11.2	57.2
5	251°30.7	-15°56.3	12°18.7	12.4	-2°32.3	-11.2	57.2
6	266°30.7	-15°55.6	26°50.1	12.5	-2°43.4	-11.2	57.2
7	281°30.6	-15°54.8	41°21.6	12.5	-2°54.6	-11.1	57.1
8	296°30.6	-15°54.0	55°53.2	12.5	-3°05.7	-11.1	57.1
9	311°30.5	-15°53.3	70°24.7	12.6	-3°16.8	-11.1	57.0
10	326°30.5	-15°52.5	84°56.3	12.6	-3°27.9	-11.1	57.0
11	341°30.4	-15°51.8	99°27.9	12.6	-3°38.9	-11.0	57.0
12	356°30.4	-15°51.0	113°59.6	12.7	-3°49.9	-11.0	56.9
13	11°30.3	-15°50.2	128°31.3	12.7	-4°00.9	-11.0	56.9
14	26°30.3	-15°49.5	143°03.0	12.7	-4°11.8	-10.9	56.9
15	41°30.2	-15°48.7	157°34.7	12.8	-4°22.7	-10.9	56.8
16	56°30.2	-15°48.0	172°06.5	12.8	-4°33.6	-10.8	56.8
17	71°30.1	-15°47.2	186°38.3	12.8	-4°44.4	-10.8	56.7
18	86°30.1	-15°46.4	201°10.1	12.8	-4°55.2	-10.8	56.7
19	101°30.1	-15°45.7	215°42.0	12.9	-5°06.0	-10.7	56.7
20	116°30.0	-15°44.9	230°13.8	12.9	-5°16.7	-10.7	56.6
21	131°30.0	-15°44.1	244°45.7	12.9	-5°27.3	-10.7	56.6
22	146°29.9	-15°43.4	259°17.6	12.9	-5°38.0	-10.6	56.6
23	161°29.9	-15°42.6	273°49.6	12.9	-5°48.6	-10.6	56.5
	SD.=16.2	d=0.8			S.D.=15.7		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:59	08:25	10:04	14:25	16:04	17:31
70	06:52	08:09	09:29	14:60	16:20	17:37
68	06:47	07:55	09:05	15:24	16:34	17:43
66	06:42	07:45	08:46	15:43	16:44	17:47
64	06:37	07:35	08:30	15:58	16:54	17:52
62	06:34	07:27	08:18	16:11	17:01	17:55
60	06:30	07:20	08:07	16:22	17:08	17:59
58	06:27	07:14	07:57	16:31	17:15	18:02
56	06:24	07:09	07:49	16:39	17:20	18:05
54	06:21	07:04	07:42	16:47	17:25	18:07
52	06:19	06:59	07:35	16:53	17:30	18:10
50	06:16	06:55	07:29	16:59	17:34	18:12
45	06:10	06:45	07:16	17:12	17:43	18:18
40	06:05	06:37	07:06	17:23	17:51	18:23
35	05:60	06:30	06:57	17:32	17:58	18:28
30	05:55	06:24	06:48	17:40	18:05	18:33
20	05:45	06:12	06:34	17:54	18:16	18:43
10	05:35	06:00	06:22	18:06	18:28	18:53
0	05:24	05:49	06:10	18:17	18:39	19:04
-10	05:11	05:37	05:59	18:29	18:51	19:17
-20	04:55	05:23	05:46	18:42	19:05	19:32
-30	04:35	05:06	05:31	18:56	19:22	19:52
-35	04:22	04:55	05:22	19:05	19:32	20:05
-40	04:07	04:43	05:13	19:15	19:44	20:20
-45	03:47	04:28	05:01	19:26	19:59	20:40
-50	03:21	04:09	04:47	19:40	20:17	21:05
-52	03:08	04:00	04:40	19:46	20:26	21:18
-54	02:52	03:50	04:33	19:54	20:36	21:33
-56	02:34	03:39	04:25	20:02	20:47	21:51
-58	02:09	03:25	04:15	20:11	21:01	22:15
-60	01:34	03:09	04:04	20:22	21:17	22:48

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	20:23	22:15	–:–	09:56	09:46	09:36
70	20:28	22:13	23:55	09:48	09:44	09:41
68	20:32	22:12	23:47	09:42	09:43	09:44
66	20:36	22:10	23:41	09:37	09:42	09:48
64	20:39	22:09	23:36	09:32	09:42	09:51
62	20:41	22:08	23:32	09:28	09:41	09:53
60	20:44	22:07	23:28	09:24	09:40	09:55
58	20:46	22:06	23:24	09:21	09:40	09:57
56	20:47	22:06	23:21	09:19	09:39	09:59
54	20:49	22:05	23:19	09:16	09:39	10:00
52	20:50	22:05	23:16	09:14	09:38	10:02
50	20:52	22:04	23:14	09:12	09:38	10:03
45	20:54	22:03	23:09	09:07	09:37	10:06
40	20:57	22:02	23:05	09:03	09:37	10:08
35	20:59	22:01	23:02	08:60	09:36	10:10
30	21:01	22:01	22:59	08:57	09:35	10:12
20	21:04	21:60	22:53	08:52	09:34	10:15
10	21:07	21:59	22:49	08:47	09:34	10:18
0	21:09	21:58	22:45	08:43	09:33	10:20
-10	21:12	21:57	22:41	08:38	09:32	10:23
-20	21:15	21:56	22:36	08:34	09:31	10:26
-30	21:18	21:55	22:31	08:28	09:30	10:29
-35	21:20	21:54	22:28	08:25	09:29	10:31
-40	21:22	21:54	22:25	08:21	09:28	10:33
-45	21:24	21:53	22:21	08:17	09:28	10:35
-50	21:27	21:52	22:17	08:12	09:27	10:38
-52	21:28	21:52	22:15	08:10	09:26	10:39
-54	21:30	21:51	22:13	08:07	09:26	10:41
-56	21:31	21:51	22:10	08:05	09:25	10:42
-58	21:33	21:50	22:07	08:01	09:24	10:44
-60	21:35	21:50	22:04	07:58	09:24	10:46

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
3	13:45	13:48	12:13	02:30	14:56	17(88%)
4	13:51	13:54	12:13	03:21	15:45	18(80%)
5	13:56	13:59	12:13	04:09	16:32	19(71%)

February 06, 07 ,08 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	136°04.8	169°30.6	-14°55.7	251°25.6	-20°47.6	266°27.0	-17°06.8	220°18.5	-22°27.1
1	151°07.2	184°30.0	-14°54.6	266°26.4	-20°47.8	281°29.3	-17°06.8	235°20.7	-22°27.0
2	166°09.7	199°29.4	-14°53.6	281°27.3	-20°48.1	296°31.5	-17°06.9	250°22.9	-22°27.0
3	181°12.2	214°28.8	-14°52.6	296°28.2	-20°48.4	311°33.7	-17°06.9	265°25.1	-22°27.0
4	196°14.6	229°28.2	-14°51.6	311°29.0	-20°48.7	326°35.9	-17°07.0	280°27.3	-22°27.0
5	211°17.1	244°27.6	-14°50.6	326°29.9	-20°49.0	341°38.2	-17°07.1	295°29.5	-22°27.0
6	226°19.6	259°27.0	-14°49.5	341°30.7	-20°49.3	356°40.4	-17°07.1	310°31.7	-22°27.0
7	241°22.0	274°26.4	-14°48.5	356°31.6	-20°49.6	11°42.6	-17°07.2	325°33.9	-22°27.0
8	256°24.5	289°25.8	-14°47.5	11°32.5	-20°49.9	26°44.9	-17°07.2	340°36.1	-22°27.0
9	271°27.0	304°25.2	-14°46.5	26°33.3	-20°50.1	41°47.1	-17°07.3	355°38.3	-22°27.0
10	286°29.4	319°24.6	-14°45.5	41°34.2	-20°50.4	56°49.3	-17°07.3	10°40.5	-22°27.0
11	301°31.9	334°24.0	-14°44.4	56°35.1	-20°50.7	71°51.6	-17°07.4	25°42.7	-22°27.0
12	316°34.4	349°23.4	-14°43.4	71°35.9	-20°51.0	86°53.8	-17°07.4	40°44.9	-22°26.9
13	331°36.8	4°22.8	-14°42.4	86°36.8	-20°51.3	101°56.0	-17°07.5	55°47.1	-22°26.9
14	346°39.3	19°22.2	-14°41.4	101°37.6	-20°51.6	116°58.3	-17°07.5	70°49.4	-22°26.9
15	1°41.7	34°21.6	-14°40.3	116°38.5	-20°51.8	132°00.5	-17°07.6	85°51.6	-22°26.9
16	16°44.2	49°21.0	-14°39.3	131°39.4	-20°52.1	147°02.7	-17°07.6	100°53.8	-22°26.9
17	31°46.7	64°20.4	-14°38.3	146°40.2	-20°52.4	162°05.0	-17°07.7	115°56.0	-22°26.9
18	46°49.1	79°19.8	-14°37.3	161°41.1	-20°52.7	177°07.2	-17°07.7	130°58.2	-22°26.9
19	61°51.6	94°19.2	-14°36.2	176°41.9	-20°53.0	192°09.4	-17°07.8	146°00.4	-22°26.9
20	76°54.1	109°18.7	-14°35.2	191°42.8	-20°53.3	207°11.7	-17°07.8	161°02.6	-22°26.9
21	91°56.5	124°18.1	-14°34.2	206°43.7	-20°53.5	222°13.9	-17°07.9	176°04.8	-22°26.9
22	106°59.0	139°17.5	-14°33.1	221°44.5	-20°53.8	237°16.1	-17°07.9	191°07.0	-22°26.9
23	122°01.5	154°16.9	-14°32.1	236°45.4	-20°54.1	252°18.4	-17°08.0	206°09.2	-22°26.8
Mer.pass.:14:53		v-0.6 d1.0 m-3.8		v0.9 d-0.3 m1.1		v2.2 d-0.1 m-1.9		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	137°03.9	169°16.3	-14°31.1	251°46.2	-20°54.4	267°20.6	-17°08.0	221°11.4	-22°26.8
1	152°06.4	184°15.7	-14°30.0	266°47.1	-20°54.7	282°22.8	-17°08.1	236°13.6	-22°26.8
2	167°08.9	199°15.1	-14°29.0	281°48.0	-20°54.9	297°25.1	-17°08.1	251°15.8	-22°26.8
3	182°11.3	214°14.5	-14°28.0	296°48.8	-20°55.2	312°27.3	-17°08.2	266°18.0	-22°26.8
4	197°13.8	229°13.9	-14°26.9	311°49.7	-20°55.5	327°29.6	-17°08.3	281°20.2	-22°26.8
5	212°16.2	244°13.3	-14°25.9	326°50.6	-20°55.8	342°31.8	-17°08.3	296°22.4	-22°26.8
6	227°18.7	259°12.7	-14°24.9	341°51.4	-20°56.1	357°34.0	-17°08.4	311°24.6	-22°26.8
7	242°21.2	274°12.1	-14°23.8	356°52.3	-20°56.3	12°36.3	-17°08.4	326°26.8	-22°26.8
8	257°23.6	289°11.6	-14°22.8	11°53.1	-20°56.6	27°38.5	-17°08.5	341°29.0	-22°26.8
9	272°26.1	304°11.0	-14°21.8	26°54.0	-20°56.9	42°40.7	-17°08.5	356°31.2	-22°26.7
10	287°28.6	319°10.4	-14°20.7	41°54.9	-20°57.2	57°43.0	-17°08.6	11°33.4	-22°26.7
11	302°31.0	334°09.8	-14°19.7	56°55.7	-20°57.5	72°45.2	-17°08.6	26°35.6	-22°26.7
12	317°33.5	349°09.2	-14°18.6	71°56.6	-20°57.7	87°47.5	-17°08.7	41°37.8	-22°26.7
13	332°36.0	4°08.6	-14°17.6	86°57.4	-20°58.0	102°49.7	-17°08.7	56°40.0	-22°26.7
14	347°38.4	19°08.0	-14°16.5	101°58.3	-20°58.3	117°51.9	-17°08.8	71°42.2	-22°26.7
15	2°40.9	34°07.5	-14°15.5	116°59.2	-20°58.6	132°54.2	-17°08.8	86°44.4	-22°26.7
16	17°43.3	49°06.9	-14°14.5	132°00.0	-20°58.9	147°56.4	-17°08.9	101°46.6	-22°26.7
17	32°45.8	64°06.3	-14°13.4	147°00.9	-20°59.1	162°58.7	-17°08.9	116°48.8	-22°26.7
18	47°48.3	79°05.7	-14°12.4	162°01.7	-20°59.4	178°00.9	-17°09.0	131°51.0	-22°26.7
19	62°50.7	94°05.1	-14°11.3	177°02.6	-20°59.7	193°03.1	-17°09.0	146°53.2	-22°26.7
20	77°53.2	109°04.5	-14°10.3	192°03.5	-20°60.0	208°05.4	-17°09.1	161°55.4	-22°26.6
21	92°55.7	124°04.0	-14°09.2	207°04.3	-21°00.2	223°07.6	-17°09.1	176°57.6	-22°26.6
22	107°58.1	139°03.4	-14°08.2	222°05.2	-21°00.5	238°09.9	-17°09.2	191°59.8	-22°26.6
23	123°00.6	154°02.8	-14°07.1	237°06.0	-21°00.8	253°12.1	-17°09.2	207°02.0	-22°26.6
Mer.pass.:14:49		v-0.6 d1.0 m-3.8		v0.9 d-0.3 m1.1		v2.2 d-0.1 m-1.9		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	138°03.1	169°02.2	-14°06.1	252°06.9	-21°01.1	268°14.4	-17°09.3	222°04.2	-22°26.6
1	153°05.5	184°01.6	-14°05.0	267°07.8	-21°01.3	283°16.6	-17°09.3	237°06.5	-22°26.6
2	168°08.0	199°01.1	-14°04.0	282°08.6	-21°01.6	298°18.8	-17°09.4	252°08.7	-22°26.6
3	183°10.5	214°00.5	-14°02.9	297°09.5	-21°01.9	313°21.1	-17°09.4	267°10.9	-22°26.6
4	198°12.9	228°59.9	-14°01.9	312°10.3	-21°02.2	328°23.3	-17°09.5	282°13.1	-22°26.6
5	213°15.4	243°59.3	-14°00.8	327°11.2	-21°02.4	343°25.6	-17°09.5	297°15.3	-22°26.6
6	228°17.8	258°58.7	-13°59.8	342°12.1	-21°02.7	358°27.8	-17°09.6	312°17.5	-22°26.5
7	243°20.3	273°58.2	-13°58.7	357°12.9	-21°03.0	13°30.1	-17°09.6	327°19.7	-22°26.5
8	258°22.8	288°57.6	-13°57.7	12°13.8	-21°03.3	28°32.3	-17°09.7	342°21.9	-22°26.5
9	273°25.2	303°57.0	-13°56.6	27°14.6	-21°03.5	43°34.6	-17°09.7	357°24.1	-22°26.5
10	288°27.7	318°56.4	-13°55.6	42°15.5	-21°03.8	58°36.8	-17°09.8	12°26.3	-22°26.5
11	303°30.2	333°55.9	-13°54.5	57°16.4	-21°04.1	73°39.0	-17°09.8	27°28.5	-22°26.5
12	318°32.6	348°55.3	-13°53.5	72°17.2	-21°04.3	88°41.3	-17°09.9	42°30.7	-22°26.5
13	333°35.1	3°54.7	-13°52.4	87°18.1	-21°04.6	103°43.5	-17°09.9	57°32.9	-22°26.5
14	348°37.6	18°54.2	-13°51.3	102°18.9	-21°04.9	118°45.8	-17°10.0	72°35.1	-22°26.5
15	3°40.0	33°53.6	-13°50.3	117°19.8	-21°05.2	133°48.0	-17°10.0	87°37.3	-22°26.5
16	18°42.5	48°53.0	-13°49.2	132°20.7	-21°05.4	148°50.3	-17°10.0	102°39.5	-22°26.5
17	33°45.0	63°52.4	-13°48.2	147°21.5	-21°05.7	163°52.5	-17°10.1	117°41.7	-22°26.4
18	48°47.4	78°51.9	-13°47.1	162°22.4	-21°06.0	178°54.8	-17°10.1	132°43.9	-22°26.4
19	63°49.9	93°51.3	-13°46.1	177°23.2	-21°06.2	193°57.0	-17°10.2	147°46.2	-22°26.4
20	78°52.3	108°50.7	-13°45.0	192°24.1	-21°06.5	208°59.3	-17°10.2	162°48.4	-22°26.4
21	93°54.8	123°50.2	-13°43.9	207°25.0	-21°06.8	224°01.5	-17°10.3	177°50.6	-22°26.4
22	108°57.3	138°49.6	-13°42.9	222°25.8	-21°07.1	239°03.8	-17°10.3	192°52.8	-22°26.4
23	123°59.7	153°49.0	-13°41.8	237°26.7	-21°07.3	254°06.0	-17°10.4	207°55.0	-22°26.4
Mer.pass.:14:45		v-0.6 d1.0 m-3.8		v0.9 d-0.3 m1.1		v2.2 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.4
Ankaa	353°12.9	-42°12.8
Schedar	349°37.2	56°38.3
Diphda	348°52.8	-17°53.5
Achernar	335°24.7	-57°09.1
Hamal	327°57.3	23°32.8
Polaris	316°22.2	89°20.6
Akamar	315°16.0	-40°14.4
Menkar	314°11.7	4°09.4
Mirfak	308°35.7	49°55.5
Aldebaran	290°45.6	16°32.5
Rigel	281°08.8	-8°11.2
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°43.0	-1°11.7
Betelgeuse	270°57.7	7°24.4
Canopus	263°54.3	-52°42.7
Sirius	258°30.6	-16°44.6
Adara	255°09.7	-29°00.1
Procyon	244°56.0	5°10.6
Pollux	243°23.4	27°58.8
Avior	234°16.1	-59°34.2
Suhail	222°49.6	-43°30.5
Miaplacidus	221°38.0	-69°47.5
Alphard	217°52.7	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.3	61°39.0
Denebola	182°30.1	14°28.2
Gienah	175°48.8	-17°38.5
Acrux	173°05.3	-63°11.7
Gacrux	171°57.0	-57°12.6
Alioth	166°17.7	55°51.5
Spica	158°27.8	-11°15.2
Alcaid	152°56.3	49°13.2
Hadar	148°43.2	-60°27.2
Menkent	148°03.7	-36°27.3
Arcturus	145°52.7	19°05.5
Rigil Kent.	139°47.3	-60°54.2
Zubenelg.	137°01.9	-16°06.8
Kochab	137°20.2	74°04.7
Alphecca	126°08.4	26°39.2
Antares	112°22.5	-26°28.1
Atria	107°21.7	-69°03.1
Sabik	102°09.1	-15°44.7
Shaula	96°17.9	-37°06.7
Rasalhague	96°03.8	12°32.9
Etamin	90°45.0	51°29.1
Kaus Aust.	83°39.9	-34°22.3
Vega	80°37.2	38°47.9
Nunki	75°54.7	-26°16.3
Altair	62°05.6	8°54.9
Peacock	53°14.9	-56°40.5
Deneb	49°29.8	45°20.7
Enif	33°44.4	9°57.4
Alnair	27°40.3	-46°52.5
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.6	28°10.8
Markab	13°35.5	15°18.1

2018/2/6	**SHA**	**Mer.pass**
Venus	33°25.8	12:42
Mars	115°20.8	07:14
Jupiter	130°22.2	06:13
Saturn	84°13.8	09:17

2018/2/7	**SHA**	**Mer.pass**
Venus	32°12.4	12:43
Mars	114°42.3	07:13
Jupiter	130°16.7	06:10
Saturn	84°07.4	09:14

2018/2/8	**SHA**	**Mer.pass**
Venus	30°59.2	12:44
Mars	114°03.8	07:11
Jupiter	130°11.3	06:06
Saturn	84°01.2	09:10

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°29.8	-15°41.8	288°21.5	13.0	-5°59.1	-10.5	56.5
1	191°29.8	-15°41.1	302°53.5	13.0	-6°09.6	-10.5	56.5
2	206°29.7	-15°40.3	317°25.5	13.0	-6°20.1	-10.4	56.4
3	221°29.7	-15°39.5	331°57.5	13.0	-6°30.5	-10.4	56.4
4	236°29.7	-15°38.8	346°29.6	13.0	-6°40.9	-10.4	56.3
5	251°29.6	-15°38.0	1°01.6	13.1	-6°51.2	-10.3	56.3
6	266°29.6	-15°37.2	15°33.7	13.1	-7°01.5	-10.3	56.3
7	281°29.5	-15°36.5	30°05.8	13.1	-7°11.8	-10.2	56.2
8	296°29.5	-15°35.7	44°37.9	13.1	-7°22.0	-10.2	56.2
9	311°29.5	-15°34.9	59°10.0	13.1	-7°32.1	-10.1	56.2
10	326°29.4	-15°34.1	73°42.1	13.1	-7°42.2	-10.1	56.1
11	341°29.4	-15°33.4	88°14.3	13.2	-7°52.3	-10.0	56.1
12	356°29.3	-15°32.6	102°46.4	13.2	-8°02.3	-10.0	56.1
13	11°29.3	-15°31.8	117°18.6	13.2	-8°12.3	-9.9	56.0
14	26°29.3	-15°31.0	131°50.8	13.2	-8°22.2	-9.9	56.0
15	41°29.2	-15°30.3	146°23.0	13.2	-8°32.0	-9.8	56.0
16	56°29.2	-15°29.5	160°55.2	13.2	-8°41.8	-9.8	55.9
17	71°29.1	-15°28.7	175°27.4	13.2	-8°51.6	-9.7	55.9
18	86°29.1	-15°28.0	189°59.6	13.2	-9°01.3	-9.7	55.9
19	101°29.1	-15°27.2	204°31.8	13.2	-9°10.9	-9.6	55.8
20	116°29.0	-15°26.4	219°04.1	13.2	-9°20.5	-9.6	55.8
21	131°29.0	-15°25.6	233°36.3	13.2	-9°30.1	-9.5	55.8
22	146°28.9	-15°24.8	248°08.6	13.3	-9°39.6	-9.5	55.8
23	161°28.9	-15°24.1	262°40.8	13.3	-9°49.0	-9.4	55.7
	SD.=16.2	d=0.8			S.D.=15.4		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°28.9	-15°23.3	277°13.1	13.3	-9°58.4	-9.4	55.7
1	191°28.8	-15°22.5	291°45.4	13.3	-10°07.7	-9.3	55.7
2	206°28.8	-15°21.7	306°17.6	13.3	-10°17.0	-9.2	55.6
3	221°28.8	-15°21.0	320°49.9	13.3	-10°26.2	-9.2	55.6
4	236°28.7	-15°20.2	335°22.2	13.3	-10°35.3	-9.1	55.6
5	251°28.7	-15°19.4	349°54.5	13.3	-10°44.4	-9.1	55.5
6	266°28.7	-15°18.6	4°26.7	13.3	-10°53.5	-9.0	55.5
7	281°28.6	-15°17.8	18°59.0	13.3	-11°02.5	-9.0	55.5
8	296°28.6	-15°17.1	33°31.3	13.3	-11°11.4	-8.9	55.5
9	311°28.6	-15°16.3	48°03.6	13.3	-11°20.3	-8.8	55.4
10	326°28.5	-15°15.5	62°35.9	13.3	-11°29.1	-8.8	55.4
11	341°28.5	-15°14.7	77°08.2	13.3	-11°37.8	-8.7	55.4
12	356°28.5	-15°13.9	91°40.4	13.3	-11°46.5	-8.6	55.3
13	11°28.4	-15°13.1	106°12.7	13.3	-11°55.1	-8.6	55.3
14	26°28.4	-15°12.4	120°45.0	13.3	-12°03.7	-8.5	55.3
15	41°28.4	-15°11.6	135°17.3	13.3	-12°12.1	-8.5	55.3
16	56°28.3	-15°10.8	149°49.5	13.3	-12°20.6	-8.4	55.2
17	71°28.3	-15°10.0	164°21.8	13.3	-12°28.9	-8.3	55.2
18	86°28.3	-15°09.2	178°54.1	13.3	-12°37.3	-8.3	55.2
19	101°28.3	-15°08.4	193°26.3	13.3	-12°45.5	-8.2	55.2
20	116°28.2	-15°07.6	207°58.6	13.3	-12°53.7	-8.1	55.1
21	131°28.2	-15°06.8	222°30.8	13.2	-13°01.8	-8.1	55.1
22	146°28.2	-15°06.1	237°03.1	13.2	-13°09.8	-8.0	55.1
23	161°28.1	-15°05.3	251°35.3	13.2	-13°17.8	-7.9	55.1
	SD.=16.2	d=0.8			S.D.=15.2		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°28.1	-15°04.5	266°07.5	13.2	-13°25.7	-7.9	55.0
1	191°28.1	-15°03.7	280°39.8	13.2	-13°33.6	-7.8	55.0
2	206°28.1	-15°02.9	295°12.0	13.2	-13°41.3	-7.7	55.0
3	221°28.0	-15°02.1	309°44.2	13.2	-13°49.1	-7.7	55.0
4	236°28.0	-15°01.3	324°16.4	13.2	-13°56.7	-7.6	54.9
5	251°28.0	-15°00.5	338°48.6	13.2	-14°04.3	-7.5	54.9
6	266°28.0	-14°59.7	353°20.7	13.2	-14°11.8	-7.5	54.9
7	281°27.9	-14°58.9	7°52.9	13.2	-14°19.2	-7.4	54.9
8	296°27.9	-14°58.2	22°25.1	13.2	-14°26.6	-7.3	54.9
9	311°27.9	-14°57.4	36°57.2	13.1	-14°33.9	-7.3	54.8
10	326°27.9	-14°56.6	51°29.3	13.1	-14°41.1	-7.2	54.8
11	341°27.8	-14°55.8	66°01.5	13.1	-14°48.3	-7.1	54.8
12	356°27.8	-14°55.0	80°33.6	13.1	-14°55.3	-7.0	54.8
13	11°27.8	-14°54.2	95°05.7	13.1	-15°02.4	-7.0	54.8
14	26°27.8	-14°53.4	109°37.8	13.1	-15°09.3	-6.9	54.7
15	41°27.7	-14°52.6	124°09.9	13.1	-15°16.2	-6.8	54.7
16	56°27.7	-14°51.8	138°41.9	13.1	-15°23.0	-6.8	54.7
17	71°27.7	-14°51.0	153°14.0	13.0	-15°29.7	-6.7	54.7
18	86°27.7	-14°50.2	167°46.0	13.0	-15°36.3	-6.6	54.7
19	101°27.6	-14°49.4	182°18.1	13.0	-15°42.9	-6.5	54.6
20	116°27.6	-14°48.6	196°50.1	13.0	-15°49.4	-6.5	54.6
21	131°27.6	-14°47.8	211°22.1	13.0	-15°55.8	-6.4	54.6
22	146°27.6	-14°47.0	225°54.1	13.0	-16°02.2	-6.3	54.6
23	161°27.6	-14°46.2	240°26.1	13.0	-16°08.4	-6.2	54.6
	SD.=16.2	d=0.8			S.D.=15.0		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:47	08:12	09:43	14:46	16:18	17:43
70	06:42	07:57	09:14	15:16	16:33	17:48
68	06:37	07:45	08:52	15:37	16:44	17:52
66	06:34	07:35	08:35	15:54	16:54	17:56
64	06:30	07:27	08:21	16:08	17:02	17:59
62	06:27	07:20	08:09	16:20	17:09	18:03
60	06:24	07:14	07:59	16:30	17:16	18:05
58	06:21	07:08	07:51	16:38	17:21	18:08
56	06:19	07:03	07:43	16:46	17:26	18:10
54	06:16	06:58	07:36	16:53	17:31	18:13
52	06:14	06:54	07:30	16:59	17:35	18:15
50	06:12	06:50	07:24	17:04	17:39	18:17
45	06:07	06:42	07:13	17:16	17:47	18:22
40	06:02	06:34	07:03	17:26	17:54	18:26
35	05:58	06:28	06:54	17:35	18:01	18:31
30	05:53	06:22	06:46	17:42	18:07	18:35
20	05:44	06:11	06:33	17:55	18:18	18:44
10	05:35	05:60	06:22	18:07	18:28	18:53
0	05:24	05:49	06:11	18:18	18:39	19:04
-10	05:12	05:38	05:60	18:29	18:50	19:16
-20	04:57	05:24	05:48	18:40	19:03	19:31
-30	04:38	05:08	05:34	18:54	19:19	19:50
-35	04:26	04:58	05:26	19:02	19:29	20:02
-40	04:11	04:47	05:16	19:11	19:41	20:16
-45	03:53	04:33	05:05	19:22	19:54	20:34
-50	03:28	04:15	04:52	19:35	20:12	20:58
-52	03:16	04:07	04:46	19:41	20:20	21:10
-54	03:02	03:57	04:39	19:48	20:29	21:24
-56	02:44	03:46	04:31	19:55	20:40	21:41
-58	02:23	03:34	04:23	20:04	20:52	22:02
-60	01:54	03:19	04:13	20:14	21:07	22:30

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	00:04	01:52	03:43	09:25	09:14	08:58
70	–:–	01:34	03:14	09:37	09:32	09:28
68	–:–	01:20	02:52	09:46	09:48	09:51
66	–:–	01:09	02:35	09:53	09:60	10:09
64	–:–	00:60	02:21	09:60	10:10	10:23
62	–:–	00:52	02:10	10:05	10:19	10:35
60	–:–	00:45	01:60	10:10	10:27	10:46
58	–:–	00:39	01:51	10:14	10:33	10:55
56	–:–	00:34	01:44	10:18	10:39	11:03
54	–:–	00:29	01:37	10:22	10:45	11:10
52	–:–	00:25	01:31	10:25	10:49	11:16
50	–:–	00:21	01:26	10:28	10:54	11:22
45	–:–	00:13	01:14	10:34	11:03	11:35
40	–:–	00:06	01:05	10:39	11:11	11:45
35	23:60	–:–	00:57	10:44	11:18	11:54
30	23:55	–:–	00:49	10:48	11:24	12:02
20	23:46	–:–	00:37	10:55	11:35	12:15
10	23:38	–:–	00:26	11:01	11:44	12:27
0	23:31	–:–	00:16	11:07	11:53	12:39
-10	23:23	–:–	00:06	11:13	12:01	12:50
-20	23:16	23:56	–:–	11:19	12:11	13:02
-30	23:07	23:44	–:–	11:26	12:21	13:15
-35	23:02	23:37	–:–	11:30	12:27	13:23
-40	22:56	23:29	–:–	11:35	12:34	13:32
-45	22:50	23:20	23:53	11:40	12:43	13:43
-50	22:42	23:09	23:39	11:46	12:52	13:56
-52	22:38	23:04	23:33	11:49	12:57	14:02
-54	22:35	22:58	23:26	11:53	13:02	14:09
-56	22:30	22:52	23:18	11:56	13:08	14:16
-58	22:25	22:45	23:09	12:00	13:14	14:25
-60	22:20	22:38	22:59	12:05	13:21	14:34

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
6	14:01	14:03	12:14	04:55	17:18	20(62%)
7	14:05	14:06	12:14	05:41	18:04	21(52%)
8	14:08	14:09	12:14	06:27	18:50	22(42%)

February 09, 10 ,11 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	139°02.2	168°48.4	-13°40.7	252°27.5	-21°07.6	269°08.3	-17°10.4	222°57.2	-22°26.4
1	154°04.7	183°47.9	-13°39.7	267°28.4	-21°07.9	284°10.5	-17°10.5	237°59.4	-22°26.4
2	169°07.1	198°47.3	-13°38.6	282°29.3	-21°08.1	299°12.8	-17°10.5	253°01.6	-22°26.4
3	184°09.6	213°46.7	-13°37.5	297°30.1	-21°08.4	314°15.0	-17°10.6	268°03.8	-22°26.3
4	199°12.1	228°46.2	-13°36.5	312°31.0	-21°08.7	329°17.3	-17°10.6	283°06.0	-22°26.3
5	214°14.5	243°45.6	-13°35.4	327°31.8	-21°08.9	344°19.5	-17°10.7	298°08.2	-22°26.3
6	229°17.0	258°45.0	-13°34.3	342°32.7	-21°09.2	359°21.8	-17°10.7	313°10.4	-22°26.3
7	244°19.4	273°44.5	-13°33.3	357°33.6	-21°09.5	14°24.0	-17°10.8	328°12.6	-22°26.3
8	259°21.9	288°43.9	-13°32.2	12°34.4	-21°09.7	29°26.3	-17°10.8	343°14.8	-22°26.3
9	274°24.4	303°43.4	-13°31.1	27°35.3	-21°10.0	44°28.5	-17°10.9	358°17.1	-22°26.3
10	289°26.8	318°42.8	-13°30.1	42°36.1	-21°10.3	59°30.8	-17°10.9	13°19.3	-22°26.3
11	304°29.3	333°42.2	-13°29.0	57°37.0	-21°10.5	74°33.0	-17°11.0	28°21.5	-22°26.3
12	319°31.8	348°41.7	-13°27.9	72°37.8	-21°10.8	89°35.3	-17°11.0	43°23.7	-22°26.3
13	334°34.2	3°41.1	-13°26.8	87°38.7	-21°11.1	104°37.5	-17°11.1	58°25.9	-22°26.3
14	349°36.7	18°40.5	-13°25.8	102°39.6	-21°11.3	119°39.8	-17°11.1	73°28.1	-22°26.2
15	4°39.2	33°40.0	-13°24.7	117°40.4	-21°11.6	134°42.0	-17°11.1	88°30.3	-22°26.2
16	19°41.6	48°39.4	-13°23.6	132°41.3	-21°11.9	149°44.3	-17°11.2	103°32.5	-22°26.2
17	34°44.1	63°38.9	-13°22.5	147°42.1	-21°12.1	164°46.5	-17°11.2	118°34.7	-22°26.2
18	49°46.6	78°38.3	-13°21.5	162°43.0	-21°12.4	179°48.8	-17°11.3	133°36.9	-22°26.2
19	64°49.0	93°37.7	-13°20.4	177°43.9	-21°12.7	194°51.1	-17°11.3	148°39.1	-22°26.2
20	79°51.5	108°37.2	-13°19.3	192°44.7	-21°12.9	209°53.3	-17°11.4	163°41.4	-22°26.2
21	94°53.9	123°36.6	-13°18.2	207°45.6	-21°13.2	224°55.6	-17°11.4	178°43.6	-22°26.2
22	109°56.4	138°36.1	-13°17.2	222°46.4	-21°13.5	239°57.8	-17°11.5	193°45.8	-22°26.2
23	124°58.9	153°35.5	-13°16.1	237°47.3	-21°13.7	255°00.1	-17°11.5	208°48.0	-22°26.2
Mer.pass.:14:41		v-0.6 d1.1 m-3.8		v0.9 d-0.3 m1.1		v2.2 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	140°01.3	168°35.0	-13°15.0	252°48.2	-21°14.0	270°02.3	-17°11.6	223°50.2	-22°26.1
1	155°03.8	183°34.4	-13°13.9	267°49.0	-21°14.2	285°04.6	-17°11.6	238°52.4	-22°26.1
2	170°06.3	198°33.8	-13°12.8	282°49.9	-21°14.5	300°06.8	-17°11.7	253°54.6	-22°26.1
3	185°08.7	213°33.3	-13°11.8	297°50.7	-21°14.8	315°09.1	-17°11.7	268°56.8	-22°26.1
4	200°11.2	228°32.7	-13°10.7	312°51.6	-21°15.0	330°11.4	-17°11.7	283°59.0	-22°26.1
5	215°13.7	243°32.2	-13°09.6	327°52.5	-21°15.3	345°13.6	-17°11.8	299°01.2	-22°26.1
6	230°16.1	258°31.6	-13°08.5	342°53.3	-21°15.6	0°15.9	-17°11.8	314°03.5	-22°26.1
7	245°18.6	273°31.1	-13°07.4	357°54.2	-21°15.8	15°18.1	-17°11.9	329°05.7	-22°26.1
8	260°21.1	288°30.5	-13°06.4	12°55.0	-21°16.1	30°20.4	-17°11.9	344°07.9	-22°26.1
9	275°23.5	303°30.0	-13°05.3	27°55.9	-21°16.3	45°22.7	-17°12.0	359°10.1	-22°26.1
10	290°26.0	318°29.4	-13°04.2	42°56.7	-21°16.6	60°24.9	-17°12.0	14°12.3	-22°26.0
11	305°28.4	333°28.9	-13°03.1	57°57.6	-21°16.9	75°27.2	-17°12.1	29°14.5	-22°26.0
12	320°30.9	348°28.3	-13°02.0	72°58.5	-21°17.1	90°29.4	-17°12.1	44°16.7	-22°26.0
13	335°33.4	3°27.8	-13°00.9	87°59.3	-21°17.4	105°31.7	-17°12.2	59°18.9	-22°26.0
14	350°35.8	18°27.2	-12°59.8	103°00.2	-21°17.6	120°34.0	-17°12.2	74°21.1	-22°26.0
15	5°38.3	33°26.7	-12°58.7	118°01.0	-21°17.9	135°36.2	-17°12.2	89°23.3	-22°26.0
16	20°40.8	48°26.1	-12°57.7	133°01.9	-21°18.2	150°38.5	-17°12.3	104°25.6	-22°26.0
17	35°43.2	63°25.6	-12°56.6	148°02.8	-21°18.4	165°40.7	-17°12.3	119°27.8	-22°26.0
18	50°45.7	78°25.0	-12°55.5	163°03.6	-21°18.7	180°43.0	-17°12.4	134°30.0	-22°26.0
19	65°48.2	93°24.5	-12°54.4	178°04.5	-21°18.9	195°45.3	-17°12.4	149°32.2	-22°26.0
20	80°50.6	108°23.9	-12°53.3	193°05.3	-21°19.2	210°47.5	-17°12.5	164°34.4	-22°26.0
21	95°53.1	123°23.4	-12°52.2	208°06.2	-21°19.5	225°49.8	-17°12.5	179°36.6	-22°25.9
22	110°55.5	138°22.8	-12°51.1	223°07.0	-21°19.7	240°52.0	-17°12.6	194°38.8	-22°25.9
23	125°58.0	153°22.3	-12°50.0	238°07.9	-21°20.0	255°54.3	-17°12.6	209°41.0	-22°25.9
Mer.pass.:14:37		v-0.6 d1.1 m-3.8		v0.9 d-0.3 m1.1		v2.3 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	141°00.5	168°21.8	-12°48.9	253°08.8	-21°20.2	270°56.6	-17°12.6	224°43.3	-22°25.9
1	156°02.9	183°21.2	-12°47.8	268°09.6	-21°20.5	285°58.8	-17°12.7	239°45.5	-22°25.9
2	171°05.4	198°20.7	-12°46.7	283°10.5	-21°20.7	301°01.1	-17°12.7	254°47.7	-22°25.9
3	186°07.9	213°20.1	-12°45.6	298°11.3	-21°21.0	316°03.4	-17°12.8	269°49.9	-22°25.9
4	201°10.3	228°19.6	-12°44.5	313°12.2	-21°21.3	331°05.6	-17°12.8	284°52.1	-22°25.9
5	216°12.8	243°19.0	-12°43.4	328°13.1	-21°21.5	346°07.9	-17°12.9	299°54.3	-22°25.9
6	231°15.3	258°18.5	-12°42.3	343°13.9	-21°21.8	1°10.2	-17°12.9	314°56.5	-22°25.9
7	246°17.7	273°17.9	-12°41.2	358°14.8	-21°22.0	16°12.4	-17°13.0	329°58.7	-22°25.8
8	261°20.2	288°17.4	-12°40.1	13°15.6	-21°22.3	31°14.7	-17°13.0	345°01.0	-22°25.8
9	276°22.7	303°16.9	-12°39.0	28°16.5	-21°22.5	46°17.0	-17°13.0	0°03.2	-22°25.8
10	291°25.1	318°16.3	-12°37.9	43°17.3	-21°22.8	61°19.2	-17°13.1	15°05.4	-22°25.8
11	306°27.6	333°15.8	-12°36.8	58°18.2	-21°23.0	76°21.5	-17°13.1	30°07.6	-22°25.8
12	321°30.0	348°15.2	-12°35.7	73°19.1	-21°23.3	91°23.8	-17°13.2	45°09.8	-22°25.8
13	336°32.5	3°14.7	-12°34.6	88°19.9	-21°23.6	106°26.0	-17°13.2	60°12.0	-22°25.8
14	351°35.0	18°14.2	-12°33.5	103°20.8	-21°23.8	121°28.3	-17°13.3	75°14.2	-22°25.8
15	6°37.4	33°13.6	-12°32.4	118°21.6	-21°24.1	136°30.6	-17°13.3	90°16.4	-22°25.8
16	21°39.9	48°13.1	-12°31.3	133°22.5	-21°24.3	151°32.8	-17°13.3	105°18.7	-22°25.8
17	36°42.4	63°12.6	-12°30.2	148°23.3	-21°24.6	166°35.1	-17°13.4	120°20.9	-22°25.7
18	51°44.8	78°12.0	-12°29.1	163°24.2	-21°24.8	181°37.4	-17°13.4	135°23.1	-22°25.7
19	66°47.3	93°11.5	-12°28.0	178°25.1	-21°25.1	196°39.6	-17°13.5	150°25.3	-22°25.7
20	81°49.8	108°10.9	-12°26.9	193°25.9	-21°25.3	211°41.9	-17°13.5	165°27.5	-22°25.7
21	96°52.2	123°10.4	-12°25.8	208°26.8	-21°25.6	226°44.2	-17°13.6	180°29.7	-22°25.7
22	111°54.7	138°09.9	-12°24.7	223°27.6	-21°25.8	241°46.4	-17°13.6	195°31.9	-22°25.7
23	126°57.2	153°09.3	-12°23.6	238°28.5	-21°26.1	256°48.7	-17°13.6	210°34.2	-22°25.7
Mer.pass.:14:33		v-0.5 d1.1 m-3.8		v0.9 d-0.3 m1.1		v2.3 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.4
Ankaa	353°12.9	-42°12.8
Schedar	349°37.2	56°38.3
Diphda	348°52.8	-17°53.5
Achernar	335°24.7	-57°09.1
Hamal	327°57.3	23°32.8
Polaris	316°23.5	89°20.6
Akamar	315°16.0	-40°14.4
Menkar	314°11.7	4°09.4
Mirfak	308°35.7	49°55.5
Aldebaran	290°45.6	16°32.5
Rigel	281°08.8	-8°11.2
Capella	280°29.5	46°00.9
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°43.0	-1°11.7
Betelgeuse	270°57.7	7°24.4
Canopus	263°54.3	-52°42.7
Sirius	258°30.6	-16°44.6
Adara	255°09.7	-29°00.1
Procyon	244°56.0	5°10.6
Pollux	243°23.4	27°58.8
Avior	234°16.1	-59°34.2
Suhail	222°49.6	-43°30.5
Miaplacidus	221°38.0	-69°47.6
Alphard	217°52.6	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.3	61°39.0
Denebola	182°30.1	14°28.2
Gienah	175°48.8	-17°38.5
Acrux	173°05.2	-63°11.7
Gacrux	171°56.9	-57°12.6
Alioth	166°17.7	55°51.5
Spica	158°27.8	-11°15.2
Alcaid	152°56.3	49°13.2
Hadar	148°43.1	-60°27.2
Menkent	148°03.7	-36°27.3
Arcturus	145°52.6	19°05.5
Rigil Kent.	139°47.3	-60°54.2
Zubenelg.	137°01.9	-16°06.8
Kochab	137°20.1	74°04.7
Alphecca	126°08.4	26°39.2
Antares	112°22.5	-26°28.1
Atria	107°21.7	-69°03.1
Sabik	102°09.1	-15°44.7
Shaula	96°17.9	-37°06.7
Rasalhague	96°03.7	12°32.9
Etamin	90°45.0	51°29.1
Kaus Aust.	83°39.9	-34°22.3
Vega	80°37.2	38°47.9
Nunki	75°54.7	-26°16.3
Altair	62°05.5	8°54.9
Peacock	53°14.9	-56°40.5
Deneb	49°29.8	45°20.7
Enif	33°44.4	9°57.4
Alnair	27°40.3	-46°52.5
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.6	28°10.8
Markab	13°35.5	15°18.1

2018/2/9	**SHA**	**Mer.pass**
Venus	29°46.2	12:45
Mars	113°25.3	07:10
Jupiter	130°06.1	06:03
Saturn	83°55.0	09:07

2018/2/1	**SHA**	**Mer.pass**
Venus	28°33.6	12:46
Mars	112°46.8	07:08
Jupiter	130°01.0	05:59
Saturn	83°48.9	09:03

2018/2/1	**SHA**	**Mer.pass**
Venus	27°21.3	12:47
Mars	112°08.3	07:07
Jupiter	129°56.1	05:55
Saturn	83°42.8	08:60

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°27.5	-14°45.4	254°58.0	13.0	-16°14.6	-6.2	54.6
1	191°27.5	-14°44.6	269°30.0	12.9	-16°20.8	-6.1	54.5
2	206°27.5	-14°43.8	284°01.9	12.9	-16°26.8	-6.0	54.5
3	221°27.5	-14°43.0	298°33.8	12.9	-16°32.8	-5.9	54.5
4	236°27.5	-14°42.2	313°05.7	12.9	-16°38.7	-5.9	54.5
5	251°27.5	-14°41.4	327°37.6	12.9	-16°44.5	-5.8	54.5
6	266°27.4	-14°40.6	342°09.5	12.9	-16°50.2	-5.7	54.5
7	281°27.4	-14°39.8	356°41.3	12.8	-16°55.9	-5.6	54.4
8	296°27.4	-14°39.0	11°13.2	12.8	-17°01.5	-5.5	54.4
9	311°27.4	-14°38.2	25°45.0	12.8	-17°07.0	-5.5	54.4
10	326°27.4	-14°37.4	40°16.8	12.8	-17°12.4	-5.4	54.4
11	341°27.3	-14°36.6	54°48.6	12.8	-17°17.7	-5.3	54.4
12	356°27.3	-14°35.8	69°20.4	12.8	-17°23.0	-5.2	54.4
13	11°27.3	-14°35.0	83°52.1	12.8	-17°28.2	-5.1	54.4
14	26°27.3	-14°34.2	98°23.9	12.7	-17°33.3	-5.1	54.3
15	41°27.3	-14°33.4	112°55.6	12.7	-17°38.3	-5.0	54.3
16	56°27.3	-14°32.6	127°27.3	12.7	-17°43.2	-4.9	54.3
17	71°27.3	-14°31.8	141°59.0	12.7	-17°48.1	-4.8	54.3
18	86°27.2	-14°31.0	156°30.7	12.7	-17°52.8	-4.7	54.3
19	101°27.2	-14°30.2	171°02.4	12.7	-17°57.5	-4.6	54.3
20	116°27.2	-14°29.3	185°34.0	12.6	-18°02.1	-4.6	54.3
21	131°27.2	-14°28.5	200°05.7	12.6	-18°06.7	-4.5	54.3
22	146°27.2	-14°27.7	214°37.3	12.6	-18°11.1	-4.4	54.3
23	161°27.2	-14°26.9	229°08.9	12.6	-18°15.5	-4.3	54.2
	SD.=16.2	d=0.8	S.D.=14.9				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°27.2	-14°26.1	243°40.5	12.6	-18°19.7	-4.2	54.2
1	191°27.2	-14°25.3	258°12.0	12.6	-18°23.9	-4.1	54.2
2	206°27.1	-14°24.5	272°43.6	12.5	-18°28.0	-4.1	54.2
3	221°27.1	-14°23.7	287°15.1	12.5	-18°32.0	-4.0	54.2
4	236°27.1	-14°22.9	301°46.6	12.5	-18°36.0	-3.9	54.2
5	251°27.1	-14°22.1	316°18.2	12.5	-18°39.8	-3.8	54.2
6	266°27.1	-14°21.2	330°49.6	12.5	-18°43.6	-3.7	54.2
7	281°27.1	-14°20.4	345°21.1	12.5	-18°47.3	-3.6	54.2
8	296°27.1	-14°19.6	359°52.6	12.5	-18°50.9	-3.6	54.2
9	311°27.1	-14°18.8	14°24.0	12.4	-18°54.4	-3.5	54.2
10	326°27.1	-14°18.0	28°55.4	12.4	-18°57.8	-3.4	54.1
11	341°27.1	-14°17.2	43°26.9	12.4	-19°01.1	-3.3	54.1
12	356°27.1	-14°16.4	57°58.3	12.4	-19°04.4	-3.2	54.1
13	11°27.0	-14°15.5	72°29.6	12.4	-19°07.5	-3.1	54.1
14	26°27.0	-14°14.7	87°01.0	12.4	-19°10.6	-3.0	54.1
15	41°27.0	-14°13.9	101°32.4	12.3	-19°13.6	-2.9	54.1
16	56°27.0	-14°13.1	116°03.7	12.3	-19°16.5	-2.9	54.1
17	71°27.0	-14°12.3	130°35.0	12.3	-19°19.3	-2.8	54.1
18	86°27.0	-14°11.5	145°06.3	12.3	-19°22.0	-2.7	54.1
19	101°27.0	-14°10.6	159°37.6	12.3	-19°24.6	-2.6	54.1
20	116°27.0	-14°09.8	174°08.9	12.3	-19°27.2	-2.5	54.1
21	131°27.0	-14°09.0	188°40.2	12.3	-19°29.6	-2.4	54.1
22	146°27.0	-14°08.2	203°11.4	12.2	-19°32.0	-2.3	54.1
23	161°27.0	-14°07.4	217°42.7	12.2	-19°34.3	-2.2	54.1
	SD.=16.2	d=0.8	S.D.=14.8				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°27.0	-14°06.6	232°13.9	12.2	-19°36.5	-2.1	54.1
1	191°27.0	-14°05.7	246°45.1	12.2	-19°38.5	-2.0	54.1
2	206°27.0	-14°04.9	261°16.3	12.2	-19°40.6	-2.0	54.1
3	221°27.0	-14°04.1	275°47.5	12.2	-19°42.5	-1.9	54.1
4	236°27.0	-14°03.3	290°18.7	12.2	-19°44.3	-1.8	54.1
5	251°27.0	-14°02.4	304°49.9	12.2	-19°46.0	-1.7	54.1
6	266°27.0	-14°01.6	319°21.0	12.2	-19°47.7	-1.6	54.1
7	281°27.0	-14°00.8	333°52.2	12.1	-19°49.2	-1.5	54.1
8	296°27.0	-13°60.0	348°23.3	12.1	-19°50.7	-1.4	54.1
9	311°27.0	-13°59.2	2°54.4	12.1	-19°52.0	-1.3	54.0
10	326°27.0	-13°58.3	17°25.6	12.1	-19°53.3	-1.2	54.0
11	341°27.0	-13°57.5	31°56.7	12.1	-19°54.5	-1.1	54.0
12	356°27.0	-13°56.7	46°27.8	12.1	-19°55.6	-1.0	54.0
13	11°27.0	-13°55.9	60°58.8	12.1	-19°56.6	-1.0	54.0
14	26°27.0	-13°55.0	75°29.9	12.1	-19°57.5	-0.9	54.0
15	41°27.0	-13°54.2	90°01.0	12.1	-19°58.3	-0.8	54.0
16	56°27.0	-13°53.4	104°32.1	12.1	-19°59.1	-0.7	54.0
17	71°27.0	-13°52.6	119°03.1	12.0	-19°59.7	-0.6	54.0
18	86°27.0	-13°51.7	133°34.2	12.0	-20°00.2	-0.5	54.0
19	101°27.0	-13°50.9	148°05.2	12.0	-20°00.7	-0.4	54.0
20	116°27.0	-13°50.1	162°36.2	12.0	-20°01.1	-0.3	54.1
21	131°27.0	-13°49.3	177°07.2	12.0	-20°01.3	-0.2	54.1
22	146°27.0	-13°48.4	191°38.3	12.0	-20°01.5	-0.1	54.1
23	161°27.0	-13°47.6	206°09.3	12.0	-20°01.6	-0.0	54.1
	SD.=16.2	d=0.8	S.D.=14.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:35	07:58	09:24	15:06	16:32	17:55
70	06:31	07:45	08:59	15:31	16:45	17:59
68	06:28	07:35	08:39	15:50	16:55	18:02
66	06:25	07:26	08:24	16:06	17:04	18:05
64	06:22	07:19	08:11	16:18	17:11	18:07
62	06:20	07:12	08:01	16:29	17:17	18:10
60	06:17	07:07	07:52	16:38	17:23	18:12
58	06:15	07:02	07:44	16:46	17:28	18:14
56	06:13	06:57	07:37	16:53	17:32	18:16
54	06:11	06:53	07:30	16:59	17:36	18:18
52	06:09	06:49	07:25	17:04	17:40	18:20
50	06:08	06:46	07:20	17:10	17:43	18:22
45	06:03	06:38	07:08	17:21	17:51	18:26
40	05:59	06:31	06:59	17:30	17:58	18:30
35	05:55	06:25	06:51	17:38	18:04	18:34
30	05:51	06:20	06:44	17:45	18:09	18:38
20	05:43	06:09	06:32	17:57	18:19	18:46
10	05:34	05:59	06:21	18:07	18:29	18:54
0	05:25	05:49	06:11	18:18	18:39	19:04
-10	05:13	05:39	06:00	18:28	18:50	19:15
-20	04:59	05:26	05:49	18:39	19:02	19:29
-30	04:41	05:11	05:36	18:52	19:17	19:47
-35	04:29	05:02	05:29	18:59	19:26	19:58
-40	04:15	04:51	05:20	19:08	19:37	20:12
-45	03:58	04:38	05:10	19:18	19:50	20:29
-50	03:35	04:21	04:57	19:30	20:06	20:52
-52	03:24	04:13	04:52	19:36	20:14	21:03
-54	03:11	04:04	04:45	19:42	20:22	21:16
-56	02:55	03:54	04:38	19:49	20:32	21:31
-58	02:35	03:43	04:30	19:57	20:44	21:50
-60	02:10	03:29	04:21	20:06	20:57	22:14

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	05:48	–:–	–:–	08:29	–:–	–:–
70	04:54	06:37	08:29	09:24	09:18	09:05
68	04:21	05:46	06:59	09:57	10:09	10:35
66	03:57	05:14	06:21	10:22	10:42	11:13
64	03:39	04:51	05:54	10:41	11:05	11:40
62	03:24	04:32	05:33	10:56	11:24	12:01
60	03:11	04:17	05:16	11:09	11:40	12:18
58	03:00	04:04	05:02	11:21	11:53	12:32
56	02:51	03:53	04:50	11:31	12:04	12:45
54	02:42	03:43	04:39	11:39	12:14	12:55
52	02:35	03:35	04:30	11:47	12:23	13:05
50	02:28	03:27	04:21	11:54	12:31	13:13
45	02:14	03:10	04:04	12:09	12:48	13:31
40	02:02	02:57	03:49	12:22	13:02	13:46
35	01:52	02:45	03:37	12:32	13:14	13:59
30	01:43	02:35	03:26	12:42	13:24	14:09
20	01:28	02:18	03:07	12:58	13:42	14:28
10	01:15	02:03	02:51	13:12	13:57	14:44
0	01:02	01:49	02:36	13:25	14:12	14:60
-10	00:50	01:35	02:22	13:38	14:26	15:15
-20	00:37	01:20	02:06	13:52	14:42	15:31
-30	00:22	01:03	01:47	14:08	14:60	15:50
-35	00:14	00:54	01:37	14:18	15:10	16:00
-40	00:04	00:42	01:25	14:29	15:22	16:13
-45	–:–	00:29	01:10	14:41	15:36	16:28
-50	–:–	00:13	00:53	14:57	15:53	16:45
-52	–:–	00:06	00:44	15:04	16:01	16:54
-54	23:57	–:–	00:35	15:12	16:11	17:03
-56	23:48	–:–	00:25	15:21	16:21	17:14
-58	23:38	–:–	00:13	15:31	16:32	17:26
-60	23:25	23:60	–:–	15:43	16:46	17:40

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
9	14:10	14:11	12:14	07:13	19:37	23(33%)
10	14:11	14:12	12:14	08:00	20:24	24(24%)
11	14:12	14:12	12:14	08:47	21:11	25(17%)

February 12, 13 ,14 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	141°59.6	168°08.8	-12°22.5	253°29.4	-21°26.3	271°51.0	-17°13.7	225°36.4	-22°25.7
1	157°02.1	183°08.3	-12°21.4	268°30.2	-21°26.6	286°53.2	-17°13.7	240°38.6	-22°25.7
2	172°04.5	198°07.7	-12°20.3	283°31.1	-21°26.8	301°55.5	-17°13.8	255°40.8	-22°25.7
3	187°07.0	213°07.2	-12°19.2	298°31.9	-21°27.1	316°57.8	-17°13.8	270°43.0	-22°25.6
4	202°09.5	228°06.7	-12°18.1	313°32.8	-21°27.3	332°00.1	-17°13.8	285°45.2	-22°25.6
5	217°11.9	243°06.2	-12°16.9	328°33.6	-21°27.6	347°02.3	-17°13.9	300°47.5	-22°25.6
6	232°14.4	258°05.6	-12°15.8	343°34.5	-21°27.8	2°04.6	-17°13.9	315°49.7	-22°25.6
7	247°16.9	273°05.1	-12°14.7	358°35.4	-21°28.1	17°06.9	-17°14.0	330°51.9	-22°25.6
8	262°19.3	288°04.6	-12°13.6	13°36.2	-21°28.3	32°09.2	-17°14.0	345°54.1	-22°25.6
9	277°21.8	303°04.0	-12°12.5	28°37.1	-21°28.6	47°11.4	-17°14.1	0°56.3	-22°25.6
10	292°24.3	318°03.5	-12°11.4	43°37.9	-21°28.8	62°13.7	-17°14.1	15°58.5	-22°25.6
11	307°26.7	333°03.0	-12°10.3	58°38.8	-21°29.1	77°16.0	-17°14.1	31°00.7	-22°25.6
12	322°29.2	348°02.4	-12°09.1	73°39.6	-21°29.3	92°18.2	-17°14.2	46°03.0	-22°25.6
13	337°31.7	3°01.9	-12°08.0	88°40.5	-21°29.6	107°20.5	-17°14.2	61°05.2	-22°25.5
14	352°34.1	18°01.4	-12°06.9	103°41.4	-21°29.8	122°22.8	-17°14.3	76°07.4	-22°25.5
15	7°36.6	33°00.9	-12°05.8	118°42.2	-21°30.1	137°25.1	-17°14.3	91°09.6	-22°25.5
16	22°39.0	48°00.3	-12°04.7	133°43.1	-21°30.3	152°27.3	-17°14.3	106°11.8	-22°25.5
17	37°41.5	62°59.8	-12°03.6	148°43.9	-21°30.6	167°29.6	-17°14.4	121°14.0	-22°25.5
18	52°44.0	77°59.3	-12°02.4	163°44.8	-21°30.8	182°31.9	-17°14.4	136°16.3	-22°25.5
19	67°46.4	92°58.8	-12°01.3	178°45.6	-21°31.1	197°34.2	-17°14.5	151°18.5	-22°25.5
20	82°48.9	107°58.2	-12°00.2	193°46.5	-21°31.3	212°36.4	-17°14.5	166°20.7	-22°25.5
21	97°51.4	122°57.7	-11°59.1	208°47.4	-21°31.6	227°38.7	-17°14.6	181°22.9	-22°25.5
22	112°53.8	137°57.2	-11°58.0	223°48.2	-21°31.8	242°41.0	-17°14.6	196°25.1	-22°25.5
23	127°56.3	152°56.7	-11°56.8	238°49.1	-21°32.0	257°43.3	-17°14.6	211°27.3	-22°25.5
Mer.pass.:14:29		v-0.5 d1.1 m-3.8		v0.9 d-0.3 m1.1		v2.3 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	142°58.8	167°56.1	-11°55.7	253°49.9	-21°32.3	272°45.6	-17°14.7	226°29.6	-22°25.4
1	158°01.2	182°55.6	-11°54.6	268°50.8	-21°32.5	287°47.8	-17°14.7	241°31.8	-22°25.4
2	173°03.7	197°55.1	-11°53.5	283°51.7	-21°32.8	302°50.1	-17°14.8	256°34.0	-22°25.4
3	188°06.1	212°54.6	-11°52.4	298°52.5	-21°33.0	317°52.4	-17°14.8	271°36.2	-22°25.4
4	203°08.6	227°54.1	-11°51.2	313°53.4	-21°33.3	332°54.7	-17°14.8	286°38.4	-22°25.4
5	218°11.1	242°53.5	-11°50.1	328°54.2	-21°33.5	347°56.9	-17°14.9	301°40.7	-22°25.4
6	233°13.5	257°53.0	-11°49.0	343°55.1	-21°33.8	2°59.2	-17°14.9	316°42.9	-22°25.4
7	248°16.0	272°52.5	-11°47.9	358°55.9	-21°34.0	18°01.5	-17°15.0	331°45.1	-22°25.4
8	263°18.5	287°52.0	-11°46.7	13°56.8	-21°34.2	33°03.8	-17°15.0	346°47.3	-22°25.4
9	278°20.9	302°51.5	-11°45.6	28°57.7	-21°34.5	48°06.1	-17°15.0	1°49.5	-22°25.4
10	293°23.4	317°50.9	-11°44.5	43°58.5	-21°34.7	63°08.3	-17°15.1	16°51.7	-22°25.3
11	308°25.9	332°50.4	-11°43.4	58°59.4	-21°35.0	78°10.6	-17°15.1	31°54.0	-22°25.3
12	323°28.3	347°49.9	-11°42.2	74°00.2	-21°35.2	93°12.9	-17°15.2	46°56.2	-22°25.3
13	338°30.8	2°49.4	-11°41.1	89°01.1	-21°35.5	108°15.2	-17°15.2	61°58.4	-22°25.3
14	353°33.3	17°48.9	-11°40.0	104°01.9	-21°35.7	123°17.5	-17°15.2	77°00.6	-22°25.3
15	8°35.7	32°48.4	-11°38.8	119°02.8	-21°35.9	138°19.7	-17°15.3	92°02.8	-22°25.3
16	23°38.2	47°47.8	-11°37.7	134°03.7	-21°36.2	153°22.0	-17°15.3	107°05.1	-22°25.3
17	38°40.6	62°47.3	-11°36.6	149°04.5	-21°36.4	168°24.3	-17°15.3	122°07.3	-22°25.3
18	53°43.1	77°46.8	-11°35.4	164°05.4	-21°36.7	183°26.6	-17°15.4	137°09.5	-22°25.3
19	68°45.6	92°46.3	-11°34.3	179°06.2	-21°36.9	198°28.9	-17°15.4	152°11.7	-22°25.3
20	83°48.0	107°45.8	-11°33.2	194°07.1	-21°37.1	213°31.2	-17°15.5	167°13.9	-22°25.2
21	98°50.5	122°45.3	-11°32.0	209°07.9	-21°37.4	228°33.4	-17°15.5	182°16.2	-22°25.2
22	113°53.0	137°44.8	-11°30.9	224°08.8	-21°37.6	243°35.7	-17°15.5	197°18.4	-22°25.2
23	128°55.4	152°44.2	-11°29.8	239°09.7	-21°37.9	258°38.0	-17°15.6	212°20.6	-22°25.2
Mer.pass.:14:25		v-0.5 d1.1 m-3.8		v0.9 d-0.2 m1.0		v2.3 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	143°57.9	167°43.7	-11°28.6	254°10.5	-21°38.1	273°40.3	-17°15.6	227°22.8	-22°25.2
1	159°00.4	182°43.2	-11°27.5	269°11.4	-21°38.3	288°42.6	-17°15.7	242°25.0	-22°25.2
2	174°02.8	197°42.7	-11°26.4	284°12.2	-21°38.6	303°44.9	-17°15.7	257°27.3	-22°25.2
3	189°05.3	212°42.2	-11°25.2	299°13.1	-21°38.8	318°47.2	-17°15.7	272°29.5	-22°25.2
4	204°07.8	227°41.7	-11°24.1	314°13.9	-21°39.1	333°49.4	-17°15.8	287°31.7	-22°25.2
5	219°10.2	242°41.2	-11°23.0	329°14.8	-21°39.3	348°51.7	-17°15.8	302°33.9	-22°25.2
6	234°12.7	257°40.7	-11°21.8	344°15.7	-21°39.5	3°54.0	-17°15.8	317°36.1	-22°25.1
7	249°15.1	272°40.2	-11°20.7	359°16.5	-21°39.8	18°56.3	-17°15.9	332°38.4	-22°25.1
8	264°17.6	287°39.6	-11°19.6	14°17.4	-21°40.0	33°58.6	-17°15.9	347°40.6	-22°25.1
9	279°20.1	302°39.1	-11°18.4	29°18.2	-21°40.2	49°00.9	-17°16.0	2°42.8	-22°25.1
10	294°22.5	317°38.6	-11°17.3	44°19.1	-21°40.5	64°03.2	-17°16.0	17°45.0	-22°25.1
11	309°25.0	332°38.1	-11°16.1	59°19.9	-21°40.7	79°05.4	-17°16.0	32°47.3	-22°25.1
12	324°27.5	347°37.6	-11°15.0	74°20.8	-21°41.0	94°07.7	-17°16.1	47°49.5	-22°25.1
13	339°29.9	2°37.1	-11°13.9	89°21.7	-21°41.2	109°10.0	-17°16.1	62°51.7	-22°25.1
14	354°32.4	17°36.6	-11°12.7	104°22.5	-21°41.4	124°12.3	-17°16.2	77°53.9	-22°25.1
15	9°34.9	32°36.1	-11°11.6	119°23.4	-21°41.7	139°14.6	-17°16.2	92°56.1	-22°25.1
16	24°37.3	47°35.6	-11°10.4	134°24.2	-21°41.9	154°16.9	-17°16.2	107°58.4	-22°25.0
17	39°39.8	62°35.1	-11°09.3	149°25.1	-21°42.1	169°19.2	-17°16.3	123°00.6	-22°25.0
18	54°42.3	77°34.6	-11°08.1	164°25.9	-21°42.4	184°21.5	-17°16.3	138°02.8	-22°25.0
19	69°44.7	92°34.1	-11°07.0	179°26.8	-21°42.6	199°23.8	-17°16.3	153°05.0	-22°25.0
20	84°47.2	107°33.6	-11°05.8	194°27.7	-21°42.8	214°26.0	-17°16.4	168°07.3	-22°25.0
21	99°49.6	122°33.1	-11°04.7	209°28.5	-21°43.1	229°28.3	-17°16.4	183°09.5	-22°25.0
22	114°52.1	137°32.6	-11°03.6	224°29.4	-21°43.3	244°30.6	-17°16.4	198°11.7	-22°25.0
23	129°54.6	152°32.1	-11°02.4	239°30.2	-21°43.5	259°32.9	-17°16.5	213°13.9	-22°25.0
Mer.pass.:14:21		v-0.5 d1.1 m-3.8		v0.9 d-0.2 m1.0		v2.3 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.4
Ankaa	353°12.9	-42°12.8
Schedar	349°37.2	56°38.3
Diphda	348°52.8	-17°53.5
Achernar	335°24.7	-57°09.1
Hamal	327°57.3	23°32.8
Polaris	316°24.8	89°20.6
Akamar	315°16.0	-40°14.4
Menkar	314°11.8	4°09.4
Mirfak	308°35.8	49°55.5
Aldebaran	290°45.6	16°32.5
Rigel	281°08.9	-8°11.2
Capella	280°29.5	46°01.0
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°43.0	-1°11.7
Betelgeuse	270°57.7	7°24.4
Canopus	263°54.4	-52°42.7
Sirius	258°30.6	-16°44.6
Adara	255°09.7	-29°00.1
Procyon	244°56.0	5°10.6
Pollux	243°23.4	27°58.8
Avior	234°16.1	-59°34.3
Suhail	222°49.6	-43°30.5
Miaplacidus	221°38.0	-69°47.6
Alphard	217°52.6	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.3	61°39.1
Denebola	182°30.1	14°28.2
Gienah	175°48.8	-17°38.5
Acrux	173°05.2	-63°11.7
Gacrux	171°56.9	-57°12.6
Alioth	166°17.7	55°51.5
Spica	158°27.7	-11°15.3
Alcaid	152°56.2	49°13.2
Hadar	148°43.1	-60°27.2
Menkent	148°03.7	-36°27.3
Arcturus	145°52.6	19°05.5
Rigil Kent.	139°47.2	-60°54.2
Zubenelg.	137°01.9	-16°06.9
Kochab	137°20.0	74°04.7
Alphecca	126°08.4	26°39.2
Antares	112°22.5	-26°28.1
Atria	107°21.6	-69°03.1
Sabik	102°09.1	-15°44.7
Shaula	96°17.8	-37°06.7
Rasalhague	96°03.7	12°32.9
Etamin	90°45.0	51°29.1
Kaus Aust.	83°39.9	-34°22.3
Vega	80°37.2	38°47.9
Nunki	75°54.7	-26°16.3
Altair	62°05.5	8°54.9
Peacock	53°14.9	-56°40.5
Deneb	49°29.7	45°20.7
Enif	33°44.3	9°57.4
Alnair	27°40.3	-46°52.5
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.6	28°10.8
Markab	13°35.5	15°18.1

2018/2/1	**SHA**	**Mer.pass**
Venus	26°09.2	12:48
Mars	111°29.7	07:06
Jupiter	129°51.4	05:52
Saturn	83°36.8	08:56

2018/2/1	**SHA**	**Mer.pass**
Venus	24°57.4	12:49
Mars	110°51.2	07:04
Jupiter	129°46.8	05:48
Saturn	83°30.8	08:53

2018/2/1	**SHA**	**Mer.pass**
Venus	23°45.8	12:50
Mars	110°12.6	07:03
Jupiter	129°42.4	05:44
Saturn	83°24.9	08:49

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°27.0	-13°46.8	220°40.3	12.0	-20°01.6	0.1	54.1
1	191°27.0	-13°45.9	235°11.3	12.0	-20°01.5	0.2	54.1
2	206°27.0	-13°45.1	249°42.3	12.0	-20°01.3	0.2	54.1
3	221°27.0	-13°44.3	264°13.3	12.0	-20°01.0	0.3	54.1
4	236°27.0	-13°43.4	278°44.3	12.0	-20°00.6	0.4	54.1
5	251°27.0	-13°42.6	293°15.3	12.0	-20°00.1	0.5	54.1
6	266°27.0	-13°41.8	307°46.2	12.0	-19°59.5	0.6	54.1
7	281°27.0	-13°40.9	322°17.2	12.0	-19°58.9	0.7	54.1
8	296°27.0	-13°40.1	336°48.2	12.0	-19°58.1	0.8	54.1
9	311°27.0	-13°39.3	351°19.2	12.0	-19°57.3	0.9	54.1
10	326°27.0	-13°38.5	5°50.1	12.0	-19°56.3	1.0	54.1
11	341°27.0	-13°37.6	20°21.1	12.0	-19°55.3	1.1	54.1
12	356°27.1	-13°36.8	34°52.1	12.0	-19°54.2	1.2	54.1
13	11°27.1	-13°35.9	49°23.0	12.0	-19°53.0	1.3	54.1
14	26°27.1	-13°35.1	63°54.0	12.0	-19°51.6	1.4	54.1
15	41°27.1	-13°34.3	78°25.0	12.0	-19°50.2	1.4	54.1
16	56°27.1	-13°33.4	92°56.0	12.0	-19°48.7	1.5	54.1
17	71°27.1	-13°32.6	107°26.9	12.0	-19°47.2	1.6	54.1
18	86°27.1	-13°31.8	121°57.9	12.0	-19°45.5	1.7	54.1
19	101°27.1	-13°30.9	136°28.9	12.0	-19°43.7	1.8	54.1
20	116°27.1	-13°30.1	150°59.9	12.0	-19°41.8	1.9	54.1
21	131°27.1	-13°29.3	165°30.8	12.0	-19°39.9	2.0	54.2
22	146°27.2	-13°28.4	180°01.8	12.0	-19°37.8	2.1	54.2
23	161°27.2	-13°27.6	194°32.8	12.0	-19°35.7	2.2	54.2
	SD.=16.2	d=0.8	S.D.=14.7				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°27.2	-13°26.7	209°03.8	12.0	-19°33.5	2.3	54.2
1	191°27.2	-13°25.9	223°34.8	12.0	-19°31.1	2.4	54.2
2	206°27.2	-13°25.1	238°05.8	12.0	-19°28.7	2.5	54.2
3	221°27.2	-13°24.2	252°36.8	12.0	-19°26.2	2.6	54.2
4	236°27.2	-13°23.4	267°07.8	12.0	-19°23.6	2.6	54.2
5	251°27.2	-13°22.5	281°38.8	12.0	-19°20.9	2.7	54.2
6	266°27.2	-13°21.7	296°09.8	12.0	-19°18.1	2.8	54.2
7	281°27.3	-13°20.9	310°40.8	12.0	-19°15.3	2.9	54.2
8	296°27.3	-13°20.0	325°11.9	12.0	-19°12.3	3.0	54.2
9	311°27.3	-13°19.2	339°42.9	12.0	-19°09.2	3.1	54.2
10	326°27.3	-13°18.3	354°13.9	12.0	-19°06.1	3.2	54.3
11	341°27.3	-13°17.5	8°45.0	12.1	-19°02.9	3.3	54.3
12	356°27.3	-13°16.7	23°16.1	12.1	-18°59.5	3.4	54.3
13	11°27.4	-13°15.8	37°47.1	12.1	-18°56.1	3.5	54.3
14	26°27.4	-13°15.0	52°18.2	12.1	-18°52.6	3.5	54.3
15	41°27.4	-13°14.1	66°49.3	12.1	-18°49.0	3.6	54.3
16	56°27.4	-13°13.3	81°20.4	12.1	-18°45.3	3.7	54.3
17	71°27.4	-13°12.4	95°51.5	12.1	-18°41.6	3.8	54.3
18	86°27.4	-13°11.6	110°22.6	12.1	-18°37.7	3.9	54.3
19	101°27.5	-13°10.7	124°53.7	12.1	-18°33.8	4.0	54.3
20	116°27.5	-13°09.9	139°24.9	12.1	-18°29.7	4.1	54.3
21	131°27.5	-13°09.1	153°56.0	12.2	-18°25.6	4.2	54.4
22	146°27.5	-13°08.2	168°27.2	12.2	-18°21.4	4.3	54.4
23	161°27.5	-13°07.4	182°58.3	12.2	-18°17.1	4.3	54.4
	SD.=16.2	d=0.8	S.D.=14.8				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°27.5	-13°06.5	197°29.5	12.2	-18°12.7	4.4	54.4
1	191°27.6	-13°05.7	212°00.7	12.2	-18°08.2	4.5	54.4
2	206°27.6	-13°04.8	226°31.9	12.2	-18°03.7	4.6	54.4
3	221°27.6	-13°04.0	241°03.1	12.2	-17°59.0	4.7	54.4
4	236°27.6	-13°03.1	255°34.3	12.2	-17°54.3	4.8	54.4
5	251°27.6	-13°02.3	270°05.6	12.2	-17°49.5	4.9	54.4
6	266°27.7	-13°01.4	284°36.8	12.3	-17°44.6	4.9	54.5
7	281°27.7	-13°00.6	299°08.1	12.3	-17°39.6	5.0	54.5
8	296°27.7	-12°59.7	313°39.4	12.3	-17°34.5	5.1	54.5
9	311°27.7	-12°58.9	328°10.7	12.3	-17°29.4	5.2	54.5
10	326°27.8	-12°58.0	342°42.0	12.3	-17°24.1	5.3	54.5
11	341°27.8	-12°57.2	357°13.3	12.3	-17°18.8	5.4	54.5
12	356°27.8	-12°56.3	11°44.6	12.3	-17°13.4	5.4	54.5
13	11°27.8	-12°55.5	26°16.0	12.4	-17°07.9	5.5	54.5
14	26°27.8	-12°54.6	40°47.4	12.4	-17°02.4	5.6	54.6
15	41°27.9	-12°53.8	55°18.7	12.4	-16°56.7	5.7	54.6
16	56°27.9	-12°52.9	69°50.1	12.4	-16°51.0	5.8	54.6
17	71°27.9	-12°52.0	84°21.6	12.4	-16°45.2	5.9	54.6
18	86°27.9	-12°51.2	98°53.0	12.4	-16°39.3	5.9	54.6
19	101°28.0	-12°50.3	113°24.4	12.5	-16°33.3	6.0	54.6
20	116°28.0	-12°49.5	127°55.9	12.5	-16°27.2	6.1	54.6
21	131°28.0	-12°48.6	142°27.4	12.5	-16°21.1	6.2	54.7
22	146°28.0	-12°47.8	156°58.9	12.5	-16°14.9	6.3	54.7
23	161°28.1	-12°46.9	171°30.4	12.5	-16°08.6	6.3	54.7
	SD.=16.2	d=0.8	S.D.=14.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:23	07:44	09:06	15:24	16:46	18:07
70	06:21	07:33	08:44	15:46	16:57	18:10
68	06:18	07:24	08:27	16:03	17:06	18:12
66	06:16	07:17	08:13	16:17	17:13	18:14
64	06:14	07:10	08:02	16:28	17:20	18:16
62	06:12	07:04	07:52	16:37	17:25	18:17
60	06:11	06:59	07:44	16:46	17:30	18:19
58	06:09	06:55	07:36	16:53	17:34	18:21
56	06:07	06:51	07:30	16:59	17:38	18:22
54	06:06	06:47	07:24	17:05	17:42	18:24
52	06:04	06:44	07:19	17:10	17:45	18:25
50	06:03	06:41	07:14	17:15	17:48	18:26
45	05:59	06:34	07:04	17:25	17:55	18:30
40	05:56	06:28	06:56	17:33	18:01	18:33
35	05:52	06:22	06:48	17:41	18:07	18:36
30	05:49	06:17	06:42	17:47	18:12	18:40
20	05:42	06:08	06:30	17:58	18:21	18:47
10	05:34	05:59	06:20	18:08	18:30	18:55
0	05:25	05:50	06:11	18:18	18:39	19:03
-10	05:14	05:39	06:01	18:27	18:49	19:14
-20	05:01	05:28	05:51	18:37	19:00	19:27
-30	04:44	05:14	05:39	18:49	19:14	19:44
-35	04:33	05:05	05:32	18:56	19:23	19:55
-40	04:20	04:55	05:24	19:04	19:33	20:08
-45	04:03	04:42	05:14	19:13	19:45	20:24
-50	03:42	04:27	05:03	19:25	20:00	20:45
-52	03:31	04:20	04:57	19:30	20:07	20:55
-54	03:19	04:11	04:52	19:36	20:15	21:07
-56	03:05	04:02	04:45	19:42	20:24	21:21
-58	02:47	03:51	04:38	19:49	20:35	21:38
-60	02:25	03:39	04:29	19:57	20:47	21:59

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	–:–	10:12	–:–	–:–	12:21
70	–:–	09:15	09:09	–:–	11:38	13:23
68	07:51	08:20	08:34	11:22	12:33	13:58
66	07:12	07:46	08:08	12:01	13:06	14:23
64	06:44	07:22	07:48	12:29	13:30	14:42
62	06:23	07:03	07:32	12:50	13:49	14:58
60	06:06	06:47	07:19	13:07	14:05	15:11
58	05:52	06:33	07:07	13:21	14:18	15:22
56	05:40	06:22	06:57	13:33	14:29	15:32
54	05:29	06:12	06:48	13:44	14:39	15:41
52	05:19	06:03	06:40	13:53	14:48	15:48
50	05:11	05:55	06:33	14:02	14:56	15:55
45	04:53	05:37	06:17	14:20	15:13	16:10
40	04:38	05:23	06:04	14:34	15:27	16:22
35	04:25	05:11	05:54	14:47	15:38	16:32
30	04:15	05:01	05:44	14:58	15:49	16:41
20	03:56	04:43	05:28	15:16	16:06	16:57
10	03:39	04:27	05:13	15:32	16:21	17:10
0	03:24	04:12	05:00	15:47	16:35	17:23
-10	03:09	03:58	04:47	16:03	16:50	17:35
-20	02:53	03:42	04:32	16:19	17:05	17:49
-30	02:34	03:24	04:16	16:37	17:22	18:04
-35	02:23	03:13	04:06	16:48	17:32	18:13
-40	02:11	03:01	03:55	16:60	17:43	18:23
-45	01:56	02:47	03:42	17:14	17:57	18:34
-50	01:38	02:30	03:26	17:32	18:13	18:48
-52	01:30	02:21	03:19	17:40	18:21	18:55
-54	01:20	02:12	03:11	17:50	18:29	19:02
-56	01:10	02:02	03:02	18:00	18:39	19:10
-58	00:57	01:50	02:51	18:12	18:49	19:20
-60	00:43	01:37	02:39	18:26	19:02	19:30

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
12	14:12	14:12	12:14	09:35	21:59	26(10%)
13	14:11	14:11	12:14	10:23	22:47	27(5%)
14	14:10	14:09	12:14	11:11	23:35	28(2%)

February 15, 16 ,17 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	144°57.0	167°31.6	-11°01.3	254°31.1	-21°43.8	274°35.2	-17°16.5	228°16.1	-22°25.0
1	159°59.5	182°31.1	-11°00.1	269°31.9	-21°44.0	289°37.5	-17°16.6	243°18.4	-22°25.0
2	175°02.0	197°30.6	-10°59.0	284°32.8	-21°44.2	304°39.8	-17°16.6	258°20.6	-22°24.9
3	190°04.4	212°30.1	-10°57.8	299°33.7	-21°44.5	319°42.1	-17°16.6	273°22.8	-22°24.9
4	205°06.9	227°29.6	-10°56.7	314°34.5	-21°44.7	334°44.4	-17°16.7	288°25.0	-22°24.9
5	220°09.4	242°29.1	-10°55.5	329°35.4	-21°44.9	349°46.7	-17°16.7	303°27.3	-22°24.9
6	235°11.8	257°28.6	-10°54.4	344°36.2	-21°45.2	4°49.0	-17°16.7	318°29.5	-22°24.9
7	250°14.3	272°28.1	-10°53.2	359°37.1	-21°45.4	19°51.3	-17°16.8	333°31.7	-22°24.9
8	265°16.7	287°27.6	-10°52.1	14°37.9	-21°45.6	34°53.6	-17°16.8	348°33.9	-22°24.9
9	280°19.2	302°27.1	-10°50.9	29°38.8	-21°45.9	49°55.9	-17°16.8	3°36.2	-22°24.9
10	295°21.7	317°26.6	-10°49.8	44°39.7	-21°46.1	64°58.1	-17°16.9	18°38.4	-22°24.9
11	310°24.1	332°26.1	-10°48.6	59°40.5	-21°46.3	80°00.4	-17°16.9	33°40.6	-22°24.9
12	325°26.6	347°25.6	-10°47.5	74°41.4	-21°46.6	95°02.7	-17°17.0	48°42.8	-22°24.8
13	340°29.1	2°25.1	-10°46.3	89°42.2	-21°46.8	110°05.0	-17°17.0	63°45.1	-22°24.8
14	355°31.5	17°24.6	-10°45.2	104°43.1	-21°47.0	125°07.3	-17°17.0	78°47.3	-22°24.8
15	10°34.0	32°24.1	-10°44.0	119°43.9	-21°47.2	140°09.6	-17°17.1	93°49.5	-22°24.8
16	25°36.5	47°23.6	-10°42.8	134°44.8	-21°47.5	155°11.9	-17°17.1	108°51.7	-22°24.8
17	40°38.9	62°23.1	-10°41.7	149°45.7	-21°47.7	170°14.2	-17°17.1	123°54.0	-22°24.8
18	55°41.4	77°22.6	-10°40.5	164°46.5	-21°47.9	185°16.5	-17°17.2	138°56.2	-22°24.8
19	70°43.9	92°22.1	-10°39.4	179°47.4	-21°48.2	200°18.8	-17°17.2	153°58.4	-22°24.8
20	85°46.3	107°21.6	-10°38.2	194°48.2	-21°48.4	215°21.1	-17°17.2	169°00.6	-22°24.8
21	100°48.8	122°21.1	-10°37.1	209°49.1	-21°48.6	230°23.4	-17°17.3	184°02.9	-22°24.7
22	115°51.2	137°20.6	-10°35.9	224°49.9	-21°48.8	245°25.7	-17°17.3	199°05.1	-22°24.7
23	130°53.7	152°20.1	-10°34.7	239°50.8	-21°49.1	260°28.0	-17°17.3	214°07.3	-22°24.7
Mer.pass.:14:17		v-0.5 d1.1 m-3.8		v0.9 d-0.2 m1.0		v2.3 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	145°56.2	167°19.7	-10°33.6	254°51.7	-21°49.3	275°30.3	-17°17.4	229°09.5	-22°24.7
1	160°58.6	182°19.2	-10°32.4	269°52.5	-21°49.5	290°32.6	-17°17.4	244°11.8	-22°24.7
2	176°01.1	197°18.7	-10°31.3	284°53.4	-21°49.7	305°34.9	-17°17.4	259°14.0	-22°24.7
3	191°03.6	212°18.2	-10°30.1	299°54.2	-21°50.0	320°37.2	-17°17.5	274°16.2	-22°24.7
4	206°06.0	227°17.7	-10°28.9	314°55.1	-21°50.2	335°39.5	-17°17.5	289°18.4	-22°24.7
5	221°08.5	242°17.2	-10°27.8	329°55.9	-21°50.4	350°41.8	-17°17.5	304°20.7	-22°24.7
6	236°11.0	257°16.7	-10°26.6	344°56.8	-21°50.6	5°44.1	-17°17.6	319°22.9	-22°24.7
7	251°13.4	272°16.2	-10°25.5	359°57.7	-21°50.9	20°46.4	-17°17.6	334°25.1	-22°24.6
8	266°15.9	287°15.7	-10°24.3	14°58.5	-21°51.1	35°48.7	-17°17.6	349°27.3	-22°24.6
9	281°18.3	302°15.3	-10°23.1	29°59.4	-21°51.3	50°51.0	-17°17.7	4°29.6	-22°24.6
10	296°20.8	317°14.8	-10°22.0	45°00.2	-21°51.5	65°53.3	-17°17.7	19°31.8	-22°24.6
11	311°23.3	332°14.3	-10°20.8	60°01.1	-21°51.8	80°55.6	-17°17.8	34°34.0	-22°24.6
12	326°25.7	347°13.8	-10°19.6	75°01.9	-21°52.0	95°57.9	-17°17.8	49°36.3	-22°24.6
13	341°28.2	2°13.3	-10°18.5	90°02.8	-21°52.2	111°00.2	-17°17.8	64°38.5	-22°24.6
14	356°30.7	17°12.8	-10°17.3	105°03.7	-21°52.4	126°02.5	-17°17.9	79°40.7	-22°24.6
15	11°33.1	32°12.3	-10°16.1	120°04.5	-21°52.7	141°04.8	-17°17.9	94°42.9	-22°24.6
16	26°35.6	47°11.8	-10°15.0	135°05.4	-21°52.9	156°07.1	-17°17.9	109°45.2	-22°24.6
17	41°38.1	62°11.4	-10°13.8	150°06.2	-21°53.1	171°09.4	-17°18.0	124°47.4	-22°24.5
18	56°40.5	77°10.9	-10°12.6	165°07.1	-21°53.3	186°11.7	-17°18.0	139°49.6	-22°24.5
19	71°43.0	92°10.4	-10°11.5	180°07.9	-21°53.6	201°14.0	-17°18.0	154°51.8	-22°24.5
20	86°45.5	107°09.9	-10°10.3	195°08.8	-21°53.8	216°16.3	-17°18.1	169°54.1	-22°24.5
21	101°47.9	122°09.4	-10°09.1	210°09.7	-21°54.0	231°18.7	-17°18.1	184°56.3	-22°24.5
22	116°50.4	137°08.9	-10°08.0	225°10.5	-21°54.2	246°21.0	-17°18.1	199°58.5	-22°24.5
23	131°52.8	152°08.5	-10°06.8	240°11.4	-21°54.4	261°23.3	-17°18.2	215°00.8	-22°24.5
Mer.pass.:14:13		v-0.5 d1.2 m-3.8		v0.9 d-0.2 m1.0		v2.3 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	146°55.3	167°08.0	-10°05.6	255°12.2	-21°54.7	276°25.6	-17°18.2	230°03.0	-22°24.5
1	161°57.8	182°07.5	-10°04.5	270°13.1	-21°54.9	291°27.9	-17°18.2	245°05.2	-22°24.5
2	177°00.2	197°07.0	-10°03.3	285°13.9	-21°55.1	306°30.2	-17°18.2	260°07.4	-22°24.5
3	192°02.7	212°06.5	-10°02.1	300°14.8	-21°55.3	321°32.5	-17°18.3	275°09.7	-22°24.4
4	207°05.2	227°06.1	-10°00.9	315°15.7	-21°55.5	336°34.8	-17°18.3	290°11.9	-22°24.4
5	222°07.6	242°05.6	-9°59.8	330°16.5	-21°55.8	351°37.1	-17°18.3	305°14.1	-22°24.4
6	237°10.1	257°05.1	-9°58.6	345°17.4	-21°56.0	6°39.4	-17°18.4	320°16.4	-22°24.4
7	252°12.6	272°04.6	-9°57.4	0°18.2	-21°56.2	21°41.7	-17°18.4	335°18.6	-22°24.4
8	267°15.0	287°04.1	-9°56.3	15°19.1	-21°56.4	36°44.0	-17°18.4	350°20.8	-22°24.4
9	282°17.5	302°03.7	-9°55.1	30°19.9	-21°56.6	51°46.3	-17°18.5	5°23.1	-22°24.4
10	297°20.0	317°03.2	-9°53.9	45°20.8	-21°56.9	66°48.7	-17°18.5	20°25.3	-22°24.4
11	312°22.4	332°02.7	-9°52.7	60°21.7	-21°57.1	81°51.0	-17°18.5	35°27.5	-22°24.4
12	327°24.9	347°02.2	-9°51.6	75°22.5	-21°57.3	96°53.3	-17°18.6	50°29.7	-22°24.4
13	342°27.3	2°01.8	-9°50.4	90°23.4	-21°57.5	111°55.6	-17°18.6	65°32.0	-22°24.3
14	357°29.8	17°01.3	-9°49.2	105°24.2	-21°57.7	126°57.9	-17°18.6	80°34.2	-22°24.3
15	12°32.3	32°00.8	-9°48.0	120°25.1	-21°57.9	142°00.2	-17°18.7	95°36.4	-22°24.3
16	27°34.7	47°00.3	-9°46.8	135°25.9	-21°58.2	157°02.5	-17°18.7	110°38.7	-22°24.3
17	42°37.2	61°59.9	-9°45.7	150°26.8	-21°58.4	172°04.8	-17°18.7	125°40.9	-22°24.3
18	57°39.7	76°59.4	-9°44.5	165°27.7	-21°58.6	187°07.1	-17°18.8	140°43.1	-22°24.3
19	72°42.1	91°58.9	-9°43.3	180°28.5	-21°58.8	202°09.4	-17°18.8	155°45.4	-22°24.3
20	87°44.6	106°58.4	-9°42.1	195°29.4	-21°59.0	217°11.8	-17°18.8	170°47.6	-22°24.3
21	102°47.1	121°58.0	-9°40.9	210°30.2	-21°59.2	232°14.1	-17°18.9	185°49.8	-22°24.3
22	117°49.5	136°57.5	-9°39.8	225°31.1	-21°59.5	247°16.4	-17°18.9	200°52.1	-22°24.3
23	132°52.0	151°57.0	-9°38.6	240°31.9	-21°59.7	262°18.7	-17°18.9	215°54.3	-22°24.2
Mer.pass.:14:09		v-0.5 d1.2 m-3.8		v0.9 d-0.2 m1.0		v2.3 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.4
Ankaa	353°12.9	-42°12.8
Schedar	349°37.2	56°38.2
Diphda	348°52.8	-17°53.5
Achernar	335°24.8	-57°09.1
Hamal	327°57.3	23°32.8
Polaris	316°26.3	89°20.6
Akamar	315°16.0	-40°14.4
Menkar	314°11.8	4°09.4
Mirfak	308°35.8	49°55.5
Aldebaran	290°45.7	16°32.5
Rigel	281°08.9	-8°11.2
Capella	280°29.6	46°01.0
Bellatrix	278°28.4	6°21.7
Elnath	278°08.4	28°37.2
Alnilam	275°43.0	-1°11.7
Betelgeuse	270°57.7	7°24.4
Canopus	263°54.4	-52°42.7
Sirius	258°30.6	-16°44.6
Adara	255°09.7	-29°00.2
Procyon	244°56.1	5°10.6
Pollux	243°23.4	27°58.8
Avior	234°16.1	-59°34.3
Suhail	222°49.6	-43°30.5
Miaplacidus	221°38.0	-69°47.6
Alphard	217°52.6	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.3	61°39.1
Denebola	182°30.1	14°28.2
Gienah	175°48.7	-17°38.5
Acrux	173°05.2	-63°11.7
Gacrux	171°56.9	-57°12.7
Alioth	166°17.6	55°51.5
Spica	158°27.7	-11°15.3
Alcaid	152°56.2	49°13.2
Hadar	148°43.1	-60°27.3
Menkent	148°03.7	-36°27.3
Arcturus	145°52.6	19°05.5
Rigil Kent.	139°47.2	-60°54.2
Zubenelg.	137°01.8	-16°06.9
Kochab	137°20.0	74°04.7
Alphecca	126°08.3	26°39.2
Antares	112°22.4	-26°28.1
Atria	107°21.6	-69°03.1
Sabik	102°09.0	-15°44.7
Shaula	96°17.8	-37°06.7
Rasalhague	96°03.7	12°32.9
Etamin	90°45.0	51°29.1
Kaus Aust.	83°39.9	-34°22.3
Vega	80°37.1	38°47.9
Nunki	75°54.7	-26°16.3
Altair	62°05.5	8°54.9
Peacock	53°14.8	-56°40.5
Deneb	49°29.7	45°20.6
Enif	33°44.3	9°57.4
Alnair	27°40.3	-46°52.5
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.6	28°10.8
Markab	13°35.5	15°18.1

2018/2/1	**SHA**	**Mer.pass**
Venus	22°34.5	12:50
Mars	109°34.1	07:02
Jupiter	129°38.2	05:41
Saturn	83°19.1	08:46

2018/2/1	**SHA**	**Mer.pass**
Venus	21°23.5	12:51
Mars	108°55.5	07:00
Jupiter	129°34.1	05:37
Saturn	83°13.4	08:42

2018/2/1	**SHA**	**Mer.pass**
Venus	20°12.7	12:52
Mars	108°16.9	06:59
Jupiter	129°30.3	05:33
Saturn	83°07.7	08:39

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°28.1	-12°46.1	186°01.9	12.5	-16°02.2	6.4	54.7
1	191°28.1	-12°45.2	200°33.4	12.5	-15°55.8	6.5	54.7
2	206°28.2	-12°44.3	215°05.0	12.6	-15°49.3	6.6	54.7
3	221°28.2	-12°43.5	229°36.6	12.6	-15°42.7	6.6	54.7
4	236°28.2	-12°42.6	244°08.1	12.6	-15°36.0	6.7	54.8
5	251°28.2	-12°41.8	258°39.7	12.6	-15°29.2	6.8	54.8
6	266°28.3	-12°40.9	273°11.4	12.6	-15°22.4	6.9	54.8
7	281°28.3	-12°40.1	287°43.0	12.6	-15°15.5	6.9	54.8
8	296°28.3	-12°39.2	302°14.7	12.7	-15°08.5	7.0	54.8
9	311°28.4	-12°38.3	316°46.3	12.7	-15°01.5	7.1	54.8
10	326°28.4	-12°37.5	331°18.0	12.7	-14°54.4	7.2	54.8
11	341°28.4	-12°36.6	345°49.7	12.7	-14°47.2	7.2	54.9
12	356°28.4	-12°35.8	0°21.4	12.7	-14°39.9	7.3	54.9
13	11°28.5	-12°34.9	14°53.2	12.7	-14°32.6	7.4	54.9
14	26°28.5	-12°34.0	29°24.9	12.8	-14°25.2	7.4	54.9
15	41°28.5	-12°33.2	43°56.7	12.8	-14°17.7	7.5	54.9
16	56°28.6	-12°32.3	58°28.5	12.8	-14°10.1	7.6	54.9
17	71°28.6	-12°31.4	73°00.3	12.8	-14°02.5	7.7	55.0
18	86°28.6	-12°30.6	87°32.1	12.8	-13°54.8	7.7	55.0
19	101°28.7	-12°29.7	102°04.0	12.8	-13°47.1	7.8	55.0
20	116°28.7	-12°28.9	116°35.8	12.9	-13°39.3	7.9	55.0
21	131°28.7	-12°28.0	131°07.7	12.9	-13°31.4	7.9	55.0
22	146°28.8	-12°27.1	145°39.6	12.9	-13°23.4	8.0	55.0
23	161°28.8	-12°26.3	160°11.5	12.9	-13°15.4	8.1	55.0
	SD.=16.2	d=0.9	S.D.=14.9				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°28.8	-12°25.4	174°43.4	12.9	-13°07.3	8.1	55.1
1	191°28.9	-12°24.5	189°15.3	12.9	-12°59.1	8.2	55.1
2	206°28.9	-12°23.7	203°47.3	13.0	-12°50.9	8.3	55.1
3	221°28.9	-12°22.8	218°19.2	13.0	-12°42.6	8.3	55.1
4	236°29.0	-12°21.9	232°51.2	13.0	-12°34.3	8.4	55.1
5	251°29.0	-12°21.1	247°23.2	13.0	-12°25.9	8.4	55.1
6	266°29.1	-12°20.2	261°55.2	13.0	-12°17.4	8.5	55.2
7	281°29.1	-12°19.3	276°27.2	13.0	-12°08.9	8.6	55.2
8	296°29.1	-12°18.5	290°59.3	13.0	-12°00.3	8.6	55.2
9	311°29.2	-12°17.6	305°31.3	13.1	-11°51.6	8.7	55.2
10	326°29.2	-12°16.7	320°03.4	13.1	-11°42.9	8.7	55.2
11	341°29.2	-12°15.9	334°35.4	13.1	-11°34.2	8.8	55.2
12	356°29.3	-12°15.0	349°07.5	13.1	-11°25.3	8.9	55.3
13	11°29.3	-12°14.1	3°39.6	13.1	-11°16.4	8.9	55.3
14	26°29.4	-12°13.3	18°11.8	13.1	-11°07.5	9.0	55.3
15	41°29.4	-12°12.4	32°43.9	13.1	-10°58.5	9.0	55.3
16	56°29.4	-12°11.5	47°16.0	13.1	-10°49.5	9.1	55.3
17	71°29.5	-12°10.6	61°48.2	13.2	-10°40.3	9.1	55.4
18	86°29.5	-12°09.8	76°20.4	13.2	-10°31.2	9.2	55.4
19	101°29.6	-12°08.9	90°52.5	13.2	-10°22.0	9.2	55.4
20	116°29.6	-12°08.0	105°24.7	13.2	-10°12.7	9.3	55.4
21	131°29.6	-12°07.2	119°56.9	13.2	-10°03.4	9.3	55.4
22	146°29.7	-12°06.3	134°29.1	13.2	-9°54.0	9.4	55.4
23	161°29.7	-12°05.4	149°01.4	13.2	-9°44.6	9.5	55.5
	SD.=16.2	d=0.9	S.D.=15.0				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°29.8	-12°04.5	163°33.6	13.2	-9°35.1	9.5	55.5
1	191°29.8	-12°03.7	178°05.8	13.2	-9°25.6	9.5	55.5
2	206°29.8	-12°02.8	192°38.1	13.3	-9°16.0	9.6	55.5
3	221°29.9	-12°01.9	207°10.3	13.3	-9°06.4	9.6	55.5
4	236°29.9	-12°01.1	221°42.6	13.3	-8°56.7	9.7	55.6
5	251°30.0	-12°00.2	236°14.9	13.3	-8°47.0	9.7	55.6
6	266°30.0	-11°59.3	250°47.2	13.3	-8°37.2	9.8	55.6
7	281°30.1	-11°58.4	265°19.5	13.3	-8°27.4	9.8	55.6
8	296°30.1	-11°57.6	279°51.8	13.3	-8°17.6	9.9	55.6
9	311°30.1	-11°56.7	294°24.1	13.3	-8°07.7	9.9	55.6
10	326°30.2	-11°55.8	308°56.4	13.3	-7°57.7	10.0	55.7
11	341°30.2	-11°54.9	323°28.7	13.3	-7°47.7	10.0	55.7
12	356°30.3	-11°54.0	338°01.0	13.3	-7°37.7	10.0	55.7
13	11°30.3	-11°53.2	352°33.3	13.3	-7°27.7	10.1	55.7
14	26°30.4	-11°52.3	7°05.7	13.3	-7°17.6	10.1	55.7
15	41°30.4	-11°51.4	21°38.0	13.3	-7°07.4	10.2	55.8
16	56°30.5	-11°50.5	36°10.3	13.3	-6°57.2	10.2	55.8
17	71°30.5	-11°49.7	50°42.7	13.3	-6°47.0	10.2	55.8
18	86°30.6	-11°48.8	65°15.0	13.3	-6°36.7	10.3	55.8
19	101°30.6	-11°47.9	79°47.4	13.3	-6°26.4	10.3	55.8
20	116°30.7	-11°47.0	94°19.7	13.3	-6°16.1	10.4	55.9
21	131°30.7	-11°46.1	108°52.1	13.3	-6°05.7	10.4	55.9
22	146°30.8	-11°45.3	123°24.4	13.3	-5°55.3	10.4	55.9
23	161°30.8	-11°44.4	137°56.8	13.3	-5°44.9	10.5	55.9
	SD.=16.2	d=0.9	S.D.=15.1				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:10	07:30	08:48	15:42	16:60	18:20
70	06:09	07:21	08:29	16:01	17:09	18:21
68	06:08	07:13	08:14	16:15	17:16	18:22
66	06:07	07:07	08:02	16:27	17:23	18:23
64	06:06	07:01	07:52	16:38	17:28	18:24
62	06:04	06:56	07:43	16:46	17:33	18:25
60	06:03	06:52	07:36	16:54	17:37	18:26
58	06:02	06:48	07:29	17:00	17:41	18:27
56	06:01	06:45	07:23	17:06	17:45	18:28
54	06:00	06:41	07:18	17:11	17:48	18:29
52	05:59	06:38	07:13	17:16	17:51	18:30
50	05:58	06:36	07:09	17:20	17:53	18:31
45	05:55	06:30	06:60	17:29	17:59	18:34
40	05:52	06:24	06:52	17:37	18:05	18:36
35	05:50	06:19	06:45	17:44	18:09	18:39
30	05:47	06:15	06:39	17:49	18:14	18:42
20	05:40	06:06	06:29	17:60	18:22	18:48
10	05:33	05:58	06:19	18:09	18:30	18:55
0	05:25	05:50	06:11	18:17	18:39	19:03
-10	05:15	05:40	06:02	18:26	18:48	19:13
-20	05:03	05:29	05:52	18:36	18:58	19:25
-30	04:47	05:16	05:41	18:47	19:11	19:41
-35	04:36	05:08	05:35	18:53	19:19	19:51
-40	04:24	04:59	05:27	19:00	19:29	20:03
-45	04:09	04:47	05:19	19:09	19:40	20:18
-50	03:49	04:33	05:08	19:19	19:54	20:38
-52	03:39	04:26	05:03	19:24	20:01	20:47
-54	03:28	04:18	04:58	19:29	20:08	20:58
-56	03:14	04:10	04:52	19:35	20:17	21:11
-58	02:59	03:60	04:45	19:41	20:26	21:27
-60	02:39	03:48	04:37	19:49	20:37	21:45

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	09:37	09:21	09:08	14:34	16:27	18:15
70	09:05	09:00	08:56	15:05	16:46	18:25
68	08:41	08:44	08:46	15:28	17:00	18:33
66	08:22	08:31	08:38	15:46	17:12	18:40
64	08:07	08:21	08:31	16:00	17:22	18:45
62	07:54	08:11	08:25	16:12	17:30	18:50
60	07:43	08:03	08:20	16:23	17:38	18:55
58	07:34	07:56	08:16	16:31	17:44	18:58
56	07:26	07:50	08:11	16:39	17:49	19:02
54	07:18	07:45	08:08	16:46	17:54	19:05
52	07:12	07:40	08:04	16:52	17:59	19:07
50	07:06	07:35	08:01	16:58	18:03	19:10
45	06:53	07:25	07:55	17:10	18:12	19:15
40	06:42	07:17	07:49	17:20	18:19	19:19
35	06:33	07:10	07:44	17:28	18:25	19:23
30	06:25	07:03	07:40	17:36	18:31	19:26
20	06:11	06:52	07:32	17:48	18:40	19:32
10	05:59	06:43	07:26	17:59	18:48	19:37
0	05:47	06:34	07:20	18:10	18:56	19:42
-10	05:36	06:25	07:14	18:20	19:04	19:46
-20	05:23	06:15	07:07	18:31	19:12	19:51
-30	05:09	06:04	06:59	18:43	19:21	19:57
-35	05:01	05:58	06:55	18:51	19:26	19:60
-40	04:52	05:50	06:50	18:59	19:32	20:03
-45	04:41	05:42	06:44	19:08	19:39	20:07
-50	04:28	05:32	06:38	19:19	19:47	20:12
-52	04:21	05:27	06:34	19:25	19:51	20:15
-54	04:14	05:22	06:31	19:30	19:55	20:17
-56	04:07	05:16	06:27	19:37	19:60	20:20
-58	03:58	05:09	06:23	19:44	20:05	20:23
-60	03:48	05:02	06:18	19:52	20:10	20:26

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
15	14:08	14:06	12:14	11:58	00:21	29(0%)
16	14:05	14:03	12:14	12:44	00:21	1(0%)
17	14:01	13:59	12:13	13:30	01:07	2(3%)

February 18, 19 ,20 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	147°54.4	166°56.5	-9°37.4	255°32.8	-21°59.9	277°21.0	-17°18.9	230°56.5	-22°24.2
1	162°56.9	181°56.1	-9°36.2	270°33.7	-22°00.1	292°23.3	-17°19.0	245°58.7	-22°24.2
2	177°59.4	196°55.6	-9°35.0	285°34.5	-22°00.3	307°25.6	-17°19.0	261°01.0	-22°24.2
3	193°01.8	211°55.1	-9°33.9	300°35.4	-22°00.5	322°28.0	-17°19.0	276°03.2	-22°24.2
4	208°04.3	226°54.7	-9°32.7	315°36.2	-22°00.7	337°30.3	-17°19.1	291°05.4	-22°24.2
5	223°06.8	241°54.2	-9°31.5	330°37.1	-22°01.0	352°32.6	-17°19.1	306°07.7	-22°24.2
6	238°09.2	256°53.7	-9°30.3	345°38.0	-22°01.2	7°34.9	-17°19.1	321°09.9	-22°24.2
7	253°11.7	271°53.2	-9°29.1	0°38.8	-22°01.4	22°37.2	-17°19.2	336°12.1	-22°24.2
8	268°14.2	286°52.8	-9°27.9	15°39.7	-22°01.6	37°39.5	-17°19.2	351°14.4	-22°24.1
9	283°16.6	301°52.3	-9°26.8	30°40.5	-22°01.8	52°41.8	-17°19.2	6°16.6	-22°24.1
10	298°19.1	316°51.8	-9°25.6	45°41.4	-22°02.0	67°44.2	-17°19.2	21°18.8	-22°24.1
11	313°21.6	331°51.4	-9°24.4	60°42.2	-22°02.2	82°46.5	-17°19.3	36°21.1	-22°24.1
12	328°24.0	346°50.9	-9°23.2	75°43.1	-22°02.5	97°48.8	-17°19.3	51°23.3	-22°24.1
13	343°26.5	1°50.4	-9°22.0	90°44.0	-22°02.7	112°51.1	-17°19.3	66°25.5	-22°24.1
14	358°28.9	16°50.0	-9°20.8	105°44.8	-22°02.9	127°53.4	-17°19.4	81°27.8	-22°24.1
15	13°31.4	31°49.5	-9°19.6	120°45.7	-22°03.1	142°55.8	-17°19.4	96°30.0	-22°24.1
16	28°33.9	46°49.0	-9°18.5	135°46.5	-22°03.3	157°58.1	-17°19.4	111°32.2	-22°24.1
17	43°36.3	61°48.6	-9°17.3	150°47.4	-22°03.5	173°00.4	-17°19.5	126°34.5	-22°24.1
18	58°38.8	76°48.1	-9°16.1	165°48.2	-22°03.7	188°02.7	-17°19.5	141°36.7	-22°24.0
19	73°41.3	91°47.6	-9°14.9	180°49.1	-22°03.9	203°05.0	-17°19.5	156°38.9	-22°24.0
20	88°43.7	106°47.2	-9°13.7	195°50.0	-22°04.1	218°07.4	-17°19.5	171°41.2	-22°24.0
21	103°46.2	121°46.7	-9°12.5	210°50.8	-22°04.3	233°09.7	-17°19.6	186°43.4	-22°24.0
22	118°48.7	136°46.2	-9°11.3	225°51.7	-22°04.6	248°12.0	-17°19.6	201°45.6	-22°24.0
23	133°51.1	151°45.8	-9°10.1	240°52.5	-22°04.8	263°14.3	-17°19.6	216°47.9	-22°24.0
Mer.pass.:14:06		v-0.5 d1.2 m-3.8		v0.9 d-0.2 m1.0		v2.3 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	148°53.6	166°45.3	-9°08.9	255°53.4	-22°05.0	278°16.6	-17°19.7	231°50.1	-22°24.0
1	163°56.0	181°44.9	-9°07.7	270°54.2	-22°05.2	293°19.0	-17°19.7	246°52.4	-22°24.0
2	178°58.5	196°44.4	-9°06.5	285°55.1	-22°05.4	308°21.3	-17°19.7	261°54.6	-22°24.0
3	194°01.0	211°43.9	-9°05.4	300°56.0	-22°05.6	323°23.6	-17°19.7	276°56.8	-22°24.0
4	209°03.4	226°43.5	-9°04.2	315°56.8	-22°05.8	338°25.9	-17°19.8	291°59.1	-22°23.9
5	224°05.9	241°43.0	-9°03.0	330°57.7	-22°06.0	353°28.2	-17°19.8	307°01.3	-22°23.9
6	239°08.4	256°42.6	-9°01.8	345°58.5	-22°06.2	8°30.6	-17°19.8	322°03.5	-22°23.9
7	254°10.8	271°42.1	-9°00.6	0°59.4	-22°06.4	23°32.9	-17°19.9	337°05.8	-22°23.9
8	269°13.3	286°41.6	-8°59.4	16°00.3	-22°06.6	38°35.2	-17°19.9	352°08.0	-22°23.9
9	284°15.8	301°41.2	-8°58.2	31°01.1	-22°06.8	53°37.5	-17°19.9	7°10.2	-22°23.9
10	299°18.2	316°40.7	-8°57.0	46°02.0	-22°07.0	68°39.9	-17°19.9	22°12.5	-22°23.9
11	314°20.7	331°40.3	-8°55.8	61°02.8	-22°07.3	83°42.2	-17°20.0	37°14.7	-22°23.9
12	329°23.2	346°39.8	-8°54.6	76°03.7	-22°07.5	98°44.5	-17°20.0	52°16.9	-22°23.9
13	344°25.6	1°39.3	-8°53.4	91°04.5	-22°07.7	113°46.8	-17°20.0	67°19.2	-22°23.9
14	359°28.1	16°38.9	-8°52.2	106°05.4	-22°07.9	128°49.2	-17°20.1	82°21.4	-22°23.8
15	14°30.5	31°38.4	-8°51.0	121°06.3	-22°08.1	143°51.5	-17°20.1	97°23.7	-22°23.8
16	29°33.0	46°38.0	-8°49.8	136°07.1	-22°08.3	158°53.8	-17°20.1	112°25.9	-22°23.8
17	44°35.5	61°37.5	-8°48.6	151°08.0	-22°08.5	173°56.1	-17°20.1	127°28.1	-22°23.8
18	59°37.9	76°37.0	-8°47.4	166°08.8	-22°08.7	188°58.5	-17°20.2	142°30.4	-22°23.8
19	74°40.4	91°36.6	-8°46.2	181°09.7	-22°08.9	204°00.8	-17°20.2	157°32.6	-22°23.8
20	89°42.9	106°36.1	-8°45.0	196°10.5	-22°09.1	219°03.1	-17°20.2	172°34.8	-22°23.8
21	104°45.3	121°35.7	-8°43.8	211°11.4	-22°09.3	234°05.4	-17°20.3	187°37.1	-22°23.8
22	119°47.8	136°35.2	-8°42.6	226°12.3	-22°09.5	249°07.8	-17°20.3	202°39.3	-22°23.8
23	134°50.3	151°34.8	-8°41.4	241°13.1	-22°09.7	264°10.1	-17°20.3	217°41.5	-22°23.7
Mer.pass.:14:02		v-0.5 d1.2 m-3.8		v0.9 d-0.2 m1.0		v2.3 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	149°52.7	166°34.3	-8°40.2	256°14.0	-22°09.9	279°12.4	-17°20.3	232°43.8	-22°23.7
1	164°55.2	181°33.9	-8°39.0	271°14.8	-22°10.1	294°14.8	-17°20.4	247°46.0	-22°23.7
2	179°57.6	196°33.4	-8°37.8	286°15.7	-22°10.3	309°17.1	-17°20.4	262°48.3	-22°23.7
3	195°00.1	211°33.0	-8°36.6	301°16.6	-22°10.5	324°19.4	-17°20.4	277°50.5	-22°23.7
4	210°02.6	226°32.5	-8°35.4	316°17.4	-22°10.7	339°21.7	-17°20.4	292°52.7	-22°23.7
5	225°05.0	241°32.1	-8°34.2	331°18.3	-22°10.9	354°24.1	-17°20.5	307°55.0	-22°23.7
6	240°07.5	256°31.6	-8°33.0	346°19.1	-22°11.1	9°26.4	-17°20.5	322°57.2	-22°23.7
7	255°10.0	271°31.1	-8°31.8	1°20.0	-22°11.3	24°28.7	-17°20.5	337°59.5	-22°23.7
8	270°12.4	286°30.7	-8°30.6	16°20.8	-22°11.5	39°31.1	-17°20.5	353°01.7	-22°23.7
9	285°14.9	301°30.2	-8°29.4	31°21.7	-22°11.7	54°33.4	-17°20.6	8°03.9	-22°23.6
10	300°17.4	316°29.8	-8°28.2	46°22.6	-22°11.9	69°35.7	-17°20.6	23°06.2	-22°23.6
11	315°19.8	331°29.3	-8°27.0	61°23.4	-22°12.1	84°38.1	-17°20.6	38°08.4	-22°23.6
12	330°22.3	346°28.9	-8°25.8	76°24.3	-22°12.3	99°40.4	-17°20.6	53°10.6	-22°23.6
13	345°24.8	1°28.4	-8°24.6	91°25.1	-22°12.5	114°42.7	-17°20.7	68°12.9	-22°23.6
14	0°27.2	16°28.0	-8°23.4	106°26.0	-22°12.7	129°45.1	-17°20.7	83°15.1	-22°23.6
15	15°29.7	31°27.5	-8°22.2	121°26.8	-22°12.9	144°47.4	-17°20.7	98°17.4	-22°23.6
16	30°32.1	46°27.1	-8°20.9	136°27.7	-22°13.1	159°49.7	-17°20.8	113°19.6	-22°23.6
17	45°34.6	61°26.7	-8°19.7	151°28.6	-22°13.3	174°52.1	-17°20.8	128°21.8	-22°23.6
18	60°37.1	76°26.2	-8°18.5	166°29.4	-22°13.5	189°54.4	-17°20.8	143°24.1	-22°23.6
19	75°39.5	91°25.8	-8°17.3	181°30.3	-22°13.7	204°56.7	-17°20.8	158°26.3	-22°23.5
20	90°42.0	106°25.3	-8°16.1	196°31.1	-22°13.9	219°59.1	-17°20.9	173°28.6	-22°23.5
21	105°44.5	121°24.9	-8°14.9	211°32.0	-22°14.1	235°01.4	-17°20.9	188°30.8	-22°23.5
22	120°46.9	136°24.4	-8°13.7	226°32.9	-22°14.3	250°03.7	-17°20.9	203°33.0	-22°23.5
23	135°49.4	151°24.0	-8°12.5	241°33.7	-22°14.5	265°06.1	-17°20.9	218°35.3	-22°23.5
Mer.pass.:13:58		v-0.5 d1.2 m-3.8		v0.9 d-0.2 m0.9		v2.3 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.4
Ankaa	353°12.9	-42°12.8
Schedar	349°37.3	56°38.2
Diphda	348°52.9	-17°53.5
Achernar	335°24.8	-57°09.1
Hamal	327°57.3	23°32.8
Polaris	316°27.8	89°20.6
Akamar	315°16.0	-40°14.4
Menkar	314°11.8	4°09.4
Mirfak	308°35.8	49°55.5
Aldebaran	290°45.7	16°32.5
Rigel	281°08.9	-8°11.2
Capella	280°29.6	46°01.0
Bellatrix	278°28.5	6°21.7
Elnath	278°08.5	28°37.2
Alnilam	275°43.0	-1°11.7
Betelgeuse	270°57.7	7°24.4
Canopus	263°54.4	-52°42.7
Sirius	258°30.6	-16°44.6
Adara	255°09.7	-29°00.2
Procyon	244°56.1	5°10.6
Pollux	243°23.5	27°58.8
Avior	234°16.1	-59°34.3
Suhail	222°49.6	-43°30.5
Miaplacidus	221°38.1	-69°47.6
Alphard	217°52.6	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.1
Denebola	182°30.1	14°28.2
Gienah	175°48.7	-17°38.5
Acrux	173°05.1	-63°11.7
Gacrux	171°56.9	-57°12.7
Alioth	166°17.6	55°51.5
Spica	158°27.7	-11°15.3
Alcaid	152°56.2	49°13.2
Hadar	148°43.0	-60°27.3
Menkent	148°03.6	-36°27.3
Arcturus	145°52.6	19°05.5
Rigil Kent.	139°47.2	-60°54.2
Zubenelg.	137°01.8	-16°06.9
Kochab	137°19.9	74°04.7
Alphecca	126°08.3	26°39.2
Antares	112°22.4	-26°28.1
Atria	107°21.5	-69°03.1
Sabik	102°09.0	-15°44.7
Shaula	96°17.8	-37°06.7
Rasalhague	96°03.7	12°32.8
Etamin	90°44.9	51°29.1
Kaus Aust.	83°39.8	-34°22.3
Vega	80°37.1	38°47.9
Nunki	75°54.7	-26°16.3
Altair	62°05.5	8°54.9
Peacock	53°14.8	-56°40.5
Deneb	49°29.7	45°20.6
Enif	33°44.3	9°57.4
Alnair	27°40.3	-46°52.4
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.7	28°10.8
Markab	13°35.5	15°18.1

2018/2/1	**SHA**	**Mer.pass**
Venus	19°02.1	12:53
Mars	107°38.4	06:57
Jupiter	129°26.6	05:30
Saturn	83°02.1	08:35

2018/2/1	**SHA**	**Mer.pass**
Venus	17°51.7	12:53
Mars	106°59.8	06:56
Jupiter	129°23.0	05:26
Saturn	82°56.5	08:31

2018/2/2	**SHA**	**Mer.pass**
Venus	16°41.6	12:54
Mars	106°21.3	06:55
Jupiter	129°19.7	05:22
Saturn	82°51.1	08:28

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°30.8	-11°43.5	152°29.1	13.3	-5°34.4	10.5	55.9
1	191°30.9	-11°42.6	167°01.5	13.3	-5°23.9	10.5	56.0
2	206°30.9	-11°41.7	181°33.8	13.3	-5°13.4	10.5	56.0
3	221°31.0	-11°40.9	196°06.1	13.3	-5°02.8	10.6	56.0
4	236°31.0	-11°40.0	210°38.5	13.3	-4°52.2	10.6	56.0
5	251°31.1	-11°39.1	225°10.8	13.3	-4°41.6	10.6	56.0
6	266°31.2	-11°38.2	239°43.2	13.3	-4°31.0	10.7	56.1
7	281°31.2	-11°37.3	254°15.5	13.3	-4°20.3	10.7	56.1
8	296°31.3	-11°36.4	268°47.8	13.3	-4°09.6	10.7	56.1
9	311°31.3	-11°35.6	283°20.1	13.3	-3°58.8	10.7	56.1
10	326°31.4	-11°34.7	297°52.4	13.3	-3°48.1	10.8	56.1
11	341°31.4	-11°33.8	312°24.7	13.3	-3°37.3	10.8	56.2
12	356°31.5	-11°32.9	326°57.0	13.3	-3°26.5	10.8	56.2
13	11°31.5	-11°32.0	341°29.3	13.3	-3°15.7	10.8	56.2
14	26°31.6	-11°31.1	356°01.6	13.3	-3°04.8	10.9	56.2
15	41°31.6	-11°30.2	10°33.9	13.3	-2°53.9	10.9	56.2
16	56°31.7	-11°29.4	25°06.2	13.3	-2°43.1	10.9	56.3
17	71°31.7	-11°28.5	39°38.4	13.2	-2°32.1	10.9	56.3
18	86°31.8	-11°27.6	54°10.6	13.2	-2°21.2	10.9	56.3
19	101°31.8	-11°26.7	68°42.9	13.2	-2°10.3	11.0	56.3
20	116°31.9	-11°25.8	83°15.1	13.2	-1°59.3	11.0	56.3
21	131°31.9	-11°24.9	97°47.3	13.2	-1°48.3	11.0	56.4
22	146°32.0	-11°24.0	112°19.5	13.2	-1°37.3	11.0	56.4
23	161°32.1	-11°23.2	126°51.7	13.2	-1°26.3	11.0	56.4
	SD.=16.2	d=0.9	S.D.=15.3				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°32.1	-11°22.3	141°23.8	13.2	-1°15.3	11.0	56.4
1	191°32.2	-11°21.4	155°56.0	13.1	-1°04.2	11.0	56.4
2	206°32.2	-11°20.5	170°28.1	13.1	-0°53.2	11.1	56.5
3	221°32.3	-11°19.6	185°00.2	13.1	-0°42.1	11.1	56.5
4	236°32.3	-11°18.7	199°32.3	13.1	-0°31.0	11.1	56.5
5	251°32.4	-11°17.8	214°04.4	13.1	-0°20.0	11.1	56.5
6	266°32.5	-11°16.9	228°36.5	13.1	-0°08.9	11.1	56.5
7	281°32.5	-11°16.0	243°08.5	13.0	0°02.2	11.1	56.6
8	296°32.6	-11°15.1	257°40.5	13.0	0°13.4	11.1	56.6
9	311°32.6	-11°14.3	272°12.5	13.0	0°24.5	11.1	56.6
10	326°32.7	-11°13.4	286°44.5	13.0	0°35.6	11.1	56.6
11	341°32.8	-11°12.5	301°16.5	12.9	0°46.7	11.1	56.6
12	356°32.8	-11°11.6	315°48.4	12.9	0°57.8	11.1	56.7
13	11°32.9	-11°10.7	330°20.3	12.9	1°09.0	11.1	56.7
14	26°32.9	-11°09.8	344°52.2	12.9	1°20.1	11.1	56.7
15	41°33.0	-11°08.9	359°24.0	12.8	1°31.2	11.1	56.7
16	56°33.1	-11°08.0	13°55.9	12.8	1°42.4	11.1	56.8
17	71°33.1	-11°07.1	28°27.7	12.8	1°53.5	11.1	56.8
18	86°33.2	-11°06.2	42°59.5	12.8	2°04.7	11.1	56.8
19	101°33.2	-11°05.3	57°31.2	12.7	2°15.8	11.1	56.8
20	116°33.3	-11°04.4	72°02.9	12.7	2°26.9	11.1	56.8
21	131°33.4	-11°03.5	86°34.6	12.7	2°38.0	11.1	56.9
22	146°33.4	-11°02.6	101°06.3	12.6	2°49.2	11.1	56.9
23	161°33.5	-11°01.7	115°37.9	12.6	3°00.3	11.1	56.9
	SD.=16.2	d=0.9	S.D.=15.4				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°33.6	-11°00.9	130°09.5	12.6	3°11.4	11.1	56.9
1	191°33.6	-10°60.0	144°41.1	12.6	3°22.5	11.1	56.9
2	206°33.7	-10°59.1	159°12.6	12.5	3°33.6	11.1	57.0
3	221°33.7	-10°58.2	173°44.1	12.5	3°44.6	11.1	57.0
4	236°33.8	-10°57.3	188°15.6	12.5	3°55.7	11.1	57.0
5	251°33.9	-10°56.4	202°47.0	12.4	4°06.8	11.1	57.0
6	266°33.9	-10°55.5	217°18.4	12.4	4°17.8	11.0	57.1
7	281°34.0	-10°54.6	231°49.8	12.3	4°28.9	11.0	57.1
8	296°34.1	-10°53.7	246°21.1	12.3	4°39.9	11.0	57.1
9	311°34.1	-10°52.8	260°52.4	12.3	4°50.9	11.0	57.1
10	326°34.2	-10°51.9	275°23.7	12.2	5°01.9	11.0	57.1
11	341°34.3	-10°51.0	289°54.9	12.2	5°12.8	11.0	57.2
12	356°34.3	-10°50.1	304°26.0	12.1	5°23.8	10.9	57.2
13	11°34.4	-10°49.2	318°57.2	12.1	5°34.7	10.9	57.2
14	26°34.5	-10°48.3	333°28.3	12.1	5°45.6	10.9	57.2
15	41°34.5	-10°47.4	347°59.3	12.0	5°56.5	10.9	57.3
16	56°34.6	-10°46.5	2°30.3	12.0	6°07.4	10.9	57.3
17	71°34.7	-10°45.6	17°01.3	11.9	6°18.2	10.8	57.3
18	86°34.7	-10°44.7	31°32.2	11.9	6°29.1	10.8	57.3
19	101°34.8	-10°43.8	46°03.0	11.8	6°39.9	10.8	57.3
20	116°34.9	-10°42.9	60°33.9	11.8	6°50.6	10.8	57.4
21	131°35.0	-10°42.0	75°04.6	11.8	7°01.4	10.7	57.4
22	146°35.0	-10°41.1	89°35.4	11.7	7°12.1	10.7	57.4
23	161°35.1	-10°40.2	104°06.1	11.7	7°22.8	10.7	57.4
	SD.=16.2	d=0.9	S.D.=15.5				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:57	07:16	08:31	15:58	17:13	18:33
70	05:57	07:08	08:15	16:15	17:21	18:32
68	05:57	07:02	08:02	16:28	17:27	18:32
66	05:57	06:57	07:51	16:38	17:32	18:32
64	05:57	06:52	07:42	16:47	17:37	18:32
62	05:56	06:48	07:34	16:55	17:41	18:33
60	05:56	06:44	07:27	17:01	17:45	18:33
58	05:55	06:41	07:21	17:07	17:48	18:33
56	05:55	06:38	07:16	17:12	17:51	18:34
54	05:54	06:35	07:11	17:17	17:53	18:35
52	05:53	06:33	07:07	17:21	17:56	18:35
50	05:53	06:30	07:03	17:25	17:58	18:36
45	05:51	06:25	06:55	17:33	18:03	18:38
40	05:49	06:20	06:48	17:40	18:08	18:40
35	05:46	06:16	06:42	17:46	18:12	18:42
30	05:44	06:12	06:36	17:52	18:16	18:44
20	05:39	06:04	06:27	18:01	18:23	18:49
10	05:32	05:57	06:18	18:09	18:31	18:55
0	05:25	05:49	06:10	18:17	18:38	19:03
-10	05:16	05:41	06:02	18:25	18:47	19:12
-20	05:04	05:31	05:54	18:34	18:56	19:23
-30	04:49	05:19	05:43	18:44	19:08	19:38
-35	04:40	05:11	05:38	18:50	19:16	19:47
-40	04:28	05:02	05:31	18:56	19:24	19:58
-45	04:14	04:52	05:23	19:04	19:35	20:13
-50	03:55	04:39	05:13	19:13	19:48	20:31
-52	03:46	04:32	05:09	19:18	19:54	20:40
-54	03:36	04:25	05:04	19:22	20:01	20:50
-56	03:24	04:17	04:59	19:28	20:09	21:02
-58	03:09	04:08	04:52	19:34	20:18	21:15
-60	02:52	03:58	04:46	19:40	20:28	21:32

	Moonrise			**Moonset**		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	08:58	08:48	08:38	20:01	21:48	23:39
70	08:52	08:48	08:44	20:04	21:44	23:27
68	08:48	08:48	08:49	20:06	21:41	23:18
66	08:44	08:49	08:54	20:08	21:39	23:11
64	08:40	08:49	08:58	20:10	21:36	23:04
62	08:38	08:49	09:01	20:12	21:34	22:59
60	08:35	08:49	09:04	20:13	21:33	22:54
58	08:33	08:49	09:06	20:14	21:31	22:50
56	08:31	08:49	09:09	20:15	21:30	22:46
54	08:29	08:50	09:11	20:16	21:29	22:43
52	08:27	08:50	09:13	20:17	21:28	22:40
50	08:26	08:50	09:14	20:18	21:27	22:37
45	08:23	08:50	09:18	20:19	21:25	22:31
40	08:20	08:50	09:21	20:21	21:23	22:26
35	08:17	08:50	09:24	20:22	21:21	22:22
30	08:15	08:51	09:27	20:23	21:20	22:19
20	08:12	08:51	09:31	20:24	21:18	22:12
10	08:08	08:51	09:35	20:26	21:16	22:06
0	08:05	08:51	09:38	20:27	21:14	22:01
-10	08:02	08:52	09:42	20:29	21:12	21:56
-20	07:59	08:52	09:46	20:30	21:10	21:50
-30	07:56	08:52	09:50	20:32	21:07	21:44
-35	07:53	08:53	09:53	20:33	21:06	21:40
-40	07:51	08:53	09:56	20:34	21:04	21:36
-45	07:48	08:53	09:59	20:35	21:03	21:31
-50	07:45	08:54	10:03	20:36	21:00	21:26
-52	07:43	08:54	10:05	20:37	20:59	21:23
-54	07:42	08:54	10:07	20:38	20:58	21:20
-56	07:40	08:54	10:10	20:38	20:57	21:17
-58	07:38	08:54	10:12	20:39	20:56	21:13
-60	07:35	08:55	10:15	20:40	20:54	21:09

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
18	13:57	13:54	12:13	14:16	01:53	3(7%)
19	13:51	13:49	12:13	15:02	02:39	4(13%)
20	13:46	13:43	12:13	15:49	03:25	5(21%)

February 21, 22 ,23 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	150°51.9	166°23.5	-8°11.3	256°34.6	-22°14.7	280°08.4	-17°21.0	233°37.5	-22°23.5
1	165°54.3	181°23.1	-8°10.1	271°35.4	-22°14.9	295°10.7	-17°21.0	248°39.8	-22°23.5
2	180°56.8	196°22.6	-8°08.9	286°36.3	-22°15.1	310°13.1	-17°21.0	263°42.0	-22°23.5
3	195°59.3	211°22.2	-8°07.6	301°37.2	-22°15.3	325°15.4	-17°21.0	278°44.3	-22°23.5
4	211°01.7	226°21.7	-8°06.4	316°38.0	-22°15.5	340°17.8	-17°21.1	293°46.5	-22°23.4
5	226°04.2	241°21.3	-8°05.2	331°38.9	-22°15.7	355°20.1	-17°21.1	308°48.7	-22°23.4
6	241°06.6	256°20.9	-8°04.0	346°39.7	-22°15.9	10°22.4	-17°21.1	323°51.0	-22°23.4
7	256°09.1	271°20.4	-8°02.8	1°40.6	-22°16.1	25°24.8	-17°21.1	338°53.2	-22°23.4
8	271°11.6	286°20.0	-8°01.6	16°41.4	-22°16.3	40°27.1	-17°21.2	353°55.5	-22°23.4
9	286°14.0	301°19.5	-8°00.4	31°42.3	-22°16.4	55°29.5	-17°21.2	8°57.7	-22°23.4
10	301°16.5	316°19.1	-7°59.2	46°43.2	-22°16.6	70°31.8	-17°21.2	23°59.9	-22°23.4
11	316°19.0	331°18.6	-7°57.9	61°44.0	-22°16.8	85°34.1	-17°21.2	39°02.2	-22°23.4
12	331°21.4	346°18.2	-7°56.7	76°44.9	-22°17.0	100°36.5	-17°21.2	54°04.4	-22°23.4
13	346°23.9	1°17.8	-7°55.5	91°45.7	-22°17.2	115°38.8	-17°21.3	69°06.7	-22°23.4
14	1°26.4	16°17.3	-7°54.3	106°46.6	-22°17.4	130°41.1	-17°21.3	84°08.9	-22°23.3
15	16°28.8	31°16.9	-7°53.1	121°47.5	-22°17.6	145°43.5	-17°21.3	99°11.2	-22°23.3
16	31°31.3	46°16.4	-7°51.9	136°48.3	-22°17.8	160°45.8	-17°21.3	114°13.4	-22°23.3
17	46°33.7	61°16.0	-7°50.6	151°49.2	-22°18.0	175°48.2	-17°21.4	129°15.6	-22°23.3
18	61°36.2	76°15.6	-7°49.4	166°50.0	-22°18.2	190°50.5	-17°21.4	144°17.9	-22°23.3
19	76°38.7	91°15.1	-7°48.2	181°50.9	-22°18.4	205°52.9	-17°21.4	159°20.1	-22°23.3
20	91°41.1	106°14.7	-7°47.0	196°51.8	-22°18.6	220°55.2	-17°21.4	174°22.4	-22°23.3
21	106°43.6	121°14.2	-7°45.8	211°52.6	-22°18.8	235°57.5	-17°21.5	189°24.6	-22°23.3
22	121°46.1	136°13.8	-7°44.6	226°53.5	-22°18.9	250°59.9	-17°21.5	204°26.9	-22°23.3
23	136°48.5	151°13.4	-7°43.3	241°54.3	-22°19.1	266°02.2	-17°21.5	219°29.1	-22°23.3
Mer.pass.:13:54		v-0.4 d1.2 m-3.8		v0.9 d-0.2 m0.9		v2.3 d-0.0 m-2.0		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	151°51.0	166°12.9	-7°42.1	256°55.2	-22°19.3	281°04.6	-17°21.5	234°31.3	-22°23.2
1	166°53.5	181°12.5	-7°40.9	271°56.0	-22°19.5	296°06.9	-17°21.6	249°33.6	-22°23.2
2	181°55.9	196°12.1	-7°39.7	286°56.9	-22°19.7	311°09.3	-17°21.6	264°35.8	-22°23.2
3	196°58.4	211°11.6	-7°38.5	301°57.8	-22°19.9	326°11.6	-17°21.6	279°38.1	-22°23.2
4	212°00.9	226°11.2	-7°37.2	316°58.6	-22°20.1	341°13.9	-17°21.6	294°40.3	-22°23.2
5	227°03.3	241°10.7	-7°36.0	331°59.5	-22°20.3	356°16.3	-17°21.6	309°42.6	-22°23.2
6	242°05.8	256°10.3	-7°34.8	347°00.3	-22°20.5	11°18.6	-17°21.7	324°44.8	-22°23.2
7	257°08.2	271°09.9	-7°33.6	2°01.2	-22°20.7	26°21.0	-17°21.7	339°47.1	-22°23.2
8	272°10.7	286°09.4	-7°32.4	17°02.1	-22°20.8	41°23.3	-17°21.7	354°49.3	-22°23.2
9	287°13.2	301°09.0	-7°31.1	32°02.9	-22°21.0	56°25.7	-17°21.7	9°51.6	-22°23.1
10	302°15.6	316°08.6	-7°29.9	47°03.8	-22°21.2	71°28.0	-17°21.8	24°53.8	-22°23.1
11	317°18.1	331°08.1	-7°28.7	62°04.6	-22°21.4	86°30.4	-17°21.8	39°56.0	-22°23.1
12	332°20.6	346°07.7	-7°27.5	77°05.5	-22°21.6	101°32.7	-17°21.8	54°58.3	-22°23.1
13	347°23.0	1°07.3	-7°26.2	92°06.4	-22°21.8	116°35.1	-17°21.8	70°00.5	-22°23.1
14	2°25.5	16°06.8	-7°25.0	107°07.2	-22°22.0	131°37.4	-17°21.8	85°02.8	-22°23.1
15	17°28.0	31°06.4	-7°23.8	122°08.1	-22°22.1	146°39.8	-17°21.9	100°05.0	-22°23.1
16	32°30.4	46°06.0	-7°22.6	137°08.9	-22°22.3	161°42.1	-17°21.9	115°07.3	-22°23.1
17	47°32.9	61°05.5	-7°21.3	152°09.8	-22°22.5	176°44.5	-17°21.9	130°09.5	-22°23.1
18	62°35.4	76°05.1	-7°20.1	167°10.7	-22°22.7	191°46.8	-17°21.9	145°11.8	-22°23.1
19	77°37.8	91°04.7	-7°18.9	182°11.5	-22°22.9	206°49.2	-17°22.0	160°14.0	-22°23.0
20	92°40.3	106°04.2	-7°17.7	197°12.4	-22°23.1	221°51.5	-17°22.0	175°16.3	-22°23.0
21	107°42.7	121°03.8	-7°16.4	212°13.2	-22°23.3	236°53.9	-17°22.0	190°18.5	-22°23.0
22	122°45.2	136°03.4	-7°15.2	227°14.1	-22°23.4	251°56.2	-17°22.0	205°20.7	-22°23.0
23	137°47.7	151°03.0	-7°14.0	242°15.0	-22°23.6	266°58.6	-17°22.0	220°23.0	-22°23.0
Mer.pass.:13:50		v-0.4 d1.2 m-3.8		v0.9 d-0.2 m0.9		v2.3 d-0.0 m-2.0		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	152°50.1	166°02.5	-7°12.8	257°15.8	-22°23.8	282°00.9	-17°22.1	235°25.2	-22°23.0
1	167°52.6	181°02.1	-7°11.5	272°16.7	-22°24.0	297°03.3	-17°22.1	250°27.5	-22°23.0
2	182°55.1	196°01.7	-7°10.3	287°17.5	-22°24.2	312°05.6	-17°22.1	265°29.7	-22°23.0
3	197°57.5	211°01.2	-7°09.1	302°18.4	-22°24.4	327°08.0	-17°22.1	280°32.0	-22°23.0
4	212°60.0	226°00.8	-7°07.8	317°19.2	-22°24.6	342°10.3	-17°22.1	295°34.2	-22°23.0
5	228°02.5	241°00.4	-7°06.6	332°20.1	-22°24.7	357°12.7	-17°22.2	310°36.5	-22°22.9
6	243°04.9	255°59.9	-7°05.4	347°21.0	-22°24.9	12°15.0	-17°22.2	325°38.7	-22°22.9
7	258°07.4	270°59.5	-7°04.2	2°21.8	-22°25.1	27°17.4	-17°22.2	340°41.0	-22°22.9
8	273°09.8	285°59.1	-7°02.9	17°22.7	-22°25.3	42°19.7	-17°22.2	355°43.2	-22°22.9
9	288°12.3	300°58.7	-7°01.7	32°23.5	-22°25.5	57°22.1	-17°22.2	10°45.5	-22°22.9
10	303°14.8	315°58.2	-7°00.5	47°24.4	-22°25.6	72°24.4	-17°22.3	25°47.7	-22°22.9
11	318°17.2	330°57.8	-6°59.2	62°25.3	-22°25.8	87°26.8	-17°22.3	40°50.0	-22°22.9
12	333°19.7	345°57.4	-6°58.0	77°26.1	-22°26.0	102°29.2	-17°22.3	55°52.2	-22°22.9
13	348°22.2	0°57.0	-6°56.8	92°27.0	-22°26.2	117°31.5	-17°22.3	70°54.5	-22°22.9
14	3°24.6	15°56.5	-6°55.5	107°27.8	-22°26.4	132°33.9	-17°22.4	85°56.7	-22°22.8
15	18°27.1	30°56.1	-6°54.3	122°28.7	-22°26.5	147°36.2	-17°22.4	100°59.0	-22°22.8
16	33°29.6	45°55.7	-6°53.1	137°29.6	-22°26.7	162°38.6	-17°22.4	116°01.2	-22°22.8
17	48°32.0	60°55.3	-6°51.8	152°30.4	-22°26.9	177°40.9	-17°22.4	131°03.5	-22°22.8
18	63°34.5	75°54.8	-6°50.6	167°31.3	-22°27.1	192°43.3	-17°22.4	146°05.7	-22°22.8
19	78°37.0	90°54.4	-6°49.4	182°32.1	-22°27.3	207°45.6	-17°22.5	161°08.0	-22°22.8
20	93°39.4	105°54.0	-6°48.1	197°33.0	-22°27.4	222°48.0	-17°22.5	176°10.2	-22°22.8
21	108°41.9	120°53.6	-6°46.9	212°33.9	-22°27.6	237°50.4	-17°22.5	191°12.5	-22°22.8
22	123°44.3	135°53.1	-6°45.7	227°34.7	-22°27.8	252°52.7	-17°22.5	206°14.7	-22°22.8
23	138°46.8	150°52.7	-6°44.4	242°35.6	-22°28.0	267°55.1	-17°22.5	221°17.0	-22°22.8
Mer.pass.:13:46		v-0.4 d1.2 m-3.8		v0.9 d-0.2 m0.9		v2.4 d-0.0 m-2.0		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.4
Ankaa	353°12.9	-42°12.8
Schedar	349°37.3	56°38.2
Diphda	348°52.9	-17°53.5
Achernar	335°24.8	-57°09.1
Hamal	327°57.3	23°32.8
Polaris	316°29.2	89°20.6
Akamar	315°16.1	-40°14.4
Menkar	314°11.8	4°09.4
Mirfak	308°35.8	49°55.5
Aldebaran	290°45.7	16°32.5
Rigel	281°08.9	-8°11.2
Capella	280°29.6	46°01.0
Bellatrix	278°28.5	6°21.7
Elnath	278°08.5	28°37.2
Alnilam	275°43.0	-1°11.7
Betelgeuse	270°57.7	7°24.3
Canopus	263°54.4	-52°42.8
Sirius	258°30.6	-16°44.6
Adara	255°09.8	-29°00.2
Procyon	244°56.1	5°10.6
Pollux	243°23.5	27°58.8
Avior	234°16.1	-59°34.3
Suhail	222°49.7	-43°30.5
Miaplacidus	221°38.1	-69°47.6
Alphard	217°52.6	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.1
Denebola	182°30.1	14°28.2
Gienah	175°48.7	-17°38.5
Acrux	173°05.1	-63°11.8
Gacrux	171°56.8	-57°12.7
Alioth	166°17.6	55°51.5
Spica	158°27.7	-11°15.3
Alcaid	152°56.2	49°13.2
Hadar	148°43.0	-60°27.3
Menkent	148°03.6	-36°27.3
Arcturus	145°52.5	19°05.5
Rigil Kent.	139°47.1	-60°54.2
Zubenelg.	137°01.8	-16°06.9
Kochab	137°19.8	74°04.7
Alphecca	126°08.3	26°39.2
Antares	112°22.4	-26°28.1
Atria	107°21.5	-69°03.1
Sabik	102°09.0	-15°44.7
Shaula	96°17.8	-37°06.7
Rasalhague	96°03.7	12°32.8
Etamin	90°44.9	51°29.1
Kaus Aust.	83°39.8	-34°22.3
Vega	80°37.1	38°47.9
Nunki	75°54.6	-26°16.3
Altair	62°05.5	8°54.9
Peacock	53°14.8	-56°40.4
Deneb	49°29.7	45°20.6
Enif	33°44.3	9°57.4
Alnair	27°40.3	-46°52.4
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.7	28°10.8
Markab	13°35.5	15°18.0

2018/2/2	**SHA**	**Mer.pass**
Venus	15°31.7	12:55
Mars	105°42.7	06:53
Jupiter	129°16.6	05:19
Saturn	82°45.7	08:24

2018/2/2	**SHA**	**Mer.pass**
Venus	14°21.9	12:56
Mars	105°04.2	06:52
Jupiter	129°13.6	05:15
Saturn	82°40.4	08:21

2018/2/2	**SHA**	**Mer.pass**
Venus	13°12.4	12:56
Mars	104°25.7	06:51
Jupiter	129°10.8	05:11
Saturn	82°35.1	08:17

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°35.2	-10°39.3	118°36.7	11.6	7°33.5	10.6	57.5
1	191°35.2	-10°38.4	133°07.3	11.6	7°44.1	10.6	57.5
2	206°35.3	-10°37.5	147°37.8	11.5	7°54.7	10.6	57.5
3	221°35.4	-10°36.6	162°08.3	11.5	8°05.3	10.5	57.5
4	236°35.4	-10°35.7	176°38.7	11.4	8°15.8	10.5	57.6
5	251°35.5	-10°34.7	191°09.1	11.4	8°26.3	10.5	57.6
6	266°35.6	-10°33.8	205°39.4	11.3	8°36.7	10.4	57.6
7	281°35.7	-10°32.9	220°09.7	11.2	8°47.2	10.4	57.6
8	296°35.7	-10°32.0	234°39.9	11.2	8°57.6	10.4	57.6
9	311°35.8	-10°31.1	249°10.1	11.1	9°07.9	10.3	57.7
10	326°35.9	-10°30.2	263°40.2	11.1	9°18.2	10.3	57.7
11	341°36.0	-10°29.3	278°10.3	11.0	9°28.5	10.2	57.7
12	356°36.0	-10°28.4	292°40.3	11.0	9°38.7	10.2	57.7
13	11°36.1	-10°27.5	307°10.2	10.9	9°48.9	10.2	57.8
14	26°36.2	-10°26.6	321°40.1	10.9	9°59.0	10.1	57.8
15	41°36.3	-10°25.7	336°09.9	10.8	10°09.1	10.1	57.8
16	56°36.3	-10°24.8	350°39.7	10.7	10°19.2	10.0	57.8
17	71°36.4	-10°23.9	5°09.4	10.7	10°29.2	10.0	57.9
18	86°36.5	-10°23.0	19°39.1	10.6	10°39.1	9.9	57.9
19	101°36.6	-10°22.1	34°08.7	10.6	10°49.0	9.9	57.9
20	116°36.6	-10°21.2	48°38.2	10.5	10°58.9	9.8	57.9
21	131°36.7	-10°20.2	63°07.6	10.4	11°08.7	9.8	57.9
22	146°36.8	-10°19.3	77°37.1	10.4	11°18.4	9.7	58.0
23	161°36.9	-10°18.4	92°06.4	10.3	11°28.1	9.7	58.0
	SD.=16.2	d=0.9	S.D.=15.7				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°36.9	-10°17.5	106°35.7	10.2	11°37.7	9.6	58.0
1	191°37.0	-10°16.6	121°04.9	10.2	11°47.3	9.6	58.0
2	206°37.1	-10°15.7	135°34.0	10.1	11°56.8	9.5	58.1
3	221°37.2	-10°14.8	150°03.1	10.1	12°06.3	9.4	58.1
4	236°37.2	-10°13.9	164°32.2	10.0	12°15.7	9.4	58.1
5	251°37.3	-10°13.0	179°01.1	9.9	12°25.1	9.3	58.1
6	266°37.4	-10°12.1	193°30.0	9.9	12°34.3	9.3	58.2
7	281°37.5	-10°11.1	207°58.8	9.8	12°43.6	9.2	58.2
8	296°37.6	-10°10.2	222°27.6	9.7	12°52.7	9.1	58.2
9	311°37.6	-10°09.3	236°56.3	9.7	13°01.8	9.1	58.2
10	326°37.7	-10°08.4	251°24.9	9.6	13°10.8	9.0	58.2
11	341°37.8	-10°07.5	265°53.5	9.5	13°19.8	8.9	58.3
12	356°37.9	-10°06.6	280°22.0	9.5	13°28.7	8.9	58.3
13	11°38.0	-10°05.7	294°50.4	9.4	13°37.5	8.8	58.3
14	26°38.0	-10°04.8	309°18.7	9.3	13°46.3	8.7	58.3
15	41°38.1	-10°03.8	323°47.0	9.3	13°54.9	8.6	58.4
16	56°38.2	-10°02.9	338°15.2	9.2	14°03.6	8.6	58.4
17	71°38.3	-10°02.0	352°43.4	9.1	14°12.1	8.5	58.4
18	86°38.4	-10°01.1	7°11.5	9.0	14°20.5	8.4	58.4
19	101°38.5	-10°00.2	21°39.5	9.0	14°28.9	8.3	58.5
20	116°38.5	-9°59.3	36°07.4	8.9	14°37.2	8.3	58.5
21	131°38.6	-9°58.4	50°35.3	8.8	14°45.5	8.2	58.5
22	146°38.7	-9°57.4	65°03.1	8.8	14°53.6	8.1	58.5
23	161°38.8	-9°56.5	79°30.8	8.7	15°01.7	8.0	58.6
	SD.=16.2	d=0.9	S.D.=15.8				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°38.9	-9°55.6	93°58.5	8.6	15°09.7	7.9	58.6
1	191°39.0	-9°54.7	108°26.0	8.5	15°17.6	7.9	58.6
2	206°39.0	-9°53.8	122°53.6	8.5	15°25.4	7.8	58.6
3	221°39.1	-9°52.9	137°21.0	8.4	15°33.1	7.7	58.6
4	236°39.2	-9°51.9	151°48.4	8.3	15°40.8	7.6	58.7
5	251°39.3	-9°51.0	166°15.7	8.3	15°48.3	7.5	58.7
6	266°39.4	-9°50.1	180°42.9	8.2	15°55.8	7.4	58.7
7	281°39.5	-9°49.2	195°10.1	8.1	16°03.2	7.3	58.7
8	296°39.6	-9°48.3	209°37.1	8.1	16°10.5	7.2	58.8
9	311°39.6	-9°47.4	224°04.2	8.0	16°17.6	7.2	58.8
10	326°39.7	-9°46.4	238°31.1	7.9	16°24.8	7.1	58.8
11	341°39.8	-9°45.5	252°58.0	7.8	16°31.8	7.0	58.8
12	356°39.9	-9°44.6	267°24.8	7.8	16°38.7	6.9	58.8
13	11°40.0	-9°43.7	281°51.5	7.7	16°45.5	6.8	58.9
14	26°40.1	-9°42.8	296°18.2	7.6	16°52.2	6.7	58.9
15	41°40.2	-9°41.8	310°44.8	7.6	16°58.8	6.6	58.9
16	56°40.3	-9°40.9	325°11.3	7.5	17°05.4	6.5	58.9
17	71°40.3	-9°40.0	339°37.8	7.4	17°11.8	6.4	59.0
18	86°40.4	-9°39.1	354°04.1	7.4	17°18.1	6.3	59.0
19	101°40.5	-9°38.2	8°30.5	7.3	17°24.3	6.2	59.0
20	116°40.6	-9°37.2	22°56.7	7.2	17°30.4	6.1	59.0
21	131°40.7	-9°36.3	37°22.9	7.1	17°36.4	6.0	59.1
22	146°40.8	-9°35.4	51°49.0	7.1	17°42.3	5.8	59.1
23	161°40.9	-9°34.5	66°15.1	7.0	17°48.1	5.7	59.1
	SD.=16.2	d=0.9	S.D.=16.0				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:44	07:02	08:15	16:14	17:27	18:46
70	05:45	06:56	08:00	16:28	17:33	18:44
68	05:46	06:51	07:49	16:39	17:38	18:43
66	05:47	06:46	07:40	16:49	17:42	18:42
64	05:48	06:43	07:32	16:57	17:46	18:41
62	05:48	06:39	07:25	17:03	17:49	18:40
60	05:48	06:36	07:19	17:09	17:52	18:40
58	05:48	06:34	07:14	17:14	17:55	18:40
56	05:48	06:31	07:09	17:19	17:57	18:40
54	05:48	06:29	07:05	17:23	17:59	18:40
52	05:48	06:27	07:01	17:27	18:01	18:40
50	05:47	06:25	06:58	17:30	18:03	18:41
45	05:46	06:20	06:50	17:38	18:07	18:41
40	05:45	06:16	06:44	17:44	18:11	18:43
35	05:43	06:13	06:38	17:49	18:15	18:44
30	05:41	06:09	06:33	17:54	18:18	18:46
20	05:37	06:03	06:25	18:02	18:25	18:50
10	05:31	05:56	06:17	18:10	18:31	18:56
0	05:25	05:49	06:10	18:17	18:38	19:02
-10	05:16	05:41	06:03	18:24	18:45	19:10
-20	05:06	05:32	05:55	18:32	18:54	19:21
-30	04:52	05:21	05:46	18:41	19:05	19:34
-35	04:43	05:14	05:40	18:46	19:12	19:43
-40	04:32	05:06	05:34	18:52	19:20	19:54
-45	04:19	04:56	05:27	18:59	19:30	20:07
-50	04:02	04:44	05:19	19:07	19:42	20:24
-52	03:53	04:38	05:15	19:11	19:47	20:32
-54	03:44	04:32	05:10	19:16	19:54	20:41
-56	03:33	04:25	05:05	19:20	20:01	20:52
-58	03:20	04:16	04:60	19:26	20:09	21:05
-60	03:04	04:07	04:54	19:32	20:18	21:20

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	08:27	08:14	07:53	–:–	01:36	03:47
70	08:40	08:36	08:33	–:–	01:15	03:08
68	08:51	08:54	09:01	–:–	00:58	02:41
66	09:00	09:09	09:22	–:–	00:45	02:21
64	09:08	09:21	09:39	–:–	00:34	02:05
62	09:14	09:31	09:53	–:–	00:25	01:52
60	09:20	09:40	10:05	–:–	00:17	01:40
58	09:25	09:47	10:15	–:–	00:10	01:30
56	09:30	09:54	10:24	–:–	00:04	01:22
54	09:34	10:00	10:32	23:58	–:–	01:14
52	09:37	10:06	10:39	23:53	–:–	01:08
50	09:41	10:11	10:46	23:49	–:–	01:01
45	09:48	10:22	10:60	23:39	–:–	00:48
40	09:54	10:31	11:12	23:31	–:–	00:38
35	09:60	10:38	11:22	23:25	–:–	00:28
30	10:04	10:45	11:30	23:19	–:–	00:20
20	10:13	10:57	11:46	23:08	–:–	00:06
10	10:20	11:08	11:59	22:59	23:54	–:–
0	10:27	11:18	12:11	22:51	23:43	–:–
-10	10:34	11:28	12:24	22:42	23:32	–:–
-20	10:41	11:38	12:37	22:33	23:20	–:–
-30	10:50	11:51	12:53	22:23	23:06	23:53
-35	10:55	11:58	13:02	22:17	22:58	23:44
-40	11:00	12:06	13:12	22:10	22:49	23:33
-45	11:07	12:16	13:25	22:03	22:38	23:20
-50	11:15	12:27	13:40	21:53	22:26	23:04
-52	11:18	12:33	13:47	21:49	22:20	22:57
-54	11:22	12:39	13:54	21:44	22:13	22:49
-56	11:27	12:45	14:03	21:39	22:06	22:39
-58	11:32	12:53	14:13	21:33	21:58	22:29
-60	11:38	13:01	14:24	21:27	21:49	22:17

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
21	13:39	13:36	12:13	16:38	04:13	6(30%)
22	13:32	13:28	12:13	17:30	05:04	7(41%)
23	13:24	13:20	12:13	18:24	05:57	8(52%)

February 24, 25 ,26 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	153°49.3	165°52.3	-6°43.2	257°36.4	-22°28.2	282°57.4	-17°22.5	236°19.2	-22°22.7
1	168°51.7	180°51.9	-6°42.0	272°37.3	-22°28.3	297°59.8	-17°22.6	251°21.5	-22°22.7
2	183°54.2	195°51.5	-6°40.7	287°38.2	-22°28.5	313°02.2	-17°22.6	266°23.7	-22°22.7
3	198°56.7	210°51.0	-6°39.5	302°39.0	-22°28.7	328°04.5	-17°22.6	281°26.0	-22°22.7
4	213°59.1	225°50.6	-6°38.3	317°39.9	-22°28.9	343°06.9	-17°22.6	296°28.2	-22°22.7
5	229°01.6	240°50.2	-6°37.0	332°40.8	-22°29.0	358°09.2	-17°22.6	311°30.5	-22°22.7
6	244°04.1	255°49.8	-6°35.8	347°41.6	-22°29.2	13°11.6	-17°22.7	326°32.7	-22°22.7
7	259°06.5	270°49.3	-6°34.6	2°42.5	-22°29.4	28°14.0	-17°22.7	341°35.0	-22°22.7
8	274°09.0	285°48.9	-6°33.3	17°43.3	-22°29.6	43°16.3	-17°22.7	356°37.2	-22°22.7
9	289°11.5	300°48.5	-6°32.1	32°44.2	-22°29.8	58°18.7	-17°22.7	11°39.5	-22°22.7
10	304°13.9	315°48.1	-6°30.8	47°45.1	-22°29.9	73°21.0	-17°22.7	26°41.7	-22°22.6
11	319°16.4	330°47.7	-6°29.6	62°45.9	-22°30.1	88°23.4	-17°22.8	41°44.0	-22°22.6
12	334°18.8	345°47.3	-6°28.4	77°46.8	-22°30.3	103°25.8	-17°22.8	56°46.2	-22°22.6
13	349°21.3	0°46.8	-6°27.1	92°47.6	-22°30.5	118°28.1	-17°22.8	71°48.5	-22°22.6
14	4°23.8	15°46.4	-6°25.9	107°48.5	-22°30.6	133°30.5	-17°22.8	86°50.7	-22°22.6
15	19°26.2	30°46.0	-6°24.7	122°49.4	-22°30.8	148°32.9	-17°22.8	101°53.0	-22°22.6
16	34°28.7	45°45.6	-6°23.4	137°50.2	-22°31.0	163°35.2	-17°22.8	116°55.2	-22°22.6
17	49°31.2	60°45.2	-6°22.2	152°51.1	-22°31.1	178°37.6	-17°22.9	131°57.5	-22°22.6
18	64°33.6	75°44.7	-6°20.9	167°51.9	-22°31.3	193°40.0	-17°22.9	146°59.7	-22°22.6
19	79°36.1	90°44.3	-6°19.7	182°52.8	-22°31.5	208°42.3	-17°22.9	162°02.0	-22°22.5
20	94°38.6	105°43.9	-6°18.5	197°53.7	-22°31.7	223°44.7	-17°22.9	177°04.2	-22°22.5
21	109°41.0	120°43.5	-6°17.2	212°54.5	-22°31.8	238°47.0	-17°22.9	192°06.5	-22°22.5
22	124°43.5	135°43.1	-6°16.0	227°55.4	-22°32.0	253°49.4	-17°23.0	207°08.8	-22°22.5
23	139°46.0	150°42.7	-6°14.7	242°56.2	-22°32.2	268°51.8	-17°23.0	222°11.0	-22°22.5
Mer.pass.:13:42		v-0.4 d1.2 m-3.8		v0.9 d-0.2 m0.9		v2.4 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	154°48.4	165°42.2	-6°13.5	257°57.1	-22°32.4	283°54.1	-17°23.0	237°13.3	-22°22.5
1	169°50.9	180°41.8	-6°12.2	272°58.0	-22°32.5	298°56.5	-17°23.0	252°15.5	-22°22.5
2	184°53.3	195°41.4	-6°11.0	287°58.8	-22°32.7	313°58.9	-17°23.0	267°17.8	-22°22.5
3	199°55.8	210°41.0	-6°09.8	302°59.7	-22°32.9	329°01.2	-17°23.0	282°20.0	-22°22.5
4	214°58.3	225°40.6	-6°08.5	318°00.5	-22°33.0	344°03.6	-17°23.1	297°22.3	-22°22.5
5	230°00.7	240°40.2	-6°07.3	333°01.4	-22°33.2	359°06.0	-17°23.1	312°24.5	-22°22.4
6	245°03.2	255°39.8	-6°06.0	348°02.3	-22°33.4	14°08.4	-17°23.1	327°26.8	-22°22.4
7	260°05.7	270°39.3	-6°04.8	3°03.1	-22°33.6	29°10.7	-17°23.1	342°29.0	-22°22.4
8	275°08.1	285°38.9	-6°03.5	18°04.0	-22°33.7	44°13.1	-17°23.1	357°31.3	-22°22.4
9	290°10.6	300°38.5	-6°02.3	33°04.9	-22°33.9	59°15.5	-17°23.1	12°33.5	-22°22.4
10	305°13.1	315°38.1	-6°01.1	48°05.7	-22°34.1	74°17.8	-17°23.2	27°35.8	-22°22.4
11	320°15.5	330°37.7	-5°59.8	63°06.6	-22°34.2	89°20.2	-17°23.2	42°38.1	-22°22.4
12	335°18.0	345°37.3	-5°58.6	78°07.4	-22°34.4	104°22.6	-17°23.2	57°40.3	-22°22.4
13	350°20.4	0°36.9	-5°57.3	93°08.3	-22°34.6	119°24.9	-17°23.2	72°42.6	-22°22.4
14	5°22.9	15°36.5	-5°56.1	108°09.2	-22°34.7	134°27.3	-17°23.2	87°44.8	-22°22.4
15	20°25.4	30°36.0	-5°54.8	123°10.0	-22°34.9	149°29.7	-17°23.2	102°47.1	-22°22.3
16	35°27.8	45°35.6	-5°53.6	138°10.9	-22°35.1	164°32.1	-17°23.3	117°49.3	-22°22.3
17	50°30.3	60°35.2	-5°52.3	153°11.7	-22°35.2	179°34.4	-17°23.3	132°51.6	-22°22.3
18	65°32.8	75°34.8	-5°51.1	168°12.6	-22°35.4	194°36.8	-17°23.3	147°53.8	-22°22.3
19	80°35.2	90°34.4	-5°49.8	183°13.5	-22°35.6	209°39.2	-17°23.3	162°56.1	-22°22.3
20	95°37.7	105°34.0	-5°48.6	198°14.3	-22°35.7	224°41.5	-17°23.3	177°58.4	-22°22.3
21	110°40.2	120°33.6	-5°47.3	213°15.2	-22°35.9	239°43.9	-17°23.3	193°00.6	-22°22.3
22	125°42.6	135°33.2	-5°46.1	228°16.1	-22°36.1	254°46.3	-17°23.3	208°02.9	-22°22.3
23	140°45.1	150°32.8	-5°44.8	243°16.9	-22°36.2	269°48.7	-17°23.4	223°05.1	-22°22.3
Mer.pass.:13:38		v-0.4 d1.2 m-3.8		v0.9 d-0.2 m0.9		v2.4 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	155°47.6	165°32.4	-5°43.6	258°17.8	-22°36.4	284°51.0	-17°23.4	238°07.4	-22°22.2
1	170°50.0	180°31.9	-5°42.3	273°18.6	-22°36.6	299°53.4	-17°23.4	253°09.6	-22°22.2
2	185°52.5	195°31.5	-5°41.1	288°19.5	-22°36.7	314°55.8	-17°23.4	268°11.9	-22°22.2
3	200°54.9	210°31.1	-5°39.8	303°20.4	-22°36.9	329°58.2	-17°23.4	283°14.2	-22°22.2
4	215°57.4	225°30.7	-5°38.6	318°21.2	-22°37.1	345°00.5	-17°23.4	298°16.4	-22°22.2
5	230°59.9	240°30.3	-5°37.4	333°22.1	-22°37.2	0°02.9	-17°23.5	313°18.7	-22°22.2
6	246°02.3	255°29.9	-5°36.1	348°22.9	-22°37.4	15°05.3	-17°23.5	328°20.9	-22°22.2
7	261°04.8	270°29.5	-5°34.9	3°23.8	-22°37.6	30°07.7	-17°23.5	343°23.2	-22°22.2
8	276°07.3	285°29.1	-5°33.6	18°24.7	-22°37.7	45°10.0	-17°23.5	358°25.4	-22°22.2
9	291°09.7	300°28.7	-5°32.3	33°25.5	-22°37.9	60°12.4	-17°23.5	13°27.7	-22°22.2
10	306°12.2	315°28.3	-5°31.1	48°26.4	-22°38.1	75°14.8	-17°23.5	28°30.0	-22°22.1
11	321°14.7	330°27.9	-5°29.8	63°27.3	-22°38.2	90°17.2	-17°23.5	43°32.2	-22°22.1
12	336°17.1	345°27.5	-5°28.6	78°28.1	-22°38.4	105°19.6	-17°23.6	58°34.5	-22°22.1
13	351°19.6	0°27.1	-5°27.3	93°29.0	-22°38.5	120°21.9	-17°23.6	73°36.7	-22°22.1
14	6°22.1	15°26.7	-5°26.1	108°29.8	-22°38.7	135°24.3	-17°23.6	88°39.0	-22°22.1
15	21°24.5	30°26.3	-5°24.8	123°30.7	-22°38.9	150°26.7	-17°23.6	103°41.3	-22°22.1
16	36°27.0	45°25.8	-5°23.6	138°31.6	-22°39.0	165°29.1	-17°23.6	118°43.5	-22°22.1
17	51°29.4	60°25.4	-5°22.3	153°32.4	-22°39.2	180°31.5	-17°23.6	133°45.8	-22°22.1
18	66°31.9	75°25.0	-5°21.1	168°33.3	-22°39.4	195°33.8	-17°23.6	148°48.0	-22°22.1
19	81°34.4	90°24.6	-5°19.8	183°34.2	-22°39.5	210°36.2	-17°23.7	163°50.3	-22°22.1
20	96°36.8	105°24.2	-5°18.6	198°35.0	-22°39.7	225°38.6	-17°23.7	178°52.6	-22°22.0
21	111°39.3	120°23.8	-5°17.3	213°35.9	-22°39.8	240°41.0	-17°23.7	193°54.8	-22°22.0
22	126°41.8	135°23.4	-5°16.1	228°36.7	-22°40.0	255°43.4	-17°23.7	208°57.1	-22°22.0
23	141°44.2	150°23.0	-5°14.8	243°37.6	-22°40.2	270°45.7	-17°23.7	223°59.3	-22°22.0
Mer.pass.:13:34		v-0.4 d1.2 m-3.8		v0.9 d-0.2 m0.9		v2.4 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°12.9	-42°12.7
Schedar	349°37.3	56°38.2
Diphda	348°52.9	-17°53.5
Achernar	335°24.8	-57°09.1
Hamal	327°57.3	23°32.7
Polaris	316°30.3	89°20.6
Akamar	315°16.1	-40°14.4
Menkar	314°11.8	4°09.4
Mirfak	308°35.8	49°55.5
Aldebaran	290°45.7	16°32.5
Rigel	281°08.9	-8°11.2
Capella	280°29.6	46°01.0
Bellatrix	278°28.5	6°21.7
Elnath	278°08.5	28°37.2
Alnilam	275°43.0	-1°11.7
Betelgeuse	270°57.7	7°24.3
Canopus	263°54.5	-52°42.8
Sirius	258°30.6	-16°44.6
Adara	255°09.8	-29°00.2
Procyon	244°56.1	5°10.6
Pollux	243°23.5	27°58.8
Avior	234°16.1	-59°34.3
Suhail	222°49.7	-43°30.6
Miaplacidus	221°38.1	-69°47.7
Alphard	217°52.6	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.1
Denebola	182°30.1	14°28.2
Gienah	175°48.7	-17°38.5
Acrux	173°05.1	-63°11.8
Gacrux	171°56.8	-57°12.7
Alioth	166°17.6	55°51.5
Spica	158°27.7	-11°15.3
Alcaid	152°56.1	49°13.2
Hadar	148°43.0	-60°27.3
Menkent	148°03.6	-36°27.3
Arcturus	145°52.5	19°05.5
Rigil Kent.	139°47.1	-60°54.2
Zubenelg.	137°01.8	-16°06.9
Kochab	137°19.8	74°04.7
Alphecca	126°08.3	26°39.2
Antares	112°22.4	-26°28.1
Atria	107°21.4	-69°03.1
Sabik	102°09.0	-15°44.7
Shaula	96°17.7	-37°06.7
Rasalhague	96°03.6	12°32.8
Etamin	90°44.9	51°29.0
Kaus Aust.	83°39.8	-34°22.3
Vega	80°37.1	38°47.9
Nunki	75°54.6	-26°16.3
Altair	62°05.5	8°54.9
Peacock	53°14.8	-56°40.4
Deneb	49°29.7	45°20.6
Enif	33°44.3	9°57.4
Alnair	27°40.3	-46°52.4
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.7	28°10.8
Markab	13°35.5	15°18.0

2018/2/2	**SHA**	**Mer.pass**
Venus	12°03.0	12:57
Mars	103°47.2	06:49
Jupiter	129°08.2	05:07
Saturn	82°29.9	08:13

2018/2/2	**SHA**	**Mer.pass**
Venus	10°53.8	12:58
Mars	103°08.7	06:48
Jupiter	129°05.7	05:04
Saturn	82°24.8	08:10

2018/2/2	**SHA**	**Mer.pass**
Venus	9°44.8	12:58
Mars	102°30.2	06:46
Jupiter	129°03.5	04:60
Saturn	82°19.8	08:06

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176°41.0	-9°33.6	80°41.0	6.9	17°53.8	5.6	59.1
1	191°41.1	-9°32.6	95°06.9	6.9	17°59.4	5.5	59.1
2	206°41.1	-9°31.7	109°32.8	6.8	18°04.9	5.4	59.2
3	221°41.2	-9°30.8	123°58.6	6.7	18°10.2	5.3	59.2
4	236°41.3	-9°29.9	138°24.3	6.7	18°15.5	5.2	59.2
5	251°41.4	-9°28.9	152°49.9	6.6	18°20.6	5.1	59.2
6	266°41.5	-9°28.0	167°15.5	6.6	18°25.6	5.0	59.2
7	281°41.6	-9°27.1	181°41.1	6.5	18°30.5	4.8	59.3
8	296°41.7	-9°26.2	196°06.5	6.4	18°35.3	4.7	59.3
9	311°41.8	-9°25.3	210°31.9	6.4	18°40.0	4.6	59.3
10	326°41.9	-9°24.3	224°57.3	6.3	18°44.5	4.5	59.3
11	341°42.0	-9°23.4	239°22.6	6.3	18°49.0	4.4	59.3
12	356°42.1	-9°22.5	253°47.8	6.2	18°53.3	4.3	59.4
13	11°42.2	-9°21.6	268°12.9	6.1	18°57.5	4.1	59.4
14	26°42.3	-9°20.6	282°38.0	6.1	19°01.5	4.0	59.4
15	41°42.4	-9°19.7	297°03.1	6.0	19°05.5	3.9	59.4
16	56°42.4	-9°18.8	311°28.1	6.0	19°09.3	3.8	59.4
17	71°42.5	-9°17.9	325°53.0	5.9	19°13.0	3.6	59.5
18	86°42.6	-9°16.9	340°17.9	5.9	19°16.6	3.5	59.5
19	101°42.7	-9°16.0	354°42.7	5.8	19°20.0	3.4	59.5
20	116°42.8	-9°15.1	9°07.5	5.8	19°23.3	3.3	59.5
21	131°42.9	-9°14.1	23°32.3	5.7	19°26.5	3.1	59.5
22	146°43.0	-9°13.2	37°56.9	5.7	19°29.6	3.0	59.6
23	161°43.1	-9°12.3	52°21.6	5.6	19°32.5	2.9	59.6
	SD.=16.2	d=0.9			S.D.=16.1		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°43.2	-9°11.4	66°46.1	5.6	19°35.3	2.7	59.6
1	191°43.3	-9°10.4	81°10.7	5.5	19°38.0	2.6	59.6
2	206°43.4	-9°09.5	95°35.2	5.5	19°40.6	2.5	59.6
3	221°43.5	-9°08.6	109°59.6	5.4	19°43.0	2.3	59.7
4	236°43.6	-9°07.6	124°24.0	5.4	19°45.3	2.2	59.7
5	251°43.7	-9°06.7	138°48.4	5.3	19°47.4	2.1	59.7
6	266°43.8	-9°05.8	153°12.7	5.3	19°49.4	1.9	59.7
7	281°43.9	-9°04.9	167°37.0	5.3	19°51.3	1.8	59.7
8	296°44.0	-9°03.9	182°01.2	5.2	19°53.1	1.7	59.7
9	311°44.1	-9°03.0	196°25.4	5.2	19°54.7	1.5	59.8
10	326°44.2	-9°02.1	210°49.6	5.1	19°56.2	1.4	59.8
11	341°44.3	-9°01.1	225°13.7	5.1	19°57.5	1.3	59.8
12	356°44.4	-9°00.2	239°37.8	5.1	19°58.7	1.1	59.8
13	11°44.5	-8°59.3	254°01.8	5.0	19°59.8	1.0	59.8
14	26°44.6	-8°58.4	268°25.9	5.0	20°00.7	0.9	59.8
15	41°44.7	-8°57.4	282°49.9	5.0	20°01.5	0.7	59.9
16	56°44.8	-8°56.5	297°13.9	5.0	20°02.1	0.6	59.9
17	71°44.9	-8°55.6	311°37.8	4.9	20°02.7	0.4	59.9
18	86°45.0	-8°54.6	326°01.7	4.9	20°03.0	0.3	59.9
19	101°45.1	-8°53.7	340°25.6	4.9	20°03.3	0.2	59.9
20	116°45.2	-8°52.8	354°49.5	4.9	20°03.4	0.0	59.9
21	131°45.3	-8°51.8	9°13.4	4.8	20°03.3	-0.1	59.9
22	146°45.4	-8°50.9	23°37.2	4.8	20°03.1	-0.3	60.0
23	161°45.5	-8°50.0	38°01.0	4.8	20°02.8	-0.4	60.0
	SD.=16.2	d=0.9			S.D.=16.3		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	176°45.6	-8°49.0	52°24.8	4.8	20°02.4	-0.5	60.0
1	191°45.7	-8°48.1	66°48.6	4.8	20°01.8	-0.7	60.0
2	206°45.8	-8°47.2	81°12.4	4.8	20°01.0	-0.8	60.0
3	221°45.9	-8°46.2	95°36.1	4.8	20°00.1	-1.0	60.0
4	236°46.0	-8°45.3	109°59.9	4.7	19°59.1	-1.1	60.0
5	251°46.1	-8°44.4	124°23.6	4.7	19°57.9	-1.2	60.0
6	266°46.2	-8°43.4	138°47.4	4.7	19°56.6	-1.4	60.1
7	281°46.3	-8°42.5	153°11.1	4.7	19°55.2	-1.5	60.1
8	296°46.4	-8°41.6	167°34.8	4.7	19°53.6	-1.7	60.1
9	311°46.6	-8°40.6	181°58.5	4.7	19°51.9	-1.8	60.1
10	326°46.7	-8°39.7	196°22.3	4.7	19°50.0	-1.9	60.1
11	341°46.8	-8°38.7	210°46.0	4.7	19°48.0	-2.1	60.1
12	356°46.9	-8°37.8	225°09.7	4.7	19°45.8	-2.2	60.1
13	11°47.0	-8°36.9	239°33.4	4.7	19°43.6	-2.4	60.1
14	26°47.1	-8°35.9	253°57.1	4.7	19°41.1	-2.5	60.1
15	41°47.2	-8°35.0	268°20.9	4.7	19°38.6	-2.6	60.1
16	56°47.3	-8°34.1	282°44.6	4.7	19°35.9	-2.8	60.2
17	71°47.4	-8°33.1	297°08.4	4.8	19°33.0	-2.9	60.2
18	86°47.5	-8°32.2	311°32.1	4.8	19°30.0	-3.1	60.2
19	101°47.6	-8°31.3	325°55.9	4.8	19°26.9	-3.2	60.2
20	116°47.7	-8°30.3	340°19.7	4.8	19°23.6	-3.3	60.2
21	131°47.8	-8°29.4	354°43.5	4.8	19°20.2	-3.5	60.2
22	146°47.9	-8°28.4	9°07.3	4.8	19°16.7	-3.6	60.2
23	161°48.0	-8°27.5	23°31.1	4.8	19°13.0	-3.7	60.2
	SD.=16.2	d=0.9			S.D.=16.4		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:30	06:48	07:58	16:30	17:41	18:59
70	05:33	06:43	07:46	16:42	17:45	18:56
68	05:35	06:39	07:36	16:51	17:49	18:53
66	05:37	06:36	07:28	16:59	17:52	18:51
64	05:38	06:33	07:21	17:06	17:55	18:50
62	05:39	06:30	07:16	17:12	17:57	18:48
60	05:40	06:28	07:10	17:17	17:59	18:47
58	05:41	06:26	07:06	17:21	18:01	18:47
56	05:41	06:24	07:02	17:25	18:03	18:46
54	05:41	06:22	06:58	17:29	18:05	18:46
52	05:42	06:21	06:55	17:32	18:06	18:45
50	05:42	06:19	06:52	17:35	18:08	18:45
45	05:41	06:15	06:45	17:42	18:11	18:45
40	05:41	06:12	06:39	17:47	18:15	18:46
35	05:40	06:09	06:35	17:52	18:17	18:47
30	05:38	06:06	06:30	17:56	18:20	18:48
20	05:35	06:01	06:23	18:04	18:26	18:51
10	05:30	05:55	06:16	18:10	18:31	18:56
0	05:24	05:49	06:10	18:16	18:37	19:02
-10	05:17	05:42	06:03	18:23	18:44	19:09
-20	05:07	05:34	05:56	18:30	18:52	19:18
-30	04:55	05:23	05:48	18:38	19:02	19:31
-35	04:46	05:17	05:43	18:42	19:08	19:39
-40	04:36	05:10	05:38	18:48	19:15	19:49
-45	04:24	05:01	05:31	18:54	19:24	20:01
-50	04:08	04:50	05:24	19:01	19:35	20:17
-52	04:00	04:44	05:20	19:05	19:40	20:24
-54	03:51	04:39	05:16	19:09	19:46	20:33
-56	03:41	04:32	05:12	19:13	19:53	20:43
-58	03:30	04:24	05:07	19:18	19:60	20:54
-60	03:15	04:16	05:02	19:23	20:08	21:08

	Moonrise			Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	–:–	–:–	–:–	–:–
70	08:30	08:31	09:36	05:07	07:09	08:11
68	09:14	09:45	10:48	04:24	05:56	06:58
66	09:44	10:22	11:25	03:55	05:19	06:21
64	10:06	10:48	11:51	03:33	04:52	05:55
62	10:24	11:09	12:12	03:16	04:32	05:34
60	10:39	11:26	12:28	03:01	04:15	05:17
58	10:52	11:40	12:42	02:49	04:01	05:03
56	11:03	11:52	12:54	02:38	03:49	04:51
54	11:12	12:03	13:05	02:29	03:39	04:40
52	11:21	12:12	13:14	02:20	03:29	04:31
50	11:29	12:21	13:23	02:13	03:21	04:22
45	11:45	12:39	13:41	01:57	03:03	04:04
40	11:59	12:53	13:55	01:44	02:49	03:50
35	12:11	13:06	14:07	01:33	02:36	03:37
30	12:21	13:17	14:18	01:23	02:26	03:26
20	12:38	13:36	14:37	01:06	02:07	03:08
10	12:54	13:52	14:53	00:52	01:51	02:51
0	13:08	14:07	15:08	00:38	01:36	02:36
-10	13:23	14:23	15:23	00:24	01:21	02:21
-20	13:38	14:39	15:39	00:10	01:05	02:04
-30	13:56	14:58	15:57	–:–	00:46	01:45
-35	14:06	15:09	16:08	–:–	00:36	01:34
-40	14:18	15:22	16:20	–:–	00:23	01:21
-45	14:33	15:37	16:35	–:–	00:09	01:06
-50	14:50	15:55	16:52	23:51	–:–	00:48
-52	14:58	16:04	17:01	23:43	–:–	00:39
-54	15:07	16:13	17:10	23:33	–:–	00:30
-56	15:17	16:24	17:21	23:23	–:–	00:19
-58	15:29	16:37	17:33	23:11	–:–	00:06
-60	15:43	16:52	17:46	22:57	23:52	–:–

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
24	13:16	13:12	12:13	19:22	06:53	9(63%)
25	13:07	13:02	12:13	20:21	07:51	10(74%)
26	12:57	12:52	12:12	21:21	08:51	11(84%)

February 27, 28 ,01 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	156°46.7	165°22.6	-5°13.6	258°38.5	-22°40.3	285°48.1	-17°23.7	239°01.6	-22°22.0
1	171°49.2	180°22.2	-5°12.3	273°39.3	-22°40.5	300°50.5	-17°23.7	254°03.9	-22°22.0
2	186°51.6	195°21.8	-5°11.0	288°40.2	-22°40.6	315°52.9	-17°23.8	269°06.1	-22°22.0
3	201°54.1	210°21.4	-5°09.8	303°41.1	-22°40.8	330°55.3	-17°23.8	284°08.4	-22°22.0
4	216°56.6	225°21.0	-5°08.5	318°41.9	-22°41.0	345°57.6	-17°23.8	299°10.6	-22°22.0
5	231°59.0	240°20.6	-5°07.3	333°42.8	-22°41.1	1°00.0	-17°23.8	314°12.9	-22°22.0
6	247°01.5	255°20.2	-5°06.0	348°43.6	-22°41.3	16°02.4	-17°23.8	329°15.2	-22°21.9
7	262°03.9	270°19.8	-5°04.8	3°44.5	-22°41.4	31°04.8	-17°23.8	344°17.4	-22°21.9
8	277°06.4	285°19.4	-5°03.5	18°45.4	-22°41.6	46°07.2	-17°23.8	359°19.7	-22°21.9
9	292°08.9	300°19.0	-5°02.3	33°46.2	-22°41.7	61°09.6	-17°23.8	14°21.9	-22°21.9
10	307°11.3	315°18.6	-5°01.0	48°47.1	-22°41.9	76°12.0	-17°23.9	29°24.2	-22°21.9
11	322°13.8	330°18.2	-4°59.7	63°48.0	-22°42.1	91°14.3	-17°23.9	44°26.5	-22°21.9
12	337°16.3	345°17.8	-4°58.5	78°48.8	-22°42.2	106°16.7	-17°23.9	59°28.7	-22°21.9
13	352°18.7	0°17.4	-4°57.2	93°49.7	-22°42.4	121°19.1	-17°23.9	74°31.0	-22°21.9
14	7°21.2	15°17.0	-4°56.0	108°50.6	-22°42.5	136°21.5	-17°23.9	89°33.2	-22°21.9
15	22°23.7	30°16.6	-4°54.7	123°51.4	-22°42.7	151°23.9	-17°23.9	104°35.5	-22°21.8
16	37°26.1	45°16.2	-4°53.5	138°52.3	-22°42.8	166°26.3	-17°23.9	119°37.8	-22°21.8
17	52°28.6	60°15.8	-4°52.2	153°53.1	-22°43.0	181°28.7	-17°23.9	134°40.0	-22°21.8
18	67°31.0	75°15.4	-4°50.9	168°54.0	-22°43.2	196°31.0	-17°24.0	149°42.3	-22°21.8
19	82°33.5	90°15.0	-4°49.7	183°54.9	-22°43.3	211°33.4	-17°24.0	164°44.6	-22°21.8
20	97°36.0	105°14.6	-4°48.4	198°55.7	-22°43.5	226°35.8	-17°24.0	179°46.8	-22°21.8
21	112°38.4	120°14.2	-4°47.2	213°56.6	-22°43.6	241°38.2	-17°24.0	194°49.1	-22°21.8
22	127°40.9	135°13.8	-4°45.9	228°57.5	-22°43.8	256°40.6	-17°24.0	209°51.3	-22°21.8
23	142°43.4	150°13.4	-4°44.6	243°58.3	-22°43.9	271°43.0	-17°24.0	224°53.6	-22°21.8
Mer.pass.:13:30		v-0.4 d1.3 m-3.8		v0.9 d-0.2 m0.8		v2.4 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	157°45.8	165°13.0	-4°43.4	258°59.2	-22°44.1	286°45.4	-17°24.0	239°55.9	-22°21.8
1	172°48.3	180°12.6	-4°42.1	274°00.0	-22°44.2	301°47.8	-17°24.0	254°58.1	-22°21.7
2	187°50.8	195°12.2	-4°40.9	289°00.9	-22°44.4	316°50.2	-17°24.1	270°00.4	-22°21.7
3	202°53.2	210°11.8	-4°39.6	304°01.8	-22°44.5	331°52.6	-17°24.1	285°02.7	-22°21.7
4	217°55.7	225°11.4	-4°38.3	319°02.6	-22°44.7	346°54.9	-17°24.1	300°04.9	-22°21.7
5	232°58.2	240°11.0	-4°37.1	334°03.5	-22°44.8	1°57.3	-17°24.1	315°07.2	-22°21.7
6	248°00.6	255°10.6	-4°35.8	349°04.4	-22°45.0	16°59.7	-17°24.1	330°09.5	-22°21.7
7	263°03.1	270°10.2	-4°34.6	4°05.2	-22°45.2	32°02.1	-17°24.1	345°11.7	-22°21.7
8	278°05.5	285°09.9	-4°33.3	19°06.1	-22°45.3	47°04.5	-17°24.1	0°14.0	-22°21.7
9	293°08.0	300°09.5	-4°32.0	34°07.0	-22°45.5	62°06.9	-17°24.1	15°16.3	-22°21.7
10	308°10.5	315°09.1	-4°30.8	49°07.8	-22°45.6	77°09.3	-17°24.1	30°18.5	-22°21.7
11	323°12.9	330°08.7	-4°29.5	64°08.7	-22°45.8	92°11.7	-17°24.2	45°20.8	-22°21.6
12	338°15.4	345°08.3	-4°28.2	79°09.6	-22°45.9	107°14.1	-17°24.2	60°23.0	-22°21.6
13	353°17.9	0°07.9	-4°27.0	94°10.4	-22°46.1	122°16.5	-17°24.2	75°25.3	-22°21.6
14	8°20.3	15°07.5	-4°25.7	109°11.3	-22°46.2	137°18.9	-17°24.2	90°27.6	-22°21.6
15	23°22.8	30°07.1	-4°24.5	124°12.1	-22°46.4	152°21.3	-17°24.2	105°29.8	-22°21.6
16	38°25.3	45°06.7	-4°23.2	139°13.0	-22°46.5	167°23.7	-17°24.2	120°32.1	-22°21.6
17	53°27.7	60°06.3	-4°21.9	154°13.9	-22°46.7	182°26.1	-17°24.2	135°34.4	-22°21.6
18	68°30.2	75°05.9	-4°20.7	169°14.7	-22°46.8	197°28.5	-17°24.2	150°36.6	-22°21.6
19	83°32.7	90°05.5	-4°19.4	184°15.6	-22°47.0	212°30.8	-17°24.2	165°38.9	-22°21.6
20	98°35.1	105°05.1	-4°18.1	199°16.5	-22°47.1	227°33.2	-17°24.2	180°41.2	-22°21.6
21	113°37.6	120°04.7	-4°16.9	214°17.3	-22°47.3	242°35.6	-17°24.3	195°43.4	-22°21.5
22	128°40.0	135°04.3	-4°15.6	229°18.2	-22°47.4	257°38.0	-17°24.3	210°45.7	-22°21.5
23	143°42.5	150°03.9	-4°14.3	244°19.1	-22°47.6	272°40.4	-17°24.3	225°48.0	-22°21.5
Mer.pass.:13:26		v-0.4 d1.3 m-3.8		v0.9 d-0.2 m0.8		v2.4 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	158°45.0	165°03.6	-4°13.1	259°19.9	-22°47.7	287°42.8	-17°24.3	240°50.2	-22°21.5
1	173°47.4	180°03.2	-4°11.8	274°20.8	-22°47.8	302°45.2	-17°24.3	255°52.5	-22°21.5
2	188°49.9	195°02.8	-4°10.6	289°21.7	-22°48.0	317°47.6	-17°24.3	270°54.8	-22°21.5
3	203°52.4	210°02.4	-4°09.3	304°22.5	-22°48.1	332°50.0	-17°24.3	285°57.0	-22°21.5
4	218°54.8	225°02.0	-4°08.0	319°23.4	-22°48.3	347°52.4	-17°24.3	300°59.3	-22°21.5
5	233°57.3	240°01.6	-4°06.8	334°24.2	-22°48.4	2°54.8	-17°24.3	316°01.6	-22°21.5
6	248°59.8	255°01.2	-4°05.5	349°25.1	-22°48.6	17°57.2	-17°24.3	331°03.8	-22°21.5
7	264°02.2	270°00.8	-4°04.2	4°26.0	-22°48.7	32°59.6	-17°24.3	346°06.1	-22°21.4
8	279°04.7	285°00.4	-4°03.0	19°26.8	-22°48.9	48°02.0	-17°24.4	1°08.4	-22°21.4
9	294°07.1	300°00.0	-4°01.7	34°27.7	-22°49.0	63°04.4	-17°24.4	16°10.6	-22°21.4
10	309°09.6	314°59.6	-4°00.4	49°28.6	-22°49.2	78°06.8	-17°24.4	31°12.9	-22°21.4
11	324°12.1	329°59.3	-3°59.2	64°29.4	-22°49.3	93°09.2	-17°24.4	46°15.2	-22°21.4
12	339°14.5	344°58.9	-3°57.9	79°30.3	-22°49.5	108°11.6	-17°24.4	61°17.5	-22°21.4
13	354°17.0	359°58.5	-3°56.6	94°31.2	-22°49.6	123°14.0	-17°24.4	76°19.7	-22°21.4
14	9°19.5	14°58.1	-3°55.4	109°32.0	-22°49.7	138°16.4	-17°24.4	91°22.0	-22°21.4
15	24°21.9	29°57.7	-3°54.1	124°32.9	-22°49.9	153°18.8	-17°24.4	106°24.3	-22°21.4
16	39°24.4	44°57.3	-3°52.8	139°33.8	-22°50.0	168°21.2	-17°24.4	121°26.5	-22°21.4
17	54°26.9	59°56.9	-3°51.5	154°34.6	-22°50.2	183°23.6	-17°24.4	136°28.8	-22°21.3
18	69°29.3	74°56.5	-3°50.3	169°35.5	-22°50.3	198°26.0	-17°24.4	151°31.1	-22°21.3
19	84°31.8	89°56.2	-3°49.0	184°36.4	-22°50.5	213°28.4	-17°24.5	166°33.3	-22°21.3
20	99°34.3	104°55.8	-3°47.7	199°37.2	-22°50.6	228°30.8	-17°24.5	181°35.6	-22°21.3
21	114°36.7	119°55.4	-3°46.5	214°38.1	-22°50.7	243°33.3	-17°24.5	196°37.9	-22°21.3
22	129°39.2	134°55.0	-3°45.2	229°39.0	-22°50.9	258°35.7	-17°24.5	211°40.1	-22°21.3
23	144°41.6	149°54.6	-3°43.9	244°39.8	-22°51.0	273°38.1	-17°24.5	226°42.4	-22°21.3
Mer.pass.:13:22		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.8		v2.4 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°12.9	-42°12.7
Schedar	349°37.3	56°38.2
Diphda	348°52.9	-17°53.5
Achernar	335°24.8	-57°09.1
Hamal	327°57.4	23°32.7
Polaris	316°31.6	89°20.6
Akamar	315°16.1	-40°14.4
Menkar	314°11.8	4°09.4
Mirfak	308°35.9	49°55.5
Aldebaran	290°45.7	16°32.5
Rigel	281°08.9	-8°11.2
Capella	280°29.6	46°01.0
Bellatrix	278°28.5	6°21.7
Elnath	278°08.5	28°37.2
Alnilam	275°43.0	-1°11.7
Betelgeuse	270°57.7	7°24.3
Canopus	263°54.5	-52°42.8
Sirius	258°30.6	-16°44.6
Adara	255°09.8	-29°00.2
Procyon	244°56.1	5°10.6
Pollux	243°23.5	27°58.8
Avior	234°16.2	-59°34.3
Suhail	222°49.7	-43°30.6
Miaplacidus	221°38.1	-69°47.7
Alphard	217°52.6	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.1
Denebola	182°30.0	14°28.2
Gienah	175°48.7	-17°38.6
Acrux	173°05.1	-63°11.8
Gacrux	171°56.8	-57°12.7
Alioth	166°17.5	55°51.6
Spica	158°27.6	-11°15.3
Alcaid	152°56.1	49°13.2
Hadar	148°42.9	-60°27.3
Menkent	148°03.6	-36°27.3
Arcturus	145°52.5	19°05.5
Rigil Kent.	139°47.0	-60°54.2
Zubenelg.	137°01.7	-16°06.9
Kochab	137°19.7	74°04.7
Alphecca	126°08.3	26°39.2
Antares	112°22.3	-26°28.1
Atria	107°21.3	-69°03.1
Sabik	102°08.9	-15°44.7
Shaula	96°17.7	-37°06.7
Rasalhague	96°03.6	12°32.8
Etamin	90°44.8	51°29.0
Kaus Aust.	83°39.8	-34°22.3
Vega	80°37.0	38°47.9
Nunki	75°54.6	-26°16.3
Altair	62°05.4	8°54.9
Peacock	53°14.8	-56°40.4
Deneb	49°29.7	45°20.6
Enif	33°44.3	9°57.4
Alnair	27°40.3	-46°52.4
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.6	28°10.7
Markab	13°35.5	15°18.0

2018/2/2	**SHA**	**Mer.pass**
Venus	8°35.9	12:59
Mars	101°51.8	06:45
Jupiter	129°01.4	04:56
Saturn	82°14.9	08:03

2018/2/2	**SHA**	**Mer.pass**
Venus	7°27.2	12:59
Mars	101°13.4	06:44
Jupiter	128°59.5	04:52
Saturn	82°10.0	07:59

2018/3/1	**SHA**	**Mer.pass**
Venus	6°18.6	13:00
Mars	100°35.0	06:42
Jupiter	128°57.9	04:48
Saturn	82°05.3	07:55

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°48.2	-8°26.6	37°55.0	4.9	19°09.2	-3.9	60.2
1	191°48.3	-8°25.6	52°18.9	4.9	19°05.3	-4.0	60.2
2	206°48.4	-8°24.7	66°42.7	4.9	19°01.2	-4.1	60.2
3	221°48.5	-8°23.7	81°06.7	4.9	18°57.0	-4.3	60.2
4	236°48.6	-8°22.8	95°30.6	5.0	18°52.7	-4.4	60.2
5	251°48.7	-8°21.9	109°54.6	5.0	18°48.2	-4.5	60.2
6	266°48.8	-8°20.9	124°18.6	5.0	18°43.6	-4.7	60.2
7	281°48.9	-8°20.0	138°42.6	5.0	18°38.8	-4.8	60.2
8	296°49.0	-8°19.0	153°06.6	5.1	18°33.9	-4.9	60.2
9	311°49.1	-8°18.1	167°30.7	5.1	18°28.9	-5.1	60.2
10	326°49.3	-8°17.2	181°54.9	5.1	18°23.8	-5.2	60.2
11	341°49.4	-8°16.2	196°19.0	5.2	18°18.5	-5.3	60.2
12	356°49.5	-8°15.3	210°43.2	5.2	18°13.2	-5.5	60.2
13	11°49.6	-8°14.3	225°07.4	5.2	18°07.6	-5.6	60.2
14	26°49.7	-8°13.4	239°31.7	5.3	18°02.0	-5.7	60.2
15	41°49.8	-8°12.5	253°56.0	5.3	17°56.2	-5.8	60.2
16	56°49.9	-8°11.5	268°20.3	5.4	17°50.3	-6.0	60.2
17	71°50.0	-8°10.6	282°44.7	5.4	17°44.3	-6.1	60.2
18	86°50.2	-8°09.6	297°09.1	5.4	17°38.2	-6.2	60.2
19	101°50.3	-8°08.7	311°33.6	5.5	17°31.9	-6.3	60.2
20	116°50.4	-8°07.8	325°58.1	5.5	17°25.5	-6.4	60.2
21	131°50.5	-8°06.8	340°22.6	5.6	17°19.0	-6.6	60.2
22	146°50.6	-8°05.9	354°47.2	5.6	17°12.4	-6.7	60.2
23	161°50.7	-8°04.9	9°11.9	5.7	17°05.7	-6.8	60.2
	SD.=16.2	d=0.9			S.D.=16.4		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	176°50.8	-8°04.0	23°36.6	5.7	16°58.8	-6.9	60.2
1	191°51.0	-8°03.0	38°01.3	5.8	16°51.8	-7.0	60.2
2	206°51.1	-8°02.1	52°26.1	5.8	16°44.7	-7.1	60.2
3	221°51.2	-8°01.1	66°50.9	5.9	16°37.5	-7.3	60.2
4	236°51.3	-8°00.2	81°15.8	5.9	16°30.2	-7.4	60.2
5	251°51.4	-7°59.3	95°40.8	6.0	16°22.8	-7.5	60.2
6	266°51.5	-7°58.3	110°05.8	6.0	16°15.3	-7.6	60.2
7	281°51.7	-7°57.4	124°30.8	6.1	16°07.6	-7.7	60.2
8	296°51.8	-7°56.4	138°55.9	6.1	15°59.9	-7.8	60.2
9	311°51.9	-7°55.5	153°21.1	6.2	15°52.0	-7.9	60.2
10	326°52.0	-7°54.5	167°46.3	6.2	15°44.1	-8.0	60.2
11	341°52.1	-7°53.6	182°11.6	6.3	15°36.0	-8.1	60.2
12	356°52.2	-7°52.6	196°36.9	6.4	15°27.9	-8.2	60.2
13	11°52.4	-7°51.7	211°02.3	6.4	15°19.6	-8.3	60.1
14	26°52.5	-7°50.7	225°27.7	6.5	15°11.2	-8.4	60.1
15	41°52.6	-7°49.8	239°53.2	6.5	15°02.8	-8.5	60.1
16	56°52.7	-7°48.9	254°18.8	6.6	14°54.2	-8.6	60.1
17	71°52.8	-7°47.9	268°44.4	6.7	14°45.5	-8.7	60.1
18	86°52.9	-7°47.0	283°10.1	6.7	14°36.8	-8.8	60.1
19	101°53.1	-7°46.0	297°35.9	6.8	14°27.9	-8.9	60.1
20	116°53.2	-7°45.1	312°01.7	6.8	14°19.0	-9.0	60.1
21	131°53.3	-7°44.1	326°27.5	6.9	14°10.0	-9.1	60.1
22	146°53.4	-7°43.2	340°53.5	7.0	14°00.8	-9.2	60.1
23	161°53.5	-7°42.2	355°19.5	7.0	13°51.6	-9.2	60.0
	SD.=16.1	d=0.9			S.D.=16.4		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	176°53.7	-7°41.3	9°45.5	7.1	13°42.3	-9.3	60.0
1	191°53.8	-7°40.3	24°11.6	7.2	13°33.0	-9.4	60.0
2	206°53.9	-7°39.4	38°37.8	7.2	13°23.5	-9.5	60.0
3	221°54.0	-7°38.4	53°04.1	7.3	13°14.0	-9.6	60.0
4	236°54.1	-7°37.5	67°30.4	7.3	13°04.3	-9.7	60.0
5	251°54.3	-7°36.5	81°56.8	7.4	12°54.6	-9.7	60.0
6	266°54.4	-7°35.6	96°23.2	7.5	12°44.9	-9.8	59.9
7	281°54.5	-7°34.6	110°49.7	7.5	12°35.0	-9.9	59.9
8	296°54.6	-7°33.7	125°16.3	7.6	12°25.1	-10.0	59.9
9	311°54.8	-7°32.7	139°42.9	7.7	12°15.1	-10.0	59.9
10	326°54.9	-7°31.8	154°09.6	7.7	12°05.0	-10.1	59.9
11	341°55.0	-7°30.8	168°36.4	7.8	11°54.8	-10.2	59.9
12	356°55.1	-7°29.9	183°03.2	7.9	11°44.6	-10.3	59.8
13	11°55.2	-7°28.9	197°30.1	7.9	11°34.3	-10.3	59.8
14	26°55.4	-7°28.0	211°57.0	8.0	11°24.0	-10.4	59.8
15	41°55.5	-7°27.0	226°24.1	8.1	11°13.6	-10.4	59.8
16	56°55.6	-7°26.1	240°51.2	8.1	11°03.1	-10.5	59.8
17	71°55.7	-7°25.1	255°18.3	8.2	10°52.6	-10.6	59.7
18	86°55.9	-7°24.2	269°45.5	8.3	10°42.0	-10.6	59.7
19	101°56.0	-7°23.2	284°12.8	8.3	10°31.3	-10.7	59.7
20	116°56.1	-7°22.3	298°40.2	8.4	10°20.6	-10.7	59.7
21	131°56.2	-7°21.3	313°07.6	8.4	10°09.8	-10.8	59.7
22	146°56.4	-7°20.4	327°35.0	8.5	9°59.0	-10.9	59.6
23	161°56.5	-7°19.4	342°02.6	8.6	9°48.1	-10.9	59.6
	SD.=16.1	d=0.9			S.D.=16.4		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:15	06:33	07:42	16:45	17:54	19:13
70	05:20	06:30	07:32	16:55	17:57	19:08
68	05:23	06:27	07:24	17:03	17:59	19:04
66	05:26	06:25	07:17	17:09	18:02	19:01
64	05:28	06:23	07:11	17:15	18:03	18:58
62	05:30	06:21	07:06	17:20	18:05	18:56
60	05:32	06:20	07:02	17:25	18:07	18:55
58	05:33	06:18	06:58	17:28	18:08	18:53
56	05:34	06:17	06:54	17:32	18:09	18:52
54	05:35	06:16	06:51	17:35	18:10	18:51
52	05:35	06:14	06:48	17:38	18:12	18:51
50	05:36	06:13	06:46	17:40	18:13	18:50
45	05:37	06:10	06:40	17:46	18:15	18:49
40	05:37	06:08	06:35	17:51	18:18	18:49
35	05:36	06:06	06:31	17:55	18:20	18:49
30	05:35	06:03	06:27	17:58	18:22	18:50
20	05:33	05:59	06:21	18:05	18:27	18:52
10	05:29	05:54	06:15	18:10	18:32	18:56
0	05:24	05:48	06:09	18:16	18:37	19:01
-10	05:18	05:42	06:03	18:21	18:43	19:07
-20	05:09	05:35	05:57	18:27	18:50	19:16
-30	04:57	05:26	05:50	18:34	18:59	19:27
-35	04:50	05:20	05:46	18:39	19:04	19:35
-40	04:40	05:13	05:41	18:43	19:11	19:44
-45	04:29	05:05	05:36	18:49	19:19	19:55
-50	04:14	04:55	05:29	18:55	19:29	20:09
-52	04:07	04:50	05:26	18:58	19:33	20:16
-54	03:59	04:45	05:22	19:02	19:39	20:24
-56	03:50	04:39	05:18	19:05	19:44	20:33
-58	03:39	04:32	05:14	19:09	19:51	20:44
-60	03:26	04:24	05:09	19:14	19:59	20:56

	Moonrise			Moonset		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	–:–	13:11	15:29	–:–	08:47	08:26
70	11:41	13:47	15:48	08:12	08:09	08:05
68	12:24	14:13	16:03	07:29	07:42	07:49
66	12:52	14:32	16:15	06:60	07:22	07:35
64	13:14	14:48	16:25	06:38	07:06	07:24
62	13:31	15:01	16:34	06:20	06:52	07:15
60	13:45	15:12	16:41	06:05	06:40	07:06
58	13:58	15:21	16:48	05:52	06:30	06:59
56	14:08	15:29	16:53	05:41	06:21	06:53
54	14:18	15:37	16:58	05:32	06:13	06:47
52	14:26	15:43	17:03	05:23	06:06	06:42
50	14:33	15:49	17:07	05:15	05:60	06:37
45	14:49	16:02	17:16	04:59	05:46	06:26
40	15:02	16:13	17:24	04:45	05:35	06:18
35	15:13	16:22	17:30	04:34	05:25	06:10
30	15:23	16:29	17:36	04:24	05:16	06:04
20	15:40	16:43	17:45	04:06	05:01	05:52
10	15:54	16:55	17:54	03:51	04:48	05:42
0	16:08	17:06	18:02	03:36	04:36	05:33
-10	16:21	17:17	18:10	03:22	04:23	05:23
-20	16:36	17:29	18:18	03:06	04:10	05:13
-30	16:52	17:42	18:28	02:49	03:55	05:01
-35	17:02	17:50	18:33	02:38	03:46	04:54
-40	17:13	17:59	18:39	02:26	03:35	04:46
-45	17:25	18:09	18:47	02:12	03:23	04:37
-50	17:41	18:21	18:55	01:55	03:09	04:26
-52	17:48	18:27	18:59	01:47	03:02	04:21
-54	17:56	18:33	19:04	01:37	02:54	04:15
-56	18:05	18:40	19:08	01:27	02:45	04:09
-58	18:16	18:48	19:14	01:15	02:36	04:01
-60	18:27	18:57	19:20	01:02	02:24	03:53

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
27	12:47	12:42	12:12	22:21	09:52	12(91%)
28	12:37	12:31	12:12	23:19	10:50	13(97%)
1	12:25	12:19	12:12	00:14	11:47	14(100%)

March 02, 03 ,04 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	159°44.1	164°54.2	-3°42.7	259°40.7	-22°51.2	288°40.5	-17°24.5	241°44.7	-22°21.3
1	174°46.6	179°53.8	-3°41.4	274°41.6	-22°51.3	303°42.9	-17°24.5	256°47.0	-22°21.3
2	189°49.0	194°53.4	-3°40.1	289°42.4	-22°51.5	318°45.3	-17°24.5	271°49.2	-22°21.2
3	204°51.5	209°53.1	-3°38.9	304°43.3	-22°51.6	333°47.7	-17°24.5	286°51.5	-22°21.2
4	219°54.0	224°52.7	-3°37.6	319°44.1	-22°51.7	348°50.1	-17°24.5	301°53.8	-22°21.2
5	234°56.4	239°52.3	-3°36.3	334°45.0	-22°51.9	3°52.5	-17°24.5	316°56.0	-22°21.2
6	249°58.9	254°51.9	-3°35.0	349°45.9	-22°52.0	18°54.9	-17°24.5	331°58.3	-22°21.2
7	265°01.4	269°51.5	-3°33.8	4°46.7	-22°52.2	33°57.3	-17°24.5	347°00.6	-22°21.2
8	280°03.8	284°51.1	-3°32.5	19°47.6	-22°52.3	48°59.7	-17°24.6	2°02.9	-22°21.2
9	295°06.3	299°50.7	-3°31.2	34°48.5	-22°52.4	64°02.1	-17°24.6	17°05.1	-22°21.2
10	310°08.7	314°50.4	-3°30.0	49°49.3	-22°52.6	79°04.5	-17°24.6	32°07.4	-22°21.2
11	325°11.2	329°50.0	-3°28.7	64°50.2	-22°52.7	94°06.9	-17°24.6	47°09.7	-22°21.2
12	340°13.7	344°49.6	-3°27.4	79°51.1	-22°52.9	109°09.4	-17°24.6	62°11.9	-22°21.1
13	355°16.1	359°49.2	-3°26.1	94°51.9	-22°53.0	124°11.8	-17°24.6	77°14.2	-22°21.1
14	10°18.6	14°48.8	-3°24.9	109°52.8	-22°53.1	139°14.2	-17°24.6	92°16.5	-22°21.1
15	25°21.1	29°48.4	-3°23.6	124°53.7	-22°53.3	154°16.6	-17°24.6	107°18.8	-22°21.1
16	40°23.5	44°48.0	-3°22.3	139°54.5	-22°53.4	169°19.0	-17°24.6	122°21.0	-22°21.1
17	55°26.0	59°47.7	-3°21.1	154°55.4	-22°53.5	184°21.4	-17°24.6	137°23.3	-22°21.1
18	70°28.5	74°47.3	-3°19.8	169°56.3	-22°53.7	199°23.8	-17°24.6	152°25.6	-22°21.1
19	85°30.9	89°46.9	-3°18.5	184°57.1	-22°53.8	214°26.2	-17°24.6	167°27.8	-22°21.1
20	100°33.4	104°46.5	-3°17.2	199°58.0	-22°54.0	229°28.6	-17°24.6	182°30.1	-22°21.1
21	115°35.9	119°46.1	-3°16.0	214°58.9	-22°54.1	244°31.1	-17°24.6	197°32.4	-22°21.1
22	130°38.3	134°45.7	-3°14.7	229°59.7	-22°54.2	259°33.5	-17°24.6	212°34.7	-22°21.0
23	145°40.8	149°45.4	-3°13.4	245°00.6	-22°54.4	274°35.9	-17°24.6	227°36.9	-22°21.0
Mer.pass.:13:18		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.8		v2.4 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	160°43.2	164°45.0	-3°12.2	260°01.5	-22°54.5	289°38.3	-17°24.7	242°39.2	-22°21.0
1	175°45.7	179°44.6	-3°10.9	275°02.3	-22°54.6	304°40.7	-17°24.7	257°41.5	-22°21.0
2	190°48.2	194°44.2	-3°09.6	290°03.2	-22°54.8	319°43.1	-17°24.7	272°43.8	-22°21.0
3	205°50.6	209°43.8	-3°08.3	305°04.1	-22°54.9	334°45.5	-17°24.7	287°46.0	-22°21.0
4	220°53.1	224°43.4	-3°07.1	320°04.9	-22°55.0	349°47.9	-17°24.7	302°48.3	-22°21.0
5	235°55.6	239°43.1	-3°05.8	335°05.8	-22°55.2	4°50.4	-17°24.7	317°50.6	-22°21.0
6	250°58.0	254°42.7	-3°04.5	350°06.7	-22°55.3	19°52.8	-17°24.7	332°52.9	-22°21.0
7	266°00.5	269°42.3	-3°03.2	5°07.5	-22°55.4	34°55.2	-17°24.7	347°55.1	-22°21.0
8	281°03.0	284°41.9	-3°02.0	20°08.4	-22°55.6	49°57.6	-17°24.7	2°57.4	-22°20.9
9	296°05.4	299°41.5	-3°00.7	35°09.3	-22°55.7	65°00.0	-17°24.7	17°59.7	-22°20.9
10	311°07.9	314°41.2	-2°59.4	50°10.1	-22°55.8	80°02.4	-17°24.7	33°02.0	-22°20.9
11	326°10.4	329°40.8	-2°58.1	65°11.0	-22°56.0	95°04.9	-17°24.7	48°04.2	-22°20.9
12	341°12.8	344°40.4	-2°56.9	80°11.9	-22°56.1	110°07.3	-17°24.7	63°06.5	-22°20.9
13	356°15.3	359°40.0	-2°55.6	95°12.8	-22°56.2	125°09.7	-17°24.7	78°08.8	-22°20.9
14	11°17.7	14°39.6	-2°54.3	110°13.6	-22°56.4	140°12.1	-17°24.7	93°11.1	-22°20.9
15	26°20.2	29°39.3	-2°53.0	125°14.5	-22°56.5	155°14.5	-17°24.7	108°13.3	-22°20.9
16	41°22.7	44°38.9	-2°51.8	140°15.4	-22°56.6	170°16.9	-17°24.7	123°15.6	-22°20.9
17	56°25.1	59°38.5	-2°50.5	155°16.2	-22°56.8	185°19.4	-17°24.7	138°17.9	-22°20.9
18	71°27.6	74°38.1	-2°49.2	170°17.1	-22°56.9	200°21.8	-17°24.7	153°20.2	-22°20.8
19	86°30.1	89°37.7	-2°47.9	185°18.0	-22°57.0	215°24.2	-17°24.8	168°22.4	-22°20.8
20	101°32.5	104°37.4	-2°46.7	200°18.8	-22°57.2	230°26.6	-17°24.8	183°24.7	-22°20.8
21	116°35.0	119°37.0	-2°45.4	215°19.7	-22°57.3	245°29.0	-17°24.8	198°27.0	-22°20.8
22	131°37.5	134°36.6	-2°44.1	230°20.6	-22°57.4	260°31.5	-17°24.8	213°29.3	-22°20.8
23	146°39.9	149°36.2	-2°42.8	245°21.4	-22°57.6	275°33.9	-17°24.8	228°31.5	-22°20.8
Mer.pass.:13:14		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.8		v2.4 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	161°42.4	164°35.8	-2°41.5	260°22.3	-22°57.7	290°36.3	-17°24.8	243°33.8	-22°20.8
1	176°44.8	179°35.5	-2°40.3	275°23.2	-22°57.8	305°38.7	-17°24.8	258°36.1	-22°20.8
2	191°47.3	194°35.1	-2°39.0	290°24.0	-22°57.9	320°41.1	-17°24.8	273°38.4	-22°20.8
3	206°49.8	209°34.7	-2°37.7	305°24.9	-22°58.1	335°43.6	-17°24.8	288°40.7	-22°20.8
4	221°52.2	224°34.3	-2°36.4	320°25.8	-22°58.2	350°46.0	-17°24.8	303°42.9	-22°20.7
5	236°54.7	239°34.0	-2°35.2	335°26.6	-22°58.3	5°48.4	-17°24.8	318°45.2	-22°20.7
6	251°57.2	254°33.6	-2°33.9	350°27.5	-22°58.5	20°50.8	-17°24.8	333°47.5	-22°20.7
7	266°59.6	269°33.2	-2°32.6	5°28.4	-22°58.6	35°53.3	-17°24.8	348°49.8	-22°20.7
8	282°02.1	284°32.8	-2°31.3	20°29.2	-22°58.7	50°55.7	-17°24.8	3°52.0	-22°20.7
9	297°04.6	299°32.4	-2°30.0	35°30.1	-22°58.8	65°58.1	-17°24.8	18°54.3	-22°20.7
10	312°07.0	314°32.1	-2°28.8	50°31.0	-22°59.0	81°00.5	-17°24.8	33°56.6	-22°20.7
11	327°09.5	329°31.7	-2°27.5	65°31.9	-22°59.1	96°03.0	-17°24.8	48°58.9	-22°20.7
12	342°12.0	344°31.3	-2°26.2	80°32.7	-22°59.2	111°05.4	-17°24.8	64°01.2	-22°20.7
13	357°14.4	359°30.9	-2°24.9	95°33.6	-22°59.3	126°07.8	-17°24.8	79°03.4	-22°20.7
14	12°16.9	14°30.6	-2°23.7	110°34.5	-22°59.5	141°10.2	-17°24.8	94°05.7	-22°20.6
15	27°19.3	29°30.2	-2°22.4	125°35.3	-22°59.6	156°12.7	-17°24.8	109°08.0	-22°20.6
16	42°21.8	44°29.8	-2°21.1	140°36.2	-22°59.7	171°15.1	-17°24.8	124°10.3	-22°20.6
17	57°24.3	59°29.4	-2°19.8	155°37.1	-22°59.9	186°17.5	-17°24.8	139°12.6	-22°20.6
18	72°26.7	74°29.0	-2°18.5	170°37.9	-22°60.0	201°19.9	-17°24.8	154°14.8	-22°20.6
19	87°29.2	89°28.7	-2°17.3	185°38.8	-23°00.1	216°22.4	-17°24.8	169°17.1	-22°20.6
20	102°31.7	104°28.3	-2°16.0	200°39.7	-23°00.2	231°24.8	-17°24.8	184°19.4	-22°20.6
21	117°34.1	119°27.9	-2°14.7	215°40.5	-23°00.4	246°27.2	-17°24.8	199°21.7	-22°20.6
22	132°36.6	134°27.5	-2°13.4	230°41.4	-23°00.5	261°29.7	-17°24.8	214°24.0	-22°20.6
23	147°39.1	149°27.2	-2°12.1	245°42.3	-23°00.6	276°32.1	-17°24.8	229°26.2	-22°20.6
Mer.pass.:13:11		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.8		v2.4 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°12.9	-42°12.7
Schedar	349°37.3	56°38.2
Diphda	348°52.9	-17°53.5
Achernar	335°24.9	-57°09.1
Hamal	327°57.4	23°32.7
Polaris	316°33.1	89°20.6
Akamar	315°16.1	-40°14.4
Menkar	314°11.8	4°09.4
Mirfak	308°35.9	49°55.5
Aldebaran	290°45.7	16°32.5
Rigel	281°08.9	-8°11.2
Capella	280°29.7	46°01.0
Bellatrix	278°28.5	6°21.7
Elnath	278°08.5	28°37.2
Alnilam	275°43.1	-1°11.7
Betelgeuse	270°57.7	7°24.3
Canopus	263°54.5	-52°42.8
Sirius	258°30.6	-16°44.6
Adara	255°09.8	-29°00.2
Procyon	244°56.1	5°10.6
Pollux	243°23.5	27°58.8
Avior	234°16.2	-59°34.3
Suhail	222°49.7	-43°30.6
Miaplacidus	221°38.1	-69°47.7
Alphard	217°52.6	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.1
Denebola	182°30.0	14°28.2
Gienah	175°48.7	-17°38.6
Acrux	173°05.1	-63°11.8
Gacrux	171°56.8	-57°12.7
Alioth	166°17.5	55°51.6
Spica	158°27.6	-11°15.3
Alcaid	152°56.1	49°13.2
Hadar	148°42.9	-60°27.3
Menkent	148°03.6	-36°27.3
Arcturus	145°52.5	19°05.5
Rigil Kent.	139°47.0	-60°54.2
Zubenelg.	137°01.7	-16°06.9
Kochab	137°19.7	74°04.7
Alphecca	126°08.2	26°39.2
Antares	112°22.3	-26°28.1
Atria	107°21.3	-69°03.1
Sabik	102°08.9	-15°44.7
Shaula	96°17.7	-37°06.7
Rasalhague	96°03.6	12°32.8
Etamin	90°44.8	51°29.0
Kaus Aust.	83°39.7	-34°22.3
Vega	80°37.0	38°47.9
Nunki	75°54.6	-26°16.3
Altair	62°05.4	8°54.9
Peacock	53°14.7	-56°40.4
Deneb	49°29.7	45°20.6
Enif	33°44.3	9°57.4
Alnair	27°40.2	-46°52.4
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.7	28°10.7
Markab	13°35.5	15°18.0

2018/3/2	**SHA**	**Mer.pass**
Venus	5°10.1	13:01
Mars	99°56.6	06:41
Jupiter	128°56.4	04:45
Saturn	82°00.6	07:52

2018/3/3	**SHA**	**Mer.pass**
Venus	4°01.7	13:01
Mars	99°18.2	06:40
Jupiter	128°55.0	04:41
Saturn	81°56.0	07:48

2018/3/4	**SHA**	**Mer.pass**
Venus	2°53.5	13:02
Mars	98°39.9	06:38
Jupiter	128°53.9	04:37
Saturn	81°51.4	07:45

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	176°56.6	-7°18.5	356°30.2	8.6	9°37.2	-11.0	59.6
1	191°56.7	-7°17.5	10°57.9	8.7	9°26.2	-11.0	59.6
2	206°56.9	-7°16.6	25°25.6	8.8	9°15.1	-11.1	59.6
3	221°57.0	-7°15.6	39°53.4	8.8	9°04.1	-11.1	59.5
4	236°57.1	-7°14.7	54°21.2	8.9	8°52.9	-11.1	59.5
5	251°57.2	-7°13.7	68°49.2	9.0	8°41.8	-11.2	59.5
6	266°57.4	-7°12.7	83°17.1	9.0	8°30.6	-11.2	59.5
7	281°57.5	-7°11.8	97°45.2	9.1	8°19.3	-11.3	59.4
8	296°57.6	-7°10.8	112°13.3	9.1	8°08.0	-11.3	59.4
9	311°57.7	-7°09.9	126°41.5	9.2	7°56.7	-11.4	59.4
10	326°57.9	-7°08.9	141°09.7	9.3	7°45.3	-11.4	59.4
11	341°58.0	-7°08.0	155°38.0	9.3	7°33.9	-11.4	59.3
12	356°58.1	-7°07.0	170°06.3	9.4	7°22.5	-11.5	59.3
13	11°58.3	-7°06.1	184°34.7	9.4	7°11.0	-11.5	59.3
14	26°58.4	-7°05.1	199°03.2	9.5	6°59.5	-11.5	59.3
15	41°58.5	-7°04.2	213°31.7	9.6	6°48.0	-11.5	59.2
16	56°58.6	-7°03.2	228°00.3	9.6	6°36.4	-11.6	59.2
17	71°58.8	-7°02.2	242°29.0	9.7	6°24.8	-11.6	59.2
18	86°58.9	-7°01.3	256°57.7	9.7	6°13.2	-11.6	59.1
19	101°59.0	-7°00.3	271°26.5	9.8	6°01.5	-11.7	59.1
20	116°59.2	-6°59.4	285°55.3	9.8	5°49.9	-11.7	59.1
21	131°59.3	-6°58.4	300°24.1	9.9	5°38.2	-11.7	59.1
22	146°59.4	-6°57.5	314°53.1	10.0	5°26.5	-11.7	59.0
23	161°59.6	-6°56.5	329°22.1	10.0	5°14.8	-11.7	59.0
	SD.=16.1	d=1.0			S.D.=16.3		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176°59.7	-6°55.5	343°51.1	10.1	5°03.0	-11.8	59.0
1	191°59.8	-6°54.6	358°20.2	10.1	4°51.3	-11.8	58.9
2	206°59.9	-6°53.6	12°49.4	10.2	4°39.5	-11.8	58.9
3	222°00.1	-6°52.7	27°18.6	10.2	4°27.7	-11.8	58.9
4	237°00.2	-6°51.7	41°47.8	10.3	4°15.9	-11.8	58.9
5	252°00.3	-6°50.8	56°17.1	10.3	4°04.1	-11.8	58.8
6	267°00.5	-6°49.8	70°46.5	10.4	3°52.2	-11.8	58.8
7	282°00.6	-6°48.8	85°15.9	10.4	3°40.4	-11.8	58.8
8	297°00.7	-6°47.9	99°45.4	10.5	3°28.6	-11.8	58.7
9	312°00.9	-6°46.9	114°14.9	10.5	3°16.7	-11.8	58.7
10	327°01.0	-6°46.0	128°44.5	10.6	3°04.9	-11.9	58.7
11	342°01.1	-6°45.0	143°14.1	10.6	2°53.0	-11.9	58.6
12	357°01.3	-6°44.1	157°43.7	10.7	2°41.2	-11.9	58.6
13	12°01.4	-6°43.1	172°13.4	10.7	2°29.3	-11.9	58.6
14	27°01.5	-6°42.1	186°43.2	10.8	2°17.4	-11.9	58.5
15	42°01.7	-6°41.2	201°13.0	10.8	2°05.6	-11.9	58.5
16	57°01.8	-6°40.2	215°42.9	10.9	1°53.7	-11.9	58.5
17	72°01.9	-6°39.3	230°12.8	10.9	1°41.9	-11.9	58.4
18	87°02.1	-6°38.3	244°42.7	11.0	1°30.0	-11.8	58.4
19	102°02.2	-6°37.3	259°12.7	11.0	1°18.2	-11.8	58.4
20	117°02.3	-6°36.4	273°42.7	11.0	1°06.4	-11.8	58.3
21	132°02.5	-6°35.4	288°12.8	11.1	0°54.5	-11.8	58.3
22	147°02.6	-6°34.5	302°42.9	11.1	0°42.7	-11.8	58.3
23	162°02.7	-6°33.5	317°13.0	11.2	0°30.9	-11.8	58.2
	SD.=16.1	d=1.0			S.D.=16.1		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177°02.9	-6°32.5	331°43.2	11.2	0°19.1	-11.8	58.2
1	192°03.0	-6°31.6	346°13.5	11.3	0°07.3	-11.8	58.2
2	207°03.1	-6°30.6	0°43.8	11.3	-0°04.5	-11.8	58.1
3	222°03.3	-6°29.6	15°14.1	11.3	-0°16.2	-11.7	58.1
4	237°03.4	-6°28.7	29°44.4	11.4	-0°28.0	-11.7	58.1
5	252°03.6	-6°27.7	44°14.8	11.4	-0°39.7	-11.7	58.0
6	267°03.7	-6°26.8	58°45.3	11.4	-0°51.4	-11.7	58.0
7	282°03.8	-6°25.8	73°15.7	11.5	-1°03.1	-11.7	58.0
8	297°04.0	-6°24.8	87°46.2	11.5	-1°14.7	-11.7	57.9
9	312°04.1	-6°23.9	102°16.8	11.6	-1°26.4	-11.6	57.9
10	327°04.2	-6°22.9	116°47.3	11.6	-1°38.0	-11.6	57.9
11	342°04.4	-6°22.0	131°17.9	11.6	-1°49.6	-11.6	57.8
12	357°04.5	-6°21.0	145°48.6	11.7	-2°01.2	-11.6	57.8
13	12°04.6	-6°20.0	160°19.3	11.7	-2°12.7	-11.5	57.8
14	27°04.8	-6°19.1	174°50.0	11.7	-2°24.3	-11.5	57.7
15	42°04.9	-6°18.1	189°20.7	11.8	-2°35.8	-11.5	57.7
16	57°05.1	-6°17.1	203°51.5	11.8	-2°47.2	-11.5	57.7
17	72°05.2	-6°16.2	218°22.3	11.8	-2°58.7	-11.4	57.6
18	87°05.3	-6°15.2	232°53.1	11.8	-3°10.1	-11.4	57.6
19	102°05.5	-6°14.2	247°24.0	11.9	-3°21.5	-11.4	57.6
20	117°05.6	-6°13.3	261°54.8	11.9	-3°32.8	-11.3	57.5
21	132°05.8	-6°12.3	276°25.8	11.9	-3°44.2	-11.3	57.5
22	147°05.9	-6°11.4	290°56.7	12.0	-3°55.4	-11.3	57.5
23	162°06.0	-6°10.4	305°27.7	12.0	-4°06.7	-11.2	57.4
	SD.=16.1	d=1.0			S.D.=15.9		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:00	06:18	07:27	16:59	18:08	19:27
70	05:06	06:17	07:18	17:07	18:09	19:20
68	05:11	06:15	07:11	17:14	18:10	19:15
66	05:15	06:14	07:06	17:20	18:11	19:11
64	05:18	06:13	07:01	17:24	18:12	19:07
62	05:21	06:12	06:57	17:29	18:13	19:04
60	05:23	06:11	06:53	17:32	18:14	19:02
58	05:25	06:10	06:50	17:35	18:15	19:00
56	05:27	06:10	06:47	17:38	18:15	18:58
54	05:28	06:09	06:44	17:41	18:16	18:57
52	05:29	06:08	06:42	17:43	18:17	18:56
50	05:30	06:07	06:39	17:45	18:18	18:55
45	05:31	06:05	06:35	17:50	18:19	18:53
40	05:32	06:04	06:31	17:54	18:21	18:52
35	05:32	06:02	06:27	17:57	18:23	18:52
30	05:32	05:60	06:24	18:00	18:24	18:52
20	05:31	05:56	06:18	18:06	18:28	18:53
10	05:28	05:52	06:13	18:11	18:32	18:56
0	05:24	05:48	06:09	18:15	18:36	19:00
-10	05:18	05:43	06:04	18:20	18:41	19:06
-20	05:10	05:36	05:58	18:25	18:47	19:13
-30	04:59	05:28	05:52	18:31	18:55	19:24
-35	04:53	05:23	05:49	18:35	19:00	19:31
-40	04:44	05:17	05:44	18:39	19:06	19:39
-45	04:34	05:10	05:40	18:43	19:13	19:49
-50	04:20	05:01	05:34	18:49	19:22	20:02
-52	04:14	04:56	05:31	18:52	19:26	20:09
-54	04:06	04:51	05:28	18:54	19:31	20:16
-56	03:58	04:46	05:25	18:58	19:36	20:24
-58	03:48	04:40	05:21	19:01	19:42	20:34
-60	03:37	04:33	05:17	19:05	19:49	20:45

	Moonrise			Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	17:34	19:31	21:24	08:13	08:02	07:52
70	17:43	19:33	21:18	08:02	07:58	07:54
68	17:51	19:34	21:14	07:52	07:54	07:55
66	17:57	19:35	21:10	07:44	07:51	07:56
64	18:02	19:36	21:07	07:38	07:48	07:57
62	18:07	19:37	21:04	07:32	07:46	07:58
60	18:10	19:37	21:01	07:27	07:44	07:59
58	18:14	19:38	20:59	07:22	07:42	07:60
56	18:17	19:38	20:57	07:18	07:40	08:01
54	18:20	19:39	20:56	07:15	07:39	08:01
52	18:22	19:39	20:54	07:11	07:37	08:02
50	18:24	19:40	20:53	07:08	07:36	08:02
45	18:29	19:41	20:50	07:02	07:34	08:03
40	18:33	19:41	20:47	06:56	07:31	08:04
35	18:37	19:42	20:45	06:52	07:29	08:05
30	18:40	19:43	20:43	06:47	07:27	08:06
20	18:45	19:44	20:40	06:40	07:24	08:07
10	18:50	19:44	20:37	06:33	07:22	08:08
0	18:55	19:45	20:34	06:27	07:19	08:09
-10	18:59	19:46	20:31	06:21	07:16	08:10
-20	19:04	19:47	20:29	06:14	07:13	08:11
-30	19:09	19:48	20:25	06:07	07:10	08:12
-35	19:12	19:49	20:24	06:02	07:08	08:12
-40	19:16	19:49	20:22	05:57	07:06	08:13
-45	19:20	19:50	20:19	05:51	07:04	08:14
-50	19:25	19:51	20:16	05:44	07:01	08:15
-52	19:27	19:52	20:15	05:41	06:59	08:15
-54	19:29	19:52	20:14	05:37	06:58	08:16
-56	19:32	19:53	20:12	05:33	06:56	08:16
-58	19:35	19:53	20:11	05:28	06:54	08:17
-60	19:38	19:54	20:09	05:23	06:52	08:17

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
2	12:13	12:07	12:12	00:14	12:41	15(100%)
3	12:01	11:55	12:11	01:06	13:32	16(97%)
4	11:48	11:42	12:11	01:56	14:21	17(92%)

March 05, 06 ,07 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	162°41.5	164°26.8	-2°10.9	260°43.2	-23°00.7	291°34.5	-17°24.8	244°28.5	-22°20.5
1	177°44.0	179°26.4	-2°09.6	275°44.0	-23°00.8	306°36.9	-17°24.8	259°30.8	-22°20.5
2	192°46.4	194°26.0	-2°08.3	290°44.9	-23°01.0	321°39.4	-17°24.8	274°33.1	-22°20.5
3	207°48.9	209°25.7	-2°07.0	305°45.8	-23°01.1	336°41.8	-17°24.8	289°35.4	-22°20.5
4	222°51.4	224°25.3	-2°05.7	320°46.6	-23°01.2	351°44.2	-17°24.8	304°37.6	-22°20.5
5	237°53.8	239°24.9	-2°04.5	335°47.5	-23°01.3	6°46.7	-17°24.8	319°39.9	-22°20.5
6	252°56.3	254°24.5	-2°03.2	350°48.4	-23°01.5	21°49.1	-17°24.9	334°42.2	-22°20.5
7	267°58.8	269°24.2	-2°01.9	5°49.2	-23°01.6	36°51.5	-17°24.9	349°44.5	-22°20.5
8	283°01.2	284°23.8	-2°00.6	20°50.1	-23°01.7	51°54.0	-17°24.9	4°46.8	-22°20.5
9	298°03.7	299°23.4	-1°59.3	35°51.0	-23°01.8	66°56.4	-17°24.9	19°49.1	-22°20.5
10	313°06.2	314°23.0	-1°58.1	50°51.9	-23°02.0	81°58.8	-17°24.9	34°51.3	-22°20.4
11	328°08.6	329°22.7	-1°56.8	65°52.7	-23°02.1	97°01.2	-17°24.9	49°53.6	-22°20.4
12	343°11.1	344°22.3	-1°55.5	80°53.6	-23°02.2	112°03.7	-17°24.9	64°55.9	-22°20.4
13	358°13.6	359°21.9	-1°54.2	95°54.5	-23°02.3	127°06.1	-17°24.9	79°58.2	-22°20.4
14	13°16.0	14°21.6	-1°52.9	110°55.3	-23°02.4	142°08.5	-17°24.9	95°00.5	-22°20.4
15	28°18.5	29°21.2	-1°51.7	125°56.2	-23°02.6	157°11.0	-17°24.9	110°02.8	-22°20.4
16	43°20.9	44°20.8	-1°50.4	140°57.1	-23°02.7	172°13.4	-17°24.9	125°05.0	-22°20.4
17	58°23.4	59°20.4	-1°49.1	155°57.9	-23°02.8	187°15.9	-17°24.9	140°07.3	-22°20.4
18	73°25.9	74°20.1	-1°47.8	170°58.8	-23°02.9	202°18.3	-17°24.9	155°09.6	-22°20.4
19	88°28.3	89°19.7	-1°46.5	185°59.7	-23°03.0	217°20.7	-17°24.9	170°11.9	-22°20.4
20	103°30.8	104°19.3	-1°45.2	201°00.6	-23°03.2	232°23.2	-17°24.9	185°14.2	-22°20.3
21	118°33.3	119°18.9	-1°44.0	216°01.4	-23°03.3	247°25.6	-17°24.9	200°16.5	-22°20.3
22	133°35.7	134°18.6	-1°42.7	231°02.3	-23°03.4	262°28.0	-17°24.9	215°18.7	-22°20.3
23	148°38.2	149°18.2	-1°41.4	246°03.2	-23°03.5	277°30.5	-17°24.9	230°21.0	-22°20.3
Mer.pass.:13:07		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.8		v2.4 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	163°40.7	164°17.8	-1°40.1	261°04.0	-23°03.6	292°32.9	-17°24.9	245°23.3	-22°20.3
1	178°43.1	179°17.4	-1°38.8	276°04.9	-23°03.7	307°35.3	-17°24.9	260°25.6	-22°20.3
2	193°45.6	194°17.1	-1°37.6	291°05.8	-23°03.9	322°37.8	-17°24.9	275°27.9	-22°20.3
3	208°48.0	209°16.7	-1°36.3	306°06.7	-23°04.0	337°40.2	-17°24.9	290°30.2	-22°20.3
4	223°50.5	224°16.3	-1°35.0	321°07.5	-23°04.1	352°42.7	-17°24.9	305°32.4	-22°20.3
5	238°53.0	239°16.0	-1°33.7	336°08.4	-23°04.2	7°45.1	-17°24.9	320°34.7	-22°20.3
6	253°55.4	254°15.6	-1°32.4	351°09.3	-23°04.3	22°47.5	-17°24.9	335°37.0	-22°20.2
7	268°57.9	269°15.2	-1°31.1	6°10.1	-23°04.4	37°50.0	-17°24.9	350°39.3	-22°20.2
8	284°00.4	284°14.8	-1°29.9	21°11.0	-23°04.6	52°52.4	-17°24.9	5°41.6	-22°20.2
9	299°02.8	299°14.5	-1°28.6	36°11.9	-23°04.7	67°54.8	-17°24.9	20°43.9	-22°20.2
10	314°05.3	314°14.1	-1°27.3	51°12.8	-23°04.8	82°57.3	-17°24.9	35°46.2	-22°20.2
11	329°07.8	329°13.7	-1°26.0	66°13.6	-23°04.9	97°59.7	-17°24.9	50°48.4	-22°20.2
12	344°10.2	344°13.4	-1°24.7	81°14.5	-23°05.0	113°02.2	-17°24.9	65°50.7	-22°20.2
13	359°12.7	359°13.0	-1°23.4	96°15.4	-23°05.1	128°04.6	-17°24.9	80°53.0	-22°20.2
14	14°15.2	14°12.6	-1°22.2	111°16.2	-23°05.3	143°07.1	-17°24.9	95°55.3	-22°20.2
15	29°17.6	29°12.2	-1°20.9	126°17.1	-23°05.4	158°09.5	-17°24.9	110°57.6	-22°20.2
16	44°20.1	44°11.9	-1°19.6	141°18.0	-23°05.5	173°11.9	-17°24.9	125°59.9	-22°20.2
17	59°22.5	59°11.5	-1°18.3	156°18.9	-23°05.6	188°14.4	-17°24.9	141°02.2	-22°20.1
18	74°25.0	74°11.1	-1°17.0	171°19.7	-23°05.7	203°16.8	-17°24.9	156°04.4	-22°20.1
19	89°27.5	89°10.8	-1°15.7	186°20.6	-23°05.8	218°19.3	-17°24.9	171°06.7	-22°20.1
20	104°29.9	104°10.4	-1°14.5	201°21.5	-23°05.9	233°21.7	-17°24.8	186°09.0	-22°20.1
21	119°32.4	119°10.0	-1°13.2	216°22.4	-23°06.0	248°24.2	-17°24.8	201°11.3	-22°20.1
22	134°34.9	134°09.7	-1°11.9	231°23.2	-23°06.2	263°26.6	-17°24.8	216°13.6	-22°20.1
23	149°37.3	149°09.3	-1°10.6	246°24.1	-23°06.3	278°29.0	-17°24.8	231°15.9	-22°20.1
Mer.pass.:13:03		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.7		v2.4 d0.0 m-2.0		v2.3 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	164°39.8	164°08.9	-1°09.3	261°25.0	-23°06.4	293°31.5	-17°24.8	246°18.2	-22°20.1
1	179°42.3	179°08.5	-1°08.0	276°25.8	-23°06.5	308°33.9	-17°24.8	261°20.5	-22°20.1
2	194°44.7	194°08.2	-1°06.7	291°26.7	-23°06.6	323°36.4	-17°24.8	276°22.7	-22°20.1
3	209°47.2	209°07.8	-1°05.5	306°27.6	-23°06.7	338°38.8	-17°24.8	291°25.0	-22°20.0
4	224°49.7	224°07.4	-1°04.2	321°28.5	-23°06.8	353°41.3	-17°24.8	306°27.3	-22°20.0
5	239°52.1	239°07.1	-1°02.9	336°29.3	-23°06.9	8°43.7	-17°24.8	321°29.6	-22°20.0
6	254°54.6	254°06.7	-1°01.6	351°30.2	-23°07.1	23°46.2	-17°24.8	336°31.9	-22°20.0
7	269°57.0	269°06.3	-1°00.3	6°31.1	-23°07.2	38°48.6	-17°24.8	351°34.2	-22°20.0
8	284°59.5	284°06.0	-0°59.0	21°32.0	-23°07.3	53°51.1	-17°24.8	6°36.5	-22°20.0
9	300°02.0	299°05.6	-0°57.8	36°32.8	-23°07.4	68°53.5	-17°24.8	21°38.8	-22°20.0
10	315°04.4	314°05.2	-0°56.5	51°33.7	-23°07.5	83°56.0	-17°24.8	36°41.1	-22°20.0
11	330°06.9	329°04.9	-0°55.2	66°34.6	-23°07.6	98°58.4	-17°24.8	51°43.3	-22°20.0
12	345°09.4	344°04.5	-0°53.9	81°35.5	-23°07.7	114°00.8	-17°24.8	66°45.6	-22°20.0
13	0°11.8	359°04.1	-0°52.6	96°36.3	-23°07.8	129°03.3	-17°24.8	81°47.9	-22°19.9
14	15°14.3	14°03.7	-0°51.3	111°37.2	-23°07.9	144°05.7	-17°24.8	96°50.2	-22°19.9
15	30°16.8	29°03.4	-0°50.0	126°38.1	-23°08.0	159°08.2	-17°24.8	111°52.5	-22°19.9
16	45°19.2	44°03.0	-0°48.8	141°39.0	-23°08.1	174°10.6	-17°24.8	126°54.8	-22°19.9
17	60°21.7	59°02.6	-0°47.5	156°39.8	-23°08.3	189°13.1	-17°24.8	141°57.1	-22°19.9
18	75°24.1	74°02.3	-0°46.2	171°40.7	-23°08.4	204°15.5	-17°24.8	156°59.4	-22°19.9
19	90°26.6	89°01.9	-0°44.9	186°41.6	-23°08.5	219°18.0	-17°24.8	172°01.7	-22°19.9
20	105°29.1	104°01.5	-0°43.6	201°42.4	-23°08.6	234°20.4	-17°24.8	187°04.0	-22°19.9
21	120°31.5	119°01.2	-0°42.3	216°43.3	-23°08.7	249°22.9	-17°24.8	202°06.3	-22°19.9
22	135°34.0	134°00.8	-0°41.0	231°44.2	-23°08.8	264°25.4	-17°24.8	217°08.5	-22°19.9
23	150°36.5	149°00.4	-0°39.8	246°45.1	-23°08.9	279°27.8	-17°24.8	232°10.8	-22°19.8
Mer.pass.:12:59		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.7		v2.4 d0.0 m-2.1		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°12.9	-42°12.7
Schedar	349°37.3	56°38.2
Diphda	348°52.9	-17°53.5
Achernar	335°24.9	-57°09.0
Hamal	327°57.4	23°32.7
Polaris	316°34.4	89°20.6
Akamar	315°16.1	-40°14.4
Menkar	314°11.8	4°09.4
Mirfak	308°35.9	49°55.5
Aldebaran	290°45.7	16°32.5
Rigel	281°08.9	-8°11.2
Capella	280°29.7	46°01.0
Bellatrix	278°28.5	6°21.7
Elnath	278°08.5	28°37.2
Alnilam	275°43.1	-1°11.7
Betelgeuse	270°57.8	7°24.3
Canopus	263°54.5	-52°42.8
Sirius	258°30.7	-16°44.6
Adara	255°09.8	-29°00.2
Procyon	244°56.1	5°10.6
Pollux	243°23.5	27°58.8
Avior	234°16.2	-59°34.4
Suhail	222°49.7	-43°30.6
Miaplacidus	221°38.1	-69°47.7
Alphard	217°52.6	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.1
Denebola	182°30.0	14°28.2
Gienah	175°48.7	-17°38.6
Acrux	173°05.0	-63°11.8
Gacrux	171°56.8	-57°12.7
Alioth	166°17.5	55°51.6
Spica	158°27.6	-11°15.3
Alcaid	152°56.1	49°13.2
Hadar	148°42.9	-60°27.3
Menkent	148°03.5	-36°27.4
Arcturus	145°52.5	19°05.5
Rigil Kent.	139°47.0	-60°54.2
Zubenelg.	137°01.7	-16°06.9
Kochab	137°19.6	74°04.7
Alphecca	126°08.2	26°39.2
Antares	112°22.3	-26°28.1
Atria	107°21.2	-69°03.1
Sabik	102°08.9	-15°44.7
Shaula	96°17.7	-37°06.7
Rasalhague	96°03.6	12°32.8
Etamin	90°44.8	51°29.0
Kaus Aust.	83°39.7	-34°22.3
Vega	80°37.0	38°47.9
Nunki	75°54.6	-26°16.3
Altair	62°05.4	8°54.9
Peacock	53°14.7	-56°40.4
Deneb	49°29.7	45°20.6
Enif	33°44.3	9°57.4
Alnair	27°40.2	-46°52.4
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.7	28°10.7
Markab	13°35.5	15°18.0

2018/3/5	**SHA**	**Mer.pass**
Venus	1°45.3	13:03
Mars	98°01.6	06:37
Jupiter	128°53.0	04:33
Saturn	81°47.0	07:41

2018/3/6	**SHA**	**Mer.pass**
Venus	0°37.2	13:03
Mars	97°23.4	06:35
Jupiter	128°52.2	04:29
Saturn	81°42.6	07:37

2018/3/7	**SHA**	**Mer.pass**
Venus	359°29.1	13:04
Mars	96°45.2	06:34
Jupiter	128°51.7	04:25
Saturn	81°38.4	07:34

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°06.2	-6°09.4	319°58.7	12.0	-4°17.9	-11.2	57.4
1	192°06.3	-6°08.5	334°29.7	12.0	-4°29.1	-11.2	57.3
2	207°06.5	-6°07.5	349°00.7	12.1	-4°40.2	-11.1	57.3
3	222°06.6	-6°06.5	3°31.8	12.1	-4°51.3	-11.1	57.3
4	237°06.7	-6°05.6	18°02.9	12.1	-5°02.4	-11.0	57.2
5	252°06.9	-6°04.6	32°34.0	12.1	-5°13.4	-11.0	57.2
6	267°07.0	-6°03.6	47°05.1	12.1	-5°24.4	-11.0	57.2
7	282°07.2	-6°02.7	61°36.3	12.2	-5°35.4	-10.9	57.1
8	297°07.3	-6°01.7	76°07.5	12.2	-5°46.3	-10.9	57.1
9	312°07.4	-6°00.7	90°38.7	12.2	-5°57.2	-10.8	57.1
10	327°07.6	-5°59.8	105°09.9	12.2	-6°08.0	-10.8	57.0
11	342°07.7	-5°58.8	119°41.1	12.2	-6°18.8	-10.8	57.0
12	357°07.9	-5°57.8	134°12.4	12.3	-6°29.5	-10.7	57.0
13	12°08.0	-5°56.9	148°43.7	12.3	-6°40.2	-10.7	56.9
14	27°08.1	-5°55.9	163°15.0	12.3	-6°50.8	-10.6	56.9
15	42°08.3	-5°54.9	177°46.3	12.3	-7°01.4	-10.6	56.9
16	57°08.4	-5°54.0	192°17.6	12.3	-7°12.0	-10.5	56.8
17	72°08.6	-5°53.0	206°48.9	12.4	-7°22.5	-10.5	56.8
18	87°08.7	-5°52.0	221°20.3	12.4	-7°32.9	-10.4	56.8
19	102°08.9	-5°51.1	235°51.7	12.4	-7°43.3	-10.4	56.7
20	117°09.0	-5°50.1	250°23.1	12.4	-7°53.7	-10.3	56.7
21	132°09.2	-5°49.1	264°54.5	12.4	-8°04.0	-10.3	56.7
22	147°09.3	-5°48.2	279°25.9	12.4	-8°14.2	-10.2	56.6
23	162°09.4	-5°47.2	293°57.3	12.4	-8°24.4	-10.2	56.6
	SD.=16.1	d=1.0			S.D.=15.7		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°09.6	-5°46.2	308°28.8	12.4	-8°34.5	-10.1	56.6
1	192°09.7	-5°45.3	323°00.2	12.5	-8°44.6	-10.1	56.5
2	207°09.9	-5°44.3	337°31.7	12.5	-8°54.7	-10.0	56.5
3	222°10.0	-5°43.3	352°03.1	12.5	-9°04.6	-9.9	56.5
4	237°10.2	-5°42.4	6°34.6	12.5	-9°14.6	-9.9	56.4
5	252°10.3	-5°41.4	21°06.1	12.5	-9°24.4	-9.8	56.4
6	267°10.4	-5°40.4	35°37.6	12.5	-9°34.2	-9.8	56.4
7	282°10.6	-5°39.5	50°09.1	12.5	-9°44.0	-9.7	56.3
8	297°10.7	-5°38.5	64°40.6	12.5	-9°53.7	-9.7	56.3
9	312°10.9	-5°37.5	79°12.2	12.5	-10°03.3	-9.6	56.3
10	327°11.0	-5°36.5	93°43.7	12.5	-10°12.9	-9.5	56.2
11	342°11.2	-5°35.6	108°15.2	12.5	-10°22.4	-9.5	56.2
12	357°11.3	-5°34.6	122°46.8	12.5	-10°31.9	-9.4	56.2
13	12°11.5	-5°33.6	137°18.3	12.6	-10°41.3	-9.4	56.1
14	27°11.6	-5°32.7	151°49.9	12.6	-10°50.6	-9.3	56.1
15	42°11.8	-5°31.7	166°21.5	12.6	-10°59.8	-9.2	56.1
16	57°11.9	-5°30.7	180°53.0	12.6	-11°09.1	-9.2	56.0
17	72°12.1	-5°29.8	195°24.6	12.6	-11°18.2	-9.1	56.0
18	87°12.2	-5°28.8	209°56.2	12.6	-11°27.3	-9.0	56.0
19	102°12.4	-5°27.8	224°27.7	12.6	-11°36.3	-9.0	56.0
20	117°12.5	-5°26.8	238°59.3	12.6	-11°45.2	-8.9	55.9
21	132°12.6	-5°25.9	253°30.9	12.6	-11°54.1	-8.9	55.9
22	147°12.8	-5°24.9	268°02.5	12.6	-12°02.9	-8.8	55.9
23	162°12.9	-5°23.9	282°34.1	12.6	-12°11.7	-8.7	55.8
	SD.=16.1	d=1.0			S.D.=15.4		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°13.1	-5°23.0	297°05.7	12.6	-12°20.4	-8.7	55.8
1	192°13.2	-5°22.0	311°37.2	12.6	-12°29.0	-8.6	55.8
2	207°13.4	-5°21.0	326°08.8	12.6	-12°37.5	-8.5	55.7
3	222°13.5	-5°20.0	340°40.4	12.6	-12°46.0	-8.4	55.7
4	237°13.7	-5°19.1	355°12.0	12.6	-12°54.4	-8.4	55.7
5	252°13.8	-5°18.1	9°43.6	12.6	-13°02.8	-8.3	55.7
6	267°14.0	-5°17.1	24°15.2	12.6	-13°11.0	-8.2	55.6
7	282°14.1	-5°16.2	38°46.8	12.6	-13°19.2	-8.2	55.6
8	297°14.3	-5°15.2	53°18.3	12.6	-13°27.4	-8.1	55.6
9	312°14.4	-5°14.2	67°49.9	12.6	-13°35.4	-8.0	55.5
10	327°14.6	-5°13.2	82°21.5	12.6	-13°43.4	-8.0	55.5
11	342°14.7	-5°12.3	96°53.1	12.6	-13°51.3	-7.9	55.5
12	357°14.9	-5°11.3	111°24.7	12.6	-13°59.2	-7.8	55.5
13	12°15.0	-5°10.3	125°56.2	12.6	-14°06.9	-7.7	55.4
14	27°15.2	-5°09.4	140°27.8	12.6	-14°14.6	-7.7	55.4
15	42°15.3	-5°08.4	154°59.3	12.6	-14°22.3	-7.6	55.4
16	57°15.5	-5°07.4	169°30.9	12.6	-14°29.8	-7.5	55.4
17	72°15.6	-5°06.4	184°02.5	12.6	-14°37.3	-7.4	55.3
18	87°15.8	-5°05.5	198°34.0	12.5	-14°44.7	-7.4	55.3
19	102°15.9	-5°04.5	213°05.6	12.5	-14°52.0	-7.3	55.3
20	117°16.1	-5°03.5	227°37.1	12.5	-14°59.3	-7.2	55.3
21	132°16.2	-5°02.5	242°08.6	12.5	-15°06.4	-7.1	55.2
22	147°16.4	-5°01.6	256°40.2	12.5	-15°13.5	-7.1	55.2
23	162°16.5	-5°00.6	271°11.7	12.5	-15°20.5	-7.0	55.2
	SD.=16.1	d=1.0			S.D.=15.2		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:45	06:03	07:11	17:14	18:21	19:41
70	04:53	06:03	07:04	17:20	18:21	19:33
68	04:59	06:03	06:59	17:25	18:21	19:26
66	05:04	06:03	06:54	17:30	18:21	19:21
64	05:08	06:03	06:50	17:34	18:21	19:16
62	05:12	06:03	06:47	17:37	18:21	19:13
60	05:15	06:03	06:44	17:40	18:21	19:10
58	05:17	06:02	06:41	17:42	18:21	19:07
56	05:19	06:02	06:39	17:44	18:22	19:05
54	05:21	06:02	06:37	17:47	18:22	19:03
52	05:22	06:01	06:35	17:48	18:22	19:01
50	05:24	06:01	06:33	17:50	18:22	18:60
45	05:26	06:00	06:29	17:54	18:23	18:57
40	05:28	05:59	06:26	17:57	18:24	18:56
35	05:29	05:58	06:23	17:60	18:25	18:55
30	05:29	05:57	06:21	18:02	18:26	18:54
20	05:28	05:54	06:16	18:07	18:29	18:54
10	05:26	05:51	06:12	18:11	18:32	18:56
0	05:23	05:47	06:08	18:15	18:35	18:59
-10	05:18	05:43	06:04	18:18	18:40	19:04
-20	05:11	05:37	05:59	18:23	18:45	19:11
-30	05:02	05:30	05:54	18:28	18:52	19:20
-35	04:56	05:26	05:51	18:31	18:56	19:26
-40	04:48	05:20	05:48	18:34	19:01	19:34
-45	04:38	05:14	05:44	18:38	19:08	19:43
-50	04:26	05:06	05:39	18:43	19:16	19:55
-52	04:20	05:02	05:37	18:45	19:19	20:01
-54	04:13	04:58	05:34	18:47	19:23	20:08
-56	04:06	04:53	05:31	18:50	19:28	20:15
-58	03:57	04:47	05:28	18:53	19:33	20:24
-60	03:46	04:41	05:25	18:56	19:39	20:34

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	23:15	–:–	01:08	07:41	07:30	07:16
70	23:02	–:–	00:44	07:50	07:45	07:41
68	22:51	–:–	00:26	07:56	07:58	08:00
66	22:42	–:–	00:11	08:02	08:08	08:16
64	22:34	23:59	–:–	08:07	08:16	08:28
62	22:28	23:49	–:–	08:11	08:24	08:39
60	22:23	23:41	–:–	08:14	08:30	08:49
58	22:18	23:33	–:–	08:18	08:36	08:57
56	22:13	23:27	–:–	08:20	08:41	09:04
54	22:10	23:21	–:–	08:23	08:46	09:10
52	22:06	23:15	–:–	08:25	08:50	09:16
50	22:03	23:11	–:–	08:28	08:54	09:21
45	21:56	23:00	–:–	08:32	09:02	09:33
40	21:50	22:52	23:51	08:36	09:09	09:42
35	21:46	22:44	23:42	08:40	09:14	09:50
30	21:41	22:38	23:33	08:43	09:20	09:58
20	21:34	22:27	23:19	08:48	09:29	10:10
10	21:28	22:18	23:07	08:52	09:37	10:21
0	21:22	22:09	22:56	08:57	09:44	10:31
-10	21:16	21:60	22:44	09:01	09:52	10:41
-20	21:09	21:50	22:32	09:06	09:60	10:52
-30	21:02	21:40	22:18	09:11	10:09	11:05
-35	20:58	21:33	22:10	09:14	10:14	11:12
-40	20:54	21:26	22:01	09:18	10:20	11:20
-45	20:48	21:18	21:51	09:22	10:27	11:30
-50	20:42	21:09	21:38	09:26	10:36	11:42
-52	20:39	21:04	21:32	09:29	10:39	11:47
-54	20:36	20:59	21:25	09:31	10:44	11:53
-56	20:32	20:54	21:18	09:34	10:49	12:00
-58	20:28	20:48	21:10	09:37	10:54	12:08
-60	20:24	20:41	21:01	09:40	10:60	12:16

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
5	11:35	11:28	12:11	02:45	15:09	18(86%)
6	11:22	11:15	12:11	03:32	15:56	19(78%)
7	11:08	11:00	12:11	04:19	16:43	20(69%)

March 08, 09 ,10 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	165°38.9	164°00.1	-0°38.5	261°45.9	-23°09.0	294°30.3	-17°24.8	247°13.1	-22°19.8
1	180°41.4	178°59.7	-0°37.2	276°46.8	-23°09.1	309°32.7	-17°24.8	262°15.4	-22°19.8
2	195°43.9	193°59.3	-0°35.9	291°47.7	-23°09.2	324°35.2	-17°24.8	277°17.7	-22°19.8
3	210°46.3	208°59.0	-0°34.6	306°48.6	-23°09.3	339°37.6	-17°24.8	292°20.0	-22°19.8
4	225°48.8	223°58.6	-0°33.3	321°49.4	-23°09.4	354°40.1	-17°24.8	307°22.3	-22°19.8
5	240°51.3	238°58.2	-0°32.0	336°50.3	-23°09.5	9°42.5	-17°24.8	322°24.6	-22°19.8
6	255°53.7	253°57.9	-0°30.8	351°51.2	-23°09.6	24°45.0	-17°24.7	337°26.9	-22°19.8
7	270°56.2	268°57.5	-0°29.5	6°52.1	-23°09.7	39°47.4	-17°24.7	352°29.2	-22°19.8
8	285°58.6	283°57.1	-0°28.2	21°52.9	-23°09.8	54°49.9	-17°24.7	7°31.5	-22°19.8
9	301°01.1	298°56.8	-0°26.9	36°53.8	-23°09.9	69°52.3	-17°24.7	22°33.8	-22°19.8
10	316°03.6	313°56.4	-0°25.6	51°54.7	-23°10.0	84°54.8	-17°24.7	37°36.0	-22°19.7
11	331°06.0	328°56.0	-0°24.3	66°55.6	-23°10.2	99°57.3	-17°24.7	52°38.3	-22°19.7
12	346°08.5	343°55.7	-0°23.0	81°56.5	-23°10.3	114°59.7	-17°24.7	67°40.6	-22°19.7
13	1°11.0	358°55.3	-0°21.8	96°57.3	-23°10.4	130°02.2	-17°24.7	82°42.9	-22°19.7
14	16°13.4	13°54.9	-0°20.5	111°58.2	-23°10.5	145°04.6	-17°24.7	97°45.2	-22°19.7
15	31°15.9	28°54.6	-0°19.2	126°59.1	-23°10.6	160°07.1	-17°24.7	112°47.5	-22°19.7
16	46°18.4	43°54.2	-0°17.9	141°60.0	-23°10.7	175°09.5	-17°24.7	127°49.8	-22°19.7
17	61°20.8	58°53.8	-0°16.6	157°00.8	-23°10.8	190°12.0	-17°24.7	142°52.1	-22°19.7
18	76°23.3	73°53.5	-0°15.3	172°01.7	-23°10.9	205°14.5	-17°24.7	157°54.4	-22°19.7
19	91°25.8	88°53.1	-0°14.0	187°02.6	-23°11.0	220°16.9	-17°24.7	172°56.7	-22°19.7
20	106°28.2	103°52.7	-0°12.8	202°03.5	-23°11.1	235°19.4	-17°24.7	187°59.0	-22°19.6
21	121°30.7	118°52.4	-0°11.5	217°04.3	-23°11.2	250°21.8	-17°24.7	203°01.3	-22°19.6
22	136°33.1	133°52.0	-0°10.2	232°05.2	-23°11.3	265°24.3	-17°24.7	218°03.6	-22°19.6
23	151°35.6	148°51.6	-0°08.9	247°06.1	-23°11.4	280°26.8	-17°24.7	233°05.9	-22°19.6
Mer.pass.:12:55		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.7		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	166°38.1	163°51.3	-0°07.6	262°07.0	-23°11.5	295°29.2	-17°24.7	248°08.2	-22°19.6
1	181°40.5	178°50.9	-0°06.3	277°07.8	-23°11.6	310°31.7	-17°24.7	263°10.5	-22°19.6
2	196°43.0	193°50.5	-0°05.0	292°08.7	-23°11.7	325°34.1	-17°24.6	278°12.8	-22°19.6
3	211°45.5	208°50.2	-0°03.7	307°09.6	-23°11.8	340°36.6	-17°24.6	293°15.1	-22°19.6
4	226°47.9	223°49.8	-0°02.5	322°10.5	-23°11.9	355°39.1	-17°24.6	308°17.3	-22°19.6
5	241°50.4	238°49.4	-0°01.2	337°11.4	-23°12.0	10°41.5	-17°24.6	323°19.6	-22°19.6
6	256°52.9	253°49.1	0°00.1	352°12.2	-23°12.1	25°44.0	-17°24.6	338°21.9	-22°19.5
7	271°55.3	268°48.7	0°01.4	7°13.1	-23°12.2	40°46.5	-17°24.6	353°24.2	-22°19.5
8	286°57.8	283°48.3	0°02.7	22°14.0	-23°12.3	55°48.9	-17°24.6	8°26.5	-22°19.5
9	302°00.2	298°48.0	0°04.0	37°14.9	-23°12.4	70°51.4	-17°24.6	23°28.8	-22°19.5
10	317°02.7	313°47.6	0°05.3	52°15.7	-23°12.5	85°53.8	-17°24.6	38°31.1	-22°19.5
11	332°05.2	328°47.2	0°06.5	67°16.6	-23°12.6	100°56.3	-17°24.6	53°33.4	-22°19.5
12	347°07.6	343°46.9	0°07.8	82°17.5	-23°12.7	115°58.8	-17°24.6	68°35.7	-22°19.5
13	2°10.1	358°46.5	0°09.1	97°18.4	-23°12.8	131°01.2	-17°24.6	83°38.0	-22°19.5
14	17°12.6	13°46.1	0°10.4	112°19.3	-23°12.9	146°03.7	-17°24.6	98°40.3	-22°19.5
15	32°15.0	28°45.8	0°11.7	127°20.1	-23°13.0	161°06.2	-17°24.6	113°42.6	-22°19.5
16	47°17.5	43°45.4	0°13.0	142°21.0	-23°13.0	176°08.6	-17°24.6	128°44.9	-22°19.5
17	62°20.0	58°45.0	0°14.3	157°21.9	-23°13.1	191°11.1	-17°24.6	143°47.2	-22°19.4
18	77°22.4	73°44.7	0°15.6	172°22.8	-23°13.2	206°13.6	-17°24.5	158°49.5	-22°19.4
19	92°24.9	88°44.3	0°16.8	187°23.6	-23°13.3	221°16.0	-17°24.5	173°51.8	-22°19.4
20	107°27.4	103°43.9	0°18.1	202°24.5	-23°13.4	236°18.5	-17°24.5	188°54.1	-22°19.4
21	122°29.8	118°43.6	0°19.4	217°25.4	-23°13.5	251°21.0	-17°24.5	203°56.4	-22°19.4
22	137°32.3	133°43.2	0°20.7	232°26.3	-23°13.6	266°23.4	-17°24.5	218°58.7	-22°19.4
23	152°34.7	148°42.8	0°22.0	247°27.2	-23°13.7	281°25.9	-17°24.5	234°01.0	-22°19.4
Mer.pass.:12:51		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.7		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	167°37.2	163°42.5	0°23.3	262°28.0	-23°13.8	296°28.4	-17°24.5	249°03.3	-22°19.4
1	182°39.7	178°42.1	0°24.6	277°28.9	-23°13.9	311°30.8	-17°24.5	264°05.6	-22°19.4
2	197°42.1	193°41.7	0°25.9	292°29.8	-23°14.0	326°33.3	-17°24.5	279°07.9	-22°19.4
3	212°44.6	208°41.4	0°27.1	307°30.7	-23°14.1	341°35.8	-17°24.5	294°10.2	-22°19.4
4	227°47.1	223°41.0	0°28.4	322°31.6	-23°14.2	356°38.3	-17°24.5	309°12.5	-22°19.3
5	242°49.5	238°40.7	0°29.7	337°32.4	-23°14.3	11°40.7	-17°24.5	324°14.8	-22°19.3
6	257°52.0	253°40.3	0°31.0	352°33.3	-23°14.4	26°43.2	-17°24.5	339°17.1	-22°19.3
7	272°54.5	268°39.9	0°32.3	7°34.2	-23°14.5	41°45.7	-17°24.4	354°19.4	-22°19.3
8	287°56.9	283°39.6	0°33.6	22°35.1	-23°14.6	56°48.1	-17°24.4	9°21.7	-22°19.3
9	302°59.4	298°39.2	0°34.9	37°36.0	-23°14.7	71°50.6	-17°24.4	24°24.0	-22°19.3
10	318°01.9	313°38.8	0°36.1	52°36.8	-23°14.7	86°53.1	-17°24.4	39°26.3	-22°19.3
11	333°04.3	328°38.5	0°37.4	67°37.7	-23°14.8	101°55.6	-17°24.4	54°28.6	-22°19.3
12	348°06.8	343°38.1	0°38.7	82°38.6	-23°14.9	116°58.0	-17°24.4	69°30.9	-22°19.3
13	3°09.2	358°37.7	0°40.0	97°39.5	-23°15.0	132°00.5	-17°24.4	84°33.2	-22°19.3
14	18°11.7	13°37.4	0°41.3	112°40.4	-23°15.1	147°03.0	-17°24.4	99°35.5	-22°19.2
15	33°14.2	28°37.0	0°42.6	127°41.2	-23°15.2	162°05.5	-17°24.4	114°37.8	-22°19.2
16	48°16.6	43°36.6	0°43.9	142°42.1	-23°15.3	177°07.9	-17°24.4	129°40.1	-22°19.2
17	63°19.1	58°36.3	0°45.2	157°43.0	-23°15.4	192°10.4	-17°24.4	144°42.4	-22°19.2
18	78°21.6	73°35.9	0°46.4	172°43.9	-23°15.5	207°12.9	-17°24.3	159°44.7	-22°19.2
19	93°24.0	88°35.5	0°47.7	187°44.8	-23°15.6	222°15.3	-17°24.3	174°47.0	-22°19.2
20	108°26.5	103°35.2	0°49.0	202°45.6	-23°15.7	237°17.8	-17°24.3	189°49.3	-22°19.2
21	123°29.0	118°34.8	0°50.3	217°46.5	-23°15.7	252°20.3	-17°24.3	204°51.6	-22°19.2
22	138°31.4	133°34.5	0°51.6	232°47.4	-23°15.8	267°22.8	-17°24.3	219°53.9	-22°19.2
23	153°33.9	148°34.1	0°52.9	247°48.3	-23°15.9	282°25.3	-17°24.3	234°56.2	-22°19.2
Mer.pass.:12:47		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.7		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°13.0	-42°12.7
Schedar	349°37.3	56°38.2
Diphda	348°52.9	-17°53.5
Achernar	335°24.9	-57°09.0
Hamal	327°57.4	23°32.7
Polaris	316°35.5	89°20.6
Akamar	315°16.1	-40°14.4
Menkar	314°11.9	4°09.4
Mirfak	308°35.9	49°55.5
Aldebaran	290°45.8	16°32.5
Rigel	281°09.0	-8°11.2
Capella	280°29.7	46°01.0
Bellatrix	278°28.5	6°21.7
Elnath	278°08.5	28°37.2
Alnilam	275°43.1	-1°11.7
Betelgeuse	270°57.8	7°24.3
Canopus	263°54.5	-52°42.8
Sirius	258°30.7	-16°44.6
Adara	255°09.8	-29°00.2
Procyon	244°56.1	5°10.6
Pollux	243°23.5	27°58.8
Avior	234°16.2	-59°34.4
Suhail	222°49.7	-43°30.6
Miaplacidus	221°38.2	-69°47.7
Alphard	217°52.6	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.1
Denebola	182°30.0	14°28.2
Gienah	175°48.7	-17°38.6
Acrux	173°05.0	-63°11.8
Gacrux	171°56.7	-57°12.8
Alioth	166°17.5	55°51.6
Spica	158°27.6	-11°15.3
Alcaid	152°56.0	49°13.3
Hadar	148°42.8	-60°27.3
Menkent	148°03.5	-36°27.4
Arcturus	145°52.5	19°05.5
Rigil Kent.	139°46.9	-60°54.3
Zubenelg.	137°01.7	-16°06.9
Kochab	137°19.5	74°04.7
Alphecca	126°08.2	26°39.2
Antares	112°22.3	-26°28.1
Atria	107°21.2	-69°03.1
Sabik	102°08.9	-15°44.7
Shaula	96°17.6	-37°06.7
Rasalhague	96°03.5	12°32.8
Etamin	90°44.8	51°29.0
Kaus Aust.	83°39.7	-34°22.3
Vega	80°37.0	38°47.9
Nunki	75°54.5	-26°16.3
Altair	62°05.4	8°54.9
Peacock	53°14.7	-56°40.4
Deneb	49°29.6	45°20.6
Enif	33°44.3	9°57.4
Alnair	27°40.2	-46°52.4
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.6	28°10.7
Markab	13°35.5	15°18.0

2018/3/8	**SHA**	**Mer.pass**
Venus	358°21.1	13:04
Mars	96°07.0	06:33
Jupiter	128°51.3	04:21
Saturn	81°34.2	07:30

2018/3/9	**SHA**	**Mer.pass**
Venus	357°13.2	13:05
Mars	95°28.9	06:31
Jupiter	128°51.2	04:17
Saturn	81°30.1	07:26

2018/3/1	**SHA**	**Mer.pass**
Venus	356°05.3	13:05
Mars	94°50.8	06:30
Jupiter	128°51.2	04:13
Saturn	81°26.1	07:23

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°16.7	-4°59.6	285°43.2	12.5	-15°27.5	-6.9	55.2
1	192°16.8	-4°58.6	300°14.7	12.5	-15°34.3	-6.8	55.1
2	207°17.0	-4°57.7	314°46.2	12.5	-15°41.1	-6.7	55.1
3	222°17.2	-4°56.7	329°17.7	12.5	-15°47.8	-6.7	55.1
4	237°17.3	-4°55.7	343°49.2	12.5	-15°54.5	-6.6	55.1
5	252°17.5	-4°54.7	358°20.7	12.5	-16°01.0	-6.5	55.0
6	267°17.6	-4°53.8	12°52.2	12.5	-16°07.5	-6.4	55.0
7	282°17.8	-4°52.8	27°23.6	12.5	-16°13.9	-6.3	55.0
8	297°17.9	-4°51.8	41°55.1	12.5	-16°20.2	-6.3	55.0
9	312°18.1	-4°50.8	56°26.5	12.5	-16°26.4	-6.2	55.0
10	327°18.2	-4°49.9	70°58.0	12.4	-16°32.5	-6.1	54.9
11	342°18.4	-4°48.9	85°29.4	12.4	-16°38.6	-6.0	54.9
12	357°18.5	-4°47.9	100°00.9	12.4	-16°44.6	-5.9	54.9
13	12°18.7	-4°46.9	114°32.3	12.4	-16°50.5	-5.9	54.9
14	27°18.8	-4°46.0	129°03.7	12.4	-16°56.3	-5.8	54.9
15	42°19.0	-4°45.0	143°35.1	12.4	-17°02.0	-5.7	54.8
16	57°19.1	-4°44.0	158°06.5	12.4	-17°07.7	-5.6	54.8
17	72°19.3	-4°43.0	172°37.9	12.4	-17°13.3	-5.5	54.8
18	87°19.5	-4°42.1	187°09.3	12.4	-17°18.7	-5.4	54.8
19	102°19.6	-4°41.1	201°40.6	12.4	-17°24.1	-5.4	54.8
20	117°19.8	-4°40.1	216°12.0	12.4	-17°29.5	-5.3	54.7
21	132°19.9	-4°39.1	230°43.4	12.4	-17°34.7	-5.2	54.7
22	147°20.1	-4°38.2	245°14.7	12.3	-17°39.9	-5.1	54.7
23	162°20.2	-4°37.2	259°46.1	12.3	-17°44.9	-5.0	54.7
	SD.=16.1	d=1.0			S.D.=15.0		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°20.4	-4°36.2	274°17.4	12.3	-17°49.9	-4.9	54.7
1	192°20.5	-4°35.2	288°48.7	12.3	-17°54.8	-4.9	54.7
2	207°20.7	-4°34.2	303°20.0	12.3	-17°59.6	-4.8	54.6
3	222°20.9	-4°33.3	317°51.3	12.3	-18°04.3	-4.7	54.6
4	237°21.0	-4°32.3	332°22.6	12.3	-18°09.0	-4.6	54.6
5	252°21.2	-4°31.3	346°53.9	12.3	-18°13.5	-4.5	54.6
6	267°21.3	-4°30.3	1°25.2	12.3	-18°18.0	-4.4	54.6
7	282°21.5	-4°29.4	15°56.4	12.3	-18°22.4	-4.3	54.6
8	297°21.6	-4°28.4	30°27.7	12.3	-18°26.6	-4.2	54.5
9	312°21.8	-4°27.4	44°59.0	12.2	-18°30.8	-4.2	54.5
10	327°22.0	-4°26.4	59°30.2	12.2	-18°35.0	-4.1	54.5
11	342°22.1	-4°25.5	74°01.4	12.2	-18°39.0	-4.0	54.5
12	357°22.3	-4°24.5	88°32.7	12.2	-18°42.9	-3.9	54.5
13	12°22.4	-4°23.5	103°03.9	12.2	-18°46.8	-3.8	54.5
14	27°22.6	-4°22.5	117°35.1	12.2	-18°50.5	-3.7	54.5
15	42°22.7	-4°21.5	132°06.3	12.2	-18°54.2	-3.6	54.4
16	57°22.9	-4°20.6	146°37.5	12.2	-18°57.8	-3.5	54.4
17	72°23.1	-4°19.6	161°08.7	12.2	-19°01.3	-3.5	54.4
18	87°23.2	-4°18.6	175°39.8	12.2	-19°04.7	-3.4	54.4
19	102°23.4	-4°17.6	190°11.0	12.2	-19°08.0	-3.3	54.4
20	117°23.5	-4°16.6	204°42.2	12.2	-19°11.3	-3.2	54.4
21	132°23.7	-4°15.7	219°13.3	12.1	-19°14.4	-3.1	54.4
22	147°23.9	-4°14.7	233°44.5	12.1	-19°17.4	-3.0	54.4
23	162°24.0	-4°13.7	248°15.6	12.1	-19°20.4	-2.9	54.4
	SD.=16.1	d=1.0			S.D.=14.9		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°24.2	-4°12.7	262°46.7	12.1	-19°23.3	-2.8	54.3
1	192°24.3	-4°11.8	277°17.9	12.1	-19°26.0	-2.7	54.3
2	207°24.5	-4°10.8	291°49.0	12.1	-19°28.7	-2.6	54.3
3	222°24.6	-4°09.8	306°20.1	12.1	-19°31.3	-2.6	54.3
4	237°24.8	-4°08.8	320°51.2	12.1	-19°33.8	-2.5	54.3
5	252°25.0	-4°07.8	335°22.3	12.1	-19°36.2	-2.4	54.3
6	267°25.1	-4°06.9	349°53.4	12.1	-19°38.6	-2.3	54.3
7	282°25.3	-4°05.9	4°24.4	12.1	-19°40.8	-2.2	54.3
8	297°25.4	-4°04.9	18°55.5	12.1	-19°42.9	-2.1	54.3
9	312°25.6	-4°03.9	33°26.6	12.1	-19°45.0	-2.0	54.3
10	327°25.8	-4°02.9	47°57.7	12.1	-19°46.9	-1.9	54.3
11	342°25.9	-4°02.0	62°28.7	12.1	-19°48.8	-1.8	54.3
12	357°26.1	-4°01.0	76°59.8	12.1	-19°50.6	-1.7	54.2
13	12°26.3	-3°60.0	91°30.8	12.0	-19°52.3	-1.6	54.2
14	27°26.4	-3°59.0	106°01.9	12.0	-19°53.9	-1.5	54.2
15	42°26.6	-3°58.0	120°32.9	12.0	-19°55.4	-1.5	54.2
16	57°26.7	-3°57.1	135°03.9	12.0	-19°56.8	-1.4	54.2
17	72°26.9	-3°56.1	149°35.0	12.0	-19°58.1	-1.3	54.2
18	87°27.1	-3°55.1	164°06.0	12.0	-19°59.3	-1.2	54.2
19	102°27.2	-3°54.1	178°37.0	12.0	-20°00.4	-1.1	54.2
20	117°27.4	-3°53.1	193°08.0	12.0	-20°01.4	-1.0	54.2
21	132°27.5	-3°52.1	207°39.0	12.0	-20°02.4	-0.9	54.2
22	147°27.7	-3°51.2	222°10.0	12.0	-20°03.2	-0.8	54.2
23	162°27.9	-3°50.2	236°41.1	12.0	-20°04.0	-0.7	54.2
	SD.=16.1	d=1.0			S.D.=14.8		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:28	05:48	06:55	17:28	18:35	19:56
70	04:38	05:50	06:50	17:33	18:33	19:46
68	04:46	05:51	06:46	17:36	18:32	19:38
66	04:52	05:52	06:43	17:40	18:31	19:31
64	04:58	05:53	06:40	17:43	18:30	19:26
62	05:02	05:53	06:37	17:45	18:29	19:21
60	05:06	05:54	06:35	17:47	18:29	19:17
58	05:09	05:54	06:33	17:49	18:28	19:14
56	05:11	05:54	06:31	17:51	18:28	19:11
54	05:14	05:55	06:30	17:52	18:28	19:09
52	05:16	05:55	06:28	17:54	18:27	19:07
50	05:17	05:55	06:27	17:55	18:27	19:05
45	05:21	05:55	06:24	17:58	18:27	19:01
40	05:23	05:54	06:21	18:00	18:27	18:59
35	05:25	05:54	06:19	18:02	18:28	18:57
30	05:26	05:53	06:17	18:04	18:28	18:56
20	05:26	05:52	06:14	18:08	18:30	18:55
10	05:25	05:49	06:10	18:11	18:32	18:56
0	05:22	05:47	06:07	18:14	18:35	18:59
-10	05:18	05:43	06:04	18:17	18:38	19:02
-20	05:13	05:38	06:00	18:20	18:42	19:08
-30	05:04	05:32	05:56	18:24	18:48	19:16
-35	04:58	05:28	05:54	18:27	18:52	19:22
-40	04:51	05:24	05:51	18:29	18:57	19:29
-45	04:43	05:18	05:48	18:32	19:02	19:37
-50	04:32	05:11	05:44	18:36	19:09	19:48
-52	04:26	05:08	05:42	18:38	19:12	19:53
-54	04:20	05:04	05:40	18:40	19:16	19:59
-56	04:13	04:60	05:38	18:42	19:20	20:06
-58	04:05	04:55	05:35	18:44	19:25	20:14
-60	03:56	04:49	05:32	18:47	19:30	20:23

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	03:08	–:–	–:–	06:53	–:–	–:–
70	02:27	04:11	06:01	07:36	07:30	07:18
68	01:58	03:27	04:47	08:05	08:14	08:33
66	01:37	02:58	04:10	08:27	08:43	09:10
64	01:21	02:37	03:44	08:44	09:06	09:36
62	01:07	02:19	03:24	08:58	09:23	09:57
60	00:55	02:05	03:07	09:11	09:38	10:13
58	00:45	01:52	02:54	09:21	09:51	10:27
56	00:36	01:42	02:42	09:30	10:02	10:40
54	00:29	01:33	02:31	09:38	10:11	10:50
52	00:22	01:24	02:22	09:46	10:20	10:60
50	00:15	01:17	02:14	09:52	10:28	11:08
45	00:02	01:01	01:56	10:07	10:44	11:26
40	–:–	00:48	01:42	10:18	10:57	11:40
35	–:–	00:37	01:30	10:28	11:09	11:53
30	–:–	00:27	01:19	10:37	11:19	12:04
20	–:–	00:11	01:01	10:52	11:36	12:22
10	23:56	–:–	00:45	11:06	11:51	12:38
0	23:43	–:–	00:30	11:18	12:06	12:53
-10	23:29	–:–	00:16	11:31	12:20	13:08
-20	23:15	23:60	–:–	11:44	12:35	13:25
-30	22:59	23:42	–:–	11:59	12:52	13:43
-35	22:49	23:31	–:–	12:08	13:02	13:54
-40	22:39	23:20	–:–	12:19	13:14	14:06
-45	22:26	23:06	23:50	12:31	13:28	14:21
-50	22:11	22:48	23:32	12:45	13:44	14:39
-52	22:04	22:40	23:23	12:52	13:52	14:47
-54	21:56	22:31	23:14	12:60	14:01	14:57
-56	21:47	22:21	23:03	13:08	14:11	15:07
-58	21:37	22:10	22:51	13:18	14:22	15:19
-60	21:25	21:57	22:37	13:29	14:35	15:34

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
8	10:53	10:46	12:10	05:06	17:30	21(59%)
9	10:38	10:31	12:10	05:54	18:17	22(50%)
10	10:23	10:16	12:10	06:41	19:05	23(40%)

March 11, 12 ,13 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	168°36.3	163°33.7	0°54.2	262°49.2	-23°16.0	297°27.7	-17°24.3	249°58.5	-22°19.2
1	183°38.8	178°33.4	0°55.5	277°50.0	-23°16.1	312°30.2	-17°24.3	265°00.8	-22°19.1
2	198°41.3	193°33.0	0°56.7	292°50.9	-23°16.2	327°32.7	-17°24.3	280°03.1	-22°19.1
3	213°43.7	208°32.6	0°58.0	307°51.8	-23°16.3	342°35.2	-17°24.3	295°05.4	-22°19.1
4	228°46.2	223°32.3	0°59.3	322°52.7	-23°16.4	357°37.6	-17°24.3	310°07.7	-22°19.1
5	243°48.7	238°31.9	1°00.6	337°53.6	-23°16.5	12°40.1	-17°24.2	325°10.0	-22°19.1
6	258°51.1	253°31.5	1°01.9	352°54.5	-23°16.5	27°42.6	-17°24.2	340°12.3	-22°19.1
7	273°53.6	268°31.2	1°03.2	7°55.3	-23°16.6	42°45.1	-17°24.2	355°14.6	-22°19.1
8	288°56.1	283°30.8	1°04.5	22°56.2	-23°16.7	57°47.6	-17°24.2	10°16.9	-22°19.1
9	303°58.5	298°30.4	1°05.7	37°57.1	-23°16.8	72°50.0	-17°24.2	25°19.3	-22°19.1
10	319°01.0	313°30.1	1°07.0	52°58.0	-23°16.9	87°52.5	-17°24.2	40°21.6	-22°19.1
11	334°03.5	328°29.7	1°08.3	67°58.9	-23°17.0	102°55.0	-17°24.2	55°23.9	-22°19.1
12	349°05.9	343°29.4	1°09.6	82°59.7	-23°17.1	117°57.5	-17°24.2	70°26.2	-22°19.0
13	4°08.4	358°29.0	1°10.9	98°00.6	-23°17.1	132°60.0	-17°24.2	85°28.5	-22°19.0
14	19°10.8	13°28.6	1°12.2	113°01.5	-23°17.2	148°02.4	-17°24.2	100°30.8	-22°19.0
15	34°13.3	28°28.3	1°13.5	128°02.4	-23°17.3	163°04.9	-17°24.1	115°33.1	-22°19.0
16	49°15.8	43°27.9	1°14.8	143°03.3	-23°17.4	178°07.4	-17°24.1	130°35.4	-22°19.0
17	64°18.2	58°27.5	1°16.0	158°04.2	-23°17.5	193°09.9	-17°24.1	145°37.7	-22°19.0
18	79°20.7	73°27.2	1°17.3	173°05.0	-23°17.6	208°12.4	-17°24.1	160°40.0	-22°19.0
19	94°23.2	88°26.8	1°18.6	188°05.9	-23°17.7	223°14.9	-17°24.1	175°42.3	-22°19.0
20	109°25.6	103°26.4	1°19.9	203°06.8	-23°17.7	238°17.3	-17°24.1	190°44.6	-22°19.0
21	124°28.1	118°26.1	1°21.2	218°07.7	-23°17.8	253°19.8	-17°24.1	205°46.9	-22°19.0
22	139°30.6	133°25.7	1°22.5	233°08.6	-23°17.9	268°22.3	-17°24.1	220°49.2	-22°18.9
23	154°33.0	148°25.3	1°23.8	248°09.5	-23°18.0	283°24.8	-17°24.1	235°51.5	-22°18.9
Mer.pass.:12:43		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.7		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	169°35.5	163°25.0	1°25.0	263°10.3	-23°18.1	298°27.3	-17°24.0	250°53.8	-22°18.9
1	184°38.0	178°24.6	1°26.3	278°11.2	-23°18.2	313°29.8	-17°24.0	265°56.1	-22°18.9
2	199°40.4	193°24.3	1°27.6	293°12.1	-23°18.2	328°32.2	-17°24.0	280°58.4	-22°18.9
3	214°42.9	208°23.9	1°28.9	308°13.0	-23°18.3	343°34.7	-17°24.0	296°00.8	-22°18.9
4	229°45.3	223°23.5	1°30.2	323°13.9	-23°18.4	358°37.2	-17°24.0	311°03.1	-22°18.9
5	244°47.8	238°23.2	1°31.5	338°14.8	-23°18.5	13°39.7	-17°24.0	326°05.4	-22°18.9
6	259°50.3	253°22.8	1°32.8	353°15.6	-23°18.6	28°42.2	-17°24.0	341°07.7	-22°18.9
7	274°52.7	268°22.4	1°34.1	8°16.5	-23°18.6	43°44.7	-17°24.0	356°10.0	-22°18.9
8	289°55.2	283°22.1	1°35.3	23°17.4	-23°18.7	58°47.2	-17°23.9	11°12.3	-22°18.9
9	304°57.7	298°21.7	1°36.6	38°18.3	-23°18.8	73°49.6	-17°23.9	26°14.6	-22°18.8
10	320°00.1	313°21.3	1°37.9	53°19.2	-23°18.9	88°52.1	-17°23.9	41°16.9	-22°18.8
11	335°02.6	328°21.0	1°39.2	68°20.1	-23°19.0	103°54.6	-17°23.9	56°19.2	-22°18.8
12	350°05.1	343°20.6	1°40.5	83°21.0	-23°19.0	118°57.1	-17°23.9	71°21.5	-22°18.8
13	5°07.5	358°20.2	1°41.8	98°21.8	-23°19.1	133°59.6	-17°23.9	86°23.8	-22°18.8
14	20°10.0	13°19.9	1°43.1	113°22.7	-23°19.2	149°02.1	-17°23.9	101°26.1	-22°18.8
15	35°12.4	28°19.5	1°44.3	128°23.6	-23°19.3	164°04.6	-17°23.9	116°28.4	-22°18.8
16	50°14.9	43°19.2	1°45.6	143°24.5	-23°19.4	179°07.1	-17°23.8	131°30.8	-22°18.8
17	65°17.4	58°18.8	1°46.9	158°25.4	-23°19.4	194°09.6	-17°23.8	146°33.1	-22°18.8
18	80°19.8	73°18.4	1°48.2	173°26.3	-23°19.5	209°12.1	-17°23.8	161°35.4	-22°18.8
19	95°22.3	88°18.1	1°49.5	188°27.2	-23°19.6	224°14.5	-17°23.8	176°37.7	-22°18.8
20	110°24.8	103°17.7	1°50.8	203°28.0	-23°19.7	239°17.0	-17°23.8	191°40.0	-22°18.7
21	125°27.2	118°17.3	1°52.1	218°28.9	-23°19.8	254°19.5	-17°23.8	206°42.3	-22°18.7
22	140°29.7	133°17.0	1°53.3	233°29.8	-23°19.8	269°22.0	-17°23.8	221°44.6	-22°18.7
23	155°32.2	148°16.6	1°54.6	248°30.7	-23°19.9	284°24.5	-17°23.8	236°46.9	-22°18.7
Mer.pass.:12:39		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.6		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	170°34.6	163°16.2	1°55.9	263°31.6	-23°20.0	299°27.0	-17°23.7	251°49.2	-22°18.7
1	185°37.1	178°15.9	1°57.2	278°32.5	-23°20.1	314°29.5	-17°23.7	266°51.5	-22°18.7
2	200°39.6	193°15.5	1°58.5	293°33.4	-23°20.1	329°32.0	-17°23.7	281°53.9	-22°18.7
3	215°42.0	208°15.1	1°59.8	308°34.2	-23°20.2	344°34.5	-17°23.7	296°56.2	-22°18.7
4	230°44.5	223°14.8	2°01.0	323°35.1	-23°20.3	359°37.0	-17°23.7	311°58.5	-22°18.7
5	245°46.9	238°14.4	2°02.3	338°36.0	-23°20.4	14°39.5	-17°23.7	327°00.8	-22°18.7
6	260°49.4	253°14.1	2°03.6	353°36.9	-23°20.5	29°42.0	-17°23.7	342°03.1	-22°18.7
7	275°51.9	268°13.7	2°04.9	8°37.8	-23°20.5	44°44.5	-17°23.6	357°05.4	-22°18.6
8	290°54.3	283°13.3	2°06.2	23°38.7	-23°20.6	59°47.0	-17°23.6	12°07.7	-22°18.6
9	305°56.8	298°13.0	2°07.5	38°39.6	-23°20.7	74°49.5	-17°23.6	27°10.0	-22°18.6
10	320°59.3	313°12.6	2°08.8	53°40.5	-23°20.8	89°52.0	-17°23.6	42°12.3	-22°18.6
11	336°01.7	328°12.2	2°10.0	68°41.3	-23°20.8	104°54.4	-17°23.6	57°14.7	-22°18.6
12	351°04.2	343°11.9	2°11.3	83°42.2	-23°20.9	119°56.9	-17°23.6	72°17.0	-22°18.6
13	6°06.7	358°11.5	2°12.6	98°43.1	-23°21.0	134°59.4	-17°23.6	87°19.3	-22°18.6
14	21°09.1	13°11.1	2°13.9	113°44.0	-23°21.1	150°01.9	-17°23.5	102°21.6	-22°18.6
15	36°11.6	28°10.8	2°15.2	128°44.9	-23°21.1	165°04.4	-17°23.5	117°23.9	-22°18.6
16	51°14.1	43°10.4	2°16.5	143°45.8	-23°21.2	180°06.9	-17°23.5	132°26.2	-22°18.6
17	66°16.5	58°10.0	2°17.7	158°46.7	-23°21.3	195°09.4	-17°23.5	147°28.5	-22°18.6
18	81°19.0	73°09.7	2°19.0	173°47.6	-23°21.3	210°11.9	-17°23.5	162°30.8	-22°18.6
19	96°21.4	88°09.3	2°20.3	188°48.5	-23°21.4	225°14.4	-17°23.5	177°33.2	-22°18.5
20	111°23.9	103°08.9	2°21.6	203°49.3	-23°21.5	240°16.9	-17°23.5	192°35.5	-22°18.5
21	126°26.4	118°08.6	2°22.9	218°50.2	-23°21.6	255°19.4	-17°23.4	207°37.8	-22°18.5
22	141°28.8	133°08.2	2°24.2	233°51.1	-23°21.6	270°21.9	-17°23.4	222°40.1	-22°18.5
23	156°31.3	148°07.9	2°25.5	248°52.0	-23°21.7	285°24.4	-17°23.4	237°42.4	-22°18.5
Mer.pass.:12:35		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.6		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°13.0	-42°12.7
Schedar	349°37.3	56°38.1
Diphda	348°52.9	-17°53.5
Achernar	335°24.9	-57°09.0
Hamal	327°57.4	23°32.7
Polaris	316°36.6	89°20.6
Akamar	315°16.2	-40°14.3
Menkar	314°11.9	4°09.4
Mirfak	308°35.9	49°55.5
Aldebaran	290°45.8	16°32.5
Rigel	281°09.0	-8°11.2
Capella	280°29.7	46°01.0
Bellatrix	278°28.5	6°21.7
Elnath	278°08.6	28°37.2
Alnilam	275°43.1	-1°11.7
Betelgeuse	270°57.8	7°24.3
Canopus	263°54.6	-52°42.8
Sirius	258°30.7	-16°44.6
Adara	255°09.8	-29°00.2
Procyon	244°56.1	5°10.6
Pollux	243°23.5	27°58.8
Avior	234°16.2	-59°34.4
Suhail	222°49.7	-43°30.6
Miaplacidus	221°38.2	-69°47.7
Alphard	217°52.6	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.2
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.6
Acrux	173°05.0	-63°11.9
Gacrux	171°56.7	-57°12.8
Alioth	166°17.5	55°51.6
Spica	158°27.6	-11°15.3
Alcaid	152°56.0	49°13.3
Hadar	148°42.8	-60°27.4
Menkent	148°03.5	-36°27.4
Arcturus	145°52.4	19°05.5
Rigil Kent.	139°46.9	-60°54.3
Zubenelg.	137°01.7	-16°06.9
Kochab	137°19.5	74°04.7
Alphecca	126°08.2	26°39.2
Antares	112°22.2	-26°28.1
Atria	107°21.1	-69°03.1
Sabik	102°08.9	-15°44.7
Shaula	96°17.6	-37°06.7
Rasalhague	96°03.5	12°32.8
Etamin	90°44.7	51°29.0
Kaus Aust.	83°39.7	-34°22.3
Vega	80°37.0	38°47.8
Nunki	75°54.5	-26°16.3
Altair	62°05.4	8°54.9
Peacock	53°14.7	-56°40.4
Deneb	49°29.6	45°20.5
Enif	33°44.3	9°57.4
Alnair	27°40.2	-46°52.4
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.6	28°10.7
Markab	13°35.5	15°18.0

2018/3/1	**SHA**	**Mer.pass**
Venus	354°57.4	13:06
Mars	94°12.8	06:28
Jupiter	128°51.4	04:09
Saturn	81°22.2	07:19

2018/3/1	**SHA**	**Mer.pass**
Venus	353°49.5	13:07
Mars	93°34.9	06:27
Jupiter	128°51.8	04:06
Saturn	81°18.3	07:15

2018/3/1	**SHA**	**Mer.pass**
Venus	352°41.6	13:07
Mars	92°57.0	06:26
Jupiter	128°52.4	04:02
Saturn	81°14.6	07:12

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177°28.0	-3°49.2	251°12.1	12.0	-20°04.7	-0.6	54.2
1	192°28.2	-3°48.2	265°43.1	12.0	-20°05.2	-0.5	54.2
2	207°28.4	-3°47.2	280°14.1	12.0	-20°05.7	-0.4	54.2
3	222°28.5	-3°46.3	294°45.1	12.0	-20°06.1	-0.3	54.2
4	237°28.7	-3°45.3	309°16.1	12.0	-20°06.4	-0.2	54.2
5	252°28.8	-3°44.3	323°47.0	12.0	-20°06.6	-0.2	54.2
6	267°29.0	-3°43.3	338°18.0	12.0	-20°06.7	-0.1	54.2
7	282°29.2	-3°42.3	352°49.0	12.0	-20°06.7	0.0	54.2
8	297°29.3	-3°41.4	7°20.0	12.0	-20°06.6	0.1	54.2
9	312°29.5	-3°40.4	21°51.0	12.0	-20°06.4	0.2	54.2
10	327°29.7	-3°39.4	36°22.0	12.0	-20°06.2	0.3	54.2
11	342°29.8	-3°38.4	50°53.0	12.0	-20°05.8	0.4	54.2
12	357°30.0	-3°37.4	65°24.0	12.0	-20°05.3	0.5	54.2
13	12°30.2	-3°36.4	79°55.0	12.0	-20°04.8	0.6	54.2
14	27°30.3	-3°35.5	94°26.0	12.0	-20°04.2	0.7	54.2
15	42°30.5	-3°34.5	108°57.0	12.0	-20°03.4	0.8	54.2
16	57°30.6	-3°33.5	123°28.0	12.0	-20°02.6	0.9	54.2
17	72°30.8	-3°32.5	137°58.9	12.0	-20°01.7	1.0	54.2
18	87°31.0	-3°31.5	152°29.9	12.0	-20°00.7	1.1	54.2
19	102°31.1	-3°30.5	167°00.9	12.0	-19°59.6	1.2	54.2
20	117°31.3	-3°29.6	181°31.9	12.0	-19°58.4	1.2	54.2
21	132°31.5	-3°28.6	196°02.9	12.0	-19°57.1	1.3	54.2
22	147°31.6	-3°27.6	210°34.0	12.0	-19°55.7	1.4	54.2
23	162°31.8	-3°26.6	225°05.0	12.0	-19°54.2	1.5	54.2
	SD.=16.1	d=1.0	S.D.=14.8				

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°32.0	-3°25.6	239°36.0	12.0	-19°52.6	1.6	54.2
1	192°32.1	-3°24.6	254°07.0	12.0	-19°51.0	1.7	54.2
2	207°32.3	-3°23.7	268°38.0	12.0	-19°49.2	1.8	54.2
3	222°32.5	-3°22.7	283°09.0	12.0	-19°47.4	1.9	54.2
4	237°32.6	-3°21.7	297°40.1	12.0	-19°45.4	2.0	54.2
5	252°32.8	-3°20.7	312°11.1	12.0	-19°43.4	2.1	54.2
6	267°33.0	-3°19.7	326°42.1	12.0	-19°41.3	2.2	54.2
7	282°33.1	-3°18.7	341°13.2	12.0	-19°39.1	2.3	54.2
8	297°33.3	-3°17.8	355°44.2	12.1	-19°36.8	2.4	54.3
9	312°33.5	-3°16.8	10°15.3	12.1	-19°34.4	2.4	54.3
10	327°33.6	-3°15.8	24°46.3	12.1	-19°31.9	2.5	54.3
11	342°33.8	-3°14.8	39°17.4	12.1	-19°29.3	2.6	54.3
12	357°34.0	-3°13.8	53°48.5	12.1	-19°26.6	2.7	54.3
13	12°34.1	-3°12.8	68°19.6	12.1	-19°23.9	2.8	54.3
14	27°34.3	-3°11.9	82°50.6	12.1	-19°21.0	2.9	54.3
15	42°34.5	-3°10.9	97°21.7	12.1	-19°18.1	3.0	54.3
16	57°34.6	-3°09.9	111°52.8	12.1	-19°15.0	3.1	54.3
17	72°34.8	-3°08.9	126°23.9	12.1	-19°11.9	3.2	54.3
18	87°35.0	-3°07.9	140°55.1	12.1	-19°08.7	3.3	54.3
19	102°35.1	-3°06.9	155°26.2	12.1	-19°05.4	3.4	54.3
20	117°35.3	-3°06.0	169°57.3	12.1	-19°02.0	3.4	54.3
21	132°35.5	-3°05.0	184°28.4	12.1	-18°58.5	3.5	54.4
22	147°35.6	-3°04.0	198°59.6	12.2	-18°54.9	3.6	54.4
23	162°35.8	-3°03.0	213°30.7	12.2	-18°51.3	3.7	54.4
	SD.=16.1	d=1.0	S.D.=14.8				

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	177°36.0	-3°02.0	228°01.9	12.2	-18°47.5	3.8	54.4
1	192°36.1	-3°01.0	242°33.1	12.2	-18°43.7	3.9	54.4
2	207°36.3	-3°00.0	257°04.3	12.2	-18°39.7	4.0	54.4
3	222°36.5	-2°59.1	271°35.5	12.2	-18°35.7	4.1	54.4
4	237°36.7	-2°58.1	286°06.7	12.2	-18°31.6	4.2	54.4
5	252°36.8	-2°57.1	300°37.9	12.2	-18°27.4	4.2	54.4
6	267°37.0	-2°56.1	315°09.1	12.2	-18°23.1	4.3	54.5
7	282°37.2	-2°55.1	329°40.3	12.2	-18°18.8	4.4	54.5
8	297°37.3	-2°54.1	344°11.6	12.2	-18°14.3	4.5	54.5
9	312°37.5	-2°53.1	358°42.8	12.3	-18°09.8	4.6	54.5
10	327°37.7	-2°52.2	13°14.1	12.3	-18°05.1	4.7	54.5
11	342°37.8	-2°51.2	27°45.4	12.3	-18°00.4	4.8	54.5
12	357°38.0	-2°50.2	42°16.6	12.3	-17°55.6	4.8	54.5
13	12°38.2	-2°49.2	56°47.9	12.3	-17°50.7	4.9	54.5
14	27°38.3	-2°48.2	71°19.2	12.3	-17°45.8	5.0	54.6
15	42°38.5	-2°47.2	85°50.6	12.3	-17°40.7	5.1	54.6
16	57°38.7	-2°46.2	100°21.9	12.3	-17°35.5	5.2	54.6
17	72°38.9	-2°45.3	114°53.2	12.3	-17°30.3	5.3	54.6
18	87°39.0	-2°44.3	129°24.6	12.4	-17°25.0	5.4	54.6
19	102°39.2	-2°43.3	143°55.9	12.4	-17°19.6	5.4	54.6
20	117°39.4	-2°42.3	158°27.3	12.4	-17°14.1	5.5	54.6
21	132°39.5	-2°41.3	172°58.7	12.4	-17°08.6	5.6	54.7
22	147°39.7	-2°40.3	187°30.1	12.4	-17°02.9	5.7	54.7
23	162°39.9	-2°39.3	202°01.5	12.4	-16°57.2	5.8	54.7
	SD.=16.1	d=1.0	S.D.=14.8				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:12	05:33	06:40	17:42	18:49	20:12
70	04:23	05:36	06:37	17:45	18:46	19:59
68	04:33	05:39	06:34	17:47	18:43	19:49
66	04:40	05:41	06:31	17:50	18:41	19:41
64	04:47	05:42	06:29	17:52	18:39	19:35
62	04:52	05:44	06:28	17:53	18:37	19:29
60	04:56	05:45	06:26	17:55	18:36	19:25
58	05:00	05:46	06:25	17:56	18:35	19:21
56	05:03	05:47	06:24	17:57	18:34	19:17
54	05:06	05:47	06:22	17:58	18:33	19:15
52	05:09	05:48	06:21	17:59	18:33	19:12
50	05:11	05:48	06:20	17:60	18:32	19:10
45	05:15	05:49	06:18	18:02	18:31	19:05
40	05:18	05:50	06:17	18:04	18:31	19:02
35	05:21	05:50	06:15	18:05	18:30	18:60
30	05:22	05:50	06:14	18:06	18:30	18:58
20	05:24	05:49	06:11	18:09	18:31	18:56
10	05:23	05:48	06:09	18:11	18:32	18:56
0	05:22	05:46	06:06	18:13	18:34	18:58
-10	05:19	05:43	06:04	18:15	18:36	19:01
-20	05:14	05:39	06:01	18:18	18:40	19:06
-30	05:06	05:34	05:58	18:21	18:45	19:13
-35	05:01	05:31	05:56	18:23	18:48	19:18
-40	04:55	05:27	05:54	18:25	18:52	19:24
-45	04:47	05:22	05:52	18:27	18:56	19:31
-50	04:37	05:16	05:49	18:30	19:02	19:41
-52	04:32	05:13	05:47	18:31	19:05	19:46
-54	04:27	05:10	05:46	18:33	19:08	19:51
-56	04:20	05:06	05:44	18:34	19:12	19:57
-58	04:13	05:02	05:42	18:36	19:16	20:04
-60	04:05	04:57	05:40	18:38	19:20	20:12

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	07:36	07:26	–:–	09:03	10:53
68	05:49	06:25	06:43	09:11	10:14	11:35
66	05:08	05:48	06:14	09:51	10:50	12:03
64	04:40	05:22	05:52	10:19	11:16	12:25
62	04:19	05:02	05:35	10:41	11:36	12:42
60	04:01	04:45	05:20	10:58	11:53	12:56
58	03:47	04:31	05:08	11:13	12:07	13:08
56	03:34	04:19	04:57	11:25	12:18	13:19
54	03:23	04:09	04:47	11:36	12:29	13:28
52	03:14	03:59	04:39	11:46	12:38	13:36
50	03:05	03:51	04:31	11:54	12:46	13:44
45	02:47	03:33	04:15	12:12	13:04	13:59
40	02:32	03:19	04:01	12:27	13:18	14:12
35	02:20	03:06	03:50	12:40	13:30	14:23
30	02:09	02:56	03:40	12:51	13:41	14:33
20	01:50	02:37	03:23	13:10	13:59	14:49
10	01:33	02:21	03:08	13:26	14:15	15:03
0	01:18	02:06	02:54	13:41	14:29	15:17
-10	01:03	01:51	02:40	13:57	14:44	15:30
-20	00:47	01:35	02:25	14:13	14:59	15:44
-30	00:28	01:16	02:07	14:32	15:17	16:00
-35	00:17	01:06	01:57	14:42	15:28	16:10
-40	00:04	00:53	01:46	14:55	15:40	16:20
-45	–:–	00:39	01:32	15:10	15:53	16:33
-50	–:–	00:21	01:16	15:28	16:10	16:48
-52	–:–	00:12	01:08	15:36	16:18	16:55
-54	–:–	00:03	00:59	15:46	16:27	17:03
-56	23:52	–:–	00:49	15:56	16:37	17:11
-58	23:40	–:–	00:38	16:08	16:49	17:21
-60	23:26	–:–	00:25	16:23	17:02	17:33

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
11	10:08	10:00	12:10	07:29	19:53	24(31%)
12	09:52	09:44	12:09	08:17	20:41	25(23%)
13	09:36	09:28	12:09	09:05	21:29	26(16%)

March 14, 15 ,16 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	171°33.8	163°07.5	2°26.7	263°52.9	-23°21.8	300°26.9	-17°23.4	252°44.7	-22°18.5
1	186°36.2	178°07.1	2°28.0	278°53.8	-23°21.9	315°29.4	-17°23.4	267°47.0	-22°18.5
2	201°38.7	193°06.8	2°29.3	293°54.7	-23°21.9	330°31.9	-17°23.4	282°49.4	-22°18.5
3	216°41.2	208°06.4	2°30.6	308°55.6	-23°22.0	345°34.4	-17°23.4	297°51.7	-22°18.5
4	231°43.6	223°06.0	2°31.9	323°56.5	-23°22.1	0°36.9	-17°23.3	312°54.0	-22°18.5
5	246°46.1	238°05.7	2°33.2	338°57.3	-23°22.1	15°39.4	-17°23.3	327°56.3	-22°18.5
6	261°48.5	253°05.3	2°34.4	353°58.2	-23°22.2	30°41.9	-17°23.3	342°58.6	-22°18.4
7	276°51.0	268°04.9	2°35.7	8°59.1	-23°22.3	45°44.4	-17°23.3	358°00.9	-22°18.4
8	291°53.5	283°04.6	2°37.0	24°00.0	-23°22.3	60°46.9	-17°23.3	13°03.3	-22°18.4
9	306°55.9	298°04.2	2°38.3	39°00.9	-23°22.4	75°49.5	-17°23.3	28°05.6	-22°18.4
10	321°58.4	313°03.8	2°39.6	54°01.8	-23°22.5	90°52.0	-17°23.2	43°07.9	-22°18.4
11	337°00.9	328°03.5	2°40.8	69°02.7	-23°22.6	105°54.5	-17°23.2	58°10.2	-22°18.4
12	352°03.3	343°03.1	2°42.1	84°03.6	-23°22.6	120°57.0	-17°23.2	73°12.5	-22°18.4
13	7°05.8	358°02.7	2°43.4	99°04.5	-23°22.7	135°59.5	-17°23.2	88°14.8	-22°18.4
14	22°08.3	13°02.4	2°44.7	114°05.4	-23°22.8	151°02.0	-17°23.2	103°17.1	-22°18.4
15	37°10.7	28°02.0	2°46.0	129°06.3	-23°22.8	166°04.5	-17°23.2	118°19.5	-22°18.4
16	52°13.2	43°01.6	2°47.3	144°07.1	-23°22.9	181°07.0	-17°23.1	133°21.8	-22°18.4
17	67°15.7	58°01.3	2°48.5	159°08.0	-23°23.0	196°09.5	-17°23.1	148°24.1	-22°18.3
18	82°18.1	73°00.9	2°49.8	174°08.9	-23°23.0	211°12.0	-17°23.1	163°26.4	-22°18.3
19	97°20.6	88°00.5	2°51.1	189°09.8	-23°23.1	226°14.5	-17°23.1	178°28.7	-22°18.3
20	112°23.0	103°00.2	2°52.4	204°10.7	-23°23.2	241°17.0	-17°23.1	193°31.1	-22°18.3
21	127°25.5	117°59.8	2°53.7	219°11.6	-23°23.2	256°19.5	-17°23.1	208°33.4	-22°18.3
22	142°28.0	132°59.5	2°55.0	234°12.5	-23°23.3	271°22.0	-17°23.0	223°35.7	-22°18.3
23	157°30.4	147°59.1	2°56.2	249°13.4	-23°23.4	286°24.5	-17°23.0	238°38.0	-22°18.3
Mer.pass.:12:31		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.6		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	172°32.9	162°58.7	2°57.5	264°14.3	-23°23.4	301°27.0	-17°23.0	253°40.3	-22°18.3
1	187°35.4	177°58.4	2°58.8	279°15.2	-23°23.5	316°29.6	-17°23.0	268°42.6	-22°18.3
2	202°37.8	192°58.0	3°00.1	294°16.1	-23°23.6	331°32.1	-17°23.0	283°45.0	-22°18.3
3	217°40.3	207°57.6	3°01.4	309°17.0	-23°23.6	346°34.6	-17°23.0	298°47.3	-22°18.3
4	232°42.8	222°57.3	3°02.6	324°17.8	-23°23.7	1°37.1	-17°22.9	313°49.6	-22°18.3
5	247°45.2	237°56.9	3°03.9	339°18.7	-23°23.8	16°39.6	-17°22.9	328°51.9	-22°18.2
6	262°47.7	252°56.5	3°05.2	354°19.6	-23°23.8	31°42.1	-17°22.9	343°54.2	-22°18.2
7	277°50.2	267°56.2	3°06.5	9°20.5	-23°23.9	46°44.6	-17°22.9	358°56.6	-22°18.2
8	292°52.6	282°55.8	3°07.8	24°21.4	-23°24.0	61°47.1	-17°22.9	13°58.9	-22°18.2
9	307°55.1	297°55.4	3°09.0	39°22.3	-23°24.0	76°49.6	-17°22.8	29°01.2	-22°18.2
10	322°57.5	312°55.1	3°10.3	54°23.2	-23°24.1	91°52.2	-17°22.8	44°03.5	-22°18.2
11	338°00.0	327°54.7	3°11.6	69°24.1	-23°24.1	106°54.7	-17°22.8	59°05.8	-22°18.2
12	353°02.5	342°54.3	3°12.9	84°25.0	-23°24.2	121°57.2	-17°22.8	74°08.2	-22°18.2
13	8°04.9	357°54.0	3°14.2	99°25.9	-23°24.3	136°59.7	-17°22.8	89°10.5	-22°18.2
14	23°07.4	12°53.6	3°15.4	114°26.8	-23°24.3	152°02.2	-17°22.8	104°12.8	-22°18.2
15	38°09.9	27°53.2	3°16.7	129°27.7	-23°24.4	167°04.7	-17°22.7	119°15.1	-22°18.2
16	53°12.3	42°52.9	3°18.0	144°28.6	-23°24.5	182°07.2	-17°22.7	134°17.4	-22°18.1
17	68°14.8	57°52.5	3°19.3	159°29.5	-23°24.5	197°09.7	-17°22.7	149°19.8	-22°18.1
18	83°17.3	72°52.1	3°20.6	174°30.4	-23°24.6	212°12.3	-17°22.7	164°22.1	-22°18.1
19	98°19.7	87°51.8	3°21.8	189°31.3	-23°24.6	227°14.8	-17°22.7	179°24.4	-22°18.1
20	113°22.2	102°51.4	3°23.1	204°32.1	-23°24.7	242°17.3	-17°22.6	194°26.7	-22°18.1
21	128°24.6	117°51.0	3°24.4	219°33.0	-23°24.8	257°19.8	-17°22.6	209°29.0	-22°18.1
22	143°27.1	132°50.7	3°25.7	234°33.9	-23°24.8	272°22.3	-17°22.6	224°31.4	-22°18.1
23	158°29.6	147°50.3	3°27.0	249°34.8	-23°24.9	287°24.8	-17°22.6	239°33.7	-22°18.1
Mer.pass.:12:27		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.6		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	173°32.0	162°49.9	3°28.2	264°35.7	-23°24.9	302°27.4	-17°22.6	254°36.0	-22°18.1
1	188°34.5	177°49.6	3°29.5	279°36.6	-23°25.0	317°29.9	-17°22.6	269°38.3	-22°18.1
2	203°37.0	192°49.2	3°30.8	294°37.5	-23°25.1	332°32.4	-17°22.5	284°40.7	-22°18.1
3	218°39.4	207°48.8	3°32.1	309°38.4	-23°25.1	347°34.9	-17°22.5	299°43.0	-22°18.1
4	233°41.9	222°48.4	3°33.4	324°39.3	-23°25.2	2°37.4	-17°22.5	314°45.3	-22°18.0
5	248°44.4	237°48.1	3°34.6	339°40.2	-23°25.2	17°39.9	-17°22.5	329°47.6	-22°18.0
6	263°46.8	252°47.7	3°35.9	354°41.1	-23°25.3	32°42.5	-17°22.5	344°49.9	-22°18.0
7	278°49.3	267°47.3	3°37.2	9°42.0	-23°25.4	47°45.0	-17°22.4	359°52.3	-22°18.0
8	293°51.8	282°47.0	3°38.5	24°42.9	-23°25.4	62°47.5	-17°22.4	14°54.6	-22°18.0
9	308°54.2	297°46.6	3°39.7	39°43.8	-23°25.5	77°50.0	-17°22.4	29°56.9	-22°18.0
10	323°56.7	312°46.2	3°41.0	54°44.7	-23°25.5	92°52.5	-17°22.4	44°59.2	-22°18.0
11	338°59.1	327°45.9	3°42.3	69°45.6	-23°25.6	107°55.1	-17°22.4	60°01.6	-22°18.0
12	354°01.6	342°45.5	3°43.6	84°46.5	-23°25.7	122°57.6	-17°22.3	75°03.9	-22°18.0
13	9°04.1	357°45.1	3°44.9	99°47.4	-23°25.7	138°00.1	-17°22.3	90°06.2	-22°18.0
14	24°06.5	12°44.8	3°46.1	114°48.3	-23°25.8	153°02.6	-17°22.3	105°08.5	-22°18.0
15	39°09.0	27°44.4	3°47.4	129°49.2	-23°25.8	168°05.1	-17°22.3	120°10.9	-22°17.9
16	54°11.5	42°44.0	3°48.7	144°50.1	-23°25.9	183°07.7	-17°22.3	135°13.2	-22°17.9
17	69°13.9	57°43.7	3°50.0	159°51.0	-23°25.9	198°10.2	-17°22.2	150°15.5	-22°17.9
18	84°16.4	72°43.3	3°51.2	174°51.9	-23°26.0	213°12.7	-17°22.2	165°17.8	-22°17.9
19	99°18.9	87°42.9	3°52.5	189°52.8	-23°26.1	228°15.2	-17°22.2	180°20.2	-22°17.9
20	114°21.3	102°42.6	3°53.8	204°53.7	-23°26.1	243°17.8	-17°22.2	195°22.5	-22°17.9
21	129°23.8	117°42.2	3°55.1	219°54.6	-23°26.2	258°20.3	-17°22.2	210°24.8	-22°17.9
22	144°26.2	132°41.8	3°56.3	234°55.5	-23°26.2	273°22.8	-17°22.1	225°27.1	-22°17.9
23	159°28.7	147°41.4	3°57.6	249°56.4	-23°26.3	288°25.3	-17°22.1	240°29.5	-22°17.9
Mer.pass.:12:23		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.6		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°13.0	-42°12.7
Schedar	349°37.3	56°38.1
Diphda	348°52.9	-17°53.5
Achernar	335°24.9	-57°09.0
Hamal	327°57.4	23°32.7
Polaris	316°37.8	89°20.6
Akamar	315°16.2	-40°14.3
Menkar	314°11.9	4°09.4
Mirfak	308°36.0	49°55.5
Aldebaran	290°45.8	16°32.5
Rigel	281°09.0	-8°11.2
Capella	280°29.7	46°01.0
Bellatrix	278°28.6	6°21.7
Elnath	278°08.6	28°37.2
Alnilam	275°43.1	-1°11.7
Betelgeuse	270°57.8	7°24.3
Canopus	263°54.6	-52°42.8
Sirius	258°30.7	-16°44.6
Adara	255°09.9	-29°00.2
Procyon	244°56.1	5°10.6
Pollux	243°23.5	27°58.8
Avior	234°16.3	-59°34.4
Suhail	222°49.7	-43°30.6
Miaplacidus	221°38.2	-69°47.8
Alphard	217°52.7	-8°44.4
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.2
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.6
Acrux	173°05.0	-63°11.9
Gacrux	171°56.7	-57°12.8
Alioth	166°17.4	55°51.6
Spica	158°27.6	-11°15.3
Alcaid	152°56.0	49°13.3
Hadar	148°42.8	-60°27.4
Menkent	148°03.5	-36°27.4
Arcturus	145°52.4	19°05.5
Rigil Kent.	139°46.9	-60°54.3
Zubenelg.	137°01.7	-16°06.9
Kochab	137°19.4	74°04.7
Alphecca	126°08.1	26°39.2
Antares	112°22.2	-26°28.1
Atria	107°21.1	-69°03.2
Sabik	102°08.8	-15°44.7
Shaula	96°17.6	-37°06.7
Rasalhague	96°03.5	12°32.8
Etamin	90°44.7	51°29.0
Kaus Aust.	83°39.6	-34°22.3
Vega	80°36.9	38°47.8
Nunki	75°54.5	-26°16.3
Altair	62°05.4	8°54.9
Peacock	53°14.6	-56°40.4
Deneb	49°29.6	45°20.5
Enif	33°44.3	9°57.4
Alnair	27°40.2	-46°52.3
Fomalhaut	15°20.9	-29°31.7
Scheat	13°50.6	28°10.7
Markab	13°35.5	15°18.0

2018/3/1	**SHA**	**Mer.pass**
Venus	351°33.7	13:08
Mars	92°19.1	06:24
Jupiter	128°53.2	03:58
Saturn	81°11.0	07:08

2018/3/1	**SHA**	**Mer.pass**
Venus	350°25.8	13:08
Mars	91°41.4	06:23
Jupiter	128°54.1	03:54
Saturn	81°07.4	07:04

2018/3/1	**SHA**	**Mer.pass**
Venus	349°17.9	13:09
Mars	91°03.7	06:21
Jupiter	128°55.3	03:50
Saturn	81°04.0	07:01

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°40.1	-2°38.4	216°32.9	12.4	-16°51.4	5.9	54.7
1	192°40.2	-2°37.4	231°04.4	12.4	-16°45.5	5.9	54.7
2	207°40.4	-2°36.4	245°35.8	12.5	-16°39.5	6.0	54.7
3	222°40.6	-2°35.4	260°07.3	12.5	-16°33.5	6.1	54.7
4	237°40.7	-2°34.4	274°38.7	12.5	-16°27.3	6.2	54.8
5	252°40.9	-2°33.4	289°10.2	12.5	-16°21.1	6.3	54.8
6	267°41.1	-2°32.4	303°41.7	12.5	-16°14.8	6.3	54.8
7	282°41.3	-2°31.5	318°13.2	12.5	-16°08.4	6.4	54.8
8	297°41.4	-2°30.5	332°44.7	12.5	-16°02.0	6.5	54.8
9	312°41.6	-2°29.5	347°16.3	12.5	-15°55.4	6.6	54.8
10	327°41.8	-2°28.5	1°47.8	12.5	-15°48.8	6.7	54.9
11	342°41.9	-2°27.5	16°19.3	12.6	-15°42.1	6.7	54.9
12	357°42.1	-2°26.5	30°50.9	12.6	-15°35.4	6.8	54.9
13	12°42.3	-2°25.5	45°22.5	12.6	-15°28.5	6.9	54.9
14	27°42.5	-2°24.6	59°54.1	12.6	-15°21.6	7.0	54.9
15	42°42.6	-2°23.6	74°25.7	12.6	-15°14.6	7.0	54.9
16	57°42.8	-2°22.6	88°57.3	12.6	-15°07.5	7.1	55.0
17	72°43.0	-2°21.6	103°28.9	12.6	-15°00.4	7.2	55.0
18	87°43.1	-2°20.6	118°00.6	12.6	-14°53.2	7.3	55.0
19	102°43.3	-2°19.6	132°32.2	12.7	-14°45.9	7.3	55.0
20	117°43.5	-2°18.6	147°03.9	12.7	-14°38.5	7.4	55.0
21	132°43.7	-2°17.6	161°35.5	12.7	-14°31.1	7.5	55.1
22	147°43.8	-2°16.7	176°07.2	12.7	-14°23.6	7.6	55.1
23	162°44.0	-2°15.7	190°38.9	12.7	-14°16.0	7.6	55.1
	SD.=16.1	d=1.0			S.D.=14.9		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°44.2	-2°14.7	205°10.6	12.7	-14°08.3	7.7	55.1
1	192°44.4	-2°13.7	219°42.4	12.7	-14°00.6	7.8	55.1
2	207°44.5	-2°12.7	234°14.1	12.7	-13°52.8	7.8	55.2
3	222°44.7	-2°11.7	248°45.8	12.7	-13°44.9	7.9	55.2
4	237°44.9	-2°10.7	263°17.6	12.8	-13°37.0	8.0	55.2
5	252°45.1	-2°09.7	277°49.3	12.8	-13°28.9	8.0	55.2
6	267°45.2	-2°08.8	292°21.1	12.8	-13°20.9	8.1	55.2
7	282°45.4	-2°07.8	306°52.9	12.8	-13°12.7	8.2	55.2
8	297°45.6	-2°06.8	321°24.7	12.8	-13°04.5	8.3	55.3
9	312°45.8	-2°05.8	335°56.5	12.8	-12°56.2	8.3	55.3
10	327°45.9	-2°04.8	350°28.3	12.8	-12°47.9	8.4	55.3
11	342°46.1	-2°03.8	5°00.1	12.8	-12°39.4	8.4	55.3
12	357°46.3	-2°02.8	19°31.9	12.8	-12°31.0	8.5	55.4
13	12°46.5	-2°01.8	34°03.8	12.8	-12°22.4	8.6	55.4
14	27°46.6	-2°00.9	48°35.6	12.9	-12°13.8	8.6	55.4
15	42°46.8	-1°59.9	63°07.5	12.9	-12°05.1	8.7	55.4
16	57°47.0	-1°58.9	77°39.4	12.9	-11°56.4	8.8	55.4
17	72°47.2	-1°57.9	92°11.2	12.9	-11°47.6	8.8	55.5
18	87°47.3	-1°56.9	106°43.1	12.9	-11°38.7	8.9	55.5
19	102°47.5	-1°55.9	121°15.0	12.9	-11°29.8	9.0	55.5
20	117°47.7	-1°54.9	135°46.9	12.9	-11°20.8	9.0	55.5
21	132°47.9	-1°53.9	150°18.8	12.9	-11°11.8	9.1	55.5
22	147°48.0	-1°53.0	164°50.7	12.9	-11°02.7	9.1	55.6
23	162°48.2	-1°52.0	179°22.6	12.9	-10°53.5	9.2	55.6
	SD.=16.1	d=1.0			S.D.=15.0		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°48.4	-1°51.0	193°54.6	12.9	-10°44.3	9.2	55.6
1	192°48.6	-1°50.0	208°26.5	12.9	-10°35.0	9.3	55.6
2	207°48.7	-1°49.0	222°58.4	12.9	-10°25.7	9.4	55.6
3	222°48.9	-1°48.0	237°30.4	12.9	-10°16.3	9.4	55.7
4	237°49.1	-1°47.0	252°02.3	12.9	-10°06.8	9.5	55.7
5	252°49.3	-1°46.0	266°34.3	13.0	-9°57.3	9.5	55.7
6	267°49.4	-1°45.1	281°06.2	13.0	-9°47.8	9.6	55.7
7	282°49.6	-1°44.1	295°38.2	13.0	-9°38.2	9.6	55.8
8	297°49.8	-1°43.1	310°10.1	13.0	-9°28.5	9.7	55.8
9	312°50.0	-1°42.1	324°42.1	13.0	-9°18.8	9.7	55.8
10	327°50.1	-1°41.1	339°14.1	13.0	-9°09.0	9.8	55.8
11	342°50.3	-1°40.1	353°46.0	13.0	-8°59.2	9.8	55.8
12	357°50.5	-1°39.1	8°18.0	13.0	-8°49.3	9.9	55.9
13	12°50.7	-1°38.1	22°50.0	13.0	-8°39.4	9.9	55.9
14	27°50.9	-1°37.1	37°22.0	13.0	-8°29.5	10.0	55.9
15	42°51.0	-1°36.2	51°54.0	13.0	-8°19.4	10.0	55.9
16	57°51.2	-1°35.2	66°25.9	13.0	-8°09.4	10.1	56.0
17	72°51.4	-1°34.2	80°57.9	13.0	-7°59.3	10.1	56.0
18	87°51.6	-1°33.2	95°29.9	13.0	-7°49.1	10.2	56.0
19	102°51.7	-1°32.2	110°01.9	13.0	-7°38.9	10.2	56.0
20	117°51.9	-1°31.2	124°33.9	13.0	-7°28.7	10.3	56.0
21	132°52.1	-1°30.2	139°05.8	13.0	-7°18.4	10.3	56.1
22	147°52.3	-1°29.2	153°37.8	13.0	-7°08.1	10.4	56.1
23	162°52.5	-1°28.3	168°09.8	13.0	-6°57.7	10.4	56.1
	SD.=16.1	d=1.0			S.D.=15.2		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:54	05:18	06:25	17:56	19:03	20:28
70	04:08	05:22	06:23	17:57	18:58	20:13
68	04:19	05:26	06:21	17:58	18:54	20:02
66	04:28	05:29	06:20	17:60	18:51	19:52
64	04:35	05:32	06:19	18:00	18:48	19:45
62	04:42	05:34	06:18	18:01	18:45	19:38
60	04:47	05:36	06:17	18:02	18:43	19:33
58	04:51	05:37	06:16	18:03	18:42	19:28
56	04:55	05:39	06:16	18:03	18:40	19:24
54	04:59	05:40	06:15	18:04	18:39	19:20
52	05:02	05:41	06:15	18:04	18:38	19:17
50	05:04	05:42	06:14	18:05	18:37	19:15
45	05:10	05:44	06:13	18:06	18:35	19:09
40	05:13	05:45	06:12	18:07	18:34	19:05
35	05:16	05:46	06:11	18:07	18:33	19:02
30	05:19	05:46	06:10	18:08	18:32	18:60
20	05:21	05:47	06:09	18:10	18:32	18:57
10	05:22	05:46	06:07	18:11	18:32	18:56
0	05:21	05:45	06:06	18:12	18:33	18:57
-10	05:19	05:43	06:04	18:14	18:35	18:59
-20	05:15	05:40	06:02	18:15	18:37	19:03
-30	05:08	05:36	06:00	18:17	18:41	19:09
-35	05:04	05:34	05:59	18:18	18:44	19:13
-40	04:58	05:30	05:57	18:20	18:47	19:19
-45	04:51	05:26	05:56	18:21	18:51	19:25
-50	04:42	05:21	05:54	18:23	18:56	19:34
-52	04:38	05:19	05:53	18:24	18:58	19:38
-54	04:33	05:16	05:51	18:25	19:01	19:43
-56	04:28	05:13	05:50	18:26	19:04	19:49
-58	04:21	05:09	05:49	18:28	19:07	19:55
-60	04:14	05:05	05:47	18:29	19:11	20:02

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	08:01	07:39	07:25	11:57	13:56	15:47
70	07:20	07:15	07:10	12:37	14:19	16:00
68	06:52	06:56	06:58	13:04	14:37	16:11
66	06:30	06:41	06:48	13:25	14:51	16:19
64	06:13	06:28	06:40	13:41	15:02	16:26
62	05:59	06:18	06:33	13:55	15:12	16:32
60	05:47	06:09	06:26	14:06	15:21	16:38
58	05:37	06:01	06:21	14:16	15:28	16:42
56	05:28	05:54	06:16	14:25	15:34	16:47
54	05:20	05:47	06:12	14:32	15:40	16:50
52	05:13	05:42	06:08	14:39	15:45	16:54
50	05:06	05:37	06:04	14:45	15:50	16:57
45	04:52	05:25	05:56	14:58	15:60	17:03
40	04:40	05:16	05:49	15:09	16:08	17:09
35	04:30	05:08	05:44	15:18	16:15	17:14
30	04:22	05:01	05:38	15:27	16:22	17:18
20	04:07	04:49	05:30	15:40	16:32	17:25
10	03:54	04:38	05:22	15:53	16:42	17:31
0	03:41	04:28	05:15	16:04	16:51	17:37
-10	03:29	04:18	05:07	16:15	16:59	17:43
-20	03:16	04:07	04:60	16:27	17:08	17:49
-30	03:00	03:55	04:51	16:41	17:19	17:56
-35	02:52	03:48	04:45	16:49	17:25	17:60
-40	02:42	03:40	04:40	16:57	17:32	18:04
-45	02:30	03:30	04:33	17:08	17:40	18:09
-50	02:15	03:19	04:25	17:20	17:49	18:15
-52	02:09	03:13	04:21	17:26	17:53	18:18
-54	02:01	03:07	04:17	17:33	17:58	18:21
-56	01:53	03:01	04:12	17:40	18:04	18:25
-58	01:43	02:53	04:07	17:48	18:09	18:28
-60	01:32	02:45	04:01	17:57	18:16	18:32

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
14	09:20	09:11	12:09	09:52	22:16	27(9%)
15	09:03	08:55	12:08	10:39	23:02	28(4%)
16	08:46	08:38	12:08	11:25	23:48	29(1%)

March 17, 18 ,19 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	174°31.2	162°41.1	3°58.9	264°57.3	-23°26.3	303°27.9	-17°22.1	255°31.8	-22°17.9
1	189°33.6	177°40.7	4°00.2	279°58.2	-23°26.4	318°30.4	-17°22.1	270°34.1	-22°17.9
2	204°36.1	192°40.3	4°01.4	294°59.1	-23°26.4	333°32.9	-17°22.0	285°36.4	-22°17.9
3	219°38.6	207°40.0	4°02.7	309°60.0	-23°26.5	348°35.4	-17°22.0	300°38.8	-22°17.8
4	234°41.0	222°39.6	4°04.0	325°00.9	-23°26.6	3°38.0	-17°22.0	315°41.1	-22°17.8
5	249°43.5	237°39.2	4°05.3	340°01.8	-23°26.6	18°40.5	-17°22.0	330°43.4	-22°17.8
6	264°46.0	252°38.9	4°06.5	355°02.7	-23°26.7	33°43.0	-17°22.0	345°45.7	-22°17.8
7	279°48.4	267°38.5	4°07.8	10°03.6	-23°26.7	48°45.5	-17°21.9	0°48.1	-22°17.8
8	294°50.9	282°38.1	4°09.1	25°04.5	-23°26.8	63°48.1	-17°21.9	15°50.4	-22°17.8
9	309°53.4	297°37.7	4°10.4	40°05.4	-23°26.8	78°50.6	-17°21.9	30°52.7	-22°17.8
10	324°55.8	312°37.4	4°11.6	55°06.3	-23°26.9	93°53.1	-17°21.9	45°55.1	-22°17.8
11	339°58.3	327°37.0	4°12.9	70°07.2	-23°26.9	108°55.7	-17°21.9	60°57.4	-22°17.8
12	355°00.7	342°36.6	4°14.2	85°08.1	-23°27.0	123°58.2	-17°21.8	75°59.7	-22°17.8
13	10°03.2	357°36.3	4°15.5	100°09.0	-23°27.0	139°00.7	-17°21.8	91°02.0	-22°17.8
14	25°05.7	12°35.9	4°16.7	115°09.9	-23°27.1	154°03.2	-17°21.8	106°04.4	-22°17.8
15	40°08.1	27°35.5	4°18.0	130°10.8	-23°27.1	169°05.8	-17°21.8	121°06.7	-22°17.7
16	55°10.6	42°35.2	4°19.3	145°11.7	-23°27.2	184°08.3	-17°21.7	136°09.0	-22°17.7
17	70°13.1	57°34.8	4°20.6	160°12.6	-23°27.2	199°10.8	-17°21.7	151°11.4	-22°17.7
18	85°15.5	72°34.4	4°21.8	175°13.5	-23°27.3	214°13.4	-17°21.7	166°13.7	-22°17.7
19	100°18.0	87°34.0	4°23.1	190°14.4	-23°27.3	229°15.9	-17°21.7	181°16.0	-22°17.7
20	115°20.5	102°33.7	4°24.4	205°15.3	-23°27.4	244°18.4	-17°21.7	196°18.3	-22°17.7
21	130°22.9	117°33.3	4°25.6	220°16.2	-23°27.4	259°21.0	-17°21.6	211°20.7	-22°17.7
22	145°25.4	132°32.9	4°26.9	235°17.1	-23°27.5	274°23.5	-17°21.6	226°23.0	-22°17.7
23	160°27.8	147°32.6	4°28.2	250°18.0	-23°27.5	289°26.0	-17°21.6	241°25.3	-22°17.7
Mer.pass.:12:19		v-0.4 d1.3 m-3.8		v0.9 d-0.1 m0.6		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	175°30.3	162°32.2	4°29.5	265°18.9	-23°27.6	304°28.5	-17°21.6	256°27.7	-22°17.7
1	190°32.8	177°31.8	4°30.7	280°19.8	-23°27.6	319°31.1	-17°21.5	271°30.0	-22°17.7
2	205°35.2	192°31.4	4°32.0	295°20.7	-23°27.7	334°33.6	-17°21.5	286°32.3	-22°17.7
3	220°37.7	207°31.1	4°33.3	310°21.6	-23°27.7	349°36.1	-17°21.5	301°34.7	-22°17.6
4	235°40.2	222°30.7	4°34.6	325°22.5	-23°27.8	4°38.7	-17°21.5	316°37.0	-22°17.6
5	250°42.6	237°30.3	4°35.8	340°23.4	-23°27.8	19°41.2	-17°21.4	331°39.3	-22°17.6
6	265°45.1	252°30.0	4°37.1	355°24.3	-23°27.9	34°43.8	-17°21.4	346°41.6	-22°17.6
7	280°47.6	267°29.6	4°38.4	10°25.2	-23°27.9	49°46.3	-17°21.4	1°44.0	-22°17.6
8	295°50.0	282°29.2	4°39.6	25°26.1	-23°28.0	64°48.8	-17°21.4	16°46.3	-22°17.6
9	310°52.5	297°28.8	4°40.9	40°27.0	-23°28.0	79°51.4	-17°21.4	31°48.6	-22°17.6
10	325°55.0	312°28.5	4°42.2	55°27.9	-23°28.1	94°53.9	-17°21.3	46°51.0	-22°17.6
11	340°57.4	327°28.1	4°43.4	70°28.8	-23°28.1	109°56.4	-17°21.3	61°53.3	-22°17.6
12	355°59.9	342°27.7	4°44.7	85°29.7	-23°28.2	124°59.0	-17°21.3	76°55.6	-22°17.6
13	11°02.3	357°27.3	4°46.0	100°30.6	-23°28.2	140°01.5	-17°21.3	91°58.0	-22°17.6
14	26°04.8	12°27.0	4°47.3	115°31.5	-23°28.3	155°04.0	-17°21.2	107°00.3	-22°17.6
15	41°07.3	27°26.6	4°48.5	130°32.4	-23°28.3	170°06.6	-17°21.2	122°02.6	-22°17.5
16	56°09.7	42°26.2	4°49.8	145°33.3	-23°28.3	185°09.1	-17°21.2	137°05.0	-22°17.5
17	71°12.2	57°25.8	4°51.1	160°34.2	-23°28.4	200°11.7	-17°21.2	152°07.3	-22°17.5
18	86°14.7	72°25.5	4°52.3	175°35.1	-23°28.4	215°14.2	-17°21.1	167°09.6	-22°17.5
19	101°17.1	87°25.1	4°53.6	190°36.0	-23°28.5	230°16.7	-17°21.1	182°12.0	-22°17.5
20	116°19.6	102°24.7	4°54.9	205°36.9	-23°28.5	245°19.3	-17°21.1	197°14.3	-22°17.5
21	131°22.1	117°24.4	4°56.1	220°37.8	-23°28.6	260°21.8	-17°21.1	212°16.6	-22°17.5
22	146°24.5	132°24.0	4°57.4	235°38.7	-23°28.6	275°24.3	-17°21.0	227°19.0	-22°17.5
23	161°27.0	147°23.6	4°58.7	250°39.7	-23°28.7	290°26.9	-17°21.0	242°21.3	-22°17.5
Mer.pass.:12:15		v-0.4 d1.3 m-3.8		v0.9 d-0.0 m0.5		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.5	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	176°29.5	162°23.2	4°59.9	265°40.6	-23°28.7	305°29.4	-17°21.0	257°23.6	-22°17.5
1	191°31.9	177°22.9	5°01.2	280°41.5	-23°28.8	320°32.0	-17°21.0	272°26.0	-22°17.5
2	206°34.4	192°22.5	5°02.5	295°42.4	-23°28.8	335°34.5	-17°20.9	287°28.3	-22°17.5
3	221°36.8	207°22.1	5°03.7	310°43.3	-23°28.8	350°37.1	-17°20.9	302°30.6	-22°17.5
4	236°39.3	222°21.7	5°05.0	325°44.2	-23°28.9	5°39.6	-17°20.9	317°33.0	-22°17.4
5	251°41.8	237°21.4	5°06.3	340°45.1	-23°28.9	20°42.1	-17°20.9	332°35.3	-22°17.4
6	266°44.2	252°21.0	5°07.5	355°46.0	-23°29.0	35°44.7	-17°20.8	347°37.6	-22°17.4
7	281°46.7	267°20.6	5°08.8	10°46.9	-23°29.0	50°47.2	-17°20.8	2°40.0	-22°17.4
8	296°49.2	282°20.2	5°10.1	25°47.8	-23°29.1	65°49.8	-17°20.8	17°42.3	-22°17.4
9	311°51.6	297°19.9	5°11.3	40°48.7	-23°29.1	80°52.3	-17°20.8	32°44.7	-22°17.4
10	326°54.1	312°19.5	5°12.6	55°49.6	-23°29.1	95°54.8	-17°20.7	47°47.0	-22°17.4
11	341°56.6	327°19.1	5°13.9	70°50.5	-23°29.2	110°57.4	-17°20.7	62°49.3	-22°17.4
12	356°59.0	342°18.7	5°15.1	85°51.4	-23°29.2	125°59.9	-17°20.7	77°51.7	-22°17.4
13	12°01.5	357°18.4	5°16.4	100°52.3	-23°29.3	141°02.5	-17°20.7	92°54.0	-22°17.4
14	27°03.9	12°18.0	5°17.7	115°53.3	-23°29.3	156°05.0	-17°20.6	107°56.3	-22°17.4
15	42°06.4	27°17.6	5°18.9	130°54.2	-23°29.3	171°07.6	-17°20.6	122°58.7	-22°17.4
16	57°08.9	42°17.2	5°20.2	145°55.1	-23°29.4	186°10.1	-17°20.6	138°01.0	-22°17.3
17	72°11.3	57°16.8	5°21.5	160°56.0	-23°29.4	201°12.7	-17°20.6	153°03.3	-22°17.3
18	87°13.8	72°16.5	5°22.7	175°56.9	-23°29.5	216°15.2	-17°20.5	168°05.7	-22°17.3
19	102°16.3	87°16.1	5°24.0	190°57.8	-23°29.5	231°17.8	-17°20.5	183°08.0	-22°17.3
20	117°18.7	102°15.7	5°25.3	205°58.7	-23°29.5	246°20.3	-17°20.5	198°10.4	-22°17.3
21	132°21.2	117°15.3	5°26.5	220°59.6	-23°29.6	261°22.9	-17°20.5	213°12.7	-22°17.3
22	147°23.7	132°15.0	5°27.8	236°00.5	-23°29.6	276°25.4	-17°20.4	228°15.0	-22°17.3
23	162°26.1	147°14.6	5°29.1	251°01.4	-23°29.7	291°27.9	-17°20.4	243°17.4	-22°17.3
Mer.pass.:12:12		v-0.4 d1.3 m-3.8		v0.9 d-0.0 m0.5		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°13.0	-42°12.7
Schedar	349°37.4	56°38.1
Diphda	348°52.9	-17°53.5
Achernar	335°24.9	-57°09.0
Hamal	327°57.4	23°32.7
Polaris	316°39.0	89°20.6
Akamar	315°16.2	-40°14.3
Menkar	314°11.9	4°09.4
Mirfak	308°36.0	49°55.5
Aldebaran	290°45.8	16°32.5
Rigel	281°09.0	-8°11.2
Capella	280°29.8	46°01.0
Bellatrix	278°28.6	6°21.7
Elnath	278°08.6	28°37.2
Alnilam	275°43.1	-1°11.7
Betelgeuse	270°57.8	7°24.3
Canopus	263°54.6	-52°42.8
Sirius	258°30.7	-16°44.6
Adara	255°09.9	-29°00.2
Procyon	244°56.1	5°10.6
Pollux	243°23.5	27°58.8
Avior	234°16.3	-59°34.4
Suhail	222°49.7	-43°30.6
Miaplacidus	221°38.3	-69°47.8
Alphard	217°52.7	-8°44.5
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.2
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.6
Acrux	173°05.0	-63°11.9
Gacrux	171°56.7	-57°12.8
Alioth	166°17.4	55°51.6
Spica	158°27.6	-11°15.3
Alcaid	152°56.0	49°13.3
Hadar	148°42.8	-60°27.4
Menkent	148°03.5	-36°27.4
Arcturus	145°52.4	19°05.5
Rigil Kent.	139°46.9	-60°54.3
Zubenelg.	137°01.6	-16°06.9
Kochab	137°19.4	74°04.7
Alphecca	126°08.1	26°39.2
Antares	112°22.2	-26°28.1
Atria	107°21.0	-69°03.2
Sabik	102°08.8	-15°44.7
Shaula	96°17.5	-37°06.7
Rasalhague	96°03.5	12°32.8
Etamin	90°44.7	51°29.0
Kaus Aust.	83°39.6	-34°22.3
Vega	80°36.9	38°47.8
Nunki	75°54.5	-26°16.3
Altair	62°05.3	8°54.9
Peacock	53°14.6	-56°40.4
Deneb	49°29.6	45°20.5
Enif	33°44.3	9°57.4
Alnair	27°40.2	-46°52.3
Fomalhaut	15°20.9	-29°31.6
Scheat	13°50.6	28°10.7
Markab	13°35.5	15°18.0

2018/3/1	**SHA**	**Mer.pass**
Venus	348°09.9	13:10
Mars	90°26.1	06:20
Jupiter	128°56.7	03:46
Saturn	81°00.6	06:57

2018/3/1	**SHA**	**Mer.pass**
Venus	347°01.9	13:10
Mars	89°48.6	06:18
Jupiter	128°58.2	03:41
Saturn	80°57.3	06:53

2018/3/1	**SHA**	**Mer.pass**
Venus	345°53.8	13:11
Mars	89°11.1	06:17
Jupiter	128°60.0	03:37
Saturn	80°54.2	06:49

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	177°52.6	-1°27.3	182°41.8	13.0	-6°47.3	10.4	56.1
1	192°52.8	-1°26.3	197°13.7	13.0	-6°36.8	10.5	56.2
2	207°53.0	-1°25.3	211°45.7	13.0	-6°26.3	10.5	56.2
3	222°53.2	-1°24.3	226°17.7	13.0	-6°15.8	10.6	56.2
4	237°53.3	-1°23.3	240°49.6	13.0	-6°05.2	10.6	56.2
5	252°53.5	-1°22.3	255°21.6	13.0	-5°54.6	10.6	56.2
6	267°53.7	-1°21.3	269°53.5	12.9	-5°44.0	10.7	56.3
7	282°53.9	-1°20.3	284°25.5	12.9	-5°33.3	10.7	56.3
8	297°54.1	-1°19.4	298°57.4	12.9	-5°22.6	10.7	56.3
9	312°54.2	-1°18.4	313°29.4	12.9	-5°11.8	10.8	56.3
10	327°54.4	-1°17.4	328°01.3	12.9	-5°01.0	10.8	56.4
11	342°54.6	-1°16.4	342°33.2	12.9	-4°50.2	10.8	56.4
12	357°54.8	-1°15.4	357°05.1	12.9	-4°39.4	10.9	56.4
13	12°55.0	-1°14.4	11°37.0	12.9	-4°28.5	10.9	56.4
14	27°55.1	-1°13.4	26°08.9	12.9	-4°17.6	10.9	56.5
15	42°55.3	-1°12.4	40°40.8	12.9	-4°06.6	11.0	56.5
16	57°55.5	-1°11.4	55°12.6	12.9	-3°55.7	11.0	56.5
17	72°55.7	-1°10.5	69°44.5	12.9	-3°44.7	11.0	56.5
18	87°55.8	-1°09.5	84°16.3	12.8	-3°33.7	11.0	56.5
19	102°56.0	-1°08.5	98°48.2	12.8	-3°22.6	11.1	56.6
20	117°56.2	-1°07.5	113°20.0	12.8	-3°11.5	11.1	56.6
21	132°56.4	-1°06.5	127°51.8	12.8	-3°00.4	11.1	56.6
22	147°56.6	-1°05.5	142°23.6	12.8	-2°49.3	11.1	56.6
23	162°56.7	-1°04.5	156°55.4	12.8	-2°38.2	11.2	56.7
	SD.=16.1	d=1.0			S.D.=15.3		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177°56.9	-1°03.5	171°27.2	12.8	-2°27.0	11.2	56.7
1	192°57.1	-1°02.5	185°58.9	12.7	-2°15.8	11.2	56.7
2	207°57.3	-1°01.6	200°30.7	12.7	-2°04.6	11.2	56.7
3	222°57.5	-1°00.6	215°02.4	12.7	-1°53.4	11.2	56.7
4	237°57.6	-0°59.6	229°34.1	12.7	-1°42.2	11.3	56.8
5	252°57.8	-0°58.6	244°05.8	12.7	-1°30.9	11.3	56.8
6	267°58.0	-0°57.6	258°37.5	12.7	-1°19.6	11.3	56.8
7	282°58.2	-0°56.6	273°09.1	12.6	-1°08.3	11.3	56.8
8	297°58.4	-0°55.6	287°40.7	12.6	-0°57.0	11.3	56.9
9	312°58.5	-0°54.6	302°12.4	12.6	-0°45.7	11.3	56.9
10	327°58.7	-0°53.6	316°44.0	12.6	-0°34.4	11.3	56.9
11	342°58.9	-0°52.7	331°15.5	12.6	-0°23.0	11.3	56.9
12	357°59.1	-0°51.7	345°47.1	12.5	-0°11.7	11.4	56.9
13	12°59.3	-0°50.7	0°18.6	12.5	-0°00.3	11.4	57.0
14	27°59.5	-0°49.7	14°50.1	12.5	0°11.0	11.4	57.0
15	42°59.6	-0°48.7	29°21.6	12.5	0°22.4	11.4	57.0
16	57°59.8	-0°47.7	43°53.1	12.4	0°33.8	11.4	57.0
17	72°60.0	-0°46.7	58°24.5	12.4	0°45.2	11.4	57.0
18	88°00.2	-0°45.7	72°55.9	12.4	0°56.6	11.4	57.1
19	103°00.4	-0°44.7	87°27.3	12.4	1°08.0	11.4	57.1
20	118°00.5	-0°43.8	101°58.7	12.3	1°19.4	11.4	57.1
21	133°00.7	-0°42.8	116°30.0	12.3	1°30.8	11.4	57.1
22	148°00.9	-0°41.8	131°01.3	12.3	1°42.2	11.4	57.2
23	163°01.1	-0°40.8	145°32.6	12.3	1°53.6	11.4	57.2
	SD.=16.1	d=1.0			S.D.=15.5		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°01.3	-0°39.8	160°03.8	12.2	2°05.0	11.4	57.2
1	193°01.5	-0°38.8	174°35.1	12.2	2°16.4	11.4	57.2
2	208°01.6	-0°37.8	189°06.2	12.2	2°27.8	11.4	57.2
3	223°01.8	-0°36.8	203°37.4	12.1	2°39.2	11.4	57.3
4	238°02.0	-0°35.8	218°08.5	12.1	2°50.6	11.4	57.3
5	253°02.2	-0°34.9	232°39.6	12.1	3°02.0	11.4	57.3
6	268°02.4	-0°33.9	247°10.7	12.1	3°13.3	11.4	57.3
7	283°02.5	-0°32.9	261°41.7	12.0	3°24.7	11.4	57.3
8	298°02.7	-0°31.9	276°12.8	12.0	3°36.1	11.4	57.4
9	313°02.9	-0°30.9	290°43.7	12.0	3°47.4	11.3	57.4
10	328°03.1	-0°29.9	305°14.7	11.9	3°58.8	11.3	57.4
11	343°03.3	-0°28.9	319°45.6	11.9	4°10.1	11.3	57.4
12	358°03.5	-0°27.9	334°16.4	11.8	4°21.4	11.3	57.4
13	13°03.6	-0°27.0	348°47.3	11.8	4°32.7	11.3	57.5
14	28°03.8	-0°26.0	3°18.0	11.8	4°44.0	11.3	57.5
15	43°04.0	-0°25.0	17°48.8	11.7	4°55.2	11.3	57.5
16	58°04.2	-0°24.0	32°19.5	11.7	5°06.5	11.2	57.5
17	73°04.4	-0°23.0	46°50.2	11.7	5°17.7	11.2	57.5
18	88°04.6	-0°22.0	61°20.8	11.6	5°28.9	11.2	57.6
19	103°04.7	-0°21.0	75°51.4	11.6	5°40.1	11.2	57.6
20	118°04.9	-0°20.0	90°22.0	11.5	5°51.3	11.2	57.6
21	133°05.1	-0°19.0	104°52.5	11.5	6°02.4	11.1	57.6
22	148°05.3	-0°18.1	119°23.0	11.5	6°13.5	11.1	57.6
23	163°05.5	-0°17.1	133°53.4	11.4	6°24.6	11.1	57.7
	SD.=16.1	d=1.0			S.D.=15.6		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:35	05:02	06:09	18:09	19:17	20:45
70	03:52	05:08	06:09	18:09	19:11	20:28
68	04:05	05:13	06:09	18:09	19:05	20:14
66	04:15	05:18	06:09	18:09	19:01	20:03
64	04:24	05:21	06:08	18:09	18:57	19:54
62	04:31	05:24	06:08	18:09	18:54	19:47
60	04:37	05:27	06:08	18:09	18:51	19:41
58	04:43	05:29	06:08	18:09	18:49	19:35
56	04:47	05:31	06:08	18:09	18:47	19:31
54	04:51	05:33	06:08	18:09	18:45	19:26
52	04:55	05:34	06:08	18:10	18:43	19:23
50	04:58	05:35	06:08	18:10	18:42	19:20
45	05:04	05:38	06:07	18:10	18:39	19:13
40	05:09	05:40	06:07	18:10	18:37	19:08
35	05:12	05:42	06:07	18:10	18:35	19:05
30	05:15	05:43	06:07	18:10	18:34	19:02
20	05:18	05:44	06:06	18:10	18:32	18:58
10	05:20	05:44	06:05	18:11	18:32	18:56
0	05:20	05:44	06:05	18:11	18:32	18:56
-10	05:19	05:43	06:04	18:12	18:33	18:57
-20	05:16	05:41	06:03	18:13	18:35	19:00
-30	05:10	05:38	06:02	18:14	18:37	19:05
-35	05:07	05:36	06:01	18:14	18:39	19:09
-40	05:02	05:33	06:01	18:15	18:42	19:14
-45	04:56	05:30	05:60	18:16	18:45	19:19
-50	04:48	05:26	05:58	18:17	18:49	19:27
-52	04:44	05:24	05:58	18:17	18:51	19:31
-54	04:39	05:22	05:57	18:18	18:53	19:35
-56	04:35	05:19	05:56	18:18	18:56	19:40
-58	04:29	05:16	05:56	18:19	18:58	19:45
-60	04:22	05:13	05:55	18:20	19:02	19:52

	Moonrise			Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	07:13	07:03	06:53	17:36	19:24	21:16
70	07:06	07:01	06:57	17:41	19:23	21:07
68	06:59	06:60	07:01	17:45	19:21	20:60
66	06:54	06:59	07:04	17:49	19:20	20:54
64	06:49	06:58	07:06	17:52	19:19	20:49
62	06:45	06:57	07:09	17:55	19:19	20:44
60	06:42	06:56	07:11	17:57	19:18	20:41
58	06:39	06:56	07:12	17:59	19:17	20:37
56	06:36	06:55	07:14	18:01	19:17	20:34
54	06:33	06:54	07:15	18:03	19:16	20:32
52	06:31	06:54	07:17	18:04	19:16	20:29
50	06:29	06:53	07:18	18:05	19:16	20:27
45	06:25	06:52	07:21	18:08	19:15	20:22
40	06:21	06:52	07:23	18:11	19:14	20:18
35	06:18	06:51	07:25	18:13	19:13	20:15
30	06:15	06:50	07:27	18:15	19:13	20:12
20	06:10	06:49	07:30	18:18	19:12	20:07
10	06:05	06:48	07:32	18:21	19:11	20:02
0	06:01	06:47	07:35	18:23	19:10	19:58
-10	05:57	06:47	07:37	18:26	19:09	19:54
-20	05:52	06:46	07:40	18:28	19:08	19:49
-30	05:47	06:45	07:43	18:31	19:07	19:44
-35	05:44	06:44	07:45	18:33	19:07	19:41
-40	05:41	06:44	07:47	18:35	19:06	19:38
-45	05:37	06:43	07:50	18:37	19:05	19:34
-50	05:32	06:42	07:53	18:40	19:04	19:29
-52	05:30	06:41	07:54	18:41	19:04	19:27
-54	05:28	06:41	07:56	18:42	19:03	19:25
-56	05:25	06:41	07:57	18:44	19:03	19:22
-58	05:22	06:40	07:59	18:45	19:02	19:19
-60	05:19	06:39	08:01	18:47	19:01	19:16

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
17	08:29	08:21	12:08	12:12	00:35	30(0%)
18	08:12	08:04	12:08	12:58	00:35	1(1%)
19	07:55	07:46	12:07	13:46	01:22	2(4%)

March 20, 21 ,22 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	177°28.6	162°14.2	5°30.3	266°02.3	-23°29.7	306°30.5	-17°20.4	258°19.7	-22°17.3
1	192°31.1	177°13.8	5°31.6	281°03.2	-23°29.7	321°33.0	-17°20.3	273°22.0	-22°17.3
2	207°33.5	192°13.5	5°32.8	296°04.2	-23°29.8	336°35.6	-17°20.3	288°24.4	-22°17.3
3	222°36.0	207°13.1	5°34.1	311°05.1	-23°29.8	351°38.1	-17°20.3	303°26.7	-22°17.3
4	237°38.4	222°12.7	5°35.4	326°06.0	-23°29.9	6°40.7	-17°20.3	318°29.1	-22°17.3
5	252°40.9	237°12.3	5°36.6	341°06.9	-23°29.9	21°43.2	-17°20.2	333°31.4	-22°17.2
6	267°43.4	252°11.9	5°37.9	356°07.8	-23°29.9	36°45.8	-17°20.2	348°33.7	-22°17.2
7	282°45.8	267°11.6	5°39.1	11°08.7	-23°30.0	51°48.3	-17°20.2	3°36.1	-22°17.2
8	297°48.3	282°11.2	5°40.4	26°09.6	-23°30.0	66°50.9	-17°20.2	18°38.4	-22°17.2
9	312°50.8	297°10.8	5°41.7	41°10.5	-23°30.0	81°53.4	-17°20.1	33°40.8	-22°17.2
10	327°53.2	312°10.4	5°42.9	56°11.4	-23°30.1	96°56.0	-17°20.1	48°43.1	-22°17.2
11	342°55.7	327°10.0	5°44.2	71°12.4	-23°30.1	111°58.5	-17°20.1	63°45.4	-22°17.2
12	357°58.2	342°09.7	5°45.5	86°13.3	-23°30.1	127°01.1	-17°20.0	78°47.8	-22°17.2
13	13°00.6	357°09.3	5°46.7	101°14.2	-23°30.2	142°03.7	-17°20.0	93°50.1	-22°17.2
14	28°03.1	12°08.9	5°48.0	116°15.1	-23°30.2	157°06.2	-17°20.0	108°52.5	-22°17.2
15	43°05.5	27°08.5	5°49.2	131°16.0	-23°30.3	172°08.8	-17°20.0	123°54.8	-22°17.2
16	58°08.0	42°08.1	5°50.5	146°16.9	-23°30.3	187°11.3	-17°19.9	138°57.1	-22°17.2
17	73°10.5	57°07.8	5°51.8	161°17.8	-23°30.3	202°13.9	-17°19.9	153°59.5	-22°17.1
18	88°12.9	72°07.4	5°53.0	176°18.7	-23°30.4	217°16.4	-17°19.9	169°01.8	-22°17.1
19	103°15.4	87°07.0	5°54.3	191°19.6	-23°30.4	232°19.0	-17°19.9	184°04.2	-22°17.1
20	118°17.9	102°06.6	5°55.5	206°20.6	-23°30.4	247°21.5	-17°19.8	199°06.5	-22°17.1
21	133°20.3	117°06.2	5°56.8	221°21.5	-23°30.5	262°24.1	-17°19.8	214°08.9	-22°17.1
22	148°22.8	132°05.9	5°58.0	236°22.4	-23°30.5	277°26.6	-17°19.8	229°11.2	-22°17.1
23	163°25.3	147°05.5	5°59.3	251°23.3	-23°30.5	292°29.2	-17°19.7	244°13.5	-22°17.1
Mer.pass.:12:08		v-0.4 d1.3 m-3.8		v0.9 d-0.0 m0.5		v2.5 d0.0 m-2.1		v2.3 d0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	178°27.7	162°05.1	6°00.6	266°24.2	-23°30.6	307°31.7	-17°19.7	259°15.9	-22°17.1
1	193°30.2	177°04.7	6°01.8	281°25.1	-23°30.6	322°34.3	-17°19.7	274°18.2	-22°17.1
2	208°32.7	192°04.3	6°03.1	296°26.0	-23°30.6	337°36.9	-17°19.7	289°20.6	-22°17.1
3	223°35.1	207°04.0	6°04.3	311°26.9	-23°30.7	352°39.4	-17°19.6	304°22.9	-22°17.1
4	238°37.6	222°03.6	6°05.6	326°27.9	-23°30.7	7°42.0	-17°19.6	319°25.2	-22°17.1
5	253°40.0	237°03.2	6°06.9	341°28.8	-23°30.7	22°44.5	-17°19.6	334°27.6	-22°17.1
6	268°42.5	252°02.8	6°08.1	356°29.7	-23°30.8	37°47.1	-17°19.5	349°29.9	-22°17.0
7	283°45.0	267°02.4	6°09.4	11°30.6	-23°30.8	52°49.6	-17°19.5	4°32.3	-22°17.0
8	298°47.4	282°02.1	6°10.6	26°31.5	-23°30.8	67°52.2	-17°19.5	19°34.6	-22°17.0
9	313°49.9	297°01.7	6°11.9	41°32.4	-23°30.9	82°54.8	-17°19.5	34°37.0	-22°17.0
10	328°52.4	312°01.3	6°13.1	56°33.3	-23°30.9	97°57.3	-17°19.4	49°39.3	-22°17.0
11	343°54.8	327°00.9	6°14.4	71°34.3	-23°30.9	112°59.9	-17°19.4	64°41.7	-22°17.0
12	358°57.3	342°00.5	6°15.6	86°35.2	-23°30.9	128°02.4	-17°19.4	79°44.0	-22°17.0
13	13°59.8	357°00.1	6°16.9	101°36.1	-23°31.0	143°05.0	-17°19.3	94°46.3	-22°17.0
14	29°02.2	11°59.8	6°18.2	116°37.0	-23°31.0	158°07.6	-17°19.3	109°48.7	-22°17.0
15	44°04.7	26°59.4	6°19.4	131°37.9	-23°31.0	173°10.1	-17°19.3	124°51.0	-22°17.0
16	59°07.2	41°59.0	6°20.7	146°38.8	-23°31.1	188°12.7	-17°19.2	139°53.4	-22°17.0
17	74°09.6	56°58.6	6°21.9	161°39.8	-23°31.1	203°15.2	-17°19.2	154°55.7	-22°17.0
18	89°12.1	71°58.2	6°23.2	176°40.7	-23°31.1	218°17.8	-17°19.2	169°58.1	-22°17.0
19	104°14.5	86°57.8	6°24.4	191°41.6	-23°31.2	233°20.4	-17°19.2	185°00.4	-22°16.9
20	119°17.0	101°57.5	6°25.7	206°42.5	-23°31.2	248°22.9	-17°19.1	200°02.8	-22°16.9
21	134°19.5	116°57.1	6°26.9	221°43.4	-23°31.2	263°25.5	-17°19.1	215°05.1	-22°16.9
22	149°21.9	131°56.7	6°28.2	236°44.3	-23°31.2	278°28.1	-17°19.1	230°07.5	-22°16.9
23	164°24.4	146°56.3	6°29.4	251°45.3	-23°31.3	293°30.6	-17°19.0	245°09.8	-22°16.9
Mer.pass.:12:04		v-0.4 d1.3 m-3.8		v0.9 d-0.0 m0.5		v2.6 d0.0 m-2.1		v2.3 d0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	179°26.9	161°55.9	6°30.7	266°46.2	-23°31.3	308°33.2	-17°19.0	260°12.1	-22°16.9
1	194°29.3	176°55.5	6°31.9	281°47.1	-23°31.3	323°35.8	-17°19.0	275°14.5	-22°16.9
2	209°31.8	191°55.1	6°33.2	296°48.0	-23°31.4	338°38.3	-17°18.9	290°16.8	-22°16.9
3	224°34.3	206°54.8	6°34.4	311°48.9	-23°31.4	353°40.9	-17°18.9	305°19.2	-22°16.9
4	239°36.7	221°54.4	6°35.7	326°49.8	-23°31.4	8°43.4	-17°18.9	320°21.5	-22°16.9
5	254°39.2	236°54.0	6°36.9	341°50.8	-23°31.4	23°46.0	-17°18.9	335°23.9	-22°16.9
6	269°41.6	251°53.6	6°38.2	356°51.7	-23°31.5	38°48.6	-17°18.8	350°26.2	-22°16.9
7	284°44.1	266°53.2	6°39.4	11°52.6	-23°31.5	53°51.1	-17°18.8	5°28.6	-22°16.9
8	299°46.6	281°52.8	6°40.7	26°53.5	-23°31.5	68°53.7	-17°18.8	20°30.9	-22°16.9
9	314°49.0	296°52.4	6°41.9	41°54.4	-23°31.5	83°56.3	-17°18.7	35°33.3	-22°16.8
10	329°51.5	311°52.1	6°43.2	56°55.4	-23°31.6	98°58.8	-17°18.7	50°35.6	-22°16.8
11	344°54.0	326°51.7	6°44.4	71°56.3	-23°31.6	114°01.4	-17°18.7	65°38.0	-22°16.8
12	359°56.4	341°51.3	6°45.7	86°57.2	-23°31.6	129°04.0	-17°18.6	80°40.3	-22°16.8
13	14°58.9	356°50.9	6°46.9	101°58.1	-23°31.6	144°06.5	-17°18.6	95°42.7	-22°16.8
14	30°01.4	11°50.5	6°48.2	116°59.0	-23°31.7	159°09.1	-17°18.6	110°45.0	-22°16.8
15	45°03.8	26°50.1	6°49.4	131°59.9	-23°31.7	174°11.7	-17°18.5	125°47.4	-22°16.8
16	60°06.3	41°49.7	6°50.7	147°00.9	-23°31.7	189°14.2	-17°18.5	140°49.7	-22°16.8
17	75°08.8	56°49.3	6°51.9	162°01.8	-23°31.7	204°16.8	-17°18.5	155°52.1	-22°16.8
18	90°11.2	71°49.0	6°53.2	177°02.7	-23°31.8	219°19.4	-17°18.4	170°54.4	-22°16.8
19	105°13.7	86°48.6	6°54.4	192°03.6	-23°31.8	234°22.0	-17°18.4	185°56.8	-22°16.8
20	120°16.1	101°48.2	6°55.7	207°04.5	-23°31.8	249°24.5	-17°18.4	200°59.1	-22°16.8
21	135°18.6	116°47.8	6°56.9	222°05.5	-23°31.8	264°27.1	-17°18.3	216°01.5	-22°16.8
22	150°21.1	131°47.4	6°58.2	237°06.4	-23°31.9	279°29.7	-17°18.3	231°03.8	-22°16.7
23	165°23.5	146°47.0	6°59.4	252°07.3	-23°31.9	294°32.2	-17°18.3	246°06.2	-22°16.7
Mer.pass.:12:00		v-0.4 d1.3 m-3.8		v0.9 d-0.0 m0.5		v2.6 d0.0 m-2.2		v2.3 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°13.0	-42°12.6
Schedar	349°37.4	56°38.1
Diphda	348°52.9	-17°53.5
Achernar	335°25.0	-57°09.0
Hamal	327°57.4	23°32.7
Polaris	316°40.1	89°20.6
Akamar	315°16.2	-40°14.3
Menkar	314°11.9	4°09.4
Mirfak	308°36.0	49°55.4
Aldebaran	290°45.8	16°32.5
Rigel	281°09.0	-8°11.2
Capella	280°29.8	46°01.0
Bellatrix	278°28.6	6°21.7
Elnath	278°08.6	28°37.2
Alnilam	275°43.1	-1°11.7
Betelgeuse	270°57.8	7°24.3
Canopus	263°54.7	-52°42.8
Sirius	258°30.7	-16°44.6
Adara	255°09.9	-29°00.2
Procyon	244°56.2	5°10.6
Pollux	243°23.6	27°58.8
Avior	234°16.3	-59°34.4
Suhail	222°49.7	-43°30.6
Miaplacidus	221°38.3	-69°47.8
Alphard	217°52.7	-8°44.5
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.2
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.6
Acrux	173°05.0	-63°11.9
Gacrux	171°56.7	-57°12.8
Alioth	166°17.4	55°51.6
Spica	158°27.6	-11°15.3
Alcaid	152°56.0	49°13.3
Hadar	148°42.7	-60°27.4
Menkent	148°03.4	-36°27.4
Arcturus	145°52.4	19°05.5
Rigil Kent.	139°46.8	-60°54.3
Zubenelg.	137°01.6	-16°06.9
Kochab	137°19.3	74°04.7
Alphecca	126°08.1	26°39.2
Antares	112°22.2	-26°28.1
Atria	107°21.0	-69°03.2
Sabik	102°08.8	-15°44.7
Shaula	96°17.5	-37°06.7
Rasalhague	96°03.5	12°32.8
Etamin	90°44.6	51°29.0
Kaus Aust.	83°39.6	-34°22.3
Vega	80°36.9	38°47.8
Nunki	75°54.4	-26°16.3
Altair	62°05.3	8°54.9
Peacock	53°14.6	-56°40.3
Deneb	49°29.6	45°20.5
Enif	33°44.2	9°57.4
Alnair	27°40.2	-46°52.3
Fomalhaut	15°20.9	-29°31.6
Scheat	13°50.6	28°10.7
Markab	13°35.5	15°18.0

2018/3/2	**SHA**	**Mer.pass**
Venus	344°45.6	13:11
Mars	88°33.8	06:15
Jupiter	129°01.9	03:33
Saturn	80°51.1	06:46

2018/3/2	**SHA**	**Mer.pass**
Venus	343°37.4	13:12
Mars	87°56.5	06:14
Jupiter	129°04.0	03:29
Saturn	80°48.2	06:42

2018/3/2	**SHA**	**Mer.pass**
Venus	342°29.1	13:13
Mars	87°19.3	06:13
Jupiter	129°06.3	03:25
Saturn	80°45.3	06:38

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°05.7	-0°16.1	148°23.8	11.4	6°35.7	11.1	57.7
1	193°05.8	-0°15.1	162°54.2	11.3	6°46.7	11.0	57.7
2	208°06.0	-0°14.1	177°24.5	11.3	6°57.7	11.0	57.7
3	223°06.2	-0°13.1	191°54.8	11.2	7°08.7	11.0	57.7
4	238°06.4	-0°12.1	206°25.0	11.2	7°19.6	10.9	57.8
5	253°06.6	-0°11.1	220°55.2	11.2	7°30.6	10.9	57.8
6	268°06.8	-0°10.1	235°25.3	11.1	7°41.5	10.9	57.8
7	283°06.9	-0°09.2	249°55.4	11.1	7°52.3	10.8	57.8
8	298°07.1	-0°08.2	264°25.4	11.0	8°03.1	10.8	57.8
9	313°07.3	-0°07.2	278°55.4	11.0	8°13.9	10.8	57.8
10	328°07.5	-0°06.2	293°25.3	10.9	8°24.6	10.7	57.9
11	343°07.7	-0°05.2	307°55.2	10.9	8°35.3	10.7	57.9
12	358°07.9	-0°04.2	322°25.1	10.8	8°46.0	10.6	57.9
13	13°08.0	-0°03.2	336°54.9	10.8	8°56.6	10.6	57.9
14	28°08.2	-0°02.2	351°24.6	10.7	9°07.2	10.6	57.9
15	43°08.4	-0°01.3	5°54.3	10.7	9°17.8	10.5	58.0
16	58°08.6	-0°00.3	20°24.0	10.6	9°28.3	10.5	58.0
17	73°08.8	0°00.7	34°53.6	10.6	9°38.7	10.4	58.0
18	88°09.0	0°01.7	49°23.1	10.5	9°49.1	10.4	58.0
19	103°09.1	0°02.7	63°52.6	10.5	9°59.5	10.3	58.0
20	118°09.3	0°03.7	78°22.1	10.4	10°09.8	10.3	58.0
21	133°09.5	0°04.7	92°51.4	10.4	10°20.0	10.2	58.1
22	148°09.7	0°05.7	107°20.8	10.3	10°30.2	10.2	58.1
23	163°09.9	0°06.7	121°50.1	10.3	10°40.4	10.1	58.1
	SD.=16.1	d=1.0	S.D.=15.7				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°10.1	0°07.6	136°19.3	10.2	10°50.5	10.1	58.1
1	193°10.3	0°08.6	150°48.5	10.1	11°00.6	10.0	58.1
2	208°10.4	0°09.6	165°17.6	10.1	11°10.6	10.0	58.1
3	223°10.6	0°10.6	179°46.7	10.0	11°20.5	9.9	58.2
4	238°10.8	0°11.6	194°15.7	10.0	11°30.4	9.9	58.2
5	253°11.0	0°12.6	208°44.6	9.9	11°40.2	9.8	58.2
6	268°11.2	0°13.6	223°13.5	9.9	11°50.0	9.7	58.2
7	283°11.4	0°14.6	237°42.4	9.8	11°59.7	9.7	58.2
8	298°11.6	0°15.5	252°11.2	9.8	12°09.3	9.6	58.2
9	313°11.7	0°16.5	266°39.9	9.7	12°18.9	9.5	58.3
10	328°11.9	0°17.5	281°08.6	9.6	12°28.4	9.5	58.3
11	343°12.1	0°18.5	295°37.2	9.6	12°37.8	9.4	58.3
12	358°12.3	0°19.5	310°05.8	9.5	12°47.2	9.3	58.3
13	13°12.5	0°20.5	324°34.3	9.5	12°56.5	9.3	58.3
14	28°12.7	0°21.5	339°02.7	9.4	13°05.8	9.2	58.3
15	43°12.8	0°22.5	353°31.1	9.4	13°14.9	9.1	58.4
16	58°13.0	0°23.4	7°59.4	9.3	13°24.0	9.1	58.4
17	73°13.2	0°24.4	22°27.7	9.2	13°33.1	9.0	58.4
18	88°13.4	0°25.4	36°55.9	9.2	13°42.0	8.9	58.4
19	103°13.6	0°26.4	51°24.1	9.1	13°50.9	8.8	58.4
20	118°13.8	0°27.4	65°52.2	9.1	13°59.7	8.8	58.4
21	133°14.0	0°28.4	80°20.2	9.0	14°08.4	8.7	58.4
22	148°14.1	0°29.4	94°48.2	9.0	14°17.1	8.6	58.5
23	163°14.3	0°30.4	109°16.1	8.9	14°25.7	8.5	58.5
	SD.=16.1	d=1.0	S.D.=15.9				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°14.5	0°31.3	123°44.0	8.8	14°34.1	8.5	58.5
1	193°14.7	0°32.3	138°11.8	8.8	14°42.6	8.4	58.5
2	208°14.9	0°33.3	152°39.5	8.7	14°50.9	8.3	58.5
3	223°15.1	0°34.3	167°07.2	8.7	14°59.1	8.2	58.5
4	238°15.3	0°35.3	181°34.9	8.6	15°07.3	8.1	58.5
5	253°15.5	0°36.3	196°02.4	8.5	15°15.4	8.0	58.6
6	268°15.6	0°37.3	210°29.9	8.5	15°23.4	7.9	58.6
7	283°15.8	0°38.3	224°57.4	8.4	15°31.3	7.9	58.6
8	298°16.0	0°39.2	239°24.8	8.4	15°39.1	7.8	58.6
9	313°16.2	0°40.2	253°52.1	8.3	15°46.8	7.7	58.6
10	328°16.4	0°41.2	268°19.4	8.2	15°54.4	7.6	58.6
11	343°16.6	0°42.2	282°46.6	8.2	16°02.0	7.5	58.6
12	358°16.8	0°43.2	297°13.8	8.1	16°09.4	7.4	58.7
13	13°16.9	0°44.2	311°40.9	8.1	16°16.8	7.3	58.7
14	28°17.1	0°45.2	326°07.9	8.0	16°24.0	7.2	58.7
15	43°17.3	0°46.1	340°34.9	8.0	16°31.2	7.1	58.7
16	58°17.5	0°47.1	355°01.8	7.9	16°38.2	7.0	58.7
17	73°17.7	0°48.1	9°28.7	7.8	16°45.2	6.9	58.7
18	88°17.9	0°49.1	23°55.5	7.8	16°52.1	6.8	58.7
19	103°18.1	0°50.1	38°22.3	7.7	16°58.8	6.7	58.7
20	118°18.3	0°51.1	52°49.0	7.7	17°05.5	6.6	58.8
21	133°18.4	0°52.1	67°15.7	7.6	17°12.1	6.5	58.8
22	148°18.6	0°53.1	81°42.3	7.6	17°18.5	6.4	58.8
23	163°18.8	0°54.0	96°08.8	7.5	17°24.9	6.3	58.8
	SD.=16.1	d=1.0	S.D.=16.0				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:15	04:46	05:54	18:23	19:32	21:04
70	03:35	04:54	05:55	18:22	19:23	20:43
68	03:50	05:00	05:56	18:20	19:16	20:27
66	04:02	05:06	05:57	18:19	19:11	20:15
64	04:12	05:10	05:58	18:18	19:06	20:05
62	04:20	05:14	05:58	18:17	19:02	19:56
60	04:27	05:17	05:59	18:17	18:58	19:49
58	04:33	05:20	05:60	18:16	18:55	19:43
56	04:39	05:23	05:60	18:16	18:53	19:37
54	04:43	05:25	06:00	18:15	18:51	19:33
52	04:47	05:27	06:01	18:15	18:48	19:28
50	04:51	05:29	06:01	18:14	18:47	19:25
45	04:58	05:32	06:02	18:14	18:43	19:17
40	05:04	05:35	06:02	18:13	18:40	19:12
35	05:08	05:37	06:03	18:12	18:38	19:07
30	05:11	05:39	06:03	18:12	18:36	19:04
20	05:16	05:41	06:03	18:11	18:33	18:59
10	05:18	05:43	06:04	18:11	18:32	18:56
0	05:19	05:43	06:04	18:10	18:31	18:55
-10	05:19	05:43	06:04	18:10	18:31	18:56
-20	05:16	05:42	06:04	18:10	18:32	18:58
-30	05:12	05:40	06:04	18:10	18:34	19:02
-35	05:09	05:39	06:04	18:10	18:35	19:05
-40	05:05	05:37	06:04	18:10	18:37	19:09
-45	04:60	05:34	06:03	18:10	18:39	19:14
-50	04:53	05:31	06:03	18:10	18:42	19:20
-52	04:49	05:29	06:03	18:10	18:44	19:24
-54	04:46	05:28	06:03	18:10	18:46	19:27
-56	04:41	05:25	06:03	18:11	18:48	19:32
-58	04:36	05:23	06:02	18:11	18:50	19:36
-60	04:31	05:21	06:02	18:11	18:52	19:42

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	06:42	06:29	06:10	23:13	–:–	01:22
70	06:53	06:48	06:44	22:55	–:–	00:49
68	07:02	07:04	07:09	22:41	–:–	00:25
66	07:09	07:17	07:28	22:29	–:–	00:07
64	07:16	07:28	07:44	22:20	23:52	–:–
62	07:21	07:37	07:57	22:12	23:40	–:–
60	07:26	07:45	08:08	22:05	23:29	–:–
58	07:31	07:52	08:17	21:58	23:20	–:–
56	07:34	07:58	08:26	21:53	23:12	–:–
54	07:38	08:03	08:33	21:48	23:05	–:–
52	07:41	08:08	08:40	21:44	22:59	–:–
50	07:44	08:13	08:46	21:40	22:53	–:–
45	07:50	08:23	08:60	21:31	22:41	23:50
40	07:56	08:31	09:11	21:24	22:31	23:37
35	08:00	08:38	09:20	21:18	22:22	23:27
30	08:04	08:45	09:29	21:13	22:15	23:17
20	08:11	08:56	09:43	21:03	22:01	23:01
10	08:18	09:05	09:56	20:55	21:50	22:47
0	08:24	09:14	10:08	20:48	21:39	22:34
-10	08:30	09:24	10:20	20:40	21:29	22:21
-20	08:36	09:33	10:32	20:32	21:18	22:07
-30	08:43	09:45	10:47	20:23	21:05	21:51
-35	08:48	09:51	10:56	20:17	20:57	21:41
-40	08:53	09:59	11:06	20:11	20:49	21:31
-45	08:58	10:08	11:17	20:05	20:39	21:18
-50	09:05	10:18	11:31	19:56	20:27	21:03
-52	09:08	10:23	11:38	19:52	20:22	20:56
-54	09:12	10:29	11:45	19:48	20:16	20:49
-56	09:16	10:35	11:54	19:44	20:09	20:40
-58	09:20	10:42	12:03	19:38	20:01	20:30
-60	09:25	10:50	12:14	19:33	19:53	20:19

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
20	07:37	07:28	12:07	14:35	02:10	3(10%)
21	07:20	07:11	12:07	15:26	03:00	4(17%)
22	07:02	06:53	12:06	16:20	03:53	5(27%)

March 23, 24 ,25 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	180°26.0	161°46.6	7°00.7	267°08.2	-23°31.9	309°34.8	-17°18.3	261°08.5	-22°16.7
1	195°28.5	176°46.2	7°01.9	282°09.2	-23°31.9	324°37.4	-17°18.2	276°10.9	-22°16.7
2	210°30.9	191°45.8	7°03.1	297°10.1	-23°32.0	339°40.0	-17°18.2	291°13.2	-22°16.7
3	225°33.4	206°45.5	7°04.4	312°11.0	-23°32.0	354°42.5	-17°18.2	306°15.6	-22°16.7
4	240°35.9	221°45.1	7°05.6	327°11.9	-23°32.0	9°45.1	-17°18.1	321°17.9	-22°16.7
5	255°38.3	236°44.7	7°06.9	342°12.8	-23°32.0	24°47.7	-17°18.1	336°20.3	-22°16.7
6	270°40.8	251°44.3	7°08.1	357°13.8	-23°32.0	39°50.2	-17°18.1	351°22.6	-22°16.7
7	285°43.3	266°43.9	7°09.4	12°14.7	-23°32.1	54°52.8	-17°18.0	6°25.0	-22°16.7
8	300°45.7	281°43.5	7°10.6	27°15.6	-23°32.1	69°55.4	-17°18.0	21°27.3	-22°16.7
9	315°48.2	296°43.1	7°11.9	42°16.5	-23°32.1	84°58.0	-17°18.0	36°29.7	-22°16.7
10	330°50.6	311°42.7	7°13.1	57°17.5	-23°32.1	100°00.5	-17°17.9	51°32.0	-22°16.7
11	345°53.1	326°42.3	7°14.3	72°18.4	-23°32.2	115°03.1	-17°17.9	66°34.4	-22°16.7
12	0°55.6	341°41.9	7°15.6	87°19.3	-23°32.2	130°05.7	-17°17.9	81°36.7	-22°16.6
13	15°58.0	356°41.5	7°16.8	102°20.2	-23°32.2	145°08.3	-17°17.8	96°39.1	-22°16.6
14	31°00.5	11°41.2	7°18.1	117°21.1	-23°32.2	160°10.8	-17°17.8	111°41.4	-22°16.6
15	46°03.0	26°40.8	7°19.3	132°22.1	-23°32.2	175°13.4	-17°17.8	126°43.8	-22°16.6
16	61°05.4	41°40.4	7°20.6	147°23.0	-23°32.3	190°16.0	-17°17.7	141°46.1	-22°16.6
17	76°07.9	56°40.0	7°21.8	162°23.9	-23°32.3	205°18.6	-17°17.7	156°48.5	-22°16.6
18	91°10.4	71°39.6	7°23.0	177°24.8	-23°32.3	220°21.1	-17°17.7	171°50.9	-22°16.6
19	106°12.8	86°39.2	7°24.3	192°25.8	-23°32.3	235°23.7	-17°17.6	186°53.2	-22°16.6
20	121°15.3	101°38.8	7°25.5	207°26.7	-23°32.3	250°26.3	-17°17.6	201°55.6	-22°16.6
21	136°17.7	116°38.4	7°26.8	222°27.6	-23°32.3	265°28.9	-17°17.6	216°57.9	-22°16.6
22	151°20.2	131°38.0	7°28.0	237°28.5	-23°32.4	280°31.5	-17°17.5	232°00.3	-22°16.6
23	166°22.7	146°37.6	7°29.2	252°29.5	-23°32.4	295°34.0	-17°17.5	247°02.6	-22°16.6
Mer.pass.:11:56		v-0.4 d1.2 m-3.8		v0.9 d-0.0 m0.5		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	181°25.1	161°37.2	7°30.5	267°30.4	-23°32.4	310°36.6	-17°17.5	262°05.0	-22°16.6
1	196°27.6	176°36.8	7°31.7	282°31.3	-23°32.4	325°39.2	-17°17.4	277°07.3	-22°16.6
2	211°30.1	191°36.4	7°33.0	297°32.2	-23°32.4	340°41.8	-17°17.4	292°09.7	-22°16.5
3	226°32.5	206°36.0	7°34.2	312°33.2	-23°32.5	355°44.4	-17°17.4	307°12.0	-22°16.5
4	241°35.0	221°35.7	7°35.4	327°34.1	-23°32.5	10°46.9	-17°17.3	322°14.4	-22°16.5
5	256°37.5	236°35.3	7°36.7	342°35.0	-23°32.5	25°49.5	-17°17.3	337°16.8	-22°16.5
6	271°39.9	251°34.9	7°37.9	357°35.9	-23°32.5	40°52.1	-17°17.3	352°19.1	-22°16.5
7	286°42.4	266°34.5	7°39.1	12°36.9	-23°32.5	55°54.7	-17°17.2	7°21.5	-22°16.5
8	301°44.9	281°34.1	7°40.4	27°37.8	-23°32.5	70°57.3	-17°17.2	22°23.8	-22°16.5
9	316°47.3	296°33.7	7°41.6	42°38.7	-23°32.6	85°59.8	-17°17.2	37°26.2	-22°16.5
10	331°49.8	311°33.3	7°42.9	57°39.6	-23°32.6	101°02.4	-17°17.1	52°28.5	-22°16.5
11	346°52.2	326°32.9	7°44.1	72°40.6	-23°32.6	116°05.0	-17°17.1	67°30.9	-22°16.5
12	1°54.7	341°32.5	7°45.3	87°41.5	-23°32.6	131°07.6	-17°17.0	82°33.2	-22°16.5
13	16°57.2	356°32.1	7°46.6	102°42.4	-23°32.6	146°10.2	-17°17.0	97°35.6	-22°16.5
14	31°59.6	11°31.7	7°47.8	117°43.4	-23°32.6	161°12.8	-17°17.0	112°38.0	-22°16.5
15	47°02.1	26°31.3	7°49.0	132°44.3	-23°32.6	176°15.3	-17°16.9	127°40.3	-22°16.5
16	62°04.6	41°30.9	7°50.3	147°45.2	-23°32.7	191°17.9	-17°16.9	142°42.7	-22°16.4
17	77°07.0	56°30.5	7°51.5	162°46.1	-23°32.7	206°20.5	-17°16.9	157°45.0	-22°16.4
18	92°09.5	71°30.1	7°52.7	177°47.1	-23°32.7	221°23.1	-17°16.8	172°47.4	-22°16.4
19	107°12.0	86°29.7	7°54.0	192°48.0	-23°32.7	236°25.7	-17°16.8	187°49.8	-22°16.4
20	122°14.4	101°29.3	7°55.2	207°48.9	-23°32.7	251°28.3	-17°16.8	202°52.1	-22°16.4
21	137°16.9	116°28.9	7°56.4	222°49.9	-23°32.7	266°30.8	-17°16.7	217°54.5	-22°16.4
22	152°19.4	131°28.5	7°57.7	237°50.8	-23°32.7	281°33.4	-17°16.7	232°56.8	-22°16.4
23	167°21.8	146°28.1	7°58.9	252°51.7	-23°32.8	296°36.0	-17°16.7	247°59.2	-22°16.4
Mer.pass.:11:52		v-0.4 d1.2 m-3.8		v0.9 d-0.0 m0.4		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	182°24.3	161°27.7	8°00.1	267°52.6	-23°32.8	311°38.6	-17°16.6	263°01.5	-22°16.4
1	197°26.7	176°27.3	8°01.4	282°53.6	-23°32.8	326°41.2	-17°16.6	278°03.9	-22°16.4
2	212°29.2	191°26.9	8°02.6	297°54.5	-23°32.8	341°43.8	-17°16.6	293°06.3	-22°16.4
3	227°31.7	206°26.5	8°03.8	312°55.4	-23°32.8	356°46.4	-17°16.5	308°08.6	-22°16.4
4	242°34.1	221°26.1	8°05.0	327°56.4	-23°32.8	11°49.0	-17°16.5	323°11.0	-22°16.4
5	257°36.6	236°25.7	8°06.3	342°57.3	-23°32.8	26°51.5	-17°16.4	338°13.3	-22°16.4
6	272°39.1	251°25.3	8°07.5	357°58.2	-23°32.8	41°54.1	-17°16.4	353°15.7	-22°16.3
7	287°41.5	266°24.9	8°08.7	12°59.2	-23°32.9	56°56.7	-17°16.4	8°18.1	-22°16.3
8	302°44.0	281°24.5	8°10.0	28°00.1	-23°32.9	71°59.3	-17°16.3	23°20.4	-22°16.3
9	317°46.5	296°24.1	8°11.2	43°01.0	-23°32.9	87°01.9	-17°16.3	38°22.8	-22°16.3
10	332°48.9	311°23.7	8°12.4	58°01.9	-23°32.9	102°04.5	-17°16.3	53°25.1	-22°16.3
11	347°51.4	326°23.3	8°13.6	73°02.9	-23°32.9	117°07.1	-17°16.2	68°27.5	-22°16.3
12	2°53.9	341°22.9	8°14.9	88°03.8	-23°32.9	132°09.7	-17°16.2	83°29.9	-22°16.3
13	17°56.3	356°22.5	8°16.1	103°04.7	-23°32.9	147°12.3	-17°16.2	98°32.2	-22°16.3
14	32°58.8	11°22.1	8°17.3	118°05.7	-23°32.9	162°14.8	-17°16.1	113°34.6	-22°16.3
15	48°01.2	26°21.7	8°18.6	133°06.6	-23°32.9	177°17.4	-17°16.1	128°37.0	-22°16.3
16	63°03.7	41°21.3	8°19.8	148°07.5	-23°32.9	192°20.0	-17°16.0	143°39.3	-22°16.3
17	78°06.2	56°20.9	8°21.0	163°08.5	-23°33.0	207°22.6	-17°16.0	158°41.7	-22°16.3
18	93°08.6	71°20.5	8°22.2	178°09.4	-23°33.0	222°25.2	-17°16.0	173°44.0	-22°16.3
19	108°11.1	86°20.1	8°23.5	193°10.3	-23°33.0	237°27.8	-17°15.9	188°46.4	-22°16.3
20	123°13.6	101°19.7	8°24.7	208°11.3	-23°33.0	252°30.4	-17°15.9	203°48.8	-22°16.3
21	138°16.0	116°19.3	8°25.9	223°12.2	-23°33.0	267°33.0	-17°15.9	218°51.1	-22°16.2
22	153°18.5	131°18.9	8°27.1	238°13.1	-23°33.0	282°35.6	-17°15.8	233°53.5	-22°16.2
23	168°21.0	146°18.5	8°28.4	253°14.1	-23°33.0	297°38.2	-17°15.8	248°55.8	-22°16.2
Mer.pass.:11:48		v-0.4 d1.2 m-3.8		v0.9 d-0.0 m0.4		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°13.0	-42°12.6
Schedar	349°37.4	56°38.1
Diphda	348°52.9	-17°53.5
Achernar	335°25.0	-57°09.0
Hamal	327°57.4	23°32.7
Polaris	316°40.9	89°20.5
Akamar	315°16.2	-40°14.3
Menkar	314°11.9	4°09.4
Mirfak	308°36.0	49°55.4
Aldebaran	290°45.8	16°32.5
Rigel	281°09.0	-8°11.2
Capella	280°29.8	46°01.0
Bellatrix	278°28.6	6°21.7
Elnath	278°08.6	28°37.2
Alnilam	275°43.2	-1°11.7
Betelgeuse	270°57.8	7°24.3
Canopus	263°54.7	-52°42.8
Sirius	258°30.7	-16°44.7
Adara	255°09.9	-29°00.2
Procyon	244°56.2	5°10.6
Pollux	243°23.6	27°58.8
Avior	234°16.3	-59°34.4
Suhail	222°49.7	-43°30.7
Miaplacidus	221°38.3	-69°47.8
Alphard	217°52.7	-8°44.5
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.2
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.6
Acrux	173°05.0	-63°11.9
Gacrux	171°56.7	-57°12.8
Alioth	166°17.4	55°51.6
Spica	158°27.5	-11°15.3
Alcaid	152°55.9	49°13.3
Hadar	148°42.7	-60°27.4
Menkent	148°03.4	-36°27.4
Arcturus	145°52.4	19°05.5
Rigil Kent.	139°46.8	-60°54.3
Zubenelg.	137°01.6	-16°06.9
Kochab	137°19.3	74°04.8
Alphecca	126°08.1	26°39.2
Antares	112°22.1	-26°28.1
Atria	107°20.9	-69°03.2
Sabik	102°08.8	-15°44.7
Shaula	96°17.5	-37°06.7
Rasalhague	96°03.4	12°32.8
Etamin	90°44.6	51°29.0
Kaus Aust.	83°39.6	-34°22.3
Vega	80°36.9	38°47.8
Nunki	75°54.4	-26°16.3
Altair	62°05.3	8°54.9
Peacock	53°14.5	-56°40.3
Deneb	49°29.5	45°20.5
Enif	33°44.2	9°57.4
Alnair	27°40.2	-46°52.3
Fomalhaut	15°20.9	-29°31.6
Scheat	13°50.6	28°10.7
Markab	13°35.4	15°18.0

2018/3/2	**SHA**	**Mer.pass**
Venus	341°20.6	13:13
Mars	86°42.2	06:11
Jupiter	129°08.8	03:21
Saturn	80°42.5	06:34

2018/3/2	**SHA**	**Mer.pass**
Venus	340°12.1	13:14
Mars	86°05.2	06:10
Jupiter	129°11.5	03:17
Saturn	80°39.8	06:31

2018/3/2	**SHA**	**Mer.pass**
Venus	339°03.4	13:15
Mars	85°28.4	06:08
Jupiter	129°14.3	03:13
Saturn	80°37.3	06:27

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°19.0	0°55.0	110°35.3	7.5	17°31.1	6.2	58.8
1	193°19.2	0°56.0	125°01.7	7.4	17°37.3	6.1	58.8
2	208°19.4	0°57.0	139°28.1	7.4	17°43.3	6.0	58.8
3	223°19.6	0°58.0	153°54.4	7.3	17°49.3	5.9	58.8
4	238°19.7	0°59.0	168°20.7	7.2	17°55.1	5.8	58.9
5	253°19.9	0°60.0	182°46.9	7.2	18°00.8	5.7	58.9
6	268°20.1	1°00.9	197°13.1	7.1	18°06.4	5.5	58.9
7	283°20.3	1°01.9	211°39.2	7.1	18°11.9	5.4	58.9
8	298°20.5	1°02.9	226°05.3	7.0	18°17.3	5.3	58.9
9	313°20.7	1°03.9	240°31.3	7.0	18°22.5	5.2	58.9
10	328°20.9	1°04.9	254°57.3	6.9	18°27.7	5.1	58.9
11	343°21.1	1°05.9	269°23.2	6.9	18°32.7	5.0	58.9
12	358°21.2	1°06.9	283°49.1	6.9	18°37.6	4.9	58.9
13	13°21.4	1°07.8	298°14.9	6.8	18°42.4	4.7	59.0
14	28°21.6	1°08.8	312°40.7	6.8	18°47.1	4.6	59.0
15	43°21.8	1°09.8	327°06.4	6.7	18°51.7	4.5	59.0
16	58°22.0	1°10.8	341°32.1	6.7	18°56.2	4.4	59.0
17	73°22.2	1°11.8	355°57.7	6.6	19°00.5	4.3	59.0
18	88°22.4	1°12.8	10°23.3	6.6	19°04.7	4.2	59.0
19	103°22.6	1°13.8	24°48.9	6.5	19°08.8	4.0	59.0
20	118°22.8	1°14.7	39°14.4	6.5	19°12.8	3.9	59.0
21	133°22.9	1°15.7	53°39.9	6.5	19°16.6	3.8	59.0
22	148°23.1	1°16.7	68°05.3	6.4	19°20.3	3.7	59.0
23	163°23.3	1°17.7	82°30.7	6.4	19°23.9	3.5	59.1
	SD.=16.0	d=1.0	S.D.=16.0				

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°23.5	1°18.7	96°56.1	6.3	19°27.4	3.4	59.1
1	193°23.7	1°19.7	111°21.4	6.3	19°30.8	3.3	59.1
2	208°23.9	1°20.6	125°46.7	6.3	19°34.0	3.2	59.1
3	223°24.1	1°21.6	140°12.0	6.2	19°37.1	3.0	59.1
4	238°24.3	1°22.6	154°37.2	6.2	19°40.1	2.9	59.1
5	253°24.4	1°23.6	169°02.4	6.2	19°42.9	2.8	59.1
6	268°24.6	1°24.6	183°27.5	6.1	19°45.6	2.7	59.1
7	283°24.8	1°25.6	197°52.7	6.1	19°48.2	2.5	59.1
8	298°25.0	1°26.6	212°17.7	6.1	19°50.7	2.4	59.1
9	313°25.2	1°27.5	226°42.8	6.0	19°53.0	2.3	59.1
10	328°25.4	1°28.5	241°07.8	6.0	19°55.2	2.1	59.2
11	343°25.6	1°29.5	255°32.9	6.0	19°57.3	2.0	59.2
12	358°25.8	1°30.5	269°57.8	6.0	19°59.2	1.9	59.2
13	13°26.0	1°31.5	284°22.8	5.9	20°01.0	1.7	59.2
14	28°26.1	1°32.5	298°47.7	5.9	20°02.7	1.6	59.2
15	43°26.3	1°33.4	313°12.6	5.9	20°04.3	1.5	59.2
16	58°26.5	1°34.4	327°37.5	5.9	20°05.7	1.4	59.2
17	73°26.7	1°35.4	342°02.4	5.9	20°07.0	1.2	59.2
18	88°26.9	1°36.4	356°27.2	5.8	20°08.1	1.1	59.2
19	103°27.1	1°37.4	10°52.1	5.8	20°09.2	1.0	59.2
20	118°27.3	1°38.4	25°16.9	5.8	20°10.0	0.8	59.2
21	133°27.5	1°39.3	39°41.7	5.8	20°10.8	0.7	59.2
22	148°27.6	1°40.3	54°06.5	5.8	20°11.4	0.6	59.2
23	163°27.8	1°41.3	68°31.2	5.8	20°11.9	0.4	59.3
	SD.=16.0	d=1.0	S.D.=16.1				

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°28.0	1°42.3	82°56.0	5.7	20°12.3	0.3	59.3
1	193°28.2	1°43.3	97°20.7	5.7	20°12.5	0.2	59.3
2	208°28.4	1°44.3	111°45.5	5.7	20°12.6	0.0	59.3
3	223°28.6	1°45.2	126°10.2	5.7	20°12.5	-0.1	59.3
4	238°28.8	1°46.2	140°34.9	5.7	20°12.3	-0.3	59.3
5	253°29.0	1°47.2	154°59.6	5.7	20°12.0	-0.4	59.3
6	268°29.2	1°48.2	169°24.3	5.7	20°11.6	-0.5	59.3
7	283°29.3	1°49.2	183°49.0	5.7	20°11.0	-0.7	59.3
8	298°29.5	1°50.2	198°13.7	5.7	20°10.2	-0.8	59.3
9	313°29.7	1°51.1	212°38.4	5.7	20°09.4	-0.9	59.3
10	328°29.9	1°52.1	227°03.1	5.7	20°08.4	-1.1	59.3
11	343°30.1	1°53.1	241°27.8	5.7	20°07.3	-1.2	59.3
12	358°30.3	1°54.1	255°52.5	5.7	20°06.0	-1.3	59.3
13	13°30.5	1°55.1	270°17.2	5.7	20°04.6	-1.5	59.3
14	28°30.7	1°56.0	284°41.9	5.7	20°03.1	-1.6	59.3
15	43°30.9	1°57.0	299°06.6	5.7	20°01.4	-1.7	59.3
16	58°31.0	1°58.0	313°31.4	5.7	19°59.6	-1.9	59.3
17	73°31.2	1°59.0	327°56.1	5.7	19°57.7	-2.0	59.4
18	88°31.4	1°60.0	342°20.8	5.7	19°55.6	-2.1	59.4
19	103°31.6	2°01.0	356°45.6	5.8	19°53.4	-2.3	59.4
20	118°31.8	2°01.9	11°10.3	5.8	19°51.1	-2.4	59.4
21	133°32.0	2°02.9	25°35.1	5.8	19°48.6	-2.5	59.4
22	148°32.2	2°03.9	39°59.9	5.8	19°46.1	-2.7	59.4
23	163°32.4	2°04.9	54°24.7	5.8	19°43.3	-2.8	59.4
	SD.=16.0	d=1.0	S.D.=16.2				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	02:53	04:29	05:38	18:37	19:47	21:25
70	03:17	04:39	05:41	18:34	19:36	20:60
68	03:35	04:47	05:44	18:31	19:28	20:41
66	03:49	04:54	05:46	18:29	19:21	20:27
64	04:00	04:59	05:47	18:27	19:15	20:15
62	04:09	05:04	05:49	18:25	19:10	20:05
60	04:17	05:08	05:50	18:24	19:06	19:57
58	04:24	05:12	05:51	18:23	19:02	19:50
56	04:30	05:15	05:52	18:22	18:59	19:44
54	04:35	05:18	05:53	18:21	18:56	19:39
52	04:40	05:20	05:54	18:20	18:54	19:34
50	04:44	05:22	05:54	18:19	18:51	19:30
45	04:52	05:27	05:56	18:17	18:47	19:21
40	04:58	05:30	05:57	18:16	18:43	19:15
35	05:04	05:33	05:58	18:15	18:40	19:10
30	05:07	05:35	05:59	18:14	18:38	19:06
20	05:13	05:39	06:01	18:12	18:34	18:60
10	05:17	05:41	06:02	18:11	18:32	18:56
0	05:18	05:42	06:03	18:10	18:30	18:54
-10	05:19	05:43	06:04	18:08	18:29	18:54
-20	05:17	05:43	06:05	18:07	18:29	18:55
-30	05:14	05:42	06:06	18:06	18:30	18:58
-35	05:12	05:41	06:06	18:06	18:31	19:00
-40	05:08	05:40	06:07	18:05	18:32	19:04
-45	05:04	05:38	06:07	18:04	18:34	19:08
-50	04:58	05:36	06:08	18:04	18:36	19:14
-52	04:55	05:35	06:08	18:03	18:37	19:16
-54	04:52	05:33	06:08	18:03	18:38	19:20
-56	04:48	05:32	06:09	18:03	18:40	19:23
-58	04:44	05:30	06:09	18:02	18:41	19:27
-60	04:39	05:28	06:09	18:02	18:43	19:32

	Moonrise			Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	05:15	–:–	–:–	04:11	–:–	–:–
70	06:39	06:33	–:–	02:48	04:54	–:–
68	07:19	07:41	08:31	02:09	03:46	04:58
66	07:46	08:17	09:11	01:42	03:10	04:19
64	08:07	08:43	09:38	01:22	02:44	03:51
62	08:24	09:04	09:59	01:05	02:24	03:30
60	08:38	09:20	10:16	00:52	02:08	03:13
58	08:51	09:34	10:31	00:40	01:54	02:58
56	09:01	09:46	10:43	00:30	01:42	02:46
54	09:11	09:57	10:54	00:21	01:32	02:35
52	09:19	10:06	11:04	00:12	01:22	02:25
50	09:26	10:15	11:12	00:05	01:14	02:17
45	09:43	10:33	11:30	–:–	00:56	01:58
40	09:56	10:47	11:45	–:–	00:42	01:43
35	10:07	10:60	11:58	–:–	00:30	01:31
30	10:17	11:11	12:09	–:–	00:19	01:20
20	10:34	11:29	12:28	–:–	00:01	01:01
10	10:49	11:46	12:44	23:45	–:–	00:44
0	11:03	12:01	12:59	23:30	–:–	00:29
-10	11:17	12:16	13:15	23:16	–:–	00:13
-20	11:32	12:33	13:31	22:60	23:57	–:–
-30	11:50	12:51	13:50	22:42	23:38	–:–
-35	12:00	13:03	14:01	22:31	23:26	–:–
-40	12:12	13:15	14:14	22:19	23:14	–:–
-45	12:26	13:30	14:29	22:05	22:59	23:60
-50	12:42	13:49	14:47	21:47	22:40	23:42
-52	12:50	13:57	14:56	21:39	22:31	23:33
-54	12:59	14:07	15:05	21:30	22:22	23:24
-56	13:09	14:18	15:16	21:20	22:10	23:13
-58	13:21	14:31	15:29	21:08	21:58	23:01
-60	13:34	14:45	15:43	20:54	21:43	22:47

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
23	06:44	06:35	12:06	17:16	04:48	6(37%)
24	06:26	06:17	12:06	18:14	05:45	7(48%)
25	06:08	05:59	12:05	19:13	06:44	8(60%)

March 26, 27 ,28 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	183°23.4	161°18.1	8°29.6	268°15.0	-23°33.0	312°40.8	-17°15.7	263°58.2	-22°16.2
1	198°25.9	176°17.7	8°30.8	283°15.9	-23°33.0	327°43.4	-17°15.7	279°00.6	-22°16.2
2	213°28.3	191°17.3	8°32.0	298°16.9	-23°33.0	342°46.0	-17°15.7	294°02.9	-22°16.2
3	228°30.8	206°16.9	8°33.3	313°17.8	-23°33.0	357°48.6	-17°15.6	309°05.3	-22°16.2
4	243°33.3	221°16.5	8°34.5	328°18.7	-23°33.0	12°51.1	-17°15.6	324°07.7	-22°16.2
5	258°35.7	236°16.1	8°35.7	343°19.7	-23°33.1	27°53.7	-17°15.6	339°10.0	-22°16.2
6	273°38.2	251°15.7	8°36.9	358°20.6	-23°33.1	42°56.3	-17°15.5	354°12.4	-22°16.2
7	288°40.7	266°15.2	8°38.1	13°21.5	-23°33.1	57°58.9	-17°15.5	9°14.8	-22°16.2
8	303°43.1	281°14.8	8°39.4	28°22.5	-23°33.1	73°01.5	-17°15.4	24°17.1	-22°16.2
9	318°45.6	296°14.4	8°40.6	43°23.4	-23°33.1	88°04.1	-17°15.4	39°19.5	-22°16.2
10	333°48.1	311°14.0	8°41.8	58°24.4	-23°33.1	103°06.7	-17°15.4	54°21.9	-22°16.2
11	348°50.5	326°13.6	8°43.0	73°25.3	-23°33.1	118°09.3	-17°15.3	69°24.2	-22°16.2
12	3°53.0	341°13.2	8°44.2	88°26.2	-23°33.1	133°11.9	-17°15.3	84°26.6	-22°16.1
13	18°55.5	356°12.8	8°45.5	103°27.2	-23°33.1	148°14.5	-17°15.3	99°28.9	-22°16.1
14	33°57.9	11°12.4	8°46.7	118°28.1	-23°33.1	163°17.1	-17°15.2	114°31.3	-22°16.1
15	49°00.4	26°12.0	8°47.9	133°29.0	-23°33.1	178°19.7	-17°15.2	129°33.7	-22°16.1
16	64°02.8	41°11.6	8°49.1	148°30.0	-23°33.1	193°22.3	-17°15.1	144°36.0	-22°16.1
17	79°05.3	56°11.2	8°50.3	163°30.9	-23°33.1	208°24.9	-17°15.1	159°38.4	-22°16.1
18	94°07.8	71°10.8	8°51.6	178°31.8	-23°33.1	223°27.5	-17°15.1	174°40.8	-22°16.1
19	109°10.2	86°10.4	8°52.8	193°32.8	-23°33.1	238°30.1	-17°15.0	189°43.1	-22°16.1
20	124°12.7	101°09.9	8°54.0	208°33.7	-23°33.1	253°32.7	-17°15.0	204°45.5	-22°16.1
21	139°15.2	116°09.5	8°55.2	223°34.7	-23°33.1	268°35.3	-17°14.9	219°47.9	-22°16.1
22	154°17.6	131°09.1	8°56.4	238°35.6	-23°33.1	283°37.9	-17°14.9	234°50.2	-22°16.1
23	169°20.1	146°08.7	8°57.6	253°36.5	-23°33.1	298°40.5	-17°14.9	249°52.6	-22°16.1
Mer.pass.:11:44		v-0.4 d1.2 m-3.8		v0.9 d-0.0 m0.4		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	184°22.6	161°08.3	8°58.9	268°37.5	-23°33.1	313°43.1	-17°14.8	264°55.0	-22°16.1
1	199°25.0	176°07.9	9°00.1	283°38.4	-23°33.2	328°45.7	-17°14.8	279°57.3	-22°16.1
2	214°27.5	191°07.5	9°01.3	298°39.3	-23°33.2	343°48.3	-17°14.7	294°59.7	-22°16.1
3	229°30.0	206°07.1	9°02.5	313°40.3	-23°33.2	358°50.9	-17°14.7	310°02.1	-22°16.0
4	244°32.4	221°06.7	9°03.7	328°41.2	-23°33.2	13°53.5	-17°14.7	325°04.5	-22°16.0
5	259°34.9	236°06.3	9°04.9	343°42.2	-23°33.2	28°56.1	-17°14.6	340°06.8	-22°16.0
6	274°37.3	251°05.8	9°06.1	358°43.1	-23°33.2	43°58.7	-17°14.6	355°09.2	-22°16.0
7	289°39.8	266°05.4	9°07.4	13°44.0	-23°33.2	59°01.3	-17°14.5	10°11.6	-22°16.0
8	304°42.3	281°05.0	9°08.6	28°45.0	-23°33.2	74°03.9	-17°14.5	25°13.9	-22°16.0
9	319°44.7	296°04.6	9°09.8	43°45.9	-23°33.2	89°06.5	-17°14.5	40°16.3	-22°16.0
10	334°47.2	311°04.2	9°11.0	58°46.9	-23°33.2	104°09.1	-17°14.4	55°18.7	-22°16.0
11	349°49.7	326°03.8	9°12.2	73°47.8	-23°33.2	119°11.7	-17°14.4	70°21.0	-22°16.0
12	4°52.1	341°03.4	9°13.4	88°48.7	-23°33.2	134°14.3	-17°14.3	85°23.4	-22°16.0
13	19°54.6	356°03.0	9°14.6	103°49.7	-23°33.2	149°17.0	-17°14.3	100°25.8	-22°16.0
14	34°57.1	11°02.5	9°15.8	118°50.6	-23°33.2	164°19.6	-17°14.3	115°28.1	-22°16.0
15	49°59.5	26°02.1	9°17.1	133°51.6	-23°33.2	179°22.2	-17°14.2	130°30.5	-22°16.0
16	65°02.0	41°01.7	9°18.3	148°52.5	-23°33.2	194°24.8	-17°14.2	145°32.9	-22°16.0
17	80°04.4	56°01.3	9°19.5	163°53.4	-23°33.2	209°27.4	-17°14.1	160°35.3	-22°16.0
18	95°06.9	71°00.9	9°20.7	178°54.4	-23°33.2	224°30.0	-17°14.1	175°37.6	-22°16.0
19	110°09.4	86°00.5	9°21.9	193°55.3	-23°33.2	239°32.6	-17°14.1	190°40.0	-22°15.9
20	125°11.8	101°00.1	9°23.1	208°56.3	-23°33.2	254°35.2	-17°14.0	205°42.4	-22°15.9
21	140°14.3	115°59.6	9°24.3	223°57.2	-23°33.2	269°37.8	-17°14.0	220°44.7	-22°15.9
22	155°16.8	130°59.2	9°25.5	238°58.2	-23°33.2	284°40.4	-17°13.9	235°47.1	-22°15.9
23	170°19.2	145°58.8	9°26.7	253°59.1	-23°33.2	299°43.0	-17°13.9	250°49.5	-22°15.9
Mer.pass.:11:40		v-0.4 d1.2 m-3.8		v0.9 d-0.0 m0.4		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	185°21.7	160°58.4	9°27.9	269°00.0	-23°33.2	314°45.6	-17°13.9	265°51.9	-22°15.9
1	200°24.2	175°58.0	9°29.1	284°01.0	-23°33.2	329°48.2	-17°13.8	280°54.2	-22°15.9
2	215°26.6	190°57.6	9°30.3	299°01.9	-23°33.2	344°50.8	-17°13.8	295°56.6	-22°15.9
3	230°29.1	205°57.1	9°31.5	314°02.9	-23°33.2	359°53.5	-17°13.7	310°59.0	-22°15.9
4	245°31.6	220°56.7	9°32.7	329°03.8	-23°33.2	14°56.1	-17°13.7	326°01.3	-22°15.9
5	260°34.0	235°56.3	9°34.0	344°04.8	-23°33.2	29°58.7	-17°13.7	341°03.7	-22°15.9
6	275°36.5	250°55.9	9°35.2	359°05.7	-23°33.1	45°01.3	-17°13.6	356°06.1	-22°15.9
7	290°38.9	265°55.5	9°36.4	14°06.6	-23°33.1	60°03.9	-17°13.6	11°08.5	-22°15.9
8	305°41.4	280°55.1	9°37.6	29°07.6	-23°33.1	75°06.5	-17°13.5	26°10.8	-22°15.9
9	320°43.9	295°54.6	9°38.8	44°08.5	-23°33.1	90°09.1	-17°13.5	41°13.2	-22°15.9
10	335°46.3	310°54.2	9°40.0	59°09.5	-23°33.1	105°11.7	-17°13.4	56°15.6	-22°15.9
11	350°48.8	325°53.8	9°41.2	74°10.4	-23°33.1	120°14.3	-17°13.4	71°18.0	-22°15.8
12	5°51.3	340°53.4	9°42.4	89°11.4	-23°33.1	135°17.0	-17°13.4	86°20.3	-22°15.8
13	20°53.7	355°53.0	9°43.6	104°12.3	-23°33.1	150°19.6	-17°13.3	101°22.7	-22°15.8
14	35°56.2	10°52.5	9°44.8	119°13.3	-23°33.1	165°22.2	-17°13.3	116°25.1	-22°15.8
15	50°58.7	25°52.1	9°46.0	134°14.2	-23°33.1	180°24.8	-17°13.2	131°27.4	-22°15.8
16	66°01.1	40°51.7	9°47.2	149°15.2	-23°33.1	195°27.4	-17°13.2	146°29.8	-22°15.8
17	81°03.6	55°51.3	9°48.4	164°16.1	-23°33.1	210°30.0	-17°13.2	161°32.2	-22°15.8
18	96°06.1	70°50.9	9°49.6	179°17.0	-23°33.1	225°32.6	-17°13.1	176°34.6	-22°15.8
19	111°08.5	85°50.4	9°50.8	194°18.0	-23°33.1	240°35.2	-17°13.1	191°36.9	-22°15.8
20	126°11.0	100°50.0	9°52.0	209°18.9	-23°33.1	255°37.9	-17°13.0	206°39.3	-22°15.8
21	141°13.4	115°49.6	9°53.2	224°19.9	-23°33.1	270°40.5	-17°13.0	221°41.7	-22°15.8
22	156°15.9	130°49.2	9°54.4	239°20.8	-23°33.1	285°43.1	-17°12.9	236°44.1	-22°15.8
23	171°18.4	145°48.7	9°55.6	254°21.8	-23°33.1	300°45.7	-17°12.9	251°46.4	-22°15.8
Mer.pass.:11:36		v-0.4 d1.2 m-3.8		v0.9 d0.0 m0.4		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°13.0	-42°12.6
Schedar	349°37.4	56°38.1
Diphda	348°52.9	-17°53.4
Achernar	335°25.0	-57°09.0
Hamal	327°57.4	23°32.7
Polaris	316°41.7	89°20.5
Akamar	315°16.2	-40°14.3
Menkar	314°11.9	4°09.4
Mirfak	308°36.0	49°55.4
Aldebaran	290°45.8	16°32.5
Rigel	281°09.0	-8°11.2
Capella	280°29.8	46°01.0
Bellatrix	278°28.6	6°21.7
Elnath	278°08.6	28°37.2
Alnilam	275°43.2	-1°11.7
Betelgeuse	270°57.8	7°24.3
Canopus	263°54.7	-52°42.8
Sirius	258°30.8	-16°44.7
Adara	255°09.9	-29°00.2
Procyon	244°56.2	5°10.6
Pollux	243°23.6	27°58.8
Avior	234°16.4	-59°34.4
Suhail	222°49.8	-43°30.7
Miaplacidus	221°38.4	-69°47.8
Alphard	217°52.7	-8°44.5
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.2
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.6
Acrux	173°04.9	-63°11.9
Gacrux	171°56.7	-57°12.9
Alioth	166°17.4	55°51.6
Spica	158°27.5	-11°15.3
Alcaid	152°55.9	49°13.3
Hadar	148°42.7	-60°27.4
Menkent	148°03.4	-36°27.4
Arcturus	145°52.4	19°05.5
Rigil Kent.	139°46.8	-60°54.3
Zubenelg.	137°01.6	-16°06.9
Kochab	137°19.3	74°04.8
Alphecca	126°08.1	26°39.2
Antares	112°22.1	-26°28.1
Atria	107°20.8	-69°03.2
Sabik	102°08.7	-15°44.7
Shaula	96°17.5	-37°06.7
Rasalhague	96°03.4	12°32.8
Etamin	90°44.6	51°29.0
Kaus Aust.	83°39.5	-34°22.3
Vega	80°36.8	38°47.8
Nunki	75°54.4	-26°16.3
Altair	62°05.3	8°54.9
Peacock	53°14.5	-56°40.3
Deneb	49°29.5	45°20.5
Enif	33°44.2	9°57.4
Alnair	27°40.1	-46°52.3
Fomalhaut	15°20.8	-29°31.6
Scheat	13°50.6	28°10.7
Markab	13°35.4	15°18.0

2018/3/2	**SHA**	**Mer.pass**
Venus	337°54.7	13:15
Mars	84°51.6	06:07
Jupiter	129°17.3	03:09
Saturn	80°34.8	06:23

2018/3/2	**SHA**	**Mer.pass**
Venus	336°45.7	13:16
Mars	84°14.9	06:05
Jupiter	129°20.6	03:05
Saturn	80°32.4	06:19

2018/3/2	**SHA**	**Mer.pass**
Venus	335°36.7	13:16
Mars	83°38.3	06:04
Jupiter	129°23.9	03:00
Saturn	80°30.2	06:16

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°32.6	2°05.9	68°49.5	5.8	19°40.5	-2.9	59.4
1	193°32.8	2°06.8	83°14.4	5.8	19°37.5	-3.1	59.4
2	208°32.9	2°07.8	97°39.2	5.9	19°34.4	-3.2	59.4
3	223°33.1	2°08.8	112°04.1	5.9	19°31.1	-3.3	59.4
4	238°33.3	2°09.8	126°29.0	5.9	19°27.7	-3.4	59.4
5	253°33.5	2°10.8	140°53.9	5.9	19°24.2	-3.6	59.4
6	268°33.7	2°11.8	155°18.8	6.0	19°20.6	-3.7	59.4
7	283°33.9	2°12.7	169°43.8	6.0	19°16.8	-3.8	59.4
8	298°34.1	2°13.7	184°08.8	6.0	19°12.9	-4.0	59.4
9	313°34.3	2°14.7	198°33.8	6.0	19°08.9	-4.1	59.4
10	328°34.5	2°15.7	212°58.8	6.1	19°04.8	-4.2	59.4
11	343°34.6	2°16.7	227°23.9	6.1	19°00.5	-4.3	59.4
12	358°34.8	2°17.6	241°49.0	6.1	18°56.1	-4.5	59.4
13	13°35.0	2°18.6	256°14.1	6.1	18°51.6	-4.6	59.4
14	28°35.2	2°19.6	270°39.3	6.2	18°46.9	-4.7	59.4
15	43°35.4	2°20.6	285°04.5	6.2	18°42.1	-4.8	59.4
16	58°35.6	2°21.6	299°29.7	6.2	18°37.2	-5.0	59.4
17	73°35.8	2°22.5	313°55.0	6.3	18°32.2	-5.1	59.4
18	88°36.0	2°23.5	328°20.3	6.3	18°27.1	-5.2	59.4
19	103°36.2	2°24.5	342°45.6	6.3	18°21.8	-5.3	59.4
20	118°36.3	2°25.5	357°11.0	6.4	18°16.4	-5.4	59.4
21	133°36.5	2°26.5	11°36.4	6.4	18°10.9	-5.6	59.4
22	148°36.7	2°27.4	26°01.8	6.5	18°05.3	-5.7	59.4
23	163°36.9	2°28.4	40°27.3	6.5	17°59.6	-5.8	59.4
	SD.=16.0	d=1.0			S.D.=16.2		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°37.1	2°29.4	54°52.8	6.5	17°53.7	-5.9	59.4
1	193°37.3	2°30.4	69°18.4	6.6	17°47.7	-6.0	59.4
2	208°37.5	2°31.4	83°43.9	6.6	17°41.7	-6.1	59.4
3	223°37.7	2°32.3	98°09.6	6.7	17°35.5	-6.3	59.4
4	238°37.9	2°33.3	112°35.3	6.7	17°29.1	-6.4	59.4
5	253°38.1	2°34.3	127°01.0	6.7	17°22.7	-6.5	59.4
6	268°38.2	2°35.3	141°26.8	6.8	17°16.2	-6.6	59.4
7	283°38.4	2°36.2	155°52.6	6.8	17°09.5	-6.7	59.4
8	298°38.6	2°37.2	170°18.4	6.9	17°02.8	-6.8	59.4
9	313°38.8	2°38.2	184°44.3	6.9	16°55.9	-6.9	59.4
10	328°39.0	2°39.2	199°10.3	7.0	16°48.9	-7.0	59.4
11	343°39.2	2°40.2	213°36.3	7.0	16°41.8	-7.1	59.4
12	358°39.4	2°41.1	228°02.3	7.1	16°34.6	-7.2	59.4
13	13°39.6	2°42.1	242°28.4	7.1	16°27.3	-7.3	59.4
14	28°39.8	2°43.1	256°54.6	7.2	16°19.9	-7.5	59.4
15	43°39.9	2°44.1	271°20.8	7.2	16°12.4	-7.6	59.4
16	58°40.1	2°45.1	285°47.0	7.3	16°04.8	-7.7	59.4
17	73°40.3	2°46.0	300°13.3	7.3	15°57.1	-7.8	59.3
18	88°40.5	2°47.0	314°39.6	7.4	15°49.3	-7.9	59.3
19	103°40.7	2°48.0	329°06.0	7.4	15°41.4	-8.0	59.3
20	118°40.9	2°49.0	343°32.4	7.5	15°33.4	-8.1	59.3
21	133°41.1	2°49.9	357°58.9	7.5	15°25.3	-8.1	59.3
22	148°41.3	2°50.9	12°25.5	7.6	15°17.1	-8.2	59.3
23	163°41.5	2°51.9	26°52.1	7.6	15°08.8	-8.3	59.3
	SD.=16.0	d=1.0			S.D.=16.2		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°41.7	2°52.9	41°18.7	7.7	15°00.4	-8.4	59.3
1	193°41.8	2°53.8	55°45.4	7.7	14°51.9	-8.5	59.3
2	208°42.0	2°54.8	70°12.2	7.8	14°43.4	-8.6	59.3
3	223°42.2	2°55.8	84°39.0	7.8	14°34.7	-8.7	59.3
4	238°42.4	2°56.8	99°05.8	7.9	14°26.0	-8.8	59.3
5	253°42.6	2°57.8	113°32.7	7.9	14°17.1	-8.9	59.3
6	268°42.8	2°58.7	127°59.7	8.0	14°08.2	-9.0	59.3
7	283°43.0	2°59.7	142°26.7	8.0	13°59.2	-9.0	59.3
8	298°43.2	3°00.7	156°53.8	8.1	13°50.1	-9.1	59.2
9	313°43.4	3°01.7	171°20.9	8.2	13°40.9	-9.2	59.2
10	328°43.5	3°02.6	185°48.1	8.2	13°31.7	-9.3	59.2
11	343°43.7	3°03.6	200°15.3	8.3	13°22.3	-9.4	59.2
12	358°43.9	3°04.6	214°42.6	8.3	13°12.9	-9.5	59.2
13	13°44.1	3°05.6	229°09.9	8.4	13°03.4	-9.5	59.2
14	28°44.3	3°06.5	243°37.3	8.4	12°53.9	-9.6	59.2
15	43°44.5	3°07.5	258°04.8	8.5	12°44.2	-9.7	59.2
16	58°44.7	3°08.5	272°32.3	8.5	12°34.5	-9.8	59.2
17	73°44.9	3°09.5	286°59.8	8.6	12°24.7	-9.8	59.2
18	88°45.1	3°10.4	301°27.5	8.6	12°14.8	-9.9	59.2
19	103°45.3	3°11.4	315°55.1	8.7	12°04.9	-10.0	59.1
20	118°45.4	3°12.4	330°22.8	8.7	11°54.9	-10.0	59.1
21	133°45.6	3°13.4	344°50.6	8.8	11°44.8	-10.1	59.1
22	148°45.8	3°14.3	359°18.4	8.9	11°34.7	-10.2	59.1
23	163°46.0	3°15.3	13°46.3	8.9	11°24.5	-10.2	59.1
	SD.=16.0	d=1.0			S.D.=16.2		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	02:29	04:12	05:23	18:51	20:03	21:48
70	02:58	04:24	05:27	18:46	19:50	21:18
68	03:19	04:34	05:31	18:42	19:40	20:56
66	03:35	04:42	05:34	18:39	19:31	20:39
64	03:48	04:48	05:37	18:36	19:25	20:26
62	03:58	04:54	05:39	18:33	19:19	20:15
60	04:07	04:59	05:41	18:31	19:14	20:06
58	04:15	05:03	05:43	18:30	19:09	19:58
56	04:21	05:07	05:44	18:28	19:05	19:51
54	04:27	05:10	05:46	18:26	19:02	19:45
52	04:32	05:13	05:47	18:25	18:59	19:40
50	04:37	05:15	05:48	18:24	18:56	19:35
45	04:46	05:21	05:50	18:21	18:51	19:26
40	04:53	05:25	05:52	18:19	18:46	19:18
35	04:59	05:29	05:54	18:17	18:43	19:12
30	05:04	05:32	05:56	18:16	18:40	19:08
20	05:10	05:36	05:58	18:13	18:35	19:01
10	05:15	05:39	06:00	18:11	18:32	18:56
0	05:17	05:41	06:02	18:09	18:29	18:53
-10	05:19	05:43	06:04	18:07	18:28	18:52
-20	05:18	05:44	06:06	18:05	18:27	18:52
-30	05:16	05:44	06:08	18:03	18:27	18:54
-35	05:14	05:43	06:09	18:02	18:27	18:56
-40	05:11	05:43	06:10	18:00	18:27	18:59
-45	05:08	05:42	06:11	17:59	18:28	19:02
-50	05:03	05:40	06:13	17:57	18:29	19:07
-52	05:00	05:40	06:13	17:56	18:30	19:09
-54	04:58	05:39	06:14	17:56	18:31	19:12
-56	04:54	05:38	06:15	17:55	18:32	19:15
-58	04:51	05:37	06:16	17:54	18:33	19:19
-60	04:46	05:35	06:17	17:53	18:34	19:23

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	10:17	12:42	–:–	07:17	06:48
70	09:02	11:07	13:08	06:31	06:25	06:21
68	09:56	11:39	13:27	05:36	05:53	06:00
66	10:28	12:02	13:42	05:03	05:29	05:44
64	10:52	12:20	13:55	04:39	05:10	05:30
62	11:11	12:35	14:05	04:19	04:54	05:19
60	11:27	12:48	14:14	04:04	04:41	05:09
58	11:40	12:59	14:22	03:50	04:30	05:01
56	11:51	13:08	14:29	03:38	04:20	04:53
54	12:01	13:16	14:35	03:28	04:12	04:46
52	12:10	13:24	14:40	03:19	04:04	04:40
50	12:18	13:30	14:45	03:11	03:57	04:35
45	12:35	13:44	14:56	02:54	03:42	04:23
40	12:49	13:56	15:05	02:39	03:29	04:13
35	13:01	14:06	15:13	02:27	03:18	04:04
30	13:11	14:15	15:19	02:17	03:09	03:57
20	13:28	14:30	15:31	01:58	02:53	03:44
10	13:44	14:43	15:41	01:42	02:39	03:32
0	13:58	14:55	15:50	01:27	02:25	03:22
-10	14:12	15:07	15:59	01:12	02:12	03:11
-20	14:28	15:20	16:09	00:56	01:58	02:59
-30	14:45	15:35	16:21	00:38	01:41	02:46
-35	14:55	15:44	16:27	00:27	01:31	02:38
-40	15:07	15:54	16:35	00:15	01:20	02:29
-45	15:20	16:05	16:43	–:–	01:07	02:18
-50	15:37	16:19	16:54	–:–	00:51	02:05
-52	15:45	16:25	16:58	–:–	00:44	01:59
-54	15:54	16:32	17:04	–:–	00:35	01:53
-56	16:03	16:40	17:10	–:–	00:26	01:45
-58	16:14	16:49	17:16	–:–	00:15	01:37
-60	16:27	16:59	17:23	–:–	00:03	01:28

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
26	05:50	05:41	12:05	20:11	07:42	9(71%)
27	05:32	05:22	12:05	21:08	08:40	10(81%)
28	05:13	05:04	12:05	22:02	09:35	11(89%)

March 29, 30 ,31 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	186°20.8	160°48.3	9°56.8	269°22.7	-23°33.1	315°48.3	-17°12.9	266°48.8	-22°15.8
1	201°23.3	175°47.9	9°58.0	284°23.7	-23°33.1	330°50.9	-17°12.8	281°51.2	-22°15.8
2	216°25.8	190°47.5	9°59.2	299°24.6	-23°33.0	345°53.6	-17°12.8	296°53.6	-22°15.8
3	231°28.2	205°47.0	10°00.4	314°25.6	-23°33.0	0°56.2	-17°12.7	311°56.0	-22°15.8
4	246°30.7	220°46.6	10°01.6	329°26.5	-23°33.0	15°58.8	-17°12.7	326°58.3	-22°15.7
5	261°33.2	235°46.2	10°02.7	344°27.5	-23°33.0	31°01.4	-17°12.6	342°00.7	-22°15.7
6	276°35.6	250°45.8	10°03.9	359°28.4	-23°33.0	46°04.0	-17°12.6	357°03.1	-22°15.7
7	291°38.1	265°45.4	10°05.1	14°29.4	-23°33.0	61°06.6	-17°12.6	12°05.5	-22°15.7
8	306°40.5	280°44.9	10°06.3	29°30.3	-23°33.0	76°09.3	-17°12.5	27°07.8	-22°15.7
9	321°43.0	295°44.5	10°07.5	44°31.3	-23°33.0	91°11.9	-17°12.5	42°10.2	-22°15.7
10	336°45.5	310°44.1	10°08.7	59°32.2	-23°33.0	106°14.5	-17°12.4	57°12.6	-22°15.7
11	351°47.9	325°43.6	10°09.9	74°33.2	-23°33.0	121°17.1	-17°12.4	72°15.0	-22°15.7
12	6°50.4	340°43.2	10°11.1	89°34.1	-23°33.0	136°19.7	-17°12.3	87°17.3	-22°15.7
13	21°52.9	355°42.8	10°12.3	104°35.1	-23°33.0	151°22.4	-17°12.3	102°19.7	-22°15.7
14	36°55.3	10°42.4	10°13.5	119°36.0	-23°33.0	166°25.0	-17°12.2	117°22.1	-22°15.7
15	51°57.8	25°41.9	10°14.7	134°37.0	-23°32.9	181°27.6	-17°12.2	132°24.5	-22°15.7
16	67°00.3	40°41.5	10°15.9	149°37.9	-23°32.9	196°30.2	-17°12.2	147°26.9	-22°15.7
17	82°02.7	55°41.1	10°17.1	164°38.9	-23°32.9	211°32.8	-17°12.1	162°29.2	-22°15.7
18	97°05.2	70°40.7	10°18.2	179°39.8	-23°32.9	226°35.5	-17°12.1	177°31.6	-22°15.7
19	112°07.7	85°40.2	10°19.4	194°40.8	-23°32.9	241°38.1	-17°12.0	192°34.0	-22°15.7
20	127°10.1	100°39.8	10°20.6	209°41.7	-23°32.9	256°40.7	-17°12.0	207°36.4	-22°15.7
21	142°12.6	115°39.4	10°21.8	224°42.7	-23°32.9	271°43.3	-17°11.9	222°38.8	-22°15.6
22	157°15.0	130°38.9	10°23.0	239°43.6	-23°32.9	286°45.9	-17°11.9	237°41.1	-22°15.6
23	172°17.5	145°38.5	10°24.2	254°44.6	-23°32.9	301°48.6	-17°11.9	252°43.5	-22°15.6
Mer.pass.:11:32		v-0.4 d1.2 m-3.8		v0.9 d0.0 m0.3		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	187°20.0	160°38.1	10°25.4	269°45.5	-23°32.9	316°51.2	-17°11.8	267°45.9	-22°15.6
1	202°22.4	175°37.7	10°26.6	284°46.5	-23°32.8	331°53.8	-17°11.8	282°48.3	-22°15.6
2	217°24.9	190°37.2	10°27.7	299°47.4	-23°32.8	346°56.4	-17°11.7	297°50.7	-22°15.6
3	232°27.4	205°36.8	10°28.9	314°48.4	-23°32.8	1°59.1	-17°11.7	312°53.0	-22°15.6
4	247°29.8	220°36.4	10°30.1	329°49.3	-23°32.8	17°01.7	-17°11.6	327°55.4	-22°15.6
5	262°32.3	235°35.9	10°31.3	344°50.3	-23°32.8	32°04.3	-17°11.6	342°57.8	-22°15.6
6	277°34.8	250°35.5	10°32.5	359°51.2	-23°32.8	47°06.9	-17°11.5	358°00.2	-22°15.6
7	292°37.2	265°35.1	10°33.7	14°52.2	-23°32.8	62°09.6	-17°11.5	13°02.6	-22°15.6
8	307°39.7	280°34.6	10°34.9	29°53.1	-23°32.8	77°12.2	-17°11.5	28°04.9	-22°15.6
9	322°42.1	295°34.2	10°36.0	44°54.1	-23°32.7	92°14.8	-17°11.4	43°07.3	-22°15.6
10	337°44.6	310°33.8	10°37.2	59°55.1	-23°32.7	107°17.4	-17°11.4	58°09.7	-22°15.6
11	352°47.1	325°33.3	10°38.4	74°56.0	-23°32.7	122°20.1	-17°11.3	73°12.1	-22°15.6
12	7°49.5	340°32.9	10°39.6	89°57.0	-23°32.7	137°22.7	-17°11.3	88°14.5	-22°15.6
13	22°52.0	355°32.5	10°40.8	104°57.9	-23°32.7	152°25.3	-17°11.2	103°16.9	-22°15.6
14	37°54.5	10°32.0	10°41.9	119°58.9	-23°32.7	167°27.9	-17°11.2	118°19.2	-22°15.6
15	52°56.9	25°31.6	10°43.1	134°59.8	-23°32.7	182°30.6	-17°11.1	133°21.6	-22°15.5
16	67°59.4	40°31.2	10°44.3	150°00.8	-23°32.6	197°33.2	-17°11.1	148°24.0	-22°15.5
17	83°01.9	55°30.7	10°45.5	165°01.7	-23°32.6	212°35.8	-17°11.0	163°26.4	-22°15.5
18	98°04.3	70°30.3	10°46.7	180°02.7	-23°32.6	227°38.4	-17°11.0	178°28.8	-22°15.5
19	113°06.8	85°29.8	10°47.8	195°03.7	-23°32.6	242°41.1	-17°11.0	193°31.2	-22°15.5
20	128°09.3	100°29.4	10°49.0	210°04.6	-23°32.6	257°43.7	-17°10.9	208°33.5	-22°15.5
21	143°11.7	115°29.0	10°50.2	225°05.6	-23°32.6	272°46.3	-17°10.9	223°35.9	-22°15.5
22	158°14.2	130°28.5	10°51.4	240°06.5	-23°32.6	287°49.0	-17°10.8	238°38.3	-22°15.5
23	173°16.6	145°28.1	10°52.6	255°07.5	-23°32.5	302°51.6	-17°10.8	253°40.7	-22°15.5
Mer.pass.:11:28		v-0.4 d1.2 m-3.8		v1.0 d0.0 m0.3		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	188°19.1	160°27.6	10°53.7	270°08.4	-23°32.5	317°54.2	-17°10.7	268°43.1	-22°15.5
1	203°21.6	175°27.2	10°54.9	285°09.4	-23°32.5	332°56.8	-17°10.7	283°45.5	-22°15.5
2	218°24.0	190°26.8	10°56.1	300°10.4	-23°32.5	347°59.5	-17°10.6	298°47.8	-22°15.5
3	233°26.5	205°26.3	10°57.3	315°11.3	-23°32.5	3°02.1	-17°10.6	313°50.2	-22°15.5
4	248°29.0	220°25.9	10°58.4	330°12.3	-23°32.5	18°04.7	-17°10.5	328°52.6	-22°15.5
5	263°31.4	235°25.5	10°59.6	345°13.2	-23°32.4	33°07.4	-17°10.5	343°55.0	-22°15.5
6	278°33.9	250°25.0	11°00.8	0°14.2	-23°32.4	48°10.0	-17°10.4	358°57.4	-22°15.5
7	293°36.4	265°24.6	11°02.0	15°15.1	-23°32.4	63°12.6	-17°10.4	13°59.8	-22°15.5
8	308°38.8	280°24.1	11°03.1	30°16.1	-23°32.4	78°15.3	-17°10.3	29°02.2	-22°15.5
9	323°41.3	295°23.7	11°04.3	45°17.1	-23°32.4	93°17.9	-17°10.3	44°04.5	-22°15.4
10	338°43.7	310°23.3	11°05.5	60°18.0	-23°32.4	108°20.5	-17°10.3	59°06.9	-22°15.4
11	353°46.2	325°22.8	11°06.7	75°19.0	-23°32.3	123°23.2	-17°10.2	74°09.3	-22°15.4
12	8°48.7	340°22.4	11°07.8	90°19.9	-23°32.3	138°25.8	-17°10.2	89°11.7	-22°15.4
13	23°51.1	355°21.9	11°09.0	105°20.9	-23°32.3	153°28.4	-17°10.1	104°14.1	-22°15.4
14	38°53.6	10°21.5	11°10.2	120°21.9	-23°32.3	168°31.1	-17°10.1	119°16.5	-22°15.4
15	53°56.1	25°21.0	11°11.4	135°22.8	-23°32.3	183°33.7	-17°10.0	134°18.9	-22°15.4
16	68°58.5	40°20.6	11°12.5	150°23.8	-23°32.3	198°36.3	-17°10.0	149°21.2	-22°15.4
17	84°01.0	55°20.2	11°13.7	165°24.7	-23°32.2	213°39.0	-17°09.9	164°23.6	-22°15.4
18	99°03.5	70°19.7	11°14.9	180°25.7	-23°32.2	228°41.6	-17°09.9	179°26.0	-22°15.4
19	114°05.9	85°19.3	11°16.0	195°26.7	-23°32.2	243°44.2	-17°09.8	194°28.4	-22°15.4
20	129°08.4	100°18.8	11°17.2	210°27.6	-23°32.2	258°46.9	-17°09.8	209°30.8	-22°15.4
21	144°10.9	115°18.4	11°18.4	225°28.6	-23°32.2	273°49.5	-17°09.7	224°33.2	-22°15.4
22	159°13.3	130°17.9	11°19.5	240°29.5	-23°32.1	288°52.1	-17°09.7	239°35.6	-22°15.4
23	174°15.8	145°17.5	11°20.7	255°30.5	-23°32.1	303°54.8	-17°09.6	254°38.0	-22°15.4
Mer.pass.:11:24		v-0.4 d1.2 m-3.8		v1.0 d0.0 m0.3		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°12.9	-42°12.6
Schedar	349°37.4	56°38.1
Diphda	348°52.9	-17°53.4
Achernar	335°25.0	-57°08.9
Hamal	327°57.4	23°32.7
Polaris	316°42.7	89°20.5
Akamar	315°16.2	-40°14.3
Menkar	314°11.9	4°09.4
Mirfak	308°36.0	49°55.4
Aldebaran	290°45.8	16°32.5
Rigel	281°09.1	-8°11.2
Capella	280°29.8	46°01.0
Bellatrix	278°28.6	6°21.7
Elnath	278°08.6	28°37.2
Alnilam	275°43.2	-1°11.7
Betelgeuse	270°57.9	7°24.3
Canopus	263°54.7	-52°42.8
Sirius	258°30.8	-16°44.7
Adara	255°09.9	-29°00.2
Procyon	244°56.2	5°10.6
Pollux	243°23.6	27°58.8
Avior	234°16.4	-59°34.4
Suhail	222°49.8	-43°30.7
Miaplacidus	221°38.4	-69°47.8
Alphard	217°52.7	-8°44.5
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.2
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.6
Acrux	173°04.9	-63°12.0
Gacrux	171°56.7	-57°12.9
Alioth	166°17.4	55°51.7
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.3
Hadar	148°42.7	-60°27.4
Menkent	148°03.4	-36°27.4
Arcturus	145°52.3	19°05.5
Rigil Kent.	139°46.7	-60°54.3
Zubenelg.	137°01.6	-16°06.9
Kochab	137°19.2	74°04.8
Alphecca	126°08.1	26°39.2
Antares	112°22.1	-26°28.1
Atria	107°20.8	-69°03.2
Sabik	102°08.7	-15°44.7
Shaula	96°17.4	-37°06.7
Rasalhague	96°03.4	12°32.8
Etamin	90°44.6	51°29.0
Kaus Aust.	83°39.5	-34°22.3
Vega	80°36.8	38°47.8
Nunki	75°54.4	-26°16.3
Altair	62°05.3	8°54.9
Peacock	53°14.5	-56°40.3
Deneb	49°29.5	45°20.5
Enif	33°44.2	9°57.4
Alnair	27°40.1	-46°52.3
Fomalhaut	15°20.8	-29°31.6
Scheat	13°50.6	28°10.7
Markab	13°35.4	15°18.0

2018/3/2	**SHA**	**Mer.pass**
Venus	334°27.5	13:17
Mars	83°01.9	06:02
Jupiter	129°27.5	02:56
Saturn	80°28.0	06:12

2018/3/3	**SHA**	**Mer.pass**
Venus	333°18.1	13:18
Mars	82°25.6	06:01
Jupiter	129°31.2	02:52
Saturn	80°25.9	06:08

2018/3/3	**SHA**	**Mer.pass**
Venus	332°08.5	13:19
Mars	81°49.3	05:59
Jupiter	129°35.1	02:48
Saturn	80°24.0	06:04

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°46.2	3°16.3	28°14.2	9.0	11°14.2	-10.3	59.1
1	193°46.4	3°17.3	42°42.2	9.0	11°03.9	-10.4	59.1
2	208°46.6	3°18.2	57°10.3	9.1	10°53.5	-10.4	59.1
3	223°46.8	3°19.2	71°38.3	9.1	10°43.0	-10.5	59.0
4	238°47.0	3°20.2	86°06.5	9.2	10°32.5	-10.5	59.0
5	253°47.1	3°21.2	100°34.7	9.2	10°22.0	-10.6	59.0
6	268°47.3	3°22.1	115°02.9	9.3	10°11.3	-10.7	59.0
7	283°47.5	3°23.1	129°31.2	9.3	10°00.7	-10.7	59.0
8	298°47.7	3°24.1	143°59.6	9.4	9°49.9	-10.8	59.0
9	313°47.9	3°25.1	158°28.0	9.4	9°39.1	-10.8	59.0
10	328°48.1	3°26.0	172°56.4	9.5	9°28.3	-10.9	59.0
11	343°48.3	3°27.0	187°24.9	9.5	9°17.4	-10.9	58.9
12	358°48.5	3°28.0	201°53.5	9.6	9°06.5	-11.0	58.9
13	13°48.7	3°28.9	216°22.1	9.6	8°55.5	-11.0	58.9
14	28°48.8	3°29.9	230°50.7	9.7	8°44.4	-11.1	58.9
15	43°49.0	3°30.9	245°19.4	9.7	8°33.4	-11.1	58.9
16	58°49.2	3°31.9	259°48.2	9.8	8°22.2	-11.1	58.9
17	73°49.4	3°32.8	274°17.0	9.8	8°11.1	-11.2	58.8
18	88°49.6	3°33.8	288°45.8	9.9	7°59.9	-11.2	58.8
19	103°49.8	3°34.8	303°14.7	9.9	7°48.6	-11.3	58.8
20	118°50.0	3°35.8	317°43.7	10.0	7°37.3	-11.3	58.8
21	133°50.2	3°36.7	332°12.7	10.0	7°26.0	-11.3	58.8
22	148°50.4	3°37.7	346°41.7	10.1	7°14.7	-11.4	58.8
23	163°50.5	3°38.7	1°10.8	10.1	7°03.3	-11.4	58.7
	SD.=16.0	d=1.0			S.D.=16.1		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°50.7	3°39.6	15°39.9	10.2	6°51.8	-11.4	58.7
1	193°50.9	3°40.6	30°09.1	10.2	6°40.4	-11.5	58.7
2	208°51.1	3°41.6	44°38.3	10.2	6°28.9	-11.5	58.7
3	223°51.3	3°42.6	59°07.6	10.3	6°17.4	-11.5	58.7
4	238°51.5	3°43.5	73°36.9	10.3	6°05.8	-11.6	58.6
5	253°51.7	3°44.5	88°06.3	10.4	5°54.3	-11.6	58.6
6	268°51.9	3°45.5	102°35.6	10.4	5°42.7	-11.6	58.6
7	283°52.1	3°46.4	117°05.1	10.5	5°31.0	-11.6	58.6
8	298°52.2	3°47.4	131°34.6	10.5	5°19.4	-11.7	58.6
9	313°52.4	3°48.4	146°04.1	10.5	5°07.7	-11.7	58.6
10	328°52.6	3°49.3	160°33.7	10.6	4°56.0	-11.7	58.5
11	343°52.8	3°50.3	175°03.3	10.6	4°44.3	-11.7	58.5
12	358°53.0	3°51.3	189°32.9	10.7	4°32.6	-11.7	58.5
13	13°53.2	3°52.3	204°02.6	10.7	4°20.8	-11.8	58.5
14	28°53.4	3°53.2	218°32.3	10.7	4°09.1	-11.8	58.5
15	43°53.6	3°54.2	233°02.1	10.8	3°57.3	-11.8	58.4
16	58°53.7	3°55.2	247°31.9	10.8	3°45.5	-11.8	58.4
17	73°53.9	3°56.1	262°01.7	10.9	3°33.7	-11.8	58.4
18	88°54.1	3°57.1	276°31.6	10.9	3°21.9	-11.8	58.4
19	103°54.3	3°58.1	291°01.5	10.9	3°10.1	-11.8	58.3
20	118°54.5	3°59.0	305°31.5	11.0	2°58.2	-11.8	58.3
21	133°54.7	4°00.0	320°01.4	11.0	2°46.4	-11.8	58.3
22	148°54.9	4°01.0	334°31.5	11.0	2°34.5	-11.9	58.3
23	163°55.1	4°02.0	349°01.5	11.1	2°22.7	-11.9	58.3
	SD.=16.0	d=1.0			S.D.=16.0		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°55.3	4°02.9	3°31.6	11.1	2°10.8	-11.9	58.2
1	193°55.4	4°03.9	18°01.7	11.1	1°59.0	-11.9	58.2
2	208°55.6	4°04.9	32°31.9	11.2	1°47.1	-11.9	58.2
3	223°55.8	4°05.8	47°02.1	11.2	1°35.3	-11.9	58.2
4	238°56.0	4°06.8	61°32.3	11.2	1°23.4	-11.9	58.1
5	253°56.2	4°07.8	76°02.5	11.3	1°11.5	-11.9	58.1
6	268°56.4	4°08.7	90°32.8	11.3	0°59.7	-11.9	58.1
7	283°56.6	4°09.7	105°03.1	11.3	0°47.8	-11.8	58.1
8	298°56.8	4°10.7	119°33.5	11.4	0°36.0	-11.8	58.0
9	313°56.9	4°11.6	134°03.8	11.4	0°24.1	-11.8	58.0
10	328°57.1	4°12.6	148°34.2	11.4	0°12.3	-11.8	58.0
11	343°57.3	4°13.6	163°04.7	11.4	0°00.5	-11.8	58.0
12	358°57.5	4°14.5	177°35.1	11.5	-0°11.3	-11.8	57.9
13	13°57.7	4°15.5	192°05.6	11.5	-0°23.1	-11.8	57.9
14	28°57.9	4°16.5	206°36.1	11.5	-0°34.9	-11.8	57.9
15	43°58.1	4°17.4	221°06.6	11.5	-0°46.7	-11.8	57.9
16	58°58.3	4°18.4	235°37.2	11.6	-0°58.5	-11.8	57.8
17	73°58.4	4°19.4	250°07.8	11.6	-1°10.2	-11.7	57.8
18	88°58.6	4°20.3	264°38.4	11.6	-1°22.0	-11.7	57.8
19	103°58.8	4°21.3	279°09.0	11.6	-1°33.7	-11.7	57.8
20	118°59.0	4°22.3	293°39.7	11.7	-1°45.4	-11.7	57.7
21	133°59.2	4°23.2	308°10.3	11.7	-1°57.1	-11.7	57.7
22	148°59.4	4°24.2	322°41.0	11.7	-2°08.7	-11.6	57.7
23	163°59.6	4°25.2	337°11.7	11.7	-2°20.4	-11.6	57.7
	SD.=16.0	d=1.0			S.D.=15.9		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	02:01	03:54	05:07	19:05	20:19	22:16
70	02:37	04:08	05:13	18:58	20:04	21:38
68	03:02	04:20	05:18	18:53	19:52	21:12
66	03:20	04:29	05:22	18:49	19:42	20:52
64	03:35	04:37	05:26	18:45	19:34	20:37
62	03:47	04:44	05:29	18:42	19:27	20:25
60	03:57	04:49	05:32	18:39	19:21	20:14
58	04:05	04:54	05:34	18:36	19:16	20:06
56	04:13	04:59	05:36	18:34	19:12	19:58
54	04:19	05:02	05:38	18:32	19:08	19:51
52	04:25	05:06	05:40	18:30	19:04	19:46
50	04:30	05:09	05:41	18:29	19:01	19:40
45	04:40	05:15	05:45	18:25	18:55	19:30
40	04:48	05:20	05:48	18:22	18:49	19:22
35	04:55	05:25	05:50	18:20	18:45	19:15
30	04:60	05:28	05:52	18:17	18:41	19:10
20	05:08	05:33	05:56	18:14	18:36	19:02
10	05:13	05:37	05:59	18:11	18:32	18:56
0	05:16	05:41	06:01	18:08	18:28	18:52
-10	05:18	05:43	06:04	18:05	18:26	18:50
-20	05:19	05:44	06:06	18:02	18:24	18:50
-30	05:18	05:45	06:09	17:59	18:23	18:51
-35	05:16	05:46	06:11	17:57	18:23	18:52
-40	05:14	05:46	06:13	17:55	18:22	18:54
-45	05:12	05:46	06:15	17:53	18:22	18:56
-50	05:08	05:45	06:17	17:51	18:23	19:00
-52	05:06	05:45	06:18	17:50	18:23	19:02
-54	05:03	05:44	06:20	17:48	18:23	19:04
-56	05:01	05:44	06:21	17:47	18:24	19:07
-58	04:57	05:43	06:22	17:45	18:24	19:10
-60	04:54	05:43	06:24	17:44	18:25	19:13

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	14:50	16:49	18:43	06:32	06:19	06:08
70	15:03	16:54	18:41	06:16	06:12	06:07
68	15:14	16:58	18:39	06:04	06:05	06:06
66	15:23	17:01	18:37	05:53	06:00	06:05
64	15:30	17:04	18:36	05:45	05:56	06:05
62	15:36	17:07	18:35	05:37	05:52	06:04
60	15:42	17:09	18:34	05:31	05:48	06:04
58	15:47	17:11	18:33	05:25	05:45	06:03
56	15:51	17:12	18:32	05:20	05:42	06:03
54	15:55	17:14	18:31	05:15	05:40	06:02
52	15:58	17:15	18:31	05:11	05:38	06:02
50	16:01	17:17	18:30	05:07	05:36	06:02
45	16:08	17:19	18:29	04:59	05:31	06:01
40	16:14	17:22	18:28	04:52	05:27	06:00
35	16:19	17:24	18:27	04:46	05:24	05:60
30	16:23	17:25	18:26	04:41	05:21	05:59
20	16:30	17:28	18:25	04:31	05:16	05:59
10	16:37	17:31	18:24	04:23	05:12	05:58
0	16:43	17:34	18:23	04:16	05:07	05:57
-10	16:49	17:36	18:22	04:08	05:03	05:56
-20	16:55	17:39	18:21	03:59	04:58	05:56
-30	17:03	17:42	18:19	03:50	04:53	05:55
-35	17:07	17:44	18:19	03:44	04:50	05:54
-40	17:12	17:46	18:18	03:38	04:46	05:53
-45	17:17	17:48	18:17	03:30	04:42	05:53
-50	17:24	17:51	18:16	03:21	04:37	05:52
-52	17:27	17:52	18:16	03:17	04:35	05:51
-54	17:30	17:53	18:15	03:13	04:32	05:51
-56	17:34	17:55	18:14	03:08	04:30	05:50
-58	17:38	17:56	18:14	03:02	04:27	05:50
-60	17:42	17:58	18:13	02:55	04:23	05:49

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
29	04:55	04:46	12:04	22:55	10:29	12(95%)
30	04:37	04:28	12:04	23:45	11:20	13(99%)
31	04:19	04:10	12:04	00:34	12:09	14(100%)

April 01, 02 ,03 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	189°18.2	160°17.1	11°21.9	270°31.5	-23°32.1	318°57.4	-17°09.6	269°40.4	-22°15.4
1	204°20.7	175°16.6	11°23.0	285°32.4	-23°32.1	334°00.1	-17°09.5	284°42.7	-22°15.4
2	219°23.2	190°16.2	11°24.2	300°33.4	-23°32.1	349°02.7	-17°09.5	299°45.1	-22°15.4
3	234°25.6	205°15.7	11°25.4	315°34.4	-23°32.0	4°05.3	-17°09.4	314°47.5	-22°15.4
4	249°28.1	220°15.3	11°26.5	330°35.3	-23°32.0	19°08.0	-17°09.4	329°49.9	-22°15.3
5	264°30.6	235°14.8	11°27.7	345°36.3	-23°32.0	34°10.6	-17°09.4	344°52.3	-22°15.3
6	279°33.0	250°14.4	11°28.9	0°37.2	-23°32.0	49°13.2	-17°09.3	359°54.7	-22°15.3
7	294°35.5	265°13.9	11°30.0	15°38.2	-23°31.9	64°15.9	-17°09.3	14°57.1	-22°15.3
8	309°38.0	280°13.5	11°31.2	30°39.2	-23°31.9	79°18.5	-17°09.2	29°59.5	-22°15.3
9	324°40.4	295°13.0	11°32.4	45°40.1	-23°31.9	94°21.2	-17°09.2	45°01.9	-22°15.3
10	339°42.9	310°12.6	11°33.5	60°41.1	-23°31.9	109°23.8	-17°09.1	60°04.3	-22°15.3
11	354°45.4	325°12.1	11°34.7	75°42.1	-23°31.9	124°26.4	-17°09.1	75°06.6	-22°15.3
12	9°47.8	340°11.7	11°35.8	90°43.0	-23°31.8	139°29.1	-17°09.0	90°09.0	-22°15.3
13	24°50.3	355°11.3	11°37.0	105°44.0	-23°31.8	154°31.7	-17°09.0	105°11.4	-22°15.3
14	39°52.7	10°10.8	11°38.2	120°45.0	-23°31.8	169°34.4	-17°08.9	120°13.8	-22°15.3
15	54°55.2	25°10.4	11°39.3	135°45.9	-23°31.8	184°37.0	-17°08.9	135°16.2	-22°15.3
16	69°57.7	40°09.9	11°40.5	150°46.9	-23°31.7	199°39.6	-17°08.8	150°18.6	-22°15.3
17	85°00.1	55°09.5	11°41.6	165°47.9	-23°31.7	214°42.3	-17°08.8	165°21.0	-22°15.3
18	100°02.6	70°09.0	11°42.8	180°48.8	-23°31.7	229°44.9	-17°08.7	180°23.4	-22°15.3
19	115°05.1	85°08.6	11°43.9	195°49.8	-23°31.7	244°47.6	-17°08.7	195°25.8	-22°15.3
20	130°07.5	100°08.1	11°45.1	210°50.8	-23°31.7	259°50.2	-17°08.6	210°28.2	-22°15.3
21	145°10.0	115°07.6	11°46.3	225°51.7	-23°31.6	274°52.8	-17°08.6	225°30.6	-22°15.3
22	160°12.5	130°07.2	11°47.4	240°52.7	-23°31.6	289°55.5	-17°08.5	240°33.0	-22°15.3
23	175°14.9	145°06.7	11°48.6	255°53.7	-23°31.6	304°58.1	-17°08.5	255°35.3	-22°15.2
Mer.pass.:11:20		v-0.4 d1.2 m-3.8		v1.0 d0.0 m0.3		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	190°17.4	160°06.3	11°49.7	270°54.6	-23°31.6	320°00.8	-17°08.4	270°37.7	-22°15.2
1	205°19.8	175°05.8	11°50.9	285°55.6	-23°31.5	335°03.4	-17°08.4	285°40.1	-22°15.2
2	220°22.3	190°05.4	11°52.0	300°56.6	-23°31.5	350°06.1	-17°08.3	300°42.5	-22°15.2
3	235°24.8	205°04.9	11°53.2	315°57.5	-23°31.5	5°08.7	-17°08.3	315°44.9	-22°15.2
4	250°27.2	220°04.5	11°54.3	330°58.5	-23°31.5	20°11.4	-17°08.2	330°47.3	-22°15.2
5	265°29.7	235°04.0	11°55.5	345°59.5	-23°31.4	35°14.0	-17°08.2	345°49.7	-22°15.2
6	280°32.2	250°03.6	11°56.6	1°00.4	-23°31.4	50°16.6	-17°08.1	0°52.1	-22°15.2
7	295°34.6	265°03.1	11°57.8	16°01.4	-23°31.4	65°19.3	-17°08.1	15°54.5	-22°15.2
8	310°37.1	280°02.7	11°58.9	31°02.4	-23°31.4	80°21.9	-17°08.0	30°56.9	-22°15.2
9	325°39.6	295°02.2	12°00.1	46°03.3	-23°31.3	95°24.6	-17°08.0	45°59.3	-22°15.2
10	340°42.0	310°01.7	12°01.2	61°04.3	-23°31.3	110°27.2	-17°07.9	61°01.7	-22°15.2
11	355°44.5	325°01.3	12°02.4	76°05.3	-23°31.3	125°29.9	-17°07.9	76°04.1	-22°15.2
12	10°47.0	340°00.8	12°03.5	91°06.2	-23°31.2	140°32.5	-17°07.8	91°06.5	-22°15.2
13	25°49.4	355°00.4	12°04.7	106°07.2	-23°31.2	155°35.2	-17°07.8	106°08.9	-22°15.2
14	40°51.9	9°59.9	12°05.8	121°08.2	-23°31.2	170°37.8	-17°07.7	121°11.3	-22°15.2
15	55°54.3	24°59.5	12°07.0	136°09.2	-23°31.2	185°40.5	-17°07.7	136°13.7	-22°15.2
16	70°56.8	39°59.0	12°08.1	151°10.1	-23°31.1	200°43.1	-17°07.6	151°16.1	-22°15.2
17	85°59.3	54°58.5	12°09.3	166°11.1	-23°31.1	215°45.8	-17°07.6	166°18.4	-22°15.2
18	101°01.7	69°58.1	12°10.4	181°12.1	-23°31.1	230°48.4	-17°07.5	181°20.8	-22°15.2
19	116°04.2	84°57.6	12°11.6	196°13.0	-23°31.1	245°51.1	-17°07.5	196°23.2	-22°15.1
20	131°06.7	99°57.2	12°12.7	211°14.0	-23°31.0	260°53.7	-17°07.4	211°25.6	-22°15.1
21	146°09.1	114°56.7	12°13.9	226°15.0	-23°31.0	275°56.4	-17°07.4	226°28.0	-22°15.1
22	161°11.6	129°56.2	12°15.0	241°16.0	-23°31.0	290°59.0	-17°07.3	241°30.4	-22°15.1
23	176°14.1	144°55.8	12°16.1	256°16.9	-23°30.9	306°01.7	-17°07.3	256°32.8	-22°15.1
Mer.pass.:11:16		v-0.5 d1.2 m-3.8		v1.0 d0.0 m0.3		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	191°16.5	159°55.3	12°17.3	271°17.9	-23°30.9	321°04.3	-17°07.2	271°35.2	-22°15.1
1	206°19.0	174°54.9	12°18.4	286°18.9	-23°30.9	336°07.0	-17°07.2	286°37.6	-22°15.1
2	221°21.4	189°54.4	12°19.6	301°19.8	-23°30.9	351°09.6	-17°07.1	301°40.0	-22°15.1
3	236°23.9	204°53.9	12°20.7	316°20.8	-23°30.8	6°12.3	-17°07.1	316°42.4	-22°15.1
4	251°26.4	219°53.5	12°21.9	331°21.8	-23°30.8	21°14.9	-17°07.0	331°44.8	-22°15.1
5	266°28.8	234°53.0	12°23.0	346°22.8	-23°30.8	36°17.6	-17°07.0	346°47.2	-22°15.1
6	281°31.3	249°52.5	12°24.1	1°23.7	-23°30.7	51°20.2	-17°06.9	1°49.6	-22°15.1
7	296°33.8	264°52.1	12°25.3	16°24.7	-23°30.7	66°22.9	-17°06.9	16°52.0	-22°15.1
8	311°36.2	279°51.6	12°26.4	31°25.7	-23°30.7	81°25.5	-17°06.8	31°54.4	-22°15.1
9	326°38.7	294°51.2	12°27.6	46°26.7	-23°30.6	96°28.2	-17°06.8	46°56.8	-22°15.1
10	341°41.2	309°50.7	12°28.7	61°27.6	-23°30.6	111°30.8	-17°06.7	61°59.2	-22°15.1
11	356°43.6	324°50.2	12°29.8	76°28.6	-23°30.6	126°33.5	-17°06.7	77°01.6	-22°15.1
12	11°46.1	339°49.8	12°31.0	91°29.6	-23°30.6	141°36.1	-17°06.6	92°04.0	-22°15.1
13	26°48.6	354°49.3	12°32.1	106°30.6	-23°30.5	156°38.8	-17°06.5	107°06.4	-22°15.1
14	41°51.0	9°48.8	12°33.2	121°31.5	-23°30.5	171°41.4	-17°06.5	122°08.8	-22°15.1
15	56°53.5	24°48.4	12°34.4	136°32.5	-23°30.5	186°44.1	-17°06.4	137°11.2	-22°15.1
16	71°55.9	39°47.9	12°35.5	151°33.5	-23°30.4	201°46.7	-17°06.4	152°13.6	-22°15.0
17	86°58.4	54°47.4	12°36.6	166°34.5	-23°30.4	216°49.4	-17°06.3	167°16.0	-22°15.0
18	102°00.9	69°47.0	12°37.8	181°35.5	-23°30.4	231°52.1	-17°06.3	182°18.4	-22°15.0
19	117°03.3	84°46.5	12°38.9	196°36.4	-23°30.3	246°54.7	-17°06.2	197°20.8	-22°15.0
20	132°05.8	99°46.0	12°40.0	211°37.4	-23°30.3	261°57.4	-17°06.2	212°23.2	-22°15.0
21	147°08.3	114°45.6	12°41.2	226°38.4	-23°30.3	277°00.0	-17°06.1	227°25.6	-22°15.0
22	162°10.7	129°45.1	12°42.3	241°39.4	-23°30.2	292°02.7	-17°06.1	242°28.0	-22°15.0
23	177°13.2	144°44.6	12°43.4	256°40.3	-23°30.2	307°05.3	-17°06.0	257°30.4	-22°15.0
Mer.pass.:11:13		v-0.5 d1.1 m-3.8		v1.0 d0.0 m0.2		v2.7 d0.1 m-2.2		v2.4 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°12.9	-42°12.6
Schedar	349°37.4	56°38.1
Diphda	348°52.9	-17°53.4
Achernar	335°25.0	-57°08.9
Hamal	327°57.4	23°32.7
Polaris	316°43.6	89°20.5
Akamar	315°16.2	-40°14.3
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.4
Aldebaran	290°45.9	16°32.5
Rigel	281°09.1	-8°11.2
Capella	280°29.9	46°01.0
Bellatrix	278°28.6	6°21.7
Elnath	278°08.7	28°37.2
Alnilam	275°43.2	-1°11.7
Betelgeuse	270°57.9	7°24.3
Canopus	263°54.8	-52°42.8
Sirius	258°30.8	-16°44.7
Adara	255°10.0	-29°00.2
Procyon	244°56.2	5°10.6
Pollux	243°23.6	27°58.8
Avior	234°16.4	-59°34.5
Suhail	222°49.8	-43°30.7
Miaplacidus	221°38.4	-69°47.8
Alphard	217°52.7	-8°44.5
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.3
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.6
Acrux	173°04.9	-63°12.0
Gacrux	171°56.7	-57°12.9
Alioth	166°17.4	55°51.7
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.3
Hadar	148°42.6	-60°27.5
Menkent	148°03.4	-36°27.5
Arcturus	145°52.3	19°05.5
Rigil Kent.	139°46.7	-60°54.4
Zubenelg.	137°01.6	-16°07.0
Kochab	137°19.2	74°04.8
Alphecca	126°08.0	26°39.2
Antares	112°22.1	-26°28.1
Atria	107°20.7	-69°03.2
Sabik	102°08.7	-15°44.7
Shaula	96°17.4	-37°06.7
Rasalhague	96°03.4	12°32.8
Etamin	90°44.5	51°29.0
Kaus Aust.	83°39.5	-34°22.3
Vega	80°36.8	38°47.8
Nunki	75°54.3	-26°16.3
Altair	62°05.3	8°54.9
Peacock	53°14.4	-56°40.3
Deneb	49°29.5	45°20.5
Enif	33°44.2	9°57.4
Alnair	27°40.1	-46°52.3
Fomalhaut	15°20.8	-29°31.6
Scheat	13°50.6	28°10.7
Markab	13°35.4	15°18.0

2018/4/1	**SHA**	**Mer.pass**
Venus	330°58.8	13:19
Mars	81°13.2	05:58
Jupiter	129°39.2	02:44
Saturn	80°22.1	06:00

2018/4/2	**SHA**	**Mer.pass**
Venus	329°48.9	13:20
Mars	80°37.2	05:56
Jupiter	129°43.4	02:39
Saturn	80°20.4	05:57

2018/4/3	**SHA**	**Mer.pass**
Venus	328°38.8	13:21
Mars	80°01.4	05:54
Jupiter	129°47.8	02:35
Saturn	80°18.7	05:53

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°59.8	4°26.1	351°42.5	11.7	-2°32.0	-11.6	57.6
1	193°59.9	4°27.1	6°13.2	11.8	-2°43.6	-11.6	57.6
2	209°00.1	4°28.1	20°44.0	11.8	-2°55.1	-11.6	57.6
3	224°00.3	4°29.0	35°14.8	11.8	-3°06.7	-11.5	57.6
4	239°00.5	4°30.0	49°45.6	11.8	-3°18.2	-11.5	57.5
5	254°00.7	4°31.0	64°16.5	11.8	-3°29.7	-11.5	57.5
6	269°00.9	4°31.9	78°47.3	11.9	-3°41.2	-11.4	57.5
7	284°01.1	4°32.9	93°18.2	11.9	-3°52.6	-11.4	57.5
8	299°01.2	4°33.8	107°49.1	11.9	-4°04.0	-11.4	57.4
9	314°01.4	4°34.8	122°20.0	11.9	-4°15.4	-11.4	57.4
10	329°01.6	4°35.8	136°50.9	11.9	-4°26.7	-11.3	57.4
11	344°01.8	4°36.7	151°21.8	11.9	-4°38.0	-11.3	57.3
12	359°02.0	4°37.7	165°52.8	12.0	-4°49.3	-11.3	57.3
13	14°02.2	4°38.7	180°23.7	12.0	-5°00.5	-11.2	57.3
14	29°02.4	4°39.6	194°54.7	12.0	-5°11.7	-11.2	57.3
15	44°02.6	4°40.6	209°25.7	12.0	-5°22.9	-11.1	57.2
16	59°02.7	4°41.6	223°56.7	12.0	-5°34.0	-11.1	57.2
17	74°02.9	4°42.5	238°27.7	12.0	-5°45.1	-11.1	57.2
18	89°03.1	4°43.5	252°58.7	12.0	-5°56.1	-11.0	57.2
19	104°03.3	4°44.4	267°29.7	12.0	-6°07.1	-11.0	57.1
20	119°03.5	4°45.4	282°00.8	12.0	-6°18.1	-10.9	57.1
21	134°03.7	4°46.4	296°31.8	12.1	-6°29.0	-10.9	57.1
22	149°03.9	4°47.3	311°02.9	12.1	-6°39.9	-10.9	57.0
23	164°04.0	4°48.3	325°34.0	12.1	-6°50.8	-10.8	57.0
	SD.=16.0	d=1.0			S.D.=15.7		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°04.2	4°49.3	340°05.0	12.1	-7°01.5	-10.8	57.0
1	194°04.4	4°50.2	354°36.1	12.1	-7°12.3	-10.7	57.0
2	209°04.6	4°51.2	9°07.2	12.1	-7°23.0	-10.7	56.9
3	224°04.8	4°52.1	23°38.3	12.1	-7°33.6	-10.6	56.9
4	239°05.0	4°53.1	38°09.4	12.1	-7°44.3	-10.6	56.9
5	254°05.2	4°54.1	52°40.6	12.1	-7°54.8	-10.5	56.8
6	269°05.3	4°55.0	67°11.7	12.1	-8°05.3	-10.5	56.8
7	284°05.5	4°56.0	81°42.8	12.1	-8°15.8	-10.4	56.8
8	299°05.7	4°56.9	96°14.0	12.1	-8°26.2	-10.4	56.8
9	314°05.9	4°57.9	110°45.1	12.1	-8°36.5	-10.3	56.7
10	329°06.1	4°58.9	125°16.2	12.1	-8°46.8	-10.3	56.7
11	344°06.3	4°59.8	139°47.4	12.1	-8°57.1	-10.2	56.7
12	359°06.5	5°00.8	154°18.5	12.2	-9°07.3	-10.2	56.6
13	14°06.6	5°01.7	168°49.7	12.2	-9°17.4	-10.1	56.6
14	29°06.8	5°02.7	183°20.8	12.2	-9°27.5	-10.1	56.6
15	44°07.0	5°03.7	197°52.0	12.2	-9°37.5	-10.0	56.6
16	59°07.2	5°04.6	212°23.2	12.2	-9°47.5	-9.9	56.5
17	74°07.4	5°05.6	226°54.3	12.2	-9°57.4	-9.9	56.5
18	89°07.6	5°06.5	241°25.5	12.2	-10°07.3	-9.8	56.5
19	104°07.7	5°07.5	255°56.7	12.2	-10°17.0	-9.8	56.5
20	119°07.9	5°08.5	270°27.8	12.2	-10°26.8	-9.7	56.4
21	134°08.1	5°09.4	284°59.0	12.2	-10°36.5	-9.6	56.4
22	149°08.3	5°10.4	299°30.2	12.2	-10°46.1	-9.6	56.4
23	164°08.5	5°11.3	314°01.3	12.2	-10°55.6	-9.5	56.3
	SD.=16.0	d=1.0			S.D.=15.5		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°08.7	5°12.3	328°32.5	12.2	-11°05.1	-9.5	56.3
1	194°08.9	5°13.3	343°03.7	12.2	-11°14.5	-9.4	56.3
2	209°09.0	5°14.2	357°34.8	12.2	-11°23.9	-9.3	56.3
3	224°09.2	5°15.2	12°06.0	12.2	-11°33.2	-9.3	56.2
4	239°09.4	5°16.1	26°37.2	12.2	-11°42.4	-9.2	56.2
5	254°09.6	5°17.1	41°08.3	12.2	-11°51.6	-9.1	56.2
6	269°09.8	5°18.0	55°39.5	12.2	-12°00.7	-9.1	56.1
7	284°10.0	5°19.0	70°10.7	12.2	-12°09.7	-9.0	56.1
8	299°10.1	5°20.0	84°41.8	12.2	-12°18.7	-8.9	56.1
9	314°10.3	5°20.9	99°13.0	12.2	-12°27.5	-8.9	56.1
10	329°10.5	5°21.9	113°44.1	12.1	-12°36.4	-8.8	56.0
11	344°10.7	5°22.8	128°15.3	12.1	-12°45.1	-8.7	56.0
12	359°10.9	5°23.8	142°46.4	12.1	-12°53.8	-8.6	56.0
13	14°11.1	5°24.7	157°17.5	12.1	-13°02.4	-8.6	56.0
14	29°11.2	5°25.7	171°48.7	12.1	-13°11.0	-8.5	55.9
15	44°11.4	5°26.7	186°19.8	12.1	-13°19.4	-8.4	55.9
16	59°11.6	5°27.6	200°50.9	12.1	-13°27.8	-8.4	55.9
17	74°11.8	5°28.6	215°22.1	12.1	-13°36.2	-8.3	55.9
18	89°12.0	5°29.5	229°53.2	12.1	-13°44.4	-8.2	55.8
19	104°12.2	5°30.5	244°24.3	12.1	-13°52.6	-8.1	55.8
20	119°12.3	5°31.4	258°55.4	12.1	-14°00.7	-8.1	55.8
21	134°12.5	5°32.4	273°26.5	12.1	-14°08.7	-8.0	55.8
22	149°12.7	5°33.3	287°57.6	12.1	-14°16.7	-7.9	55.7
23	164°12.9	5°34.3	302°28.7	12.1	-14°24.5	-7.8	55.7
	SD.=16.0	d=1.0			S.D.=15.4		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	01:26	03:36	04:51	19:19	20:36	22:54
70	02:14	03:53	04:59	19:11	20:18	22:00
68	02:43	04:06	05:05	19:04	20:04	21:29
66	03:05	04:17	05:11	18:58	19:53	21:06
64	03:21	04:26	05:15	18:54	19:44	20:49
62	03:35	04:33	05:19	18:50	19:36	20:35
60	03:46	04:40	05:23	18:46	19:29	20:23
58	03:56	04:45	05:26	18:43	19:23	20:14
56	04:04	04:50	05:28	18:40	19:18	20:05
54	04:11	04:55	05:31	18:38	19:14	19:58
52	04:17	04:59	05:33	18:35	19:10	19:52
50	04:23	05:02	05:35	18:33	19:06	19:46
45	04:34	05:09	05:39	18:29	18:59	19:34
40	04:43	05:15	05:43	18:25	18:52	19:25
35	04:50	05:20	05:46	18:22	18:47	19:18
30	04:56	05:24	05:48	18:19	18:43	19:12
20	05:05	05:31	05:53	18:15	18:37	19:03
10	05:11	05:36	05:57	18:10	18:32	18:56
0	05:15	05:40	06:00	18:07	18:28	18:52
-10	05:18	05:43	06:04	18:03	18:24	18:49
-20	05:20	05:45	06:07	17:60	18:22	18:47
-30	05:20	05:47	06:11	17:56	18:19	18:47
-35	05:19	05:48	06:13	17:53	18:18	18:48
-40	05:17	05:49	06:16	17:51	18:18	18:49
-45	05:15	05:49	06:19	17:48	18:17	18:51
-50	05:12	05:50	06:22	17:44	18:16	18:54
-52	05:11	05:50	06:24	17:43	18:16	18:55
-54	05:09	05:50	06:25	17:41	18:16	18:57
-56	05:07	05:50	06:27	17:39	18:16	18:59
-58	05:04	05:50	06:29	17:37	18:16	19:01
-60	05:01	05:50	06:31	17:35	18:16	19:04

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	20:36	22:29	–:–	05:57	05:46	05:32
70	20:26	22:10	23:55	06:03	05:58	05:53
68	20:18	21:55	23:32	06:07	06:07	06:09
66	20:11	21:43	23:13	06:10	06:16	06:22
64	20:06	21:33	22:58	06:13	06:22	06:33
62	20:01	21:25	22:46	06:16	06:28	06:42
60	19:57	21:18	22:36	06:18	06:34	06:51
58	19:53	21:11	22:26	06:20	06:38	06:58
56	19:50	21:06	22:19	06:22	06:42	07:04
54	19:47	21:01	22:12	06:24	06:46	07:10
52	19:45	20:56	22:05	06:25	06:49	07:15
50	19:42	20:52	21:59	06:27	06:52	07:19
45	19:37	20:43	21:47	06:30	06:59	07:29
40	19:33	20:36	21:37	06:32	07:05	07:38
35	19:29	20:30	21:29	06:35	07:09	07:45
30	19:26	20:24	21:21	06:37	07:14	07:52
20	19:20	20:15	21:08	06:40	07:21	08:03
10	19:15	20:06	20:57	06:43	07:28	08:12
0	19:11	19:59	20:46	06:46	07:34	08:21
-10	19:06	19:51	20:36	06:49	07:40	08:31
-20	19:02	19:43	20:25	06:52	07:46	08:40
-30	18:56	19:34	20:12	06:55	07:54	08:52
-35	18:53	19:28	20:05	06:57	07:58	08:58
-40	18:50	19:22	19:56	06:59	08:03	09:05
-45	18:46	19:15	19:47	07:02	08:09	09:14
-50	18:41	19:07	19:35	07:05	08:16	09:25
-52	18:39	19:03	19:30	07:06	08:19	09:29
-54	18:37	18:59	19:24	07:08	08:22	09:35
-56	18:34	18:55	19:18	07:09	08:26	09:41
-58	18:31	18:49	19:10	07:11	08:31	09:47
-60	18:28	18:44	19:02	07:13	08:36	09:55

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
1	04:01	03:52	12:03	00:34	12:58	15(99%)
2	03:43	03:34	12:03	01:22	13:46	16(95%)
3	03:25	03:16	12:03	02:10	14:33	17(90%)

April 04, 05 ,06 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	192°15.7	159°44.1	12°44.6	271°41.3	-23°30.2	322°08.0	-17°06.0	272°32.8	-22°15.0
1	207°18.1	174°43.7	12°45.7	286°42.3	-23°30.1	337°10.6	-17°05.9	287°35.2	-22°15.0
2	222°20.6	189°43.2	12°46.8	301°43.3	-23°30.1	352°13.3	-17°05.9	302°37.6	-22°15.0
3	237°23.1	204°42.7	12°48.0	316°44.3	-23°30.1	7°16.0	-17°05.8	317°40.0	-22°15.0
4	252°25.5	219°42.3	12°49.1	331°45.2	-23°30.0	22°18.6	-17°05.8	332°42.4	-22°15.0
5	267°28.0	234°41.8	12°50.2	346°46.2	-23°30.0	37°21.3	-17°05.7	347°44.8	-22°15.0
6	282°30.4	249°41.3	12°51.3	1°47.2	-23°30.0	52°23.9	-17°05.7	2°47.2	-22°15.0
7	297°32.9	264°40.8	12°52.5	16°48.2	-23°29.9	67°26.6	-17°05.6	17°49.6	-22°15.0
8	312°35.4	279°40.4	12°53.6	31°49.2	-23°29.9	82°29.3	-17°05.6	32°52.0	-22°15.0
9	327°37.8	294°39.9	12°54.7	46°50.1	-23°29.9	97°31.9	-17°05.5	47°54.4	-22°15.0
10	342°40.3	309°39.4	12°55.8	61°51.1	-23°29.8	112°34.6	-17°05.4	62°56.8	-22°15.0
11	357°42.8	324°39.0	12°57.0	76°52.1	-23°29.8	127°37.2	-17°05.4	77°59.2	-22°15.0
12	12°45.2	339°38.5	12°58.1	91°53.1	-23°29.8	142°39.9	-17°05.3	93°01.6	-22°15.0
13	27°47.7	354°38.0	12°59.2	106°54.1	-23°29.7	157°42.6	-17°05.3	108°04.1	-22°15.0
14	42°50.2	9°37.5	13°00.3	121°55.0	-23°29.7	172°45.2	-17°05.2	123°06.5	-22°15.0
15	57°52.6	24°37.1	13°01.5	136°56.0	-23°29.7	187°47.9	-17°05.2	138°08.9	-22°14.9
16	72°55.1	39°36.6	13°02.6	151°57.0	-23°29.6	202°50.5	-17°05.1	153°11.3	-22°14.9
17	87°57.5	54°36.1	13°03.7	166°58.0	-23°29.6	217°53.2	-17°05.1	168°13.7	-22°14.9
18	103°00.0	69°35.6	13°04.8	181°59.0	-23°29.5	232°55.9	-17°05.0	183°16.1	-22°14.9
19	118°02.5	84°35.1	13°05.9	196°59.9	-23°29.5	247°58.5	-17°05.0	198°18.5	-22°14.9
20	133°04.9	99°34.7	13°07.1	212°00.9	-23°29.5	263°01.2	-17°04.9	213°20.9	-22°14.9
21	148°07.4	114°34.2	13°08.2	227°01.9	-23°29.4	278°03.8	-17°04.9	228°23.3	-22°14.9
22	163°09.9	129°33.7	13°09.3	242°02.9	-23°29.4	293°06.5	-17°04.8	243°25.7	-22°14.9
23	178°12.3	144°33.2	13°10.4	257°03.9	-23°29.4	308°09.2	-17°04.7	258°28.1	-22°14.9
Mer.pass.:11:09		v-0.5 d1.1 m-3.8		v1.0 d0.0 m0.2		v2.7 d0.1 m-2.2		v2.4 d0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	193°14.8	159°32.8	13°11.5	272°04.9	-23°29.3	323°11.8	-17°04.7	273°30.5	-22°14.9
1	208°17.3	174°32.3	13°12.6	287°05.8	-23°29.3	338°14.5	-17°04.6	288°32.9	-22°14.9
2	223°19.7	189°31.8	13°13.8	302°06.8	-23°29.2	353°17.2	-17°04.6	303°35.3	-22°14.9
3	238°22.2	204°31.3	13°14.9	317°07.8	-23°29.2	8°19.8	-17°04.5	318°37.7	-22°14.9
4	253°24.7	219°30.8	13°16.0	332°08.8	-23°29.2	23°22.5	-17°04.5	333°40.1	-22°14.9
5	268°27.1	234°30.4	13°17.1	347°09.8	-23°29.1	38°25.2	-17°04.4	348°42.5	-22°14.9
6	283°29.6	249°29.9	13°18.2	2°10.8	-23°29.1	53°27.8	-17°04.4	3°45.0	-22°14.9
7	298°32.0	264°29.4	13°19.3	17°11.8	-23°29.1	68°30.5	-17°04.3	18°47.4	-22°14.9
8	313°34.5	279°28.9	13°20.5	32°12.7	-23°29.0	83°33.2	-17°04.3	33°49.8	-22°14.9
9	328°37.0	294°28.4	13°21.6	47°13.7	-23°29.0	98°35.8	-17°04.2	48°52.2	-22°14.9
10	343°39.4	309°27.9	13°22.7	62°14.7	-23°28.9	113°38.5	-17°04.1	63°54.6	-22°14.9
11	358°41.9	324°27.5	13°23.8	77°15.7	-23°28.9	128°41.1	-17°04.1	78°57.0	-22°14.9
12	13°44.4	339°27.0	13°24.9	92°16.7	-23°28.9	143°43.8	-17°04.0	93°59.4	-22°14.9
13	28°46.8	354°26.5	13°26.0	107°17.7	-23°28.8	158°46.5	-17°04.0	109°01.8	-22°14.9
14	43°49.3	9°26.0	13°27.1	122°18.7	-23°28.8	173°49.1	-17°03.9	124°04.2	-22°14.9
15	58°51.8	24°25.5	13°28.2	137°19.7	-23°28.7	188°51.8	-17°03.9	139°06.6	-22°14.8
16	73°54.2	39°25.0	13°29.3	152°20.6	-23°28.7	203°54.5	-17°03.8	154°09.0	-22°14.8
17	88°56.7	54°24.6	13°30.4	167°21.6	-23°28.7	218°57.2	-17°03.8	169°11.4	-22°14.8
18	103°59.2	69°24.1	13°31.5	182°22.6	-23°28.6	233°59.8	-17°03.7	184°13.9	-22°14.8
19	119°01.6	84°23.6	13°32.7	197°23.6	-23°28.6	249°02.5	-17°03.6	199°16.3	-22°14.8
20	134°04.1	99°23.1	13°33.8	212°24.6	-23°28.5	264°05.2	-17°03.6	214°18.7	-22°14.8
21	149°06.5	114°22.6	13°34.9	227°25.6	-23°28.5	279°07.8	-17°03.5	229°21.1	-22°14.8
22	164°09.0	129°22.1	13°36.0	242°26.6	-23°28.5	294°10.5	-17°03.5	244°23.5	-22°14.8
23	179°11.5	144°21.6	13°37.1	257°27.6	-23°28.4	309°13.2	-17°03.4	259°25.9	-22°14.8
Mer.pass.:11:05		v-0.5 d1.1 m-3.8		v1.0 d0.0 m0.2		v2.7 d0.1 m-2.2		v2.4 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	194°13.9	159°21.1	13°38.2	272°28.6	-23°28.4	324°15.8	-17°03.4	274°28.3	-22°14.8
1	209°16.4	174°20.7	13°39.3	287°29.5	-23°28.3	339°18.5	-17°03.3	289°30.7	-22°14.8
2	224°18.9	189°20.2	13°40.4	302°30.5	-23°28.3	354°21.2	-17°03.3	304°33.1	-22°14.8
3	239°21.3	204°19.7	13°41.5	317°31.5	-23°28.3	9°23.8	-17°03.2	319°35.5	-22°14.8
4	254°23.8	219°19.2	13°42.6	332°32.5	-23°28.2	24°26.5	-17°03.1	334°38.0	-22°14.8
5	269°26.3	234°18.7	13°43.7	347°33.5	-23°28.2	39°29.2	-17°03.1	349°40.4	-22°14.8
6	284°28.7	249°18.2	13°44.8	2°34.5	-23°28.1	54°31.9	-17°03.0	4°42.8	-22°14.8
7	299°31.2	264°17.7	13°45.9	17°35.5	-23°28.1	69°34.5	-17°03.0	19°45.2	-22°14.8
8	314°33.6	279°17.2	13°47.0	32°36.5	-23°28.0	84°37.2	-17°02.9	34°47.6	-22°14.8
9	329°36.1	294°16.7	13°48.1	47°37.5	-23°28.0	99°39.9	-17°02.9	49°50.0	-22°14.8
10	344°38.6	309°16.2	13°49.2	62°38.5	-23°28.0	114°42.5	-17°02.8	64°52.4	-22°14.8
11	359°41.0	324°15.8	13°50.3	77°39.5	-23°27.9	129°45.2	-17°02.8	79°54.8	-22°14.8
12	14°43.5	339°15.3	13°51.4	92°40.5	-23°27.9	144°47.9	-17°02.7	94°57.3	-22°14.8
13	29°46.0	354°14.8	13°52.5	107°41.4	-23°27.8	159°50.6	-17°02.6	109°59.7	-22°14.8
14	44°48.4	9°14.3	13°53.6	122°42.4	-23°27.8	174°53.2	-17°02.6	125°02.1	-22°14.8
15	59°50.9	24°13.8	13°54.7	137°43.4	-23°27.7	189°55.9	-17°02.5	140°04.5	-22°14.8
16	74°53.4	39°13.3	13°55.8	152°44.4	-23°27.7	204°58.6	-17°02.5	155°06.9	-22°14.7
17	89°55.8	54°12.8	13°56.9	167°45.4	-23°27.7	220°01.3	-17°02.4	170°09.3	-22°14.7
18	104°58.3	69°12.3	13°58.0	182°46.4	-23°27.6	235°03.9	-17°02.4	185°11.7	-22°14.7
19	120°00.8	84°11.8	13°59.0	197°47.4	-23°27.6	250°06.6	-17°02.3	200°14.1	-22°14.7
20	135°03.2	99°11.3	14°00.1	212°48.4	-23°27.5	265°09.3	-17°02.2	215°16.6	-22°14.7
21	150°05.7	114°10.8	14°01.2	227°49.4	-23°27.5	280°12.0	-17°02.2	230°19.0	-22°14.7
22	165°08.1	129°10.3	14°02.3	242°50.4	-23°27.4	295°14.6	-17°02.1	245°21.4	-22°14.7
23	180°10.6	144°09.8	14°03.4	257°51.4	-23°27.4	310°17.3	-17°02.1	260°23.8	-22°14.7
Mer.pass.:11:01		v-0.5 d1.1 m-3.8		v1.0 d0.0 m0.2		v2.7 d0.1 m-2.2		v2.4 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.3
Ankaa	353°12.9	-42°12.6
Schedar	349°37.4	56°38.0
Diphda	348°52.9	-17°53.4
Achernar	335°25.0	-57°08.9
Hamal	327°57.4	23°32.7
Polaris	316°44.2	89°20.5
Akamar	315°16.3	-40°14.3
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.4
Aldebaran	290°45.9	16°32.5
Rigel	281°09.1	-8°11.2
Capella	280°29.9	46°01.0
Bellatrix	278°28.7	6°21.7
Elnath	278°08.7	28°37.2
Alnilam	275°43.2	-1°11.7
Betelgeuse	270°57.9	7°24.3
Canopus	263°54.8	-52°42.8
Sirius	258°30.8	-16°44.7
Adara	255°10.0	-29°00.2
Procyon	244°56.2	5°10.6
Pollux	243°23.6	27°58.8
Avior	234°16.5	-59°34.5
Suhail	222°49.8	-43°30.7
Miaplacidus	221°38.5	-69°47.8
Alphard	217°52.7	-8°44.5
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.3
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.6
Acrux	173°04.9	-63°12.0
Gacrux	171°56.7	-57°12.9
Alioth	166°17.4	55°51.7
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.3
Hadar	148°42.6	-60°27.5
Menkent	148°03.4	-36°27.5
Arcturus	145°52.3	19°05.5
Rigil Kent.	139°46.7	-60°54.4
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.2	74°04.8
Alphecca	126°08.0	26°39.2
Antares	112°22.1	-26°28.1
Atria	107°20.7	-69°03.2
Sabik	102°08.7	-15°44.7
Shaula	96°17.4	-37°06.7
Rasalhague	96°03.4	12°32.8
Etamin	90°44.5	51°29.0
Kaus Aust.	83°39.5	-34°22.3
Vega	80°36.8	38°47.8
Nunki	75°54.3	-26°16.3
Altair	62°05.2	8°54.9
Peacock	53°14.4	-56°40.3
Deneb	49°29.5	45°20.5
Enif	33°44.2	9°57.4
Alnair	27°40.1	-46°52.3
Fomalhaut	15°20.8	-29°31.6
Scheat	13°50.6	28°10.7
Markab	13°35.4	15°18.0

2018/4/4	**SHA**	**Mer.pass**
Venus	327°28.5	13:21
Mars	79°25.7	05:53
Jupiter	129°52.3	02:31
Saturn	80°17.2	05:49

2018/4/5	**SHA**	**Mer.pass**
Venus	326°18.0	13:22
Mars	78°50.1	05:51
Jupiter	129°57.0	02:27
Saturn	80°15.7	05:45

2018/4/6	**SHA**	**Mer.pass**
Venus	325°07.2	13:23
Mars	78°14.6	05:50
Jupiter	130°01.9	02:23
Saturn	80°14.4	05:41

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°13.1	5°35.2	316°59.8	12.1	-14°32.4	-7.8	55.7
1	194°13.3	5°36.2	331°30.8	12.1	-14°40.1	-7.7	55.6
2	209°13.4	5°37.2	346°01.9	12.1	-14°47.7	-7.6	55.6
3	224°13.6	5°38.1	0°33.0	12.1	-14°55.3	-7.5	55.6
4	239°13.8	5°39.1	15°04.1	12.1	-15°02.8	-7.5	55.6
5	254°14.0	5°40.0	29°35.1	12.1	-15°10.2	-7.4	55.6
6	269°14.2	5°41.0	44°06.2	12.0	-15°17.5	-7.3	55.5
7	284°14.3	5°41.9	58°37.2	12.0	-15°24.8	-7.2	55.5
8	299°14.5	5°42.9	73°08.2	12.0	-15°31.9	-7.1	55.5
9	314°14.7	5°43.8	87°39.3	12.0	-15°39.0	-7.1	55.5
10	329°14.9	5°44.8	102°10.3	12.0	-15°46.0	-7.0	55.4
11	344°15.1	5°45.7	116°41.3	12.0	-15°53.0	-6.9	55.4
12	359°15.3	5°46.7	131°12.3	12.0	-15°59.8	-6.8	55.4
13	14°15.4	5°47.6	145°43.3	12.0	-16°06.6	-6.7	55.4
14	29°15.6	5°48.6	160°14.3	12.0	-16°13.3	-6.6	55.3
15	44°15.8	5°49.5	174°45.3	12.0	-16°19.9	-6.6	55.3
16	59°16.0	5°50.5	189°16.3	12.0	-16°26.4	-6.5	55.3
17	74°16.2	5°51.4	203°47.3	12.0	-16°32.8	-6.4	55.3
18	89°16.3	5°52.4	218°18.3	12.0	-16°39.2	-6.3	55.2
19	104°16.5	5°53.3	232°49.2	12.0	-16°45.4	-6.2	55.2
20	119°16.7	5°54.3	247°20.2	12.0	-16°51.6	-6.1	55.2
21	134°16.9	5°55.3	261°51.2	12.0	-16°57.7	-6.0	55.2
22	149°17.1	5°56.2	276°22.1	11.9	-17°03.7	-6.0	55.2
23	164°17.3	5°57.2	290°53.0	11.9	-17°09.6	-5.9	55.1
	SD.=16.0	d=1.0			S.D.=15.2		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°17.4	5°58.1	305°24.0	11.9	-17°15.5	-5.8	55.1
1	194°17.6	5°59.1	319°54.9	11.9	-17°21.2	-5.7	55.1
2	209°17.8	6°00.0	334°25.8	11.9	-17°26.9	-5.6	55.1
3	224°18.0	6°01.0	348°56.7	11.9	-17°32.4	-5.5	55.1
4	239°18.2	6°01.9	3°27.6	11.9	-17°37.9	-5.4	55.0
5	254°18.3	6°02.8	17°58.6	11.9	-17°43.3	-5.4	55.0
6	269°18.5	6°03.8	32°29.4	11.9	-17°48.6	-5.3	55.0
7	284°18.7	6°04.7	47°00.3	11.9	-17°53.8	-5.2	55.0
8	299°18.9	6°05.7	61°31.2	11.9	-17°59.0	-5.1	55.0
9	314°19.1	6°06.6	76°02.1	11.9	-18°04.0	-5.0	54.9
10	329°19.2	6°07.6	90°33.0	11.9	-18°09.0	-4.9	54.9
11	344°19.4	6°08.5	105°03.8	11.9	-18°13.8	-4.8	54.9
12	359°19.6	6°09.5	119°34.7	11.9	-18°18.6	-4.7	54.9
13	14°19.8	6°10.4	134°05.6	11.9	-18°23.3	-4.6	54.9
14	29°20.0	6°11.4	148°36.4	11.9	-18°27.9	-4.6	54.8
15	44°20.1	6°12.3	163°07.3	11.8	-18°32.4	-4.5	54.8
16	59°20.3	6°13.3	177°38.1	11.8	-18°36.8	-4.4	54.8
17	74°20.5	6°14.2	192°09.0	11.8	-18°41.1	-4.3	54.8
18	89°20.7	6°15.2	206°39.8	11.8	-18°45.4	-4.2	54.8
19	104°20.8	6°16.1	221°10.6	11.8	-18°49.5	-4.1	54.8
20	119°21.0	6°17.1	235°41.4	11.8	-18°53.6	-4.0	54.7
21	134°21.2	6°18.0	250°12.3	11.8	-18°57.5	-3.9	54.7
22	149°21.4	6°19.0	264°43.1	11.8	-19°01.4	-3.8	54.7
23	164°21.6	6°19.9	279°13.9	11.8	-19°05.2	-3.7	54.7
	SD.=16.0	d=1.0			S.D.=15.0		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°21.7	6°20.9	293°44.7	11.8	-19°08.9	-3.6	54.7
1	194°21.9	6°21.8	308°15.5	11.8	-19°12.4	-3.5	54.7
2	209°22.1	6°22.7	322°46.3	11.8	-19°15.9	-3.5	54.6
3	224°22.3	6°23.7	337°17.1	11.8	-19°19.3	-3.4	54.6
4	239°22.5	6°24.6	351°47.9	11.8	-19°22.7	-3.3	54.6
5	254°22.6	6°25.6	6°18.7	11.8	-19°25.9	-3.2	54.6
6	269°22.8	6°26.5	20°49.5	11.8	-19°29.0	-3.1	54.6
7	284°23.0	6°27.5	35°20.3	11.8	-19°32.0	-3.0	54.6
8	299°23.2	6°28.4	49°51.1	11.8	-19°35.0	-2.9	54.6
9	314°23.3	6°29.4	64°21.9	11.8	-19°37.8	-2.8	54.5
10	329°23.5	6°30.3	78°52.7	11.8	-19°40.6	-2.7	54.5
11	344°23.7	6°31.2	93°23.5	11.8	-19°43.2	-2.6	54.5
12	359°23.9	6°32.2	107°54.2	11.8	-19°45.8	-2.5	54.5
13	14°24.1	6°33.1	122°25.0	11.8	-19°48.3	-2.4	54.5
14	29°24.2	6°34.1	136°55.8	11.8	-19°50.6	-2.3	54.5
15	44°24.4	6°35.0	151°26.6	11.8	-19°52.9	-2.2	54.5
16	59°24.6	6°36.0	165°57.4	11.8	-19°55.1	-2.1	54.5
17	74°24.8	6°36.9	180°28.2	11.8	-19°57.2	-2.0	54.5
18	89°24.9	6°37.8	194°58.9	11.8	-19°59.2	-2.0	54.4
19	104°25.1	6°38.8	209°29.7	11.8	-20°01.1	-1.9	54.4
20	119°25.3	6°39.7	224°00.5	11.8	-20°02.9	-1.8	54.4
21	134°25.5	6°40.7	238°31.3	11.8	-20°04.6	-1.7	54.4
22	149°25.7	6°41.6	253°02.1	11.8	-20°06.2	-1.6	54.4
23	164°25.8	6°42.6	267°32.9	11.8	-20°07.8	-1.5	54.4
	SD.=16.0	d=0.9			S.D.=14.9		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	00:16	03:16	04:35	19:33	20:54	–:–
70	01:46	03:36	04:45	19:23	20:33	22:28
68	02:23	03:52	04:53	19:15	20:17	21:48
66	02:48	04:04	04:59	19:08	20:04	21:21
64	03:07	04:14	05:05	19:03	19:54	21:01
62	03:23	04:23	05:09	18:58	19:45	20:46
60	03:35	04:30	05:14	18:53	19:37	20:33
58	03:46	04:37	05:17	18:50	19:31	20:22
56	03:55	04:42	05:21	18:46	19:25	20:13
54	04:03	04:47	05:23	18:43	19:20	20:05
52	04:09	04:51	05:26	18:40	19:15	19:58
50	04:16	04:55	05:28	18:38	19:11	19:51
45	04:28	05:04	05:34	18:33	19:03	19:38
40	04:38	05:11	05:38	18:28	18:56	19:28
35	04:46	05:16	05:42	18:24	18:50	19:20
30	04:52	05:21	05:45	18:21	18:45	19:14
20	05:02	05:28	05:50	18:15	18:38	19:03
10	05:09	05:34	05:55	18:10	18:32	18:56
0	05:15	05:39	05:59	18:06	18:27	18:51
-10	05:18	05:43	06:04	18:02	18:23	18:47
-20	05:20	05:46	06:08	17:57	18:19	18:45
-30	05:21	05:49	06:13	17:52	18:16	18:44
-35	05:21	05:50	06:16	17:49	18:14	18:44
-40	05:20	05:52	06:19	17:46	18:13	18:44
-45	05:19	05:53	06:22	17:42	18:12	18:45
-50	05:17	05:54	06:27	17:38	18:10	18:47
-52	05:16	05:55	06:29	17:36	18:10	18:49
-54	05:14	05:55	06:31	17:34	18:09	18:50
-56	05:13	05:56	06:33	17:31	18:08	18:51
-58	05:11	05:56	06:36	17:29	18:08	18:53
-60	05:09	05:57	06:38	17:26	18:07	18:55

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	00:28	02:56	–:–	05:13	04:25	–:–
70	–:–	01:42	03:36	05:47	05:40	05:26
68	–:–	01:05	02:32	06:12	06:18	06:30
66	–:–	00:39	01:57	06:31	06:44	07:06
64	–:–	00:19	01:32	06:47	07:05	07:31
62	–:–	00:03	01:12	06:60	07:22	07:51
60	23:49	–:–	00:56	07:11	07:36	08:08
58	23:38	–:–	00:43	07:20	07:48	08:21
56	23:27	–:–	00:31	07:29	07:58	08:33
54	23:19	–:–	00:21	07:36	08:07	08:44
52	23:11	–:–	00:12	07:43	08:15	08:53
50	23:04	–:–	00:04	07:49	08:23	09:01
45	22:49	23:46	–:–	08:02	08:39	09:19
40	22:36	23:32	–:–	08:13	08:52	09:33
35	22:26	23:20	–:–	08:23	09:03	09:46
30	22:16	23:10	–:–	08:31	09:12	09:56
20	22:01	22:52	23:42	08:45	09:29	10:15
10	21:47	22:37	23:26	08:58	09:44	10:31
0	21:34	22:22	23:11	09:09	09:57	10:46
-10	21:21	22:08	22:55	09:21	10:11	11:01
-20	21:08	21:52	22:39	09:34	10:26	11:17
-30	20:52	21:35	22:20	09:48	10:42	11:35
-35	20:43	21:25	22:09	09:56	10:52	11:46
-40	20:33	21:13	21:57	10:06	11:03	11:58
-45	20:21	20:59	21:42	10:17	11:17	12:12
-50	20:07	20:43	21:24	10:31	11:33	12:30
-52	20:00	20:35	21:16	10:37	11:40	12:39
-54	19:53	20:26	21:06	10:44	11:49	12:48
-56	19:44	20:17	20:55	10:52	11:58	12:59
-58	19:35	20:05	20:43	11:01	12:09	13:11
-60	19:24	19:53	20:29	11:11	12:22	13:25

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
4	03:08	02:59	12:02	02:57	15:21	18(83%)
5	02:50	02:42	12:02	03:45	16:09	19(76%)
6	02:33	02:24	12:02	04:33	16:58	20(67%)

April 07, 08 ,09 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	195°13.1	159°09.3	14°04.5	272°52.4	-23°27.3	325°20.0	-17°02.0	275°26.2	-22°14.7
1	210°15.5	174°08.8	14°05.6	287°53.4	-23°27.3	340°22.7	-17°02.0	290°28.6	-22°14.7
2	225°18.0	189°08.3	14°06.7	302°54.4	-23°27.3	355°25.3	-17°01.9	305°31.0	-22°14.7
3	240°20.5	204°07.8	14°07.8	317°55.4	-23°27.2	10°28.0	-17°01.8	320°33.5	-22°14.7
4	255°22.9	219°07.3	14°08.9	332°56.4	-23°27.2	25°30.7	-17°01.8	335°35.9	-22°14.7
5	270°25.4	234°06.8	14°09.9	347°57.4	-23°27.1	40°33.4	-17°01.7	350°38.3	-22°14.7
6	285°27.9	249°06.3	14°11.0	2°58.4	-23°27.1	55°36.0	-17°01.7	5°40.7	-22°14.7
7	300°30.3	264°05.8	14°12.1	17°59.4	-23°27.0	70°38.7	-17°01.6	20°43.1	-22°14.7
8	315°32.8	279°05.3	14°13.2	33°00.4	-23°27.0	85°41.4	-17°01.6	35°45.5	-22°14.7
9	330°35.3	294°04.8	14°14.3	48°01.4	-23°26.9	100°44.1	-17°01.5	50°48.0	-22°14.7
10	345°37.7	309°04.3	14°15.4	63°02.4	-23°26.9	115°46.8	-17°01.4	65°50.4	-22°14.7
11	0°40.2	324°03.8	14°16.5	78°03.4	-23°26.8	130°49.4	-17°01.4	80°52.8	-22°14.7
12	15°42.6	339°03.3	14°17.5	93°04.4	-23°26.8	145°52.1	-17°01.3	95°55.2	-22°14.7
13	30°45.1	354°02.8	14°18.6	108°05.4	-23°26.7	160°54.8	-17°01.3	110°57.6	-22°14.7
14	45°47.6	9°02.3	14°19.7	123°06.4	-23°26.7	175°57.5	-17°01.2	126°00.0	-22°14.7
15	60°50.0	24°01.8	14°20.8	138°07.4	-23°26.7	191°00.2	-17°01.1	141°02.5	-22°14.7
16	75°52.5	39°01.3	14°21.9	153°08.4	-23°26.6	206°02.8	-17°01.1	156°04.9	-22°14.7
17	90°55.0	54°00.8	14°22.9	168°09.4	-23°26.6	221°05.5	-17°01.0	171°07.3	-22°14.7
18	105°57.4	69°00.3	14°24.0	183°10.4	-23°26.5	236°08.2	-17°01.0	186°09.7	-22°14.7
19	120°59.9	83°59.8	14°25.1	198°11.4	-23°26.5	251°10.9	-17°00.9	201°12.1	-22°14.7
20	136°02.4	98°59.3	14°26.2	213°12.4	-23°26.4	266°13.6	-17°00.9	216°14.6	-22°14.6
21	151°04.8	113°58.8	14°27.3	228°13.4	-23°26.4	281°16.2	-17°00.8	231°17.0	-22°14.6
22	166°07.3	128°58.3	14°28.3	243°14.4	-23°26.3	296°18.9	-17°00.7	246°19.4	-22°14.6
23	181°09.8	143°57.8	14°29.4	258°15.4	-23°26.3	311°21.6	-17°00.7	261°21.8	-22°14.6
Mer.pass.:10:57		v-0.5 d1.1 m-3.8		v1.0 d0.0 m0.2		v2.7 d0.1 m-2.2		v2.4 d0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	196°12.2	158°57.2	14°30.5	273°16.4	-23°26.2	326°24.3	-17°00.6	276°24.2	-22°14.6
1	211°14.7	173°56.7	14°31.6	288°17.4	-23°26.2	341°27.0	-17°00.6	291°26.6	-22°14.6
2	226°17.1	188°56.2	14°32.6	303°18.4	-23°26.1	356°29.7	-17°00.5	306°29.1	-22°14.6
3	241°19.6	203°55.7	14°33.7	318°19.4	-23°26.1	11°32.3	-17°00.4	321°31.5	-22°14.6
4	256°22.1	218°55.2	14°34.8	333°20.4	-23°26.0	26°35.0	-17°00.4	336°33.9	-22°14.6
5	271°24.5	233°54.7	14°35.8	348°21.4	-23°26.0	41°37.7	-17°00.3	351°36.3	-22°14.6
6	286°27.0	248°54.2	14°36.9	3°22.4	-23°25.9	56°40.4	-17°00.3	6°38.7	-22°14.6
7	301°29.5	263°53.7	14°38.0	18°23.4	-23°25.9	71°43.1	-17°00.2	21°41.2	-22°14.6
8	316°31.9	278°53.2	14°39.1	33°24.4	-23°25.8	86°45.8	-17°00.1	36°43.6	-22°14.6
9	331°34.4	293°52.7	14°40.1	48°25.4	-23°25.8	101°48.4	-17°00.1	51°46.0	-22°14.6
10	346°36.9	308°52.2	14°41.2	63°26.4	-23°25.7	116°51.1	-17°00.0	66°48.4	-22°14.6
11	1°39.3	323°51.6	14°42.3	78°27.4	-23°25.7	131°53.8	-16°60.0	81°50.9	-22°14.6
12	16°41.8	338°51.1	14°43.3	93°28.4	-23°25.6	146°56.5	-16°59.9	96°53.3	-22°14.6
13	31°44.2	353°50.6	14°44.4	108°29.4	-23°25.6	161°59.2	-16°59.8	111°55.7	-22°14.6
14	46°46.7	8°50.1	14°45.5	123°30.4	-23°25.5	177°01.9	-16°59.8	126°58.1	-22°14.6
15	61°49.2	23°49.6	14°46.5	138°31.4	-23°25.5	192°04.5	-16°59.7	142°00.5	-22°14.6
16	76°51.6	38°49.1	14°47.6	153°32.4	-23°25.4	207°07.2	-16°59.7	157°03.0	-22°14.6
17	91°54.1	53°48.6	14°48.7	168°33.5	-23°25.4	222°09.9	-16°59.6	172°05.4	-22°14.6
18	106°56.6	68°48.0	14°49.7	183°34.5	-23°25.3	237°12.6	-16°59.5	187°07.8	-22°14.6
19	121°59.0	83°47.5	14°50.8	198°35.5	-23°25.3	252°15.3	-16°59.5	202°10.2	-22°14.6
20	137°01.5	98°47.0	14°51.9	213°36.5	-23°25.2	267°18.0	-16°59.4	217°12.7	-22°14.6
21	152°04.0	113°46.5	14°52.9	228°37.5	-23°25.2	282°20.7	-16°59.4	232°15.1	-22°14.6
22	167°06.4	128°46.0	14°54.0	243°38.5	-23°25.1	297°23.4	-16°59.3	247°17.5	-22°14.6
23	182°08.9	143°45.5	14°55.0	258°39.5	-23°25.1	312°26.0	-16°59.2	262°19.9	-22°14.6
Mer.pass.:10:53		v-0.5 d1.1 m-3.8		v1.0 d0.0 m0.1		v2.7 d0.1 m-2.3		v2.4 d0.0 m0.5	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	197°11.4	158°44.9	14°56.1	273°40.5	-23°25.0	327°28.7	-16°59.2	277°22.3	-22°14.6
1	212°13.8	173°44.4	14°57.2	288°41.5	-23°24.9	342°31.4	-16°59.1	292°24.8	-22°14.6
2	227°16.3	188°43.9	14°58.2	303°42.5	-23°24.9	357°34.1	-16°59.1	307°27.2	-22°14.6
3	242°18.7	203°43.4	14°59.3	318°43.5	-23°24.8	12°36.8	-16°59.0	322°29.6	-22°14.5
4	257°21.2	218°42.9	15°00.3	333°44.6	-23°24.8	27°39.5	-16°58.9	337°32.0	-22°14.5
5	272°23.7	233°42.4	15°01.4	348°45.6	-23°24.7	42°42.2	-16°58.9	352°34.5	-22°14.5
6	287°26.1	248°41.8	15°02.5	3°46.6	-23°24.7	57°44.9	-16°58.8	7°36.9	-22°14.5
7	302°28.6	263°41.3	15°03.5	18°47.6	-23°24.6	72°47.6	-16°58.8	22°39.3	-22°14.5
8	317°31.1	278°40.8	15°04.6	33°48.6	-23°24.6	87°50.2	-16°58.7	37°41.7	-22°14.5
9	332°33.5	293°40.3	15°05.6	48°49.6	-23°24.5	102°52.9	-16°58.6	52°44.2	-22°14.5
10	347°36.0	308°39.7	15°06.7	63°50.6	-23°24.5	117°55.6	-16°58.6	67°46.6	-22°14.5
11	2°38.5	323°39.2	15°07.7	78°51.6	-23°24.4	132°58.3	-16°58.5	82°49.0	-22°14.5
12	17°40.9	338°38.7	15°08.8	93°52.6	-23°24.4	148°01.0	-16°58.5	97°51.4	-22°14.5
13	32°43.4	353°38.2	15°09.8	108°53.7	-23°24.3	163°03.7	-16°58.4	112°53.9	-22°14.5
14	47°45.9	8°37.7	15°10.9	123°54.7	-23°24.3	178°06.4	-16°58.3	127°56.3	-22°14.5
15	62°48.3	23°37.1	15°11.9	138°55.7	-23°24.2	193°09.1	-16°58.3	142°58.7	-22°14.5
16	77°50.8	38°36.6	15°13.0	153°56.7	-23°24.1	208°11.8	-16°58.2	158°01.1	-22°14.5
17	92°53.2	53°36.1	15°14.0	168°57.7	-23°24.1	223°14.5	-16°58.2	173°03.6	-22°14.5
18	107°55.7	68°35.6	15°15.1	183°58.7	-23°24.0	238°17.2	-16°58.1	188°06.0	-22°14.5
19	122°58.2	83°35.0	15°16.1	198°59.7	-23°24.0	253°19.9	-16°58.0	203°08.4	-22°14.5
20	138°00.6	98°34.5	15°17.2	214°00.8	-23°23.9	268°22.6	-16°58.0	218°10.9	-22°14.5
21	153°03.1	113°34.0	15°18.2	229°01.8	-23°23.9	283°25.2	-16°57.9	233°13.3	-22°14.5
22	168°05.6	128°33.5	15°19.3	244°02.8	-23°23.8	298°27.9	-16°57.8	248°15.7	-22°14.5
23	183°08.0	143°32.9	15°20.3	259°03.8	-23°23.8	313°30.6	-16°57.8	263°18.1	-22°14.5
Mer.pass.:10:49		v-0.5 d1.1 m-3.8		v1.0 d0.1 m0.1		v2.7 d0.1 m-2.3		v2.4 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.2
Ankaa	353°12.9	-42°12.6
Schedar	349°37.3	56°38.0
Diphda	348°52.9	-17°53.4
Achernar	335°25.0	-57°08.9
Hamal	327°57.4	23°32.7
Polaris	316°44.7	89°20.5
Akamar	315°16.3	-40°14.3
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.4
Aldebaran	290°45.9	16°32.5
Rigel	281°09.1	-8°11.2
Capella	280°29.9	46°00.9
Bellatrix	278°28.7	6°21.7
Elnath	278°08.7	28°37.2
Alnilam	275°43.2	-1°11.7
Betelgeuse	270°57.9	7°24.3
Canopus	263°54.8	-52°42.8
Sirius	258°30.8	-16°44.7
Adara	255°10.0	-29°00.2
Procyon	244°56.2	5°10.6
Pollux	243°23.6	27°58.8
Avior	234°16.5	-59°34.5
Suhail	222°49.8	-43°30.7
Miaplacidus	221°38.5	-69°47.9
Alphard	217°52.7	-8°44.5
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.3
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.6
Acrux	173°04.9	-63°12.0
Gacrux	171°56.7	-57°12.9
Alioth	166°17.4	55°51.7
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.4
Hadar	148°42.6	-60°27.5
Menkent	148°03.4	-36°27.5
Arcturus	145°52.3	19°05.5
Rigil Kent.	139°46.7	-60°54.4
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.1	74°04.8
Alphecca	126°08.0	26°39.2
Antares	112°22.0	-26°28.1
Atria	107°20.6	-69°03.2
Sabik	102°08.7	-15°44.7
Shaula	96°17.4	-37°06.7
Rasalhague	96°03.3	12°32.8
Etamin	90°44.5	51°29.0
Kaus Aust.	83°39.4	-34°22.3
Vega	80°36.7	38°47.8
Nunki	75°54.3	-26°16.3
Altair	62°05.2	8°54.9
Peacock	53°14.4	-56°40.3
Deneb	49°29.4	45°20.5
Enif	33°44.2	9°57.4
Alnair	27°40.1	-46°52.2
Fomalhaut	15°20.8	-29°31.6
Scheat	13°50.6	28°10.7
Markab	13°35.4	15°18.0

2018/4/7	**SHA**	**Mer.pass**
Venus	323°56.2	13:24
Mars	77°39.3	05:48
Jupiter	130°06.9	02:18
Saturn	80°13.1	05:37

2018/4/8	**SHA**	**Mer.pass**
Venus	322°45.0	13:25
Mars	77°04.2	05:47
Jupiter	130°12.1	02:14
Saturn	80°12.0	05:33

2018/4/9	**SHA**	**Mer.pass**
Venus	321°33.6	13:25
Mars	76°29.2	05:45
Jupiter	130°17.4	02:10
Saturn	80°11.0	05:30

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°26.0	6°43.5	282°03.7	11.8	-20°09.2	-1.4	54.4
1	194°26.2	6°44.4	296°34.5	11.8	-20°10.5	-1.3	54.4
2	209°26.4	6°45.4	311°05.3	11.8	-20°11.8	-1.2	54.4
3	224°26.5	6°46.3	325°36.1	11.8	-20°12.9	-1.1	54.4
4	239°26.7	6°47.3	340°06.9	11.8	-20°14.0	-1.0	54.4
5	254°26.9	6°48.2	354°37.7	11.8	-20°14.9	-0.9	54.3
6	269°27.1	6°49.1	9°08.5	11.8	-20°15.8	-0.8	54.3
7	284°27.2	6°50.1	23°39.3	11.8	-20°16.5	-0.7	54.3
8	299°27.4	6°51.0	38°10.1	11.8	-20°17.2	-0.6	54.3
9	314°27.6	6°52.0	52°40.9	11.8	-20°17.8	-0.5	54.3
10	329°27.8	6°52.9	67°11.8	11.8	-20°18.3	-0.4	54.3
11	344°27.9	6°53.8	81°42.6	11.8	-20°18.7	-0.3	54.3
12	359°28.1	6°54.8	96°13.4	11.8	-20°19.0	-0.2	54.3
13	14°28.3	6°55.7	110°44.3	11.8	-20°19.1	-0.2	54.3
14	29°28.5	6°56.7	125°15.1	11.9	-20°19.3	-0.1	54.3
15	44°28.6	6°57.6	139°46.0	11.9	-20°19.3	0.0	54.3
16	59°28.8	6°58.5	154°16.8	11.9	-20°19.2	0.1	54.3
17	74°29.0	6°59.5	168°47.7	11.9	-20°19.0	0.2	54.3
18	89°29.2	7°00.4	183°18.6	11.9	-20°18.7	0.3	54.3
19	104°29.3	7°01.3	197°49.5	11.9	-20°18.3	0.4	54.3
20	119°29.5	7°02.3	212°20.3	11.9	-20°17.9	0.5	54.3
21	134°29.7	7°03.2	226°51.2	11.9	-20°17.3	0.6	54.3
22	149°29.9	7°04.2	241°22.1	11.9	-20°16.7	0.7	54.3
23	164°30.0	7°05.1	255°53.0	11.9	-20°15.9	0.8	54.3
	SD.=16.0	d=0.9	S.D.=14.8				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°30.2	7°06.0	270°24.0	11.9	-20°15.1	0.9	54.3
1	194°30.4	7°07.0	284°54.9	11.9	-20°14.1	1.0	54.3
2	209°30.6	7°07.9	299°25.8	11.9	-20°13.1	1.1	54.3
3	224°30.7	7°08.8	313°56.8	11.9	-20°12.0	1.2	54.3
4	239°30.9	7°09.8	328°27.7	12.0	-20°10.8	1.3	54.3
5	254°31.1	7°10.7	342°58.7	12.0	-20°09.5	1.4	54.3
6	269°31.2	7°11.6	357°29.7	12.0	-20°08.1	1.4	54.3
7	284°31.4	7°12.6	12°00.6	12.0	-20°06.6	1.5	54.3
8	299°31.6	7°13.5	26°31.6	12.0	-20°05.0	1.6	54.3
9	314°31.8	7°14.4	41°02.6	12.0	-20°03.3	1.7	54.3
10	329°31.9	7°15.4	55°33.6	12.0	-20°01.5	1.8	54.3
11	344°32.1	7°16.3	70°04.7	12.0	-19°59.7	1.9	54.3
12	359°32.3	7°17.2	84°35.7	12.0	-19°57.7	2.0	54.3
13	14°32.5	7°18.2	99°06.7	12.0	-19°55.7	2.1	54.3
14	29°32.6	7°19.1	113°37.8	12.1	-19°53.5	2.2	54.3
15	44°32.8	7°20.0	128°08.8	12.1	-19°51.3	2.3	54.3
16	59°33.0	7°21.0	142°39.9	12.1	-19°48.9	2.4	54.3
17	74°33.1	7°21.9	157°11.0	12.1	-19°46.5	2.5	54.3
18	89°33.3	7°22.8	171°42.1	12.1	-19°44.0	2.6	54.3
19	104°33.5	7°23.8	186°13.2	12.1	-19°41.4	2.6	54.3
20	119°33.7	7°24.7	200°44.3	12.1	-19°38.7	2.7	54.3
21	134°33.8	7°25.6	215°15.5	12.1	-19°35.9	2.8	54.3
22	149°34.0	7°26.6	229°46.6	12.2	-19°33.1	2.9	54.3
23	164°34.2	7°27.5	244°17.8	12.2	-19°30.1	3.0	54.3
	SD.=16.0	d=0.9	S.D.=14.8				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°34.3	7°28.4	258°49.0	12.2	-19°27.0	3.1	54.3
1	194°34.5	7°29.4	273°20.1	12.2	-19°23.9	3.2	54.3
2	209°34.7	7°30.3	287°51.3	12.2	-19°20.7	3.3	54.3
3	224°34.9	7°31.2	302°22.5	12.2	-19°17.3	3.4	54.3
4	239°35.0	7°32.2	316°53.8	12.2	-19°13.9	3.5	54.3
5	254°35.2	7°33.1	331°25.0	12.2	-19°10.4	3.5	54.3
6	269°35.4	7°34.0	345°56.3	12.3	-19°06.8	3.6	54.3
7	284°35.5	7°34.9	0°27.5	12.3	-19°03.1	3.7	54.4
8	299°35.7	7°35.9	14°58.8	12.3	-18°59.4	3.8	54.4
9	314°35.9	7°36.8	29°30.1	12.3	-18°55.5	3.9	54.4
10	329°36.1	7°37.7	44°01.4	12.3	-18°51.5	4.0	54.4
11	344°36.2	7°38.7	58°32.7	12.3	-18°47.5	4.1	54.4
12	359°36.4	7°39.6	73°04.1	12.3	-18°43.4	4.2	54.4
13	14°36.6	7°40.5	87°35.4	12.4	-18°39.2	4.3	54.4
14	29°36.7	7°41.5	102°06.8	12.4	-18°34.9	4.3	54.4
15	44°36.9	7°42.4	116°38.1	12.4	-18°30.5	4.4	54.4
16	59°37.1	7°43.3	131°09.5	12.4	-18°26.0	4.5	54.4
17	74°37.2	7°44.2	145°40.9	12.4	-18°21.5	4.6	54.4
18	89°37.4	7°45.2	160°12.4	12.4	-18°16.8	4.7	54.5
19	104°37.6	7°46.1	174°43.8	12.4	-18°12.1	4.8	54.5
20	119°37.7	7°47.0	189°15.2	12.5	-18°07.3	4.9	54.5
21	134°37.9	7°47.9	203°46.7	12.5	-18°02.4	4.9	54.5
22	149°38.1	7°48.9	218°18.2	12.5	-17°57.4	5.0	54.5
23	164°38.2	7°49.8	232°49.7	12.5	-17°52.3	5.1	54.5
	SD.=16.0	d=0.9	S.D.=14.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:56	04:19	19:48	21:13	–:–
70	01:11	03:19	04:31	19:36	20:49	23:08
68	02:01	03:37	04:40	19:26	20:30	22:10
66	02:31	03:51	04:48	19:18	20:16	21:38
64	02:53	04:02	04:54	19:11	20:04	21:15
62	03:10	04:12	04:60	19:06	19:54	20:57
60	03:24	04:20	05:05	19:01	19:45	20:42
58	03:36	04:28	05:09	18:56	19:38	20:30
56	03:45	04:34	05:13	18:52	19:31	20:20
54	03:54	04:39	05:16	18:49	19:26	20:11
52	04:02	04:44	05:19	18:46	19:21	20:04
50	04:08	04:49	05:22	18:43	19:16	19:57
45	04:22	04:58	05:28	18:36	19:07	19:43
40	04:33	05:06	05:33	18:31	18:59	19:32
35	04:41	05:12	05:38	18:27	18:52	19:23
30	04:49	05:17	05:41	18:23	18:47	19:16
20	04:60	05:26	05:48	18:16	18:38	19:05
10	05:08	05:32	05:53	18:10	18:32	18:56
0	05:14	05:38	05:59	18:05	18:26	18:50
-10	05:18	05:42	06:04	17:60	18:21	18:46
-20	05:21	05:47	06:09	17:55	18:17	18:42
-30	05:23	05:51	06:15	17:49	18:13	18:40
-35	05:23	05:53	06:18	17:45	18:10	18:40
-40	05:23	05:55	06:22	17:41	18:08	18:40
-45	05:23	05:57	06:26	17:37	18:06	18:40
-50	05:21	05:59	06:31	17:32	18:04	18:41
-52	05:21	05:60	06:34	17:29	18:03	18:42
-54	05:20	06:01	06:36	17:27	18:02	18:43
-56	05:19	06:02	06:39	17:24	18:01	18:44
-58	05:17	06:03	06:42	17:20	17:60	18:45
-60	05:16	06:04	06:46	17:17	17:59	18:47

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	05:49	–:–	–:–	08:14
68	03:45	04:31	04:54	06:58	07:52	09:08
66	03:03	03:50	04:21	07:41	08:33	09:41
64	02:34	03:22	03:56	08:09	09:01	10:05
62	02:12	03:00	03:37	08:31	09:22	10:24
60	01:55	02:43	03:21	08:49	09:39	10:40
58	01:40	02:28	03:08	09:03	09:54	10:53
56	01:28	02:16	02:56	09:16	10:06	11:04
54	01:17	02:05	02:46	09:27	10:17	11:14
52	01:07	01:55	02:37	09:37	10:27	11:23
50	00:58	01:47	02:29	09:45	10:35	11:31
45	00:40	01:28	02:12	10:04	10:54	11:47
40	00:25	01:13	01:58	10:19	11:08	12:01
35	00:12	01:01	01:46	10:32	11:21	12:13
30	00:01	00:50	01:35	10:43	11:32	12:23
20	–:–	00:31	01:17	11:02	11:51	12:40
10	–:–	00:14	01:01	11:18	12:07	12:55
0	23:59	–:–	00:47	11:34	12:22	13:10
-10	23:43	–:–	00:32	11:49	12:37	13:24
-20	23:27	–:–	00:16	12:06	12:53	13:39
-30	23:08	23:58	–:–	12:25	13:12	13:56
-35	22:57	23:48	–:–	12:36	13:23	14:06
-40	22:44	23:35	–:–	12:49	13:35	14:17
-45	22:29	23:21	–:–	13:04	13:49	14:30
-50	22:11	23:04	–:–	13:22	14:07	14:47
-52	22:02	22:56	23:54	13:31	14:16	14:54
-54	21:53	22:46	23:46	13:40	14:25	15:03
-56	21:42	22:36	23:37	13:51	14:35	15:12
-58	21:29	22:24	23:26	14:04	14:47	15:23
-60	21:15	22:10	23:14	14:18	15:01	15:35

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
7	02:16	02:08	12:02	05:22	17:46	21(58%)
8	01:59	01:51	12:01	06:10	18:34	22(48%)
9	01:43	01:34	12:01	06:58	19:21	23(39%)

April 10, 11 ,12 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	198°10.5	158°32.4	15°21.4	274°04.8	-23°23.7	328°33.3	-16°57.7	278°20.6	-22°14.5
1	213°13.0	173°31.9	15°22.4	289°05.8	-23°23.6	343°36.0	-16°57.7	293°23.0	-22°14.5
2	228°15.4	188°31.3	15°23.5	304°06.8	-23°23.6	358°38.7	-16°57.6	308°25.4	-22°14.5
3	243°17.9	203°30.8	15°24.5	319°07.9	-23°23.5	13°41.4	-16°57.5	323°27.9	-22°14.5
4	258°20.3	218°30.3	15°25.5	334°08.9	-23°23.5	28°44.1	-16°57.5	338°30.3	-22°14.5
5	273°22.8	233°29.7	15°26.6	349°09.9	-23°23.4	43°46.8	-16°57.4	353°32.7	-22°14.5
6	288°25.3	248°29.2	15°27.6	4°10.9	-23°23.4	58°49.5	-16°57.4	8°35.1	-22°14.5
7	303°27.7	263°28.7	15°28.7	19°11.9	-23°23.3	73°52.2	-16°57.3	23°37.6	-22°14.5
8	318°30.2	278°28.2	15°29.7	34°12.9	-23°23.2	88°54.9	-16°57.2	38°40.0	-22°14.5
9	333°32.7	293°27.6	15°30.7	49°14.0	-23°23.2	103°57.6	-16°57.2	53°42.4	-22°14.5
10	348°35.1	308°27.1	15°31.8	64°15.0	-23°23.1	119°00.3	-16°57.1	68°44.9	-22°14.5
11	3°37.6	323°26.6	15°32.8	79°16.0	-23°23.1	134°03.0	-16°57.0	83°47.3	-22°14.5
12	18°40.1	338°26.0	15°33.9	94°17.0	-23°23.0	149°05.7	-16°57.0	98°49.7	-22°14.5
13	33°42.5	353°25.5	15°34.9	109°18.0	-23°23.0	164°08.4	-16°56.9	113°52.2	-22°14.5
14	48°45.0	8°25.0	15°35.9	124°19.1	-23°22.9	179°11.1	-16°56.9	128°54.6	-22°14.4
15	63°47.5	23°24.4	15°37.0	139°20.1	-23°22.8	194°13.8	-16°56.8	143°57.0	-22°14.4
16	78°49.9	38°23.9	15°38.0	154°21.1	-23°22.8	209°16.5	-16°56.7	158°59.4	-22°14.4
17	93°52.4	53°23.4	15°39.0	169°22.1	-23°22.7	224°19.2	-16°56.7	174°01.9	-22°14.4
18	108°54.8	68°22.8	15°40.1	184°23.1	-23°22.7	239°21.9	-16°56.6	189°04.3	-22°14.4
19	123°57.3	83°22.3	15°41.1	199°24.2	-23°22.6	254°24.6	-16°56.5	204°06.7	-22°14.4
20	138°59.8	98°21.7	15°42.1	214°25.2	-23°22.5	269°27.3	-16°56.5	219°09.2	-22°14.4
21	154°02.2	113°21.2	15°43.2	229°26.2	-23°22.5	284°30.0	-16°56.4	234°11.6	-22°14.4
22	169°04.7	128°20.7	15°44.2	244°27.2	-23°22.4	299°32.7	-16°56.4	249°14.0	-22°14.4
23	184°07.2	143°20.1	15°45.2	259°28.3	-23°22.4	314°35.4	-16°56.3	264°16.5	-22°14.4
Mer.pass.:10:45		v-0.5 d1.0 m-3.8		v1.0 d0.1 m0.1		v2.7 d0.1 m-2.3		v2.4 d0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	199°09.6	158°19.6	15°46.2	274°29.3	-23°22.3	329°38.1	-16°56.2	279°18.9	-22°14.4
1	214°12.1	173°19.1	15°47.3	289°30.3	-23°22.2	344°40.8	-16°56.2	294°21.3	-22°14.4
2	229°14.6	188°18.5	15°48.3	304°31.3	-23°22.2	359°43.5	-16°56.1	309°23.8	-22°14.4
3	244°17.0	203°18.0	15°49.3	319°32.3	-23°22.1	14°46.2	-16°56.0	324°26.2	-22°14.4
4	259°19.5	218°17.4	15°50.4	334°33.4	-23°22.1	29°48.9	-16°56.0	339°28.6	-22°14.4
5	274°22.0	233°16.9	15°51.4	349°34.4	-23°22.0	44°51.6	-16°55.9	354°31.1	-22°14.4
6	289°24.4	248°16.4	15°52.4	4°35.4	-23°21.9	59°54.3	-16°55.8	9°33.5	-22°14.4
7	304°26.9	263°15.8	15°53.4	19°36.4	-23°21.9	74°57.0	-16°55.8	24°35.9	-22°14.4
8	319°29.3	278°15.3	15°54.4	34°37.5	-23°21.8	89°59.7	-16°55.7	39°38.4	-22°14.4
9	334°31.8	293°14.7	15°55.5	49°38.5	-23°21.8	105°02.4	-16°55.7	54°40.8	-22°14.4
10	349°34.3	308°14.2	15°56.5	64°39.5	-23°21.7	120°05.1	-16°55.6	69°43.2	-22°14.4
11	4°36.7	323°13.6	15°57.5	79°40.5	-23°21.6	135°07.8	-16°55.5	84°45.7	-22°14.4
12	19°39.2	338°13.1	15°58.5	94°41.6	-23°21.6	150°10.5	-16°55.5	99°48.1	-22°14.4
13	34°41.7	353°12.6	15°59.6	109°42.6	-23°21.5	165°13.2	-16°55.4	114°50.5	-22°14.4
14	49°44.1	8°12.0	16°00.6	124°43.6	-23°21.5	180°15.9	-16°55.3	129°53.0	-22°14.4
15	64°46.6	23°11.5	16°01.6	139°44.7	-23°21.4	195°18.6	-16°55.3	144°55.4	-22°14.4
16	79°49.1	38°10.9	16°02.6	154°45.7	-23°21.3	210°21.3	-16°55.2	159°57.8	-22°14.4
17	94°51.5	53°10.4	16°03.6	169°46.7	-23°21.3	225°24.0	-16°55.1	175°00.3	-22°14.4
18	109°54.0	68°09.8	16°04.6	184°47.7	-23°21.2	240°26.7	-16°55.1	190°02.7	-22°14.4
19	124°56.4	83°09.3	16°05.7	199°48.8	-23°21.2	255°29.4	-16°55.0	205°05.2	-22°14.4
20	139°58.9	98°08.7	16°06.7	214°49.8	-23°21.1	270°32.1	-16°54.9	220°07.6	-22°14.4
21	155°01.4	113°08.2	16°07.7	229°50.8	-23°21.0	285°34.8	-16°54.9	235°10.0	-22°14.4
22	170°03.8	128°07.6	16°08.7	244°51.9	-23°21.0	300°37.5	-16°54.8	250°12.5	-22°14.4
23	185°06.3	143°07.1	16°09.7	259°52.9	-23°20.9	315°40.2	-16°54.8	265°14.9	-22°14.4
Mer.pass.:10:41		v-0.5 d1.0 m-3.8		v1.0 d0.1 m0.1		v2.7 d0.1 m-2.3		v2.4 d0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	200°08.8	158°06.5	16°10.7	274°53.9	-23°20.8	330°42.9	-16°54.7	280°17.3	-22°14.4
1	215°11.2	173°06.0	16°11.7	289°54.9	-23°20.8	345°45.6	-16°54.6	295°19.8	-22°14.4
2	230°13.7	188°05.4	16°12.8	304°56.0	-23°20.7	0°48.3	-16°54.6	310°22.2	-22°14.4
3	245°16.2	203°04.9	16°13.8	319°57.0	-23°20.6	15°51.0	-16°54.5	325°24.6	-22°14.4
4	260°18.6	218°04.3	16°14.8	334°58.0	-23°20.6	30°53.7	-16°54.4	340°27.1	-22°14.4
5	275°21.1	233°03.8	16°15.8	349°59.1	-23°20.5	45°56.5	-16°54.4	355°29.5	-22°14.4
6	290°23.6	248°03.2	16°16.8	5°00.1	-23°20.5	60°59.2	-16°54.3	10°32.0	-22°14.4
7	305°26.0	263°02.7	16°17.8	20°01.1	-23°20.4	76°01.9	-16°54.2	25°34.4	-22°14.4
8	320°28.5	278°02.1	16°18.8	35°02.2	-23°20.3	91°04.6	-16°54.2	40°36.8	-22°14.3
9	335°30.9	293°01.6	16°19.8	50°03.2	-23°20.3	106°07.3	-16°54.1	55°39.3	-22°14.3
10	350°33.4	308°01.0	16°20.8	65°04.2	-23°20.2	121°10.0	-16°54.0	70°41.7	-22°14.3
11	5°35.9	323°00.5	16°21.8	80°05.3	-23°20.1	136°12.7	-16°54.0	85°44.2	-22°14.3
12	20°38.3	337°59.9	16°22.8	95°06.3	-23°20.1	151°15.4	-16°53.9	100°46.6	-22°14.3
13	35°40.8	352°59.4	16°23.8	110°07.3	-23°20.0	166°18.1	-16°53.8	115°49.0	-22°14.3
14	50°43.3	7°58.8	16°24.8	125°08.4	-23°19.9	181°20.8	-16°53.8	130°51.5	-22°14.3
15	65°45.7	22°58.3	16°25.8	140°09.4	-23°19.9	196°23.5	-16°53.7	145°53.9	-22°14.3
16	80°48.2	37°57.7	16°26.8	155°10.4	-23°19.8	211°26.2	-16°53.7	160°56.4	-22°14.3
17	95°50.7	52°57.1	16°27.8	170°11.5	-23°19.7	226°29.0	-16°53.6	175°58.8	-22°14.3
18	110°53.1	67°56.6	16°28.8	185°12.5	-23°19.7	241°31.7	-16°53.5	191°01.2	-22°14.3
19	125°55.6	82°56.0	16°29.8	200°13.5	-23°19.6	256°34.4	-16°53.5	206°03.7	-22°14.3
20	140°58.0	97°55.5	16°30.8	215°14.6	-23°19.6	271°37.1	-16°53.4	221°06.1	-22°14.3
21	156°00.5	112°54.9	16°31.8	230°15.6	-23°19.5	286°39.8	-16°53.3	236°08.6	-22°14.3
22	171°03.0	127°54.4	16°32.8	245°16.7	-23°19.4	301°42.5	-16°53.3	251°11.0	-22°14.3
23	186°05.4	142°53.8	16°33.8	260°17.7	-23°19.4	316°45.2	-16°53.2	266°13.4	-22°14.3
Mer.pass.:10:37		v-0.5 d1.0 m-3.8		v1.0 d0.1 m0.1		v2.7 d0.1 m-2.3		v2.4 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.2
Ankaa	353°12.9	-42°12.5
Schedar	349°37.3	56°38.0
Diphda	348°52.9	-17°53.4
Achernar	335°25.0	-57°08.9
Hamal	327°57.4	23°32.7
Polaris	316°45.3	89°20.5
Akamar	315°16.3	-40°14.2
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.4
Aldebaran	290°45.9	16°32.5
Rigel	281°09.1	-8°11.2
Capella	280°29.9	46°00.9
Bellatrix	278°28.7	6°21.7
Elnath	278°08.7	28°37.2
Alnilam	275°43.2	-1°11.7
Betelgeuse	270°57.9	7°24.4
Canopus	263°54.8	-52°42.8
Sirius	258°30.8	-16°44.6
Adara	255°10.0	-29°00.2
Procyon	244°56.2	5°10.6
Pollux	243°23.6	27°58.8
Avior	234°16.5	-59°34.5
Suhail	222°49.8	-43°30.7
Miaplacidus	221°38.5	-69°47.9
Alphard	217°52.7	-8°44.5
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.3
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.7
Acrux	173°04.9	-63°12.0
Gacrux	171°56.7	-57°12.9
Alioth	166°17.4	55°51.7
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.4
Hadar	148°42.6	-60°27.5
Menkent	148°03.3	-36°27.5
Arcturus	145°52.3	19°05.5
Rigil Kent.	139°46.6	-60°54.4
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.1	74°04.8
Alphecca	126°08.0	26°39.2
Antares	112°22.0	-26°28.2
Atria	107°20.6	-69°03.2
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.7
Rasalhague	96°03.3	12°32.8
Etamin	90°44.4	51°29.0
Kaus Aust.	83°39.4	-34°22.3
Vega	80°36.7	38°47.8
Nunki	75°54.3	-26°16.2
Altair	62°05.2	8°54.9
Peacock	53°14.3	-56°40.3
Deneb	49°29.4	45°20.5
Enif	33°44.1	9°57.4
Alnair	27°40.0	-46°52.2
Fomalhaut	15°20.8	-29°31.6
Scheat	13°50.5	28°10.7
Markab	13°35.4	15°18.0

2018/4/1	**SHA**	**Mer.pass**
Venus	320°21.9	13:26
Mars	75°54.3	05:43
Jupiter	130°22.8	02:05
Saturn	80°10.1	05:26

2018/4/1	**SHA**	**Mer.pass**
Venus	319°10.0	13:27
Mars	75°19.6	05:42
Jupiter	130°28.4	02:01
Saturn	80°09.3	05:22

2018/4/1	**SHA**	**Mer.pass**
Venus	317°57.8	13:28
Mars	74°45.1	05:40
Jupiter	130°34.2	01:57
Saturn	80°08.6	05:18

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°38.4	7°50.7	247°21.2	12.5	-17°47.2	5.2	54.5
1	194°38.6	7°51.6	261°52.7	12.5	-17°41.9	5.3	54.5
2	209°38.8	7°52.6	276°24.2	12.5	-17°36.6	5.4	54.6
3	224°38.9	7°53.5	290°55.7	12.6	-17°31.2	5.4	54.6
4	239°39.1	7°54.4	305°27.3	12.6	-17°25.7	5.5	54.6
5	254°39.3	7°55.3	319°58.9	12.6	-17°20.2	5.6	54.6
6	269°39.4	7°56.3	334°30.5	12.6	-17°14.5	5.7	54.6
7	284°39.6	7°57.2	349°02.1	12.6	-17°08.8	5.8	54.6
8	299°39.8	7°58.1	3°33.7	12.6	-17°03.0	5.9	54.6
9	314°39.9	7°59.0	18°05.3	12.6	-16°57.1	5.9	54.6
10	329°40.1	7°60.0	32°37.0	12.6	-16°51.1	6.0	54.7
11	344°40.3	8°00.9	47°08.6	12.7	-16°45.0	6.1	54.7
12	359°40.4	8°01.8	61°40.3	12.7	-16°38.9	6.2	54.7
13	14°40.6	8°02.7	76°12.0	12.7	-16°32.7	6.3	54.7
14	29°40.8	8°03.7	90°43.7	12.7	-16°26.4	6.3	54.7
15	44°40.9	8°04.6	105°15.4	12.7	-16°20.0	6.4	54.7
16	59°41.1	8°05.5	119°47.1	12.7	-16°13.6	6.5	54.8
17	74°41.3	8°06.4	134°18.8	12.7	-16°07.0	6.6	54.8
18	89°41.4	8°07.4	148°50.6	12.8	-16°00.4	6.6	54.8
19	104°41.6	8°08.3	163°22.3	12.8	-15°53.7	6.7	54.8
20	119°41.8	8°09.2	177°54.1	12.8	-15°47.0	6.8	54.8
21	134°41.9	8°10.1	192°25.9	12.8	-15°40.1	6.9	54.8
22	149°42.1	8°11.0	206°57.7	12.8	-15°33.2	7.0	54.9
23	164°42.3	8°12.0	221°29.5	12.8	-15°26.2	7.0	54.9
	SD.=16.0	d=0.9			S.D.=14.9		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°42.4	8°12.9	236°01.3	12.8	-15°19.1	7.1	54.9
1	194°42.6	8°13.8	250°33.2	12.8	-15°12.0	7.2	54.9
2	209°42.7	8°14.7	265°05.0	12.9	-15°04.8	7.3	54.9
3	224°42.9	8°15.6	279°36.9	12.9	-14°57.5	7.3	55.0
4	239°43.1	8°16.6	294°08.7	12.9	-14°50.1	7.4	55.0
5	254°43.2	8°17.5	308°40.6	12.9	-14°42.7	7.5	55.0
6	269°43.4	8°18.4	323°12.5	12.9	-14°35.1	7.6	55.0
7	284°43.6	8°19.3	337°44.4	12.9	-14°27.6	7.6	55.0
8	299°43.7	8°20.2	352°16.3	12.9	-14°19.9	7.7	55.1
9	314°43.9	8°21.2	6°48.2	12.9	-14°12.2	7.8	55.1
10	329°44.1	8°22.1	21°20.2	12.9	-14°04.4	7.8	55.1
11	344°44.2	8°23.0	35°52.1	12.9	-13°56.5	7.9	55.1
12	359°44.4	8°23.9	50°24.0	13.0	-13°48.5	8.0	55.1
13	14°44.6	8°24.8	64°56.0	13.0	-13°40.5	8.0	55.2
14	29°44.7	8°25.7	79°28.0	13.0	-13°32.4	8.1	55.2
15	44°44.9	8°26.7	93°59.9	13.0	-13°24.3	8.2	55.2
16	59°45.0	8°27.6	108°31.9	13.0	-13°16.1	8.3	55.2
17	74°45.2	8°28.5	123°03.9	13.0	-13°07.8	8.3	55.3
18	89°45.4	8°29.4	137°35.9	13.0	-12°59.4	8.4	55.3
19	104°45.5	8°30.3	152°07.9	13.0	-12°51.0	8.5	55.3
20	119°45.7	8°31.2	166°39.9	13.0	-12°42.5	8.5	55.3
21	134°45.9	8°32.2	181°11.9	13.0	-12°34.0	8.6	55.3
22	149°46.0	8°33.1	195°43.9	13.0	-12°25.3	8.7	55.4
23	164°46.2	8°34.0	210°15.9	13.0	-12°16.7	8.7	55.4
	SD.=16.0	d=0.9			S.D.=15.0		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°46.3	8°34.9	224°48.0	13.0	-12°07.9	8.8	55.4
1	194°46.5	8°35.8	239°20.0	13.0	-11°59.1	8.8	55.4
2	209°46.7	8°36.7	253°52.1	13.0	-11°50.2	8.9	55.5
3	224°46.8	8°37.6	268°24.1	13.0	-11°41.3	9.0	55.5
4	239°47.0	8°38.6	282°56.1	13.0	-11°32.3	9.0	55.5
5	254°47.2	8°39.5	297°28.2	13.1	-11°23.2	9.1	55.5
6	269°47.3	8°40.4	312°00.2	13.1	-11°14.1	9.2	55.6
7	284°47.5	8°41.3	326°32.3	13.1	-11°04.9	9.2	55.6
8	299°47.6	8°42.2	341°04.4	13.1	-10°55.7	9.3	55.6
9	314°47.8	8°43.1	355°36.4	13.1	-10°46.4	9.3	55.6
10	329°48.0	8°44.0	10°08.5	13.1	-10°37.0	9.4	55.7
11	344°48.1	8°44.9	24°40.5	13.1	-10°27.6	9.5	55.7
12	359°48.3	8°45.9	39°12.6	13.1	-10°18.1	9.5	55.7
13	14°48.4	8°46.8	53°44.7	13.1	-10°08.5	9.6	55.7
14	29°48.6	8°47.7	68°16.7	13.1	-9°59.0	9.6	55.8
15	44°48.8	8°48.6	82°48.8	13.1	-9°49.3	9.7	55.8
16	59°48.9	8°49.5	97°20.9	13.1	-9°39.6	9.7	55.8
17	74°49.1	8°50.4	111°52.9	13.1	-9°29.8	9.8	55.8
18	89°49.2	8°51.3	126°25.0	13.1	-9°20.0	9.8	55.9
19	104°49.4	8°52.2	140°57.0	13.1	-9°10.2	9.9	55.9
20	119°49.6	8°53.1	155°29.1	13.0	-9°00.2	9.9	55.9
21	134°49.7	8°54.0	170°01.1	13.0	-8°50.3	10.0	55.9
22	149°49.9	8°55.0	184°33.2	13.0	-8°40.2	10.0	56.0
23	164°50.0	8°55.9	199°05.2	13.0	-8°30.2	10.1	56.0
	SD.=16.0	d=0.9			S.D.=15.1		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:33	04:02	20:03	21:35	–:–
70	–:–	03:01	04:16	19:49	21:06	–:–
68	01:34	03:22	04:27	19:38	20:44	22:37
66	02:12	03:38	04:36	19:28	20:27	21:56
64	02:37	03:51	04:44	19:21	20:14	21:29
62	02:57	04:02	04:50	19:14	20:03	21:09
60	03:12	04:11	04:56	19:08	19:53	20:52
58	03:25	04:19	05:01	19:03	19:45	20:39
56	03:36	04:26	05:05	18:58	19:38	20:28
54	03:46	04:32	05:09	18:54	19:32	20:18
52	03:54	04:37	05:13	18:51	19:26	20:10
50	04:01	04:42	05:16	18:47	19:21	20:02
45	04:16	04:52	05:23	18:40	19:11	19:47
40	04:28	05:01	05:29	18:34	19:02	19:35
35	04:37	05:08	05:34	18:29	18:55	19:26
30	04:45	05:14	05:38	18:25	18:49	19:18
20	04:57	05:23	05:45	18:17	18:39	19:06
10	05:06	05:31	05:52	18:10	18:32	18:56
0	05:13	05:37	05:58	18:04	18:25	18:49
-10	05:18	05:42	06:04	17:58	18:20	18:44
-20	05:22	05:48	06:10	17:52	18:14	18:40
-30	05:25	05:52	06:17	17:45	18:09	18:37
-35	05:26	05:55	06:20	17:41	18:07	18:36
-40	05:26	05:58	06:25	17:37	18:04	18:35
-45	05:26	06:00	06:30	17:31	18:01	18:35
-50	05:26	06:03	06:36	17:25	17:58	18:35
-52	05:26	06:05	06:39	17:23	17:57	18:36
-54	05:25	06:06	06:42	17:19	17:55	18:36
-56	05:24	06:07	06:45	17:16	17:54	18:36
-58	05:24	06:09	06:49	17:12	17:52	18:37
-60	05:23	06:11	06:53	17:08	17:50	18:38

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	06:36	06:02	05:45	09:06	11:16	13:10
70	05:38	05:32	05:26	10:02	11:46	13:28
68	05:04	05:09	05:11	10:36	12:08	13:41
66	04:39	04:51	04:59	10:60	12:25	13:52
64	04:20	04:36	04:49	11:19	12:38	14:01
62	04:04	04:24	04:40	11:34	12:50	14:09
60	03:51	04:14	04:32	11:47	12:60	14:16
58	03:39	04:05	04:26	11:58	13:08	14:22
56	03:29	03:57	04:20	12:08	13:16	14:27
54	03:20	03:49	04:15	12:16	13:22	14:32
52	03:13	03:43	04:10	12:24	13:28	14:36
50	03:05	03:37	04:05	12:30	13:34	14:40
45	02:50	03:25	03:56	12:45	13:45	14:48
40	02:38	03:14	03:48	12:57	13:55	14:55
35	02:27	03:05	03:41	13:07	14:03	15:00
30	02:18	02:57	03:35	13:16	14:10	15:05
20	02:01	02:44	03:25	13:31	14:22	15:14
10	01:47	02:32	03:16	13:44	14:33	15:22
0	01:34	02:21	03:07	13:57	14:43	15:29
-10	01:21	02:10	02:58	14:09	14:53	15:36
-20	01:06	01:58	02:49	14:22	15:04	15:44
-30	00:50	01:44	02:39	14:37	15:16	15:52
-35	00:41	01:36	02:33	14:45	15:22	15:57
-40	00:30	01:27	02:26	14:55	15:30	16:03
-45	00:17	01:16	02:17	15:07	15:39	16:09
-50	00:01	01:03	02:08	15:21	15:50	16:17
-52	–:–	00:57	02:03	15:27	15:55	16:21
-54	–:–	00:50	01:58	15:34	16:01	16:24
-56	–:–	00:43	01:53	15:42	16:07	16:29
-58	–:–	00:34	01:46	15:51	16:14	16:33
-60	–:–	00:25	01:39	16:01	16:22	16:39

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
10	01:26	01:18	12:01	07:45	20:08	24(30%)
11	01:10	01:02	12:01	08:31	20:55	25(21%)
12	00:55	00:47	12:00	09:18	21:41	26(14%)

April 13, 14 ,15 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	201°07.9	157°53.2	16°34.8	275°18.7	-23°19.3	331°47.9	-16°53.1	281°15.9	-22°14.3
1	216°10.4	172°52.7	16°35.8	290°19.8	-23°19.2	346°50.6	-16°53.1	296°18.3	-22°14.3
2	231°12.8	187°52.1	16°36.8	305°20.8	-23°19.2	1°53.3	-16°53.0	311°20.8	-22°14.3
3	246°15.3	202°51.6	16°37.8	320°21.8	-23°19.1	16°56.1	-16°52.9	326°23.2	-22°14.3
4	261°17.8	217°51.0	16°38.8	335°22.9	-23°19.0	31°58.8	-16°52.9	341°25.6	-22°14.3
5	276°20.2	232°50.4	16°39.8	350°23.9	-23°19.0	47°01.5	-16°52.8	356°28.1	-22°14.3
6	291°22.7	247°49.9	16°40.8	5°25.0	-23°18.9	62°04.2	-16°52.7	11°30.5	-22°14.3
7	306°25.2	262°49.3	16°41.8	20°26.0	-23°18.8	77°06.9	-16°52.7	26°33.0	-22°14.3
8	321°27.6	277°48.7	16°42.7	35°27.0	-23°18.8	92°09.6	-16°52.6	41°35.4	-22°14.3
9	336°30.1	292°48.2	16°43.7	50°28.1	-23°18.7	107°12.3	-16°52.5	56°37.9	-22°14.3
10	351°32.5	307°47.6	16°44.7	65°29.1	-23°18.6	122°15.0	-16°52.5	71°40.3	-22°14.3
11	6°35.0	322°47.1	16°45.7	80°30.2	-23°18.6	137°17.8	-16°52.4	86°42.7	-22°14.3
12	21°37.5	337°46.5	16°46.7	95°31.2	-23°18.5	152°20.5	-16°52.3	101°45.2	-22°14.3
13	36°39.9	352°45.9	16°47.7	110°32.2	-23°18.4	167°23.2	-16°52.3	116°47.6	-22°14.3
14	51°42.4	7°45.4	16°48.7	125°33.3	-23°18.3	182°25.9	-16°52.2	131°50.1	-22°14.3
15	66°44.9	22°44.8	16°49.7	140°34.3	-23°18.3	197°28.6	-16°52.1	146°52.5	-22°14.3
16	81°47.3	37°44.2	16°50.6	155°35.4	-23°18.2	212°31.3	-16°52.1	161°55.0	-22°14.3
17	96°49.8	52°43.7	16°51.6	170°36.4	-23°18.1	227°34.0	-16°52.0	176°57.4	-22°14.3
18	111°52.3	67°43.1	16°52.6	185°37.5	-23°18.1	242°36.8	-16°51.9	191°59.9	-22°14.3
19	126°54.7	82°42.5	16°53.6	200°38.5	-23°18.0	257°39.5	-16°51.9	207°02.3	-22°14.3
20	141°57.2	97°42.0	16°54.6	215°39.5	-23°17.9	272°42.2	-16°51.8	222°04.7	-22°14.3
21	156°59.6	112°41.4	16°55.5	230°40.6	-23°17.9	287°44.9	-16°51.7	237°07.2	-22°14.3
22	172°02.1	127°40.8	16°56.5	245°41.6	-23°17.8	302°47.6	-16°51.7	252°09.6	-22°14.3
23	187°04.6	142°40.2	16°57.5	260°42.7	-23°17.7	317°50.3	-16°51.6	267°12.1	-22°14.3
Mer.pass.:10:33		v-0.6 d1.0 m-3.8		v1.0 d0.1 m0.0		v2.7 d0.1 m-2.3		v2.4 d0.0 m0.4	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	202°07.0	157°39.7	16°58.5	275°43.7	-23°17.7	332°53.1	-16°51.5	282°14.5	-22°14.3
1	217°09.5	172°39.1	16°59.5	290°44.8	-23°17.6	347°55.8	-16°51.5	297°17.0	-22°14.3
2	232°12.0	187°38.5	17°00.4	305°45.8	-23°17.5	2°58.5	-16°51.4	312°19.4	-22°14.3
3	247°14.4	202°38.0	17°01.4	320°46.9	-23°17.5	18°01.2	-16°51.3	327°21.9	-22°14.3
4	262°16.9	217°37.4	17°02.4	335°47.9	-23°17.4	33°03.9	-16°51.3	342°24.3	-22°14.3
5	277°19.4	232°36.8	17°03.4	350°48.9	-23°17.3	48°06.6	-16°51.2	357°26.8	-22°14.3
6	292°21.8	247°36.2	17°04.3	5°50.0	-23°17.2	63°09.4	-16°51.1	12°29.2	-22°14.3
7	307°24.3	262°35.7	17°05.3	20°51.0	-23°17.2	78°12.1	-16°51.1	27°31.7	-22°14.3
8	322°26.8	277°35.1	17°06.3	35°52.1	-23°17.1	93°14.8	-16°51.0	42°34.1	-22°14.3
9	337°29.2	292°34.5	17°07.2	50°53.1	-23°17.0	108°17.5	-16°50.9	57°36.6	-22°14.3
10	352°31.7	307°33.9	17°08.2	65°54.2	-23°17.0	123°20.2	-16°50.9	72°39.0	-22°14.3
11	7°34.1	322°33.4	17°09.2	80°55.2	-23°16.9	138°22.9	-16°50.8	87°41.4	-22°14.3
12	22°36.6	337°32.8	17°10.2	95°56.3	-23°16.8	153°25.7	-16°50.7	102°43.9	-22°14.3
13	37°39.1	352°32.2	17°11.1	110°57.3	-23°16.8	168°28.4	-16°50.6	117°46.3	-22°14.3
14	52°41.5	7°31.6	17°12.1	125°58.4	-23°16.7	183°31.1	-16°50.6	132°48.8	-22°14.3
15	67°44.0	22°31.1	17°13.1	140°59.4	-23°16.6	198°33.8	-16°50.5	147°51.2	-22°14.3
16	82°46.5	37°30.5	17°14.0	156°00.5	-23°16.5	213°36.5	-16°50.4	162°53.7	-22°14.2
17	97°48.9	52°29.9	17°15.0	171°01.5	-23°16.5	228°39.3	-16°50.4	177°56.1	-22°14.2
18	112°51.4	67°29.3	17°15.9	186°02.6	-23°16.4	243°42.0	-16°50.3	192°58.6	-22°14.2
19	127°53.9	82°28.7	17°16.9	201°03.6	-23°16.3	258°44.7	-16°50.2	208°01.0	-22°14.2
20	142°56.3	97°28.2	17°17.9	216°04.7	-23°16.3	273°47.4	-16°50.2	223°03.5	-22°14.2
21	157°58.8	112°27.6	17°18.8	231°05.7	-23°16.2	288°50.1	-16°50.1	238°05.9	-22°14.2
22	173°01.3	127°27.0	17°19.8	246°06.8	-23°16.1	303°52.9	-16°50.0	253°08.4	-22°14.2
23	188°03.7	142°26.4	17°20.8	261°07.8	-23°16.0	318°55.6	-16°50.0	268°10.8	-22°14.2
Mer.pass.:10:29		v-0.6 d1.0 m-3.8		v1.0 d0.1 m0.0		v2.7 d0.1 m-2.3		v2.4 d0.0 m0.4	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	203°06.2	157°25.8	17°21.7	276°08.9	-23°16.0	333°58.3	-16°49.9	283°13.3	-22°14.2
1	218°08.6	172°25.3	17°22.7	291°09.9	-23°15.9	349°01.0	-16°49.8	298°15.7	-22°14.2
2	233°11.1	187°24.7	17°23.6	306°11.0	-23°15.8	4°03.7	-16°49.8	313°18.2	-22°14.2
3	248°13.6	202°24.1	17°24.6	321°12.1	-23°15.7	19°06.5	-16°49.7	328°20.6	-22°14.2
4	263°16.0	217°23.5	17°25.5	336°13.1	-23°15.7	34°09.2	-16°49.6	343°23.1	-22°14.2
5	278°18.5	232°22.9	17°26.5	351°14.2	-23°15.6	49°11.9	-16°49.6	358°25.5	-22°14.2
6	293°21.0	247°22.3	17°27.5	6°15.2	-23°15.5	64°14.6	-16°49.5	13°28.0	-22°14.2
7	308°23.4	262°21.8	17°28.4	21°16.3	-23°15.5	79°17.4	-16°49.4	28°30.4	-22°14.2
8	323°25.9	277°21.2	17°29.4	36°17.3	-23°15.4	94°20.1	-16°49.3	43°32.9	-22°14.2
9	338°28.4	292°20.6	17°30.3	51°18.4	-23°15.3	109°22.8	-16°49.3	58°35.3	-22°14.2
10	353°30.8	307°20.0	17°31.3	66°19.4	-23°15.2	124°25.5	-16°49.2	73°37.8	-22°14.2
11	8°33.3	322°19.4	17°32.2	81°20.5	-23°15.2	139°28.3	-16°49.1	88°40.3	-22°14.2
12	23°35.7	337°18.8	17°33.2	96°21.6	-23°15.1	154°31.0	-16°49.1	103°42.7	-22°14.2
13	38°38.2	352°18.2	17°34.1	111°22.6	-23°15.0	169°33.7	-16°49.0	118°45.2	-22°14.2
14	53°40.7	7°17.7	17°35.1	126°23.7	-23°14.9	184°36.4	-16°48.9	133°47.6	-22°14.2
15	68°43.1	22°17.1	17°36.0	141°24.7	-23°14.9	199°39.1	-16°48.9	148°50.1	-22°14.2
16	83°45.6	37°16.5	17°37.0	156°25.8	-23°14.8	214°41.9	-16°48.8	163°52.5	-22°14.2
17	98°48.1	52°15.9	17°37.9	171°26.8	-23°14.7	229°44.6	-16°48.7	178°55.0	-22°14.2
18	113°50.5	67°15.3	17°38.9	186°27.9	-23°14.6	244°47.3	-16°48.7	193°57.4	-22°14.2
19	128°53.0	82°14.7	17°39.8	201°29.0	-23°14.6	259°50.0	-16°48.6	208°59.9	-22°14.2
20	143°55.5	97°14.1	17°40.7	216°30.0	-23°14.5	274°52.8	-16°48.5	224°02.3	-22°14.2
21	158°57.9	112°13.5	17°41.7	231°31.1	-23°14.4	289°55.5	-16°48.4	239°04.8	-22°14.2
22	174°00.4	127°12.9	17°42.6	246°32.1	-23°14.3	304°58.2	-16°48.4	254°07.2	-22°14.2
23	189°02.9	142°12.3	17°43.6	261°33.2	-23°14.3	320°00.9	-16°48.3	269°09.7	-22°14.2
Mer.pass.:10:25		v-0.6 d1.0 m-3.8		v1.1 d0.1 m-0.0		v2.7 d0.1 m-2.3		v2.5 d0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.2
Ankaa	353°12.9	-42°12.5
Schedar	349°37.3	56°38.0
Diphda	348°52.9	-17°53.4
Achernar	335°25.0	-57°08.9
Hamal	327°57.4	23°32.7
Polaris	316°45.9	89°20.4
Akamar	315°16.3	-40°14.2
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.4
Aldebaran	290°45.9	16°32.5
Rigel	281°09.1	-8°11.2
Capella	280°29.9	46°00.9
Bellatrix	278°28.7	6°21.7
Elnath	278°08.7	28°37.2
Alnilam	275°43.2	-1°11.7
Betelgeuse	270°57.9	7°24.4
Canopus	263°54.9	-52°42.8
Sirius	258°30.8	-16°44.6
Adara	255°10.0	-29°00.2
Procyon	244°56.3	5°10.6
Pollux	243°23.7	27°58.8
Avior	234°16.6	-59°34.5
Suhail	222°49.9	-43°30.7
Miaplacidus	221°38.6	-69°47.9
Alphard	217°52.7	-8°44.5
Regulus	207°39.8	11°52.6
Dubhe	193°47.2	61°39.3
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.7
Acrux	173°04.9	-63°12.0
Gacrux	171°56.7	-57°13.0
Alioth	166°17.4	55°51.7
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.4
Hadar	148°42.6	-60°27.5
Menkent	148°03.3	-36°27.5
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.6	-60°54.4
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.1	74°04.8
Alphecca	126°08.0	26°39.2
Antares	112°22.0	-26°28.2
Atria	107°20.5	-69°03.2
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.7
Rasalhague	96°03.3	12°32.8
Etamin	90°44.4	51°29.0
Kaus Aust.	83°39.4	-34°22.3
Vega	80°36.7	38°47.8
Nunki	75°54.2	-26°16.2
Altair	62°05.2	8°54.9
Peacock	53°14.3	-56°40.3
Deneb	49°29.4	45°20.5
Enif	33°44.1	9°57.4
Alnair	27°40.0	-46°52.2
Fomalhaut	15°20.8	-29°31.6
Scheat	13°50.5	28°10.6
Markab	13°35.4	15°18.0

2018/4/1	**SHA**	**Mer.pass**
Venus	316°45.3	13:29
Mars	74°10.8	05:38
Jupiter	130°40.0	01:52
Saturn	80°08.0	05:14

2018/4/1	**SHA**	**Mer.pass**
Venus	315°32.6	13:30
Mars	73°36.7	05:37
Jupiter	130°46.0	01:48
Saturn	80°07.5	05:10

2018/4/1	**SHA**	**Mer.pass**
Venus	314°19.7	13:31
Mars	73°02.7	05:35
Jupiter	130°52.1	01:44
Saturn	80°07.1	05:06

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°50.2	8°56.8	213°37.2	13.0	-8°20.0	10.2	56.0
1	194°50.4	8°57.7	228°09.3	13.0	-8°09.9	10.2	56.1
2	209°50.5	8°58.6	242°41.3	13.0	-7°59.6	10.2	56.1
3	224°50.7	8°59.5	257°13.3	13.0	-7°49.4	10.3	56.1
4	239°50.8	9°00.4	271°45.3	13.0	-7°39.0	10.3	56.1
5	254°51.0	9°01.3	286°17.3	13.0	-7°28.7	10.4	56.2
6	269°51.1	9°02.2	300°49.3	13.0	-7°18.3	10.4	56.2
7	284°51.3	9°03.1	315°21.3	13.0	-7°07.8	10.5	56.2
8	299°51.5	9°04.0	329°53.3	13.0	-6°57.3	10.5	56.3
9	314°51.6	9°04.9	344°25.2	13.0	-6°46.8	10.6	56.3
10	329°51.8	9°05.8	358°57.2	13.0	-6°36.2	10.6	56.3
11	344°51.9	9°06.8	13°29.1	12.9	-6°25.5	10.7	56.3
12	359°52.1	9°07.7	28°01.1	12.9	-6°14.9	10.7	56.4
13	14°52.2	9°08.6	42°33.0	12.9	-6°04.1	10.7	56.4
14	29°52.4	9°09.5	57°04.9	12.9	-5°53.4	10.8	56.4
15	44°52.6	9°10.4	71°36.8	12.9	-5°42.6	10.8	56.4
16	59°52.7	9°11.3	86°08.7	12.9	-5°31.8	10.9	56.5
17	74°52.9	9°12.2	100°40.6	12.9	-5°20.9	10.9	56.5
18	89°53.0	9°13.1	115°12.4	12.8	-5°10.0	10.9	56.5
19	104°53.2	9°14.0	129°44.3	12.8	-4°59.0	11.0	56.6
20	119°53.3	9°14.9	144°16.1	12.8	-4°48.0	11.0	56.6
21	134°53.5	9°15.8	158°47.9	12.8	-4°37.0	11.0	56.6
22	149°53.7	9°16.7	173°19.7	12.8	-4°26.0	11.1	56.6
23	164°53.8	9°17.6	187°51.4	12.8	-4°14.9	11.1	56.7
	SD.=16.0	d=0.9			S.D.=15.3		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°54.0	9°18.5	202°23.2	12.7	-4°03.8	11.1	56.7
1	194°54.1	9°19.4	216°54.9	12.7	-3°52.6	11.2	56.7
2	209°54.3	9°20.3	231°26.7	12.7	-3°41.4	11.2	56.8
3	224°54.4	9°21.2	245°58.4	12.7	-3°30.2	11.2	56.8
4	239°54.6	9°22.1	260°30.0	12.7	-3°19.0	11.3	56.8
5	254°54.7	9°23.0	275°01.7	12.6	-3°07.7	11.3	56.8
6	269°54.9	9°23.9	289°33.3	12.6	-2°56.4	11.3	56.9
7	284°55.0	9°24.8	304°04.9	12.6	-2°45.1	11.3	56.9
8	299°55.2	9°25.7	318°36.5	12.6	-2°33.7	11.4	56.9
9	314°55.4	9°26.6	333°08.1	12.6	-2°22.4	11.4	57.0
10	329°55.5	9°27.5	347°39.6	12.5	-2°11.0	11.4	57.0
11	344°55.7	9°28.4	2°11.1	12.5	-1°59.6	11.4	57.0
12	359°55.8	9°29.3	16°42.6	12.5	-1°48.1	11.5	57.0
13	14°56.0	9°30.2	31°14.1	12.5	-1°36.7	11.5	57.1
14	29°56.1	9°31.1	45°45.5	12.4	-1°25.2	11.5	57.1
15	44°56.3	9°32.0	60°17.0	12.4	-1°13.7	11.5	57.1
16	59°56.4	9°32.9	74°48.3	12.4	-1°02.1	11.5	57.2
17	74°56.6	9°33.8	89°19.7	12.3	-0°50.6	11.5	57.2
18	89°56.7	9°34.7	103°51.0	12.3	-0°39.0	11.6	57.2
19	104°56.9	9°35.6	118°22.3	12.3	-0°27.5	11.6	57.2
20	119°57.0	9°36.5	132°53.6	12.3	-0°15.9	11.6	57.3
21	134°57.2	9°37.4	147°24.8	12.2	-0°04.3	11.6	57.3
22	149°57.3	9°38.3	161°56.0	12.2	0°07.3	11.6	57.3
23	164°57.5	9°39.2	176°27.2	12.2	0°18.9	11.6	57.4
	SD.=15.9	d=0.9			S.D.=15.5		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°57.6	9°40.1	190°58.3	12.1	0°30.6	11.6	57.4
1	194°57.8	9°41.0	205°29.4	12.1	0°42.2	11.6	57.4
2	209°57.9	9°41.9	220°00.5	12.1	0°53.9	11.7	57.4
3	224°58.1	9°42.8	234°31.5	12.0	1°05.5	11.7	57.5
4	239°58.2	9°43.7	249°02.6	12.0	1°17.2	11.7	57.5
5	254°58.4	9°44.6	263°33.5	11.9	1°28.9	11.7	57.5
6	269°58.6	9°45.4	278°04.4	11.9	1°40.5	11.7	57.6
7	284°58.7	9°46.3	292°35.3	11.9	1°52.2	11.7	57.6
8	299°58.9	9°47.2	307°06.2	11.8	2°03.9	11.7	57.6
9	314°59.0	9°48.1	321°37.0	11.8	2°15.6	11.7	57.6
10	329°59.2	9°49.0	336°07.8	11.8	2°27.3	11.7	57.7
11	344°59.3	9°49.9	350°38.5	11.7	2°39.0	11.7	57.7
12	359°59.5	9°50.8	5°09.2	11.7	2°50.6	11.7	57.7
13	14°59.6	9°51.7	19°39.9	11.6	3°02.3	11.7	57.7
14	29°59.8	9°52.6	34°10.5	11.6	3°14.0	11.7	57.8
15	44°59.9	9°53.5	48°41.1	11.6	3°25.7	11.7	57.8
16	60°00.0	9°54.4	63°11.6	11.5	3°37.3	11.7	57.8
17	75°00.2	9°55.3	77°42.1	11.5	3°49.0	11.6	57.8
18	90°00.3	9°56.2	92°12.5	11.4	4°00.6	11.6	57.9
19	105°00.5	9°57.0	106°42.9	11.4	4°12.3	11.6	57.9
20	120°00.6	9°57.9	121°13.3	11.3	4°23.9	11.6	57.9
21	135°00.8	9°58.8	135°43.6	11.3	4°35.5	11.6	58.0
22	150°00.9	9°59.7	150°13.9	11.2	4°47.1	11.6	58.0
23	165°01.1	10°00.6	164°44.1	11.2	4°58.7	11.6	58.0
	SD.=15.9	d=0.9			S.D.=15.7		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:08	03:45	20:19	21:60	–:–
70	–:–	02:42	04:01	20:02	21:24	–:–
68	00:58	03:06	04:14	19:49	20:59	23:19
66	01:50	03:24	04:24	19:39	20:40	22:17
64	02:21	03:39	04:33	19:30	20:25	21:44
62	02:43	03:51	04:40	19:22	20:12	21:21
60	03:01	04:01	04:47	19:15	20:02	21:03
58	03:15	04:10	04:52	19:10	19:53	20:48
56	03:27	04:17	04:57	19:05	19:45	20:36
54	03:37	04:24	05:02	18:60	19:38	20:25
52	03:46	04:30	05:06	18:56	19:32	20:16
50	03:54	04:36	05:10	18:52	19:26	20:08
45	04:10	04:47	05:17	18:44	19:15	19:52
40	04:23	04:56	05:24	18:37	19:05	19:39
35	04:33	05:04	05:30	18:32	18:58	19:28
30	04:41	05:10	05:35	18:27	18:51	19:20
20	04:54	05:21	05:43	18:18	18:40	19:07
10	05:04	05:29	05:50	18:10	18:32	18:57
0	05:12	05:36	05:57	18:04	18:25	18:49
-10	05:18	05:42	06:04	17:57	18:18	18:43
-20	05:23	05:48	06:11	17:50	18:12	18:38
-30	05:26	05:54	06:18	17:42	18:06	18:34
-35	05:28	05:57	06:23	17:37	18:03	18:32
-40	05:29	06:00	06:28	17:32	17:59	18:31
-45	05:30	06:04	06:34	17:26	17:56	18:30
-50	05:30	06:08	06:41	17:19	17:52	18:29
-52	05:30	06:09	06:44	17:16	17:50	18:29
-54	05:30	06:11	06:47	17:12	17:48	18:29
-56	05:30	06:13	06:51	17:09	17:46	18:29
-58	05:30	06:15	06:55	17:04	17:44	18:30
-60	05:29	06:18	07:00	16:59	17:42	18:30

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	05:31	05:20	05:09	15:00	16:50	18:42
70	05:21	05:16	05:11	15:09	16:51	18:37
68	05:12	05:12	05:12	15:16	16:53	18:32
66	05:05	05:09	05:14	15:22	16:53	18:28
64	04:58	05:07	05:15	15:27	16:54	18:24
62	04:53	05:05	05:16	15:31	16:55	18:22
60	04:48	05:03	05:17	15:35	16:56	18:19
58	04:44	05:01	05:17	15:38	16:56	18:17
56	04:40	04:59	05:18	15:41	16:57	18:15
54	04:37	04:58	05:19	15:43	16:57	18:13
52	04:34	04:57	05:19	15:46	16:57	18:11
50	04:31	04:56	05:20	15:48	16:58	18:10
45	04:25	04:53	05:21	15:52	16:59	18:07
40	04:20	04:51	05:22	15:56	16:59	18:04
35	04:15	04:49	05:23	15:59	16:60	18:02
30	04:12	04:47	05:24	16:02	17:00	17:60
20	04:05	04:45	05:25	16:07	17:01	17:56
10	03:59	04:42	05:26	16:11	17:02	17:53
0	03:53	04:40	05:27	16:15	17:02	17:50
-10	03:48	04:37	05:28	16:19	17:03	17:47
-20	03:42	04:35	05:30	16:24	17:03	17:44
-30	03:35	04:32	05:31	16:28	17:04	17:41
-35	03:31	04:31	05:32	16:31	17:05	17:39
-40	03:26	04:29	05:33	16:34	17:05	17:36
-45	03:21	04:27	05:34	16:38	17:05	17:34
-50	03:15	04:24	05:35	16:42	17:06	17:31
-52	03:12	04:23	05:36	16:44	17:06	17:29
-54	03:09	04:22	05:37	16:46	17:07	17:28
-56	03:05	04:20	05:37	16:48	17:07	17:26
-58	03:01	04:19	05:38	16:51	17:07	17:24
-60	02:57	04:17	05:39	16:54	17:08	17:22

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
13	00:39	00:32	12:00	10:04	22:27	27(8%)
14	00:24	00:17	12:00	10:50	23:14	28(3%)
15	00:09	00:02	12:00	11:38	00:03	29(1%)

April 16, 17 ,18 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	204°05.3	157°11.8	17°44.5	276°34.3	-23°14.2	335°03.7	-16°48.2	284°12.2	-22°14.2
1	219°07.8	172°11.2	17°45.5	291°35.3	-23°14.1	350°06.4	-16°48.2	299°14.6	-22°14.2
2	234°10.2	187°10.6	17°46.4	306°36.4	-23°14.0	5°09.1	-16°48.1	314°17.1	-22°14.2
3	249°12.7	202°10.0	17°47.3	321°37.5	-23°14.0	20°11.9	-16°48.0	329°19.5	-22°14.2
4	264°15.2	217°09.4	17°48.3	336°38.5	-23°13.9	35°14.6	-16°48.0	344°22.0	-22°14.2
5	279°17.6	232°08.8	17°49.2	351°39.6	-23°13.8	50°17.3	-16°47.9	359°24.4	-22°14.2
6	294°20.1	247°08.2	17°50.1	6°40.6	-23°13.7	65°20.0	-16°47.8	14°26.9	-22°14.2
7	309°22.6	262°07.6	17°51.1	21°41.7	-23°13.7	80°22.8	-16°47.7	29°29.3	-22°14.2
8	324°25.0	277°07.0	17°52.0	36°42.8	-23°13.6	95°25.5	-16°47.7	44°31.8	-22°14.2
9	339°27.5	292°06.4	17°52.9	51°43.8	-23°13.5	110°28.2	-16°47.6	59°34.3	-22°14.2
10	354°30.0	307°05.8	17°53.9	66°44.9	-23°13.4	125°30.9	-16°47.5	74°36.7	-22°14.2
11	9°32.4	322°05.2	17°54.8	81°46.0	-23°13.4	140°33.7	-16°47.5	89°39.2	-22°14.2
12	24°34.9	337°04.6	17°55.7	96°47.0	-23°13.3	155°36.4	-16°47.4	104°41.6	-22°14.2
13	39°37.3	352°04.0	17°56.7	111°48.1	-23°13.2	170°39.1	-16°47.3	119°44.1	-22°14.2
14	54°39.8	7°03.4	17°57.6	126°49.2	-23°13.1	185°41.9	-16°47.3	134°46.5	-22°14.2
15	69°42.3	22°02.8	17°58.5	141°50.2	-23°13.1	200°44.6	-16°47.2	149°49.0	-22°14.2
16	84°44.7	37°02.2	17°59.5	156°51.3	-23°13.0	215°47.3	-16°47.1	164°51.5	-22°14.2
17	99°47.2	52°01.6	18°00.4	171°52.4	-23°12.9	230°50.1	-16°47.0	179°53.9	-22°14.2
18	114°49.7	67°01.0	18°01.3	186°53.4	-23°12.8	245°52.8	-16°47.0	194°56.4	-22°14.2
19	129°52.1	82°00.4	18°02.2	201°54.5	-23°12.7	260°55.5	-16°46.9	209°58.8	-22°14.2
20	144°54.6	96°59.8	18°03.2	216°55.6	-23°12.7	275°58.2	-16°46.8	225°01.3	-22°14.2
21	159°57.1	111°59.2	18°04.1	231°56.6	-23°12.6	291°01.0	-16°46.8	240°03.7	-22°14.2
22	174°59.5	126°58.6	18°05.0	246°57.7	-23°12.5	306°03.7	-16°46.7	255°06.2	-22°14.2
23	190°02.0	141°58.0	18°05.9	261°58.8	-23°12.4	321°06.4	-16°46.6	270°08.7	-22°14.2
Mer.pass.:10:21		v-0.6 d0.9 m-3.8		v1.1 d0.1 m-0.0		v2.7 d0.1 m-2.3		v2.5 d0.0 m0.4	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	205°04.5	156°57.4	18°06.9	276°59.8	-23°12.4	336°09.2	-16°46.5	285°11.1	-22°14.2
1	220°06.9	171°56.8	18°07.8	292°00.9	-23°12.3	351°11.9	-16°46.5	300°13.6	-22°14.2
2	235°09.4	186°56.2	18°08.7	307°02.0	-23°12.2	6°14.6	-16°46.4	315°16.0	-22°14.2
3	250°11.8	201°55.6	18°09.6	322°03.0	-23°12.1	21°17.4	-16°46.3	330°18.5	-22°14.2
4	265°14.3	216°55.0	18°10.5	337°04.1	-23°12.0	36°20.1	-16°46.3	345°21.0	-22°14.2
5	280°16.8	231°54.4	18°11.5	352°05.2	-23°12.0	51°22.8	-16°46.2	0°23.4	-22°14.2
6	295°19.2	246°53.8	18°12.4	7°06.3	-23°11.9	66°25.6	-16°46.1	15°25.9	-22°14.2
7	310°21.7	261°53.2	18°13.3	22°07.3	-23°11.8	81°28.3	-16°46.0	30°28.3	-22°14.2
8	325°24.2	276°52.6	18°14.2	37°08.4	-23°11.7	96°31.0	-16°46.0	45°30.8	-22°14.2
9	340°26.6	291°51.9	18°15.1	52°09.5	-23°11.7	111°33.8	-16°45.9	60°33.3	-22°14.2
10	355°29.1	306°51.3	18°16.0	67°10.5	-23°11.6	126°36.5	-16°45.8	75°35.7	-22°14.2
11	10°31.6	321°50.7	18°16.9	82°11.6	-23°11.5	141°39.2	-16°45.8	90°38.2	-22°14.2
12	25°34.0	336°50.1	18°17.9	97°12.7	-23°11.4	156°42.0	-16°45.7	105°40.6	-22°14.2
13	40°36.5	351°49.5	18°18.8	112°13.8	-23°11.3	171°44.7	-16°45.6	120°43.1	-22°14.2
14	55°39.0	6°48.9	18°19.7	127°14.8	-23°11.3	186°47.4	-16°45.5	135°45.6	-22°14.2
15	70°41.4	21°48.3	18°20.6	142°15.9	-23°11.2	201°50.2	-16°45.5	150°48.0	-22°14.2
16	85°43.9	36°47.7	18°21.5	157°17.0	-23°11.1	216°52.9	-16°45.4	165°50.5	-22°14.2
17	100°46.3	51°47.1	18°22.4	172°18.1	-23°11.0	231°55.6	-16°45.3	180°53.0	-22°14.2
18	115°48.8	66°46.5	18°23.3	187°19.1	-23°10.9	246°58.4	-16°45.3	195°55.4	-22°14.2
19	130°51.3	81°45.8	18°24.2	202°20.2	-23°10.9	262°01.1	-16°45.2	210°57.9	-22°14.2
20	145°53.7	96°45.2	18°25.1	217°21.3	-23°10.8	277°03.8	-16°45.1	226°00.3	-22°14.2
21	160°56.2	111°44.6	18°26.0	232°22.4	-23°10.7	292°06.6	-16°45.0	241°02.8	-22°14.2
22	175°58.7	126°44.0	18°26.9	247°23.4	-23°10.6	307°09.3	-16°45.0	256°05.3	-22°14.2
23	191°01.1	141°43.4	18°27.8	262°24.5	-23°10.5	322°12.0	-16°44.9	271°07.7	-22°14.2
Mer.pass.:10:18		v-0.6 d0.9 m-3.8		v1.1 d0.1 m-0.1		v2.7 d0.1 m-2.3		v2.5 d0.0 m0.4	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	206°03.6	156°42.8	18°28.7	277°25.6	-23°10.5	337°14.8	-16°44.8	286°10.2	-22°14.2
1	221°06.1	171°42.2	18°29.6	292°26.7	-23°10.4	352°17.5	-16°44.8	301°12.7	-22°14.2
2	236°08.5	186°41.5	18°30.5	307°27.8	-23°10.3	7°20.2	-16°44.7	316°15.1	-22°14.2
3	251°11.0	201°40.9	18°31.4	322°28.8	-23°10.2	22°23.0	-16°44.6	331°17.6	-22°14.2
4	266°13.4	216°40.3	18°32.3	337°29.9	-23°10.1	37°25.7	-16°44.5	346°20.1	-22°14.2
5	281°15.9	231°39.7	18°33.2	352°31.0	-23°10.1	52°28.4	-16°44.5	1°22.5	-22°14.2
6	296°18.4	246°39.1	18°34.1	7°32.1	-23°10.0	67°31.2	-16°44.4	16°25.0	-22°14.2
7	311°20.8	261°38.5	18°35.0	22°33.1	-23°09.9	82°33.9	-16°44.3	31°27.5	-22°14.2
8	326°23.3	276°37.8	18°35.9	37°34.2	-23°09.8	97°36.7	-16°44.2	46°29.9	-22°14.2
9	341°25.8	291°37.2	18°36.8	52°35.3	-23°09.7	112°39.4	-16°44.2	61°32.4	-22°14.2
10	356°28.2	306°36.6	18°37.7	67°36.4	-23°09.6	127°42.1	-16°44.1	76°34.8	-22°14.2
11	11°30.7	321°36.0	18°38.6	82°37.5	-23°09.6	142°44.9	-16°44.0	91°37.3	-22°14.2
12	26°33.2	336°35.4	18°39.5	97°38.6	-23°09.5	157°47.6	-16°44.0	106°39.8	-22°14.2
13	41°35.6	351°34.7	18°40.4	112°39.6	-23°09.4	172°50.3	-16°43.9	121°42.2	-22°14.2
14	56°38.1	6°34.1	18°41.3	127°40.7	-23°09.3	187°53.1	-16°43.8	136°44.7	-22°14.2
15	71°40.6	21°33.5	18°42.2	142°41.8	-23°09.2	202°55.8	-16°43.7	151°47.2	-22°14.2
16	86°43.0	36°32.9	18°43.1	157°42.9	-23°09.2	217°58.6	-16°43.7	166°49.6	-22°14.2
17	101°45.5	51°32.3	18°43.9	172°44.0	-23°09.1	233°01.3	-16°43.6	181°52.1	-22°14.2
18	116°47.9	66°31.6	18°44.8	187°45.1	-23°09.0	248°04.0	-16°43.5	196°54.6	-22°14.2
19	131°50.4	81°31.0	18°45.7	202°46.1	-23°08.9	263°06.8	-16°43.4	211°57.0	-22°14.2
20	146°52.9	96°30.4	18°46.6	217°47.2	-23°08.8	278°09.5	-16°43.4	226°59.5	-22°14.2
21	161°55.3	111°29.8	18°47.5	232°48.3	-23°08.7	293°12.3	-16°43.3	242°02.0	-22°14.2
22	176°57.8	126°29.1	18°48.4	247°49.4	-23°08.7	308°15.0	-16°43.2	257°04.5	-22°14.2
23	192°00.3	141°28.5	18°49.3	262°50.5	-23°08.6	323°17.7	-16°43.2	272°06.9	-22°14.2
Mer.pass.:10:14		v-0.6 d0.9 m-3.8		v1.1 d0.1 m-0.1		v2.7 d0.1 m-2.3		v2.5 d0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°40.5	29°11.2
Ankaa	353°12.9	-42°12.5
Schedar	349°37.3	56°38.0
Diphda	348°52.9	-17°53.4
Achernar	335°25.0	-57°08.8
Hamal	327°57.4	23°32.7
Polaris	316°46.4	89°20.4
Akamar	315°16.3	-40°14.2
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.4
Aldebaran	290°45.9	16°32.5
Rigel	281°09.1	-8°11.2
Capella	280°29.9	46°00.9
Bellatrix	278°28.7	6°21.7
Elnath	278°08.7	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°57.9	7°24.4
Canopus	263°54.9	-52°42.8
Sirius	258°30.9	-16°44.6
Adara	255°10.0	-29°00.2
Procyon	244°56.3	5°10.6
Pollux	243°23.7	27°58.8
Avior	234°16.6	-59°34.5
Suhail	222°49.9	-43°30.7
Miaplacidus	221°38.6	-69°47.9
Alphard	217°52.8	-8°44.5
Regulus	207°39.8	11°52.6
Dubhe	193°47.3	61°39.3
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.7
Acrux	173°05.0	-63°12.1
Gacrux	171°56.7	-57°13.0
Alioth	166°17.4	55°51.7
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.4
Hadar	148°42.6	-60°27.5
Menkent	148°03.3	-36°27.5
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.6	-60°54.4
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.0	74°04.9
Alphecca	126°08.0	26°39.2
Antares	112°22.0	-26°28.2
Atria	107°20.5	-69°03.2
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.7
Rasalhague	96°03.3	12°32.8
Etamin	90°44.4	51°29.0
Kaus Aust.	83°39.4	-34°22.3
Vega	80°36.7	38°47.9
Nunki	75°54.2	-26°16.2
Altair	62°05.1	8°54.9
Peacock	53°14.3	-56°40.3
Deneb	49°29.4	45°20.5
Enif	33°44.1	9°57.4
Alnair	27°40.0	-46°52.2
Fomalhaut	15°20.8	-29°31.5
Scheat	13°50.5	28°10.6
Markab	13°35.4	15°18.0

2018/4/1	**SHA**	**Mer.pass**
Venus	313°06.4	13:32
Mars	72°29.0	05:33
Jupiter	130°58.4	01:39
Saturn	80°06.8	05:02

2018/4/1	**SHA**	**Mer.pass**
Venus	311°52.9	13:33
Mars	71°55.4	05:32
Jupiter	131°04.7	01:35
Saturn	80°06.7	04:58

2018/4/1	**SHA**	**Mer.pass**
Venus	310°39.2	13:34
Mars	71°22.0	05:30
Jupiter	131°11.2	01:31
Saturn	80°06.6	04:55

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h Sun Moon

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°01.2	10°01.5	179°14.3	11.1	5°10.2	11.6	58.0
1	195°01.4	10°02.4	193°44.4	11.1	5°21.8	11.5	58.1
2	210°01.5	10°03.3	208°14.5	11.1	5°33.3	11.5	58.1
3	225°01.7	10°04.2	222°44.5	11.0	5°44.8	11.5	58.1
4	240°01.8	10°05.0	237°14.5	11.0	5°56.3	11.5	58.1
5	255°02.0	10°05.9	251°44.4	10.9	6°07.8	11.5	58.2
6	270°02.1	10°06.8	266°14.3	10.9	6°19.3	11.4	58.2
7	285°02.3	10°07.7	280°44.1	10.8	6°30.7	11.4	58.2
8	300°02.4	10°08.6	295°13.9	10.7	6°42.1	11.4	58.2
9	315°02.6	10°09.5	309°43.6	10.7	6°53.5	11.4	58.2
10	330°02.7	10°10.4	324°13.3	10.6	7°04.8	11.3	58.3
11	345°02.9	10°11.3	338°42.9	10.6	7°16.1	11.3	58.3
12	0°03.0	10°12.1	353°12.4	10.5	7°27.4	11.3	58.3
13	15°03.1	10°13.0	7°42.0	10.5	7°38.7	11.2	58.3
14	30°03.3	10°13.9	22°11.4	10.4	7°49.9	11.2	58.4
15	45°03.4	10°14.8	36°40.8	10.4	8°01.1	11.2	58.4
16	60°03.6	10°15.7	51°10.2	10.3	8°12.2	11.1	58.4
17	75°03.7	10°16.6	65°39.4	10.3	8°23.4	11.1	58.4
18	90°03.9	10°17.4	80°08.7	10.2	8°34.4	11.1	58.5
19	105°04.0	10°18.3	94°37.9	10.2	8°45.5	11.0	58.5
20	120°04.2	10°19.2	109°07.0	10.1	8°56.5	11.0	58.5
21	135°04.3	10°20.1	123°36.1	10.0	9°07.4	10.9	58.5
22	150°04.5	10°21.0	138°05.1	10.0	9°18.4	10.9	58.5
23	165°04.6	10°21.9	152°34.0	9.9	9°29.2	10.9	58.6
	SD.=15.9	d=0.9	S.D.=15.8				

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°04.7	10°22.7	167°02.9	9.9	9°40.1	10.8	58.6
1	195°04.9	10°23.6	181°31.7	9.8	9°50.8	10.8	58.6
2	210°05.0	10°24.5	196°00.5	9.7	10°01.6	10.7	58.6
3	225°05.2	10°25.4	210°29.2	9.7	10°12.3	10.7	58.6
4	240°05.3	10°26.3	224°57.9	9.6	10°22.9	10.6	58.7
5	255°05.5	10°27.1	239°26.5	9.6	10°33.5	10.6	58.7
6	270°05.6	10°28.0	253°55.0	9.5	10°44.0	10.5	58.7
7	285°05.7	10°28.9	268°23.5	9.4	10°54.5	10.4	58.7
8	300°05.9	10°29.8	282°51.9	9.4	11°04.9	10.4	58.7
9	315°06.0	10°30.7	297°20.3	9.3	11°15.3	10.3	58.8
10	330°06.2	10°31.5	311°48.5	9.3	11°25.6	10.3	58.8
11	345°06.3	10°32.4	326°16.8	9.2	11°35.8	10.2	58.8
12	0°06.5	10°33.3	340°45.0	9.1	11°46.0	10.2	58.8
13	15°06.6	10°34.2	355°13.1	9.1	11°56.1	10.1	58.8
14	30°06.7	10°35.1	9°41.1	9.0	12°06.2	10.0	58.8
15	45°06.9	10°35.9	24°09.1	9.0	12°16.2	10.0	58.9
16	60°07.0	10°36.8	38°37.0	8.9	12°26.1	9.9	58.9
17	75°07.2	10°37.7	53°04.9	8.8	12°35.9	9.8	58.9
18	90°07.3	10°38.6	67°32.7	8.8	12°45.7	9.8	58.9
19	105°07.4	10°39.4	82°00.4	8.7	12°55.4	9.7	58.9
20	120°07.6	10°40.3	96°28.1	8.6	13°05.1	9.6	58.9
21	135°07.7	10°41.2	110°55.7	8.6	13°14.7	9.5	59.0
22	150°07.9	10°42.1	125°23.3	8.5	13°24.2	9.5	59.0
23	165°08.0	10°42.9	139°50.7	8.5	13°33.6	9.4	59.0
	SD.=15.9	d=0.9	S.D.=16.0				

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°08.1	10°43.8	154°18.2	8.4	13°42.9	9.3	59.0
1	195°08.3	10°44.7	168°45.5	8.3	13°52.2	9.2	59.0
2	210°08.4	10°45.6	183°12.8	8.3	14°01.4	9.2	59.0
3	225°08.6	10°46.4	197°40.1	8.2	14°10.5	9.1	59.1
4	240°08.7	10°47.3	212°07.3	8.1	14°19.6	9.0	59.1
5	255°08.8	10°48.2	226°34.4	8.1	14°28.5	8.9	59.1
6	270°09.0	10°49.1	241°01.4	8.0	14°37.4	8.8	59.1
7	285°09.1	10°49.9	255°28.4	8.0	14°46.1	8.7	59.1
8	300°09.3	10°50.8	269°55.4	7.9	14°54.8	8.6	59.1
9	315°09.4	10°51.7	284°22.2	7.8	15°03.4	8.6	59.1
10	330°09.5	10°52.6	298°49.0	7.8	15°12.0	8.5	59.1
11	345°09.7	10°53.4	313°15.8	7.7	15°20.4	8.4	59.2
12	0°09.8	10°54.3	327°42.5	7.7	15°28.7	8.3	59.2
13	15°10.0	10°55.2	342°09.1	7.6	15°37.0	8.2	59.2
14	30°10.1	10°56.0	356°35.7	7.5	15°45.1	8.1	59.2
15	45°10.2	10°56.9	11°02.2	7.5	15°53.1	8.0	59.2
16	60°10.4	10°57.8	25°28.6	7.4	16°01.1	7.9	59.2
17	75°10.5	10°58.6	39°55.0	7.4	16°09.0	7.8	59.2
18	90°10.6	10°59.5	54°21.4	7.3	16°16.7	7.7	59.2
19	105°10.8	11°00.4	68°47.6	7.2	16°24.4	7.6	59.3
20	120°10.9	11°01.3	83°13.9	7.2	16°31.9	7.5	59.3
21	135°11.1	11°02.1	97°40.0	7.1	16°39.4	7.4	59.3
22	150°11.2	11°03.0	112°06.1	7.1	16°46.7	7.3	59.3
23	165°11.3	11°03.9	126°32.2	7.0	16°54.0	7.2	59.3
	SD.=15.9	d=0.9	S.D.=16.1				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	01:38	03:28	20:35	22:31	–:–
70	–:–	02:21	03:46	20:16	21:44	–:–
68	–:–	02:49	04:01	20:01	21:14	–:–
66	01:25	03:10	04:13	19:49	20:52	22:43
64	02:03	03:26	04:22	19:39	20:35	22:01
62	02:29	03:40	04:31	19:30	20:22	21:34
60	02:48	03:51	04:38	19:23	20:10	21:14
58	03:04	04:01	04:44	19:16	20:00	20:58
56	03:17	04:09	04:50	19:11	19:51	20:44
54	03:28	04:17	04:55	19:06	19:44	20:33
52	03:38	04:23	04:59	19:01	19:37	20:23
50	03:47	04:29	05:03	18:57	19:31	20:14
45	04:04	04:41	05:12	18:48	19:19	19:56
40	04:18	04:51	05:20	18:40	19:09	19:42
35	04:29	04:60	05:26	18:34	19:00	19:31
30	04:38	05:07	05:31	18:28	18:53	19:22
20	04:52	05:18	05:41	18:19	18:41	19:08
10	05:02	05:27	05:49	18:11	18:32	18:57
0	05:11	05:35	05:56	18:03	18:24	18:48
-10	05:18	05:42	06:04	17:55	18:17	18:41
-20	05:23	05:49	06:11	17:47	18:10	18:36
-30	05:28	05:56	06:20	17:39	18:03	18:31
-35	05:30	05:60	06:25	17:33	17:59	18:29
-40	05:32	06:03	06:31	17:28	17:55	18:27
-45	05:33	06:08	06:37	17:21	17:51	18:25
-50	05:35	06:12	06:45	17:13	17:46	18:24
-52	05:35	06:14	06:49	17:10	17:44	18:23
-54	05:35	06:17	06:53	17:06	17:42	18:23
-56	05:36	06:19	06:57	17:01	17:39	18:22
-58	05:36	06:21	07:02	16:56	17:37	18:22
-60	05:36	06:24	07:07	16:51	17:34	18:22

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	04:58	04:45	04:27	20:40	22:48	–:–
70	05:06	05:01	04:56	20:26	22:21	–:–
68	05:13	05:14	05:17	20:15	22:01	23:50
66	05:19	05:25	05:34	20:05	21:45	23:26
64	05:24	05:34	05:48	19:57	21:32	23:07
62	05:28	05:42	05:60	19:51	21:21	22:51
60	05:32	05:49	06:10	19:45	21:12	22:38
58	05:35	05:55	06:19	19:40	21:04	22:27
56	05:38	06:00	06:27	19:35	20:57	22:17
54	05:41	06:05	06:34	19:31	20:50	22:09
52	05:43	06:09	06:40	19:27	20:45	22:01
50	05:45	06:13	06:46	19:24	20:39	21:55
45	05:50	06:22	06:58	19:17	20:28	21:40
40	05:54	06:29	07:08	19:11	20:19	21:28
35	05:58	06:35	07:17	19:06	20:11	21:18
30	06:01	06:41	07:25	19:01	20:04	21:09
20	06:07	06:51	07:38	18:53	19:53	20:53
10	06:11	06:59	07:50	18:47	19:42	20:40
0	06:16	07:07	08:01	18:40	19:33	20:27
-10	06:21	07:15	08:12	18:34	19:23	20:15
-20	06:26	07:24	08:24	18:27	19:13	20:02
-30	06:32	07:34	08:38	18:19	19:01	19:46
-35	06:35	07:40	08:46	18:15	18:54	19:38
-40	06:39	07:47	08:55	18:10	18:46	19:28
-45	06:43	07:54	09:06	18:04	18:37	19:16
-50	06:49	08:04	09:19	17:57	18:27	19:02
-52	06:51	08:08	09:25	17:54	18:22	18:55
-54	06:54	08:13	09:32	17:50	18:16	18:48
-56	06:57	08:18	09:40	17:47	18:10	18:40
-58	07:00	08:24	09:48	17:42	18:04	18:30
-60	07:04	08:31	09:58	17:37	17:56	18:20

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
16	00:05	00:12	11:59	12:28	00:03	0(0%)
17	00:19	00:26	11:59	13:19	00:53	1(3%)
18	00:33	00:39	11:59	14:14	01:46	2(8%)

April 19, 20 ,21 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	207°02.7	156°27.9	18°50.1	277°51.6	-23°08.5	338°20.5	-16°43.1	287°09.4	-22°14.2
1	222°05.2	171°27.3	18°51.0	292°52.7	-23°08.4	353°23.2	-16°43.0	302°11.9	-22°14.2
2	237°07.7	186°26.6	18°51.9	307°53.7	-23°08.3	8°26.0	-16°42.9	317°14.3	-22°14.2
3	252°10.1	201°26.0	18°52.8	322°54.8	-23°08.2	23°28.7	-16°42.9	332°16.8	-22°14.2
4	267°12.6	216°25.4	18°53.7	337°55.9	-23°08.2	38°31.4	-16°42.8	347°19.3	-22°14.2
5	282°15.1	231°24.7	18°54.5	352°57.0	-23°08.1	53°34.2	-16°42.7	2°21.7	-22°14.2
6	297°17.5	246°24.1	18°55.4	7°58.1	-23°08.0	68°36.9	-16°42.6	17°24.2	-22°14.2
7	312°20.0	261°23.5	18°56.3	22°59.2	-23°07.9	83°39.7	-16°42.6	32°26.7	-22°14.2
8	327°22.4	276°22.9	18°57.2	38°00.3	-23°07.8	98°42.4	-16°42.5	47°29.1	-22°14.2
9	342°24.9	291°22.2	18°58.0	53°01.4	-23°07.7	113°45.1	-16°42.4	62°31.6	-22°14.2
10	357°27.4	306°21.6	18°58.9	68°02.4	-23°07.7	128°47.9	-16°42.3	77°34.1	-22°14.2
11	12°29.8	321°21.0	18°59.8	83°03.5	-23°07.6	143°50.6	-16°42.3	92°36.5	-22°14.2
12	27°32.3	336°20.3	19°00.7	98°04.6	-23°07.5	158°53.4	-16°42.2	107°39.0	-22°14.2
13	42°34.8	351°19.7	19°01.5	113°05.7	-23°07.4	173°56.1	-16°42.1	122°41.5	-22°14.2
14	57°37.2	6°19.1	19°02.4	128°06.8	-23°07.3	188°58.8	-16°42.1	137°44.0	-22°14.2
15	72°39.7	21°18.4	19°03.3	143°07.9	-23°07.2	204°01.6	-16°42.0	152°46.4	-22°14.2
16	87°42.2	36°17.8	19°04.1	158°09.0	-23°07.2	219°04.3	-16°41.9	167°48.9	-22°14.2
17	102°44.6	51°17.2	19°05.0	173°10.1	-23°07.1	234°07.1	-16°41.8	182°51.4	-22°14.2
18	117°47.1	66°16.5	19°05.9	188°11.2	-23°07.0	249°09.8	-16°41.8	197°53.8	-22°14.2
19	132°49.5	81°15.9	19°06.7	203°12.3	-23°06.9	264°12.6	-16°41.7	212°56.3	-22°14.2
20	147°52.0	96°15.3	19°07.6	218°13.4	-23°06.8	279°15.3	-16°41.6	227°58.8	-22°14.2
21	162°54.5	111°14.6	19°08.5	233°14.5	-23°06.7	294°18.0	-16°41.5	243°01.3	-22°14.2
22	177°56.9	126°14.0	19°09.3	248°15.6	-23°06.6	309°20.8	-16°41.5	258°03.7	-22°14.2
23	192°59.4	141°13.4	19°10.2	263°16.6	-23°06.6	324°23.5	-16°41.4	273°06.2	-22°14.2
Mer.pass.:10:10		v-0.6 d0.9 m-3.8		v1.1 d0.1 m-0.1		v2.7 d0.1 m-2.3		v2.5 d0.0 m0.4	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	208°01.9	156°12.7	19°11.1	278°17.7	-23°06.5	339°26.3	-16°41.3	288°08.7	-22°14.2
1	223°04.3	171°12.1	19°11.9	293°18.8	-23°06.4	354°29.0	-16°41.2	303°11.1	-22°14.2
2	238°06.8	186°11.5	19°12.8	308°19.9	-23°06.3	9°31.8	-16°41.2	318°13.6	-22°14.2
3	253°09.3	201°10.8	19°13.6	323°21.0	-23°06.2	24°34.5	-16°41.1	333°16.1	-22°14.2
4	268°11.7	216°10.2	19°14.5	338°22.1	-23°06.1	39°37.3	-16°41.0	348°18.6	-22°14.2
5	283°14.2	231°09.5	19°15.3	353°23.2	-23°06.1	54°40.0	-16°40.9	3°21.0	-22°14.2
6	298°16.7	246°08.9	19°16.2	8°24.3	-23°06.0	69°42.7	-16°40.9	18°23.5	-22°14.2
7	313°19.1	261°08.3	19°17.1	23°25.4	-23°05.9	84°45.5	-16°40.8	33°26.0	-22°14.2
8	328°21.6	276°07.6	19°17.9	38°26.5	-23°05.8	99°48.2	-16°40.7	48°28.5	-22°14.2
9	343°24.0	291°07.0	19°18.8	53°27.6	-23°05.7	114°51.0	-16°40.6	63°30.9	-22°14.2
10	358°26.5	306°06.3	19°19.6	68°28.7	-23°05.6	129°53.7	-16°40.6	78°33.4	-22°14.2
11	13°29.0	321°05.7	19°20.5	83°29.8	-23°05.5	144°56.5	-16°40.5	93°35.9	-22°14.2
12	28°31.4	336°05.0	19°21.3	98°30.9	-23°05.5	159°59.2	-16°40.4	108°38.4	-22°14.2
13	43°33.9	351°04.4	19°22.2	113°32.0	-23°05.4	175°02.0	-16°40.3	123°40.8	-22°14.2
14	58°36.4	6°03.8	19°23.0	128°33.1	-23°05.3	190°04.7	-16°40.3	138°43.3	-22°14.2
15	73°38.8	21°03.1	19°23.9	143°34.2	-23°05.2	205°07.5	-16°40.2	153°45.8	-22°14.2
16	88°41.3	36°02.5	19°24.7	158°35.3	-23°05.1	220°10.2	-16°40.1	168°48.3	-22°14.2
17	103°43.8	51°01.8	19°25.6	173°36.4	-23°05.0	235°13.0	-16°40.0	183°50.7	-22°14.2
18	118°46.2	66°01.2	19°26.4	188°37.5	-23°04.9	250°15.7	-16°40.0	198°53.2	-22°14.2
19	133°48.7	81°00.5	19°27.3	203°38.6	-23°04.8	265°18.4	-16°39.9	213°55.7	-22°14.2
20	148°51.2	95°59.9	19°28.1	218°39.7	-23°04.8	280°21.2	-16°39.8	228°58.2	-22°14.2
21	163°53.6	110°59.2	19°28.9	233°40.8	-23°04.7	295°23.9	-16°39.7	244°00.6	-22°14.2
22	178°56.1	125°58.6	19°29.8	248°41.9	-23°04.6	310°26.7	-16°39.7	259°03.1	-22°14.2
23	193°58.5	140°58.0	19°30.6	263°43.0	-23°04.5	325°29.4	-16°39.6	274°05.6	-22°14.2
Mer.pass.:10:06		v-0.6 d0.9 m-3.8		v1.1 d0.1 m-0.1		v2.7 d0.1 m-2.3		v2.5 d-0.0 m0.4	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	209°01.0	155°57.3	19°31.5	278°44.1	-23°04.4	340°32.2	-16°39.5	289°08.1	-22°14.2
1	224°03.5	170°56.7	19°32.3	293°45.2	-23°04.3	355°34.9	-16°39.4	304°10.6	-22°14.2
2	239°05.9	185°56.0	19°33.1	308°46.3	-23°04.2	10°37.7	-16°39.4	319°13.0	-22°14.2
3	254°08.4	200°55.4	19°34.0	323°47.4	-23°04.1	25°40.4	-16°39.3	334°15.5	-22°14.2
4	269°10.9	215°54.7	19°34.8	338°48.5	-23°04.1	40°43.2	-16°39.2	349°18.0	-22°14.2
5	284°13.3	230°54.1	19°35.7	353°49.7	-23°04.0	55°45.9	-16°39.1	4°20.5	-22°14.2
6	299°15.8	245°53.4	19°36.5	8°50.8	-23°03.9	70°48.7	-16°39.1	19°22.9	-22°14.2
7	314°18.3	260°52.8	19°37.3	23°51.9	-23°03.8	85°51.4	-16°39.0	34°25.4	-22°14.2
8	329°20.7	275°52.1	19°38.2	38°53.0	-23°03.7	100°54.2	-16°38.9	49°27.9	-22°14.2
9	344°23.2	290°51.5	19°39.0	53°54.1	-23°03.6	115°56.9	-16°38.8	64°30.4	-22°14.2
10	359°25.7	305°50.8	19°39.8	68°55.2	-23°03.5	130°59.7	-16°38.8	79°32.9	-22°14.2
11	14°28.1	320°50.2	19°40.6	83°56.3	-23°03.4	146°02.4	-16°38.7	94°35.3	-22°14.2
12	29°30.6	335°49.5	19°41.5	98°57.4	-23°03.4	161°05.2	-16°38.6	109°37.8	-22°14.2
13	44°33.0	350°48.8	19°42.3	113°58.5	-23°03.3	176°07.9	-16°38.5	124°40.3	-22°14.2
14	59°35.5	5°48.2	19°43.1	128°59.6	-23°03.2	191°10.7	-16°38.5	139°42.8	-22°14.2
15	74°38.0	20°47.5	19°44.0	144°00.7	-23°03.1	206°13.4	-16°38.4	154°45.3	-22°14.2
16	89°40.4	35°46.9	19°44.8	159°01.8	-23°03.0	221°16.2	-16°38.3	169°47.7	-22°14.2
17	104°42.9	50°46.2	19°45.6	174°02.9	-23°02.9	236°18.9	-16°38.2	184°50.2	-22°14.2
18	119°45.4	65°45.6	19°46.4	189°04.1	-23°02.8	251°21.7	-16°38.2	199°52.7	-22°14.2
19	134°47.8	80°44.9	19°47.3	204°05.2	-23°02.7	266°24.4	-16°38.1	214°55.2	-22°14.2
20	149°50.3	95°44.3	19°48.1	219°06.3	-23°02.6	281°27.2	-16°38.0	229°57.7	-22°14.2
21	164°52.8	110°43.6	19°48.9	234°07.4	-23°02.6	296°29.9	-16°37.9	245°00.1	-22°14.2
22	179°55.2	125°42.9	19°49.7	249°08.5	-23°02.5	311°32.7	-16°37.9	260°02.6	-22°14.2
23	194°57.7	140°42.3	19°50.5	264°09.6	-23°02.4	326°35.4	-16°37.8	275°05.1	-22°14.2
Mer.pass.:10:02		v-0.6 d0.8 m-3.8		v1.1 d0.1 m-0.1		v2.7 d0.1 m-2.3		v2.5 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.2
Ankaa	353°12.9	-42°12.5
Schedar	349°37.3	56°38.0
Diphda	348°52.8	-17°53.4
Achernar	335°25.0	-57°08.8
Hamal	327°57.4	23°32.7
Polaris	316°46.5	89°20.4
Akamar	315°16.3	-40°14.2
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.4
Aldebaran	290°45.9	16°32.5
Rigel	281°09.1	-8°11.2
Capella	280°29.9	46°00.9
Bellatrix	278°28.7	6°21.7
Elnath	278°08.7	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°54.9	-52°42.8
Sirius	258°30.9	-16°44.6
Adara	255°10.1	-29°00.2
Procyon	244°56.3	5°10.6
Pollux	243°23.7	27°58.8
Avior	234°16.6	-59°34.5
Suhail	222°49.9	-43°30.7
Miaplacidus	221°38.7	-69°47.9
Alphard	217°52.8	-8°44.5
Regulus	207°39.9	11°52.6
Dubhe	193°47.3	61°39.3
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.7
Acrux	173°05.0	-63°12.1
Gacrux	171°56.7	-57°13.0
Alioth	166°17.4	55°51.8
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.4
Hadar	148°42.5	-60°27.5
Menkent	148°03.3	-36°27.5
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.6	-60°54.4
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.0	74°04.9
Alphecca	126°08.0	26°39.2
Antares	112°22.0	-26°28.2
Atria	107°20.4	-69°03.2
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.7
Rasalhague	96°03.3	12°32.8
Etamin	90°44.4	51°29.1
Kaus Aust.	83°39.3	-34°22.3
Vega	80°36.6	38°47.9
Nunki	75°54.2	-26°16.2
Altair	62°05.1	8°54.9
Peacock	53°14.2	-56°40.3
Deneb	49°29.3	45°20.5
Enif	33°44.1	9°57.4
Alnair	27°40.0	-46°52.2
Fomalhaut	15°20.7	-29°31.5
Scheat	13°50.5	28°10.6
Markab	13°35.3	15°18.0

2018/4/1	**SHA**	**Mer.pass**
Venus	309°25.2	13:35
Mars	70°48.8	05:28
Jupiter	131°17.7	01:26
Saturn	80°06.7	04:51

2018/4/2	**SHA**	**Mer.pass**
Venus	308°10.9	13:36
Mars	70°15.9	05:26
Jupiter	131°24.4	01:22
Saturn	80°06.8	04:47

2018/4/2	**SHA**	**Mer.pass**
Venus	306°56.3	13:37
Mars	69°43.1	05:25
Jupiter	131°31.2	01:18
Saturn	80°07.1	04:43

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°11.5	11°04.7	140°58.2	7.0	17°01.1	7.1	59.3
1	195°11.6	11°05.6	155°24.1	6.9	17°08.2	7.0	59.3
2	210°11.7	11°06.5	169°50.0	6.9	17°15.1	6.9	59.3
3	225°11.9	11°07.3	184°15.9	6.8	17°21.9	6.8	59.3
4	240°12.0	11°08.2	198°41.6	6.8	17°28.6	6.7	59.3
5	255°12.1	11°09.1	213°07.4	6.7	17°35.2	6.5	59.3
6	270°12.3	11°09.9	227°33.1	6.7	17°41.7	6.4	59.3
7	285°12.4	11°10.8	241°58.7	6.6	17°48.1	6.3	59.4
8	300°12.5	11°11.6	256°24.3	6.6	17°54.4	6.2	59.4
9	315°12.7	11°12.5	270°49.8	6.5	18°00.5	6.1	59.4
10	330°12.8	11°13.4	285°15.3	6.5	18°06.5	6.0	59.4
11	345°12.9	11°14.2	299°40.7	6.4	18°12.5	5.9	59.4
12	0°13.1	11°15.1	314°06.1	6.4	18°18.3	5.7	59.4
13	15°13.2	11°16.0	328°31.4	6.3	18°23.9	5.6	59.4
14	30°13.3	11°16.8	342°56.7	6.3	18°29.5	5.5	59.4
15	45°13.5	11°17.7	357°22.0	6.2	18°34.9	5.4	59.4
16	60°13.6	11°18.6	11°47.2	6.2	18°40.3	5.3	59.4
17	75°13.7	11°19.4	26°12.4	6.1	18°45.5	5.1	59.4
18	90°13.9	11°20.3	40°37.5	6.1	18°50.5	5.0	59.4
19	105°14.0	11°21.1	55°02.6	6.1	18°55.5	4.9	59.4
20	120°14.1	11°22.0	69°27.6	6.0	19°00.3	4.8	59.4
21	135°14.3	11°22.9	83°52.7	6.0	19°05.0	4.6	59.4
22	150°14.4	11°23.7	98°17.6	6.0	19°09.6	4.5	59.4
23	165°14.5	11°24.6	112°42.6	5.9	19°14.0	4.4	59.4
	SD.=15.9	d=0.9	S.D.=16.2				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°14.7	11°25.4	127°07.5	5.9	19°18.4	4.3	59.4
1	195°14.8	11°26.3	141°32.3	5.9	19°22.6	4.1	59.4
2	210°14.9	11°27.2	155°57.2	5.8	19°26.6	4.0	59.5
3	225°15.1	11°28.0	170°22.0	5.8	19°30.6	3.9	59.5
4	240°15.2	11°28.9	184°46.7	5.8	19°34.4	3.7	59.5
5	255°15.3	11°29.7	199°11.5	5.7	19°38.1	3.6	59.5
6	270°15.5	11°30.6	213°36.2	5.7	19°41.6	3.5	59.5
7	285°15.6	11°31.4	228°00.9	5.7	19°45.0	3.4	59.5
8	300°15.7	11°32.3	242°25.6	5.6	19°48.3	3.2	59.5
9	315°15.9	11°33.2	256°50.2	5.6	19°51.5	3.1	59.5
10	330°16.0	11°34.0	271°14.8	5.6	19°54.5	3.0	59.5
11	345°16.1	11°34.9	285°39.4	5.6	19°57.4	2.8	59.5
12	0°16.2	11°35.7	300°04.0	5.6	20°00.1	2.7	59.5
13	15°16.4	11°36.6	314°28.5	5.5	20°02.7	2.6	59.5
14	30°16.5	11°37.4	328°53.1	5.5	20°05.2	2.4	59.5
15	45°16.6	11°38.3	343°17.6	5.5	20°07.6	2.3	59.5
16	60°16.8	11°39.1	357°42.1	5.5	20°09.8	2.1	59.5
17	75°16.9	11°40.0	12°06.5	5.5	20°11.9	2.0	59.5
18	90°17.0	11°40.9	26°31.0	5.5	20°13.8	1.9	59.5
19	105°17.2	11°41.7	40°55.5	5.5	20°15.6	1.7	59.5
20	120°17.3	11°42.6	55°19.9	5.4	20°17.3	1.6	59.5
21	135°17.4	11°43.4	69°44.4	5.4	20°18.8	1.5	59.5
22	150°17.5	11°44.3	84°08.8	5.4	20°20.2	1.3	59.5
23	165°17.7	11°45.1	98°33.2	5.4	20°21.5	1.2	59.5
	SD.=15.9	d=0.9	S.D.=16.2				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°17.8	11°46.0	112°57.6	5.4	20°22.6	1.1	59.5
1	195°17.9	11°46.8	127°22.1	5.4	20°23.6	0.9	59.5
2	210°18.0	11°47.7	141°46.5	5.4	20°24.4	0.8	59.5
3	225°18.2	11°48.5	156°10.9	5.4	20°25.1	0.6	59.5
4	240°18.3	11°49.4	170°35.3	5.4	20°25.7	0.5	59.5
5	255°18.4	11°50.2	184°59.7	5.4	20°26.1	0.4	59.4
6	270°18.6	11°51.1	199°24.1	5.4	20°26.4	0.2	59.4
7	285°18.7	11°51.9	213°48.5	5.4	20°26.6	0.1	59.4
8	300°18.8	11°52.8	228°12.9	5.4	20°26.6	-0.0	59.4
9	315°18.9	11°53.6	242°37.4	5.4	20°26.5	-0.2	59.4
10	330°19.1	11°54.5	257°01.8	5.4	20°26.2	-0.3	59.4
11	345°19.2	11°55.3	271°26.3	5.5	20°25.9	-0.5	59.4
12	0°19.3	11°56.2	285°50.7	5.5	20°25.3	-0.6	59.4
13	15°19.4	11°57.0	300°15.2	5.5	20°24.7	-0.7	59.4
14	30°19.6	11°57.9	314°39.7	5.5	20°23.9	-0.9	59.4
15	45°19.7	11°58.7	329°04.2	5.5	20°22.9	-1.0	59.4
16	60°19.8	11°59.5	343°28.7	5.5	20°21.8	-1.1	59.4
17	75°19.9	12°00.4	357°53.2	5.5	20°20.6	-1.3	59.4
18	90°20.1	12°01.2	12°17.7	5.6	20°19.3	-1.4	59.4
19	105°20.2	12°02.1	26°42.3	5.6	20°17.8	-1.6	59.4
20	120°20.3	12°02.9	41°06.9	5.6	20°16.2	-1.7	59.4
21	135°20.4	12°03.8	55°31.5	5.6	20°14.4	-1.8	59.4
22	150°20.6	12°04.6	69°56.1	5.6	20°12.5	-2.0	59.4
23	165°20.7	12°05.5	84°20.8	5.7	20°10.5	-2.1	59.4
	SD.=15.9	d=0.9	S.D.=16.2				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	00:57	03:10	20:52	23:20	–:–
70	–:–	01:58	03:31	20:30	22:07	–:–
68	–:–	02:32	03:48	20:13	21:31	–:–
66	00:50	02:56	04:01	19:59	21:06	23:26
64	01:43	03:14	04:12	19:48	20:47	22:21
62	02:13	03:29	04:21	19:38	20:31	21:49
60	02:36	03:41	04:29	19:30	20:19	21:25
58	02:53	03:52	04:36	19:23	20:08	21:07
56	03:08	04:01	04:42	19:17	19:58	20:52
54	03:20	04:09	04:48	19:11	19:50	20:40
52	03:30	04:16	04:53	19:06	19:43	20:29
50	03:39	04:23	04:57	19:01	19:36	20:20
45	03:58	04:36	05:07	18:52	19:23	20:01
40	04:13	04:47	05:15	18:43	19:12	19:46
35	04:24	04:56	05:22	18:36	19:03	19:34
30	04:34	05:03	05:28	18:30	18:55	19:24
20	04:49	05:16	05:38	18:20	18:42	19:09
10	05:01	05:26	05:47	18:11	18:32	18:57
0	05:10	05:34	05:56	18:02	18:23	18:48
-10	05:18	05:42	06:04	17:54	18:15	18:40
-20	05:24	05:50	06:12	17:45	18:08	18:34
-30	05:30	05:58	06:22	17:35	17:60	18:28
-35	05:32	06:02	06:28	17:30	17:56	18:25
-40	05:35	06:06	06:34	17:23	17:51	18:23
-45	05:37	06:11	06:41	17:16	17:46	18:20
-50	05:39	06:17	06:50	17:07	17:40	18:18
-52	05:40	06:19	06:54	17:03	17:38	18:17
-54	05:40	06:22	06:58	16:59	17:35	18:16
-56	05:41	06:25	07:03	16:54	17:32	18:16
-58	05:42	06:28	07:08	16:48	17:29	18:15
-60	05:43	06:31	07:15	16:42	17:26	18:14

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	03:51	–:–	–:–	01:21	–:–	–:–
70	04:49	04:38	–:–	00:24	02:36	–:–
68	05:24	05:39	06:18	–:–	01:35	02:59
66	05:49	06:15	07:00	–:–	01:00	02:18
64	06:08	06:40	07:29	–:–	00:35	01:49
62	06:24	06:60	07:51	–:–	00:15	01:27
60	06:38	07:16	08:08	23:59	–:–	01:10
58	06:50	07:30	08:23	23:46	–:–	00:55
56	06:60	07:42	08:36	23:34	–:–	00:42
54	07:09	07:52	08:47	23:24	–:–	00:31
52	07:17	08:02	08:57	23:15	–:–	00:21
50	07:24	08:10	09:05	23:07	–:–	00:13
45	07:39	08:28	09:24	22:49	23:54	–:–
40	07:52	08:42	09:39	22:35	23:39	–:–
35	08:03	08:55	09:52	22:23	23:26	–:–
30	08:13	09:05	10:03	22:13	23:15	–:–
20	08:29	09:24	10:22	21:55	22:56	23:55
10	08:44	09:40	10:39	21:39	22:39	23:38
0	08:57	09:55	10:55	21:25	22:24	23:23
-10	09:11	10:11	11:10	21:10	22:08	23:07
-20	09:26	10:27	11:27	20:55	21:51	22:51
-30	09:43	10:46	11:47	20:37	21:32	22:32
-35	09:52	10:57	11:58	20:26	21:21	22:21
-40	10:04	11:10	12:11	20:15	21:08	22:08
-45	10:17	11:25	12:26	20:01	20:53	21:53
-50	10:33	11:43	12:45	19:44	20:34	21:34
-52	10:41	11:52	12:54	19:36	20:25	21:25
-54	10:50	12:01	13:04	19:27	20:16	21:15
-56	10:59	12:12	13:15	19:17	20:05	21:04
-58	11:10	12:25	13:28	19:05	19:52	20:51
-60	11:23	12:40	13:43	18:52	19:37	20:36

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
19	00:46	00:52	11:59	15:10	02:42	3(15%)
20	00:59	01:05	11:58	16:09	03:40	4(24%)
21	01:11	01:17	11:58	17:08	04:39	5(34%)

April 22, 23 ,24 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	210°00.2	155°41.6	19°51.4	279°10.7	-23°02.3	341°38.2	-16°37.7	290°07.6	-22°14.2
1	225°02.6	170°41.0	19°52.2	294°11.8	-23°02.2	356°40.9	-16°37.6	305°10.1	-22°14.2
2	240°05.1	185°40.3	19°53.0	309°13.0	-23°02.1	11°43.7	-16°37.5	320°12.5	-22°14.2
3	255°07.5	200°39.6	19°53.8	324°14.1	-23°02.0	26°46.4	-16°37.5	335°15.0	-22°14.2
4	270°10.0	215°39.0	19°54.6	339°15.2	-23°01.9	41°49.2	-16°37.4	350°17.5	-22°14.2
5	285°12.5	230°38.3	19°55.4	354°16.3	-23°01.8	56°51.9	-16°37.3	5°20.0	-22°14.2
6	300°14.9	245°37.7	19°56.3	9°17.4	-23°01.7	71°54.7	-16°37.2	20°22.5	-22°14.2
7	315°17.4	260°37.0	19°57.1	24°18.5	-23°01.7	86°57.4	-16°37.2	35°25.0	-22°14.2
8	330°19.9	275°36.3	19°57.9	39°19.6	-23°01.6	102°00.2	-16°37.1	50°27.4	-22°14.2
9	345°22.3	290°35.7	19°58.7	54°20.8	-23°01.5	117°03.0	-16°37.0	65°29.9	-22°14.2
10	0°24.8	305°35.0	19°59.5	69°21.9	-23°01.4	132°05.7	-16°36.9	80°32.4	-22°14.2
11	15°27.3	320°34.3	20°00.3	84°23.0	-23°01.3	147°08.5	-16°36.9	95°34.9	-22°14.2
12	30°29.7	335°33.7	20°01.1	99°24.1	-23°01.2	162°11.2	-16°36.8	110°37.4	-22°14.2
13	45°32.2	350°33.0	20°01.9	114°25.2	-23°01.1	177°14.0	-16°36.7	125°39.9	-22°14.2
14	60°34.6	5°32.4	20°02.7	129°26.3	-23°01.0	192°16.7	-16°36.6	140°42.3	-22°14.2
15	75°37.1	20°31.7	20°03.5	144°27.5	-23°00.9	207°19.5	-16°36.6	155°44.8	-22°14.2
16	90°39.6	35°31.0	20°04.3	159°28.6	-23°00.8	222°22.2	-16°36.5	170°47.3	-22°14.2
17	105°42.0	50°30.4	20°05.1	174°29.7	-23°00.8	237°25.0	-16°36.4	185°49.8	-22°14.2
18	120°44.5	65°29.7	20°05.9	189°30.8	-23°00.7	252°27.7	-16°36.3	200°52.3	-22°14.2
19	135°47.0	80°29.0	20°06.7	204°31.9	-23°00.6	267°30.5	-16°36.2	215°54.8	-22°14.2
20	150°49.4	95°28.4	20°07.5	219°33.1	-23°00.5	282°33.2	-16°36.2	230°57.2	-22°14.2
21	165°51.9	110°27.7	20°08.3	234°34.2	-23°00.4	297°36.0	-16°36.1	245°59.7	-22°14.2
22	180°54.4	125°27.0	20°09.1	249°35.3	-23°00.3	312°38.8	-16°36.0	261°02.2	-22°14.2
23	195°56.8	140°26.4	20°09.9	264°36.4	-23°00.2	327°41.5	-16°35.9	276°04.7	-22°14.2
Mer.pass.:9:58:		v-0.7 d0.8 m-3.8		v1.1 d0.1 m-0.2		v2.8 d0.1 m-2.3		v2.5 d-0.0 m0.4	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	210°59.3	155°25.7	20°10.7	279°37.6	-23°00.1	342°44.3	-16°35.9	291°07.2	-22°14.2
1	226°01.8	170°25.0	20°11.5	294°38.7	-23°00.0	357°47.0	-16°35.8	306°09.7	-22°14.2
2	241°04.2	185°24.3	20°12.3	309°39.8	-22°59.9	12°49.8	-16°35.7	321°12.2	-22°14.2
3	256°06.7	200°23.7	20°13.1	324°40.9	-22°59.8	27°52.5	-16°35.6	336°14.6	-22°14.2
4	271°09.1	215°23.0	20°13.9	339°42.0	-22°59.7	42°55.3	-16°35.6	351°17.1	-22°14.2
5	286°11.6	230°22.3	20°14.7	354°43.2	-22°59.7	57°58.0	-16°35.5	6°19.6	-22°14.2
6	301°14.1	245°21.7	20°15.5	9°44.3	-22°59.6	73°00.8	-16°35.4	21°22.1	-22°14.2
7	316°16.5	260°21.0	20°16.3	24°45.4	-22°59.5	88°03.6	-16°35.3	36°24.6	-22°14.2
8	331°19.0	275°20.3	20°17.1	39°46.5	-22°59.4	103°06.3	-16°35.2	51°27.1	-22°14.2
9	346°21.5	290°19.6	20°17.9	54°47.7	-22°59.3	118°09.1	-16°35.2	66°29.6	-22°14.2
10	1°23.9	305°19.0	20°18.7	69°48.8	-22°59.2	133°11.8	-16°35.1	81°32.1	-22°14.2
11	16°26.4	320°18.3	20°19.4	84°49.9	-22°59.1	148°14.6	-16°35.0	96°34.5	-22°14.2
12	31°28.9	335°17.6	20°20.2	99°51.0	-22°59.0	163°17.3	-16°34.9	111°37.0	-22°14.2
13	46°31.3	350°16.9	20°21.0	114°52.2	-22°58.9	178°20.1	-16°34.9	126°39.5	-22°14.2
14	61°33.8	5°16.3	20°21.8	129°53.3	-22°58.8	193°22.9	-16°34.8	141°42.0	-22°14.2
15	76°36.3	20°15.6	20°22.6	144°54.4	-22°58.7	208°25.6	-16°34.7	156°44.5	-22°14.2
16	91°38.7	35°14.9	20°23.4	159°55.6	-22°58.6	223°28.4	-16°34.6	171°47.0	-22°14.2
17	106°41.2	50°14.2	20°24.1	174°56.7	-22°58.6	238°31.1	-16°34.5	186°49.5	-22°14.2
18	121°43.6	65°13.6	20°24.9	189°57.8	-22°58.5	253°33.9	-16°34.5	201°52.0	-22°14.2
19	136°46.1	80°12.9	20°25.7	204°58.9	-22°58.4	268°36.6	-16°34.4	216°54.4	-22°14.2
20	151°48.6	95°12.2	20°26.5	220°00.1	-22°58.3	283°39.4	-16°34.3	231°56.9	-22°14.2
21	166°51.0	110°11.5	20°27.3	235°01.2	-22°58.2	298°42.2	-16°34.2	246°59.4	-22°14.2
22	181°53.5	125°10.8	20°28.0	250°02.3	-22°58.1	313°44.9	-16°34.2	262°01.9	-22°14.2
23	196°56.0	140°10.2	20°28.8	265°03.5	-22°58.0	328°47.7	-16°34.1	277°04.4	-22°14.2
Mer.pass.:9:54:		v-0.7 d0.8 m-3.8		v1.1 d0.1 m-0.2		v2.8 d0.1 m-2.3		v2.5 d-0.0 m0.4	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	211°58.4	155°09.5	20°29.6	280°04.6	-22°57.9	343°50.4	-16°34.0	292°06.9	-22°14.2
1	227°00.9	170°08.8	20°30.4	295°05.7	-22°57.8	358°53.2	-16°33.9	307°09.4	-22°14.2
2	242°03.4	185°08.1	20°31.1	310°06.9	-22°57.7	13°56.0	-16°33.8	322°11.9	-22°14.2
3	257°05.8	200°07.4	20°31.9	325°08.0	-22°57.6	28°58.7	-16°33.8	337°14.4	-22°14.2
4	272°08.3	215°06.8	20°32.7	340°09.1	-22°57.5	44°01.5	-16°33.7	352°16.9	-22°14.2
5	287°10.7	230°06.1	20°33.4	355°10.3	-22°57.4	59°04.2	-16°33.6	7°19.3	-22°14.2
6	302°13.2	245°05.4	20°34.2	10°11.4	-22°57.3	74°07.0	-16°33.5	22°21.8	-22°14.2
7	317°15.7	260°04.7	20°35.0	25°12.5	-22°57.2	89°09.8	-16°33.5	37°24.3	-22°14.2
8	332°18.1	275°04.0	20°35.7	40°13.7	-22°57.2	104°12.5	-16°33.4	52°26.8	-22°14.2
9	347°20.6	290°03.3	20°36.5	55°14.8	-22°57.1	119°15.3	-16°33.3	67°29.3	-22°14.2
10	2°23.1	305°02.7	20°37.3	70°15.9	-22°57.0	134°18.0	-16°33.2	82°31.8	-22°14.2
11	17°25.5	320°02.0	20°38.0	85°17.1	-22°56.9	149°20.8	-16°33.1	97°34.3	-22°14.2
12	32°28.0	335°01.3	20°38.8	100°18.2	-22°56.8	164°23.5	-16°33.1	112°36.8	-22°14.3
13	47°30.5	350°00.6	20°39.6	115°19.3	-22°56.7	179°26.3	-16°33.0	127°39.3	-22°14.3
14	62°32.9	4°59.9	20°40.3	130°20.5	-22°56.6	194°29.1	-16°32.9	142°41.8	-22°14.3
15	77°35.4	19°59.2	20°41.1	145°21.6	-22°56.5	209°31.8	-16°32.8	157°44.3	-22°14.3
16	92°37.9	34°58.5	20°41.8	160°22.7	-22°56.4	224°34.6	-16°32.7	172°46.8	-22°14.3
17	107°40.3	49°57.9	20°42.6	175°23.9	-22°56.3	239°37.4	-16°32.7	187°49.3	-22°14.3
18	122°42.8	64°57.2	20°43.4	190°25.0	-22°56.2	254°40.1	-16°32.6	202°51.7	-22°14.3
19	137°45.2	79°56.5	20°44.1	205°26.2	-22°56.1	269°42.9	-16°32.5	217°54.2	-22°14.3
20	152°47.7	94°55.8	20°44.9	220°27.3	-22°56.0	284°45.6	-16°32.4	232°56.7	-22°14.3
21	167°50.2	109°55.1	20°45.6	235°28.4	-22°55.9	299°48.4	-16°32.4	247°59.2	-22°14.3
22	182°52.6	124°54.4	20°46.4	250°29.6	-22°55.8	314°51.2	-16°32.3	263°01.7	-22°14.3
23	197°55.1	139°53.7	20°47.1	265°30.7	-22°55.7	329°53.9	-16°32.2	278°04.2	-22°14.3
Mer.pass.:9:50:		v-0.7 d0.8 m-3.8		v1.1 d0.1 m-0.2		v2.8 d0.1 m-2.3		v2.5 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.2
Ankaa	353°12.9	-42°12.5
Schedar	349°37.3	56°38.0
Diphda	348°52.8	-17°53.4
Achernar	335°25.0	-57°08.8
Hamal	327°57.4	23°32.7
Polaris	316°46.6	89°20.4
Akamar	315°16.3	-40°14.2
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.4
Aldebaran	290°45.9	16°32.5
Rigel	281°09.1	-8°11.2
Capella	280°30.0	46°00.9
Bellatrix	278°28.7	6°21.7
Elnath	278°08.7	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°54.9	-52°42.8
Sirius	258°30.9	-16°44.6
Adara	255°10.1	-29°00.2
Procyon	244°56.3	5°10.6
Pollux	243°23.7	27°58.8
Avior	234°16.6	-59°34.5
Suhail	222°49.9	-43°30.7
Miaplacidus	221°38.7	-69°47.9
Alphard	217°52.8	-8°44.5
Regulus	207°39.9	11°52.6
Dubhe	193°47.3	61°39.3
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.7
Acrux	173°05.0	-63°12.1
Gacrux	171°56.7	-57°13.0
Alioth	166°17.4	55°51.8
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.4
Hadar	148°42.5	-60°27.6
Menkent	148°03.3	-36°27.5
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.6	-60°54.5
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.0	74°04.9
Alphecca	126°07.9	26°39.2
Antares	112°21.9	-26°28.2
Atria	107°20.4	-69°03.3
Sabik	102°08.6	-15°44.7
Shaula	96°17.2	-37°06.7
Rasalhague	96°03.2	12°32.8
Etamin	90°44.3	51°29.1
Kaus Aust.	83°39.3	-34°22.3
Vega	80°36.6	38°47.9
Nunki	75°54.2	-26°16.2
Altair	62°05.1	8°54.9
Peacock	53°14.2	-56°40.3
Deneb	49°29.3	45°20.5
Enif	33°44.1	9°57.4
Alnair	27°39.9	-46°52.2
Fomalhaut	15°20.7	-29°31.5
Scheat	13°50.5	28°10.6
Markab	13°35.3	15°18.0

2018/4/2	**SHA**	**Mer.pass**
Venus	305°41.5	13:38
Mars	69°10.6	05:23
Jupiter	131°38.0	01:13
Saturn	80°07.4	04:39

2018/4/2	**SHA**	**Mer.pass**
Venus	304°26.4	13:39
Mars	68°38.3	05:21
Jupiter	131°45.0	01:09
Saturn	80°07.9	04:35

2018/4/2	**SHA**	**Mer.pass**
Venus	303°11.1	13:40
Mars	68°06.2	05:19
Jupiter	131°52.0	01:04
Saturn	80°08.5	04:31

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°20.8	12°06.3	98°45.5	5.7	20°08.3	-2.2	59.4
1	195°20.9	12°07.1	113°10.2	5.7	20°06.1	-2.4	59.4
2	210°21.0	12°08.0	127°34.9	5.7	20°03.6	-2.5	59.4
3	225°21.2	12°08.8	141°59.7	5.8	20°01.1	-2.6	59.3
4	240°21.3	12°09.7	156°24.5	5.8	19°58.4	-2.8	59.3
5	255°21.4	12°10.5	170°49.3	5.8	19°55.6	-2.9	59.3
6	270°21.5	12°11.4	185°14.2	5.9	19°52.6	-3.0	59.3
7	285°21.7	12°12.2	199°39.0	5.9	19°49.5	-3.1	59.3
8	300°21.8	12°13.0	214°04.0	5.9	19°46.3	-3.3	59.3
9	315°21.9	12°13.9	228°28.9	6.0	19°43.0	-3.4	59.3
10	330°22.0	12°14.7	242°53.9	6.0	19°39.5	-3.5	59.3
11	345°22.1	12°15.6	257°19.0	6.1	19°35.9	-3.7	59.3
12	0°22.3	12°16.4	271°44.0	6.1	19°32.2	-3.8	59.3
13	15°22.4	12°17.2	286°09.1	6.1	19°28.3	-3.9	59.3
14	30°22.5	12°18.1	300°34.3	6.2	19°24.3	-4.0	59.3
15	45°22.6	12°18.9	314°59.5	6.2	19°20.2	-4.2	59.3
16	60°22.7	12°19.7	329°24.7	6.3	19°16.0	-4.3	59.2
17	75°22.9	12°20.6	343°50.0	6.3	19°11.6	-4.4	59.2
18	90°23.0	12°21.4	358°15.3	6.3	19°07.2	-4.5	59.2
19	105°23.1	12°22.3	12°40.7	6.4	19°02.6	-4.7	59.2
20	120°23.2	12°23.1	27°06.1	6.4	18°57.8	-4.8	59.2
21	135°23.3	12°23.9	41°31.6	6.5	18°53.0	-4.9	59.2
22	150°23.5	12°24.8	55°57.1	6.5	18°48.0	-5.0	59.2
23	165°23.6	12°25.6	70°22.6	6.6	18°42.9	-5.1	59.2
	SD.=15.9	d=0.8	S.D.=16.2				

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°23.7	12°26.4	84°48.3	6.6	18°37.7	-5.3	59.2
1	195°23.8	12°27.3	99°13.9	6.7	18°32.4	-5.4	59.2
2	210°23.9	12°28.1	113°39.6	6.7	18°27.0	-5.5	59.2
3	225°24.1	12°28.9	128°05.4	6.8	18°21.4	-5.6	59.1
4	240°24.2	12°29.8	142°31.2	6.8	18°15.8	-5.7	59.1
5	255°24.3	12°30.6	156°57.0	6.9	18°10.0	-5.8	59.1
6	270°24.4	12°31.4	171°22.9	6.9	18°04.1	-6.0	59.1
7	285°24.5	12°32.3	185°48.9	7.0	17°58.1	-6.1	59.1
8	300°24.6	12°33.1	200°14.9	7.0	17°52.0	-6.2	59.1
9	315°24.8	12°33.9	214°41.0	7.1	17°45.7	-6.3	59.1
10	330°24.9	12°34.8	229°07.1	7.2	17°39.4	-6.4	59.1
11	345°25.0	12°35.6	243°33.3	7.2	17°32.9	-6.5	59.1
12	0°25.1	12°36.4	257°59.6	7.3	17°26.4	-6.6	59.1
13	15°25.2	12°37.3	272°25.8	7.3	17°19.7	-6.7	59.0
14	30°25.3	12°38.1	286°52.2	7.4	17°12.9	-6.8	59.0
15	45°25.5	12°38.9	301°18.6	7.4	17°06.1	-6.9	59.0
16	60°25.6	12°39.7	315°45.1	7.5	16°59.1	-7.0	59.0
17	75°25.7	12°40.6	330°11.6	7.6	16°52.0	-7.1	59.0
18	90°25.8	12°41.4	344°38.2	7.6	16°44.8	-7.2	59.0
19	105°25.9	12°42.2	359°04.8	7.7	16°37.5	-7.3	59.0
20	120°26.0	12°43.1	13°31.5	7.7	16°30.2	-7.4	59.0
21	135°26.2	12°43.9	27°58.3	7.8	16°22.7	-7.5	59.0
22	150°26.3	12°44.7	42°25.1	7.8	16°15.1	-7.6	58.9
23	165°26.4	12°45.5	56°52.0	7.9	16°07.4	-7.7	58.9
	SD.=15.9	d=0.8	S.D.=16.1				

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°26.5	12°46.4	71°18.9	8.0	15°59.6	-7.8	58.9
1	195°26.6	12°47.2	85°45.9	8.0	15°51.8	-7.9	58.9
2	210°26.7	12°48.0	100°12.9	8.1	15°43.8	-8.0	58.9
3	225°26.8	12°48.8	114°40.1	8.1	15°35.8	-8.1	58.9
4	240°27.0	12°49.7	129°07.2	8.2	15°27.6	-8.2	58.9
5	255°27.1	12°50.5	143°34.5	8.3	15°19.4	-8.3	58.9
6	270°27.2	12°51.3	158°01.7	8.3	15°11.1	-8.4	58.8
7	285°27.3	12°52.1	172°29.1	8.4	15°02.7	-8.5	58.8
8	300°27.4	12°53.0	186°56.5	8.4	14°54.2	-8.5	58.8
9	315°27.5	12°53.8	201°24.0	8.5	14°45.6	-8.6	58.8
10	330°27.6	12°54.6	215°51.5	8.6	14°36.9	-8.7	58.8
11	345°27.7	12°55.4	230°19.1	8.6	14°28.2	-8.8	58.8
12	0°27.9	12°56.2	244°46.8	8.7	14°19.3	-8.9	58.8
13	15°28.0	12°57.1	259°14.5	8.7	14°10.4	-9.0	58.8
14	30°28.1	12°57.9	273°42.2	8.8	14°01.4	-9.0	58.7
15	45°28.2	12°58.7	288°10.1	8.9	13°52.4	-9.1	58.7
16	60°28.3	12°59.5	302°38.0	8.9	13°43.2	-9.2	58.7
17	75°28.4	13°00.4	317°05.9	9.0	13°34.0	-9.3	58.7
18	90°28.5	13°01.2	331°33.9	9.0	13°24.7	-9.3	58.7
19	105°28.6	13°02.0	346°02.0	9.1	13°15.3	-9.4	58.7
20	120°28.7	13°02.8	0°30.1	9.2	13°05.9	-9.5	58.7
21	135°28.9	13°03.6	14°58.3	9.2	12°56.4	-9.6	58.6
22	150°29.0	13°04.4	29°26.5	9.3	12°46.8	-9.6	58.6
23	165°29.1	13°05.3	43°54.8	9.3	12°37.1	-9.7	58.6
	SD.=15.9	d=0.8	S.D.=16.1				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	02:51	21:10	–:–	–:–
70	–:–	01:31	03:16	20:45	22:35	–:–
68	–:–	02:13	03:34	20:25	21:49	–:–
66	–:–	02:40	03:49	20:10	21:20	–:–
64	01:19	03:01	04:01	19:57	20:58	22:46
62	01:57	03:18	04:12	19:47	20:41	22:05
60	02:22	03:32	04:21	19:38	20:27	21:38
58	02:42	03:43	04:28	19:30	20:15	21:17
56	02:58	03:53	04:35	19:23	20:05	21:01
54	03:11	04:02	04:41	19:17	19:56	20:48
52	03:22	04:09	04:47	19:11	19:49	20:36
50	03:32	04:16	04:52	19:06	19:42	20:26
45	03:52	04:31	05:02	18:55	19:27	20:05
40	04:08	04:42	05:11	18:46	19:15	19:50
35	04:20	04:52	05:18	18:39	19:05	19:37
30	04:31	05:00	05:25	18:32	18:57	19:27
20	04:47	05:13	05:36	18:21	18:43	19:10
10	04:59	05:24	05:46	18:11	18:32	18:58
0	05:09	05:34	05:55	18:02	18:23	18:47
-10	05:18	05:42	06:04	17:53	18:14	18:39
-20	05:25	05:51	06:13	17:43	18:06	18:32
-30	05:31	05:59	06:24	17:32	17:57	18:25
-35	05:34	06:04	06:30	17:26	17:52	18:22
-40	05:37	06:09	06:37	17:19	17:47	18:19
-45	05:40	06:15	06:45	17:11	17:41	18:16
-50	05:43	06:21	06:54	17:02	17:35	18:13
-52	05:44	06:24	06:59	16:57	17:32	18:12
-54	05:45	06:27	07:04	16:52	17:29	18:10
-56	05:47	06:30	07:09	16:47	17:26	18:09
-58	05:48	06:34	07:15	16:41	17:22	18:08
-60	05:49	06:38	07:22	16:34	17:18	18:07

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	07:13	10:07	–:–	06:10	05:12
70	06:21	08:36	10:39	05:01	04:46	04:39
68	07:35	09:15	11:02	03:47	04:06	04:14
66	08:12	09:42	11:20	03:09	03:39	03:55
64	08:38	10:03	11:35	02:43	03:18	03:40
62	08:58	10:19	11:47	02:22	03:00	03:27
60	09:15	10:33	11:57	02:05	02:46	03:16
58	09:29	10:45	12:06	01:51	02:34	03:06
56	09:41	10:55	12:14	01:39	02:23	02:58
54	09:51	11:04	12:21	01:28	02:14	02:50
52	10:01	11:12	12:27	01:19	02:06	02:44
50	10:09	11:19	12:33	01:10	01:58	02:38
45	10:27	11:35	12:45	00:52	01:42	02:24
40	10:41	11:47	12:55	00:37	01:29	02:13
35	10:54	11:58	13:03	00:25	01:17	02:04
30	11:04	12:07	13:11	00:14	01:07	01:56
20	11:23	12:23	13:24	–:–	00:50	01:41
10	11:39	12:37	13:35	–:–	00:35	01:29
0	11:53	12:51	13:45	–:–	00:21	01:17
-10	12:08	13:04	13:56	–:–	00:07	01:05
-20	12:24	13:18	14:07	23:52	–:–	00:52
-30	12:43	13:34	14:20	23:34	–:–	00:38
-35	12:53	13:43	14:27	23:24	–:–	00:29
-40	13:05	13:53	14:35	23:12	–:–	00:19
-45	13:20	14:06	14:45	22:58	–:–	00:08
-50	13:37	14:21	14:57	22:41	23:54	–:–
-52	13:46	14:28	15:02	22:33	23:47	–:–
-54	13:55	14:36	15:08	22:24	23:40	–:–
-56	14:05	14:44	15:15	22:14	23:31	–:–
-58	14:17	14:54	15:22	22:03	23:22	–:–
-60	14:31	15:05	15:30	21:50	23:12	–:–

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
22	01:23	01:29	11:58	18:07	05:38	6(45%)
23	01:35	01:40	11:58	19:03	06:35	7(57%)
24	01:46	01:51	11:58	19:57	07:31	8(68%)

April 25, 26 ,27 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	212°57.6	154°53.0	20°47.9	280°31.9	-22°55.6	344°56.7	-16°32.1	293°06.7	-22°14.3
1	228°00.0	169°52.3	20°48.6	295°33.0	-22°55.6	359°59.4	-16°32.0	308°09.2	-22°14.3
2	243°02.5	184°51.7	20°49.4	310°34.1	-22°55.5	15°02.2	-16°32.0	323°11.7	-22°14.3
3	258°05.0	199°51.0	20°50.1	325°35.3	-22°55.4	30°05.0	-16°31.9	338°14.2	-22°14.3
4	273°07.4	214°50.3	20°50.9	340°36.4	-22°55.3	45°07.7	-16°31.8	353°16.7	-22°14.3
5	288°09.9	229°49.6	20°51.6	355°37.6	-22°55.2	60°10.5	-16°31.7	8°19.2	-22°14.3
6	303°12.4	244°48.9	20°52.4	10°38.7	-22°55.1	75°13.3	-16°31.6	23°21.7	-22°14.3
7	318°14.8	259°48.2	20°53.1	25°39.9	-22°55.0	90°16.0	-16°31.6	38°24.2	-22°14.3
8	333°17.3	274°47.5	20°53.8	40°41.0	-22°54.9	105°18.8	-16°31.5	53°26.7	-22°14.3
9	348°19.7	289°46.8	20°54.6	55°42.1	-22°54.8	120°21.5	-16°31.4	68°29.2	-22°14.3
10	3°22.2	304°46.1	20°55.3	70°43.3	-22°54.7	135°24.3	-16°31.3	83°31.7	-22°14.3
11	18°24.7	319°45.4	20°56.1	85°44.4	-22°54.6	150°27.1	-16°31.2	98°34.2	-22°14.3
12	33°27.1	334°44.7	20°56.8	100°45.6	-22°54.5	165°29.8	-16°31.2	113°36.7	-22°14.3
13	48°29.6	349°44.0	20°57.6	115°46.7	-22°54.4	180°32.6	-16°31.1	128°39.2	-22°14.3
14	63°32.1	4°43.3	20°58.3	130°47.9	-22°54.3	195°35.4	-16°31.0	143°41.7	-22°14.3
15	78°34.5	19°42.6	20°59.0	145°49.0	-22°54.2	210°38.1	-16°30.9	158°44.1	-22°14.3
16	93°37.0	34°41.9	20°59.8	160°50.2	-22°54.1	225°40.9	-16°30.9	173°46.6	-22°14.3
17	108°39.5	49°41.2	21°00.5	175°51.3	-22°54.0	240°43.6	-16°30.8	188°49.1	-22°14.3
18	123°41.9	64°40.5	21°01.2	190°52.5	-22°53.9	255°46.4	-16°30.7	203°51.6	-22°14.3
19	138°44.4	79°39.8	21°02.0	205°53.6	-22°53.8	270°49.2	-16°30.6	218°54.1	-22°14.3
20	153°46.8	94°39.1	21°02.7	220°54.8	-22°53.7	285°51.9	-16°30.5	233°56.6	-22°14.3
21	168°49.3	109°38.4	21°03.4	235°55.9	-22°53.6	300°54.7	-16°30.5	248°59.1	-22°14.3
22	183°51.8	124°37.7	21°04.2	250°57.1	-22°53.5	315°57.5	-16°30.4	264°01.6	-22°14.3
23	198°54.2	139°37.0	21°04.9	265°58.2	-22°53.5	331°00.2	-16°30.3	279°04.1	-22°14.3
Mer.pass.:9:46:		v-0.7 d0.8 m-3.8		v1.1 d0.1 m-0.2		v2.8 d0.1 m-2.3		v2.5 d-0.0 m0.4	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	213°56.7	154°36.3	21°05.6	280°59.4	-22°53.4	346°03.0	-16°30.2	294°06.6	-22°14.3
1	228°59.2	169°35.6	21°06.3	296°00.5	-22°53.3	1°05.8	-16°30.1	309°09.1	-22°14.3
2	244°01.6	184°34.9	21°07.1	311°01.7	-22°53.2	16°08.5	-16°30.1	324°11.6	-22°14.3
3	259°04.1	199°34.2	21°07.8	326°02.8	-22°53.1	31°11.3	-16°30.0	339°14.1	-22°14.3
4	274°06.6	214°33.5	21°08.5	341°04.0	-22°53.0	46°14.1	-16°29.9	354°16.6	-22°14.3
5	289°09.0	229°32.8	21°09.2	356°05.1	-22°52.9	61°16.8	-16°29.8	9°19.1	-22°14.3
6	304°11.5	244°32.1	21°10.0	11°06.3	-22°52.8	76°19.6	-16°29.7	24°21.6	-22°14.3
7	319°14.0	259°31.4	21°10.7	26°07.4	-22°52.7	91°22.4	-16°29.7	39°24.1	-22°14.3
8	334°16.4	274°30.7	21°11.4	41°08.6	-22°52.6	106°25.1	-16°29.6	54°26.6	-22°14.3
9	349°18.9	289°30.0	21°12.1	56°09.7	-22°52.5	121°27.9	-16°29.5	69°29.1	-22°14.3
10	4°21.3	304°29.3	21°12.8	71°10.9	-22°52.4	136°30.7	-16°29.4	84°31.6	-22°14.3
11	19°23.8	319°28.6	21°13.6	86°12.0	-22°52.3	151°33.4	-16°29.3	99°34.1	-22°14.3
12	34°26.3	334°27.9	21°14.3	101°13.2	-22°52.2	166°36.2	-16°29.3	114°36.6	-22°14.3
13	49°28.7	349°27.2	21°15.0	116°14.4	-22°52.1	181°39.0	-16°29.2	129°39.1	-22°14.3
14	64°31.2	4°26.5	21°15.7	131°15.5	-22°52.0	196°41.7	-16°29.1	144°41.6	-22°14.3
15	79°33.7	19°25.8	21°16.4	146°16.7	-22°51.9	211°44.5	-16°29.0	159°44.1	-22°14.3
16	94°36.1	34°25.1	21°17.1	161°17.8	-22°51.8	226°47.2	-16°28.9	174°46.6	-22°14.3
17	109°38.6	49°24.4	21°17.8	176°19.0	-22°51.7	241°50.0	-16°28.9	189°49.1	-22°14.3
18	124°41.1	64°23.6	21°18.5	191°20.1	-22°51.6	256°52.8	-16°28.8	204°51.6	-22°14.4
19	139°43.5	79°22.9	21°19.2	206°21.3	-22°51.5	271°55.5	-16°28.7	219°54.1	-22°14.4
20	154°46.0	94°22.2	21°20.0	221°22.5	-22°51.4	286°58.3	-16°28.6	234°56.6	-22°14.4
21	169°48.4	109°21.5	21°20.7	236°23.6	-22°51.3	302°01.1	-16°28.5	249°59.1	-22°14.4
22	184°50.9	124°20.8	21°21.4	251°24.8	-22°51.2	317°03.9	-16°28.5	265°01.6	-22°14.4
23	199°53.4	139°20.1	21°22.1	266°25.9	-22°51.1	332°06.6	-16°28.4	280°04.2	-22°14.4
Mer.pass.:9:42:		v-0.7 d0.7 m-3.8		v1.2 d0.1 m-0.3		v2.8 d0.1 m-2.3		v2.5 d-0.0 m0.4	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	214°55.8	154°19.4	21°22.8	281°27.1	-22°51.0	347°09.4	-16°28.3	295°06.7	-22°14.4
1	229°58.3	169°18.7	21°23.5	296°28.3	-22°50.9	2°12.2	-16°28.2	310°09.2	-22°14.4
2	245°00.8	184°18.0	21°24.2	311°29.4	-22°50.8	17°14.9	-16°28.1	325°11.7	-22°14.4
3	260°03.2	199°17.2	21°24.9	326°30.6	-22°50.7	32°17.7	-16°28.1	340°14.2	-22°14.4
4	275°05.7	214°16.5	21°25.6	341°31.7	-22°50.6	47°20.5	-16°28.0	355°16.7	-22°14.4
5	290°08.2	229°15.8	21°26.3	356°32.9	-22°50.5	62°23.2	-16°27.9	10°19.2	-22°14.4
6	305°10.6	244°15.1	21°27.0	11°34.1	-22°50.4	77°26.0	-16°27.8	25°21.7	-22°14.4
7	320°13.1	259°14.4	21°27.7	26°35.2	-22°50.3	92°28.8	-16°27.7	40°24.2	-22°14.4
8	335°15.6	274°13.7	21°28.4	41°36.4	-22°50.2	107°31.5	-16°27.7	55°26.7	-22°14.4
9	350°18.0	289°13.0	21°29.1	56°37.6	-22°50.2	122°34.3	-16°27.6	70°29.2	-22°14.4
10	5°20.5	304°12.3	21°29.8	71°38.7	-22°50.1	137°37.1	-16°27.5	85°31.7	-22°14.4
11	20°22.9	319°11.5	21°30.5	86°39.9	-22°50.0	152°39.8	-16°27.4	100°34.2	-22°14.4
12	35°25.4	334°10.8	21°31.1	101°41.0	-22°49.9	167°42.6	-16°27.3	115°36.7	-22°14.4
13	50°27.9	349°10.1	21°31.8	116°42.2	-22°49.8	182°45.4	-16°27.2	130°39.2	-22°14.4
14	65°30.3	4°09.4	21°32.5	131°43.4	-22°49.7	197°48.1	-16°27.2	145°41.7	-22°14.4
15	80°32.8	19°08.7	21°33.2	146°44.5	-22°49.6	212°50.9	-16°27.1	160°44.2	-22°14.4
16	95°35.3	34°08.0	21°33.9	161°45.7	-22°49.5	227°53.7	-16°27.0	175°46.7	-22°14.4
17	110°37.7	49°07.2	21°34.6	176°46.9	-22°49.4	242°56.4	-16°26.9	190°49.2	-22°14.4
18	125°40.2	64°06.5	21°35.3	191°48.0	-22°49.3	257°59.2	-16°26.8	205°51.7	-22°14.4
19	140°42.7	79°05.8	21°36.0	206°49.2	-22°49.2	273°02.0	-16°26.8	220°54.2	-22°14.4
20	155°45.1	94°05.1	21°36.6	221°50.4	-22°49.1	288°04.8	-16°26.7	235°56.8	-22°14.4
21	170°47.6	109°04.4	21°37.3	236°51.6	-22°49.0	303°07.5	-16°26.6	250°59.3	-22°14.4
22	185°50.1	124°03.6	21°38.0	251°52.7	-22°48.9	318°10.3	-16°26.5	266°01.8	-22°14.4
23	200°52.5	139°02.9	21°38.7	266°53.9	-22°48.8	333°13.1	-16°26.4	281°04.3	-22°14.4
Mer.pass.:9:38:		v-0.7 d0.7 m-3.8		v1.2 d0.1 m-0.3		v2.8 d0.1 m-2.3		v2.5 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.2
Ankaa	353°12.9	-42°12.5
Schedar	349°37.3	56°38.0
Diphda	348°52.8	-17°53.4
Achernar	335°25.0	-57°08.8
Hamal	327°57.4	23°32.7
Polaris	316°47.0	89°20.4
Akamar	315°16.3	-40°14.2
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.4
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.2
Capella	280°30.0	46°00.9
Bellatrix	278°28.7	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.0	-52°42.8
Sirius	258°30.9	-16°44.6
Adara	255°10.1	-29°00.2
Procyon	244°56.3	5°10.6
Pollux	243°23.7	27°58.8
Avior	234°16.7	-59°34.5
Suhail	222°49.9	-43°30.7
Miaplacidus	221°38.8	-69°47.9
Alphard	217°52.8	-8°44.5
Regulus	207°39.9	11°52.6
Dubhe	193°47.3	61°39.4
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.7
Acrux	173°05.0	-63°12.1
Gacrux	171°56.7	-57°13.0
Alioth	166°17.4	55°51.8
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.4
Hadar	148°42.5	-60°27.6
Menkent	148°03.3	-36°27.5
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.6	-60°54.5
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.0	74°04.9
Alphecca	126°07.9	26°39.2
Antares	112°21.9	-26°28.2
Atria	107°20.4	-69°03.3
Sabik	102°08.5	-15°44.7
Shaula	96°17.2	-37°06.8
Rasalhague	96°03.2	12°32.9
Etamin	90°44.3	51°29.1
Kaus Aust.	83°39.3	-34°22.3
Vega	80°36.6	38°47.9
Nunki	75°54.1	-26°16.2
Altair	62°05.1	8°54.9
Peacock	53°14.1	-56°40.3
Deneb	49°29.3	45°20.5
Enif	33°44.0	9°57.4
Alnair	27°39.9	-46°52.2
Fomalhaut	15°20.7	-29°31.5
Scheat	13°50.5	28°10.6
Markab	13°35.3	15°18.0

2018/4/2	**SHA**	**Mer.pass**
Venus	301°55.5	13:41
Mars	67°34.3	05:17
Jupiter	131°59.1	01:00
Saturn	80°09.1	04:27

2018/4/2	**SHA**	**Mer.pass**
Venus	300°39.6	13:42
Mars	67°02.7	05:16
Jupiter	132°06.3	00:56
Saturn	80°09.9	04:23

2018/4/2	**SHA**	**Mer.pass**
Venus	299°23.5	13:43
Mars	66°31.2	05:14
Jupiter	132°13.5	00:51
Saturn	80°10.8	04:19

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°29.2	13°06.1	58°23.2	9.4	12°27.4	-9.8	58.6
1	195°29.3	13°06.9	72°51.6	9.4	12°17.6	-9.8	58.6
2	210°29.4	13°07.7	87°20.1	9.5	12°07.7	-9.9	58.6
3	225°29.5	13°08.5	101°48.6	9.6	11°57.8	-10.0	58.6
4	240°29.6	13°09.3	116°17.2	9.6	11°47.8	-10.0	58.5
5	255°29.7	13°10.2	130°45.8	9.7	11°37.8	-10.1	58.5
6	270°29.8	13°11.0	145°14.5	9.7	11°27.7	-10.1	58.5
7	285°29.9	13°11.8	159°43.3	9.8	11°17.5	-10.2	58.5
8	300°30.0	13°12.6	174°12.1	9.8	11°07.3	-10.3	58.5
9	315°30.2	13°13.4	188°41.0	9.9	10°57.0	-10.3	58.5
10	330°30.3	13°14.2	203°09.9	9.9	10°46.6	-10.4	58.5
11	345°30.4	13°15.0	217°38.8	10.0	10°36.2	-10.4	58.4
12	0°30.5	13°15.9	232°07.9	10.0	10°25.8	-10.5	58.4
13	15°30.6	13°16.7	246°36.9	10.1	10°15.3	-10.5	58.4
14	30°30.7	13°17.5	261°06.1	10.2	10°04.7	-10.6	58.4
15	45°30.8	13°18.3	275°35.2	10.2	9°54.1	-10.6	58.4
16	60°30.9	13°19.1	290°04.5	10.3	9°43.4	-10.7	58.4
17	75°31.0	13°19.9	304°33.8	10.3	9°32.7	-10.7	58.4
18	90°31.1	13°20.7	319°03.1	10.4	9°22.0	-10.8	58.3
19	105°31.2	13°21.5	333°32.5	10.4	9°11.1	-10.8	58.3
20	120°31.3	13°22.3	348°01.9	10.5	9°00.3	-10.9	58.3
21	135°31.4	13°23.2	2°31.4	10.5	8°49.4	-10.9	58.3
22	150°31.5	13°24.0	17°00.9	10.6	8°38.5	-11.0	58.3
23	165°31.6	13°24.8	31°30.5	10.6	8°27.5	-11.0	58.3
	SD.=15.9	d=0.8			S.D.=16.0		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°31.7	13°25.6	46°00.1	10.6	8°16.5	-11.0	58.2
1	195°31.9	13°26.4	60°29.8	10.7	8°05.4	-11.1	58.2
2	210°32.0	13°27.2	74°59.5	10.7	7°54.3	-11.1	58.2
3	225°32.1	13°28.0	89°29.3	10.8	7°43.2	-11.2	58.2
4	240°32.2	13°28.8	103°59.1	10.8	7°32.0	-11.2	58.2
5	255°32.3	13°29.6	118°29.0	10.9	7°20.8	-11.2	58.2
6	270°32.4	13°30.4	132°58.8	10.9	7°09.6	-11.3	58.1
7	285°32.5	13°31.2	147°28.8	11.0	6°58.3	-11.3	58.1
8	300°32.6	13°32.0	161°58.8	11.0	6°47.0	-11.3	58.1
9	315°32.7	13°32.8	176°28.8	11.0	6°35.7	-11.3	58.1
10	330°32.8	13°33.6	190°58.9	11.1	6°24.3	-11.4	58.1
11	345°32.9	13°34.4	205°29.0	11.1	6°12.9	-11.4	58.1
12	0°33.0	13°35.2	219°59.1	11.2	6°01.5	-11.4	58.0
13	15°33.1	13°36.0	234°29.3	11.2	5°50.0	-11.5	58.0
14	30°33.2	13°36.8	248°59.6	11.2	5°38.6	-11.5	58.0
15	45°33.3	13°37.7	263°29.8	11.3	5°27.1	-11.5	58.0
16	60°33.4	13°38.5	278°00.1	11.3	5°15.6	-11.5	58.0
17	75°33.5	13°39.3	292°30.5	11.4	5°04.0	-11.5	57.9
18	90°33.6	13°40.1	307°00.8	11.4	4°52.5	-11.6	57.9
19	105°33.7	13°40.9	321°31.3	11.4	4°40.9	-11.6	57.9
20	120°33.8	13°41.7	336°01.7	11.5	4°29.3	-11.6	57.9
21	135°33.9	13°42.5	350°32.2	11.5	4°17.7	-11.6	57.9
22	150°34.0	13°43.3	5°02.7	11.5	4°06.1	-11.6	57.9
23	165°34.1	13°44.1	19°33.3	11.6	3°54.4	-11.6	57.8
	SD.=15.9	d=0.8			S.D.=15.9		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°34.2	13°44.9	34°03.9	11.6	3°42.8	-11.7	57.8
1	195°34.3	13°45.7	48°34.5	11.6	3°31.1	-11.7	57.8
2	210°34.4	13°46.4	63°05.1	11.7	3°19.4	-11.7	57.8
3	225°34.5	13°47.2	77°35.8	11.7	3°07.7	-11.7	57.8
4	240°34.6	13°48.0	92°06.5	11.7	2°56.0	-11.7	57.7
5	255°34.7	13°48.8	106°37.3	11.8	2°44.3	-11.7	57.7
6	270°34.8	13°49.6	121°08.0	11.8	2°32.6	-11.7	57.7
7	285°34.9	13°50.4	135°38.8	11.8	2°20.9	-11.7	57.7
8	300°35.0	13°51.2	150°09.7	11.8	2°09.1	-11.7	57.7
9	315°35.1	13°52.0	164°40.5	11.9	1°57.4	-11.7	57.6
10	330°35.2	13°52.8	179°11.4	11.9	1°45.7	-11.7	57.6
11	345°35.3	13°53.6	193°42.3	11.9	1°33.9	-11.7	57.6
12	0°35.4	13°54.4	208°13.2	11.9	1°22.2	-11.7	57.6
13	15°35.5	13°55.2	222°44.2	12.0	1°10.4	-11.7	57.6
14	30°35.6	13°56.0	237°15.2	12.0	0°58.7	-11.7	57.6
15	45°35.7	13°56.8	251°46.2	12.0	0°47.0	-11.7	57.5
16	60°35.8	13°57.6	266°17.2	12.0	0°35.2	-11.7	57.5
17	75°35.9	13°58.4	280°48.2	12.1	0°23.5	-11.7	57.5
18	90°36.0	13°59.2	295°19.3	12.1	0°11.8	-11.7	57.5
19	105°36.0	13°60.0	309°50.4	12.1	0°00.1	-11.7	57.5
20	120°36.1	14°00.7	324°21.5	12.1	-0°11.7	-11.7	57.4
21	135°36.2	14°01.5	338°52.6	12.1	-0°23.4	-11.7	57.4
22	150°36.3	14°02.3	353°23.8	12.2	-0°35.1	-11.7	57.4
23	165°36.4	14°03.1	7°54.9	12.2	-0°46.7	-11.7	57.4
	SD.=15.9	d=0.8			S.D.=15.8		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	02:31	21:30	–:–	–:–
70	–:–	00:54	02:60	20:60	23:20	–:–
68	–:–	01:52	03:21	20:38	22:10	–:–
66	–:–	02:25	03:38	20:21	21:35	–:–
64	00:47	02:48	03:51	20:07	21:11	23:24
62	01:39	03:07	04:02	19:55	20:52	22:23
60	02:09	03:22	04:12	19:45	20:36	21:51
58	02:30	03:34	04:21	19:37	20:23	21:28
56	02:48	03:45	04:28	19:29	20:12	21:10
54	03:02	03:54	04:35	19:22	20:03	20:55
52	03:15	04:03	04:40	19:16	19:54	20:43
50	03:25	04:10	04:46	19:11	19:47	20:32
45	03:47	04:26	04:57	18:59	19:31	20:10
40	04:03	04:38	05:07	18:49	19:18	19:53
35	04:16	04:48	05:15	18:41	19:08	19:40
30	04:27	04:57	05:22	18:34	18:59	19:29
20	04:44	05:11	05:34	18:22	18:45	19:12
10	04:58	05:23	05:45	18:11	18:33	18:58
0	05:08	05:33	05:54	18:01	18:22	18:47
-10	05:18	05:43	06:04	17:51	18:13	18:38
-20	05:26	05:52	06:14	17:41	18:04	18:30
-30	05:33	06:01	06:26	17:29	17:54	18:22
-35	05:37	06:06	06:32	17:23	17:49	18:19
-40	05:40	06:12	06:40	17:15	17:43	18:15
-45	05:44	06:18	06:49	17:06	17:37	18:11
-50	05:47	06:25	06:59	16:56	17:30	18:08
-52	05:49	06:28	07:04	16:51	17:26	18:06
-54	05:50	06:32	07:09	16:46	17:23	18:04
-56	05:52	06:36	07:15	16:40	17:19	18:03
-58	05:53	06:40	07:21	16:33	17:15	18:01
-60	05:55	06:44	07:29	16:26	17:10	17:59

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	12:17	14:16	16:10	04:52	04:38	04:26
70	12:34	14:24	16:11	04:33	04:27	04:22
68	12:48	14:31	16:11	04:18	04:19	04:19
66	12:59	14:36	16:12	04:05	04:12	04:17
64	13:08	14:41	16:12	03:55	04:06	04:15
62	13:16	14:45	16:12	03:46	04:00	04:13
60	13:23	14:48	16:12	03:38	03:56	04:11
58	13:29	14:51	16:13	03:31	03:52	04:10
56	13:34	14:54	16:13	03:25	03:48	04:08
54	13:39	14:57	16:13	03:20	03:45	04:07
52	13:43	14:59	16:13	03:15	03:42	04:06
50	13:47	15:01	16:13	03:11	03:39	04:05
45	13:55	15:05	16:14	03:01	03:33	04:03
40	14:02	15:09	16:14	02:53	03:28	04:01
35	14:08	15:12	16:14	02:46	03:24	03:59
30	14:13	15:15	16:15	02:40	03:20	03:58
20	14:22	15:19	16:15	02:29	03:13	03:55
10	14:30	15:24	16:16	02:19	03:07	03:53
0	14:37	15:27	16:16	02:10	03:02	03:51
-10	14:45	15:31	16:16	02:01	02:56	03:49
-20	14:53	15:36	16:17	01:52	02:50	03:46
-30	15:01	15:40	16:17	01:41	02:43	03:44
-35	15:07	15:43	16:18	01:34	02:39	03:42
-40	15:12	15:46	16:18	01:27	02:34	03:40
-45	15:19	15:50	16:18	01:18	02:29	03:38
-50	15:27	15:54	16:19	01:08	02:22	03:36
-52	15:31	15:56	16:19	01:03	02:19	03:34
-54	15:35	15:58	16:19	00:58	02:16	03:33
-56	15:39	16:00	16:20	00:52	02:12	03:32
-58	15:44	16:03	16:20	00:45	02:08	03:30
-60	15:50	16:06	16:20	00:37	02:03	03:28

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
25	01:57	02:02	11:57	20:49	08:24	9(78%)
26	02:07	02:12	11:57	21:39	09:14	10(86%)
27	02:17	02:21	11:57	22:27	10:03	11(93%)

April 28, 29 ,30 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	215°55.0	154°02.2	21°39.4	281°55.1	-22°48.7	348°15.8	-16°26.4	296°06.8	-22°14.4
1	230°57.4	169°01.5	21°40.0	296°56.2	-22°48.6	3°18.6	-16°26.3	311°09.3	-22°14.4
2	245°59.9	184°00.8	21°40.7	311°57.4	-22°48.5	18°21.4	-16°26.2	326°11.8	-22°14.4
3	261°02.4	199°00.0	21°41.4	326°58.6	-22°48.4	33°24.1	-16°26.1	341°14.3	-22°14.4
4	276°04.8	213°59.3	21°42.1	341°59.7	-22°48.3	48°26.9	-16°26.0	356°16.8	-22°14.4
5	291°07.3	228°58.6	21°42.8	357°00.9	-22°48.2	63°29.7	-16°26.0	11°19.3	-22°14.4
6	306°09.8	243°57.9	21°43.4	12°02.1	-22°48.1	78°32.5	-16°25.9	26°21.8	-22°14.4
7	321°12.2	258°57.1	21°44.1	27°03.3	-22°48.0	93°35.2	-16°25.8	41°24.3	-22°14.4
8	336°14.7	273°56.4	21°44.8	42°04.4	-22°47.9	108°38.0	-16°25.7	56°26.8	-22°14.4
9	351°17.2	288°55.7	21°45.4	57°05.6	-22°47.8	123°40.8	-16°25.6	71°29.4	-22°14.4
10	6°19.6	303°55.0	21°46.1	72°06.8	-22°47.7	138°43.5	-16°25.5	86°31.9	-22°14.4
11	21°22.1	318°54.2	21°46.8	87°08.0	-22°47.6	153°46.3	-16°25.5	101°34.4	-22°14.4
12	36°24.5	333°53.5	21°47.4	102°09.1	-22°47.5	168°49.1	-16°25.4	116°36.9	-22°14.5
13	51°27.0	348°52.8	21°48.1	117°10.3	-22°47.4	183°51.9	-16°25.3	131°39.4	-22°14.5
14	66°29.5	3°52.1	21°48.8	132°11.5	-22°47.3	198°54.6	-16°25.2	146°41.9	-22°14.5
15	81°31.9	18°51.3	21°49.4	147°12.7	-22°47.2	213°57.4	-16°25.1	161°44.4	-22°14.5
16	96°34.4	33°50.6	21°50.1	162°13.8	-22°47.1	229°00.2	-16°25.1	176°46.9	-22°14.5
17	111°36.9	48°49.9	21°50.8	177°15.0	-22°47.0	244°02.9	-16°25.0	191°49.4	-22°14.5
18	126°39.3	63°49.1	21°51.4	192°16.2	-22°46.9	259°05.7	-16°24.9	206°51.9	-22°14.5
19	141°41.8	78°48.4	21°52.1	207°17.4	-22°46.8	274°08.5	-16°24.8	221°54.5	-22°14.5
20	156°44.3	93°47.7	21°52.7	222°18.6	-22°46.7	289°11.3	-16°24.7	236°57.0	-22°14.5
21	171°46.7	108°47.0	21°53.4	237°19.7	-22°46.6	304°14.0	-16°24.7	251°59.5	-22°14.5
22	186°49.2	123°46.2	21°54.1	252°20.9	-22°46.5	319°16.8	-16°24.6	267°02.0	-22°14.5
23	201°51.7	138°45.5	21°54.7	267°22.1	-22°46.4	334°19.6	-16°24.5	282°04.5	-22°14.5
Mer.pass.:9:34:		v-0.7 d0.7 m-3.8		v1.2 d0.1 m-0.3		v2.8 d0.1 m-2.4		v2.5 d-0.0 m0.4	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	216°54.1	153°44.8	21°55.4	282°23.3	-22°46.3	349°22.3	-16°24.4	297°07.0	-22°14.5
1	231°56.6	168°44.0	21°56.0	297°24.5	-22°46.2	4°25.1	-16°24.3	312°09.5	-22°14.5
2	246°59.0	183°43.3	21°56.7	312°25.6	-22°46.1	19°27.9	-16°24.2	327°12.0	-22°14.5
3	262°01.5	198°42.6	21°57.3	327°26.8	-22°46.0	34°30.7	-16°24.2	342°14.5	-22°14.5
4	277°04.0	213°41.8	21°58.0	342°28.0	-22°45.9	49°33.4	-16°24.1	357°17.1	-22°14.5
5	292°06.4	228°41.1	21°58.6	357°29.2	-22°45.8	64°36.2	-16°24.0	12°19.6	-22°14.5
6	307°08.9	243°40.4	21°59.3	12°30.4	-22°45.7	79°39.0	-16°23.9	27°22.1	-22°14.5
7	322°11.4	258°39.6	21°59.9	27°31.5	-22°45.6	94°41.7	-16°23.8	42°24.6	-22°14.5
8	337°13.8	273°38.9	22°00.6	42°32.7	-22°45.5	109°44.5	-16°23.8	57°27.1	-22°14.5
9	352°16.3	288°38.2	22°01.2	57°33.9	-22°45.4	124°47.3	-16°23.7	72°29.6	-22°14.5
10	7°18.8	303°37.4	22°01.9	72°35.1	-22°45.3	139°50.1	-16°23.6	87°32.1	-22°14.5
11	22°21.2	318°36.7	22°02.5	87°36.3	-22°45.2	154°52.8	-16°23.5	102°34.6	-22°14.5
12	37°23.7	333°36.0	22°03.1	102°37.5	-22°45.1	169°55.6	-16°23.4	117°37.2	-22°14.5
13	52°26.1	348°35.2	22°03.8	117°38.7	-22°45.0	184°58.4	-16°23.3	132°39.7	-22°14.5
14	67°28.6	3°34.5	22°04.4	132°39.8	-22°44.9	200°01.2	-16°23.3	147°42.2	-22°14.5
15	82°31.1	18°33.8	22°05.1	147°41.0	-22°44.8	215°03.9	-16°23.2	162°44.7	-22°14.5
16	97°33.5	33°33.0	22°05.7	162°42.2	-22°44.7	230°06.7	-16°23.1	177°47.2	-22°14.5
17	112°36.0	48°32.3	22°06.3	177°43.4	-22°44.6	245°09.5	-16°23.0	192°49.7	-22°14.5
18	127°38.5	63°31.6	22°07.0	192°44.6	-22°44.5	260°12.3	-16°22.9	207°52.2	-22°14.5
19	142°40.9	78°30.8	22°07.6	207°45.8	-22°44.4	275°15.0	-16°22.9	222°54.8	-22°14.5
20	157°43.4	93°30.1	22°08.2	222°47.0	-22°44.3	290°17.8	-16°22.8	237°57.3	-22°14.5
21	172°45.9	108°29.3	22°08.9	237°48.2	-22°44.2	305°20.6	-16°22.7	252°59.8	-22°14.5
22	187°48.3	123°28.6	22°09.5	252°49.4	-22°44.1	320°23.4	-16°22.6	268°02.3	-22°14.6
23	202°50.8	138°27.9	22°10.1	267°50.5	-22°44.0	335°26.1	-16°22.5	283°04.8	-22°14.6
Mer.pass.:9:30:		v-0.7 d0.7 m-3.8		v1.2 d0.1 m-0.3		v2.8 d0.1 m-2.4		v2.5 d-0.0 m0.4	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	217°53.3	153°27.1	22°10.8	282°51.7	-22°43.9	350°28.9	-16°22.4	298°07.3	-22°14.6
1	232°55.7	168°26.4	22°11.4	297°52.9	-22°43.8	5°31.7	-16°22.4	313°09.9	-22°14.6
2	247°58.2	183°25.6	22°12.0	312°54.1	-22°43.7	20°34.4	-16°22.3	328°12.4	-22°14.6
3	263°00.6	198°24.9	22°12.7	327°55.3	-22°43.6	35°37.2	-16°22.2	343°14.9	-22°14.6
4	278°03.1	213°24.2	22°13.3	342°56.5	-22°43.5	50°40.0	-16°22.1	358°17.4	-22°14.6
5	293°05.6	228°23.4	22°13.9	357°57.7	-22°43.4	65°42.8	-16°22.0	13°19.9	-22°14.6
6	308°08.0	243°22.7	22°14.5	12°58.9	-22°43.3	80°45.5	-16°21.9	28°22.4	-22°14.6
7	323°10.5	258°21.9	22°15.2	28°00.1	-22°43.2	95°48.3	-16°21.9	43°25.0	-22°14.6
8	338°13.0	273°21.2	22°15.8	43°01.3	-22°43.1	110°51.1	-16°21.8	58°27.5	-22°14.6
9	353°15.4	288°20.4	22°16.4	58°02.5	-22°43.0	125°53.9	-16°21.7	73°30.0	-22°14.6
10	8°17.9	303°19.7	22°17.0	73°03.7	-22°42.9	140°56.6	-16°21.6	88°32.5	-22°14.6
11	23°20.4	318°18.9	22°17.6	88°04.9	-22°42.8	155°59.4	-16°21.5	103°35.0	-22°14.6
12	38°22.8	333°18.2	22°18.2	103°06.1	-22°42.7	171°02.2	-16°21.5	118°37.5	-22°14.6
13	53°25.3	348°17.5	22°18.9	118°07.3	-22°42.6	186°05.0	-16°21.4	133°40.1	-22°14.6
14	68°27.8	3°16.7	22°19.5	133°08.5	-22°42.5	201°07.7	-16°21.3	148°42.6	-22°14.6
15	83°30.2	18°16.0	22°20.1	148°09.6	-22°42.4	216°10.5	-16°21.2	163°45.1	-22°14.6
16	98°32.7	33°15.2	22°20.7	163°10.8	-22°42.3	231°13.3	-16°21.1	178°47.6	-22°14.6
17	113°35.1	48°14.5	22°21.3	178°12.0	-22°42.2	246°16.1	-16°21.0	193°50.1	-22°14.6
18	128°37.6	63°13.7	22°21.9	193°13.2	-22°42.1	261°18.9	-16°21.0	208°52.6	-22°14.6
19	143°40.1	78°13.0	22°22.5	208°14.4	-22°42.0	276°21.6	-16°20.9	223°55.2	-22°14.6
20	158°42.5	93°12.2	22°23.1	223°15.6	-22°41.9	291°24.4	-16°20.8	238°57.7	-22°14.6
21	173°45.0	108°11.5	22°23.8	238°16.8	-22°41.8	306°27.2	-16°20.7	254°00.2	-22°14.6
22	188°47.5	123°10.7	22°24.4	253°18.0	-22°41.7	321°30.0	-16°20.6	269°02.7	-22°14.6
23	203°49.9	138°10.0	22°25.0	268°19.2	-22°41.6	336°32.7	-16°20.5	284°05.2	-22°14.6
Mer.pass.:9:26:		v-0.7 d0.6 m-3.8		v1.2 d0.1 m-0.4		v2.8 d0.1 m-2.4		v2.5 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.2
Ankaa	353°12.9	-42°12.5
Schedar	349°37.3	56°38.0
Diphda	348°52.8	-17°53.3
Achernar	335°25.0	-57°08.8
Hamal	327°57.4	23°32.7
Polaris	316°47.1	89°20.4
Akamar	315°16.3	-40°14.2
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.2
Capella	280°30.0	46°00.9
Bellatrix	278°28.7	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.0	-52°42.8
Sirius	258°30.9	-16°44.6
Adara	255°10.1	-29°00.2
Procyon	244°56.3	5°10.6
Pollux	243°23.7	27°58.9
Avior	234°16.7	-59°34.5
Suhail	222°50.0	-43°30.7
Miaplacidus	221°38.8	-69°47.9
Alphard	217°52.8	-8°44.5
Regulus	207°39.9	11°52.6
Dubhe	193°47.3	61°39.4
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.7
Acrux	173°05.0	-63°12.1
Gacrux	171°56.7	-57°13.0
Alioth	166°17.4	55°51.8
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.5
Hadar	148°42.5	-60°27.6
Menkent	148°03.3	-36°27.5
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.6	-60°54.5
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.0	74°04.9
Alphecca	126°07.9	26°39.3
Antares	112°21.9	-26°28.2
Atria	107°20.3	-69°03.3
Sabik	102°08.5	-15°44.7
Shaula	96°17.2	-37°06.8
Rasalhague	96°03.2	12°32.9
Etamin	90°44.3	51°29.1
Kaus Aust.	83°39.2	-34°22.3
Vega	80°36.6	38°47.9
Nunki	75°54.1	-26°16.2
Altair	62°05.1	8°54.9
Peacock	53°14.1	-56°40.2
Deneb	49°29.2	45°20.5
Enif	33°44.0	9°57.4
Alnair	27°39.9	-46°52.2
Fomalhaut	15°20.7	-29°31.5
Scheat	13°50.4	28°10.6
Markab	13°35.3	15°18.0

2018/4/2	**SHA**	**Mer.pass**
Venus	298°07.2	13:45
Mars	66°00.1	05:12
Jupiter	132°20.9	00:47
Saturn	80°11.8	04:15

2018/4/2	**SHA**	**Mer.pass**
Venus	296°50.7	13:46
Mars	65°29.2	05:10
Jupiter	132°28.2	00:42
Saturn	80°12.9	04:11

2018/4/3	**SHA**	**Mer.pass**
Venus	295°33.9	13:47
Mars	64°58.5	05:08
Jupiter	132°35.6	00:38
Saturn	80°14.1	04:07

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°36.5	14°03.9	22°26.1	12.2	-0°58.4	-11.7	57.4
1	195°36.6	14°04.7	36°57.3	12.2	-1°10.1	-11.7	57.3
2	210°36.7	14°05.5	51°28.5	12.2	-1°21.7	-11.6	57.3
3	225°36.8	14°06.3	65°59.8	12.2	-1°33.4	-11.6	57.3
4	240°36.9	14°07.1	80°31.0	12.3	-1°45.0	-11.6	57.3
5	255°37.0	14°07.8	95°02.3	12.3	-1°56.6	-11.6	57.2
6	270°37.1	14°08.6	109°33.5	12.3	-2°08.2	-11.6	57.2
7	285°37.2	14°09.4	124°04.8	12.3	-2°19.7	-11.6	57.2
8	300°37.3	14°10.2	138°36.1	12.3	-2°31.3	-11.5	57.2
9	315°37.4	14°11.0	153°07.4	12.3	-2°42.8	-11.5	57.2
10	330°37.5	14°11.8	167°38.8	12.3	-2°54.3	-11.5	57.1
11	345°37.5	14°12.6	182°10.1	12.3	-3°05.8	-11.5	57.1
12	0°37.6	14°13.3	196°41.4	12.3	-3°17.3	-11.5	57.1
13	15°37.7	14°14.1	211°12.8	12.4	-3°28.7	-11.4	57.1
14	30°37.8	14°14.9	225°44.2	12.4	-3°40.1	-11.4	57.1
15	45°37.9	14°15.7	240°15.5	12.4	-3°51.5	-11.4	57.0
16	60°38.0	14°16.5	254°46.9	12.4	-4°02.9	-11.4	57.0
17	75°38.1	14°17.3	269°18.3	12.4	-4°14.2	-11.3	57.0
18	90°38.2	14°18.0	283°49.7	12.4	-4°25.5	-11.3	57.0
19	105°38.3	14°18.8	298°21.1	12.4	-4°36.8	-11.3	57.0
20	120°38.4	14°19.6	312°52.5	12.4	-4°48.1	-11.2	56.9
21	135°38.5	14°20.4	327°23.9	12.4	-4°59.3	-11.2	56.9
22	150°38.5	14°21.2	341°55.3	12.4	-5°10.5	-11.2	56.9
23	165°38.6	14°21.9	356°26.7	12.4	-5°21.6	-11.1	56.9
	SD.=15.9	d=0.8			S.D.=15.6		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°38.7	14°22.7	10°58.2	12.4	-5°32.8	-11.1	56.8
1	195°38.8	14°23.5	25°29.6	12.4	-5°43.8	-11.1	56.8
2	210°38.9	14°24.3	40°01.0	12.4	-5°54.9	-11.0	56.8
3	225°39.0	14°25.0	54°32.5	12.4	-6°05.9	-11.0	56.8
4	240°39.1	14°25.8	69°03.9	12.4	-6°16.9	-11.0	56.8
5	255°39.2	14°26.6	83°35.3	12.4	-6°27.8	-10.9	56.7
6	270°39.2	14°27.4	98°06.8	12.4	-6°38.7	-10.9	56.7
7	285°39.3	14°28.2	112°38.2	12.4	-6°49.6	-10.8	56.7
8	300°39.4	14°28.9	127°09.6	12.4	-7°00.4	-10.8	56.7
9	315°39.5	14°29.7	141°41.1	12.4	-7°11.2	-10.8	56.7
10	330°39.6	14°30.5	156°12.5	12.4	-7°21.9	-10.7	56.6
11	345°39.7	14°31.3	170°43.9	12.4	-7°32.6	-10.7	56.6
12	0°39.8	14°32.0	185°15.4	12.4	-7°43.3	-10.6	56.6
13	15°39.9	14°32.8	199°46.8	12.4	-7°53.9	-10.6	56.6
14	30°39.9	14°33.6	214°18.2	12.4	-8°04.4	-10.5	56.5
15	45°40.0	14°34.4	228°49.6	12.4	-8°14.9	-10.5	56.5
16	60°40.1	14°35.1	243°21.1	12.4	-8°25.4	-10.4	56.5
17	75°40.2	14°35.9	257°52.5	12.4	-8°35.8	-10.4	56.5
18	90°40.3	14°36.7	272°23.9	12.4	-8°46.2	-10.3	56.5
19	105°40.4	14°37.4	286°55.3	12.4	-8°56.5	-10.3	56.4
20	120°40.5	14°38.2	301°26.7	12.4	-9°06.8	-10.2	56.4
21	135°40.5	14°39.0	315°58.1	12.4	-9°17.0	-10.2	56.4
22	150°40.6	14°39.8	330°29.5	12.4	-9°27.1	-10.1	56.4
23	165°40.7	14°40.5	345°00.9	12.4	-9°37.2	-10.1	56.3
	SD.=15.9	d=0.8			S.D.=15.5		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°40.8	14°41.3	359°32.3	12.4	-9°47.3	-10.0	56.3
1	195°40.9	14°42.1	14°03.6	12.4	-9°57.3	-10.0	56.3
2	210°41.0	14°42.8	28°35.0	12.4	-10°07.2	-9.9	56.3
3	225°41.0	14°43.6	43°06.3	12.4	-10°17.1	-9.9	56.3
4	240°41.1	14°44.4	57°37.7	12.3	-10°27.0	-9.8	56.2
5	255°41.2	14°45.1	72°09.0	12.3	-10°36.7	-9.7	56.2
6	270°41.3	14°45.9	86°40.4	12.3	-10°46.5	-9.7	56.2
7	285°41.4	14°46.7	101°11.7	12.3	-10°56.1	-9.6	56.2
8	300°41.5	14°47.4	115°43.0	12.3	-11°05.7	-9.6	56.1
9	315°41.5	14°48.2	130°14.3	12.3	-11°15.3	-9.5	56.1
10	330°41.6	14°49.0	144°45.6	12.3	-11°24.7	-9.4	56.1
11	345°41.7	14°49.7	159°16.9	12.3	-11°34.1	-9.4	56.1
12	0°41.8	14°50.5	173°48.2	12.3	-11°43.5	-9.3	56.1
13	15°41.9	14°51.3	188°19.4	12.3	-11°52.8	-9.3	56.0
14	30°41.9	14°52.0	202°50.7	12.3	-12°02.0	-9.2	56.0
15	45°42.0	14°52.8	217°21.9	12.2	-12°11.2	-9.1	56.0
16	60°42.1	14°53.5	231°53.2	12.2	-12°20.3	-9.1	56.0
17	75°42.2	14°54.3	246°24.4	12.2	-12°29.3	-9.0	55.9
18	90°42.3	14°55.1	260°55.6	12.2	-12°38.3	-8.9	55.9
19	105°42.3	14°55.8	275°26.8	12.2	-12°47.1	-8.9	55.9
20	120°42.4	14°56.6	289°58.0	12.2	-12°56.0	-8.8	55.9
21	135°42.5	14°57.3	304°29.2	12.2	-13°04.7	-8.7	55.9
22	150°42.6	14°58.1	319°00.3	12.2	-13°13.4	-8.7	55.8
23	165°42.7	14°58.9	333°31.5	12.1	-13°22.0	-8.6	55.8
	SD.=15.9	d=0.8			S.D.=15.4		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	02:09	21:52	–:–	–:–
70	–:–	–:–	02:43	21:16	–:–	–:–
68	–:–	01:28	03:07	20:51	22:35	–:–
66	–:–	02:08	03:26	20:32	21:52	–:–
64	–:–	02:35	03:41	20:16	21:23	–:–
62	01:17	02:55	03:53	20:03	21:02	22:45
60	01:54	03:12	04:04	19:53	20:45	22:05
58	02:19	03:26	04:13	19:43	20:31	21:39
56	02:38	03:37	04:21	19:35	20:19	21:19
54	02:54	03:47	04:28	19:28	20:09	21:03
52	03:07	03:56	04:35	19:21	19:60	20:50
50	03:18	04:04	04:40	19:15	19:52	20:38
45	03:41	04:21	04:53	19:03	19:35	20:15
40	03:58	04:34	05:03	18:52	19:22	19:57
35	04:12	04:45	05:12	18:44	19:11	19:43
30	04:24	04:54	05:19	18:36	19:01	19:31
20	04:42	05:09	05:32	18:23	18:46	19:13
10	04:56	05:22	05:43	18:11	18:33	18:59
0	05:08	05:33	05:54	18:01	18:22	18:47
-10	05:18	05:43	06:04	17:50	18:12	18:37
-20	05:26	05:53	06:15	17:39	18:02	18:28
-30	05:35	06:03	06:28	17:27	17:51	18:20
-35	05:39	06:09	06:35	17:20	17:46	18:16
-40	05:43	06:15	06:43	17:11	17:39	18:11
-45	05:47	06:22	06:52	17:02	17:33	18:07
-50	05:51	06:29	07:03	16:51	17:25	18:03
-52	05:53	06:33	07:09	16:45	17:21	18:01
-54	05:55	06:37	07:14	16:40	17:17	17:59
-56	05:57	06:41	07:21	16:33	17:13	17:57
-58	05:59	06:46	07:28	16:26	17:08	17:55
-60	06:01	06:51	07:36	16:18	17:03	17:52

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	18:02	19:54	21:51	04:15	04:03	03:49
70	17:55	19:39	21:24	04:17	04:12	04:06
68	17:50	19:27	21:04	04:19	04:19	04:19
66	17:45	19:17	20:48	04:21	04:25	04:30
64	17:41	19:09	20:36	04:23	04:31	04:40
62	17:38	19:02	20:25	04:24	04:35	04:48
60	17:35	18:56	20:16	04:25	04:39	04:55
58	17:33	18:51	20:08	04:26	04:43	05:01
56	17:30	18:46	20:01	04:27	04:46	05:06
54	17:28	18:42	19:54	04:28	04:49	05:11
52	17:27	18:39	19:49	04:29	04:51	05:15
50	17:25	18:35	19:44	04:29	04:54	05:19
45	17:21	18:28	19:33	04:31	04:59	05:28
40	17:18	18:22	19:24	04:32	05:03	05:35
35	17:16	18:16	19:16	04:33	05:07	05:42
30	17:14	18:12	19:09	04:34	05:10	05:47
20	17:10	18:04	18:58	04:36	05:16	05:57
10	17:07	17:57	18:47	04:37	05:21	06:05
0	17:03	17:51	18:38	04:39	05:26	06:13
-10	17:00	17:44	18:29	04:40	05:31	06:21
-20	16:57	17:37	18:19	04:41	05:36	06:30
-30	16:53	17:30	18:07	04:43	05:42	06:40
-35	16:51	17:25	18:01	04:44	05:45	06:45
-40	16:49	17:20	17:53	04:45	05:49	06:52
-45	16:46	17:15	17:45	04:46	05:53	06:59
-50	16:43	17:08	17:35	04:48	05:59	07:08
-52	16:42	17:05	17:30	04:48	06:01	07:12
-54	16:40	17:01	17:25	04:49	06:04	07:17
-56	16:38	16:58	17:19	04:50	06:07	07:22
-58	16:36	16:53	17:12	04:51	06:10	07:28
-60	16:34	16:49	17:05	04:52	06:14	07:34

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
28	02:26	02:31	11:57	23:14	10:51	12(97%)
29	02:35	02:39	11:57	00:01	11:38	13(99%)
30	02:43	02:47	11:57	00:01	12:25	14(100%)

May 01, 02 ,03 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	218°52.4	153°09.2	22°25.6	283°20.4	-22°41.5	351°35.5	-16°20.5	299°07.8	-22°14.6
1	233°54.9	168°08.5	22°26.2	298°21.6	-22°41.4	6°38.3	-16°20.4	314°10.3	-22°14.6
2	248°57.3	183°07.7	22°26.8	313°22.9	-22°41.3	21°41.1	-16°20.3	329°12.8	-22°14.6
3	263°59.8	198°07.0	22°27.4	328°24.1	-22°41.2	36°43.8	-16°20.2	344°15.3	-22°14.6
4	279°02.2	213°06.2	22°28.0	343°25.3	-22°41.1	51°46.6	-16°20.1	359°17.8	-22°14.6
5	294°04.7	228°05.5	22°28.6	358°26.5	-22°41.0	66°49.4	-16°20.1	14°20.4	-22°14.7
6	309°07.2	243°04.7	22°29.2	13°27.7	-22°40.9	81°52.2	-16°20.0	29°22.9	-22°14.7
7	324°09.6	258°04.0	22°29.8	28°28.9	-22°40.8	96°54.9	-16°19.9	44°25.4	-22°14.7
8	339°12.1	273°03.2	22°30.4	43°30.1	-22°40.7	111°57.7	-16°19.8	59°27.9	-22°14.7
9	354°14.6	288°02.5	22°31.0	58°31.3	-22°40.6	127°00.5	-16°19.7	74°30.5	-22°14.7
10	9°17.0	303°01.7	22°31.6	73°32.5	-22°40.5	142°03.3	-16°19.6	89°33.0	-22°14.7
11	24°19.5	318°01.0	22°32.1	88°33.7	-22°40.4	157°06.1	-16°19.6	104°35.5	-22°14.7
12	39°22.0	333°00.2	22°32.7	103°34.9	-22°40.3	172°08.8	-16°19.5	119°38.0	-22°14.7
13	54°24.4	347°59.5	22°33.3	118°36.1	-22°40.2	187°11.6	-16°19.4	134°40.5	-22°14.7
14	69°26.9	2°58.7	22°33.9	133°37.3	-22°40.1	202°14.4	-16°19.3	149°43.1	-22°14.7
15	84°29.4	17°58.0	22°34.5	148°38.5	-22°40.0	217°17.2	-16°19.2	164°45.6	-22°14.7
16	99°31.8	32°57.2	22°35.1	163°39.7	-22°39.9	232°19.9	-16°19.1	179°48.1	-22°14.7
17	114°34.3	47°56.4	22°35.7	178°40.9	-22°39.8	247°22.7	-16°19.1	194°50.6	-22°14.7
18	129°36.7	62°55.7	22°36.3	193°42.2	-22°39.7	262°25.5	-16°19.0	209°53.2	-22°14.7
19	144°39.2	77°54.9	22°36.8	208°43.4	-22°39.6	277°28.3	-16°18.9	224°55.7	-22°14.7
20	159°41.7	92°54.2	22°37.4	223°44.6	-22°39.4	292°31.0	-16°18.8	239°58.2	-22°14.7
21	174°44.1	107°53.4	22°38.0	238°45.8	-22°39.3	307°33.8	-16°18.7	255°00.7	-22°14.7
22	189°46.6	122°52.7	22°38.6	253°47.0	-22°39.2	322°36.6	-16°18.6	270°03.2	-22°14.7
23	204°49.1	137°51.9	22°39.2	268°48.2	-22°39.1	337°39.4	-16°18.6	285°05.8	-22°14.7
Mer.pass.:9:22:		v-0.7 d0.6 m-3.8		v1.2 d0.1 m-0.4		v2.8 d0.1 m-2.4		v2.5 d-0.0 m0.3	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	219°51.5	152°51.1	22°39.7	283°49.4	-22°39.0	352°42.2	-16°18.5	300°08.3	-22°14.7
1	234°54.0	167°50.4	22°40.3	298°50.6	-22°38.9	7°44.9	-16°18.4	315°10.8	-22°14.7
2	249°56.5	182°49.6	22°40.9	313°51.8	-22°38.8	22°47.7	-16°18.3	330°13.3	-22°14.7
3	264°58.9	197°48.9	22°41.5	328°53.1	-22°38.7	37°50.5	-16°18.2	345°15.9	-22°14.7
4	280°01.4	212°48.1	22°42.1	343°54.3	-22°38.6	52°53.3	-16°18.1	0°18.4	-22°14.7
5	295°03.9	227°47.3	22°42.6	358°55.5	-22°38.5	67°56.1	-16°18.1	15°20.9	-22°14.7
6	310°06.3	242°46.6	22°43.2	13°56.7	-22°38.4	82°58.8	-16°18.0	30°23.4	-22°14.7
7	325°08.8	257°45.8	22°43.8	28°57.9	-22°38.3	98°01.6	-16°17.9	45°26.0	-22°14.7
8	340°11.2	272°45.1	22°44.3	43°59.1	-22°38.2	113°04.4	-16°17.8	60°28.5	-22°14.7
9	355°13.7	287°44.3	22°44.9	59°00.4	-22°38.1	128°07.2	-16°17.7	75°31.0	-22°14.8
10	10°16.2	302°43.5	22°45.5	74°01.6	-22°38.0	143°09.9	-16°17.6	90°33.5	-22°14.8
11	25°18.6	317°42.8	22°46.0	89°02.8	-22°37.9	158°12.7	-16°17.6	105°36.1	-22°14.8
12	40°21.1	332°42.0	22°46.6	104°04.0	-22°37.8	173°15.5	-16°17.5	120°38.6	-22°14.8
13	55°23.6	347°41.3	22°47.2	119°05.2	-22°37.7	188°18.3	-16°17.4	135°41.1	-22°14.8
14	70°26.0	2°40.5	22°47.7	134°06.4	-22°37.6	203°21.1	-16°17.3	150°43.6	-22°14.8
15	85°28.5	17°39.7	22°48.3	149°07.7	-22°37.5	218°23.8	-16°17.2	165°46.2	-22°14.8
16	100°31.0	32°39.0	22°48.9	164°08.9	-22°37.4	233°26.6	-16°17.1	180°48.7	-22°14.8
17	115°33.4	47°38.2	22°49.4	179°10.1	-22°37.3	248°29.4	-16°17.1	195°51.2	-22°14.8
18	130°35.9	62°37.4	22°50.0	194°11.3	-22°37.2	263°32.2	-16°17.0	210°53.8	-22°14.8
19	145°38.3	77°36.7	22°50.5	209°12.5	-22°37.1	278°35.0	-16°16.9	225°56.3	-22°14.8
20	160°40.8	92°35.9	22°51.1	224°13.8	-22°37.0	293°37.7	-16°16.8	240°58.8	-22°14.8
21	175°43.3	107°35.1	22°51.6	239°15.0	-22°36.9	308°40.5	-16°16.7	256°01.3	-22°14.8
22	190°45.7	122°34.4	22°52.2	254°16.2	-22°36.8	323°43.3	-16°16.6	271°03.9	-22°14.8
23	205°48.2	137°33.6	22°52.8	269°17.4	-22°36.7	338°46.1	-16°16.6	286°06.4	-22°14.8
Mer.pass.:9:19:		v-0.8 d0.6 m-3.8		v1.2 d0.1 m-0.4		v2.8 d0.1 m-2.4		v2.5 d-0.0 m0.3	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	220°50.7	152°32.8	22°53.3	284°18.7	-22°36.6	353°48.8	-16°16.5	301°08.9	-22°14.8
1	235°53.1	167°32.1	22°53.9	299°19.9	-22°36.5	8°51.6	-16°16.4	316°11.5	-22°14.8
2	250°55.6	182°31.3	22°54.4	314°21.1	-22°36.4	23°54.4	-16°16.3	331°14.0	-22°14.8
3	265°58.1	197°30.5	22°55.0	329°22.3	-22°36.3	38°57.2	-16°16.2	346°16.5	-22°14.8
4	281°00.5	212°29.8	22°55.5	344°23.6	-22°36.2	53°60.0	-16°16.1	1°19.0	-22°14.8
5	296°03.0	227°29.0	22°56.0	359°24.8	-22°36.1	69°02.7	-16°16.1	16°21.6	-22°14.8
6	311°05.5	242°28.2	22°56.6	14°26.0	-22°36.0	84°05.5	-16°16.0	31°24.1	-22°14.8
7	326°07.9	257°27.5	22°57.1	29°27.2	-22°35.9	99°08.3	-16°15.9	46°26.6	-22°14.8
8	341°10.4	272°26.7	22°57.7	44°28.5	-22°35.8	114°11.1	-16°15.8	61°29.2	-22°14.8
9	356°12.8	287°25.9	22°58.2	59°29.7	-22°35.7	129°13.9	-16°15.7	76°31.7	-22°14.8
10	11°15.3	302°25.2	22°58.8	74°30.9	-22°35.6	144°16.6	-16°15.6	91°34.2	-22°14.9
11	26°17.8	317°24.4	22°59.3	89°32.2	-22°35.5	159°19.4	-16°15.6	106°36.7	-22°14.9
12	41°20.2	332°23.6	22°59.8	104°33.4	-22°35.4	174°22.2	-16°15.5	121°39.3	-22°14.9
13	56°22.7	347°22.8	23°00.4	119°34.6	-22°35.3	189°25.0	-16°15.4	136°41.8	-22°14.9
14	71°25.2	2°22.1	23°00.9	134°35.8	-22°35.2	204°27.8	-16°15.3	151°44.3	-22°14.9
15	86°27.6	17°21.3	23°01.5	149°37.1	-22°35.1	219°30.5	-16°15.2	166°46.9	-22°14.9
16	101°30.1	32°20.5	23°02.0	164°38.3	-22°35.0	234°33.3	-16°15.1	181°49.4	-22°14.9
17	116°32.6	47°19.8	23°02.5	179°39.5	-22°34.9	249°36.1	-16°15.1	196°51.9	-22°14.9
18	131°35.0	62°19.0	23°03.1	194°40.8	-22°34.8	264°38.9	-16°15.0	211°54.5	-22°14.9
19	146°37.5	77°18.2	23°03.6	209°42.0	-22°34.7	279°41.7	-16°14.9	226°57.0	-22°14.9
20	161°40.0	92°17.4	23°04.1	224°43.2	-22°34.6	294°44.4	-16°14.8	241°59.5	-22°14.9
21	176°42.4	107°16.7	23°04.6	239°44.5	-22°34.5	309°47.2	-16°14.7	257°02.1	-22°14.9
22	191°44.9	122°15.9	23°05.2	254°45.7	-22°34.4	324°50.0	-16°14.6	272°04.6	-22°14.9
23	206°47.3	137°15.1	23°05.7	269°46.9	-22°34.3	339°52.8	-16°14.6	287°07.1	-22°14.9
Mer.pass.:9:15:		v-0.8 d0.6 m-3.8		v1.2 d0.1 m-0.4		v2.8 d0.1 m-2.4		v2.5 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.2
Ankaa	353°12.8	-42°12.4
Schedar	349°37.2	56°38.0
Diphda	348°52.8	-17°53.3
Achernar	335°25.0	-57°08.7
Hamal	327°57.4	23°32.7
Polaris	316°47.0	89°20.4
Akamar	315°16.3	-40°14.1
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.2
Capella	280°30.0	46°00.9
Bellatrix	278°28.7	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.0	-52°42.7
Sirius	258°30.9	-16°44.6
Adara	255°10.1	-29°00.2
Procyon	244°56.3	5°10.6
Pollux	243°23.8	27°58.8
Avior	234°16.7	-59°34.5
Suhail	222°50.0	-43°30.7
Miaplacidus	221°38.9	-69°47.9
Alphard	217°52.8	-8°44.5
Regulus	207°39.9	11°52.6
Dubhe	193°47.4	61°39.4
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.7
Acrux	173°05.0	-63°12.1
Gacrux	171°56.7	-57°13.0
Alioth	166°17.4	55°51.8
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.5
Hadar	148°42.5	-60°27.6
Menkent	148°03.3	-36°27.5
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.6	-60°54.5
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.0	74°04.9
Alphecca	126°07.9	26°39.3
Antares	112°21.9	-26°28.2
Atria	107°20.3	-69°03.3
Sabik	102°08.5	-15°44.7
Shaula	96°17.2	-37°06.8
Rasalhague	96°03.2	12°32.9
Etamin	90°44.3	51°29.1
Kaus Aust.	83°39.2	-34°22.3
Vega	80°36.5	38°47.9
Nunki	75°54.1	-26°16.2
Altair	62°05.0	8°54.9
Peacock	53°14.1	-56°40.2
Deneb	49°29.2	45°20.5
Enif	33°44.0	9°57.4
Alnair	27°39.8	-46°52.1
Fomalhaut	15°20.7	-29°31.5
Scheat	13°50.4	28°10.6
Markab	13°35.3	15°18.0

2018/5/1	**SHA**	**Mer.pass**
Venus	294°16.8	13:48
Mars	64°28.1	05:06
Jupiter	132°43.1	00:34
Saturn	80°15.4	04:03

2018/5/2	**SHA**	**Mer.pass**
Venus	292°59.6	13:49
Mars	63°57.9	05:04
Jupiter	132°50.6	00:29
Saturn	80°16.8	03:59

2018/5/3	**SHA**	**Mer.pass**
Venus	291°42.2	13:51
Mars	63°28.0	05:02
Jupiter	132°58.2	00:25
Saturn	80°18.3	03:55

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°42.7	14°59.6	348°02.6	12.1	-13°30.6	-8.5	55.8
1	195°42.8	15°00.4	2°33.8	12.1	-13°39.1	-8.4	55.8
2	210°42.9	15°01.1	17°04.9	12.1	-13°47.5	-8.4	55.8
3	225°43.0	15°01.9	31°36.0	12.1	-13°55.8	-8.3	55.7
4	240°43.0	15°02.7	46°07.1	12.1	-14°04.1	-8.2	55.7
5	255°43.1	15°03.4	60°38.2	12.1	-14°12.2	-8.1	55.7
6	270°43.2	15°04.2	75°09.2	12.1	-14°20.4	-8.1	55.7
7	285°43.3	15°04.9	89°40.3	12.1	-14°28.4	-8.0	55.6
8	300°43.3	15°05.7	104°11.4	12.0	-14°36.4	-7.9	55.6
9	315°43.4	15°06.4	118°42.4	12.0	-14°44.2	-7.8	55.6
10	330°43.5	15°07.2	133°13.4	12.0	-14°52.0	-7.8	55.6
11	345°43.6	15°07.9	147°44.4	12.0	-14°59.8	-7.7	55.6
12	0°43.6	15°08.7	162°15.4	12.0	-15°07.4	-7.6	55.5
13	15°43.7	15°09.5	176°46.4	12.0	-15°15.0	-7.5	55.5
14	30°43.8	15°10.2	191°17.4	12.0	-15°22.5	-7.5	55.5
15	45°43.9	15°11.0	205°48.3	12.0	-15°29.9	-7.4	55.5
16	60°43.9	15°11.7	220°19.3	11.9	-15°37.3	-7.3	55.5
17	75°44.0	15°12.5	234°50.2	11.9	-15°44.5	-7.2	55.4
18	90°44.1	15°13.2	249°21.1	11.9	-15°51.7	-7.1	55.4
19	105°44.2	15°14.0	263°52.0	11.9	-15°58.8	-7.1	55.4
20	120°44.2	15°14.7	278°22.9	11.9	-16°05.8	-7.0	55.4
21	135°44.3	15°15.5	292°53.8	11.9	-16°12.7	-6.9	55.4
22	150°44.4	15°16.2	307°24.7	11.9	-16°19.6	-6.8	55.3
23	165°44.5	15°17.0	321°55.5	11.9	-16°26.3	-6.7	55.3
	SD.=15.9	d=0.8	S.D.=15.2				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°44.5	15°17.7	336°26.4	11.8	-16°33.0	-6.6	55.3
1	195°44.6	15°18.5	350°57.2	11.8	-16°39.6	-6.6	55.3
2	210°44.7	15°19.2	5°28.0	11.8	-16°46.1	-6.5	55.3
3	225°44.7	15°20.0	19°58.8	11.8	-16°52.6	-6.4	55.2
4	240°44.8	15°20.7	34°29.6	11.8	-16°58.9	-6.3	55.2
5	255°44.9	15°21.4	49°00.4	11.8	-17°05.2	-6.2	55.2
6	270°45.0	15°22.2	63°31.2	11.8	-17°11.3	-6.1	55.2
7	285°45.0	15°22.9	78°02.0	11.8	-17°17.4	-6.0	55.2
8	300°45.1	15°23.7	92°32.7	11.7	-17°23.4	-6.0	55.1
9	315°45.2	15°24.4	107°03.5	11.7	-17°29.3	-5.9	55.1
10	330°45.2	15°25.2	121°34.2	11.7	-17°35.1	-5.8	55.1
11	345°45.3	15°25.9	136°04.9	11.7	-17°40.9	-5.7	55.1
12	0°45.4	15°26.7	150°35.6	11.7	-17°46.5	-5.6	55.1
13	15°45.5	15°27.4	165°06.3	11.7	-17°52.1	-5.5	55.1
14	30°45.5	15°28.1	179°37.0	11.7	-17°57.5	-5.4	55.0
15	45°45.6	15°28.9	194°07.7	11.7	-18°02.9	-5.3	55.0
16	60°45.7	15°29.6	208°38.4	11.7	-18°08.2	-5.2	55.0
17	75°45.7	15°30.4	223°09.0	11.7	-18°13.4	-5.2	55.0
18	90°45.8	15°31.1	237°39.7	11.7	-18°18.5	-5.1	55.0
19	105°45.9	15°31.8	252°10.4	11.6	-18°23.5	-5.0	54.9
20	120°45.9	15°32.6	266°41.0	11.6	-18°28.4	-4.9	54.9
21	135°46.0	15°33.3	281°11.6	11.6	-18°33.3	-4.8	54.9
22	150°46.1	15°34.1	295°42.2	11.6	-18°38.0	-4.7	54.9
23	165°46.1	15°34.8	310°12.9	11.6	-18°42.6	-4.6	54.9
	SD.=15.9	d=0.7	S.D.=15.1				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°46.2	15°35.5	324°43.5	11.6	-18°47.2	-4.5	54.9
1	195°46.3	15°36.3	339°14.1	11.6	-18°51.7	-4.4	54.8
2	210°46.3	15°37.0	353°44.7	11.6	-18°56.0	-4.3	54.8
3	225°46.4	15°37.8	8°15.3	11.6	-19°00.3	-4.2	54.8
4	240°46.5	15°38.5	22°45.9	11.6	-19°04.5	-4.1	54.8
5	255°46.5	15°39.2	37°16.4	11.6	-19°08.6	-4.0	54.8
6	270°46.6	15°40.0	51°47.0	11.6	-19°12.6	-3.9	54.8
7	285°46.7	15°40.7	66°17.6	11.6	-19°16.5	-3.9	54.8
8	300°46.7	15°41.4	80°48.1	11.6	-19°20.3	-3.8	54.7
9	315°46.8	15°42.2	95°18.7	11.6	-19°24.0	-3.7	54.7
10	330°46.9	15°42.9	109°49.3	11.6	-19°27.6	-3.6	54.7
11	345°46.9	15°43.6	124°19.8	11.6	-19°31.1	-3.5	54.7
12	0°47.0	15°44.4	138°50.4	11.5	-19°34.6	-3.4	54.7
13	15°47.0	15°45.1	153°20.9	11.5	-19°37.9	-3.3	54.7
14	30°47.1	15°45.8	167°51.5	11.5	-19°41.1	-3.2	54.6
15	45°47.2	15°46.6	182°22.0	11.5	-19°44.3	-3.1	54.6
16	60°47.2	15°47.3	196°52.6	11.5	-19°47.3	-3.0	54.6
17	75°47.3	15°48.0	211°23.1	11.5	-19°50.3	-2.9	54.6
18	90°47.4	15°48.7	225°53.6	11.5	-19°53.1	-2.8	54.6
19	105°47.4	15°49.5	240°24.2	11.5	-19°55.9	-2.7	54.6
20	120°47.5	15°50.2	254°54.7	11.5	-19°58.5	-2.6	54.6
21	135°47.5	15°50.9	269°25.2	11.5	-20°01.1	-2.5	54.6
22	150°47.6	15°51.7	283°55.8	11.5	-20°03.6	-2.4	54.5
23	165°47.7	15°52.4	298°26.3	11.5	-20°05.9	-2.3	54.5
	SD.=15.9	d=0.7	S.D.=15.0				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	01:45	22:17	–:–	–:–
70	–:–	–:–	02:26	21:33	–:–	–:–
68	–:–	00:56	02:53	21:04	23:11	–:–
66	–:–	01:50	03:14	20:43	22:10	–:–
64	–:–	02:21	03:31	20:26	21:37	–:–
62	00:50	02:44	03:44	20:12	21:13	23:16
60	01:38	03:02	03:56	20:00	20:54	22:21
58	02:06	03:17	04:06	19:50	20:39	21:51
56	02:28	03:29	04:14	19:41	20:26	21:29
54	02:45	03:40	04:22	19:33	20:15	21:11
52	02:59	03:50	04:29	19:26	20:06	20:57
50	03:11	03:58	04:35	19:20	19:57	20:44
45	03:35	04:16	04:48	19:07	19:39	20:20
40	03:54	04:30	04:59	18:56	19:25	20:01
35	04:09	04:41	05:08	18:46	19:13	19:46
30	04:21	04:51	05:16	18:38	19:03	19:34
20	04:40	05:07	05:30	18:24	18:47	19:14
10	04:55	05:21	05:42	18:12	18:34	18:59
0	05:07	05:32	05:54	18:00	18:22	18:47
-10	05:18	05:43	06:05	17:49	18:11	18:36
-20	05:27	05:54	06:16	17:37	18:00	18:26
-30	05:36	06:05	06:30	17:24	17:49	18:17
-35	05:41	06:11	06:37	17:16	17:43	18:13
-40	05:45	06:17	06:46	17:08	17:36	18:08
-45	05:50	06:25	06:56	16:58	17:28	18:03
-50	05:55	06:34	07:08	16:45	17:20	17:58
-52	05:57	06:38	07:14	16:40	17:16	17:56
-54	05:60	06:42	07:20	16:33	17:11	17:53
-56	06:02	06:46	07:27	16:27	17:07	17:51
-58	06:05	06:52	07:34	16:19	17:02	17:48
-60	06:07	06:57	07:43	16:10	16:56	17:46

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	–:–	00:02	–:–	03:32	03:00	–:–
70	23:12	–:–	01:06	03:60	03:52	03:38
68	22:40	–:–	00:13	04:21	04:24	04:32
66	22:17	23:41	–:–	04:37	04:48	05:04
64	21:59	23:17	–:–	04:51	05:07	05:29
62	21:44	22:58	–:–	05:03	05:22	05:48
60	21:32	22:43	23:46	05:13	05:35	06:03
58	21:21	22:30	23:32	05:21	05:46	06:17
56	21:12	22:19	23:19	05:29	05:56	06:28
54	21:04	22:09	23:08	05:36	06:04	06:38
52	20:56	22:00	22:59	05:42	06:12	06:47
50	20:50	21:52	22:50	05:47	06:19	06:56
45	20:36	21:36	22:32	05:59	06:34	07:13
40	20:24	21:22	22:17	06:09	06:46	07:27
35	20:14	21:11	22:04	06:18	06:57	07:39
30	20:06	21:00	21:53	06:26	07:06	07:49
20	19:51	20:43	21:34	06:39	07:22	08:07
10	19:38	20:28	21:18	06:50	07:36	08:23
0	19:26	20:14	21:03	07:01	07:49	08:38
-10	19:14	20:00	20:48	07:12	08:02	08:52
-20	19:01	19:45	20:31	07:23	08:16	09:08
-30	18:47	19:28	20:13	07:36	08:32	09:26
-35	18:38	19:18	20:02	07:44	08:42	09:37
-40	18:29	19:07	19:50	07:53	08:52	09:49
-45	18:18	18:54	19:35	08:03	09:05	10:03
-50	18:04	18:38	19:17	08:16	09:20	10:20
-52	17:58	18:31	19:09	08:21	09:27	10:29
-54	17:51	18:22	18:59	08:28	09:35	10:38
-56	17:43	18:13	18:49	08:35	09:44	10:48
-58	17:35	18:02	18:37	08:43	09:54	11:00
-60	17:25	17:50	18:23	08:52	10:06	11:14

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
1	02:51	02:55	11:57	00:49	13:13	15(98%)
2	02:58	03:02	11:56	01:37	14:01	16(94%)
3	03:05	03:08	11:56	02:25	14:50	17(88%)

May 04, 05 ,06 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	221°49.8	152°14.3	23°06.2	284°48.2	-22°34.2	354°55.6	-16°14.5	302°09.7	-22°14.9
1	236°52.3	167°13.6	23°06.8	299°49.4	-22°34.1	9°58.4	-16°14.4	317°12.2	-22°14.9
2	251°54.7	182°12.8	23°07.3	314°50.7	-22°33.9	25°01.1	-16°14.3	332°14.7	-22°14.9
3	266°57.2	197°12.0	23°07.8	329°51.9	-22°33.8	40°03.9	-16°14.2	347°17.3	-22°14.9
4	281°59.7	212°11.2	23°08.3	344°53.1	-22°33.7	55°06.7	-16°14.1	2°19.8	-22°14.9
5	297°02.1	227°10.5	23°08.8	359°54.4	-22°33.6	70°09.5	-16°14.1	17°22.3	-22°14.9
6	312°04.6	242°09.7	23°09.4	14°55.6	-22°33.5	85°12.3	-16°14.0	32°24.9	-22°14.9
7	327°07.1	257°08.9	23°09.9	29°56.8	-22°33.4	100°15.0	-16°13.9	47°27.4	-22°14.9
8	342°09.5	272°08.1	23°10.4	44°58.1	-22°33.3	115°17.8	-16°13.8	62°29.9	-22°14.9
9	357°12.0	287°07.3	23°10.9	59°59.3	-22°33.2	130°20.6	-16°13.7	77°32.5	-22°14.9
10	12°14.5	302°06.6	23°11.4	75°00.6	-22°33.1	145°23.4	-16°13.6	92°35.0	-22°15.0
11	27°16.9	317°05.8	23°11.9	90°01.8	-22°33.0	160°26.2	-16°13.5	107°37.5	-22°15.0
12	42°19.4	332°05.0	23°12.4	105°03.0	-22°32.9	175°28.9	-16°13.5	122°40.1	-22°15.0
13	57°21.8	347°04.2	23°13.0	120°04.3	-22°32.8	190°31.7	-16°13.4	137°42.6	-22°15.0
14	72°24.3	2°03.5	23°13.5	135°05.5	-22°32.7	205°34.5	-16°13.3	152°45.1	-22°15.0
15	87°26.8	17°02.7	23°14.0	150°06.8	-22°32.6	220°37.3	-16°13.2	167°47.7	-22°15.0
16	102°29.2	32°01.9	23°14.5	165°08.0	-22°32.5	235°40.1	-16°13.1	182°50.2	-22°15.0
17	117°31.7	47°01.1	23°15.0	180°09.3	-22°32.4	250°42.9	-16°13.0	197°52.7	-22°15.0
18	132°34.2	62°00.3	23°15.5	195°10.5	-22°32.3	265°45.6	-16°13.0	212°55.3	-22°15.0
19	147°36.6	76°59.6	23°16.0	210°11.7	-22°32.2	280°48.4	-16°12.9	227°57.8	-22°15.0
20	162°39.1	91°58.8	23°16.5	225°13.0	-22°32.1	295°51.2	-16°12.8	243°00.3	-22°15.0
21	177°41.6	106°58.0	23°17.0	240°14.2	-22°32.0	310°54.0	-16°12.7	258°02.9	-22°15.0
22	192°44.0	121°57.2	23°17.5	255°15.5	-22°31.9	325°56.8	-16°12.6	273°05.4	-22°15.0
23	207°46.5	136°56.4	23°18.0	270°16.7	-22°31.8	340°59.5	-16°12.5	288°07.9	-22°15.0
Mer.pass.:9:11:		v-0.8 d0.5 m-3.8		v1.2 d0.1 m-0.5		v2.8 d0.1 m-2.4		v2.5 d-0.0 m0.3	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	222°48.9	151°55.6	23°18.5	285°18.0	-22°31.7	356°02.3	-16°12.5	303°10.5	-22°15.0
1	237°51.4	166°54.9	23°19.0	300°19.2	-22°31.6	11°05.1	-16°12.4	318°13.0	-22°15.0
2	252°53.9	181°54.1	23°19.5	315°20.5	-22°31.5	26°07.9	-16°12.3	333°15.6	-22°15.0
3	267°56.3	196°53.3	23°20.0	330°21.7	-22°31.4	41°10.7	-16°12.2	348°18.1	-22°15.0
4	282°58.8	211°52.5	23°20.5	345°23.0	-22°31.3	56°13.5	-16°12.1	3°20.6	-22°15.0
5	298°01.3	226°51.7	23°21.0	0°24.2	-22°31.2	71°16.2	-16°12.0	18°23.2	-22°15.0
6	313°03.7	241°50.9	23°21.5	15°25.5	-22°31.1	86°19.0	-16°11.9	33°25.7	-22°15.0
7	328°06.2	256°50.2	23°22.0	30°26.7	-22°31.0	101°21.8	-16°11.9	48°28.2	-22°15.0
8	343°08.7	271°49.4	23°22.5	45°28.0	-22°30.9	116°24.6	-16°11.8	63°30.8	-22°15.1
9	358°11.1	286°48.6	23°22.9	60°29.2	-22°30.8	131°27.4	-16°11.7	78°33.3	-22°15.1
10	13°13.6	301°47.8	23°23.4	75°30.5	-22°30.7	146°30.1	-16°11.6	93°35.9	-22°15.1
11	28°16.1	316°47.0	23°23.9	90°31.7	-22°30.6	161°32.9	-16°11.5	108°38.4	-22°15.1
12	43°18.5	331°46.2	23°24.4	105°33.0	-22°30.5	176°35.7	-16°11.4	123°40.9	-22°15.1
13	58°21.0	346°45.4	23°24.9	120°34.2	-22°30.4	191°38.5	-16°11.4	138°43.5	-22°15.1
14	73°23.4	1°44.7	23°25.4	135°35.5	-22°30.3	206°41.3	-16°11.3	153°46.0	-22°15.1
15	88°25.9	16°43.9	23°25.9	150°36.7	-22°30.2	221°44.1	-16°11.2	168°48.5	-22°15.1
16	103°28.4	31°43.1	23°26.3	165°38.0	-22°30.1	236°46.8	-16°11.1	183°51.1	-22°15.1
17	118°30.8	46°42.3	23°26.8	180°39.3	-22°30.0	251°49.6	-16°11.0	198°53.6	-22°15.1
18	133°33.3	61°41.5	23°27.3	195°40.5	-22°29.9	266°52.4	-16°10.9	213°56.2	-22°15.1
19	148°35.8	76°40.7	23°27.8	210°41.8	-22°29.8	281°55.2	-16°10.9	228°58.7	-22°15.1
20	163°38.2	91°39.9	23°28.2	225°43.0	-22°29.7	296°58.0	-16°10.8	244°01.2	-22°15.1
21	178°40.7	106°39.1	23°28.7	240°44.3	-22°29.6	312°00.7	-16°10.7	259°03.8	-22°15.1
22	193°43.2	121°38.3	23°29.2	255°45.5	-22°29.5	327°03.5	-16°10.6	274°06.3	-22°15.1
23	208°45.6	136°37.6	23°29.7	270°46.8	-22°29.4	342°06.3	-16°10.5	289°08.9	-22°15.1
Mer.pass.:9:07:		v-0.8 d0.5 m-3.8		v1.2 d0.1 m-0.5		v2.8 d0.1 m-2.4		v2.5 d-0.0 m0.3	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	223°48.1	151°36.8	23°30.1	285°48.1	-22°29.3	357°09.1	-16°10.4	304°11.4	-22°15.1
1	238°50.6	166°36.0	23°30.6	300°49.3	-22°29.2	12°11.9	-16°10.3	319°13.9	-22°15.1
2	253°53.0	181°35.2	23°31.1	315°50.6	-22°29.1	27°14.7	-16°10.3	334°16.5	-22°15.1
3	268°55.5	196°34.4	23°31.5	330°51.8	-22°29.0	42°17.4	-16°10.2	349°19.0	-22°15.1
4	283°57.9	211°33.6	23°32.0	345°53.1	-22°28.9	57°20.2	-16°10.1	4°21.6	-22°15.1
5	299°00.4	226°32.8	23°32.5	0°54.4	-22°28.8	72°23.0	-16°10.0	19°24.1	-22°15.2
6	314°02.9	241°32.0	23°32.9	15°55.6	-22°28.7	87°25.8	-16°09.9	34°26.7	-22°15.2
7	329°05.3	256°31.2	23°33.4	30°56.9	-22°28.6	102°28.6	-16°09.8	49°29.2	-22°15.2
8	344°07.8	271°30.4	23°33.9	45°58.2	-22°28.4	117°31.4	-16°09.8	64°31.7	-22°15.2
9	359°10.3	286°29.6	23°34.3	60°59.4	-22°28.3	132°34.1	-16°09.7	79°34.3	-22°15.2
10	14°12.7	301°28.8	23°34.8	76°00.7	-22°28.2	147°36.9	-16°09.6	94°36.8	-22°15.2
11	29°15.2	316°28.1	23°35.3	91°02.0	-22°28.1	162°39.7	-16°09.5	109°39.4	-22°15.2
12	44°17.7	331°27.3	23°35.7	106°03.2	-22°28.0	177°42.5	-16°09.4	124°41.9	-22°15.2
13	59°20.1	346°26.5	23°36.2	121°04.5	-22°27.9	192°45.3	-16°09.3	139°44.4	-22°15.2
14	74°22.6	1°25.7	23°36.6	136°05.7	-22°27.8	207°48.1	-16°09.3	154°47.0	-22°15.2
15	89°25.1	16°24.9	23°37.1	151°07.0	-22°27.7	222°50.8	-16°09.2	169°49.5	-22°15.2
16	104°27.5	31°24.1	23°37.5	166°08.3	-22°27.6	237°53.6	-16°09.1	184°52.1	-22°15.2
17	119°30.0	46°23.3	23°38.0	181°09.6	-22°27.5	252°56.4	-16°09.0	199°54.6	-22°15.2
18	134°32.4	61°22.5	23°38.4	196°10.8	-22°27.4	267°59.2	-16°08.9	214°57.2	-22°15.2
19	149°34.9	76°21.7	23°38.9	211°12.1	-22°27.3	283°02.0	-16°08.8	229°59.7	-22°15.2
20	164°37.4	91°20.9	23°39.3	226°13.4	-22°27.2	298°04.8	-16°08.7	245°02.3	-22°15.2
21	179°39.8	106°20.1	23°39.8	241°14.6	-22°27.1	313°07.5	-16°08.7	260°04.8	-22°15.2
22	194°42.3	121°19.3	23°40.2	256°15.9	-22°27.0	328°10.3	-16°08.6	275°07.3	-22°15.2
23	209°44.8	136°18.5	23°40.7	271°17.2	-22°26.9	343°13.1	-16°08.5	290°09.9	-22°15.2
Mer.pass.:9:03:		v-0.8 d0.5 m-3.9		v1.3 d0.1 m-0.5		v2.8 d0.1 m-2.4		v2.5 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°40.4	29°11.2
Ankaa	353°12.8	-42°12.4
Schedar	349°37.2	56°37.9
Diphda	348°52.8	-17°53.3
Achernar	335°25.0	-57°08.7
Hamal	327°57.4	23°32.7
Polaris	316°46.8	89°20.3
Akamar	315°16.3	-40°14.1
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.9
Bellatrix	278°28.7	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.0	-52°42.7
Sirius	258°30.9	-16°44.6
Adara	255°10.1	-29°00.2
Procyon	244°56.3	5°10.6
Pollux	243°23.8	27°58.8
Avior	234°16.8	-59°34.5
Suhail	222°50.0	-43°30.7
Miaplacidus	221°38.9	-69°47.9
Alphard	217°52.8	-8°44.5
Regulus	207°39.9	11°52.6
Dubhe	193°47.4	61°39.4
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.7
Acrux	173°05.0	-63°12.1
Gacrux	171°56.7	-57°13.1
Alioth	166°17.4	55°51.8
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.5
Hadar	148°42.5	-60°27.6
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.5	-60°54.5
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.0	74°05.0
Alphecca	126°07.9	26°39.3
Antares	112°21.9	-26°28.2
Atria	107°20.2	-69°03.3
Sabik	102°08.5	-15°44.7
Shaula	96°17.1	-37°06.8
Rasalhague	96°03.2	12°32.9
Etamin	90°44.2	51°29.1
Kaus Aust.	83°39.2	-34°22.3
Vega	80°36.5	38°47.9
Nunki	75°54.1	-26°16.2
Altair	62°05.0	8°54.9
Peacock	53°14.0	-56°40.2
Deneb	49°29.2	45°20.5
Enif	33°44.0	9°57.4
Alnair	27°39.8	-46°52.1
Fomalhaut	15°20.6	-29°31.5
Scheat	13°50.4	28°10.6
Markab	13°35.2	15°18.0

2018/5/4	**SHA**	**Mer.pass**
Venus	290°24.5	13:52
Mars	62°58.4	05:00
Jupiter	133°05.8	00:20
Saturn	80°19.8	03:51

2018/5/5	**SHA**	**Mer.pass**
Venus	289°06.7	13:53
Mars	62°29.0	04:58
Jupiter	133°13.4	00:16
Saturn	80°21.5	03:47

2018/5/6	**SHA**	**Mer.pass**
Venus	287°48.7	13:54
Mars	61°60.0	04:56
Jupiter	133°21.0	00:11
Saturn	80°23.3	03:43

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°47.7	15°53.1	312°56.9	11.5	-20°08.2	-2.2	54.5
1	195°47.8	15°53.8	327°27.4	11.5	-20°10.4	-2.1	54.5
2	210°47.8	15°54.6	341°58.0	11.5	-20°12.5	-2.0	54.5
3	225°47.9	15°55.3	356°28.5	11.5	-20°14.4	-1.9	54.5
4	240°48.0	15°56.0	10°59.1	11.6	-20°16.3	-1.8	54.5
5	255°48.0	15°56.7	25°29.6	11.6	-20°18.1	-1.7	54.5
6	270°48.1	15°57.5	40°00.2	11.6	-20°19.8	-1.6	54.5
7	285°48.1	15°58.2	54°30.7	11.6	-20°21.4	-1.5	54.4
8	300°48.2	15°58.9	69°01.3	11.6	-20°22.9	-1.5	54.4
9	315°48.3	15°59.6	83°31.9	11.6	-20°24.3	-1.4	54.4
10	330°48.3	16°00.4	98°02.4	11.6	-20°25.6	-1.3	54.4
11	345°48.4	16°01.1	112°33.0	11.6	-20°26.8	-1.2	54.4
12	0°48.4	16°01.8	127°03.6	11.6	-20°27.9	-1.1	54.4
13	15°48.5	16°02.5	141°34.2	11.6	-20°29.0	-1.0	54.4
14	30°48.6	16°03.3	156°04.8	11.6	-20°29.9	-0.9	54.4
15	45°48.6	16°04.0	170°35.4	11.6	-20°30.7	-0.8	54.4
16	60°48.7	16°04.7	185°06.0	11.6	-20°31.4	-0.7	54.4
17	75°48.7	16°05.4	199°36.7	11.6	-20°32.1	-0.6	54.3
18	90°48.8	16°06.1	214°07.3	11.6	-20°32.6	-0.5	54.3
19	105°48.8	16°06.8	228°37.9	11.6	-20°33.0	-0.4	54.3
20	120°48.9	16°07.6	243°08.6	11.7	-20°33.4	-0.3	54.3
21	135°48.9	16°08.3	257°39.2	11.7	-20°33.6	-0.2	54.3
22	150°49.0	16°09.0	272°09.9	11.7	-20°33.7	-0.1	54.3
23	165°49.1	16°09.7	286°40.6	11.7	-20°33.8	0.0	54.3
	SD.=15.9	d=0.7			S.D.=14.9		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°49.1	16°10.4	301°11.3	11.7	-20°33.7	0.1	54.3
1	195°49.2	16°11.1	315°42.0	11.7	-20°33.6	0.2	54.3
2	210°49.2	16°11.9	330°12.7	11.7	-20°33.4	0.3	54.3
3	225°49.3	16°12.6	344°43.4	11.7	-20°33.0	0.4	54.3
4	240°49.3	16°13.3	359°14.1	11.7	-20°32.6	0.5	54.3
5	255°49.4	16°14.0	13°44.9	11.8	-20°32.1	0.6	54.3
6	270°49.4	16°14.7	28°15.6	11.8	-20°31.4	0.7	54.3
7	285°49.5	16°15.4	42°46.4	11.8	-20°30.7	0.8	54.3
8	300°49.5	16°16.1	57°17.2	11.8	-20°29.9	0.9	54.3
9	315°49.6	16°16.9	71°48.0	11.8	-20°29.0	1.0	54.2
10	330°49.6	16°17.6	86°18.8	11.8	-20°28.0	1.1	54.2
11	345°49.7	16°18.3	100°49.6	11.8	-20°26.9	1.1	54.2
12	0°49.8	16°19.0	115°20.5	11.8	-20°25.7	1.2	54.2
13	15°49.8	16°19.7	129°51.3	11.9	-20°24.4	1.3	54.2
14	30°49.9	16°20.4	144°22.2	11.9	-20°23.0	1.4	54.2
15	45°49.9	16°21.1	158°53.1	11.9	-20°21.5	1.5	54.2
16	60°50.0	16°21.8	173°24.0	11.9	-20°20.0	1.6	54.2
17	75°50.0	16°22.5	187°54.9	11.9	-20°18.3	1.7	54.2
18	90°50.1	16°23.2	202°25.9	11.9	-20°16.5	1.8	54.2
19	105°50.1	16°23.9	216°56.8	12.0	-20°14.7	1.9	54.2
20	120°50.2	16°24.7	231°27.8	12.0	-20°12.7	2.0	54.2
21	135°50.2	16°25.4	245°58.8	12.0	-20°10.7	2.1	54.2
22	150°50.3	16°26.1	260°29.8	12.0	-20°08.5	2.2	54.2
23	165°50.3	16°26.8	275°00.8	12.0	-20°06.3	2.3	54.2
	SD.=15.9	d=0.7			S.D.=14.8		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°50.4	16°27.5	289°31.8	12.0	-20°04.0	2.4	54.2
1	195°50.4	16°28.2	304°02.9	12.1	-20°01.6	2.5	54.2
2	210°50.5	16°28.9	318°33.9	12.1	-19°59.1	2.5	54.2
3	225°50.5	16°29.6	333°05.0	12.1	-19°56.5	2.6	54.2
4	240°50.5	16°30.3	347°36.1	12.1	-19°53.8	2.7	54.2
5	255°50.6	16°31.0	2°07.3	12.1	-19°51.0	2.8	54.2
6	270°50.6	16°31.7	16°38.4	12.2	-19°48.2	2.9	54.2
7	285°50.7	16°32.4	31°09.6	12.2	-19°45.2	3.0	54.2
8	300°50.7	16°33.1	45°40.8	12.2	-19°42.2	3.1	54.2
9	315°50.8	16°33.8	60°12.0	12.2	-19°39.0	3.2	54.2
10	330°50.8	16°34.5	74°43.2	12.2	-19°35.8	3.3	54.2
11	345°50.9	16°35.2	89°14.4	12.3	-19°32.5	3.4	54.2
12	0°50.9	16°35.9	103°45.7	12.3	-19°29.1	3.5	54.2
13	15°51.0	16°36.6	118°17.0	12.3	-19°25.6	3.5	54.2
14	30°51.0	16°37.3	132°48.3	12.3	-19°22.0	3.6	54.2
15	45°51.1	16°38.0	147°19.6	12.3	-19°18.3	3.7	54.2
16	60°51.1	16°38.7	161°51.0	12.4	-19°14.5	3.8	54.2
17	75°51.1	16°39.4	176°22.3	12.4	-19°10.7	3.9	54.3
18	90°51.2	16°40.1	190°53.7	12.4	-19°06.7	4.0	54.3
19	105°51.2	16°40.8	205°25.1	12.4	-19°02.7	4.1	54.3
20	120°51.3	16°41.5	219°56.6	12.4	-18°58.6	4.2	54.3
21	135°51.3	16°42.2	234°28.0	12.5	-18°54.4	4.2	54.3
22	150°51.4	16°42.9	248°59.5	12.5	-18°50.1	4.3	54.3
23	165°51.4	16°43.6	263°31.0	12.5	-18°45.7	4.4	54.3
	SD.=15.9	d=0.7			S.D.=14.8		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	01:15	22:49	–:–	–:–
70	–:–	–:–	02:07	21:51	–:–	–:–
68	–:–	–:–	02:39	21:18	–:–	–:–
66	–:–	01:29	03:02	20:54	22:31	–:–
64	–:–	02:07	03:20	20:35	21:51	–:–
62	–:–	02:32	03:35	20:20	21:24	–:–
60	01:19	02:52	03:48	20:07	21:04	22:40
58	01:53	03:08	03:58	19:57	20:47	22:04
56	02:17	03:22	04:08	19:47	20:33	21:39
54	02:36	03:33	04:16	19:39	20:22	21:20
52	02:51	03:44	04:23	19:31	20:11	21:04
50	03:04	03:52	04:30	19:25	20:02	20:51
45	03:30	04:11	04:44	19:10	19:43	20:24
40	03:50	04:26	04:55	18:59	19:28	20:05
35	04:05	04:38	05:05	18:49	19:16	19:49
30	04:18	04:48	05:14	18:40	19:05	19:36
20	04:38	05:05	05:29	18:25	18:48	19:16
10	04:54	05:19	05:41	18:12	18:34	18:60
0	05:07	05:32	05:53	18:00	18:22	18:47
-10	05:18	05:43	06:05	17:48	18:10	18:35
-20	05:28	05:54	06:17	17:36	17:59	18:25
-30	05:38	06:06	06:31	17:22	17:47	18:15
-35	05:43	06:13	06:40	17:13	17:40	18:10
-40	05:48	06:20	06:49	17:04	17:33	18:05
-45	05:53	06:28	06:59	16:53	17:24	17:59
-50	05:59	06:38	07:12	16:40	17:15	17:54
-52	06:02	06:42	07:18	16:34	17:11	17:51
-54	06:04	06:47	07:25	16:28	17:06	17:48
-56	06:07	06:52	07:32	16:20	17:01	17:46
-58	06:10	06:57	07:41	16:12	16:55	17:43
-60	06:13	07:04	07:50	16:02	16:49	17:39

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	04:35	–:–	–:–	05:12
68	01:36	02:36	03:06	04:50	05:32	06:41
66	00:54	01:50	02:27	05:32	06:17	07:20
64	00:26	01:20	01:60	06:01	06:47	07:46
62	00:04	00:58	01:39	06:23	07:09	08:07
60	–:–	00:40	01:22	06:40	07:27	08:24
58	–:–	00:25	01:08	06:55	07:42	08:38
56	–:–	00:12	00:55	07:08	07:55	08:50
54	–:–	00:00	00:45	07:19	08:06	09:01
52	23:50	–:–	00:35	07:29	08:16	09:10
50	23:42	–:–	00:27	07:37	08:25	09:19
45	23:23	–:–	00:08	07:56	08:44	09:36
40	23:07	23:54	–:–	08:11	08:59	09:51
35	22:55	23:41	–:–	08:24	09:12	10:03
30	22:43	23:30	–:–	08:35	09:23	10:14
20	22:24	23:11	23:56	08:54	09:43	10:32
10	22:07	22:55	23:41	09:11	09:59	10:48
0	21:51	22:40	23:27	09:26	10:15	11:03
-10	21:36	22:24	23:13	09:42	10:30	11:18
-20	21:19	22:08	22:58	09:59	10:47	11:33
-30	20:60	21:49	22:40	10:18	11:06	11:51
-35	20:49	21:38	22:30	10:29	11:17	12:02
-40	20:36	21:26	22:19	10:42	11:30	12:14
-45	20:21	21:11	22:05	10:57	11:45	12:28
-50	20:02	20:53	21:48	11:15	12:03	12:45
-52	19:53	20:44	21:40	11:24	12:12	12:53
-54	19:43	20:34	21:32	11:34	12:22	13:02
-56	19:32	20:23	21:22	11:45	12:33	13:12
-58	19:20	20:11	21:10	11:57	12:45	13:24
-60	19:05	19:57	20:57	12:12	13:00	13:37

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
4	03:11	03:14	11:56	03:14	15:38	18(82%)
5	03:16	03:19	11:56	04:03	16:27	19(74%)
6	03:21	03:24	11:56	04:51	17:14	20(65%)

May 07, 08 ,09 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	224°47.2	151°17.7	23°41.1	286°18.4	-22°26.8	358°15.9	-16°08.4	305°12.4	-22°15.2
1	239°49.7	166°16.9	23°41.6	301°19.7	-22°26.7	13°18.7	-16°08.3	320°15.0	-22°15.3
2	254°52.2	181°16.1	23°42.0	316°21.0	-22°26.6	28°21.5	-16°08.2	335°17.5	-22°15.3
3	269°54.6	196°15.3	23°42.4	331°22.3	-22°26.5	43°24.2	-16°08.2	350°20.1	-22°15.3
4	284°57.1	211°14.5	23°42.9	346°23.5	-22°26.4	58°27.0	-16°08.1	5°22.6	-22°15.3
5	299°59.5	226°13.7	23°43.3	1°24.8	-22°26.3	73°29.8	-16°08.0	20°25.2	-22°15.3
6	315°02.0	241°12.9	23°43.8	16°26.1	-22°26.2	88°32.6	-16°07.9	35°27.7	-22°15.3
7	330°04.5	256°12.1	23°44.2	31°27.4	-22°26.1	103°35.4	-16°07.8	50°30.2	-22°15.3
8	345°06.9	271°11.3	23°44.6	46°28.6	-22°26.0	118°38.2	-16°07.7	65°32.8	-22°15.3
9	0°09.4	286°10.5	23°45.1	61°29.9	-22°25.9	133°40.9	-16°07.6	80°35.3	-22°15.3
10	15°11.9	301°09.7	23°45.5	76°31.2	-22°25.8	148°43.7	-16°07.6	95°37.9	-22°15.3
11	30°14.3	316°08.9	23°45.9	91°32.5	-22°25.7	163°46.5	-16°07.5	110°40.4	-22°15.3
12	45°16.8	331°08.1	23°46.4	106°33.7	-22°25.6	178°49.3	-16°07.4	125°43.0	-22°15.3
13	60°19.3	346°07.3	23°46.8	121°35.0	-22°25.5	193°52.1	-16°07.3	140°45.5	-22°15.3
14	75°21.7	1°06.5	23°47.2	136°36.3	-22°25.4	208°54.9	-16°07.2	155°48.1	-22°15.3
15	90°24.2	16°05.7	23°47.6	151°37.6	-22°25.3	223°57.6	-16°07.1	170°50.6	-22°15.3
16	105°26.7	31°04.9	23°48.1	166°38.9	-22°25.2	239°00.4	-16°07.1	185°53.2	-22°15.3
17	120°29.1	46°04.1	23°48.5	181°40.1	-22°25.1	254°03.2	-16°07.0	200°55.7	-22°15.3
18	135°31.6	61°03.3	23°48.9	196°41.4	-22°25.0	269°06.0	-16°06.9	215°58.3	-22°15.3
19	150°34.0	76°02.5	23°49.3	211°42.7	-22°24.9	284°08.8	-16°06.8	231°00.8	-22°15.3
20	165°36.5	91°01.7	23°49.8	226°44.0	-22°24.8	299°11.6	-16°06.7	246°03.4	-22°15.4
21	180°39.0	106°00.9	23°50.2	241°45.3	-22°24.7	314°14.3	-16°06.6	261°05.9	-22°15.4
22	195°41.4	121°00.1	23°50.6	256°46.6	-22°24.6	329°17.1	-16°06.5	276°08.4	-22°15.4
23	210°43.9	135°59.3	23°51.0	271°47.8	-22°24.5	344°19.9	-16°06.5	291°11.0	-22°15.4
Mer.pass.:8:59:		v-0.8 d0.4 m-3.9		v1.3 d0.1 m-0.5		v2.8 d0.1 m-2.4		v2.5 d-0.0 m0.3	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	225°46.4	150°58.5	23°51.4	286°49.1	-22°24.4	359°22.7	-16°06.4	306°13.5	-22°15.4
1	240°48.8	165°57.7	23°51.8	301°50.4	-22°24.3	14°25.5	-16°06.3	321°16.1	-22°15.4
2	255°51.3	180°56.9	23°52.3	316°51.7	-22°24.2	29°28.3	-16°06.2	336°18.6	-22°15.4
3	270°53.8	195°56.1	23°52.7	331°53.0	-22°24.1	44°31.0	-16°06.1	351°21.2	-22°15.4
4	285°56.2	210°55.3	23°53.1	346°54.3	-22°24.0	59°33.8	-16°06.0	6°23.7	-22°15.4
5	300°58.7	225°54.5	23°53.5	1°55.6	-22°23.9	74°36.6	-16°06.0	21°26.3	-22°15.4
6	316°01.2	240°53.7	23°53.9	16°56.8	-22°23.8	89°39.4	-16°05.9	36°28.8	-22°15.4
7	331°03.6	255°52.9	23°54.3	31°58.1	-22°23.7	104°42.2	-16°05.8	51°31.4	-22°15.4
8	346°06.1	270°52.1	23°54.7	46°59.4	-22°23.6	119°45.0	-16°05.7	66°33.9	-22°15.4
9	1°08.5	285°51.3	23°55.1	62°00.7	-22°23.5	134°47.7	-16°05.6	81°36.5	-22°15.4
10	16°11.0	300°50.5	23°55.5	77°02.0	-22°23.4	149°50.5	-16°05.5	96°39.0	-22°15.4
11	31°13.5	315°49.7	23°55.9	92°03.3	-22°23.3	164°53.3	-16°05.4	111°41.6	-22°15.4
12	46°15.9	330°48.9	23°56.3	107°04.6	-22°23.2	179°56.1	-16°05.4	126°44.1	-22°15.4
13	61°18.4	345°48.0	23°56.7	122°05.9	-22°23.1	194°58.9	-16°05.3	141°46.7	-22°15.4
14	76°20.9	0°47.2	23°57.1	137°07.2	-22°23.0	210°01.7	-16°05.2	156°49.2	-22°15.5
15	91°23.3	15°46.4	23°57.5	152°08.5	-22°22.9	225°04.4	-16°05.1	171°51.8	-22°15.5
16	106°25.8	30°45.6	23°57.9	167°09.8	-22°22.8	240°07.2	-16°05.0	186°54.3	-22°15.5
17	121°28.3	45°44.8	23°58.3	182°11.1	-22°22.7	255°10.0	-16°04.9	201°56.9	-22°15.5
18	136°30.7	60°44.0	23°58.7	197°12.3	-22°22.6	270°12.8	-16°04.9	216°59.4	-22°15.5
19	151°33.2	75°43.2	23°59.1	212°13.6	-22°22.5	285°15.6	-16°04.8	232°02.0	-22°15.5
20	166°35.6	90°42.4	23°59.5	227°14.9	-22°22.4	300°18.4	-16°04.7	247°04.6	-22°15.5
21	181°38.1	105°41.6	23°59.9	242°16.2	-22°22.3	315°21.2	-16°04.6	262°07.1	-22°15.5
22	196°40.6	120°40.8	24°00.3	257°17.5	-22°22.2	330°23.9	-16°04.5	277°09.7	-22°15.5
23	211°43.0	135°40.0	24°00.7	272°18.8	-22°22.1	345°26.7	-16°04.4	292°12.2	-22°15.5
Mer.pass.:8:55:		v-0.8 d0.4 m-3.9		v1.3 d0.1 m-0.6		v2.8 d0.1 m-2.4		v2.5 d-0.0 m0.3	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	226°45.5	150°39.2	24°01.1	287°20.1	-22°22.0	0°29.5	-16°04.3	307°14.8	-22°15.5
1	241°48.0	165°38.3	24°01.5	302°21.4	-22°21.9	15°32.3	-16°04.3	322°17.3	-22°15.5
2	256°50.4	180°37.5	24°01.8	317°22.7	-22°21.8	30°35.1	-16°04.2	337°19.9	-22°15.5
3	271°52.9	195°36.7	24°02.2	332°24.0	-22°21.7	45°37.9	-16°04.1	352°22.4	-22°15.5
4	286°55.4	210°35.9	24°02.6	347°25.3	-22°21.6	60°40.6	-16°04.0	7°25.0	-22°15.5
5	301°57.8	225°35.1	24°03.0	2°26.6	-22°21.5	75°43.4	-16°03.9	22°27.5	-22°15.5
6	317°00.3	240°34.3	24°03.4	17°27.9	-22°21.4	90°46.2	-16°03.8	37°30.1	-22°15.5
7	332°02.8	255°33.5	24°03.8	32°29.2	-22°21.3	105°49.0	-16°03.8	52°32.6	-22°15.5
8	347°05.2	270°32.7	24°04.1	47°30.5	-22°21.2	120°51.8	-16°03.7	67°35.2	-22°15.6
9	2°07.7	285°31.9	24°04.5	62°31.8	-22°21.1	135°54.6	-16°03.6	82°37.7	-22°15.6
10	17°10.1	300°31.0	24°04.9	77°33.1	-22°21.0	150°57.3	-16°03.5	97°40.3	-22°15.6
11	32°12.6	315°30.2	24°05.3	92°34.4	-22°20.9	166°00.1	-16°03.4	112°42.8	-22°15.6
12	47°15.1	330°29.4	24°05.6	107°35.7	-22°20.8	181°02.9	-16°03.3	127°45.4	-22°15.6
13	62°17.5	345°28.6	24°06.0	122°37.1	-22°20.7	196°05.7	-16°03.2	142°48.0	-22°15.6
14	77°20.0	0°27.8	24°06.4	137°38.4	-22°20.6	211°08.5	-16°03.2	157°50.5	-22°15.6
15	92°22.5	15°27.0	24°06.7	152°39.7	-22°20.5	226°11.3	-16°03.1	172°53.1	-22°15.6
16	107°24.9	30°26.2	24°07.1	167°41.0	-22°20.4	241°14.0	-16°03.0	187°55.6	-22°15.6
17	122°27.4	45°25.4	24°07.5	182°42.3	-22°20.3	256°16.8	-16°02.9	202°58.2	-22°15.6
18	137°29.9	60°24.5	24°07.9	197°43.6	-22°20.2	271°19.6	-16°02.8	218°00.7	-22°15.6
19	152°32.3	75°23.7	24°08.2	212°44.9	-22°20.1	286°22.4	-16°02.7	233°03.3	-22°15.6
20	167°34.8	90°22.9	24°08.6	227°46.2	-22°20.0	301°25.2	-16°02.7	248°05.8	-22°15.6
21	182°37.3	105°22.1	24°08.9	242°47.5	-22°19.9	316°28.0	-16°02.6	263°08.4	-22°15.6
22	197°39.7	120°21.3	24°09.3	257°48.8	-22°19.8	331°30.7	-16°02.5	278°11.0	-22°15.6
23	212°42.2	135°20.5	24°09.7	272°50.1	-22°19.7	346°33.5	-16°02.4	293°13.5	-22°15.6
Mer.pass.:8:51:		v-0.8 d0.4 m-3.9		v1.3 d0.1 m-0.6		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°40.3	29°11.2
Ankaa	353°12.8	-42°12.4
Schedar	349°37.2	56°37.9
Diphda	348°52.8	-17°53.3
Achernar	335°24.9	-57°08.7
Hamal	327°57.4	23°32.7
Polaris	316°46.7	89°20.3
Akamar	315°16.3	-40°14.1
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.9
Bellatrix	278°28.8	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.1	-52°42.7
Sirius	258°30.9	-16°44.6
Adara	255°10.1	-29°00.2
Procyon	244°56.3	5°10.6
Pollux	243°23.8	27°58.9
Avior	234°16.8	-59°34.5
Suhail	222°50.0	-43°30.7
Miaplacidus	221°39.0	-69°47.9
Alphard	217°52.8	-8°44.5
Regulus	207°39.9	11°52.6
Dubhe	193°47.4	61°39.4
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.7
Acrux	173°05.0	-63°12.2
Gacrux	171°56.7	-57°13.1
Alioth	166°17.4	55°51.8
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.5
Hadar	148°42.5	-60°27.6
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.5	-60°54.5
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.0	74°05.0
Alphecca	126°07.9	26°39.3
Antares	112°21.9	-26°28.2
Atria	107°20.2	-69°03.3
Sabik	102°08.5	-15°44.7
Shaula	96°17.1	-37°06.8
Rasalhague	96°03.1	12°32.9
Etamin	90°44.2	51°29.1
Kaus Aust.	83°39.2	-34°22.3
Vega	80°36.5	38°47.9
Nunki	75°54.0	-26°16.2
Altair	62°05.0	8°54.9
Peacock	53°14.0	-56°40.2
Deneb	49°29.2	45°20.5
Enif	33°43.9	9°57.4
Alnair	27°39.8	-46°52.1
Fomalhaut	15°20.6	-29°31.5
Scheat	13°50.4	28°10.7
Markab	13°35.2	15°18.0

2018/5/7	**SHA**	**Mer.pass**
Venus	286°30.5	13:56
Mars	61°31.2	04:54
Jupiter	133°28.7	00:07
Saturn	80°25.2	03:39

2018/5/8	**SHA**	**Mer.pass**
Venus	285°12.1	13:57
Mars	61°02.8	04:52
Jupiter	133°36.3	00:02
Saturn	80°27.2	03:34

2018/5/9	**SHA**	**Mer.pass**
Venus	283°53.6	13:58
Mars	60°34.6	04:50
Jupiter	133°44.0	23:54
Saturn	80°29.3	03:30

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°51.5	16°44.3	278°02.5	12.5	-18°41.3	4.5	54.3
1	195°51.5	16°44.9	292°34.0	12.5	-18°36.7	4.6	54.3
2	210°51.5	16°45.6	307°05.6	12.6	-18°32.1	4.7	54.3
3	225°51.6	16°46.3	321°37.1	12.6	-18°27.4	4.8	54.3
4	240°51.6	16°47.0	336°08.7	12.6	-18°22.6	4.8	54.3
5	255°51.7	16°47.7	350°40.3	12.6	-18°17.7	4.9	54.3
6	270°51.7	16°48.4	5°12.0	12.6	-18°12.8	5.0	54.3
7	285°51.7	16°49.1	19°43.6	12.7	-18°07.7	5.1	54.3
8	300°51.8	16°49.8	34°15.3	12.7	-18°02.6	5.2	54.4
9	315°51.8	16°50.5	48°47.0	12.7	-17°57.4	5.3	54.4
10	330°51.9	16°51.2	63°18.7	12.7	-17°52.1	5.3	54.4
11	345°51.9	16°51.8	77°50.4	12.7	-17°46.7	5.4	54.4
12	0°51.9	16°52.5	92°22.2	12.8	-17°41.2	5.5	54.4
13	15°52.0	16°53.2	106°54.0	12.8	-17°35.7	5.6	54.4
14	30°52.0	16°53.9	121°25.8	12.8	-17°30.1	5.7	54.4
15	45°52.1	16°54.6	135°57.6	12.8	-17°24.4	5.7	54.4
16	60°52.1	16°55.3	150°29.4	12.8	-17°18.6	5.8	54.4
17	75°52.1	16°56.0	165°01.3	12.9	-17°12.7	5.9	54.4
18	90°52.2	16°56.6	179°33.2	12.9	-17°06.8	6.0	54.5
19	105°52.2	16°57.3	194°05.1	12.9	-17°00.7	6.1	54.5
20	120°52.3	16°58.0	208°37.0	12.9	-16°54.6	6.1	54.5
21	135°52.3	16°58.7	223°08.9	12.9	-16°48.5	6.2	54.5
22	150°52.3	16°59.4	237°40.9	13.0	-16°42.2	6.3	54.5
23	165°52.4	17°00.1	252°12.8	13.0	-16°35.9	6.4	54.5
	SD.=15.9	d=0.7	S.D.=14.8				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°52.4	17°00.7	266°44.8	13.0	-16°29.5	6.4	54.5
1	195°52.4	17°01.4	281°16.8	13.0	-16°23.0	6.5	54.6
2	210°52.5	17°02.1	295°48.9	13.0	-16°16.4	6.6	54.6
3	225°52.5	17°02.8	310°20.9	13.1	-16°09.8	6.7	54.6
4	240°52.6	17°03.5	324°53.0	13.1	-16°03.1	6.8	54.6
5	255°52.6	17°04.1	339°25.1	13.1	-15°56.3	6.8	54.6
6	270°52.6	17°04.8	353°57.2	13.1	-15°49.4	6.9	54.6
7	285°52.7	17°05.5	8°29.3	13.1	-15°42.5	7.0	54.6
8	300°52.7	17°06.2	23°01.4	13.1	-15°35.4	7.1	54.7
9	315°52.7	17°06.9	37°33.6	13.2	-15°28.4	7.1	54.7
10	330°52.8	17°07.5	52°05.7	13.2	-15°21.2	7.2	54.7
11	345°52.8	17°08.2	66°37.9	13.2	-15°14.0	7.3	54.7
12	0°52.8	17°08.9	81°10.1	13.2	-15°06.7	7.3	54.7
13	15°52.9	17°09.6	95°42.3	13.2	-14°59.3	7.4	54.7
14	30°52.9	17°10.2	110°14.6	13.2	-14°51.8	7.5	54.8
15	45°52.9	17°10.9	124°46.8	13.3	-14°44.3	7.6	54.8
16	60°53.0	17°11.6	139°19.1	13.3	-14°36.7	7.6	54.8
17	75°53.0	17°12.3	153°51.3	13.3	-14°29.1	7.7	54.8
18	90°53.0	17°12.9	168°23.6	13.3	-14°21.3	7.8	54.8
19	105°53.1	17°13.6	182°55.9	13.3	-14°13.5	7.8	54.9
20	120°53.1	17°14.3	197°28.2	13.3	-14°05.7	7.9	54.9
21	135°53.1	17°14.9	212°00.5	13.3	-13°57.7	8.0	54.9
22	150°53.2	17°15.6	226°32.9	13.3	-13°49.7	8.0	54.9
23	165°53.2	17°16.3	241°05.2	13.4	-13°41.7	8.1	54.9
	SD.=15.8	d=0.7	S.D.=14.9				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°53.2	17°17.0	255°37.6	13.4	-13°33.5	8.2	55.0
1	195°53.2	17°17.6	270°10.0	13.4	-13°25.3	8.2	55.0
2	210°53.3	17°18.3	284°42.3	13.4	-13°17.0	8.3	55.0
3	225°53.3	17°19.0	299°14.7	13.4	-13°08.7	8.4	55.0
4	240°53.3	17°19.6	313°47.1	13.4	-13°00.3	8.4	55.0
5	255°53.4	17°20.3	328°19.5	13.4	-12°51.8	8.5	55.1
6	270°53.4	17°21.0	342°52.0	13.4	-12°43.3	8.6	55.1
7	285°53.4	17°21.6	357°24.4	13.4	-12°34.7	8.6	55.1
8	300°53.5	17°22.3	11°56.8	13.4	-12°26.1	8.7	55.1
9	315°53.5	17°23.0	26°29.3	13.4	-12°17.3	8.8	55.2
10	330°53.5	17°23.6	41°01.7	13.5	-12°08.5	8.8	55.2
11	345°53.5	17°24.3	55°34.2	13.5	-11°59.7	8.9	55.2
12	0°53.6	17°25.0	70°06.6	13.5	-11°50.8	8.9	55.2
13	15°53.6	17°25.6	84°39.1	13.5	-11°41.8	9.0	55.2
14	30°53.6	17°26.3	99°11.6	13.5	-11°32.8	9.1	55.3
15	45°53.6	17°26.9	113°44.1	13.5	-11°23.7	9.1	55.3
16	60°53.7	17°27.6	128°16.5	13.5	-11°14.6	9.2	55.3
17	75°53.7	17°28.3	142°49.0	13.5	-11°05.4	9.2	55.3
18	90°53.7	17°28.9	157°21.5	13.5	-10°56.1	9.3	55.4
19	105°53.7	17°29.6	171°54.0	13.5	-10°46.8	9.3	55.4
20	120°53.8	17°30.3	186°26.5	13.5	-10°37.4	9.4	55.4
21	135°53.8	17°30.9	200°59.0	13.5	-10°28.0	9.5	55.4
22	150°53.8	17°31.6	215°31.5	13.5	-10°18.5	9.5	55.5
23	165°53.8	17°32.2	230°04.0	13.5	-10°08.9	9.6	55.5
	SD.=15.8	d=0.7	S.D.=15.0				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	00:27	–:–	–:–	–:–
70	–:–	–:–	01:47	22:12	–:–	–:–
68	–:–	–:–	02:24	21:33	–:–	–:–
66	–:–	01:04	02:50	21:06	22:58	–:–
64	–:–	01:51	03:10	20:45	22:06	–:–
62	–:–	02:20	03:26	20:29	21:36	–:–
60	00:57	02:42	03:40	20:15	21:13	23:04
58	01:40	02:60	03:51	20:03	20:55	22:17
56	02:07	03:14	04:01	19:53	20:40	21:49
54	02:27	03:27	04:10	19:44	20:28	21:28
52	02:44	03:37	04:18	19:36	20:17	21:11
50	02:58	03:47	04:25	19:29	20:07	20:57
45	03:25	04:07	04:40	19:14	19:47	20:29
40	03:45	04:22	04:52	19:01	19:32	20:08
35	04:02	04:35	05:02	18:51	19:19	19:52
30	04:15	04:46	05:12	18:42	19:08	19:38
20	04:36	05:04	05:27	18:26	18:49	19:17
10	04:53	05:18	05:41	18:13	18:35	19:00
0	05:06	05:31	05:53	17:60	18:22	18:47
-10	05:18	05:43	06:05	17:47	18:09	18:35
-20	05:29	05:55	06:18	17:34	17:57	18:24
-30	05:40	06:08	06:33	17:19	17:44	18:13
-35	05:45	06:15	06:42	17:11	17:37	18:08
-40	05:51	06:23	06:52	17:01	17:30	18:02
-45	05:56	06:32	07:03	16:49	17:21	17:56
-50	06:03	06:42	07:17	16:36	17:11	17:49
-52	06:06	06:46	07:23	16:29	17:06	17:47
-54	06:09	06:51	07:30	16:22	17:01	17:44
-56	06:12	06:57	07:38	16:14	16:55	17:40
-58	06:15	07:03	07:47	16:05	16:49	17:37
-60	06:19	07:10	07:57	15:55	16:42	17:33

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	04:32	04:08	–:–	08:31	10:30
70	04:02	03:51	03:44	07:24	09:11	10:53
68	03:18	03:23	03:26	08:07	09:38	11:10
66	02:49	03:02	03:11	08:35	09:58	11:24
64	02:27	02:45	02:58	08:57	10:14	11:35
62	02:09	02:31	02:48	09:14	10:28	11:45
60	01:54	02:19	02:39	09:29	10:39	11:53
58	01:42	02:09	02:31	09:41	10:49	12:00
56	01:31	02:00	02:24	09:51	10:57	12:07
54	01:21	01:52	02:18	10:01	11:05	12:12
52	01:13	01:45	02:12	10:09	11:12	12:17
50	01:05	01:38	02:07	10:16	11:18	12:22
45	00:49	01:24	01:56	10:32	11:31	12:32
40	00:35	01:13	01:47	10:45	11:42	12:40
35	00:24	01:03	01:39	10:56	11:51	12:47
30	00:14	00:54	01:32	11:06	11:59	12:53
20	–:–	00:39	01:20	11:22	12:13	13:04
10	–:–	00:26	01:10	11:36	12:25	13:13
0	–:–	00:14	00:60	11:50	12:36	13:22
-10	–:–	00:01	00:50	12:03	12:47	13:30
-20	23:48	–:–	00:39	12:17	12:59	13:39
-30	23:33	–:–	00:27	12:33	13:13	13:50
-35	23:24	–:–	00:20	12:43	13:20	13:56
-40	23:14	–:–	00:12	12:53	13:29	14:02
-45	23:02	–:–	00:02	13:06	13:40	14:10
-50	22:48	23:51	–:–	13:21	13:52	14:19
-52	22:41	23:46	–:–	13:28	13:58	14:24
-54	22:34	23:40	–:–	13:36	14:04	14:28
-56	22:25	23:33	–:–	13:45	14:11	14:33
-58	22:16	23:26	–:–	13:55	14:19	14:39
-60	22:05	23:18	–:–	14:06	14:28	14:46

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
7	03:26	03:28	11:56	05:38	18:01	21(56%)
8	03:30	03:31	11:56	06:24	18:47	22(46%)
9	03:33	03:34	11:56	07:10	19:33	23(37%)

May 10, 11 ,12 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	227°44.6	150°19.7	24°10.0	287°51.4	-22°19.6	1°36.3	-16°02.3	308°16.1	-22°15.6
1	242°47.1	165°18.8	24°10.4	302°52.8	-22°19.5	16°39.1	-16°02.2	323°18.6	-22°15.7
2	257°49.6	180°18.0	24°10.7	317°54.1	-22°19.4	31°41.9	-16°02.1	338°21.2	-22°15.7
3	272°52.0	195°17.2	24°11.1	332°55.4	-22°19.3	46°44.7	-16°02.1	353°23.7	-22°15.7
4	287°54.5	210°16.4	24°11.5	347°56.7	-22°19.2	61°47.5	-16°02.0	8°26.3	-22°15.7
5	302°57.0	225°15.6	24°11.8	2°58.0	-22°19.1	76°50.2	-16°01.9	23°28.9	-22°15.7
6	317°59.4	240°14.8	24°12.2	17°59.3	-22°19.0	91°53.0	-16°01.8	38°31.4	-22°15.7
7	333°01.9	255°14.0	24°12.5	33°00.6	-22°18.9	106°55.8	-16°01.7	53°34.0	-22°15.7
8	348°04.4	270°13.1	24°12.9	48°02.0	-22°18.8	121°58.6	-16°01.6	68°36.5	-22°15.7
9	3°06.8	285°12.3	24°13.2	63°03.3	-22°18.7	137°01.4	-16°01.6	83°39.1	-22°15.7
10	18°09.3	300°11.5	24°13.6	78°04.6	-22°18.6	152°04.2	-16°01.5	98°41.6	-22°15.7
11	33°11.7	315°10.7	24°13.9	93°05.9	-22°18.5	167°06.9	-16°01.4	113°44.2	-22°15.7
12	48°14.2	330°09.9	24°14.3	108°07.2	-22°18.4	182°09.7	-16°01.3	128°46.8	-22°15.7
13	63°16.7	345°09.1	24°14.6	123°08.5	-22°18.3	197°12.5	-16°01.2	143°49.3	-22°15.7
14	78°19.1	0°08.2	24°14.9	138°09.9	-22°18.2	212°15.3	-16°01.1	158°51.9	-22°15.7
15	93°21.6	15°07.4	24°15.3	153°11.2	-22°18.1	227°18.1	-16°01.0	173°54.4	-22°15.7
16	108°24.1	30°06.6	24°15.6	168°12.5	-22°18.0	242°20.9	-16°01.0	188°57.0	-22°15.7
17	123°26.5	45°05.8	24°16.0	183°13.8	-22°18.0	257°23.6	-16°00.9	203°59.6	-22°15.7
18	138°29.0	60°05.0	24°16.3	198°15.1	-22°17.9	272°26.4	-16°00.8	219°02.1	-22°15.8
19	153°31.5	75°04.1	24°16.6	213°16.5	-22°17.8	287°29.2	-16°00.7	234°04.7	-22°15.8
20	168°33.9	90°03.3	24°17.0	228°17.8	-22°17.7	302°32.0	-16°00.6	249°07.2	-22°15.8
21	183°36.4	105°02.5	24°17.3	243°19.1	-22°17.6	317°34.8	-16°00.5	264°09.8	-22°15.8
22	198°38.9	120°01.7	24°17.6	258°20.4	-22°17.5	332°37.6	-16°00.5	279°12.4	-22°15.8
23	213°41.3	135°00.9	24°18.0	273°21.8	-22°17.4	347°40.3	-16°00.4	294°14.9	-22°15.8
Mer.pass.:8:47:		v-0.8 d0.4 m-3.9		v1.3 d0.1 m-0.6		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.3	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	228°43.8	150°00.0	24°18.3	288°23.1	-22°17.3	2°43.1	-16°00.3	309°17.5	-22°15.8
1	243°46.2	164°59.2	24°18.6	303°24.4	-22°17.2	17°45.9	-16°00.2	324°20.0	-22°15.8
2	258°48.7	179°58.4	24°19.0	318°25.7	-22°17.1	32°48.7	-16°00.1	339°22.6	-22°15.8
3	273°51.2	194°57.6	24°19.3	333°27.1	-22°17.0	47°51.5	-16°00.0	354°25.2	-22°15.8
4	288°53.6	209°56.8	24°19.6	348°28.4	-22°16.9	62°54.3	-15°59.9	9°27.7	-22°15.8
5	303°56.1	224°55.9	24°20.0	3°29.7	-22°16.8	77°57.0	-15°59.9	24°30.3	-22°15.8
6	318°58.6	239°55.1	24°20.3	18°31.1	-22°16.7	92°59.8	-15°59.8	39°32.8	-22°15.8
7	334°01.0	254°54.3	24°20.6	33°32.4	-22°16.6	108°02.6	-15°59.7	54°35.4	-22°15.8
8	349°03.5	269°53.5	24°20.9	48°33.7	-22°16.5	123°05.4	-15°59.6	69°38.0	-22°15.8
9	4°06.0	284°52.7	24°21.2	63°35.0	-22°16.4	138°08.2	-15°59.5	84°40.5	-22°15.8
10	19°08.4	299°51.8	24°21.6	78°36.4	-22°16.3	153°11.0	-15°59.4	99°43.1	-22°15.9
11	34°10.9	314°51.0	24°21.9	93°37.7	-22°16.2	168°13.7	-15°59.4	114°45.6	-22°15.9
12	49°13.4	329°50.2	24°22.2	108°39.0	-22°16.1	183°16.5	-15°59.3	129°48.2	-22°15.9
13	64°15.8	344°49.4	24°22.5	123°40.4	-22°16.0	198°19.3	-15°59.2	144°50.8	-22°15.9
14	79°18.3	359°48.6	24°22.8	138°41.7	-22°15.9	213°22.1	-15°59.1	159°53.3	-22°15.9
15	94°20.7	14°47.7	24°23.1	153°43.0	-22°15.8	228°24.9	-15°59.0	174°55.9	-22°15.9
16	109°23.2	29°46.9	24°23.5	168°44.4	-22°15.7	243°27.7	-15°58.9	189°58.5	-22°15.9
17	124°25.7	44°46.1	24°23.8	183°45.7	-22°15.6	258°30.4	-15°58.8	205°01.0	-22°15.9
18	139°28.1	59°45.3	24°24.1	198°47.0	-22°15.5	273°33.2	-15°58.8	220°03.6	-22°15.9
19	154°30.6	74°44.4	24°24.4	213°48.4	-22°15.4	288°36.0	-15°58.7	235°06.1	-22°15.9
20	169°33.1	89°43.6	24°24.7	228°49.7	-22°15.3	303°38.8	-15°58.6	250°08.7	-22°15.9
21	184°35.5	104°42.8	24°25.0	243°51.1	-22°15.2	318°41.6	-15°58.5	265°11.3	-22°15.9
22	199°38.0	119°42.0	24°25.3	258°52.4	-22°15.1	333°44.4	-15°58.4	280°13.8	-22°15.9
23	214°40.5	134°41.1	24°25.6	273°53.7	-22°15.0	348°47.1	-15°58.3	295°16.4	-22°15.9
Mer.pass.:8:43:		v-0.8 d0.3 m-3.9		v1.3 d0.1 m-0.6		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.3	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	229°42.9	149°40.3	24°25.9	288°55.1	-22°14.9	3°49.9	-15°58.3	310°19.0	-22°15.9
1	244°45.4	164°39.5	24°26.2	303°56.4	-22°14.9	18°52.7	-15°58.2	325°21.5	-22°15.9
2	259°47.8	179°38.7	24°26.5	318°57.8	-22°14.8	33°55.5	-15°58.1	340°24.1	-22°16.0
3	274°50.3	194°37.8	24°26.8	333°59.1	-22°14.7	48°58.3	-15°58.0	355°26.7	-22°16.0
4	289°52.8	209°37.0	24°27.1	349°00.4	-22°14.6	64°01.1	-15°57.9	10°29.2	-22°16.0
5	304°55.2	224°36.2	24°27.4	4°01.8	-22°14.5	79°03.8	-15°57.8	25°31.8	-22°16.0
6	319°57.7	239°35.4	24°27.7	19°03.1	-22°14.4	94°06.6	-15°57.7	40°34.4	-22°16.0
7	335°00.2	254°34.5	24°28.0	34°04.5	-22°14.3	109°09.4	-15°57.7	55°36.9	-22°16.0
8	350°02.6	269°33.7	24°28.3	49°05.8	-22°14.2	124°12.2	-15°57.6	70°39.5	-22°16.0
9	5°05.1	284°32.9	24°28.6	64°07.2	-22°14.1	139°15.0	-15°57.5	85°42.1	-22°16.0
10	20°07.6	299°32.1	24°28.9	79°08.5	-22°14.0	154°17.8	-15°57.4	100°44.6	-22°16.0
11	35°10.0	314°31.2	24°29.2	94°09.8	-22°13.9	169°20.5	-15°57.3	115°47.2	-22°16.0
12	50°12.5	329°30.4	24°29.4	109°11.2	-22°13.8	184°23.3	-15°57.2	130°49.8	-22°16.0
13	65°15.0	344°29.6	24°29.7	124°12.5	-22°13.7	199°26.1	-15°57.2	145°52.3	-22°16.0
14	80°17.4	359°28.8	24°30.0	139°13.9	-22°13.6	214°28.9	-15°57.1	160°54.9	-22°16.0
15	95°19.9	14°27.9	24°30.3	154°15.2	-22°13.5	229°31.7	-15°57.0	175°57.4	-22°16.0
16	110°22.3	29°27.1	24°30.6	169°16.6	-22°13.4	244°34.5	-15°56.9	191°00.0	-22°16.0
17	125°24.8	44°26.3	24°30.9	184°17.9	-22°13.3	259°37.2	-15°56.8	206°02.6	-22°16.1
18	140°27.3	59°25.5	24°31.2	199°19.3	-22°13.2	274°40.0	-15°56.7	221°05.1	-22°16.1
19	155°29.7	74°24.6	24°31.4	214°20.6	-22°13.1	289°42.8	-15°56.6	236°07.7	-22°16.1
20	170°32.2	89°23.8	24°31.7	229°22.0	-22°13.0	304°45.6	-15°56.6	251°10.3	-22°16.1
21	185°34.7	104°23.0	24°32.0	244°23.3	-22°12.9	319°48.4	-15°56.5	266°12.9	-22°16.1
22	200°37.1	119°22.2	24°32.3	259°24.7	-22°12.9	334°51.1	-15°56.4	281°15.4	-22°16.1
23	215°39.6	134°21.3	24°32.5	274°26.1	-22°12.8	349°53.9	-15°56.3	296°18.0	-22°16.1
Mer.pass.:8:39:		v-0.8 d0.3 m-3.9		v1.3 d0.1 m-0.7		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°40.3	29°11.2
Ankaa	353°12.8	-42°12.4
Schedar	349°37.2	56°37.9
Diphda	348°52.8	-17°53.3
Achernar	335°24.9	-57°08.7
Hamal	327°57.4	23°32.7
Polaris	316°46.6	89°20.3
Akamar	315°16.3	-40°14.1
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.9
Bellatrix	278°28.8	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.1	-52°42.7
Sirius	258°31.0	-16°44.6
Adara	255°10.2	-29°00.2
Procyon	244°56.4	5°10.6
Pollux	243°23.8	27°58.9
Avior	234°16.8	-59°34.5
Suhail	222°50.0	-43°30.7
Miaplacidus	221°39.0	-69°47.9
Alphard	217°52.8	-8°44.5
Regulus	207°39.9	11°52.6
Dubhe	193°47.4	61°39.4
Denebola	182°30.0	14°28.2
Gienah	175°48.6	-17°38.7
Acrux	173°05.0	-63°12.2
Gacrux	171°56.7	-57°13.1
Alioth	166°17.4	55°51.9
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.5
Hadar	148°42.5	-60°27.6
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.5	-60°54.5
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.0	74°05.0
Alphecca	126°07.9	26°39.3
Antares	112°21.8	-26°28.2
Atria	107°20.2	-69°03.3
Sabik	102°08.4	-15°44.7
Shaula	96°17.1	-37°06.8
Rasalhague	96°03.1	12°32.9
Etamin	90°44.2	51°29.1
Kaus Aust.	83°39.1	-34°22.3
Vega	80°36.5	38°47.9
Nunki	75°54.0	-26°16.2
Altair	62°05.0	8°54.9
Peacock	53°13.9	-56°40.2
Deneb	49°29.1	45°20.5
Enif	33°43.9	9°57.4
Alnair	27°39.8	-46°52.1
Fomalhaut	15°20.6	-29°31.5
Scheat	13°50.4	28°10.7
Markab	13°35.2	15°18.0

2018/5/1	**SHA**	**Mer.pass**
Venus	282°35.0	13:59
Mars	60°06.8	04:48
Jupiter	133°51.7	23:49
Saturn	80°31.4	03:26

2018/5/1	**SHA**	**Mer.pass**
Venus	281°16.3	14:01
Mars	59°39.3	04:46
Jupiter	133°59.3	23:45
Saturn	80°33.7	03:22

2018/5/1	**SHA**	**Mer.pass**
Venus	279°57.4	14:02
Mars	59°12.2	04:44
Jupiter	134°07.0	23:40
Saturn	80°36.0	03:18

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°53.9	17°32.9	244°36.5	13.5	-9°59.3	9.6	55.5
1	195°53.9	17°33.5	259°09.0	13.5	-9°49.7	9.7	55.6
2	210°53.9	17°34.2	273°41.4	13.5	-9°40.0	9.7	55.6
3	225°53.9	17°34.9	288°13.9	13.5	-9°30.2	9.8	55.6
4	240°54.0	17°35.5	302°46.4	13.5	-9°20.4	9.8	55.6
5	255°54.0	17°36.2	317°18.9	13.5	-9°10.5	9.9	55.7
6	270°54.0	17°36.8	331°51.4	13.5	-9°00.6	9.9	55.7
7	285°54.0	17°37.5	346°23.9	13.5	-8°50.6	10.0	55.7
8	300°54.1	17°38.1	0°56.3	13.5	-8°40.6	10.0	55.7
9	315°54.1	17°38.8	15°28.8	13.5	-8°30.5	10.1	55.8
10	330°54.1	17°39.4	30°01.2	13.5	-8°20.4	10.1	55.8
11	345°54.1	17°40.1	44°33.7	13.4	-8°10.2	10.2	55.8
12	0°54.1	17°40.7	59°06.1	13.4	-8°00.0	10.2	55.9
13	15°54.2	17°41.4	73°38.6	13.4	-7°49.7	10.3	55.9
14	30°54.2	17°42.0	88°11.0	13.4	-7°39.4	10.3	55.9
15	45°54.2	17°42.7	102°43.4	13.4	-7°29.1	10.4	56.0
16	60°54.2	17°43.3	117°15.8	13.4	-7°18.7	10.4	56.0
17	75°54.3	17°44.0	131°48.2	13.4	-7°08.2	10.5	56.0
18	90°54.3	17°44.6	146°20.6	13.4	-6°57.7	10.5	56.0
19	105°54.3	17°45.3	160°53.0	13.4	-6°47.2	10.6	56.1
20	120°54.3	17°45.9	175°25.3	13.4	-6°36.6	10.6	56.1
21	135°54.3	17°46.6	189°57.7	13.3	-6°25.9	10.6	56.1
22	150°54.3	17°47.2	204°30.0	13.3	-6°15.3	10.7	56.2
23	165°54.4	17°47.9	219°02.3	13.3	-6°04.6	10.7	56.2
	SD.=15.8	d=0.7	S.D.=15.1				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°54.4	17°48.5	233°34.6	13.3	-5°53.8	10.8	56.2
1	195°54.4	17°49.2	248°06.9	13.3	-5°43.0	10.8	56.3
2	210°54.4	17°49.8	262°39.2	13.3	-5°32.2	10.9	56.3
3	225°54.4	17°50.5	277°11.4	13.2	-5°21.3	10.9	56.3
4	240°54.5	17°51.1	291°43.6	13.2	-5°10.4	10.9	56.4
5	255°54.5	17°51.7	306°15.8	13.2	-4°59.5	11.0	56.4
6	270°54.5	17°52.4	320°48.0	13.2	-4°48.5	11.0	56.4
7	285°54.5	17°53.0	335°20.2	13.2	-4°37.5	11.0	56.5
8	300°54.5	17°53.7	349°52.4	13.1	-4°26.4	11.1	56.5
9	315°54.5	17°54.3	4°24.5	13.1	-4°15.3	11.1	56.5
10	330°54.6	17°54.9	18°56.6	13.1	-4°04.2	11.1	56.5
11	345°54.6	17°55.6	33°28.7	13.1	-3°53.0	11.2	56.6
12	0°54.6	17°56.2	48°00.7	13.0	-3°41.8	11.2	56.6
13	15°54.6	17°56.9	62°32.8	13.0	-3°30.6	11.2	56.6
14	30°54.6	17°57.5	77°04.8	13.0	-3°19.4	11.3	56.7
15	45°54.6	17°58.1	91°36.7	13.0	-3°08.1	11.3	56.7
16	60°54.6	17°58.8	106°08.7	12.9	-2°56.8	11.3	56.7
17	75°54.7	17°59.4	120°40.6	12.9	-2°45.5	11.4	56.8
18	90°54.7	18°00.0	135°12.5	12.9	-2°34.1	11.4	56.8
19	105°54.7	18°00.7	149°44.4	12.8	-2°22.7	11.4	56.9
20	120°54.7	18°01.3	164°16.2	12.8	-2°11.3	11.4	56.9
21	135°54.7	18°02.0	178°48.0	12.8	-1°59.8	11.5	56.9
22	150°54.7	18°02.6	193°19.8	12.8	-1°48.4	11.5	57.0
23	165°54.7	18°03.2	207°51.5	12.7	-1°36.9	11.5	57.0
	SD.=15.8	d=0.6	S.D.=15.3				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°54.7	18°03.9	222°23.2	12.7	-1°25.4	11.5	57.0
1	195°54.8	18°04.5	236°54.9	12.7	-1°13.8	11.5	57.1
2	210°54.8	18°05.1	251°26.5	12.6	-1°02.3	11.6	57.1
3	225°54.8	18°05.7	265°58.1	12.6	-0°50.7	11.6	57.1
4	240°54.8	18°06.4	280°29.7	12.5	-0°39.1	11.6	57.2
5	255°54.8	18°07.0	295°01.2	12.5	-0°27.5	11.6	57.2
6	270°54.8	18°07.6	309°32.7	12.5	-0°15.8	11.6	57.2
7	285°54.8	18°08.3	324°04.2	12.4	-0°04.2	11.7	57.3
8	300°54.8	18°08.9	338°35.6	12.4	0°07.5	11.7	57.3
9	315°54.8	18°09.5	353°06.9	12.4	0°19.2	11.7	57.3
10	330°54.9	18°10.2	7°38.3	12.3	0°30.8	11.7	57.4
11	345°54.9	18°10.8	22°09.6	12.3	0°42.6	11.7	57.4
12	0°54.9	18°11.4	36°40.8	12.2	0°54.3	11.7	57.4
13	15°54.9	18°12.0	51°12.0	12.2	1°06.0	11.7	57.5
14	30°54.9	18°12.7	65°43.2	12.1	1°17.7	11.7	57.5
15	45°54.9	18°13.3	80°14.3	12.1	1°29.5	11.8	57.5
16	60°54.9	18°13.9	94°45.4	12.0	1°41.2	11.8	57.6
17	75°54.9	18°14.5	109°16.4	12.0	1°53.0	11.8	57.6
18	90°54.9	18°15.2	123°47.4	12.0	2°04.8	11.8	57.6
19	105°54.9	18°15.8	138°18.3	11.9	2°16.5	11.8	57.7
20	120°54.9	18°16.4	152°49.2	11.9	2°28.3	11.8	57.7
21	135°54.9	18°17.0	167°20.0	11.8	2°40.1	11.8	57.7
22	150°55.0	18°17.6	181°50.8	11.8	2°51.9	11.8	57.8
23	165°55.0	18°18.3	196°21.5	11.7	3°03.7	11.8	57.8
	SD.=15.8	d=0.6	S.D.=15.6				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	01:24	22:36	–:–	–:–
68	–:–	–:–	02:09	21:48	–:–	–:–
66	–:–	00:26	02:38	21:17	–:–	–:–
64	–:–	01:35	03:00	20:55	22:23	–:–
62	–:–	02:08	03:18	20:37	21:48	–:–
60	00:23	02:32	03:32	20:22	21:23	–:–
58	01:25	02:51	03:45	20:10	21:03	22:33
56	01:56	03:07	03:55	19:59	20:47	22:00
54	02:18	03:20	04:04	19:49	20:34	21:37
52	02:36	03:32	04:13	19:41	20:22	21:18
50	02:51	03:42	04:20	19:33	20:12	21:03
45	03:20	04:02	04:36	19:17	19:51	20:34
40	03:41	04:19	04:49	19:04	19:35	20:12
35	03:58	04:32	04:60	18:53	19:21	19:55
30	04:12	04:43	05:09	18:44	19:10	19:41
20	04:35	05:02	05:26	18:27	18:51	19:19
10	04:52	05:18	05:40	18:13	18:35	19:01
0	05:06	05:31	05:53	17:60	18:22	18:47
-10	05:18	05:44	06:06	17:47	18:09	18:34
-20	05:30	05:56	06:20	17:33	17:56	18:23
-30	05:41	06:10	06:35	17:17	17:42	18:11
-35	05:47	06:17	06:44	17:08	17:35	18:05
-40	05:53	06:26	06:54	16:58	17:27	17:59
-45	05:59	06:35	07:06	16:46	17:17	17:53
-50	06:07	06:46	07:21	16:31	17:06	17:46
-52	06:10	06:51	07:28	16:24	17:01	17:42
-54	06:13	06:56	07:35	16:17	16:56	17:39
-56	06:16	07:02	07:44	16:08	16:50	17:36
-58	06:20	07:08	07:53	15:59	16:44	17:32
-60	06:24	07:16	08:04	15:48	16:36	17:28

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	03:52	03:40	03:28	12:21	14:10	16:00
70	03:38	03:32	03:27	12:34	14:15	15:58
68	03:26	03:26	03:26	12:44	14:19	15:56
66	03:17	03:21	03:25	12:52	14:22	15:55
64	03:08	03:17	03:24	12:59	14:25	15:53
62	03:01	03:13	03:24	13:05	14:27	15:52
60	02:55	03:10	03:23	13:10	14:29	15:51
58	02:50	03:07	03:23	13:14	14:31	15:50
56	02:45	03:04	03:22	13:18	14:33	15:50
54	02:41	03:02	03:22	13:22	14:34	15:49
52	02:37	02:60	03:22	13:25	14:36	15:48
50	02:33	02:58	03:21	13:28	14:37	15:48
45	02:26	02:53	03:21	13:35	14:39	15:46
40	02:19	02:50	03:20	13:40	14:42	15:45
35	02:13	02:47	03:20	13:45	14:44	15:44
30	02:09	02:44	03:19	13:49	14:45	15:44
20	01:60	02:39	03:18	13:55	14:48	15:42
10	01:52	02:35	03:18	14:01	14:51	15:41
0	01:45	02:31	03:17	14:07	14:53	15:40
-10	01:38	02:27	03:17	14:13	14:55	15:39
-20	01:30	02:23	03:16	14:18	14:58	15:37
-30	01:22	02:18	03:15	14:25	15:00	15:36
-35	01:17	02:15	03:15	14:29	15:02	15:35
-40	01:11	02:12	03:15	14:33	15:04	15:34
-45	01:04	02:08	03:14	14:38	15:06	15:33
-50	00:56	02:04	03:14	14:44	15:08	15:32
-52	00:53	02:02	03:13	14:47	15:09	15:31
-54	00:48	01:59	03:13	14:50	15:10	15:30
-56	00:44	01:57	03:13	14:53	15:11	15:30
-58	00:39	01:54	03:12	14:57	15:13	15:29
-60	00:33	01:51	03:12	15:01	15:15	15:28

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
10	03:35	03:37	11:56	07:56	20:18	24(27%)
11	03:38	03:38	11:56	08:41	21:04	25(19%)
12	03:39	03:40	11:56	09:28	21:52	26(11%)

May 13, 14 ,15 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	230°42.1	149°20.5	24°32.8	289°27.4	-22°12.7	4°56.7	-15°56.2	311°20.6	-22°16.1
1	245°44.5	164°19.7	24°33.1	304°28.8	-22°12.6	19°59.5	-15°56.1	326°23.1	-22°16.1
2	260°47.0	179°18.8	24°33.4	319°30.1	-22°12.5	35°02.3	-15°56.1	341°25.7	-22°16.1
3	275°49.4	194°18.0	24°33.6	334°31.5	-22°12.4	50°05.1	-15°56.0	356°28.3	-22°16.1
4	290°51.9	209°17.2	24°33.9	349°32.8	-22°12.3	65°07.8	-15°55.9	11°30.8	-22°16.1
5	305°54.4	224°16.4	24°34.2	4°34.2	-22°12.2	80°10.6	-15°55.8	26°33.4	-22°16.1
6	320°56.8	239°15.5	24°34.4	19°35.5	-22°12.1	95°13.4	-15°55.7	41°36.0	-22°16.1
7	335°59.3	254°14.7	24°34.7	34°36.9	-22°12.0	110°16.2	-15°55.6	56°38.5	-22°16.1
8	351°01.8	269°13.9	24°35.0	49°38.3	-22°11.9	125°19.0	-15°55.6	71°41.1	-22°16.2
9	6°04.2	284°13.0	24°35.2	64°39.6	-22°11.8	140°21.8	-15°55.5	86°43.7	-22°16.2
10	21°06.7	299°12.2	24°35.5	79°41.0	-22°11.7	155°24.5	-15°55.4	101°46.2	-22°16.2
11	36°09.2	314°11.4	24°35.7	94°42.3	-22°11.6	170°27.3	-15°55.3	116°48.8	-22°16.2
12	51°11.6	329°10.6	24°36.0	109°43.7	-22°11.5	185°30.1	-15°55.2	131°51.4	-22°16.2
13	66°14.1	344°09.7	24°36.3	124°45.1	-22°11.4	200°32.9	-15°55.1	146°54.0	-22°16.2
14	81°16.6	359°08.9	24°36.5	139°46.4	-22°11.3	215°35.7	-15°55.0	161°56.5	-22°16.2
15	96°19.0	14°08.1	24°36.8	154°47.8	-22°11.3	230°38.4	-15°55.0	176°59.1	-22°16.2
16	111°21.5	29°07.2	24°37.0	169°49.2	-22°11.2	245°41.2	-15°54.9	192°01.7	-22°16.2
17	126°23.9	44°06.4	24°37.3	184°50.5	-22°11.1	260°44.0	-15°54.8	207°04.2	-22°16.2
18	141°26.4	59°05.6	24°37.5	199°51.9	-22°11.0	275°46.8	-15°54.7	222°06.8	-22°16.2
19	156°28.9	74°04.7	24°37.8	214°53.2	-22°10.9	290°49.6	-15°54.6	237°09.4	-22°16.2
20	171°31.3	89°03.9	24°38.0	229°54.6	-22°10.8	305°52.4	-15°54.5	252°11.9	-22°16.2
21	186°33.8	104°03.1	24°38.3	244°56.0	-22°10.7	320°55.1	-15°54.5	267°14.5	-22°16.2
22	201°36.3	119°02.3	24°38.5	259°57.3	-22°10.6	335°57.9	-15°54.4	282°17.1	-22°16.2
23	216°38.7	134°01.4	24°38.8	274°58.7	-22°10.5	351°00.7	-15°54.3	297°19.7	-22°16.3
Mer.pass.:8:35:		v-0.8 d0.3 m-3.9		v1.4 d0.1 m-0.7		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.3	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	231°41.2	149°00.6	24°39.0	290°00.1	-22°10.4	6°03.5	-15°54.2	312°22.2	-22°16.3
1	246°43.7	163°59.8	24°39.3	305°01.5	-22°10.3	21°06.3	-15°54.1	327°24.8	-22°16.3
2	261°46.1	178°58.9	24°39.5	320°02.8	-22°10.2	36°09.0	-15°54.0	342°27.4	-22°16.3
3	276°48.6	193°58.1	24°39.7	335°04.2	-22°10.1	51°11.8	-15°54.0	357°29.9	-22°16.3
4	291°51.1	208°57.3	24°40.0	350°05.6	-22°10.1	66°14.6	-15°53.9	12°32.5	-22°16.3
5	306°53.5	223°56.4	24°40.2	5°06.9	-22°10.0	81°17.4	-15°53.8	27°35.1	-22°16.3
6	321°56.0	238°55.6	24°40.5	20°08.3	-22°09.9	96°20.2	-15°53.7	42°37.7	-22°16.3
7	336°58.4	253°54.8	24°40.7	35°09.7	-22°09.8	111°22.9	-15°53.6	57°40.2	-22°16.3
8	352°00.9	268°53.9	24°40.9	50°11.1	-22°09.7	126°25.7	-15°53.5	72°42.8	-22°16.3
9	7°03.4	283°53.1	24°41.2	65°12.4	-22°09.6	141°28.5	-15°53.5	87°45.4	-22°16.3
10	22°05.8	298°52.3	24°41.4	80°13.8	-22°09.5	156°31.3	-15°53.4	102°48.0	-22°16.3
11	37°08.3	313°51.4	24°41.6	95°15.2	-22°09.4	171°34.1	-15°53.3	117°50.5	-22°16.3
12	52°10.8	328°50.6	24°41.9	110°16.6	-22°09.3	186°36.9	-15°53.2	132°53.1	-22°16.3
13	67°13.2	343°49.8	24°42.1	125°17.9	-22°09.2	201°39.6	-15°53.1	147°55.7	-22°16.4
14	82°15.7	358°48.9	24°42.3	140°19.3	-22°09.1	216°42.4	-15°53.0	162°58.3	-22°16.4
15	97°18.2	13°48.1	24°42.5	155°20.7	-22°09.0	231°45.2	-15°52.9	178°00.8	-22°16.4
16	112°20.6	28°47.3	24°42.8	170°22.1	-22°09.0	246°48.0	-15°52.9	193°03.4	-22°16.4
17	127°23.1	43°46.5	24°43.0	185°23.5	-22°08.9	261°50.8	-15°52.8	208°06.0	-22°16.4
18	142°25.5	58°45.6	24°43.2	200°24.8	-22°08.8	276°53.5	-15°52.7	223°08.5	-22°16.4
19	157°28.0	73°44.8	24°43.4	215°26.2	-22°08.7	291°56.3	-15°52.6	238°11.1	-22°16.4
20	172°30.5	88°44.0	24°43.7	230°27.6	-22°08.6	306°59.1	-15°52.5	253°13.7	-22°16.4
21	187°32.9	103°43.1	24°43.9	245°29.0	-22°08.5	322°01.9	-15°52.4	268°16.3	-22°16.4
22	202°35.4	118°42.3	24°44.1	260°30.4	-22°08.4	337°04.7	-15°52.4	283°18.8	-22°16.4
23	217°37.9	133°41.5	24°44.3	275°31.7	-22°08.3	352°07.4	-15°52.3	298°21.4	-22°16.4
Mer.pass.:8:31:		v-0.8 d0.2 m-3.9		v1.4 d0.1 m-0.7		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.3	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	232°40.3	148°40.6	24°44.5	290°33.1	-22°08.2	7°10.2	-15°52.2	313°24.0	-22°16.4
1	247°42.8	163°39.8	24°44.7	305°34.5	-22°08.1	22°13.0	-15°52.1	328°26.6	-22°16.4
2	262°45.3	178°39.0	24°44.9	320°35.9	-22°08.0	37°15.8	-15°52.0	343°29.2	-22°16.4
3	277°47.7	193°38.1	24°45.2	335°37.3	-22°08.0	52°18.6	-15°51.9	358°31.7	-22°16.5
4	292°50.2	208°37.3	24°45.4	350°38.7	-22°07.9	67°21.3	-15°51.9	13°34.3	-22°16.5
5	307°52.7	223°36.5	24°45.6	5°40.1	-22°07.8	82°24.1	-15°51.8	28°36.9	-22°16.5
6	322°55.1	238°35.6	24°45.8	20°41.5	-22°07.7	97°26.9	-15°51.7	43°39.5	-22°16.5
7	337°57.6	253°34.8	24°46.0	35°42.8	-22°07.6	112°29.7	-15°51.6	58°42.0	-22°16.5
8	353°00.0	268°33.9	24°46.2	50°44.2	-22°07.5	127°32.5	-15°51.5	73°44.6	-22°16.5
9	8°02.5	283°33.1	24°46.4	65°45.6	-22°07.4	142°35.2	-15°51.4	88°47.2	-22°16.5
10	23°05.0	298°32.3	24°46.6	80°47.0	-22°07.3	157°38.0	-15°51.4	103°49.8	-22°16.5
11	38°07.4	313°31.4	24°46.8	95°48.4	-22°07.2	172°40.8	-15°51.3	118°52.3	-22°16.5
12	53°09.9	328°30.6	24°47.0	110°49.8	-22°07.1	187°43.6	-15°51.2	133°54.9	-22°16.5
13	68°12.4	343°29.8	24°47.2	125°51.2	-22°07.1	202°46.4	-15°51.1	148°57.5	-22°16.5
14	83°14.8	358°28.9	24°47.4	140°52.6	-22°07.0	217°49.1	-15°51.0	164°00.1	-22°16.5
15	98°17.3	13°28.1	24°47.6	155°54.0	-22°06.9	232°51.9	-15°50.9	179°02.6	-22°16.5
16	113°19.8	28°27.3	24°47.8	170°55.4	-22°06.8	247°54.7	-15°50.9	194°05.2	-22°16.5
17	128°22.2	43°26.4	24°48.0	185°56.8	-22°06.7	262°57.5	-15°50.8	209°07.8	-22°16.6
18	143°24.7	58°25.6	24°48.2	200°58.2	-22°06.6	278°00.3	-15°50.7	224°10.4	-22°16.6
19	158°27.2	73°24.8	24°48.4	215°59.6	-22°06.5	293°03.0	-15°50.6	239°13.0	-22°16.6
20	173°29.6	88°23.9	24°48.6	231°01.0	-22°06.4	308°05.8	-15°50.5	254°15.5	-22°16.6
21	188°32.1	103°23.1	24°48.8	246°02.3	-22°06.3	323°08.6	-15°50.4	269°18.1	-22°16.6
22	203°34.5	118°22.3	24°48.9	261°03.7	-22°06.3	338°11.4	-15°50.4	284°20.7	-22°16.6
23	218°37.0	133°21.4	24°49.1	276°05.1	-22°06.2	353°14.1	-15°50.3	299°23.3	-22°16.6
Mer.pass.:8:27:		v-0.8 d0.2 m-3.9		v1.4 d0.1 m-0.8		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°40.3	29°11.2
Ankaa	353°12.8	-42°12.4
Schedar	349°37.1	56°37.9
Diphda	348°52.7	-17°53.3
Achernar	335°24.9	-57°08.7
Hamal	327°57.4	23°32.7
Polaris	316°46.4	89°20.3
Akamar	315°16.3	-40°14.1
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.9
Bellatrix	278°28.8	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.1	-52°42.7
Sirius	258°31.0	-16°44.6
Adara	255°10.2	-29°00.2
Procyon	244°56.4	5°10.6
Pollux	243°23.8	27°58.9
Avior	234°16.9	-59°34.5
Suhail	222°50.0	-43°30.7
Miaplacidus	221°39.0	-69°47.9
Alphard	217°52.9	-8°44.5
Regulus	207°39.9	11°52.6
Dubhe	193°47.5	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.6	-17°38.7
Acrux	173°05.1	-63°12.2
Gacrux	171°56.7	-57°13.1
Alioth	166°17.4	55°51.9
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.5
Hadar	148°42.5	-60°27.7
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.5	-60°54.6
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.0	74°05.0
Alphecca	126°07.9	26°39.3
Antares	112°21.8	-26°28.2
Atria	107°20.1	-69°03.3
Sabik	102°08.4	-15°44.7
Shaula	96°17.1	-37°06.8
Rasalhague	96°03.1	12°32.9
Etamin	90°44.2	51°29.1
Kaus Aust.	83°39.1	-34°22.3
Vega	80°36.5	38°47.9
Nunki	75°54.0	-26°16.2
Altair	62°04.9	8°54.9
Peacock	53°13.9	-56°40.2
Deneb	49°29.1	45°20.5
Enif	33°43.9	9°57.4
Alnair	27°39.7	-46°52.1
Fomalhaut	15°20.6	-29°31.4
Scheat	13°50.3	28°10.7
Markab	13°35.2	15°18.0

2018/5/1	**SHA**	**Mer.pass**
Venus	278°38.4	14:03
Mars	58°45.3	04:42
Jupiter	134°14.7	23:36
Saturn	80°38.5	03:14

2018/5/1	**SHA**	**Mer.pass**
Venus	277°19.4	14:05
Mars	58°18.9	04:40
Jupiter	134°22.3	23:31
Saturn	80°41.0	03:10

2018/5/1	**SHA**	**Mer.pass**
Venus	276°00.3	14:06
Mars	57°52.8	04:37
Jupiter	134°29.9	23:27
Saturn	80°43.7	03:06

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°55.0	18°18.9	210°52.2	11.7	3°15.4	11.8	57.8
1	195°55.0	18°19.5	225°22.8	11.6	3°27.2	11.8	57.9
2	210°55.0	18°20.1	239°53.4	11.5	3°39.0	11.8	57.9
3	225°55.0	18°20.7	254°23.9	11.5	3°50.8	11.8	58.0
4	240°55.0	18°21.4	268°54.4	11.4	4°02.5	11.8	58.0
5	255°55.0	18°22.0	283°24.8	11.4	4°14.3	11.8	58.0
6	270°55.0	18°22.6	297°55.1	11.3	4°26.1	11.8	58.1
7	285°55.0	18°23.2	312°25.4	11.3	4°37.8	11.7	58.1
8	300°55.0	18°23.8	326°55.7	11.2	4°49.5	11.7	58.1
9	315°55.0	18°24.4	341°25.8	11.2	5°01.3	11.7	58.2
10	330°55.0	18°25.1	355°56.0	11.1	5°13.0	11.7	58.2
11	345°55.0	18°25.7	10°26.0	11.0	5°24.7	11.7	58.2
12	0°55.0	18°26.3	24°56.0	11.0	5°36.4	11.7	58.3
13	15°55.0	18°26.9	39°26.0	10.9	5°48.0	11.7	58.3
14	30°55.0	18°27.5	53°55.8	10.9	5°59.7	11.6	58.3
15	45°55.0	18°28.1	68°25.7	10.8	6°11.3	11.6	58.4
16	60°55.0	18°28.7	82°55.4	10.7	6°23.0	11.6	58.4
17	75°55.0	18°29.3	97°25.1	10.7	6°34.6	11.6	58.4
18	90°55.0	18°30.0	111°54.7	10.6	6°46.1	11.6	58.5
19	105°55.0	18°30.6	126°24.3	10.5	6°57.7	11.5	58.5
20	120°55.0	18°31.2	140°53.8	10.5	7°09.2	11.5	58.5
21	135°55.0	18°31.8	155°23.2	10.4	7°20.7	11.5	58.6
22	150°55.0	18°32.4	169°52.6	10.3	7°32.2	11.5	58.6
23	165°55.0	18°33.0	184°21.9	10.3	7°43.6	11.4	58.6
	SD.=15.8	d=0.6	S.D.=15.8				

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°55.0	18°33.6	198°51.1	10.2	7°55.1	11.4	58.6
1	195°55.0	18°34.2	213°20.3	10.1	8°06.5	11.4	58.7
2	210°55.0	18°34.8	227°49.4	10.1	8°17.8	11.3	58.7
3	225°55.0	18°35.4	242°18.4	10.0	8°29.1	11.3	58.7
4	240°55.0	18°36.0	256°47.4	9.9	8°40.4	11.3	58.8
5	255°55.0	18°36.6	271°16.3	9.9	8°51.7	11.2	58.8
6	270°55.0	18°37.2	285°45.1	9.8	9°02.9	11.2	58.8
7	285°55.0	18°37.8	300°13.9	9.7	9°14.1	11.2	58.9
8	300°55.0	18°38.4	314°42.5	9.6	9°25.2	11.1	58.9
9	315°55.0	18°39.1	329°11.1	9.6	9°36.3	11.1	58.9
10	330°55.0	18°39.7	343°39.7	9.5	9°47.3	11.0	59.0
11	345°55.0	18°40.3	358°08.1	9.4	9°58.4	11.0	59.0
12	0°55.0	18°40.9	12°36.5	9.3	10°09.3	10.9	59.0
13	15°55.0	18°41.5	27°04.8	9.3	10°20.2	10.9	59.0
14	30°55.0	18°42.1	41°33.1	9.2	10°31.1	10.8	59.1
15	45°55.0	18°42.7	56°01.2	9.1	10°41.9	10.8	59.1
16	60°55.0	18°43.3	70°29.3	9.1	10°52.7	10.7	59.1
17	75°55.0	18°43.8	84°57.3	9.0	11°03.4	10.7	59.2
18	90°55.0	18°44.4	99°25.3	8.9	11°14.0	10.6	59.2
19	105°55.0	18°45.0	113°53.1	8.8	11°24.6	10.6	59.2
20	120°55.0	18°45.6	128°20.9	8.8	11°35.2	10.5	59.2
21	135°55.0	18°46.2	142°48.6	8.7	11°45.7	10.5	59.3
22	150°55.0	18°46.8	157°16.3	8.6	11°56.1	10.4	59.3
23	165°55.0	18°47.4	171°43.8	8.5	12°06.5	10.3	59.3
	SD.=15.8	d=0.6	S.D.=16.0				

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°55.0	18°48.0	186°11.3	8.4	12°16.8	10.3	59.3
1	195°55.0	18°48.6	200°38.7	8.4	12°27.0	10.2	59.4
2	210°55.0	18°49.2	215°06.1	8.3	12°37.2	10.1	59.4
3	225°54.9	18°49.8	229°33.3	8.2	12°47.3	10.1	59.4
4	240°54.9	18°50.4	244°00.5	8.1	12°57.3	10.0	59.4
5	255°54.9	18°51.0	258°27.6	8.1	13°07.3	9.9	59.5
6	270°54.9	18°51.6	272°54.6	8.0	13°17.2	9.9	59.5
7	285°54.9	18°52.2	287°21.6	7.9	13°27.0	9.8	59.5
8	300°54.9	18°52.8	301°48.4	7.8	13°36.7	9.7	59.5
9	315°54.9	18°53.3	316°15.2	7.8	13°46.4	9.6	59.6
10	330°54.9	18°53.9	330°41.9	7.7	13°56.0	9.5	59.6
11	345°54.9	18°54.5	345°08.6	7.6	14°05.5	9.5	59.6
12	0°54.9	18°55.1	359°35.1	7.5	14°14.9	9.4	59.6
13	15°54.9	18°55.7	14°01.6	7.4	14°24.3	9.3	59.7
14	30°54.9	18°56.3	28°28.0	7.4	14°33.5	9.2	59.7
15	45°54.9	18°56.9	42°54.4	7.3	14°42.7	9.1	59.7
16	60°54.8	18°57.5	57°20.6	7.2	14°51.8	9.0	59.7
17	75°54.8	18°58.0	71°46.8	7.1	15°00.8	9.0	59.7
18	90°54.8	18°58.6	86°12.9	7.1	15°09.7	8.9	59.8
19	105°54.8	18°59.2	100°39.0	7.0	15°18.5	8.8	59.8
20	120°54.8	18°59.8	115°04.9	6.9	15°27.2	8.7	59.8
21	135°54.8	19°00.4	129°30.8	6.8	15°35.9	8.6	59.8
22	150°54.8	19°01.0	143°56.6	6.8	15°44.4	8.5	59.8
23	165°54.8	19°01.5	158°22.4	6.7	15°52.9	8.4	59.9
	SD.=15.8	d=0.6	S.D.=16.2				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	00:55	23:10	–:–	–:–
68	–:–	–:–	01:53	22:04	–:–	–:–
66	–:–	–:–	02:27	21:29	–:–	–:–
64	–:–	01:16	02:51	21:04	22:43	–:–
62	–:–	01:56	03:10	20:45	22:00	–:–
60	–:–	02:23	03:25	20:29	21:33	–:–
58	01:08	02:43	03:38	20:16	21:11	22:50
56	01:45	02:60	03:49	20:05	20:54	22:11
54	02:10	03:14	03:59	19:55	20:40	21:46
52	02:29	03:26	04:08	19:46	20:28	21:26
50	02:45	03:37	04:16	19:38	20:17	21:10
45	03:15	03:58	04:32	19:21	19:55	20:39
40	03:38	04:15	04:46	19:07	19:38	20:16
35	03:55	04:29	04:57	18:56	19:24	19:58
30	04:10	04:41	05:07	18:46	19:12	19:43
20	04:33	05:01	05:24	18:28	18:52	19:20
10	04:51	05:17	05:39	18:14	18:36	19:02
0	05:06	05:31	05:53	17:60	18:22	18:47
-10	05:19	05:44	06:06	17:46	18:08	18:34
-20	05:31	05:58	06:21	17:32	17:55	18:22
-30	05:43	06:12	06:37	17:15	17:41	18:10
-35	05:49	06:20	06:47	17:06	17:33	18:03
-40	05:55	06:28	06:57	16:55	17:24	17:57
-45	06:02	06:38	07:10	16:42	17:14	17:50
-50	06:10	06:50	07:25	16:27	17:03	17:42
-52	06:14	06:55	07:32	16:20	16:57	17:39
-54	06:17	07:01	07:40	16:12	16:52	17:35
-56	06:21	07:07	07:49	16:03	16:45	17:31
-58	06:25	07:14	07:59	15:53	16:38	17:27
-60	06:30	07:22	08:11	15:41	16:30	17:22

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	03:16	03:03	02:47	17:56	20:01	22:23
70	03:21	03:16	03:10	17:46	19:40	21:43
68	03:26	03:26	03:27	17:38	19:24	21:16
66	03:29	03:34	03:41	17:31	19:11	20:55
64	03:32	03:41	03:53	17:25	19:01	20:38
62	03:35	03:47	04:03	17:20	18:52	20:25
60	03:37	03:53	04:12	17:16	18:44	20:13
58	03:39	03:57	04:19	17:12	18:37	20:04
56	03:41	04:02	04:26	17:09	18:31	19:55
54	03:43	04:05	04:32	17:06	18:26	19:47
52	03:44	04:09	04:37	17:04	18:21	19:40
50	03:46	04:12	04:42	17:01	18:17	19:34
45	03:49	04:19	04:53	16:56	18:08	19:21
40	03:51	04:25	05:02	16:51	17:60	19:10
35	03:54	04:30	05:10	16:48	17:53	19:01
30	03:56	04:34	05:16	16:44	17:47	18:53
20	03:59	04:42	05:28	16:39	17:37	18:39
10	04:02	04:49	05:39	16:33	17:29	18:26
0	04:05	04:55	05:49	16:29	17:20	18:15
-10	04:08	05:02	05:58	16:24	17:12	18:04
-20	04:11	05:09	06:09	16:19	17:03	17:52
-30	04:15	05:17	06:21	16:13	16:53	17:38
-35	04:17	05:22	06:28	16:10	16:48	17:30
-40	04:20	05:27	06:37	16:06	16:41	17:21
-45	04:22	05:33	06:46	16:02	16:34	17:10
-50	04:26	05:41	06:58	15:57	16:25	16:57
-52	04:27	05:44	07:03	15:54	16:20	16:51
-54	04:29	05:48	07:09	15:52	16:16	16:45
-56	04:31	05:52	07:16	15:49	16:11	16:37
-58	04:33	05:57	07:23	15:46	16:05	16:29
-60	04:36	06:02	07:32	15:42	15:59	16:20

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
13	03:40	03:40	11:56	10:16	22:41	27(5%)
14	03:40	03:40	11:56	11:07	23:34	28(2%)
15	03:40	03:40	11:56	12:01	00:29	0(0%)

May 16, 17 ,18 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	233°39.5	148°20.6	24°49.3	291°06.5	-22°06.1	8°16.9	-15°50.2	314°25.9	-22°16.6
1	248°41.9	163°19.8	24°49.5	306°07.9	-22°06.0	23°19.7	-15°50.1	329°28.4	-22°16.6
2	263°44.4	178°18.9	24°49.7	321°09.3	-22°05.9	38°22.5	-15°50.0	344°31.0	-22°16.6
3	278°46.9	193°18.1	24°49.9	336°10.7	-22°05.8	53°25.3	-15°49.9	359°33.6	-22°16.6
4	293°49.3	208°17.3	24°50.1	351°12.2	-22°05.7	68°28.0	-15°49.9	14°36.2	-22°16.6
5	308°51.8	223°16.4	24°50.2	6°13.6	-22°05.6	83°30.8	-15°49.8	29°38.8	-22°16.6
6	323°54.3	238°15.6	24°50.4	21°15.0	-22°05.6	98°33.6	-15°49.7	44°41.3	-22°16.6
7	338°56.7	253°14.7	24°50.6	36°16.4	-22°05.5	113°36.4	-15°49.6	59°43.9	-22°16.7
8	353°59.2	268°13.9	24°50.8	51°17.8	-22°05.4	128°39.2	-15°49.5	74°46.5	-22°16.7
9	9°01.6	283°13.1	24°50.9	66°19.2	-22°05.3	143°41.9	-15°49.4	89°49.1	-22°16.7
10	24°04.1	298°12.2	24°51.1	81°20.6	-22°05.2	158°44.7	-15°49.4	104°51.7	-22°16.7
11	39°06.6	313°11.4	24°51.3	96°22.0	-22°05.1	173°47.5	-15°49.3	119°54.2	-22°16.7
12	54°09.0	328°10.6	24°51.5	111°23.4	-22°05.0	188°50.3	-15°49.2	134°56.8	-22°16.7
13	69°11.5	343°09.7	24°51.6	126°24.8	-22°04.9	203°53.0	-15°49.1	149°59.4	-22°16.7
14	84°14.0	358°08.9	24°51.8	141°26.2	-22°04.9	218°55.8	-15°49.0	165°02.0	-22°16.7
15	99°16.4	13°08.1	24°52.0	156°27.6	-22°04.8	233°58.6	-15°48.9	180°04.6	-22°16.7
16	114°18.9	28°07.2	24°52.1	171°29.0	-22°04.7	249°01.4	-15°48.9	195°07.1	-22°16.7
17	129°21.4	43°06.4	24°52.3	186°30.4	-22°04.6	264°04.2	-15°48.8	210°09.7	-22°16.7
18	144°23.8	58°05.6	24°52.5	201°31.9	-22°04.5	279°06.9	-15°48.7	225°12.3	-22°16.7
19	159°26.3	73°04.7	24°52.6	216°33.3	-22°04.4	294°09.7	-15°48.6	240°14.9	-22°16.7
20	174°28.8	88°03.9	24°52.8	231°34.7	-22°04.3	309°12.5	-15°48.5	255°17.5	-22°16.8
21	189°31.2	103°03.0	24°52.9	246°36.1	-22°04.3	324°15.3	-15°48.4	270°20.0	-22°16.8
22	204°33.7	118°02.2	24°53.1	261°37.5	-22°04.2	339°18.0	-15°48.4	285°22.6	-22°16.8
23	219°36.1	133°01.4	24°53.3	276°38.9	-22°04.1	354°20.8	-15°48.3	300°25.2	-22°16.8
Mer.pass.:8:23:		v-0.8 d0.2 m-3.9		v1.4 d0.1 m-0.8		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.3	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	234°38.6	148°00.5	24°53.4	291°40.3	-22°04.0	9°23.6	-15°48.2	315°27.8	-22°16.8
1	249°41.1	162°59.7	24°53.6	306°41.8	-22°03.9	24°26.4	-15°48.1	330°30.4	-22°16.8
2	264°43.5	177°58.9	24°53.7	321°43.2	-22°03.8	39°29.2	-15°48.0	345°33.0	-22°16.8
3	279°46.0	192°58.0	24°53.9	336°44.6	-22°03.7	54°31.9	-15°47.9	0°35.5	-22°16.8
4	294°48.5	207°57.2	24°54.0	351°46.0	-22°03.7	69°34.7	-15°47.9	15°38.1	-22°16.8
5	309°50.9	222°56.4	24°54.2	6°47.4	-22°03.6	84°37.5	-15°47.8	30°40.7	-22°16.8
6	324°53.4	237°55.5	24°54.3	21°48.8	-22°03.5	99°40.3	-15°47.7	45°43.3	-22°16.8
7	339°55.9	252°54.7	24°54.5	36°50.3	-22°03.4	114°43.0	-15°47.6	60°45.9	-22°16.8
8	354°58.3	267°53.8	24°54.6	51°51.7	-22°03.3	129°45.8	-15°47.5	75°48.5	-22°16.8
9	10°00.8	282°53.0	24°54.8	66°53.1	-22°03.2	144°48.6	-15°47.4	90°51.0	-22°16.9
10	25°03.3	297°52.2	24°54.9	81°54.5	-22°03.1	159°51.4	-15°47.4	105°53.6	-22°16.9
11	40°05.7	312°51.3	24°55.1	96°56.0	-22°03.1	174°54.1	-15°47.3	120°56.2	-22°16.9
12	55°08.2	327°50.5	24°55.2	111°57.4	-22°03.0	189°56.9	-15°47.2	135°58.8	-22°16.9
13	70°10.6	342°49.7	24°55.3	126°58.8	-22°02.9	204°59.7	-15°47.1	151°01.4	-22°16.9
14	85°13.1	357°48.8	24°55.5	142°00.2	-22°02.8	220°02.5	-15°47.0	166°04.0	-22°16.9
15	100°15.6	12°48.0	24°55.6	157°01.7	-22°02.7	235°05.2	-15°47.0	181°06.6	-22°16.9
16	115°18.0	27°47.2	24°55.8	172°03.1	-22°02.6	250°08.0	-15°46.9	196°09.1	-22°16.9
17	130°20.5	42°46.3	24°55.9	187°04.5	-22°02.6	265°10.8	-15°46.8	211°11.7	-22°16.9
18	145°23.0	57°45.5	24°56.0	202°05.9	-22°02.5	280°13.6	-15°46.7	226°14.3	-22°16.9
19	160°25.4	72°44.6	24°56.2	217°07.4	-22°02.4	295°16.4	-15°46.6	241°16.9	-22°16.9
20	175°27.9	87°43.8	24°56.3	232°08.8	-22°02.3	310°19.1	-15°46.5	256°19.5	-22°16.9
21	190°30.4	102°43.0	24°56.4	247°10.2	-22°02.2	325°21.9	-15°46.5	271°22.1	-22°16.9
22	205°32.8	117°42.1	24°56.5	262°11.6	-22°02.1	340°24.7	-15°46.4	286°24.6	-22°17.0
23	220°35.3	132°41.3	24°56.7	277°13.1	-22°02.1	355°27.5	-15°46.3	301°27.2	-22°17.0
Mer.pass.:8:20:		v-0.8 d0.2 m-3.9		v1.4 d0.1 m-0.8		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.2	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	235°37.8	147°40.5	24°56.8	292°14.5	-22°02.0	10°30.2	-15°46.2	316°29.8	-22°17.0
1	250°40.2	162°39.6	24°56.9	307°15.9	-22°01.9	25°33.0	-15°46.1	331°32.4	-22°17.0
2	265°42.7	177°38.8	24°57.1	322°17.4	-22°01.8	40°35.8	-15°46.0	346°35.0	-22°17.0
3	280°45.1	192°38.0	24°57.2	337°18.8	-22°01.7	55°38.6	-15°46.0	1°37.6	-22°17.0
4	295°47.6	207°37.1	24°57.3	352°20.2	-22°01.6	70°41.3	-15°45.9	16°40.2	-22°17.0
5	310°50.1	222°36.3	24°57.4	7°21.7	-22°01.6	85°44.1	-15°45.8	31°42.8	-22°17.0
6	325°52.5	237°35.4	24°57.5	22°23.1	-22°01.5	100°46.9	-15°45.7	46°45.3	-22°17.0
7	340°55.0	252°34.6	24°57.7	37°24.6	-22°01.4	115°49.7	-15°45.6	61°47.9	-22°17.0
8	355°57.5	267°33.8	24°57.8	52°26.0	-22°01.3	130°52.4	-15°45.6	76°50.5	-22°17.0
9	10°59.9	282°32.9	24°57.9	67°27.4	-22°01.2	145°55.2	-15°45.5	91°53.1	-22°17.0
10	26°02.4	297°32.1	24°58.0	82°28.9	-22°01.1	160°58.0	-15°45.4	106°55.7	-22°17.0
11	41°04.9	312°31.3	24°58.1	97°30.3	-22°01.1	176°00.8	-15°45.3	121°58.3	-22°17.1
12	56°07.3	327°30.4	24°58.2	112°31.7	-22°01.0	191°03.5	-15°45.2	137°00.9	-22°17.1
13	71°09.8	342°29.6	24°58.3	127°33.2	-22°00.9	206°06.3	-15°45.1	152°03.5	-22°17.1
14	86°12.3	357°28.7	24°58.4	142°34.6	-22°00.8	221°09.1	-15°45.1	167°06.0	-22°17.1
15	101°14.7	12°27.9	24°58.6	157°36.1	-22°00.7	236°11.8	-15°45.0	182°08.6	-22°17.1
16	116°17.2	27°27.1	24°58.7	172°37.5	-22°00.7	251°14.6	-15°44.9	197°11.2	-22°17.1
17	131°19.6	42°26.2	24°58.8	187°39.0	-22°00.6	266°17.4	-15°44.8	212°13.8	-22°17.1
18	146°22.1	57°25.4	24°58.9	202°40.4	-22°00.5	281°20.2	-15°44.7	227°16.4	-22°17.1
19	161°24.6	72°24.6	24°59.0	217°41.8	-22°00.4	296°22.9	-15°44.7	242°19.0	-22°17.1
20	176°27.0	87°23.7	24°59.1	232°43.3	-22°00.3	311°25.7	-15°44.6	257°21.6	-22°17.1
21	191°29.5	102°22.9	24°59.2	247°44.7	-22°00.3	326°28.5	-15°44.5	272°24.2	-22°17.1
22	206°32.0	117°22.1	24°59.3	262°46.2	-22°00.2	341°31.3	-15°44.4	287°26.8	-22°17.1
23	221°34.4	132°21.2	24°59.4	277°47.6	-22°00.1	356°34.0	-15°44.3	302°29.3	-22°17.2
Mer.pass.:8:16:		v-0.8 d0.1 m-3.9		v1.4 d0.1 m-0.8		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°40.3	29°11.2
Ankaa	353°12.7	-42°12.4
Schedar	349°37.1	56°37.9
Diphda	348°52.7	-17°53.3
Achernar	335°24.9	-57°08.7
Hamal	327°57.4	23°32.7
Polaris	316°45.8	89°20.3
Akamar	315°16.3	-40°14.1
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.9
Bellatrix	278°28.8	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.1	-52°42.7
Sirius	258°31.0	-16°44.6
Adara	255°10.2	-29°00.2
Procyon	244°56.4	5°10.6
Pollux	243°23.8	27°58.9
Avior	234°16.9	-59°34.5
Suhail	222°50.1	-43°30.7
Miaplacidus	221°39.1	-69°47.9
Alphard	217°52.9	-8°44.5
Regulus	207°39.9	11°52.6
Dubhe	193°47.5	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.6	-17°38.7
Acrux	173°05.1	-63°12.2
Gacrux	171°56.7	-57°13.1
Alioth	166°17.5	55°51.9
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.5
Hadar	148°42.5	-60°27.7
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.5	-60°54.6
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.0	74°05.0
Alphecca	126°07.9	26°39.3
Antares	112°21.8	-26°28.2
Atria	107°20.1	-69°03.3
Sabik	102°08.4	-15°44.7
Shaula	96°17.1	-37°06.8
Rasalhague	96°03.1	12°32.9
Etamin	90°44.1	51°29.2
Kaus Aust.	83°39.1	-34°22.3
Vega	80°36.4	38°47.9
Nunki	75°54.0	-26°16.2
Altair	62°04.9	8°55.0
Peacock	53°13.9	-56°40.2
Deneb	49°29.1	45°20.5
Enif	33°43.9	9°57.4
Alnair	27°39.7	-46°52.1
Fomalhaut	15°20.5	-29°31.4
Scheat	13°50.3	28°10.7
Markab	13°35.2	15°18.0

2018/5/1	**SHA**	**Mer.pass**
Venus	274°41.1	14:07
Mars	57°27.1	04:35
Jupiter	134°37.5	23:23
Saturn	80°46.4	03:02

2018/5/1	**SHA**	**Mer.pass**
Venus	273°21.9	14:09
Mars	57°01.7	04:33
Jupiter	134°45.0	23:18
Saturn	80°49.2	02:58

2018/5/1	**SHA**	**Mer.pass**
Venus	272°02.7	14:10
Mars	56°36.8	04:31
Jupiter	134°52.5	23:14
Saturn	80°52.1	02:54

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h Sun Moon

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.8	19°02.1	172°48.0	6.6	16°01.2	8.3	59.9
1	195°54.7	19°02.7	187°13.6	6.6	16°09.5	8.2	59.9
2	210°54.7	19°03.3	201°39.1	6.5	16°17.6	8.1	59.9
3	225°54.7	19°03.9	216°04.6	6.4	16°25.6	8.0	59.9
4	240°54.7	19°04.4	230°30.0	6.3	16°33.6	7.9	59.9
5	255°54.7	19°05.0	244°55.3	6.3	16°41.4	7.8	60.0
6	270°54.7	19°05.6	259°20.5	6.2	16°49.1	7.7	60.0
7	285°54.7	19°06.2	273°45.7	6.1	16°56.8	7.6	60.0
8	300°54.7	19°06.7	288°10.8	6.1	17°04.3	7.5	60.0
9	315°54.6	19°07.3	302°35.8	6.0	17°11.7	7.3	60.0
10	330°54.6	19°07.9	317°00.8	5.9	17°19.0	7.2	60.0
11	345°54.6	19°08.5	331°25.7	5.9	17°26.1	7.1	60.0
12	0°54.6	19°09.0	345°50.5	5.8	17°33.2	7.0	60.1
13	15°54.6	19°09.6	0°15.3	5.7	17°40.2	6.9	60.1
14	30°54.6	19°10.2	14°40.0	5.7	17°47.0	6.8	60.1
15	45°54.5	19°10.8	29°04.7	5.6	17°53.7	6.7	60.1
16	60°54.5	19°11.3	43°29.3	5.6	18°00.3	6.5	60.1
17	75°54.5	19°11.9	57°53.8	5.5	18°06.8	6.4	60.1
18	90°54.5	19°12.5	72°18.3	5.4	18°13.1	6.3	60.1
19	105°54.5	19°13.0	86°42.7	5.4	18°19.3	6.2	60.1
20	120°54.5	19°13.6	101°07.0	5.3	18°25.5	6.0	60.1
21	135°54.5	19°14.2	115°31.3	5.3	18°31.4	5.9	60.2
22	150°54.4	19°14.8	129°55.6	5.2	18°37.3	5.8	60.2
23	165°54.4	19°15.3	144°19.8	5.2	18°43.0	5.7	60.2
	SD.=15.8	d=0.6	S.D.=16.3				

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.4	19°15.9	158°43.9	5.1	18°48.6	5.5	60.2
1	195°54.4	19°16.5	173°08.0	5.1	18°54.1	5.4	60.2
2	210°54.4	19°17.0	187°32.0	5.0	18°59.4	5.3	60.2
3	225°54.3	19°17.6	201°56.0	5.0	19°04.6	5.1	60.2
4	240°54.3	19°18.2	216°20.0	4.9	19°09.7	5.0	60.2
5	255°54.3	19°18.7	230°43.9	4.9	19°14.7	4.9	60.2
6	270°54.3	19°19.3	245°07.7	4.8	19°19.5	4.7	60.2
7	285°54.3	19°19.8	259°31.5	4.8	19°24.2	4.6	60.2
8	300°54.2	19°20.4	273°55.3	4.7	19°28.7	4.5	60.2
9	315°54.2	19°21.0	288°19.0	4.7	19°33.1	4.3	60.2
10	330°54.2	19°21.5	302°42.7	4.7	19°37.4	4.2	60.3
11	345°54.2	19°22.1	317°06.4	4.6	19°41.5	4.1	60.3
12	0°54.2	19°22.7	331°30.0	4.6	19°45.5	3.9	60.3
13	15°54.1	19°23.2	345°53.6	4.6	19°49.4	3.8	60.3
14	30°54.1	19°23.8	0°17.1	4.5	19°53.1	3.6	60.3
15	45°54.1	19°24.3	14°40.6	4.5	19°56.7	3.5	60.3
16	60°54.1	19°24.9	29°04.1	4.5	20°00.1	3.4	60.3
17	75°54.1	19°25.4	43°27.6	4.4	20°03.4	3.2	60.3
18	90°54.0	19°26.0	57°51.0	4.4	20°06.5	3.1	60.3
19	105°54.0	19°26.6	72°14.4	4.4	20°09.5	2.9	60.3
20	120°54.0	19°27.1	86°37.8	4.4	20°12.4	2.8	60.3
21	135°54.0	19°27.7	101°01.2	4.4	20°15.1	2.6	60.3
22	150°54.0	19°28.2	115°24.5	4.3	20°17.7	2.5	60.3
23	165°53.9	19°28.8	129°47.9	4.3	20°20.1	2.4	60.3
	SD.=15.8	d=0.6	S.D.=16.4				

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°53.9	19°29.3	144°11.2	4.3	20°22.4	2.2	60.3
1	195°53.9	19°29.9	158°34.5	4.3	20°24.6	2.1	60.3
2	210°53.9	19°30.4	172°57.7	4.3	20°26.6	1.9	60.3
3	225°53.8	19°31.0	187°21.0	4.3	20°28.4	1.8	60.3
4	240°53.8	19°31.5	201°44.3	4.3	20°30.1	1.6	60.3
5	255°53.8	19°32.1	216°07.5	4.3	20°31.7	1.5	60.3
6	270°53.8	19°32.6	230°30.8	4.2	20°33.1	1.3	60.3
7	285°53.7	19°33.2	244°54.0	4.2	20°34.3	1.2	60.3
8	300°53.7	19°33.7	259°17.3	4.2	20°35.4	1.0	60.3
9	315°53.7	19°34.3	273°40.5	4.2	20°36.4	0.9	60.2
10	330°53.7	19°34.8	288°03.7	4.2	20°37.2	0.7	60.2
11	345°53.6	19°35.4	302°27.0	4.2	20°37.9	0.6	60.2
12	0°53.6	19°35.9	316°50.2	4.3	20°38.4	0.5	60.2
13	15°53.6	19°36.5	331°13.5	4.3	20°38.8	0.3	60.2
14	30°53.6	19°37.0	345°36.8	4.3	20°39.0	0.2	60.2
15	45°53.5	19°37.6	0°00.0	4.3	20°39.1	0.0	60.2
16	60°53.5	19°38.1	14°23.3	4.3	20°39.1	-0.1	60.2
17	75°53.5	19°38.7	28°46.6	4.3	20°38.9	-0.3	60.2
18	90°53.4	19°39.2	43°09.9	4.3	20°38.5	-0.4	60.2
19	105°53.4	19°39.7	57°33.2	4.3	20°38.0	-0.6	60.2
20	120°53.4	19°40.3	71°56.6	4.4	20°37.3	-0.7	60.2
21	135°53.4	19°40.8	86°20.0	4.4	20°36.5	-0.9	60.2
22	150°53.3	19°41.4	100°43.3	4.4	20°35.6	-1.0	60.2
23	165°53.3	19°41.9	115°06.7	4.4	20°34.5	-1.2	60.2
	SD.=15.8	d=0.6	S.D.=16.4				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	01:36	22:22	–:–	–:–
66	–:–	–:–	02:15	21:41	–:–	–:–
64	–:–	00:53	02:41	21:14	23:08	–:–
62	–:–	01:43	03:02	20:53	22:14	–:–
60	–:–	02:13	03:18	20:36	21:42	–:–
58	00:48	02:35	03:32	20:22	21:20	23:13
56	01:33	02:53	03:44	20:10	21:01	22:23
54	02:01	03:08	03:54	19:60	20:46	21:54
52	02:22	03:21	04:03	19:50	20:33	21:33
50	02:39	03:32	04:12	19:42	20:22	21:16
45	03:11	03:55	04:29	19:24	19:59	20:43
40	03:34	04:12	04:43	19:10	19:41	20:19
35	03:53	04:27	04:55	18:58	19:26	20:01
30	04:08	04:39	05:06	18:48	19:14	19:46
20	04:32	04:60	05:23	18:30	18:53	19:22
10	04:50	05:16	05:39	18:14	18:37	19:03
0	05:05	05:31	05:53	17:60	18:22	18:47
-10	05:19	05:45	06:07	17:46	18:08	18:34
-20	05:32	05:59	06:22	17:31	17:54	18:21
-30	05:44	06:13	06:39	17:14	17:39	18:08
-35	05:51	06:22	06:49	17:04	17:31	18:01
-40	05:58	06:31	07:00	16:52	17:22	17:54
-45	06:05	06:41	07:13	16:39	17:11	17:47
-50	06:14	06:53	07:29	16:23	16:59	17:39
-52	06:17	06:59	07:37	16:15	16:53	17:35
-54	06:21	07:05	07:45	16:07	16:47	17:31
-56	06:25	07:12	07:55	15:58	16:41	17:27
-58	06:30	07:19	08:05	15:47	16:33	17:22
-60	06:35	07:27	08:17	15:35	16:25	17:17

	Moonrise			Moonset		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	02:21	–:–	–:–	–:–	–:–	–:–
70	03:02	02:51	–:–	23:57	–:–	–:–
68	03:31	03:41	04:07	23:08	–:–	00:49
66	03:52	04:12	04:49	22:37	–:–	00:07
64	04:10	04:36	05:18	22:14	23:38	–:–
62	04:24	04:55	05:40	21:55	23:16	–:–
60	04:36	05:10	05:58	21:40	22:59	–:–
58	04:47	05:23	06:13	21:28	22:44	23:47
56	04:56	05:35	06:25	21:17	22:31	23:35
54	05:04	05:45	06:36	21:07	22:20	23:24
52	05:11	05:54	06:46	20:58	22:11	23:14
50	05:18	06:02	06:55	20:50	22:02	23:05
45	05:32	06:19	07:14	20:34	21:43	22:46
40	05:44	06:33	07:29	20:20	21:28	22:31
35	05:54	06:45	07:42	20:09	21:16	22:18
30	06:03	06:56	07:53	19:59	21:04	22:07
20	06:19	07:14	08:13	19:42	20:45	21:47
10	06:32	07:30	08:30	19:27	20:29	21:30
0	06:45	07:44	08:45	19:13	20:13	21:15
-10	06:58	07:59	09:01	18:59	19:58	20:59
-20	07:12	08:15	09:18	18:44	19:41	20:42
-30	07:27	08:34	09:38	18:27	19:22	20:22
-35	07:37	08:45	09:49	18:17	19:11	20:11
-40	07:47	08:57	10:02	18:06	18:58	19:58
-45	07:60	09:12	10:18	17:53	18:43	19:42
-50	08:15	09:29	10:37	17:37	18:25	19:23
-52	08:22	09:38	10:46	17:29	18:16	19:14
-54	08:30	09:47	10:56	17:21	18:06	19:04
-56	08:39	09:58	11:08	17:11	17:55	18:52
-58	08:49	10:10	11:21	17:01	17:43	18:39
-60	09:01	10:25	11:36	16:48	17:28	18:24

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
16	03:39	03:38	11:56	12:58	00:29	1(2%)
17	03:38	03:37	11:56	13:58	01:28	2(6%)
18	03:36	03:34	11:56	15:00	02:29	3(12%)

May 19, 20 ,21 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	236°36.9	147°20.4	24°59.5	292°49.1	-22°00.0	11°36.8	-15°44.2	317°31.9	-22°17.2
1	251°39.4	162°19.5	24°59.6	307°50.5	-21°59.9	26°39.6	-15°44.2	332°34.5	-22°17.2
2	266°41.8	177°18.7	24°59.7	322°52.0	-21°59.9	41°42.4	-15°44.1	347°37.1	-22°17.2
3	281°44.3	192°17.9	24°59.8	337°53.4	-21°59.8	56°45.1	-15°44.0	2°39.7	-22°17.2
4	296°46.8	207°17.0	24°59.9	352°54.9	-21°59.7	71°47.9	-15°43.9	17°42.3	-22°17.2
5	311°49.2	222°16.2	24°59.9	7°56.3	-21°59.6	86°50.7	-15°43.8	32°44.9	-22°17.2
6	326°51.7	237°15.4	25°00.0	22°57.8	-21°59.5	101°53.4	-15°43.8	47°47.5	-22°17.2
7	341°54.1	252°14.5	25°00.1	37°59.2	-21°59.5	116°56.2	-15°43.7	62°50.1	-22°17.2
8	356°56.6	267°13.7	25°00.2	53°00.7	-21°59.4	131°59.0	-15°43.6	77°52.7	-22°17.2
9	11°59.1	282°12.9	25°00.3	68°02.1	-21°59.3	147°01.8	-15°43.5	92°55.2	-22°17.2
10	27°01.5	297°12.0	25°00.4	83°03.6	-21°59.2	162°04.5	-15°43.4	107°57.8	-22°17.2
11	42°04.0	312°11.2	25°00.5	98°05.1	-21°59.1	177°07.3	-15°43.3	123°00.4	-22°17.2
12	57°06.5	327°10.3	25°00.5	113°06.5	-21°59.1	192°10.1	-15°43.3	138°03.0	-22°17.3
13	72°08.9	342°09.5	25°00.6	128°08.0	-21°59.0	207°12.9	-15°43.2	153°05.6	-22°17.3
14	87°11.4	357°08.7	25°00.7	143°09.4	-21°58.9	222°15.6	-15°43.1	168°08.2	-22°17.3
15	102°13.9	12°07.8	25°00.8	158°10.9	-21°58.8	237°18.4	-15°43.0	183°10.8	-22°17.3
16	117°16.3	27°07.0	25°00.9	173°12.3	-21°58.7	252°21.2	-15°42.9	198°13.4	-22°17.3
17	132°18.8	42°06.2	25°00.9	188°13.8	-21°58.7	267°23.9	-15°42.9	213°16.0	-22°17.3
18	147°21.2	57°05.3	25°01.0	203°15.3	-21°58.6	282°26.7	-15°42.8	228°18.6	-22°17.3
19	162°23.7	72°04.5	25°01.1	218°16.7	-21°58.5	297°29.5	-15°42.7	243°21.2	-22°17.3
20	177°26.2	87°03.7	25°01.2	233°18.2	-21°58.4	312°32.3	-15°42.6	258°23.8	-22°17.3
21	192°28.6	102°02.8	25°01.2	248°19.6	-21°58.4	327°35.0	-15°42.5	273°26.3	-22°17.3
22	207°31.1	117°02.0	25°01.3	263°21.1	-21°58.3	342°37.8	-15°42.5	288°28.9	-22°17.3
23	222°33.6	132°01.2	25°01.4	278°22.6	-21°58.2	357°40.6	-15°42.4	303°31.5	-22°17.3
Mer.pass.:8:12:		v-0.8 d0.1 m-3.9		v1.4 d0.1 m-0.9		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.2	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	237°36.0	147°00.3	25°01.4	293°24.0	-21°58.1	12°43.3	-15°42.3	318°34.1	-22°17.4
1	252°38.5	161°59.5	25°01.5	308°25.5	-21°58.1	27°46.1	-15°42.2	333°36.7	-22°17.4
2	267°41.0	176°58.6	25°01.6	323°27.0	-21°58.0	42°48.9	-15°42.1	348°39.3	-22°17.4
3	282°43.4	191°57.8	25°01.6	338°28.4	-21°57.9	57°51.7	-15°42.0	3°41.9	-22°17.4
4	297°45.9	206°57.0	25°01.7	353°29.9	-21°57.8	72°54.4	-15°42.0	18°44.5	-22°17.4
5	312°48.4	221°56.1	25°01.8	8°31.4	-21°57.7	87°57.2	-15°41.9	33°47.1	-22°17.4
6	327°50.8	236°55.3	25°01.8	23°32.8	-21°57.7	102°60.0	-15°41.8	48°49.7	-22°17.4
7	342°53.3	251°54.5	25°01.9	38°34.3	-21°57.6	118°02.7	-15°41.7	63°52.3	-22°17.4
8	357°55.7	266°53.6	25°01.9	53°35.8	-21°57.5	133°05.5	-15°41.6	78°54.9	-22°17.4
9	12°58.2	281°52.8	25°02.0	68°37.3	-21°57.4	148°08.3	-15°41.6	93°57.5	-22°17.4
10	28°00.7	296°52.0	25°02.0	83°38.7	-21°57.4	163°11.0	-15°41.5	109°00.1	-22°17.4
11	43°03.1	311°51.1	25°02.1	98°40.2	-21°57.3	178°13.8	-15°41.4	124°02.7	-22°17.4
12	58°05.6	326°50.3	25°02.2	113°41.7	-21°57.2	193°16.6	-15°41.3	139°05.2	-22°17.5
13	73°08.1	341°49.5	25°02.2	128°43.1	-21°57.1	208°19.4	-15°41.2	154°07.8	-22°17.5
14	88°10.5	356°48.6	25°02.3	143°44.6	-21°57.1	223°22.1	-15°41.2	169°10.4	-22°17.5
15	103°13.0	11°47.8	25°02.3	158°46.1	-21°57.0	238°24.9	-15°41.1	184°13.0	-22°17.5
16	118°15.5	26°47.0	25°02.4	173°47.6	-21°56.9	253°27.7	-15°41.0	199°15.6	-22°17.5
17	133°17.9	41°46.1	25°02.4	188°49.1	-21°56.8	268°30.4	-15°40.9	214°18.2	-22°17.5
18	148°20.4	56°45.3	25°02.4	203°50.5	-21°56.8	283°33.2	-15°40.8	229°20.8	-22°17.5
19	163°22.9	71°44.5	25°02.5	218°52.0	-21°56.7	298°36.0	-15°40.8	244°23.4	-22°17.5
20	178°25.3	86°43.6	25°02.5	233°53.5	-21°56.6	313°38.7	-15°40.7	259°26.0	-22°17.5
21	193°27.8	101°42.8	25°02.6	248°55.0	-21°56.5	328°41.5	-15°40.6	274°28.6	-22°17.5
22	208°30.2	116°42.0	25°02.6	263°56.4	-21°56.5	343°44.3	-15°40.5	289°31.2	-22°17.5
23	223°32.7	131°41.1	25°02.6	278°57.9	-21°56.4	358°47.0	-15°40.4	304°33.8	-22°17.5
Mer.pass.:8:08:		v-0.8 d0.1 m-3.9		v1.5 d0.1 m-0.9		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.2	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	238°35.2	146°40.3	25°02.7	293°59.4	-21°56.3	13°49.8	-15°40.4	319°36.4	-22°17.6
1	253°37.6	161°39.5	25°02.7	309°00.9	-21°56.2	28°52.6	-15°40.3	334°39.0	-22°17.6
2	268°40.1	176°38.6	25°02.8	324°02.4	-21°56.2	43°55.3	-15°40.2	349°41.6	-22°17.6
3	283°42.6	191°37.8	25°02.8	339°03.9	-21°56.1	58°58.1	-15°40.1	4°44.2	-22°17.6
4	298°45.0	206°37.0	25°02.8	354°05.3	-21°56.0	74°00.9	-15°40.0	19°46.8	-22°17.6
5	313°47.5	221°36.1	25°02.9	9°06.8	-21°56.0	89°03.7	-15°40.0	34°49.4	-22°17.6
6	328°50.0	236°35.3	25°02.9	24°08.3	-21°55.9	104°06.4	-15°39.9	49°52.0	-22°17.6
7	343°52.4	251°34.5	25°02.9	39°09.8	-21°55.8	119°09.2	-15°39.8	64°54.6	-22°17.6
8	358°54.9	266°33.6	25°02.9	54°11.3	-21°55.7	134°12.0	-15°39.7	79°57.2	-22°17.6
9	13°57.4	281°32.8	25°03.0	69°12.8	-21°55.7	149°14.7	-15°39.6	94°59.8	-22°17.6
10	28°59.8	296°32.0	25°03.0	84°14.3	-21°55.6	164°17.5	-15°39.6	110°02.4	-22°17.6
11	44°02.3	311°31.1	25°03.0	99°15.8	-21°55.5	179°20.3	-15°39.5	125°05.0	-22°17.6
12	59°04.7	326°30.3	25°03.0	114°17.2	-21°55.4	194°23.0	-15°39.4	140°07.6	-22°17.7
13	74°07.2	341°29.5	25°03.1	129°18.7	-21°55.4	209°25.8	-15°39.3	155°10.2	-22°17.7
14	89°09.7	356°28.6	25°03.1	144°20.2	-21°55.3	224°28.6	-15°39.2	170°12.8	-22°17.7
15	104°12.1	11°27.8	25°03.1	159°21.7	-21°55.2	239°31.3	-15°39.2	185°15.4	-22°17.7
16	119°14.6	26°27.0	25°03.1	174°23.2	-21°55.2	254°34.1	-15°39.1	200°18.0	-22°17.7
17	134°17.1	41°26.1	25°03.1	189°24.7	-21°55.1	269°36.9	-15°39.0	215°20.6	-22°17.7
18	149°19.5	56°25.3	25°03.2	204°26.2	-21°55.0	284°39.6	-15°38.9	230°23.2	-22°17.7
19	164°22.0	71°24.5	25°03.2	219°27.7	-21°54.9	299°42.4	-15°38.8	245°25.7	-22°17.7
20	179°24.5	86°23.6	25°03.2	234°29.2	-21°54.9	314°45.2	-15°38.8	260°28.3	-22°17.7
21	194°26.9	101°22.8	25°03.2	249°30.7	-21°54.8	329°47.9	-15°38.7	275°30.9	-22°17.7
22	209°29.4	116°22.0	25°03.2	264°32.2	-21°54.7	344°50.7	-15°38.6	290°33.5	-22°17.7
23	224°31.8	131°21.1	25°03.2	279°33.7	-21°54.7	359°53.5	-15°38.5	305°36.1	-22°17.8
Mer.pass.:8:04:		v-0.8 d0.0 m-3.9		v1.5 d0.1 m-0.9		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°40.3	29°11.2
Ankaa	353°12.7	-42°12.3
Schedar	349°37.1	56°37.9
Diphda	348°52.7	-17°53.3
Achernar	335°24.9	-57°08.6
Hamal	327°57.3	23°32.7
Polaris	316°45.2	89°20.3
Akamar	315°16.3	-40°14.0
Menkar	314°11.9	4°09.4
Mirfak	308°36.1	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.9
Bellatrix	278°28.8	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.1	-52°42.7
Sirius	258°31.0	-16°44.6
Adara	255°10.2	-29°00.1
Procyon	244°56.4	5°10.6
Pollux	243°23.8	27°58.8
Avior	234°16.9	-59°34.5
Suhail	222°50.1	-43°30.7
Miaplacidus	221°39.1	-69°47.9
Alphard	217°52.9	-8°44.5
Regulus	207°40.0	11°52.6
Dubhe	193°47.5	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.6	-17°38.7
Acrux	173°05.1	-63°12.2
Gacrux	171°56.8	-57°13.1
Alioth	166°17.5	55°51.9
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.5
Hadar	148°42.5	-60°27.7
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.6
Rigil Kent.	139°46.5	-60°54.6
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.0	74°05.0
Alphecca	126°07.9	26°39.3
Antares	112°21.8	-26°28.2
Atria	107°20.1	-69°03.4
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.8
Rasalhague	96°03.1	12°32.9
Etamin	90°44.1	51°29.2
Kaus Aust.	83°39.1	-34°22.3
Vega	80°36.4	38°48.0
Nunki	75°54.0	-26°16.2
Altair	62°04.9	8°55.0
Peacock	53°13.8	-56°40.2
Deneb	49°29.0	45°20.5
Enif	33°43.9	9°57.4
Alnair	27°39.7	-46°52.1
Fomalhaut	15°20.5	-29°31.4
Scheat	13°50.3	28°10.7
Markab	13°35.1	15°18.0

2018/5/1	**SHA**	**Mer.pass**
Venus	270°43.5	14:11
Mars	56°12.2	04:28
Jupiter	134°59.9	23:09
Saturn	80°55.0	02:49

2018/5/2	**SHA**	**Mer.pass**
Venus	269°24.3	14:13
Mars	55°48.0	04:26
Jupiter	135°07.3	23:05
Saturn	80°58.1	02:45

2018/5/2	**SHA**	**Mer.pass**
Venus	268°05.1	14:14
Mars	55°24.2	04:24
Jupiter	135°14.6	23:00
Saturn	81°01.2	02:41

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h Sun Moon

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°53.3	19°42.4	129°30.2	4.4	20°33.3	-1.3	60.1
1	195°53.2	19°43.0	143°53.6	4.5	20°31.9	-1.5	60.1
2	210°53.2	19°43.5	158°17.1	4.5	20°30.4	-1.6	60.1
3	225°53.2	19°44.1	172°40.6	4.5	20°28.7	-1.7	60.1
4	240°53.2	19°44.6	187°04.2	4.6	20°26.9	-1.9	60.1
5	255°53.1	19°45.1	201°27.8	4.6	20°25.0	-2.0	60.1
6	270°53.1	19°45.7	215°51.4	4.6	20°22.9	-2.2	60.1
7	285°53.1	19°46.2	230°15.0	4.7	20°20.6	-2.3	60.1
8	300°53.0	19°46.7	244°38.7	4.7	20°18.2	-2.4	60.1
9	315°53.0	19°47.3	259°02.4	4.7	20°15.7	-2.6	60.0
10	330°53.0	19°47.8	273°26.2	4.8	20°13.1	-2.7	60.0
11	345°52.9	19°48.3	287°50.0	4.8	20°10.3	-2.9	60.0
12	0°52.9	19°48.9	302°13.9	4.9	20°07.3	-3.0	60.0
13	15°52.9	19°49.4	316°37.8	4.9	20°04.2	-3.1	60.0
14	30°52.8	19°49.9	331°01.7	5.0	20°01.0	-3.3	60.0
15	45°52.8	19°50.5	345°25.7	5.0	19°57.7	-3.4	60.0
16	60°52.8	19°51.0	359°49.7	5.1	19°54.2	-3.6	59.9
17	75°52.8	19°51.5	14°13.8	5.1	19°50.6	-3.7	59.9
18	90°52.7	19°52.1	28°37.9	5.2	19°46.8	-3.8	59.9
19	105°52.7	19°52.6	43°02.1	5.2	19°42.9	-4.0	59.9
20	120°52.7	19°53.1	57°26.4	5.3	19°38.9	-4.1	59.9
21	135°52.6	19°53.6	71°50.7	5.3	19°34.8	-4.2	59.9
22	150°52.6	19°54.2	86°15.0	5.4	19°30.5	-4.4	59.9
23	165°52.6	19°54.7	100°39.4	5.4	19°26.1	-4.5	59.8
	SD.=15.8	d=0.5	S.D.=16.4				

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°52.5	19°55.2	115°03.9	5.5	19°21.5	-4.6	59.8
1	195°52.5	19°55.8	129°28.4	5.6	19°16.8	-4.7	59.8
2	210°52.4	19°56.3	143°53.0	5.6	19°12.0	-4.9	59.8
3	225°52.4	19°56.8	158°17.6	5.7	19°07.1	-5.0	59.8
4	240°52.4	19°57.3	172°42.3	5.7	19°02.1	-5.1	59.8
5	255°52.3	19°57.8	187°07.1	5.8	18°56.9	-5.2	59.7
6	270°52.3	19°58.4	201°31.9	5.9	18°51.6	-5.4	59.7
7	285°52.3	19°58.9	215°56.8	5.9	18°46.2	-5.5	59.7
8	300°52.2	19°59.4	230°21.8	6.0	18°40.6	-5.6	59.7
9	315°52.2	19°59.9	244°46.8	6.1	18°35.0	-5.7	59.7
10	330°52.2	20°00.5	259°11.9	6.1	18°29.2	-5.8	59.7
11	345°52.1	20°01.0	273°37.1	6.2	18°23.3	-6.0	59.6
12	0°52.1	20°01.5	288°02.3	6.3	18°17.3	-6.1	59.6
13	15°52.0	20°02.0	302°27.6	6.3	18°11.1	-6.2	59.6
14	30°52.0	20°02.5	316°52.9	6.4	18°04.9	-6.3	59.6
15	45°52.0	20°03.0	331°18.4	6.5	17°58.5	-6.4	59.6
16	60°51.9	20°03.6	345°43.9	6.5	17°52.1	-6.5	59.5
17	75°51.9	20°04.1	0°09.5	6.6	17°45.5	-6.6	59.5
18	90°51.9	20°04.6	14°35.1	6.7	17°38.8	-6.7	59.5
19	105°51.8	20°05.1	29°00.8	6.8	17°32.0	-6.9	59.5
20	120°51.8	20°05.6	43°26.6	6.8	17°25.1	-7.0	59.5
21	135°51.7	20°06.1	57°52.5	6.9	17°18.1	-7.1	59.4
22	150°51.7	20°06.6	72°18.4	7.0	17°10.9	-7.2	59.4
23	165°51.7	20°07.2	86°44.4	7.0	17°03.7	-7.3	59.4
	SD.=15.8	d=0.5	S.D.=16.3				

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°51.6	20°07.7	101°10.5	7.1	16°56.4	-7.4	59.4
1	195°51.6	20°08.2	115°36.7	7.2	16°49.0	-7.5	59.4
2	210°51.5	20°08.7	130°02.9	7.3	16°41.4	-7.6	59.3
3	225°51.5	20°09.2	144°29.2	7.3	16°33.8	-7.7	59.3
4	240°51.5	20°09.7	158°55.6	7.4	16°26.1	-7.8	59.3
5	255°51.4	20°10.2	173°22.0	7.5	16°18.2	-7.9	59.3
6	270°51.4	20°10.7	187°48.6	7.6	16°10.3	-8.0	59.3
7	285°51.3	20°11.2	202°15.2	7.6	16°02.3	-8.1	59.2
8	300°51.3	20°11.7	216°41.9	7.7	15°54.2	-8.2	59.2
9	315°51.3	20°12.2	231°08.6	7.8	15°46.0	-8.2	59.2
10	330°51.2	20°12.7	245°35.4	7.9	15°37.7	-8.3	59.2
11	345°51.2	20°13.3	260°02.4	7.9	15°29.3	-8.4	59.1
12	0°51.1	20°13.8	274°29.3	8.0	15°20.9	-8.5	59.1
13	15°51.1	20°14.3	288°56.4	8.1	15°12.3	-8.6	59.1
14	30°51.0	20°14.8	303°23.5	8.2	15°03.7	-8.7	59.1
15	45°51.0	20°15.3	317°50.7	8.2	14°55.0	-8.8	59.1
16	60°51.0	20°15.8	332°18.0	8.3	14°46.2	-8.8	59.0
17	75°50.9	20°16.3	346°45.4	8.4	14°37.3	-8.9	59.0
18	90°50.9	20°16.8	1°12.8	8.5	14°28.3	-9.0	59.0
19	105°50.8	20°17.3	15°40.3	8.5	14°19.3	-9.1	59.0
20	120°50.8	20°17.8	30°07.9	8.6	14°10.1	-9.2	58.9
21	135°50.7	20°18.3	44°35.6	8.7	14°00.9	-9.2	58.9
22	150°50.7	20°18.8	59°03.3	8.8	13°51.7	-9.3	58.9
23	165°50.6	20°19.3	73°31.1	8.8	13°42.3	-9.4	58.9
	SD.=15.8	d=0.5	S.D.=16.2				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	01:17	22:42	–:–	–:–
66	–:–	–:–	02:03	21:54	–:–	–:–
64	–:–	00:15	02:32	21:24	–:–	–:–
62	–:–	01:29	02:54	21:01	22:28	–:–
60	–:–	02:03	03:11	20:43	21:52	–:–
58	00:13	02:28	03:26	20:28	21:27	–:–
56	01:21	02:47	03:39	20:16	21:08	22:36
54	01:52	03:02	03:50	20:04	20:52	22:03
52	02:15	03:16	03:59	19:55	20:38	21:40
50	02:33	03:27	04:08	19:46	20:27	21:22
45	03:06	03:51	04:26	19:28	20:03	20:48
40	03:31	04:10	04:41	19:13	19:44	20:23
35	03:50	04:25	04:53	19:00	19:29	20:04
30	04:06	04:37	05:04	18:49	19:16	19:48
20	04:30	04:58	05:22	18:31	18:55	19:23
10	04:49	05:16	05:38	18:15	18:37	19:04
0	05:05	05:31	05:53	18:00	18:22	18:48
-10	05:20	05:45	06:08	17:45	18:08	18:33
-20	05:33	05:60	06:23	17:30	17:53	18:20
-30	05:46	06:15	06:41	17:12	17:38	18:07
-35	05:53	06:24	06:51	17:02	17:29	17:60
-40	06:00	06:33	07:03	16:50	17:19	17:52
-45	06:08	06:44	07:16	16:36	17:09	17:45
-50	06:17	06:57	07:33	16:19	16:56	17:36
-52	06:21	07:03	07:41	16:12	16:50	17:32
-54	06:25	07:09	07:50	16:03	16:43	17:27
-56	06:29	07:16	07:60	15:53	16:36	17:23
-58	06:34	07:24	08:11	15:42	16:29	17:18
-60	06:40	07:33	08:24	15:29	16:20	17:13

	Moonrise			Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	07:29	–:–	–:–	03:41
70	–:–	06:00	08:11	–:–	03:10	02:58
68	05:11	06:50	08:39	01:53	02:19	02:29
66	05:53	07:21	08:60	01:11	01:48	02:07
64	06:22	07:44	09:17	00:42	01:24	01:50
62	06:43	08:03	09:30	00:20	01:05	01:35
60	07:01	08:18	09:42	00:02	00:49	01:23
58	07:16	08:31	09:52	–:–	00:36	01:12
56	07:28	08:42	10:01	–:–	00:25	01:03
54	07:39	08:51	10:09	–:–	00:15	00:55
52	07:49	09:00	10:16	–:–	00:06	00:47
50	07:58	09:08	10:22	23:58	–:–	00:40
45	08:16	09:24	10:35	23:40	–:–	00:26
40	08:31	09:38	10:46	23:26	–:–	00:14
35	08:44	09:49	10:56	23:14	–:–	00:04
30	08:55	09:59	11:04	23:04	23:55	–:–
20	09:14	10:17	11:18	22:46	23:39	–:–
10	09:31	10:32	11:30	22:30	23:26	–:–
0	09:46	10:46	11:42	22:15	23:13	–:–
-10	10:02	10:60	11:54	21:60	22:60	23:58
-20	10:19	11:15	12:06	21:44	22:46	23:47
-30	10:38	11:32	12:20	21:26	22:30	23:34
-35	10:49	11:42	12:28	21:15	22:21	23:27
-40	11:01	11:53	12:37	21:02	22:10	23:19
-45	11:17	12:06	12:48	20:48	21:58	23:09
-50	11:35	12:22	13:01	20:30	21:42	22:57
-52	11:44	12:30	13:07	20:21	21:35	22:52
-54	11:53	12:38	13:14	20:12	21:27	22:46
-56	12:04	12:48	13:21	20:01	21:18	22:39
-58	12:17	12:58	13:29	19:49	21:08	22:31
-60	12:31	13:11	13:39	19:34	20:56	22:23

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
19	03:33	03:32	11:56	16:00	03:30	4(21%)
20	03:30	03:28	11:56	16:59	04:30	5(32%)
21	03:27	03:25	11:56	17:54	05:27	6(43%)

May 22, 23 ,24 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	239°34.3	146°20.3	25°03.2	294°35.2	-21°54.6	14°56.2	-15°38.4	320°38.7	-22°17.8
1	254°36.8	161°19.5	25°03.2	309°36.7	-21°54.5	29°59.0	-15°38.4	335°41.3	-22°17.8
2	269°39.2	176°18.6	25°03.2	324°38.2	-21°54.5	45°01.8	-15°38.3	350°43.9	-22°17.8
3	284°41.7	191°17.8	25°03.2	339°39.7	-21°54.4	60°04.5	-15°38.2	5°46.5	-22°17.8
4	299°44.2	206°17.0	25°03.2	354°41.2	-21°54.3	75°07.3	-15°38.1	20°49.1	-22°17.8
5	314°46.6	221°16.2	25°03.2	9°42.7	-21°54.2	90°10.0	-15°38.0	35°51.7	-22°17.8
6	329°49.1	236°15.3	25°03.2	24°44.2	-21°54.2	105°12.8	-15°38.0	50°54.3	-22°17.8
7	344°51.6	251°14.5	25°03.2	39°45.7	-21°54.1	120°15.6	-15°37.9	65°56.9	-22°17.8
8	359°54.0	266°13.7	25°03.2	54°47.2	-21°54.0	135°18.3	-15°37.8	80°59.5	-22°17.8
9	14°56.5	281°12.8	25°03.2	69°48.7	-21°54.0	150°21.1	-15°37.7	96°02.1	-22°17.8
10	29°59.0	296°12.0	25°03.2	84°50.2	-21°53.9	165°23.9	-15°37.6	111°04.7	-22°17.8
11	45°01.4	311°11.2	25°03.2	99°51.7	-21°53.8	180°26.6	-15°37.6	126°07.3	-22°17.9
12	60°03.9	326°10.3	25°03.2	114°53.2	-21°53.8	195°29.4	-15°37.5	141°10.0	-22°17.9
13	75°06.3	341°09.5	25°03.2	129°54.7	-21°53.7	210°32.2	-15°37.4	156°12.6	-22°17.9
14	90°08.8	356°08.7	25°03.2	144°56.3	-21°53.6	225°34.9	-15°37.3	171°15.2	-22°17.9
15	105°11.3	11°07.9	25°03.2	159°57.8	-21°53.6	240°37.7	-15°37.2	186°17.8	-22°17.9
16	120°13.7	26°07.0	25°03.2	174°59.3	-21°53.5	255°40.5	-15°37.2	201°20.4	-22°17.9
17	135°16.2	41°06.2	25°03.2	190°00.8	-21°53.4	270°43.2	-15°37.1	216°23.0	-22°17.9
18	150°18.7	56°05.4	25°03.2	205°02.3	-21°53.4	285°46.0	-15°37.0	231°25.6	-22°17.9
19	165°21.1	71°04.5	25°03.1	220°03.8	-21°53.3	300°48.7	-15°36.9	246°28.2	-22°17.9
20	180°23.6	86°03.7	25°03.1	235°05.3	-21°53.2	315°51.5	-15°36.8	261°30.8	-22°17.9
21	195°26.1	101°02.9	25°03.1	250°06.8	-21°53.2	330°54.3	-15°36.8	276°33.4	-22°17.9
22	210°28.5	116°02.1	25°03.1	265°08.4	-21°53.1	345°57.0	-15°36.7	291°36.0	-22°18.0
23	225°31.0	131°01.2	25°03.1	280°09.9	-21°53.0	0°59.8	-15°36.6	306°38.6	-22°18.0
Mer.pass.:8:00:		v-0.8 d0.0 m-3.9		v1.5 d0.1 m-0.9		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.2	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	240°33.5	146°00.4	25°03.0	295°11.4	-21°53.0	16°02.6	-15°36.5	321°41.2	-22°18.0
1	255°35.9	160°59.6	25°03.0	310°12.9	-21°52.9	31°05.3	-15°36.5	336°43.8	-22°18.0
2	270°38.4	175°58.7	25°03.0	325°14.4	-21°52.8	46°08.1	-15°36.4	351°46.4	-22°18.0
3	285°40.8	190°57.9	25°03.0	340°15.9	-21°52.8	61°10.8	-15°36.3	6°49.0	-22°18.0
4	300°43.3	205°57.1	25°02.9	355°17.5	-21°52.7	76°13.6	-15°36.2	21°51.6	-22°18.0
5	315°45.8	220°56.3	25°02.9	10°19.0	-21°52.6	91°16.4	-15°36.1	36°54.2	-22°18.0
6	330°48.2	235°55.4	25°02.9	25°20.5	-21°52.6	106°19.1	-15°36.1	51°56.8	-22°18.0
7	345°50.7	250°54.6	25°02.9	40°22.0	-21°52.5	121°21.9	-15°36.0	66°59.4	-22°18.0
8	0°53.2	265°53.8	25°02.8	55°23.5	-21°52.4	136°24.7	-15°35.9	82°02.0	-22°18.0
9	15°55.6	280°52.9	25°02.8	70°25.1	-21°52.4	151°27.4	-15°35.8	97°04.6	-22°18.1
10	30°58.1	295°52.1	25°02.8	85°26.6	-21°52.3	166°30.2	-15°35.7	112°07.2	-22°18.1
11	46°00.6	310°51.3	25°02.7	100°28.1	-21°52.2	181°32.9	-15°35.7	127°09.8	-22°18.1
12	61°03.0	325°50.5	25°02.7	115°29.6	-21°52.2	196°35.7	-15°35.6	142°12.4	-22°18.1
13	76°05.5	340°49.6	25°02.7	130°31.2	-21°52.1	211°38.5	-15°35.5	157°15.0	-22°18.1
14	91°07.9	355°48.8	25°02.6	145°32.7	-21°52.0	226°41.2	-15°35.4	172°17.6	-22°18.1
15	106°10.4	10°48.0	25°02.6	160°34.2	-21°52.0	241°44.0	-15°35.4	187°20.2	-22°18.1
16	121°12.9	25°47.2	25°02.5	175°35.8	-21°51.9	256°46.7	-15°35.3	202°22.8	-22°18.1
17	136°15.3	40°46.3	25°02.5	190°37.3	-21°51.8	271°49.5	-15°35.2	217°25.4	-22°18.1
18	151°17.8	55°45.5	25°02.4	205°38.8	-21°51.8	286°52.3	-15°35.1	232°28.0	-22°18.1
19	166°20.3	70°44.7	25°02.4	220°40.3	-21°51.7	301°55.0	-15°35.0	247°30.6	-22°18.1
20	181°22.7	85°43.9	25°02.4	235°41.9	-21°51.7	316°57.8	-15°35.0	262°33.3	-22°18.2
21	196°25.2	100°43.0	25°02.3	250°43.4	-21°51.6	332°00.6	-15°34.9	277°35.9	-22°18.2
22	211°27.7	115°42.2	25°02.3	265°44.9	-21°51.5	347°03.3	-15°34.8	292°38.5	-22°18.2
23	226°30.1	130°41.4	25°02.2	280°46.5	-21°51.5	2°06.1	-15°34.7	307°41.1	-22°18.2
Mer.pass.:7:56:		v-0.8 d-0.0 m-3.9		v1.5 d0.1 m-1.0		v2.8 d0.1 m-2.4		v2.6 d-0.0 m0.2	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	241°32.6	145°40.6	25°02.2	295°48.0	-21°51.4	17°08.8	-15°34.7	322°43.7	-22°18.2
1	256°35.1	160°39.7	25°02.1	310°49.5	-21°51.3	32°11.6	-15°34.6	337°46.3	-22°18.2
2	271°37.5	175°38.9	25°02.1	325°51.1	-21°51.3	47°14.3	-15°34.5	352°48.9	-22°18.2
3	286°40.0	190°38.1	25°02.0	340°52.6	-21°51.2	62°17.1	-15°34.4	7°51.5	-22°18.2
4	301°42.4	205°37.3	25°01.9	355°54.2	-21°51.2	77°19.9	-15°34.3	22°54.1	-22°18.2
5	316°44.9	220°36.4	25°01.9	10°55.7	-21°51.1	92°22.6	-15°34.3	37°56.7	-22°18.2
6	331°47.4	235°35.6	25°01.8	25°57.2	-21°51.0	107°25.4	-15°34.2	52°59.3	-22°18.2
7	346°49.8	250°34.8	25°01.8	40°58.8	-21°51.0	122°28.1	-15°34.1	68°01.9	-22°18.3
8	1°52.3	265°34.0	25°01.7	56°00.3	-21°50.9	137°30.9	-15°34.0	83°04.5	-22°18.3
9	16°54.8	280°33.2	25°01.6	71°01.9	-21°50.9	152°33.7	-15°34.0	98°07.1	-22°18.3
10	31°57.2	295°32.3	25°01.6	86°03.4	-21°50.8	167°36.4	-15°33.9	113°09.7	-22°18.3
11	46°59.7	310°31.5	25°01.5	101°04.9	-21°50.7	182°39.2	-15°33.8	128°12.3	-22°18.3
12	62°02.2	325°30.7	25°01.4	116°06.5	-21°50.7	197°41.9	-15°33.7	143°15.0	-22°18.3
13	77°04.6	340°29.9	25°01.4	131°08.0	-21°50.6	212°44.7	-15°33.6	158°17.6	-22°18.3
14	92°07.1	355°29.0	25°01.3	146°09.6	-21°50.5	227°47.5	-15°33.6	173°20.2	-22°18.3
15	107°09.6	10°28.2	25°01.2	161°11.1	-21°50.5	242°50.2	-15°33.5	188°22.8	-22°18.3
16	122°12.0	25°27.4	25°01.2	176°12.7	-21°50.4	257°53.0	-15°33.4	203°25.4	-22°18.3
17	137°14.5	40°26.6	25°01.1	191°14.2	-21°50.4	272°55.7	-15°33.3	218°28.0	-22°18.3
18	152°16.9	55°25.8	25°01.0	206°15.8	-21°50.3	287°58.5	-15°33.3	233°30.6	-22°18.4
19	167°19.4	70°24.9	25°00.9	221°17.3	-21°50.2	303°01.2	-15°33.2	248°33.2	-22°18.4
20	182°21.9	85°24.1	25°00.9	236°18.9	-21°50.2	318°04.0	-15°33.1	263°35.8	-22°18.4
21	197°24.3	100°23.3	25°00.8	251°20.4	-21°50.1	333°06.8	-15°33.0	278°38.4	-22°18.4
22	212°26.8	115°22.5	25°00.7	266°22.0	-21°50.1	348°09.5	-15°32.9	293°41.0	-22°18.4
23	227°29.3	130°21.7	25°00.6	281°23.5	-21°50.0	3°12.3	-15°32.9	308°43.6	-22°18.4
Mer.pass.:7:52:		v-0.8 d-0.1 m-3.9		v1.5 d0.1 m-1.0		v2.8 d0.1 m-2.3		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°40.2	29°11.2
Ankaa	353°12.7	-42°12.3
Schedar	349°37.0	56°37.9
Diphda	348°52.7	-17°53.3
Achernar	335°24.9	-57°08.6
Hamal	327°57.3	23°32.7
Polaris	316°44.8	89°20.3
Akamar	315°16.3	-40°14.0
Menkar	314°11.9	4°09.5
Mirfak	308°36.1	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.9
Bellatrix	278°28.8	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.1	-52°42.7
Sirius	258°31.0	-16°44.6
Adara	255°10.2	-29°00.1
Procyon	244°56.4	5°10.6
Pollux	243°23.8	27°58.9
Avior	234°16.9	-59°34.5
Suhail	222°50.1	-43°30.7
Miaplacidus	221°39.2	-69°47.9
Alphard	217°52.9	-8°44.5
Regulus	207°40.0	11°52.6
Dubhe	193°47.5	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.7	-17°38.7
Acrux	173°05.1	-63°12.2
Gacrux	171°56.8	-57°13.1
Alioth	166°17.5	55°51.9
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.6
Hadar	148°42.5	-60°27.7
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.5	-60°54.6
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.0	74°05.1
Alphecca	126°07.9	26°39.3
Antares	112°21.8	-26°28.2
Atria	107°20.0	-69°03.4
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.8
Rasalhague	96°03.1	12°32.9
Etamin	90°44.1	51°29.2
Kaus Aust.	83°39.1	-34°22.3
Vega	80°36.4	38°48.0
Nunki	75°53.9	-26°16.2
Altair	62°04.9	8°55.0
Peacock	53°13.8	-56°40.2
Deneb	49°29.0	45°20.5
Enif	33°43.8	9°57.5
Alnair	27°39.6	-46°52.1
Fomalhaut	15°20.5	-29°31.4
Scheat	13°50.3	28°10.7
Markab	13°35.1	15°18.1

2018/5/2	**SHA**	**Mer.pass**
Venus	266°46.0	14:15
Mars	55°00.9	04:21
Jupiter	135°21.9	22:56
Saturn	81°04.4	02:37

2018/5/2	**SHA**	**Mer.pass**
Venus	265°26.9	14:17
Mars	54°37.9	04:19
Jupiter	135°29.1	22:52
Saturn	81°07.7	02:33

2018/5/2	**SHA**	**Mer.pass**
Venus	264°08.0	14:18
Mars	54°15.4	04:16
Jupiter	135°36.2	22:47
Saturn	81°11.1	02:29

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h Sun Moon

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°50.6	20°19.8	87°59.0	8.9	13°32.9	-9.5	58.9
1	195°50.6	20°20.3	102°26.9	9.0	13°23.4	-9.5	58.8
2	210°50.5	20°20.7	116°55.0	9.1	13°13.8	-9.6	58.8
3	225°50.5	20°21.2	131°23.1	9.1	13°04.2	-9.7	58.8
4	240°50.4	20°21.7	145°51.2	9.2	12°54.5	-9.7	58.8
5	255°50.4	20°22.2	160°19.5	9.3	12°44.7	-9.8	58.7
6	270°50.3	20°22.7	174°47.8	9.3	12°34.9	-9.9	58.7
7	285°50.3	20°23.2	189°16.2	9.4	12°25.0	-9.9	58.7
8	300°50.2	20°23.7	203°44.6	9.5	12°15.1	-10.0	58.7
9	315°50.2	20°24.2	218°13.1	9.6	12°05.0	-10.1	58.6
10	330°50.1	20°24.7	232°41.7	9.6	11°54.9	-10.1	58.6
11	345°50.1	20°25.2	247°10.4	9.7	11°44.8	-10.2	58.6
12	0°50.0	20°25.7	261°39.1	9.8	11°34.6	-10.2	58.6
13	15°50.0	20°26.2	276°07.9	9.8	11°24.3	-10.3	58.5
14	30°49.9	20°26.6	290°36.8	9.9	11°14.0	-10.3	58.5
15	45°49.9	20°27.1	305°05.7	10.0	11°03.7	-10.4	58.5
16	60°49.9	20°27.6	319°34.7	10.0	10°53.3	-10.4	58.5
17	75°49.8	20°28.1	334°03.8	10.1	10°42.8	-10.5	58.5
18	90°49.8	20°28.6	348°32.9	10.2	10°32.3	-10.5	58.4
19	105°49.7	20°29.1	3°02.1	10.2	10°21.7	-10.6	58.4
20	120°49.7	20°29.6	17°31.4	10.3	10°11.1	-10.6	58.4
21	135°49.6	20°30.1	32°00.7	10.4	10°00.4	-10.7	58.4
22	150°49.6	20°30.5	46°30.1	10.4	9°49.7	-10.7	58.3
23	165°49.5	20°31.0	60°59.5	10.5	9°38.9	-10.8	58.3
	SD.=15.8	d=0.5			S.D.=16.1		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°49.5	20°31.5	75°29.0	10.5	9°28.1	-10.8	58.3
1	195°49.4	20°32.0	89°58.6	10.6	9°17.3	-10.9	58.3
2	210°49.4	20°32.5	104°28.2	10.7	9°06.4	-10.9	58.2
3	225°49.3	20°32.9	118°57.9	10.7	8°55.5	-10.9	58.2
4	240°49.3	20°33.4	133°27.7	10.8	8°44.5	-11.0	58.2
5	255°49.2	20°33.9	147°57.5	10.8	8°33.5	-11.0	58.2
6	270°49.2	20°34.4	162°27.3	10.9	8°22.5	-11.1	58.1
7	285°49.1	20°34.9	176°57.3	10.9	8°11.4	-11.1	58.1
8	300°49.0	20°35.3	191°27.2	11.0	8°00.3	-11.1	58.1
9	315°49.0	20°35.8	205°57.3	11.1	7°49.1	-11.2	58.1
10	330°48.9	20°36.3	220°27.4	11.1	7°37.9	-11.2	58.0
11	345°48.9	20°36.8	234°57.5	11.2	7°26.7	-11.2	58.0
12	0°48.8	20°37.2	249°27.7	11.2	7°15.5	-11.3	58.0
13	15°48.8	20°37.7	263°57.9	11.3	7°04.2	-11.3	58.0
14	30°48.7	20°38.2	278°28.2	11.3	6°52.9	-11.3	57.9
15	45°48.7	20°38.7	292°58.6	11.4	6°41.6	-11.3	57.9
16	60°48.6	20°39.1	307°29.0	11.4	6°30.3	-11.4	57.9
17	75°48.6	20°39.6	321°59.4	11.5	6°18.9	-11.4	57.9
18	90°48.5	20°40.1	336°29.9	11.5	6°07.5	-11.4	57.9
19	105°48.5	20°40.5	351°00.4	11.6	5°56.1	-11.4	57.8
20	120°48.4	20°41.0	5°31.0	11.6	5°44.6	-11.5	57.8
21	135°48.4	20°41.5	20°01.7	11.7	5°33.2	-11.5	57.8
22	150°48.3	20°42.0	34°32.3	11.7	5°21.7	-11.5	57.8
23	165°48.2	20°42.4	49°03.1	11.7	5°10.2	-11.5	57.7
	SD.=15.8	d=0.5			S.D.=15.9		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°48.2	20°42.9	63°33.8	11.8	4°58.6	-11.5	57.7
1	195°48.1	20°43.4	78°04.6	11.8	4°47.1	-11.5	57.7
2	210°48.1	20°43.8	92°35.5	11.9	4°35.6	-11.6	57.7
3	225°48.0	20°44.3	107°06.4	11.9	4°24.0	-11.6	57.6
4	240°48.0	20°44.8	121°37.3	12.0	4°12.4	-11.6	57.6
5	255°47.9	20°45.2	136°08.3	12.0	4°00.8	-11.6	57.6
6	270°47.8	20°45.7	150°39.3	12.0	3°49.2	-11.6	57.6
7	285°47.8	20°46.1	165°10.3	12.1	3°37.6	-11.6	57.5
8	300°47.7	20°46.6	179°41.4	12.1	3°26.0	-11.6	57.5
9	315°47.7	20°47.1	194°12.6	12.1	3°14.3	-11.6	57.5
10	330°47.6	20°47.5	208°43.7	12.2	3°02.7	-11.6	57.5
11	345°47.6	20°48.0	223°14.9	12.2	2°51.1	-11.6	57.5
12	0°47.5	20°48.4	237°46.1	12.2	2°39.4	-11.7	57.4
13	15°47.4	20°48.9	252°17.4	12.3	2°27.8	-11.7	57.4
14	30°47.4	20°49.4	266°48.7	12.3	2°16.1	-11.7	57.4
15	45°47.3	20°49.8	281°20.0	12.3	2°04.4	-11.7	57.4
16	60°47.3	20°50.3	295°51.4	12.4	1°52.8	-11.7	57.3
17	75°47.2	20°50.7	310°22.8	12.4	1°41.1	-11.7	57.3
18	90°47.2	20°51.2	324°54.2	12.4	1°29.4	-11.7	57.3
19	105°47.1	20°51.7	339°25.6	12.5	1°17.8	-11.7	57.3
20	120°47.0	20°52.1	353°57.1	12.5	1°06.1	-11.7	57.2
21	135°47.0	20°52.6	8°28.6	12.5	0°54.5	-11.7	57.2
22	150°46.9	20°53.0	23°00.1	12.5	0°42.8	-11.7	57.2
23	165°46.9	20°53.5	37°31.7	12.6	0°31.1	-11.6	57.2
	SD.=15.8	d=0.5			S.D.=15.7		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	00:55	23:07	–:–	–:–
66	–:–	–:–	01:50	22:07	–:–	–:–
64	–:–	–:–	02:23	21:33	–:–	–:–
62	–:–	01:15	02:47	21:09	22:43	–:–
60	–:–	01:54	03:05	20:50	22:02	–:–
58	–:–	02:20	03:21	20:34	21:35	–:–
56	01:08	02:41	03:34	20:21	21:15	22:50
54	01:44	02:57	03:45	20:09	20:58	22:12
52	02:08	03:11	03:55	19:59	20:43	21:47
50	02:27	03:23	04:04	19:50	20:31	21:28
45	03:03	03:48	04:23	19:31	20:06	20:52
40	03:28	04:07	04:38	19:16	19:47	20:26
35	03:48	04:23	04:51	19:03	19:31	20:06
30	04:04	04:36	05:02	18:51	19:18	19:50
20	04:29	04:58	05:22	18:32	18:56	19:25
10	04:49	05:15	05:38	18:16	18:38	19:05
0	05:05	05:31	05:53	18:00	18:22	18:48
-10	05:20	05:46	06:08	17:45	18:08	18:33
-20	05:34	06:01	06:24	17:29	17:53	18:20
-30	05:48	06:17	06:43	17:11	17:36	18:06
-35	05:55	06:26	06:53	16:60	17:27	17:58
-40	06:02	06:36	07:05	16:48	17:17	17:51
-45	06:11	06:47	07:20	16:34	17:06	17:42
-50	06:20	07:00	07:37	16:16	16:53	17:33
-52	06:24	07:06	07:45	16:08	16:47	17:29
-54	06:29	07:13	07:54	15:59	16:40	17:24
-56	06:33	07:20	08:05	15:48	16:33	17:20
-58	06:39	07:29	08:16	15:37	16:24	17:14
-60	06:44	07:38	08:30	15:23	16:15	17:09

	Moonrise			Moonset		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	09:49	11:51	13:45	03:14	02:58	02:45
70	10:10	12:02	13:48	02:51	02:45	02:39
68	10:27	12:11	13:51	02:33	02:34	02:34
66	10:40	12:18	13:53	02:18	02:25	02:30
64	10:51	12:24	13:55	02:06	02:18	02:26
62	11:01	12:30	13:57	01:56	02:11	02:23
60	11:09	12:34	13:58	01:47	02:06	02:21
58	11:16	12:38	13:59	01:39	02:00	02:18
56	11:22	12:42	14:00	01:32	01:56	02:16
54	11:27	12:45	14:01	01:26	01:52	02:14
52	11:32	12:48	14:02	01:21	01:48	02:13
50	11:37	12:51	14:03	01:16	01:45	02:11
45	11:46	12:56	14:05	01:05	01:38	02:07
40	11:54	13:01	14:06	00:55	01:32	02:05
35	12:01	13:05	14:07	00:47	01:26	02:02
30	12:07	13:09	14:08	00:41	01:22	01:60
20	12:18	13:15	14:10	00:28	01:14	01:56
10	12:27	13:20	14:12	00:18	01:06	01:52
0	12:35	13:26	14:14	00:08	00:60	01:49
-10	12:44	13:31	14:15	–:–	00:53	01:45
-20	12:53	13:36	14:17	–:–	00:45	01:42
-30	13:03	13:42	14:19	–:–	00:37	01:37
-35	13:09	13:46	14:20	–:–	00:32	01:35
-40	13:16	13:50	14:21	–:–	00:26	01:32
-45	13:23	13:55	14:23	–:–	00:20	01:29
-50	13:33	14:00	14:25	–:–	00:12	01:25
-52	13:37	14:03	14:26	–:–	00:08	01:23
-54	13:42	14:05	14:26	–:–	00:04	01:21
-56	13:47	14:08	14:27	23:60	–:–	01:19
-58	13:53	14:12	14:29	23:55	–:–	01:17
-60	13:59	14:16	14:30	23:49	–:–	01:14

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
22	03:22	03:20	11:56	18:47	06:21	7(54%)
23	03:18	03:15	11:56	19:37	07:12	8(65%)
24	03:13	03:10	11:56	20:24	08:01	9(75%)

May 25, 26 ,27 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	242°31.7	145°20.8	25°00.6	296°25.1	-21°50.0	18°15.0	-15°32.8	323°46.3	-22°18.4
1	257°34.2	160°20.0	25°00.5	311°26.6	-21°49.9	33°17.8	-15°32.7	338°48.9	-22°18.4
2	272°36.7	175°19.2	25°00.4	326°28.2	-21°49.8	48°20.5	-15°32.6	353°51.5	-22°18.4
3	287°39.1	190°18.4	25°00.3	341°29.7	-21°49.8	63°23.3	-15°32.6	8°54.1	-22°18.4
4	302°41.6	205°17.6	25°00.2	356°31.3	-21°49.7	78°26.0	-15°32.5	23°56.7	-22°18.4
5	317°44.0	220°16.7	25°00.1	11°32.8	-21°49.7	93°28.8	-15°32.4	38°59.3	-22°18.5
6	332°46.5	235°15.9	25°00.0	26°34.4	-21°49.6	108°31.6	-15°32.3	54°01.9	-22°18.5
7	347°49.0	250°15.1	24°60.0	41°36.0	-21°49.6	123°34.3	-15°32.3	69°04.5	-22°18.5
8	2°51.4	265°14.3	24°59.9	56°37.5	-21°49.5	138°37.1	-15°32.2	84°07.1	-22°18.5
9	17°53.9	280°13.5	24°59.8	71°39.1	-21°49.4	153°39.8	-15°32.1	99°09.7	-22°18.5
10	32°56.4	295°12.7	24°59.7	86°40.6	-21°49.4	168°42.6	-15°32.0	114°12.4	-22°18.5
11	47°58.8	310°11.8	24°59.6	101°42.2	-21°49.3	183°45.3	-15°32.0	129°15.0	-22°18.5
12	63°01.3	325°11.0	24°59.5	116°43.8	-21°49.3	198°48.1	-15°31.9	144°17.6	-22°18.5
13	78°03.8	340°10.2	24°59.4	131°45.3	-21°49.2	213°50.8	-15°31.8	159°20.2	-22°18.5
14	93°06.2	355°09.4	24°59.3	146°46.9	-21°49.2	228°53.6	-15°31.7	174°22.8	-22°18.5
15	108°08.7	10°08.6	24°59.2	161°48.4	-21°49.1	243°56.4	-15°31.6	189°25.4	-22°18.5
16	123°11.2	25°07.7	24°59.1	176°50.0	-21°49.0	258°59.1	-15°31.6	204°28.0	-22°18.6
17	138°13.6	40°06.9	24°59.0	191°51.6	-21°49.0	274°01.9	-15°31.5	219°30.6	-22°18.6
18	153°16.1	55°06.1	24°58.9	206°53.1	-21°48.9	289°04.6	-15°31.4	234°33.2	-22°18.6
19	168°18.5	70°05.3	24°58.8	221°54.7	-21°48.9	304°07.4	-15°31.3	249°35.8	-22°18.6
20	183°21.0	85°04.5	24°58.7	236°56.3	-21°48.8	319°10.1	-15°31.3	264°38.5	-22°18.6
21	198°23.5	100°03.7	24°58.6	251°57.8	-21°48.8	334°12.9	-15°31.2	279°41.1	-22°18.6
22	213°25.9	115°02.9	24°58.5	266°59.4	-21°48.7	349°15.6	-15°31.1	294°43.7	-22°18.6
23	228°28.4	130°02.0	24°58.4	282°01.0	-21°48.7	4°18.4	-15°31.0	309°46.3	-22°18.6
Mer.pass.:7:48:		v-0.8 d-0.1 m-3.9		v1.6 d0.1 m-1.0		v2.8 d0.1 m-2.3		v2.6 d-0.0 m0.2	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	243°30.9	145°01.2	24°58.2	297°02.6	-21°48.6	19°21.1	-15°31.0	324°48.9	-22°18.6
1	258°33.3	160°00.4	24°58.1	312°04.1	-21°48.6	34°23.9	-15°30.9	339°51.5	-22°18.6
2	273°35.8	174°59.6	24°58.0	327°05.7	-21°48.5	49°26.6	-15°30.8	354°54.1	-22°18.6
3	288°38.3	189°58.8	24°57.9	342°07.3	-21°48.4	64°29.4	-15°30.7	9°56.7	-22°18.7
4	303°40.7	204°58.0	24°57.8	357°08.9	-21°48.4	79°32.1	-15°30.7	24°59.4	-22°18.7
5	318°43.2	219°57.2	24°57.7	12°10.4	-21°48.3	94°34.9	-15°30.6	40°02.0	-22°18.7
6	333°45.6	234°56.3	24°57.6	27°12.0	-21°48.3	109°37.6	-15°30.5	55°04.6	-22°18.7
7	348°48.1	249°55.5	24°57.4	42°13.6	-21°48.2	124°40.4	-15°30.4	70°07.2	-22°18.7
8	3°50.6	264°54.7	24°57.3	57°15.2	-21°48.2	139°43.2	-15°30.4	85°09.8	-22°18.7
9	18°53.0	279°53.9	24°57.2	72°16.7	-21°48.1	154°45.9	-15°30.3	100°12.4	-22°18.7
10	33°55.5	294°53.1	24°57.1	87°18.3	-21°48.1	169°48.7	-15°30.2	115°15.0	-22°18.7
11	48°58.0	309°52.3	24°57.0	102°19.9	-21°48.0	184°51.4	-15°30.1	130°17.6	-22°18.7
12	64°00.4	324°51.5	24°56.8	117°21.5	-21°48.0	199°54.2	-15°30.1	145°20.3	-22°18.7
13	79°02.9	339°50.7	24°56.7	132°23.1	-21°47.9	214°56.9	-15°30.0	160°22.9	-22°18.8
14	94°05.4	354°49.8	24°56.6	147°24.6	-21°47.9	229°59.7	-15°29.9	175°25.5	-22°18.8
15	109°07.8	9°49.0	24°56.4	162°26.2	-21°47.8	245°02.4	-15°29.8	190°28.1	-22°18.8
16	124°10.3	24°48.2	24°56.3	177°27.8	-21°47.8	260°05.2	-15°29.8	205°30.7	-22°18.8
17	139°12.8	39°47.4	24°56.2	192°29.4	-21°47.7	275°07.9	-15°29.7	220°33.3	-22°18.8
18	154°15.2	54°46.6	24°56.1	207°31.0	-21°47.7	290°10.7	-15°29.6	235°35.9	-22°18.8
19	169°17.7	69°45.8	24°55.9	222°32.6	-21°47.6	305°13.4	-15°29.5	250°38.6	-22°18.8
20	184°20.1	84°45.0	24°55.8	237°34.1	-21°47.6	320°16.2	-15°29.5	265°41.2	-22°18.8
21	199°22.6	99°44.2	24°55.6	252°35.7	-21°47.5	335°18.9	-15°29.4	280°43.8	-22°18.8
22	214°25.1	114°43.4	24°55.5	267°37.3	-21°47.5	350°21.7	-15°29.3	295°46.4	-22°18.8
23	229°27.5	129°42.6	24°55.4	282°38.9	-21°47.4	5°24.4	-15°29.2	310°49.0	-22°18.8
Mer.pass.:7:44:		v-0.8 d-0.1 m-3.9		v1.6 d0.1 m-1.1		v2.8 d0.1 m-2.3		v2.6 d-0.0 m0.2	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	244°30.0	144°41.7	24°55.2	297°40.5	-21°47.4	20°27.2	-15°29.2	325°51.6	-22°18.9
1	259°32.5	159°40.9	24°55.1	312°42.1	-21°47.3	35°29.9	-15°29.1	340°54.2	-22°18.9
2	274°34.9	174°40.1	24°55.0	327°43.7	-21°47.3	50°32.7	-15°29.0	355°56.9	-22°18.9
3	289°37.4	189°39.3	24°54.8	342°45.3	-21°47.2	65°35.4	-15°28.9	10°59.5	-22°18.9
4	304°39.9	204°38.5	24°54.7	357°46.9	-21°47.2	80°38.2	-15°28.9	26°02.1	-22°18.9
5	319°42.3	219°37.7	24°54.5	12°48.5	-21°47.1	95°40.9	-15°28.8	41°04.7	-22°18.9
6	334°44.8	234°36.9	24°54.4	27°50.1	-21°47.1	110°43.7	-15°28.7	56°07.3	-22°18.9
7	349°47.3	249°36.1	24°54.2	42°51.7	-21°47.0	125°46.4	-15°28.6	71°09.9	-22°18.9
8	4°49.7	264°35.3	24°54.1	57°53.3	-21°47.0	140°49.1	-15°28.6	86°12.5	-22°18.9
9	19°52.2	279°34.5	24°53.9	72°54.9	-21°46.9	155°51.9	-15°28.5	101°15.2	-22°18.9
10	34°54.6	294°33.7	24°53.8	87°56.5	-21°46.9	170°54.6	-15°28.4	116°17.8	-22°19.0
11	49°57.1	309°32.9	24°53.6	102°58.1	-21°46.8	185°57.4	-15°28.3	131°20.4	-22°19.0
12	64°59.6	324°32.1	24°53.5	117°59.7	-21°46.8	201°00.1	-15°28.3	146°23.0	-22°19.0
13	80°02.0	339°31.3	24°53.3	133°01.3	-21°46.7	216°02.9	-15°28.2	161°25.6	-22°19.0
14	95°04.5	354°30.4	24°53.1	148°02.9	-21°46.7	231°05.6	-15°28.1	176°28.2	-22°19.0
15	110°07.0	9°29.6	24°53.0	163°04.5	-21°46.6	246°08.4	-15°28.0	191°30.9	-22°19.0
16	125°09.4	24°28.8	24°52.8	178°06.1	-21°46.6	261°11.1	-15°28.0	206°33.5	-22°19.0
17	140°11.9	39°28.0	24°52.7	193°07.7	-21°46.6	276°13.9	-15°27.9	221°36.1	-22°19.0
18	155°14.4	54°27.2	24°52.5	208°09.3	-21°46.5	291°16.6	-15°27.8	236°38.7	-22°19.0
19	170°16.8	69°26.4	24°52.3	223°10.9	-21°46.5	306°19.4	-15°27.7	251°41.3	-22°19.0
20	185°19.3	84°25.6	24°52.2	238°12.5	-21°46.4	321°22.1	-15°27.7	266°43.9	-22°19.1
21	200°21.7	99°24.8	24°52.0	253°14.1	-21°46.4	336°24.9	-15°27.6	281°46.6	-22°19.1
22	215°24.2	114°24.0	24°51.9	268°15.7	-21°46.3	351°27.6	-15°27.5	296°49.2	-22°19.1
23	230°26.7	129°23.2	24°51.7	283°17.3	-21°46.3	6°30.3	-15°27.4	311°51.8	-22°19.1
Mer.pass.:7:40:		v-0.8 d-0.1 m-3.9		v1.6 d0.0 m-1.1		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°40.2	29°11.2
Ankaa	353°12.7	-42°12.3
Schedar	349°37.0	56°37.9
Diphda	348°52.7	-17°53.2
Achernar	335°24.8	-57°08.6
Hamal	327°57.3	23°32.7
Polaris	316°44.3	89°20.2
Akamar	315°16.2	-40°14.0
Menkar	314°11.9	4°09.5
Mirfak	308°36.1	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.9
Bellatrix	278°28.8	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.7
Sirius	258°31.0	-16°44.6
Adara	255°10.2	-29°00.1
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.9
Avior	234°17.0	-59°34.5
Suhail	222°50.1	-43°30.7
Miaplacidus	221°39.2	-69°47.9
Alphard	217°52.9	-8°44.4
Regulus	207°40.0	11°52.6
Dubhe	193°47.6	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.7	-17°38.7
Acrux	173°05.1	-63°12.2
Gacrux	171°56.8	-57°13.1
Alioth	166°17.5	55°51.9
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.6
Hadar	148°42.5	-60°27.7
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.5	-60°54.6
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.1	74°05.1
Alphecca	126°07.9	26°39.4
Antares	112°21.8	-26°28.2
Atria	107°20.0	-69°03.4
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.8
Rasalhague	96°03.1	12°32.9
Etamin	90°44.1	51°29.2
Kaus Aust.	83°39.0	-34°22.3
Vega	80°36.4	38°48.0
Nunki	75°53.9	-26°16.2
Altair	62°04.9	8°55.0
Peacock	53°13.8	-56°40.2
Deneb	49°29.0	45°20.6
Enif	33°43.8	9°57.5
Alnair	27°39.6	-46°52.1
Fomalhaut	15°20.5	-29°31.4
Scheat	13°50.2	28°10.7
Markab	13°35.1	15°18.1

2018/5/2	**SHA**	**Mer.pass**
Venus	262°49.1	14:19
Mars	53°53.3	04:14
Jupiter	135°43.3	22:43
Saturn	81°14.5	02:24

2018/5/2	**SHA**	**Mer.pass**
Venus	261°30.4	14:21
Mars	53°31.7	04:11
Jupiter	135°50.3	22:38
Saturn	81°18.0	02:20

2018/5/2	**SHA**	**Mer.pass**
Venus	260°11.7	14:22
Mars	53°10.5	04:09
Jupiter	135°57.2	22:34
Saturn	81°21.6	02:16

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h Sun Moon

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°46.8	20°53.9	52°03.2	12.6	0°19.5	-11.6	57.2
1	195°46.7	20°54.4	66°34.8	12.6	0°07.9	-11.6	57.1
2	210°46.7	20°54.8	81°06.5	12.6	-0°03.8	-11.6	57.1
3	225°46.6	20°55.3	95°38.1	12.7	-0°15.4	-11.6	57.1
4	240°46.5	20°55.7	110°09.8	12.7	-0°27.0	-11.6	57.1
5	255°46.5	20°56.2	124°41.5	12.7	-0°38.6	-11.6	57.0
6	270°46.4	20°56.6	139°13.2	12.7	-0°50.2	-11.6	57.0
7	285°46.4	20°57.1	153°44.9	12.7	-1°01.8	-11.6	57.0
8	300°46.3	20°57.5	168°16.6	12.8	-1°13.3	-11.6	57.0
9	315°46.2	20°58.0	182°48.4	12.8	-1°24.9	-11.5	56.9
10	330°46.2	20°58.4	197°20.2	12.8	-1°36.4	-11.5	56.9
11	345°46.1	20°58.9	211°52.0	12.8	-1°47.9	-11.5	56.9
12	0°46.1	20°59.3	226°23.8	12.8	-1°59.5	-11.5	56.9
13	15°46.0	20°59.7	240°55.6	12.8	-2°10.9	-11.5	56.9
14	30°45.9	21°00.2	255°27.4	12.8	-2°22.4	-11.5	56.8
15	45°45.9	21°00.6	269°59.3	12.9	-2°33.9	-11.4	56.8
16	60°45.8	21°01.1	284°31.1	12.9	-2°45.3	-11.4	56.8
17	75°45.7	21°01.5	299°03.0	12.9	-2°56.7	-11.4	56.8
18	90°45.7	21°02.0	313°34.9	12.9	-3°08.1	-11.4	56.7
19	105°45.6	21°02.4	328°06.8	12.9	-3°19.5	-11.4	56.7
20	120°45.5	21°02.8	342°38.7	12.9	-3°30.8	-11.3	56.7
21	135°45.5	21°03.3	357°10.6	12.9	-3°42.1	-11.3	56.7
22	150°45.4	21°03.7	11°42.5	12.9	-3°53.4	-11.3	56.7
23	165°45.3	21°04.2	26°14.5	12.9	-4°04.7	-11.3	56.6
	SD.=15.8	d=0.5			S.D.=15.6		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°45.3	21°04.6	40°46.4	12.9	-4°15.9	-11.2	56.6
1	195°45.2	21°05.0	55°18.4	12.9	-4°27.1	-11.2	56.6
2	210°45.1	21°05.5	69°50.3	13.0	-4°38.3	-11.2	56.6
3	225°45.1	21°05.9	84°22.3	13.0	-4°49.5	-11.1	56.6
4	240°45.0	21°06.3	98°54.2	13.0	-5°00.6	-11.1	56.5
5	255°45.0	21°06.8	113°26.2	13.0	-5°11.7	-11.1	56.5
6	270°44.9	21°07.2	127°58.1	13.0	-5°22.7	-11.0	56.5
7	285°44.8	21°07.6	142°30.1	13.0	-5°33.8	-11.0	56.5
8	300°44.8	21°08.1	157°02.1	13.0	-5°44.8	-11.0	56.4
9	315°44.7	21°08.5	171°34.0	13.0	-5°55.7	-10.9	56.4
10	330°44.6	21°08.9	186°06.0	13.0	-6°06.7	-10.9	56.4
11	345°44.5	21°09.4	200°38.0	13.0	-6°17.6	-10.9	56.4
12	0°44.5	21°09.8	215°10.0	13.0	-6°28.4	-10.8	56.4
13	15°44.4	21°10.2	229°41.9	13.0	-6°39.2	-10.8	56.3
14	30°44.3	21°10.6	244°13.9	13.0	-6°50.0	-10.8	56.3
15	45°44.3	21°11.1	258°45.9	13.0	-7°00.7	-10.7	56.3
16	60°44.2	21°11.5	273°17.8	13.0	-7°11.5	-10.7	56.3
17	75°44.1	21°11.9	287°49.8	13.0	-7°22.1	-10.6	56.3
18	90°44.1	21°12.4	302°21.7	13.0	-7°32.7	-10.6	56.2
19	105°44.0	21°12.8	316°53.7	12.9	-7°43.3	-10.6	56.2
20	120°43.9	21°13.2	331°25.6	12.9	-7°53.8	-10.5	56.2
21	135°43.9	21°13.6	345°57.6	12.9	-8°04.3	-10.5	56.2
22	150°43.8	21°14.0	0°29.5	12.9	-8°14.8	-10.4	56.2
23	165°43.7	21°14.5	15°01.4	12.9	-8°25.2	-10.4	56.1
	SD.=15.8	d=0.4			S.D.=15.4		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°43.6	21°14.9	29°33.3	12.9	-8°35.5	-10.3	56.1
1	195°43.6	21°15.3	44°05.3	12.9	-8°45.9	-10.3	56.1
2	210°43.5	21°15.7	58°37.2	12.9	-8°56.1	-10.2	56.1
3	225°43.4	21°16.2	73°09.1	12.9	-9°06.3	-10.2	56.1
4	240°43.4	21°16.6	87°40.9	12.9	-9°16.5	-10.1	56.0
5	255°43.3	21°17.0	102°12.8	12.9	-9°26.6	-10.1	56.0
6	270°43.2	21°17.4	116°44.7	12.9	-9°36.7	-10.0	56.0
7	285°43.2	21°17.8	131°16.5	12.9	-9°46.7	-10.0	56.0
8	300°43.1	21°18.2	145°48.4	12.8	-9°56.7	-9.9	56.0
9	315°43.0	21°18.7	160°20.2	12.8	-10°06.6	-9.9	55.9
10	330°42.9	21°19.1	174°52.0	12.8	-10°16.4	-9.8	55.9
11	345°42.9	21°19.5	189°23.9	12.8	-10°26.2	-9.8	55.9
12	0°42.8	21°19.9	203°55.7	12.8	-10°36.0	-9.7	55.9
13	15°42.7	21°20.3	218°27.4	12.8	-10°45.7	-9.7	55.9
14	30°42.6	21°20.7	232°59.2	12.8	-10°55.3	-9.6	55.8
15	45°42.6	21°21.1	247°31.0	12.8	-11°04.9	-9.6	55.8
16	60°42.5	21°21.6	262°02.7	12.7	-11°14.4	-9.5	55.8
17	75°42.4	21°22.0	276°34.5	12.7	-11°23.9	-9.4	55.8
18	90°42.3	21°22.4	291°06.2	12.7	-11°33.3	-9.4	55.8
19	105°42.3	21°22.8	305°37.9	12.7	-11°42.6	-9.3	55.7
20	120°42.2	21°23.2	320°09.6	12.7	-11°51.9	-9.3	55.7
21	135°42.1	21°23.6	334°41.2	12.7	-12°01.1	-9.2	55.7
22	150°42.1	21°24.0	349°12.9	12.6	-12°10.3	-9.1	55.7
23	165°42.0	21°24.4	3°44.5	12.6	-12°19.4	-9.1	55.7
	SD.=15.8	d=0.4			S.D.=15.3		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	00:19	–:–	–:–	–:–
66	–:–	–:–	01:38	22:20	–:–	–:–
64	–:–	–:–	02:14	21:42	–:–	–:–
62	–:–	00:59	02:40	21:16	23:01	–:–
60	–:–	01:45	02:60	20:56	22:12	–:–
58	–:–	02:13	03:16	20:39	21:43	–:–
56	00:53	02:35	03:30	20:26	21:21	23:06
54	01:35	02:52	03:41	20:14	21:03	22:22
52	02:02	03:07	03:52	20:03	20:48	21:54
50	02:22	03:20	04:01	19:54	20:35	21:33
45	02:59	03:45	04:21	19:34	20:10	20:56
40	03:25	04:05	04:36	19:18	19:50	20:29
35	03:46	04:21	04:50	19:05	19:34	20:09
30	04:02	04:35	05:01	18:53	19:20	19:52
20	04:28	04:57	05:21	18:33	18:57	19:26
10	04:49	05:15	05:38	18:16	18:39	19:06
0	05:06	05:31	05:53	18:01	18:23	18:49
-10	05:21	05:47	06:09	17:45	18:07	18:33
-20	05:35	06:02	06:26	17:28	17:52	18:19
-30	05:49	06:19	06:44	17:09	17:35	18:05
-35	05:57	06:28	06:55	16:59	17:26	17:57
-40	06:05	06:38	07:08	16:46	17:16	17:49
-45	06:13	06:50	07:23	16:31	17:04	17:40
-50	06:23	07:04	07:41	16:13	16:50	17:31
-52	06:27	07:10	07:49	16:05	16:44	17:26
-54	06:32	07:17	07:59	15:55	16:37	17:21
-56	06:37	07:25	08:09	15:44	16:29	17:16
-58	06:43	07:33	08:22	15:32	16:20	17:11
-60	06:49	07:43	08:36	15:18	16:11	17:05

	Moonrise			Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	15:36	17:26	19:19	02:33	02:21	02:08
70	15:32	17:14	18:58	02:33	02:28	02:22
68	15:29	17:05	18:41	02:34	02:33	02:33
66	15:26	16:57	18:28	02:34	02:38	02:42
64	15:24	16:51	18:17	02:34	02:41	02:50
62	15:22	16:45	18:07	02:34	02:45	02:56
60	15:20	16:40	17:59	02:34	02:48	03:02
58	15:18	16:36	17:52	02:35	02:50	03:07
56	15:17	16:32	17:46	02:35	02:53	03:12
54	15:16	16:29	17:41	02:35	02:55	03:16
52	15:15	16:26	17:36	02:35	02:57	03:20
50	15:14	16:23	17:31	02:35	02:59	03:23
45	15:12	16:17	17:22	02:35	03:03	03:30
40	15:10	16:12	17:14	02:35	03:06	03:37
35	15:08	16:08	17:07	02:36	03:09	03:42
30	15:07	16:04	17:01	02:36	03:11	03:47
20	15:04	15:58	16:51	02:36	03:15	03:55
10	15:02	15:52	16:42	02:36	03:19	04:02
0	15:01	15:47	16:33	02:36	03:23	04:09
-10	14:59	15:42	16:25	02:36	03:26	04:16
-20	14:57	15:36	16:16	02:36	03:30	04:23
-30	14:55	15:30	16:06	02:37	03:34	04:32
-35	14:53	15:26	16:00	02:37	03:37	04:36
-40	14:52	15:22	15:54	02:37	03:40	04:42
-45	14:50	15:18	15:46	02:37	03:43	04:48
-50	14:48	15:12	15:37	02:37	03:47	04:56
-52	14:47	15:10	15:33	02:37	03:49	04:60
-54	14:47	15:07	15:29	02:37	03:51	05:03
-56	14:45	15:04	15:24	02:37	03:53	05:08
-58	14:44	15:00	15:18	02:37	03:56	05:13
-60	14:43	14:57	15:12	02:37	03:58	05:18

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
25	03:07	03:04	11:56	21:11	08:48	10(83%)
26	03:01	02:58	11:57	21:57	09:34	11(90%)
27	02:55	02:51	11:57	22:44	10:21	12(95%)

May 28, 29 ,30 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	245°29.1	144°22.4	24°51.5	298°18.9	-21°46.2	21°33.1	-15°27.4	326°54.4	-22°19.1
1	260°31.6	159°21.6	24°51.3	313°20.5	-21°46.2	36°35.8	-15°27.3	341°57.0	-22°19.1
2	275°34.1	174°20.8	24°51.2	328°22.1	-21°46.1	51°38.6	-15°27.2	356°59.6	-22°19.1
3	290°36.5	189°20.0	24°51.0	343°23.7	-21°46.1	66°41.3	-15°27.1	12°02.3	-22°19.1
4	305°39.0	204°19.2	24°50.8	358°25.4	-21°46.1	81°44.1	-15°27.1	27°04.9	-22°19.1
5	320°41.5	219°18.4	24°50.7	13°27.0	-21°46.0	96°46.8	-15°27.0	42°07.5	-22°19.1
6	335°43.9	234°17.6	24°50.5	28°28.6	-21°46.0	111°49.6	-15°26.9	57°10.1	-22°19.1
7	350°46.4	249°16.8	24°50.3	43°30.2	-21°45.9	126°52.3	-15°26.9	72°12.7	-22°19.2
8	5°48.9	264°16.0	24°50.1	58°31.8	-21°45.9	141°55.1	-15°26.8	87°15.4	-22°19.2
9	20°51.3	279°15.2	24°49.9	73°33.4	-21°45.8	156°57.8	-15°26.7	102°18.0	-22°19.2
10	35°53.8	294°14.4	24°49.8	88°35.1	-21°45.8	172°00.5	-15°26.6	117°20.6	-22°19.2
11	50°56.2	309°13.6	24°49.6	103°36.7	-21°45.8	187°03.3	-15°26.6	132°23.2	-22°19.2
12	65°58.7	324°12.8	24°49.4	118°38.3	-21°45.7	202°06.0	-15°26.5	147°25.8	-22°19.2
13	81°01.2	339°12.0	24°49.2	133°39.9	-21°45.7	217°08.8	-15°26.4	162°28.5	-22°19.2
14	96°03.6	354°11.2	24°49.0	148°41.5	-21°45.6	232°11.5	-15°26.3	177°31.1	-22°19.2
15	111°06.1	9°10.4	24°48.8	163°43.2	-21°45.6	247°14.3	-15°26.3	192°33.7	-22°19.2
16	126°08.6	24°09.6	24°48.6	178°44.8	-21°45.5	262°17.0	-15°26.2	207°36.3	-22°19.2
17	141°11.0	39°08.8	24°48.5	193°46.4	-21°45.5	277°19.7	-15°26.1	222°38.9	-22°19.3
18	156°13.5	54°08.0	24°48.3	208°48.0	-21°45.5	292°22.5	-15°26.0	237°41.5	-22°19.3
19	171°16.0	69°07.2	24°48.1	223°49.7	-21°45.4	307°25.2	-15°26.0	252°44.2	-22°19.3
20	186°18.4	84°06.4	24°47.9	238°51.3	-21°45.4	322°28.0	-15°25.9	267°46.8	-22°19.3
21	201°20.9	99°05.6	24°47.7	253°52.9	-21°45.3	337°30.7	-15°25.8	282°49.4	-22°19.3
22	216°23.4	114°04.8	24°47.5	268°54.5	-21°45.3	352°33.5	-15°25.8	297°52.0	-22°19.3
23	231°25.8	129°04.0	24°47.3	283°56.2	-21°45.3	7°36.2	-15°25.7	312°54.6	-22°19.3
Mer.pass.:7:36:		v-0.8 d-0.2 m-3.9		v1.6 d0.0 m-1.1		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.2	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	246°28.3	144°03.2	24°47.1	298°57.8	-21°45.2	22°38.9	-15°25.6	327°57.3	-22°19.3
1	261°30.7	159°02.4	24°46.9	313°59.4	-21°45.2	37°41.7	-15°25.5	342°59.9	-22°19.3
2	276°33.2	174°01.6	24°46.7	329°01.1	-21°45.1	52°44.4	-15°25.5	358°02.5	-22°19.3
3	291°35.7	189°00.9	24°46.5	344°02.7	-21°45.1	67°47.2	-15°25.4	13°05.1	-22°19.4
4	306°38.1	204°00.1	24°46.3	359°04.3	-21°45.1	82°49.9	-15°25.3	28°07.8	-22°19.4
5	321°40.6	218°59.3	24°46.1	14°06.0	-21°45.0	97°52.6	-15°25.2	43°10.4	-22°19.4
6	336°43.1	233°58.5	24°45.9	29°07.6	-21°45.0	112°55.4	-15°25.2	58°13.0	-22°19.4
7	351°45.5	248°57.7	24°45.7	44°09.2	-21°45.0	127°58.1	-15°25.1	73°15.6	-22°19.4
8	6°48.0	263°56.9	24°45.5	59°10.9	-21°44.9	143°00.9	-15°25.0	88°18.2	-22°19.4
9	21°50.5	278°56.1	24°45.3	74°12.5	-21°44.9	158°03.6	-15°25.0	103°20.9	-22°19.4
10	36°52.9	293°55.3	24°45.0	89°14.1	-21°44.8	173°06.3	-15°24.9	118°23.5	-22°19.4
11	51°55.4	308°54.5	24°44.8	104°15.8	-21°44.8	188°09.1	-15°24.8	133°26.1	-22°19.4
12	66°57.9	323°53.7	24°44.6	119°17.4	-21°44.8	203°11.8	-15°24.7	148°28.7	-22°19.4
13	82°00.3	338°52.9	24°44.4	134°19.1	-21°44.7	218°14.6	-15°24.7	163°31.3	-22°19.5
14	97°02.8	353°52.1	24°44.2	149°20.7	-21°44.7	233°17.3	-15°24.6	178°34.0	-22°19.5
15	112°05.2	8°51.3	24°44.0	164°22.3	-21°44.7	248°20.0	-15°24.5	193°36.6	-22°19.5
16	127°07.7	23°50.6	24°43.8	179°24.0	-21°44.6	263°22.8	-15°24.5	208°39.2	-22°19.5
17	142°10.2	38°49.8	24°43.5	194°25.6	-21°44.6	278°25.5	-15°24.4	223°41.8	-22°19.5
18	157°12.6	53°49.0	24°43.3	209°27.3	-21°44.5	293°28.3	-15°24.3	238°44.5	-22°19.5
19	172°15.1	68°48.2	24°43.1	224°28.9	-21°44.5	308°31.0	-15°24.2	253°47.1	-22°19.5
20	187°17.6	83°47.4	24°42.9	239°30.6	-21°44.5	323°33.7	-15°24.2	268°49.7	-22°19.5
21	202°20.0	98°46.6	24°42.7	254°32.2	-21°44.4	338°36.5	-15°24.1	283°52.3	-22°19.5
22	217°22.5	113°45.8	24°42.4	269°33.9	-21°44.4	353°39.2	-15°24.0	298°54.9	-22°19.5
23	232°25.0	128°45.0	24°42.2	284°35.5	-21°44.4	8°41.9	-15°24.0	313°57.6	-22°19.6
Mer.pass.:7:32:		v-0.8 d-0.2 m-3.9		v1.6 d0.0 m-1.1		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.2	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	247°27.4	143°44.2	24°42.0	299°37.2	-21°44.3	23°44.7	-15°23.9	329°00.2	-22°19.6
1	262°29.9	158°43.5	24°41.8	314°38.8	-21°44.3	38°47.4	-15°23.8	344°02.8	-22°19.6
2	277°32.3	173°42.7	24°41.5	329°40.5	-21°44.3	53°50.2	-15°23.7	359°05.4	-22°19.6
3	292°34.8	188°41.9	24°41.3	344°42.1	-21°44.2	68°52.9	-15°23.7	14°08.1	-22°19.6
4	307°37.3	203°41.1	24°41.1	359°43.8	-21°44.2	83°55.6	-15°23.6	29°10.7	-22°19.6
5	322°39.7	218°40.3	24°40.8	14°45.4	-21°44.2	98°58.4	-15°23.5	44°13.3	-22°19.6
6	337°42.2	233°39.5	24°40.6	29°47.1	-21°44.1	114°01.1	-15°23.5	59°15.9	-22°19.6
7	352°44.7	248°38.7	24°40.4	44°48.7	-21°44.1	129°03.8	-15°23.4	74°18.6	-22°19.6
8	7°47.1	263°38.0	24°40.1	59°50.4	-21°44.1	144°06.6	-15°23.3	89°21.2	-22°19.6
9	22°49.6	278°37.2	24°39.9	74°52.0	-21°44.0	159°09.3	-15°23.2	104°23.8	-22°19.7
10	37°52.1	293°36.4	24°39.6	89°53.7	-21°44.0	174°12.0	-15°23.2	119°26.4	-22°19.7
11	52°54.5	308°35.6	24°39.4	104°55.4	-21°44.0	189°14.8	-15°23.1	134°29.0	-22°19.7
12	67°57.0	323°34.8	24°39.2	119°57.0	-21°43.9	204°17.5	-15°23.0	149°31.7	-22°19.7
13	82°59.5	338°34.0	24°38.9	134°58.7	-21°43.9	219°20.3	-15°23.0	164°34.3	-22°19.7
14	98°01.9	353°33.3	24°38.7	150°00.3	-21°43.9	234°23.0	-15°22.9	179°36.9	-22°19.7
15	113°04.4	8°32.5	24°38.4	165°02.0	-21°43.8	249°25.7	-15°22.8	194°39.5	-22°19.7
16	128°06.8	23°31.7	24°38.2	180°03.7	-21°43.8	264°28.5	-15°22.7	209°42.2	-22°19.7
17	143°09.3	38°30.9	24°37.9	195°05.3	-21°43.8	279°31.2	-15°22.7	224°44.8	-22°19.7
18	158°11.8	53°30.1	24°37.7	210°07.0	-21°43.8	294°33.9	-15°22.6	239°47.4	-22°19.7
19	173°14.2	68°29.3	24°37.4	225°08.7	-21°43.7	309°36.7	-15°22.5	254°50.0	-22°19.8
20	188°16.7	83°28.6	24°37.2	240°10.3	-21°43.7	324°39.4	-15°22.5	269°52.7	-22°19.8
21	203°19.2	98°27.8	24°36.9	255°12.0	-21°43.7	339°42.1	-15°22.4	284°55.3	-22°19.8
22	218°21.6	113°27.0	24°36.7	270°13.7	-21°43.6	354°44.9	-15°22.3	299°57.9	-22°19.8
23	233°24.1	128°26.2	24°36.4	285°15.3	-21°43.6	9°47.6	-15°22.3	315°00.5	-22°19.8
Mer.pass.:7:28:		v-0.8 d-0.2 m-3.9		v1.7 d0.0 m-1.2		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°40.2	29°11.2
Ankaa	353°12.7	-42°12.3
Schedar	349°37.0	56°37.9
Diphda	348°52.6	-17°53.2
Achernar	335°24.8	-57°08.6
Hamal	327°57.3	23°32.7
Polaris	316°43.5	89°20.2
Akamar	315°16.2	-40°14.0
Menkar	314°11.9	4°09.5
Mirfak	308°36.0	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.8
Bellatrix	278°28.8	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.6
Sirius	258°31.0	-16°44.6
Adara	255°10.2	-29°00.1
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.0	-59°34.4
Suhail	222°50.1	-43°30.7
Miaplacidus	221°39.3	-69°47.9
Alphard	217°52.9	-8°44.4
Regulus	207°40.0	11°52.6
Dubhe	193°47.6	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.7	-17°38.7
Acrux	173°05.1	-63°12.2
Gacrux	171°56.8	-57°13.1
Alioth	166°17.5	55°51.9
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.6
Hadar	148°42.5	-60°27.7
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.5	-60°54.6
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.1	74°05.1
Alphecca	126°07.8	26°39.4
Antares	112°21.8	-26°28.2
Atria	107°20.0	-69°03.4
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.8
Rasalhague	96°03.0	12°32.9
Etamin	90°44.1	51°29.2
Kaus Aust.	83°39.0	-34°22.3
Vega	80°36.4	38°48.0
Nunki	75°53.9	-26°16.2
Altair	62°04.8	8°55.0
Peacock	53°13.7	-56°40.2
Deneb	49°29.0	45°20.6
Enif	33°43.8	9°57.5
Alnair	27°39.6	-46°52.1
Fomalhaut	15°20.4	-29°31.4
Scheat	13°50.2	28°10.7
Markab	13°35.1	15°18.1

2018/5/2	**SHA**	**Mer.pass**
Venus	258°53.3	14:23
Mars	52°49.8	04:06
Jupiter	136°04.0	22:30
Saturn	81°25.3	02:12

2018/5/2	**SHA**	**Mer.pass**
Venus	257°35.0	14:25
Mars	52°29.5	04:04
Jupiter	136°10.7	22:25
Saturn	81°29.0	02:08

2018/5/3	**SHA**	**Mer.pass**
Venus	256°16.8	14:26
Mars	52°09.7	04:01
Jupiter	136°17.3	22:21
Saturn	81°32.8	02:04

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°41.9	21°24.8	18°16.2	12.6	-12°28.4	-9.0	55.6
1	195°41.8	21°25.2	32°47.8	12.6	-12°37.4	-8.9	55.6
2	210°41.8	21°25.6	47°19.4	12.6	-12°46.3	-8.9	55.6
3	225°41.7	21°26.0	61°50.9	12.6	-12°55.2	-8.8	55.6
4	240°41.6	21°26.5	76°22.5	12.6	-13°04.0	-8.7	55.6
5	255°41.5	21°26.9	90°54.0	12.5	-13°12.7	-8.7	55.5
6	270°41.4	21°27.3	105°25.6	12.5	-13°21.3	-8.6	55.5
7	285°41.4	21°27.7	119°57.1	12.5	-13°29.9	-8.5	55.5
8	300°41.3	21°28.1	134°28.6	12.5	-13°38.4	-8.5	55.5
9	315°41.2	21°28.5	149°00.0	12.5	-13°46.8	-8.4	55.5
10	330°41.1	21°28.9	163°31.5	12.4	-13°55.2	-8.3	55.5
11	345°41.1	21°29.3	178°02.9	12.4	-14°03.5	-8.3	55.4
12	0°41.0	21°29.7	192°34.3	12.4	-14°11.8	-8.2	55.4
13	15°40.9	21°30.1	207°05.7	12.4	-14°19.9	-8.1	55.4
14	30°40.8	21°30.5	221°37.1	12.4	-14°28.0	-8.1	55.4
15	45°40.8	21°30.9	236°08.5	12.4	-14°36.0	-8.0	55.4
16	60°40.7	21°31.2	250°39.8	12.3	-14°44.0	-7.9	55.3
17	75°40.6	21°31.6	265°11.1	12.3	-14°51.8	-7.8	55.3
18	90°40.5	21°32.0	279°42.5	12.3	-14°59.6	-7.8	55.3
19	105°40.4	21°32.4	294°13.7	12.3	-15°07.3	-7.7	55.3
20	120°40.4	21°32.8	308°45.0	12.3	-15°15.0	-7.6	55.3
21	135°40.3	21°33.2	323°16.3	12.2	-15°22.6	-7.5	55.3
22	150°40.2	21°33.6	337°47.5	12.2	-15°30.0	-7.5	55.2
23	165°40.1	21°34.0	352°18.7	12.2	-15°37.5	-7.4	55.2
	SD.=15.8	d=0.4			S.D.=15.2		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°40.0	21°34.4	6°49.9	12.2	-15°44.8	-7.3	55.2
1	195°40.0	21°34.8	21°21.1	12.2	-15°52.0	-7.2	55.2
2	210°39.9	21°35.2	35°52.2	12.1	-15°59.2	-7.1	55.2
3	225°39.8	21°35.6	50°23.4	12.1	-16°06.3	-7.1	55.2
4	240°39.7	21°36.0	64°54.5	12.1	-16°13.3	-7.0	55.1
5	255°39.6	21°36.3	79°25.6	12.1	-16°20.3	-6.9	55.1
6	270°39.6	21°36.7	93°56.7	12.1	-16°27.1	-6.8	55.1
7	285°39.5	21°37.1	108°27.7	12.1	-16°33.9	-6.7	55.1
8	300°39.4	21°37.5	122°58.8	12.0	-16°40.6	-6.7	55.1
9	315°39.3	21°37.9	137°29.8	12.0	-16°47.2	-6.6	55.1
10	330°39.2	21°38.3	152°00.8	12.0	-16°53.8	-6.5	55.0
11	345°39.2	21°38.7	166°31.8	12.0	-17°00.2	-6.4	55.0
12	0°39.1	21°39.0	181°02.8	12.0	-17°06.6	-6.3	55.0
13	15°39.0	21°39.4	195°33.7	11.9	-17°12.8	-6.2	55.0
14	30°38.9	21°39.8	210°04.7	11.9	-17°19.0	-6.1	55.0
15	45°38.8	21°40.2	224°35.6	11.9	-17°25.1	-6.1	55.0
16	60°38.7	21°40.6	239°06.5	11.9	-17°31.2	-6.0	55.0
17	75°38.7	21°40.9	253°37.4	11.9	-17°37.1	-5.9	54.9
18	90°38.6	21°41.3	268°08.3	11.9	-17°42.9	-5.8	54.9
19	105°38.5	21°41.7	282°39.1	11.8	-17°48.7	-5.7	54.9
20	120°38.4	21°42.1	297°10.0	11.8	-17°54.4	-5.6	54.9
21	135°38.3	21°42.5	311°40.8	11.8	-17°60.0	-5.5	54.9
22	150°38.2	21°42.8	326°11.6	11.8	-18°05.5	-5.5	54.9
23	165°38.2	21°43.2	340°42.4	11.8	-18°10.9	-5.4	54.8
	SD.=15.8	d=0.4			S.D.=15.1		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°38.1	21°43.6	355°13.2	11.8	-18°16.2	-5.3	54.8
1	195°38.0	21°44.0	9°43.9	11.8	-18°21.4	-5.2	54.8
2	210°37.9	21°44.3	24°14.7	11.7	-18°26.6	-5.1	54.8
3	225°37.8	21°44.7	38°45.4	11.7	-18°31.6	-5.0	54.8
4	240°37.7	21°45.1	53°16.1	11.7	-18°36.6	-4.9	54.8
5	255°37.6	21°45.5	67°46.9	11.7	-18°41.4	-4.8	54.8
6	270°37.6	21°45.8	82°17.5	11.7	-18°46.2	-4.7	54.7
7	285°37.5	21°46.2	96°48.2	11.7	-18°50.9	-4.6	54.7
8	300°37.4	21°46.6	111°18.9	11.7	-18°55.5	-4.5	54.7
9	315°37.3	21°46.9	125°49.6	11.7	-19°00.0	-4.5	54.7
10	330°37.2	21°47.3	140°20.2	11.6	-19°04.4	-4.4	54.7
11	345°37.1	21°47.7	154°50.8	11.6	-19°08.7	-4.3	54.7
12	0°37.0	21°48.0	169°21.5	11.6	-19°12.9	-4.2	54.7
13	15°37.0	21°48.4	183°52.1	11.6	-19°17.1	-4.1	54.6
14	30°36.9	21°48.8	198°22.7	11.6	-19°21.1	-4.0	54.6
15	45°36.8	21°49.1	212°53.3	11.6	-19°25.1	-3.9	54.6
16	60°36.7	21°49.5	227°23.9	11.6	-19°28.9	-3.8	54.6
17	75°36.6	21°49.9	241°54.4	11.6	-19°32.7	-3.7	54.6
18	90°36.5	21°50.2	256°25.0	11.6	-19°36.3	-3.6	54.6
19	105°36.4	21°50.6	270°55.6	11.6	-19°39.9	-3.5	54.6
20	120°36.3	21°51.0	285°26.1	11.5	-19°43.3	-3.4	54.6
21	135°36.3	21°51.3	299°56.7	11.5	-19°46.7	-3.3	54.5
22	150°36.2	21°51.7	314°27.2	11.5	-19°50.0	-3.2	54.5
23	165°36.1	21°52.0	328°57.7	11.5	-19°53.2	-3.1	54.5
	SD.=15.8	d=0.4			S.D.=15.0		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	01:26	22:33	–:–	–:–
64	–:–	–:–	02:06	21:51	–:–	–:–
62	–:–	00:40	02:33	21:23	23:23	–:–
60	–:–	01:35	02:54	21:02	22:22	–:–
58	–:–	02:07	03:11	20:45	21:50	–:–
56	00:36	02:29	03:26	20:30	21:27	23:26
54	01:27	02:48	03:38	20:18	21:08	22:30
52	01:56	03:03	03:49	20:07	20:53	22:01
50	02:17	03:16	03:58	19:57	20:39	21:39
45	02:56	03:43	04:19	19:37	20:13	20:60
40	03:23	04:03	04:35	19:20	19:52	20:32
35	03:44	04:19	04:48	19:07	19:36	20:11
30	04:01	04:33	05:00	18:55	19:22	19:54
20	04:28	04:56	05:20	18:35	18:59	19:27
10	04:48	05:15	05:38	18:17	18:40	19:07
0	05:06	05:32	05:54	18:01	18:23	18:49
-10	05:21	05:47	06:10	17:45	18:08	18:34
-20	05:36	06:03	06:27	17:28	17:52	18:19
-30	05:51	06:20	06:46	17:09	17:35	18:04
-35	05:58	06:30	06:57	16:57	17:25	17:56
-40	06:07	06:40	07:10	16:44	17:14	17:48
-45	06:16	06:52	07:25	16:29	17:02	17:39
-50	06:26	07:07	07:44	16:11	16:48	17:28
-52	06:30	07:13	07:53	16:02	16:41	17:24
-54	06:35	07:20	08:02	15:52	16:34	17:19
-56	06:41	07:28	08:14	15:41	16:26	17:14
-58	06:46	07:37	08:26	15:28	16:17	17:08
-60	06:53	07:47	08:41	15:13	16:07	17:02

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	21:23	–:–	–:–	01:52	01:27	–:–
70	20:44	22:36	–:–	02:15	02:07	01:55
68	20:17	21:52	23:22	02:33	02:34	02:39
66	19:57	21:23	22:42	02:47	02:55	03:08
64	19:41	21:02	22:15	02:59	03:12	03:31
62	19:28	20:44	21:54	03:09	03:26	03:48
60	19:16	20:30	21:37	03:18	03:38	04:03
58	19:07	20:18	21:23	03:26	03:48	04:16
56	18:58	20:07	21:10	03:33	03:57	04:27
54	18:51	19:58	20:60	03:39	04:05	04:37
52	18:44	19:49	20:50	03:44	04:12	04:45
50	18:38	19:42	20:42	03:49	04:19	04:53
45	18:25	19:26	20:24	04:00	04:33	05:09
40	18:14	19:13	20:09	04:09	04:44	05:23
35	18:05	19:02	19:57	04:17	04:54	05:35
30	17:57	18:52	19:46	04:24	05:03	05:45
20	17:43	18:36	19:28	04:36	05:18	06:02
10	17:31	18:22	19:12	04:46	05:31	06:17
0	17:20	18:08	18:57	04:56	05:43	06:31
-10	17:09	17:55	18:42	05:06	05:56	06:46
-20	16:57	17:41	18:26	05:16	06:09	07:01
-30	16:44	17:24	18:08	05:28	06:24	07:18
-35	16:36	17:15	17:57	05:35	06:33	07:29
-40	16:28	17:04	17:45	05:43	06:43	07:40
-45	16:17	16:52	17:31	05:52	06:55	07:54
-50	16:05	16:37	17:13	06:03	07:09	08:11
-52	15:59	16:30	17:05	06:09	07:16	08:19
-54	15:53	16:22	16:56	06:14	07:23	08:28
-56	15:46	16:13	16:46	06:21	07:31	08:38
-58	15:38	16:03	16:34	06:28	07:41	08:49
-60	15:30	15:52	16:21	06:36	07:52	09:02

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
28	02:48	02:44	11:57	23:31	11:08	13(99%)
29	02:40	02:36	11:57	00:19	11:55	14(100%)
30	02:32	02:28	11:57	00:19	12:44	15(99%)

May 31, 01 ,02 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	248°26.6	143°25.4	24°36.2	300°17.0	-21°43.6	24°50.3	-15°22.2	330°03.2	-22°19.8
1	263°29.0	158°24.7	24°35.9	315°18.7	-21°43.6	39°53.1	-15°22.1	345°05.8	-22°19.8
2	278°31.5	173°23.9	24°35.7	330°20.3	-21°43.5	54°55.8	-15°22.0	0°08.4	-22°19.8
3	293°34.0	188°23.1	24°35.4	345°22.0	-21°43.5	69°58.5	-15°22.0	15°11.1	-22°19.8
4	308°36.4	203°22.3	24°35.1	0°23.7	-21°43.5	85°01.3	-15°21.9	30°13.7	-22°19.8
5	323°38.9	218°21.6	24°34.9	15°25.4	-21°43.4	100°04.0	-15°21.8	45°16.3	-22°19.9
6	338°41.3	233°20.8	24°34.6	30°27.0	-21°43.4	115°06.7	-15°21.8	60°18.9	-22°19.9
7	353°43.8	248°20.0	24°34.4	45°28.7	-21°43.4	130°09.5	-15°21.7	75°21.6	-22°19.9
8	8°46.3	263°19.2	24°34.1	60°30.4	-21°43.4	145°12.2	-15°21.6	90°24.2	-22°19.9
9	23°48.7	278°18.4	24°33.8	75°32.1	-21°43.3	160°14.9	-15°21.6	105°26.8	-22°19.9
10	38°51.2	293°17.7	24°33.6	90°33.8	-21°43.3	175°17.6	-15°21.5	120°29.4	-22°19.9
11	53°53.7	308°16.9	24°33.3	105°35.4	-21°43.3	190°20.4	-15°21.4	135°32.1	-22°19.9
12	68°56.1	323°16.1	24°33.0	120°37.1	-21°43.3	205°23.1	-15°21.3	150°34.7	-22°19.9
13	83°58.6	338°15.3	24°32.7	135°38.8	-21°43.2	220°25.8	-15°21.3	165°37.3	-22°19.9
14	99°01.1	353°14.6	24°32.5	150°40.5	-21°43.2	235°28.6	-15°21.2	180°39.9	-22°19.9
15	114°03.5	8°13.8	24°32.2	165°42.2	-21°43.2	250°31.3	-15°21.1	195°42.6	-22°20.0
16	129°06.0	23°13.0	24°31.9	180°43.9	-21°43.1	265°34.0	-15°21.1	210°45.2	-22°20.0
17	144°08.5	38°12.3	24°31.6	195°45.5	-21°43.1	280°36.8	-15°21.0	225°47.8	-22°20.0
18	159°10.9	53°11.5	24°31.4	210°47.2	-21°43.1	295°39.5	-15°20.9	240°50.5	-22°20.0
19	174°13.4	68°10.7	24°31.1	225°48.9	-21°43.1	310°42.2	-15°20.9	255°53.1	-22°20.0
20	189°15.8	83°09.9	24°30.8	240°50.6	-21°43.1	325°45.0	-15°20.8	270°55.7	-22°20.0
21	204°18.3	98°09.2	24°30.5	255°52.3	-21°43.0	340°47.7	-15°20.7	285°58.3	-22°20.0
22	219°20.8	113°08.4	24°30.3	270°54.0	-21°43.0	355°50.4	-15°20.7	301°01.0	-22°20.0
23	234°23.2	128°07.6	24°30.0	285°55.7	-21°43.0	10°53.1	-15°20.6	316°03.6	-22°20.0
Mer.pass.:7:25:		v-0.8 d-0.3 m-3.9		v1.7 d0.0 m-1.2		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.2	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	249°25.7	143°06.8	24°29.7	300°57.4	-21°43.0	25°55.9	-15°20.5	331°06.2	-22°20.1
1	264°28.2	158°06.1	24°29.4	315°59.1	-21°42.9	40°58.6	-15°20.4	346°08.8	-22°20.1
2	279°30.6	173°05.3	24°29.1	331°00.7	-21°42.9	56°01.3	-15°20.4	1°11.5	-22°20.1
3	294°33.1	188°04.5	24°28.8	346°02.4	-21°42.9	71°04.1	-15°20.3	16°14.1	-22°20.1
4	309°35.6	203°03.8	24°28.5	1°04.1	-21°42.9	86°06.8	-15°20.2	31°16.7	-22°20.1
5	324°38.0	218°03.0	24°28.2	16°05.8	-21°42.8	101°09.5	-15°20.2	46°19.4	-22°20.1
6	339°40.5	233°02.2	24°28.0	31°07.5	-21°42.8	116°12.2	-15°20.1	61°22.0	-22°20.1
7	354°43.0	248°01.5	24°27.7	46°09.2	-21°42.8	131°15.0	-15°20.0	76°24.6	-22°20.1
8	9°45.4	263°00.7	24°27.4	61°10.9	-21°42.8	146°17.7	-15°20.0	91°27.2	-22°20.1
9	24°47.9	277°59.9	24°27.1	76°12.6	-21°42.8	161°20.4	-15°19.9	106°29.9	-22°20.1
10	39°50.3	292°59.2	24°26.8	91°14.3	-21°42.7	176°23.1	-15°19.8	121°32.5	-22°20.2
11	54°52.8	307°58.4	24°26.5	106°16.0	-21°42.7	191°25.9	-15°19.8	136°35.1	-22°20.2
12	69°55.3	322°57.6	24°26.2	121°17.7	-21°42.7	206°28.6	-15°19.7	151°37.8	-22°20.2
13	84°57.7	337°56.9	24°25.9	136°19.4	-21°42.7	221°31.3	-15°19.6	166°40.4	-22°20.2
14	100°00.2	352°56.1	24°25.6	151°21.1	-21°42.7	236°34.0	-15°19.6	181°43.0	-22°20.2
15	115°02.7	7°55.3	24°25.3	166°22.8	-21°42.6	251°36.8	-15°19.5	196°45.7	-22°20.2
16	130°05.1	22°54.6	24°25.0	181°24.6	-21°42.6	266°39.5	-15°19.4	211°48.3	-22°20.2
17	145°07.6	37°53.8	24°24.7	196°26.3	-21°42.6	281°42.2	-15°19.4	226°50.9	-22°20.2
18	160°10.1	52°53.0	24°24.4	211°28.0	-21°42.6	296°44.9	-15°19.3	241°53.5	-22°20.2
19	175°12.5	67°52.3	24°24.1	226°29.7	-21°42.6	311°47.7	-15°19.2	256°56.2	-22°20.2
20	190°15.0	82°51.5	24°23.8	241°31.4	-21°42.5	326°50.4	-15°19.2	271°58.8	-22°20.3
21	205°17.4	97°50.8	24°23.4	256°33.1	-21°42.5	341°53.1	-15°19.1	287°01.4	-22°20.3
22	220°19.9	112°50.0	24°23.1	271°34.8	-21°42.5	356°55.8	-15°19.0	302°04.1	-22°20.3
23	235°22.4	127°49.2	24°22.8	286°36.5	-21°42.5	11°58.6	-15°19.0	317°06.7	-22°20.3
Mer.pass.:7:21:		v-0.8 d-0.3 m-3.9		v1.7 d0.0 m-1.2		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.2	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	250°24.8	142°48.5	24°22.5	301°38.2	-21°42.5	27°01.3	-15°18.9	332°09.3	-22°20.3
1	265°27.3	157°47.7	24°22.2	316°40.0	-21°42.5	42°04.0	-15°18.8	347°12.0	-22°20.3
2	280°29.8	172°47.0	24°21.9	331°41.7	-21°42.4	57°06.7	-15°18.7	2°14.6	-22°20.3
3	295°32.2	187°46.2	24°21.6	346°43.4	-21°42.4	72°09.5	-15°18.7	17°17.2	-22°20.3
4	310°34.7	202°45.4	24°21.3	1°45.1	-21°42.4	87°12.2	-15°18.6	32°19.8	-22°20.3
5	325°37.2	217°44.7	24°20.9	16°46.8	-21°42.4	102°14.9	-15°18.5	47°22.5	-22°20.4
6	340°39.6	232°43.9	24°20.6	31°48.5	-21°42.4	117°17.6	-15°18.5	62°25.1	-22°20.4
7	355°42.1	247°43.2	24°20.3	46°50.3	-21°42.4	132°20.4	-15°18.4	77°27.7	-22°20.4
8	10°44.6	262°42.4	24°20.0	61°52.0	-21°42.3	147°23.1	-15°18.3	92°30.4	-22°20.4
9	25°47.0	277°41.6	24°19.6	76°53.7	-21°42.3	162°25.8	-15°18.3	107°33.0	-22°20.4
10	40°49.5	292°40.9	24°19.3	91°55.4	-21°42.3	177°28.5	-15°18.2	122°35.6	-22°20.4
11	55°51.9	307°40.1	24°19.0	106°57.1	-21°42.3	192°31.2	-15°18.1	137°38.3	-22°20.4
12	70°54.4	322°39.4	24°18.7	121°58.9	-21°42.3	207°34.0	-15°18.1	152°40.9	-22°20.4
13	85°56.9	337°38.6	24°18.3	137°00.6	-21°42.3	222°36.7	-15°18.0	167°43.5	-22°20.4
14	100°59.3	352°37.9	24°18.0	152°02.3	-21°42.3	237°39.4	-15°17.9	182°46.2	-22°20.4
15	116°01.8	7°37.1	24°17.7	167°04.0	-21°42.2	252°42.1	-15°17.9	197°48.8	-22°20.5
16	131°04.3	22°36.4	24°17.4	182°05.8	-21°42.2	267°44.9	-15°17.8	212°51.4	-22°20.5
17	146°06.7	37°35.6	24°17.0	197°07.5	-21°42.2	282°47.6	-15°17.7	227°54.1	-22°20.5
18	161°09.2	52°34.8	24°16.7	212°09.2	-21°42.2	297°50.3	-15°17.7	242°56.7	-22°20.5
19	176°11.7	67°34.1	24°16.4	227°11.0	-21°42.2	312°53.0	-15°17.6	257°59.3	-22°20.5
20	191°14.1	82°33.3	24°16.0	242°12.7	-21°42.2	327°55.7	-15°17.5	273°02.0	-22°20.5
21	206°16.6	97°32.6	24°15.7	257°14.4	-21°42.2	342°58.5	-15°17.5	288°04.6	-22°20.5
22	221°19.1	112°31.8	24°15.3	272°16.2	-21°42.2	358°01.2	-15°17.4	303°07.2	-22°20.5
23	236°21.5	127°31.1	24°15.0	287°17.9	-21°42.1	13°03.9	-15°17.3	318°09.9	-22°20.5
Mer.pass.:7:17:		v-0.8 d-0.3 m-3.9		v1.7 d0.0 m-1.3		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°40.2	29°11.3
Ankaa	353°12.6	-42°12.3
Schedar	349°36.9	56°37.9
Diphda	348°52.6	-17°53.2
Achernar	335°24.8	-57°08.6
Hamal	327°57.3	23°32.7
Polaris	316°42.6	89°20.2
Akamar	315°16.2	-40°14.0
Menkar	314°11.9	4°09.5
Mirfak	308°36.0	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.8
Bellatrix	278°28.8	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.7
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.6
Sirius	258°31.0	-16°44.6
Adara	255°10.2	-29°00.1
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.0	-59°34.4
Suhail	222°50.1	-43°30.7
Miaplacidus	221°39.3	-69°47.9
Alphard	217°52.9	-8°44.4
Regulus	207°40.0	11°52.7
Dubhe	193°47.6	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.7	-17°38.7
Acrux	173°05.2	-63°12.2
Gacrux	171°56.8	-57°13.1
Alioth	166°17.5	55°51.9
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.6
Hadar	148°42.5	-60°27.7
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.5	-60°54.6
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.1	74°05.1
Alphecca	126°07.8	26°39.4
Antares	112°21.8	-26°28.2
Atria	107°20.0	-69°03.4
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.8
Rasalhague	96°03.0	12°33.0
Etamin	90°44.1	51°29.2
Kaus Aust.	83°39.0	-34°22.3
Vega	80°36.3	38°48.0
Nunki	75°53.9	-26°16.2
Altair	62°04.8	8°55.0
Peacock	53°13.7	-56°40.2
Deneb	49°28.9	45°20.6
Enif	33°43.8	9°57.5
Alnair	27°39.5	-46°52.1
Fomalhaut	15°20.4	-29°31.4
Scheat	13°50.2	28°10.7
Markab	13°35.0	15°18.1

2018/5/3	**SHA**	**Mer.pass**
Venus	254°58.9	14:27
Mars	51°50.4	03:58
Jupiter	136°23.8	22:17
Saturn	81°36.6	01:59

2018/6/1	**SHA**	**Mer.pass**
Venus	253°41.1	14:28
Mars	51°31.7	03:56
Jupiter	136°30.2	22:12
Saturn	81°40.5	01:55

2018/6/2	**SHA**	**Mer.pass**
Venus	252°23.6	14:30
Mars	51°13.4	03:53
Jupiter	136°36.5	22:08
Saturn	81°44.5	01:51

Horizontal paralax	
Venus:	0.1
Mars:	0.2

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°36.0	21°52.4	343°28.3	11.5	-19°56.3	-3.0	54.5
1	195°35.9	21°52.8	357°58.8	11.5	-19°59.2	-2.9	54.5
2	210°35.8	21°53.1	12°29.3	11.5	-20°02.1	-2.8	54.5
3	225°35.7	21°53.5	26°59.8	11.5	-20°04.9	-2.7	54.5
4	240°35.6	21°53.8	41°30.3	11.5	-20°07.6	-2.7	54.5
5	255°35.5	21°54.2	56°00.8	11.5	-20°10.2	-2.6	54.5
6	270°35.5	21°54.5	70°31.3	11.5	-20°12.7	-2.5	54.4
7	285°35.4	21°54.9	85°01.8	11.5	-20°15.2	-2.4	54.4
8	300°35.3	21°55.3	99°32.3	11.5	-20°17.5	-2.3	54.4
9	315°35.2	21°55.6	114°02.8	11.5	-20°19.7	-2.2	54.4
10	330°35.1	21°56.0	128°33.3	11.5	-20°21.8	-2.1	54.4
11	345°35.0	21°56.3	143°03.8	11.5	-20°23.8	-2.0	54.4
12	0°34.9	21°56.7	157°34.3	11.5	-20°25.7	-1.9	54.4
13	15°34.8	21°57.0	172°04.8	11.5	-20°27.6	-1.8	54.4
14	30°34.7	21°57.4	186°35.3	11.5	-20°29.3	-1.7	54.4
15	45°34.6	21°57.7	201°05.8	11.5	-20°30.9	-1.6	54.3
16	60°34.5	21°58.1	215°36.3	11.5	-20°32.4	-1.5	54.3
17	75°34.5	21°58.4	230°06.8	11.5	-20°33.9	-1.4	54.3
18	90°34.4	21°58.8	244°37.3	11.5	-20°35.2	-1.3	54.3
19	105°34.3	21°59.1	259°07.8	11.5	-20°36.4	-1.2	54.3
20	120°34.2	21°59.5	273°38.4	11.5	-20°37.6	-1.1	54.3
21	135°34.1	21°59.8	288°08.9	11.5	-20°38.6	-1.0	54.3
22	150°34.0	22°00.1	302°39.4	11.5	-20°39.6	-0.9	54.3
23	165°33.9	22°00.5	317°09.9	11.5	-20°40.4	-0.8	54.3
	SD.=15.8	d=0.4			S.D.=14.9		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°33.8	22°00.8	331°40.5	11.5	-20°41.2	-0.7	54.3
1	195°33.7	22°01.2	346°11.0	11.5	-20°41.8	-0.6	54.3
2	210°33.6	22°01.5	0°41.6	11.6	-20°42.4	-0.5	54.3
3	225°33.5	22°01.9	15°12.1	11.6	-20°42.8	-0.4	54.2
4	240°33.4	22°02.2	29°42.7	11.6	-20°43.2	-0.3	54.2
5	255°33.3	22°02.5	44°13.3	11.6	-20°43.4	-0.2	54.2
6	270°33.2	22°02.9	58°43.9	11.6	-20°43.6	-0.1	54.2
7	285°33.1	22°03.2	73°14.5	11.6	-20°43.6	-0.0	54.2
8	300°33.1	22°03.6	87°45.1	11.6	-20°43.6	0.1	54.2
9	315°33.0	22°03.9	102°15.7	11.6	-20°43.5	0.2	54.2
10	330°32.9	22°04.2	116°46.3	11.6	-20°43.2	0.3	54.2
11	345°32.8	22°04.6	131°17.0	11.6	-20°42.9	0.4	54.2
12	0°32.7	22°04.9	145°47.6	11.7	-20°42.5	0.5	54.2
13	15°32.6	22°05.2	160°18.3	11.7	-20°42.0	0.6	54.2
14	30°32.5	22°05.6	174°49.0	11.7	-20°41.4	0.7	54.2
15	45°32.4	22°05.9	189°19.6	11.7	-20°40.6	0.8	54.2
16	60°32.3	22°06.2	203°50.4	11.7	-20°39.8	0.9	54.2
17	75°32.2	22°06.6	218°21.1	11.7	-20°38.9	1.0	54.2
18	90°32.1	22°06.9	232°51.8	11.7	-20°37.9	1.1	54.2
19	105°32.0	22°07.2	247°22.6	11.8	-20°36.8	1.1	54.1
20	120°31.9	22°07.6	261°53.3	11.8	-20°35.6	1.2	54.1
21	135°31.8	22°07.9	276°24.1	11.8	-20°34.3	1.3	54.1
22	150°31.7	22°08.2	290°54.9	11.8	-20°33.0	1.4	54.1
23	165°31.6	22°08.6	305°25.7	11.8	-20°31.5	1.5	54.1
	SD.=15.8	d=0.3			S.D.=14.8		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°31.5	22°08.9	319°56.6	11.8	-20°29.9	1.6	54.1
1	195°31.4	22°09.2	334°27.4	11.9	-20°28.2	1.7	54.1
2	210°31.3	22°09.5	348°58.3	11.9	-20°26.5	1.8	54.1
3	225°31.2	22°09.9	3°29.2	11.9	-20°24.6	1.9	54.1
4	240°31.1	22°10.2	18°00.1	11.9	-20°22.7	2.0	54.1
5	255°31.0	22°10.5	32°31.0	11.9	-20°20.6	2.1	54.1
6	270°30.9	22°10.8	47°02.0	12.0	-20°18.5	2.2	54.1
7	285°30.8	22°11.2	61°32.9	12.0	-20°16.2	2.3	54.1
8	300°30.7	22°11.5	76°03.9	12.0	-20°13.9	2.4	54.1
9	315°30.6	22°11.8	90°34.9	12.0	-20°11.5	2.5	54.1
10	330°30.5	22°12.1	105°06.0	12.0	-20°09.0	2.6	54.1
11	345°30.4	22°12.5	119°37.0	12.1	-20°06.4	2.7	54.1
12	0°30.3	22°12.8	134°08.1	12.1	-20°03.7	2.7	54.1
13	15°30.2	22°13.1	148°39.2	12.1	-20°00.9	2.8	54.1
14	30°30.1	22°13.4	163°10.3	12.1	-19°58.0	2.9	54.1
15	45°30.0	22°13.7	177°41.4	12.2	-19°55.0	3.0	54.1
16	60°29.9	22°14.0	192°12.6	12.2	-19°52.0	3.1	54.1
17	75°29.8	22°14.4	206°43.8	12.2	-19°48.8	3.2	54.1
18	90°29.7	22°14.7	221°15.0	12.2	-19°45.6	3.3	54.1
19	105°29.6	22°15.0	235°46.2	12.2	-19°42.3	3.4	54.1
20	120°29.5	22°15.3	250°17.5	12.3	-19°38.8	3.5	54.1
21	135°29.4	22°15.6	264°48.8	12.3	-19°35.3	3.6	54.1
22	150°29.3	22°15.9	279°20.1	12.3	-19°31.7	3.6	54.1
23	165°29.2	22°16.2	293°51.4	12.3	-19°28.0	3.7	54.1
	SD.=15.8	d=0.3			S.D.=14.8		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	01:13	22:47	–:–	–:–
64	–:–	–:–	01:58	21:60	–:–	–:–
62	–:–	–:–	02:27	21:30	–:–	–:–
60	–:–	01:26	02:50	21:07	22:32	–:–
58	–:–	02:00	03:07	20:49	21:57	–:–
56	–:–	02:25	03:22	20:34	21:32	–:–
54	01:19	02:44	03:35	20:21	21:13	22:39
52	01:50	02:60	03:46	20:10	20:57	22:07
50	02:13	03:13	03:56	20:00	20:43	21:44
45	02:53	03:40	04:17	19:39	20:16	21:03
40	03:21	04:01	04:33	19:23	19:55	20:35
35	03:42	04:18	04:47	19:09	19:38	20:14
30	03:60	04:32	04:59	18:56	19:23	19:56
20	04:27	04:56	05:20	18:36	19:00	19:29
10	04:48	05:15	05:38	18:18	18:41	19:08
0	05:06	05:32	05:54	18:01	18:24	18:50
-10	05:22	05:48	06:11	17:45	18:08	18:34
-20	05:37	06:04	06:28	17:28	17:51	18:19
-30	05:52	06:22	06:48	17:08	17:34	18:03
-35	06:00	06:31	06:59	16:56	17:24	17:55
-40	06:09	06:42	07:12	16:43	17:13	17:47
-45	06:18	06:55	07:28	16:27	17:01	17:37
-50	06:29	07:09	07:47	16:08	16:46	17:27
-52	06:33	07:16	07:56	15:59	16:39	17:22
-54	06:38	07:24	08:06	15:49	16:32	17:17
-56	06:44	07:32	08:18	15:38	16:23	17:11
-58	06:50	07:41	08:31	15:24	16:14	17:05
-60	06:56	07:52	08:46	15:09	16:04	16:59

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	00:34	01:15	02:50	03:19	04:19
66	23:47	–:–	00:31	03:30	04:07	05:03
64	23:16	–:–	00:02	03:58	04:38	05:32
62	22:53	23:40	–:–	04:19	05:01	05:54
60	22:35	23:22	23:58	04:36	05:19	06:12
58	22:19	23:07	23:44	04:51	05:34	06:27
56	22:06	22:54	23:33	05:03	05:47	06:39
54	21:55	22:43	23:22	05:14	05:59	06:51
52	21:45	22:33	23:13	05:24	06:09	07:00
50	21:36	22:24	23:05	05:32	06:18	07:09
45	21:17	22:05	22:48	05:51	06:37	07:28
40	21:02	21:50	22:33	06:06	06:52	07:43
35	20:49	21:37	22:21	06:18	07:05	07:55
30	20:37	21:26	22:11	06:29	07:17	08:06
20	20:18	21:06	21:53	06:48	07:36	08:25
10	20:01	20:50	21:37	07:05	07:53	08:42
0	19:45	20:34	21:22	07:20	08:09	08:57
-10	19:30	20:18	21:07	07:36	08:25	09:13
-20	19:13	20:01	20:51	07:52	08:42	09:29
-30	18:54	19:42	20:33	08:11	09:01	09:48
-35	18:42	19:31	20:22	08:22	09:12	09:59
-40	18:29	19:18	20:10	08:35	09:25	10:11
-45	18:14	19:03	19:56	08:50	09:41	10:26
-50	17:56	18:44	19:38	09:08	09:59	10:44
-52	17:47	18:35	19:30	09:17	10:08	10:52
-54	17:37	18:25	19:20	09:27	10:18	11:02
-56	17:26	18:14	19:10	09:38	10:29	11:13
-58	17:13	18:01	18:58	09:50	10:42	11:25
-60	16:58	17:46	18:44	10:05	10:57	11:39

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
31	02:24	02:20	11:57	01:08	13:32	16(97%)
1	02:15	02:11	11:57	01:57	14:21	17(92%)
2	02:06	02:01	11:57	02:45	15:09	18(87%)

June 03, 04 ,05 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	251°24.0	142°30.3	24°14.7	302°19.6	-21°42.1	28°06.6	-15°17.3	333°12.5	-22°20.6
1	266°26.4	157°29.6	24°14.3	317°21.4	-21°42.1	43°09.3	-15°17.2	348°15.1	-22°20.6
2	281°28.9	172°28.8	24°14.0	332°23.1	-21°42.1	58°12.1	-15°17.2	3°17.8	-22°20.6
3	296°31.4	187°28.1	24°13.6	347°24.9	-21°42.1	73°14.8	-15°17.1	18°20.4	-22°20.6
4	311°33.8	202°27.3	24°13.3	2°26.6	-21°42.1	88°17.5	-15°17.0	33°23.0	-22°20.6
5	326°36.3	217°26.6	24°12.9	17°28.3	-21°42.1	103°20.2	-15°17.0	48°25.7	-22°20.6
6	341°38.8	232°25.8	24°12.6	32°30.1	-21°42.1	118°22.9	-15°16.9	63°28.3	-22°20.6
7	356°41.2	247°25.1	24°12.3	47°31.8	-21°42.1	133°25.6	-15°16.8	78°30.9	-22°20.6
8	11°43.7	262°24.3	24°11.9	62°33.6	-21°42.1	148°28.4	-15°16.8	93°33.6	-22°20.6
9	26°46.2	277°23.6	24°11.6	77°35.3	-21°42.0	163°31.1	-15°16.7	108°36.2	-22°20.6
10	41°48.6	292°22.8	24°11.2	92°37.0	-21°42.0	178°33.8	-15°16.6	123°38.8	-22°20.7
11	56°51.1	307°22.1	24°10.8	107°38.8	-21°42.0	193°36.5	-15°16.6	138°41.5	-22°20.7
12	71°53.6	322°21.4	24°10.5	122°40.5	-21°42.0	208°39.2	-15°16.5	153°44.1	-22°20.7
13	86°56.0	337°20.6	24°10.1	137°42.3	-21°42.0	223°41.9	-15°16.4	168°46.7	-22°20.7
14	101°58.5	352°19.9	24°09.8	152°44.0	-21°42.0	238°44.7	-15°16.4	183°49.4	-22°20.7
15	117°00.9	7°19.1	24°09.4	167°45.8	-21°42.0	253°47.4	-15°16.3	198°52.0	-22°20.7
16	132°03.4	22°18.4	24°09.1	182°47.5	-21°42.0	268°50.1	-15°16.2	213°54.6	-22°20.7
17	147°05.9	37°17.6	24°08.7	197°49.3	-21°42.0	283°52.8	-15°16.2	228°57.3	-22°20.7
18	162°08.3	52°16.9	24°08.3	212°51.0	-21°42.0	298°55.5	-15°16.1	243°59.9	-22°20.7
19	177°10.8	67°16.1	24°08.0	227°52.8	-21°42.0	313°58.2	-15°16.0	259°02.5	-22°20.8
20	192°13.3	82°15.4	24°07.6	242°54.6	-21°42.0	329°01.0	-15°16.0	274°05.2	-22°20.8
21	207°15.7	97°14.7	24°07.3	257°56.3	-21°42.0	344°03.7	-15°15.9	289°07.8	-22°20.8
22	222°18.2	112°13.9	24°06.9	272°58.1	-21°42.0	359°06.4	-15°15.8	304°10.4	-22°20.8
23	237°20.7	127°13.2	24°06.5	287°59.8	-21°42.0	14°09.1	-15°15.8	319°13.1	-22°20.8
Mer.pass.:7:13:		v-0.8 d-0.3 m-3.9		v1.7 d0.0 m-1.3		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.1	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	252°23.1	142°12.4	24°06.2	303°01.6	-21°42.0	29°11.8	-15°15.7	334°15.7	-22°20.8
1	267°25.6	157°11.7	24°05.8	318°03.3	-21°41.9	44°14.5	-15°15.7	349°18.3	-22°20.8
2	282°28.0	172°11.0	24°05.4	333°05.1	-21°41.9	59°17.2	-15°15.6	4°21.0	-22°20.8
3	297°30.5	187°10.2	24°05.0	348°06.9	-21°41.9	74°20.0	-15°15.5	19°23.6	-22°20.8
4	312°33.0	202°09.5	24°04.7	3°08.6	-21°41.9	89°22.7	-15°15.5	34°26.3	-22°20.9
5	327°35.4	217°08.7	24°04.3	18°10.4	-21°41.9	104°25.4	-15°15.4	49°28.9	-22°20.9
6	342°37.9	232°08.0	24°03.9	33°12.2	-21°41.9	119°28.1	-15°15.3	64°31.5	-22°20.9
7	357°40.4	247°07.3	24°03.5	48°13.9	-21°41.9	134°30.8	-15°15.3	79°34.2	-22°20.9
8	12°42.8	262°06.5	24°03.2	63°15.7	-21°41.9	149°33.5	-15°15.2	94°36.8	-22°20.9
9	27°45.3	277°05.8	24°02.8	78°17.5	-21°41.9	164°36.2	-15°15.1	109°39.4	-22°20.9
10	42°47.8	292°05.1	24°02.4	93°19.2	-21°41.9	179°38.9	-15°15.1	124°42.1	-22°20.9
11	57°50.2	307°04.3	24°02.0	108°21.0	-21°41.9	194°41.7	-15°15.0	139°44.7	-22°20.9
12	72°52.7	322°03.6	24°01.6	123°22.8	-21°41.9	209°44.4	-15°14.9	154°47.3	-22°20.9
13	87°55.2	337°02.9	24°01.3	138°24.5	-21°41.9	224°47.1	-15°14.9	169°50.0	-22°20.9
14	102°57.6	352°02.1	24°00.9	153°26.3	-21°41.9	239°49.8	-15°14.8	184°52.6	-22°21.0
15	118°00.1	7°01.4	24°00.5	168°28.1	-21°41.9	254°52.5	-15°14.8	199°55.3	-22°21.0
16	133°02.5	22°00.7	24°00.1	183°29.9	-21°41.9	269°55.2	-15°14.7	214°57.9	-22°21.0
17	148°05.0	36°59.9	23°59.7	198°31.6	-21°41.9	284°57.9	-15°14.6	230°00.5	-22°21.0
18	163°07.5	51°59.2	23°59.3	213°33.4	-21°41.9	300°00.6	-15°14.6	245°03.2	-22°21.0
19	178°09.9	66°58.5	23°58.9	228°35.2	-21°41.9	315°03.3	-15°14.5	260°05.8	-22°21.0
20	193°12.4	81°57.7	23°58.6	243°37.0	-21°41.9	330°06.1	-15°14.4	275°08.4	-22°21.0
21	208°14.9	96°57.0	23°58.2	258°38.7	-21°41.9	345°08.8	-15°14.4	290°11.1	-22°21.0
22	223°17.3	111°56.3	23°57.8	273°40.5	-21°41.9	0°11.5	-15°14.3	305°13.7	-22°21.0
23	238°19.8	126°55.5	23°57.4	288°42.3	-21°41.9	15°14.2	-15°14.2	320°16.3	-22°21.1
Mer.pass.:7:09:		v-0.7 d-0.4 m-3.9		v1.8 d0.0 m-1.3		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.1	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	253°22.3	141°54.8	23°57.0	303°44.1	-21°41.9	30°16.9	-15°14.2	335°19.0	-22°21.1
1	268°24.7	156°54.1	23°56.6	318°45.9	-21°41.9	45°19.6	-15°14.1	350°21.6	-22°21.1
2	283°27.2	171°53.3	23°56.2	333°47.6	-21°41.9	60°22.3	-15°14.1	5°24.3	-22°21.1
3	298°29.7	186°52.6	23°55.8	348°49.4	-21°41.9	75°25.0	-15°14.0	20°26.9	-22°21.1
4	313°32.1	201°51.9	23°55.4	3°51.2	-21°41.9	90°27.7	-15°13.9	35°29.5	-22°21.1
5	328°34.6	216°51.2	23°55.0	18°53.0	-21°41.9	105°30.4	-15°13.9	50°32.2	-22°21.1
6	343°37.0	231°50.4	23°54.6	33°54.8	-21°41.9	120°33.1	-15°13.8	65°34.8	-22°21.1
7	358°39.5	246°49.7	23°54.2	48°56.6	-21°41.9	135°35.9	-15°13.7	80°37.5	-22°21.1
8	13°42.0	261°49.0	23°53.8	63°58.4	-21°41.9	150°38.6	-15°13.7	95°40.1	-22°21.2
9	28°44.4	276°48.3	23°53.4	79°00.2	-21°42.0	165°41.3	-15°13.6	110°42.7	-22°21.2
10	43°46.9	291°47.5	23°53.0	94°02.0	-21°42.0	180°44.0	-15°13.6	125°45.4	-22°21.2
11	58°49.4	306°46.8	23°52.6	109°03.8	-21°42.0	195°46.7	-15°13.5	140°48.0	-22°21.2
12	73°51.8	321°46.1	23°52.1	124°05.5	-21°42.0	210°49.4	-15°13.4	155°50.6	-22°21.2
13	88°54.3	336°45.4	23°51.7	139°07.3	-21°42.0	225°52.1	-15°13.4	170°53.3	-22°21.2
14	103°56.8	351°44.6	23°51.3	154°09.1	-21°42.0	240°54.8	-15°13.3	185°55.9	-22°21.2
15	118°59.2	6°43.9	23°50.9	169°10.9	-21°42.0	255°57.5	-15°13.2	200°58.6	-22°21.2
16	134°01.7	21°43.2	23°50.5	184°12.7	-21°42.0	271°00.2	-15°13.2	216°01.2	-22°21.2
17	149°04.1	36°42.5	23°50.1	199°14.5	-21°42.0	286°02.9	-15°13.1	231°03.8	-22°21.3
18	164°06.6	51°41.8	23°49.7	214°16.3	-21°42.0	301°05.6	-15°13.1	246°06.5	-22°21.3
19	179°09.1	66°41.0	23°49.2	229°18.1	-21°42.0	316°08.3	-15°13.0	261°09.1	-22°21.3
20	194°11.5	81°40.3	23°48.8	244°19.9	-21°42.0	331°11.0	-15°12.9	276°11.8	-22°21.3
21	209°14.0	96°39.6	23°48.4	259°21.7	-21°42.0	346°13.7	-15°12.9	291°14.4	-22°21.3
22	224°16.5	111°38.9	23°48.0	274°23.5	-21°42.0	1°16.4	-15°12.8	306°17.0	-22°21.3
23	239°18.9	126°38.2	23°47.6	289°25.3	-21°42.0	16°19.1	-15°12.8	321°19.7	-22°21.3
Mer.pass.:7:05:		v-0.7 d-0.4 m-3.9		v1.8 d-0.0 m-1.4		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°40.1	29°11.3
Ankaa	353°12.6	-42°12.3
Schedar	349°36.9	56°37.9
Diphda	348°52.6	-17°53.2
Achernar	335°24.8	-57°08.5
Hamal	327°57.3	23°32.7
Polaris	316°41.8	89°20.2
Akamar	315°16.2	-40°14.0
Menkar	314°11.8	4°09.5
Mirfak	308°36.0	49°55.3
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.8
Bellatrix	278°28.7	6°21.7
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.6
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.6
Sirius	258°31.0	-16°44.5
Adara	255°10.2	-29°00.1
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.0	-59°34.4
Suhail	222°50.2	-43°30.7
Miaplacidus	221°39.4	-69°47.9
Alphard	217°52.9	-8°44.4
Regulus	207°40.0	11°52.7
Dubhe	193°47.6	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.7	-17°38.7
Acrux	173°05.2	-63°12.2
Gacrux	171°56.8	-57°13.1
Alioth	166°17.5	55°51.9
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.6
Hadar	148°42.5	-60°27.7
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.5	-60°54.6
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.1	74°05.1
Alphecca	126°07.8	26°39.4
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.4
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°33.0
Etamin	90°44.0	51°29.2
Kaus Aust.	83°39.0	-34°22.3
Vega	80°36.3	38°48.0
Nunki	75°53.9	-26°16.2
Altair	62°04.8	8°55.0
Peacock	53°13.6	-56°40.2
Deneb	49°28.9	45°20.6
Enif	33°43.7	9°57.5
Alnair	27°39.5	-46°52.1
Fomalhaut	15°20.4	-29°31.4
Scheat	13°50.2	28°10.7
Markab	13°35.0	15°18.1

2018/6/3	**SHA**	**Mer.pass**
Venus	251°06.4	14:31
Mars	50°55.7	03:50
Jupiter	136°42.6	22:04
Saturn	81°48.5	01:47

2018/6/4	**SHA**	**Mer.pass**
Venus	249°49.3	14:32
Mars	50°38.5	03:47
Jupiter	136°48.7	21:59
Saturn	81°52.6	01:43

2018/6/5	**SHA**	**Mer.pass**
Venus	248°32.5	14:33
Mars	50°21.8	03:45
Jupiter	136°54.6	21:55
Saturn	81°56.7	01:38

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°29.1	22°16.6	308°22.8	12.4	-19°24.3	3.8	54.1
1	195°29.0	22°16.9	322°54.2	12.4	-19°20.4	3.9	54.1
2	210°28.9	22°17.2	337°25.6	12.4	-19°16.4	4.0	54.1
3	225°28.8	22°17.5	351°57.0	12.4	-19°12.4	4.1	54.1
4	240°28.7	22°17.8	6°28.5	12.5	-19°08.3	4.2	54.1
5	255°28.6	22°18.1	20°59.9	12.5	-19°04.1	4.3	54.1
6	270°28.5	22°18.4	35°31.4	12.5	-18°59.8	4.3	54.1
7	285°28.4	22°18.7	50°03.0	12.5	-18°55.4	4.4	54.1
8	300°28.3	22°19.0	64°34.5	12.6	-18°50.9	4.5	54.1
9	315°28.2	22°19.3	79°06.1	12.6	-18°46.4	4.6	54.1
10	330°28.1	22°19.6	93°37.7	12.6	-18°41.7	4.7	54.1
11	345°28.0	22°19.9	108°09.4	12.7	-18°37.0	4.8	54.1
12	0°27.9	22°20.2	122°41.0	12.7	-18°32.2	4.8	54.1
13	15°27.8	22°20.5	137°12.7	12.7	-18°27.3	4.9	54.1
14	30°27.7	22°20.8	151°44.4	12.7	-18°22.3	5.0	54.2
15	45°27.6	22°21.1	166°16.2	12.8	-18°17.3	5.1	54.2
16	60°27.5	22°21.4	180°48.0	12.8	-18°12.1	5.2	54.2
17	75°27.4	22°21.7	195°19.8	12.8	-18°06.9	5.3	54.2
18	90°27.3	22°22.0	209°51.6	12.8	-18°01.6	5.3	54.2
19	105°27.2	22°22.3	224°23.4	12.9	-17°56.2	5.4	54.2
20	120°27.1	22°22.6	238°55.3	12.9	-17°50.8	5.5	54.2
21	135°27.0	22°22.9	253°27.2	12.9	-17°45.2	5.6	54.2
22	150°26.9	22°23.2	267°59.1	12.9	-17°39.6	5.7	54.2
23	165°26.8	22°23.5	282°31.1	13.0	-17°33.9	5.7	54.2
	SD.=15.8	d=0.3	S.D.=14.8				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°26.6	22°23.8	297°03.1	13.0	-17°28.1	5.8	54.2
1	195°26.5	22°24.1	311°35.1	13.0	-17°22.3	5.9	54.2
2	210°26.4	22°24.4	326°07.1	13.0	-17°16.4	6.0	54.2
3	225°26.3	22°24.7	340°39.2	13.1	-17°10.3	6.1	54.2
4	240°26.2	22°25.0	355°11.2	13.1	-17°04.3	6.1	54.2
5	255°26.1	22°25.3	9°43.4	13.1	-16°58.1	6.2	54.3
6	270°26.0	22°25.6	24°15.5	13.1	-16°51.8	6.3	54.3
7	285°25.9	22°25.9	38°47.7	13.2	-16°45.5	6.4	54.3
8	300°25.8	22°26.2	53°19.8	13.2	-16°39.1	6.4	54.3
9	315°25.7	22°26.5	67°52.0	13.2	-16°32.7	6.5	54.3
10	330°25.6	22°26.7	82°24.3	13.2	-16°26.1	6.6	54.3
11	345°25.5	22°27.0	96°56.5	13.3	-16°19.5	6.7	54.3
12	0°25.4	22°27.3	111°28.8	13.3	-16°12.8	6.7	54.3
13	15°25.3	22°27.6	126°01.1	13.3	-16°06.0	6.8	54.3
14	30°25.2	22°27.9	140°33.5	13.3	-15°59.2	6.9	54.4
15	45°25.0	22°28.2	155°05.8	13.4	-15°52.3	6.9	54.4
16	60°24.9	22°28.5	169°38.2	13.4	-15°45.3	7.0	54.4
17	75°24.8	22°28.7	184°10.6	13.4	-15°38.3	7.1	54.4
18	90°24.7	22°29.0	198°43.0	13.4	-15°31.1	7.2	54.4
19	105°24.6	22°29.3	213°15.5	13.5	-15°24.0	7.2	54.4
20	120°24.5	22°29.6	227°47.9	13.5	-15°16.7	7.3	54.4
21	135°24.4	22°29.9	242°20.4	13.5	-15°09.4	7.4	54.4
22	150°24.3	22°30.2	256°52.9	13.5	-15°02.0	7.4	54.5
23	165°24.2	22°30.4	271°25.5	13.5	-14°54.5	7.5	54.5
	SD.=15.8	d=0.3	S.D.=14.8				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°24.1	22°30.7	285°58.0	13.6	-14°46.9	7.6	54.5
1	195°24.0	22°31.0	300°30.6	13.6	-14°39.3	7.6	54.5
2	210°23.9	22°31.3	315°03.2	13.6	-14°31.7	7.7	54.5
3	225°23.7	22°31.5	329°35.8	13.6	-14°23.9	7.8	54.5
4	240°23.6	22°31.8	344°08.4	13.6	-14°16.1	7.8	54.5
5	255°23.5	22°32.1	358°41.1	13.7	-14°08.3	7.9	54.6
6	270°23.4	22°32.4	13°13.8	13.7	-14°00.3	8.0	54.6
7	285°23.3	22°32.7	27°46.5	13.7	-13°52.3	8.0	54.6
8	300°23.2	22°32.9	42°19.2	13.7	-13°44.3	8.1	54.6
9	315°23.1	22°33.2	56°51.9	13.7	-13°36.1	8.2	54.6
10	330°23.0	22°33.5	71°24.6	13.8	-13°27.9	8.2	54.6
11	345°22.9	22°33.7	85°57.4	13.8	-13°19.7	8.3	54.7
12	0°22.8	22°34.0	100°30.2	13.8	-13°11.4	8.3	54.7
13	15°22.6	22°34.3	115°03.0	13.8	-13°03.0	8.4	54.7
14	30°22.5	22°34.6	129°35.8	13.8	-12°54.5	8.5	54.7
15	45°22.4	22°34.8	144°08.6	13.8	-12°46.0	8.5	54.7
16	60°22.3	22°35.1	158°41.4	13.8	-12°37.5	8.6	54.7
17	75°22.2	22°35.4	173°14.3	13.9	-12°28.9	8.7	54.8
18	90°22.1	22°35.6	187°47.2	13.9	-12°20.2	8.7	54.8
19	105°22.0	22°35.9	202°20.0	13.9	-12°11.4	8.8	54.8
20	120°21.9	22°36.2	216°52.9	13.9	-12°02.6	8.8	54.8
21	135°21.7	22°36.4	231°25.8	13.9	-11°53.8	8.9	54.8
22	150°21.6	22°36.7	245°58.7	13.9	-11°44.9	8.9	54.9
23	165°21.5	22°36.9	260°31.7	13.9	-11°35.9	9.0	54.9
	SD.=15.8	d=0.3	S.D.=14.9				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	00:60	23:01	–:–	–:–
64	–:–	–:–	01:51	22:07	–:–	–:–
62	–:–	–:–	02:22	21:36	–:–	–:–
60	–:–	01:18	02:45	21:12	22:41	–:–
58	–:–	01:55	03:04	20:54	22:03	–:–
56	–:–	02:21	03:19	20:38	21:37	–:–
54	01:11	02:40	03:32	20:25	21:17	22:48
52	01:45	02:57	03:44	20:13	21:01	22:13
50	02:09	03:11	03:54	20:03	20:46	21:49
45	02:51	03:39	04:15	19:42	20:18	21:07
40	03:19	03:60	04:32	19:25	19:57	20:38
35	03:41	04:17	04:47	19:10	19:40	20:16
30	03:59	04:32	04:59	18:58	19:25	19:58
20	04:27	04:55	05:20	18:37	19:01	19:30
10	04:48	05:15	05:38	18:19	18:42	19:09
0	05:06	05:32	05:55	18:02	18:24	18:50
-10	05:22	05:49	06:11	17:45	18:08	18:34
-20	05:38	06:05	06:29	17:28	17:51	18:19
-30	05:53	06:23	06:49	17:07	17:33	18:03
-35	06:02	06:33	07:01	16:56	17:23	17:55
-40	06:10	06:44	07:14	16:42	17:12	17:46
-45	06:20	06:57	07:30	16:26	16:60	17:36
-50	06:31	07:12	07:50	16:07	16:44	17:25
-52	06:36	07:19	07:59	15:57	16:37	17:21
-54	06:41	07:27	08:09	15:47	16:30	17:15
-56	06:47	07:35	08:21	15:35	16:21	17:10
-58	06:53	07:45	08:35	15:21	16:12	17:03
-60	06:60	07:55	08:51	15:05	16:01	16:56

	Moonrise			**Moonset**		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	03:09	02:33	–:–	05:42	07:53
70	02:29	02:12	02:03	04:44	06:38	08:22
68	01:32	01:38	01:41	05:41	07:11	08:43
66	00:58	01:14	01:23	06:15	07:35	08:60
64	00:33	00:54	01:09	06:39	07:54	09:13
62	00:14	00:38	00:57	06:58	08:09	09:25
60	–:–	00:25	00:46	07:14	08:22	09:34
58	–:–	00:14	00:37	07:27	08:33	09:43
56	–:–	00:04	00:29	07:38	08:43	09:50
54	23:55	–:–	00:22	07:48	08:51	09:57
52	23:47	–:–	00:16	07:57	08:58	10:02
50	23:40	–:–	00:10	08:05	09:05	10:08
45	23:25	23:58	–:–	08:22	09:20	10:19
40	23:12	23:48	–:–	08:36	09:31	10:29
35	23:02	23:39	–:–	08:48	09:42	10:37
30	22:52	23:31	–:–	08:58	09:50	10:44
20	22:36	23:17	23:57	09:15	10:06	10:56
10	22:22	23:06	23:48	09:30	10:19	11:06
0	22:09	22:55	23:39	09:45	10:31	11:16
-10	21:55	22:43	23:31	09:59	10:43	11:26
-20	21:41	22:32	23:22	10:14	10:56	11:37
-30	21:25	22:18	23:12	10:31	11:11	11:48
-35	21:15	22:10	23:06	10:41	11:20	11:55
-40	21:05	22:01	22:59	10:52	11:29	12:03
-45	20:52	21:50	22:51	11:06	11:41	12:12
-50	20:36	21:37	22:41	11:22	11:54	12:23
-52	20:29	21:31	22:37	11:30	12:01	12:28
-54	20:21	21:25	22:32	11:38	12:08	12:33
-56	20:12	21:17	22:26	11:47	12:16	12:39
-58	20:01	21:09	22:20	11:58	12:25	12:46
-60	19:49	20:60	22:13	12:11	12:35	12:54

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
3	01:57	01:52	11:58	03:33	15:56	19(80%)
4	01:47	01:41	11:58	04:19	16:42	20(71%)
5	01:36	01:31	11:58	05:05	17:27	21(62%)

June 06, 07 ,08 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	254°21.4	141°37.4	23°47.1	304°27.1	-21°42.1	31°21.9	-15°12.7	336°22.3	-22°21.3
1	269°23.9	156°36.7	23°46.7	319°29.0	-21°42.1	46°24.6	-15°12.6	351°25.0	-22°21.3
2	284°26.3	171°36.0	23°46.3	334°30.8	-21°42.1	61°27.3	-15°12.6	6°27.6	-22°21.3
3	299°28.8	186°35.3	23°45.9	349°32.6	-21°42.1	76°30.0	-15°12.5	21°30.2	-22°21.4
4	314°31.3	201°34.6	23°45.4	4°34.4	-21°42.1	91°32.7	-15°12.4	36°32.9	-22°21.4
5	329°33.7	216°33.9	23°45.0	19°36.2	-21°42.1	106°35.4	-15°12.4	51°35.5	-22°21.4
6	344°36.2	231°33.1	23°44.6	34°38.0	-21°42.1	121°38.1	-15°12.3	66°38.2	-22°21.4
7	359°38.6	246°32.4	23°44.2	49°39.8	-21°42.1	136°40.8	-15°12.3	81°40.8	-22°21.4
8	14°41.1	261°31.7	23°43.7	64°41.6	-21°42.1	151°43.5	-15°12.2	96°43.4	-22°21.4
9	29°43.6	276°31.0	23°43.3	79°43.4	-21°42.1	166°46.2	-15°12.1	111°46.1	-22°21.4
10	44°46.0	291°30.3	23°42.9	94°45.3	-21°42.2	181°48.9	-15°12.1	126°48.7	-22°21.4
11	59°48.5	306°29.6	23°42.4	109°47.1	-21°42.2	196°51.6	-15°12.0	141°51.4	-22°21.4
12	74°51.0	321°28.9	23°42.0	124°48.9	-21°42.2	211°54.3	-15°12.0	156°54.0	-22°21.5
13	89°53.4	336°28.1	23°41.5	139°50.7	-21°42.2	226°57.0	-15°11.9	171°56.6	-22°21.5
14	104°55.9	351°27.4	23°41.1	154°52.5	-21°42.2	241°59.7	-15°11.8	186°59.3	-22°21.5
15	119°58.4	6°26.7	23°40.7	169°54.4	-21°42.2	257°02.4	-15°11.8	202°01.9	-22°21.5
16	135°00.8	21°26.0	23°40.2	184°56.2	-21°42.2	272°05.1	-15°11.7	217°04.6	-22°21.5
17	150°03.3	36°25.3	23°39.8	199°58.0	-21°42.2	287°07.8	-15°11.7	232°07.2	-22°21.5
18	165°05.8	51°24.6	23°39.3	214°59.8	-21°42.3	302°10.5	-15°11.6	247°09.8	-22°21.5
19	180°08.2	66°23.9	23°38.9	230°01.7	-21°42.3	317°13.2	-15°11.5	262°12.5	-22°21.5
20	195°10.7	81°23.2	23°38.5	245°03.5	-21°42.3	332°15.9	-15°11.5	277°15.1	-22°21.5
21	210°13.1	96°22.5	23°38.0	260°05.3	-21°42.3	347°18.6	-15°11.4	292°17.8	-22°21.6
22	225°15.6	111°21.8	23°37.6	275°07.1	-21°42.3	2°21.3	-15°11.4	307°20.4	-22°21.6
23	240°18.1	126°21.1	23°37.1	290°09.0	-21°42.3	17°24.0	-15°11.3	322°23.1	-22°21.6
Mer.pass.:7:01:		v-0.7 d-0.4 m-3.9		v1.8 d-0.0 m-1.4		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.1	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	255°20.5	141°20.4	23°36.7	305°10.8	-21°42.4	32°26.7	-15°11.2	337°25.7	-22°21.6
1	270°23.0	156°19.6	23°36.2	320°12.6	-21°42.4	47°29.4	-15°11.2	352°28.3	-22°21.6
2	285°25.5	171°18.9	23°35.8	335°14.5	-21°42.4	62°32.1	-15°11.1	7°31.0	-22°21.6
3	300°27.9	186°18.2	23°35.3	350°16.3	-21°42.4	77°34.8	-15°11.1	22°33.6	-22°21.6
4	315°30.4	201°17.5	23°34.9	5°18.1	-21°42.4	92°37.5	-15°11.0	37°36.3	-22°21.6
5	330°32.9	216°16.8	23°34.4	20°20.0	-21°42.4	107°40.2	-15°10.9	52°38.9	-22°21.6
6	345°35.3	231°16.1	23°33.9	35°21.8	-21°42.5	122°42.9	-15°10.9	67°41.5	-22°21.7
7	0°37.8	246°15.4	23°33.5	50°23.6	-21°42.5	137°45.6	-15°10.8	82°44.2	-22°21.7
8	15°40.2	261°14.7	23°33.0	65°25.5	-21°42.5	152°48.3	-15°10.8	97°46.8	-22°21.7
9	30°42.7	276°14.0	23°32.6	80°27.3	-21°42.5	167°51.0	-15°10.7	112°49.5	-22°21.7
10	45°45.2	291°13.3	23°32.1	95°29.2	-21°42.5	182°53.7	-15°10.6	127°52.1	-22°21.7
11	60°47.6	306°12.6	23°31.6	110°31.0	-21°42.5	197°56.4	-15°10.6	142°54.8	-22°21.7
12	75°50.1	321°11.9	23°31.2	125°32.8	-21°42.6	212°59.1	-15°10.5	157°57.4	-22°21.7
13	90°52.6	336°11.2	23°30.7	140°34.7	-21°42.6	228°01.7	-15°10.5	173°00.0	-22°21.7
14	105°55.0	351°10.5	23°30.3	155°36.5	-21°42.6	243°04.4	-15°10.4	188°02.7	-22°21.7
15	120°57.5	6°09.8	23°29.8	170°38.4	-21°42.6	258°07.1	-15°10.3	203°05.3	-22°21.8
16	135°60.0	21°09.1	23°29.3	185°40.2	-21°42.6	273°09.8	-15°10.3	218°08.0	-22°21.8
17	151°02.4	36°08.4	23°28.9	200°42.1	-21°42.7	288°12.5	-15°10.2	233°10.6	-22°21.8
18	166°04.9	51°07.7	23°28.4	215°43.9	-21°42.7	303°15.2	-15°10.2	248°13.3	-22°21.8
19	181°07.4	66°07.0	23°27.9	230°45.8	-21°42.7	318°17.9	-15°10.1	263°15.9	-22°21.8
20	196°09.8	81°06.3	23°27.4	245°47.6	-21°42.7	333°20.6	-15°10.0	278°18.5	-22°21.8
21	211°12.3	96°05.6	23°27.0	260°49.5	-21°42.8	348°23.3	-15°10.0	293°21.2	-22°21.8
22	226°14.7	111°05.0	23°26.5	275°51.3	-21°42.8	3°26.0	-15°09.9	308°23.8	-22°21.8
23	241°17.2	126°04.3	23°26.0	290°53.2	-21°42.8	18°28.7	-15°09.9	323°26.5	-22°21.8
Mer.pass.:6:57:		v-0.7 d-0.5 m-3.9		v1.8 d-0.0 m-1.4		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.1	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	256°19.7	141°03.6	23°25.5	305°55.0	-21°42.8	33°31.4	-15°09.8	338°29.1	-22°21.9
1	271°22.1	156°02.9	23°25.1	320°56.9	-21°42.8	48°34.1	-15°09.8	353°31.8	-22°21.9
2	286°24.6	171°02.2	23°24.6	335°58.8	-21°42.9	63°36.8	-15°09.7	8°34.4	-22°21.9
3	301°27.1	186°01.5	23°24.1	351°00.6	-21°42.9	78°39.5	-15°09.6	23°37.1	-22°21.9
4	316°29.5	201°00.8	23°23.6	6°02.5	-21°42.9	93°42.2	-15°09.6	38°39.7	-22°21.9
5	331°32.0	216°00.1	23°23.2	21°04.3	-21°42.9	108°44.8	-15°09.5	53°42.3	-22°21.9
6	346°34.5	230°59.4	23°22.7	36°06.2	-21°43.0	123°47.5	-15°09.5	68°45.0	-22°21.9
7	1°36.9	245°58.7	23°22.2	51°08.1	-21°43.0	138°50.2	-15°09.4	83°47.6	-22°21.9
8	16°39.4	260°58.0	23°21.7	66°09.9	-21°43.0	153°52.9	-15°09.4	98°50.3	-22°21.9
9	31°41.9	275°57.3	23°21.2	81°11.8	-21°43.0	168°55.6	-15°09.3	113°52.9	-22°22.0
10	46°44.3	290°56.7	23°20.7	96°13.7	-21°43.1	183°58.3	-15°09.2	128°55.6	-22°22.0
11	61°46.8	305°56.0	23°20.2	111°15.5	-21°43.1	199°01.0	-15°09.2	143°58.2	-22°22.0
12	76°49.2	320°55.3	23°19.8	126°17.4	-21°43.1	214°03.7	-15°09.1	159°00.9	-22°22.0
13	91°51.7	335°54.6	23°19.3	141°19.3	-21°43.2	229°06.4	-15°09.1	174°03.5	-22°22.0
14	106°54.2	350°53.9	23°18.8	156°21.1	-21°43.2	244°09.1	-15°09.0	189°06.1	-22°22.0
15	121°56.6	5°53.2	23°18.3	171°23.0	-21°43.2	259°11.8	-15°08.9	204°08.8	-22°22.0
16	136°59.1	20°52.5	23°17.8	186°24.9	-21°43.2	274°14.4	-15°08.9	219°11.4	-22°22.0
17	152°01.6	35°51.9	23°17.3	201°26.7	-21°43.3	289°17.1	-15°08.8	234°14.1	-22°22.0
18	167°04.0	50°51.2	23°16.8	216°28.6	-21°43.3	304°19.8	-15°08.8	249°16.7	-22°22.1
19	182°06.5	65°50.5	23°16.3	231°30.5	-21°43.3	319°22.5	-15°08.7	264°19.4	-22°22.1
20	197°09.0	80°49.8	23°15.8	246°32.4	-21°43.4	334°25.2	-15°08.7	279°22.0	-22°22.1
21	212°11.4	95°49.1	23°15.3	261°34.3	-21°43.4	349°27.9	-15°08.6	294°24.7	-22°22.1
22	227°13.9	110°48.4	23°14.8	276°36.1	-21°43.4	4°30.6	-15°08.5	309°27.3	-22°22.1
23	242°16.3	125°47.8	23°14.3	291°38.0	-21°43.4	19°33.3	-15°08.5	324°30.0	-22°22.1
Mer.pass.:6:53:		v-0.7 d-0.5 m-3.9		v1.9 d-0.0 m-1.5		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°40.1	29°11.3
Ankaa	353°12.6	-42°12.3
Schedar	349°36.9	56°37.9
Diphda	348°52.6	-17°53.2
Achernar	335°24.7	-57°08.5
Hamal	327°57.2	23°32.7
Polaris	316°41.0	89°20.2
Akamar	315°16.2	-40°13.9
Menkar	314°11.8	4°09.5
Mirfak	308°36.0	49°55.2
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.1
Capella	280°30.0	46°00.8
Bellatrix	278°28.7	6°21.8
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.6
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.6
Sirius	258°31.0	-16°44.5
Adara	255°10.2	-29°00.1
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.1	-59°34.4
Suhail	222°50.2	-43°30.7
Miaplacidus	221°39.4	-69°47.9
Alphard	217°52.9	-8°44.4
Regulus	207°40.0	11°52.7
Dubhe	193°47.7	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.7	-17°38.7
Acrux	173°05.2	-63°12.3
Gacrux	171°56.9	-57°13.1
Alioth	166°17.6	55°51.9
Spica	158°27.5	-11°15.4
Alcaid	152°55.9	49°13.6
Hadar	148°42.6	-60°27.8
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.5	-60°54.7
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.2	74°05.1
Alphecca	126°07.8	26°39.4
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.4
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°33.0
Etamin	90°44.0	51°29.3
Kaus Aust.	83°39.0	-34°22.3
Vega	80°36.3	38°48.0
Nunki	75°53.8	-26°16.2
Altair	62°04.8	8°55.0
Peacock	53°13.6	-56°40.2
Deneb	49°28.9	45°20.6
Enif	33°43.7	9°57.5
Alnair	27°39.5	-46°52.1
Fomalhaut	15°20.4	-29°31.4
Scheat	13°50.1	28°10.7
Markab	13°35.0	15°18.1

2018/6/6	**SHA**	**Mer.pass**
Venus	247°16.0	14:34
Mars	50°05.8	03:42
Jupiter	137°00.5	21:51
Saturn	82°00.9	01:34

2018/6/7	**SHA**	**Mer.pass**
Venus	245°59.8	14:35
Mars	49°50.3	03:39
Jupiter	137°06.1	21:46
Saturn	82°05.2	01:30

2018/6/8	**SHA**	**Mer.pass**
Venus	244°43.9	14:36
Mars	49°35.4	03:36
Jupiter	137°11.7	21:42
Saturn	82°09.4	01:26

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°21.4	22°37.2	275°04.6	13.9	-11°26.9	9.1	54.9
1	195°21.3	22°37.5	289°37.6	13.9	-11°17.8	9.1	54.9
2	210°21.2	22°37.7	304°10.5	14.0	-11°08.6	9.2	54.9
3	225°21.1	22°38.0	318°43.5	14.0	-10°59.4	9.2	55.0
4	240°21.0	22°38.3	333°16.4	14.0	-10°50.2	9.3	55.0
5	255°20.8	22°38.5	347°49.4	14.0	-10°40.9	9.3	55.0
6	270°20.7	22°38.8	2°22.4	14.0	-10°31.5	9.4	55.0
7	285°20.6	22°39.0	16°55.4	14.0	-10°22.1	9.4	55.1
8	300°20.5	22°39.3	31°28.4	14.0	-10°12.7	9.5	55.1
9	315°20.4	22°39.5	46°01.4	14.0	-10°03.1	9.5	55.1
10	330°20.3	22°39.8	60°34.4	14.0	-9°53.6	9.6	55.1
11	345°20.2	22°40.1	75°07.4	14.0	-9°44.0	9.6	55.2
12	0°20.1	22°40.3	89°40.4	14.0	-9°34.3	9.7	55.2
13	15°19.9	22°40.6	104°13.4	14.0	-9°24.6	9.7	55.2
14	30°19.8	22°40.8	118°46.4	14.0	-9°14.8	9.8	55.2
15	45°19.7	22°41.1	133°19.5	14.0	-9°05.0	9.8	55.2
16	60°19.6	22°41.3	147°52.5	14.0	-8°55.1	9.9	55.3
17	75°19.5	22°41.6	162°25.5	14.0	-8°45.2	9.9	55.3
18	90°19.4	22°41.8	176°58.5	14.0	-8°35.3	10.0	55.3
19	105°19.2	22°42.1	191°31.5	14.0	-8°25.3	10.0	55.4
20	120°19.1	22°42.3	206°04.5	14.0	-8°15.2	10.1	55.4
21	135°19.0	22°42.6	220°37.5	14.0	-8°05.1	10.1	55.4
22	150°18.9	22°42.8	235°10.5	14.0	-7°55.0	10.2	55.4
23	165°18.8	22°43.1	249°43.5	14.0	-7°44.8	10.2	55.5
	SD.=15.8	d=0.3	S.D.=15.0				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°18.7	22°43.3	264°16.5	14.0	-7°34.6	10.2	55.5
1	195°18.6	22°43.6	278°49.5	14.0	-7°24.3	10.3	55.5
2	210°18.4	22°43.8	293°22.5	14.0	-7°14.0	10.3	55.5
3	225°18.3	22°44.0	307°55.5	14.0	-7°03.6	10.4	55.6
4	240°18.2	22°44.3	322°28.4	14.0	-6°53.2	10.4	55.6
5	255°18.1	22°44.5	337°01.4	14.0	-6°42.8	10.5	55.6
6	270°18.0	22°44.8	351°34.3	13.9	-6°32.3	10.5	55.7
7	285°17.9	22°45.0	6°07.3	13.9	-6°21.8	10.5	55.7
8	300°17.7	22°45.2	20°40.2	13.9	-6°11.2	10.6	55.7
9	315°17.6	22°45.5	35°13.1	13.9	-6°00.6	10.6	55.7
10	330°17.5	22°45.7	49°46.0	13.9	-5°50.0	10.7	55.8
11	345°17.4	22°46.0	64°18.9	13.9	-5°39.3	10.7	55.8
12	0°17.3	22°46.2	78°51.8	13.9	-5°28.6	10.7	55.8
13	15°17.2	22°46.4	93°24.6	13.9	-5°17.9	10.8	55.9
14	30°17.0	22°46.7	107°57.5	13.8	-5°07.1	10.8	55.9
15	45°16.9	22°46.9	122°30.3	13.8	-4°56.3	10.8	55.9
16	60°16.8	22°47.1	137°03.1	13.8	-4°45.4	10.9	56.0
17	75°16.7	22°47.4	151°35.9	13.8	-4°34.6	10.9	56.0
18	90°16.6	22°47.6	166°08.7	13.8	-4°23.6	10.9	56.0
19	105°16.4	22°47.8	180°41.4	13.7	-4°12.7	11.0	56.1
20	120°16.3	22°48.1	195°14.2	13.7	-4°01.7	11.0	56.1
21	135°16.2	22°48.3	209°46.9	13.7	-3°50.7	11.0	56.1
22	150°16.1	22°48.5	224°19.6	13.7	-3°39.7	11.1	56.1
23	165°16.0	22°48.8	238°52.2	13.7	-3°28.6	11.1	56.2
	SD.=15.8	d=0.2	S.D.=15.1				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°15.8	22°49.0	253°24.9	13.6	-3°17.5	11.1	56.2
1	195°15.7	22°49.2	267°57.5	13.6	-3°06.4	11.1	56.2
2	210°15.6	22°49.5	282°30.1	13.6	-2°55.2	11.2	56.3
3	225°15.5	22°49.7	297°02.6	13.5	-2°44.0	11.2	56.3
4	240°15.4	22°49.9	311°35.1	13.5	-2°32.8	11.2	56.3
5	255°15.3	22°50.1	326°07.7	13.5	-2°21.6	11.2	56.4
6	270°15.1	22°50.4	340°40.1	13.5	-2°10.3	11.3	56.4
7	285°15.0	22°50.6	355°12.6	13.4	-1°59.0	11.3	56.4
8	300°14.9	22°50.8	9°45.0	13.4	-1°47.7	11.3	56.5
9	315°14.8	22°51.0	24°17.4	13.4	-1°36.4	11.3	56.5
10	330°14.7	22°51.3	38°49.7	13.3	-1°25.0	11.4	56.6
11	345°14.5	22°51.5	53°22.0	13.3	-1°13.7	11.4	56.6
12	0°14.4	22°51.7	67°54.3	13.3	-1°02.3	11.4	56.6
13	15°14.3	22°51.9	82°26.6	13.2	-0°50.9	11.4	56.7
14	30°14.2	22°52.1	96°58.8	13.2	-0°39.4	11.4	56.7
15	45°14.0	22°52.4	111°30.9	13.2	-0°28.0	11.5	56.7
16	60°13.9	22°52.6	126°03.1	13.1	-0°16.5	11.5	56.8
17	75°13.8	22°52.8	140°35.2	13.1	-0°05.0	11.5	56.8
18	90°13.7	22°53.0	155°07.2	13.0	0°06.5	11.5	56.8
19	105°13.6	22°53.2	169°39.2	13.0	0°18.0	11.5	56.9
20	120°13.4	22°53.4	184°11.2	13.0	0°29.5	11.5	56.9
21	135°13.3	22°53.7	198°43.1	12.9	0°41.1	11.5	56.9
22	150°13.2	22°53.9	213°15.0	12.9	0°52.6	11.6	57.0
23	165°13.1	22°54.1	227°46.9	12.8	1°04.2	11.6	57.0
	SD.=15.8	d=0.2	S.D.=15.3				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	00:46	23:17	–:–	–:–
64	–:–	–:–	01:45	22:15	–:–	–:–
62	–:–	–:–	02:18	21:41	–:–	–:–
60	–:–	01:10	02:42	21:17	22:50	–:–
58	–:–	01:50	03:01	20:57	22:09	–:–
56	–:–	02:17	03:17	20:41	21:42	–:–
54	01:04	02:38	03:30	20:28	21:21	22:56
52	01:41	02:54	03:42	20:16	21:04	22:18
50	02:06	03:09	03:52	20:06	20:49	21:53
45	02:49	03:37	04:14	19:44	20:21	21:10
40	03:18	03:59	04:31	19:27	19:59	20:40
35	03:40	04:16	04:46	19:12	19:41	20:18
30	03:58	04:31	04:58	18:59	19:27	19:60
20	04:26	04:55	05:20	18:38	19:02	19:31
10	04:48	05:15	05:38	18:20	18:43	19:09
0	05:07	05:33	05:55	18:02	18:25	18:51
-10	05:23	05:49	06:12	17:46	18:08	18:35
-20	05:39	06:06	06:30	17:28	17:51	18:19
-30	05:55	06:24	06:51	17:07	17:33	18:03
-35	06:03	06:35	07:03	16:55	17:23	17:55
-40	06:12	06:46	07:16	16:41	17:12	17:46
-45	06:22	06:59	07:32	16:25	16:59	17:36
-50	06:33	07:14	07:52	16:05	16:43	17:24
-52	06:38	07:21	08:02	15:56	16:36	17:19
-54	06:43	07:29	08:12	15:45	16:28	17:14
-56	06:49	07:38	08:25	15:33	16:20	17:08
-58	06:56	07:48	08:39	15:19	16:10	17:02
-60	07:03	07:59	08:55	15:02	15:59	16:55

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	02:14	01:60	01:48	09:45	11:33	13:20
70	01:56	01:49	01:44	10:02	11:41	13:21
68	01:41	01:41	01:40	10:15	11:48	13:22
66	01:29	01:34	01:37	10:26	11:53	13:23
64	01:19	01:28	01:35	10:35	11:58	13:24
62	01:11	01:22	01:33	10:42	12:02	13:24
60	01:03	01:18	01:31	10:49	12:06	13:25
58	00:57	01:14	01:29	10:55	12:09	13:25
56	00:51	01:10	01:28	10:60	12:12	13:26
54	00:46	01:07	01:26	11:04	12:14	13:26
52	00:41	01:04	01:25	11:08	12:16	13:26
50	00:37	01:01	01:24	11:12	12:18	13:27
45	00:28	00:55	01:22	11:20	12:23	13:27
40	00:20	00:50	01:20	11:27	12:27	13:28
35	00:13	00:46	01:18	11:33	12:30	13:28
30	00:07	00:42	01:16	11:38	12:33	13:29
20	–:–	00:35	01:14	11:46	12:37	13:30
10	–:–	00:30	01:11	11:54	12:42	13:30
0	–:–	00:24	01:09	12:01	12:45	13:31
-10	–:–	00:19	01:07	12:08	12:49	13:31
-20	–:–	00:13	01:04	12:15	12:53	13:32
-30	–:–	00:06	01:02	12:24	12:58	13:32
-35	–:–	00:02	01:00	12:29	13:01	13:33
-40	23:58	–:–	00:58	12:34	13:04	13:33
-45	23:53	–:–	00:56	12:40	13:07	13:34
-50	23:46	–:–	00:54	12:48	13:11	13:34
-52	23:44	–:–	00:53	12:51	13:13	13:34
-54	23:41	–:–	00:51	12:55	13:15	13:35
-56	23:37	–:–	00:50	12:59	13:17	13:35
-58	23:33	–:–	00:49	13:04	13:20	13:35
-60	23:29	–:–	00:47	13:09	13:23	13:35

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
6	01:26	01:20	11:58	05:50	18:12	22(53%)
7	01:15	01:09	11:58	06:34	18:57	23(43%)
8	01:03	00:58	11:59	07:19	19:42	24(33%)

June 09, 10 ,11 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	257°18.8	140°47.1	23°13.8	306°39.9	-21°43.5	34°36.0	-15°08.4	339°32.6	-22°22.1
1	272°21.3	155°46.4	23°13.3	321°41.8	-21°43.5	49°38.6	-15°08.4	354°35.2	-22°22.1
2	287°23.7	170°45.7	23°12.8	336°43.7	-21°43.5	64°41.3	-15°08.3	9°37.9	-22°22.1
3	302°26.2	185°45.0	23°12.3	351°45.5	-21°43.6	79°44.0	-15°08.3	24°40.5	-22°22.2
4	317°28.7	200°44.4	23°11.8	6°47.4	-21°43.6	94°46.7	-15°08.2	39°43.2	-22°22.2
5	332°31.1	215°43.7	23°11.3	21°49.3	-21°43.6	109°49.4	-15°08.2	54°45.8	-22°22.2
6	347°33.6	230°43.0	23°10.8	36°51.2	-21°43.7	124°52.1	-15°08.1	69°48.5	-22°22.2
7	2°36.1	245°42.3	23°10.3	51°53.1	-21°43.7	139°54.8	-15°08.0	84°51.1	-22°22.2
8	17°38.5	260°41.6	23°09.7	66°55.0	-21°43.7	154°57.4	-15°08.0	99°53.8	-22°22.2
9	32°41.0	275°41.0	23°09.2	81°56.9	-21°43.8	170°00.1	-15°07.9	114°56.4	-22°22.2
10	47°43.5	290°40.3	23°08.7	96°58.8	-21°43.8	185°02.8	-15°07.9	129°59.1	-22°22.2
11	62°45.9	305°39.6	23°08.2	112°00.7	-21°43.8	200°05.5	-15°07.8	145°01.7	-22°22.2
12	77°48.4	320°38.9	23°07.7	127°02.6	-21°43.9	215°08.2	-15°07.8	160°04.4	-22°22.3
13	92°50.8	335°38.3	23°07.2	142°04.4	-21°43.9	230°10.9	-15°07.7	175°07.0	-22°22.3
14	107°53.3	350°37.6	23°06.7	157°06.3	-21°43.9	245°13.6	-15°07.7	190°09.6	-22°22.3
15	122°55.8	5°36.9	23°06.1	172°08.2	-21°44.0	260°16.2	-15°07.6	205°12.3	-22°22.3
16	137°58.2	20°36.3	23°05.6	187°10.1	-21°44.0	275°18.9	-15°07.5	220°14.9	-22°22.3
17	153°00.7	35°35.6	23°05.1	202°12.0	-21°44.0	290°21.6	-15°07.5	235°17.6	-22°22.3
18	168°03.2	50°34.9	23°04.6	217°13.9	-21°44.1	305°24.3	-15°07.4	250°20.2	-22°22.3
19	183°05.6	65°34.2	23°04.1	232°15.8	-21°44.1	320°27.0	-15°07.4	265°22.9	-22°22.3
20	198°08.1	80°33.6	23°03.5	247°17.7	-21°44.1	335°29.7	-15°07.3	280°25.5	-22°22.3
21	213°10.6	95°32.9	23°03.0	262°19.6	-21°44.2	350°32.3	-15°07.3	295°28.2	-22°22.4
22	228°13.0	110°32.2	23°02.5	277°21.6	-21°44.2	5°35.0	-15°07.2	310°30.8	-22°22.4
23	243°15.5	125°31.6	23°02.0	292°23.5	-21°44.3	20°37.7	-15°07.2	325°33.5	-22°22.4
Mer.pass.:6:49:		v-0.7 d-0.5 m-3.9		v1.9 d-0.0 m-1.5		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.1	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	258°18.0	140°30.9	23°01.4	307°25.4	-21°44.3	35°40.4	-15°07.1	340°36.1	-22°22.4
1	273°20.4	155°30.2	23°00.9	322°27.3	-21°44.3	50°43.1	-15°07.0	355°38.8	-22°22.4
2	288°22.9	170°29.6	23°00.4	337°29.2	-21°44.4	65°45.7	-15°07.0	10°41.4	-22°22.4
3	303°25.3	185°28.9	22°59.8	352°31.1	-21°44.4	80°48.4	-15°06.9	25°44.1	-22°22.4
4	318°27.8	200°28.2	22°59.3	7°33.0	-21°44.5	95°51.1	-15°06.9	40°46.7	-22°22.4
5	333°30.3	215°27.6	22°58.8	22°34.9	-21°44.5	110°53.8	-15°06.8	55°49.4	-22°22.4
6	348°32.7	230°26.9	22°58.2	37°36.8	-21°44.5	125°56.5	-15°06.8	70°52.0	-22°22.5
7	3°35.2	245°26.2	22°57.7	52°38.7	-21°44.6	140°59.2	-15°06.7	85°54.7	-22°22.5
8	18°37.7	260°25.6	22°57.2	67°40.7	-21°44.6	156°01.8	-15°06.7	100°57.3	-22°22.5
9	33°40.1	275°24.9	22°56.6	82°42.6	-21°44.7	171°04.5	-15°06.6	115°59.9	-22°22.5
10	48°42.6	290°24.3	22°56.1	97°44.5	-21°44.7	186°07.2	-15°06.6	131°02.6	-22°22.5
11	63°45.1	305°23.6	22°55.6	112°46.4	-21°44.7	201°09.9	-15°06.5	146°05.2	-22°22.5
12	78°47.5	320°22.9	22°55.0	127°48.3	-21°44.8	216°12.5	-15°06.4	161°07.9	-22°22.5
13	93°50.0	335°22.3	22°54.5	142°50.3	-21°44.8	231°15.2	-15°06.4	176°10.5	-22°22.5
14	108°52.4	350°21.6	22°53.9	157°52.2	-21°44.9	246°17.9	-15°06.3	191°13.2	-22°22.5
15	123°54.9	5°21.0	22°53.4	172°54.1	-21°44.9	261°20.6	-15°06.3	206°15.8	-22°22.6
16	138°57.4	20°20.3	22°52.8	187°56.0	-21°45.0	276°23.3	-15°06.2	221°18.5	-22°22.6
17	153°59.8	35°19.6	22°52.3	202°58.0	-21°45.0	291°25.9	-15°06.2	236°21.1	-22°22.6
18	169°02.3	50°19.0	22°51.7	217°59.9	-21°45.0	306°28.6	-15°06.1	251°23.8	-22°22.6
19	184°04.8	65°18.3	22°51.2	233°01.8	-21°45.1	321°31.3	-15°06.1	266°26.4	-22°22.6
20	199°07.2	80°17.7	22°50.6	248°03.7	-21°45.1	336°34.0	-15°06.0	281°29.1	-22°22.6
21	214°09.7	95°17.0	22°50.1	263°05.7	-21°45.2	351°36.6	-15°06.0	296°31.7	-22°22.6
22	229°12.2	110°16.4	22°49.5	278°07.6	-21°45.2	6°39.3	-15°05.9	311°34.4	-22°22.6
23	244°14.6	125°15.7	22°49.0	293°09.5	-21°45.3	21°42.0	-15°05.9	326°37.0	-22°22.6
Mer.pass.:6:45:		v-0.7 d-0.5 m-3.9		v1.9 d-0.0 m-1.5		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.1	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	259°17.1	140°15.1	22°48.4	308°11.5	-21°45.3	36°44.7	-15°05.8	341°39.7	-22°22.7
1	274°19.6	155°14.4	22°47.9	323°13.4	-21°45.4	51°47.4	-15°05.7	356°42.3	-22°22.7
2	289°22.0	170°13.7	22°47.3	338°15.3	-21°45.4	66°50.0	-15°05.7	11°45.0	-22°22.7
3	304°24.5	185°13.1	22°46.8	353°17.3	-21°45.5	81°52.7	-15°05.6	26°47.6	-22°22.7
4	319°26.9	200°12.4	22°46.2	8°19.2	-21°45.5	96°55.4	-15°05.6	41°50.3	-22°22.7
5	334°29.4	215°11.8	22°45.7	23°21.2	-21°45.5	111°58.1	-15°05.5	56°52.9	-22°22.7
6	349°31.9	230°11.1	22°45.1	38°23.1	-21°45.6	127°00.7	-15°05.5	71°55.6	-22°22.7
7	4°34.3	245°10.5	22°44.5	53°25.0	-21°45.6	142°03.4	-15°05.4	86°58.2	-22°22.7
8	19°36.8	260°09.8	22°44.0	68°27.0	-21°45.7	157°06.1	-15°05.4	102°00.9	-22°22.7
9	34°39.3	275°09.2	22°43.4	83°28.9	-21°45.7	172°08.7	-15°05.3	117°03.5	-22°22.8
10	49°41.7	290°08.5	22°42.9	98°30.9	-21°45.8	187°11.4	-15°05.3	132°06.2	-22°22.8
11	64°44.2	305°07.9	22°42.3	113°32.8	-21°45.8	202°14.1	-15°05.2	147°08.8	-22°22.8
12	79°46.7	320°07.3	22°41.7	128°34.8	-21°45.9	217°16.8	-15°05.2	162°11.5	-22°22.8
13	94°49.1	335°06.6	22°41.2	143°36.7	-21°45.9	232°19.4	-15°05.1	177°14.1	-22°22.8
14	109°51.6	350°06.0	22°40.6	158°38.7	-21°46.0	247°22.1	-15°05.1	192°16.8	-22°22.8
15	124°54.1	5°05.3	22°40.0	173°40.6	-21°46.0	262°24.8	-15°05.0	207°19.4	-22°22.8
16	139°56.5	20°04.7	22°39.4	188°42.6	-21°46.1	277°27.5	-15°05.0	222°22.1	-22°22.8
17	154°59.0	35°04.0	22°38.9	203°44.5	-21°46.1	292°30.1	-15°04.9	237°24.7	-22°22.9
18	170°01.4	50°03.4	22°38.3	218°46.5	-21°46.2	307°32.8	-15°04.9	252°27.4	-22°22.9
19	185°03.9	65°02.7	22°37.7	233°48.4	-21°46.2	322°35.5	-15°04.8	267°30.0	-22°22.9
20	200°06.4	80°02.1	22°37.2	248°50.4	-21°46.3	337°38.1	-15°04.8	282°32.7	-22°22.9
21	215°08.8	95°01.5	22°36.6	263°52.4	-21°46.4	352°40.8	-15°04.7	297°35.3	-22°22.9
22	230°11.3	110°00.8	22°36.0	278°54.3	-21°46.4	7°43.5	-15°04.7	312°38.0	-22°22.9
23	245°13.8	125°00.2	22°35.4	293°56.3	-21°46.5	22°46.2	-15°04.6	327°40.6	-22°22.9
Mer.pass.:6:41:		v-0.7 d-0.6 m-3.9		v1.9 d-0.0 m-1.6		v2.7 d0.1 m-2.3		v2.6 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°40.1	29°11.3
Ankaa	353°12.5	-42°12.3
Schedar	349°36.8	56°37.9
Diphda	348°52.6	-17°53.2
Achernar	335°24.7	-57°08.5
Hamal	327°57.2	23°32.7
Polaris	316°40.2	89°20.2
Akamar	315°16.2	-40°13.9
Menkar	314°11.8	4°09.5
Mirfak	308°36.0	49°55.2
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.0
Capella	280°30.0	46°00.8
Bellatrix	278°28.7	6°21.8
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.6
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.6
Sirius	258°31.0	-16°44.5
Adara	255°10.2	-29°00.1
Procyon	244°56.4	5°10.7
Pollux	243°23.9	27°58.8
Avior	234°17.1	-59°34.4
Suhail	222°50.2	-43°30.7
Miaplacidus	221°39.4	-69°47.9
Alphard	217°52.9	-8°44.4
Regulus	207°40.0	11°52.7
Dubhe	193°47.7	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.7	-17°38.7
Acrux	173°05.2	-63°12.3
Gacrux	171°56.9	-57°13.2
Alioth	166°17.6	55°52.0
Spica	158°27.5	-11°15.4
Alcaid	152°56.0	49°13.6
Hadar	148°42.6	-60°27.8
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.6	-60°54.7
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.2	74°05.1
Alphecca	126°07.8	26°39.4
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.5
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°33.0
Etamin	90°44.0	51°29.3
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.3	38°48.1
Nunki	75°53.8	-26°16.2
Altair	62°04.8	8°55.0
Peacock	53°13.6	-56°40.2
Deneb	49°28.9	45°20.6
Enif	33°43.7	9°57.5
Alnair	27°39.4	-46°52.0
Fomalhaut	15°20.3	-29°31.4
Scheat	13°50.1	28°10.7
Markab	13°35.0	15°18.1

2018/6/9	**SHA**	**Mer.pass**
Venus	243°28.3	14:38
Mars	49°21.1	03:33
Jupiter	137°17.1	21:38
Saturn	82°13.8	01:22

2018/6/1	**SHA**	**Mer.pass**
Venus	242°13.0	14:39
Mars	49°07.4	03:30
Jupiter	137°22.4	21:33
Saturn	82°18.2	01:17

2018/6/1	**SHA**	**Mer.pass**
Venus	240°58.0	14:40
Mars	48°54.4	03:27
Jupiter	137°27.6	21:29
Saturn	82°22.6	01:13

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°13.0	22°54.3	242°18.7	12.8	1°15.8	11.6	57.1
1	195°12.8	22°54.5	256°50.4	12.7	1°27.4	11.6	57.1
2	210°12.7	22°54.7	271°22.1	12.7	1°39.0	11.6	57.1
3	225°12.6	22°54.9	285°53.8	12.6	1°50.6	11.6	57.2
4	240°12.5	22°55.1	300°25.4	12.6	2°02.2	11.6	57.2
5	255°12.3	22°55.4	314°56.9	12.5	2°13.8	11.6	57.2
6	270°12.2	22°55.6	329°28.4	12.5	2°25.4	11.6	57.3
7	285°12.1	22°55.8	343°59.9	12.4	2°37.0	11.6	57.3
8	300°12.0	22°56.0	358°31.3	12.4	2°48.7	11.6	57.4
9	315°11.9	22°56.2	13°02.6	12.3	3°00.3	11.6	57.4
10	330°11.7	22°56.4	27°33.9	12.3	3°11.9	11.6	57.4
11	345°11.6	22°56.6	42°05.2	12.2	3°23.6	11.6	57.5
12	0°11.5	22°56.8	56°36.3	12.2	3°35.2	11.6	57.5
13	15°11.4	22°57.0	71°07.5	12.1	3°46.9	11.6	57.5
14	30°11.2	22°57.2	85°38.5	12.0	3°58.5	11.6	57.6
15	45°11.1	22°57.4	100°09.5	12.0	4°10.1	11.6	57.6
16	60°11.0	22°57.6	114°40.5	11.9	4°21.7	11.6	57.7
17	75°10.9	22°57.8	129°11.4	11.9	4°33.4	11.6	57.7
18	90°10.7	22°58.0	143°42.2	11.8	4°45.0	11.6	57.7
19	105°10.6	22°58.2	158°13.0	11.7	4°56.6	11.6	57.8
20	120°10.5	22°58.4	172°43.7	11.7	5°08.2	11.6	57.8
21	135°10.4	22°58.6	187°14.3	11.6	5°19.8	11.6	57.9
22	150°10.2	22°58.8	201°44.9	11.5	5°31.3	11.6	57.9
23	165°10.1	22°59.0	216°15.4	11.5	5°42.9	11.6	57.9
	SD.=15.8	d=0.2	S.D.=15.6				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°10.0	22°59.2	230°45.8	11.4	5°54.5	11.5	58.0
1	195°09.9	22°59.4	245°16.2	11.3	6°06.0	11.5	58.0
2	210°09.7	22°59.6	259°46.5	11.3	6°17.5	11.5	58.0
3	225°09.6	22°59.8	274°16.7	11.2	6°29.0	11.5	58.1
4	240°09.5	22°60.0	288°46.9	11.1	6°40.5	11.5	58.1
5	255°09.4	23°00.2	303°17.0	11.1	6°52.0	11.5	58.2
6	270°09.2	23°00.4	317°47.0	11.0	7°03.4	11.4	58.2
7	285°09.1	23°00.5	332°17.0	10.9	7°14.8	11.4	58.2
8	300°09.0	23°00.7	346°46.8	10.8	7°26.3	11.4	58.3
9	315°08.9	23°00.9	1°16.6	10.8	7°37.6	11.4	58.3
10	330°08.7	23°01.1	15°46.4	10.7	7°49.0	11.3	58.4
11	345°08.6	23°01.3	30°16.0	10.6	8°00.3	11.3	58.4
12	0°08.5	23°01.5	44°45.6	10.5	8°11.6	11.3	58.4
13	15°08.4	23°01.7	59°15.1	10.5	8°22.9	11.3	58.5
14	30°08.2	23°01.9	73°44.5	10.4	8°34.1	11.2	58.5
15	45°08.1	23°02.0	88°13.9	10.3	8°45.4	11.2	58.6
16	60°08.0	23°02.2	102°43.2	10.2	8°56.5	11.2	58.6
17	75°07.9	23°02.4	117°12.3	10.1	9°07.7	11.1	58.6
18	90°07.7	23°02.6	131°41.4	10.1	9°18.8	11.1	58.7
19	105°07.6	23°02.8	146°10.5	10.0	9°29.9	11.1	58.7
20	120°07.5	23°03.0	160°39.4	9.9	9°40.9	11.0	58.7
21	135°07.4	23°03.1	175°08.3	9.8	9°51.9	11.0	58.8
22	150°07.2	23°03.3	189°37.1	9.7	10°02.9	10.9	58.8
23	165°07.1	23°03.5	204°05.8	9.7	10°13.8	10.9	58.9
	SD.=15.8	d=0.2	S.D.=15.8				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°07.0	23°03.7	218°34.4	9.6	10°24.7	10.9	58.9
1	195°06.8	23°03.9	233°02.9	9.5	10°35.5	10.8	58.9
2	210°06.7	23°04.0	247°31.3	9.4	10°46.3	10.8	59.0
3	225°06.6	23°04.2	261°59.7	9.3	10°57.0	10.7	59.0
4	240°06.5	23°04.4	276°28.0	9.2	11°07.7	10.7	59.0
5	255°06.3	23°04.6	290°56.2	9.1	11°18.3	10.6	59.1
6	270°06.2	23°04.7	305°24.3	9.1	11°28.9	10.6	59.1
7	285°06.1	23°04.9	319°52.3	9.0	11°39.4	10.5	59.1
8	300°06.0	23°05.1	334°20.2	8.9	11°49.9	10.4	59.2
9	315°05.8	23°05.3	348°48.0	8.8	12°00.3	10.4	59.2
10	330°05.7	23°05.4	3°15.8	8.7	12°10.7	10.3	59.3
11	345°05.6	23°05.6	17°43.4	8.6	12°21.0	10.3	59.3
12	0°05.4	23°05.8	32°11.0	8.5	12°31.2	10.2	59.3
13	15°05.3	23°05.9	46°38.5	8.4	12°41.4	10.1	59.4
14	30°05.2	23°06.1	61°05.9	8.3	12°51.5	10.1	59.4
15	45°05.1	23°06.3	75°33.2	8.3	13°01.6	10.0	59.4
16	60°04.9	23°06.5	90°00.4	8.2	13°11.6	10.0	59.5
17	75°04.8	23°06.6	104°27.5	8.1	13°21.5	9.9	59.5
18	90°04.7	23°06.8	118°54.5	8.0	13°31.3	9.8	59.5
19	105°04.5	23°07.0	133°21.5	7.9	13°41.1	9.7	59.6
20	120°04.4	23°07.1	147°48.3	7.8	13°50.8	9.7	59.6
21	135°04.3	23°07.3	162°15.1	7.7	14°00.5	9.6	59.6
22	150°04.2	23°07.4	176°41.7	7.6	14°10.0	9.5	59.7
23	165°04.0	23°07.6	191°08.3	7.5	14°19.5	9.4	59.7
	SD.=15.8	d=0.2	S.D.=16.1				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	00:29	23:36	–:–	–:–
64	–:–	–:–	01:40	22:21	–:–	–:–
62	–:–	–:–	02:14	21:46	–:–	–:–
60	–:–	01:03	02:39	21:20	22:58	–:–
58	–:–	01:46	02:59	21:01	22:14	–:–
56	–:–	02:14	03:15	20:44	21:46	–:–
54	00:57	02:35	03:29	20:31	21:24	23:03
52	01:37	02:53	03:41	20:19	21:07	22:23
50	02:03	03:07	03:51	20:08	20:52	21:56
45	02:47	03:36	04:13	19:46	20:23	21:12
40	03:17	03:58	04:31	19:28	20:01	20:42
35	03:40	04:16	04:46	19:13	19:43	20:20
30	03:58	04:31	04:58	19:01	19:28	20:01
20	04:26	04:55	05:20	18:39	19:04	19:33
10	04:49	05:16	05:39	18:20	18:43	19:10
0	05:07	05:33	05:56	18:03	18:26	18:52
-10	05:24	05:50	06:13	17:46	18:09	18:35
-20	05:40	06:07	06:31	17:28	17:52	18:19
-30	05:56	06:26	06:52	17:07	17:33	18:03
-35	06:04	06:36	07:04	16:55	17:23	17:54
-40	06:13	06:47	07:18	16:41	17:11	17:45
-45	06:24	07:01	07:34	16:24	16:58	17:35
-50	06:35	07:16	07:55	16:04	16:42	17:24
-52	06:40	07:24	08:04	15:54	16:35	17:19
-54	06:46	07:32	08:15	15:44	16:27	17:13
-56	06:52	07:40	08:27	15:31	16:18	17:07
-58	06:58	07:50	08:42	15:17	16:08	17:01
-60	07:05	08:02	08:59	15:00	15:57	16:53

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	01:36	01:24	01:09	15:10	17:08	19:19
70	01:38	01:32	01:26	15:04	16:54	18:51
68	01:40	01:39	01:39	14:60	16:42	18:31
66	01:41	01:45	01:50	14:55	16:33	18:14
64	01:42	01:50	01:60	14:52	16:25	18:01
62	01:43	01:54	02:07	14:49	16:18	17:50
60	01:44	01:58	02:14	14:47	16:12	17:40
58	01:45	02:01	02:20	14:44	16:07	17:32
56	01:45	02:04	02:26	14:42	16:02	17:25
54	01:46	02:07	02:31	14:41	15:58	17:18
52	01:47	02:09	02:35	14:39	15:54	17:13
50	01:47	02:12	02:39	14:37	15:51	17:07
45	01:48	02:17	02:48	14:34	15:44	16:56
40	01:49	02:21	02:55	14:31	15:38	16:47
35	01:50	02:24	03:02	14:29	15:33	16:39
30	01:51	02:28	03:07	14:27	15:28	16:32
20	01:52	02:33	03:17	14:24	15:20	16:20
10	01:54	02:38	03:26	14:20	15:13	16:09
0	01:55	02:43	03:34	14:17	15:07	15:59
-10	01:56	02:48	03:42	14:15	15:00	15:49
-20	01:57	02:53	03:51	14:11	14:53	15:39
-30	01:59	02:59	04:01	14:08	14:46	15:27
-35	01:60	03:02	04:07	14:06	14:41	15:20
-40	02:01	03:06	04:14	14:03	14:36	15:13
-45	02:02	03:10	04:21	14:01	14:30	15:03
-50	02:03	03:16	04:31	13:58	14:23	14:53
-52	02:04	03:18	04:35	13:56	14:20	14:48
-54	02:05	03:21	04:40	13:55	14:16	14:42
-56	02:05	03:24	04:46	13:53	14:13	14:36
-58	02:06	03:27	04:52	13:51	14:08	14:29
-60	02:07	03:31	04:58	13:49	14:03	14:21

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
9	00:52	00:46	11:59	08:06	20:30	25(23%)
10	00:40	00:34	11:59	08:54	21:20	26(15%)
11	00:28	00:22	11:59	09:46	22:13	27(8%)

June 12, 13 ,14 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	260°16.2	139°59.5	22°34.9	308°58.2	-21°46.5	37°48.8	-15°04.5	342°43.3	-22°22.9
1	275°18.7	154°58.9	22°34.3	324°00.2	-21°46.6	52°51.5	-15°04.5	357°45.9	-22°22.9
2	290°21.2	169°58.3	22°33.7	339°02.2	-21°46.6	67°54.2	-15°04.4	12°48.6	-22°23.0
3	305°23.6	184°57.6	22°33.1	354°04.1	-21°46.7	82°56.8	-15°04.4	27°51.2	-22°23.0
4	320°26.1	199°57.0	22°32.5	9°06.1	-21°46.7	97°59.5	-15°04.3	42°53.9	-22°23.0
5	335°28.5	214°56.3	22°31.9	24°08.1	-21°46.8	113°02.2	-15°04.3	57°56.5	-22°23.0
6	350°31.0	229°55.7	22°31.4	39°10.0	-21°46.8	128°04.8	-15°04.2	72°59.2	-22°23.0
7	5°33.5	244°55.1	22°30.8	54°12.0	-21°46.9	143°07.5	-15°04.2	88°01.8	-22°23.0
8	20°35.9	259°54.4	22°30.2	69°14.0	-21°47.0	158°10.2	-15°04.1	103°04.5	-22°23.0
9	35°38.4	274°53.8	22°29.6	84°15.9	-21°47.0	173°12.8	-15°04.1	118°07.1	-22°23.0
10	50°40.9	289°53.2	22°29.0	99°17.9	-21°47.1	188°15.5	-15°04.0	133°09.8	-22°23.0
11	65°43.3	304°52.5	22°28.4	114°19.9	-21°47.1	203°18.2	-15°04.0	148°12.4	-22°23.1
12	80°45.8	319°51.9	22°27.8	129°21.9	-21°47.2	218°20.8	-15°03.9	163°15.1	-22°23.1
13	95°48.3	334°51.3	22°27.2	144°23.8	-21°47.2	233°23.5	-15°03.9	178°17.7	-22°23.1
14	110°50.7	349°50.6	22°26.6	159°25.8	-21°47.3	248°26.2	-15°03.8	193°20.4	-22°23.1
15	125°53.2	4°50.0	22°26.1	174°27.8	-21°47.4	263°28.8	-15°03.8	208°23.0	-22°23.1
16	140°55.7	19°49.4	22°25.5	189°29.8	-21°47.4	278°31.5	-15°03.7	223°25.7	-22°23.1
17	155°58.1	34°48.7	22°24.9	204°31.7	-21°47.5	293°34.2	-15°03.7	238°28.4	-22°23.1
18	171°00.6	49°48.1	22°24.3	219°33.7	-21°47.5	308°36.8	-15°03.6	253°31.0	-22°23.1
19	186°03.0	64°47.5	22°23.7	234°35.7	-21°47.6	323°39.5	-15°03.6	268°33.7	-22°23.1
20	201°05.5	79°46.9	22°23.1	249°37.7	-21°47.7	338°42.2	-15°03.5	283°36.3	-22°23.2
21	216°08.0	94°46.2	22°22.5	264°39.7	-21°47.7	353°44.8	-15°03.5	298°39.0	-22°23.2
22	231°10.4	109°45.6	22°21.9	279°41.7	-21°47.8	8°47.5	-15°03.4	313°41.6	-22°23.2
23	246°12.9	124°45.0	22°21.3	294°43.7	-21°47.8	23°50.2	-15°03.4	328°44.3	-22°23.2
Mer.pass.:6:37:		v-0.6 d-0.6 m-3.9		v2.0 d-0.1 m-1.6		v2.7 d0.1 m-2.3		v2.7 d-0.0 m0.1	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	261°15.4	139°44.4	22°20.7	309°45.6	-21°47.9	38°52.8	-15°03.3	343°46.9	-22°23.2
1	276°17.8	154°43.7	22°20.1	324°47.6	-21°48.0	53°55.5	-15°03.3	358°49.6	-22°23.2
2	291°20.3	169°43.1	22°19.5	339°49.6	-21°48.0	68°58.2	-15°03.2	13°52.2	-22°23.2
3	306°22.8	184°42.5	22°18.9	354°51.6	-21°48.1	84°00.8	-15°03.2	28°54.9	-22°23.2
4	321°25.2	199°41.9	22°18.2	9°53.6	-21°48.2	99°03.5	-15°03.1	43°57.5	-22°23.2
5	336°27.7	214°41.2	22°17.6	24°55.6	-21°48.2	114°06.1	-15°03.1	59°00.2	-22°23.3
6	351°30.2	229°40.6	22°17.0	39°57.6	-21°48.3	129°08.8	-15°03.0	74°02.8	-22°23.3
7	6°32.6	244°40.0	22°16.4	54°59.6	-21°48.4	144°11.5	-15°03.0	89°05.5	-22°23.3
8	21°35.1	259°39.4	22°15.8	70°01.6	-21°48.4	159°14.1	-15°02.9	104°08.1	-22°23.3
9	36°37.5	274°38.8	22°15.2	85°03.6	-21°48.5	174°16.8	-15°02.9	119°10.8	-22°23.3
10	51°40.0	289°38.1	22°14.6	100°05.6	-21°48.5	189°19.4	-15°02.9	134°13.4	-22°23.3
11	66°42.5	304°37.5	22°14.0	115°07.6	-21°48.6	204°22.1	-15°02.8	149°16.1	-22°23.3
12	81°44.9	319°36.9	22°13.4	130°09.6	-21°48.7	219°24.8	-15°02.8	164°18.7	-22°23.3
13	96°47.4	334°36.3	22°12.7	145°11.6	-21°48.7	234°27.4	-15°02.7	179°21.4	-22°23.4
14	111°49.9	349°35.7	22°12.1	160°13.6	-21°48.8	249°30.1	-15°02.7	194°24.1	-22°23.4
15	126°52.3	4°35.0	22°11.5	175°15.6	-21°48.9	264°32.7	-15°02.6	209°26.7	-22°23.4
16	141°54.8	19°34.4	22°10.9	190°17.6	-21°48.9	279°35.4	-15°02.6	224°29.4	-22°23.4
17	156°57.3	34°33.8	22°10.3	205°19.6	-21°49.0	294°38.1	-15°02.5	239°32.0	-22°23.4
18	171°59.7	49°33.2	22°09.6	220°21.6	-21°49.1	309°40.7	-15°02.5	254°34.7	-22°23.4
19	187°02.2	64°32.6	22°09.0	235°23.7	-21°49.2	324°43.4	-15°02.4	269°37.3	-22°23.4
20	202°04.7	79°32.0	22°08.4	250°25.7	-21°49.2	339°46.0	-15°02.4	284°40.0	-22°23.4
21	217°07.1	94°31.4	22°07.8	265°27.7	-21°49.3	354°48.7	-15°02.3	299°42.6	-22°23.4
22	232°09.6	109°30.8	22°07.1	280°29.7	-21°49.4	9°51.4	-15°02.3	314°45.3	-22°23.5
23	247°12.0	124°30.1	22°06.5	295°31.7	-21°49.4	24°54.0	-15°02.2	329°47.9	-22°23.5
Mer.pass.:6:33:		v-0.6 d-0.6 m-3.9		v2.0 d-0.1 m-1.6		v2.7 d0.0 m-2.3		v2.7 d-0.0 m0.1	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	262°14.5	139°29.5	22°05.9	310°33.7	-21°49.5	39°56.7	-15°02.2	344°50.6	-22°23.5
1	277°17.0	154°28.9	22°05.3	325°35.7	-21°49.6	54°59.3	-15°02.1	359°53.2	-22°23.5
2	292°19.4	169°28.3	22°04.6	340°37.8	-21°49.6	70°02.0	-15°02.1	14°55.9	-22°23.5
3	307°21.9	184°27.7	22°04.0	355°39.8	-21°49.7	85°04.6	-15°02.0	29°58.6	-22°23.5
4	322°24.4	199°27.1	22°03.4	10°41.8	-21°49.8	100°07.3	-15°02.0	45°01.2	-22°23.5
5	337°26.8	214°26.5	22°02.7	25°43.8	-21°49.9	115°10.0	-15°01.9	60°03.9	-22°23.5
6	352°29.3	229°25.9	22°02.1	40°45.9	-21°49.9	130°12.6	-15°01.9	75°06.5	-22°23.5
7	7°31.8	244°25.3	22°01.5	55°47.9	-21°50.0	145°15.3	-15°01.8	90°09.2	-22°23.6
8	22°34.2	259°24.7	22°00.8	70°49.9	-21°50.1	160°17.9	-15°01.8	105°11.8	-22°23.6
9	37°36.7	274°24.1	22°00.2	85°51.9	-21°50.1	175°20.6	-15°01.8	120°14.5	-22°23.6
10	52°39.2	289°23.5	21°59.6	100°54.0	-21°50.2	190°23.2	-15°01.7	135°17.1	-22°23.6
11	67°41.6	304°22.9	21°58.9	115°56.0	-21°50.3	205°25.9	-15°01.7	150°19.8	-22°23.6
12	82°44.1	319°22.3	21°58.3	130°58.0	-21°50.4	220°28.5	-15°01.6	165°22.4	-22°23.6
13	97°46.5	334°21.6	21°57.7	146°00.1	-21°50.4	235°31.2	-15°01.6	180°25.1	-22°23.6
14	112°49.0	349°21.0	21°57.0	161°02.1	-21°50.5	250°33.9	-15°01.5	195°27.7	-22°23.6
15	127°51.5	4°20.4	21°56.4	176°04.1	-21°50.6	265°36.5	-15°01.5	210°30.4	-22°23.6
16	142°53.9	19°19.8	21°55.7	191°06.2	-21°50.7	280°39.2	-15°01.4	225°33.1	-22°23.7
17	157°56.4	34°19.2	21°55.1	206°08.2	-21°50.7	295°41.8	-15°01.4	240°35.7	-22°23.7
18	172°58.9	49°18.6	21°54.4	221°10.2	-21°50.8	310°44.5	-15°01.3	255°38.4	-22°23.7
19	188°01.3	64°18.0	21°53.8	236°12.3	-21°50.9	325°47.1	-15°01.3	270°41.0	-22°23.7
20	203°03.8	79°17.4	21°53.1	251°14.3	-21°51.0	340°49.8	-15°01.2	285°43.7	-22°23.7
21	218°06.3	94°16.9	21°52.5	266°16.4	-21°51.1	355°52.4	-15°01.2	300°46.3	-22°23.7
22	233°08.7	109°16.3	21°51.8	281°18.4	-21°51.1	10°55.1	-15°01.2	315°49.0	-22°23.7
23	248°11.2	124°15.7	21°51.2	296°20.4	-21°51.2	25°57.7	-15°01.1	330°51.6	-22°23.7
Mer.pass.:6:29:		v-0.6 d-0.6 m-3.9		v2.0 d-0.1 m-1.7		v2.7 d0.0 m-2.3		v2.7 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°40.1	29°11.3
Ankaa	353°12.5	-42°12.2
Schedar	349°36.8	56°37.9
Diphda	348°52.5	-17°53.2
Achernar	335°24.7	-57°08.5
Hamal	327°57.2	23°32.7
Polaris	316°39.0	89°20.2
Akamar	315°16.2	-40°13.9
Menkar	314°11.8	4°09.5
Mirfak	308°35.9	49°55.2
Aldebaran	290°45.9	16°32.5
Rigel	281°09.2	-8°11.0
Capella	280°30.0	46°00.8
Bellatrix	278°28.7	6°21.8
Elnath	278°08.8	28°37.2
Alnilam	275°43.3	-1°11.6
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.6
Sirius	258°31.0	-16°44.5
Adara	255°10.2	-29°00.1
Procyon	244°56.4	5°10.7
Pollux	243°23.9	27°58.8
Avior	234°17.1	-59°34.4
Suhail	222°50.2	-43°30.7
Miaplacidus	221°39.5	-69°47.9
Alphard	217°52.9	-8°44.4
Regulus	207°40.0	11°52.7
Dubhe	193°47.7	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.7	-17°38.7
Acrux	173°05.3	-63°12.3
Gacrux	171°56.9	-57°13.2
Alioth	166°17.6	55°52.0
Spica	158°27.5	-11°15.4
Alcaid	152°56.0	49°13.6
Hadar	148°42.6	-60°27.8
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.6	-60°54.7
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.2	74°05.1
Alphecca	126°07.8	26°39.4
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.5
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°33.0
Etamin	90°44.0	51°29.3
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.3	38°48.1
Nunki	75°53.8	-26°16.2
Altair	62°04.7	8°55.0
Peacock	53°13.5	-56°40.2
Deneb	49°28.8	45°20.6
Enif	33°43.7	9°57.5
Alnair	27°39.4	-46°52.0
Fomalhaut	15°20.3	-29°31.3
Scheat	13°50.1	28°10.7
Markab	13°34.9	15°18.1

2018/6/1	**SHA**	**Mer.pass**
Venus	239°43.3	14:41
Mars	48°42.0	03:24
Jupiter	137°32.6	21:25
Saturn	82°27.1	01:09

2018/6/1	**SHA**	**Mer.pass**
Venus	238°29.0	14:42
Mars	48°30.3	03:21
Jupiter	137°37.5	21:21
Saturn	82°31.5	01:05

2018/6/1	**SHA**	**Mer.pass**
Venus	237°15.0	14:43
Mars	48°19.2	03:17
Jupiter	137°42.2	21:16
Saturn	82°36.1	01:00

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h Sun Moon

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°03.9	23°07.8	205°34.8	7.4	14°28.9	9.4	59.7
1	195°03.8	23°07.9	220°01.1	7.3	14°38.2	9.3	59.8
2	210°03.6	23°08.1	234°27.4	7.3	14°47.4	9.2	59.8
3	225°03.5	23°08.3	248°53.6	7.2	14°56.6	9.1	59.8
4	240°03.4	23°08.4	263°19.8	7.1	15°05.6	9.0	59.9
5	255°03.2	23°08.6	277°45.8	7.0	15°14.6	8.9	59.9
6	270°03.1	23°08.7	292°11.7	6.9	15°23.5	8.8	59.9
7	285°03.0	23°08.9	306°37.6	6.8	15°32.3	8.8	59.9
8	300°02.9	23°09.0	321°03.3	6.7	15°41.0	8.7	60.0
9	315°02.7	23°09.2	335°29.0	6.6	15°49.6	8.6	60.0
10	330°02.6	23°09.4	349°54.5	6.5	15°58.2	8.5	60.0
11	345°02.5	23°09.5	4°20.0	6.4	16°06.6	8.4	60.1
12	0°02.3	23°09.7	18°45.4	6.3	16°14.9	8.3	60.1
13	15°02.2	23°09.8	33°10.7	6.3	16°23.1	8.2	60.1
14	30°02.1	23°10.0	47°35.9	6.2	16°31.3	8.1	60.2
15	45°01.9	23°10.1	62°01.1	6.1	16°39.3	8.0	60.2
16	60°01.8	23°10.3	76°26.1	6.0	16°47.2	7.9	60.2
17	75°01.7	23°10.4	90°51.1	5.9	16°55.0	7.8	60.2
18	90°01.6	23°10.6	105°15.9	5.8	17°02.7	7.7	60.3
19	105°01.4	23°10.7	119°40.7	5.7	17°10.3	7.5	60.3
20	120°01.3	23°10.9	134°05.4	5.7	17°17.8	7.4	60.3
21	135°01.2	23°11.0	148°30.0	5.6	17°25.2	7.3	60.3
22	150°01.0	23°11.2	162°54.6	5.5	17°32.5	7.2	60.4
23	165°00.9	23°11.3	177°19.0	5.4	17°39.6	7.1	60.4
	SD.=15.8	d=0.2	S.D.=16.3				

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°00.8	23°11.4	191°43.4	5.3	17°46.7	7.0	60.4
1	195°00.6	23°11.6	206°07.7	5.2	17°53.6	6.9	60.4
2	210°00.5	23°11.7	220°31.9	5.2	18°00.4	6.7	60.5
3	225°00.4	23°11.9	234°56.0	5.1	18°07.1	6.6	60.5
4	240°00.2	23°12.0	249°20.1	5.0	18°13.6	6.5	60.5
5	255°00.1	23°12.2	263°44.0	4.9	18°20.1	6.4	60.5
6	269°60.0	23°12.3	278°07.9	4.9	18°26.4	6.3	60.5
7	284°59.8	23°12.4	292°31.8	4.8	18°32.6	6.1	60.6
8	299°59.7	23°12.6	306°55.5	4.7	18°38.6	6.0	60.6
9	314°59.6	23°12.7	321°19.2	4.6	18°44.6	5.9	60.6
10	329°59.4	23°12.9	335°42.8	4.6	18°50.4	5.7	60.6
11	344°59.3	23°13.0	350°06.4	4.5	18°56.0	5.6	60.6
12	359°59.2	23°13.1	4°29.8	4.4	19°01.6	5.5	60.7
13	14°59.1	23°13.3	18°53.2	4.4	19°07.0	5.3	60.7
14	29°58.9	23°13.4	33°16.6	4.3	19°12.3	5.2	60.7
15	44°58.8	23°13.5	47°39.9	4.2	19°17.4	5.1	60.7
16	59°58.7	23°13.7	62°03.1	4.2	19°22.4	4.9	60.7
17	74°58.5	23°13.8	76°26.2	4.1	19°27.3	4.8	60.7
18	89°58.4	23°13.9	90°49.3	4.1	19°32.0	4.7	60.8
19	104°58.3	23°14.1	105°12.4	4.0	19°36.6	4.5	60.8
20	119°58.1	23°14.2	119°35.3	4.0	19°41.0	4.4	60.8
21	134°58.0	23°14.3	133°58.3	3.9	19°45.3	4.2	60.8
22	149°57.9	23°14.5	148°21.1	3.8	19°49.5	4.1	60.8
23	164°57.7	23°14.6	162°44.0	3.8	19°53.5	3.9	60.8
	SD.=15.7	d=0.1	S.D.=16.5				

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°57.6	23°14.7	177°06.7	3.7	19°57.4	3.8	60.8
1	194°57.5	23°14.8	191°29.5	3.7	20°01.1	3.7	60.9
2	209°57.3	23°15.0	205°52.1	3.7	20°04.7	3.5	60.9
3	224°57.2	23°15.1	220°14.8	3.6	20°08.2	3.4	60.9
4	239°57.1	23°15.2	234°37.4	3.6	20°11.4	3.2	60.9
5	254°56.9	23°15.3	248°59.9	3.5	20°14.6	3.1	60.9
6	269°56.8	23°15.5	263°22.4	3.5	20°17.6	2.9	60.9
7	284°56.7	23°15.6	277°44.9	3.5	20°20.4	2.8	60.9
8	299°56.5	23°15.7	292°07.4	3.4	20°23.1	2.6	60.9
9	314°56.4	23°15.8	306°29.8	3.4	20°25.6	2.5	60.9
10	329°56.3	23°16.0	320°52.1	3.4	20°28.0	2.3	60.9
11	344°56.1	23°16.1	335°14.5	3.3	20°30.3	2.2	60.9
12	359°56.0	23°16.2	349°36.8	3.3	20°32.4	2.0	61.0
13	14°55.9	23°16.3	3°59.1	3.3	20°34.3	1.9	61.0
14	29°55.7	23°16.4	18°21.4	3.3	20°36.1	1.7	61.0
15	44°55.6	23°16.6	32°43.6	3.2	20°37.7	1.5	61.0
16	59°55.5	23°16.7	47°05.9	3.2	20°39.1	1.4	61.0
17	74°55.3	23°16.8	61°28.1	3.2	20°40.5	1.2	61.0
18	89°55.2	23°16.9	75°50.3	3.2	20°41.6	1.1	61.0
19	104°55.1	23°17.0	90°12.5	3.2	20°42.6	0.9	61.0
20	119°54.9	23°17.1	104°34.7	3.2	20°43.5	0.8	61.0
21	134°54.8	23°17.2	118°56.8	3.2	20°44.1	0.6	61.0
22	149°54.7	23°17.4	133°19.0	3.2	20°44.7	0.5	61.0
23	164°54.5	23°17.5	147°41.2	3.2	20°45.1	0.3	61.0
	SD.=15.7	d=0.1	S.D.=16.6				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:36	22:26	–:–	–:–
62	–:–	–:–	02:12	21:49	–:–	–:–
60	–:–	00:57	02:37	21:23	23:05	–:–
58	–:–	01:43	02:57	21:03	22:18	–:–
56	–:–	02:12	03:14	20:47	21:49	–:–
54	00:52	02:34	03:28	20:33	21:27	23:10
52	01:35	02:51	03:40	20:21	21:09	22:26
50	02:02	03:06	03:51	20:10	20:54	21:59
45	02:46	03:36	04:13	19:47	20:25	21:14
40	03:16	03:58	04:31	19:30	20:02	20:44
35	03:39	04:16	04:46	19:15	19:44	20:21
30	03:58	04:31	04:58	19:02	19:29	20:03
20	04:27	04:56	05:20	18:40	19:05	19:34
10	04:49	05:16	05:39	18:21	18:44	19:11
0	05:08	05:34	05:56	18:04	18:26	18:52
-10	05:25	05:51	06:14	17:46	18:09	18:36
-20	05:41	06:08	06:32	17:28	17:52	18:19
-30	05:57	06:27	06:53	17:07	17:33	18:03
-35	06:06	06:37	07:05	16:55	17:23	17:55
-40	06:15	06:49	07:19	16:41	17:11	17:45
-45	06:25	07:02	07:36	16:24	16:58	17:35
-50	06:37	07:18	07:56	16:04	16:42	17:23
-52	06:42	07:25	08:06	15:54	16:35	17:18
-54	06:47	07:34	08:17	15:43	16:26	17:13
-56	06:53	07:42	08:30	15:30	16:17	17:06
-58	07:00	07:53	08:44	15:16	16:07	16:60
-60	07:08	08:04	09:01	14:59	15:56	16:52

	Moonrise			Moonset		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	00:50	00:02	–:–	22:07	–:–	–:–
70	01:19	01:10	00:44	21:00	23:33	–:–
68	01:41	01:47	02:02	20:24	22:16	23:45
66	01:59	02:13	02:40	19:59	21:39	22:59
64	02:13	02:33	03:07	19:39	21:12	22:29
62	02:25	02:50	03:28	19:23	20:52	22:07
60	02:35	03:04	03:45	19:10	20:35	21:48
58	02:44	03:16	03:59	18:58	20:21	21:33
56	02:52	03:26	04:11	18:48	20:09	21:20
54	02:59	03:35	04:22	18:40	19:58	21:09
52	03:06	03:44	04:32	18:32	19:49	20:59
50	03:12	03:51	04:40	18:25	19:40	20:50
45	03:24	04:07	04:58	18:10	19:23	20:31
40	03:35	04:20	05:13	17:58	19:08	20:15
35	03:43	04:31	05:26	17:47	18:56	20:02
30	03:51	04:41	05:37	17:38	18:45	19:51
20	04:05	04:58	05:56	17:22	18:27	19:31
10	04:17	05:13	06:13	17:09	18:11	19:14
0	04:28	05:27	06:28	16:56	17:56	18:58
-10	04:40	05:41	06:44	16:43	17:41	18:42
-20	04:52	05:56	07:01	16:29	17:25	18:25
-30	05:06	06:13	07:20	16:14	17:07	18:06
-35	05:14	06:23	07:31	16:05	16:56	17:54
-40	05:24	06:35	07:44	15:55	16:44	17:41
-45	05:35	06:49	07:60	15:43	16:29	17:25
-50	05:48	07:06	08:19	15:28	16:12	17:06
-52	05:55	07:14	08:28	15:21	16:04	16:57
-54	06:02	07:22	08:38	15:14	15:54	16:47
-56	06:09	07:32	08:49	15:05	15:44	16:36
-58	06:18	07:44	09:02	14:56	15:32	16:22
-60	06:28	07:57	09:17	14:45	15:19	16:07

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
12	00:16	00:09	11:59	10:41	23:11	28(3%)
13	00:03	00:03	12:00	11:41	00:12	29(0%)
14	00:10	00:16	12:00	12:43	00:12	1(1%)

June 15, 16 ,17 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	263°13.7	139°15.1	21°50.5	311°22.5	-21°51.3	41°00.4	-15°01.1	345°54.3	-22°23.8
1	278°16.1	154°14.5	21°49.9	326°24.5	-21°51.4	56°03.0	-15°01.0	0°57.0	-22°23.8
2	293°18.6	169°13.9	21°49.2	341°26.6	-21°51.4	71°05.7	-15°01.0	15°59.6	-22°23.8
3	308°21.0	184°13.3	21°48.6	356°28.6	-21°51.5	86°08.3	-15°00.9	31°02.3	-22°23.8
4	323°23.5	199°12.7	21°47.9	11°30.7	-21°51.6	101°11.0	-15°00.9	46°04.9	-22°23.8
5	338°26.0	214°12.1	21°47.3	26°32.7	-21°51.7	116°13.6	-15°00.8	61°07.6	-22°23.8
6	353°28.4	229°11.5	21°46.6	41°34.8	-21°51.8	131°16.3	-15°00.8	76°10.2	-22°23.8
7	8°30.9	244°10.9	21°46.0	56°36.8	-21°51.8	146°18.9	-15°00.7	91°12.9	-22°23.8
8	23°33.4	259°10.3	21°45.3	71°38.9	-21°51.9	161°21.6	-15°00.7	106°15.5	-22°23.8
9	38°35.8	274°09.7	21°44.6	86°41.0	-21°52.0	176°24.2	-15°00.7	121°18.2	-22°23.9
10	53°38.3	289°09.1	21°44.0	101°43.0	-21°52.1	191°26.9	-15°00.6	136°20.8	-22°23.9
11	68°40.8	304°08.6	21°43.3	116°45.1	-21°52.2	206°29.5	-15°00.6	151°23.5	-22°23.9
12	83°43.2	319°08.0	21°42.7	131°47.1	-21°52.3	221°32.2	-15°00.5	166°26.2	-22°23.9
13	98°45.7	334°07.4	21°42.0	146°49.2	-21°52.3	236°34.8	-15°00.5	181°28.8	-22°23.9
14	113°48.1	349°06.8	21°41.3	161°51.3	-21°52.4	251°37.5	-15°00.4	196°31.5	-22°23.9
15	128°50.6	4°06.2	21°40.7	176°53.3	-21°52.5	266°40.1	-15°00.4	211°34.1	-22°23.9
16	143°53.1	19°05.6	21°40.0	191°55.4	-21°52.6	281°42.8	-15°00.3	226°36.8	-22°23.9
17	158°55.5	34°05.0	21°39.3	206°57.4	-21°52.7	296°45.4	-15°00.3	241°39.4	-22°23.9
18	173°58.0	49°04.4	21°38.7	221°59.5	-21°52.8	311°48.1	-15°00.3	256°42.1	-22°24.0
19	189°00.5	64°03.9	21°38.0	237°01.6	-21°52.8	326°50.7	-15°00.2	271°44.8	-22°24.0
20	204°02.9	79°03.3	21°37.3	252°03.7	-21°52.9	341°53.3	-15°00.2	286°47.4	-22°24.0
21	219°05.4	94°02.7	21°36.7	267°05.7	-21°53.0	356°56.0	-15°00.1	301°50.1	-22°24.0
22	234°07.9	109°02.1	21°36.0	282°07.8	-21°53.1	11°58.6	-15°00.1	316°52.7	-22°24.0
23	249°10.3	124°01.5	21°35.3	297°09.9	-21°53.2	27°01.3	-15°00.0	331°55.4	-22°24.0
Mer.pass.:6:26:		v-0.6 d-0.7 m-3.9		v2.0 d-0.1 m-1.7		v2.7 d0.0 m-2.2		v2.7 d-0.0 m0.1	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	264°12.8	139°01.0	21°34.6	312°11.9	-21°53.3	42°03.9	-14°60.0	346°58.0	-22°24.0
1	279°15.3	154°00.4	21°34.0	327°14.0	-21°53.4	57°06.6	-14°59.9	2°00.7	-22°24.0
2	294°17.7	168°59.8	21°33.3	342°16.1	-21°53.5	72°09.2	-14°59.9	17°03.3	-22°24.1
3	309°20.2	183°59.2	21°32.6	357°18.2	-21°53.5	87°11.9	-14°59.9	32°06.0	-22°24.1
4	324°22.6	198°58.6	21°31.9	12°20.3	-21°53.6	102°14.5	-14°59.8	47°08.7	-22°24.1
5	339°25.1	213°58.1	21°31.3	27°22.3	-21°53.7	117°17.1	-14°59.8	62°11.3	-22°24.1
6	354°27.6	228°57.5	21°30.6	42°24.4	-21°53.8	132°19.8	-14°59.7	77°14.0	-22°24.1
7	9°30.0	243°56.9	21°29.9	57°26.5	-21°53.9	147°22.4	-14°59.7	92°16.6	-22°24.1
8	24°32.5	258°56.3	21°29.2	72°28.6	-21°54.0	162°25.1	-14°59.6	107°19.3	-22°24.1
9	39°35.0	273°55.8	21°28.5	87°30.7	-21°54.1	177°27.7	-14°59.6	122°21.9	-22°24.1
10	54°37.4	288°55.2	21°27.8	102°32.8	-21°54.2	192°30.4	-14°59.6	137°24.6	-22°24.1
11	69°39.9	303°54.6	21°27.2	117°34.8	-21°54.3	207°33.0	-14°59.5	152°27.3	-22°24.2
12	84°42.4	318°54.0	21°26.5	132°36.9	-21°54.4	222°35.6	-14°59.5	167°29.9	-22°24.2
13	99°44.8	333°53.5	21°25.8	147°39.0	-21°54.4	237°38.3	-14°59.4	182°32.6	-22°24.2
14	114°47.3	348°52.9	21°25.1	162°41.1	-21°54.5	252°40.9	-14°59.4	197°35.2	-22°24.2
15	129°49.8	3°52.3	21°24.4	177°43.2	-21°54.6	267°43.6	-14°59.3	212°37.9	-22°24.2
16	144°52.2	18°51.8	21°23.7	192°45.3	-21°54.7	282°46.2	-14°59.3	227°40.5	-22°24.2
17	159°54.7	33°51.2	21°23.0	207°47.4	-21°54.8	297°48.8	-14°59.3	242°43.2	-22°24.2
18	174°57.1	48°50.6	21°22.3	222°49.5	-21°54.9	312°51.5	-14°59.2	257°45.9	-22°24.2
19	189°59.6	63°50.1	21°21.6	237°51.6	-21°55.0	327°54.1	-14°59.2	272°48.5	-22°24.2
20	205°02.1	78°49.5	21°21.0	252°53.7	-21°55.1	342°56.8	-14°59.1	287°51.2	-22°24.3
21	220°04.5	93°48.9	21°20.3	267°55.8	-21°55.2	357°59.4	-14°59.1	302°53.8	-22°24.3
22	235°07.0	108°48.4	21°19.6	282°57.9	-21°55.3	13°02.0	-14°59.1	317°56.5	-22°24.3
23	250°09.5	123°47.8	21°18.9	297°60.0	-21°55.4	28°04.7	-14°59.0	332°59.1	-22°24.3
Mer.pass.:6:22:		v-0.6 d-0.7 m-3.9		v2.1 d-0.1 m-1.7		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.1	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	265°11.9	138°47.2	21°18.2	313°02.1	-21°55.5	43°07.3	-14°59.0	348°01.8	-22°24.3
1	280°14.4	153°46.7	21°17.5	328°04.2	-21°55.6	58°10.0	-14°58.9	3°04.5	-22°24.3
2	295°16.9	168°46.1	21°16.8	343°06.3	-21°55.7	73°12.6	-14°58.9	18°07.1	-22°24.3
3	310°19.3	183°45.5	21°16.1	358°08.4	-21°55.8	88°15.2	-14°58.8	33°09.8	-22°24.3
4	325°21.8	198°45.0	21°15.4	13°10.5	-21°55.9	103°17.9	-14°58.8	48°12.4	-22°24.4
5	340°24.3	213°44.4	21°14.7	28°12.6	-21°56.0	118°20.5	-14°58.8	63°15.1	-22°24.4
6	355°26.7	228°43.9	21°14.0	43°14.7	-21°56.1	133°23.1	-14°58.7	78°17.7	-22°24.4
7	10°29.2	243°43.3	21°13.3	58°16.8	-21°56.2	148°25.8	-14°58.7	93°20.4	-22°24.4
8	25°31.6	258°42.7	21°12.6	73°19.0	-21°56.3	163°28.4	-14°58.6	108°23.1	-22°24.4
9	40°34.1	273°42.2	21°11.9	88°21.1	-21°56.3	178°31.0	-14°58.6	123°25.7	-22°24.4
10	55°36.6	288°41.6	21°11.2	103°23.2	-21°56.4	193°33.7	-14°58.6	138°28.4	-22°24.4
11	70°39.0	303°41.1	21°10.4	118°25.3	-21°56.5	208°36.3	-14°58.5	153°31.0	-22°24.4
12	85°41.5	318°40.5	21°09.7	133°27.4	-21°56.6	223°38.9	-14°58.5	168°33.7	-22°24.4
13	100°44.0	333°40.0	21°09.0	148°29.5	-21°56.7	238°41.6	-14°58.4	183°36.3	-22°24.5
14	115°46.4	348°39.4	21°08.3	163°31.7	-21°56.8	253°44.2	-14°58.4	198°39.0	-22°24.5
15	130°48.9	3°38.8	21°07.6	178°33.8	-21°56.9	268°46.9	-14°58.4	213°41.7	-22°24.5
16	145°51.4	18°38.3	21°06.9	193°35.9	-21°57.0	283°49.5	-14°58.3	228°44.3	-22°24.5
17	160°53.8	33°37.7	21°06.2	208°38.0	-21°57.2	298°52.1	-14°58.3	243°47.0	-22°24.5
18	175°56.3	48°37.2	21°05.5	223°40.2	-21°57.3	313°54.8	-14°58.2	258°49.6	-22°24.5
19	190°58.8	63°36.6	21°04.8	238°42.3	-21°57.4	328°57.4	-14°58.2	273°52.3	-22°24.5
20	206°01.2	78°36.1	21°04.0	253°44.4	-21°57.5	344°00.0	-14°58.2	288°55.0	-22°24.5
21	221°03.7	93°35.5	21°03.3	268°46.5	-21°57.6	359°02.6	-14°58.1	303°57.6	-22°24.5
22	236°06.1	108°35.0	21°02.6	283°48.7	-21°57.7	14°05.3	-14°58.1	319°00.3	-22°24.6
23	251°08.6	123°34.4	21°01.9	298°50.8	-21°57.8	29°07.9	-14°58.0	334°02.9	-22°24.6
Mer.pass.:6:18:		v-0.6 d-0.7 m-3.9		v2.1 d-0.1 m-1.8		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Stars

	SHA	**Dec**
Alpheratz	357°40.0	29°11.3
Ankaa	353°12.5	-42°12.2
Schedar	349°36.8	56°37.9
Diphda	348°52.5	-17°53.2
Achernar	335°24.6	-57°08.5
Hamal	327°57.2	23°32.7
Polaris	316°37.8	89°20.2
Akamar	315°16.1	-40°13.9
Menkar	314°11.8	4°09.5
Mirfak	308°35.9	49°55.2
Aldebaran	290°45.9	16°32.6
Rigel	281°09.2	-8°11.0
Capella	280°30.0	46°00.8
Bellatrix	278°28.7	6°21.8
Elnath	278°08.7	28°37.2
Alnilam	275°43.3	-1°11.6
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.5
Sirius	258°31.0	-16°44.5
Adara	255°10.2	-29°00.0
Procyon	244°56.4	5°10.7
Pollux	243°23.9	27°58.8
Avior	234°17.1	-59°34.4
Suhail	222°50.2	-43°30.7
Miaplacidus	221°39.5	-69°47.9
Alphard	217°52.9	-8°44.4
Regulus	207°40.0	11°52.7
Dubhe	193°47.7	61°39.4
Denebola	182°30.1	14°28.3
Gienah	175°48.7	-17°38.7
Acrux	173°05.3	-63°12.3
Gacrux	171°56.9	-57°13.2
Alioth	166°17.6	55°52.0
Spica	158°27.5	-11°15.4
Alcaid	152°56.0	49°13.6
Hadar	148°42.6	-60°27.8
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.6	-60°54.7
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.3	74°05.2
Alphecca	126°07.8	26°39.4
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.5
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°33.0
Etamin	90°44.0	51°29.3
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.3	38°48.1
Nunki	75°53.8	-26°16.2
Altair	62°04.7	8°55.1
Peacock	53°13.5	-56°40.2
Deneb	49°28.8	45°20.7
Enif	33°43.6	9°57.5
Alnair	27°39.4	-46°52.0
Fomalhaut	15°20.3	-29°31.3
Scheat	13°50.1	28°10.7
Markab	13°34.9	15°18.1

2018/6/1	**SHA**	**Mer.pass**
Venus	236°01.4	14:44
Mars	48°08.8	03:14
Jupiter	137°46.7	21:12
Saturn	82°40.6	00:56

2018/6/1	**SHA**	**Mer.pass**
Venus	234°48.2	14:45
Mars	47°59.2	03:11
Jupiter	137°51.1	21:08
Saturn	82°45.2	00:52

2018/6/1	**SHA**	**Mer.pass**
Venus	233°35.3	14:45
Mars	47°50.2	03:07
Jupiter	137°55.4	21:04
Saturn	82°49.9	00:48

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h Sun Moon

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	179°54.4	23°17.6	162°03.3	3.2	20°45.3	0.1	61.0
1	194°54.3	23°17.7	176°25.5	3.2	20°45.3	-0.0	61.0
2	209°54.1	23°17.8	190°47.6	3.2	20°45.2	-0.2	61.0
3	224°54.0	23°17.9	205°09.8	3.2	20°45.0	-0.3	61.0
4	239°53.9	23°18.0	219°32.0	3.2	20°44.6	-0.5	61.0
5	254°53.7	23°18.1	233°54.2	3.2	20°44.0	-0.6	61.0
6	269°53.6	23°18.2	248°16.4	3.2	20°43.3	-0.8	61.0
7	284°53.4	23°18.3	262°38.6	3.2	20°42.4	-1.0	61.0
8	299°53.3	23°18.4	277°00.8	3.2	20°41.4	-1.1	61.0
9	314°53.2	23°18.5	291°23.0	3.2	20°40.2	-1.3	61.0
10	329°53.0	23°18.6	305°45.3	3.3	20°38.9	-1.4	61.0
11	344°52.9	23°18.8	320°07.6	3.3	20°37.4	-1.6	61.0
12	359°52.8	23°18.9	334°29.9	3.3	20°35.8	-1.7	61.0
13	14°52.6	23°19.0	348°52.2	3.3	20°34.0	-1.9	60.9
14	29°52.5	23°19.1	3°14.6	3.4	20°32.0	-2.0	60.9
15	44°52.4	23°19.2	17°36.9	3.4	20°29.9	-2.2	60.9
16	59°52.2	23°19.3	31°59.4	3.4	20°27.6	-2.3	60.9
17	74°52.1	23°19.4	46°21.8	3.5	20°25.2	-2.5	60.9
18	89°52.0	23°19.5	60°44.3	3.5	20°22.7	-2.6	60.9
19	104°51.8	23°19.6	75°06.8	3.5	20°20.0	-2.8	60.9
20	119°51.7	23°19.6	89°29.4	3.6	20°17.1	-2.9	60.9
21	134°51.6	23°19.7	103°52.0	3.6	20°14.1	-3.1	60.9
22	149°51.4	23°19.8	118°14.6	3.7	20°10.9	-3.2	60.9
23	164°51.3	23°19.9	132°37.3	3.7	20°07.6	-3.4	60.9
	SD.=15.7	d=0.1			S.D.=16.6		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°51.2	23°20.0	147°00.0	3.8	20°04.2	-3.5	60.8
1	194°51.0	23°20.1	161°22.8	3.8	20°00.6	-3.7	60.8
2	209°50.9	23°20.2	175°45.6	3.9	19°56.8	-3.8	60.8
3	224°50.7	23°20.3	190°08.5	3.9	19°52.9	-4.0	60.8
4	239°50.6	23°20.4	204°31.5	4.0	19°48.9	-4.1	60.8
5	254°50.5	23°20.5	218°54.4	4.0	19°44.7	-4.2	60.8
6	269°50.3	23°20.6	233°17.5	4.1	19°40.4	-4.4	60.8
7	284°50.2	23°20.7	247°40.6	4.1	19°36.0	-4.5	60.8
8	299°50.1	23°20.8	262°03.7	4.2	19°31.4	-4.7	60.7
9	314°49.9	23°20.8	276°27.0	4.2	19°26.6	-4.8	60.7
10	329°49.8	23°20.9	290°50.2	4.3	19°21.8	-4.9	60.7
11	344°49.7	23°21.0	305°13.6	4.4	19°16.8	-5.1	60.7
12	359°49.5	23°21.1	319°37.0	4.4	19°11.6	-5.2	60.7
13	14°49.4	23°21.2	334°00.5	4.5	19°06.3	-5.3	60.7
14	29°49.3	23°21.3	348°24.0	4.6	19°00.9	-5.5	60.6
15	44°49.1	23°21.3	2°47.6	4.6	18°55.4	-5.6	60.6
16	59°49.0	23°21.4	17°11.3	4.7	18°49.7	-5.7	60.6
17	74°48.9	23°21.5	31°35.1	4.8	18°43.9	-5.9	60.6
18	89°48.7	23°21.6	45°58.9	4.9	18°38.0	-6.0	60.6
19	104°48.6	23°21.7	60°22.8	4.9	18°31.9	-6.1	60.5
20	119°48.4	23°21.8	74°46.7	5.0	18°25.7	-6.2	60.5
21	134°48.3	23°21.8	89°10.8	5.1	18°19.4	-6.4	60.5
22	149°48.2	23°21.9	103°34.9	5.2	18°13.0	-6.5	60.5
23	164°48.0	23°22.0	117°59.1	5.2	18°06.5	-6.6	60.5
	SD.=15.7	d=0.1			S.D.=16.6		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°47.9	23°22.1	132°23.4	5.3	17°59.8	-6.7	60.4
1	194°47.8	23°22.1	146°47.7	5.4	17°53.0	-6.8	60.4
2	209°47.6	23°22.2	161°12.1	5.5	17°46.1	-7.0	60.4
3	224°47.5	23°22.3	175°36.7	5.6	17°39.1	-7.1	60.4
4	239°47.4	23°22.4	190°01.2	5.6	17°31.9	-7.2	60.3
5	254°47.2	23°22.4	204°25.9	5.7	17°24.7	-7.3	60.3
6	269°47.1	23°22.5	218°50.7	5.8	17°17.3	-7.4	60.3
7	284°46.9	23°22.6	233°15.5	5.9	17°09.8	-7.5	60.3
8	299°46.8	23°22.7	247°40.4	6.0	17°02.3	-7.6	60.3
9	314°46.7	23°22.7	262°05.4	6.0	16°54.6	-7.7	60.2
10	329°46.5	23°22.8	276°30.5	6.1	16°46.8	-7.8	60.2
11	344°46.4	23°22.9	290°55.7	6.2	16°38.9	-8.0	60.2
12	359°46.3	23°22.9	305°21.0	6.3	16°30.9	-8.1	60.2
13	14°46.1	23°23.0	319°46.3	6.4	16°22.8	-8.2	60.1
14	29°46.0	23°23.1	334°11.7	6.5	16°14.6	-8.3	60.1
15	44°45.9	23°23.1	348°37.2	6.6	16°06.2	-8.4	60.1
16	59°45.7	23°23.2	3°02.8	6.6	15°57.8	-8.5	60.0
17	74°45.6	23°23.3	17°28.5	6.7	15°49.3	-8.5	60.0
18	89°45.4	23°23.3	31°54.3	6.8	15°40.7	-8.6	60.0
19	104°45.3	23°23.4	46°20.2	6.9	15°32.1	-8.7	60.0
20	119°45.2	23°23.4	60°46.1	7.0	15°23.3	-8.8	59.9
21	134°45.0	23°23.5	75°12.2	7.1	15°14.4	-8.9	59.9
22	149°44.9	23°23.6	89°38.3	7.2	15°05.5	-9.0	59.9
23	164°44.8	23°23.6	104°04.5	7.3	14°56.4	-9.1	59.9
	SD.=15.7	d=0.1			S.D.=16.5		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:33	22:29	–:–	–:–
62	–:–	–:–	02:10	21:52	–:–	–:–
60	–:–	00:52	02:36	21:26	23:10	–:–
58	–:–	01:41	02:56	21:05	22:21	–:–
56	–:–	02:11	03:13	20:49	21:51	–:–
54	00:48	02:33	03:27	20:34	21:29	23:15
52	01:33	02:51	03:39	20:22	21:11	22:29
50	02:00	03:06	03:50	20:11	20:56	22:01
45	02:46	03:35	04:13	19:49	20:26	21:16
40	03:16	03:58	04:31	19:31	20:04	20:45
35	03:39	04:16	04:46	19:16	19:46	20:22
30	03:58	04:31	04:59	19:03	19:30	20:04
20	04:27	04:56	05:21	18:41	19:05	19:35
10	04:49	05:16	05:40	18:22	18:45	19:12
0	05:08	05:35	05:57	18:04	18:27	18:53
-10	05:25	05:52	06:14	17:47	18:10	18:36
-20	05:41	06:09	06:33	17:28	17:52	18:20
-30	05:58	06:28	06:54	17:07	17:34	18:04
-35	06:07	06:38	07:06	16:55	17:23	17:55
-40	06:16	06:50	07:21	16:41	17:11	17:45
-45	06:26	07:03	07:37	16:24	16:58	17:35
-50	06:38	07:20	07:58	16:03	16:42	17:23
-52	06:43	07:27	08:08	15:53	16:34	17:18
-54	06:49	07:35	08:19	15:42	16:26	17:12
-56	06:55	07:44	08:32	15:30	16:17	17:06
-58	07:02	07:54	08:46	15:15	16:07	16:60
-60	07:09	08:06	09:04	14:58	15:55	16:52

	Moonrise			Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	04:26	–:–	–:–	02:24
70	–:–	02:60	05:31	–:–	01:42	01:18
68	02:45	04:15	06:06	–:–	00:27	00:42
66	03:31	04:52	06:32	23:49	–:–	00:16
64	04:01	05:18	06:51	23:23	23:55	–:–
62	04:23	05:39	07:07	23:02	23:39	–:–
60	04:42	05:55	07:20	22:45	23:25	23:53
58	04:57	06:09	07:32	22:31	23:13	23:44
56	05:10	06:21	07:42	22:18	23:03	23:36
54	05:21	06:32	07:50	22:07	22:54	23:29
52	05:31	06:41	07:58	21:58	22:45	23:23
50	05:40	06:50	08:05	21:49	22:38	23:17
45	05:59	07:07	08:20	21:31	22:22	23:05
40	06:15	07:22	08:32	21:16	22:09	22:54
35	06:28	07:34	08:43	21:04	21:58	22:46
30	06:39	07:45	08:52	20:53	21:48	22:38
20	06:59	08:03	09:07	20:34	21:31	22:24
10	07:16	08:19	09:21	20:17	21:17	22:12
0	07:31	08:34	09:34	20:01	21:03	22:01
-10	07:47	08:49	09:46	19:46	20:49	21:49
-20	08:05	09:05	09:60	19:29	20:34	21:37
-30	08:24	09:23	10:15	19:10	20:16	21:23
-35	08:36	09:34	10:24	18:58	20:06	21:15
-40	08:49	09:46	10:35	18:45	19:55	21:06
-45	09:04	10:00	10:46	18:30	19:41	20:55
-50	09:24	10:17	11:01	18:11	19:24	20:41
-52	09:33	10:26	11:08	18:02	19:16	20:35
-54	09:43	10:35	11:15	17:52	19:08	20:28
-56	09:54	10:45	11:23	17:41	18:58	20:20
-58	10:07	10:57	11:33	17:28	18:46	20:12
-60	10:23	11:10	11:43	17:13	18:33	20:02

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
15	00:22	00:29	12:00	13:46	01:14	2(4%)
16	00:35	00:42	12:00	14:48	02:17	3(10%)
17	00:48	00:55	12:00	15:47	03:18	4(19%)

June 18, 19 ,20 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	266°11.1	138°33.9	21°01.2	313°52.9	-21°57.9	44°10.5	-14°58.0	349°05.6	-22°24.6
1	281°13.5	153°33.3	21°00.4	328°55.1	-21°58.0	59°13.2	-14°58.0	4°08.2	-22°24.6
2	296°16.0	168°32.8	20°59.7	343°57.2	-21°58.1	74°15.8	-14°57.9	19°10.9	-22°24.6
3	311°18.5	183°32.2	20°59.0	358°59.3	-21°58.2	89°18.4	-14°57.9	34°13.6	-22°24.6
4	326°20.9	198°31.7	20°58.3	14°01.5	-21°58.3	104°21.1	-14°57.8	49°16.2	-22°24.6
5	341°23.4	213°31.1	20°57.6	29°03.6	-21°58.4	119°23.7	-14°57.8	64°18.9	-22°24.6
6	356°25.9	228°30.6	20°56.8	44°05.8	-21°58.5	134°26.3	-14°57.8	79°21.5	-22°24.7
7	11°28.3	243°30.1	20°56.1	59°07.9	-21°58.6	149°29.0	-14°57.7	94°24.2	-22°24.7
8	26°30.8	258°29.5	20°55.4	74°10.1	-21°58.7	164°31.6	-14°57.7	109°26.9	-22°24.7
9	41°33.2	273°29.0	20°54.6	89°12.2	-21°58.8	179°34.2	-14°57.6	124°29.5	-22°24.7
10	56°35.7	288°28.4	20°53.9	104°14.3	-21°58.9	194°36.8	-14°57.6	139°32.2	-22°24.7
11	71°38.2	303°27.9	20°53.2	119°16.5	-21°59.0	209°39.5	-14°57.6	154°34.8	-22°24.7
12	86°40.6	318°27.4	20°52.5	134°18.6	-21°59.1	224°42.1	-14°57.5	169°37.5	-22°24.7
13	101°43.1	333°26.8	20°51.7	149°20.8	-21°59.3	239°44.7	-14°57.5	184°40.1	-22°24.7
14	116°45.6	348°26.3	20°51.0	164°22.9	-21°59.4	254°47.4	-14°57.4	199°42.8	-22°24.7
15	131°48.0	3°25.7	20°50.3	179°25.1	-21°59.5	269°50.0	-14°57.4	214°45.5	-22°24.8
16	146°50.5	18°25.2	20°49.5	194°27.2	-21°59.6	284°52.6	-14°57.4	229°48.1	-22°24.8
17	161°53.0	33°24.7	20°48.8	209°29.4	-21°59.7	299°55.2	-14°57.3	244°50.8	-22°24.8
18	176°55.4	48°24.1	20°48.1	224°31.5	-21°59.8	314°57.9	-14°57.3	259°53.4	-22°24.8
19	191°57.9	63°23.6	20°47.3	239°33.7	-21°59.9	330°00.5	-14°57.3	274°56.1	-22°24.8
20	207°00.4	78°23.1	20°46.6	254°35.9	-22°00.0	345°03.1	-14°57.2	289°58.8	-22°24.8
21	222°02.8	93°22.5	20°45.8	269°38.0	-22°00.1	0°05.7	-14°57.2	305°01.4	-22°24.8
22	237°05.3	108°22.0	20°45.1	284°40.2	-22°00.3	15°08.4	-14°57.1	320°04.1	-22°24.8
23	252°07.7	123°21.5	20°44.4	299°42.3	-22°00.4	30°11.0	-14°57.1	335°06.7	-22°24.9
Mer.pass.:6:14:		v-0.5 d-0.7 m-3.9		v2.1 d-0.1 m-1.8		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	267°10.2	138°20.9	20°43.6	314°44.5	-22°00.5	45°13.6	-14°57.1	350°09.4	-22°24.9
1	282°12.7	153°20.4	20°42.9	329°46.7	-22°00.6	60°16.2	-14°57.0	5°12.1	-22°24.9
2	297°15.1	168°19.9	20°42.1	344°48.8	-22°00.7	75°18.9	-14°57.0	20°14.7	-22°24.9
3	312°17.6	183°19.3	20°41.4	359°51.0	-22°00.8	90°21.5	-14°57.0	35°17.4	-22°24.9
4	327°20.1	198°18.8	20°40.7	14°53.2	-22°00.9	105°24.1	-14°56.9	50°20.0	-22°24.9
5	342°22.5	213°18.3	20°39.9	29°55.3	-22°01.0	120°26.7	-14°56.9	65°22.7	-22°24.9
6	357°25.0	228°17.7	20°39.2	44°57.5	-22°01.2	135°29.4	-14°56.8	80°25.4	-22°24.9
7	12°27.5	243°17.2	20°38.4	59°59.7	-22°01.3	150°32.0	-14°56.8	95°28.0	-22°24.9
8	27°29.9	258°16.7	20°37.7	75°01.9	-22°01.4	165°34.6	-14°56.8	110°30.7	-22°25.0
9	42°32.4	273°16.2	20°36.9	90°04.0	-22°01.5	180°37.2	-14°56.7	125°33.3	-22°25.0
10	57°34.9	288°15.6	20°36.2	105°06.2	-22°01.6	195°39.8	-14°56.7	140°36.0	-22°25.0
11	72°37.3	303°15.1	20°35.4	120°08.4	-22°01.7	210°42.5	-14°56.7	155°38.7	-22°25.0
12	87°39.8	318°14.6	20°34.7	135°10.6	-22°01.9	225°45.1	-14°56.6	170°41.3	-22°25.0
13	102°42.2	333°14.1	20°33.9	150°12.7	-22°02.0	240°47.7	-14°56.6	185°44.0	-22°25.0
14	117°44.7	348°13.5	20°33.2	165°14.9	-22°02.1	255°50.3	-14°56.6	200°46.6	-22°25.0
15	132°47.2	3°13.0	20°32.4	180°17.1	-22°02.2	270°52.9	-14°56.5	215°49.3	-22°25.0
16	147°49.6	18°12.5	20°31.6	195°19.3	-22°02.3	285°55.6	-14°56.5	230°52.0	-22°25.0
17	162°52.1	33°12.0	20°30.9	210°21.5	-22°02.4	300°58.2	-14°56.4	245°54.6	-22°25.1
18	177°54.6	48°11.5	20°30.1	225°23.7	-22°02.6	316°00.8	-14°56.4	260°57.3	-22°25.1
19	192°57.0	63°10.9	20°29.4	240°25.8	-22°02.7	331°03.4	-14°56.4	275°59.9	-22°25.1
20	207°59.5	78°10.4	20°28.6	255°28.0	-22°02.8	346°06.0	-14°56.3	291°02.6	-22°25.1
21	223°02.0	93°09.9	20°27.9	270°30.2	-22°02.9	1°08.7	-14°56.3	306°05.3	-22°25.1
22	238°04.4	108°09.4	20°27.1	285°32.4	-22°03.0	16°11.3	-14°56.3	321°07.9	-22°25.1
23	253°06.9	123°08.9	20°26.3	300°34.6	-22°03.2	31°13.9	-14°56.2	336°10.6	-22°25.1
Mer.pass.:6:10:		v-0.5 d-0.7 m-3.9		v2.2 d-0.1 m-1.8		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	268°09.3	138°08.3	20°25.6	315°36.8	-22°03.3	46°16.5	-14°56.2	351°13.2	-22°25.1
1	283°11.8	153°07.8	20°24.8	330°39.0	-22°03.4	61°19.1	-14°56.2	6°15.9	-22°25.2
2	298°14.3	168°07.3	20°24.0	345°41.2	-22°03.5	76°21.8	-14°56.1	21°18.6	-22°25.2
3	313°16.7	183°06.8	20°23.3	0°43.4	-22°03.7	91°24.4	-14°56.1	36°21.2	-22°25.2
4	328°19.2	198°06.3	20°22.5	15°45.6	-22°03.8	106°27.0	-14°56.1	51°23.9	-22°25.2
5	343°21.7	213°05.8	20°21.7	30°47.8	-22°03.9	121°29.6	-14°56.0	66°26.5	-22°25.2
6	358°24.1	228°05.3	20°21.0	45°50.0	-22°04.0	136°32.2	-14°56.0	81°29.2	-22°25.2
7	13°26.6	243°04.8	20°20.2	60°52.2	-22°04.1	151°34.8	-14°55.9	96°31.9	-22°25.2
8	28°29.1	258°04.2	20°19.4	75°54.4	-22°04.3	166°37.5	-14°55.9	111°34.5	-22°25.2
9	43°31.5	273°03.7	20°18.7	90°56.6	-22°04.4	181°40.1	-14°55.9	126°37.2	-22°25.2
10	58°34.0	288°03.2	20°17.9	105°58.8	-22°04.5	196°42.7	-14°55.8	141°39.8	-22°25.3
11	73°36.5	303°02.7	20°17.1	121°01.0	-22°04.6	211°45.3	-14°55.8	156°42.5	-22°25.3
12	88°38.9	318°02.2	20°16.3	136°03.2	-22°04.8	226°47.9	-14°55.8	171°45.2	-22°25.3
13	103°41.4	333°01.7	20°15.6	151°05.4	-22°04.9	241°50.5	-14°55.7	186°47.8	-22°25.3
14	118°43.8	348°01.2	20°14.8	166°07.6	-22°05.0	256°53.1	-14°55.7	201°50.5	-22°25.3
15	133°46.3	3°00.7	20°14.0	181°09.8	-22°05.2	271°55.8	-14°55.7	216°53.1	-22°25.3
16	148°48.8	18°00.2	20°13.2	196°12.1	-22°05.3	286°58.4	-14°55.6	231°55.8	-22°25.3
17	163°51.2	32°59.7	20°12.5	211°14.3	-22°05.4	302°01.0	-14°55.6	246°58.5	-22°25.3
18	178°53.7	47°59.2	20°11.7	226°16.5	-22°05.5	317°03.6	-14°55.6	262°01.1	-22°25.4
19	193°56.2	62°58.7	20°10.9	241°18.7	-22°05.7	332°06.2	-14°55.5	277°03.8	-22°25.4
20	208°58.6	77°58.2	20°10.1	256°20.9	-22°05.8	347°08.8	-14°55.5	292°06.4	-22°25.4
21	224°01.1	92°57.7	20°09.3	271°23.1	-22°05.9	2°11.4	-14°55.5	307°09.1	-22°25.4
22	239°03.6	107°57.2	20°08.6	286°25.4	-22°06.0	17°14.0	-14°55.4	322°11.8	-22°25.4
23	254°06.0	122°56.7	20°07.8	301°27.6	-22°06.2	32°16.7	-14°55.4	337°14.4	-22°25.4
Mer.pass.:6:06:		v-0.5 d-0.8 m-3.9		v2.2 d-0.1 m-1.9		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Stars

	SHA	**Dec**
Alpheratz	357°40.0	29°11.3
Ankaa	353°12.5	-42°12.2
Schedar	349°36.7	56°37.9
Diphda	348°52.5	-17°53.1
Achernar	335°24.6	-57°08.5
Hamal	327°57.2	23°32.7
Polaris	316°36.8	89°20.1
Akamar	315°16.1	-40°13.9
Menkar	314°11.8	4°09.5
Mirfak	308°35.9	49°55.2
Aldebaran	290°45.8	16°32.6
Rigel	281°09.1	-8°11.0
Capella	280°29.9	46°00.8
Bellatrix	278°28.7	6°21.8
Elnath	278°08.7	28°37.2
Alnilam	275°43.3	-1°11.6
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.5
Sirius	258°31.0	-16°44.5
Adara	255°10.2	-29°00.0
Procyon	244°56.4	5°10.7
Pollux	243°23.9	27°58.8
Avior	234°17.2	-59°34.4
Suhail	222°50.2	-43°30.7
Miaplacidus	221°39.6	-69°47.9
Alphard	217°53.0	-8°44.4
Regulus	207°40.0	11°52.7
Dubhe	193°47.8	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.7	-17°38.7
Acrux	173°05.3	-63°12.3
Gacrux	171°56.9	-57°13.2
Alioth	166°17.6	55°52.0
Spica	158°27.5	-11°15.4
Alcaid	152°56.0	49°13.6
Hadar	148°42.6	-60°27.8
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.6	-60°54.7
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.3	74°05.2
Alphecca	126°07.8	26°39.4
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.5
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°33.0
Etamin	90°44.0	51°29.3
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.3	38°48.1
Nunki	75°53.8	-26°16.2
Altair	62°04.7	8°55.1
Peacock	53°13.5	-56°40.2
Deneb	49°28.8	45°20.7
Enif	33°43.6	9°57.5
Alnair	27°39.3	-46°52.0
Fomalhaut	15°20.2	-29°31.3
Scheat	13°50.0	28°10.8
Markab	13°34.9	15°18.1

2018/6/1	**SHA**	**Mer.pass**
Venus	232°22.8	14:46
Mars	47°41.9	03:04
Jupiter	137°59.5	20:60
Saturn	82°54.5	00:43

2018/6/1	**SHA**	**Mer.pass**
Venus	231°10.7	14:47
Mars	47°34.3	03:01
Jupiter	138°03.4	20:55
Saturn	82°59.2	00:39

2018/6/2	**SHA**	**Mer.pass**
Venus	229°59.0	14:48
Mars	47°27.4	02:57
Jupiter	138°07.2	20:51
Saturn	83°03.9	00:35

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°44.6	23°23.7	118°30.8	7.3	14°47.3	-9.2	59.8
1	194°44.5	23°23.7	132°57.2	7.4	14°38.1	-9.3	59.8
2	209°44.4	23°23.8	147°23.7	7.5	14°28.8	-9.3	59.8
3	224°44.2	23°23.9	161°50.2	7.6	14°19.4	-9.4	59.7
4	239°44.1	23°23.9	176°16.9	7.7	14°09.9	-9.5	59.7
5	254°43.9	23°24.0	190°43.6	7.8	14°00.4	-9.6	59.7
6	269°43.8	23°24.0	205°10.4	7.9	13°50.8	-9.7	59.7
7	284°43.7	23°24.1	219°37.3	8.0	13°41.1	-9.7	59.6
8	299°43.5	23°24.1	234°04.3	8.0	13°31.3	-9.8	59.6
9	314°43.4	23°24.2	248°31.4	8.1	13°21.5	-9.9	59.6
10	329°43.3	23°24.2	262°58.6	8.2	13°11.6	-9.9	59.5
11	344°43.1	23°24.3	277°25.8	8.3	13°01.6	-10.0	59.5
12	359°43.0	23°24.3	291°53.2	8.4	12°51.6	-10.1	59.5
13	14°42.9	23°24.4	306°20.6	8.5	12°41.4	-10.1	59.4
14	29°42.7	23°24.4	320°48.1	8.6	12°31.3	-10.2	59.4
15	44°42.6	23°24.5	335°15.7	8.6	12°21.0	-10.3	59.4
16	59°42.4	23°24.5	349°43.4	8.7	12°10.7	-10.3	59.4
17	74°42.3	23°24.6	4°11.1	8.8	12°00.4	-10.4	59.3
18	89°42.2	23°24.6	18°39.0	8.9	11°49.9	-10.5	59.3
19	104°42.0	23°24.7	33°06.9	9.0	11°39.5	-10.5	59.3
20	119°41.9	23°24.7	47°34.9	9.0	11°28.9	-10.6	59.2
21	134°41.8	23°24.8	62°03.0	9.1	11°18.3	-10.6	59.2
22	149°41.6	23°24.8	76°31.2	9.2	11°07.7	-10.7	59.2
23	164°41.5	23°24.9	90°59.4	9.3	10°57.0	-10.7	59.1
	SD.=15.7	d=0.1			S.D.=16.3		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°41.4	23°24.9	105°27.7	9.4	10°46.2	-10.8	59.1
1	194°41.2	23°24.9	119°56.2	9.4	10°35.4	-10.8	59.1
2	209°41.1	23°25.0	134°24.6	9.5	10°24.6	-10.9	59.0
3	224°40.9	23°25.0	148°53.2	9.6	10°13.7	-10.9	59.0
4	239°40.8	23°25.1	163°21.8	9.7	10°02.7	-11.0	59.0
5	254°40.7	23°25.1	177°50.6	9.8	9°51.7	-11.0	58.9
6	269°40.5	23°25.1	192°19.3	9.8	9°40.7	-11.1	58.9
7	284°40.4	23°25.2	206°48.2	9.9	9°29.6	-11.1	58.9
8	299°40.3	23°25.2	221°17.2	10.0	9°18.5	-11.1	58.8
9	314°40.1	23°25.2	235°46.2	10.1	9°07.4	-11.2	58.8
10	329°40.0	23°25.3	250°15.3	10.1	8°56.2	-11.2	58.8
11	344°39.9	23°25.3	264°44.4	10.2	8°45.0	-11.2	58.7
12	359°39.7	23°25.4	279°13.7	10.3	8°33.7	-11.3	58.7
13	14°39.6	23°25.4	293°43.0	10.3	8°22.4	-11.3	58.7
14	29°39.4	23°25.4	308°12.3	10.4	8°11.1	-11.3	58.6
15	44°39.3	23°25.4	322°41.8	10.5	7°59.7	-11.4	58.6
16	59°39.2	23°25.5	337°11.3	10.5	7°48.3	-11.4	58.6
17	74°39.0	23°25.5	351°40.9	10.6	7°36.9	-11.4	58.5
18	89°38.9	23°25.5	6°10.5	10.7	7°25.4	-11.5	58.5
19	104°38.8	23°25.6	20°40.2	10.7	7°14.0	-11.5	58.5
20	119°38.6	23°25.6	35°10.0	10.8	7°02.5	-11.5	58.4
21	134°38.5	23°25.6	49°39.8	10.9	6°50.9	-11.5	58.4
22	149°38.4	23°25.6	64°09.7	10.9	6°39.4	-11.6	58.4
23	164°38.2	23°25.7	78°39.7	11.0	6°27.8	-11.6	58.4
	SD.=15.7	d=0.0			S.D.=16.1		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°38.1	23°25.7	93°09.7	11.1	6°16.2	-11.6	58.3
1	194°37.9	23°25.7	107°39.8	11.1	6°04.6	-11.6	58.3
2	209°37.8	23°25.7	122°09.9	11.2	5°53.0	-11.6	58.3
3	224°37.7	23°25.8	136°40.2	11.2	5°41.3	-11.7	58.2
4	239°37.5	23°25.8	151°10.4	11.3	5°29.6	-11.7	58.2
5	254°37.4	23°25.8	165°40.7	11.4	5°18.0	-11.7	58.2
6	269°37.3	23°25.8	180°11.1	11.4	5°06.3	-11.7	58.1
7	284°37.1	23°25.9	194°41.6	11.5	4°54.6	-11.7	58.1
8	299°37.0	23°25.9	209°12.0	11.5	4°42.8	-11.7	58.1
9	314°36.9	23°25.9	223°42.6	11.6	4°31.1	-11.7	58.0
10	329°36.7	23°25.9	238°13.2	11.6	4°19.4	-11.7	58.0
11	344°36.6	23°25.9	252°43.8	11.7	4°07.6	-11.8	58.0
12	359°36.4	23°25.9	267°14.5	11.7	3°55.8	-11.8	57.9
13	14°36.3	23°26.0	281°45.3	11.8	3°44.1	-11.8	57.9
14	29°36.2	23°26.0	296°16.1	11.8	3°32.3	-11.8	57.9
15	44°36.0	23°26.0	310°46.9	11.9	3°20.5	-11.8	57.8
16	59°35.9	23°26.0	325°17.8	11.9	3°08.7	-11.8	57.8
17	74°35.8	23°26.0	339°48.8	12.0	2°57.0	-11.8	57.8
18	89°35.6	23°26.0	354°19.7	12.0	2°45.2	-11.8	57.7
19	104°35.5	23°26.0	8°50.8	12.1	2°33.4	-11.8	57.7
20	119°35.4	23°26.0	23°21.8	12.1	2°21.6	-11.8	57.7
21	134°35.2	23°26.1	37°53.0	12.1	2°09.8	-11.8	57.6
22	149°35.1	23°26.1	52°24.1	12.2	1°58.0	-11.8	57.6
23	164°34.9	23°26.1	66°55.3	12.2	1°46.2	-11.8	57.6
	SD.=15.7	d=0.0			S.D.=15.9		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:31	22:32	–:–	–:–
62	–:–	–:–	02:09	21:54	–:–	–:–
60	–:–	00:50	02:36	21:27	23:14	–:–
58	–:–	01:40	02:56	21:07	22:23	–:–
56	–:–	02:10	03:13	20:50	21:53	–:–
54	00:45	02:33	03:27	20:36	21:30	23:18
52	01:32	02:51	03:40	20:23	21:12	22:31
50	02:00	03:06	03:50	20:12	20:57	22:03
45	02:46	03:35	04:13	19:50	20:27	21:17
40	03:16	03:58	04:31	19:32	20:05	20:46
35	03:40	04:16	04:46	19:17	19:46	20:23
30	03:58	04:32	04:59	19:04	19:31	20:05
20	04:27	04:57	05:21	18:42	19:06	19:35
10	04:50	05:17	05:40	18:23	18:46	19:13
0	05:09	05:35	05:58	18:05	18:28	18:54
-10	05:26	05:52	06:15	17:48	18:10	18:37
-20	05:42	06:10	06:34	17:29	17:53	18:21
-30	05:59	06:29	06:55	17:08	17:34	18:04
-35	06:07	06:39	07:07	16:55	17:24	17:55
-40	06:17	06:51	07:22	16:41	17:12	17:46
-45	06:27	07:04	07:38	16:24	16:58	17:35
-50	06:39	07:21	07:59	16:04	16:42	17:24
-52	06:44	07:28	08:09	15:54	16:35	17:18
-54	06:50	07:36	08:20	15:43	16:26	17:13
-56	06:56	07:45	08:33	15:30	16:17	17:07
-58	07:03	07:56	08:48	15:15	16:07	16:60
-60	07:10	08:07	09:05	14:58	15:55	16:52

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	07:11	09:22	11:21	01:38	01:18	01:04
70	07:39	09:37	11:27	01:09	01:02	00:56
68	07:60	09:48	11:31	00:47	00:49	00:49
66	08:16	09:58	11:35	00:30	00:38	00:43
64	08:29	10:05	11:39	00:15	00:29	00:38
62	08:40	10:12	11:41	00:03	00:21	00:34
60	08:50	10:18	11:44	–:–	00:14	00:30
58	08:58	10:23	11:46	–:–	00:08	00:27
56	09:05	10:28	11:48	–:–	00:03	00:24
54	09:11	10:32	11:50	23:58	–:–	00:22
52	09:17	10:35	11:51	23:53	–:–	00:19
50	09:22	10:39	11:53	23:49	–:–	00:17
45	09:33	10:46	11:56	23:41	–:–	00:12
40	09:43	10:52	11:58	23:33	–:–	00:08
35	09:51	10:57	12:01	23:27	–:–	00:04
30	09:58	11:01	12:03	23:22	–:–	00:01
20	10:10	11:09	12:06	23:12	23:56	–:–
10	10:20	11:16	12:09	23:03	23:51	–:–
0	10:30	11:22	12:12	22:55	23:46	–:–
-10	10:40	11:29	12:15	22:47	23:42	–:–
-20	10:50	11:36	12:18	22:38	23:37	–:–
-30	11:02	11:43	12:21	22:28	23:31	–:–
-35	11:09	11:48	12:23	22:22	23:28	–:–
-40	11:16	11:53	12:26	22:16	23:24	–:–
-45	11:25	11:59	12:28	22:08	23:19	–:–
-50	11:36	12:05	12:31	21:59	23:14	–:–
-52	11:41	12:09	12:33	21:54	23:12	–:–
-54	11:47	12:12	12:34	21:49	23:09	–:–
-56	11:53	12:16	12:36	21:44	23:06	–:–
-58	11:59	12:20	12:38	21:38	23:03	–:–
-60	12:07	12:25	12:40	21:31	22:59	–:–

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
18	01:01	01:08	12:01	16:42	04:15	5(29%)
19	01:15	01:21	12:01	17:34	05:08	6(40%)
20	01:28	01:34	12:01	18:23	05:59	7(51%)

June 21, 22 ,23 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	269°08.5	137°56.2	20°07.0	316°29.8	-22°06.3	47°19.3	-14°55.4	352°17.1	-22°25.4
1	284°11.0	152°55.7	20°06.2	331°32.0	-22°06.4	62°21.9	-14°55.3	7°19.7	-22°25.4
2	299°13.4	167°55.2	20°05.4	346°34.3	-22°06.6	77°24.5	-14°55.3	22°22.4	-22°25.4
3	314°15.9	182°54.7	20°04.6	1°36.5	-22°06.7	92°27.1	-14°55.3	37°25.1	-22°25.5
4	329°18.3	197°54.2	20°03.9	16°38.7	-22°06.8	107°29.7	-14°55.2	52°27.7	-22°25.5
5	344°20.8	212°53.7	20°03.1	31°40.9	-22°07.0	122°32.3	-14°55.2	67°30.4	-22°25.5
6	359°23.3	227°53.2	20°02.3	46°43.2	-22°07.1	137°34.9	-14°55.2	82°33.0	-22°25.5
7	14°25.7	242°52.7	20°01.5	61°45.4	-22°07.2	152°37.5	-14°55.1	97°35.7	-22°25.5
8	29°28.2	257°52.2	20°00.7	76°47.6	-22°07.4	167°40.1	-14°55.1	112°38.4	-22°25.5
9	44°30.7	272°51.7	19°59.9	91°49.9	-22°07.5	182°42.7	-14°55.1	127°41.0	-22°25.5
10	59°33.1	287°51.2	19°59.1	106°52.1	-22°07.6	197°45.4	-14°55.0	142°43.7	-22°25.5
11	74°35.6	302°50.7	19°58.3	121°54.3	-22°07.8	212°48.0	-14°55.0	157°46.4	-22°25.5
12	89°38.1	317°50.2	19°57.5	136°56.6	-22°07.9	227°50.6	-14°55.0	172°49.0	-22°25.6
13	104°40.5	332°49.8	19°56.7	151°58.8	-22°08.0	242°53.2	-14°54.9	187°51.7	-22°25.6
14	119°43.0	347°49.3	19°55.9	167°01.1	-22°08.2	257°55.8	-14°54.9	202°54.3	-22°25.6
15	134°45.4	2°48.8	19°55.1	182°03.3	-22°08.3	272°58.4	-14°54.9	217°57.0	-22°25.6
16	149°47.9	17°48.3	19°54.3	197°05.6	-22°08.4	288°01.0	-14°54.8	232°59.7	-22°25.6
17	164°50.4	32°47.8	19°53.5	212°07.8	-22°08.6	303°03.6	-14°54.8	248°02.3	-22°25.6
18	179°52.8	47°47.3	19°52.7	227°10.0	-22°08.7	318°06.2	-14°54.8	263°05.0	-22°25.6
19	194°55.3	62°46.8	19°51.9	242°12.3	-22°08.8	333°08.8	-14°54.7	278°07.6	-22°25.6
20	209°57.8	77°46.3	19°51.1	257°14.5	-22°09.0	348°11.4	-14°54.7	293°10.3	-22°25.7
21	225°00.2	92°45.9	19°50.3	272°16.8	-22°09.1	3°14.0	-14°54.7	308°13.0	-22°25.7
22	240°02.7	107°45.4	19°49.5	287°19.0	-22°09.3	18°16.6	-14°54.7	323°15.6	-22°25.7
23	255°05.2	122°44.9	19°48.7	302°21.3	-22°09.4	33°19.2	-14°54.6	338°18.3	-22°25.7
Mer.pass.:6:02:		v-0.5 d-0.8 m-3.9		v2.2 d-0.1 m-1.9		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	270°07.6	137°44.4	19°47.9	317°23.5	-22°09.5	48°21.8	-14°54.6	353°20.9	-22°25.7
1	285°10.1	152°43.9	19°47.1	332°25.8	-22°09.7	63°24.4	-14°54.6	8°23.6	-22°25.7
2	300°12.6	167°43.4	19°46.3	347°28.1	-22°09.8	78°27.0	-14°54.5	23°26.3	-22°25.7
3	315°15.0	182°43.0	19°45.5	2°30.3	-22°10.0	93°29.7	-14°54.5	38°28.9	-22°25.7
4	330°17.5	197°42.5	19°44.7	17°32.6	-22°10.1	108°32.3	-14°54.5	53°31.6	-22°25.7
5	345°19.9	212°42.0	19°43.9	32°34.8	-22°10.2	123°34.9	-14°54.4	68°34.3	-22°25.8
6	0°22.4	227°41.5	19°43.1	47°37.1	-22°10.4	138°37.5	-14°54.4	83°36.9	-22°25.8
7	15°24.9	242°41.0	19°42.3	62°39.4	-22°10.5	153°40.1	-14°54.4	98°39.6	-22°25.8
8	30°27.3	257°40.6	19°41.5	77°41.6	-22°10.7	168°42.7	-14°54.3	113°42.2	-22°25.8
9	45°29.8	272°40.1	19°40.6	92°43.9	-22°10.8	183°45.3	-14°54.3	128°44.9	-22°25.8
10	60°32.3	287°39.6	19°39.8	107°46.2	-22°10.9	198°47.9	-14°54.3	143°47.6	-22°25.8
11	75°34.7	302°39.1	19°39.0	122°48.4	-22°11.1	213°50.5	-14°54.3	158°50.2	-22°25.8
12	90°37.2	317°38.7	19°38.2	137°50.7	-22°11.2	228°53.1	-14°54.2	173°52.9	-22°25.8
13	105°39.7	332°38.2	19°37.4	152°53.0	-22°11.4	243°55.7	-14°54.2	188°55.5	-22°25.8
14	120°42.1	347°37.7	19°36.6	167°55.2	-22°11.5	258°58.3	-14°54.2	203°58.2	-22°25.9
15	135°44.6	2°37.3	19°35.8	182°57.5	-22°11.7	274°00.9	-14°54.1	219°00.9	-22°25.9
16	150°47.1	17°36.8	19°34.9	197°59.8	-22°11.8	289°03.5	-14°54.1	234°03.5	-22°25.9
17	165°49.5	32°36.3	19°34.1	213°02.1	-22°11.9	304°06.1	-14°54.1	249°06.2	-22°25.9
18	180°52.0	47°35.8	19°33.3	228°04.3	-22°12.1	319°08.7	-14°54.0	264°08.9	-22°25.9
19	195°54.4	62°35.4	19°32.5	243°06.6	-22°12.2	334°11.3	-14°54.0	279°11.5	-22°25.9
20	210°56.9	77°34.9	19°31.7	258°08.9	-22°12.4	349°13.9	-14°54.0	294°14.2	-22°25.9
21	225°59.4	92°34.4	19°30.8	273°11.2	-22°12.5	4°16.5	-14°54.0	309°16.8	-22°25.9
22	241°01.8	107°34.0	19°30.0	288°13.5	-22°12.7	19°19.1	-14°53.9	324°19.5	-22°26.0
23	256°04.3	122°33.5	19°29.2	303°15.7	-22°12.8	34°21.7	-14°53.9	339°22.2	-22°26.0
Mer.pass.:5:58:		v-0.5 d-0.8 m-4.0		v2.3 d-0.1 m-1.9		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	271°06.8	137°33.0	19°28.4	318°18.0	-22°13.0	49°24.3	-14°53.9	354°24.8	-22°26.0
1	286°09.2	152°32.6	19°27.5	333°20.3	-22°13.1	64°26.8	-14°53.8	9°27.5	-22°26.0
2	301°11.7	167°32.1	19°26.7	348°22.6	-22°13.3	79°29.4	-14°53.8	24°30.2	-22°26.0
3	316°14.2	182°31.6	19°25.9	3°24.9	-22°13.4	94°32.0	-14°53.8	39°32.8	-22°26.0
4	331°16.6	197°31.2	19°25.1	18°27.2	-22°13.6	109°34.6	-14°53.7	54°35.5	-22°26.0
5	346°19.1	212°30.7	19°24.2	33°29.5	-22°13.7	124°37.2	-14°53.7	69°38.1	-22°26.0
6	1°21.5	227°30.3	19°23.4	48°31.8	-22°13.9	139°39.8	-14°53.7	84°40.8	-22°26.0
7	16°24.0	242°29.8	19°22.6	63°34.1	-22°14.0	154°42.4	-14°53.7	99°43.5	-22°26.1
8	31°26.5	257°29.3	19°21.7	78°36.4	-22°14.2	169°45.0	-14°53.6	114°46.1	-22°26.1
9	46°28.9	272°28.9	19°20.9	93°38.7	-22°14.3	184°47.6	-14°53.6	129°48.8	-22°26.1
10	61°31.4	287°28.4	19°20.1	108°41.0	-22°14.5	199°50.2	-14°53.6	144°51.4	-22°26.1
11	76°33.9	302°28.0	19°19.2	123°43.3	-22°14.6	214°52.8	-14°53.5	159°54.1	-22°26.1
12	91°36.3	317°27.5	19°18.4	138°45.6	-22°14.8	229°55.4	-14°53.5	174°56.8	-22°26.1
13	106°38.8	332°27.1	19°17.6	153°47.9	-22°14.9	244°58.0	-14°53.5	189°59.4	-22°26.1
14	121°41.3	347°26.6	19°16.7	168°50.2	-22°15.1	260°00.6	-14°53.5	205°02.1	-22°26.1
15	136°43.7	2°26.1	19°15.9	183°52.5	-22°15.2	275°03.2	-14°53.4	220°04.8	-22°26.2
16	151°46.2	17°25.7	19°15.1	198°54.8	-22°15.4	290°05.8	-14°53.4	235°07.4	-22°26.2
17	166°48.7	32°25.2	19°14.2	213°57.1	-22°15.5	305°08.4	-14°53.4	250°10.1	-22°26.2
18	181°51.1	47°24.8	19°13.4	228°59.4	-22°15.7	320°10.9	-14°53.4	265°12.7	-22°26.2
19	196°53.6	62°24.3	19°12.5	244°01.7	-22°15.8	335°13.5	-14°53.3	280°15.4	-22°26.2
20	211°56.0	77°23.9	19°11.7	259°04.0	-22°16.0	350°16.1	-14°53.3	295°18.1	-22°26.2
21	226°58.5	92°23.4	19°10.9	274°06.3	-22°16.1	5°18.7	-14°53.3	310°20.7	-22°26.2
22	242°01.0	107°23.0	19°10.0	289°08.6	-22°16.3	20°21.3	-14°53.2	325°23.4	-22°26.2
23	257°03.4	122°22.5	19°09.2	304°11.0	-22°16.5	35°23.9	-14°53.2	340°26.1	-22°26.2
Mer.pass.:5:54:		v-0.5 d-0.8 m-4.0		v2.3 d-0.1 m-2.0		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Stars

	SHA	**Dec**
Alpheratz	357°40.0	29°11.3
Ankaa	353°12.4	-42°12.2
Schedar	349°36.7	56°37.9
Diphda	348°52.5	-17°53.1
Achernar	335°24.6	-57°08.5
Hamal	327°57.1	23°32.7
Polaris	316°35.7	89°20.1
Akamar	315°16.1	-40°13.9
Menkar	314°11.7	4°09.5
Mirfak	308°35.9	49°55.2
Aldebaran	290°45.8	16°32.6
Rigel	281°09.1	-8°11.0
Capella	280°29.9	46°00.8
Bellatrix	278°28.7	6°21.8
Elnath	278°08.7	28°37.2
Alnilam	275°43.3	-1°11.6
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.5
Sirius	258°31.0	-16°44.5
Adara	255°10.2	-29°00.0
Procyon	244°56.4	5°10.7
Pollux	243°23.9	27°58.8
Avior	234°17.2	-59°34.4
Suhail	222°50.2	-43°30.6
Miaplacidus	221°39.6	-69°47.8
Alphard	217°53.0	-8°44.4
Regulus	207°40.0	11°52.7
Dubhe	193°47.8	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.7	-17°38.7
Acrux	173°05.4	-63°12.3
Gacrux	171°57.0	-57°13.2
Alioth	166°17.7	55°52.0
Spica	158°27.5	-11°15.4
Alcaid	152°56.0	49°13.7
Hadar	148°42.6	-60°27.8
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.6	-60°54.7
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.3	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.5
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°33.0
Etamin	90°44.0	51°29.3
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.3	38°48.1
Nunki	75°53.8	-26°16.2
Altair	62°04.7	8°55.1
Peacock	53°13.4	-56°40.3
Deneb	49°28.8	45°20.7
Enif	33°43.6	9°57.6
Alnair	27°39.3	-46°52.0
Fomalhaut	15°20.2	-29°31.3
Scheat	13°50.0	28°10.8
Markab	13°34.9	15°18.1

2018/6/2	**SHA**	**Mer.pass**
Venus	228°47.7	14:49
Mars	47°21.3	02:54
Jupiter	138°10.8	20:47
Saturn	83°08.6	00:31

2018/6/2	**SHA**	**Mer.pass**
Venus	227°36.8	14:50
Mars	47°15.9	02:50
Jupiter	138°14.2	20:43
Saturn	83°13.3	00:27

2018/6/2	**SHA**	**Mer.pass**
Venus	226°26.3	14:50
Mars	47°11.3	02:46
Jupiter	138°17.5	20:39
Saturn	83°18.1	00:22

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°34.8	23°26.1	81°26.6	12.3	1°34.5	-11.8	57.5
1	194°34.7	23°26.1	95°57.9	12.3	1°22.7	-11.8	57.5
2	209°34.5	23°26.1	110°29.2	12.3	1°10.9	-11.8	57.5
3	224°34.4	23°26.1	125°00.5	12.4	0°59.1	-11.8	57.5
4	239°34.3	23°26.1	139°31.9	12.4	0°47.4	-11.7	57.4
5	254°34.1	23°26.1	154°03.3	12.4	0°35.6	-11.7	57.4
6	269°34.0	23°26.1	168°34.8	12.5	0°23.9	-11.7	57.4
7	284°33.9	23°26.1	183°06.3	12.5	0°12.2	-11.7	57.3
8	299°33.7	23°26.1	197°37.8	12.5	0°00.5	-11.7	57.3
9	314°33.6	23°26.1	212°09.4	12.6	-0°11.2	-11.7	57.3
10	329°33.4	23°26.1	226°41.0	12.6	-0°22.9	-11.7	57.2
11	344°33.3	23°26.1	241°12.6	12.6	-0°34.6	-11.7	57.2
12	359°33.2	23°26.1	255°44.3	12.7	-0°46.3	-11.7	57.2
13	14°33.0	23°26.1	270°16.0	12.7	-0°57.9	-11.6	57.1
14	29°32.9	23°26.1	284°47.7	12.7	-1°09.5	-11.6	57.1
15	44°32.8	23°26.1	299°19.4	12.8	-1°21.1	-11.6	57.1
16	59°32.6	23°26.1	313°51.2	12.8	-1°32.7	-11.6	57.1
17	74°32.5	23°26.1	328°23.0	12.8	-1°44.3	-11.6	57.0
18	89°32.4	23°26.1	342°54.8	12.8	-1°55.9	-11.5	57.0
19	104°32.2	23°26.1	357°26.6	12.8	-2°07.4	-11.5	57.0
20	119°32.1	23°26.1	11°58.5	12.9	-2°18.9	-11.5	56.9
21	134°32.0	23°26.1	26°30.4	12.9	-2°30.4	-11.5	56.9
22	149°31.8	23°26.1	41°02.3	12.9	-2°41.9	-11.5	56.9
23	164°31.7	23°26.1	55°34.2	12.9	-2°53.3	-11.4	56.9
	SD.=15.7	d=0.0			S.D.=15.7		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°31.5	23°26.0	70°06.1	13.0	-3°04.7	-11.4	56.8
1	194°31.4	23°26.0	84°38.1	13.0	-3°16.1	-11.4	56.8
2	209°31.3	23°26.0	99°10.1	13.0	-3°27.5	-11.4	56.8
3	224°31.1	23°26.0	113°42.1	13.0	-3°38.8	-11.3	56.7
4	239°31.0	23°26.0	128°14.1	13.0	-3°50.1	-11.3	56.7
5	254°30.9	23°26.0	142°46.1	13.0	-4°01.4	-11.3	56.7
6	269°30.7	23°26.0	157°18.1	13.0	-4°12.7	-11.2	56.7
7	284°30.6	23°26.0	171°50.2	13.1	-4°23.9	-11.2	56.6
8	299°30.5	23°25.9	186°22.3	13.1	-4°35.1	-11.2	56.6
9	314°30.3	23°25.9	200°54.3	13.1	-4°46.3	-11.1	56.6
10	329°30.2	23°25.9	215°26.4	13.1	-4°57.4	-11.1	56.5
11	344°30.1	23°25.9	229°58.5	13.1	-5°08.5	-11.1	56.5
12	359°29.9	23°25.9	244°30.6	13.1	-5°19.6	-11.0	56.5
13	14°29.8	23°25.9	259°02.8	13.1	-5°30.6	-11.0	56.5
14	29°29.7	23°25.8	273°34.9	13.1	-5°41.6	-11.0	56.4
15	44°29.5	23°25.8	288°07.0	13.1	-5°52.5	-10.9	56.4
16	59°29.4	23°25.8	302°39.2	13.1	-6°03.5	-10.9	56.4
17	74°29.2	23°25.8	317°11.3	13.2	-6°14.3	-10.9	56.4
18	89°29.1	23°25.8	331°43.5	13.2	-6°25.2	-10.8	56.3
19	104°29.0	23°25.7	346°15.6	13.2	-6°36.0	-10.8	56.3
20	119°28.8	23°25.7	0°47.8	13.2	-6°46.8	-10.7	56.3
21	134°28.7	23°25.7	15°20.0	13.2	-6°57.5	-10.7	56.3
22	149°28.6	23°25.7	29°52.1	13.2	-7°08.2	-10.7	56.2
23	164°28.4	23°25.6	44°24.3	13.2	-7°18.8	-10.6	56.2
	SD.=15.7	d=-0.0			S.D.=15.5		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°28.3	23°25.6	58°56.5	13.2	-7°29.4	-10.6	56.2
1	194°28.2	23°25.6	73°28.6	13.2	-7°40.0	-10.5	56.1
2	209°28.0	23°25.5	88°00.8	13.2	-7°50.5	-10.5	56.1
3	224°27.9	23°25.5	102°33.0	13.2	-8°01.0	-10.4	56.1
4	239°27.8	23°25.5	117°05.2	13.2	-8°11.4	-10.4	56.1
5	254°27.6	23°25.5	131°37.3	13.2	-8°21.8	-10.4	56.0
6	269°27.5	23°25.4	146°09.5	13.2	-8°32.1	-10.3	56.0
7	284°27.4	23°25.4	160°41.7	13.2	-8°42.4	-10.3	56.0
8	299°27.2	23°25.4	175°13.8	13.2	-8°52.6	-10.2	56.0
9	314°27.1	23°25.3	189°46.0	13.2	-9°02.8	-10.2	56.0
10	329°27.0	23°25.3	204°18.1	13.1	-9°12.9	-10.1	55.9
11	344°26.8	23°25.3	218°50.3	13.1	-9°23.0	-10.1	55.9
12	359°26.7	23°25.2	233°22.4	13.1	-9°33.1	-10.0	55.9
13	14°26.6	23°25.2	247°54.6	13.1	-9°43.0	-10.0	55.9
14	29°26.4	23°25.2	262°26.7	13.1	-9°53.0	-9.9	55.8
15	44°26.3	23°25.1	276°58.8	13.1	-10°02.9	-9.9	55.8
16	59°26.2	23°25.1	291°30.9	13.1	-10°12.7	-9.8	55.8
17	74°26.0	23°25.0	306°03.0	13.1	-10°22.5	-9.7	55.8
18	89°25.9	23°25.0	320°35.1	13.1	-10°32.2	-9.7	55.7
19	104°25.8	23°25.0	335°07.2	13.1	-10°41.8	-9.6	55.7
20	119°25.6	23°24.9	349°39.3	13.1	-10°51.5	-9.6	55.7
21	134°25.5	23°24.9	4°11.3	13.1	-11°01.0	-9.5	55.7
22	149°25.4	23°24.8	18°43.4	13.0	-11°10.5	-9.5	55.7
23	164°25.2	23°24.8	33°15.4	13.0	-11°19.9	-9.4	55.6
	SD.=15.7	d=-0.0			S.D.=15.3		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:32	22:32	–:–	–:–
62	–:–	–:–	02:10	21:54	–:–	–:–
60	–:–	00:50	02:36	21:28	23:14	–:–
58	–:–	01:41	02:57	21:07	22:23	–:–
56	–:–	02:11	03:13	20:51	21:53	–:–
54	00:45	02:33	03:28	20:36	21:31	23:18
52	01:33	02:51	03:40	20:24	21:13	22:31
50	02:01	03:06	03:51	20:13	20:58	22:03
45	02:46	03:36	04:14	19:50	20:28	21:18
40	03:17	03:59	04:32	19:32	20:05	20:47
35	03:40	04:17	04:47	19:17	19:47	20:24
30	03:59	04:32	04:60	19:04	19:32	20:05
20	04:28	04:57	05:22	18:42	19:07	19:36
10	04:51	05:18	05:41	18:23	18:46	19:13
0	05:10	05:36	05:58	18:06	18:28	18:54
-10	05:27	05:53	06:16	17:48	18:11	18:37
-20	05:43	06:10	06:34	17:30	17:54	18:21
-30	05:59	06:29	06:56	17:08	17:35	18:05
-35	06:08	06:40	07:08	16:56	17:24	17:56
-40	06:18	06:52	07:22	16:42	17:12	17:46
-45	06:28	07:05	07:39	16:25	16:59	17:36
-50	06:40	07:21	07:60	16:04	16:43	17:24
-52	06:45	07:29	08:10	15:54	16:35	17:19
-54	06:51	07:37	08:21	15:43	16:27	17:13
-56	06:57	07:46	08:34	15:30	16:18	17:07
-58	07:04	07:56	08:48	15:16	16:08	17:00
-60	07:11	08:08	09:06	14:58	15:56	16:53

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	13:13	15:03	16:54	00:52	00:40	00:27
70	13:12	14:54	16:36	00:50	00:44	00:38
68	13:10	14:47	16:23	00:48	00:48	00:47
66	13:09	14:41	16:11	00:47	00:51	00:55
64	13:08	14:36	16:02	00:46	00:53	01:01
62	13:08	14:32	15:54	00:45	00:56	01:06
60	13:07	14:28	15:47	00:45	00:58	01:11
58	13:06	14:25	15:41	00:44	00:60	01:16
56	13:06	14:22	15:36	00:43	01:01	01:19
54	13:05	14:19	15:31	00:43	01:03	01:23
52	13:05	14:17	15:26	00:42	01:04	01:26
50	13:05	14:14	15:23	00:42	01:05	01:29
45	13:04	14:10	15:14	00:41	01:08	01:35
40	13:03	14:06	15:07	00:40	01:10	01:40
35	13:02	14:02	15:01	00:39	01:12	01:45
30	13:02	13:59	14:56	00:38	01:14	01:49
20	13:01	13:54	14:47	00:37	01:17	01:56
10	13:00	13:50	14:39	00:36	01:19	02:02
0	12:59	13:46	14:32	00:35	01:22	02:08
-10	12:59	13:42	14:24	00:34	01:24	02:13
-20	12:58	13:37	14:17	00:33	01:27	02:20
-30	12:57	13:32	14:08	00:31	01:30	02:27
-35	12:57	13:30	14:03	00:30	01:31	02:31
-40	12:56	13:26	13:57	00:30	01:33	02:35
-45	12:56	13:23	13:51	00:28	01:35	02:41
-50	12:55	13:18	13:43	00:27	01:38	02:47
-52	12:55	13:16	13:39	00:27	01:39	02:50
-54	12:54	13:14	13:35	00:26	01:41	02:53
-56	12:54	13:12	13:31	00:25	01:42	02:57
-58	12:54	13:09	13:26	00:24	01:44	03:01
-60	12:53	13:06	13:20	00:24	01:46	03:06

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
21	01:41	01:47	12:01	19:10	06:47	8(61%)
22	01:54	02:00	12:02	19:56	07:33	9(71%)
23	02:07	02:13	12:02	20:42	08:19	10(80%)

June 24, 25 ,26 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	272°05.9	137°22.1	19°08.3	319°13.3	-22°16.6	50°26.5	-14°53.2	355°28.7	-22°26.3
1	287°08.4	152°21.6	19°07.5	334°15.6	-22°16.8	65°29.1	-14°53.2	10°31.4	-22°26.3
2	302°10.8	167°21.2	19°06.6	349°17.9	-22°16.9	80°31.7	-14°53.1	25°34.0	-22°26.3
3	317°13.3	182°20.7	19°05.8	4°20.2	-22°17.1	95°34.3	-14°53.1	40°36.7	-22°26.3
4	332°15.8	197°20.3	19°05.0	19°22.5	-22°17.2	110°36.8	-14°53.1	55°39.4	-22°26.3
5	347°18.2	212°19.8	19°04.1	34°24.9	-22°17.4	125°39.4	-14°53.1	70°42.0	-22°26.3
6	2°20.7	227°19.4	19°03.3	49°27.2	-22°17.5	140°42.0	-14°53.0	85°44.7	-22°26.3
7	17°23.2	242°19.0	19°02.4	64°29.5	-22°17.7	155°44.6	-14°53.0	100°47.4	-22°26.3
8	32°25.6	257°18.5	19°01.6	79°31.8	-22°17.9	170°47.2	-14°53.0	115°50.0	-22°26.3
9	47°28.1	272°18.1	19°00.7	94°34.2	-22°18.0	185°49.8	-14°53.0	130°52.7	-22°26.4
10	62°30.5	287°17.6	18°59.9	109°36.5	-22°18.2	200°52.4	-14°52.9	145°55.3	-22°26.4
11	77°33.0	302°17.2	18°59.0	124°38.8	-22°18.3	215°55.0	-14°52.9	160°58.0	-22°26.4
12	92°35.5	317°16.8	18°58.1	139°41.2	-22°18.5	230°57.5	-14°52.9	176°00.7	-22°26.4
13	107°37.9	332°16.3	18°57.3	154°43.5	-22°18.7	246°00.1	-14°52.8	191°03.3	-22°26.4
14	122°40.4	347°15.9	18°56.4	169°45.8	-22°18.8	261°02.7	-14°52.8	206°06.0	-22°26.4
15	137°42.9	2°15.4	18°55.6	184°48.2	-22°19.0	276°05.3	-14°52.8	221°08.7	-22°26.4
16	152°45.3	17°15.0	18°54.7	199°50.5	-22°19.1	291°07.9	-14°52.8	236°11.3	-22°26.4
17	167°47.8	32°14.6	18°53.9	214°52.8	-22°19.3	306°10.5	-14°52.7	251°14.0	-22°26.5
18	182°50.3	47°14.1	18°53.0	229°55.2	-22°19.5	321°13.1	-14°52.7	266°16.6	-22°26.5
19	197°52.7	62°13.7	18°52.1	244°57.5	-22°19.6	336°15.6	-14°52.7	281°19.3	-22°26.5
20	212°55.2	77°13.3	18°51.3	259°59.9	-22°19.8	351°18.2	-14°52.7	296°22.0	-22°26.5
21	227°57.6	92°12.8	18°50.4	275°02.2	-22°20.0	6°20.8	-14°52.6	311°24.6	-22°26.5
22	243°00.1	107°12.4	18°49.6	290°04.6	-22°20.1	21°23.4	-14°52.6	326°27.3	-22°26.5
23	258°02.6	122°12.0	18°48.7	305°06.9	-22°20.3	36°26.0	-14°52.6	341°30.0	-22°26.5
Mer.pass.:5:50:		v-0.4 d-0.8 m-4.0		v2.3 d-0.2 m-2.0		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	273°05.0	137°11.5	18°47.8	320°09.3	-22°20.5	51°28.6	-14°52.6	356°32.6	-22°26.5
1	288°07.5	152°11.1	18°47.0	335°11.6	-22°20.6	66°31.1	-14°52.5	11°35.3	-22°26.5
2	303°10.0	167°10.7	18°46.1	350°14.0	-22°20.8	81°33.7	-14°52.5	26°37.9	-22°26.6
3	318°12.4	182°10.2	18°45.2	5°16.3	-22°20.9	96°36.3	-14°52.5	41°40.6	-22°26.6
4	333°14.9	197°09.8	18°44.4	20°18.7	-22°21.1	111°38.9	-14°52.5	56°43.3	-22°26.6
5	348°17.4	212°09.4	18°43.5	35°21.0	-22°21.3	126°41.5	-14°52.4	71°45.9	-22°26.6
6	3°19.8	227°09.0	18°42.6	50°23.4	-22°21.4	141°44.1	-14°52.4	86°48.6	-22°26.6
7	18°22.3	242°08.5	18°41.8	65°25.7	-22°21.6	156°46.6	-14°52.4	101°51.3	-22°26.6
8	33°24.8	257°08.1	18°40.9	80°28.1	-22°21.8	171°49.2	-14°52.4	116°53.9	-22°26.6
9	48°27.2	272°07.7	18°40.0	95°30.5	-22°21.9	186°51.8	-14°52.3	131°56.6	-22°26.6
10	63°29.7	287°07.3	18°39.2	110°32.8	-22°22.1	201°54.4	-14°52.3	146°59.2	-22°26.6
11	78°32.1	302°06.8	18°38.3	125°35.2	-22°22.3	216°57.0	-14°52.3	162°01.9	-22°26.7
12	93°34.6	317°06.4	18°37.4	140°37.5	-22°22.4	231°59.5	-14°52.3	177°04.6	-22°26.7
13	108°37.1	332°06.0	18°36.6	155°39.9	-22°22.6	247°02.1	-14°52.3	192°07.2	-22°26.7
14	123°39.5	347°05.6	18°35.7	170°42.3	-22°22.8	262°04.7	-14°52.2	207°09.9	-22°26.7
15	138°42.0	2°05.1	18°34.8	185°44.6	-22°23.0	277°07.3	-14°52.2	222°12.6	-22°26.7
16	153°44.5	17°04.7	18°33.9	200°47.0	-22°23.1	292°09.9	-14°52.2	237°15.2	-22°26.7
17	168°46.9	32°04.3	18°33.0	215°49.4	-22°23.3	307°12.4	-14°52.2	252°17.9	-22°26.7
18	183°49.4	47°03.9	18°32.2	230°51.8	-22°23.5	322°15.0	-14°52.1	267°20.5	-22°26.7
19	198°51.9	62°03.5	18°31.3	245°54.1	-22°23.6	337°17.6	-14°52.1	282°23.2	-22°26.8
20	213°54.3	77°03.0	18°30.4	260°56.5	-22°23.8	352°20.2	-14°52.1	297°25.9	-22°26.8
21	228°56.8	92°02.6	18°29.5	275°58.9	-22°24.0	7°22.7	-14°52.1	312°28.5	-22°26.8
22	243°59.3	107°02.2	18°28.7	291°01.3	-22°24.2	22°25.3	-14°52.0	327°31.2	-22°26.8
23	259°01.7	122°01.8	18°27.8	306°03.6	-22°24.3	37°27.9	-14°52.0	342°33.9	-22°26.8
Mer.pass.:5:46:		v-0.4 d-0.9 m-4.0		v2.3 d-0.2 m-2.0		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	274°04.2	137°01.4	18°26.9	321°06.0	-22°24.5	52°30.5	-14°52.0	357°36.5	-22°26.8
1	289°06.6	152°01.0	18°26.0	336°08.4	-22°24.7	67°33.0	-14°52.0	12°39.2	-22°26.8
2	304°09.1	167°00.6	18°25.1	351°10.8	-22°24.8	82°35.6	-14°52.0	27°41.8	-22°26.8
3	319°11.6	182°00.1	18°24.2	6°13.2	-22°25.0	97°38.2	-14°51.9	42°44.5	-22°26.8
4	334°14.0	196°59.7	18°23.4	21°15.5	-22°25.2	112°40.8	-14°51.9	57°47.2	-22°26.9
5	349°16.5	211°59.3	18°22.5	36°17.9	-22°25.4	127°43.3	-14°51.9	72°49.8	-22°26.9
6	4°19.0	226°58.9	18°21.6	51°20.3	-22°25.5	142°45.9	-14°51.9	87°52.5	-22°26.9
7	19°21.4	241°58.5	18°20.7	66°22.7	-22°25.7	157°48.5	-14°51.8	102°55.2	-22°26.9
8	34°23.9	256°58.1	18°19.8	81°25.1	-22°25.9	172°51.1	-14°51.8	117°57.8	-22°26.9
9	49°26.4	271°57.7	18°18.9	96°27.5	-22°26.1	187°53.6	-14°51.8	133°00.5	-22°26.9
10	64°28.8	286°57.3	18°18.0	111°29.9	-22°26.2	202°56.2	-14°51.8	148°03.2	-22°26.9
11	79°31.3	301°56.9	18°17.1	126°32.3	-22°26.4	217°58.8	-14°51.8	163°05.8	-22°26.9
12	94°33.8	316°56.5	18°16.3	141°34.7	-22°26.6	233°01.4	-14°51.7	178°08.5	-22°26.9
13	109°36.2	331°56.1	18°15.4	156°37.1	-22°26.8	248°03.9	-14°51.7	193°11.1	-22°27.0
14	124°38.7	346°55.7	18°14.5	171°39.5	-22°27.0	263°06.5	-14°51.7	208°13.8	-22°27.0
15	139°41.1	1°55.3	18°13.6	186°41.9	-22°27.1	278°09.1	-14°51.7	223°16.5	-22°27.0
16	154°43.6	16°54.9	18°12.7	201°44.3	-22°27.3	293°11.6	-14°51.6	238°19.1	-22°27.0
17	169°46.1	31°54.5	18°11.8	216°46.7	-22°27.5	308°14.2	-14°51.6	253°21.8	-22°27.0
18	184°48.5	46°54.1	18°10.9	231°49.1	-22°27.7	323°16.8	-14°51.6	268°24.5	-22°27.0
19	199°51.0	61°53.6	18°10.0	246°51.5	-22°27.8	338°19.3	-14°51.6	283°27.1	-22°27.0
20	214°53.5	76°53.2	18°09.1	261°53.9	-22°28.0	353°21.9	-14°51.6	298°29.8	-22°27.0
21	229°55.9	91°52.8	18°08.2	276°56.3	-22°28.2	8°24.5	-14°51.5	313°32.4	-22°27.1
22	244°58.4	106°52.5	18°07.3	291°58.7	-22°28.4	23°27.1	-14°51.5	328°35.1	-22°27.1
23	260°00.9	121°52.1	18°06.4	307°01.1	-22°28.6	38°29.6	-14°51.5	343°37.8	-22°27.1
Mer.pass.:5:42:		v-0.4 d-0.9 m-4.0		v2.4 d-0.2 m-2.1		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Stars

	SHA	**Dec**
Alpheratz	357°40.0	29°11.3
Ankaa	353°12.4	-42°12.2
Schedar	349°36.7	56°37.9
Diphda	348°52.4	-17°53.1
Achernar	335°24.5	-57°08.5
Hamal	327°57.1	23°32.7
Polaris	316°34.4	89°20.1
Akamar	315°16.1	-40°13.9
Menkar	314°11.7	4°09.5
Mirfak	308°35.8	49°55.2
Aldebaran	290°45.8	16°32.6
Rigel	281°09.1	-8°11.0
Capella	280°29.9	46°00.8
Bellatrix	278°28.7	6°21.8
Elnath	278°08.7	28°37.2
Alnilam	275°43.3	-1°11.6
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.5
Sirius	258°31.0	-16°44.5
Adara	255°10.2	-29°00.0
Procyon	244°56.4	5°10.7
Pollux	243°23.9	27°58.8
Avior	234°17.2	-59°34.3
Suhail	222°50.3	-43°30.6
Miaplacidus	221°39.6	-69°47.8
Alphard	217°53.0	-8°44.4
Regulus	207°40.1	11°52.7
Dubhe	193°47.8	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.8	-17°38.7
Acrux	173°05.4	-63°12.3
Gacrux	171°57.0	-57°13.2
Alioth	166°17.7	55°52.0
Spica	158°27.5	-11°15.4
Alcaid	152°56.0	49°13.7
Hadar	148°42.7	-60°27.8
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.6	-60°54.7
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.4	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.5
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°33.0
Etamin	90°44.0	51°29.4
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.2	38°48.1
Nunki	75°53.7	-26°16.2
Altair	62°04.7	8°55.1
Peacock	53°13.4	-56°40.3
Deneb	49°28.8	45°20.7
Enif	33°43.6	9°57.6
Alnair	27°39.3	-46°52.0
Fomalhaut	15°20.2	-29°31.3
Scheat	13°50.0	28°10.8
Markab	13°34.8	15°18.2

2018/6/2	**SHA**	**Mer.pass**
Venus	225°16.2	14:51
Mars	47°07.4	02:43
Jupiter	138°20.6	20:35
Saturn	83°22.8	00:18

2018/6/2	**SHA**	**Mer.pass**
Venus	224°06.5	14:52
Mars	47°04.2	02:39
Jupiter	138°23.5	20:31
Saturn	83°27.6	00:14

2018/6/2	**SHA**	**Mer.pass**
Venus	222°57.2	14:52
Mars	47°01.8	02:35
Jupiter	138°26.3	20:26
Saturn	83°32.3	00:10

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°25.1	23°24.7	47°47.4	13.0	-11°29.3	-9.4	55.6
1	194°24.9	23°24.7	62°19.5	13.0	-11°38.6	-9.3	55.6
2	209°24.8	23°24.7	76°51.5	13.0	-11°47.9	-9.2	55.6
3	224°24.7	23°24.6	91°23.5	13.0	-11°57.1	-9.2	55.5
4	239°24.5	23°24.6	105°55.4	13.0	-12°06.2	-9.1	55.5
5	254°24.4	23°24.5	120°27.4	13.0	-12°15.3	-9.0	55.5
6	269°24.3	23°24.5	134°59.4	12.9	-12°24.3	-9.0	55.5
7	284°24.1	23°24.4	149°31.3	12.9	-12°33.3	-8.9	55.5
8	299°24.0	23°24.4	164°03.2	12.9	-12°42.2	-8.9	55.4
9	314°23.9	23°24.3	178°35.1	12.9	-12°51.0	-8.8	55.4
10	329°23.7	23°24.3	193°07.0	12.9	-12°59.8	-8.7	55.4
11	344°23.6	23°24.2	207°38.9	12.9	-13°08.5	-8.7	55.4
12	359°23.5	23°24.2	222°10.7	12.8	-13°17.1	-8.6	55.4
13	14°23.3	23°24.1	236°42.6	12.8	-13°25.7	-8.5	55.3
14	29°23.2	23°24.1	251°14.4	12.8	-13°34.2	-8.5	55.3
15	44°23.1	23°24.0	265°46.2	12.8	-13°42.6	-8.4	55.3
16	59°22.9	23°23.9	280°18.0	12.8	-13°51.0	-8.3	55.3
17	74°22.8	23°23.9	294°49.7	12.8	-13°59.3	-8.3	55.3
18	89°22.7	23°23.8	309°21.5	12.7	-14°07.5	-8.2	55.2
19	104°22.6	23°23.8	323°53.2	12.7	-14°15.6	-8.1	55.2
20	119°22.4	23°23.7	338°24.9	12.7	-14°23.7	-8.0	55.2
21	134°22.3	23°23.7	352°56.6	12.7	-14°31.7	-8.0	55.2
22	149°22.2	23°23.6	7°28.3	12.7	-14°39.7	-7.9	55.2
23	164°22.0	23°23.5	21°60.0	12.6	-14°47.5	-7.8	55.2
	SD.=15.7	d=-0.0	S.D.=15.2				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°21.9	23°23.5	36°31.6	12.6	-14°55.3	-7.8	55.1
1	194°21.8	23°23.4	51°03.2	12.6	-15°03.1	-7.7	55.1
2	209°21.6	23°23.3	65°34.8	12.6	-15°10.7	-7.6	55.1
3	224°21.5	23°23.3	80°06.4	12.6	-15°18.3	-7.5	55.1
4	239°21.4	23°23.2	94°38.0	12.6	-15°25.8	-7.5	55.1
5	254°21.2	23°23.2	109°09.5	12.5	-15°33.2	-7.4	55.0
6	269°21.1	23°23.1	123°41.1	12.5	-15°40.6	-7.3	55.0
7	284°21.0	23°23.0	138°12.6	12.5	-15°47.8	-7.2	55.0
8	299°20.8	23°23.0	152°44.0	12.5	-15°55.0	-7.2	55.0
9	314°20.7	23°22.9	167°15.5	12.5	-16°02.2	-7.1	55.0
10	329°20.6	23°22.8	181°46.9	12.4	-16°09.2	-7.0	55.0
11	344°20.4	23°22.8	196°18.4	12.4	-16°16.2	-6.9	54.9
12	359°20.3	23°22.7	210°49.8	12.4	-16°23.1	-6.8	54.9
13	14°20.2	23°22.6	225°21.2	12.4	-16°29.9	-6.8	54.9
14	29°20.0	23°22.5	239°52.5	12.4	-16°36.6	-6.7	54.9
15	44°19.9	23°22.5	254°23.9	12.3	-16°43.2	-6.6	54.9
16	59°19.8	23°22.4	268°55.2	12.3	-16°49.8	-6.5	54.9
17	74°19.6	23°22.3	283°26.5	12.3	-16°56.3	-6.4	54.8
18	89°19.5	23°22.2	297°57.8	12.3	-17°02.7	-6.4	54.8
19	104°19.4	23°22.2	312°29.0	12.3	-17°09.0	-6.3	54.8
20	119°19.2	23°22.1	327°00.3	12.2	-17°15.2	-6.2	54.8
21	134°19.1	23°22.0	341°31.5	12.2	-17°21.4	-6.1	54.8
22	149°19.0	23°21.9	356°02.7	12.2	-17°27.5	-6.0	54.8
23	164°18.9	23°21.9	10°33.9	12.2	-17°33.5	-5.9	54.8
	SD.=15.7	d=-0.1	S.D.=15.0				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°18.7	23°21.8	25°05.0	12.2	-17°39.4	-5.9	54.7
1	194°18.6	23°21.7	39°36.2	12.1	-17°45.2	-5.8	54.7
2	209°18.5	23°21.6	54°07.3	12.1	-17°50.9	-5.7	54.7
3	224°18.3	23°21.6	68°38.4	12.1	-17°56.6	-5.6	54.7
4	239°18.2	23°21.5	83°09.5	12.1	-18°02.1	-5.5	54.7
5	254°18.1	23°21.4	97°40.6	12.1	-18°07.6	-5.4	54.7
6	269°17.9	23°21.3	112°11.6	12.0	-18°13.0	-5.3	54.7
7	284°17.8	23°21.2	126°42.7	12.0	-18°18.3	-5.3	54.6
8	299°17.7	23°21.1	141°13.7	12.0	-18°23.5	-5.2	54.6
9	314°17.5	23°21.1	155°44.7	12.0	-18°28.6	-5.1	54.6
10	329°17.4	23°21.0	170°15.7	12.0	-18°33.6	-5.0	54.6
11	344°17.3	23°20.9	184°46.6	12.0	-18°38.6	-4.9	54.6
12	359°17.2	23°20.8	199°17.6	11.9	-18°43.4	-4.8	54.6
13	14°17.0	23°20.7	213°48.5	11.9	-18°48.2	-4.7	54.6
14	29°16.9	23°20.6	228°19.4	11.9	-18°52.9	-4.6	54.6
15	44°16.8	23°20.5	242°50.3	11.9	-18°57.5	-4.5	54.5
16	59°16.6	23°20.4	257°21.2	11.9	-19°02.0	-4.4	54.5
17	74°16.5	23°20.3	271°52.1	11.9	-19°06.4	-4.4	54.5
18	89°16.4	23°20.3	286°22.9	11.8	-19°10.7	-4.3	54.5
19	104°16.2	23°20.2	300°53.8	11.8	-19°14.9	-4.2	54.5
20	119°16.1	23°20.1	315°24.6	11.8	-19°19.0	-4.1	54.5
21	134°16.0	23°20.0	329°55.4	11.8	-19°23.1	-4.0	54.5
22	149°15.9	23°19.9	344°26.2	11.8	-19°27.0	-3.9	54.5
23	164°15.7	23°19.8	358°57.0	11.8	-19°30.8	-3.8	54.4
	SD.=15.7	d=-0.1	S.D.=14.9				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:33	22:31	–:–	–:–
62	–:–	–:–	02:11	21:54	–:–	–:–
60	–:–	00:52	02:37	21:28	23:12	–:–
58	–:–	01:42	02:58	21:07	22:23	–:–
56	–:–	02:12	03:15	20:51	21:53	–:–
54	00:48	02:34	03:29	20:36	21:31	23:17
52	01:34	02:52	03:41	20:24	21:13	22:31
50	02:02	03:07	03:52	20:13	20:58	22:03
45	02:47	03:37	04:14	19:51	20:28	21:18
40	03:18	03:60	04:32	19:33	20:06	20:47
35	03:41	04:18	04:47	19:18	19:48	20:24
30	03:60	04:33	05:00	19:05	19:32	20:06
20	04:29	04:58	05:22	18:43	19:07	19:37
10	04:51	05:18	05:41	18:24	18:47	19:14
0	05:10	05:36	05:59	18:06	18:29	18:55
-10	05:27	05:54	06:16	17:49	18:12	18:38
-20	05:43	06:11	06:35	17:30	17:54	18:22
-30	05:60	06:30	06:56	17:09	17:36	18:05
-35	06:09	06:40	07:09	16:57	17:25	17:57
-40	06:18	06:52	07:23	16:43	17:13	17:47
-45	06:28	07:06	07:39	16:26	16:60	17:37
-50	06:40	07:22	08:00	16:05	16:44	17:25
-52	06:45	07:29	08:10	15:55	16:36	17:20
-54	06:51	07:37	08:21	15:44	16:28	17:14
-56	06:57	07:46	08:34	15:32	16:19	17:08
-58	07:04	07:57	08:49	15:17	16:09	17:01
-60	07:11	08:08	09:06	14:59	15:57	16:54

	Moonrise			**Moonset**		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	18:52	21:18	–:–	00:12	23:04	–:–
70	18:21	20:09	22:12	00:31	00:24	00:13
68	17:58	19:33	21:05	00:47	00:47	00:50
66	17:40	19:07	20:29	00:59	01:06	01:16
64	17:26	18:48	20:04	01:10	01:21	01:37
62	17:14	18:32	19:44	01:19	01:34	01:53
60	17:04	18:18	19:27	01:26	01:44	02:07
58	16:55	18:07	19:14	01:33	01:54	02:19
56	16:48	17:57	19:02	01:39	02:02	02:29
54	16:41	17:48	18:52	01:45	02:09	02:38
52	16:35	17:40	18:43	01:50	02:16	02:46
50	16:29	17:33	18:34	01:54	02:22	02:54
45	16:17	17:18	18:17	02:04	02:35	03:10
40	16:07	17:06	18:03	02:12	02:46	03:22
35	15:59	16:56	17:51	02:19	02:55	03:33
30	15:52	16:47	17:41	02:25	03:03	03:43
20	15:39	16:31	17:23	02:36	03:17	03:60
10	15:28	16:18	17:07	02:45	03:29	04:14
0	15:18	16:05	16:53	02:54	03:40	04:28
-10	15:08	15:52	16:38	03:03	03:52	04:42
-20	14:57	15:39	16:23	03:12	04:04	04:56
-30	14:45	15:24	16:05	03:23	04:18	05:13
-35	14:38	15:15	15:55	03:29	04:27	05:23
-40	14:30	15:05	15:43	03:36	04:36	05:34
-45	14:20	14:53	15:30	03:45	04:47	05:47
-50	14:09	14:39	15:13	03:55	05:00	06:03
-52	14:04	14:32	15:05	03:59	05:06	06:11
-54	13:58	14:25	14:56	04:04	05:13	06:19
-56	13:52	14:17	14:47	04:10	05:21	06:28
-58	13:45	14:07	14:36	04:17	05:30	06:39
-60	13:37	13:57	14:23	04:24	05:40	06:52

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
24	02:20	02:26	12:02	21:29	09:05	11(87%)
25	02:32	02:39	12:02	22:16	09:52	12(93%)
26	02:45	02:51	12:02	23:04	10:40	13(97%)

June 27, 28 ,29 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	275°03.3	136°51.7	18°05.5	322°03.5	-22°28.7	53°32.2	-14°51.5	358°40.4	-22°27.1
1	290°05.8	151°51.3	18°04.6	337°05.9	-22°28.9	68°34.8	-14°51.5	13°43.1	-22°27.1
2	305°08.2	166°50.9	18°03.7	352°08.4	-22°29.1	83°37.3	-14°51.4	28°45.8	-22°27.1
3	320°10.7	181°50.5	18°02.8	7°10.8	-22°29.3	98°39.9	-14°51.4	43°48.4	-22°27.1
4	335°13.2	196°50.1	18°01.9	22°13.2	-22°29.5	113°42.5	-14°51.4	58°51.1	-22°27.1
5	350°15.6	211°49.7	18°01.0	37°15.6	-22°29.7	128°45.0	-14°51.4	73°53.7	-22°27.1
6	5°18.1	226°49.3	18°00.1	52°18.0	-22°29.8	143°47.6	-14°51.4	88°56.4	-22°27.2
7	20°20.6	241°48.9	17°59.2	67°20.5	-22°30.0	158°50.2	-14°51.3	103°59.1	-22°27.2
8	35°23.0	256°48.5	17°58.3	82°22.9	-22°30.2	173°52.7	-14°51.3	119°01.7	-22°27.2
9	50°25.5	271°48.1	17°57.4	97°25.3	-22°30.4	188°55.3	-14°51.3	134°04.4	-22°27.2
10	65°28.0	286°47.7	17°56.5	112°27.7	-22°30.6	203°57.9	-14°51.3	149°07.1	-22°27.2
11	80°30.4	301°47.3	17°55.6	127°30.2	-22°30.8	219°00.4	-14°51.3	164°09.7	-22°27.2
12	95°32.9	316°46.9	17°54.7	142°32.6	-22°30.9	234°03.0	-14°51.2	179°12.4	-22°27.2
13	110°35.4	331°46.6	17°53.7	157°35.0	-22°31.1	249°05.6	-14°51.2	194°15.0	-22°27.2
14	125°37.8	346°46.2	17°52.8	172°37.5	-22°31.3	264°08.1	-14°51.2	209°17.7	-22°27.2
15	140°40.3	1°45.8	17°51.9	187°39.9	-22°31.5	279°10.7	-14°51.2	224°20.4	-22°27.3
16	155°42.7	16°45.4	17°51.0	202°42.3	-22°31.7	294°13.3	-14°51.2	239°23.0	-22°27.3
17	170°45.2	31°45.0	17°50.1	217°44.8	-22°31.9	309°15.8	-14°51.2	254°25.7	-22°27.3
18	185°47.7	46°44.6	17°49.2	232°47.2	-22°32.1	324°18.4	-14°51.1	269°28.4	-22°27.3
19	200°50.1	61°44.2	17°48.3	247°49.6	-22°32.3	339°20.9	-14°51.1	284°31.0	-22°27.3
20	215°52.6	76°43.9	17°47.4	262°52.1	-22°32.4	354°23.5	-14°51.1	299°33.7	-22°27.3
21	230°55.1	91°43.5	17°46.4	277°54.5	-22°32.6	9°26.1	-14°51.1	314°36.4	-22°27.3
22	245°57.5	106°43.1	17°45.5	292°56.9	-22°32.8	24°28.6	-14°51.1	329°39.0	-22°27.3
23	260°60.0	121°42.7	17°44.6	307°59.4	-22°33.0	39°31.2	-14°51.0	344°41.7	-22°27.4
Mer.pass.:5:38:		v-0.4 d-0.9 m-4.0		v2.4 d-0.2 m-2.1		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	276°02.5	136°42.3	17°43.7	323°01.8	-22°33.2	54°33.8	-14°51.0	359°44.3	-22°27.4
1	291°04.9	151°42.0	17°42.8	338°04.3	-22°33.4	69°36.3	-14°51.0	14°47.0	-22°27.4
2	306°07.4	166°41.6	17°41.9	353°06.7	-22°33.6	84°38.9	-14°51.0	29°49.7	-22°27.4
3	321°09.9	181°41.2	17°40.9	8°09.2	-22°33.8	99°41.4	-14°51.0	44°52.3	-22°27.4
4	336°12.3	196°40.8	17°40.0	23°11.6	-22°34.0	114°44.0	-14°50.9	59°55.0	-22°27.4
5	351°14.8	211°40.4	17°39.1	38°14.1	-22°34.1	129°46.6	-14°50.9	74°57.7	-22°27.4
6	6°17.2	226°40.1	17°38.2	53°16.5	-22°34.3	144°49.1	-14°50.9	90°00.3	-22°27.4
7	21°19.7	241°39.7	17°37.2	68°19.0	-22°34.5	159°51.7	-14°50.9	105°03.0	-22°27.4
8	36°22.2	256°39.3	17°36.3	83°21.4	-22°34.7	174°54.2	-14°50.9	120°05.6	-22°27.5
9	51°24.6	271°38.9	17°35.4	98°23.9	-22°34.9	189°56.8	-14°50.9	135°08.3	-22°27.5
10	66°27.1	286°38.6	17°34.5	113°26.4	-22°35.1	204°59.4	-14°50.8	150°11.0	-22°27.5
11	81°29.6	301°38.2	17°33.6	128°28.8	-22°35.3	220°01.9	-14°50.8	165°13.6	-22°27.5
12	96°32.0	316°37.8	17°32.6	143°31.3	-22°35.5	235°04.5	-14°50.8	180°16.3	-22°27.5
13	111°34.5	331°37.5	17°31.7	158°33.7	-22°35.7	250°07.0	-14°50.8	195°19.0	-22°27.5
14	126°37.0	346°37.1	17°30.8	173°36.2	-22°35.9	265°09.6	-14°50.8	210°21.6	-22°27.5
15	141°39.4	1°36.7	17°29.8	188°38.7	-22°36.1	280°12.1	-14°50.8	225°24.3	-22°27.5
16	156°41.9	16°36.4	17°28.9	203°41.1	-22°36.3	295°14.7	-14°50.7	240°26.9	-22°27.5
17	171°44.4	31°36.0	17°28.0	218°43.6	-22°36.5	310°17.3	-14°50.7	255°29.6	-22°27.6
18	186°46.8	46°35.6	17°27.1	233°46.1	-22°36.7	325°19.8	-14°50.7	270°32.3	-22°27.6
19	201°49.3	61°35.2	17°26.1	248°48.5	-22°36.9	340°22.4	-14°50.7	285°34.9	-22°27.6
20	216°51.7	76°34.9	17°25.2	263°51.0	-22°37.1	355°24.9	-14°50.7	300°37.6	-22°27.6
21	231°54.2	91°34.5	17°24.3	278°53.5	-22°37.2	10°27.5	-14°50.7	315°40.3	-22°27.6
22	246°56.7	106°34.2	17°23.3	293°56.0	-22°37.4	25°30.0	-14°50.6	330°42.9	-22°27.6
23	261°59.1	121°33.8	17°22.4	308°58.4	-22°37.6	40°32.6	-14°50.6	345°45.6	-22°27.6
Mer.pass.:5:34:		v-0.4 d-0.9 m-4.0		v2.4 d-0.2 m-2.1		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	277°01.6	136°33.4	17°21.5	324°00.9	-22°37.8	55°35.1	-14°50.6	0°48.3	-22°27.6
1	292°04.1	151°33.1	17°20.5	339°03.4	-22°38.0	70°37.7	-14°50.6	15°50.9	-22°27.7
2	307°06.5	166°32.7	17°19.6	354°05.9	-22°38.2	85°40.2	-14°50.6	30°53.6	-22°27.7
3	322°09.0	181°32.3	17°18.7	9°08.4	-22°38.4	100°42.8	-14°50.6	45°56.2	-22°27.7
4	337°11.5	196°32.0	17°17.7	24°10.8	-22°38.6	115°45.4	-14°50.5	60°58.9	-22°27.7
5	352°13.9	211°31.6	17°16.8	39°13.3	-22°38.8	130°47.9	-14°50.5	76°01.6	-22°27.7
6	7°16.4	226°31.3	17°15.8	54°15.8	-22°39.0	145°50.5	-14°50.5	91°04.2	-22°27.7
7	22°18.9	241°30.9	17°14.9	69°18.3	-22°39.2	160°53.0	-14°50.5	106°06.9	-22°27.7
8	37°21.3	256°30.5	17°14.0	84°20.8	-22°39.4	175°55.6	-14°50.5	121°09.6	-22°27.7
9	52°23.8	271°30.2	17°13.0	99°23.3	-22°39.6	190°58.1	-14°50.5	136°12.2	-22°27.7
10	67°26.2	286°29.8	17°12.1	114°25.8	-22°39.8	206°00.7	-14°50.5	151°14.9	-22°27.8
11	82°28.7	301°29.5	17°11.1	129°28.3	-22°40.0	221°03.2	-14°50.4	166°17.5	-22°27.8
12	97°31.2	316°29.1	17°10.2	144°30.8	-22°40.2	236°05.8	-14°50.4	181°20.2	-22°27.8
13	112°33.6	331°28.8	17°09.2	159°33.3	-22°40.4	251°08.3	-14°50.4	196°22.9	-22°27.8
14	127°36.1	346°28.4	17°08.3	174°35.7	-22°40.6	266°10.9	-14°50.4	211°25.5	-22°27.8
15	142°38.6	1°28.1	17°07.4	189°38.2	-22°40.8	281°13.4	-14°50.4	226°28.2	-22°27.8
16	157°41.0	16°27.7	17°06.4	204°40.7	-22°41.0	296°16.0	-14°50.4	241°30.9	-22°27.8
17	172°43.5	31°27.4	17°05.5	219°43.2	-22°41.2	311°18.5	-14°50.4	256°33.5	-22°27.8
18	187°46.0	46°27.0	17°04.5	234°45.7	-22°41.4	326°21.1	-14°50.3	271°36.2	-22°27.8
19	202°48.4	61°26.7	17°03.6	249°48.3	-22°41.6	341°23.6	-14°50.3	286°38.8	-22°27.9
20	217°50.9	76°26.3	17°02.6	264°50.8	-22°41.9	356°26.2	-14°50.3	301°41.5	-22°27.9
21	232°53.3	91°26.0	17°01.7	279°53.3	-22°42.1	11°28.7	-14°50.3	316°44.2	-22°27.9
22	247°55.8	106°25.6	17°00.7	294°55.8	-22°42.3	26°31.3	-14°50.3	331°46.8	-22°27.9
23	262°58.3	121°25.3	16°59.8	309°58.3	-22°42.5	41°33.8	-14°50.3	346°49.5	-22°27.9
Mer.pass.:5:30:		v-0.4 d-0.9 m-4.0		v2.5 d-0.2 m-2.2		v2.6 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Stars

	SHA	**Dec**
Alpheratz	357°39.9	29°11.3
Ankaa	353°12.4	-42°12.2
Schedar	349°36.6	56°37.9
Diphda	348°52.4	-17°53.1
Achernar	335°24.5	-57°08.4
Hamal	327°57.1	23°32.7
Polaris	316°33.0	89°20.1
Akamar	315°16.1	-40°13.8
Menkar	314°11.7	4°09.5
Mirfak	308°35.8	49°55.2
Aldebaran	290°45.8	16°32.6
Rigel	281°09.1	-8°11.0
Capella	280°29.9	46°00.8
Bellatrix	278°28.7	6°21.8
Elnath	278°08.7	28°37.2
Alnilam	275°43.3	-1°11.6
Betelgeuse	270°58.0	7°24.4
Canopus	263°55.2	-52°42.5
Sirius	258°31.0	-16°44.5
Adara	255°10.2	-28°60.0
Procyon	244°56.4	5°10.7
Pollux	243°23.9	27°58.8
Avior	234°17.2	-59°34.3
Suhail	222°50.3	-43°30.6
Miaplacidus	221°39.6	-69°47.8
Alphard	217°53.0	-8°44.4
Regulus	207°40.1	11°52.7
Dubhe	193°47.8	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.8	-17°38.7
Acrux	173°05.4	-63°12.3
Gacrux	171°57.0	-57°13.2
Alioth	166°17.7	55°52.0
Spica	158°27.6	-11°15.4
Alcaid	152°56.0	49°13.7
Hadar	148°42.7	-60°27.8
Menkent	148°03.3	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.6	-60°54.7
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.4	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.5
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°33.0
Etamin	90°44.0	51°29.4
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.2	38°48.2
Nunki	75°53.7	-26°16.2
Altair	62°04.7	8°55.1
Peacock	53°13.4	-56°40.3
Deneb	49°28.7	45°20.7
Enif	33°43.6	9°57.6
Alnair	27°39.3	-46°52.0
Fomalhaut	15°20.2	-29°31.3
Scheat	13°50.0	28°10.8
Markab	13°34.8	15°18.2

2018/6/2	**SHA**	**Mer.pass**
Venus	221°48.3	14:53
Mars	47°00.2	02:31
Jupiter	138°28.9	20:22
Saturn	83°37.1	00:05

2018/6/2	**SHA**	**Mer.pass**
Venus	220°39.9	14:54
Mars	46°59.4	02:27
Jupiter	138°31.3	20:18
Saturn	83°41.9	00:01

2018/6/2	**SHA**	**Mer.pass**
Venus	219°31.8	14:54
Mars	46°59.3	02:24
Jupiter	138°33.5	20:14
Saturn	83°46.6	23:53

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°15.6	23°19.7	13°27.7	11.8	-19°34.6	-3.7	54.4
1	194°15.5	23°19.6	27°58.5	11.8	-19°38.3	-3.6	54.4
2	209°15.3	23°19.5	42°29.2	11.7	-19°41.8	-3.5	54.4
3	224°15.2	23°19.4	56°60.0	11.7	-19°45.3	-3.4	54.4
4	239°15.1	23°19.3	71°30.7	11.7	-19°48.7	-3.3	54.4
5	254°15.0	23°19.2	86°01.4	11.7	-19°52.0	-3.2	54.4
6	269°14.8	23°19.1	100°32.1	11.7	-19°55.2	-3.1	54.4
7	284°14.7	23°19.0	115°02.8	11.7	-19°58.3	-3.1	54.4
8	299°14.6	23°18.9	129°33.5	11.7	-20°01.3	-3.0	54.3
9	314°14.4	23°18.8	144°04.2	11.7	-20°04.2	-2.9	54.3
10	329°14.3	23°18.7	158°34.8	11.7	-20°07.0	-2.8	54.3
11	344°14.2	23°18.6	173°05.5	11.7	-20°09.7	-2.7	54.3
12	359°14.1	23°18.5	187°36.1	11.6	-20°12.3	-2.6	54.3
13	14°13.9	23°18.4	202°06.8	11.6	-20°14.9	-2.5	54.3
14	29°13.8	23°18.3	216°37.4	11.6	-20°17.3	-2.4	54.3
15	44°13.7	23°18.2	231°08.0	11.6	-20°19.6	-2.3	54.3
16	59°13.5	23°18.1	245°38.7	11.6	-20°21.8	-2.2	54.3
17	74°13.4	23°18.0	260°09.3	11.6	-20°24.0	-2.1	54.3
18	89°13.3	23°17.9	274°39.9	11.6	-20°26.0	-2.0	54.3
19	104°13.2	23°17.7	289°10.5	11.6	-20°28.0	-1.9	54.2
20	119°13.0	23°17.6	303°41.1	11.6	-20°29.8	-1.8	54.2
21	134°12.9	23°17.5	318°11.7	11.6	-20°31.6	-1.7	54.2
22	149°12.8	23°17.4	332°42.3	11.6	-20°33.2	-1.6	54.2
23	164°12.6	23°17.3	347°12.9	11.6	-20°34.8	-1.5	54.2
	SD.=15.7	d=-0.1	S.D.=14.8				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°12.5	23°17.2	1°43.5	11.6	-20°36.2	-1.4	54.2
1	194°12.4	23°17.1	16°14.1	11.6	-20°37.6	-1.3	54.2
2	209°12.3	23°17.0	30°44.7	11.6	-20°38.9	-1.2	54.2
3	224°12.1	23°16.9	45°15.3	11.6	-20°40.0	-1.1	54.2
4	239°12.0	23°16.7	59°45.9	11.6	-20°41.1	-1.0	54.2
5	254°11.9	23°16.6	74°16.5	11.6	-20°42.1	-0.9	54.2
6	269°11.7	23°16.5	88°47.1	11.6	-20°42.9	-0.8	54.2
7	284°11.6	23°16.4	103°17.7	11.6	-20°43.7	-0.7	54.2
8	299°11.5	23°16.3	117°48.3	11.6	-20°44.4	-0.6	54.1
9	314°11.4	23°16.1	132°18.9	11.6	-20°45.0	-0.5	54.1
10	329°11.2	23°16.0	146°49.6	11.6	-20°45.5	-0.4	54.1
11	344°11.1	23°15.9	161°20.2	11.6	-20°45.8	-0.3	54.1
12	359°11.0	23°15.8	175°50.8	11.6	-20°46.1	-0.2	54.1
13	14°10.9	23°15.7	190°21.4	11.6	-20°46.3	-0.1	54.1
14	29°10.7	23°15.5	204°52.1	11.6	-20°46.4	-0.0	54.1
15	44°10.6	23°15.4	219°22.7	11.6	-20°46.4	0.1	54.1
16	59°10.5	23°15.3	233°53.4	11.7	-20°46.3	0.2	54.1
17	74°10.4	23°15.2	248°24.0	11.7	-20°46.1	0.2	54.1
18	89°10.2	23°15.0	262°54.7	11.7	-20°45.8	0.3	54.1
19	104°10.1	23°14.9	277°25.4	11.7	-20°45.4	0.4	54.1
20	119°10.0	23°14.8	291°56.1	11.7	-20°44.9	0.5	54.1
21	134°09.9	23°14.7	306°26.8	11.7	-20°44.3	0.6	54.1
22	149°09.7	23°14.5	320°57.5	11.7	-20°43.6	0.7	54.1
23	164°09.6	23°14.4	335°28.2	11.7	-20°42.9	0.8	54.1
	SD.=15.7	d=-0.1	S.D.=14.8				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°09.5	23°14.3	349°58.9	11.7	-20°42.0	0.9	54.1
1	194°09.4	23°14.2	4°29.7	11.8	-20°41.0	1.0	54.1
2	209°09.2	23°14.0	19°00.4	11.8	-20°39.9	1.1	54.0
3	224°09.1	23°13.9	33°31.2	11.8	-20°38.8	1.2	54.0
4	239°09.0	23°13.8	48°02.0	11.8	-20°37.5	1.3	54.0
5	254°08.8	23°13.6	62°32.8	11.8	-20°36.1	1.4	54.0
6	269°08.7	23°13.5	77°03.6	11.8	-20°34.7	1.5	54.0
7	284°08.6	23°13.4	91°34.4	11.8	-20°33.1	1.6	54.0
8	299°08.5	23°13.2	106°05.3	11.9	-20°31.5	1.7	54.0
9	314°08.3	23°13.1	120°36.1	11.9	-20°29.7	1.8	54.0
10	329°08.2	23°12.9	135°07.0	11.9	-20°27.9	1.9	54.0
11	344°08.1	23°12.8	149°37.9	11.9	-20°26.0	2.0	54.0
12	359°08.0	23°12.7	164°08.8	11.9	-20°24.0	2.1	54.0
13	14°07.9	23°12.5	178°39.7	11.9	-20°21.8	2.2	54.0
14	29°07.7	23°12.4	193°10.7	12.0	-20°19.6	2.3	54.0
15	44°07.6	23°12.3	207°41.6	12.0	-20°17.3	2.4	54.0
16	59°07.5	23°12.1	222°12.6	12.0	-20°14.9	2.4	54.0
17	74°07.4	23°12.0	236°43.6	12.0	-20°12.4	2.5	54.0
18	89°07.2	23°11.8	251°14.7	12.0	-20°09.8	2.6	54.0
19	104°07.1	23°11.7	265°45.7	12.1	-20°07.2	2.7	54.0
20	119°07.0	23°11.5	280°16.8	12.1	-20°04.4	2.8	54.0
21	134°06.9	23°11.4	294°47.9	12.1	-20°01.5	2.9	54.0
22	149°06.7	23°11.3	309°19.0	12.1	-19°58.6	3.0	54.0
23	164°06.6	23°11.1	323°50.1	12.1	-19°55.5	3.1	54.0
	SD.=15.7	d=-0.1	S.D.=14.7				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:37	22:29	–:–	–:–
62	–:–	–:–	02:13	21:52	–:–	–:–
60	–:–	00:57	02:39	21:27	23:08	–:–
58	–:–	01:45	02:60	21:07	22:21	–:–
56	–:–	02:14	03:16	20:50	21:52	–:–
54	00:52	02:36	03:30	20:36	21:30	23:13
52	01:36	02:54	03:42	20:24	21:12	22:29
50	02:04	03:09	03:53	20:13	20:57	22:02
45	02:49	03:38	04:16	19:51	20:28	21:18
40	03:19	04:01	04:34	19:33	20:06	20:47
35	03:42	04:19	04:48	19:18	19:48	20:24
30	04:01	04:34	05:01	19:05	19:33	20:06
20	04:30	04:59	05:23	18:43	19:08	19:37
10	04:52	05:19	05:42	18:24	18:47	19:14
0	05:11	05:37	05:60	18:07	18:29	18:56
-10	05:28	05:54	06:17	17:50	18:12	18:39
-20	05:44	06:11	06:35	17:31	17:55	18:23
-30	06:00	06:30	06:56	17:10	17:36	18:06
-35	06:09	06:41	07:09	16:58	17:26	17:58
-40	06:18	06:52	07:23	16:44	17:14	17:48
-45	06:29	07:06	07:40	16:27	17:01	17:38
-50	06:40	07:22	08:00	16:07	16:45	17:26
-52	06:45	07:29	08:10	15:57	16:38	17:21
-54	06:51	07:37	08:21	15:46	16:29	17:16
-56	06:57	07:46	08:33	15:33	16:20	17:10
-58	07:04	07:56	08:48	15:19	16:10	17:03
-60	07:11	08:08	09:05	15:01	15:59	16:55

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	22:26	23:19	23:42	00:58	01:18	02:05
66	21:40	22:32	23:04	01:34	02:04	02:53
64	21:10	22:01	22:37	01:60	02:34	03:23
62	20:47	21:38	22:17	02:20	02:57	03:46
60	20:29	21:20	21:60	02:37	03:15	04:04
58	20:14	21:04	21:46	02:51	03:30	04:20
56	20:01	20:51	21:33	03:03	03:43	04:33
54	19:49	20:40	21:23	03:13	03:55	04:44
52	19:40	20:30	21:13	03:22	04:05	04:54
50	19:31	20:21	21:05	03:31	04:14	05:03
45	19:12	20:02	20:46	03:49	04:33	05:22
40	18:57	19:46	20:32	04:03	04:48	05:37
35	18:44	19:33	20:19	04:15	05:01	05:50
30	18:33	19:22	20:08	04:26	05:12	06:01
20	18:13	19:03	19:50	04:45	05:32	06:21
10	17:57	18:46	19:33	05:01	05:49	06:37
0	17:41	18:30	19:18	05:16	06:05	06:53
-10	17:26	18:14	19:03	05:31	06:20	07:09
-20	17:09	17:57	18:46	05:47	06:37	07:25
-30	16:50	17:37	18:27	06:06	06:57	07:45
-35	16:39	17:26	18:16	06:17	07:08	07:56
-40	16:26	17:13	18:04	06:29	07:21	08:09
-45	16:11	16:58	17:49	06:44	07:36	08:24
-50	15:53	16:39	17:31	07:02	07:55	08:42
-52	15:44	16:30	17:22	07:10	08:04	08:51
-54	15:35	16:20	17:13	07:20	08:14	09:01
-56	15:24	16:09	17:02	07:31	08:25	09:12
-58	15:11	15:56	16:49	07:43	08:38	09:24
-60	14:57	15:41	16:35	07:57	08:54	09:39

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
27	02:58	03:04	12:03	23:52	11:28	14(99%)
28	03:10	03:16	12:03	00:41	12:17	15(100%)
29	03:22	03:28	12:03	00:41	13:05	16(98%)

June 30, 01 ,02 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	278°00.7	136°24.9	16°58.8	325°00.8	-22°42.7	56°36.3	-14°50.3	1°52.2	-22°27.9
1	293°03.2	151°24.6	16°57.9	340°03.3	-22°42.9	71°38.9	-14°50.2	16°54.8	-22°27.9
2	308°05.7	166°24.2	16°56.9	355°05.8	-22°43.1	86°41.4	-14°50.2	31°57.5	-22°27.9
3	323°08.1	181°23.9	16°56.0	10°08.3	-22°43.3	101°44.0	-14°50.2	47°00.1	-22°27.9
4	338°10.6	196°23.5	16°55.0	25°10.8	-22°43.5	116°46.5	-14°50.2	62°02.8	-22°28.0
5	353°13.1	211°23.2	16°54.1	40°13.4	-22°43.7	131°49.1	-14°50.2	77°05.5	-22°28.0
6	8°15.5	226°22.9	16°53.1	55°15.9	-22°43.9	146°51.6	-14°50.2	92°08.1	-22°28.0
7	23°18.0	241°22.5	16°52.1	70°18.4	-22°44.1	161°54.2	-14°50.2	107°10.8	-22°28.0
8	38°20.5	256°22.2	16°51.2	85°20.9	-22°44.3	176°56.7	-14°50.1	122°13.5	-22°28.0
9	53°22.9	271°21.8	16°50.2	100°23.4	-22°44.5	191°59.3	-14°50.1	137°16.1	-22°28.0
10	68°25.4	286°21.5	16°49.3	115°26.0	-22°44.7	207°01.8	-14°50.1	152°18.8	-22°28.0
11	83°27.8	301°21.2	16°48.3	130°28.5	-22°45.0	222°04.3	-14°50.1	167°21.4	-22°28.0
12	98°30.3	316°20.8	16°47.4	145°31.0	-22°45.2	237°06.9	-14°50.1	182°24.1	-22°28.1
13	113°32.8	331°20.5	16°46.4	160°33.5	-22°45.4	252°09.4	-14°50.1	197°26.8	-22°28.1
14	128°35.2	346°20.2	16°45.4	175°36.1	-22°45.6	267°12.0	-14°50.1	212°29.4	-22°28.1
15	143°37.7	1°19.8	16°44.5	190°38.6	-22°45.8	282°14.5	-14°50.1	227°32.1	-22°28.1
16	158°40.2	16°19.5	16°43.5	205°41.1	-22°46.0	297°17.1	-14°50.0	242°34.8	-22°28.1
17	173°42.6	31°19.2	16°42.6	220°43.7	-22°46.2	312°19.6	-14°50.0	257°37.4	-22°28.1
18	188°45.1	46°18.8	16°41.6	235°46.2	-22°46.4	327°22.1	-14°50.0	272°40.1	-22°28.1
19	203°47.6	61°18.5	16°40.6	250°48.7	-22°46.6	342°24.7	-14°50.0	287°42.7	-22°28.1
20	218°50.0	76°18.2	16°39.7	265°51.3	-22°46.8	357°27.2	-14°50.0	302°45.4	-22°28.1
21	233°52.5	91°17.8	16°38.7	280°53.8	-22°47.1	12°29.8	-14°50.0	317°48.1	-22°28.2
22	248°55.0	106°17.5	16°37.7	295°56.4	-22°47.3	27°32.3	-14°50.0	332°50.7	-22°28.2
23	263°57.4	121°17.2	16°36.8	310°58.9	-22°47.5	42°34.8	-14°50.0	347°53.4	-22°28.2
Mer.pass.:5:27:		v-0.3 d-1.0 m-4.0		v2.5 d-0.2 m-2.2		v2.5 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	278°59.9	136°16.8	16°35.8	326°01.5	-22°47.7	57°37.4	-14°50.0	2°56.1	-22°28.2
1	294°02.3	151°16.5	16°34.8	341°04.0	-22°47.9	72°39.9	-14°49.9	17°58.7	-22°28.2
2	309°04.8	166°16.2	16°33.9	356°06.5	-22°48.1	87°42.5	-14°49.9	33°01.4	-22°28.2
3	324°07.3	181°15.9	16°32.9	11°09.1	-22°48.3	102°45.0	-14°49.9	48°04.0	-22°28.2
4	339°09.7	196°15.5	16°31.9	26°11.6	-22°48.5	117°47.5	-14°49.9	63°06.7	-22°28.2
5	354°12.2	211°15.2	16°30.9	41°14.2	-22°48.8	132°50.1	-14°49.9	78°09.4	-22°28.2
6	9°14.7	226°14.9	16°30.0	56°16.7	-22°49.0	147°52.6	-14°49.9	93°12.0	-22°28.3
7	24°17.1	241°14.6	16°29.0	71°19.3	-22°49.2	162°55.2	-14°49.9	108°14.7	-22°28.3
8	39°19.6	256°14.2	16°28.0	86°21.8	-22°49.4	177°57.7	-14°49.9	123°17.4	-22°28.3
9	54°22.1	271°13.9	16°27.1	101°24.4	-22°49.6	193°00.2	-14°49.9	138°20.0	-22°28.3
10	69°24.5	286°13.6	16°26.1	116°27.0	-22°49.8	208°02.8	-14°49.8	153°22.7	-22°28.3
11	84°27.0	301°13.3	16°25.1	131°29.5	-22°50.1	223°05.3	-14°49.8	168°25.3	-22°28.3
12	99°29.5	316°12.9	16°24.1	146°32.1	-22°50.3	238°07.8	-14°49.8	183°28.0	-22°28.3
13	114°31.9	331°12.6	16°23.2	161°34.6	-22°50.5	253°10.4	-14°49.8	198°30.7	-22°28.3
14	129°34.4	346°12.3	16°22.2	176°37.2	-22°50.7	268°12.9	-14°49.8	213°33.3	-22°28.3
15	144°36.8	1°12.0	16°21.2	191°39.8	-22°50.9	283°15.4	-14°49.8	228°36.0	-22°28.4
16	159°39.3	16°11.7	16°20.2	206°42.3	-22°51.1	298°18.0	-14°49.8	243°38.7	-22°28.4
17	174°41.8	31°11.3	16°19.3	221°44.9	-22°51.4	313°20.5	-14°49.8	258°41.3	-22°28.4
18	189°44.2	46°11.0	16°18.3	236°47.5	-22°51.6	328°23.0	-14°49.8	273°44.0	-22°28.4
19	204°46.7	61°10.7	16°17.3	251°50.0	-22°51.8	343°25.6	-14°49.7	288°46.6	-22°28.4
20	219°49.2	76°10.4	16°16.3	266°52.6	-22°52.0	358°28.1	-14°49.7	303°49.3	-22°28.4
21	234°51.6	91°10.1	16°15.3	281°55.2	-22°52.2	13°30.6	-14°49.7	318°52.0	-22°28.4
22	249°54.1	106°09.8	16°14.4	296°57.8	-22°52.5	28°33.2	-14°49.7	333°54.6	-22°28.4
23	264°56.6	121°09.5	16°13.4	312°00.3	-22°52.7	43°35.7	-14°49.7	348°57.3	-22°28.5
Mer.pass.:5:23:		v-0.3 d-1.0 m-4.0		v2.5 d-0.2 m-2.2		v2.5 d0.0 m-2.2		v2.7 d-0.0 m0.0	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	279°59.0	136°09.1	16°12.4	327°02.9	-22°52.9	58°38.2	-14°49.7	3°60.0	-22°28.5
1	295°01.5	151°08.8	16°11.4	342°05.5	-22°53.1	73°40.8	-14°49.7	19°02.6	-22°28.5
2	310°03.9	166°08.5	16°10.4	357°08.1	-22°53.3	88°43.3	-14°49.7	34°05.3	-22°28.5
3	325°06.4	181°08.2	16°09.4	12°10.6	-22°53.6	103°45.8	-14°49.7	49°07.9	-22°28.5
4	340°08.9	196°07.9	16°08.4	27°13.2	-22°53.8	118°48.4	-14°49.7	64°10.6	-22°28.5
5	355°11.3	211°07.6	16°07.5	42°15.8	-22°54.0	133°50.9	-14°49.7	79°13.3	-22°28.5
6	10°13.8	226°07.3	16°06.5	57°18.4	-22°54.2	148°53.4	-14°49.6	94°15.9	-22°28.5
7	25°16.3	241°07.0	16°05.5	72°21.0	-22°54.4	163°56.0	-14°49.6	109°18.6	-22°28.5
8	40°18.7	256°06.7	16°04.5	87°23.6	-22°54.7	178°58.5	-14°49.6	124°21.2	-22°28.6
9	55°21.2	271°06.4	16°03.5	102°26.2	-22°54.9	194°01.0	-14°49.6	139°23.9	-22°28.6
10	70°23.7	286°06.1	16°02.5	117°28.7	-22°55.1	209°03.6	-14°49.6	154°26.6	-22°28.6
11	85°26.1	301°05.8	16°01.5	132°31.3	-22°55.3	224°06.1	-14°49.6	169°29.2	-22°28.6
12	100°28.6	316°05.5	16°00.5	147°33.9	-22°55.6	239°08.6	-14°49.6	184°31.9	-22°28.6
13	115°31.1	331°05.2	15°59.6	162°36.5	-22°55.8	254°11.1	-14°49.6	199°34.6	-22°28.6
14	130°33.5	346°04.9	15°58.6	177°39.1	-22°56.0	269°13.7	-14°49.6	214°37.2	-22°28.6
15	145°36.0	1°04.6	15°57.6	192°41.7	-22°56.2	284°16.2	-14°49.6	229°39.9	-22°28.6
16	160°38.4	16°04.3	15°56.6	207°44.3	-22°56.5	299°18.7	-14°49.6	244°42.5	-22°28.6
17	175°40.9	31°04.0	15°55.6	222°46.9	-22°56.7	314°21.3	-14°49.6	259°45.2	-22°28.7
18	190°43.4	46°03.7	15°54.6	237°49.5	-22°56.9	329°23.8	-14°49.5	274°47.9	-22°28.7
19	205°45.8	61°03.4	15°53.6	252°52.1	-22°57.1	344°26.3	-14°49.5	289°50.5	-22°28.7
20	220°48.3	76°03.1	15°52.6	267°54.7	-22°57.4	359°28.8	-14°49.5	304°53.2	-22°28.7
21	235°50.8	91°02.8	15°51.6	282°57.3	-22°57.6	14°31.4	-14°49.5	319°55.9	-22°28.7
22	250°53.2	106°02.5	15°50.6	297°59.9	-22°57.8	29°33.9	-14°49.5	334°58.5	-22°28.7
23	265°55.7	121°02.2	15°49.6	313°02.5	-22°58.0	44°36.4	-14°49.5	350°01.2	-22°28.7
Mer.pass.:5:19:		v-0.3 d-1.0 m-4.0		v2.6 d-0.2 m-2.3		v2.5 d0.0 m-2.1		v2.7 d-0.0 m0.0	

Stars

	SHA	**Dec**
Alpheratz	357°39.9	29°11.3
Ankaa	353°12.3	-42°12.2
Schedar	349°36.6	56°37.9
Diphda	348°52.4	-17°53.1
Achernar	335°24.5	-57°08.4
Hamal	327°57.1	23°32.7
Polaris	316°31.7	89°20.1
Akamar	315°16.0	-40°13.8
Menkar	314°11.7	4°09.6
Mirfak	308°35.8	49°55.2
Aldebaran	290°45.8	16°32.6
Rigel	281°09.1	-8°11.0
Capella	280°29.9	46°00.8
Bellatrix	278°28.7	6°21.8
Elnath	278°08.7	28°37.2
Alnilam	275°43.2	-1°11.6
Betelgeuse	270°57.9	7°24.4
Canopus	263°55.2	-52°42.5
Sirius	258°31.0	-16°44.4
Adara	255°10.2	-28°60.0
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.2	-59°34.3
Suhail	222°50.3	-43°30.6
Miaplacidus	221°39.7	-69°47.8
Alphard	217°53.0	-8°44.4
Regulus	207°40.1	11°52.7
Dubhe	193°47.9	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.8	-17°38.7
Acrux	173°05.4	-63°12.3
Gacrux	171°57.0	-57°13.2
Alioth	166°17.7	55°52.0
Spica	158°27.6	-11°15.4
Alcaid	152°56.1	49°13.7
Hadar	148°42.7	-60°27.8
Menkent	148°03.4	-36°27.6
Arcturus	145°52.3	19°05.7
Rigil Kent.	139°46.6	-60°54.7
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.5	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.5
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°33.1
Etamin	90°44.0	51°29.4
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.2	38°48.2
Nunki	75°53.7	-26°16.2
Altair	62°04.7	8°55.1
Peacock	53°13.4	-56°40.3
Deneb	49°28.7	45°20.7
Enif	33°43.5	9°57.6
Alnair	27°39.2	-46°52.0
Fomalhaut	15°20.1	-29°31.3
Scheat	13°49.9	28°10.8
Markab	13°34.8	15°18.2

2018/6/3	**SHA**	**Mer.pass**
Venus	218°24.2	14:55
Mars	47°00.0	02:20
Jupiter	138°35.6	20:10
Saturn	83°51.4	23:48

2018/7/1	**SHA**	**Mer.pass**
Venus	217°17.0	14:55
Mars	47°01.6	02:16
Jupiter	138°37.5	20:06
Saturn	83°56.2	23:44

2018/7/2	**SHA**	**Mer.pass**
Venus	216°10.1	14:56
Mars	47°03.9	02:11
Jupiter	138°39.2	20:02
Saturn	84°00.9	23:40

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h Sun Moon

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°06.5	23°11.0	338°21.3	12.2	-19°52.4	3.2	54.0
1	194°06.4	23°10.8	352°52.5	12.2	-19°49.2	3.3	54.0
2	209°06.2	23°10.7	7°23.7	12.2	-19°45.9	3.4	54.0
3	224°06.1	23°10.5	21°54.9	12.2	-19°42.4	3.5	54.0
4	239°06.0	23°10.4	36°26.2	12.3	-19°39.0	3.5	54.0
5	254°05.9	23°10.2	50°57.4	12.3	-19°35.4	3.6	54.0
6	269°05.8	23°10.1	65°28.8	12.3	-19°31.7	3.7	54.0
7	284°05.6	23°09.9	80°00.1	12.3	-19°27.9	3.8	54.0
8	299°05.5	23°09.8	94°31.4	12.4	-19°24.1	3.9	54.0
9	314°05.4	23°09.6	109°02.8	12.4	-19°20.1	4.0	54.0
10	329°05.3	23°09.5	123°34.2	12.4	-19°16.1	4.1	54.0
11	344°05.1	23°09.3	138°05.6	12.4	-19°12.0	4.2	54.0
12	359°05.0	23°09.1	152°37.1	12.5	-19°07.8	4.2	54.0
13	14°04.9	23°09.0	167°08.6	12.5	-19°03.5	4.3	54.0
14	29°04.8	23°08.8	181°40.1	12.5	-18°59.1	4.4	54.0
15	44°04.7	23°08.7	196°11.6	12.6	-18°54.7	4.5	54.0
16	59°04.5	23°08.5	210°43.2	12.6	-18°50.1	4.6	54.0
17	74°04.4	23°08.4	225°14.8	12.6	-18°45.5	4.7	54.0
18	89°04.3	23°08.2	239°46.4	12.6	-18°40.8	4.8	54.0
19	104°04.2	23°08.0	254°18.1	12.7	-18°36.0	4.8	54.0
20	119°04.0	23°07.9	268°49.7	12.7	-18°31.1	4.9	54.0
21	134°03.9	23°07.7	283°21.4	12.7	-18°26.2	5.0	54.0
22	149°03.8	23°07.6	297°53.2	12.7	-18°21.1	5.1	54.0
23	164°03.7	23°07.4	312°24.9	12.8	-18°16.0	5.2	54.0
	SD.=15.7	d=-0.1	S.D.=14.7				

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°03.6	23°07.2	326°56.7	12.8	-18°10.8	5.2	54.0
1	194°03.4	23°07.1	341°28.6	12.8	-18°05.5	5.3	54.0
2	209°03.3	23°06.9	356°00.4	12.9	-18°00.1	5.4	54.0
3	224°03.2	23°06.7	10°32.3	12.9	-17°54.7	5.5	54.1
4	239°03.1	23°06.6	25°04.2	12.9	-17°49.1	5.6	54.1
5	254°03.0	23°06.4	39°36.1	12.9	-17°43.5	5.6	54.1
6	269°02.8	23°06.2	54°08.1	13.0	-17°37.8	5.7	54.1
7	284°02.7	23°06.1	68°40.1	13.0	-17°32.1	5.8	54.1
8	299°02.6	23°05.9	83°12.1	13.0	-17°26.2	5.9	54.1
9	314°02.5	23°05.7	97°44.1	13.1	-17°20.3	6.0	54.1
10	329°02.4	23°05.6	112°16.2	13.1	-17°14.3	6.0	54.1
11	344°02.2	23°05.4	126°48.3	13.1	-17°08.2	6.1	54.1
12	359°02.1	23°05.2	141°20.5	13.2	-17°02.1	6.2	54.1
13	14°02.0	23°05.1	155°52.6	13.2	-16°55.8	6.3	54.1
14	29°01.9	23°04.9	170°24.8	13.2	-16°49.5	6.3	54.1
15	44°01.8	23°04.7	184°57.0	13.2	-16°43.2	6.4	54.1
16	59°01.6	23°04.5	199°29.3	13.3	-16°36.7	6.5	54.1
17	74°01.5	23°04.4	214°01.6	13.3	-16°30.2	6.6	54.1
18	89°01.4	23°04.2	228°33.9	13.3	-16°23.6	6.6	54.1
19	104°01.3	23°04.0	243°06.2	13.4	-16°16.9	6.7	54.1
20	119°01.2	23°03.8	257°38.6	13.4	-16°10.2	6.8	54.2
21	134°01.0	23°03.6	272°11.0	13.4	-16°03.3	6.9	54.2
22	149°00.9	23°03.5	286°43.4	13.4	-15°56.5	6.9	54.2
23	164°00.8	23°03.3	301°15.8	13.5	-15°49.5	7.0	54.2
	SD.=15.7	d=-0.2	S.D.=14.7				

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°00.7	23°03.1	315°48.3	13.5	-15°42.5	7.1	54.2
1	194°00.6	23°02.9	330°20.8	13.5	-15°35.4	7.1	54.2
2	209°00.5	23°02.7	344°53.3	13.5	-15°28.2	7.2	54.2
3	224°00.3	23°02.6	359°25.9	13.6	-15°21.0	7.3	54.2
4	239°00.2	23°02.4	13°58.5	13.6	-15°13.7	7.3	54.2
5	254°00.1	23°02.2	28°31.1	13.6	-15°06.3	7.4	54.2
6	268°60.0	23°02.0	43°03.7	13.6	-14°58.9	7.5	54.2
7	283°59.9	23°01.8	57°36.4	13.7	-14°51.4	7.5	54.3
8	298°59.7	23°01.6	72°09.1	13.7	-14°43.8	7.6	54.3
9	313°59.6	23°01.5	86°41.8	13.7	-14°36.1	7.7	54.3
10	328°59.5	23°01.3	101°14.5	13.8	-14°28.4	7.7	54.3
11	343°59.4	23°01.1	115°47.3	13.8	-14°20.7	7.8	54.3
12	358°59.3	23°00.9	130°20.1	13.8	-14°12.8	7.9	54.3
13	13°59.2	23°00.7	144°52.9	13.8	-14°05.0	7.9	54.3
14	28°59.0	23°00.5	159°25.7	13.8	-13°57.0	8.0	54.3
15	43°58.9	23°00.3	173°58.6	13.9	-13°49.0	8.1	54.3
16	58°58.8	23°00.1	188°31.5	13.9	-13°40.9	8.1	54.4
17	73°58.7	22°59.9	203°04.4	13.9	-13°32.8	8.2	54.4
18	88°58.6	22°59.7	217°37.3	13.9	-13°24.6	8.2	54.4
19	103°58.5	22°59.6	232°10.3	14.0	-13°16.3	8.3	54.4
20	118°58.3	22°59.4	246°43.2	14.0	-13°08.0	8.4	54.4
21	133°58.2	22°59.2	261°16.2	14.0	-12°59.6	8.4	54.4
22	148°58.1	22°59.0	275°49.3	14.0	-12°51.1	8.5	54.4
23	163°58.0	22°58.8	290°22.3	14.0	-12°42.6	8.5	54.5
	SD.=15.7	d=-0.2	S.D.=14.8				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	00:20	23:40	–:–	–:–
64	–:–	–:–	01:41	22:25	–:–	–:–
62	–:–	–:–	02:17	21:50	–:–	–:–
60	–:–	01:03	02:42	21:25	23:03	–:–
58	–:–	01:48	03:02	21:05	22:18	–:–
56	–:–	02:17	03:18	20:49	21:50	–:–
54	00:58	02:38	03:32	20:35	21:29	23:08
52	01:40	02:56	03:44	20:23	21:11	22:27
50	02:06	03:11	03:55	20:12	20:57	22:01
45	02:51	03:40	04:17	19:50	20:28	21:17
40	03:21	04:02	04:35	19:33	20:05	20:47
35	03:43	04:20	04:50	19:18	19:48	20:24
30	04:02	04:35	05:02	19:05	19:33	20:06
20	04:31	04:60	05:24	18:43	19:08	19:37
10	04:53	05:20	05:43	18:25	18:48	19:15
0	05:12	05:38	06:00	18:08	18:30	18:56
-10	05:28	05:55	06:17	17:50	18:13	18:39
-20	05:44	06:12	06:36	17:32	17:56	18:24
-30	06:00	06:30	06:57	17:11	17:38	18:07
-35	06:09	06:41	07:09	16:59	17:27	17:59
-40	06:18	06:52	07:23	16:45	17:16	17:50
-45	06:28	07:06	07:39	16:29	17:02	17:39
-50	06:40	07:21	07:60	16:08	16:47	17:28
-52	06:45	07:29	08:09	15:59	16:39	17:23
-54	06:51	07:37	08:20	15:48	16:31	17:17
-56	06:57	07:45	08:33	15:35	16:22	17:11
-58	07:03	07:55	08:47	15:21	16:12	17:05
-60	07:10	08:07	09:04	15:04	16:01	16:57

	Moonrise			Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	00:58	–:–	–:–	05:21
70	01:05	00:32	00:21	01:60	04:10	05:57
68	23:51	23:55	23:55	03:22	04:50	06:22
66	23:23	23:34	23:41	03:59	05:18	06:41
64	23:02	23:18	23:30	04:26	05:39	06:57
62	22:45	23:05	23:20	04:46	05:55	07:09
60	22:30	22:53	23:11	05:03	06:09	07:20
58	22:18	22:43	23:04	05:17	06:21	07:30
56	22:07	22:35	22:57	05:29	06:32	07:38
54	21:58	22:27	22:51	05:40	06:41	07:45
52	21:49	22:20	22:46	05:49	06:49	07:52
50	21:42	22:14	22:41	05:57	06:56	07:58
45	21:26	22:00	22:31	06:15	07:12	08:10
40	21:12	21:49	22:22	06:29	07:24	08:21
35	21:01	21:39	22:14	06:42	07:35	08:30
30	20:51	21:31	22:08	06:52	07:44	08:37
20	20:34	21:16	21:56	07:10	08:01	08:51
10	20:19	21:03	21:46	07:26	08:15	09:02
0	20:05	20:51	21:36	07:41	08:28	09:13
-10	19:51	20:39	21:27	07:56	08:41	09:24
-20	19:36	20:26	21:17	08:11	08:55	09:36
-30	19:19	20:12	21:05	08:29	09:10	09:49
-35	19:09	20:03	20:58	08:40	09:20	09:56
-40	18:58	19:53	20:50	08:52	09:30	10:05
-45	18:44	19:42	20:41	09:06	09:42	10:15
-50	18:28	19:28	20:30	09:23	09:57	10:27
-52	18:20	19:21	20:25	09:31	10:04	10:32
-54	18:11	19:14	20:20	09:40	10:12	10:38
-56	18:01	19:06	20:13	09:50	10:20	10:45
-58	17:50	18:57	20:06	10:01	10:30	10:53
-60	17:37	18:46	19:59	10:14	10:41	11:01

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
30	03:34	03:40	12:03	01:29	13:53	17(95%)
1	03:46	03:52	12:03	02:16	14:39	18(91%)
2	03:57	04:03	12:04	03:02	15:24	19(84%)

July 03, 04 ,05 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	280°58.2	136°01.9	15°48.6	328°05.2	-22°58.3	59°38.9	-14°49.5	5°03.8	-22°28.7
1	296°00.6	151°01.6	15°47.6	343°07.8	-22°58.5	74°41.5	-14°49.5	20°06.5	-22°28.7
2	311°03.1	166°01.3	15°46.6	358°10.4	-22°58.7	89°44.0	-14°49.5	35°09.2	-22°28.8
3	326°05.6	181°01.0	15°45.6	13°13.0	-22°59.0	104°46.5	-14°49.5	50°11.8	-22°28.8
4	341°08.0	196°00.7	15°44.6	28°15.6	-22°59.2	119°49.0	-14°49.5	65°14.5	-22°28.8
5	356°10.5	211°00.4	15°43.6	43°18.2	-22°59.4	134°51.6	-14°49.5	80°17.1	-22°28.8
6	11°12.9	226°00.1	15°42.6	58°20.8	-22°59.6	149°54.1	-14°49.5	95°19.8	-22°28.8
7	26°15.4	240°59.8	15°41.6	73°23.5	-22°59.9	164°56.6	-14°49.5	110°22.5	-22°28.8
8	41°17.9	255°59.5	15°40.6	88°26.1	-23°00.1	179°59.1	-14°49.5	125°25.1	-22°28.8
9	56°20.3	270°59.2	15°39.6	103°28.7	-23°00.3	195°01.6	-14°49.4	140°27.8	-22°28.8
10	71°22.8	285°59.0	15°38.6	118°31.3	-23°00.6	210°04.2	-14°49.4	155°30.5	-22°28.8
11	86°25.3	300°58.7	15°37.6	133°34.0	-23°00.8	225°06.7	-14°49.4	170°33.1	-22°28.9
12	101°27.7	315°58.4	15°36.6	148°36.6	-23°01.0	240°09.2	-14°49.4	185°35.8	-22°28.9
13	116°30.2	330°58.1	15°35.6	163°39.2	-23°01.3	255°11.7	-14°49.4	200°38.4	-22°28.9
14	131°32.7	345°57.8	15°34.6	178°41.8	-23°01.5	270°14.2	-14°49.4	215°41.1	-22°28.9
15	146°35.1	0°57.5	15°33.6	193°44.5	-23°01.7	285°16.8	-14°49.4	230°43.8	-22°28.9
16	161°37.6	15°57.2	15°32.6	208°47.1	-23°01.9	300°19.3	-14°49.4	245°46.4	-22°28.9
17	176°40.0	30°57.0	15°31.5	223°49.7	-23°02.2	315°21.8	-14°49.4	260°49.1	-22°28.9
18	191°42.5	45°56.7	15°30.5	238°52.4	-23°02.4	330°24.3	-14°49.4	275°51.7	-22°28.9
19	206°45.0	60°56.4	15°29.5	253°55.0	-23°02.6	345°26.8	-14°49.4	290°54.4	-22°29.0
20	221°47.4	75°56.1	15°28.5	268°57.6	-23°02.9	0°29.4	-14°49.4	305°57.1	-22°29.0
21	236°49.9	90°55.8	15°27.5	284°00.3	-23°03.1	15°31.9	-14°49.4	320°59.7	-22°29.0
22	251°52.4	105°55.5	15°26.5	299°02.9	-23°03.3	30°34.4	-14°49.4	336°02.4	-22°29.0
23	266°54.8	120°55.3	15°25.5	314°05.6	-23°03.6	45°36.9	-14°49.4	351°05.0	-22°29.0
Mer.pass.:5:15:		v-0.3 d-1.0 m-4.0		v2.6 d-0.2 m-2.3		v2.5 d0.0 m-2.1		v2.7 d-0.0 m0.0	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	281°57.3	135°55.0	15°24.5	329°08.2	-23°03.8	60°39.4	-14°49.4	6°07.7	-22°29.0
1	296°59.8	150°54.7	15°23.5	344°10.8	-23°04.0	75°42.0	-14°49.4	21°10.4	-22°29.0
2	312°02.2	165°54.4	15°22.4	359°13.5	-23°04.3	90°44.5	-14°49.4	36°13.0	-22°29.0
3	327°04.7	180°54.2	15°21.4	14°16.1	-23°04.5	105°47.0	-14°49.3	51°15.7	-22°29.0
4	342°07.2	195°53.9	15°20.4	29°18.8	-23°04.8	120°49.5	-14°49.3	66°18.4	-22°29.1
5	357°09.6	210°53.6	15°19.4	44°21.4	-23°05.0	135°52.0	-14°49.3	81°21.0	-22°29.1
6	12°12.1	225°53.3	15°18.4	59°24.1	-23°05.2	150°54.5	-14°49.3	96°23.7	-22°29.1
7	27°14.5	240°53.1	15°17.4	74°26.7	-23°05.5	165°57.1	-14°49.3	111°26.3	-22°29.1
8	42°17.0	255°52.8	15°16.3	89°29.4	-23°05.7	180°59.6	-14°49.3	126°29.0	-22°29.1
9	57°19.5	270°52.5	15°15.3	104°32.0	-23°05.9	196°02.1	-14°49.3	141°31.7	-22°29.1
10	72°21.9	285°52.2	15°14.3	119°34.7	-23°06.2	211°04.6	-14°49.3	156°34.3	-22°29.1
11	87°24.4	300°52.0	15°13.3	134°37.4	-23°06.4	226°07.1	-14°49.3	171°37.0	-22°29.1
12	102°26.9	315°51.7	15°12.3	149°40.0	-23°06.6	241°09.6	-14°49.3	186°39.6	-22°29.1
13	117°29.3	330°51.4	15°11.3	164°42.7	-23°06.9	256°12.1	-14°49.3	201°42.3	-22°29.2
14	132°31.8	345°51.2	15°10.2	179°45.3	-23°07.1	271°14.7	-14°49.3	216°45.0	-22°29.2
15	147°34.3	0°50.9	15°09.2	194°48.0	-23°07.4	286°17.2	-14°49.3	231°47.6	-22°29.2
16	162°36.7	15°50.6	15°08.2	209°50.7	-23°07.6	301°19.7	-14°49.3	246°50.3	-22°29.2
17	177°39.2	30°50.4	15°07.2	224°53.3	-23°07.8	316°22.2	-14°49.3	261°52.9	-22°29.2
18	192°41.7	45°50.1	15°06.1	239°56.0	-23°08.1	331°24.7	-14°49.3	276°55.6	-22°29.2
19	207°44.1	60°49.8	15°05.1	254°58.7	-23°08.3	346°27.2	-14°49.3	291°58.3	-22°29.2
20	222°46.6	75°49.6	15°04.1	270°01.3	-23°08.6	1°29.7	-14°49.3	307°00.9	-22°29.2
21	237°49.0	90°49.3	15°03.1	285°04.0	-23°08.8	16°32.2	-14°49.3	322°03.6	-22°29.2
22	252°51.5	105°49.0	15°02.0	300°06.7	-23°09.0	31°34.8	-14°49.3	337°06.2	-22°29.3
23	267°54.0	120°48.8	15°01.0	315°09.4	-23°09.3	46°37.3	-14°49.3	352°08.9	-22°29.3
Mer.pass.:5:11:		v-0.3 d-1.0 m-4.0		v2.6 d-0.2 m-2.3		v2.5 d0.0 m-2.1		v2.7 d-0.0 m0.0	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	282°56.4	135°48.5	14°60.0	330°12.0	-23°09.5	61°39.8	-14°49.3	7°11.6	-22°29.3
1	297°58.9	150°48.3	14°59.0	345°14.7	-23°09.8	76°42.3	-14°49.3	22°14.2	-22°29.3
2	313°01.4	165°48.0	14°57.9	0°17.4	-23°10.0	91°44.8	-14°49.3	37°16.9	-22°29.3
3	328°03.8	180°47.7	14°56.9	15°20.1	-23°10.2	106°47.3	-14°49.3	52°19.5	-22°29.3
4	343°06.3	195°47.5	14°55.9	30°22.8	-23°10.5	121°49.8	-14°49.3	67°22.2	-22°29.3
5	358°08.8	210°47.2	14°54.8	45°25.4	-23°10.7	136°52.3	-14°49.3	82°24.9	-22°29.3
6	13°11.2	225°47.0	14°53.8	60°28.1	-23°11.0	151°54.8	-14°49.3	97°27.5	-22°29.3
7	28°13.7	240°46.7	14°52.8	75°30.8	-23°11.2	166°57.3	-14°49.3	112°30.2	-22°29.4
8	43°16.1	255°46.4	14°51.8	90°33.5	-23°11.4	181°59.8	-14°49.3	127°32.8	-22°29.4
9	58°18.6	270°46.2	14°50.7	105°36.2	-23°11.7	197°02.4	-14°49.3	142°35.5	-22°29.4
10	73°21.1	285°45.9	14°49.7	120°38.9	-23°11.9	212°04.9	-14°49.3	157°38.2	-22°29.4
11	88°23.5	300°45.7	14°48.7	135°41.6	-23°12.2	227°07.4	-14°49.3	172°40.8	-22°29.4
12	103°26.0	315°45.4	14°47.6	150°44.3	-23°12.4	242°09.9	-14°49.3	187°43.5	-22°29.4
13	118°28.5	330°45.2	14°46.6	165°46.9	-23°12.7	257°12.4	-14°49.2	202°46.1	-22°29.4
14	133°30.9	345°44.9	14°45.6	180°49.6	-23°12.9	272°14.9	-14°49.2	217°48.8	-22°29.4
15	148°33.4	0°44.7	14°44.5	195°52.3	-23°13.2	287°17.4	-14°49.2	232°51.5	-22°29.4
16	163°35.9	15°44.4	14°43.5	210°55.0	-23°13.4	302°19.9	-14°49.2	247°54.1	-22°29.5
17	178°38.3	30°44.2	14°42.4	225°57.7	-23°13.6	317°22.4	-14°49.2	262°56.8	-22°29.5
18	193°40.8	45°43.9	14°41.4	241°00.4	-23°13.9	332°24.9	-14°49.2	277°59.4	-22°29.5
19	208°43.3	60°43.7	14°40.4	256°03.1	-23°14.1	347°27.4	-14°49.2	293°02.1	-22°29.5
20	223°45.7	75°43.4	14°39.3	271°05.8	-23°14.4	2°29.9	-14°49.2	308°04.8	-22°29.5
21	238°48.2	90°43.2	14°38.3	286°08.5	-23°14.6	17°32.4	-14°49.2	323°07.4	-22°29.5
22	253°50.6	105°42.9	14°37.3	301°11.3	-23°14.9	32°34.9	-14°49.2	338°10.1	-22°29.5
23	268°53.1	120°42.7	14°36.2	316°14.0	-23°15.1	47°37.4	-14°49.2	353°12.7	-22°29.5
Mer.pass.:5:07:		v-0.3 d-1.0 m-4.0		v2.7 d-0.2 m-2.4		v2.5 d0.0 m-2.1		v2.7 d-0.0 m0.0	

Stars

	SHA	**Dec**
Alpheratz	357°39.9	29°11.3
Ankaa	353°12.3	-42°12.2
Schedar	349°36.5	56°37.9
Diphda	348°52.4	-17°53.1
Achernar	335°24.4	-57°08.4
Hamal	327°57.0	23°32.7
Polaris	316°30.5	89°20.1
Akamar	315°16.0	-40°13.8
Menkar	314°11.7	4°09.6
Mirfak	308°35.8	49°55.2
Aldebaran	290°45.8	16°32.6
Rigel	281°09.1	-8°11.0
Capella	280°29.9	46°00.8
Bellatrix	278°28.7	6°21.8
Elnath	278°08.7	28°37.2
Alnilam	275°43.2	-1°11.6
Betelgeuse	270°57.9	7°24.5
Canopus	263°55.2	-52°42.4
Sirius	258°31.0	-16°44.4
Adara	255°10.2	-28°60.0
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.2	-59°34.3
Suhail	222°50.3	-43°30.6
Miaplacidus	221°39.7	-69°47.8
Alphard	217°53.0	-8°44.4
Regulus	207°40.1	11°52.7
Dubhe	193°47.9	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.8	-17°38.7
Acrux	173°05.5	-63°12.3
Gacrux	171°57.1	-57°13.2
Alioth	166°17.7	55°52.0
Spica	158°27.6	-11°15.3
Alcaid	152°56.1	49°13.7
Hadar	148°42.7	-60°27.8
Menkent	148°03.4	-36°27.6
Arcturus	145°52.3	19°05.8
Rigil Kent.	139°46.7	-60°54.7
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.5	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.6
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°33.1
Etamin	90°44.0	51°29.4
Kaus Aust.	83°38.8	-34°22.3
Vega	80°36.2	38°48.2
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.1
Peacock	53°13.3	-56°40.3
Deneb	49°28.7	45°20.7
Enif	33°43.5	9°57.6
Alnair	27°39.2	-46°52.0
Fomalhaut	15°20.1	-29°31.3
Scheat	13°49.9	28°10.8
Markab	13°34.8	15°18.2

2018/7/3	**SHA**	**Mer.pass**
Venus	215°03.7	14:56
Mars	47°07.0	02:07
Jupiter	138°40.8	19:58
Saturn	84°05.7	23:36

2018/7/4	**SHA**	**Mer.pass**
Venus	213°57.7	14:57
Mars	47°10.9	02:03
Jupiter	138°42.1	19:54
Saturn	84°10.4	23:31

2018/7/5	**SHA**	**Mer.pass**
Venus	212°52.1	14:57
Mars	47°15.6	01:59
Jupiter	138°43.3	19:50
Saturn	84°15.1	23:27

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°57.9	22°58.6	304°55.4	14.1	-12°34.1	8.6	54.5
1	193°57.8	22°58.4	319°28.4	14.1	-12°25.5	8.6	54.5
2	208°57.7	22°58.2	334°01.5	14.1	-12°16.8	8.7	54.5
3	223°57.5	22°58.0	348°34.6	14.1	-12°08.1	8.8	54.5
4	238°57.4	22°57.8	3°07.8	14.1	-11°59.3	8.8	54.5
5	253°57.3	22°57.6	17°40.9	14.2	-11°50.5	8.9	54.5
6	268°57.2	22°57.4	32°14.1	14.2	-11°41.6	8.9	54.6
7	283°57.1	22°57.2	46°47.3	14.2	-11°32.6	9.0	54.6
8	298°57.0	22°57.0	61°20.5	14.2	-11°23.6	9.0	54.6
9	313°56.9	22°56.8	75°53.7	14.2	-11°14.6	9.1	54.6
10	328°56.7	22°56.6	90°26.9	14.2	-11°05.5	9.1	54.6
11	343°56.6	22°56.4	105°00.2	14.3	-10°56.3	9.2	54.6
12	358°56.5	22°56.2	119°33.4	14.3	-10°47.1	9.2	54.7
13	13°56.4	22°56.0	134°06.7	14.3	-10°37.9	9.3	54.7
14	28°56.3	22°55.7	148°40.0	14.3	-10°28.6	9.3	54.7
15	43°56.2	22°55.5	163°13.3	14.3	-10°19.2	9.4	54.7
16	58°56.1	22°55.3	177°46.6	14.3	-10°09.8	9.4	54.7
17	73°55.9	22°55.1	192°20.0	14.3	-10°00.3	9.5	54.7
18	88°55.8	22°54.9	206°53.3	14.3	-9°50.8	9.5	54.8
19	103°55.7	22°54.7	221°26.6	14.4	-9°41.3	9.6	54.8
20	118°55.6	22°54.5	236°00.0	14.4	-9°31.7	9.6	54.8
21	133°55.5	22°54.3	250°33.4	14.4	-9°22.1	9.7	54.8
22	148°55.4	22°54.1	265°06.7	14.4	-9°12.4	9.7	54.8
23	163°55.3	22°53.9	279°40.1	14.4	-9°02.6	9.8	54.9
	SD.=15.7	d=-0.2			S.D.=14.9		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°55.2	22°53.6	294°13.5	14.4	-8°52.9	9.8	54.9
1	193°55.0	22°53.4	308°46.9	14.4	-8°43.0	9.8	54.9
2	208°54.9	22°53.2	323°20.3	14.4	-8°33.2	9.9	54.9
3	223°54.8	22°53.0	337°53.7	14.4	-8°23.3	9.9	54.9
4	238°54.7	22°52.8	352°27.1	14.4	-8°13.3	10.0	55.0
5	253°54.6	22°52.6	7°00.6	14.4	-8°03.3	10.0	55.0
6	268°54.5	22°52.3	21°34.0	14.4	-7°53.3	10.1	55.0
7	283°54.4	22°52.1	36°07.4	14.4	-7°43.2	10.1	55.0
8	298°54.3	22°51.9	50°40.8	14.4	-7°33.1	10.1	55.0
9	313°54.1	22°51.7	65°14.3	14.4	-7°23.0	10.2	55.1
10	328°54.0	22°51.5	79°47.7	14.4	-7°12.8	10.2	55.1
11	343°53.9	22°51.3	94°21.1	14.4	-7°02.6	10.2	55.1
12	358°53.8	22°51.0	108°54.5	14.4	-6°52.3	10.3	55.1
13	13°53.7	22°50.8	123°28.0	14.4	-6°42.0	10.3	55.2
14	28°53.6	22°50.6	138°01.4	14.4	-6°31.6	10.4	55.2
15	43°53.5	22°50.4	152°34.8	14.4	-6°21.3	10.4	55.2
16	58°53.4	22°50.1	167°08.2	14.4	-6°10.9	10.4	55.2
17	73°53.3	22°49.9	181°41.6	14.4	-6°00.4	10.5	55.2
18	88°53.1	22°49.7	196°15.0	14.4	-5°49.9	10.5	55.3
19	103°53.0	22°49.5	210°48.4	14.4	-5°39.4	10.5	55.3
20	118°52.9	22°49.2	225°21.8	14.4	-5°28.9	10.6	55.3
21	133°52.8	22°49.0	239°55.2	14.4	-5°18.3	10.6	55.3
22	148°52.7	22°48.8	254°28.6	14.4	-5°07.7	10.6	55.4
23	163°52.6	22°48.5	269°01.9	14.4	-4°57.1	10.7	55.4
	SD.=15.7	d=-0.2			S.D.=15.0		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°52.5	22°48.3	283°35.3	14.3	-4°46.4	10.7	55.4
1	193°52.4	22°48.1	298°08.6	14.3	-4°35.7	10.7	55.5
2	208°52.3	22°47.9	312°42.0	14.3	-4°25.0	10.7	55.5
3	223°52.2	22°47.6	327°15.3	14.3	-4°14.2	10.8	55.5
4	238°52.1	22°47.4	341°48.6	14.3	-4°03.4	10.8	55.5
5	253°51.9	22°47.2	356°21.9	14.3	-3°52.6	10.8	55.6
6	268°51.8	22°46.9	10°55.2	14.3	-3°41.7	10.9	55.6
7	283°51.7	22°46.7	25°28.4	14.3	-3°30.9	10.9	55.6
8	298°51.6	22°46.4	40°01.7	14.2	-3°20.0	10.9	55.6
9	313°51.5	22°46.2	54°34.9	14.2	-3°09.1	10.9	55.7
10	328°51.4	22°46.0	69°08.1	14.2	-2°58.1	11.0	55.7
11	343°51.3	22°45.7	83°41.3	14.2	-2°47.2	11.0	55.7
12	358°51.2	22°45.5	98°14.5	14.2	-2°36.2	11.0	55.8
13	13°51.1	22°45.3	112°47.6	14.1	-2°25.2	11.0	55.8
14	28°51.0	22°45.0	127°20.7	14.1	-2°14.1	11.0	55.8
15	43°50.9	22°44.8	141°53.8	14.1	-2°03.1	11.1	55.8
16	58°50.8	22°44.5	156°26.9	14.1	-1°52.0	11.1	55.9
17	73°50.7	22°44.3	170°60.0	14.0	-1°40.9	11.1	55.9
18	88°50.5	22°44.1	185°33.0	14.0	-1°29.8	11.1	55.9
19	103°50.4	22°43.8	200°06.0	14.0	-1°18.7	11.1	56.0
20	118°50.3	22°43.6	214°39.0	14.0	-1°07.5	11.2	56.0
21	133°50.2	22°43.3	229°11.9	13.9	-0°56.3	11.2	56.0
22	148°50.1	22°43.1	243°44.9	13.9	-0°45.2	11.2	56.1
23	163°50.0	22°42.8	258°17.7	13.9	-0°34.0	11.2	56.1
	SD.=15.7	d=-0.2			S.D.=15.1		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	00:42	23:22	–:–	–:–
64	–:–	–:–	01:47	22:20	–:–	–:–
62	–:–	–:–	02:21	21:47	–:–	–:–
60	–:–	01:11	02:46	21:22	22:56	–:–
58	–:–	01:53	03:05	21:03	22:14	–:–
56	–:–	02:21	03:21	20:47	21:47	–:–
54	01:05	02:42	03:35	20:34	21:27	23:02
52	01:44	02:59	03:47	20:22	21:10	22:24
50	02:10	03:13	03:57	20:11	20:55	21:58
45	02:53	03:42	04:19	19:50	20:27	21:15
40	03:23	04:04	04:36	19:32	20:05	20:46
35	03:45	04:21	04:51	19:18	19:47	20:23
30	04:03	04:36	05:04	19:05	19:32	20:05
20	04:32	05:01	05:25	18:44	19:08	19:37
10	04:54	05:21	05:44	18:25	18:48	19:15
0	05:12	05:38	06:01	18:08	18:30	18:57
-10	05:29	05:55	06:18	17:51	18:14	18:40
-20	05:45	06:12	06:36	17:33	17:57	18:24
-30	06:00	06:30	06:56	17:12	17:39	18:08
-35	06:09	06:40	07:09	17:00	17:28	18:00
-40	06:18	06:52	07:22	16:47	17:17	17:51
-45	06:28	07:05	07:39	16:30	17:04	17:41
-50	06:39	07:21	07:59	16:10	16:48	17:30
-52	06:44	07:28	08:08	16:01	16:41	17:25
-54	06:50	07:36	08:19	15:50	16:33	17:19
-56	06:56	07:44	08:31	15:38	16:25	17:13
-58	07:02	07:54	08:45	15:24	16:15	17:07
-60	07:09	08:05	09:02	15:07	16:04	16:60

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	00:35	00:19	00:07	07:17	09:04	10:49
70	00:13	00:06	23:54	07:37	09:15	10:53
68	23:55	23:54	23:54	07:53	09:25	10:56
66	23:46	23:50	23:53	08:06	09:32	10:59
64	23:39	23:46	23:53	08:17	09:39	11:01
62	23:32	23:43	23:52	08:26	09:44	11:04
60	23:26	23:40	23:52	08:34	09:49	11:05
58	23:21	23:37	23:52	08:41	09:53	11:07
56	23:17	23:35	23:52	08:47	09:57	11:08
54	23:13	23:32	23:51	08:52	10:00	11:10
52	23:09	23:30	23:51	08:57	10:03	11:11
50	23:06	23:29	23:51	09:01	10:06	11:12
45	22:58	23:25	23:51	09:10	10:12	11:14
40	22:52	23:22	23:50	09:18	10:17	11:16
35	22:47	23:19	23:50	09:25	10:21	11:18
30	22:42	23:16	23:50	09:31	10:24	11:19
20	22:34	23:12	23:49	09:41	10:31	11:21
10	22:27	23:08	23:49	09:50	10:36	11:24
0	22:21	23:04	23:49	09:58	10:42	11:26
-10	22:14	23:01	23:48	10:06	10:47	11:28
-20	22:07	22:57	23:48	10:15	10:52	11:30
-30	21:58	22:53	23:48	10:24	10:58	11:32
-35	21:54	22:50	23:48	10:30	11:02	11:33
-40	21:48	22:47	23:47	10:36	11:06	11:35
-45	21:42	22:44	23:47	10:44	11:11	11:36
-50	21:35	22:40	23:47	10:53	11:16	11:38
-52	21:31	22:38	23:47	10:57	11:19	11:39
-54	21:27	22:36	23:47	11:01	11:21	11:40
-56	21:23	22:34	23:47	11:06	11:24	11:42
-58	21:18	22:31	23:46	11:11	11:28	11:43
-60	21:13	22:29	23:46	11:18	11:31	11:44

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
3	04:08	04:14	12:04	03:47	16:09	20(77%)
4	04:19	04:25	12:04	04:31	16:53	21(68%)
5	04:30	04:35	12:04	05:14	17:37	22(59%)

July 06, 07 ,08 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	283°55.6	135°42.4	14°35.2	331°16.7	-23°15.4	62°39.9	-14°49.2	8°15.4	-22°29.5
1	298°58.0	150°42.2	14°34.1	346°19.4	-23°15.6	77°42.4	-14°49.2	23°18.1	-22°29.6
2	314°00.5	165°41.9	14°33.1	1°22.1	-23°15.9	92°44.9	-14°49.2	38°20.7	-22°29.6
3	329°03.0	180°41.7	14°32.1	16°24.8	-23°16.1	107°47.4	-14°49.2	53°23.4	-22°29.6
4	344°05.4	195°41.5	14°31.0	31°27.5	-23°16.4	122°49.9	-14°49.2	68°26.0	-22°29.6
5	359°07.9	210°41.2	14°30.0	46°30.2	-23°16.6	137°52.4	-14°49.2	83°28.7	-22°29.6
6	14°10.4	225°41.0	14°28.9	61°32.9	-23°16.9	152°54.9	-14°49.2	98°31.4	-22°29.6
7	29°12.8	240°40.7	14°27.9	76°35.7	-23°17.1	167°57.4	-14°49.2	113°34.0	-22°29.6
8	44°15.3	255°40.5	14°26.8	91°38.4	-23°17.3	182°59.9	-14°49.2	128°36.7	-22°29.6
9	59°17.8	270°40.2	14°25.8	106°41.1	-23°17.6	198°02.4	-14°49.2	143°39.3	-22°29.6
10	74°20.2	285°40.0	14°24.7	121°43.8	-23°17.8	213°04.9	-14°49.2	158°42.0	-22°29.7
11	89°22.7	300°39.8	14°23.7	136°46.6	-23°18.1	228°07.4	-14°49.2	173°44.7	-22°29.7
12	104°25.1	315°39.5	14°22.6	151°49.3	-23°18.3	243°09.9	-14°49.2	188°47.3	-22°29.7
13	119°27.6	330°39.3	14°21.6	166°52.0	-23°18.6	258°12.4	-14°49.2	203°50.0	-22°29.7
14	134°30.1	345°39.1	14°20.6	181°54.7	-23°18.8	273°14.9	-14°49.2	218°52.6	-22°29.7
15	149°32.5	0°38.8	14°19.5	196°57.5	-23°19.1	288°17.4	-14°49.2	233°55.3	-22°29.7
16	164°35.0	15°38.6	14°18.5	212°00.2	-23°19.3	303°19.9	-14°49.2	248°58.0	-22°29.7
17	179°37.5	30°38.4	14°17.4	227°02.9	-23°19.6	318°22.4	-14°49.2	264°00.6	-22°29.7
18	194°39.9	45°38.1	14°16.4	242°05.7	-23°19.8	333°24.9	-14°49.2	279°03.3	-22°29.7
19	209°42.4	60°37.9	14°15.3	257°08.4	-23°20.1	348°27.4	-14°49.3	294°05.9	-22°29.8
20	224°44.9	75°37.7	14°14.3	272°11.1	-23°20.3	3°29.9	-14°49.3	309°08.6	-22°29.8
21	239°47.3	90°37.4	14°13.2	287°13.9	-23°20.6	18°32.4	-14°49.3	324°11.2	-22°29.8
22	254°49.8	105°37.2	14°12.1	302°16.6	-23°20.9	33°34.9	-14°49.3	339°13.9	-22°29.8
23	269°52.2	120°37.0	14°11.1	317°19.3	-23°21.1	48°37.4	-14°49.3	354°16.6	-22°29.8
Mer.pass.:5:03:		v-0.2 d-1.0 m-4.0		v2.7 d-0.2 m-2.4		v2.5 d0.0 m-2.1		v2.7 d-0.0 m0.0	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	284°54.7	135°36.7	14°10.0	332°22.1	-23°21.4	63°39.9	-14°49.3	9°19.2	-22°29.8
1	299°57.2	150°36.5	14°09.0	347°24.8	-23°21.6	78°42.4	-14°49.3	24°21.9	-22°29.8
2	314°59.6	165°36.3	14°07.9	2°27.6	-23°21.9	93°44.9	-14°49.3	39°24.5	-22°29.8
3	330°02.1	180°36.1	14°06.9	17°30.3	-23°22.1	108°47.4	-14°49.3	54°27.2	-22°29.8
4	345°04.6	195°35.8	14°05.8	32°33.1	-23°22.4	123°49.9	-14°49.3	69°29.9	-22°29.9
5	0°07.0	210°35.6	14°04.8	47°35.8	-23°22.6	138°52.4	-14°49.3	84°32.5	-22°29.9
6	15°09.5	225°35.4	14°03.7	62°38.6	-23°22.9	153°54.9	-14°49.3	99°35.2	-22°29.9
7	30°12.0	240°35.2	14°02.6	77°41.3	-23°23.1	168°57.4	-14°49.3	114°37.8	-22°29.9
8	45°14.4	255°34.9	14°01.6	92°44.1	-23°23.4	183°59.9	-14°49.3	129°40.5	-22°29.9
9	60°16.9	270°34.7	14°00.5	107°46.8	-23°23.6	199°02.3	-14°49.3	144°43.2	-22°29.9
10	75°19.4	285°34.5	13°59.5	122°49.6	-23°23.9	214°04.8	-14°49.3	159°45.8	-22°29.9
11	90°21.8	300°34.3	13°58.4	137°52.3	-23°24.1	229°07.3	-14°49.3	174°48.5	-22°29.9
12	105°24.3	315°34.0	13°57.4	152°55.1	-23°24.4	244°09.8	-14°49.3	189°51.1	-22°29.9
13	120°26.7	330°33.8	13°56.3	167°57.8	-23°24.7	259°12.3	-14°49.3	204°53.8	-22°30.0
14	135°29.2	345°33.6	13°55.2	183°00.6	-23°24.9	274°14.8	-14°49.3	219°56.4	-22°30.0
15	150°31.7	0°33.4	13°54.2	198°03.4	-23°25.2	289°17.3	-14°49.3	234°59.1	-22°30.0
16	165°34.1	15°33.2	13°53.1	213°06.1	-23°25.4	304°19.8	-14°49.3	250°01.8	-22°30.0
17	180°36.6	30°32.9	13°52.0	228°08.9	-23°25.7	319°22.3	-14°49.3	265°04.4	-22°30.0
18	195°39.1	45°32.7	13°51.0	243°11.7	-23°25.9	334°24.8	-14°49.3	280°07.1	-22°30.0
19	210°41.5	60°32.5	13°49.9	258°14.4	-23°26.2	349°27.3	-14°49.3	295°09.7	-22°30.0
20	225°44.0	75°32.3	13°48.9	273°17.2	-23°26.4	4°29.7	-14°49.3	310°12.4	-22°30.0
21	240°46.5	90°32.1	13°47.8	288°20.0	-23°26.7	19°32.2	-14°49.3	325°15.1	-22°30.0
22	255°48.9	105°31.9	13°46.7	303°22.7	-23°27.0	34°34.7	-14°49.3	340°17.7	-22°30.1
23	270°51.4	120°31.7	13°45.7	318°25.5	-23°27.2	49°37.2	-14°49.3	355°20.4	-22°30.1
Mer.pass.:4:59:		v-0.2 d-1.1 m-4.0		v2.7 d-0.3 m-2.5		v2.5 d-0.0 m-2.1		v2.7 d-0.0 m0.0	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	285°53.8	135°31.4	13°44.6	333°28.3	-23°27.5	64°39.7	-14°49.3	10°23.0	-22°30.1
1	300°56.3	150°31.2	13°43.5	348°31.1	-23°27.7	79°42.2	-14°49.3	25°25.7	-22°30.1
2	315°58.8	165°31.0	13°42.5	3°33.8	-23°28.0	94°44.7	-14°49.3	40°28.3	-22°30.1
3	331°01.2	180°30.8	13°41.4	18°36.6	-23°28.3	109°47.2	-14°49.3	55°31.0	-22°30.1
4	346°03.7	195°30.6	13°40.3	33°39.4	-23°28.5	124°49.6	-14°49.4	70°33.7	-22°30.1
5	1°06.2	210°30.4	13°39.3	48°42.2	-23°28.8	139°52.1	-14°49.4	85°36.3	-22°30.1
6	16°08.6	225°30.2	13°38.2	63°44.9	-23°29.0	154°54.6	-14°49.4	100°39.0	-22°30.1
7	31°11.1	240°30.0	13°37.1	78°47.7	-23°29.3	169°57.1	-14°49.4	115°41.6	-22°30.2
8	46°13.6	255°29.8	13°36.0	93°50.5	-23°29.5	184°59.6	-14°49.4	130°44.3	-22°30.2
9	61°16.0	270°29.6	13°35.0	108°53.3	-23°29.8	200°02.1	-14°49.4	145°46.9	-22°30.2
10	76°18.5	285°29.3	13°33.9	123°56.1	-23°30.1	215°04.6	-14°49.4	160°49.6	-22°30.2
11	91°21.0	300°29.1	13°32.8	138°58.9	-23°30.3	230°07.0	-14°49.4	175°52.3	-22°30.2
12	106°23.4	315°28.9	13°31.8	154°01.7	-23°30.6	245°09.5	-14°49.4	190°54.9	-22°30.2
13	121°25.9	330°28.7	13°30.7	169°04.5	-23°30.8	260°12.0	-14°49.4	205°57.6	-22°30.2
14	136°28.3	345°28.5	13°29.6	184°07.2	-23°31.1	275°14.5	-14°49.4	221°00.2	-22°30.2
15	151°30.8	0°28.3	13°28.5	199°10.0	-23°31.4	290°17.0	-14°49.4	236°02.9	-22°30.2
16	166°33.3	15°28.1	13°27.5	214°12.8	-23°31.6	305°19.5	-14°49.4	251°05.5	-22°30.3
17	181°35.7	30°27.9	13°26.4	229°15.6	-23°31.9	320°21.9	-14°49.4	266°08.2	-22°30.3
18	196°38.2	45°27.7	13°25.3	244°18.4	-23°32.1	335°24.4	-14°49.4	281°10.9	-22°30.3
19	211°40.7	60°27.5	13°24.2	259°21.2	-23°32.4	350°26.9	-14°49.4	296°13.5	-22°30.3
20	226°43.1	75°27.3	13°23.2	274°24.0	-23°32.7	5°29.4	-14°49.4	311°16.2	-22°30.3
21	241°45.6	90°27.1	13°22.1	289°26.8	-23°32.9	20°31.9	-14°49.4	326°18.8	-22°30.3
22	256°48.1	105°26.9	13°21.0	304°29.6	-23°33.2	35°34.4	-14°49.4	341°21.5	-22°30.3
23	271°50.5	120°26.7	13°19.9	319°32.4	-23°33.5	50°36.8	-14°49.5	356°24.1	-22°30.3
Mer.pass.:4:55:		v-0.2 d-1.1 m-4.0		v2.8 d-0.3 m-2.5		v2.5 d-0.0 m-2.1		v2.7 d-0.0 m0.0	

Stars

	SHA	**Dec**
Alpheratz	357°39.9	29°11.4
Ankaa	353°12.3	-42°12.2
Schedar	349°36.5	56°38.0
Diphda	348°52.3	-17°53.1
Achernar	335°24.4	-57°08.4
Hamal	327°57.0	23°32.7
Polaris	316°29.2	89°20.1
Akamar	315°16.0	-40°13.8
Menkar	314°11.6	4°09.6
Mirfak	308°35.7	49°55.2
Aldebaran	290°45.7	16°32.6
Rigel	281°09.1	-8°11.0
Capella	280°29.8	46°00.8
Bellatrix	278°28.6	6°21.8
Elnath	278°08.7	28°37.2
Alnilam	275°43.2	-1°11.6
Betelgeuse	270°57.9	7°24.5
Canopus	263°55.2	-52°42.4
Sirius	258°31.0	-16°44.4
Adara	255°10.2	-28°60.0
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.2	-59°34.3
Suhail	222°50.3	-43°30.6
Miaplacidus	221°39.7	-69°47.8
Alphard	217°53.0	-8°44.4
Regulus	207°40.1	11°52.7
Dubhe	193°47.9	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.8	-17°38.6
Acrux	173°05.5	-63°12.3
Gacrux	171°57.1	-57°13.2
Alioth	166°17.8	55°52.0
Spica	158°27.6	-11°15.3
Alcaid	152°56.1	49°13.7
Hadar	148°42.7	-60°27.8
Menkent	148°03.4	-36°27.6
Arcturus	145°52.3	19°05.8
Rigil Kent.	139°46.7	-60°54.7
Zubenelg.	137°01.4	-16°07.0
Kochab	137°19.6	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.6
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.0	51°29.4
Kaus Aust.	83°38.8	-34°22.3
Vega	80°36.2	38°48.2
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.1
Peacock	53°13.3	-56°40.3
Deneb	49°28.7	45°20.8
Enif	33°43.5	9°57.6
Alnair	27°39.2	-46°52.0
Fomalhaut	15°20.1	-29°31.3
Scheat	13°49.9	28°10.8
Markab	13°34.8	15°18.2

2018/7/6	**SHA**	**Mer.pass**
Venus	211°46.9	14:57
Mars	47°21.1	01:55
Jupiter	138°44.4	19:46
Saturn	84°19.8	23:23

2018/7/7	**SHA**	**Mer.pass**
Venus	210°42.0	14:58
Mars	47°27.4	01:50
Jupiter	138°45.2	19:42
Saturn	84°24.5	23:19

2018/7/8	**SHA**	**Mer.pass**
Venus	209°37.6	14:58
Mars	47°34.4	01:46
Jupiter	138°45.8	19:38
Saturn	84°29.2	23:14

Horizontal paralax	
Venus:	0.1
Mars:	0.3

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°49.9	22°42.6	272°50.6	13.8	-0°22.7	11.2	56.1
1	193°49.8	22°42.3	287°23.4	13.8	-0°11.5	11.2	56.1
2	208°49.7	22°42.1	301°56.2	13.8	-0°00.3	11.2	56.2
3	223°49.6	22°41.8	316°29.0	13.7	0°11.0	11.3	56.2
4	238°49.5	22°41.6	331°01.7	13.7	0°22.2	11.3	56.2
5	253°49.4	22°41.3	345°34.4	13.7	0°33.5	11.3	56.3
6	268°49.3	22°41.1	0°07.1	13.6	0°44.8	11.3	56.3
7	283°49.2	22°40.8	14°39.7	13.6	0°56.1	11.3	56.3
8	298°49.1	22°40.6	29°12.3	13.6	1°07.4	11.3	56.4
9	313°49.0	22°40.3	43°44.8	13.5	1°18.7	11.3	56.4
10	328°48.9	22°40.1	58°17.3	13.5	1°30.1	11.3	56.4
11	343°48.8	22°39.8	72°49.8	13.4	1°41.4	11.3	56.5
12	358°48.7	22°39.6	87°22.2	13.4	1°52.7	11.3	56.5
13	13°48.5	22°39.3	101°54.6	13.4	2°04.1	11.3	56.5
14	28°48.4	22°39.1	116°26.9	13.3	2°15.4	11.3	56.6
15	43°48.3	22°38.8	130°59.2	13.3	2°26.7	11.3	56.6
16	58°48.2	22°38.5	145°31.4	13.2	2°38.1	11.4	56.6
17	73°48.1	22°38.3	160°03.6	13.2	2°49.4	11.4	56.7
18	88°48.0	22°38.0	174°35.8	13.1	3°00.8	11.4	56.7
19	103°47.9	22°37.8	189°07.9	13.1	3°12.2	11.4	56.8
20	118°47.8	22°37.5	203°39.9	13.0	3°23.5	11.4	56.8
21	133°47.7	22°37.3	218°11.9	13.0	3°34.9	11.3	56.8
22	148°47.6	22°37.0	232°43.9	12.9	3°46.2	11.3	56.9
23	163°47.5	22°36.7	247°15.7	12.9	3°57.6	11.3	56.9
	SD.=15.7	d=-0.2	S.D.=15.3				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°47.4	22°36.5	261°47.6	12.8	4°08.9	11.3	56.9
1	193°47.3	22°36.2	276°19.4	12.8	4°20.2	11.3	57.0
2	208°47.2	22°35.9	290°51.1	12.7	4°31.6	11.3	57.0
3	223°47.1	22°35.7	305°22.8	12.6	4°42.9	11.3	57.0
4	238°47.0	22°35.4	319°54.4	12.6	4°54.2	11.3	57.1
5	253°46.9	22°35.1	334°26.0	12.5	5°05.5	11.3	57.1
6	268°46.8	22°34.9	348°57.5	12.5	5°16.8	11.3	57.1
7	283°46.7	22°34.6	3°28.9	12.4	5°28.1	11.3	57.2
8	298°46.6	22°34.3	18°00.3	12.4	5°39.4	11.3	57.2
9	313°46.5	22°34.1	32°31.6	12.3	5°50.6	11.3	57.3
10	328°46.4	22°33.8	47°02.9	12.2	6°01.9	11.2	57.3
11	343°46.3	22°33.5	61°34.1	12.2	6°13.1	11.2	57.3
12	358°46.2	22°33.3	76°05.2	12.1	6°24.3	11.2	57.4
13	13°46.1	22°33.0	90°36.3	12.0	6°35.5	11.2	57.4
14	28°46.0	22°32.7	105°07.3	12.0	6°46.7	11.2	57.5
15	43°45.9	22°32.4	119°38.2	11.9	6°57.9	11.2	57.5
16	58°45.8	22°32.2	134°09.0	11.8	7°09.0	11.1	57.5
17	73°45.7	22°31.9	148°39.8	11.8	7°20.2	11.1	57.6
18	88°45.6	22°31.6	163°10.6	11.7	7°31.3	11.1	57.6
19	103°45.5	22°31.3	177°41.2	11.6	7°42.3	11.1	57.6
20	118°45.4	22°31.1	192°11.8	11.5	7°53.4	11.0	57.7
21	133°45.3	22°30.8	206°42.3	11.5	8°04.4	11.0	57.7
22	148°45.2	22°30.5	221°12.7	11.4	8°15.4	11.0	57.8
23	163°45.1	22°30.2	235°43.1	11.3	8°26.4	11.0	57.8
	SD.=15.7	d=-0.3	S.D.=15.5				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°45.0	22°29.9	250°13.4	11.2	8°37.4	10.9	57.8
1	193°44.9	22°29.7	264°43.6	11.2	8°48.3	10.9	57.9
2	208°44.8	22°29.4	279°13.7	11.1	8°59.2	10.9	57.9
3	223°44.7	22°29.1	293°43.8	11.0	9°10.0	10.8	58.0
4	238°44.6	22°28.8	308°13.7	10.9	9°20.9	10.8	58.0
5	253°44.5	22°28.5	322°43.6	10.9	9°31.7	10.8	58.0
6	268°44.4	22°28.3	337°13.5	10.8	9°42.4	10.7	58.1
7	283°44.3	22°28.0	351°43.2	10.7	9°53.1	10.7	58.1
8	298°44.2	22°27.7	6°12.8	10.6	10°03.8	10.7	58.2
9	313°44.1	22°27.4	20°42.4	10.5	10°14.5	10.6	58.2
10	328°44.0	22°27.1	35°11.9	10.4	10°25.1	10.6	58.2
11	343°43.9	22°26.8	49°41.3	10.4	10°35.6	10.5	58.3
12	358°43.8	22°26.5	64°10.6	10.3	10°46.1	10.5	58.3
13	13°43.7	22°26.3	78°39.9	10.2	10°56.6	10.5	58.3
14	28°43.6	22°26.0	93°09.0	10.1	11°07.1	10.4	58.4
15	43°43.5	22°25.7	107°38.1	10.0	11°17.4	10.4	58.4
16	58°43.4	22°25.4	122°07.0	9.9	11°27.8	10.3	58.5
17	73°43.4	22°25.1	136°35.9	9.8	11°38.1	10.3	58.5
18	88°43.3	22°24.8	151°04.7	9.8	11°48.3	10.2	58.5
19	103°43.2	22°24.5	165°33.4	9.7	11°58.5	10.2	58.6
20	118°43.1	22°24.2	180°02.0	9.6	12°08.6	10.1	58.6
21	133°43.0	22°23.9	194°30.6	9.5	12°18.7	10.1	58.7
22	148°42.9	22°23.6	208°59.0	9.4	12°28.7	10.0	58.7
23	163°42.8	22°23.3	223°27.3	9.3	12°38.7	9.9	58.7
	SD.=15.7	d=-0.3	S.D.=15.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	00:58	23:08	–:–	–:–
64	–:–	–:–	01:54	22:14	–:–	–:–
62	–:–	–:–	02:26	21:42	–:–	–:–
60	–:–	01:20	02:50	21:19	22:48	–:–
58	–:–	01:58	03:09	21:00	22:10	–:–
56	–:–	02:25	03:24	20:45	21:44	–:–
54	01:13	02:45	03:38	20:32	21:24	22:54
52	01:49	03:02	03:49	20:20	21:07	22:19
50	02:14	03:16	03:59	20:10	20:53	21:55
45	02:56	03:44	04:21	19:49	20:25	21:13
40	03:25	04:06	04:38	19:31	20:04	20:45
35	03:47	04:23	04:53	19:17	19:46	20:23
30	04:05	04:38	05:05	19:05	19:32	20:05
20	04:33	05:02	05:26	18:44	19:08	19:37
10	04:55	05:21	05:44	18:25	18:48	19:15
0	05:13	05:39	06:01	18:09	18:31	18:57
-10	05:29	05:55	06:18	17:52	18:15	18:41
-20	05:45	06:12	06:36	17:34	17:58	18:25
-30	06:00	06:30	06:56	17:14	17:40	18:10
-35	06:09	06:40	07:08	17:02	17:30	18:01
-40	06:18	06:51	07:22	16:48	17:19	17:53
-45	06:27	07:04	07:38	16:32	17:06	17:43
-50	06:38	07:19	07:57	16:13	16:51	17:32
-52	06:43	07:26	08:07	16:03	16:44	17:27
-54	06:49	07:34	08:17	15:53	16:36	17:22
-56	06:54	07:43	08:29	15:41	16:27	17:16
-58	07:01	07:52	08:43	15:27	16:18	17:10
-60	07:08	08:03	08:59	15:11	16:07	17:03

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	23:43	23:30	23:14	12:35	14:25	16:26
70	23:48	23:42	23:36	12:32	14:15	16:05
68	23:53	23:52	23:53	12:30	14:07	15:50
66	23:57	–:–	00:01	12:28	14:00	15:37
64	23:60	–:–	00:08	12:26	13:54	15:26
62	–:–	00:03	00:14	12:25	13:49	15:17
60	–:–	00:05	00:20	12:24	13:45	15:10
58	–:–	00:07	00:24	12:23	13:41	15:03
56	–:–	00:09	00:29	12:22	13:38	14:57
54	–:–	00:11	00:32	12:21	13:35	14:52
52	–:–	00:13	00:36	12:20	13:32	14:47
50	–:–	00:14	00:39	12:20	13:30	14:43
45	–:–	00:17	00:46	12:18	13:24	14:33
40	–:–	00:20	00:52	12:17	13:20	14:26
35	–:–	00:22	00:57	12:16	13:16	14:19
30	–:–	00:24	01:01	12:15	13:13	14:13
20	–:–	00:28	01:09	12:13	13:07	14:03
10	–:–	00:31	01:16	12:12	13:02	13:55
0	–:–	00:34	01:22	12:10	12:57	13:46
-10	–:–	00:38	01:29	12:09	12:52	13:38
-20	–:–	00:41	01:36	12:07	12:47	13:29
-30	–:–	00:45	01:44	12:06	12:41	13:20
-35	–:–	00:47	01:49	12:05	12:38	13:14
-40	–:–	00:50	01:54	12:04	12:34	13:07
-45	–:–	00:52	02:00	12:02	12:30	12:60
-50	–:–	00:56	02:08	12:01	12:25	12:51
-52	–:–	00:58	02:11	12:00	12:22	12:47
-54	–:–	00:59	02:15	11:59	12:20	12:42
-56	–:–	01:01	02:19	11:59	12:17	12:37
-58	–:–	01:04	02:24	11:58	12:13	12:32
-60	–:–	01:06	02:29	11:57	12:10	12:25

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
6	04:40	04:45	12:04	05:59	18:22	23(48%)
7	04:50	04:55	12:04	06:45	19:09	24(38%)
8	05:00	05:05	12:05	07:34	19:59	25(28%)

July 09, 10 ,11 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	286°53.0	135°26.5	13°18.8	334°35.2	-23°33.7	65°39.3	-14°49.5	11°26.8	-22°30.3
1	301°55.5	150°26.3	13°17.8	349°38.1	-23°34.0	80°41.8	-14°49.5	26°29.5	-22°30.4
2	316°57.9	165°26.1	13°16.7	4°40.9	-23°34.2	95°44.3	-14°49.5	41°32.1	-22°30.4
3	332°00.4	180°25.9	13°15.6	19°43.7	-23°34.5	110°46.8	-14°49.5	56°34.8	-22°30.4
4	347°02.8	195°25.7	13°14.5	34°46.5	-23°34.8	125°49.2	-14°49.5	71°37.4	-22°30.4
5	2°05.3	210°25.5	13°13.4	49°49.3	-23°35.0	140°51.7	-14°49.5	86°40.1	-22°30.4
6	17°07.8	225°25.4	13°12.4	64°52.1	-23°35.3	155°54.2	-14°49.5	101°42.7	-22°30.4
7	32°10.2	240°25.2	13°11.3	79°54.9	-23°35.6	170°56.7	-14°49.5	116°45.4	-22°30.4
8	47°12.7	255°25.0	13°10.2	94°57.7	-23°35.8	185°59.2	-14°49.5	131°48.1	-22°30.4
9	62°15.2	270°24.8	13°09.1	110°00.6	-23°36.1	201°01.6	-14°49.5	146°50.7	-22°30.4
10	77°17.6	285°24.6	13°08.0	125°03.4	-23°36.3	216°04.1	-14°49.5	161°53.4	-22°30.4
11	92°20.1	300°24.4	13°06.9	140°06.2	-23°36.6	231°06.6	-14°49.5	176°56.0	-22°30.5
12	107°22.6	315°24.2	13°05.9	155°09.0	-23°36.9	246°09.1	-14°49.5	191°58.7	-22°30.5
13	122°25.0	330°24.0	13°04.8	170°11.8	-23°37.1	261°11.5	-14°49.6	207°01.3	-22°30.5
14	137°27.5	345°23.8	13°03.7	185°14.7	-23°37.4	276°14.0	-14°49.6	222°04.0	-22°30.5
15	152°30.0	0°23.6	13°02.6	200°17.5	-23°37.7	291°16.5	-14°49.6	237°06.6	-22°30.5
16	167°32.4	15°23.5	13°01.5	215°20.3	-23°37.9	306°19.0	-14°49.6	252°09.3	-22°30.5
17	182°34.9	30°23.3	13°00.4	230°23.1	-23°38.2	321°21.4	-14°49.6	267°12.0	-22°30.5
18	197°37.3	45°23.1	12°59.3	245°26.0	-23°38.5	336°23.9	-14°49.6	282°14.6	-22°30.5
19	212°39.8	60°22.9	12°58.3	260°28.8	-23°38.7	351°26.4	-14°49.6	297°17.3	-22°30.5
20	227°42.3	75°22.7	12°57.2	275°31.6	-23°39.0	6°28.9	-14°49.6	312°19.9	-22°30.6
21	242°44.7	90°22.5	12°56.1	290°34.5	-23°39.3	21°31.3	-14°49.6	327°22.6	-22°30.6
22	257°47.2	105°22.4	12°55.0	305°37.3	-23°39.5	36°33.8	-14°49.6	342°25.2	-22°30.6
23	272°49.7	120°22.2	12°53.9	320°40.1	-23°39.8	51°36.3	-14°49.6	357°27.9	-22°30.6
Mer.pass.:4:51:		v-0.2 d-1.1 m-4.0		v2.8 d-0.3 m-2.5		v2.5 d-0.0 m-2.1		v2.7 d-0.0 m0.0	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	287°52.1	135°22.0	12°52.8	335°43.0	-23°40.1	66°38.8	-14°49.6	12°30.6	-22°30.6
1	302°54.6	150°21.8	12°51.7	350°45.8	-23°40.3	81°41.2	-14°49.7	27°33.2	-22°30.6
2	317°57.1	165°21.6	12°50.6	5°48.6	-23°40.6	96°43.7	-14°49.7	42°35.9	-22°30.6
3	332°59.5	180°21.5	12°49.5	20°51.5	-23°40.9	111°46.2	-14°49.7	57°38.5	-22°30.6
4	348°02.0	195°21.3	12°48.4	35°54.3	-23°41.1	126°48.6	-14°49.7	72°41.2	-22°30.6
5	3°04.4	210°21.1	12°47.3	50°57.2	-23°41.4	141°51.1	-14°49.7	87°43.8	-22°30.7
6	18°06.9	225°20.9	12°46.3	66°00.0	-23°41.7	156°53.6	-14°49.7	102°46.5	-22°30.7
7	33°09.4	240°20.7	12°45.2	81°02.9	-23°41.9	171°56.1	-14°49.7	117°49.1	-22°30.7
8	48°11.8	255°20.6	12°44.1	96°05.7	-23°42.2	186°58.5	-14°49.7	132°51.8	-22°30.7
9	63°14.3	270°20.4	12°43.0	111°08.6	-23°42.5	202°01.0	-14°49.7	147°54.4	-22°30.7
10	78°16.8	285°20.2	12°41.9	126°11.4	-23°42.7	217°03.5	-14°49.7	162°57.1	-22°30.7
11	93°19.2	300°20.0	12°40.8	141°14.3	-23°43.0	232°05.9	-14°49.7	177°59.8	-22°30.7
12	108°21.7	315°19.9	12°39.7	156°17.1	-23°43.3	247°08.4	-14°49.8	193°02.4	-22°30.7
13	123°24.2	330°19.7	12°38.6	171°20.0	-23°43.5	262°10.9	-14°49.8	208°05.1	-22°30.7
14	138°26.6	345°19.5	12°37.5	186°22.8	-23°43.8	277°13.3	-14°49.8	223°07.7	-22°30.8
15	153°29.1	0°19.3	12°36.4	201°25.7	-23°44.1	292°15.8	-14°49.8	238°10.4	-22°30.8
16	168°31.6	15°19.2	12°35.3	216°28.5	-23°44.3	307°18.3	-14°49.8	253°13.0	-22°30.8
17	183°34.0	30°19.0	12°34.2	231°31.4	-23°44.6	322°20.8	-14°49.8	268°15.7	-22°30.8
18	198°36.5	45°18.8	12°33.1	246°34.2	-23°44.9	337°23.2	-14°49.8	283°18.3	-22°30.8
19	213°38.9	60°18.7	12°32.0	261°37.1	-23°45.1	352°25.7	-14°49.8	298°21.0	-22°30.8
20	228°41.4	75°18.5	12°30.9	276°40.0	-23°45.4	7°28.2	-14°49.8	313°23.7	-22°30.8
21	243°43.9	90°18.3	12°29.8	291°42.8	-23°45.7	22°30.6	-14°49.9	328°26.3	-22°30.8
22	258°46.3	105°18.2	12°28.7	306°45.7	-23°46.0	37°33.1	-14°49.9	343°29.0	-22°30.8
23	273°48.8	120°18.0	12°27.6	321°48.6	-23°46.2	52°35.6	-14°49.9	358°31.6	-22°30.8
Mer.pass.:4:47:		v-0.2 d-1.1 m-4.0		v2.8 d-0.3 m-2.6		v2.5 d-0.0 m-2.1		v2.7 d-0.0 m0.1	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	288°51.3	135°17.8	12°26.5	336°51.4	-23°46.5	67°38.0	-14°49.9	13°34.3	-22°30.9
1	303°53.7	150°17.7	12°25.4	351°54.3	-23°46.8	82°40.5	-14°49.9	28°36.9	-22°30.9
2	318°56.2	165°17.5	12°24.3	6°57.2	-23°47.0	97°42.9	-14°49.9	43°39.6	-22°30.9
3	333°58.7	180°17.3	12°23.2	22°00.0	-23°47.3	112°45.4	-14°49.9	58°42.2	-22°30.9
4	349°01.1	195°17.2	12°22.1	37°02.9	-23°47.6	127°47.9	-14°49.9	73°44.9	-22°30.9
5	4°03.6	210°17.0	12°21.0	52°05.8	-23°47.8	142°50.3	-14°49.9	88°47.5	-22°30.9
6	19°06.1	225°16.9	12°19.9	67°08.7	-23°48.1	157°52.8	-14°50.0	103°50.2	-22°30.9
7	34°08.5	240°16.7	12°18.8	82°11.5	-23°48.4	172°55.3	-14°50.0	118°52.8	-22°30.9
8	49°11.0	255°16.5	12°17.7	97°14.4	-23°48.7	187°57.7	-14°50.0	133°55.5	-22°30.9
9	64°13.4	270°16.4	12°16.6	112°17.3	-23°48.9	203°00.2	-14°50.0	148°58.2	-22°31.0
10	79°15.9	285°16.2	12°15.5	127°20.2	-23°49.2	218°02.7	-14°50.0	164°00.8	-22°31.0
11	94°18.4	300°16.1	12°14.3	142°23.0	-23°49.5	233°05.1	-14°50.0	179°03.5	-22°31.0
12	109°20.8	315°15.9	12°13.2	157°25.9	-23°49.7	248°07.6	-14°50.0	194°06.1	-22°31.0
13	124°23.3	330°15.7	12°12.1	172°28.8	-23°50.0	263°10.0	-14°50.0	209°08.8	-22°31.0
14	139°25.8	345°15.6	12°11.0	187°31.7	-23°50.3	278°12.5	-14°50.0	224°11.4	-22°31.0
15	154°28.2	0°15.4	12°09.9	202°34.6	-23°50.6	293°15.0	-14°50.1	239°14.1	-22°31.0
16	169°30.7	15°15.3	12°08.8	217°37.5	-23°50.8	308°17.4	-14°50.1	254°16.7	-22°31.0
17	184°33.2	30°15.1	12°07.7	232°40.4	-23°51.1	323°19.9	-14°50.1	269°19.4	-22°31.0
18	199°35.6	45°15.0	12°06.6	247°43.2	-23°51.4	338°22.3	-14°50.1	284°22.0	-22°31.1
19	214°38.1	60°14.8	12°05.5	262°46.1	-23°51.6	353°24.8	-14°50.1	299°24.7	-22°31.1
20	229°40.6	75°14.7	12°04.4	277°49.0	-23°51.9	8°27.3	-14°50.1	314°27.3	-22°31.1
21	244°43.0	90°14.5	12°03.3	292°51.9	-23°52.2	23°29.7	-14°50.1	329°30.0	-22°31.1
22	259°45.5	105°14.4	12°02.1	307°54.8	-23°52.5	38°32.2	-14°50.1	344°32.7	-22°31.1
23	274°47.9	120°14.2	12°01.0	322°57.7	-23°52.7	53°34.6	-14°50.2	359°35.3	-22°31.1
Mer.pass.:4:43:		v-0.2 d-1.1 m-4.0		v2.9 d-0.3 m-2.6		v2.5 d-0.0 m-2.1		v2.7 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.4
Ankaa	353°12.3	-42°12.2
Schedar	349°36.5	56°38.0
Diphda	348°52.3	-17°53.1
Achernar	335°24.4	-57°08.4
Hamal	327°57.0	23°32.8
Polaris	316°27.7	89°20.1
Akamar	315°16.0	-40°13.8
Menkar	314°11.6	4°09.6
Mirfak	308°35.7	49°55.2
Aldebaran	290°45.7	16°32.6
Rigel	281°09.1	-8°10.9
Capella	280°29.8	46°00.8
Bellatrix	278°28.6	6°21.8
Elnath	278°08.6	28°37.2
Alnilam	275°43.2	-1°11.6
Betelgeuse	270°57.9	7°24.5
Canopus	263°55.2	-52°42.4
Sirius	258°31.0	-16°44.4
Adara	255°10.2	-28°59.9
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.2	-59°34.3
Suhail	222°50.3	-43°30.6
Miaplacidus	221°39.8	-69°47.8
Alphard	217°53.0	-8°44.4
Regulus	207°40.1	11°52.7
Dubhe	193°47.9	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.8	-17°38.6
Acrux	173°05.5	-63°12.3
Gacrux	171°57.1	-57°13.2
Alioth	166°17.8	55°52.0
Spica	158°27.6	-11°15.3
Alcaid	152°56.1	49°13.7
Hadar	148°42.8	-60°27.8
Menkent	148°03.4	-36°27.6
Arcturus	145°52.4	19°05.8
Rigil Kent.	139°46.7	-60°54.7
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.6	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.6
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.0	51°29.4
Kaus Aust.	83°38.8	-34°22.3
Vega	80°36.2	38°48.2
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.1
Peacock	53°13.3	-56°40.3
Deneb	49°28.7	45°20.8
Enif	33°43.5	9°57.6
Alnair	27°39.1	-46°52.0
Fomalhaut	15°20.1	-29°31.3
Scheat	13°49.9	28°10.8
Markab	13°34.7	15°18.2

2018/7/9	**SHA**	**Mer.pass**
Venus	208°33.5	14:58
Mars	47°42.3	01:41
Jupiter	138°46.3	19:34
Saturn	84°33.8	23:10

2018/7/1	**SHA**	**Mer.pass**
Venus	207°29.9	14:59
Mars	47°50.8	01:37
Jupiter	138°46.6	19:30
Saturn	84°38.4	23:06

2018/7/1	**SHA**	**Mer.pass**
Venus	206°26.6	14:59
Mars	48°00.2	01:32
Jupiter	138°46.7	19:26
Saturn	84°43.0	23:02

Horizontal paralax	
Venus:	0.1
Mars:	0.4

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°42.7	22°23.0	237°55.6	9.2	12°48.6	9.9	58.8
1	193°42.6	22°22.8	252°23.7	9.1	12°58.4	9.8	58.8
2	208°42.5	22°22.5	266°51.8	9.0	13°08.2	9.8	58.9
3	223°42.4	22°22.2	281°19.8	8.9	13°17.9	9.7	58.9
4	238°42.3	22°21.9	295°47.6	8.8	13°27.6	9.6	58.9
5	253°42.2	22°21.6	310°15.4	8.7	13°37.2	9.6	59.0
6	268°42.1	22°21.3	324°43.1	8.6	13°46.7	9.5	59.0
7	283°42.0	22°21.0	339°10.7	8.5	13°56.2	9.4	59.1
8	298°41.9	22°20.7	353°38.2	8.4	14°05.6	9.4	59.1
9	313°41.8	22°20.4	8°05.6	8.4	14°14.9	9.3	59.1
10	328°41.8	22°20.1	22°32.9	8.3	14°24.1	9.2	59.2
11	343°41.7	22°19.8	37°00.1	8.2	14°33.3	9.1	59.2
12	358°41.6	22°19.4	51°27.2	8.1	14°42.4	9.1	59.2
13	13°41.5	22°19.1	65°54.2	8.0	14°51.4	9.0	59.3
14	28°41.4	22°18.8	80°21.2	7.9	15°00.3	8.9	59.3
15	43°41.3	22°18.5	94°48.0	7.8	15°09.2	8.8	59.4
16	58°41.2	22°18.2	109°14.7	7.7	15°18.0	8.7	59.4
17	73°41.1	22°17.9	123°41.3	7.6	15°26.7	8.7	59.4
18	88°41.0	22°17.6	138°07.8	7.5	15°35.3	8.6	59.5
19	103°40.9	22°17.3	152°34.3	7.4	15°43.8	8.5	59.5
20	118°40.8	22°17.0	167°00.6	7.3	15°52.2	8.4	59.5
21	133°40.7	22°16.7	181°26.8	7.2	16°00.6	8.3	59.6
22	148°40.7	22°16.4	195°53.0	7.1	16°08.8	8.2	59.6
23	163°40.6	22°16.1	210°19.0	7.0	16°17.0	8.1	59.7
	SD.=15.7	d=-0.3	S.D.=16.0				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°40.5	22°15.8	224°45.0	6.9	16°25.1	8.0	59.7
1	193°40.4	22°15.4	239°10.8	6.8	16°33.0	7.9	59.7
2	208°40.3	22°15.1	253°36.6	6.7	16°40.9	7.8	59.8
3	223°40.2	22°14.8	268°02.2	6.6	16°48.7	7.7	59.8
4	238°40.1	22°14.5	282°27.8	6.5	16°56.4	7.6	59.8
5	253°40.0	22°14.2	296°53.2	6.4	17°04.0	7.5	59.9
6	268°39.9	22°13.9	311°18.6	6.3	17°11.4	7.4	59.9
7	283°39.8	22°13.6	325°43.9	6.2	17°18.8	7.3	59.9
8	298°39.8	22°13.2	340°09.0	6.1	17°26.1	7.2	60.0
9	313°39.7	22°12.9	354°34.1	6.0	17°33.2	7.1	60.0
10	328°39.6	22°12.6	8°59.1	5.9	17°40.3	7.0	60.0
11	343°39.5	22°12.3	23°24.0	5.8	17°47.2	6.9	60.1
12	358°39.4	22°12.0	37°48.8	5.8	17°54.1	6.8	60.1
13	13°39.3	22°11.6	52°13.5	5.7	18°00.8	6.7	60.1
14	28°39.2	22°11.3	66°38.1	5.6	18°07.4	6.5	60.2
15	43°39.1	22°11.0	81°02.7	5.5	18°13.9	6.4	60.2
16	58°39.0	22°10.7	95°27.1	5.4	18°20.2	6.3	60.2
17	73°39.0	22°10.4	109°51.5	5.3	18°26.5	6.2	60.3
18	88°38.9	22°10.0	124°15.7	5.2	18°32.6	6.1	60.3
19	103°38.8	22°09.7	138°39.9	5.1	18°38.6	5.9	60.3
20	118°38.7	22°09.4	153°04.0	5.0	18°44.5	5.8	60.4
21	133°38.6	22°09.1	167°28.0	5.0	18°50.3	5.7	60.4
22	148°38.5	22°08.7	181°51.9	4.9	18°55.9	5.6	60.4
23	163°38.4	22°08.4	196°15.8	4.8	19°01.4	5.4	60.4
	SD.=15.7	d=-0.3	S.D.=16.3				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°38.4	22°08.1	210°39.5	4.7	19°06.8	5.3	60.5
1	193°38.3	22°07.8	225°03.2	4.6	19°12.0	5.2	60.5
2	208°38.2	22°07.4	239°26.8	4.6	19°17.2	5.1	60.5
3	223°38.1	22°07.1	253°50.3	4.5	19°22.1	4.9	60.6
4	238°38.0	22°06.8	268°13.8	4.4	19°27.0	4.8	60.6
5	253°37.9	22°06.4	282°37.1	4.3	19°31.7	4.7	60.6
6	268°37.8	22°06.1	297°00.4	4.3	19°36.3	4.5	60.6
7	283°37.8	22°05.8	311°23.6	4.2	19°40.7	4.4	60.7
8	298°37.7	22°05.4	325°46.8	4.1	19°45.0	4.2	60.7
9	313°37.6	22°05.1	340°09.9	4.0	19°49.2	4.1	60.7
10	328°37.5	22°04.8	354°32.9	4.0	19°53.2	4.0	60.7
11	343°37.4	22°04.4	8°55.8	3.9	19°57.1	3.8	60.8
12	358°37.3	22°04.1	23°18.7	3.8	20°00.9	3.7	60.8
13	13°37.3	22°03.8	37°41.5	3.8	20°04.5	3.5	60.8
14	28°37.2	22°03.4	52°04.2	3.7	20°07.9	3.4	60.8
15	43°37.1	22°03.1	66°26.9	3.7	20°11.2	3.2	60.9
16	58°37.0	22°02.8	80°49.6	3.6	20°14.4	3.1	60.9
17	73°36.9	22°02.4	95°12.1	3.5	20°17.4	2.9	60.9
18	88°36.8	22°02.1	109°34.7	3.5	20°20.3	2.8	60.9
19	103°36.8	22°01.7	123°57.1	3.4	20°23.0	2.6	60.9
20	118°36.7	22°01.4	138°19.5	3.4	20°25.6	2.5	61.0
21	133°36.6	22°01.1	152°41.9	3.3	20°28.0	2.3	61.0
22	148°36.5	22°00.7	167°04.2	3.3	20°30.3	2.2	61.0
23	163°36.4	22°00.4	181°26.5	3.2	20°32.4	2.0	61.0
	SD.=15.7	d=-0.3	S.D.=16.5				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	01:12	22:54	–:–	–:–
64	–:–	–:–	02:01	22:07	–:–	–:–
62	–:–	–:–	02:32	21:37	–:–	–:–
60	–:–	01:29	02:55	21:15	22:39	–:–
58	–:–	02:04	03:13	20:57	22:05	–:–
56	–:–	02:30	03:28	20:42	21:40	–:–
54	01:21	02:49	03:41	20:29	21:21	22:47
52	01:55	03:05	03:52	20:18	21:05	22:15
50	02:18	03:19	04:02	20:08	20:51	21:52
45	02:59	03:47	04:23	19:47	20:24	21:11
40	03:27	04:08	04:40	19:30	20:03	20:43
35	03:49	04:25	04:54	19:16	19:45	20:21
30	04:07	04:39	05:06	19:04	19:31	20:04
20	04:34	05:03	05:27	18:43	19:08	19:37
10	04:55	05:22	05:45	18:26	18:48	19:15
0	05:13	05:39	06:02	18:09	18:31	18:57
-10	05:29	05:56	06:18	17:53	18:15	18:41
-20	05:45	06:12	06:36	17:35	17:59	18:26
-30	05:60	06:30	06:56	17:15	17:41	18:11
-35	06:08	06:39	07:07	17:04	17:31	18:03
-40	06:17	06:50	07:21	16:50	17:21	17:54
-45	06:26	07:03	07:36	16:35	17:08	17:45
-50	06:37	07:18	07:56	16:15	16:53	17:34
-52	06:42	07:25	08:05	16:06	16:46	17:29
-54	06:47	07:32	08:15	15:56	16:39	17:24
-56	06:52	07:41	08:27	15:45	16:30	17:19
-58	06:59	07:50	08:40	15:31	16:21	17:13
-60	07:05	08:01	08:56	15:16	16:11	17:06

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	22:48	–:–	–:–	18:45	–:–	–:–
70	23:28	23:16	–:–	18:05	20:19	–:–
68	23:56	–:–	00:05	17:38	19:31	21:15
66	00:07	00:18	00:36	17:18	18:60	20:32
64	00:19	00:35	00:60	17:02	18:37	20:03
62	00:29	00:49	01:19	16:48	18:19	19:41
60	00:37	01:01	01:34	16:37	18:04	19:24
58	00:45	01:11	01:47	16:27	17:51	19:09
56	00:52	01:20	01:59	16:19	17:40	18:56
54	00:57	01:29	02:09	16:11	17:30	18:45
52	01:03	01:36	02:18	16:04	17:21	18:35
50	01:08	01:42	02:26	15:58	17:14	18:27
45	01:18	01:57	02:43	15:45	16:57	18:08
40	01:27	02:08	02:57	15:34	16:44	17:53
35	01:35	02:19	03:09	15:25	16:32	17:40
30	01:42	02:27	03:19	15:17	16:23	17:29
20	01:53	02:43	03:37	15:03	16:05	17:10
10	02:04	02:56	03:53	14:51	15:51	16:53
0	02:14	03:09	04:08	14:39	15:37	16:38
-10	02:23	03:22	04:23	14:28	15:23	16:22
-20	02:34	03:35	04:39	14:16	15:08	16:05
-30	02:46	03:51	04:58	14:02	14:51	15:46
-35	02:53	04:00	05:08	13:54	14:41	15:35
-40	03:01	04:11	05:21	13:45	14:30	15:22
-45	03:11	04:23	05:35	13:35	14:17	15:07
-50	03:22	04:38	05:53	13:22	14:00	14:49
-52	03:28	04:45	06:02	13:16	13:53	14:40
-54	03:33	04:53	06:11	13:10	13:45	14:30
-56	03:40	05:02	06:22	13:03	13:35	14:19
-58	03:47	05:12	06:34	12:55	13:25	14:07
-60	03:56	05:24	06:49	12:45	13:13	13:52

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
9	05:09	05:14	12:05	08:26	20:53	26(18%)
10	05:18	05:22	12:05	09:22	21:52	27(10%)
11	05:27	05:31	12:05	10:22	22:53	28(4%)

July 12, 13 ,14 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	289°50.4	135°14.1	11°59.9	338°00.6	-23°53.0	68°37.1	-14°50.2	14°38.0	-22°31.1
1	304°52.9	150°13.9	11°58.8	353°03.5	-23°53.3	83°39.6	-14°50.2	29°40.6	-22°31.1
2	319°55.3	165°13.8	11°57.7	8°06.4	-23°53.5	98°42.0	-14°50.2	44°43.3	-22°31.1
3	334°57.8	180°13.6	11°56.6	23°09.3	-23°53.8	113°44.5	-14°50.2	59°45.9	-22°31.1
4	350°00.3	195°13.5	11°55.5	38°12.2	-23°54.1	128°46.9	-14°50.2	74°48.6	-22°31.2
5	5°02.7	210°13.3	11°54.3	53°15.1	-23°54.4	143°49.4	-14°50.2	89°51.2	-22°31.2
6	20°05.2	225°13.2	11°53.2	68°18.0	-23°54.6	158°51.8	-14°50.3	104°53.9	-22°31.2
7	35°07.7	240°13.0	11°52.1	83°20.9	-23°54.9	173°54.3	-14°50.3	119°56.5	-22°31.2
8	50°10.1	255°12.9	11°51.0	98°23.8	-23°55.2	188°56.7	-14°50.3	134°59.2	-22°31.2
9	65°12.6	270°12.7	11°49.9	113°26.7	-23°55.5	203°59.2	-14°50.3	150°01.8	-22°31.2
10	80°15.1	285°12.6	11°48.8	128°29.6	-23°55.7	219°01.7	-14°50.3	165°04.5	-22°31.2
11	95°17.5	300°12.4	11°47.7	143°32.6	-23°56.0	234°04.1	-14°50.3	180°07.1	-22°31.2
12	110°20.0	315°12.3	11°46.5	158°35.5	-23°56.3	249°06.6	-14°50.3	195°09.8	-22°31.2
13	125°22.4	330°12.2	11°45.4	173°38.4	-23°56.6	264°09.0	-14°50.4	210°12.4	-22°31.3
14	140°24.9	345°12.0	11°44.3	188°41.3	-23°56.8	279°11.5	-14°50.4	225°15.1	-22°31.3
15	155°27.4	0°11.9	11°43.2	203°44.2	-23°57.1	294°13.9	-14°50.4	240°17.7	-22°31.3
16	170°29.8	15°11.7	11°42.1	218°47.1	-23°57.4	309°16.4	-14°50.4	255°20.4	-22°31.3
17	185°32.3	30°11.6	11°40.9	233°50.0	-23°57.7	324°18.8	-14°50.4	270°23.1	-22°31.3
18	200°34.8	45°11.5	11°39.8	248°53.0	-23°57.9	339°21.3	-14°50.4	285°25.7	-22°31.3
19	215°37.2	60°11.3	11°38.7	263°55.9	-23°58.2	354°23.7	-14°50.4	300°28.4	-22°31.3
20	230°39.7	75°11.2	11°37.6	278°58.8	-23°58.5	9°26.2	-14°50.5	315°31.0	-22°31.3
21	245°42.2	90°11.1	11°36.5	294°01.7	-23°58.8	24°28.6	-14°50.5	330°33.7	-22°31.3
22	260°44.6	105°10.9	11°35.3	309°04.6	-23°59.0	39°31.1	-14°50.5	345°36.3	-22°31.4
23	275°47.1	120°10.8	11°34.2	324°07.6	-23°59.3	54°33.5	-14°50.5	0°39.0	-22°31.4
Mer.pass.:4:39:		v-0.1 d-1.1 m-4.0		v2.9 d-0.3 m-2.7		v2.5 d-0.0 m-2.1		v2.7 d-0.0 m0.1	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	290°49.6	135°10.6	11°33.1	339°10.5	-23°59.6	69°36.0	-14°50.5	15°41.6	-22°31.4
1	305°52.0	150°10.5	11°32.0	354°13.4	-23°59.9	84°38.4	-14°50.5	30°44.3	-22°31.4
2	320°54.5	165°10.4	11°30.8	9°16.3	-24°00.1	99°40.9	-14°50.6	45°46.9	-22°31.4
3	335°56.9	180°10.2	11°29.7	24°19.3	-24°00.4	114°43.3	-14°50.6	60°49.6	-22°31.4
4	350°59.4	195°10.1	11°28.6	39°22.2	-24°00.7	129°45.8	-14°50.6	75°52.2	-22°31.4
5	6°01.9	210°10.0	11°27.5	54°25.1	-24°01.0	144°48.2	-14°50.6	90°54.9	-22°31.4
6	21°04.3	225°09.9	11°26.3	69°28.1	-24°01.2	159°50.7	-14°50.6	105°57.5	-22°31.4
7	36°06.8	240°09.7	11°25.2	84°31.0	-24°01.5	174°53.1	-14°50.6	121°00.2	-22°31.4
8	51°09.3	255°09.6	11°24.1	99°33.9	-24°01.8	189°55.6	-14°50.7	136°02.8	-22°31.5
9	66°11.7	270°09.5	11°23.0	114°36.9	-24°02.1	204°58.0	-14°50.7	151°05.5	-22°31.5
10	81°14.2	285°09.3	11°21.8	129°39.8	-24°02.3	220°00.5	-14°50.7	166°08.1	-22°31.5
11	96°16.7	300°09.2	11°20.7	144°42.7	-24°02.6	235°02.9	-14°50.7	181°10.8	-22°31.5
12	111°19.1	315°09.1	11°19.6	159°45.7	-24°02.9	250°05.4	-14°50.7	196°13.4	-22°31.5
13	126°21.6	330°09.0	11°18.5	174°48.6	-24°03.2	265°07.8	-14°50.7	211°16.1	-22°31.5
14	141°24.1	345°08.8	11°17.3	189°51.6	-24°03.4	280°10.3	-14°50.8	226°18.7	-22°31.5
15	156°26.5	0°08.7	11°16.2	204°54.5	-24°03.7	295°12.7	-14°50.8	241°21.4	-22°31.5
16	171°29.0	15°08.6	11°15.1	219°57.4	-24°04.0	310°15.2	-14°50.8	256°24.0	-22°31.5
17	186°31.4	30°08.5	11°13.9	235°00.4	-24°04.3	325°17.6	-14°50.8	271°26.7	-22°31.6
18	201°33.9	45°08.3	11°12.8	250°03.3	-24°04.5	340°20.1	-14°50.8	286°29.3	-22°31.6
19	216°36.4	60°08.2	11°11.7	265°06.3	-24°04.8	355°22.5	-14°50.8	301°32.0	-22°31.6
20	231°38.8	75°08.1	11°10.5	280°09.2	-24°05.1	10°24.9	-14°50.9	316°34.6	-22°31.6
21	246°41.3	90°08.0	11°09.4	295°12.2	-24°05.4	25°27.4	-14°50.9	331°37.3	-22°31.6
22	261°43.8	105°07.8	11°08.3	310°15.1	-24°05.6	40°29.8	-14°50.9	346°39.9	-22°31.6
23	276°46.2	120°07.7	11°07.2	325°18.1	-24°05.9	55°32.3	-14°50.9	1°42.6	-22°31.6
Mer.pass.:4:35:		v-0.1 d-1.1 m-4.0		v2.9 d-0.3 m-2.7		v2.5 d-0.0 m-2.1		v2.7 d-0.0 m0.1	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	291°48.7	135°07.6	11°06.0	340°21.0	-24°06.2	70°34.7	-14°50.9	16°45.2	-22°31.6
1	306°51.2	150°07.5	11°04.9	355°24.0	-24°06.5	85°37.2	-14°50.9	31°47.9	-22°31.6
2	321°53.6	165°07.4	11°03.8	10°26.9	-24°06.7	100°39.6	-14°51.0	46°50.5	-22°31.7
3	336°56.1	180°07.3	11°02.6	25°29.9	-24°07.0	115°42.0	-14°51.0	61°53.2	-22°31.7
4	351°58.5	195°07.1	11°01.5	40°32.9	-24°07.3	130°44.5	-14°51.0	76°55.8	-22°31.7
5	7°01.0	210°07.0	11°00.4	55°35.8	-24°07.6	145°46.9	-14°51.0	91°58.5	-22°31.7
6	22°03.5	225°06.9	10°59.2	70°38.8	-24°07.9	160°49.4	-14°51.0	107°01.1	-22°31.7
7	37°05.9	240°06.8	10°58.1	85°41.7	-24°08.1	175°51.8	-14°51.1	122°03.8	-22°31.7
8	52°08.4	255°06.7	10°56.9	100°44.7	-24°08.4	190°54.3	-14°51.1	137°06.4	-22°31.7
9	67°10.9	270°06.6	10°55.8	115°47.7	-24°08.7	205°56.7	-14°51.1	152°09.1	-22°31.7
10	82°13.3	285°06.5	10°54.7	130°50.6	-24°09.0	220°59.1	-14°51.1	167°11.7	-22°31.7
11	97°15.8	300°06.3	10°53.5	145°53.6	-24°09.2	236°01.6	-14°51.1	182°14.4	-22°31.7
12	112°18.3	315°06.2	10°52.4	160°56.6	-24°09.5	251°04.0	-14°51.1	197°17.0	-22°31.8
13	127°20.7	330°06.1	10°51.3	175°59.5	-24°09.8	266°06.4	-14°51.2	212°19.7	-22°31.8
14	142°23.2	345°06.0	10°50.1	191°02.5	-24°10.1	281°08.9	-14°51.2	227°22.3	-22°31.8
15	157°25.7	0°05.9	10°49.0	206°05.5	-24°10.3	296°11.3	-14°51.2	242°25.0	-22°31.8
16	172°28.1	15°05.8	10°47.8	221°08.4	-24°10.6	311°13.8	-14°51.2	257°27.6	-22°31.8
17	187°30.6	30°05.7	10°46.7	236°11.4	-24°10.9	326°16.2	-14°51.2	272°30.3	-22°31.8
18	202°33.0	45°05.6	10°45.6	251°14.4	-24°11.2	341°18.6	-14°51.3	287°32.9	-22°31.8
19	217°35.5	60°05.5	10°44.4	266°17.4	-24°11.5	356°21.1	-14°51.3	302°35.6	-22°31.8
20	232°38.0	75°05.4	10°43.3	281°20.3	-24°11.7	11°23.5	-14°51.3	317°38.2	-22°31.8
21	247°40.4	90°05.3	10°42.1	296°23.3	-24°12.0	26°25.9	-14°51.3	332°40.9	-22°31.9
22	262°42.9	105°05.1	10°41.0	311°26.3	-24°12.3	41°28.4	-14°51.3	347°43.5	-22°31.9
23	277°45.4	120°05.0	10°39.9	326°29.3	-24°12.6	56°30.8	-14°51.4	2°46.2	-22°31.9
Mer.pass.:4:32:		v-0.1 d-1.1 m-4.0		v3.0 d-0.3 m-2.7		v2.4 d-0.0 m-2.1		v2.6 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.4
Ankaa	353°12.2	-42°12.2
Schedar	349°36.4	56°38.0
Diphda	348°52.3	-17°53.1
Achernar	335°24.3	-57°08.4
Hamal	327°57.0	23°32.8
Polaris	316°26.1	89°20.1
Akamar	315°15.9	-40°13.8
Menkar	314°11.6	4°09.6
Mirfak	308°35.7	49°55.2
Aldebaran	290°45.7	16°32.6
Rigel	281°09.0	-8°10.9
Capella	280°29.8	46°00.8
Bellatrix	278°28.6	6°21.8
Elnath	278°08.6	28°37.2
Alnilam	275°43.2	-1°11.5
Betelgeuse	270°57.9	7°24.5
Canopus	263°55.2	-52°42.4
Sirius	258°30.9	-16°44.4
Adara	255°10.2	-28°59.9
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.2	-59°34.3
Suhail	222°50.3	-43°30.6
Miaplacidus	221°39.8	-69°47.8
Alphard	217°53.0	-8°44.4
Regulus	207°40.1	11°52.7
Dubhe	193°47.9	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.8	-17°38.6
Acrux	173°05.5	-63°12.3
Gacrux	171°57.1	-57°13.2
Alioth	166°17.8	55°52.0
Spica	158°27.6	-11°15.3
Alcaid	152°56.1	49°13.7
Hadar	148°42.8	-60°27.8
Menkent	148°03.4	-36°27.6
Arcturus	145°52.4	19°05.8
Rigil Kent.	139°46.7	-60°54.7
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.7	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.7	-26°28.2
Atria	107°19.9	-69°03.6
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.0	51°29.5
Kaus Aust.	83°38.8	-34°22.4
Vega	80°36.2	38°48.2
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.1
Peacock	53°13.3	-56°40.3
Deneb	49°28.7	45°20.8
Enif	33°43.5	9°57.6
Alnair	27°39.1	-46°52.0
Fomalhaut	15°20.0	-29°31.3
Scheat	13°49.8	28°10.8
Markab	13°34.7	15°18.2

2018/7/1	**SHA**	**Mer.pass**
Venus	205°23.6	14:59
Mars	48°10.2	01:28
Jupiter	138°46.7	19:22
Saturn	84°47.5	22:57

2018/7/1	**SHA**	**Mer.pass**
Venus	204°21.1	14:59
Mars	48°20.9	01:23
Jupiter	138°46.4	19:18
Saturn	84°52.1	22:53

2018/7/1	**SHA**	**Mer.pass**
Venus	203°18.9	14:60
Mars	48°32.3	01:18
Jupiter	138°46.0	19:15
Saturn	84°56.5	22:49

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°36.3	22°00.0	195°48.7	3.2	20°34.3	1.9	61.0
1	193°36.3	21°59.7	210°10.9	3.2	20°36.1	1.7	61.1
2	208°36.2	21°59.3	224°33.0	3.1	20°37.8	1.6	61.1
3	223°36.1	21°59.0	238°55.1	3.1	20°39.3	1.4	61.1
4	238°36.0	21°58.6	253°17.2	3.1	20°40.6	1.3	61.1
5	253°35.9	21°58.3	267°39.3	3.0	20°41.8	1.1	61.1
6	268°35.9	21°58.0	282°01.3	3.0	20°42.8	0.9	61.1
7	283°35.8	21°57.6	296°23.2	3.0	20°43.7	0.8	61.2
8	298°35.7	21°57.3	310°45.2	2.9	20°44.4	0.6	61.2
9	313°35.6	21°56.9	325°07.1	2.9	20°45.0	0.5	61.2
10	328°35.5	21°56.6	339°29.0	2.9	20°45.4	0.3	61.2
11	343°35.5	21°56.2	353°50.9	2.9	20°45.6	0.2	61.2
12	358°35.4	21°55.9	8°12.8	2.9	20°45.7	0.0	61.2
13	13°35.3	21°55.5	22°34.6	2.8	20°45.6	-0.2	61.2
14	28°35.2	21°55.2	36°56.4	2.8	20°45.4	-0.3	61.2
15	43°35.1	21°54.8	51°18.2	2.8	20°45.0	-0.5	61.3
16	58°35.1	21°54.4	65°40.1	2.8	20°44.4	-0.6	61.3
17	73°35.0	21°54.1	80°01.9	2.8	20°43.7	-0.8	61.3
18	88°34.9	21°53.7	94°23.7	2.8	20°42.8	-1.0	61.3
19	103°34.8	21°53.4	108°45.5	2.8	20°41.8	-1.1	61.3
20	118°34.8	21°53.0	123°07.2	2.8	20°40.6	-1.3	61.3
21	133°34.7	21°52.7	137°29.0	2.8	20°39.3	-1.4	61.3
22	148°34.6	21°52.3	151°50.8	2.8	20°37.7	-1.6	61.3
23	163°34.5	21°52.0	166°12.6	2.8	20°36.1	-1.7	61.3
	SD.=15.7	d=-0.3			S.D.=16.7		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°34.4	21°51.6	180°34.5	2.8	20°34.2	-1.9	61.3
1	193°34.4	21°51.2	194°56.3	2.8	20°32.3	-2.1	61.3
2	208°34.3	21°50.9	209°18.1	2.8	20°30.1	-2.2	61.3
3	223°34.2	21°50.5	223°40.0	2.9	20°27.8	-2.4	61.3
4	238°34.1	21°50.2	238°01.8	2.9	20°25.4	-2.5	61.3
5	253°34.1	21°49.8	252°23.7	2.9	20°22.7	-2.7	61.3
6	268°34.0	21°49.4	266°45.6	2.9	20°20.0	-2.9	61.3
7	283°33.9	21°49.1	281°07.6	2.9	20°17.0	-3.0	61.3
8	298°33.8	21°48.7	295°29.5	3.0	20°14.0	-3.2	61.3
9	313°33.8	21°48.3	309°51.5	3.0	20°10.7	-3.3	61.3
10	328°33.7	21°48.0	324°13.5	3.0	20°07.3	-3.5	61.3
11	343°33.6	21°47.6	338°35.5	3.1	20°03.8	-3.6	61.3
12	358°33.5	21°47.2	352°57.6	3.1	20°00.1	-3.8	61.3
13	13°33.5	21°46.9	7°19.7	3.1	19°56.2	-3.9	61.3
14	28°33.4	21°46.5	21°41.9	3.2	19°52.2	-4.1	61.3
15	43°33.3	21°46.1	36°04.1	3.2	19°48.1	-4.2	61.3
16	58°33.2	21°45.8	50°26.3	3.3	19°43.8	-4.4	61.3
17	73°33.2	21°45.4	64°48.6	3.3	19°39.3	-4.5	61.3
18	88°33.1	21°45.0	79°10.9	3.3	19°34.7	-4.7	61.3
19	103°33.0	21°44.7	93°33.3	3.4	19°30.0	-4.8	61.3
20	118°33.0	21°44.3	107°55.7	3.4	19°25.1	-5.0	61.3
21	133°32.9	21°43.9	122°18.1	3.5	19°20.1	-5.1	61.3
22	148°32.8	21°43.5	136°40.7	3.5	19°14.9	-5.3	61.3
23	163°32.7	21°43.2	151°03.2	3.6	19°09.6	-5.4	61.3
	SD.=15.7	d=-0.4			S.D.=16.7		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°32.7	21°42.8	165°25.9	3.7	19°04.1	-5.5	61.3
1	193°32.6	21°42.4	179°48.5	3.7	18°58.5	-5.7	61.3
2	208°32.5	21°42.0	194°11.3	3.8	18°52.7	-5.8	61.3
3	223°32.5	21°41.7	208°34.1	3.8	18°46.9	-5.9	61.2
4	238°32.4	21°41.3	222°56.9	3.9	18°40.8	-6.1	61.2
5	253°32.3	21°40.9	237°19.9	4.0	18°34.7	-6.2	61.2
6	268°32.2	21°40.5	251°42.9	4.0	18°28.4	-6.4	61.2
7	283°32.2	21°40.2	266°05.9	4.1	18°22.0	-6.5	61.2
8	298°32.1	21°39.8	280°29.0	4.2	18°15.4	-6.6	61.2
9	313°32.0	21°39.4	294°52.2	4.2	18°08.7	-6.7	61.2
10	328°32.0	21°39.0	309°15.5	4.3	18°01.9	-6.9	61.2
11	343°31.9	21°38.6	323°38.8	4.4	17°55.0	-7.0	61.1
12	358°31.8	21°38.3	338°02.2	4.4	17°47.9	-7.1	61.1
13	13°31.8	21°37.9	352°25.7	4.5	17°40.7	-7.3	61.1
14	28°31.7	21°37.5	6°49.3	4.6	17°33.4	-7.4	61.1
15	43°31.6	21°37.1	21°12.9	4.7	17°26.0	-7.5	61.1
16	58°31.6	21°36.7	35°36.6	4.7	17°18.4	-7.6	61.1
17	73°31.5	21°36.3	50°00.4	4.8	17°10.7	-7.7	61.0
18	88°31.4	21°35.9	64°24.2	4.9	17°02.9	-7.9	61.0
19	103°31.3	21°35.6	78°48.2	5.0	16°55.0	-8.0	61.0
20	118°31.3	21°35.2	93°12.2	5.1	16°47.0	-8.1	61.0
21	133°31.2	21°34.8	107°36.3	5.1	16°38.9	-8.2	61.0
22	148°31.1	21°34.4	122°00.5	5.2	16°30.6	-8.3	60.9
23	163°31.1	21°34.0	136°24.8	5.3	16°22.3	-8.4	60.9
	SD.=15.7	d=-0.4			S.D.=16.7		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	01:26	22:41	–:–	–:–
64	–:–	–:–	02:10	21:60	–:–	–:–
62	–:–	00:30	02:38	21:32	23:31	–:–
60	–:–	01:38	02:60	21:10	22:31	–:–
58	–:–	02:11	03:17	20:53	21:59	–:–
56	00:28	02:35	03:32	20:39	21:35	23:34
54	01:30	02:54	03:44	20:26	21:17	22:39
52	02:01	03:09	03:55	20:15	21:01	22:09
50	02:23	03:23	04:05	20:06	20:48	21:47
45	03:02	03:50	04:26	19:45	20:21	21:08
40	03:30	04:10	04:42	19:29	20:01	20:41
35	03:51	04:27	04:56	19:15	19:44	20:20
30	04:08	04:41	05:08	19:03	19:30	20:03
20	04:35	05:04	05:28	18:43	19:07	19:36
10	04:56	05:23	05:46	18:26	18:48	19:15
0	05:14	05:40	06:02	18:09	18:32	18:58
-10	05:30	05:56	06:18	17:53	18:16	18:42
-20	05:44	06:12	06:35	17:36	17:60	18:27
-30	05:59	06:29	06:55	17:17	17:43	18:12
-35	06:07	06:39	07:06	17:05	17:33	18:04
-40	06:16	06:49	07:19	16:52	17:22	17:56
-45	06:25	07:02	07:35	16:37	17:10	17:47
-50	06:35	07:16	07:53	16:18	16:56	17:37
-52	06:40	07:23	08:02	16:10	16:49	17:32
-54	06:45	07:30	08:12	15:60	16:42	17:27
-56	06:50	07:38	08:23	15:48	16:34	17:22
-58	06:56	07:47	08:36	15:36	16:25	17:16
-60	07:03	07:57	08:52	15:20	16:15	17:09

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	02:32	–:–	23:39	23:26
68	00:30	01:35	03:22	22:23	22:49	22:58
66	01:13	02:19	03:53	21:39	22:17	22:37
64	01:42	02:48	04:16	21:10	21:54	22:20
62	02:04	03:10	04:34	20:48	21:35	22:06
60	02:22	03:28	04:49	20:30	21:19	21:54
58	02:37	03:42	05:02	20:15	21:06	21:43
56	02:50	03:55	05:13	20:02	20:54	21:34
54	03:01	04:06	05:23	19:51	20:44	21:26
52	03:11	04:16	05:32	19:41	20:35	21:19
50	03:20	04:25	05:39	19:32	20:27	21:12
45	03:38	04:44	05:56	19:13	20:10	20:58
40	03:54	04:59	06:09	18:58	19:56	20:46
35	04:07	05:12	06:21	18:45	19:44	20:36
30	04:18	05:23	06:31	18:33	19:33	20:27
20	04:38	05:42	06:48	18:14	19:15	20:12
10	04:55	05:59	07:03	17:57	18:59	19:59
0	05:11	06:14	07:17	17:41	18:44	19:46
-10	05:27	06:30	07:31	17:25	18:29	19:33
-20	05:44	06:47	07:46	17:08	18:13	19:19
-30	06:03	07:06	08:03	16:48	17:55	19:04
-35	06:15	07:17	08:13	16:36	17:44	18:54
-40	06:28	07:30	08:24	16:23	17:31	18:44
-45	06:44	07:45	08:37	16:08	17:17	18:31
-50	07:03	08:04	08:54	15:48	16:59	18:16
-52	07:12	08:12	09:01	15:39	16:50	18:09
-54	07:22	08:22	09:09	15:29	16:41	18:01
-56	07:34	08:33	09:19	15:17	16:30	17:52
-58	07:47	08:46	09:29	15:04	16:17	17:42
-60	08:03	09:01	09:42	14:48	16:03	17:31

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
12	05:35	05:39	12:05	11:25	23:57	29(1%)
13	05:42	05:46	12:05	12:29	01:00	0(0%)
14	05:49	05:53	12:05	13:31	01:00	1(3%)

July 15, 16 ,17 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	292°47.8	135°04.9	10°38.7	341°32.2	-24°12.8	71°33.3	-14°51.4	17°48.8	-22°31.9
1	307°50.3	150°04.8	10°37.6	356°35.2	-24°13.1	86°35.7	-14°51.4	32°51.5	-22°31.9
2	322°52.8	165°04.7	10°36.4	11°38.2	-24°13.4	101°38.1	-14°51.4	47°54.1	-22°31.9
3	337°55.2	180°04.6	10°35.3	26°41.2	-24°13.7	116°40.6	-14°51.4	62°56.8	-22°31.9
4	352°57.7	195°04.5	10°34.1	41°44.2	-24°14.0	131°43.0	-14°51.5	77°59.4	-22°31.9
5	8°00.2	210°04.4	10°33.0	56°47.1	-24°14.2	146°45.4	-14°51.5	93°02.1	-22°31.9
6	23°02.6	225°04.3	10°31.9	71°50.1	-24°14.5	161°47.9	-14°51.5	108°04.7	-22°31.9
7	38°05.1	240°04.2	10°30.7	86°53.1	-24°14.8	176°50.3	-14°51.5	123°07.3	-22°32.0
8	53°07.5	255°04.1	10°29.6	101°56.1	-24°15.1	191°52.7	-14°51.5	138°10.0	-22°32.0
9	68°10.0	270°04.0	10°28.4	116°59.1	-24°15.3	206°55.2	-14°51.6	153°12.6	-22°32.0
10	83°12.5	285°03.9	10°27.3	132°02.1	-24°15.6	221°57.6	-14°51.6	168°15.3	-22°32.0
11	98°14.9	300°03.8	10°26.1	147°05.1	-24°15.9	237°00.0	-14°51.6	183°17.9	-22°32.0
12	113°17.4	315°03.7	10°25.0	162°08.1	-24°16.2	252°02.5	-14°51.6	198°20.6	-22°32.0
13	128°19.9	330°03.6	10°23.8	177°11.1	-24°16.4	267°04.9	-14°51.7	213°23.2	-22°32.0
14	143°22.3	345°03.5	10°22.7	192°14.1	-24°16.7	282°07.3	-14°51.7	228°25.9	-22°32.0
15	158°24.8	0°03.5	10°21.5	207°17.0	-24°17.0	297°09.8	-14°51.7	243°28.5	-22°32.0
16	173°27.3	15°03.4	10°20.4	222°20.0	-24°17.3	312°12.2	-14°51.7	258°31.2	-22°32.0
17	188°29.7	30°03.3	10°19.3	237°23.0	-24°17.6	327°14.6	-14°51.7	273°33.8	-22°32.1
18	203°32.2	45°03.2	10°18.1	252°26.0	-24°17.8	342°17.0	-14°51.8	288°36.5	-22°32.1
19	218°34.7	60°03.1	10°17.0	267°29.0	-24°18.1	357°19.5	-14°51.8	303°39.1	-22°32.1
20	233°37.1	75°03.0	10°15.8	282°32.0	-24°18.4	12°21.9	-14°51.8	318°41.8	-22°32.1
21	248°39.6	90°02.9	10°14.7	297°35.0	-24°18.7	27°24.3	-14°51.8	333°44.4	-22°32.1
22	263°42.0	105°02.8	10°13.5	312°38.0	-24°18.9	42°26.8	-14°51.8	348°47.1	-22°32.1
23	278°44.5	120°02.7	10°12.4	327°41.0	-24°19.2	57°29.2	-14°51.9	3°49.7	-22°32.1
Mer.pass.:4:28:		v-0.1 d-1.1 m-4.0		v3.0 d-0.3 m-2.7		v2.4 d-0.0 m-2.1		v2.6 d-0.0 m0.1	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	293°47.0	135°02.6	10°11.2	342°44.0	-24°19.5	72°31.6	-14°51.9	18°52.4	-22°32.1
1	308°49.4	150°02.5	10°10.1	357°47.1	-24°19.8	87°34.0	-14°51.9	33°55.0	-22°32.1
2	323°51.9	165°02.5	10°08.9	12°50.1	-24°20.1	102°36.5	-14°51.9	48°57.6	-22°32.2
3	338°54.4	180°02.4	10°07.8	27°53.1	-24°20.3	117°38.9	-14°52.0	64°00.3	-22°32.2
4	353°56.8	195°02.3	10°06.6	42°56.1	-24°20.6	132°41.3	-14°52.0	79°02.9	-22°32.2
5	8°59.3	210°02.2	10°05.4	57°59.1	-24°20.9	147°43.8	-14°52.0	94°05.6	-22°32.2
6	24°01.8	225°02.1	10°04.3	73°02.1	-24°21.2	162°46.2	-14°52.0	109°08.2	-22°32.2
7	39°04.2	240°02.0	10°03.1	88°05.1	-24°21.4	177°48.6	-14°52.1	124°10.9	-22°32.2
8	54°06.7	255°01.9	10°02.0	103°08.1	-24°21.7	192°51.0	-14°52.1	139°13.5	-22°32.2
9	69°09.1	270°01.9	10°00.8	118°11.1	-24°22.0	207°53.5	-14°52.1	154°16.2	-22°32.2
10	84°11.6	285°01.8	9°59.7	133°14.1	-24°22.3	222°55.9	-14°52.1	169°18.8	-22°32.2
11	99°14.1	300°01.7	9°58.5	148°17.2	-24°22.6	237°58.3	-14°52.1	184°21.5	-22°32.2
12	114°16.5	315°01.6	9°57.4	163°20.2	-24°22.8	253°00.7	-14°52.2	199°24.1	-22°32.3
13	129°19.0	330°01.5	9°56.2	178°23.2	-24°23.1	268°03.2	-14°52.2	214°26.7	-22°32.3
14	144°21.5	345°01.4	9°55.1	193°26.2	-24°23.4	283°05.6	-14°52.2	229°29.4	-22°32.3
15	159°23.9	0°01.4	9°53.9	208°29.2	-24°23.7	298°08.0	-14°52.2	244°32.0	-22°32.3
16	174°26.4	15°01.3	9°52.7	223°32.2	-24°23.9	313°10.4	-14°52.3	259°34.7	-22°32.3
17	189°28.9	30°01.2	9°51.6	238°35.3	-24°24.2	328°12.9	-14°52.3	274°37.3	-22°32.3
18	204°31.3	45°01.1	9°50.4	253°38.3	-24°24.5	343°15.3	-14°52.3	289°40.0	-22°32.3
19	219°33.8	60°01.1	9°49.3	268°41.3	-24°24.8	358°17.7	-14°52.3	304°42.6	-22°32.3
20	234°36.3	75°01.0	9°48.1	283°44.3	-24°25.0	13°20.1	-14°52.4	319°45.3	-22°32.3
21	249°38.7	90°00.9	9°47.0	298°47.4	-24°25.3	28°22.5	-14°52.4	334°47.9	-22°32.4
22	264°41.2	105°00.8	9°45.8	313°50.4	-24°25.6	43°25.0	-14°52.4	349°50.6	-22°32.4
23	279°43.6	120°00.8	9°44.6	328°53.4	-24°25.9	58°27.4	-14°52.4	4°53.2	-22°32.4
Mer.pass.:4:24:		v-0.1 d-1.2 m-4.0		v3.0 d-0.3 m-2.8		v2.4 d-0.0 m-2.1		v2.6 d-0.0 m0.1	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	294°46.1	135°00.7	9°43.5	343°56.4	-24°26.2	73°29.8	-14°52.5	19°55.8	-22°32.4
1	309°48.6	150°00.6	9°42.3	358°59.5	-24°26.4	88°32.2	-14°52.5	34°58.5	-22°32.4
2	324°51.0	165°00.5	9°41.2	14°02.5	-24°26.7	103°34.6	-14°52.5	50°01.1	-22°32.4
3	339°53.5	180°00.5	9°40.0	29°05.5	-24°27.0	118°37.1	-14°52.5	65°03.8	-22°32.4
4	354°56.0	195°00.4	9°38.8	44°08.6	-24°27.3	133°39.5	-14°52.6	80°06.4	-22°32.4
5	9°58.4	210°00.3	9°37.7	59°11.6	-24°27.5	148°41.9	-14°52.6	95°09.1	-22°32.4
6	25°00.9	225°00.3	9°36.5	74°14.6	-24°27.8	163°44.3	-14°52.6	110°11.7	-22°32.4
7	40°03.4	240°00.2	9°35.4	89°17.7	-24°28.1	178°46.7	-14°52.6	125°14.4	-22°32.5
8	55°05.8	255°00.1	9°34.2	104°20.7	-24°28.4	193°49.2	-14°52.7	140°17.0	-22°32.5
9	70°08.3	270°00.0	9°33.0	119°23.7	-24°28.6	208°51.6	-14°52.7	155°19.6	-22°32.5
10	85°10.8	284°60.0	9°31.9	134°26.8	-24°28.9	223°54.0	-14°52.7	170°22.3	-22°32.5
11	100°13.2	299°59.9	9°30.7	149°29.8	-24°29.2	238°56.4	-14°52.7	185°24.9	-22°32.5
12	115°15.7	314°59.8	9°29.5	164°32.8	-24°29.5	253°58.8	-14°52.8	200°27.6	-22°32.5
13	130°18.1	329°59.8	9°28.4	179°35.9	-24°29.8	269°01.2	-14°52.8	215°30.2	-22°32.5
14	145°20.6	344°59.7	9°27.2	194°38.9	-24°30.0	284°03.7	-14°52.8	230°32.9	-22°32.5
15	160°23.1	359°59.6	9°26.1	209°42.0	-24°30.3	299°06.1	-14°52.8	245°35.5	-22°32.5
16	175°25.5	14°59.6	9°24.9	224°45.0	-24°30.6	314°08.5	-14°52.9	260°38.2	-22°32.5
17	190°28.0	29°59.5	9°23.7	239°48.0	-24°30.9	329°10.9	-14°52.9	275°40.8	-22°32.6
18	205°30.5	44°59.5	9°22.6	254°51.1	-24°31.1	344°13.3	-14°52.9	290°43.4	-22°32.6
19	220°32.9	59°59.4	9°21.4	269°54.1	-24°31.4	359°15.7	-14°52.9	305°46.1	-22°32.6
20	235°35.4	74°59.3	9°20.2	284°57.2	-24°31.7	14°18.2	-14°53.0	320°48.7	-22°32.6
21	250°37.9	89°59.3	9°19.1	300°00.2	-24°32.0	29°20.6	-14°53.0	335°51.4	-22°32.6
22	265°40.3	104°59.2	9°17.9	315°03.3	-24°32.2	44°23.0	-14°53.0	350°54.0	-22°32.6
23	280°42.8	119°59.2	9°16.7	330°06.3	-24°32.5	59°25.4	-14°53.0	5°56.7	-22°32.6
Mer.pass.:4:20:		v-0.1 d-1.2 m-4.0		v3.0 d-0.3 m-2.8		v2.4 d-0.0 m-2.0		v2.6 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.4
Ankaa	353°12.2	-42°12.2
Schedar	349°36.4	56°38.0
Diphda	348°52.3	-17°53.1
Achernar	335°24.3	-57°08.4
Hamal	327°56.9	23°32.8
Polaris	316°24.7	89°20.1
Akamar	315°15.9	-40°13.8
Menkar	314°11.6	4°09.6
Mirfak	308°35.6	49°55.2
Aldebaran	290°45.7	16°32.6
Rigel	281°09.0	-8°10.9
Capella	280°29.8	46°00.8
Bellatrix	278°28.6	6°21.8
Elnath	278°08.6	28°37.2
Alnilam	275°43.2	-1°11.5
Betelgeuse	270°57.9	7°24.5
Canopus	263°55.2	-52°42.4
Sirius	258°30.9	-16°44.4
Adara	255°10.2	-28°59.9
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.2	-59°34.2
Suhail	222°50.3	-43°30.5
Miaplacidus	221°39.8	-69°47.7
Alphard	217°53.0	-8°44.4
Regulus	207°40.1	11°52.7
Dubhe	193°47.9	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.8	-17°38.6
Acrux	173°05.6	-63°12.3
Gacrux	171°57.1	-57°13.2
Alioth	166°17.8	55°52.0
Spica	158°27.6	-11°15.3
Alcaid	152°56.1	49°13.7
Hadar	148°42.8	-60°27.8
Menkent	148°03.4	-36°27.6
Arcturus	145°52.4	19°05.8
Rigil Kent.	139°46.8	-60°54.8
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.7	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.7	-26°28.2
Atria	107°20.0	-69°03.6
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.0	51°29.5
Kaus Aust.	83°38.8	-34°22.4
Vega	80°36.2	38°48.2
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.3
Deneb	49°28.7	45°20.8
Enif	33°43.5	9°57.6
Alnair	27°39.1	-46°52.0
Fomalhaut	15°20.0	-29°31.3
Scheat	13°49.8	28°10.9
Markab	13°34.7	15°18.2

2018/7/1	**SHA**	**Mer.pass**
Venus	202°17.1	14:60
Mars	48°44.4	01:14
Jupiter	138°45.4	19:11
Saturn	85°01.0	22:45

2018/7/1	**SHA**	**Mer.pass**
Venus	201°15.7	14:60
Mars	48°57.1	01:09
Jupiter	138°44.6	19:07
Saturn	85°05.4	22:41

2018/7/1	**SHA**	**Mer.pass**
Venus	200°14.6	15:00
Mars	49°10.3	01:04
Jupiter	138°43.7	19:03
Saturn	85°09.7	22:36

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°31.0	21°33.6	150°49.1	5.4	16°13.8	-8.5	60.9
1	193°30.9	21°33.2	165°13.5	5.5	16°05.2	-8.6	60.9
2	208°30.9	21°32.8	179°38.0	5.6	15°56.5	-8.7	60.9
3	223°30.8	21°32.4	194°02.6	5.6	15°47.8	-8.8	60.8
4	238°30.8	21°32.1	208°27.3	5.7	15°38.9	-8.9	60.8
5	253°30.7	21°31.7	222°52.1	5.8	15°29.9	-9.0	60.8
6	268°30.6	21°31.3	237°17.0	5.9	15°20.8	-9.1	60.8
7	283°30.6	21°30.9	251°41.9	6.0	15°11.6	-9.2	60.7
8	298°30.5	21°30.5	266°06.9	6.1	15°02.4	-9.3	60.7
9	313°30.4	21°30.1	280°32.1	6.2	14°53.0	-9.4	60.7
10	328°30.4	21°29.7	294°57.3	6.2	14°43.5	-9.5	60.7
11	343°30.3	21°29.3	309°22.6	6.3	14°34.0	-9.6	60.6
12	358°30.2	21°28.9	323°47.9	6.4	14°24.3	-9.7	60.6
13	13°30.2	21°28.5	338°13.4	6.5	14°14.6	-9.8	60.6
14	28°30.1	21°28.1	352°39.0	6.6	14°04.8	-9.9	60.6
15	43°30.0	21°27.7	7°04.6	6.7	13°54.9	-9.9	60.5
16	58°30.0	21°27.3	21°30.3	6.8	13°44.9	-10.0	60.5
17	73°29.9	21°26.9	35°56.2	6.9	13°34.9	-10.1	60.5
18	88°29.9	21°26.5	50°22.1	7.0	13°24.7	-10.2	60.5
19	103°29.8	21°26.1	64°48.1	7.0	13°14.5	-10.3	60.4
20	118°29.7	21°25.7	79°14.2	7.1	13°04.2	-10.3	60.4
21	133°29.7	21°25.3	93°40.3	7.2	12°53.9	-10.4	60.4
22	148°29.6	21°24.9	108°06.6	7.3	12°43.4	-10.5	60.3
23	163°29.5	21°24.5	122°33.0	7.4	12°32.9	-10.5	60.3
	SD.=15.7	d=-0.4			S.D.=16.6		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°29.5	21°24.1	136°59.4	7.5	12°22.3	-10.6	60.3
1	193°29.4	21°23.7	151°25.9	7.6	12°11.7	-10.7	60.2
2	208°29.4	21°23.3	165°52.6	7.7	12°01.0	-10.7	60.2
3	223°29.3	21°22.9	180°19.3	7.7	11°50.2	-10.8	60.2
4	238°29.2	21°22.4	194°46.1	7.8	11°39.4	-10.9	60.2
5	253°29.2	21°22.0	209°12.9	7.9	11°28.5	-10.9	60.1
6	268°29.1	21°21.6	223°39.9	8.0	11°17.5	-11.0	60.1
7	283°29.1	21°21.2	238°06.9	8.1	11°06.5	-11.0	60.1
8	298°29.0	21°20.8	252°34.1	8.2	10°55.5	-11.1	60.0
9	313°28.9	21°20.4	267°01.3	8.3	10°44.3	-11.1	60.0
10	328°28.9	21°20.0	281°28.6	8.3	10°33.2	-11.2	60.0
11	343°28.8	21°19.6	295°56.0	8.4	10°21.9	-11.3	59.9
12	358°28.8	21°19.2	310°23.5	8.5	10°10.7	-11.3	59.9
13	13°28.7	21°18.8	324°51.0	8.6	9°59.3	-11.3	59.9
14	28°28.7	21°18.3	339°18.7	8.7	9°48.0	-11.4	59.8
15	43°28.6	21°17.9	353°46.4	8.8	9°36.6	-11.4	59.8
16	58°28.5	21°17.5	8°14.2	8.8	9°25.1	-11.5	59.7
17	73°28.5	21°17.1	22°42.1	8.9	9°13.6	-11.5	59.7
18	88°28.4	21°16.7	37°10.1	9.0	9°02.1	-11.6	59.7
19	103°28.4	21°16.3	51°38.1	9.1	8°50.5	-11.6	59.6
20	118°28.3	21°15.8	66°06.2	9.2	8°38.9	-11.6	59.6
21	133°28.3	21°15.4	80°34.4	9.2	8°27.2	-11.7	59.6
22	148°28.2	21°15.0	95°02.7	9.3	8°15.5	-11.7	59.5
23	163°28.1	21°14.6	109°31.1	9.4	8°03.8	-11.7	59.5
	SD.=15.7	d=-0.4			S.D.=16.4		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°28.1	21°14.2	123°59.5	9.5	7°52.0	-11.8	59.5
1	193°28.0	21°13.7	138°28.0	9.6	7°40.3	-11.8	59.4
2	208°28.0	21°13.3	152°56.6	9.6	7°28.5	-11.8	59.4
3	223°27.9	21°12.9	167°25.3	9.7	7°16.6	-11.9	59.4
4	238°27.9	21°12.5	181°54.0	9.8	7°04.7	-11.9	59.3
5	253°27.8	21°12.1	196°22.8	9.8	6°52.9	-11.9	59.3
6	268°27.8	21°11.6	210°51.7	9.9	6°40.9	-11.9	59.2
7	283°27.7	21°11.2	225°20.7	10.0	6°29.0	-11.9	59.2
8	298°27.7	21°10.8	239°49.7	10.1	6°17.0	-12.0	59.2
9	313°27.6	21°10.4	254°18.8	10.1	6°05.1	-12.0	59.1
10	328°27.6	21°09.9	268°47.9	10.2	5°53.1	-12.0	59.1
11	343°27.5	21°09.5	283°17.2	10.3	5°41.1	-12.0	59.1
12	358°27.4	21°09.1	297°46.5	10.3	5°29.0	-12.0	59.0
13	13°27.4	21°08.7	312°15.8	10.4	5°17.0	-12.0	59.0
14	28°27.3	21°08.2	326°45.3	10.5	5°04.9	-12.1	58.9
15	43°27.3	21°07.8	341°14.8	10.5	4°52.9	-12.1	58.9
16	58°27.2	21°07.4	355°44.3	10.6	4°40.8	-12.1	58.9
17	73°27.2	21°06.9	10°13.9	10.7	4°28.7	-12.1	58.8
18	88°27.1	21°06.5	24°43.6	10.7	4°16.6	-12.1	58.8
19	103°27.1	21°06.1	39°13.4	10.8	4°04.5	-12.1	58.8
20	118°27.0	21°05.6	53°43.2	10.8	3°52.4	-12.1	58.7
21	133°27.0	21°05.2	68°13.0	10.9	3°40.3	-12.1	58.7
22	148°26.9	21°04.8	82°43.0	11.0	3°28.2	-12.1	58.6
23	163°26.9	21°04.3	97°13.0	11.0	3°16.1	-12.1	58.6
	SD.=15.7	d=-0.4			S.D.=16.2		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	01:40	22:29	–:–	–:–
64	–:–	–:–	02:18	21:52	–:–	–:–
62	–:–	00:56	02:45	21:26	23:10	–:–
60	–:–	01:48	03:05	21:05	22:22	–:–
58	–:–	02:18	03:22	20:49	21:52	–:–
56	00:52	02:41	03:36	20:35	21:30	23:15
54	01:39	02:59	03:48	20:23	21:12	22:31
52	02:07	03:14	03:59	20:12	20:58	22:03
50	02:28	03:27	04:09	20:03	20:45	21:43
45	03:06	03:53	04:28	19:43	20:19	21:05
40	03:33	04:13	04:44	19:27	19:59	20:39
35	03:54	04:29	04:58	19:14	19:43	20:18
30	04:10	04:43	05:10	19:02	19:29	20:01
20	04:37	05:05	05:29	18:43	19:07	19:35
10	04:57	05:24	05:47	18:25	18:48	19:15
0	05:14	05:40	06:03	18:10	18:32	18:58
-10	05:30	05:56	06:18	17:54	18:16	18:42
-20	05:44	06:11	06:35	17:37	18:01	18:28
-30	05:59	06:28	06:54	17:18	17:44	18:14
-35	06:06	06:38	07:05	17:07	17:35	18:06
-40	06:14	06:48	07:18	16:55	17:25	17:58
-45	06:23	06:60	07:33	16:40	17:13	17:49
-50	06:33	07:14	07:51	16:22	16:59	17:39
-52	06:38	07:20	07:60	16:13	16:52	17:35
-54	06:43	07:27	08:09	16:03	16:45	17:30
-56	06:48	07:35	08:20	15:53	16:37	17:25
-58	06:53	07:44	08:32	15:40	16:29	17:19
-60	06:59	07:54	08:47	15:26	16:19	17:13

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	04:14	06:40	08:47	00:06	23:23	23:10
70	04:52	06:59	08:56	23:18	23:12	23:06
68	05:19	07:14	09:03	23:01	23:02	23:02
66	05:39	07:26	09:09	22:48	22:55	22:59
64	05:56	07:37	09:15	22:37	22:48	22:57
62	06:09	07:45	09:19	22:27	22:42	22:55
60	06:20	07:53	09:23	22:18	22:37	22:53
58	06:30	07:59	09:26	22:11	22:33	22:51
56	06:38	08:05	09:29	22:05	22:29	22:49
54	06:46	08:10	09:32	21:59	22:25	22:48
52	06:53	08:14	09:34	21:53	22:22	22:47
50	06:59	08:19	09:36	21:49	22:19	22:46
45	07:12	08:28	09:41	21:38	22:13	22:43
40	07:23	08:35	09:45	21:30	22:07	22:41
35	07:32	08:41	09:48	21:22	22:02	22:39
30	07:40	08:47	09:51	21:15	21:58	22:37
20	07:54	08:57	09:57	21:04	21:51	22:35
10	08:06	09:05	10:01	20:54	21:45	22:32
0	08:17	09:13	10:06	20:44	21:38	22:30
-10	08:28	09:21	10:10	20:34	21:32	22:27
-20	08:40	09:29	10:14	20:24	21:26	22:24
-30	08:54	09:39	10:20	20:12	21:18	22:21
-35	09:02	09:44	10:23	20:05	21:14	22:20
-40	09:11	09:51	10:26	19:57	21:09	22:18
-45	09:21	09:58	10:30	19:48	21:03	22:15
-50	09:34	10:07	10:35	19:36	20:56	22:12
-52	09:40	10:11	10:37	19:31	20:52	22:11
-54	09:46	10:15	10:39	19:25	20:49	22:10
-56	09:53	10:20	10:42	19:19	20:45	22:08
-58	10:01	10:25	10:44	19:12	20:40	22:06
-60	10:10	10:31	10:48	19:03	20:35	22:04

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
15	05:56	05:59	12:05	14:30	02:01	2(8%)
16	06:02	06:05	12:06	15:25	02:58	3(16%)
17	06:08	06:10	12:06	16:17	03:52	4(26%)

July 18, 19 ,20 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	295°45.2	134°59.1	9°15.6	345°09.4	-24°32.8	74°27.8	-14°53.1	20°59.3	-22°32.6
1	310°47.7	149°59.0	9°14.4	0°12.4	-24°33.1	89°30.2	-14°53.1	36°01.9	-22°32.6
2	325°50.2	164°59.0	9°13.2	15°15.5	-24°33.3	104°32.6	-14°53.1	51°04.6	-22°32.7
3	340°52.6	179°58.9	9°12.1	30°18.5	-24°33.6	119°35.0	-14°53.2	66°07.2	-22°32.7
4	355°55.1	194°58.9	9°10.9	45°21.6	-24°33.9	134°37.5	-14°53.2	81°09.9	-22°32.7
5	10°57.6	209°58.8	9°09.7	60°24.6	-24°34.2	149°39.9	-14°53.2	96°12.5	-22°32.7
6	26°00.0	224°58.8	9°08.6	75°27.7	-24°34.4	164°42.3	-14°53.2	111°15.2	-22°32.7
7	41°02.5	239°58.7	9°07.4	90°30.7	-24°34.7	179°44.7	-14°53.3	126°17.8	-22°32.7
8	56°05.0	254°58.6	9°06.2	105°33.8	-24°35.0	194°47.1	-14°53.3	141°20.4	-22°32.7
9	71°07.4	269°58.6	9°05.1	120°36.9	-24°35.3	209°49.5	-14°53.3	156°23.1	-22°32.7
10	86°09.9	284°58.5	9°03.9	135°39.9	-24°35.5	224°51.9	-14°53.3	171°25.7	-22°32.7
11	101°12.4	299°58.5	9°02.7	150°43.0	-24°35.8	239°54.3	-14°53.4	186°28.4	-22°32.7
12	116°14.8	314°58.4	9°01.5	165°46.0	-24°36.1	254°56.7	-14°53.4	201°31.0	-22°32.8
13	131°17.3	329°58.4	9°00.4	180°49.1	-24°36.4	269°59.2	-14°53.4	216°33.6	-22°32.8
14	146°19.7	344°58.3	8°59.2	195°52.2	-24°36.6	285°01.6	-14°53.5	231°36.3	-22°32.8
15	161°22.2	359°58.3	8°58.0	210°55.2	-24°36.9	300°04.0	-14°53.5	246°38.9	-22°32.8
16	176°24.7	14°58.2	8°56.9	225°58.3	-24°37.2	315°06.4	-14°53.5	261°41.6	-22°32.8
17	191°27.1	29°58.2	8°55.7	241°01.3	-24°37.5	330°08.8	-14°53.5	276°44.2	-22°32.8
18	206°29.6	44°58.1	8°54.5	256°04.4	-24°37.7	345°11.2	-14°53.6	291°46.9	-22°32.8
19	221°32.1	59°58.1	8°53.3	271°07.5	-24°38.0	0°13.6	-14°53.6	306°49.5	-22°32.8
20	236°34.5	74°58.0	8°52.2	286°10.5	-24°38.3	15°16.0	-14°53.6	321°52.1	-22°32.8
21	251°37.0	89°58.0	8°51.0	301°13.6	-24°38.6	30°18.4	-14°53.7	336°54.8	-22°32.8
22	266°39.5	104°58.0	8°49.8	316°16.7	-24°38.8	45°20.8	-14°53.7	351°57.4	-22°32.9
23	281°41.9	119°57.9	8°48.6	331°19.7	-24°39.1	60°23.2	-14°53.7	7°00.1	-22°32.9
Mer.pass.:4:16:		v-0.1 d-1.2 m-4.1		v3.1 d-0.3 m-2.8		v2.4 d-0.0 m-2.0		v2.6 d-0.0 m0.1	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	296°44.4	134°57.9	8°47.5	346°22.8	-24°39.4	75°25.6	-14°53.7	22°02.7	-22°32.9
1	311°46.8	149°57.8	8°46.3	1°25.9	-24°39.7	90°28.0	-14°53.8	37°05.3	-22°32.9
2	326°49.3	164°57.8	8°45.1	16°29.0	-24°39.9	105°30.4	-14°53.8	52°08.0	-22°32.9
3	341°51.8	179°57.7	8°43.9	31°32.0	-24°40.2	120°32.9	-14°53.8	67°10.6	-22°32.9
4	356°54.2	194°57.7	8°42.8	46°35.1	-24°40.5	135°35.3	-14°53.9	82°13.3	-22°32.9
5	11°56.7	209°57.6	8°41.6	61°38.2	-24°40.7	150°37.7	-14°53.9	97°15.9	-22°32.9
6	26°59.2	224°57.6	8°40.4	76°41.3	-24°41.0	165°40.1	-14°53.9	112°18.5	-22°32.9
7	42°01.6	239°57.6	8°39.2	91°44.3	-24°41.3	180°42.5	-14°53.9	127°21.2	-22°32.9
8	57°04.1	254°57.5	8°38.1	106°47.4	-24°41.6	195°44.9	-14°54.0	142°23.8	-22°33.0
9	72°06.6	269°57.5	8°36.9	121°50.5	-24°41.8	210°47.3	-14°54.0	157°26.5	-22°33.0
10	87°09.0	284°57.5	8°35.7	136°53.6	-24°42.1	225°49.7	-14°54.0	172°29.1	-22°33.0
11	102°11.5	299°57.4	8°34.5	151°56.6	-24°42.4	240°52.1	-14°54.1	187°31.7	-22°33.0
12	117°14.0	314°57.4	8°33.4	166°59.7	-24°42.7	255°54.5	-14°54.1	202°34.4	-22°33.0
13	132°16.4	329°57.3	8°32.2	182°02.8	-24°42.9	270°56.9	-14°54.1	217°37.0	-22°33.0
14	147°18.9	344°57.3	8°31.0	197°05.9	-24°43.2	285°59.3	-14°54.2	232°39.7	-22°33.0
15	162°21.3	359°57.3	8°29.8	212°09.0	-24°43.5	301°01.7	-14°54.2	247°42.3	-22°33.0
16	177°23.8	14°57.2	8°28.6	227°12.0	-24°43.7	316°04.1	-14°54.2	262°44.9	-22°33.0
17	192°26.3	29°57.2	8°27.5	242°15.1	-24°44.0	331°06.5	-14°54.2	277°47.6	-22°33.0
18	207°28.7	44°57.2	8°26.3	257°18.2	-24°44.3	346°08.9	-14°54.3	292°50.2	-22°33.1
19	222°31.2	59°57.1	8°25.1	272°21.3	-24°44.6	1°11.3	-14°54.3	307°52.9	-22°33.1
20	237°33.7	74°57.1	8°23.9	287°24.4	-24°44.8	16°13.7	-14°54.3	322°55.5	-22°33.1
21	252°36.1	89°57.1	8°22.7	302°27.5	-24°45.1	31°16.1	-14°54.4	337°58.1	-22°33.1
22	267°38.6	104°57.0	8°21.6	317°30.6	-24°45.4	46°18.5	-14°54.4	353°00.8	-22°33.1
23	282°41.1	119°57.0	8°20.4	332°33.6	-24°45.6	61°20.9	-14°54.4	8°03.4	-22°33.1
Mer.pass.:4:12:		v-0.0 d-1.2 m-4.1		v3.1 d-0.3 m-2.8		v2.4 d-0.0 m-2.0		v2.6 d-0.0 m0.1	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	297°43.5	134°57.0	8°19.2	347°36.7	-24°45.9	76°23.3	-14°54.5	23°06.1	-22°33.1
1	312°46.0	149°57.0	8°18.0	2°39.8	-24°46.2	91°25.7	-14°54.5	38°08.7	-22°33.1
2	327°48.5	164°56.9	8°16.8	17°42.9	-24°46.5	106°28.1	-14°54.5	53°11.3	-22°33.1
3	342°50.9	179°56.9	8°15.7	32°46.0	-24°46.7	121°30.5	-14°54.6	68°14.0	-22°33.1
4	357°53.4	194°56.9	8°14.5	47°49.1	-24°47.0	136°32.9	-14°54.6	83°16.6	-22°33.2
5	12°55.8	209°56.8	8°13.3	62°52.2	-24°47.3	151°35.3	-14°54.6	98°19.2	-22°33.2
6	27°58.3	224°56.8	8°12.1	77°55.3	-24°47.5	166°37.7	-14°54.7	113°21.9	-22°33.2
7	43°00.8	239°56.8	8°10.9	92°58.4	-24°47.8	181°40.1	-14°54.7	128°24.5	-22°33.2
8	58°03.2	254°56.8	8°09.7	108°01.5	-24°48.1	196°42.5	-14°54.7	143°27.2	-22°33.2
9	73°05.7	269°56.7	8°08.6	123°04.6	-24°48.3	211°44.9	-14°54.7	158°29.8	-22°33.2
10	88°08.2	284°56.7	8°07.4	138°07.7	-24°48.6	226°47.3	-14°54.8	173°32.4	-22°33.2
11	103°10.6	299°56.7	8°06.2	153°10.8	-24°48.9	241°49.7	-14°54.8	188°35.1	-22°33.2
12	118°13.1	314°56.7	8°05.0	168°13.9	-24°49.2	256°52.0	-14°54.8	203°37.7	-22°33.2
13	133°15.6	329°56.7	8°03.8	183°17.0	-24°49.4	271°54.4	-14°54.9	218°40.3	-22°33.2
14	148°18.0	344°56.6	8°02.6	198°20.0	-24°49.7	286°56.8	-14°54.9	233°43.0	-22°33.3
15	163°20.5	359°56.6	8°01.4	213°23.1	-24°50.0	301°59.2	-14°54.9	248°45.6	-22°33.3
16	178°22.9	14°56.6	8°00.3	228°26.2	-24°50.2	317°01.6	-14°55.0	263°48.3	-22°33.3
17	193°25.4	29°56.6	7°59.1	243°29.4	-24°50.5	332°04.0	-14°55.0	278°50.9	-22°33.3
18	208°27.9	44°56.6	7°57.9	258°32.5	-24°50.8	347°06.4	-14°55.0	293°53.5	-22°33.3
19	223°30.3	59°56.5	7°56.7	273°35.6	-24°51.0	2°08.8	-14°55.1	308°56.2	-22°33.3
20	238°32.8	74°56.5	7°55.5	288°38.7	-24°51.3	17°11.2	-14°55.1	323°58.8	-22°33.3
21	253°35.3	89°56.5	7°54.3	303°41.8	-24°51.6	32°13.6	-14°55.1	339°01.4	-22°33.3
22	268°37.7	104°56.5	7°53.1	318°44.9	-24°51.8	47°16.0	-14°55.2	354°04.1	-22°33.3
23	283°40.2	119°56.5	7°52.0	333°48.0	-24°52.1	62°18.4	-14°55.2	9°06.7	-22°33.3
Mer.pass.:4:08:		v-0.0 d-1.2 m-4.1		v3.1 d-0.3 m-2.8		v2.4 d-0.0 m-2.0		v2.6 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.4
Ankaa	353°12.2	-42°12.2
Schedar	349°36.4	56°38.0
Diphda	348°52.2	-17°53.1
Achernar	335°24.3	-57°08.4
Hamal	327°56.9	23°32.8
Polaris	316°23.4	89°20.1
Akamar	315°15.9	-40°13.7
Menkar	314°11.5	4°09.6
Mirfak	308°35.6	49°55.2
Aldebaran	290°45.7	16°32.6
Rigel	281°09.0	-8°10.9
Capella	280°29.7	46°00.8
Bellatrix	278°28.6	6°21.8
Elnath	278°08.6	28°37.2
Alnilam	275°43.2	-1°11.5
Betelgeuse	270°57.9	7°24.5
Canopus	263°55.1	-52°42.4
Sirius	258°30.9	-16°44.4
Adara	255°10.2	-28°59.9
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.3	-59°34.2
Suhail	222°50.3	-43°30.5
Miaplacidus	221°39.8	-69°47.7
Alphard	217°53.0	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.0	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.8	-17°38.6
Acrux	173°05.6	-63°12.3
Gacrux	171°57.2	-57°13.1
Alioth	166°17.9	55°52.0
Spica	158°27.6	-11°15.3
Alcaid	152°56.2	49°13.7
Hadar	148°42.8	-60°27.8
Menkent	148°03.4	-36°27.6
Arcturus	145°52.4	19°05.8
Rigil Kent.	139°46.8	-60°54.8
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.8	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.7	-26°28.2
Atria	107°20.0	-69°03.6
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.0	51°29.5
Kaus Aust.	83°38.8	-34°22.4
Vega	80°36.2	38°48.3
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.3
Deneb	49°28.6	45°20.8
Enif	33°43.4	9°57.7
Alnair	27°39.1	-46°52.0
Fomalhaut	15°20.0	-29°31.3
Scheat	13°49.8	28°10.9
Markab	13°34.7	15°18.2

2018/7/1	**SHA**	**Mer.pass**
Venus	199°13.8	15:00
Mars	49°24.1	00:59
Jupiter	138°42.6	18:59
Saturn	85°14.0	22:32

2018/7/1	**SHA**	**Mer.pass**
Venus	198°13.5	15:00
Mars	49°38.4	00:54
Jupiter	138°41.3	18:55
Saturn	85°18.3	22:28

2018/7/2	**SHA**	**Mer.pass**
Venus	197°13.5	15:00
Mars	49°53.2	00:49
Jupiter	138°39.8	18:51
Saturn	85°22.5	22:24

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°26.8	21°03.9	111°43.0	11.1	3°04.0	-12.1	58.6
1	193°26.8	21°03.5	126°13.1	11.1	2°51.8	-12.1	58.5
2	208°26.7	21°03.0	140°43.2	11.2	2°39.7	-12.1	58.5
3	223°26.7	21°02.6	155°13.5	11.2	2°27.6	-12.1	58.4
4	238°26.6	21°02.2	169°43.7	11.3	2°15.5	-12.1	58.4
5	253°26.6	21°01.7	184°14.0	11.3	2°03.4	-12.1	58.4
6	268°26.5	21°01.3	198°44.4	11.4	1°51.3	-12.1	58.3
7	283°26.5	21°00.8	213°14.8	11.4	1°39.2	-12.1	58.3
8	298°26.4	21°00.4	227°45.3	11.5	1°27.1	-12.1	58.3
9	313°26.4	20°60.0	242°15.8	11.5	1°15.1	-12.1	58.2
10	328°26.4	20°59.5	256°46.4	11.6	1°03.0	-12.1	58.2
11	343°26.3	20°59.1	271°17.0	11.6	0°50.9	-12.0	58.1
12	358°26.3	20°58.6	285°47.6	11.7	0°38.9	-12.0	58.1
13	13°26.2	20°58.2	300°18.3	11.7	0°26.9	-12.0	58.1
14	28°26.2	20°57.7	314°49.1	11.8	0°14.8	-12.0	58.0
15	43°26.1	20°57.3	329°19.9	11.8	0°02.8	-12.0	58.0
16	58°26.1	20°56.9	343°50.7	11.9	-0°09.1	-12.0	58.0
17	73°26.0	20°56.4	358°21.6	11.9	-0°21.1	-12.0	57.9
18	88°26.0	20°56.0	12°52.5	11.9	-0°33.1	-11.9	57.9
19	103°25.9	20°55.5	27°23.4	12.0	-0°45.0	-11.9	57.8
20	118°25.9	20°55.1	41°54.4	12.0	-0°56.9	-11.9	57.8
21	133°25.8	20°54.6	56°25.5	12.1	-1°08.8	-11.9	57.8
22	148°25.8	20°54.2	70°56.5	12.1	-1°20.7	-11.9	57.7
23	163°25.8	20°53.7	85°27.7	12.1	-1°32.5	-11.8	57.7
	SD.=15.7	d=-0.4			S.D.=16.0		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°25.7	20°53.3	99°58.8	12.2	-1°44.3	-11.8	57.7
1	193°25.7	20°52.8	114°30.0	12.2	-1°56.1	-11.8	57.6
2	208°25.6	20°52.4	129°01.2	12.2	-2°07.9	-11.8	57.6
3	223°25.6	20°51.9	143°32.4	12.3	-2°19.7	-11.7	57.5
4	238°25.5	20°51.5	158°03.7	12.3	-2°31.4	-11.7	57.5
5	253°25.5	20°51.0	172°35.0	12.3	-2°43.1	-11.7	57.5
6	268°25.5	20°50.6	187°06.3	12.4	-2°54.7	-11.7	57.4
7	283°25.4	20°50.1	201°37.7	12.4	-3°06.4	-11.6	57.4
8	298°25.4	20°49.7	216°09.1	12.4	-3°18.0	-11.6	57.4
9	313°25.3	20°49.2	230°40.5	12.4	-3°29.6	-11.6	57.3
10	328°25.3	20°48.8	245°12.0	12.5	-3°41.1	-11.5	57.3
11	343°25.2	20°48.3	259°43.5	12.5	-3°52.6	-11.5	57.2
12	358°25.2	20°47.8	274°15.0	12.5	-4°04.1	-11.5	57.2
13	13°25.2	20°47.4	288°46.5	12.5	-4°15.5	-11.4	57.2
14	28°25.1	20°46.9	303°18.0	12.6	-4°26.9	-11.4	57.1
15	43°25.1	20°46.5	317°49.6	12.6	-4°38.3	-11.4	57.1
16	58°25.0	20°46.0	332°21.2	12.6	-4°49.6	-11.3	57.1
17	73°25.0	20°45.5	346°52.8	12.6	-5°00.9	-11.3	57.0
18	88°25.0	20°45.1	1°24.5	12.6	-5°12.2	-11.2	57.0
19	103°24.9	20°44.6	15°56.1	12.7	-5°23.4	-11.2	57.0
20	118°24.9	20°44.2	30°27.8	12.7	-5°34.6	-11.2	56.9
21	133°24.9	20°43.7	44°59.5	12.7	-5°45.8	-11.1	56.9
22	148°24.8	20°43.2	59°31.2	12.7	-5°56.9	-11.1	56.9
23	163°24.8	20°42.8	74°02.9	12.7	-6°07.9	-11.0	56.8
	SD.=15.7	d=-0.5			S.D.=15.7		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°24.7	20°42.3	88°34.6	12.7	-6°18.9	-11.0	56.8
1	193°24.7	20°41.8	103°06.4	12.8	-6°29.9	-11.0	56.8
2	208°24.7	20°41.4	117°38.2	12.8	-6°40.8	-10.9	56.7
3	223°24.6	20°40.9	132°10.0	12.8	-6°51.7	-10.9	56.7
4	238°24.6	20°40.4	146°41.7	12.8	-7°02.6	-10.8	56.7
5	253°24.6	20°40.0	161°13.6	12.8	-7°13.4	-10.8	56.6
6	268°24.5	20°39.5	175°45.4	12.8	-7°24.1	-10.7	56.6
7	283°24.5	20°39.0	190°17.2	12.8	-7°34.8	-10.7	56.6
8	298°24.4	20°38.6	204°49.0	12.8	-7°45.5	-10.6	56.5
9	313°24.4	20°38.1	219°20.9	12.9	-7°56.1	-10.6	56.5
10	328°24.4	20°37.6	233°52.7	12.9	-8°06.6	-10.5	56.5
11	343°24.3	20°37.2	248°24.6	12.9	-8°17.1	-10.5	56.4
12	358°24.3	20°36.7	262°56.5	12.9	-8°27.6	-10.4	56.4
13	13°24.3	20°36.2	277°28.3	12.9	-8°38.0	-10.4	56.4
14	28°24.2	20°35.7	292°00.2	12.9	-8°48.3	-10.3	56.3
15	43°24.2	20°35.3	306°32.1	12.9	-8°58.6	-10.3	56.3
16	58°24.2	20°34.8	321°04.0	12.9	-9°08.9	-10.2	56.3
17	73°24.1	20°34.3	335°35.9	12.9	-9°19.1	-10.2	56.2
18	88°24.1	20°33.8	350°07.8	12.9	-9°29.2	-10.1	56.2
19	103°24.1	20°33.4	4°39.7	12.9	-9°39.3	-10.1	56.2
20	118°24.0	20°32.9	19°11.6	12.9	-9°49.3	-10.0	56.2
21	133°24.0	20°32.4	33°43.5	12.9	-9°59.3	-9.9	56.1
22	148°24.0	20°31.9	48°15.4	12.9	-10°09.2	-9.9	56.1
23	163°23.9	20°31.5	62°47.3	12.9	-10°19.1	-9.8	56.1
	SD.=15.7	d=-0.5			S.D.=15.5		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	00:45	23:17	–:–	–:–
66	–:–	–:–	01:53	22:17	–:–	–:–
64	–:–	–:–	02:27	21:43	–:–	–:–
62	–:–	01:15	02:52	21:19	22:53	–:–
60	–:–	01:58	03:11	20:60	22:12	–:–
58	–:–	02:25	03:27	20:44	21:45	–:–
56	01:08	02:47	03:41	20:31	21:24	22:60
54	01:48	03:04	03:53	20:19	21:08	22:22
52	02:14	03:18	04:03	20:09	20:53	21:57
50	02:34	03:31	04:12	19:60	20:41	21:38
45	03:10	03:56	04:31	19:41	20:16	21:02
40	03:36	04:15	04:47	19:25	19:57	20:36
35	03:56	04:31	04:60	19:12	19:41	20:16
30	04:12	04:45	05:11	19:01	19:28	19:60
20	04:38	05:07	05:31	18:42	19:06	19:34
10	04:58	05:25	05:47	18:25	18:48	19:14
0	05:15	05:41	06:03	18:10	18:32	18:58
-10	05:30	05:56	06:18	17:55	18:17	18:43
-20	05:44	06:11	06:34	17:38	18:02	18:29
-30	05:58	06:27	06:53	17:20	17:46	18:15
-35	06:05	06:36	07:04	17:09	17:37	18:08
-40	06:13	06:46	07:16	16:57	17:27	17:60
-45	06:21	06:58	07:30	16:43	17:15	17:52
-50	06:31	07:11	07:48	16:25	17:02	17:42
-52	06:35	07:17	07:56	16:17	16:56	17:38
-54	06:40	07:24	08:06	16:07	16:49	17:33
-56	06:45	07:32	08:16	15:57	16:41	17:29
-58	06:50	07:40	08:28	15:45	16:33	17:23
-60	06:56	07:50	08:42	15:31	16:24	17:17

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	10:45	12:38	14:30	22:57	22:45	22:31
70	10:46	12:32	14:15	22:60	22:54	22:47
68	10:47	12:27	14:04	23:01	23:01	23:00
66	10:48	12:22	13:54	23:03	23:07	23:11
64	10:48	12:19	13:46	23:04	23:12	23:20
62	10:49	12:16	13:40	23:05	23:16	23:28
60	10:49	12:13	13:34	23:06	23:20	23:35
58	10:50	12:11	13:29	23:07	23:24	23:41
56	10:50	12:09	13:24	23:08	23:27	23:46
54	10:51	12:07	13:20	23:09	23:29	23:51
52	10:51	12:05	13:16	23:10	23:32	23:55
50	10:51	12:03	13:13	23:10	23:34	23:59
45	10:52	12:00	13:06	23:11	23:39	–:–
40	10:52	11:57	13:00	23:13	23:43	–:–
35	10:53	11:55	12:55	23:14	23:47	–:–
30	10:53	11:53	12:50	23:14	23:50	–:–
20	10:54	11:49	12:43	23:16	23:56	–:–
10	10:55	11:46	12:36	23:17	–:–	00:01
0	10:55	11:43	12:30	23:18	–:–	00:05
-10	10:56	11:40	12:23	23:19	–:–	00:10
-20	10:57	11:37	12:17	23:21	–:–	00:15
-30	10:57	11:34	12:09	23:22	–:–	00:21
-35	10:58	11:32	12:05	23:23	–:–	00:24
-40	10:58	11:29	12:00	23:24	–:–	00:28
-45	10:59	11:27	11:55	23:25	–:–	00:32
-50	10:60	11:24	11:48	23:26	–:–	00:37
-52	11:00	11:22	11:45	23:27	–:–	00:39
-54	11:00	11:21	11:42	23:27	–:–	00:42
-56	11:01	11:19	11:38	23:28	–:–	00:45
-58	11:01	11:17	11:34	23:29	–:–	00:48
-60	11:02	11:15	11:29	23:29	–:–	00:52

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
18	06:13	06:15	12:06	17:06	04:42	5(36%)
19	06:17	06:19	12:06	17:54	05:30	6(47%)
20	06:21	06:23	12:06	18:40	06:17	7(57%)

July 21, 22 ,23 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	298°42.7	134°56.5	7°50.8	348°51.1	-24°52.4	77°20.8	-14°55.2	24°09.4	-22°33.4
1	313°45.1	149°56.4	7°49.6	3°54.2	-24°52.6	92°23.2	-14°55.3	39°12.0	-22°33.4
2	328°47.6	164°56.4	7°48.4	18°57.3	-24°52.9	107°25.5	-14°55.3	54°14.6	-22°33.4
3	343°50.1	179°56.4	7°47.2	34°00.4	-24°53.2	122°27.9	-14°55.3	69°17.3	-22°33.4
4	358°52.5	194°56.4	7°46.0	49°03.5	-24°53.4	137°30.3	-14°55.4	84°19.9	-22°33.4
5	13°55.0	209°56.4	7°44.8	64°06.6	-24°53.7	152°32.7	-14°55.4	99°22.5	-22°33.4
6	28°57.4	224°56.4	7°43.6	79°09.7	-24°54.0	167°35.1	-14°55.4	114°25.2	-22°33.4
7	43°59.9	239°56.4	7°42.4	94°12.8	-24°54.2	182°37.5	-14°55.5	129°27.8	-22°33.4
8	59°02.4	254°56.4	7°41.3	109°15.9	-24°54.5	197°39.9	-14°55.5	144°30.4	-22°33.4
9	74°04.8	269°56.3	7°40.1	124°19.1	-24°54.8	212°42.3	-14°55.5	159°33.1	-22°33.4
10	89°07.3	284°56.3	7°38.9	139°22.2	-24°55.0	227°44.7	-14°55.6	174°35.7	-22°33.5
11	104°09.8	299°56.3	7°37.7	154°25.3	-24°55.3	242°47.0	-14°55.6	189°38.3	-22°33.5
12	119°12.2	314°56.3	7°36.5	169°28.4	-24°55.6	257°49.4	-14°55.6	204°41.0	-22°33.5
13	134°14.7	329°56.3	7°35.3	184°31.5	-24°55.8	272°51.8	-14°55.7	219°43.6	-22°33.5
14	149°17.2	344°56.3	7°34.1	199°34.6	-24°56.1	287°54.2	-14°55.7	234°46.3	-22°33.5
15	164°19.6	359°56.3	7°32.9	214°37.7	-24°56.4	302°56.6	-14°55.7	249°48.9	-22°33.5
16	179°22.1	14°56.3	7°31.7	229°40.9	-24°56.6	317°59.0	-14°55.8	264°51.5	-22°33.5
17	194°24.6	29°56.3	7°30.5	244°44.0	-24°56.9	333°01.4	-14°55.8	279°54.2	-22°33.5
18	209°27.0	44°56.3	7°29.3	259°47.1	-24°57.2	348°03.8	-14°55.9	294°56.8	-22°33.5
19	224°29.5	59°56.3	7°28.2	274°50.2	-24°57.4	3°06.1	-14°55.9	309°59.4	-22°33.5
20	239°31.9	74°56.3	7°27.0	289°53.3	-24°57.7	18°08.5	-14°55.9	325°02.1	-22°33.6
21	254°34.4	89°56.3	7°25.8	304°56.5	-24°58.0	33°10.9	-14°56.0	340°04.7	-22°33.6
22	269°36.9	104°56.3	7°24.6	319°59.6	-24°58.2	48°13.3	-14°56.0	355°07.3	-22°33.6
23	284°39.3	119°56.3	7°23.4	335°02.7	-24°58.5	63°15.7	-14°56.0	10°10.0	-22°33.6
Mer.pass.:4:04:		v-0.0 d-1.2 m-4.1		v3.1 d-0.3 m-2.8		v2.4 d-0.0 m-2.0		v2.6 d-0.0 m0.1	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	299°41.8	134°56.3	7°22.2	350°05.8	-24°58.7	78°18.1	-14°56.1	25°12.6	-22°33.6
1	314°44.3	149°56.3	7°21.0	5°08.9	-24°59.0	93°20.4	-14°56.1	40°15.2	-22°33.6
2	329°46.7	164°56.3	7°19.8	20°12.1	-24°59.3	108°22.8	-14°56.1	55°17.9	-22°33.6
3	344°49.2	179°56.3	7°18.6	35°15.2	-24°59.5	123°25.2	-14°56.2	70°20.5	-22°33.6
4	359°51.7	194°56.3	7°17.4	50°18.3	-24°59.8	138°27.6	-14°56.2	85°23.1	-22°33.6
5	14°54.1	209°56.3	7°16.2	65°21.4	-25°00.1	153°30.0	-14°56.2	100°25.8	-22°33.6
6	29°56.6	224°56.3	7°15.0	80°24.6	-25°00.3	168°32.4	-14°56.3	115°28.4	-22°33.7
7	44°59.0	239°56.3	7°13.8	95°27.7	-25°00.6	183°34.7	-14°56.3	130°31.0	-22°33.7
8	60°01.5	254°56.3	7°12.6	110°30.8	-25°00.8	198°37.1	-14°56.4	145°33.7	-22°33.7
9	75°04.0	269°56.3	7°11.4	125°33.9	-25°01.1	213°39.5	-14°56.4	160°36.3	-22°33.7
10	90°06.4	284°56.3	7°10.2	140°37.1	-25°01.4	228°41.9	-14°56.4	175°38.9	-22°33.7
11	105°08.9	299°56.3	7°09.0	155°40.2	-25°01.6	243°44.3	-14°56.5	190°41.6	-22°33.7
12	120°11.4	314°56.3	7°07.9	170°43.3	-25°01.9	258°46.6	-14°56.5	205°44.2	-22°33.7
13	135°13.8	329°56.3	7°06.7	185°46.5	-25°02.2	273°49.0	-14°56.5	220°46.8	-22°33.7
14	150°16.3	344°56.3	7°05.5	200°49.6	-25°02.4	288°51.4	-14°56.6	235°49.5	-22°33.7
15	165°18.8	359°56.3	7°04.3	215°52.7	-25°02.7	303°53.8	-14°56.6	250°52.1	-22°33.7
16	180°21.2	14°56.3	7°03.1	230°55.8	-25°02.9	318°56.2	-14°56.6	265°54.7	-22°33.8
17	195°23.7	29°56.4	7°01.9	245°59.0	-25°03.2	333°58.5	-14°56.7	280°57.4	-22°33.8
18	210°26.2	44°56.4	7°00.7	261°02.1	-25°03.5	349°00.9	-14°56.7	295°60.0	-22°33.8
19	225°28.6	59°56.4	6°59.5	276°05.2	-25°03.7	4°03.3	-14°56.8	311°02.6	-22°33.8
20	240°31.1	74°56.4	6°58.3	291°08.4	-25°04.0	19°05.7	-14°56.8	326°05.3	-22°33.8
21	255°33.5	89°56.4	6°57.1	306°11.5	-25°04.2	34°08.1	-14°56.8	341°07.9	-22°33.8
22	270°36.0	104°56.4	6°55.9	321°14.6	-25°04.5	49°10.4	-14°56.9	356°10.5	-22°33.8
23	285°38.5	119°56.4	6°54.7	336°17.8	-25°04.7	64°12.8	-14°56.9	11°13.2	-22°33.8
Mer.pass.:4:00:		v-0.0 d-1.2 m-4.1		v3.1 d-0.3 m-2.8		v2.4 d-0.0 m-2.0		v2.6 d-0.0 m0.1	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	300°40.9	134°56.4	6°53.5	351°20.9	-25°05.0	79°15.2	-14°56.9	26°15.8	-22°33.8
1	315°43.4	149°56.4	6°52.3	6°24.0	-25°05.3	94°17.6	-14°57.0	41°18.4	-22°33.8
2	330°45.9	164°56.5	6°51.1	21°27.2	-25°05.5	109°19.9	-14°57.0	56°21.1	-22°33.8
3	345°48.3	179°56.5	6°49.9	36°30.3	-25°05.8	124°22.3	-14°57.1	71°23.7	-22°33.9
4	0°50.8	194°56.5	6°48.7	51°33.5	-25°06.0	139°24.7	-14°57.1	86°26.3	-22°33.9
5	15°53.3	209°56.5	6°47.5	66°36.6	-25°06.3	154°27.1	-14°57.1	101°28.9	-22°33.9
6	30°55.7	224°56.5	6°46.3	81°39.7	-25°06.6	169°29.4	-14°57.2	116°31.6	-22°33.9
7	45°58.2	239°56.5	6°45.1	96°42.9	-25°06.8	184°31.8	-14°57.2	131°34.2	-22°33.9
8	61°00.7	254°56.6	6°43.9	111°46.0	-25°07.1	199°34.2	-14°57.2	146°36.8	-22°33.9
9	76°03.1	269°56.6	6°42.7	126°49.2	-25°07.3	214°36.6	-14°57.3	161°39.5	-22°33.9
10	91°05.6	284°56.6	6°41.5	141°52.3	-25°07.6	229°38.9	-14°57.3	176°42.1	-22°33.9
11	106°08.0	299°56.6	6°40.3	156°55.4	-25°07.8	244°41.3	-14°57.4	191°44.7	-22°33.9
12	121°10.5	314°56.6	6°39.1	171°58.6	-25°08.1	259°43.7	-14°57.4	206°47.4	-22°33.9
13	136°13.0	329°56.7	6°37.9	187°01.7	-25°08.3	274°46.1	-14°57.4	221°50.0	-22°34.0
14	151°15.4	344°56.7	6°36.7	202°04.9	-25°08.6	289°48.4	-14°57.5	236°52.6	-22°34.0
15	166°17.9	359°56.7	6°35.5	217°08.0	-25°08.9	304°50.8	-14°57.5	251°55.3	-22°34.0
16	181°20.4	14°56.7	6°34.3	232°11.1	-25°09.1	319°53.2	-14°57.6	266°57.9	-22°34.0
17	196°22.8	29°56.8	6°33.1	247°14.3	-25°09.4	334°55.6	-14°57.6	282°00.5	-22°34.0
18	211°25.3	44°56.8	6°31.9	262°17.4	-25°09.6	349°57.9	-14°57.6	297°03.1	-22°34.0
19	226°27.8	59°56.8	6°30.7	277°20.6	-25°09.9	5°00.3	-14°57.7	312°05.8	-22°34.0
20	241°30.2	74°56.8	6°29.4	292°23.7	-25°10.1	20°02.7	-14°57.7	327°08.4	-22°34.0
21	256°32.7	89°56.9	6°28.2	307°26.9	-25°10.4	35°05.0	-14°57.8	342°11.0	-22°34.0
22	271°35.2	104°56.9	6°27.0	322°30.0	-25°10.6	50°07.4	-14°57.8	357°13.7	-22°34.0
23	286°37.6	119°56.9	6°25.8	337°33.2	-25°10.9	65°09.8	-14°57.8	12°16.3	-22°34.1
Mer.pass.:3:56:		v0.0 d-1.2 m-4.1		v3.1 d-0.3 m-2.8		v2.4 d-0.0 m-2.0		v2.6 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.4
Ankaa	353°12.1	-42°12.1
Schedar	349°36.3	56°38.0
Diphda	348°52.2	-17°53.0
Achernar	335°24.2	-57°08.4
Hamal	327°56.9	23°32.8
Polaris	316°21.9	89°20.1
Akamar	315°15.9	-40°13.7
Menkar	314°11.5	4°09.6
Mirfak	308°35.6	49°55.2
Aldebaran	290°45.6	16°32.6
Rigel	281°09.0	-8°10.9
Capella	280°29.7	46°00.8
Bellatrix	278°28.6	6°21.8
Elnath	278°08.6	28°37.2
Alnilam	275°43.1	-1°11.5
Betelgeuse	270°57.9	7°24.5
Canopus	263°55.1	-52°42.3
Sirius	258°30.9	-16°44.4
Adara	255°10.2	-28°59.9
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.3	-59°34.2
Suhail	222°50.3	-43°30.5
Miaplacidus	221°39.8	-69°47.7
Alphard	217°53.0	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.0	61°39.4
Denebola	182°30.2	14°28.3
Gienah	175°48.8	-17°38.6
Acrux	173°05.6	-63°12.3
Gacrux	171°57.2	-57°13.1
Alioth	166°17.9	55°52.0
Spica	158°27.6	-11°15.3
Alcaid	152°56.2	49°13.7
Hadar	148°42.9	-60°27.8
Menkent	148°03.4	-36°27.6
Arcturus	145°52.4	19°05.8
Rigil Kent.	139°46.8	-60°54.8
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.9	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.7	-26°28.2
Atria	107°20.0	-69°03.6
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.0	51°29.5
Kaus Aust.	83°38.8	-34°22.4
Vega	80°36.2	38°48.3
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.3
Deneb	49°28.6	45°20.8
Enif	33°43.4	9°57.7
Alnair	27°39.0	-46°52.0
Fomalhaut	15°20.0	-29°31.3
Scheat	13°49.8	28°10.9
Markab	13°34.7	15°18.3

2018/7/2	**SHA**	**Mer.pass**
Venus	196°13.8	15:00
Mars	50°08.4	00:44
Jupiter	138°38.1	18:48
Saturn	85°26.7	22:19

2018/7/2	**SHA**	**Mer.pass**
Venus	195°14.5	15:00
Mars	50°24.0	00:39
Jupiter	138°36.3	18:44
Saturn	85°30.8	22:15

2018/7/2	**SHA**	**Mer.pass**
Venus	194°15.5	15:00
Mars	50°40.0	00:34
Jupiter	138°34.3	18:40
Saturn	85°34.9	22:11

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°23.9	20°31.0	77°19.2	12.9	-10°28.9	-9.8	56.0
1	193°23.9	20°30.5	91°51.1	12.9	-10°38.6	-9.7	56.0
2	208°23.8	20°30.0	106°23.0	12.9	-10°48.3	-9.7	56.0
3	223°23.8	20°29.5	120°54.9	12.9	-10°57.9	-9.6	55.9
4	238°23.8	20°29.1	135°26.8	12.9	-11°07.5	-9.5	55.9
5	253°23.7	20°28.6	149°58.7	12.9	-11°17.0	-9.5	55.9
6	268°23.7	20°28.1	164°30.5	12.9	-11°26.4	-9.4	55.9
7	283°23.7	20°27.6	179°02.4	12.9	-11°35.8	-9.3	55.8
8	298°23.7	20°27.1	193°34.3	12.9	-11°45.1	-9.3	55.8
9	313°23.6	20°26.6	208°06.2	12.9	-11°54.4	-9.2	55.8
10	328°23.6	20°26.2	222°38.0	12.9	-12°03.6	-9.2	55.8
11	343°23.6	20°25.7	237°09.9	12.9	-12°12.7	-9.1	55.7
12	358°23.5	20°25.2	251°41.7	12.8	-12°21.8	-9.0	55.7
13	13°23.5	20°24.7	266°13.6	12.8	-12°30.8	-9.0	55.7
14	28°23.5	20°24.2	280°45.4	12.8	-12°39.7	-8.9	55.6
15	43°23.5	20°23.7	295°17.2	12.8	-12°48.6	-8.8	55.6
16	58°23.4	20°23.2	309°49.1	12.8	-12°57.4	-8.8	55.6
17	73°23.4	20°22.8	324°20.9	12.8	-13°06.1	-8.7	55.6
18	88°23.4	20°22.3	338°52.7	12.8	-13°14.8	-8.6	55.5
19	103°23.3	20°21.8	353°24.5	12.8	-13°23.4	-8.6	55.5
20	118°23.3	20°21.3	7°56.2	12.8	-13°31.9	-8.5	55.5
21	133°23.3	20°20.8	22°28.0	12.8	-13°40.3	-8.4	55.5
22	148°23.3	20°20.3	36°59.8	12.8	-13°48.7	-8.4	55.4
23	163°23.2	20°19.8	51°31.5	12.7	-13°57.0	-8.3	55.4
	SD.=15.7	d=-0.5	S.D.=15.3				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°23.2	20°19.3	66°03.2	12.7	-14°05.3	-8.2	55.4
1	193°23.2	20°18.8	80°35.0	12.7	-14°13.4	-8.1	55.4
2	208°23.2	20°18.3	95°06.7	12.7	-14°21.5	-8.1	55.3
3	223°23.1	20°17.8	109°38.4	12.7	-14°29.6	-8.0	55.3
4	238°23.1	20°17.3	124°10.1	12.7	-14°37.5	-7.9	55.3
5	253°23.1	20°16.8	138°41.7	12.7	-14°45.4	-7.8	55.3
6	268°23.1	20°16.3	153°13.4	12.7	-14°53.2	-7.8	55.3
7	283°23.0	20°15.8	167°45.0	12.6	-15°01.0	-7.7	55.2
8	298°23.0	20°15.4	182°16.7	12.6	-15°08.6	-7.6	55.2
9	313°23.0	20°14.9	196°48.3	12.6	-15°16.2	-7.5	55.2
10	328°23.0	20°14.4	211°19.9	12.6	-15°23.7	-7.5	55.2
11	343°23.0	20°13.9	225°51.5	12.6	-15°31.1	-7.4	55.1
12	358°22.9	20°13.4	240°23.0	12.6	-15°38.5	-7.3	55.1
13	13°22.9	20°12.9	254°54.6	12.5	-15°45.8	-7.2	55.1
14	28°22.9	20°12.4	269°26.1	12.5	-15°53.0	-7.2	55.1
15	43°22.9	20°11.9	283°57.7	12.5	-16°00.1	-7.1	55.1
16	58°22.8	20°11.3	298°29.2	12.5	-16°07.1	-7.0	55.0
17	73°22.8	20°10.8	313°00.7	12.5	-16°14.1	-6.9	55.0
18	88°22.8	20°10.3	327°32.2	12.5	-16°21.0	-6.8	55.0
19	103°22.8	20°09.8	342°03.6	12.5	-16°27.8	-6.8	55.0
20	118°22.8	20°09.3	356°35.1	12.4	-16°34.5	-6.7	55.0
21	133°22.7	20°08.8	11°06.5	12.4	-16°41.1	-6.6	54.9
22	148°22.7	20°08.3	25°37.9	12.4	-16°47.7	-6.5	54.9
23	163°22.7	20°07.8	40°09.3	12.4	-16°54.2	-6.4	54.9
	SD.=15.7	d=-0.5	S.D.=15.1				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°22.7	20°07.3	54°40.7	12.4	-17°00.6	-6.4	54.9
1	193°22.7	20°06.8	69°12.1	12.4	-17°06.9	-6.3	54.9
2	208°22.6	20°06.3	83°43.4	12.3	-17°13.1	-6.2	54.8
3	223°22.6	20°05.8	98°14.7	12.3	-17°19.3	-6.1	54.8
4	238°22.6	20°05.3	112°46.1	12.3	-17°25.4	-6.0	54.8
5	253°22.6	20°04.8	127°17.4	12.3	-17°31.3	-5.9	54.8
6	268°22.6	20°04.3	141°48.7	12.3	-17°37.2	-5.9	54.8
7	283°22.5	20°03.7	156°19.9	12.3	-17°43.0	-5.8	54.7
8	298°22.5	20°03.2	170°51.2	12.2	-17°48.8	-5.7	54.7
9	313°22.5	20°02.7	185°22.4	12.2	-17°54.4	-5.6	54.7
10	328°22.5	20°02.2	199°53.6	12.2	-17°60.0	-5.5	54.7
11	343°22.5	20°01.7	214°24.8	12.2	-18°05.4	-5.4	54.7
12	358°22.5	20°01.2	228°56.0	12.2	-18°10.8	-5.3	54.7
13	13°22.4	20°00.7	243°27.2	12.2	-18°16.1	-5.3	54.6
14	28°22.4	20°00.2	257°58.4	12.1	-18°21.3	-5.2	54.6
15	43°22.4	19°59.6	272°29.5	12.1	-18°26.4	-5.1	54.6
16	58°22.4	19°59.1	287°00.6	12.1	-18°31.5	-5.0	54.6
17	73°22.4	19°58.6	301°31.7	12.1	-18°36.4	-4.9	54.6
18	88°22.4	19°58.1	316°02.8	12.1	-18°41.3	-4.8	54.6
19	103°22.4	19°57.6	330°33.9	12.1	-18°46.0	-4.7	54.6
20	118°22.3	19°57.0	345°05.0	12.1	-18°50.7	-4.6	54.5
21	133°22.3	19°56.5	359°36.0	12.0	-18°55.3	-4.5	54.5
22	148°22.3	19°56.0	14°07.1	12.0	-18°59.8	-4.5	54.5
23	163°22.3	19°55.5	28°38.1	12.0	-19°04.2	-4.4	54.5
	SD.=15.7	d=-0.5	S.D.=15.0				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	01:14	22:52	–:–	–:–
66	–:–	–:–	02:05	22:04	–:–	–:–
64	–:–	–:–	02:36	21:34	–:–	–:–
62	–:–	01:31	02:59	21:12	22:38	–:–
60	–:–	02:08	03:18	20:54	22:03	–:–
58	–:–	02:33	03:33	20:39	21:38	–:–
56	01:23	02:53	03:46	20:26	21:18	22:46
54	01:57	03:09	03:57	20:15	21:02	22:14
52	02:21	03:23	04:07	20:05	20:49	21:50
50	02:39	03:35	04:16	19:56	20:37	21:32
45	03:14	03:59	04:34	19:38	20:13	20:58
40	03:39	04:18	04:49	19:23	19:54	20:33
35	03:59	04:33	05:02	19:11	19:39	20:14
30	04:14	04:46	05:13	18:60	19:26	19:58
20	04:40	05:08	05:32	18:41	19:05	19:33
10	04:59	05:25	05:48	18:25	18:47	19:14
0	05:15	05:41	06:03	18:10	18:32	18:58
-10	05:30	05:55	06:18	17:55	18:18	18:43
-20	05:43	06:10	06:34	17:40	18:03	18:30
-30	05:57	06:26	06:52	17:22	17:47	18:16
-35	06:04	06:35	07:02	17:11	17:39	18:09
-40	06:11	06:44	07:14	16:59	17:29	18:02
-45	06:19	06:55	07:28	16:46	17:18	17:54
-50	06:28	07:08	07:45	16:29	17:05	17:45
-52	06:32	07:14	07:53	16:21	16:59	17:41
-54	06:37	07:21	08:02	16:12	16:53	17:37
-56	06:41	07:28	08:12	16:02	16:46	17:32
-58	06:46	07:36	08:23	15:50	16:38	17:27
-60	06:52	07:45	08:36	15:37	16:29	17:22

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	16:25	18:34	–:–	22:13	21:41	–:–
70	15:59	17:46	19:40	22:40	22:31	22:15
68	15:40	17:15	18:48	23:01	23:03	23:08
66	15:24	16:52	18:16	23:17	23:26	23:41
64	15:12	16:34	17:52	23:31	23:45	–:–
62	15:01	16:20	17:34	23:42	23:60	–:–
60	14:52	16:08	17:18	23:52	–:–	00:13
58	14:44	15:57	17:05	–:–	00:00	00:24
56	14:37	15:48	16:54	–:–	00:08	00:33
54	14:31	15:40	16:44	–:–	00:14	00:42
52	14:26	15:32	16:36	–:–	00:20	00:49
50	14:21	15:26	16:28	–:–	00:26	00:56
45	14:10	15:12	16:11	00:08	00:38	01:11
40	14:01	15:00	15:58	00:15	00:48	01:23
35	13:53	14:51	15:46	00:21	00:56	01:34
30	13:47	14:42	15:36	00:26	01:04	01:43
20	13:35	14:27	15:19	00:36	01:16	01:59
10	13:25	14:15	15:04	00:44	01:28	02:13
0	13:16	14:03	14:50	00:52	01:38	02:26
-10	13:07	13:51	14:36	00:60	01:49	02:38
-20	12:57	13:38	14:21	01:08	02:01	02:52
-30	12:46	13:24	14:05	01:18	02:14	03:08
-35	12:39	13:16	13:55	01:23	02:21	03:18
-40	12:32	13:06	13:44	01:29	02:30	03:28
-45	12:24	12:55	13:30	01:37	02:40	03:41
-50	12:14	12:42	13:15	01:46	02:52	03:56
-52	12:09	12:36	13:07	01:50	02:58	04:03
-54	12:04	12:29	12:59	01:54	03:04	04:11
-56	11:58	12:22	12:50	01:59	03:11	04:20
-58	11:52	12:13	12:39	02:05	03:19	04:30
-60	11:45	12:03	12:27	02:11	03:28	04:42

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
21	06:24	06:26	12:06	19:27	07:03	8(67%)
22	06:27	06:28	12:06	20:14	07:50	9(76%)
23	06:29	06:30	12:06	21:01	08:37	10(84%)

July 24, 25 ,26 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	301°40.1	134°56.9	6°24.6	352°36.3	-25°11.1	80°12.1	-14°57.9	27°18.9	-22°34.1
1	316°42.5	149°57.0	6°23.4	7°39.5	-25°11.4	95°14.5	-14°57.9	42°21.6	-22°34.1
2	331°45.0	164°57.0	6°22.2	22°42.6	-25°11.7	110°16.9	-14°58.0	57°24.2	-22°34.1
3	346°47.5	179°57.0	6°21.0	37°45.8	-25°11.9	125°19.3	-14°58.0	72°26.8	-22°34.1
4	1°49.9	194°57.1	6°19.8	52°48.9	-25°12.2	140°21.6	-14°58.0	87°29.4	-22°34.1
5	16°52.4	209°57.1	6°18.6	67°52.1	-25°12.4	155°24.0	-14°58.1	102°32.1	-22°34.1
6	31°54.9	224°57.1	6°17.4	82°55.2	-25°12.7	170°26.4	-14°58.1	117°34.7	-22°34.1
7	46°57.3	239°57.1	6°16.2	97°58.4	-25°12.9	185°28.7	-14°58.2	132°37.3	-22°34.1
8	61°59.8	254°57.2	6°15.0	113°01.5	-25°13.2	200°31.1	-14°58.2	147°40.0	-22°34.1
9	77°02.3	269°57.2	6°13.8	128°04.7	-25°13.4	215°33.5	-14°58.2	162°42.6	-22°34.2
10	92°04.7	284°57.2	6°12.6	143°07.8	-25°13.7	230°35.8	-14°58.3	177°45.2	-22°34.2
11	107°07.2	299°57.3	6°11.4	158°11.0	-25°13.9	245°38.2	-14°58.3	192°47.8	-22°34.2
12	122°09.6	314°57.3	6°10.2	173°14.1	-25°14.2	260°40.6	-14°58.4	207°50.5	-22°34.2
13	137°12.1	329°57.3	6°09.0	188°17.3	-25°14.4	275°42.9	-14°58.4	222°53.1	-22°34.2
14	152°14.6	344°57.4	6°07.8	203°20.4	-25°14.7	290°45.3	-14°58.4	237°55.7	-22°34.2
15	167°17.0	359°57.4	6°06.5	218°23.6	-25°14.9	305°47.7	-14°58.5	252°58.4	-22°34.2
16	182°19.5	14°57.5	6°05.3	233°26.7	-25°15.2	320°50.0	-14°58.5	268°01.0	-22°34.2
17	197°22.0	29°57.5	6°04.1	248°29.9	-25°15.4	335°52.4	-14°58.6	283°03.6	-22°34.2
18	212°24.4	44°57.5	6°02.9	263°33.0	-25°15.7	350°54.7	-14°58.6	298°06.2	-22°34.2
19	227°26.9	59°57.6	6°01.7	278°36.2	-25°15.9	5°57.1	-14°58.6	313°08.9	-22°34.2
20	242°29.4	74°57.6	6°00.5	293°39.4	-25°16.2	20°59.5	-14°58.7	328°11.5	-22°34.3
21	257°31.8	89°57.7	5°59.3	308°42.5	-25°16.4	36°01.8	-14°58.7	343°14.1	-22°34.3
22	272°34.3	104°57.7	5°58.1	323°45.7	-25°16.7	51°04.2	-14°58.8	358°16.7	-22°34.3
23	287°36.8	119°57.7	5°56.9	338°48.8	-25°16.9	66°06.6	-14°58.8	13°19.4	-22°34.3
Mer.pass.:3:52:		v0.0 d-1.2 m-4.1		v3.1 d-0.3 m-2.8		v2.4 d-0.0 m-2.0		v2.6 d-0.0 m0.1	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	302°39.2	134°57.8	5°55.7	353°52.0	-25°17.1	81°08.9	-14°58.9	28°22.0	-22°34.3
1	317°41.7	149°57.8	5°54.5	8°55.1	-25°17.4	96°11.3	-14°58.9	43°24.6	-22°34.3
2	332°44.1	164°57.9	5°53.3	23°58.3	-25°17.6	111°13.7	-14°58.9	58°27.2	-22°34.3
3	347°46.6	179°57.9	5°52.1	39°01.5	-25°17.9	126°16.0	-14°59.0	73°29.9	-22°34.3
4	2°49.1	194°57.9	5°50.8	54°04.6	-25°18.1	141°18.4	-14°59.0	88°32.5	-22°34.3
5	17°51.5	209°58.0	5°49.6	69°07.8	-25°18.4	156°20.7	-14°59.1	103°35.1	-22°34.3
6	32°54.0	224°58.0	5°48.4	84°10.9	-25°18.6	171°23.1	-14°59.1	118°37.8	-22°34.4
7	47°56.5	239°58.1	5°47.2	99°14.1	-25°18.9	186°25.5	-14°59.1	133°40.4	-22°34.4
8	62°58.9	254°58.1	5°46.0	114°17.3	-25°19.1	201°27.8	-14°59.2	148°43.0	-22°34.4
9	78°01.4	269°58.2	5°44.8	129°20.4	-25°19.4	216°30.2	-14°59.2	163°45.6	-22°34.4
10	93°03.9	284°58.2	5°43.6	144°23.6	-25°19.6	231°32.5	-14°59.3	178°48.3	-22°34.4
11	108°06.3	299°58.3	5°42.4	159°26.7	-25°19.8	246°34.9	-14°59.3	193°50.9	-22°34.4
12	123°08.8	314°58.3	5°41.2	174°29.9	-25°20.1	261°37.3	-14°59.4	208°53.5	-22°34.4
13	138°11.3	329°58.4	5°39.9	189°33.1	-25°20.3	276°39.6	-14°59.4	223°56.1	-22°34.4
14	153°13.7	344°58.4	5°38.7	204°36.2	-25°20.6	291°42.0	-14°59.4	238°58.8	-22°34.4
15	168°16.2	359°58.5	5°37.5	219°39.4	-25°20.8	306°44.3	-14°59.5	254°01.4	-22°34.4
16	183°18.6	14°58.5	5°36.3	234°42.6	-25°21.1	321°46.7	-14°59.5	269°04.0	-22°34.4
17	198°21.1	29°58.6	5°35.1	249°45.7	-25°21.3	336°49.0	-14°59.6	284°06.6	-22°34.5
18	213°23.6	44°58.6	5°33.9	264°48.9	-25°21.5	351°51.4	-14°59.6	299°09.3	-22°34.5
19	228°26.0	59°58.7	5°32.7	279°52.1	-25°21.8	6°53.8	-14°59.7	314°11.9	-22°34.5
20	243°28.5	74°58.7	5°31.5	294°55.2	-25°22.0	21°56.1	-14°59.7	329°14.5	-22°34.5
21	258°31.0	89°58.8	5°30.3	309°58.4	-25°22.3	36°58.5	-14°59.8	344°17.1	-22°34.5
22	273°33.4	104°58.8	5°29.0	325°01.5	-25°22.5	52°00.8	-14°59.8	359°19.8	-22°34.5
23	288°35.9	119°58.9	5°27.8	340°04.7	-25°22.8	67°03.2	-14°59.8	14°22.4	-22°34.5
Mer.pass.:3:48:		v0.0 d-1.2 m-4.1		v3.2 d-0.2 m-2.8		v2.4 d-0.0 m-2.0		v2.6 d-0.0 m0.1	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	303°38.4	134°58.9	5°26.6	355°07.9	-25°23.0	82°05.5	-14°59.9	29°25.0	-22°34.5
1	318°40.8	149°59.0	5°25.4	10°11.0	-25°23.2	97°07.9	-14°59.9	44°27.6	-22°34.5
2	333°43.3	164°59.1	5°24.2	25°14.2	-25°23.5	112°10.2	-14°60.0	59°30.3	-22°34.5
3	348°45.8	179°59.1	5°23.0	40°17.4	-25°23.7	127°12.6	-15°00.0	74°32.9	-22°34.6
4	3°48.2	194°59.2	5°21.8	55°20.5	-25°24.0	142°15.0	-15°00.1	89°35.5	-22°34.6
5	18°50.7	209°59.2	5°20.6	70°23.7	-25°24.2	157°17.3	-15°00.1	104°38.1	-22°34.6
6	33°53.1	224°59.3	5°19.3	85°26.9	-25°24.4	172°19.7	-15°00.1	119°40.8	-22°34.6
7	48°55.6	239°59.4	5°18.1	100°30.1	-25°24.7	187°22.0	-15°00.2	134°43.4	-22°34.6
8	63°58.1	254°59.4	5°16.9	115°33.2	-25°24.9	202°24.4	-15°00.2	149°46.0	-22°34.6
9	79°00.5	269°59.5	5°15.7	130°36.4	-25°25.1	217°26.7	-15°00.3	164°48.6	-22°34.6
10	94°03.0	284°59.5	5°14.5	145°39.6	-25°25.4	232°29.1	-15°00.3	179°51.2	-22°34.6
11	109°05.5	299°59.6	5°13.3	160°42.7	-25°25.6	247°31.4	-15°00.4	194°53.9	-22°34.6
12	124°07.9	314°59.7	5°12.1	175°45.9	-25°25.9	262°33.8	-15°00.4	209°56.5	-22°34.6
13	139°10.4	329°59.7	5°10.8	190°49.1	-25°26.1	277°36.1	-15°00.5	224°59.1	-22°34.6
14	154°12.9	344°59.8	5°09.6	205°52.2	-25°26.3	292°38.5	-15°00.5	240°01.7	-22°34.7
15	169°15.3	359°59.8	5°08.4	220°55.4	-25°26.6	307°40.8	-15°00.6	255°04.4	-22°34.7
16	184°17.8	14°59.9	5°07.2	235°58.6	-25°26.8	322°43.2	-15°00.6	270°07.0	-22°34.7
17	199°20.2	29°60.0	5°06.0	251°01.7	-25°27.0	337°45.5	-15°00.6	285°09.6	-22°34.7
18	214°22.7	45°00.0	5°04.8	266°04.9	-25°27.3	352°47.9	-15°00.7	300°12.2	-22°34.7
19	229°25.2	60°00.1	5°03.5	281°08.1	-25°27.5	7°50.2	-15°00.7	315°14.8	-22°34.7
20	244°27.6	75°00.2	5°02.3	296°11.3	-25°27.7	22°52.6	-15°00.8	330°17.5	-22°34.7
21	259°30.1	90°00.2	5°01.1	311°14.4	-25°28.0	37°54.9	-15°00.8	345°20.1	-22°34.7
22	274°32.6	105°00.3	4°59.9	326°17.6	-25°28.2	52°57.3	-15°00.9	0°22.7	-22°34.7
23	289°35.0	120°00.4	4°58.7	341°20.8	-25°28.4	67°59.6	-15°00.9	15°25.3	-22°34.7
Mer.pass.:3:44:		v0.1 d-1.2 m-4.1		v3.2 d-0.2 m-2.9		v2.4 d-0.0 m-2.0		v2.6 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.4
Ankaa	353°12.1	-42°12.1
Schedar	349°36.3	56°38.0
Diphda	348°52.2	-17°53.0
Achernar	335°24.2	-57°08.4
Hamal	327°56.9	23°32.8
Polaris	316°20.2	89°20.1
Akamar	315°15.8	-40°13.7
Menkar	314°11.5	4°09.6
Mirfak	308°35.5	49°55.2
Aldebaran	290°45.6	16°32.6
Rigel	281°09.0	-8°10.9
Capella	280°29.7	46°00.7
Bellatrix	278°28.5	6°21.8
Elnath	278°08.5	28°37.2
Alnilam	275°43.1	-1°11.5
Betelgeuse	270°57.8	7°24.5
Canopus	263°55.1	-52°42.3
Sirius	258°30.9	-16°44.4
Adara	255°10.2	-28°59.9
Procyon	244°56.4	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.3	-59°34.2
Suhail	222°50.3	-43°30.5
Miaplacidus	221°39.8	-69°47.7
Alphard	217°53.0	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.0	61°39.3
Denebola	182°30.3	14°28.3
Gienah	175°48.8	-17°38.6
Acrux	173°05.7	-63°12.2
Gacrux	171°57.2	-57°13.1
Alioth	166°17.9	55°52.0
Spica	158°27.6	-11°15.3
Alcaid	152°56.2	49°13.7
Hadar	148°42.9	-60°27.8
Menkent	148°03.5	-36°27.6
Arcturus	145°52.4	19°05.8
Rigil Kent.	139°46.8	-60°54.8
Zubenelg.	137°01.5	-16°07.0
Kochab	137°19.9	74°05.2
Alphecca	126°07.9	26°39.5
Antares	112°21.8	-26°28.2
Atria	107°20.0	-69°03.6
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.1	51°29.5
Kaus Aust.	83°38.8	-34°22.4
Vega	80°36.2	38°48.3
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.3
Deneb	49°28.6	45°20.9
Enif	33°43.4	9°57.7
Alnair	27°39.0	-46°52.0
Fomalhaut	15°20.0	-29°31.3
Scheat	13°49.8	28°10.9
Markab	13°34.6	15°18.3

2018/7/2	**SHA**	**Mer.pass**
Venus	193°16.9	15:00
Mars	50°56.2	00:29
Jupiter	138°32.1	18:36
Saturn	85°38.8	22:07

2018/7/2	**SHA**	**Mer.pass**
Venus	192°18.6	15:00
Mars	51°12.8	00:24
Jupiter	138°29.7	18:32
Saturn	85°42.8	22:03

2018/7/2	**SHA**	**Mer.pass**
Venus	191°20.6	15:00
Mars	51°29.5	00:19
Jupiter	138°27.2	18:29
Saturn	85°46.7	21:58

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°22.3	19°55.0	43°09.1	12.0	-19°08.5	-4.3	54.5
1	193°22.3	19°54.4	57°40.1	12.0	-19°12.7	-4.2	54.5
2	208°22.3	19°53.9	72°11.1	12.0	-19°16.9	-4.1	54.5
3	223°22.2	19°53.4	86°42.0	12.0	-19°20.9	-4.0	54.4
4	238°22.2	19°52.9	101°13.0	11.9	-19°24.9	-3.9	54.4
5	253°22.2	19°52.4	115°43.9	11.9	-19°28.7	-3.8	54.4
6	268°22.2	19°51.8	130°14.8	11.9	-19°32.5	-3.7	54.4
7	283°22.2	19°51.3	144°45.8	11.9	-19°36.2	-3.6	54.4
8	298°22.2	19°50.8	159°16.7	11.9	-19°39.7	-3.5	54.4
9	313°22.2	19°50.3	173°47.6	11.9	-19°43.2	-3.4	54.4
10	328°22.2	19°49.7	188°18.4	11.9	-19°46.6	-3.3	54.4
11	343°22.2	19°49.2	202°49.3	11.9	-19°49.9	-3.3	54.3
12	358°22.1	19°48.7	217°20.2	11.9	-19°53.1	-3.2	54.3
13	13°22.1	19°48.1	231°51.0	11.8	-19°56.2	-3.1	54.3
14	28°22.1	19°47.6	246°21.9	11.8	-19°59.2	-3.0	54.3
15	43°22.1	19°47.1	260°52.7	11.8	-20°02.2	-2.9	54.3
16	58°22.1	19°46.6	275°23.5	11.8	-20°05.0	-2.8	54.3
17	73°22.1	19°46.0	289°54.3	11.8	-20°07.7	-2.7	54.3
18	88°22.1	19°45.5	304°25.1	11.8	-20°10.4	-2.6	54.3
19	103°22.1	19°45.0	318°55.9	11.8	-20°12.9	-2.5	54.3
20	118°22.1	19°44.4	333°26.7	11.8	-20°15.4	-2.4	54.3
21	133°22.1	19°43.9	347°57.5	11.8	-20°17.7	-2.3	54.2
22	148°22.1	19°43.4	2°28.2	11.8	-20°20.0	-2.2	54.2
23	163°22.1	19°42.8	16°59.0	11.8	-20°22.1	-2.1	54.2
	SD.=15.7	d=-0.5	S.D.=14.9				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°22.0	19°42.3	31°29.8	11.8	-20°24.2	-2.0	54.2
1	193°22.0	19°41.8	46°00.5	11.8	-20°26.2	-1.9	54.2
2	208°22.0	19°41.2	60°31.3	11.7	-20°28.0	-1.8	54.2
3	223°22.0	19°40.7	75°02.0	11.7	-20°29.8	-1.7	54.2
4	238°22.0	19°40.2	89°32.8	11.7	-20°31.5	-1.6	54.2
5	253°22.0	19°39.6	104°03.5	11.7	-20°33.1	-1.5	54.2
6	268°22.0	19°39.1	118°34.2	11.7	-20°34.6	-1.4	54.2
7	283°22.0	19°38.5	133°05.0	11.7	-20°36.0	-1.3	54.2
8	298°22.0	19°38.0	147°35.7	11.7	-20°37.3	-1.2	54.1
9	313°22.0	19°37.5	162°06.4	11.7	-20°38.4	-1.1	54.1
10	328°22.0	19°36.9	176°37.1	11.7	-20°39.5	-1.1	54.1
11	343°22.0	19°36.4	191°07.9	11.7	-20°40.6	-1.0	54.1
12	358°22.0	19°35.8	205°38.6	11.7	-20°41.5	-0.9	54.1
13	13°22.0	19°35.3	220°09.3	11.7	-20°42.3	-0.8	54.1
14	28°22.0	19°34.8	234°40.0	11.7	-20°43.0	-0.7	54.1
15	43°22.0	19°34.2	249°10.7	11.7	-20°43.6	-0.6	54.1
16	58°22.0	19°33.7	263°41.5	11.7	-20°44.1	-0.5	54.1
17	73°22.0	19°33.1	278°12.2	11.7	-20°44.5	-0.4	54.1
18	88°22.0	19°32.6	292°42.9	11.7	-20°44.9	-0.3	54.1
19	103°22.0	19°32.0	307°13.7	11.7	-20°45.1	-0.2	54.1
20	118°22.0	19°31.5	321°44.4	11.7	-20°45.2	-0.1	54.1
21	133°22.0	19°30.9	336°15.1	11.7	-20°45.2	0.0	54.1
22	148°22.0	19°30.4	350°45.9	11.7	-20°45.2	0.1	54.1
23	163°22.0	19°29.8	5°16.6	11.8	-20°45.0	0.2	54.1
	SD.=15.7	d=-0.5	S.D.=14.8				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°22.0	19°29.3	19°47.4	11.8	-20°44.8	0.3	54.0
1	193°22.0	19°28.7	34°18.2	11.8	-20°44.4	0.4	54.0
2	208°22.0	19°28.2	48°48.9	11.8	-20°44.0	0.5	54.0
3	223°22.0	19°27.6	63°19.7	11.8	-20°43.4	0.6	54.0
4	238°22.0	19°27.1	77°50.5	11.8	-20°42.8	0.7	54.0
5	253°22.0	19°26.5	92°21.3	11.8	-20°42.0	0.8	54.0
6	268°22.0	19°26.0	106°52.1	11.8	-20°41.2	0.9	54.0
7	283°22.0	19°25.4	121°22.9	11.8	-20°40.2	1.0	54.0
8	298°22.0	19°24.9	135°53.7	11.8	-20°39.2	1.1	54.0
9	313°22.0	19°24.3	150°24.5	11.8	-20°38.1	1.2	54.0
10	328°22.0	19°23.8	164°55.4	11.8	-20°36.9	1.3	54.0
11	343°22.0	19°23.2	179°26.2	11.9	-20°35.6	1.4	54.0
12	358°22.0	19°22.7	193°57.1	11.9	-20°34.1	1.5	54.0
13	13°22.0	19°22.1	208°27.9	11.9	-20°32.6	1.6	54.0
14	28°22.0	19°21.6	222°58.8	11.9	-20°31.0	1.7	54.0
15	43°22.0	19°21.0	237°29.7	11.9	-20°29.3	1.7	54.0
16	58°22.0	19°20.4	252°00.6	11.9	-20°27.5	1.8	54.0
17	73°22.0	19°19.9	266°31.6	11.9	-20°25.6	1.9	54.0
18	88°22.0	19°19.3	281°02.5	11.9	-20°23.7	2.0	54.0
19	103°22.0	19°18.8	295°33.5	12.0	-20°21.6	2.1	54.0
20	118°22.0	19°18.2	310°04.4	12.0	-20°19.4	2.2	54.0
21	133°22.0	19°17.7	324°35.4	12.0	-20°17.2	2.3	54.0
22	148°22.0	19°17.1	339°06.4	12.0	-20°14.8	2.4	54.0
23	163°22.0	19°16.5	353°37.4	12.0	-20°12.3	2.5	54.0
	SD.=15.7	d=-0.5	S.D.=14.7				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	01:35	22:33	–:–	–:–
66	–:–	–:–	02:17	21:52	–:–	–:–
64	–:–	00:43	02:46	21:25	23:19	–:–
62	–:–	01:45	03:07	21:04	22:24	–:–
60	–:–	02:17	03:24	20:47	21:53	–:–
58	00:40	02:41	03:39	20:33	21:30	23:24
56	01:36	02:59	03:51	20:21	21:12	22:34
54	02:06	03:15	04:02	20:10	20:57	22:05
52	02:28	03:28	04:11	20:01	20:44	21:44
50	02:45	03:39	04:20	19:53	20:33	21:26
45	03:18	04:03	04:37	19:35	20:10	20:54
40	03:42	04:21	04:52	19:21	19:52	20:30
35	04:01	04:36	05:04	19:09	19:37	20:11
30	04:17	04:48	05:15	18:58	19:24	19:56
20	04:41	05:09	05:33	18:40	19:04	19:32
10	04:60	05:26	05:49	18:24	18:47	19:13
0	05:16	05:41	06:03	18:10	18:32	18:58
-10	05:29	05:55	06:17	17:56	18:18	18:44
-20	05:42	06:09	06:33	17:41	18:04	18:31
-30	05:55	06:24	06:50	17:23	17:49	18:18
-35	06:02	06:33	07:00	17:13	17:41	18:11
-40	06:09	06:42	07:11	17:02	17:31	18:04
-45	06:17	06:53	07:25	16:49	17:21	17:57
-50	06:25	07:05	07:41	16:32	17:08	17:48
-52	06:29	07:11	07:49	16:25	17:03	17:44
-54	06:33	07:17	07:57	16:16	16:57	17:40
-56	06:37	07:24	08:07	16:07	16:50	17:36
-58	06:42	07:31	08:18	15:56	16:42	17:32
-60	06:47	07:40	08:30	15:43	16:34	17:26

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	20:13	21:17	21:49	23:23	23:59	–:–
66	19:30	20:29	21:08	–:–	00:06	00:48
64	19:02	19:58	20:40	00:05	00:35	01:18
62	18:40	19:35	20:18	00:24	00:57	01:41
60	18:22	19:17	20:00	00:39	01:15	01:60
58	18:08	19:01	19:46	00:53	01:29	02:15
56	17:55	18:48	19:33	01:04	01:42	02:28
54	17:44	18:37	19:22	01:14	01:53	02:40
52	17:34	18:27	19:12	01:23	02:03	02:50
50	17:26	18:18	19:03	01:31	02:12	02:59
45	17:07	17:59	18:45	01:48	02:31	03:18
40	16:52	17:43	18:30	02:03	02:46	03:33
35	16:40	17:30	18:17	02:14	02:59	03:46
30	16:29	17:19	18:06	02:25	03:10	03:58
20	16:10	16:59	17:47	02:43	03:29	04:17
10	15:53	16:42	17:30	02:59	03:46	04:34
0	15:38	16:26	17:15	03:13	04:01	04:50
-10	15:23	16:11	16:59	03:28	04:17	05:06
-20	15:07	15:54	16:43	03:44	04:34	05:23
-30	14:48	15:34	16:23	04:02	04:53	05:42
-35	14:37	15:23	16:12	04:12	05:04	05:53
-40	14:25	15:10	15:59	04:24	05:17	06:06
-45	14:10	14:55	15:44	04:39	05:32	06:21
-50	13:52	14:36	15:26	04:56	05:51	06:40
-52	13:44	14:27	15:17	05:04	05:60	06:49
-54	13:34	14:17	15:07	05:13	06:10	06:59
-56	13:24	14:06	14:56	05:24	06:21	07:10
-58	13:12	13:53	14:43	05:36	06:34	07:23
-60	12:58	13:38	14:28	05:49	06:49	07:38

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
24	06:31	06:31	12:06	21:49	09:25	11(90%)
25	06:32	06:32	12:06	22:38	10:13	12(95%)
26	06:32	06:32	12:06	23:26	11:02	13(98%)

July 27, 28 ,29 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	304°37.5	135°00.5	4°57.5	356°24.0	-25°28.7	83°02.0	-15°01.0	30°28.0	-22°34.8
1	319°40.0	150°00.5	4°56.2	11°27.1	-25°28.9	98°04.3	-15°01.0	45°30.6	-22°34.8
2	334°42.4	165°00.6	4°55.0	26°30.3	-25°29.1	113°06.7	-15°01.1	60°33.2	-22°34.8
3	349°44.9	180°00.7	4°53.8	41°33.5	-25°29.4	128°09.0	-15°01.1	75°35.8	-22°34.8
4	4°47.4	195°00.7	4°52.6	56°36.6	-25°29.6	143°11.4	-15°01.1	90°38.4	-22°34.8
5	19°49.8	210°00.8	4°51.4	71°39.8	-25°29.8	158°13.7	-15°01.2	105°41.1	-22°34.8
6	34°52.3	225°00.9	4°50.2	86°43.0	-25°30.1	173°16.1	-15°01.2	120°43.7	-22°34.8
7	49°54.7	240°01.0	4°48.9	101°46.2	-25°30.3	188°18.4	-15°01.3	135°46.3	-22°34.8
8	64°57.2	255°01.0	4°47.7	116°49.3	-25°30.5	203°20.8	-15°01.3	150°48.9	-22°34.8
9	79°59.7	270°01.1	4°46.5	131°52.5	-25°30.7	218°23.1	-15°01.4	165°51.5	-22°34.8
10	95°02.1	285°01.2	4°45.3	146°55.7	-25°31.0	233°25.4	-15°01.4	180°54.2	-22°34.8
11	110°04.6	300°01.2	4°44.1	161°58.9	-25°31.2	248°27.8	-15°01.5	195°56.8	-22°34.9
12	125°07.1	315°01.3	4°42.9	177°02.0	-25°31.4	263°30.1	-15°01.5	210°59.4	-22°34.9
13	140°09.5	330°01.4	4°41.6	192°05.2	-25°31.7	278°32.5	-15°01.6	226°02.0	-22°34.9
14	155°12.0	345°01.5	4°40.4	207°08.4	-25°31.9	293°34.8	-15°01.6	241°04.6	-22°34.9
15	170°14.5	0°01.6	4°39.2	222°11.6	-25°32.1	308°37.2	-15°01.7	256°07.3	-22°34.9
16	185°16.9	15°01.6	4°38.0	237°14.7	-25°32.4	323°39.5	-15°01.7	271°09.9	-22°34.9
17	200°19.4	30°01.7	4°36.8	252°17.9	-25°32.6	338°41.9	-15°01.8	286°12.5	-22°34.9
18	215°21.9	45°01.8	4°35.5	267°21.1	-25°32.8	353°44.2	-15°01.8	301°15.1	-22°34.9
19	230°24.3	60°01.9	4°34.3	282°24.3	-25°33.0	8°46.5	-15°01.9	316°17.7	-22°34.9
20	245°26.8	75°02.0	4°33.1	297°27.5	-25°33.3	23°48.9	-15°01.9	331°20.4	-22°34.9
21	260°29.2	90°02.0	4°31.9	312°30.6	-25°33.5	38°51.2	-15°01.9	346°23.0	-22°35.0
22	275°31.7	105°02.1	4°30.7	327°33.8	-25°33.7	53°53.6	-15°02.0	1°25.6	-22°35.0
23	290°34.2	120°02.2	4°29.4	342°37.0	-25°33.9	68°55.9	-15°02.0	16°28.2	-22°35.0
Mer.pass.:3:40:		v0.1 d-1.2 m-4.1		v3.2 d-0.2 m-2.9		v2.3 d-0.0 m-2.0		v2.6 d-0.0 m0.2	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	305°36.6	135°02.3	4°28.2	357°40.2	-25°34.2	83°58.2	-15°02.1	31°30.8	-22°35.0
1	320°39.1	150°02.4	4°27.0	12°43.3	-25°34.4	99°00.6	-15°02.1	46°33.5	-22°35.0
2	335°41.6	165°02.4	4°25.8	27°46.5	-25°34.6	114°02.9	-15°02.2	61°36.1	-22°35.0
3	350°44.0	180°02.5	4°24.6	42°49.7	-25°34.8	129°05.3	-15°02.2	76°38.7	-22°35.0
4	5°46.5	195°02.6	4°23.3	57°52.9	-25°35.1	144°07.6	-15°02.3	91°41.3	-22°35.0
5	20°49.0	210°02.7	4°22.1	72°56.1	-25°35.3	159°10.0	-15°02.3	106°43.9	-22°35.0
6	35°51.4	225°02.8	4°20.9	87°59.2	-25°35.5	174°12.3	-15°02.4	121°46.6	-22°35.0
7	50°53.9	240°02.9	4°19.7	103°02.4	-25°35.7	189°14.6	-15°02.4	136°49.2	-22°35.0
8	65°56.4	255°03.0	4°18.5	118°05.6	-25°35.9	204°17.0	-15°02.5	151°51.8	-22°35.1
9	80°58.8	270°03.1	4°17.2	133°08.8	-25°36.2	219°19.3	-15°02.5	166°54.4	-22°35.1
10	96°01.3	285°03.1	4°16.0	148°11.9	-25°36.4	234°21.6	-15°02.6	181°57.0	-22°35.1
11	111°03.7	300°03.2	4°14.8	163°15.1	-25°36.6	249°24.0	-15°02.6	196°59.6	-22°35.1
12	126°06.2	315°03.3	4°13.6	178°18.3	-25°36.8	264°26.3	-15°02.7	212°02.3	-22°35.1
13	141°08.7	330°03.4	4°12.4	193°21.5	-25°37.1	279°28.7	-15°02.7	227°04.9	-22°35.1
14	156°11.1	345°03.5	4°11.1	208°24.7	-25°37.3	294°31.0	-15°02.8	242°07.5	-22°35.1
15	171°13.6	0°03.6	4°09.9	223°27.8	-25°37.5	309°33.3	-15°02.8	257°10.1	-22°35.1
16	186°16.1	15°03.7	4°08.7	238°31.0	-25°37.7	324°35.7	-15°02.9	272°12.7	-22°35.1
17	201°18.5	30°03.8	4°07.5	253°34.2	-25°37.9	339°38.0	-15°02.9	287°15.3	-22°35.1
18	216°21.0	45°03.9	4°06.3	268°37.4	-25°38.1	354°40.3	-15°03.0	302°18.0	-22°35.1
19	231°23.5	60°04.0	4°05.0	283°40.6	-25°38.4	9°42.7	-15°03.0	317°20.6	-22°35.2
20	246°25.9	75°04.1	4°03.8	298°43.7	-25°38.6	24°45.0	-15°03.1	332°23.2	-22°35.2
21	261°28.4	90°04.1	4°02.6	313°46.9	-25°38.8	39°47.3	-15°03.1	347°25.8	-22°35.2
22	276°30.8	105°04.2	4°01.4	328°50.1	-25°39.0	54°49.7	-15°03.2	2°28.4	-22°35.2
23	291°33.3	120°04.3	4°00.1	343°53.3	-25°39.2	69°52.0	-15°03.2	17°31.0	-22°35.2
Mer.pass.:3:36:		v0.1 d-1.2 m-4.1		v3.2 d-0.2 m-2.9		v2.3 d-0.0 m-2.0		v2.6 d-0.0 m0.2	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	306°35.8	135°04.4	3°58.9	358°56.5	-25°39.5	84°54.4	-15°03.3	32°33.7	-22°35.2
1	321°38.2	150°04.5	3°57.7	13°59.6	-25°39.7	99°56.7	-15°03.3	47°36.3	-22°35.2
2	336°40.7	165°04.6	3°56.5	29°02.8	-25°39.9	114°59.0	-15°03.4	62°38.9	-22°35.2
3	351°43.2	180°04.7	3°55.3	44°06.0	-25°40.1	130°01.4	-15°03.4	77°41.5	-22°35.2
4	6°45.6	195°04.8	3°54.0	59°09.2	-25°40.3	145°03.7	-15°03.5	92°44.1	-22°35.2
5	21°48.1	210°04.9	3°52.8	74°12.4	-25°40.5	160°06.0	-15°03.5	107°46.7	-22°35.3
6	36°50.6	225°05.0	3°51.6	89°15.5	-25°40.7	175°08.4	-15°03.6	122°49.4	-22°35.3
7	51°53.0	240°05.1	3°50.4	104°18.7	-25°41.0	190°10.7	-15°03.6	137°52.0	-22°35.3
8	66°55.5	255°05.2	3°49.1	119°21.9	-25°41.2	205°13.0	-15°03.7	152°54.6	-22°35.3
9	81°58.0	270°05.3	3°47.9	134°25.1	-25°41.4	220°15.3	-15°03.7	167°57.2	-22°35.3
10	97°00.4	285°05.4	3°46.7	149°28.3	-25°41.6	235°17.7	-15°03.8	182°59.8	-22°35.3
11	112°02.9	300°05.5	3°45.5	164°31.4	-25°41.8	250°20.0	-15°03.8	198°02.4	-22°35.3
12	127°05.3	315°05.6	3°44.2	179°34.6	-25°42.0	265°22.3	-15°03.9	213°05.0	-22°35.3
13	142°07.8	330°05.7	3°43.0	194°37.8	-25°42.2	280°24.7	-15°03.9	228°07.7	-22°35.3
14	157°10.3	345°05.8	3°41.8	209°41.0	-25°42.4	295°27.0	-15°04.0	243°10.3	-22°35.3
15	172°12.7	0°05.9	3°40.6	224°44.2	-25°42.7	310°29.3	-15°04.0	258°12.9	-22°35.3
16	187°15.2	15°06.0	3°39.3	239°47.4	-25°42.9	325°31.7	-15°04.1	273°15.5	-22°35.4
17	202°17.7	30°06.2	3°38.1	254°50.5	-25°43.1	340°34.0	-15°04.1	288°18.1	-22°35.4
18	217°20.1	45°06.3	3°36.9	269°53.7	-25°43.3	355°36.3	-15°04.2	303°20.7	-22°35.4
19	232°22.6	60°06.4	3°35.7	284°56.9	-25°43.5	10°38.6	-15°04.2	318°23.3	-22°35.4
20	247°25.1	75°06.5	3°34.4	300°00.1	-25°43.7	25°41.0	-15°04.3	333°26.0	-22°35.4
21	262°27.5	90°06.6	3°33.2	315°03.3	-25°43.9	40°43.3	-15°04.3	348°28.6	-22°35.4
22	277°30.0	105°06.7	3°32.0	330°06.4	-25°44.1	55°45.6	-15°04.4	3°31.2	-22°35.4
23	292°32.5	120°06.8	3°30.8	345°09.6	-25°44.3	70°48.0	-15°04.4	18°33.8	-22°35.4
Mer.pass.:3:33:		v0.1 d-1.2 m-4.1		v3.2 d-0.2 m-2.9		v2.3 d-0.1 m-2.0		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.4
Ankaa	353°12.1	-42°12.1
Schedar	349°36.3	56°38.0
Diphda	348°52.2	-17°53.0
Achernar	335°24.1	-57°08.4
Hamal	327°56.8	23°32.8
Polaris	316°18.7	89°20.1
Akamar	315°15.8	-40°13.7
Menkar	314°11.5	4°09.6
Mirfak	308°35.5	49°55.2
Aldebaran	290°45.6	16°32.6
Rigel	281°08.9	-8°10.9
Capella	280°29.7	46°00.7
Bellatrix	278°28.5	6°21.9
Elnath	278°08.5	28°37.2
Alnilam	275°43.1	-1°11.5
Betelgeuse	270°57.8	7°24.5
Canopus	263°55.1	-52°42.3
Sirius	258°30.9	-16°44.3
Adara	255°10.1	-28°59.9
Procyon	244°56.3	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.2	-59°34.2
Suhail	222°50.3	-43°30.5
Miaplacidus	221°39.9	-69°47.7
Alphard	217°53.0	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.0	61°39.3
Denebola	182°30.3	14°28.3
Gienah	175°48.8	-17°38.6
Acrux	173°05.7	-63°12.2
Gacrux	171°57.2	-57°13.1
Alioth	166°17.9	55°52.0
Spica	158°27.6	-11°15.3
Alcaid	152°56.2	49°13.7
Hadar	148°42.9	-60°27.8
Menkent	148°03.5	-36°27.6
Arcturus	145°52.4	19°05.8
Rigil Kent.	139°46.9	-60°54.8
Zubenelg.	137°01.5	-16°07.0
Kochab	137°20.0	74°05.2
Alphecca	126°08.0	26°39.5
Antares	112°21.8	-26°28.2
Atria	107°20.0	-69°03.6
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.1	51°29.5
Kaus Aust.	83°38.8	-34°22.4
Vega	80°36.2	38°48.3
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.3
Deneb	49°28.6	45°20.9
Enif	33°43.4	9°57.7
Alnair	27°39.0	-46°52.1
Fomalhaut	15°19.9	-29°31.3
Scheat	13°49.7	28°10.9
Markab	13°34.6	15°18.3

2018/7/2	**SHA**	**Mer.pass**
Venus	190°23.0	14:60
Mars	51°46.5	00:14
Jupiter	138°24.5	18:25
Saturn	85°50.5	21:54

2018/7/2	**SHA**	**Mer.pass**
Venus	189°25.6	14:60
Mars	52°03.5	00:09
Jupiter	138°21.6	18:21
Saturn	85°54.2	21:50

2018/7/2	**SHA**	**Mer.pass**
Venus	188°28.7	14:60
Mars	52°20.7	00:04
Jupiter	138°18.6	18:18
Saturn	85°57.9	21:46

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°22.0	19°16.0	8°08.5	12.0	-20°09.8	2.6	54.0
1	193°22.0	19°15.4	22°39.5	12.1	-20°07.2	2.7	54.0
2	208°22.0	19°14.8	37°10.6	12.1	-20°04.4	2.8	54.0
3	223°22.0	19°14.3	51°41.7	12.1	-20°01.6	2.9	54.0
4	238°22.0	19°13.7	66°12.8	12.1	-19°58.7	3.0	54.0
5	253°22.0	19°13.2	80°43.9	12.1	-19°55.7	3.1	54.0
6	268°22.0	19°12.6	95°15.1	12.2	-19°52.6	3.1	54.0
7	283°22.1	19°12.0	109°46.3	12.2	-19°49.4	3.2	54.0
8	298°22.1	19°11.5	124°17.5	12.2	-19°46.1	3.3	54.0
9	313°22.1	19°10.9	138°48.7	12.2	-19°42.7	3.4	54.0
10	328°22.1	19°10.3	153°19.9	12.2	-19°39.3	3.5	54.0
11	343°22.1	19°09.8	167°51.1	12.3	-19°35.7	3.6	54.0
12	358°22.1	19°09.2	182°22.4	12.3	-19°32.1	3.7	54.0
13	13°22.1	19°08.6	196°53.7	12.3	-19°28.4	3.8	54.0
14	28°22.1	19°08.1	211°25.0	12.3	-19°24.5	3.9	54.0
15	43°22.1	19°07.5	225°56.4	12.4	-19°20.6	4.0	54.0
16	58°22.1	19°06.9	240°27.7	12.4	-19°16.6	4.0	54.0
17	73°22.1	19°06.3	254°59.1	12.4	-19°12.5	4.1	54.0
18	88°22.2	19°05.8	269°30.5	12.4	-19°08.4	4.2	54.0
19	103°22.2	19°05.2	284°02.0	12.4	-19°04.1	4.3	54.0
20	118°22.2	19°04.6	298°33.4	12.5	-18°59.8	4.4	54.0
21	133°22.2	19°04.1	313°04.9	12.5	-18°55.3	4.5	54.0
22	148°22.2	19°03.5	327°36.4	12.5	-18°50.8	4.6	54.0
23	163°22.2	19°02.9	342°08.0	12.5	-18°46.2	4.6	54.0
	SD.=15.7	d=-0.6			S.D.=14.7		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°22.2	19°02.3	356°39.5	12.6	-18°41.5	4.7	54.0
1	193°22.2	19°01.8	11°11.1	12.6	-18°36.8	4.8	54.0
2	208°22.2	19°01.2	25°42.7	12.6	-18°31.9	4.9	54.0
3	223°22.3	19°00.6	40°14.4	12.7	-18°27.0	5.0	54.0
4	238°22.3	19°00.0	54°46.1	12.7	-18°21.9	5.1	54.0
5	253°22.3	18°59.5	69°17.7	12.7	-18°16.8	5.1	54.0
6	268°22.3	18°58.9	83°49.5	12.7	-18°11.6	5.2	54.0
7	283°22.3	18°58.3	98°21.2	12.8	-18°06.4	5.3	54.0
8	298°22.3	18°57.7	112°53.0	12.8	-18°01.0	5.4	54.0
9	313°22.3	18°57.1	127°24.8	12.8	-17°55.6	5.5	54.0
10	328°22.4	18°56.6	141°56.6	12.8	-17°50.1	5.6	54.0
11	343°22.4	18°56.0	156°28.5	12.9	-17°44.5	5.6	54.0
12	358°22.4	18°55.4	171°00.4	12.9	-17°38.8	5.7	54.0
13	13°22.4	18°54.8	185°32.3	12.9	-17°33.0	5.8	54.1
14	28°22.4	18°54.2	200°04.2	13.0	-17°27.2	5.9	54.1
15	43°22.4	18°53.6	214°36.2	13.0	-17°21.3	6.0	54.1
16	58°22.4	18°53.1	229°08.2	13.0	-17°15.3	6.0	54.1
17	73°22.5	18°52.5	243°40.2	13.0	-17°09.2	6.1	54.1
18	88°22.5	18°51.9	258°12.2	13.1	-17°03.1	6.2	54.1
19	103°22.5	18°51.3	272°44.3	13.1	-16°56.9	6.3	54.1
20	118°22.5	18°50.7	287°16.4	13.1	-16°50.6	6.3	54.1
21	133°22.5	18°50.1	301°48.6	13.1	-16°44.2	6.4	54.1
22	148°22.5	18°49.6	316°20.7	13.2	-16°37.7	6.5	54.1
23	163°22.6	18°49.0	330°52.9	13.2	-16°31.2	6.6	54.1
	SD.=15.8	d=-0.6			S.D.=14.7		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°22.6	18°48.4	345°25.1	13.2	-16°24.6	6.6	54.1
1	193°22.6	18°47.8	359°57.4	13.3	-16°18.0	6.7	54.1
2	208°22.6	18°47.2	14°29.7	13.3	-16°11.2	6.8	54.1
3	223°22.6	18°46.6	29°02.0	13.3	-16°04.4	6.9	54.1
4	238°22.7	18°46.0	43°34.3	13.3	-15°57.5	6.9	54.1
5	253°22.7	18°45.4	58°06.7	13.4	-15°50.6	7.0	54.1
6	268°22.7	18°44.8	72°39.1	13.4	-15°43.5	7.1	54.2
7	283°22.7	18°44.3	87°11.5	13.4	-15°36.4	7.1	54.2
8	298°22.7	18°43.7	101°43.9	13.5	-15°29.3	7.2	54.2
9	313°22.8	18°43.1	116°16.4	13.5	-15°22.0	7.3	54.2
10	328°22.8	18°42.5	130°48.9	13.5	-15°14.7	7.3	54.2
11	343°22.8	18°41.9	145°21.4	13.5	-15°07.3	7.4	54.2
12	358°22.8	18°41.3	159°54.0	13.6	-14°59.9	7.5	54.2
13	13°22.8	18°40.7	174°26.5	13.6	-14°52.4	7.5	54.2
14	28°22.9	18°40.1	188°59.2	13.6	-14°44.8	7.6	54.2
15	43°22.9	18°39.5	203°31.8	13.6	-14°37.2	7.7	54.2
16	58°22.9	18°38.9	218°04.5	13.7	-14°29.5	7.7	54.2
17	73°22.9	18°38.3	232°37.1	13.7	-14°21.7	7.8	54.2
18	88°22.9	18°37.7	247°09.9	13.7	-14°13.9	7.9	54.3
19	103°23.0	18°37.1	261°42.6	13.8	-14°06.0	7.9	54.3
20	118°23.0	18°36.5	276°15.4	13.8	-13°58.0	8.0	54.3
21	133°23.0	18°35.9	290°48.2	13.8	-13°50.0	8.1	54.3
22	148°23.0	18°35.3	305°21.0	13.8	-13°41.9	8.1	54.3
23	163°23.1	18°34.7	319°53.8	13.9	-13°33.8	8.2	54.3
	SD.=15.8	d=-0.6			S.D.=14.8		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	00:35	23:21	–:–	–:–
68	–:–	–:–	01:53	22:15	–:–	–:–
66	–:–	–:–	02:30	21:40	–:–	–:–
64	–:–	01:12	02:55	21:15	22:54	–:–
62	–:–	01:58	03:15	20:56	22:11	–:–
60	–:–	02:27	03:31	20:40	21:43	–:–
58	01:06	02:49	03:45	20:27	21:22	23:01
56	01:48	03:06	03:56	20:15	21:05	22:22
54	02:14	03:21	04:07	20:05	20:51	21:56
52	02:35	03:33	04:16	19:56	20:39	21:36
50	02:51	03:44	04:24	19:49	20:28	21:20
45	03:23	04:06	04:41	19:32	20:06	20:49
40	03:46	04:24	04:55	19:18	19:49	20:26
35	04:04	04:38	05:06	19:06	19:34	20:08
30	04:19	04:50	05:17	18:56	19:22	19:54
20	04:42	05:10	05:34	18:39	19:02	19:30
10	05:01	05:27	05:49	18:24	18:46	19:12
0	05:16	05:41	06:03	18:10	18:32	18:57
-10	05:29	05:55	06:17	17:56	18:18	18:44
-20	05:42	06:08	06:32	17:42	18:05	18:32
-30	05:54	06:23	06:48	17:25	17:50	18:19
-35	06:00	06:31	06:58	17:15	17:43	18:13
-40	06:07	06:40	07:09	17:05	17:34	18:07
-45	06:14	06:50	07:22	16:52	17:24	17:59
-50	06:22	07:02	07:37	16:36	17:12	17:51
-52	06:26	07:07	07:45	16:29	17:07	17:48
-54	06:29	07:13	07:53	16:21	17:01	17:44
-56	06:33	07:19	08:02	16:12	16:54	17:40
-58	06:38	07:26	08:12	16:02	16:47	17:36
-60	06:42	07:34	08:24	15:50	16:39	17:31

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	22:54	–:–	–:–	02:51
70	22:51	22:37	22:28	–:–	01:45	03:35
68	22:02	22:07	22:08	01:07	02:33	04:04
66	21:31	21:44	21:52	01:49	03:04	04:26
64	21:08	21:26	21:39	02:17	03:27	04:43
62	20:49	21:12	21:28	02:38	03:45	04:57
60	20:34	20:59	21:19	02:56	03:60	05:09
58	20:21	20:48	21:11	03:10	04:12	05:20
56	20:09	20:39	21:03	03:22	04:23	05:29
54	19:60	20:31	20:57	03:33	04:33	05:36
52	19:51	20:23	20:51	03:43	04:41	05:44
50	19:43	20:16	20:45	03:52	04:49	05:50
45	19:26	20:02	20:34	04:10	05:05	06:04
40	19:12	19:50	20:24	04:24	05:19	06:15
35	19:00	19:40	20:16	04:37	05:30	06:24
30	18:50	19:31	20:09	04:48	05:40	06:33
20	18:32	19:15	19:56	05:07	05:57	06:47
10	18:17	19:02	19:45	05:23	06:11	06:60
0	18:02	18:49	19:35	05:38	06:25	07:11
-10	17:48	18:36	19:24	05:53	06:39	07:23
-20	17:32	18:23	19:13	06:09	06:53	07:35
-30	17:15	18:07	19:00	06:28	07:10	07:49
-35	17:04	17:58	18:53	06:38	07:20	07:57
-40	16:52	17:48	18:44	06:51	07:31	08:07
-45	16:38	17:35	18:34	07:05	07:43	08:17
-50	16:21	17:20	18:23	07:23	07:59	08:30
-52	16:13	17:13	18:17	07:31	08:06	08:36
-54	16:04	17:06	18:11	07:40	08:14	08:43
-56	15:54	16:57	18:04	07:51	08:24	08:50
-58	15:42	16:47	17:56	08:03	08:34	08:58
-60	15:29	16:36	17:47	08:16	08:46	09:08

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
27	06:32	06:32	12:06	00:13	11:50	14(100%)
28	06:31	06:30	12:06	00:13	12:37	15(100%)
29	06:30	06:29	12:06	01:00	13:22	16(98%)

July 30, 31 ,01 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	307°34.9	135°06.9	3°29.6	0°12.8	-25°44.5	85°50.3	-15°04.5	33°36.4	-22°35.4
1	322°37.4	150°07.0	3°28.3	15°16.0	-25°44.7	100°52.6	-15°04.5	48°39.0	-22°35.4
2	337°39.8	165°07.1	3°27.1	30°19.2	-25°44.9	115°54.9	-15°04.6	63°41.6	-22°35.4
3	352°42.3	180°07.2	3°25.9	45°22.3	-25°45.2	130°57.3	-15°04.7	78°44.3	-22°35.5
4	7°44.8	195°07.4	3°24.7	60°25.5	-25°45.4	145°59.6	-15°04.7	93°46.9	-22°35.5
5	22°47.2	210°07.5	3°23.4	75°28.7	-25°45.6	161°01.9	-15°04.8	108°49.5	-22°35.5
6	37°49.7	225°07.6	3°22.2	90°31.9	-25°45.8	176°04.2	-15°04.8	123°52.1	-22°35.5
7	52°52.2	240°07.7	3°21.0	105°35.1	-25°46.0	191°06.6	-15°04.9	138°54.7	-22°35.5
8	67°54.6	255°07.8	3°19.7	120°38.2	-25°46.2	206°08.9	-15°04.9	153°57.3	-22°35.5
9	82°57.1	270°07.9	3°18.5	135°41.4	-25°46.4	221°11.2	-15°05.0	168°59.9	-22°35.5
10	97°59.6	285°08.0	3°17.3	150°44.6	-25°46.6	236°13.5	-15°05.0	184°02.5	-22°35.5
11	113°02.0	300°08.1	3°16.1	165°47.8	-25°46.8	251°15.9	-15°05.1	199°05.2	-22°35.5
12	128°04.5	315°08.3	3°14.8	180°51.0	-25°47.0	266°18.2	-15°05.1	214°07.8	-22°35.5
13	143°06.9	330°08.4	3°13.6	195°54.1	-25°47.2	281°20.5	-15°05.2	229°10.4	-22°35.5
14	158°09.4	345°08.5	3°12.4	210°57.3	-25°47.4	296°22.8	-15°05.2	244°13.0	-22°35.6
15	173°11.9	0°08.6	3°11.2	226°00.5	-25°47.6	311°25.2	-15°05.3	259°15.6	-22°35.6
16	188°14.3	15°08.7	3°09.9	241°03.7	-25°47.8	326°27.5	-15°05.3	274°18.2	-22°35.6
17	203°16.8	30°08.9	3°08.7	256°06.9	-25°48.0	341°29.8	-15°05.4	289°20.8	-22°35.6
18	218°19.3	45°09.0	3°07.5	271°10.1	-25°48.2	356°32.1	-15°05.4	304°23.4	-22°35.6
19	233°21.7	60°09.1	3°06.3	286°13.2	-25°48.4	11°34.5	-15°05.5	319°26.0	-22°35.6
20	248°24.2	75°09.2	3°05.0	301°16.4	-25°48.6	26°36.8	-15°05.6	334°28.7	-22°35.6
21	263°26.7	90°09.3	3°03.8	316°19.6	-25°48.8	41°39.1	-15°05.6	349°31.3	-22°35.6
22	278°29.1	105°09.5	3°02.6	331°22.8	-25°49.0	56°41.4	-15°05.7	4°33.9	-22°35.6
23	293°31.6	120°09.6	3°01.4	346°26.0	-25°49.2	71°43.7	-15°05.7	19°36.5	-22°35.6
Mer.pass.:3:29:		v0.1 d-1.2 m-4.1		v3.2 d-0.2 m-2.9		v2.3 d-0.1 m-2.0		v2.6 d-0.0 m0.2	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	308°34.1	135°09.7	3°00.1	1°29.1	-25°49.4	86°46.1	-15°05.8	34°39.1	-22°35.6
1	323°36.5	150°09.8	2°58.9	16°32.3	-25°49.6	101°48.4	-15°05.8	49°41.7	-22°35.7
2	338°39.0	165°09.9	2°57.7	31°35.5	-25°49.8	116°50.7	-15°05.9	64°44.3	-22°35.7
3	353°41.4	180°10.1	2°56.5	46°38.7	-25°50.0	131°53.0	-15°05.9	79°46.9	-22°35.7
4	8°43.9	195°10.2	2°55.2	61°41.8	-25°50.2	146°55.3	-15°06.0	94°49.5	-22°35.7
5	23°46.4	210°10.3	2°54.0	76°45.0	-25°50.4	161°57.7	-15°06.0	109°52.1	-22°35.7
6	38°48.8	225°10.4	2°52.8	91°48.2	-25°50.6	176°60.0	-15°06.1	124°54.8	-22°35.7
7	53°51.3	240°10.6	2°51.5	106°51.4	-25°50.8	192°02.3	-15°06.2	139°57.4	-22°35.7
8	68°53.8	255°10.7	2°50.3	121°54.6	-25°51.0	207°04.6	-15°06.2	154°60.0	-22°35.7
9	83°56.2	270°10.8	2°49.1	136°57.7	-25°51.2	222°06.9	-15°06.3	170°02.6	-22°35.7
10	98°58.7	285°11.0	2°47.9	152°00.9	-25°51.3	237°09.2	-15°06.3	185°05.2	-22°35.7
11	114°01.2	300°11.1	2°46.6	167°04.1	-25°51.5	252°11.6	-15°06.4	200°07.8	-22°35.7
12	129°03.6	315°11.2	2°45.4	182°07.3	-25°51.7	267°13.9	-15°06.4	215°10.4	-22°35.8
13	144°06.1	330°11.3	2°44.2	197°10.5	-25°51.9	282°16.2	-15°06.5	230°13.0	-22°35.8
14	159°08.6	345°11.5	2°42.9	212°13.6	-25°52.1	297°18.5	-15°06.5	245°15.6	-22°35.8
15	174°11.0	0°11.6	2°41.7	227°16.8	-25°52.3	312°20.8	-15°06.6	260°18.2	-22°35.8
16	189°13.5	15°11.7	2°40.5	242°20.0	-25°52.5	327°23.1	-15°06.6	275°20.8	-22°35.8
17	204°15.9	30°11.9	2°39.3	257°23.2	-25°52.7	342°25.5	-15°06.7	290°23.5	-22°35.8
18	219°18.4	45°12.0	2°38.0	272°26.3	-25°52.9	357°27.8	-15°06.8	305°26.1	-22°35.8
19	234°20.9	60°12.1	2°36.8	287°29.5	-25°53.1	12°30.1	-15°06.8	320°28.7	-22°35.8
20	249°23.3	75°12.3	2°35.6	302°32.7	-25°53.3	27°32.4	-15°06.9	335°31.3	-22°35.8
21	264°25.8	90°12.4	2°34.4	317°35.9	-25°53.5	42°34.7	-15°06.9	350°33.9	-22°35.8
22	279°28.3	105°12.5	2°33.1	332°39.1	-25°53.6	57°37.0	-15°07.0	5°36.5	-22°35.8
23	294°30.7	120°12.7	2°31.9	347°42.2	-25°53.8	72°39.4	-15°07.0	20°39.1	-22°35.9
Mer.pass.:3:25:		v0.1 d-1.2 m-4.1		v3.2 d-0.2 m-2.9		v2.3 d-0.1 m-2.0		v2.6 d-0.0 m0.2	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	309°33.2	135°12.8	2°30.7	2°45.4	-25°54.0	87°41.7	-15°07.1	35°41.7	-22°35.9
1	324°35.7	150°12.9	2°29.4	17°48.6	-25°54.2	102°44.0	-15°07.1	50°44.3	-22°35.9
2	339°38.1	165°13.1	2°28.2	32°51.8	-25°54.4	117°46.3	-15°07.2	65°46.9	-22°35.9
3	354°40.6	180°13.2	2°27.0	47°54.9	-25°54.6	132°48.6	-15°07.3	80°49.5	-22°35.9
4	9°43.0	195°13.4	2°25.8	62°58.1	-25°54.8	147°50.9	-15°07.3	95°52.1	-22°35.9
5	24°45.5	210°13.5	2°24.5	78°01.3	-25°55.0	162°53.2	-15°07.4	110°54.7	-22°35.9
6	39°48.0	225°13.6	2°23.3	93°04.5	-25°55.1	177°55.5	-15°07.4	125°57.3	-22°35.9
7	54°50.4	240°13.8	2°22.1	108°07.6	-25°55.3	192°57.9	-15°07.5	140°60.0	-22°35.9
8	69°52.9	255°13.9	2°20.8	123°10.8	-25°55.5	208°00.2	-15°07.5	156°02.6	-22°35.9
9	84°55.4	270°14.1	2°19.6	138°14.0	-25°55.7	223°02.5	-15°07.6	171°05.2	-22°35.9
10	99°57.8	285°14.2	2°18.4	153°17.2	-25°55.9	238°04.8	-15°07.7	186°07.8	-22°36.0
11	115°00.3	300°14.3	2°17.2	168°20.3	-25°56.1	253°07.1	-15°07.7	201°10.4	-22°36.0
12	130°02.8	315°14.5	2°15.9	183°23.5	-25°56.2	268°09.4	-15°07.8	216°13.0	-22°36.0
13	145°05.2	330°14.6	2°14.7	198°26.7	-25°56.4	283°11.7	-15°07.8	231°15.6	-22°36.0
14	160°07.7	345°14.8	2°13.5	213°29.9	-25°56.6	298°14.0	-15°07.9	246°18.2	-22°36.0
15	175°10.2	0°14.9	2°12.2	228°33.0	-25°56.8	313°16.3	-15°07.9	261°20.8	-22°36.0
16	190°12.6	15°15.1	2°11.0	243°36.2	-25°57.0	328°18.6	-15°08.0	276°23.4	-22°36.0
17	205°15.1	30°15.2	2°09.8	258°39.4	-25°57.1	343°21.0	-15°08.1	291°26.0	-22°36.0
18	220°17.5	45°15.3	2°08.6	273°42.6	-25°57.3	358°23.3	-15°08.1	306°28.6	-22°36.0
19	235°20.0	60°15.5	2°07.3	288°45.7	-25°57.5	13°25.6	-15°08.2	321°31.2	-22°36.0
20	250°22.5	75°15.6	2°06.1	303°48.9	-25°57.7	28°27.9	-15°08.2	336°33.8	-22°36.0
21	265°24.9	90°15.8	2°04.9	318°52.1	-25°57.9	43°30.2	-15°08.3	351°36.4	-22°36.1
22	280°27.4	105°15.9	2°03.6	333°55.2	-25°58.0	58°32.5	-15°08.3	6°39.0	-22°36.1
23	295°29.9	120°16.1	2°02.4	348°58.4	-25°58.2	73°34.8	-15°08.4	21°41.6	-22°36.1
Mer.pass.:3:21:		v0.1 d-1.2 m-4.1		v3.2 d-0.2 m-2.9		v2.3 d-0.1 m-2.0		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.5
Ankaa	353°12.1	-42°12.1
Schedar	349°36.2	56°38.0
Diphda	348°52.1	-17°53.0
Achernar	335°24.1	-57°08.4
Hamal	327°56.8	23°32.8
Polaris	316°17.3	89°20.1
Akamar	315°15.8	-40°13.7
Menkar	314°11.5	4°09.6
Mirfak	308°35.5	49°55.2
Aldebaran	290°45.6	16°32.6
Rigel	281°08.9	-8°10.9
Capella	280°29.6	46°00.7
Bellatrix	278°28.5	6°21.9
Elnath	278°08.5	28°37.2
Alnilam	275°43.1	-1°11.5
Betelgeuse	270°57.8	7°24.5
Canopus	263°55.1	-52°42.3
Sirius	258°30.9	-16°44.3
Adara	255°10.1	-28°59.8
Procyon	244°56.3	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.2	-59°34.2
Suhail	222°50.3	-43°30.5
Miaplacidus	221°39.9	-69°47.7
Alphard	217°53.0	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.0	61°39.3
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.6
Acrux	173°05.7	-63°12.2
Gacrux	171°57.3	-57°13.1
Alioth	166°17.9	55°52.0
Spica	158°27.7	-11°15.3
Alcaid	152°56.2	49°13.7
Hadar	148°42.9	-60°27.8
Menkent	148°03.5	-36°27.6
Arcturus	145°52.4	19°05.8
Rigil Kent.	139°46.9	-60°54.8
Zubenelg.	137°01.5	-16°07.0
Kochab	137°20.0	74°05.2
Alphecca	126°08.0	26°39.5
Antares	112°21.8	-26°28.2
Atria	107°20.1	-69°03.7
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.1	51°29.5
Kaus Aust.	83°38.8	-34°22.4
Vega	80°36.2	38°48.3
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.4
Deneb	49°28.6	45°20.9
Enif	33°43.4	9°57.7
Alnair	27°39.0	-46°52.1
Fomalhaut	15°19.9	-29°31.3
Scheat	13°49.7	28°10.9
Markab	13°34.6	15°18.3

2018/7/3	**SHA**	**Mer.pass**
Venus	187°32.0	14:59
Mars	52°37.9	23:54
Jupiter	138°15.4	18:14
Saturn	86°01.5	21:42

2018/7/3	**SHA**	**Mer.pass**
Venus	186°35.6	14:59
Mars	52°55.1	23:49
Jupiter	138°12.0	18:10
Saturn	86°05.0	21:38

2018/8/1	**SHA**	**Mer.pass**
Venus	185°39.6	14:59
Mars	53°12.2	23:44
Jupiter	138°08.5	18:06
Saturn	86°08.5	21:33

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°23.1	18°34.1	334°26.7	13.9	-13°25.5	8.2	54.3
1	193°23.1	18°33.5	348°59.6	13.9	-13°17.3	8.3	54.3
2	208°23.1	18°32.9	3°32.5	13.9	-13°09.0	8.4	54.3
3	223°23.2	18°32.3	18°05.4	14.0	-13°00.6	8.4	54.3
4	238°23.2	18°31.7	32°38.4	14.0	-12°52.1	8.5	54.4
5	253°23.2	18°31.1	47°11.4	14.0	-12°43.6	8.5	54.4
6	268°23.2	18°30.5	61°44.4	14.0	-12°35.1	8.6	54.4
7	283°23.3	18°29.9	76°17.4	14.0	-12°26.4	8.6	54.4
8	298°23.3	18°29.3	90°50.5	14.1	-12°17.8	8.7	54.4
9	313°23.3	18°28.7	105°23.6	14.1	-12°09.0	8.8	54.4
10	328°23.3	18°28.1	119°56.7	14.1	-12°00.3	8.8	54.4
11	343°23.4	18°27.5	134°29.8	14.1	-11°51.4	8.9	54.4
12	358°23.4	18°26.9	149°02.9	14.2	-11°42.5	8.9	54.4
13	13°23.4	18°26.3	163°36.1	14.2	-11°33.6	9.0	54.5
14	28°23.5	18°25.7	178°09.3	14.2	-11°24.6	9.0	54.5
15	43°23.5	18°25.0	192°42.5	14.2	-11°15.5	9.1	54.5
16	58°23.5	18°24.4	207°15.7	14.2	-11°06.4	9.1	54.5
17	73°23.5	18°23.8	221°48.9	14.2	-10°57.3	9.2	54.5
18	88°23.6	18°23.2	236°22.2	14.3	-10°48.1	9.2	54.5
19	103°23.6	18°22.6	250°55.4	14.3	-10°38.9	9.3	54.5
20	118°23.6	18°22.0	265°28.7	14.3	-10°29.6	9.3	54.6
21	133°23.7	18°21.4	280°02.0	14.3	-10°20.2	9.4	54.6
22	148°23.7	18°20.8	294°35.4	14.3	-10°10.8	9.4	54.6
23	163°23.7	18°20.2	309°08.7	14.3	-10°01.4	9.5	54.6
	SD.=15.8	d=-0.6			S.D.=14.8		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°23.7	18°19.6	323°42.1	14.4	-9°51.9	9.5	54.6
1	193°23.8	18°18.9	338°15.4	14.4	-9°42.4	9.6	54.6
2	208°23.8	18°18.3	352°48.8	14.4	-9°32.8	9.6	54.6
3	223°23.8	18°17.7	7°22.2	14.4	-9°23.2	9.6	54.7
4	238°23.9	18°17.1	21°55.6	14.4	-9°13.5	9.7	54.7
5	253°23.9	18°16.5	36°29.1	14.4	-9°03.8	9.7	54.7
6	268°23.9	18°15.9	51°02.5	14.4	-8°54.0	9.8	54.7
7	283°24.0	18°15.2	65°35.9	14.5	-8°44.2	9.8	54.7
8	298°24.0	18°14.6	80°09.4	14.5	-8°34.4	9.9	54.7
9	313°24.0	18°14.0	94°42.9	14.5	-8°24.5	9.9	54.7
10	328°24.1	18°13.4	109°16.4	14.5	-8°14.6	9.9	54.8
11	343°24.1	18°12.8	123°49.9	14.5	-8°04.6	10.0	54.8
12	358°24.1	18°12.2	138°23.4	14.5	-7°54.6	10.0	54.8
13	13°24.2	18°11.5	152°56.9	14.5	-7°44.6	10.1	54.8
14	28°24.2	18°10.9	167°30.4	14.5	-7°34.5	10.1	54.8
15	43°24.2	18°10.3	182°03.9	14.5	-7°24.4	10.1	54.8
16	58°24.3	18°09.7	196°37.4	14.5	-7°14.3	10.2	54.9
17	73°24.3	18°09.1	211°11.0	14.5	-7°04.1	10.2	54.9
18	88°24.3	18°08.4	225°44.5	14.5	-6°53.9	10.2	54.9
19	103°24.4	18°07.8	240°18.1	14.5	-6°43.6	10.3	54.9
20	118°24.4	18°07.2	254°51.6	14.6	-6°33.3	10.3	54.9
21	133°24.4	18°06.6	269°25.2	14.6	-6°23.0	10.3	54.9
22	148°24.5	18°05.9	283°58.7	14.6	-6°12.7	10.4	55.0
23	163°24.5	18°05.3	298°32.3	14.6	-6°02.3	10.4	55.0
	SD.=15.8	d=-0.6			S.D.=14.9		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°24.6	18°04.7	313°05.9	14.6	-5°51.9	10.4	55.0
1	193°24.6	18°04.1	327°39.4	14.6	-5°41.4	10.5	55.0
2	208°24.6	18°03.4	342°13.0	14.6	-5°30.9	10.5	55.0
3	223°24.7	18°02.8	356°46.5	14.6	-5°20.4	10.5	55.1
4	238°24.7	18°02.2	11°20.1	14.6	-5°09.9	10.6	55.1
5	253°24.7	18°01.6	25°53.7	14.6	-4°59.3	10.6	55.1
6	268°24.8	18°00.9	40°27.2	14.6	-4°48.7	10.6	55.1
7	283°24.8	18°00.3	55°00.8	14.6	-4°38.1	10.6	55.1
8	298°24.9	17°59.7	69°34.3	14.5	-4°27.5	10.7	55.2
9	313°24.9	17°59.0	84°07.9	14.5	-4°16.8	10.7	55.2
10	328°24.9	17°58.4	98°41.4	14.5	-4°06.1	10.7	55.2
11	343°25.0	17°57.8	113°14.9	14.5	-3°55.4	10.7	55.2
12	358°25.0	17°57.1	127°48.5	14.5	-3°44.6	10.8	55.2
13	13°25.1	17°56.5	142°22.0	14.5	-3°33.9	10.8	55.3
14	28°25.1	17°55.9	156°55.5	14.5	-3°23.1	10.8	55.3
15	43°25.1	17°55.2	171°29.0	14.5	-3°12.2	10.8	55.3
16	58°25.2	17°54.6	186°02.5	14.5	-3°01.4	10.8	55.3
17	73°25.2	17°54.0	200°36.0	14.5	-2°50.6	10.9	55.3
18	88°25.3	17°53.3	215°09.4	14.5	-2°39.7	10.9	55.4
19	103°25.3	17°52.7	229°42.9	14.4	-2°28.8	10.9	55.4
20	118°25.3	17°52.1	244°16.3	14.4	-2°17.9	10.9	55.4
21	133°25.4	17°51.4	258°49.7	14.4	-2°06.9	10.9	55.4
22	148°25.4	17°50.8	273°23.2	14.4	-1°56.0	11.0	55.5
23	163°25.5	17°50.2	287°56.6	14.4	-1°45.0	11.0	55.5
	SD.=15.8	d=-0.6			S.D.=15.0		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	01:16	22:48	–:–	–:–
68	–:–	–:–	02:09	21:59	–:–	–:–
66	–:–	–:–	02:41	21:28	–:–	–:–
64	–:–	01:33	03:05	21:06	22:34	–:–
62	–:–	02:11	03:23	20:48	21:59	–:–
60	–:–	02:37	03:38	20:33	21:34	–:–
58	01:24	02:57	03:51	20:20	21:14	22:44
56	01:59	03:13	04:02	20:10	20:58	22:11
54	02:23	03:27	04:12	20:00	20:45	21:47
52	02:42	03:38	04:20	19:52	20:33	21:29
50	02:57	03:49	04:28	19:44	20:23	21:14
45	03:27	04:10	04:44	19:28	20:02	20:44
40	03:49	04:27	04:57	19:15	19:45	20:23
35	04:07	04:41	05:09	19:04	19:32	20:05
30	04:21	04:52	05:18	18:54	19:20	19:51
20	04:44	05:12	05:35	18:37	19:01	19:29
10	05:01	05:27	05:50	18:23	18:45	19:11
0	05:16	05:41	06:03	18:10	18:32	18:57
-10	05:29	05:54	06:16	17:57	18:19	18:44
-20	05:40	06:07	06:30	17:43	18:06	18:32
-30	05:52	06:21	06:46	17:27	17:52	18:21
-35	05:58	06:29	06:55	17:18	17:45	18:15
-40	06:04	06:37	07:06	17:07	17:36	18:09
-45	06:11	06:47	07:18	16:55	17:27	18:02
-50	06:18	06:58	07:33	16:40	17:16	17:55
-52	06:22	07:03	07:40	16:33	17:11	17:52
-54	06:25	07:08	07:48	16:26	17:05	17:48
-56	06:29	07:14	07:56	16:17	16:59	17:45
-58	06:33	07:21	08:06	16:07	16:52	17:41
-60	06:37	07:29	08:17	15:56	16:45	17:36

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	22:37	22:23	22:12	04:53	06:42	08:27
70	22:21	22:15	22:09	05:18	06:56	08:33
68	22:08	22:08	22:07	05:36	07:08	08:38
66	21:58	22:02	22:05	05:51	07:17	08:43
64	21:49	21:57	22:03	06:03	07:25	08:47
62	21:41	21:52	22:02	06:14	07:31	08:50
60	21:35	21:48	22:01	06:22	07:37	08:53
58	21:29	21:45	21:60	06:30	07:42	08:55
56	21:24	21:42	21:59	06:37	07:46	08:57
54	21:19	21:39	21:58	06:43	07:50	08:59
52	21:15	21:36	21:57	06:48	07:54	09:01
50	21:11	21:34	21:56	06:53	07:57	09:02
45	21:02	21:29	21:55	07:03	08:04	09:06
40	20:55	21:25	21:53	07:12	08:10	09:09
35	20:49	21:21	21:52	07:20	08:15	09:11
30	20:44	21:18	21:51	07:26	08:20	09:14
20	20:35	21:12	21:49	07:37	08:27	09:17
10	20:27	21:07	21:48	07:47	08:34	09:21
0	20:19	21:03	21:46	07:56	08:40	09:24
-10	20:11	20:58	21:45	08:05	08:46	09:27
-20	20:03	20:53	21:44	08:15	08:53	09:30
-30	19:54	20:48	21:42	08:26	09:00	09:34
-35	19:48	20:44	21:41	08:32	09:05	09:36
-40	19:42	20:41	21:40	08:39	09:09	09:38
-45	19:35	20:36	21:38	08:47	09:15	09:41
-50	19:26	20:31	21:37	08:57	09:21	09:44
-52	19:22	20:29	21:36	09:02	09:24	09:45
-54	19:18	20:26	21:35	09:07	09:28	09:47
-56	19:13	20:23	21:35	09:12	09:31	09:49
-58	19:07	20:20	21:34	09:19	09:36	09:51
-60	19:01	20:16	21:32	09:25	09:40	09:53

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
30	06:28	06:26	12:06	01:45	14:07	17(94%)
31	06:25	06:23	12:06	02:29	14:51	18(88%)
1	06:22	06:20	12:06	03:13	15:35	19(81%)

August 02, 03 ,04 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	310°32.3	135°16.2	2°01.2	4°01.6	-25°58.4	88°37.1	-15°08.5	36°44.2	-22°36.1
1	325°34.8	150°16.4	1°60.0	19°04.8	-25°58.6	103°39.4	-15°08.5	51°46.8	-22°36.1
2	340°37.3	165°16.5	1°58.7	34°07.9	-25°58.7	118°41.7	-15°08.6	66°49.4	-22°36.1
3	355°39.7	180°16.7	1°57.5	49°11.1	-25°58.9	133°44.0	-15°08.6	81°52.1	-22°36.1
4	10°42.2	195°16.8	1°56.3	64°14.3	-25°59.1	148°46.3	-15°08.7	96°54.7	-22°36.1
5	25°44.6	210°17.0	1°55.0	79°17.4	-25°59.3	163°48.6	-15°08.8	111°57.3	-22°36.1
6	40°47.1	225°17.1	1°53.8	94°20.6	-25°59.4	178°50.9	-15°08.8	126°59.9	-22°36.1
7	55°49.6	240°17.3	1°52.6	109°23.8	-25°59.6	193°53.2	-15°08.9	142°02.5	-22°36.1
8	70°52.0	255°17.4	1°51.3	124°26.9	-25°59.8	208°55.5	-15°08.9	157°05.1	-22°36.2
9	85°54.5	270°17.6	1°50.1	139°30.1	-25°60.0	223°57.9	-15°09.0	172°07.7	-22°36.2
10	100°57.0	285°17.7	1°48.9	154°33.3	-26°00.1	239°00.2	-15°09.0	187°10.3	-22°36.2
11	115°59.4	300°17.9	1°47.7	169°36.4	-26°00.3	254°02.5	-15°09.1	202°12.9	-22°36.2
12	131°01.9	315°18.1	1°46.4	184°39.6	-26°00.5	269°04.8	-15°09.2	217°15.5	-22°36.2
13	146°04.4	330°18.2	1°45.2	199°42.8	-26°00.7	284°07.1	-15°09.2	232°18.1	-22°36.2
14	161°06.8	345°18.4	1°44.0	214°46.0	-26°00.8	299°09.4	-15°09.3	247°20.7	-22°36.2
15	176°09.3	0°18.5	1°42.7	229°49.1	-26°01.0	314°11.7	-15°09.3	262°23.3	-22°36.2
16	191°11.8	15°18.7	1°41.5	244°52.3	-26°01.2	329°14.0	-15°09.4	277°25.9	-22°36.2
17	206°14.2	30°18.8	1°40.3	259°55.5	-26°01.3	344°16.3	-15°09.5	292°28.5	-22°36.2
18	221°16.7	45°19.0	1°39.0	274°58.6	-26°01.5	359°18.6	-15°09.5	307°31.1	-22°36.2
19	236°19.1	60°19.2	1°37.8	290°01.8	-26°01.7	14°20.9	-15°09.6	322°33.7	-22°36.2
20	251°21.6	75°19.3	1°36.6	305°05.0	-26°01.8	29°23.2	-15°09.6	337°36.3	-22°36.3
21	266°24.1	90°19.5	1°35.4	320°08.1	-26°02.0	44°25.5	-15°09.7	352°38.9	-22°36.3
22	281°26.5	105°19.6	1°34.1	335°11.3	-26°02.2	59°27.8	-15°09.8	7°41.5	-22°36.3
23	296°29.0	120°19.8	1°32.9	350°14.4	-26°02.3	74°30.1	-15°09.8	22°44.1	-22°36.3
Mer.pass.:3:17:		v0.1 d-1.2 m-4.2		v3.2 d-0.2 m-2.9		v2.3 d-0.1 m-1.9		v2.6 d-0.0 m0.2	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	311°31.5	135°20.0	1°31.7	5°17.6	-26°02.5	89°32.4	-15°09.9	37°46.7	-22°36.3
1	326°33.9	150°20.1	1°30.4	20°20.8	-26°02.7	104°34.7	-15°09.9	52°49.3	-22°36.3
2	341°36.4	165°20.3	1°29.2	35°23.9	-26°02.8	119°37.0	-15°10.0	67°51.9	-22°36.3
3	356°38.9	180°20.4	1°28.0	50°27.1	-26°03.0	134°39.3	-15°10.1	82°54.5	-22°36.3
4	11°41.3	195°20.6	1°26.8	65°30.3	-26°03.2	149°41.6	-15°10.1	97°57.1	-22°36.3
5	26°43.8	210°20.8	1°25.5	80°33.4	-26°03.3	164°43.9	-15°10.2	112°59.7	-22°36.3
6	41°46.3	225°20.9	1°24.3	95°36.6	-26°03.5	179°46.2	-15°10.2	128°02.3	-22°36.3
7	56°48.7	240°21.1	1°23.1	110°39.7	-26°03.7	194°48.5	-15°10.3	143°04.9	-22°36.4
8	71°51.2	255°21.3	1°21.8	125°42.9	-26°03.8	209°50.8	-15°10.4	158°07.5	-22°36.4
9	86°53.6	270°21.4	1°20.6	140°46.1	-26°04.0	224°53.1	-15°10.4	173°10.1	-22°36.4
10	101°56.1	285°21.6	1°19.4	155°49.2	-26°04.2	239°55.4	-15°10.5	188°12.7	-22°36.4
11	116°58.6	300°21.8	1°18.1	170°52.4	-26°04.3	254°57.7	-15°10.5	203°15.3	-22°36.4
12	132°01.0	315°21.9	1°16.9	185°55.6	-26°04.5	269°60.0	-15°10.6	218°17.9	-22°36.4
13	147°03.5	330°22.1	1°15.7	200°58.7	-26°04.6	285°02.3	-15°10.7	233°20.5	-22°36.4
14	162°06.0	345°22.3	1°14.5	216°01.9	-26°04.8	300°04.6	-15°10.7	248°23.1	-22°36.4
15	177°08.4	0°22.4	1°13.2	231°05.0	-26°05.0	315°06.8	-15°10.8	263°25.7	-22°36.4
16	192°10.9	15°22.6	1°12.0	246°08.2	-26°05.1	330°09.1	-15°10.8	278°28.3	-22°36.4
17	207°13.4	30°22.8	1°10.8	261°11.3	-26°05.3	345°11.4	-15°10.9	293°30.9	-22°36.4
18	222°15.8	45°23.0	1°09.5	276°14.5	-26°05.4	0°13.7	-15°11.0	308°33.5	-22°36.5
19	237°18.3	60°23.1	1°08.3	291°17.7	-26°05.6	15°16.0	-15°11.0	323°36.1	-22°36.5
20	252°20.7	75°23.3	1°07.1	306°20.8	-26°05.7	30°18.3	-15°11.1	338°38.7	-22°36.5
21	267°23.2	90°23.5	1°05.8	321°24.0	-26°05.9	45°20.6	-15°11.1	353°41.3	-22°36.5
22	282°25.7	105°23.7	1°04.6	336°27.1	-26°06.1	60°22.9	-15°11.2	8°43.9	-22°36.5
23	297°28.1	120°23.8	1°03.4	351°30.3	-26°06.2	75°25.2	-15°11.3	23°46.5	-22°36.5
Mer.pass.:3:13:		v0.2 d-1.2 m-4.2		v3.2 d-0.2 m-2.9		v2.3 d-0.1 m-1.9		v2.6 d-0.0 m0.2	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	312°30.6	135°24.0	1°02.2	6°33.4	-26°06.4	90°27.5	-15°11.3	38°49.1	-22°36.5
1	327°33.1	150°24.2	1°00.9	21°36.6	-26°06.5	105°29.8	-15°11.4	53°51.7	-22°36.5
2	342°35.5	165°24.3	0°59.7	36°39.7	-26°06.7	120°32.1	-15°11.5	68°54.3	-22°36.5
3	357°38.0	180°24.5	0°58.5	51°42.9	-26°06.8	135°34.4	-15°11.5	83°56.9	-22°36.5
4	12°40.5	195°24.7	0°57.2	66°46.1	-26°07.0	150°36.7	-15°11.6	98°59.5	-22°36.5
5	27°42.9	210°24.9	0°56.0	81°49.2	-26°07.1	165°39.0	-15°11.6	114°02.1	-22°36.5
6	42°45.4	225°25.1	0°54.8	96°52.4	-26°07.3	180°41.2	-15°11.7	129°04.7	-22°36.6
7	57°47.9	240°25.2	0°53.5	111°55.5	-26°07.4	195°43.5	-15°11.8	144°07.3	-22°36.6
8	72°50.3	255°25.4	0°52.3	126°58.7	-26°07.6	210°45.8	-15°11.8	159°09.9	-22°36.6
9	87°52.8	270°25.6	0°51.1	142°01.8	-26°07.7	225°48.1	-15°11.9	174°12.5	-22°36.6
10	102°55.2	285°25.8	0°49.8	157°05.0	-26°07.9	240°50.4	-15°12.0	189°15.1	-22°36.6
11	117°57.7	300°26.0	0°48.6	172°08.1	-26°08.0	255°52.7	-15°12.0	204°17.7	-22°36.6
12	133°00.2	315°26.1	0°47.4	187°11.3	-26°08.2	270°55.0	-15°12.1	219°20.3	-22°36.6
13	148°02.6	330°26.3	0°46.2	202°14.4	-26°08.3	285°57.3	-15°12.1	234°22.9	-22°36.6
14	163°05.1	345°26.5	0°44.9	217°17.6	-26°08.5	300°59.6	-15°12.2	249°25.4	-22°36.6
15	178°07.6	0°26.7	0°43.7	232°20.7	-26°08.6	316°01.9	-15°12.3	264°28.0	-22°36.6
16	193°10.0	15°26.9	0°42.5	247°23.9	-26°08.8	331°04.1	-15°12.3	279°30.6	-22°36.6
17	208°12.5	30°27.0	0°41.2	262°27.0	-26°08.9	346°06.4	-15°12.4	294°33.2	-22°36.7
18	223°15.0	45°27.2	0°40.0	277°30.1	-26°09.1	1°08.7	-15°12.5	309°35.8	-22°36.7
19	238°17.4	60°27.4	0°38.8	292°33.3	-26°09.2	16°11.0	-15°12.5	324°38.4	-22°36.7
20	253°19.9	75°27.6	0°37.5	307°36.4	-26°09.4	31°13.3	-15°12.6	339°41.0	-22°36.7
21	268°22.3	90°27.8	0°36.3	322°39.6	-26°09.5	46°15.6	-15°12.6	354°43.6	-22°36.7
22	283°24.8	105°28.0	0°35.1	337°42.7	-26°09.7	61°17.9	-15°12.7	9°46.2	-22°36.7
23	298°27.3	120°28.2	0°33.9	352°45.9	-26°09.8	76°20.2	-15°12.8	24°48.8	-22°36.7
Mer.pass.:3:09:		v0.2 d-1.2 m-4.2		v3.2 d-0.2 m-2.9		v2.3 d-0.1 m-1.9		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.5
Ankaa	353°12.0	-42°12.1
Schedar	349°36.2	56°38.1
Diphda	348°52.1	-17°53.0
Achernar	335°24.1	-57°08.4
Hamal	327°56.8	23°32.8
Polaris	316°15.8	89°20.1
Akamar	315°15.7	-40°13.7
Menkar	314°11.4	4°09.7
Mirfak	308°35.4	49°55.2
Aldebaran	290°45.6	16°32.6
Rigel	281°08.9	-8°10.9
Capella	280°29.6	46°00.7
Bellatrix	278°28.5	6°21.9
Elnath	278°08.5	28°37.2
Alnilam	275°43.1	-1°11.5
Betelgeuse	270°57.8	7°24.5
Canopus	263°55.1	-52°42.3
Sirius	258°30.9	-16°44.3
Adara	255°10.1	-28°59.8
Procyon	244°56.3	5°10.7
Pollux	243°23.8	27°58.8
Avior	234°17.2	-59°34.1
Suhail	222°50.3	-43°30.5
Miaplacidus	221°39.9	-69°47.6
Alphard	217°53.0	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.0	61°39.3
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.6
Acrux	173°05.7	-63°12.2
Gacrux	171°57.3	-57°13.1
Alioth	166°18.0	55°51.9
Spica	158°27.7	-11°15.3
Alcaid	152°56.3	49°13.7
Hadar	148°43.0	-60°27.8
Menkent	148°03.5	-36°27.6
Arcturus	145°52.4	19°05.8
Rigil Kent.	139°46.9	-60°54.8
Zubenelg.	137°01.5	-16°07.0
Kochab	137°20.1	74°05.2
Alphecca	126°08.0	26°39.5
Antares	112°21.8	-26°28.2
Atria	107°20.1	-69°03.7
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.1	51°29.6
Kaus Aust.	83°38.8	-34°22.4
Vega	80°36.3	38°48.3
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.4
Deneb	49°28.6	45°20.9
Enif	33°43.4	9°57.7
Alnair	27°39.0	-46°52.1
Fomalhaut	15°19.9	-29°31.3
Scheat	13°49.7	28°10.9
Markab	13°34.6	15°18.3

2018/8/2	**SHA**	**Mer.pass**
Venus	184°43.9	14:59
Mars	53°29.3	23:39
Jupiter	138°04.8	18:03
Saturn	86°11.9	21:29

2018/8/3	**SHA**	**Mer.pass**
Venus	183°48.5	14:59
Mars	53°46.1	23:34
Jupiter	138°00.9	17:59
Saturn	86°15.2	21:25

2018/8/4	**SHA**	**Mer.pass**
Venus	182°53.4	14:58
Mars	54°02.8	23:29
Jupiter	137°56.9	17:55
Saturn	86°18.5	21:21

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°25.5	17°49.5	302°29.9	14.4	-1°34.0	11.0	55.5
1	193°25.6	17°48.9	317°03.3	14.4	-1°23.1	11.0	55.5
2	208°25.6	17°48.2	331°36.6	14.3	-1°12.0	11.0	55.6
3	223°25.6	17°47.6	346°10.0	14.3	-1°01.0	11.0	55.6
4	238°25.7	17°47.0	0°43.3	14.3	-0°50.0	11.0	55.6
5	253°25.7	17°46.3	15°16.6	14.3	-0°38.9	11.1	55.6
6	268°25.8	17°45.7	29°49.8	14.3	-0°27.9	11.1	55.6
7	283°25.8	17°45.0	44°23.1	14.2	-0°16.8	11.1	55.7
8	298°25.9	17°44.4	58°56.3	14.2	-0°05.7	11.1	55.7
9	313°25.9	17°43.8	73°29.5	14.2	0°05.4	11.1	55.7
10	328°26.0	17°43.1	88°02.7	14.2	0°16.5	11.1	55.7
11	343°26.0	17°42.5	102°35.8	14.1	0°27.6	11.1	55.8
12	358°26.1	17°41.8	117°08.9	14.1	0°38.7	11.1	55.8
13	13°26.1	17°41.2	131°42.0	14.1	0°49.8	11.1	55.8
14	28°26.1	17°40.5	146°15.1	14.1	1°00.9	11.1	55.9
15	43°26.2	17°39.9	160°48.1	14.0	1°12.1	11.1	55.9
16	58°26.2	17°39.3	175°21.1	14.0	1°23.2	11.1	55.9
17	73°26.3	17°38.6	189°54.1	14.0	1°34.4	11.1	55.9
18	88°26.3	17°38.0	204°27.1	13.9	1°45.5	11.1	56.0
19	103°26.4	17°37.3	218°60.0	13.9	1°56.7	11.1	56.0
20	118°26.4	17°36.7	233°32.9	13.9	2°07.8	11.1	56.0
21	133°26.5	17°36.0	248°05.7	13.8	2°18.9	11.1	56.0
22	148°26.5	17°35.4	262°38.5	13.8	2°30.1	11.1	56.1
23	163°26.6	17°34.7	277°11.3	13.8	2°41.2	11.1	56.1
	SD.=15.8	d=-0.6			S.D.=15.1		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°26.6	17°34.1	291°44.0	13.7	2°52.4	11.1	56.1
1	193°26.7	17°33.4	306°16.7	13.7	3°03.5	11.1	56.1
2	208°26.7	17°32.8	320°49.4	13.6	3°14.7	11.1	56.2
3	223°26.8	17°32.1	335°22.0	13.6	3°25.8	11.1	56.2
4	238°26.8	17°31.5	349°54.6	13.6	3°36.9	11.1	56.2
5	253°26.9	17°30.8	4°27.2	13.5	3°48.1	11.1	56.3
6	268°26.9	17°30.2	18°59.7	13.5	3°59.2	11.1	56.3
7	283°27.0	17°29.5	33°32.1	13.4	4°10.3	11.1	56.3
8	298°27.0	17°28.9	48°04.5	13.4	4°21.4	11.1	56.3
9	313°27.1	17°28.2	62°36.9	13.3	4°32.5	11.1	56.4
10	328°27.1	17°27.5	77°09.2	13.3	4°43.6	11.1	56.4
11	343°27.2	17°26.9	91°41.5	13.3	4°54.7	11.1	56.4
12	358°27.2	17°26.2	106°13.7	13.2	5°05.7	11.1	56.5
13	13°27.3	17°25.6	120°45.9	13.2	5°16.8	11.0	56.5
14	28°27.3	17°24.9	135°18.0	13.1	5°27.8	11.0	56.5
15	43°27.4	17°24.3	149°50.1	13.1	5°38.8	11.0	56.6
16	58°27.4	17°23.6	164°22.2	13.0	5°49.9	11.0	56.6
17	73°27.5	17°23.0	178°54.1	13.0	6°00.8	11.0	56.6
18	88°27.5	17°22.3	193°26.1	12.9	6°11.8	11.0	56.6
19	103°27.6	17°21.6	207°57.9	12.8	6°22.8	11.0	56.7
20	118°27.7	17°21.0	222°29.8	12.8	6°33.7	10.9	56.7
21	133°27.7	17°20.3	237°01.5	12.7	6°44.6	10.9	56.7
22	148°27.8	17°19.7	251°33.2	12.7	6°55.5	10.9	56.8
23	163°27.8	17°19.0	266°04.9	12.6	7°06.4	10.9	56.8
	SD.=15.8	d=-0.7			S.D.=15.3		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°27.9	17°18.3	280°36.5	12.6	7°17.3	10.8	56.8
1	193°27.9	17°17.7	295°08.0	12.5	7°28.1	10.8	56.9
2	208°28.0	17°17.0	309°39.5	12.4	7°38.9	10.8	56.9
3	223°28.0	17°16.3	324°10.9	12.4	7°49.7	10.8	56.9
4	238°28.1	17°15.7	338°42.2	12.3	8°00.5	10.7	57.0
5	253°28.2	17°15.0	353°13.5	12.3	8°11.2	10.7	57.0
6	268°28.2	17°14.4	7°44.8	12.2	8°21.9	10.7	57.0
7	283°28.3	17°13.7	22°15.9	12.1	8°32.6	10.7	57.1
8	298°28.3	17°13.0	36°47.0	12.1	8°43.2	10.6	57.1
9	313°28.4	17°12.4	51°18.1	12.0	8°53.9	10.6	57.1
10	328°28.4	17°11.7	65°49.0	11.9	9°04.4	10.6	57.2
11	343°28.5	17°11.0	80°19.9	11.9	9°15.0	10.5	57.2
12	358°28.6	17°10.4	94°50.7	11.8	9°25.5	10.5	57.2
13	13°28.6	17°09.7	109°21.5	11.7	9°36.0	10.5	57.3
14	28°28.7	17°09.0	123°52.2	11.7	9°46.4	10.4	57.3
15	43°28.7	17°08.4	138°22.8	11.6	9°56.9	10.4	57.3
16	58°28.8	17°07.7	152°53.4	11.5	10°07.2	10.4	57.4
17	73°28.9	17°07.0	167°23.8	11.4	10°17.6	10.3	57.4
18	88°28.9	17°06.3	181°54.3	11.4	10°27.9	10.3	57.4
19	103°29.0	17°05.7	196°24.6	11.3	10°38.1	10.2	57.5
20	118°29.0	17°05.0	210°54.8	11.2	10°48.3	10.2	57.5
21	133°29.1	17°04.3	225°25.0	11.1	10°58.5	10.1	57.5
22	148°29.2	17°03.7	239°55.1	11.1	11°08.6	10.1	57.6
23	163°29.2	17°03.0	254°25.1	11.0	11°18.7	10.1	57.6
	SD.=15.8	d=-0.7			S.D.=15.5		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	01:42	22:23	–:–	–:–
68	–:–	–:–	02:25	21:44	–:–	–:–
66	–:–	00:52	02:53	21:16	23:09	–:–
64	–:–	01:50	03:14	20:56	22:17	–:–
62	–:–	02:23	03:31	20:39	21:46	–:–
60	00:47	02:46	03:45	20:25	21:24	23:15
58	01:40	03:04	03:57	20:14	21:06	22:28
56	02:10	03:20	04:07	20:04	20:51	21:60
54	02:31	03:33	04:17	19:55	20:38	21:39
52	02:49	03:44	04:25	19:47	20:27	21:22
50	03:03	03:54	04:32	19:39	20:18	21:07
45	03:32	04:14	04:47	19:24	19:58	20:39
40	03:53	04:30	05:00	19:12	19:42	20:19
35	04:10	04:43	05:11	19:01	19:29	20:02
30	04:23	04:54	05:20	18:52	19:18	19:49
20	04:45	05:13	05:36	18:36	18:59	19:27
10	05:02	05:28	05:50	18:22	18:44	19:10
0	05:16	05:41	06:03	18:10	18:31	18:56
-10	05:28	05:53	06:15	17:57	18:19	18:44
-20	05:39	06:06	06:29	17:44	18:07	18:33
-30	05:50	06:19	06:44	17:29	17:54	18:22
-35	05:56	06:26	06:53	17:20	17:47	18:17
-40	06:02	06:34	07:03	17:10	17:39	18:11
-45	06:08	06:43	07:15	16:58	17:30	18:05
-50	06:15	06:54	07:29	16:44	17:19	17:58
-52	06:18	06:58	07:35	16:38	17:15	17:55
-54	06:21	07:03	07:42	16:31	17:10	17:52
-56	06:24	07:09	07:51	16:22	17:04	17:49
-58	06:28	07:15	07:60	16:13	16:58	17:46
-60	06:31	07:22	08:10	16:03	16:51	17:42

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	21:60	21:48	21:33	10:11	11:57	13:50
70	22:03	21:57	21:51	10:10	11:50	13:34
68	22:06	22:05	22:05	10:10	11:44	13:21
66	22:08	22:12	22:17	10:10	11:39	13:11
64	22:10	22:17	22:27	10:10	11:35	13:03
62	22:12	22:22	22:35	10:09	11:31	12:55
60	22:13	22:26	22:42	10:09	11:28	12:49
58	22:14	22:30	22:49	10:09	11:25	12:44
56	22:16	22:34	22:54	10:09	11:23	12:39
54	22:17	22:37	22:59	10:09	11:21	12:34
52	22:18	22:39	23:04	10:09	11:19	12:30
50	22:18	22:42	23:08	10:09	11:17	12:27
45	22:20	22:47	23:17	10:09	11:13	12:19
40	22:22	22:52	23:25	10:09	11:10	12:13
35	22:23	22:56	23:32	10:08	11:07	12:07
30	22:25	22:60	23:37	10:08	11:04	12:02
20	22:27	23:06	23:48	10:08	10:60	11:54
10	22:29	23:11	23:57	10:08	10:56	11:46
0	22:31	23:17	–:–	10:08	10:53	11:39
-10	22:33	23:22	–:–	10:07	10:49	11:33
-20	22:35	23:28	–:–	10:07	10:45	11:25
-30	22:37	23:34	–:–	10:07	10:41	11:17
-35	22:38	23:38	–:–	10:07	10:38	11:12
-40	22:40	23:42	–:–	10:06	10:36	11:07
-45	22:42	23:47	–:–	10:06	10:32	11:00
-50	22:44	23:53	–:–	10:06	10:28	10:53
-52	22:45	23:56	–:–	10:06	10:27	10:50
-54	22:46	23:59	–:–	10:06	10:25	10:46
-56	22:47	–:–	00:02	10:05	10:23	10:42
-58	22:49	–:–	00:06	10:05	10:20	10:37
-60	22:50	–:–	00:10	10:05	10:18	10:32

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
2	06:18	06:16	12:06	03:57	16:19	20(73%)
3	06:13	06:11	12:06	04:41	17:04	21(63%)
4	06:08	06:06	12:06	05:28	17:52	22(53%)

August 05, 06 ,07 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	313°29.7	135°28.3	0°32.6	7°49.0	-26°10.0	91°22.4	-15°12.8	39°51.4	-22°36.7
1	328°32.2	150°28.5	0°31.4	22°52.2	-26°10.1	106°24.7	-15°12.9	54°54.0	-22°36.7
2	343°34.7	165°28.7	0°30.2	37°55.3	-26°10.2	121°27.0	-15°13.0	69°56.6	-22°36.7
3	358°37.1	180°28.9	0°28.9	52°58.4	-26°10.4	136°29.3	-15°13.0	84°59.2	-22°36.7
4	13°39.6	195°29.1	0°27.7	68°01.6	-26°10.5	151°31.6	-15°13.1	100°01.8	-22°36.7
5	28°42.1	210°29.3	0°26.5	83°04.7	-26°10.7	166°33.9	-15°13.2	115°04.4	-22°36.8
6	43°44.5	225°29.5	0°25.3	98°07.9	-26°10.8	181°36.2	-15°13.2	130°07.0	-22°36.8
7	58°47.0	240°29.7	0°24.0	113°11.0	-26°10.9	196°38.4	-15°13.3	145°09.6	-22°36.8
8	73°49.5	255°29.9	0°22.8	128°14.2	-26°11.1	211°40.7	-15°13.4	160°12.2	-22°36.8
9	88°51.9	270°30.1	0°21.6	143°17.3	-26°11.2	226°43.0	-15°13.4	175°14.7	-22°36.8
10	103°54.4	285°30.2	0°20.3	158°20.4	-26°11.4	241°45.3	-15°13.5	190°17.3	-22°36.8
11	118°56.8	300°30.4	0°19.1	173°23.6	-26°11.5	256°47.6	-15°13.5	205°19.9	-22°36.8
12	133°59.3	315°30.6	0°17.9	188°26.7	-26°11.6	271°49.9	-15°13.6	220°22.5	-22°36.8
13	149°01.8	330°30.8	0°16.6	203°29.8	-26°11.8	286°52.1	-15°13.7	235°25.1	-22°36.8
14	164°04.2	345°31.0	0°15.4	218°33.0	-26°11.9	301°54.4	-15°13.7	250°27.7	-22°36.8
15	179°06.7	0°31.2	0°14.2	233°36.1	-26°12.0	316°56.7	-15°13.8	265°30.3	-22°36.8
16	194°09.2	15°31.4	0°13.0	248°39.2	-26°12.2	331°59.0	-15°13.9	280°32.9	-22°36.8
17	209°11.6	30°31.6	0°11.7	263°42.4	-26°12.3	347°01.3	-15°13.9	295°35.5	-22°36.9
18	224°14.1	45°31.8	0°10.5	278°45.5	-26°12.5	2°03.6	-15°14.0	310°38.1	-22°36.9
19	239°16.6	60°32.0	0°09.3	293°48.6	-26°12.6	17°05.8	-15°14.1	325°40.7	-22°36.9
20	254°19.0	75°32.2	0°08.0	308°51.8	-26°12.7	32°08.1	-15°14.1	340°43.3	-22°36.9
21	269°21.5	90°32.4	0°06.8	323°54.9	-26°12.9	47°10.4	-15°14.2	355°45.9	-22°36.9
22	284°24.0	105°32.6	0°05.6	338°58.0	-26°13.0	62°12.7	-15°14.3	10°48.4	-22°36.9
23	299°26.4	120°32.8	0°04.3	354°01.2	-26°13.1	77°15.0	-15°14.3	25°51.0	-22°36.9
Mer.pass.:3:05:		v0.2 d-1.2 m-4.2		v3.1 d-0.1 m-2.9		v2.3 d-0.1 m-1.9		v2.6 d-0.0 m0.2	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	314°28.9	135°33.0	0°03.1	9°04.3	-26°13.3	92°17.2	-15°14.4	40°53.6	-22°36.9
1	329°31.3	150°33.2	0°01.9	24°07.4	-26°13.4	107°19.5	-15°14.5	55°56.2	-22°36.9
2	344°33.8	165°33.4	0°00.7	39°10.6	-26°13.5	122°21.8	-15°14.5	70°58.8	-22°36.9
3	359°36.3	180°33.6	-0°00.6	54°13.7	-26°13.6	137°24.1	-15°14.6	86°01.4	-22°36.9
4	14°38.7	195°33.8	-0°01.8	69°16.8	-26°13.8	152°26.4	-15°14.7	101°04.0	-22°37.0
5	29°41.2	210°34.0	-0°03.0	84°20.0	-26°13.9	167°28.6	-15°14.7	116°06.6	-22°37.0
6	44°43.7	225°34.2	-0°04.3	99°23.1	-26°14.0	182°30.9	-15°14.8	131°09.2	-22°37.0
7	59°46.1	240°34.4	-0°05.5	114°26.2	-26°14.2	197°33.2	-15°14.8	146°11.8	-22°37.0
8	74°48.6	255°34.6	-0°06.7	129°29.3	-26°14.3	212°35.5	-15°14.9	161°14.4	-22°37.0
9	89°51.1	270°34.8	-0°07.9	144°32.5	-26°14.4	227°37.7	-15°15.0	176°16.9	-22°37.0
10	104°53.5	285°35.0	-0°09.2	159°35.6	-26°14.5	242°40.0	-15°15.0	191°19.5	-22°37.0
11	119°56.0	300°35.2	-0°10.4	174°38.7	-26°14.7	257°42.3	-15°15.1	206°22.1	-22°37.0
12	134°58.5	315°35.4	-0°11.6	189°41.8	-26°14.8	272°44.6	-15°15.2	221°24.7	-22°37.0
13	150°00.9	330°35.6	-0°12.9	204°44.9	-26°14.9	287°46.9	-15°15.2	236°27.3	-22°37.0
14	165°03.4	345°35.8	-0°14.1	219°48.1	-26°15.0	302°49.1	-15°15.3	251°29.9	-22°37.0
15	180°05.8	0°36.1	-0°15.3	234°51.2	-26°15.2	317°51.4	-15°15.4	266°32.5	-22°37.0
16	195°08.3	15°36.3	-0°16.5	249°54.3	-26°15.3	332°53.7	-15°15.4	281°35.1	-22°37.1
17	210°10.8	30°36.5	-0°17.8	264°57.4	-26°15.4	347°56.0	-15°15.5	296°37.7	-22°37.1
18	225°13.2	45°36.7	-0°19.0	280°00.6	-26°15.5	2°58.2	-15°15.6	311°40.2	-22°37.1
19	240°15.7	60°36.9	-0°20.2	295°03.7	-26°15.7	18°00.5	-15°15.6	326°42.8	-22°37.1
20	255°18.2	75°37.1	-0°21.5	310°06.8	-26°15.8	33°02.8	-15°15.7	341°45.4	-22°37.1
21	270°20.6	90°37.3	-0°22.7	325°09.9	-26°15.9	48°05.1	-15°15.8	356°48.0	-22°37.1
22	285°23.1	105°37.5	-0°23.9	340°13.0	-26°16.0	63°07.3	-15°15.8	11°50.6	-22°37.1
23	300°25.6	120°37.7	-0°25.1	355°16.1	-26°16.1	78°09.6	-15°15.9	26°53.2	-22°37.1
Mer.pass.:3:01:		v0.2 d-1.2 m-4.2		v3.1 d-0.1 m-2.9		v2.3 d-0.1 m-1.9		v2.6 d-0.0 m0.2	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	315°28.0	135°37.9	-0°26.4	10°19.3	-26°16.3	93°11.9	-15°16.0	41°55.8	-22°37.1
1	330°30.5	150°38.2	-0°27.6	25°22.4	-26°16.4	108°14.1	-15°16.1	56°58.4	-22°37.1
2	345°32.9	165°38.4	-0°28.8	40°25.5	-26°16.5	123°16.4	-15°16.1	72°01.0	-22°37.1
3	0°35.4	180°38.6	-0°30.1	55°28.6	-26°16.6	138°18.7	-15°16.2	87°03.5	-22°37.1
4	15°37.9	195°38.8	-0°31.3	70°31.7	-26°16.7	153°21.0	-15°16.3	102°06.1	-22°37.2
5	30°40.3	210°39.0	-0°32.5	85°34.8	-26°16.9	168°23.2	-15°16.3	117°08.7	-22°37.2
6	45°42.8	225°39.2	-0°33.7	100°37.9	-26°17.0	183°25.5	-15°16.4	132°11.3	-22°37.2
7	60°45.3	240°39.4	-0°35.0	115°41.0	-26°17.1	198°27.8	-15°16.5	147°13.9	-22°37.2
8	75°47.7	255°39.7	-0°36.2	130°44.2	-26°17.2	213°30.0	-15°16.5	162°16.5	-22°37.2
9	90°50.2	270°39.9	-0°37.4	145°47.3	-26°17.3	228°32.3	-15°16.6	177°19.1	-22°37.2
10	105°52.7	285°40.1	-0°38.7	160°50.4	-26°17.4	243°34.6	-15°16.7	192°21.6	-22°37.2
11	120°55.1	300°40.3	-0°39.9	175°53.5	-26°17.5	258°36.9	-15°16.7	207°24.2	-22°37.2
12	135°57.6	315°40.5	-0°41.1	190°56.6	-26°17.7	273°39.1	-15°16.8	222°26.8	-22°37.2
13	151°00.1	330°40.8	-0°42.3	205°59.7	-26°17.8	288°41.4	-15°16.9	237°29.4	-22°37.2
14	166°02.5	345°41.0	-0°43.6	221°02.8	-26°17.9	303°43.7	-15°16.9	252°32.0	-22°37.2
15	181°05.0	0°41.2	-0°44.8	236°05.9	-26°18.0	318°45.9	-15°17.0	267°34.6	-22°37.2
16	196°07.4	15°41.4	-0°46.0	251°09.0	-26°18.1	333°48.2	-15°17.1	282°37.2	-22°37.3
17	211°09.9	30°41.6	-0°47.2	266°12.1	-26°18.2	348°50.5	-15°17.1	297°39.7	-22°37.3
18	226°12.4	45°41.9	-0°48.5	281°15.2	-26°18.3	3°52.7	-15°17.2	312°42.3	-22°37.3
19	241°14.8	60°42.1	-0°49.7	296°18.3	-26°18.4	18°55.0	-15°17.3	327°44.9	-22°37.3
20	256°17.3	75°42.3	-0°50.9	311°21.4	-26°18.5	33°57.3	-15°17.3	342°47.5	-22°37.3
21	271°19.8	90°42.5	-0°52.2	326°24.5	-26°18.7	48°59.5	-15°17.4	357°50.1	-22°37.3
22	286°22.2	105°42.8	-0°53.4	341°27.6	-26°18.8	64°01.8	-15°17.5	12°52.7	-22°37.3
23	301°24.7	120°43.0	-0°54.6	356°30.7	-26°18.9	79°04.1	-15°17.6	27°55.3	-22°37.3
Mer.pass.:2:57:		v0.2 d-1.2 m-4.2		v3.1 d-0.1 m-2.9		v2.3 d-0.1 m-1.9		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.5
Ankaa	353°12.0	-42°12.1
Schedar	349°36.2	56°38.1
Diphda	348°52.1	-17°53.0
Achernar	335°24.0	-57°08.4
Hamal	327°56.8	23°32.8
Polaris	316°14.2	89°20.1
Akamar	315°15.7	-40°13.7
Menkar	314°11.4	4°09.7
Mirfak	308°35.4	49°55.2
Aldebaran	290°45.5	16°32.6
Rigel	281°08.9	-8°10.9
Capella	280°29.6	46°00.7
Bellatrix	278°28.5	6°21.9
Elnath	278°08.5	28°37.2
Alnilam	275°43.1	-1°11.5
Betelgeuse	270°57.8	7°24.5
Canopus	263°55.0	-52°42.3
Sirius	258°30.9	-16°44.3
Adara	255°10.1	-28°59.8
Procyon	244°56.3	5°10.8
Pollux	243°23.7	27°58.8
Avior	234°17.2	-59°34.1
Suhail	222°50.3	-43°30.4
Miaplacidus	221°39.9	-69°47.6
Alphard	217°53.0	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.0	61°39.3
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.6
Acrux	173°05.8	-63°12.2
Gacrux	171°57.3	-57°13.1
Alioth	166°18.0	55°51.9
Spica	158°27.7	-11°15.3
Alcaid	152°56.3	49°13.7
Hadar	148°43.0	-60°27.8
Menkent	148°03.5	-36°27.6
Arcturus	145°52.5	19°05.8
Rigil Kent.	139°47.0	-60°54.8
Zubenelg.	137°01.5	-16°07.0
Kochab	137°20.1	74°05.2
Alphecca	126°08.0	26°39.6
Antares	112°21.8	-26°28.2
Atria	107°20.1	-69°03.7
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.1	51°29.6
Kaus Aust.	83°38.8	-34°22.4
Vega	80°36.3	38°48.3
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.4
Deneb	49°28.6	45°20.9
Enif	33°43.4	9°57.7
Alnair	27°39.0	-46°52.1
Fomalhaut	15°19.9	-29°31.3
Scheat	13°49.7	28°11.0
Markab	13°34.6	15°18.3

2018/8/5	**SHA**	**Mer.pass**
Venus	181°58.6	14:58
Mars	54°19.3	23:24
Jupiter	137°52.7	17:52
Saturn	86°21.7	21:17

2018/8/6	**SHA**	**Mer.pass**
Venus	181°04.1	14:58
Mars	54°35.4	23:19
Jupiter	137°48.4	17:48
Saturn	86°24.7	21:13

2018/8/7	**SHA**	**Mer.pass**
Venus	180°09.9	14:57
Mars	54°51.2	23:14
Jupiter	137°43.9	17:45
Saturn	86°27.8	21:09

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°29.3	17°02.3	268°55.1	10.9	11°28.7	10.0	57.6
1	193°29.3	17°01.6	283°25.0	10.8	11°38.7	10.0	57.7
2	208°29.4	17°01.0	297°54.8	10.8	11°48.6	9.9	57.7
3	223°29.5	17°00.3	312°24.5	10.7	11°58.5	9.9	57.7
4	238°29.5	16°59.6	326°54.1	10.6	12°08.3	9.8	57.8
5	253°29.6	16°58.9	341°23.7	10.5	12°18.1	9.8	57.8
6	268°29.6	16°58.3	355°53.1	10.4	12°27.8	9.7	57.9
7	283°29.7	16°57.6	10°22.5	10.3	12°37.5	9.6	57.9
8	298°29.8	16°56.9	24°51.8	10.3	12°47.1	9.6	57.9
9	313°29.8	16°56.2	39°21.0	10.2	12°56.7	9.5	58.0
10	328°29.9	16°55.6	53°50.2	10.1	13°06.2	9.5	58.0
11	343°30.0	16°54.9	68°19.2	10.0	13°15.6	9.4	58.0
12	358°30.0	16°54.2	82°48.2	9.9	13°25.0	9.3	58.1
13	13°30.1	16°53.5	97°17.1	9.8	13°34.3	9.3	58.1
14	28°30.2	16°52.8	111°45.9	9.8	13°43.5	9.2	58.1
15	43°30.2	16°52.2	126°14.6	9.7	13°52.7	9.2	58.2
16	58°30.3	16°51.5	140°43.2	9.6	14°01.9	9.1	58.2
17	73°30.4	16°50.8	155°11.7	9.5	14°10.9	9.0	58.2
18	88°30.4	16°50.1	169°40.2	9.4	14°19.9	9.0	58.3
19	103°30.5	16°49.4	184°08.6	9.3	14°28.8	8.9	58.3
20	118°30.6	16°48.7	198°36.8	9.2	14°37.7	8.8	58.4
21	133°30.6	16°48.1	213°05.0	9.1	14°46.4	8.7	58.4
22	148°30.7	16°47.4	227°33.1	9.0	14°55.1	8.7	58.4
23	163°30.8	16°46.7	242°01.1	9.0	15°03.8	8.6	58.5
	SD.=15.8	d=-0.7	S.D.=15.7				

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°30.8	16°46.0	256°29.0	8.9	15°12.3	8.5	58.5
1	193°30.9	16°45.3	270°56.8	8.8	15°20.8	8.4	58.5
2	208°31.0	16°44.6	285°24.5	8.7	15°29.2	8.4	58.6
3	223°31.0	16°44.0	299°52.2	8.6	15°37.5	8.3	58.6
4	238°31.1	16°43.3	314°19.7	8.5	15°45.7	8.2	58.6
5	253°31.2	16°42.6	328°47.2	8.4	15°53.9	8.1	58.7
6	268°31.2	16°41.9	343°14.5	8.3	16°01.9	8.0	58.7
7	283°31.3	16°41.2	357°41.8	8.2	16°09.9	7.9	58.8
8	298°31.4	16°40.5	12°09.0	8.1	16°17.8	7.9	58.8
9	313°31.4	16°39.8	26°36.1	8.0	16°25.6	7.8	58.8
10	328°31.5	16°39.1	41°03.1	7.9	16°33.3	7.7	58.9
11	343°31.6	16°38.5	55°30.0	7.9	16°41.0	7.6	58.9
12	358°31.6	16°37.8	69°56.8	7.8	16°48.5	7.5	58.9
13	13°31.7	16°37.1	84°23.5	7.7	16°55.9	7.4	59.0
14	28°31.8	16°36.4	98°50.1	7.6	17°03.3	7.3	59.0
15	43°31.9	16°35.7	113°16.7	7.5	17°10.5	7.2	59.0
16	58°31.9	16°35.0	127°43.1	7.4	17°17.7	7.1	59.1
17	73°32.0	16°34.3	142°09.4	7.3	17°24.7	7.0	59.1
18	88°32.1	16°33.6	156°35.7	7.2	17°31.7	6.9	59.1
19	103°32.1	16°32.9	171°01.9	7.1	17°38.5	6.8	59.2
20	118°32.2	16°32.2	185°27.9	7.0	17°45.3	6.7	59.2
21	133°32.3	16°31.5	199°53.9	6.9	17°51.9	6.6	59.3
22	148°32.4	16°30.8	214°19.8	6.8	17°58.5	6.5	59.3
23	163°32.4	16°30.1	228°45.6	6.8	18°04.9	6.4	59.3
	SD.=15.8	d=-0.7	S.D.=16.0				

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°32.5	16°29.4	243°11.3	6.7	18°11.3	6.3	59.4
1	193°32.6	16°28.7	257°37.0	6.6	18°17.5	6.2	59.4
2	208°32.7	16°28.1	272°02.5	6.5	18°23.6	6.1	59.4
3	223°32.7	16°27.4	286°27.9	6.4	18°29.6	5.9	59.5
4	238°32.8	16°26.7	300°53.3	6.3	18°35.5	5.8	59.5
5	253°32.9	16°26.0	315°18.6	6.2	18°41.2	5.7	59.5
6	268°33.0	16°25.3	329°43.8	6.1	18°46.9	5.6	59.6
7	283°33.0	16°24.6	344°08.9	6.1	18°52.4	5.5	59.6
8	298°33.1	16°23.9	358°33.9	6.0	18°57.8	5.4	59.6
9	313°33.2	16°23.2	12°58.8	5.9	19°03.1	5.2	59.7
10	328°33.3	16°22.5	27°23.6	5.8	19°08.3	5.1	59.7
11	343°33.3	16°21.8	41°48.4	5.7	19°13.4	5.0	59.7
12	358°33.4	16°21.1	56°13.1	5.6	19°18.3	4.9	59.8
13	13°33.5	16°20.4	70°37.7	5.6	19°23.1	4.7	59.8
14	28°33.6	16°19.7	85°02.2	5.5	19°27.8	4.6	59.8
15	43°33.6	16°19.0	99°26.6	5.4	19°32.4	4.5	59.9
16	58°33.7	16°18.2	113°51.0	5.3	19°36.8	4.4	59.9
17	73°33.8	16°17.5	128°15.3	5.2	19°41.1	4.2	59.9
18	88°33.9	16°16.8	142°39.5	5.2	19°45.3	4.1	60.0
19	103°33.9	16°16.1	157°03.6	5.1	19°49.3	4.0	60.0
20	118°34.0	16°15.4	171°27.7	5.0	19°53.2	3.8	60.0
21	133°34.1	16°14.7	185°51.6	4.9	19°57.0	3.7	60.0
22	148°34.2	16°14.0	200°15.6	4.9	20°00.6	3.6	60.1
23	163°34.3	16°13.3	214°39.4	4.8	20°04.1	3.4	60.1
	SD.=15.8	d=-0.7	S.D.=16.2				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	00:57	23:01	–:–	–:–
70	–:–	–:–	02:04	22:02	–:–	–:–
68	–:–	–:–	02:39	21:29	–:–	–:–
66	–:–	01:23	03:04	21:05	22:42	–:–
64	–:–	02:06	03:24	20:46	22:02	–:–
62	–:–	02:34	03:39	20:31	21:35	–:–
60	01:15	02:55	03:52	20:18	21:14	22:51
58	01:54	03:12	04:03	20:07	20:57	22:14
56	02:20	03:27	04:13	19:57	20:43	21:49
54	02:40	03:39	04:22	19:49	20:32	21:30
52	02:56	03:49	04:29	19:41	20:21	21:14
50	03:10	03:59	04:36	19:35	20:12	21:01
45	03:36	04:18	04:51	19:20	19:53	20:34
40	03:56	04:33	05:03	19:08	19:38	20:14
35	04:12	04:46	05:13	18:58	19:26	19:59
30	04:26	04:56	05:22	18:49	19:15	19:46
20	04:46	05:14	05:37	18:34	18:58	19:25
10	05:02	05:28	05:50	18:21	18:43	19:09
0	05:16	05:41	06:02	18:09	18:31	18:56
-10	05:27	05:53	06:15	17:57	18:19	18:44
-20	05:38	06:04	06:27	17:45	18:08	18:34
-30	05:48	06:17	06:42	17:30	17:55	18:24
-35	05:53	06:24	06:50	17:22	17:49	18:19
-40	05:59	06:31	06:60	17:13	17:41	18:14
-45	06:04	06:39	07:11	17:02	17:33	18:08
-50	06:10	06:49	07:24	16:48	17:23	18:02
-52	06:13	06:54	07:30	16:42	17:19	17:59
-54	06:16	06:58	07:37	16:36	17:14	17:57
-56	06:19	07:04	07:45	16:28	17:09	17:54
-58	06:22	07:09	07:53	16:19	17:03	17:51
-60	06:26	07:16	08:03	16:10	16:57	17:47

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	21:14	20:26	–:–	15:55	18:36	–:–
70	21:44	21:35	21:11	15:26	17:28	19:54
68	22:07	22:12	22:26	15:04	16:52	18:39
66	22:25	22:38	23:04	14:47	16:26	18:02
64	22:39	22:59	23:30	14:34	16:06	17:35
62	22:52	23:15	23:51	14:22	15:50	17:15
60	23:02	23:29	–:–	14:13	15:37	16:58
58	23:11	23:41	–:–	14:04	15:26	16:44
56	23:19	23:52	–:–	13:57	15:16	16:32
54	23:27	–:–	00:01	13:50	15:07	16:22
52	23:33	–:–	00:09	13:44	14:59	16:13
50	23:39	–:–	00:17	13:39	14:52	16:04
45	23:52	–:–	00:32	13:27	14:37	15:46
40	–:–	00:02	00:46	13:18	14:25	15:32
35	–:–	00:11	00:57	13:09	14:14	15:20
30	–:–	00:19	01:07	13:02	14:05	15:09
20	–:–	00:33	01:23	12:50	13:49	14:51
10	–:–	00:45	01:38	12:39	13:35	14:35
0	00:05	00:57	01:52	12:29	13:23	14:20
-10	00:14	01:08	02:06	12:19	13:10	14:05
-20	00:23	01:21	02:21	12:09	12:56	13:49
-30	00:33	01:35	02:39	11:56	12:41	13:31
-35	00:39	01:43	02:49	11:49	12:32	13:20
-40	00:46	01:53	03:00	11:41	12:21	13:08
-45	00:54	02:04	03:14	11:32	12:09	12:54
-50	01:04	02:17	03:31	11:21	11:55	12:36
-52	01:09	02:24	03:39	11:16	11:48	12:28
-54	01:14	02:31	03:47	11:10	11:40	12:19
-56	01:20	02:39	03:57	11:04	11:32	12:09
-58	01:26	02:47	04:09	10:57	11:23	11:57
-60	01:33	02:58	04:22	10:49	11:12	11:44

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
5	06:03	06:00	12:06	06:17	18:42	23(42%)
6	05:57	05:53	12:05	07:09	19:37	24(31%)
7	05:50	05:46	12:05	08:05	20:35	25(21%)

August 08, 09 ,10 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	316°27.2	135°43.2	-0°55.8	11°33.8	-26°19.0	94°06.3	-15°17.6	42°57.8	-22°37.3
1	331°29.6	150°43.4	-0°57.1	26°36.9	-26°19.1	109°08.6	-15°17.7	58°00.4	-22°37.3
2	346°32.1	165°43.7	-0°58.3	41°40.0	-26°19.2	124°10.9	-15°17.8	73°03.0	-22°37.3
3	1°34.6	180°43.9	-0°59.5	56°43.1	-26°19.3	139°13.1	-15°17.8	88°05.6	-22°37.3
4	16°37.0	195°44.1	-1°00.7	71°46.2	-26°19.4	154°15.4	-15°17.9	103°08.2	-22°37.4
5	31°39.5	210°44.3	-1°02.0	86°49.3	-26°19.5	169°17.7	-15°18.0	118°10.8	-22°37.4
6	46°41.9	225°44.6	-1°03.2	101°52.4	-26°19.6	184°19.9	-15°18.0	133°13.3	-22°37.4
7	61°44.4	240°44.8	-1°04.4	116°55.5	-26°19.7	199°22.2	-15°18.1	148°15.9	-22°37.4
8	76°46.9	255°45.0	-1°05.6	131°58.6	-26°19.8	214°24.5	-15°18.2	163°18.5	-22°37.4
9	91°49.3	270°45.3	-1°06.9	147°01.7	-26°19.9	229°26.7	-15°18.2	178°21.1	-22°37.4
10	106°51.8	285°45.5	-1°08.1	162°04.7	-26°20.0	244°29.0	-15°18.3	193°23.7	-22°37.4
11	121°54.3	300°45.7	-1°09.3	177°07.8	-26°20.1	259°31.3	-15°18.4	208°26.3	-22°37.4
12	136°56.7	315°45.9	-1°10.5	192°10.9	-26°20.2	274°33.5	-15°18.5	223°28.8	-22°37.4
13	151°59.2	330°46.2	-1°11.8	207°14.0	-26°20.3	289°35.8	-15°18.5	238°31.4	-22°37.4
14	167°01.7	345°46.4	-1°13.0	222°17.1	-26°20.4	304°38.0	-15°18.6	253°34.0	-22°37.4
15	182°04.1	0°46.6	-1°14.2	237°20.2	-26°20.5	319°40.3	-15°18.7	268°36.6	-22°37.4
16	197°06.6	15°46.9	-1°15.5	252°23.3	-26°20.6	334°42.6	-15°18.7	283°39.2	-22°37.5
17	212°09.1	30°47.1	-1°16.7	267°26.4	-26°20.7	349°44.8	-15°18.8	298°41.8	-22°37.5
18	227°11.5	45°47.3	-1°17.9	282°29.4	-26°20.8	4°47.1	-15°18.9	313°44.3	-22°37.5
19	242°14.0	60°47.6	-1°19.1	297°32.5	-26°20.9	19°49.4	-15°18.9	328°46.9	-22°37.5
20	257°16.4	75°47.8	-1°20.4	312°35.6	-26°21.0	34°51.6	-15°19.0	343°49.5	-22°37.5
21	272°18.9	90°48.1	-1°21.6	327°38.7	-26°21.1	49°53.9	-15°19.1	358°52.1	-22°37.5
22	287°21.4	105°48.3	-1°22.8	342°41.8	-26°21.2	64°56.1	-15°19.2	13°54.7	-22°37.5
23	302°23.8	120°48.5	-1°24.0	357°44.8	-26°21.3	79°58.4	-15°19.2	28°57.2	-22°37.5
Mer.pass.:2:53:		v0.2 d-1.2 m-4.2		v3.1 d-0.1 m-2.9		v2.3 d-0.1 m-1.9		v2.6 d-0.0 m0.2	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	317°26.3	135°48.8	-1°25.3	12°47.9	-26°21.4	95°00.7	-15°19.3	43°59.8	-22°37.5
1	332°28.8	150°49.0	-1°26.5	27°51.0	-26°21.5	110°02.9	-15°19.4	59°02.4	-22°37.5
2	347°31.2	165°49.2	-1°27.7	42°54.1	-26°21.6	125°05.2	-15°19.4	74°05.0	-22°37.5
3	2°33.7	180°49.5	-1°28.9	57°57.2	-26°21.7	140°07.4	-15°19.5	89°07.6	-22°37.5
4	17°36.2	195°49.7	-1°30.2	73°00.2	-26°21.8	155°09.7	-15°19.6	104°10.1	-22°37.6
5	32°38.6	210°50.0	-1°31.4	88°03.3	-26°21.9	170°12.0	-15°19.7	119°12.7	-22°37.6
6	47°41.1	225°50.2	-1°32.6	103°06.4	-26°22.0	185°14.2	-15°19.7	134°15.3	-22°37.6
7	62°43.6	240°50.4	-1°33.8	118°09.5	-26°22.1	200°16.5	-15°19.8	149°17.9	-22°37.6
8	77°46.0	255°50.7	-1°35.1	133°12.5	-26°22.1	215°18.7	-15°19.9	164°20.5	-22°37.6
9	92°48.5	270°50.9	-1°36.3	148°15.6	-26°22.2	230°21.0	-15°19.9	179°23.0	-22°37.6
10	107°50.9	285°51.2	-1°37.5	163°18.7	-26°22.3	245°23.2	-15°20.0	194°25.6	-22°37.6
11	122°53.4	300°51.4	-1°38.7	178°21.7	-26°22.4	260°25.5	-15°20.1	209°28.2	-22°37.6
12	137°55.9	315°51.7	-1°39.9	193°24.8	-26°22.5	275°27.8	-15°20.2	224°30.8	-22°37.6
13	152°58.3	330°51.9	-1°41.2	208°27.9	-26°22.6	290°30.0	-15°20.2	239°33.4	-22°37.6
14	168°00.8	345°52.2	-1°42.4	223°30.9	-26°22.7	305°32.3	-15°20.3	254°35.9	-22°37.6
15	183°03.3	0°52.4	-1°43.6	238°34.0	-26°22.8	320°34.5	-15°20.4	269°38.5	-22°37.6
16	198°05.7	15°52.6	-1°44.8	253°37.1	-26°22.8	335°36.8	-15°20.4	284°41.1	-22°37.7
17	213°08.2	30°52.9	-1°46.1	268°40.1	-26°22.9	350°39.0	-15°20.5	299°43.7	-22°37.7
18	228°10.7	45°53.1	-1°47.3	283°43.2	-26°23.0	5°41.3	-15°20.6	314°46.3	-22°37.7
19	243°13.1	60°53.4	-1°48.5	298°46.3	-26°23.1	20°43.5	-15°20.7	329°48.8	-22°37.7
20	258°15.6	75°53.6	-1°49.7	313°49.3	-26°23.2	35°45.8	-15°20.7	344°51.4	-22°37.7
21	273°18.0	90°53.9	-1°51.0	328°52.4	-26°23.3	50°48.1	-15°20.8	359°54.0	-22°37.7
22	288°20.5	105°54.1	-1°52.2	343°55.4	-26°23.4	65°50.3	-15°20.9	14°56.6	-22°37.7
23	303°23.0	120°54.4	-1°53.4	358°58.5	-26°23.4	80°52.6	-15°21.0	29°59.1	-22°37.7
Mer.pass.:2:49:		v0.2 d-1.2 m-4.2		v3.1 d-0.1 m-2.9		v2.3 d-0.1 m-1.9		v2.6 d-0.0 m0.2	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	318°25.4	135°54.6	-1°54.6	14°01.6	-26°23.5	95°54.8	-15°21.0	45°01.7	-22°37.7
1	333°27.9	150°54.9	-1°55.8	29°04.6	-26°23.6	110°57.1	-15°21.1	60°04.3	-22°37.7
2	348°30.4	165°55.1	-1°57.1	44°07.7	-26°23.7	125°59.3	-15°21.2	75°06.9	-22°37.7
3	3°32.8	180°55.4	-1°58.3	59°10.7	-26°23.8	141°01.6	-15°21.2	90°09.4	-22°37.7
4	18°35.3	195°55.6	-1°59.5	74°13.8	-26°23.8	156°03.8	-15°21.3	105°12.0	-22°37.8
5	33°37.8	210°55.9	-2°00.7	89°16.8	-26°23.9	171°06.1	-15°21.4	120°14.6	-22°37.8
6	48°40.2	225°56.2	-2°02.0	104°19.9	-26°24.0	186°08.3	-15°21.5	135°17.2	-22°37.8
7	63°42.7	240°56.4	-2°03.2	119°22.9	-26°24.1	201°10.6	-15°21.5	150°19.8	-22°37.8
8	78°45.2	255°56.7	-2°04.4	134°26.0	-26°24.2	216°12.8	-15°21.6	165°22.3	-22°37.8
9	93°47.6	270°56.9	-2°05.6	149°29.0	-26°24.2	231°15.1	-15°21.7	180°24.9	-22°37.8
10	108°50.1	285°57.2	-2°06.8	164°32.1	-26°24.3	246°17.3	-15°21.8	195°27.5	-22°37.8
11	123°52.5	300°57.4	-2°08.1	179°35.1	-26°24.4	261°19.6	-15°21.8	210°30.1	-22°37.8
12	138°55.0	315°57.7	-2°09.3	194°38.2	-26°24.5	276°21.8	-15°21.9	225°32.6	-22°37.8
13	153°57.5	330°57.9	-2°10.5	209°41.2	-26°24.5	291°24.1	-15°22.0	240°35.2	-22°37.8
14	168°59.9	345°58.2	-2°11.7	224°44.3	-26°24.6	306°26.3	-15°22.1	255°37.8	-22°37.8
15	184°02.4	0°58.5	-2°13.0	239°47.3	-26°24.7	321°28.6	-15°22.1	270°40.4	-22°37.8
16	199°04.9	15°58.7	-2°14.2	254°50.4	-26°24.8	336°30.8	-15°22.2	285°42.9	-22°37.9
17	214°07.3	30°59.0	-2°15.4	269°53.4	-26°24.8	351°33.1	-15°22.3	300°45.5	-22°37.9
18	229°09.8	45°59.2	-2°16.6	284°56.4	-26°24.9	6°35.3	-15°22.4	315°48.1	-22°37.9
19	244°12.3	60°59.5	-2°17.8	299°59.5	-26°25.0	21°37.6	-15°22.4	330°50.7	-22°37.9
20	259°14.7	75°59.8	-2°19.1	315°02.5	-26°25.1	36°39.8	-15°22.5	345°53.2	-22°37.9
21	274°17.2	91°00.0	-2°20.3	330°05.6	-26°25.1	51°42.1	-15°22.6	0°55.8	-22°37.9
22	289°19.7	106°00.3	-2°21.5	345°08.6	-26°25.2	66°44.3	-15°22.6	15°58.4	-22°37.9
23	304°22.1	121°00.5	-2°22.7	0°11.6	-26°25.3	81°46.6	-15°22.7	31°01.0	-22°37.9
Mer.pass.:2:45:		v0.3 d-1.2 m-4.2		v3.1 d-0.1 m-2.8		v2.3 d-0.1 m-1.9		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.5
Ankaa	353°12.0	-42°12.1
Schedar	349°36.1	56°38.1
Diphda	348°52.1	-17°53.0
Achernar	335°24.0	-57°08.4
Hamal	327°56.7	23°32.8
Polaris	316°12.5	89°20.1
Akamar	315°15.7	-40°13.7
Menkar	314°11.4	4°09.7
Mirfak	308°35.4	49°55.2
Aldebaran	290°45.5	16°32.6
Rigel	281°08.9	-8°10.9
Capella	280°29.6	46°00.7
Bellatrix	278°28.4	6°21.9
Elnath	278°08.4	28°37.2
Alnilam	275°43.0	-1°11.5
Betelgeuse	270°57.7	7°24.5
Canopus	263°55.0	-52°42.3
Sirius	258°30.8	-16°44.3
Adara	255°10.1	-28°59.8
Procyon	244°56.3	5°10.8
Pollux	243°23.7	27°58.8
Avior	234°17.2	-59°34.1
Suhail	222°50.3	-43°30.4
Miaplacidus	221°39.9	-69°47.6
Alphard	217°53.0	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.0	61°39.3
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.6
Acrux	173°05.8	-63°12.2
Gacrux	171°57.3	-57°13.1
Alioth	166°18.0	55°51.9
Spica	158°27.7	-11°15.3
Alcaid	152°56.3	49°13.7
Hadar	148°43.0	-60°27.8
Menkent	148°03.5	-36°27.6
Arcturus	145°52.5	19°05.8
Rigil Kent.	139°47.0	-60°54.8
Zubenelg.	137°01.5	-16°07.0
Kochab	137°20.2	74°05.2
Alphecca	126°08.0	26°39.6
Antares	112°21.8	-26°28.2
Atria	107°20.2	-69°03.7
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.1
Etamin	90°44.1	51°29.6
Kaus Aust.	83°38.8	-34°22.4
Vega	80°36.3	38°48.3
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.4
Deneb	49°28.6	45°20.9
Enif	33°43.4	9°57.7
Alnair	27°38.9	-46°52.1
Fomalhaut	15°19.9	-29°31.3
Scheat	13°49.7	28°11.0
Markab	13°34.6	15°18.3

2018/8/8	**SHA**	**Mer.pass**
Venus	179°16.0	14:57
Mars	55°06.6	23:09
Jupiter	137°39.2	17:41
Saturn	86°30.7	21:05

2018/8/9	**SHA**	**Mer.pass**
Venus	178°22.5	14:57
Mars	55°21.6	23:04
Jupiter	137°34.4	17:37
Saturn	86°33.5	21:00

2018/8/1	**SHA**	**Mer.pass**
Venus	177°29.2	14:56
Mars	55°36.1	22:59
Jupiter	137°29.4	17:34
Saturn	86°36.3	20:56

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°34.3	16°12.6	229°03.2	4.7	20°07.5	3.3	60.1
1	193°34.4	16°11.9	243°26.9	4.7	20°10.7	3.2	60.2
2	208°34.5	16°11.2	257°50.5	4.6	20°13.8	3.0	60.2
3	223°34.6	16°10.5	272°14.1	4.5	20°16.8	2.9	60.2
4	238°34.7	16°09.8	286°37.6	4.5	20°19.6	2.7	60.3
5	253°34.7	16°09.1	301°01.0	4.4	20°22.3	2.6	60.3
6	268°34.8	16°08.4	315°24.4	4.3	20°24.8	2.5	60.3
7	283°34.9	16°07.6	329°47.7	4.3	20°27.2	2.3	60.3
8	298°35.0	16°06.9	344°11.0	4.2	20°29.4	2.2	60.4
9	313°35.1	16°06.2	358°34.2	4.2	20°31.5	2.0	60.4
10	328°35.1	16°05.5	12°57.3	4.1	20°33.5	1.9	60.4
11	343°35.2	16°04.8	27°20.4	4.1	20°35.3	1.7	60.4
12	358°35.3	16°04.1	41°43.4	4.0	20°36.9	1.6	60.5
13	13°35.4	16°03.4	56°06.4	4.0	20°38.4	1.4	60.5
14	28°35.5	16°02.7	70°29.4	3.9	20°39.8	1.3	60.5
15	43°35.6	16°02.0	84°52.3	3.9	20°41.0	1.1	60.6
16	58°35.6	16°01.2	99°15.1	3.8	20°42.1	1.0	60.6
17	73°35.7	16°00.5	113°37.9	3.8	20°43.0	0.8	60.6
18	88°35.8	15°59.8	128°00.7	3.7	20°43.8	0.7	60.6
19	103°35.9	15°59.1	142°23.4	3.7	20°44.4	0.5	60.6
20	118°36.0	15°58.4	156°46.1	3.7	20°44.8	0.4	60.7
21	133°36.1	15°57.7	171°08.8	3.6	20°45.1	0.2	60.7
22	148°36.1	15°56.9	185°31.4	3.6	20°45.3	0.1	60.7
23	163°36.2	15°56.2	199°54.0	3.6	20°45.3	-0.1	60.7
	SD.=15.8	d=-0.7	S.D.=16.4				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°36.3	15°55.5	214°16.5	3.5	20°45.1	-0.2	60.8
1	193°36.4	15°54.8	228°39.0	3.5	20°44.8	-0.4	60.8
2	208°36.5	15°54.1	243°01.5	3.5	20°44.4	-0.5	60.8
3	223°36.6	15°53.4	257°24.0	3.5	20°43.8	-0.7	60.8
4	238°36.7	15°52.6	271°46.5	3.4	20°43.0	-0.8	60.8
5	253°36.7	15°51.9	286°08.9	3.4	20°42.1	-1.0	60.9
6	268°36.8	15°51.2	300°31.3	3.4	20°41.0	-1.2	60.9
7	283°36.9	15°50.5	314°53.7	3.4	20°39.7	-1.3	60.9
8	298°37.0	15°49.8	329°16.1	3.4	20°38.4	-1.5	60.9
9	313°37.1	15°49.0	343°38.4	3.4	20°36.8	-1.6	60.9
10	328°37.2	15°48.3	358°00.8	3.3	20°35.1	-1.8	61.0
11	343°37.3	15°47.6	12°23.1	3.3	20°33.3	-1.9	61.0
12	358°37.4	15°46.9	26°45.5	3.3	20°31.2	-2.1	61.0
13	13°37.4	15°46.1	41°07.8	3.3	20°29.1	-2.2	61.0
14	28°37.5	15°45.4	55°30.1	3.3	20°26.8	-2.4	61.0
15	43°37.6	15°44.7	69°52.5	3.3	20°24.3	-2.6	61.0
16	58°37.7	15°44.0	84°14.8	3.3	20°21.6	-2.7	61.0
17	73°37.8	15°43.2	98°37.1	3.3	20°18.9	-2.9	61.1
18	88°37.9	15°42.5	112°59.5	3.3	20°15.9	-3.0	61.1
19	103°38.0	15°41.8	127°21.8	3.3	20°12.8	-3.2	61.1
20	118°38.1	15°41.1	141°44.2	3.4	20°09.6	-3.3	61.1
21	133°38.2	15°40.3	156°06.5	3.4	20°06.2	-3.5	61.1
22	148°38.2	15°39.6	170°28.9	3.4	20°02.6	-3.6	61.1
23	163°38.3	15°38.9	184°51.3	3.4	19°58.9	-3.8	61.1
	SD.=15.8	d=-0.7	S.D.=16.6				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°38.4	15°38.2	199°13.7	3.4	19°55.1	-3.9	61.1
1	193°38.5	15°37.4	213°36.1	3.4	19°51.1	-4.1	61.2
2	208°38.6	15°36.7	227°58.6	3.5	19°46.9	-4.2	61.2
3	223°38.7	15°36.0	242°21.0	3.5	19°42.6	-4.4	61.2
4	238°38.8	15°35.2	256°43.5	3.5	19°38.2	-4.5	61.2
5	253°38.9	15°34.5	271°06.1	3.5	19°33.5	-4.7	61.2
6	268°39.0	15°33.8	285°28.6	3.6	19°28.8	-4.8	61.2
7	283°39.1	15°33.1	299°51.2	3.6	19°23.9	-5.0	61.2
8	298°39.2	15°32.3	314°13.8	3.6	19°18.9	-5.1	61.2
9	313°39.3	15°31.6	328°36.4	3.7	19°13.7	-5.3	61.2
10	328°39.4	15°30.9	342°59.1	3.7	19°08.3	-5.4	61.2
11	343°39.4	15°30.1	357°21.8	3.7	19°02.9	-5.5	61.2
12	358°39.5	15°29.4	11°44.6	3.8	18°57.2	-5.7	61.2
13	13°39.6	15°28.7	26°07.3	3.8	18°51.5	-5.8	61.2
14	28°39.7	15°27.9	40°30.2	3.9	18°45.6	-6.0	61.2
15	43°39.8	15°27.2	54°53.1	3.9	18°39.5	-6.1	61.2
16	58°39.9	15°26.5	69°16.0	3.9	18°33.3	-6.3	61.2
17	73°40.0	15°25.7	83°38.9	4.0	18°27.0	-6.4	61.2
18	88°40.1	15°25.0	98°01.9	4.0	18°20.6	-6.5	61.2
19	103°40.2	15°24.2	112°25.0	4.1	18°14.0	-6.7	61.2
20	118°40.3	15°23.5	126°48.1	4.1	18°07.3	-6.8	61.2
21	133°40.4	15°22.8	141°11.3	4.2	18°00.4	-6.9	61.2
22	148°40.5	15°22.0	155°34.5	4.2	17°53.4	-7.1	61.2
23	163°40.6	15°21.3	169°57.7	4.3	17°46.3	-7.2	61.2
	SD.=15.8	d=-0.7	S.D.=16.7				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	01:35	22:28	–:–	–:–
70	–:–	–:–	02:23	21:43	–:–	–:–
68	–:–	00:26	02:53	21:14	23:23	–:–
66	–:–	01:45	03:15	20:53	22:20	–:–
64	–:–	02:20	03:33	20:36	21:47	–:–
62	00:24	02:45	03:47	20:22	21:23	23:28
60	01:34	03:05	03:60	20:10	21:04	22:31
58	02:07	03:20	04:10	19:60	20:49	22:01
56	02:30	03:33	04:19	19:51	20:36	21:39
54	02:48	03:45	04:27	19:43	20:25	21:21
52	03:03	03:55	04:34	19:36	20:15	21:06
50	03:16	04:03	04:41	19:29	20:06	20:54
45	03:41	04:22	04:54	19:16	19:48	20:29
40	04:00	04:36	05:06	19:05	19:34	20:10
35	04:15	04:48	05:15	18:55	19:22	19:55
30	04:28	04:58	05:24	18:47	19:12	19:43
20	04:48	05:15	05:38	18:33	18:56	19:23
10	05:03	05:29	05:51	18:20	18:42	19:08
0	05:16	05:41	06:02	18:09	18:30	18:55
-10	05:27	05:52	06:14	17:58	18:19	18:45
-20	05:36	06:03	06:26	17:46	18:08	18:35
-30	05:46	06:14	06:39	17:32	17:57	18:25
-35	05:51	06:21	06:47	17:24	17:51	18:21
-40	05:56	06:28	06:56	17:15	17:44	18:16
-45	06:01	06:35	07:06	17:05	17:36	18:11
-50	06:06	06:45	07:19	16:53	17:27	18:06
-52	06:08	06:49	07:25	16:47	17:23	18:03
-54	06:11	06:53	07:31	16:41	17:19	18:01
-56	06:13	06:58	07:38	16:34	17:14	17:58
-58	06:16	07:03	07:46	16:26	17:09	17:56
-60	06:19	07:09	07:55	16:16	17:03	17:53

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	–:–	–:–	–:–	–:–	–:–	22:51
70	–:–	23:15	–:–	–:–	22:10	21:43
68	23:07	–:–	00:35	20:07	20:51	21:06
66	23:53	–:–	01:13	19:21	20:12	20:40
64	–:–	00:23	01:39	18:51	19:45	20:19
62	–:–	00:45	01:60	18:29	19:24	20:03
60	00:08	01:03	02:17	18:10	19:07	19:49
58	00:22	01:19	02:31	17:55	18:53	19:37
56	00:35	01:32	02:43	17:42	18:41	19:26
54	00:46	01:43	02:54	17:31	18:30	19:17
52	00:55	01:53	03:03	17:21	18:20	19:09
50	01:04	02:02	03:11	17:12	18:12	19:02
45	01:22	02:21	03:29	16:53	17:53	18:46
40	01:37	02:36	03:44	16:38	17:38	18:33
35	01:49	02:49	03:56	16:24	17:26	18:21
30	02:00	03:01	04:07	16:13	17:15	18:12
20	02:19	03:20	04:25	15:54	16:56	17:55
10	02:36	03:37	04:41	15:37	16:39	17:40
0	02:51	03:53	04:56	15:21	16:23	17:26
-10	03:07	04:09	05:11	15:05	16:08	17:12
-20	03:24	04:26	05:27	14:48	15:51	16:57
-30	03:43	04:46	05:46	14:28	15:31	16:39
-35	03:54	04:58	05:56	14:17	15:20	16:29
-40	04:07	05:11	06:08	14:03	15:07	16:17
-45	04:23	05:26	06:23	13:48	14:52	16:04
-50	04:41	05:46	06:40	13:29	14:33	15:47
-52	04:50	05:55	06:49	13:20	14:24	15:39
-54	05:00	06:05	06:58	13:10	14:14	15:30
-56	05:12	06:16	07:08	12:58	14:02	15:20
-58	05:25	06:29	07:20	12:45	13:49	15:08
-60	05:40	06:45	07:34	12:30	13:34	14:55

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
8	05:43	05:39	12:05	09:05	21:36	26(12%)
9	05:35	05:31	12:05	10:08	22:39	27(6%)
10	05:26	05:22	12:05	11:11	23:41	28(1%)

August 11, 12 ,13 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	319°24.6	136°00.8	-2°23.9	15°14.7	-26°25.3	96°48.8	-15°22.8	46°03.5	-22°37.9
1	334°27.0	151°01.1	-2°25.2	30°17.7	-26°25.4	111°51.1	-15°22.9	61°06.1	-22°37.9
2	349°29.5	166°01.3	-2°26.4	45°20.7	-26°25.5	126°53.3	-15°22.9	76°08.7	-22°37.9
3	4°32.0	181°01.6	-2°27.6	60°23.8	-26°25.5	141°55.6	-15°23.0	91°11.2	-22°37.9
4	19°34.4	196°01.9	-2°28.8	75°26.8	-26°25.6	156°57.8	-15°23.1	106°13.8	-22°38.0
5	34°36.9	211°02.1	-2°30.0	90°29.8	-26°25.7	172°00.0	-15°23.2	121°16.4	-22°38.0
6	49°39.4	226°02.4	-2°31.3	105°32.9	-26°25.7	187°02.3	-15°23.2	136°19.0	-22°38.0
7	64°41.8	241°02.7	-2°32.5	120°35.9	-26°25.8	202°04.5	-15°23.3	151°21.5	-22°38.0
8	79°44.3	256°02.9	-2°33.7	135°38.9	-26°25.9	217°06.8	-15°23.4	166°24.1	-22°38.0
9	94°46.8	271°03.2	-2°34.9	150°41.9	-26°25.9	232°09.0	-15°23.5	181°26.7	-22°38.0
10	109°49.2	286°03.5	-2°36.1	165°45.0	-26°26.0	247°11.3	-15°23.5	196°29.3	-22°38.0
11	124°51.7	301°03.7	-2°37.3	180°48.0	-26°26.1	262°13.5	-15°23.6	211°31.8	-22°38.0
12	139°54.2	316°04.0	-2°38.6	195°51.0	-26°26.1	277°15.8	-15°23.7	226°34.4	-22°38.0
13	154°56.6	331°04.3	-2°39.8	210°54.0	-26°26.2	292°18.0	-15°23.8	241°37.0	-22°38.0
14	169°59.1	346°04.6	-2°41.0	225°57.0	-26°26.3	307°20.2	-15°23.8	256°39.5	-22°38.0
15	185°01.5	1°04.8	-2°42.2	241°00.1	-26°26.3	322°22.5	-15°23.9	271°42.1	-22°38.0
16	200°04.0	16°05.1	-2°43.4	256°03.1	-26°26.4	337°24.7	-15°24.0	286°44.7	-22°38.1
17	215°06.5	31°05.4	-2°44.7	271°06.1	-26°26.4	352°27.0	-15°24.1	301°47.3	-22°38.1
18	230°08.9	46°05.6	-2°45.9	286°09.1	-26°26.5	7°29.2	-15°24.1	316°49.8	-22°38.1
19	245°11.4	61°05.9	-2°47.1	301°12.1	-26°26.6	22°31.5	-15°24.2	331°52.4	-22°38.1
20	260°13.9	76°06.2	-2°48.3	316°15.1	-26°26.6	37°33.7	-15°24.3	346°55.0	-22°38.1
21	275°16.3	91°06.5	-2°49.5	331°18.2	-26°26.7	52°35.9	-15°24.4	1°57.5	-22°38.1
22	290°18.8	106°06.7	-2°50.7	346°21.2	-26°26.7	67°38.2	-15°24.5	17°00.1	-22°38.1
23	305°21.3	121°07.0	-2°52.0	1°24.2	-26°26.8	82°40.4	-15°24.5	32°02.7	-22°38.1
Mer.pass.:2:41:		v0.3 d-1.2 m-4.2		v3.0 d-0.1 m-2.8		v2.2 d-0.1 m-1.9		v2.6 d-0.0 m0.2	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	320°23.7	136°07.3	-2°53.2	16°27.2	-26°26.8	97°42.7	-15°24.6	47°05.2	-22°38.1
1	335°26.2	151°07.6	-2°54.4	31°30.2	-26°26.9	112°44.9	-15°24.7	62°07.8	-22°38.1
2	350°28.6	166°07.9	-2°55.6	46°33.2	-26°27.0	127°47.1	-15°24.8	77°10.4	-22°38.1
3	5°31.1	181°08.1	-2°56.8	61°36.2	-26°27.0	142°49.4	-15°24.8	92°13.0	-22°38.1
4	20°33.6	196°08.4	-2°58.0	76°39.2	-26°27.1	157°51.6	-15°24.9	107°15.5	-22°38.1
5	35°36.0	211°08.7	-2°59.3	91°42.2	-26°27.1	172°53.9	-15°25.0	122°18.1	-22°38.2
6	50°38.5	226°09.0	-3°00.5	106°45.2	-26°27.2	187°56.1	-15°25.1	137°20.7	-22°38.2
7	65°41.0	241°09.3	-3°01.7	121°48.2	-26°27.2	202°58.3	-15°25.1	152°23.2	-22°38.2
8	80°43.4	256°09.5	-3°02.9	136°51.2	-26°27.3	218°00.6	-15°25.2	167°25.8	-22°38.2
9	95°45.9	271°09.8	-3°04.1	151°54.2	-26°27.3	233°02.8	-15°25.3	182°28.4	-22°38.2
10	110°48.4	286°10.1	-3°05.3	166°57.2	-26°27.4	248°05.1	-15°25.4	197°30.9	-22°38.2
11	125°50.8	301°10.4	-3°06.5	182°00.2	-26°27.4	263°07.3	-15°25.4	212°33.5	-22°38.2
12	140°53.3	316°10.7	-3°07.8	197°03.2	-26°27.5	278°09.5	-15°25.5	227°36.1	-22°38.2
13	155°55.8	331°10.9	-3°09.0	212°06.2	-26°27.5	293°11.8	-15°25.6	242°38.6	-22°38.2
14	170°58.2	346°11.2	-3°10.2	227°09.2	-26°27.6	308°14.0	-15°25.7	257°41.2	-22°38.2
15	186°00.7	1°11.5	-3°11.4	242°12.2	-26°27.6	323°16.2	-15°25.8	272°43.8	-22°38.2
16	201°03.1	16°11.8	-3°12.6	257°15.2	-26°27.7	338°18.5	-15°25.8	287°46.3	-22°38.2
17	216°05.6	31°12.1	-3°13.8	272°18.2	-26°27.7	353°20.7	-15°25.9	302°48.9	-22°38.3
18	231°08.1	46°12.4	-3°15.1	287°21.2	-26°27.8	8°22.9	-15°26.0	317°51.5	-22°38.3
19	246°10.5	61°12.7	-3°16.3	302°24.2	-26°27.8	23°25.2	-15°26.1	332°54.0	-22°38.3
20	261°13.0	76°12.9	-3°17.5	317°27.2	-26°27.9	38°27.4	-15°26.1	347°56.6	-22°38.3
21	276°15.5	91°13.2	-3°18.7	332°30.2	-26°27.9	53°29.7	-15°26.2	2°59.2	-22°38.3
22	291°17.9	106°13.5	-3°19.9	347°33.1	-26°28.0	68°31.9	-15°26.3	18°01.7	-22°38.3
23	306°20.4	121°13.8	-3°21.1	2°36.1	-26°28.0	83°34.1	-15°26.4	33°04.3	-22°38.3
Mer.pass.:2:37:		v0.3 d-1.2 m-4.2		v3.0 d-0.1 m-2.7		v2.2 d-0.1 m-1.9		v2.6 d-0.0 m0.2	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	321°22.9	136°14.1	-3°22.3	17°39.1	-26°28.1	98°36.4	-15°26.5	48°06.9	-22°38.3
1	336°25.3	151°14.4	-3°23.5	32°42.1	-26°28.1	113°38.6	-15°26.5	63°09.4	-22°38.3
2	351°27.8	166°14.7	-3°24.8	47°45.1	-26°28.1	128°40.8	-15°26.6	78°12.0	-22°38.3
3	6°30.3	181°15.0	-3°26.0	62°48.1	-26°28.2	143°43.1	-15°26.7	93°14.6	-22°38.3
4	21°32.7	196°15.3	-3°27.2	77°51.0	-26°28.2	158°45.3	-15°26.8	108°17.1	-22°38.3
5	36°35.2	211°15.6	-3°28.4	92°54.0	-26°28.3	173°47.5	-15°26.8	123°19.7	-22°38.3
6	51°37.6	226°15.9	-3°29.6	107°57.0	-26°28.3	188°49.8	-15°26.9	138°22.3	-22°38.4
7	66°40.1	241°16.1	-3°30.8	122°60.0	-26°28.3	203°52.0	-15°27.0	153°24.8	-22°38.4
8	81°42.6	256°16.4	-3°32.0	138°02.9	-26°28.4	218°54.2	-15°27.1	168°27.4	-22°38.4
9	96°45.0	271°16.7	-3°33.2	153°05.9	-26°28.4	233°56.5	-15°27.2	183°30.0	-22°38.4
10	111°47.5	286°17.0	-3°34.5	168°08.9	-26°28.5	248°58.7	-15°27.2	198°32.5	-22°38.4
11	126°50.0	301°17.3	-3°35.7	183°11.9	-26°28.5	264°00.9	-15°27.3	213°35.1	-22°38.4
12	141°52.4	316°17.6	-3°36.9	198°14.8	-26°28.5	279°03.1	-15°27.4	228°37.7	-22°38.4
13	156°54.9	331°17.9	-3°38.1	213°17.8	-26°28.6	294°05.4	-15°27.5	243°40.2	-22°38.4
14	171°57.4	346°18.2	-3°39.3	228°20.8	-26°28.6	309°07.6	-15°27.6	258°42.8	-22°38.4
15	186°59.8	1°18.5	-3°40.5	243°23.7	-26°28.7	324°09.8	-15°27.6	273°45.4	-22°38.4
16	202°02.3	16°18.8	-3°41.7	258°26.7	-26°28.7	339°12.1	-15°27.7	288°47.9	-22°38.4
17	217°04.7	31°19.1	-3°42.9	273°29.7	-26°28.7	354°14.3	-15°27.8	303°50.5	-22°38.4
18	232°07.2	46°19.4	-3°44.1	288°32.6	-26°28.8	9°16.5	-15°27.9	318°53.0	-22°38.5
19	247°09.7	61°19.7	-3°45.4	303°35.6	-26°28.8	24°18.8	-15°27.9	333°55.6	-22°38.5
20	262°12.1	76°20.0	-3°46.6	318°38.5	-26°28.8	39°21.0	-15°28.0	348°58.2	-22°38.5
21	277°14.6	91°20.3	-3°47.8	333°41.5	-26°28.9	54°23.2	-15°28.1	4°00.7	-22°38.5
22	292°17.1	106°20.6	-3°49.0	348°44.5	-26°28.9	69°25.4	-15°28.2	19°03.3	-22°38.5
23	307°19.5	121°20.9	-3°50.2	3°47.4	-26°28.9	84°27.7	-15°28.3	34°05.9	-22°38.5
Mer.pass.:2:34:		v0.3 d-1.2 m-4.2		v3.0 d-0.0 m-2.7		v2.2 d-0.1 m-1.9		v2.6 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.5
Ankaa	353°12.0	-42°12.1
Schedar	349°36.1	56°38.1
Diphda	348°52.1	-17°53.0
Achernar	335°24.0	-57°08.4
Hamal	327°56.7	23°32.9
Polaris	316°11.0	89°20.1
Akamar	315°15.7	-40°13.7
Menkar	314°11.4	4°09.7
Mirfak	308°35.3	49°55.3
Aldebaran	290°45.5	16°32.6
Rigel	281°08.8	-8°10.8
Capella	280°29.5	46°00.7
Bellatrix	278°28.4	6°21.9
Elnath	278°08.4	28°37.2
Alnilam	275°43.0	-1°11.5
Betelgeuse	270°57.7	7°24.5
Canopus	263°55.0	-52°42.2
Sirius	258°30.8	-16°44.3
Adara	255°10.1	-28°59.8
Procyon	244°56.3	5°10.8
Pollux	243°23.7	27°58.8
Avior	234°17.2	-59°34.1
Suhail	222°50.3	-43°30.4
Miaplacidus	221°39.9	-69°47.6
Alphard	217°53.0	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.0	61°39.3
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.6
Acrux	173°05.8	-63°12.2
Gacrux	171°57.3	-57°13.1
Alioth	166°18.0	55°51.9
Spica	158°27.7	-11°15.3
Alcaid	152°56.3	49°13.7
Hadar	148°43.0	-60°27.8
Menkent	148°03.5	-36°27.6
Arcturus	145°52.5	19°05.8
Rigil Kent.	139°47.0	-60°54.8
Zubenelg.	137°01.6	-16°07.0
Kochab	137°20.3	74°05.2
Alphecca	126°08.0	26°39.6
Antares	112°21.8	-26°28.2
Atria	107°20.2	-69°03.7
Sabik	102°08.3	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.2
Etamin	90°44.2	51°29.6
Kaus Aust.	83°38.8	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.4
Deneb	49°28.6	45°21.0
Enif	33°43.4	9°57.7
Alnair	27°38.9	-46°52.1
Fomalhaut	15°19.9	-29°31.3
Scheat	13°49.7	28°11.0
Markab	13°34.5	15°18.3

2018/8/1	**SHA**	**Mer.pass**
Venus	176°36.2	14:56
Mars	55°50.1	22:54
Jupiter	137°24.2	17:30
Saturn	86°38.9	20:52

2018/8/1	**SHA**	**Mer.pass**
Venus	175°43.6	14:55
Mars	56°03.5	22:50
Jupiter	137°18.9	17:27
Saturn	86°41.5	20:48

2018/8/1	**SHA**	**Mer.pass**
Venus	174°51.2	14:55
Mars	56°16.3	22:45
Jupiter	137°13.5	17:23
Saturn	86°44.0	20:44

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h Sun Moon

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°40.7	15°20.6	184°21.1	4.4	17°39.0	-7.3	61.2
1	193°40.8	15°19.8	198°44.4	4.4	17°31.7	-7.4	61.2
2	208°40.9	15°19.1	213°07.9	4.5	17°24.2	-7.6	61.2
3	223°41.0	15°18.3	227°31.4	4.5	17°16.5	-7.7	61.2
4	238°41.1	15°17.6	241°54.9	4.6	17°08.8	-7.8	61.2
5	253°41.2	15°16.9	256°18.6	4.6	17°00.9	-7.9	61.2
6	268°41.3	15°16.1	270°42.2	4.7	16°52.9	-8.1	61.2
7	283°41.4	15°15.4	285°06.0	4.8	16°44.8	-8.2	61.2
8	298°41.5	15°14.6	299°29.8	4.8	16°36.5	-8.3	61.2
9	313°41.6	15°13.9	313°53.7	4.9	16°28.2	-8.4	61.2
10	328°41.7	15°13.1	328°17.6	5.0	16°19.7	-8.5	61.2
11	343°41.8	15°12.4	342°41.6	5.0	16°11.1	-8.6	61.2
12	358°41.9	15°11.7	357°05.7	5.1	16°02.5	-8.7	61.1
13	13°42.0	15°10.9	11°29.8	5.2	15°53.7	-8.9	61.1
14	28°42.1	15°10.2	25°54.0	5.2	15°44.7	-9.0	61.1
15	43°42.2	15°09.4	40°18.3	5.3	15°35.7	-9.1	61.1
16	58°42.3	15°08.7	54°42.7	5.4	15°26.6	-9.2	61.1
17	73°42.4	15°07.9	69°07.1	5.5	15°17.4	-9.3	61.1
18	88°42.5	15°07.2	83°31.6	5.5	15°08.0	-9.4	61.1
19	103°42.6	15°06.4	97°56.2	5.6	14°58.6	-9.5	61.1
20	118°42.7	15°05.7	112°20.8	5.7	14°49.0	-9.6	61.0
21	133°42.8	15°05.0	126°45.5	5.8	14°39.4	-9.7	61.0
22	148°42.9	15°04.2	141°10.3	5.8	14°29.7	-9.8	61.0
23	163°43.0	15°03.5	155°35.2	5.9	14°19.9	-9.9	61.0
	SD.=15.8	d=-0.7			S.D.=16.7		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°43.1	15°02.7	170°00.1	6.0	14°09.9	-10.0	61.0
1	193°43.2	15°02.0	184°25.2	6.1	13°59.9	-10.1	61.0
2	208°43.3	15°01.2	198°50.3	6.1	13°49.8	-10.1	61.0
3	223°43.4	15°00.5	213°15.4	6.2	13°39.6	-10.2	60.9
4	238°43.5	14°59.7	227°40.7	6.3	13°29.4	-10.3	60.9
5	253°43.6	14°59.0	242°06.0	6.4	13°19.0	-10.4	60.9
6	268°43.7	14°58.2	256°31.4	6.4	13°08.6	-10.5	60.9
7	283°43.8	14°57.5	270°56.9	6.5	12°58.0	-10.6	60.9
8	298°43.9	14°56.7	285°22.4	6.6	12°47.4	-10.6	60.8
9	313°44.0	14°56.0	299°48.1	6.7	12°36.7	-10.7	60.8
10	328°44.1	14°55.2	314°13.8	6.8	12°26.0	-10.8	60.8
11	343°44.2	14°54.4	328°39.6	6.8	12°15.2	-10.9	60.8
12	358°44.3	14°53.7	343°05.5	6.9	12°04.3	-10.9	60.8
13	13°44.4	14°52.9	357°31.4	7.0	11°53.3	-11.0	60.7
14	28°44.6	14°52.2	11°57.4	7.1	11°42.2	-11.1	60.7
15	43°44.7	14°51.4	26°23.5	7.1	11°31.1	-11.1	60.7
16	58°44.8	14°50.7	40°49.7	7.2	11°19.9	-11.2	60.7
17	73°44.9	14°49.9	55°16.0	7.3	11°08.7	-11.3	60.6
18	88°45.0	14°49.2	69°42.3	7.4	10°57.4	-11.3	60.6
19	103°45.1	14°48.4	84°08.7	7.5	10°46.0	-11.4	60.6
20	118°45.2	14°47.7	98°35.2	7.5	10°34.6	-11.5	60.6
21	133°45.3	14°46.9	113°01.8	7.6	10°23.1	-11.5	60.5
22	148°45.4	14°46.1	127°28.4	7.7	10°11.6	-11.6	60.5
23	163°45.5	14°45.4	141°55.2	7.8	9°60.0	-11.6	60.5
	SD.=15.8	d=-0.7			S.D.=16.6		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°45.6	14°44.6	156°22.0	7.8	9°48.3	-11.7	60.5
1	193°45.7	14°43.9	170°48.8	7.9	9°36.6	-11.7	60.4
2	208°45.8	14°43.1	185°15.8	8.0	9°24.9	-11.8	60.4
3	223°46.0	14°42.3	199°42.8	8.1	9°13.1	-11.8	60.4
4	238°46.1	14°41.6	214°09.9	8.1	9°01.2	-11.9	60.3
5	253°46.2	14°40.8	228°37.1	8.2	8°49.3	-11.9	60.3
6	268°46.3	14°40.1	243°04.3	8.3	8°37.4	-11.9	60.3
7	283°46.4	14°39.3	257°31.6	8.4	8°25.5	-12.0	60.3
8	298°46.5	14°38.5	271°59.0	8.4	8°13.4	-12.0	60.2
9	313°46.6	14°37.8	286°26.5	8.5	8°01.4	-12.1	60.2
10	328°46.7	14°37.0	300°54.1	8.6	7°49.3	-12.1	60.2
11	343°46.8	14°36.3	315°21.7	8.6	7°37.2	-12.1	60.1
12	358°47.0	14°35.5	329°49.4	8.7	7°25.0	-12.2	60.1
13	13°47.1	14°34.7	344°17.1	8.8	7°12.9	-12.2	60.1
14	28°47.2	14°34.0	358°44.9	8.9	7°00.7	-12.2	60.0
15	43°47.3	14°33.2	13°12.8	8.9	6°48.4	-12.3	60.0
16	58°47.4	14°32.4	27°40.8	9.0	6°36.1	-12.3	60.0
17	73°47.5	14°31.7	42°08.8	9.1	6°23.9	-12.3	59.9
18	88°47.6	14°30.9	56°36.9	9.1	6°11.5	-12.3	59.9
19	103°47.7	14°30.1	71°05.1	9.2	5°59.2	-12.3	59.9
20	118°47.9	14°29.4	85°33.3	9.3	5°46.8	-12.4	59.8
21	133°48.0	14°28.6	100°01.6	9.3	5°34.5	-12.4	59.8
22	148°48.1	14°27.8	114°30.0	9.4	5°22.1	-12.4	59.8
23	163°48.2	14°27.1	128°58.4	9.5	5°09.7	-12.4	59.7
	SD.=15.8	d=-0.8			S.D.=16.5		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	02:01	22:02	–:–	–:–
70	–:–	–:–	02:40	21:26	–:–	–:–
68	–:–	01:15	03:06	21:00	22:46	–:–
66	–:–	02:04	03:26	20:41	22:01	–:–
64	–:–	02:34	03:42	20:25	21:33	–:–
62	01:07	02:56	03:56	20:13	21:11	22:55
60	01:51	03:14	04:07	20:02	20:54	22:15
58	02:18	03:28	04:16	19:52	20:40	21:48
56	02:39	03:40	04:25	19:44	20:28	21:28
54	02:56	03:51	04:32	19:37	20:18	21:12
52	03:10	04:00	04:39	19:30	20:09	20:59
50	03:22	04:08	04:45	19:24	20:00	20:47
45	03:45	04:26	04:58	19:11	19:44	20:23
40	04:04	04:39	05:09	19:01	19:30	20:06
35	04:18	04:51	05:18	18:52	19:19	19:51
30	04:30	05:00	05:26	18:44	19:09	19:39
20	04:49	05:16	05:39	18:31	18:54	19:21
10	05:03	05:29	05:51	18:19	18:41	19:06
0	05:15	05:40	06:02	18:08	18:30	18:55
-10	05:26	05:51	06:12	17:58	18:19	18:45
-20	05:35	06:01	06:24	17:47	18:09	18:35
-30	05:44	06:12	06:37	17:34	17:59	18:27
-35	05:48	06:18	06:44	17:27	17:53	18:23
-40	05:52	06:24	06:52	17:18	17:46	18:18
-45	05:57	06:31	07:02	17:09	17:39	18:14
-50	06:01	06:40	07:14	16:57	17:31	18:09
-52	06:03	06:43	07:19	16:52	17:27	18:07
-54	06:06	06:47	07:25	16:46	17:23	18:05
-56	06:08	06:52	07:32	16:39	17:19	18:03
-58	06:10	06:57	07:39	16:32	17:14	18:01
-60	06:13	07:02	07:48	16:23	17:09	17:59

	Moonrise			Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	00:47	03:40	05:59	22:02	21:42	21:27
70	01:53	04:08	06:12	21:34	21:26	21:20
68	02:29	04:28	06:23	21:12	21:14	21:14
66	02:55	04:44	06:32	20:55	21:03	21:09
64	03:15	04:57	06:39	20:41	20:54	21:05
62	03:31	05:08	06:46	20:29	20:47	21:01
60	03:44	05:17	06:51	20:18	20:40	20:58
58	03:55	05:25	06:56	20:10	20:34	20:55
56	04:05	05:33	07:00	20:02	20:29	20:52
54	04:14	05:39	07:04	19:55	20:24	20:50
52	04:22	05:45	07:08	19:48	20:20	20:47
50	04:29	05:50	07:11	19:43	20:16	20:45
45	04:44	06:01	07:18	19:30	20:08	20:41
40	04:56	06:10	07:23	19:20	20:01	20:37
35	05:06	06:18	07:28	19:11	19:55	20:34
30	05:16	06:25	07:32	19:03	19:49	20:31
20	05:31	06:37	07:40	18:49	19:40	20:26
10	05:45	06:47	07:46	18:37	19:32	20:22
0	05:58	06:57	07:52	18:26	19:24	20:18
-10	06:11	07:06	07:59	18:15	19:16	20:14
-20	06:24	07:17	08:05	18:03	19:07	20:09
-30	06:40	07:28	08:12	17:49	18:57	20:04
-35	06:49	07:35	08:17	17:40	18:52	20:01
-40	06:59	07:43	08:21	17:31	18:45	19:57
-45	07:11	07:52	08:27	17:20	18:37	19:53
-50	07:26	08:02	08:33	17:07	18:28	19:48
-52	07:32	08:07	08:36	17:00	18:24	19:46
-54	07:40	08:13	08:40	16:53	18:19	19:44
-56	07:48	08:19	08:43	16:46	18:14	19:41
-58	07:58	08:26	08:47	16:37	18:08	19:38
-60	08:08	08:33	08:52	16:27	18:01	19:35

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
11	05:17	05:12	12:05	12:12	00:41	0(0%)
12	05:08	05:03	12:05	13:10	00:41	1(2%)
13	04:57	04:52	12:04	14:05	01:38	2(6%)

August 14, 15 ,16 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	322°22.0	136°21.2	-3°51.4	18°50.4	-26°29.0	99°29.9	-15°28.3	49°08.4	-22°38.5
1	337°24.5	151°21.5	-3°52.6	33°53.3	-26°29.0	114°32.1	-15°28.4	64°11.0	-22°38.5
2	352°26.9	166°21.8	-3°53.8	48°56.3	-26°29.0	129°34.4	-15°28.5	79°13.5	-22°38.5
3	7°29.4	181°22.1	-3°55.0	63°59.2	-26°29.0	144°36.6	-15°28.6	94°16.1	-22°38.5
4	22°31.9	196°22.4	-3°56.2	79°02.2	-26°29.1	159°38.8	-15°28.7	109°18.7	-22°38.5
5	37°34.3	211°22.8	-3°57.4	94°05.1	-26°29.1	174°41.0	-15°28.7	124°21.2	-22°38.5
6	52°36.8	226°23.1	-3°58.6	109°08.1	-26°29.1	189°43.3	-15°28.8	139°23.8	-22°38.5
7	67°39.2	241°23.4	-3°59.9	124°11.0	-26°29.2	204°45.5	-15°28.9	154°26.3	-22°38.6
8	82°41.7	256°23.7	-4°01.1	139°14.0	-26°29.2	219°47.7	-15°29.0	169°28.9	-22°38.6
9	97°44.2	271°24.0	-4°02.3	154°16.9	-26°29.2	234°49.9	-15°29.1	184°31.5	-22°38.6
10	112°46.6	286°24.3	-4°03.5	169°19.9	-26°29.2	249°52.2	-15°29.1	199°34.0	-22°38.6
11	127°49.1	301°24.6	-4°04.7	184°22.8	-26°29.3	264°54.4	-15°29.2	214°36.6	-22°38.6
12	142°51.6	316°24.9	-4°05.9	199°25.8	-26°29.3	279°56.6	-15°29.3	229°39.2	-22°38.6
13	157°54.0	331°25.2	-4°07.1	214°28.7	-26°29.3	294°58.8	-15°29.4	244°41.7	-22°38.6
14	172°56.5	346°25.5	-4°08.3	229°31.6	-26°29.3	310°01.1	-15°29.5	259°44.3	-22°38.6
15	187°59.0	1°25.8	-4°09.5	244°34.6	-26°29.4	325°03.3	-15°29.5	274°46.8	-22°38.6
16	203°01.4	16°26.2	-4°10.7	259°37.5	-26°29.4	340°05.5	-15°29.6	289°49.4	-22°38.6
17	218°03.9	31°26.5	-4°11.9	274°40.4	-26°29.4	355°07.7	-15°29.7	304°52.0	-22°38.6
18	233°06.3	46°26.8	-4°13.1	289°43.4	-26°29.4	10°10.0	-15°29.8	319°54.5	-22°38.6
19	248°08.8	61°27.1	-4°14.3	304°46.3	-26°29.4	25°12.2	-15°29.9	334°57.1	-22°38.7
20	263°11.3	76°27.4	-4°15.5	319°49.2	-26°29.5	40°14.4	-15°29.9	349°59.6	-22°38.7
21	278°13.7	91°27.7	-4°16.7	334°52.2	-26°29.5	55°16.6	-15°30.0	5°02.2	-22°38.7
22	293°16.2	106°28.0	-4°18.0	349°55.1	-26°29.5	70°18.8	-15°30.1	20°04.7	-22°38.7
23	308°18.7	121°28.4	-4°19.2	4°58.0	-26°29.5	85°21.1	-15°30.2	35°07.3	-22°38.7
Mer.pass.:2:30:		v0.3 d-1.2 m-4.2		v3.0 d-0.0 m-2.6		v2.2 d-0.1 m-1.9		v2.6 d-0.0 m0.3	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	323°21.1	136°28.7	-4°20.4	20°01.0	-26°29.5	100°23.3	-15°30.3	50°09.9	-22°38.7
1	338°23.6	151°29.0	-4°21.6	35°03.9	-26°29.6	115°25.5	-15°30.4	65°12.4	-22°38.7
2	353°26.1	166°29.3	-4°22.8	50°06.8	-26°29.6	130°27.7	-15°30.4	80°15.0	-22°38.7
3	8°28.5	181°29.6	-4°24.0	65°09.7	-26°29.6	145°30.0	-15°30.5	95°17.5	-22°38.7
4	23°31.0	196°30.0	-4°25.2	80°12.7	-26°29.6	160°32.2	-15°30.6	110°20.1	-22°38.7
5	38°33.5	211°30.3	-4°26.4	95°15.6	-26°29.6	175°34.4	-15°30.7	125°22.7	-22°38.7
6	53°35.9	226°30.6	-4°27.6	110°18.5	-26°29.6	190°36.6	-15°30.8	140°25.2	-22°38.7
7	68°38.4	241°30.9	-4°28.8	125°21.4	-26°29.7	205°38.8	-15°30.8	155°27.8	-22°38.7
8	83°40.8	256°31.2	-4°30.0	140°24.3	-26°29.7	220°41.1	-15°30.9	170°30.3	-22°38.8
9	98°43.3	271°31.6	-4°31.2	155°27.2	-26°29.7	235°43.3	-15°31.0	185°32.9	-22°38.8
10	113°45.8	286°31.9	-4°32.4	170°30.2	-26°29.7	250°45.5	-15°31.1	200°35.4	-22°38.8
11	128°48.2	301°32.2	-4°33.6	185°33.1	-26°29.7	265°47.7	-15°31.2	215°38.0	-22°38.8
12	143°50.7	316°32.5	-4°34.8	200°36.0	-26°29.7	280°49.9	-15°31.3	230°40.6	-22°38.8
13	158°53.2	331°32.9	-4°36.0	215°38.9	-26°29.7	295°52.1	-15°31.3	245°43.1	-22°38.8
14	173°55.6	346°33.2	-4°37.2	230°41.8	-26°29.8	310°54.4	-15°31.4	260°45.7	-22°38.8
15	188°58.1	1°33.5	-4°38.4	245°44.7	-26°29.8	325°56.6	-15°31.5	275°48.2	-22°38.8
16	204°00.6	16°33.8	-4°39.6	260°47.6	-26°29.8	340°58.8	-15°31.6	290°50.8	-22°38.8
17	219°03.0	31°34.2	-4°40.8	275°50.5	-26°29.8	356°01.0	-15°31.7	305°53.3	-22°38.8
18	234°05.5	46°34.5	-4°42.0	290°53.4	-26°29.8	11°03.2	-15°31.7	320°55.9	-22°38.8
19	249°07.9	61°34.8	-4°43.2	305°56.3	-26°29.8	26°05.5	-15°31.8	335°58.4	-22°38.8
20	264°10.4	76°35.1	-4°44.4	320°59.2	-26°29.8	41°07.7	-15°31.9	351°01.0	-22°38.8
21	279°12.9	91°35.5	-4°45.6	336°02.1	-26°29.8	56°09.9	-15°32.0	6°03.6	-22°38.9
22	294°15.3	106°35.8	-4°46.8	351°05.0	-26°29.8	71°12.1	-15°32.1	21°06.1	-22°38.9
23	309°17.8	121°36.1	-4°48.0	6°07.9	-26°29.8	86°14.3	-15°32.2	36°08.7	-22°38.9
Mer.pass.:2:26:		v0.3 d-1.2 m-4.2		v2.9 d-0.0 m-2.6		v2.2 d-0.1 m-1.9		v2.6 d-0.0 m0.3	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	324°20.3	136°36.5	-4°49.2	21°10.8	-26°29.8	101°16.5	-15°32.2	51°11.2	-22°38.9
1	339°22.7	151°36.8	-4°50.4	36°13.7	-26°29.8	116°18.7	-15°32.3	66°13.8	-22°38.9
2	354°25.2	166°37.1	-4°51.6	51°16.6	-26°29.8	131°21.0	-15°32.4	81°16.3	-22°38.9
3	9°27.7	181°37.5	-4°52.8	66°19.5	-26°29.9	146°23.2	-15°32.5	96°18.9	-22°38.9
4	24°30.1	196°37.8	-4°54.0	81°22.4	-26°29.9	161°25.4	-15°32.6	111°21.4	-22°38.9
5	39°32.6	211°38.1	-4°55.2	96°25.3	-26°29.9	176°27.6	-15°32.7	126°24.0	-22°38.9
6	54°35.1	226°38.5	-4°56.4	111°28.2	-26°29.9	191°29.8	-15°32.7	141°26.5	-22°38.9
7	69°37.5	241°38.8	-4°57.6	126°31.1	-26°29.9	206°32.0	-15°32.8	156°29.1	-22°38.9
8	84°40.0	256°39.1	-4°58.8	141°33.9	-26°29.9	221°34.2	-15°32.9	171°31.6	-22°38.9
9	99°42.4	271°39.5	-4°60.0	156°36.8	-26°29.9	236°36.5	-15°33.0	186°34.2	-22°38.9
10	114°44.9	286°39.8	-5°01.2	171°39.7	-26°29.9	251°38.7	-15°33.1	201°36.8	-22°39.0
11	129°47.4	301°40.2	-5°02.4	186°42.6	-26°29.9	266°40.9	-15°33.2	216°39.3	-22°39.0
12	144°49.8	316°40.5	-5°03.6	201°45.5	-26°29.9	281°43.1	-15°33.2	231°41.9	-22°39.0
13	159°52.3	331°40.8	-5°04.8	216°48.4	-26°29.9	296°45.3	-15°33.3	246°44.4	-22°39.0
14	174°54.8	346°41.2	-5°06.0	231°51.2	-26°29.9	311°47.5	-15°33.4	261°47.0	-22°39.0
15	189°57.2	1°41.5	-5°07.2	246°54.1	-26°29.9	326°49.7	-15°33.5	276°49.5	-22°39.0
16	204°59.7	16°41.8	-5°08.4	261°57.0	-26°29.9	341°51.9	-15°33.6	291°52.1	-22°39.0
17	220°02.2	31°42.2	-5°09.6	276°59.9	-26°29.9	356°54.2	-15°33.7	306°54.6	-22°39.0
18	235°04.6	46°42.5	-5°10.8	292°02.7	-26°29.9	11°56.4	-15°33.7	321°57.2	-22°39.0
19	250°07.1	61°42.9	-5°12.0	307°05.6	-26°29.9	26°58.6	-15°33.8	336°59.7	-22°39.0
20	265°09.6	76°43.2	-5°13.2	322°08.5	-26°29.9	42°00.8	-15°33.9	352°02.3	-22°39.0
21	280°12.0	91°43.6	-5°14.3	337°11.3	-26°29.8	57°03.0	-15°34.0	7°04.8	-22°39.0
22	295°14.5	106°43.9	-5°15.5	352°14.2	-26°29.8	72°05.2	-15°34.1	22°07.4	-22°39.0
23	310°16.9	121°44.3	-5°16.7	7°17.1	-26°29.8	87°07.4	-15°34.2	37°09.9	-22°39.1
Mer.pass.:2:22:		v0.3 d-1.2 m-4.2		v2.9 d-0.0 m-2.6		v2.2 d-0.1 m-1.9		v2.6 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.5
Ankaa	353°11.9	-42°12.2
Schedar	349°36.1	56°38.1
Diphda	348°52.0	-17°53.0
Achernar	335°23.9	-57°08.4
Hamal	327°56.7	23°32.9
Polaris	316°09.7	89°20.1
Akamar	315°15.6	-40°13.7
Menkar	314°11.3	4°09.7
Mirfak	308°35.3	49°55.3
Aldebaran	290°45.5	16°32.7
Rigel	281°08.8	-8°10.8
Capella	280°29.5	46°00.7
Bellatrix	278°28.4	6°21.9
Elnath	278°08.4	28°37.2
Alnilam	275°43.0	-1°11.5
Betelgeuse	270°57.7	7°24.5
Canopus	263°55.0	-52°42.2
Sirius	258°30.8	-16°44.3
Adara	255°10.1	-28°59.8
Procyon	244°56.3	5°10.8
Pollux	243°23.7	27°58.8
Avior	234°17.2	-59°34.1
Suhail	222°50.3	-43°30.4
Miaplacidus	221°39.9	-69°47.6
Alphard	217°53.0	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.1	61°39.3
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.6
Acrux	173°05.8	-63°12.2
Gacrux	171°57.4	-57°13.1
Alioth	166°18.0	55°51.9
Spica	158°27.7	-11°15.3
Alcaid	152°56.3	49°13.7
Hadar	148°43.1	-60°27.8
Menkent	148°03.6	-36°27.6
Arcturus	145°52.5	19°05.8
Rigil Kent.	139°47.0	-60°54.8
Zubenelg.	137°01.6	-16°07.0
Kochab	137°20.3	74°05.2
Alphecca	126°08.0	26°39.6
Antares	112°21.8	-26°28.2
Atria	107°20.2	-69°03.7
Sabik	102°08.4	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.2
Etamin	90°44.2	51°29.6
Kaus Aust.	83°38.9	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.4
Deneb	49°28.6	45°21.0
Enif	33°43.4	9°57.7
Alnair	27°38.9	-46°52.1
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.7	28°11.0
Markab	13°34.5	15°18.3

2018/8/1	**SHA**	**Mer.pass**
Venus	173°59.2	14:54
Mars	56°28.4	22:40
Jupiter	137°07.9	17:19
Saturn	86°46.4	20:40

2018/8/1	**SHA**	**Mer.pass**
Venus	173°07.6	14:54
Mars	56°39.8	22:36
Jupiter	137°02.2	17:16
Saturn	86°48.7	20:36

2018/8/1	**SHA**	**Mer.pass**
Venus	172°16.2	14:53
Mars	56°50.6	22:31
Jupiter	136°56.3	17:12
Saturn	86°50.9	20:32

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°48.3	14°26.3	143°26.9	9.5	4°57.2	-12.4	59.7
1	193°48.4	14°25.5	157°55.5	9.6	4°44.8	-12.4	59.7
2	208°48.5	14°24.8	172°24.1	9.7	4°32.3	-12.5	59.6
3	223°48.7	14°24.0	186°52.8	9.7	4°19.9	-12.5	59.6
4	238°48.8	14°23.2	201°21.6	9.8	4°07.4	-12.5	59.5
5	253°48.9	14°22.5	215°50.4	9.8	3°54.9	-12.5	59.5
6	268°49.0	14°21.7	230°19.2	9.9	3°42.4	-12.5	59.5
7	283°49.1	14°20.9	244°48.2	10.0	3°30.0	-12.5	59.4
8	298°49.2	14°20.1	259°17.2	10.0	3°17.5	-12.5	59.4
9	313°49.4	14°19.4	273°46.2	10.1	3°05.0	-12.5	59.4
10	328°49.5	14°18.6	288°15.3	10.1	2°52.5	-12.5	59.3
11	343°49.6	14°17.8	302°44.5	10.2	2°40.0	-12.5	59.3
12	358°49.7	14°17.0	317°13.7	10.2	2°27.5	-12.5	59.3
13	13°49.8	14°16.3	331°43.0	10.3	2°15.0	-12.5	59.2
14	28°49.9	14°15.5	346°12.3	10.4	2°02.5	-12.5	59.2
15	43°50.1	14°14.7	0°41.7	10.4	1°50.0	-12.5	59.1
16	58°50.2	14°14.0	15°11.1	10.5	1°37.5	-12.5	59.1
17	73°50.3	14°13.2	29°40.6	10.5	1°25.1	-12.5	59.1
18	88°50.4	14°12.4	44°10.1	10.6	1°12.6	-12.5	59.0
19	103°50.5	14°11.6	58°39.7	10.6	1°00.2	-12.4	59.0
20	118°50.7	14°10.9	73°09.3	10.7	0°47.7	-12.4	58.9
21	133°50.8	14°10.1	87°39.0	10.7	0°35.3	-12.4	58.9
22	148°50.9	14°09.3	102°08.7	10.8	0°22.9	-12.4	58.9
23	163°51.0	14°08.5	116°38.5	10.8	0°10.5	-12.4	58.8
	SD.=15.8	d=-0.8	S.D.=16.3				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°51.1	14°07.7	131°08.4	10.8	-0°01.9	-12.4	58.8
1	193°51.3	14°07.0	145°38.2	10.9	-0°14.2	-12.4	58.8
2	208°51.4	14°06.2	160°08.1	10.9	-0°26.6	-12.3	58.7
3	223°51.5	14°05.4	174°38.1	11.0	-0°38.9	-12.3	58.7
4	238°51.6	14°04.6	189°08.1	11.0	-0°51.2	-12.3	58.6
5	253°51.7	14°03.9	203°38.1	11.1	-1°03.5	-12.3	58.6
6	268°51.9	14°03.1	218°08.2	11.1	-1°15.8	-12.2	58.6
7	283°52.0	14°02.3	232°38.4	11.1	-1°28.0	-12.2	58.5
8	298°52.1	14°01.5	247°08.5	11.2	-1°40.2	-12.2	58.5
9	313°52.2	14°00.7	261°38.7	11.2	-1°52.4	-12.2	58.4
10	328°52.4	13°59.9	276°09.0	11.3	-2°04.5	-12.1	58.4
11	343°52.5	13°59.2	290°39.3	11.3	-2°16.7	-12.1	58.4
12	358°52.6	13°58.4	305°09.6	11.3	-2°28.8	-12.1	58.3
13	13°52.7	13°57.6	319°39.9	11.4	-2°40.8	-12.1	58.3
14	28°52.8	13°56.8	334°10.3	11.4	-2°52.9	-12.0	58.2
15	43°53.0	13°56.0	348°40.8	11.4	-3°04.9	-12.0	58.2
16	58°53.1	13°55.3	3°11.2	11.5	-3°16.8	-12.0	58.2
17	73°53.2	13°54.5	17°41.7	11.5	-3°28.8	-11.9	58.1
18	88°53.3	13°53.7	32°12.2	11.5	-3°40.7	-11.9	58.1
19	103°53.5	13°52.9	46°42.8	11.6	-3°52.5	-11.8	58.0
20	118°53.6	13°52.1	61°13.4	11.6	-4°04.4	-11.8	58.0
21	133°53.7	13°51.3	75°44.0	11.6	-4°16.2	-11.8	58.0
22	148°53.8	13°50.5	90°14.7	11.7	-4°27.9	-11.7	57.9
23	163°54.0	13°49.8	104°45.3	11.7	-4°39.6	-11.7	57.9
	SD.=15.8	d=-0.8	S.D.=16.0				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°54.1	13°49.0	119°16.0	11.7	-4°51.3	-11.7	57.8
1	193°54.2	13°48.2	133°46.8	11.7	-5°02.9	-11.6	57.8
2	208°54.3	13°47.4	148°17.5	11.8	-5°14.5	-11.6	57.8
3	223°54.5	13°46.6	162°48.3	11.8	-5°26.1	-11.5	57.7
4	238°54.6	13°45.8	177°19.1	11.8	-5°37.6	-11.5	57.7
5	253°54.7	13°45.0	191°49.9	11.8	-5°49.0	-11.4	57.6
6	268°54.9	13°44.2	206°20.8	11.9	-6°00.4	-11.4	57.6
7	283°55.0	13°43.5	220°51.7	11.9	-6°11.8	-11.3	57.6
8	298°55.1	13°42.7	235°22.6	11.9	-6°23.1	-11.3	57.5
9	313°55.2	13°41.9	249°53.5	11.9	-6°34.4	-11.2	57.5
10	328°55.4	13°41.1	264°24.4	12.0	-6°45.6	-11.2	57.5
11	343°55.5	13°40.3	278°55.4	12.0	-6°56.8	-11.1	57.4
12	358°55.6	13°39.5	293°26.4	12.0	-7°07.9	-11.1	57.4
13	13°55.8	13°38.7	307°57.4	12.0	-7°19.0	-11.0	57.3
14	28°55.9	13°37.9	322°28.4	12.0	-7°30.0	-11.0	57.3
15	43°56.0	13°37.1	336°59.4	12.0	-7°41.0	-10.9	57.3
16	58°56.1	13°36.3	351°30.5	12.1	-7°51.9	-10.9	57.2
17	73°56.3	13°35.5	6°01.5	12.1	-8°02.8	-10.8	57.2
18	88°56.4	13°34.7	20°32.6	12.1	-8°13.6	-10.8	57.1
19	103°56.5	13°33.9	35°03.7	12.1	-8°24.3	-10.7	57.1
20	118°56.7	13°33.2	49°34.8	12.1	-8°35.0	-10.7	57.1
21	133°56.8	13°32.4	64°05.9	12.1	-8°45.7	-10.6	57.0
22	148°56.9	13°31.6	78°37.1	12.1	-8°56.2	-10.6	57.0
23	163°57.1	13°30.8	93°08.2	12.2	-9°06.8	-10.5	57.0
	SD.=15.8	d=-0.8	S.D.=15.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	02:24	21:40	–:–	–:–
70	–:–	–:–	02:56	21:09	–:–	–:–
68	–:–	01:43	03:19	20:47	22:19	–:–
66	–:–	02:21	03:37	20:29	21:44	–:–
64	–:–	02:47	03:52	20:15	21:19	–:–
62	01:31	03:06	04:04	20:03	20:60	22:32
60	02:06	03:22	04:14	19:53	20:44	21:59
58	02:30	03:36	04:23	19:45	20:31	21:36
56	02:48	03:47	04:31	19:37	20:20	21:18
54	03:04	03:57	04:38	19:30	20:11	21:03
52	03:17	04:06	04:44	19:24	20:02	20:51
50	03:28	04:13	04:49	19:18	19:54	20:40
45	03:50	04:29	05:02	19:07	19:39	20:18
40	04:07	04:42	05:11	18:57	19:26	20:01
35	04:21	04:53	05:20	18:49	19:15	19:47
30	04:32	05:02	05:27	18:41	19:06	19:36
20	04:50	05:17	05:40	18:29	18:52	19:19
10	05:04	05:29	05:51	18:18	18:40	19:05
0	05:15	05:40	06:01	18:08	18:29	18:54
-10	05:25	05:50	06:11	17:58	18:20	18:44
-20	05:33	05:59	06:22	17:47	18:10	18:36
-30	05:41	06:09	06:34	17:36	18:00	18:28
-35	05:45	06:15	06:41	17:29	17:55	18:25
-40	05:49	06:20	06:48	17:21	17:49	18:21
-45	05:52	06:27	06:57	17:12	17:43	18:17
-50	05:57	06:35	07:08	17:01	17:35	18:13
-52	05:58	06:38	07:13	16:56	17:32	18:12
-54	05:60	06:42	07:19	16:51	17:28	18:10
-56	06:02	06:46	07:25	16:45	17:24	18:08
-58	06:04	06:50	07:32	16:38	17:20	18:06
-60	06:06	06:55	07:40	16:30	17:15	18:04

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	08:04	10:03	11:59	21:15	21:02	20:49
70	08:09	09:60	11:47	21:14	21:08	21:02
68	08:13	09:57	11:38	21:14	21:13	21:12
66	08:16	09:55	11:31	21:13	21:17	21:21
64	08:18	09:53	11:25	21:13	21:21	21:29
62	08:21	09:52	11:20	21:13	21:24	21:35
60	08:23	09:50	11:15	21:12	21:27	21:41
58	08:24	09:49	11:11	21:12	21:29	21:46
56	08:26	09:48	11:07	21:12	21:31	21:51
54	08:27	09:47	11:04	21:12	21:33	21:55
52	08:28	09:46	11:01	21:12	21:35	21:58
50	08:30	09:45	10:58	21:11	21:36	22:02
45	08:32	09:44	10:53	21:11	21:40	22:09
40	08:34	09:42	10:48	21:11	21:43	22:15
35	08:36	09:41	10:44	21:11	21:45	22:20
30	08:38	09:40	10:40	21:10	21:48	22:25
20	08:40	09:38	10:34	21:10	21:52	22:33
10	08:43	09:37	10:29	21:10	21:55	22:40
0	08:45	09:35	10:24	21:09	21:58	22:47
-10	08:47	09:34	10:19	21:09	22:02	22:53
-20	08:50	09:32	10:13	21:08	22:05	23:00
-30	08:53	09:31	10:07	21:08	22:09	23:08
-35	08:54	09:30	10:04	21:07	22:11	23:13
-40	08:56	09:28	10:00	21:07	22:14	23:19
-45	08:58	09:27	09:56	21:07	22:17	23:25
-50	09:01	09:26	09:51	21:06	22:21	23:32
-52	09:02	09:25	09:48	21:06	22:22	23:36
-54	09:03	09:24	09:45	21:05	22:24	23:40
-56	09:04	09:24	09:43	21:05	22:26	23:44
-58	09:06	09:23	09:39	21:05	22:28	23:49
-60	09:08	09:22	09:36	21:04	22:31	23:54

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
14	04:47	04:41	12:04	14:57	02:31	3(13%)
15	04:35	04:30	12:04	15:46	03:22	4(22%)
16	04:24	04:17	12:04	16:35	04:11	5(32%)

August 17, 18 ,19 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	325°19.4	136°44.6	-5°17.9	22°19.9	-26°29.8	102°09.6	-15°34.2	52°12.5	-22°39.1
1	340°21.9	151°44.9	-5°19.1	37°22.8	-26°29.8	117°11.8	-15°34.3	67°15.0	-22°39.1
2	355°24.3	166°45.3	-5°20.3	52°25.7	-26°29.8	132°14.0	-15°34.4	82°17.6	-22°39.1
3	10°26.8	181°45.6	-5°21.5	67°28.5	-26°29.8	147°16.3	-15°34.5	97°20.1	-22°39.1
4	25°29.3	196°46.0	-5°22.7	82°31.4	-26°29.8	162°18.5	-15°34.6	112°22.7	-22°39.1
5	40°31.7	211°46.3	-5°23.9	97°34.2	-26°29.8	177°20.7	-15°34.7	127°25.2	-22°39.1
6	55°34.2	226°46.7	-5°25.1	112°37.1	-26°29.8	192°22.9	-15°34.8	142°27.8	-22°39.1
7	70°36.7	241°47.0	-5°26.3	127°40.0	-26°29.8	207°25.1	-15°34.8	157°30.3	-22°39.1
8	85°39.1	256°47.4	-5°27.5	142°42.8	-26°29.8	222°27.3	-15°34.9	172°32.9	-22°39.1
9	100°41.6	271°47.7	-5°28.7	157°45.7	-26°29.8	237°29.5	-15°35.0	187°35.4	-22°39.1
10	115°44.0	286°48.1	-5°29.9	172°48.5	-26°29.7	252°31.7	-15°35.1	202°38.0	-22°39.1
11	130°46.5	301°48.4	-5°31.1	187°51.4	-26°29.7	267°33.9	-15°35.2	217°40.5	-22°39.1
12	145°49.0	316°48.8	-5°32.2	202°54.2	-26°29.7	282°36.1	-15°35.3	232°43.1	-22°39.2
13	160°51.4	331°49.1	-5°33.4	217°57.1	-26°29.7	297°38.3	-15°35.3	247°45.6	-22°39.2
14	175°53.9	346°49.5	-5°34.6	232°59.9	-26°29.7	312°40.5	-15°35.4	262°48.2	-22°39.2
15	190°56.4	1°49.9	-5°35.8	248°02.7	-26°29.7	327°42.7	-15°35.5	277°50.7	-22°39.2
16	205°58.8	16°50.2	-5°37.0	263°05.6	-26°29.7	342°44.9	-15°35.6	292°53.3	-22°39.2
17	221°01.3	31°50.6	-5°38.2	278°08.4	-26°29.6	357°47.1	-15°35.7	307°55.8	-22°39.2
18	236°03.8	46°50.9	-5°39.4	293°11.3	-26°29.6	12°49.4	-15°35.8	322°58.4	-22°39.2
19	251°06.2	61°51.3	-5°40.6	308°14.1	-26°29.6	27°51.6	-15°35.9	338°00.9	-22°39.2
20	266°08.7	76°51.6	-5°41.8	323°17.0	-26°29.6	42°53.8	-15°35.9	353°03.5	-22°39.2
21	281°11.2	91°52.0	-5°43.0	338°19.8	-26°29.6	57°56.0	-15°36.0	8°06.0	-22°39.2
22	296°13.6	106°52.4	-5°44.1	353°22.6	-26°29.6	72°58.2	-15°36.1	23°08.6	-22°39.2
23	311°16.1	121°52.7	-5°45.3	8°25.5	-26°29.5	88°00.4	-15°36.2	38°11.1	-22°39.2
Mer.pass.:2:18:		v0.3 d-1.2 m-4.2		v2.9 d0.0 m-2.6		v2.2 d-0.1 m-1.9		v2.6 d-0.0 m0.3	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	326°18.5	136°53.1	-5°46.5	23°28.3	-26°29.5	103°02.6	-15°36.3	53°13.6	-22°39.2
1	341°21.0	151°53.4	-5°47.7	38°31.1	-26°29.5	118°04.8	-15°36.4	68°16.2	-22°39.3
2	356°23.5	166°53.8	-5°48.9	53°33.9	-26°29.5	133°07.0	-15°36.5	83°18.7	-22°39.3
3	11°25.9	181°54.2	-5°50.1	68°36.8	-26°29.5	148°09.2	-15°36.5	98°21.3	-22°39.3
4	26°28.4	196°54.5	-5°51.3	83°39.6	-26°29.4	163°11.4	-15°36.6	113°23.8	-22°39.3
5	41°30.9	211°54.9	-5°52.5	98°42.4	-26°29.4	178°13.6	-15°36.7	128°26.4	-22°39.3
6	56°33.3	226°55.2	-5°53.6	113°45.3	-26°29.4	193°15.8	-15°36.8	143°28.9	-22°39.3
7	71°35.8	241°55.6	-5°54.8	128°48.1	-26°29.4	208°18.0	-15°36.9	158°31.5	-22°39.3
8	86°38.3	256°56.0	-5°56.0	143°50.9	-26°29.4	223°20.2	-15°37.0	173°34.0	-22°39.3
9	101°40.7	271°56.3	-5°57.2	158°53.7	-26°29.3	238°22.4	-15°37.1	188°36.6	-22°39.3
10	116°43.2	286°56.7	-5°58.4	173°56.5	-26°29.3	253°24.6	-15°37.2	203°39.1	-22°39.3
11	131°45.7	301°57.1	-5°59.6	188°59.4	-26°29.3	268°26.8	-15°37.2	218°41.6	-22°39.3
12	146°48.1	316°57.4	-6°00.8	204°02.2	-26°29.3	283°29.0	-15°37.3	233°44.2	-22°39.3
13	161°50.6	331°57.8	-6°01.9	219°05.0	-26°29.2	298°31.2	-15°37.4	248°46.7	-22°39.3
14	176°53.0	346°58.2	-6°03.1	234°07.8	-26°29.2	313°33.4	-15°37.5	263°49.3	-22°39.4
15	191°55.5	1°58.6	-6°04.3	249°10.6	-26°29.2	328°35.6	-15°37.6	278°51.8	-22°39.4
16	206°58.0	16°58.9	-6°05.5	264°13.4	-26°29.2	343°37.8	-15°37.7	293°54.4	-22°39.4
17	222°00.4	31°59.3	-6°06.7	279°16.2	-26°29.1	358°40.0	-15°37.8	308°56.9	-22°39.4
18	237°02.9	46°59.7	-6°07.9	294°19.0	-26°29.1	13°42.2	-15°37.8	323°59.5	-22°39.4
19	252°05.4	62°00.0	-6°09.0	309°21.8	-26°29.1	28°44.4	-15°37.9	339°02.0	-22°39.4
20	267°07.8	77°00.4	-6°10.2	324°24.6	-26°29.1	43°46.6	-15°38.0	354°04.5	-22°39.4
21	282°10.3	92°00.8	-6°11.4	339°27.4	-26°29.0	58°48.8	-15°38.1	9°07.1	-22°39.4
22	297°12.8	107°01.2	-6°12.6	354°30.2	-26°29.0	73°51.0	-15°38.2	24°09.6	-22°39.4
23	312°15.2	122°01.5	-6°13.8	9°33.0	-26°29.0	88°53.2	-15°38.3	39°12.2	-22°39.4
Mer.pass.:2:14:		v0.4 d-1.2 m-4.3		v2.8 d0.0 m-2.5		v2.2 d-0.1 m-1.9		v2.5 d-0.0 m0.3	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	327°17.7	137°01.9	-6°15.0	24°35.8	-26°28.9	103°55.4	-15°38.4	54°14.7	-22°39.4
1	342°20.1	152°02.3	-6°16.1	39°38.6	-26°28.9	118°57.6	-15°38.5	69°17.3	-22°39.4
2	357°22.6	167°02.7	-6°17.3	54°41.4	-26°28.9	133°59.8	-15°38.5	84°19.8	-22°39.4
3	12°25.1	182°03.0	-6°18.5	69°44.2	-26°28.8	149°02.0	-15°38.6	99°22.3	-22°39.4
4	27°27.5	197°03.4	-6°19.7	84°47.0	-26°28.8	164°04.2	-15°38.7	114°24.9	-22°39.5
5	42°30.0	212°03.8	-6°20.9	99°49.8	-26°28.8	179°06.4	-15°38.8	129°27.4	-22°39.5
6	57°32.5	227°04.2	-6°22.0	114°52.6	-26°28.7	194°08.6	-15°38.9	144°30.0	-22°39.5
7	72°34.9	242°04.6	-6°23.2	129°55.4	-26°28.7	209°10.8	-15°39.0	159°32.5	-22°39.5
8	87°37.4	257°04.9	-6°24.4	144°58.2	-26°28.7	224°12.9	-15°39.1	174°35.0	-22°39.5
9	102°39.9	272°05.3	-6°25.6	160°01.0	-26°28.6	239°15.1	-15°39.2	189°37.6	-22°39.5
10	117°42.3	287°05.7	-6°26.8	175°03.8	-26°28.6	254°17.3	-15°39.2	204°40.1	-22°39.5
11	132°44.8	302°06.1	-6°27.9	190°06.5	-26°28.6	269°19.5	-15°39.3	219°42.7	-22°39.5
12	147°47.3	317°06.5	-6°29.1	205°09.3	-26°28.5	284°21.7	-15°39.4	234°45.2	-22°39.5
13	162°49.7	332°06.8	-6°30.3	220°12.1	-26°28.5	299°23.9	-15°39.5	249°47.8	-22°39.5
14	177°52.2	347°07.2	-6°31.5	235°14.9	-26°28.5	314°26.1	-15°39.6	264°50.3	-22°39.5
15	192°54.6	2°07.6	-6°32.7	250°17.7	-26°28.4	329°28.3	-15°39.7	279°52.8	-22°39.5
16	207°57.1	17°08.0	-6°33.8	265°20.4	-26°28.4	344°30.5	-15°39.8	294°55.4	-22°39.5
17	222°59.6	32°08.4	-6°35.0	280°23.2	-26°28.3	359°32.7	-15°39.9	309°57.9	-22°39.6
18	238°02.0	47°08.8	-6°36.2	295°26.0	-26°28.3	14°34.9	-15°40.0	325°00.5	-22°39.6
19	253°04.5	62°09.2	-6°37.4	310°28.8	-26°28.3	29°37.1	-15°40.0	340°03.0	-22°39.6
20	268°07.0	77°09.5	-6°38.5	325°31.5	-26°28.2	44°39.3	-15°40.1	355°05.5	-22°39.6
21	283°09.4	92°09.9	-6°39.7	340°34.3	-26°28.2	59°41.5	-15°40.2	10°08.1	-22°39.6
22	298°11.9	107°10.3	-6°40.9	355°37.1	-26°28.1	74°43.7	-15°40.3	25°10.6	-22°39.6
23	313°14.4	122°10.7	-6°42.1	10°39.8	-26°28.1	89°45.9	-15°40.4	40°13.1	-22°39.6
Mer.pass.:2:10:		v0.4 d-1.2 m-4.3		v2.8 d0.0 m-2.5		v2.2 d-0.1 m-1.9		v2.5 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.5
Ankaa	353°11.9	-42°12.2
Schedar	349°36.1	56°38.1
Diphda	348°52.0	-17°53.0
Achernar	335°23.9	-57°08.4
Hamal	327°56.7	23°32.9
Polaris	316°08.2	89°20.1
Akamar	315°15.6	-40°13.7
Menkar	314°11.3	4°09.7
Mirfak	308°35.3	49°55.3
Aldebaran	290°45.4	16°32.7
Rigel	281°08.8	-8°10.8
Capella	280°29.5	46°00.7
Bellatrix	278°28.4	6°21.9
Elnath	278°08.4	28°37.2
Alnilam	275°43.0	-1°11.5
Betelgeuse	270°57.7	7°24.5
Canopus	263°55.0	-52°42.2
Sirius	258°30.8	-16°44.3
Adara	255°10.0	-28°59.8
Procyon	244°56.3	5°10.8
Pollux	243°23.7	27°58.8
Avior	234°17.2	-59°34.1
Suhail	222°50.3	-43°30.4
Miaplacidus	221°39.9	-69°47.6
Alphard	217°53.0	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.1	61°39.2
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.6
Acrux	173°05.9	-63°12.2
Gacrux	171°57.4	-57°13.1
Alioth	166°18.0	55°51.9
Spica	158°27.7	-11°15.3
Alcaid	152°56.4	49°13.7
Hadar	148°43.1	-60°27.8
Menkent	148°03.6	-36°27.6
Arcturus	145°52.5	19°05.8
Rigil Kent.	139°47.1	-60°54.7
Zubenelg.	137°01.6	-16°06.9
Kochab	137°20.4	74°05.2
Alphecca	126°08.1	26°39.6
Antares	112°21.8	-26°28.2
Atria	107°20.3	-69°03.7
Sabik	102°08.4	-15°44.7
Shaula	96°16.9	-37°06.9
Rasalhague	96°03.0	12°33.2
Etamin	90°44.2	51°29.6
Kaus Aust.	83°38.9	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.4
Deneb	49°28.6	45°21.0
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.1
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.7	28°11.0
Markab	13°34.5	15°18.4

2018/8/1	**SHA**	**Mer.pass**
Venus	171°25.2	14:53
Mars	57°00.5	22:26
Jupiter	136°50.2	17:09
Saturn	86°53.1	20:28

2018/8/1	**SHA**	**Mer.pass**
Venus	170°34.5	14:52
Mars	57°09.7	22:22
Jupiter	136°44.0	17:05
Saturn	86°55.1	20:24

2018/8/1	**SHA**	**Mer.pass**
Venus	169°44.2	14:51
Mars	57°18.2	22:17
Jupiter	136°37.7	17:02
Saturn	86°57.0	20:20

Horizontal paralax	
Venus:	0.2
Mars:	0.4

h Sun Moon

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°57.2	13°30.0	107°39.4	12.2	-9°17.2	-10.4	56.9
1	193°57.3	13°29.2	122°10.6	12.2	-9°27.6	-10.4	56.9
2	208°57.5	13°28.4	136°41.7	12.2	-9°38.0	-10.3	56.8
3	223°57.6	13°27.6	151°12.9	12.2	-9°48.3	-10.3	56.8
4	238°57.7	13°26.8	165°44.1	12.2	-9°58.5	-10.2	56.8
5	253°57.9	13°26.0	180°15.3	12.2	-10°08.6	-10.1	56.7
6	268°58.0	13°25.2	194°46.5	12.2	-10°18.7	-10.1	56.7
7	283°58.1	13°24.4	209°17.7	12.2	-10°28.8	-10.0	56.7
8	298°58.3	13°23.6	223°49.0	12.2	-10°38.8	-9.9	56.6
9	313°58.4	13°22.8	238°20.2	12.2	-10°48.7	-9.9	56.6
10	328°58.5	13°22.0	252°51.4	12.2	-10°58.5	-9.8	56.6
11	343°58.7	13°21.2	267°22.7	12.2	-11°08.3	-9.7	56.5
12	358°58.8	13°20.4	281°53.9	12.2	-11°18.0	-9.7	56.5
13	13°58.9	13°19.6	296°25.2	12.3	-11°27.7	-9.6	56.5
14	28°59.1	13°18.8	310°56.4	12.3	-11°37.2	-9.5	56.4
15	43°59.2	13°18.0	325°27.7	12.3	-11°46.7	-9.5	56.4
16	58°59.3	13°17.2	339°59.0	12.3	-11°56.2	-9.4	56.4
17	73°59.5	13°16.4	354°30.2	12.3	-12°05.6	-9.3	56.3
18	88°59.6	13°15.6	9°01.5	12.3	-12°14.9	-9.3	56.3
19	103°59.7	13°14.8	23°32.8	12.3	-12°24.1	-9.2	56.3
20	118°59.9	13°14.0	38°04.0	12.3	-12°33.3	-9.1	56.2
21	134°00.0	13°13.2	52°35.3	12.3	-12°42.4	-9.1	56.2
22	149°00.1	13°12.4	67°06.5	12.3	-12°51.4	-9.0	56.2
23	164°00.3	13°11.6	81°37.8	12.3	-13°00.3	-8.9	56.1
	SD.=15.8	d=-0.8			S.D.=15.5		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°00.4	13°10.8	96°09.1	12.3	-13°09.2	-8.8	56.1
1	194°00.6	13°10.0	110°40.3	12.3	-13°18.0	-8.8	56.1
2	209°00.7	13°09.2	125°11.6	12.3	-13°26.7	-8.7	56.0
3	224°00.8	13°08.4	139°42.9	12.3	-13°35.4	-8.6	56.0
4	239°01.0	13°07.5	154°14.1	12.3	-13°44.0	-8.5	56.0
5	254°01.1	13°06.7	168°45.4	12.3	-13°52.5	-8.5	55.9
6	269°01.2	13°05.9	183°16.6	12.2	-14°00.9	-8.4	55.9
7	284°01.4	13°05.1	197°47.9	12.2	-14°09.3	-8.3	55.9
8	299°01.5	13°04.3	212°19.1	12.2	-14°17.6	-8.2	55.8
9	314°01.7	13°03.5	226°50.4	12.2	-14°25.8	-8.2	55.8
10	329°01.8	13°02.7	241°21.6	12.2	-14°33.9	-8.1	55.8
11	344°01.9	13°01.9	255°52.8	12.2	-14°41.9	-8.0	55.8
12	359°02.1	13°01.1	270°24.0	12.2	-14°49.9	-7.9	55.7
13	14°02.2	13°00.3	284°55.3	12.2	-14°57.8	-7.9	55.7
14	29°02.4	12°59.5	299°26.5	12.2	-15°05.6	-7.8	55.7
15	44°02.5	12°58.7	313°57.7	12.2	-15°13.4	-7.7	55.6
16	59°02.6	12°57.8	328°28.9	12.2	-15°21.0	-7.6	55.6
17	74°02.8	12°57.0	343°00.1	12.2	-15°28.6	-7.5	55.6
18	89°02.9	12°56.2	357°31.3	12.2	-15°36.1	-7.5	55.6
19	104°03.1	12°55.4	12°02.4	12.2	-15°43.5	-7.4	55.5
20	119°03.2	12°54.6	26°33.6	12.2	-15°50.8	-7.3	55.5
21	134°03.3	12°53.8	41°04.8	12.2	-15°58.1	-7.2	55.5
22	149°03.5	12°53.0	55°35.9	12.2	-16°05.2	-7.1	55.4
23	164°03.6	12°52.2	70°07.1	12.1	-16°12.3	-7.0	55.4
	SD.=15.8	d=-0.8			S.D.=15.3		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°03.8	12°51.4	84°38.2	12.1	-16°19.3	-7.0	55.4
1	194°03.9	12°50.5	99°09.4	12.1	-16°26.2	-6.9	55.4
2	209°04.1	12°49.7	113°40.5	12.1	-16°33.1	-6.8	55.3
3	224°04.2	12°48.9	128°11.6	12.1	-16°39.8	-6.7	55.3
4	239°04.3	12°48.1	142°42.7	12.1	-16°46.5	-6.6	55.3
5	254°04.5	12°47.3	157°13.8	12.1	-16°53.1	-6.5	55.3
6	269°04.6	12°46.5	171°44.9	12.1	-16°59.6	-6.5	55.2
7	284°04.8	12°45.6	186°16.0	12.1	-17°06.0	-6.4	55.2
8	299°04.9	12°44.8	200°47.1	12.1	-17°12.3	-6.3	55.2
9	314°05.1	12°44.0	215°18.1	12.1	-17°18.5	-6.2	55.2
10	329°05.2	12°43.2	229°49.2	12.1	-17°24.7	-6.1	55.1
11	344°05.4	12°42.4	244°20.2	12.0	-17°30.7	-6.0	55.1
12	359°05.5	12°41.6	258°51.3	12.0	-17°36.7	-5.9	55.1
13	14°05.6	12°40.7	273°22.3	12.0	-17°42.6	-5.8	55.1
14	29°05.8	12°39.9	287°53.3	12.0	-17°48.4	-5.8	55.0
15	44°05.9	12°39.1	302°24.3	12.0	-17°54.1	-5.7	55.0
16	59°06.1	12°38.3	316°55.3	12.0	-17°59.7	-5.6	55.0
17	74°06.2	12°37.5	331°26.3	12.0	-18°05.3	-5.5	55.0
18	89°06.4	12°36.7	345°57.3	12.0	-18°10.7	-5.4	55.0
19	104°06.5	12°35.8	0°28.3	12.0	-18°16.1	-5.3	54.9
20	119°06.7	12°35.0	14°59.3	12.0	-18°21.3	-5.2	54.9
21	134°06.8	12°34.2	29°30.2	12.0	-18°26.5	-5.1	54.9
22	149°07.0	12°33.4	44°01.2	11.9	-18°31.6	-5.0	54.9
23	164°07.1	12°32.6	58°32.1	11.9	-18°36.6	-4.9	54.9
	SD.=15.8	d=-0.8			S.D.=15.1		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	02:44	21:19	–:–	–:–
70	–:–	01:12	03:11	20:53	22:45	–:–
68	–:–	02:05	03:32	20:33	21:58	–:–
66	–:–	02:36	03:48	20:18	21:28	–:–
64	01:03	02:59	04:01	20:05	21:06	22:55
62	01:50	03:16	04:12	19:54	20:49	22:12
60	02:19	03:31	04:21	19:45	20:34	21:45
58	02:40	03:43	04:29	19:37	20:22	21:25
56	02:57	03:54	04:37	19:30	20:12	21:08
54	03:11	04:03	04:43	19:24	20:03	20:55
52	03:23	04:11	04:49	19:18	19:55	20:43
50	03:34	04:18	04:54	19:13	19:48	20:33
45	03:55	04:33	05:05	19:02	19:33	20:12
40	04:11	04:46	05:14	18:53	19:21	19:56
35	04:24	04:56	05:22	18:45	19:12	19:43
30	04:34	05:04	05:29	18:38	19:03	19:33
20	04:51	05:18	05:41	18:27	18:49	19:16
10	05:04	05:29	05:51	18:17	18:38	19:03
0	05:15	05:39	06:01	18:07	18:28	18:53
-10	05:23	05:48	06:10	17:58	18:19	18:44
-20	05:31	05:57	06:20	17:48	18:11	18:37
-30	05:38	06:06	06:31	17:37	18:02	18:30
-35	05:42	06:11	06:37	17:31	17:57	18:27
-40	05:45	06:17	06:44	17:24	17:52	18:23
-45	05:48	06:22	06:53	17:16	17:46	18:20
-50	05:51	06:29	07:03	17:06	17:39	18:17
-52	05:53	06:32	07:07	17:01	17:36	18:16
-54	05:54	06:36	07:12	16:56	17:33	18:15
-56	05:56	06:39	07:18	16:50	17:30	18:13
-58	05:57	06:43	07:24	16:44	17:26	18:12
-60	05:58	06:47	07:31	16:37	17:21	18:10

	Moonrise			Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	13:55	15:59	–:–	20:32	20:07	–:–
70	13:34	15:21	17:13	20:55	20:46	20:34
68	13:17	14:55	16:30	21:12	21:14	21:18
66	13:04	14:35	16:01	21:27	21:35	21:47
64	12:53	14:19	15:40	21:39	21:51	22:09
62	12:44	14:06	15:22	21:49	22:05	22:27
60	12:36	13:54	15:08	21:57	22:17	22:42
58	12:29	13:45	14:56	22:05	22:27	22:54
56	12:23	13:36	14:45	22:12	22:36	23:05
54	12:18	13:29	14:36	22:18	22:44	23:15
52	12:13	13:22	14:27	22:23	22:51	23:24
50	12:09	13:16	14:20	22:28	22:58	23:31
45	11:59	13:03	14:04	22:39	23:12	23:48
40	11:51	12:52	13:51	22:48	23:23	–:–
35	11:45	12:43	13:40	22:56	23:33	–:–
30	11:39	12:35	13:31	23:02	23:42	–:–
20	11:28	12:22	13:14	23:14	23:56	–:–
10	11:20	12:10	12:60	23:24	–:–	00:09
0	11:11	11:59	12:47	23:34	–:–	00:22
-10	11:03	11:48	12:33	23:44	–:–	00:34
-20	10:54	11:36	12:19	23:54	–:–	00:47
-30	10:45	11:23	12:03	–:–	00:06	01:02
-35	10:39	11:15	11:54	–:–	00:13	01:11
-40	10:32	11:06	11:43	–:–	00:21	01:21
-45	10:25	10:56	11:30	–:–	00:30	01:33
-50	10:16	10:44	11:15	–:–	00:41	01:47
-52	10:12	10:38	11:08	–:–	00:46	01:54
-54	10:08	10:32	11:00	–:–	00:52	02:01
-56	10:03	10:25	10:52	–:–	00:58	02:09
-58	09:57	10:17	10:42	–:–	01:06	02:19
-60	09:51	10:09	10:31	–:–	01:14	02:30

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
17	04:11	04:05	12:04	17:22	04:58	6(42%)
18	03:58	03:52	12:03	18:10	05:46	7(52%)
19	03:45	03:38	12:03	18:58	06:34	8(62%)

August 20, 21 ,22 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	328°16.8	137°11.1	-6°43.2	25°42.6	-26°28.1	104°48.0	-15°40.5	55°15.7	-22°39.6
1	343°19.3	152°11.5	-6°44.4	40°45.4	-26°28.0	119°50.2	-15°40.6	70°18.2	-22°39.6
2	358°21.8	167°11.9	-6°45.6	55°48.1	-26°28.0	134°52.4	-15°40.7	85°20.8	-22°39.6
3	13°24.2	182°12.3	-6°46.8	70°50.9	-26°27.9	149°54.6	-15°40.8	100°23.3	-22°39.6
4	28°26.7	197°12.7	-6°47.9	85°53.6	-26°27.9	164°56.8	-15°40.8	115°25.8	-22°39.6
5	43°29.1	212°13.1	-6°49.1	100°56.4	-26°27.8	179°59.0	-15°40.9	130°28.4	-22°39.6
6	58°31.6	227°13.5	-6°50.3	115°59.2	-26°27.8	195°01.2	-15°41.0	145°30.9	-22°39.7
7	73°34.1	242°13.9	-6°51.5	131°01.9	-26°27.7	210°03.4	-15°41.1	160°33.5	-22°39.7
8	88°36.5	257°14.3	-6°52.6	146°04.7	-26°27.7	225°05.6	-15°41.2	175°36.0	-22°39.7
9	103°39.0	272°14.7	-6°53.8	161°07.4	-26°27.7	240°07.8	-15°41.3	190°38.5	-22°39.7
10	118°41.5	287°15.1	-6°55.0	176°10.2	-26°27.6	255°09.9	-15°41.4	205°41.1	-22°39.7
11	133°43.9	302°15.4	-6°56.1	191°12.9	-26°27.6	270°12.1	-15°41.5	220°43.6	-22°39.7
12	148°46.4	317°15.8	-6°57.3	206°15.7	-26°27.5	285°14.3	-15°41.6	235°46.1	-22°39.7
13	163°48.9	332°16.2	-6°58.5	221°18.4	-26°27.5	300°16.5	-15°41.6	250°48.7	-22°39.7
14	178°51.3	347°16.6	-6°59.7	236°21.2	-26°27.4	315°18.7	-15°41.7	265°51.2	-22°39.7
15	193°53.8	2°17.0	-7°00.8	251°23.9	-26°27.4	330°20.9	-15°41.8	280°53.7	-22°39.7
16	208°56.2	17°17.4	-7°02.0	266°26.6	-26°27.3	345°23.1	-15°41.9	295°56.3	-22°39.7
17	223°58.7	32°17.9	-7°03.2	281°29.4	-26°27.3	0°25.3	-15°42.0	310°58.8	-22°39.7
18	239°01.2	47°18.3	-7°04.3	296°32.1	-26°27.2	15°27.4	-15°42.1	326°01.3	-22°39.7
19	254°03.6	62°18.7	-7°05.5	311°34.9	-26°27.2	30°29.6	-15°42.2	341°03.9	-22°39.7
20	269°06.1	77°19.1	-7°06.7	326°37.6	-26°27.1	45°31.8	-15°42.3	356°06.4	-22°39.8
21	284°08.6	92°19.5	-7°07.9	341°40.3	-26°27.1	60°34.0	-15°42.4	11°09.0	-22°39.8
22	299°11.0	107°19.9	-7°09.0	356°43.1	-26°27.0	75°36.2	-15°42.5	26°11.5	-22°39.8
23	314°13.5	122°20.3	-7°10.2	11°45.8	-26°26.9	90°38.4	-15°42.5	41°14.0	-22°39.8
Mer.pass.:2:06:		v0.4 d-1.2 m-4.3		v2.8 d0.0 m-2.5		v2.2 d-0.1 m-1.8		v2.5 d-0.0 m0.3	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	329°16.0	137°20.7	-7°11.4	26°48.5	-26°26.9	105°40.6	-15°42.6	56°16.6	-22°39.8
1	344°18.4	152°21.1	-7°12.5	41°51.3	-26°26.8	120°42.7	-15°42.7	71°19.1	-22°39.8
2	359°20.9	167°21.5	-7°13.7	56°54.0	-26°26.8	135°44.9	-15°42.8	86°21.6	-22°39.8
3	14°23.4	182°21.9	-7°14.9	71°56.7	-26°26.7	150°47.1	-15°42.9	101°24.2	-22°39.8
4	29°25.8	197°22.3	-7°16.0	86°59.4	-26°26.7	165°49.3	-15°43.0	116°26.7	-22°39.8
5	44°28.3	212°22.7	-7°17.2	102°02.2	-26°26.6	180°51.5	-15°43.1	131°29.2	-22°39.8
6	59°30.7	227°23.1	-7°18.4	117°04.9	-26°26.6	195°53.7	-15°43.2	146°31.8	-22°39.8
7	74°33.2	242°23.5	-7°19.5	132°07.6	-26°26.5	210°55.9	-15°43.3	161°34.3	-22°39.8
8	89°35.7	257°24.0	-7°20.7	147°10.3	-26°26.4	225°58.0	-15°43.4	176°36.8	-22°39.8
9	104°38.1	272°24.4	-7°21.9	162°13.0	-26°26.4	241°00.2	-15°43.5	191°39.4	-22°39.8
10	119°40.6	287°24.8	-7°23.0	177°15.8	-26°26.3	256°02.4	-15°43.5	206°41.9	-22°39.9
11	134°43.1	302°25.2	-7°24.2	192°18.5	-26°26.3	271°04.6	-15°43.6	221°44.4	-22°39.9
12	149°45.5	317°25.6	-7°25.3	207°21.2	-26°26.2	286°06.8	-15°43.7	236°47.0	-22°39.9
13	164°48.0	332°26.0	-7°26.5	222°23.9	-26°26.1	301°09.0	-15°43.8	251°49.5	-22°39.9
14	179°50.5	347°26.4	-7°27.7	237°26.6	-26°26.1	316°11.1	-15°43.9	266°52.0	-22°39.9
15	194°52.9	2°26.9	-7°28.8	252°29.3	-26°26.0	331°13.3	-15°44.0	281°54.6	-22°39.9
16	209°55.4	17°27.3	-7°30.0	267°32.0	-26°26.0	346°15.5	-15°44.1	296°57.1	-22°39.9
17	224°57.9	32°27.7	-7°31.2	282°34.7	-26°25.9	1°17.7	-15°44.2	311°59.6	-22°39.9
18	240°00.3	47°28.1	-7°32.3	297°37.4	-26°25.8	16°19.9	-15°44.3	327°02.2	-22°39.9
19	255°02.8	62°28.5	-7°33.5	312°40.1	-26°25.8	31°22.0	-15°44.4	342°04.7	-22°39.9
20	270°05.2	77°29.0	-7°34.6	327°42.8	-26°25.7	46°24.2	-15°44.5	357°07.2	-22°39.9
21	285°07.7	92°29.4	-7°35.8	342°45.5	-26°25.6	61°26.4	-15°44.5	12°09.7	-22°39.9
22	300°10.2	107°29.8	-7°37.0	357°48.2	-26°25.6	76°28.6	-15°44.6	27°12.3	-22°39.9
23	315°12.6	122°30.2	-7°38.1	12°50.9	-26°25.5	91°30.8	-15°44.7	42°14.8	-22°40.0
Mer.pass.:2:02:		v0.4 d-1.2 m-4.3		v2.7 d0.1 m-2.4		v2.2 d-0.1 m-1.8		v2.5 d-0.0 m0.3	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	330°15.1	137°30.6	-7°39.3	27°53.6	-26°25.5	106°32.9	-15°44.8	57°17.3	-22°40.0
1	345°17.6	152°31.1	-7°40.5	42°56.3	-26°25.4	121°35.1	-15°44.9	72°19.9	-22°40.0
2	0°20.0	167°31.5	-7°41.6	57°59.0	-26°25.3	136°37.3	-15°45.0	87°22.4	-22°40.0
3	15°22.5	182°31.9	-7°42.8	73°01.7	-26°25.3	151°39.5	-15°45.1	102°24.9	-22°40.0
4	30°25.0	197°32.3	-7°43.9	88°04.4	-26°25.2	166°41.7	-15°45.2	117°27.5	-22°40.0
5	45°27.4	212°32.8	-7°45.1	103°07.1	-26°25.1	181°43.8	-15°45.3	132°30.0	-22°40.0
6	60°29.9	227°33.2	-7°46.2	118°09.8	-26°25.1	196°46.0	-15°45.4	147°32.5	-22°40.0
7	75°32.4	242°33.6	-7°47.4	133°12.4	-26°25.0	211°48.2	-15°45.5	162°35.0	-22°40.0
8	90°34.8	257°34.1	-7°48.6	148°15.1	-26°24.9	226°50.4	-15°45.6	177°37.6	-22°40.0
9	105°37.3	272°34.5	-7°49.7	163°17.8	-26°24.8	241°52.5	-15°45.7	192°40.1	-22°40.0
10	120°39.7	287°34.9	-7°50.9	178°20.5	-26°24.8	256°54.7	-15°45.7	207°42.6	-22°40.0
11	135°42.2	302°35.3	-7°52.0	193°23.2	-26°24.7	271°56.9	-15°45.8	222°45.2	-22°40.0
12	150°44.7	317°35.8	-7°53.2	208°25.8	-26°24.6	286°59.1	-15°45.9	237°47.7	-22°40.0
13	165°47.1	332°36.2	-7°54.3	223°28.5	-26°24.6	302°01.3	-15°46.0	252°50.2	-22°40.1
14	180°49.6	347°36.6	-7°55.5	238°31.2	-26°24.5	317°03.4	-15°46.1	267°52.7	-22°40.1
15	195°52.1	2°37.1	-7°56.7	253°33.9	-26°24.4	332°05.6	-15°46.2	282°55.3	-22°40.1
16	210°54.5	17°37.5	-7°57.8	268°36.5	-26°24.3	347°07.8	-15°46.3	297°57.8	-22°40.1
17	225°57.0	32°37.9	-7°59.0	283°39.2	-26°24.3	2°10.0	-15°46.4	313°00.3	-22°40.1
18	240°59.5	47°38.4	-8°00.1	298°41.9	-26°24.2	17°12.1	-15°46.5	328°02.9	-22°40.1
19	256°01.9	62°38.8	-8°01.3	313°44.6	-26°24.1	32°14.3	-15°46.6	343°05.4	-22°40.1
20	271°04.4	77°39.3	-8°02.4	328°47.2	-26°24.1	47°16.5	-15°46.7	358°07.9	-22°40.1
21	286°06.8	92°39.7	-8°03.6	343°49.9	-26°24.0	62°18.7	-15°46.8	13°10.4	-22°40.1
22	301°09.3	107°40.1	-8°04.7	358°52.5	-26°23.9	77°20.8	-15°46.9	28°13.0	-22°40.1
23	316°11.8	122°40.6	-8°05.9	13°55.2	-26°23.8	92°23.0	-15°47.0	43°15.5	-22°40.1
Mer.pass.:1:58:		v0.4 d-1.2 m-4.3		v2.7 d0.1 m-2.4		v2.2 d-0.1 m-1.8		v2.5 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.5
Ankaa	353°11.9	-42°12.2
Schedar	349°36.0	56°38.1
Diphda	348°52.0	-17°53.0
Achernar	335°23.9	-57°08.4
Hamal	327°56.6	23°32.9
Polaris	316°06.5	89°20.1
Akamar	315°15.6	-40°13.7
Menkar	314°11.3	4°09.7
Mirfak	308°35.2	49°55.3
Aldebaran	290°45.4	16°32.7
Rigel	281°08.8	-8°10.8
Capella	280°29.4	46°00.7
Bellatrix	278°28.4	6°21.9
Elnath	278°08.3	28°37.2
Alnilam	275°43.0	-1°11.5
Betelgeuse	270°57.7	7°24.5
Canopus	263°54.9	-52°42.2
Sirius	258°30.8	-16°44.3
Adara	255°10.0	-28°59.8
Procyon	244°56.2	5°10.8
Pollux	243°23.7	27°58.8
Avior	234°17.2	-59°34.0
Suhail	222°50.3	-43°30.4
Miaplacidus	221°39.9	-69°47.6
Alphard	217°52.9	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.1	61°39.2
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.6
Acrux	173°05.9	-63°12.2
Gacrux	171°57.4	-57°13.1
Alioth	166°18.1	55°51.9
Spica	158°27.7	-11°15.3
Alcaid	152°56.4	49°13.7
Hadar	148°43.1	-60°27.8
Menkent	148°03.6	-36°27.6
Arcturus	145°52.5	19°05.8
Rigil Kent.	139°47.1	-60°54.7
Zubenelg.	137°01.6	-16°06.9
Kochab	137°20.4	74°05.2
Alphecca	126°08.1	26°39.6
Antares	112°21.9	-26°28.2
Atria	107°20.3	-69°03.7
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.9
Rasalhague	96°03.1	12°33.2
Etamin	90°44.2	51°29.6
Kaus Aust.	83°38.9	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.2
Peacock	53°13.2	-56°40.4
Deneb	49°28.6	45°21.0
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.1
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.0
Markab	13°34.5	15°18.4

2018/8/2	**SHA**	**Mer.pass**
Venus	168°54.3	14:51
Mars	57°25.8	22:13
Jupiter	136°31.2	16:58
Saturn	86°58.9	20:16

2018/8/2	**SHA**	**Mer.pass**
Venus	168°04.7	14:50
Mars	57°32.6	22:09
Jupiter	136°24.6	16:55
Saturn	87°00.6	20:11

2018/8/2	**SHA**	**Mer.pass**
Venus	167°15.5	14:50
Mars	57°38.5	22:04
Jupiter	136°17.8	16:51
Saturn	87°02.2	20:07

Horizontal paralax	
Venus:	0.2
Mars:	0.3

h Sun Moon

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°07.3	12°31.7	73°03.0	11.9	-18°41.5	-4.9	54.8
1	194°07.4	12°30.9	87°34.0	11.9	-18°46.3	-4.8	54.8
2	209°07.6	12°30.1	102°04.9	11.9	-18°51.0	-4.7	54.8
3	224°07.7	12°29.3	116°35.8	11.9	-18°55.6	-4.6	54.8
4	239°07.9	12°28.4	131°06.7	11.9	-19°00.2	-4.5	54.8
5	254°08.0	12°27.6	145°37.6	11.9	-19°04.6	-4.4	54.7
6	269°08.2	12°26.8	160°08.4	11.9	-19°09.0	-4.3	54.7
7	284°08.3	12°26.0	174°39.3	11.9	-19°13.2	-4.2	54.7
8	299°08.5	12°25.1	189°10.2	11.9	-19°17.4	-4.1	54.7
9	314°08.6	12°24.3	203°41.0	11.9	-19°21.5	-4.0	54.7
10	329°08.8	12°23.5	218°11.9	11.8	-19°25.5	-3.9	54.6
11	344°08.9	12°22.7	232°42.7	11.8	-19°29.3	-3.8	54.6
12	359°09.1	12°21.8	247°13.5	11.8	-19°33.1	-3.7	54.6
13	14°09.2	12°21.0	261°44.4	11.8	-19°36.8	-3.7	54.6
14	29°09.4	12°20.2	276°15.2	11.8	-19°40.4	-3.6	54.6
15	44°09.5	12°19.4	290°46.0	11.8	-19°43.9	-3.5	54.6
16	59°09.7	12°18.5	305°16.8	11.8	-19°47.4	-3.4	54.5
17	74°09.8	12°17.7	319°47.6	11.8	-19°50.7	-3.3	54.5
18	89°10.0	12°16.9	334°18.4	11.8	-19°53.9	-3.2	54.5
19	104°10.1	12°16.1	348°49.2	11.8	-19°57.0	-3.1	54.5
20	119°10.3	12°15.2	3°20.0	11.8	-20°00.1	-3.0	54.5
21	134°10.4	12°14.4	17°50.7	11.8	-20°03.0	-2.9	54.5
22	149°10.6	12°13.6	32°21.5	11.8	-20°05.9	-2.8	54.5
23	164°10.7	12°12.7	46°52.3	11.8	-20°08.6	-2.7	54.4
	SD.=15.8	d=-0.8	S.D.=15.0				

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°10.9	12°11.9	61°23.0	11.8	-20°11.3	-2.6	54.4
1	194°11.0	12°11.1	75°53.8	11.8	-20°13.8	-2.5	54.4
2	209°11.2	12°10.3	90°24.6	11.8	-20°16.3	-2.4	54.4
3	224°11.3	12°09.4	104°55.3	11.8	-20°18.7	-2.3	54.4
4	239°11.5	12°08.6	119°26.1	11.7	-20°20.9	-2.2	54.4
5	254°11.6	12°07.8	133°56.8	11.7	-20°23.1	-2.1	54.4
6	269°11.8	12°06.9	148°27.5	11.7	-20°25.2	-2.0	54.4
7	284°11.9	12°06.1	162°58.3	11.7	-20°27.2	-1.9	54.3
8	299°12.1	12°05.3	177°29.0	11.7	-20°29.0	-1.8	54.3
9	314°12.3	12°04.4	191°59.8	11.7	-20°30.8	-1.7	54.3
10	329°12.4	12°03.6	206°30.5	11.7	-20°32.5	-1.6	54.3
11	344°12.6	12°02.8	221°01.2	11.7	-20°34.1	-1.5	54.3
12	359°12.7	12°01.9	235°32.0	11.7	-20°35.6	-1.4	54.3
13	14°12.9	12°01.1	250°02.7	11.7	-20°37.0	-1.4	54.3
14	29°13.0	12°00.3	264°33.4	11.7	-20°38.3	-1.3	54.3
15	44°13.2	11°59.4	279°04.2	11.7	-20°39.5	-1.2	54.3
16	59°13.3	11°58.6	293°34.9	11.7	-20°40.6	-1.1	54.2
17	74°13.5	11°57.8	308°05.6	11.7	-20°41.6	-1.0	54.2
18	89°13.7	11°56.9	322°36.4	11.7	-20°42.5	-0.9	54.2
19	104°13.8	11°56.1	337°07.1	11.7	-20°43.4	-0.8	54.2
20	119°14.0	11°55.3	351°37.9	11.7	-20°44.1	-0.7	54.2
21	134°14.1	11°54.4	6°08.6	11.7	-20°44.7	-0.6	54.2
22	149°14.3	11°53.6	20°39.4	11.8	-20°45.2	-0.5	54.2
23	164°14.4	11°52.7	35°10.1	11.8	-20°45.7	-0.4	54.2
	SD.=15.8	d=-0.8	S.D.=14.8				

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°14.6	11°51.9	49°40.9	11.8	-20°46.0	-0.3	54.2
1	194°14.8	11°51.1	64°11.6	11.8	-20°46.2	-0.2	54.2
2	209°14.9	11°50.2	78°42.4	11.8	-20°46.4	-0.1	54.2
3	224°15.1	11°49.4	93°13.2	11.8	-20°46.4	0.0	54.2
4	239°15.2	11°48.6	107°43.9	11.8	-20°46.3	0.1	54.1
5	254°15.4	11°47.7	122°14.7	11.8	-20°46.2	0.2	54.1
6	269°15.6	11°46.9	136°45.5	11.8	-20°45.9	0.3	54.1
7	284°15.7	11°46.0	151°16.3	11.8	-20°45.6	0.4	54.1
8	299°15.9	11°45.2	165°47.1	11.8	-20°45.1	0.5	54.1
9	314°16.0	11°44.4	180°17.9	11.8	-20°44.6	0.6	54.1
10	329°16.2	11°43.5	194°48.7	11.8	-20°44.0	0.7	54.1
11	344°16.4	11°42.7	209°19.6	11.8	-20°43.2	0.8	54.1
12	359°16.5	11°41.8	223°50.4	11.8	-20°42.4	0.9	54.1
13	14°16.7	11°41.0	238°21.3	11.8	-20°41.5	1.0	54.1
14	29°16.8	11°40.2	252°52.1	11.9	-20°40.4	1.1	54.1
15	44°17.0	11°39.3	267°23.0	11.9	-20°39.3	1.2	54.1
16	59°17.2	11°38.5	281°53.9	11.9	-20°38.1	1.3	54.1
17	74°17.3	11°37.6	296°24.7	11.9	-20°36.8	1.4	54.1
18	89°17.5	11°36.8	310°55.6	11.9	-20°35.4	1.5	54.1
19	104°17.6	11°35.9	325°26.5	11.9	-20°33.9	1.5	54.1
20	119°17.8	11°35.1	339°57.5	11.9	-20°32.3	1.6	54.1
21	134°18.0	11°34.3	354°28.4	11.9	-20°30.6	1.7	54.1
22	149°18.1	11°33.4	8°59.3	12.0	-20°28.8	1.8	54.1
23	164°18.3	11°32.6	23°30.3	12.0	-20°26.9	1.9	54.1
	SD.=15.8	d=-0.8	S.D.=14.8				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	03:02	20:60	–:–	–:–
70	–:–	01:44	03:26	20:37	22:15	–:–
68	–:–	02:23	03:44	20:20	21:38	–:–
66	–:–	02:50	03:58	20:06	21:13	–:–
64	01:31	03:10	04:10	19:54	20:53	22:29
62	02:07	03:26	04:20	19:45	20:38	21:55
60	02:31	03:40	04:28	19:36	20:25	21:32
58	02:50	03:51	04:36	19:29	20:14	21:13
56	03:06	04:01	04:42	19:22	20:04	20:58
54	03:19	04:09	04:48	19:17	19:56	20:46
52	03:30	04:17	04:54	19:12	19:48	20:35
50	03:39	04:23	04:58	19:07	19:42	20:25
45	03:59	04:37	05:09	18:57	19:28	20:06
40	04:14	04:49	05:17	18:48	19:17	19:51
35	04:26	04:58	05:24	18:41	19:08	19:39
30	04:36	05:06	05:31	18:35	18:60	19:29
20	04:52	05:19	05:42	18:24	18:47	19:14
10	05:04	05:30	05:51	18:15	18:37	19:02
0	05:14	05:39	05:60	18:06	18:28	18:52
-10	05:22	05:47	06:08	17:58	18:19	18:44
-20	05:29	05:55	06:18	17:49	18:11	18:37
-30	05:35	06:03	06:28	17:39	18:03	18:31
-35	05:38	06:08	06:34	17:33	17:59	18:29
-40	05:41	06:13	06:40	17:27	17:54	18:26
-45	05:43	06:18	06:48	17:19	17:49	18:23
-50	05:46	06:24	06:57	17:10	17:43	18:21
-52	05:47	06:26	07:01	17:06	17:41	18:20
-54	05:48	06:29	07:06	17:01	17:38	18:19
-56	05:49	06:32	07:11	16:56	17:35	18:18
-58	05:50	06:36	07:17	16:51	17:32	18:17
-60	05:51	06:40	07:23	16:44	17:28	18:17

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	17:60	19:13	19:55	21:28	21:56	22:54
66	17:20	18:25	19:10	22:08	22:44	23:38
64	16:53	17:54	18:40	22:36	23:14	–:–
62	16:32	17:31	18:18	22:57	23:37	–:–
60	16:15	17:13	17:60	23:14	23:56	–:–
58	16:00	16:57	17:45	23:29	–:–	00:11
56	15:48	16:44	17:32	23:41	–:–	00:24
54	15:38	16:33	17:20	23:52	–:–	00:36
52	15:28	16:23	17:10	–:–	00:01	00:46
50	15:20	16:14	17:02	–:–	00:10	00:55
45	15:02	15:55	16:43	–:–	00:28	01:14
40	14:47	15:39	16:27	00:01	00:43	01:29
35	14:35	15:26	16:14	00:13	00:56	01:43
30	14:24	15:15	16:03	00:23	01:07	01:54
20	14:06	14:56	15:44	00:40	01:26	02:13
10	13:50	14:39	15:27	00:55	01:42	02:30
0	13:35	14:23	15:11	01:10	01:58	02:46
-10	13:20	14:07	14:55	01:24	02:13	03:02
-20	13:04	13:50	14:39	01:39	02:30	03:19
-30	12:46	13:31	14:19	01:57	02:49	03:39
-35	12:35	13:20	14:08	02:07	02:60	03:50
-40	12:23	13:07	13:55	02:18	03:13	04:03
-45	12:09	12:52	13:40	02:32	03:28	04:18
-50	11:51	12:33	13:21	02:49	03:46	04:37
-52	11:43	12:24	13:12	02:57	03:55	04:46
-54	11:34	12:14	13:02	03:06	04:04	04:56
-56	11:24	12:03	12:51	03:16	04:15	05:07
-58	11:12	11:51	12:38	03:27	04:28	05:20
-60	10:59	11:36	12:23	03:40	04:43	05:35

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
20	03:31	03:24	12:03	19:46	07:22	9(71%)
21	03:16	03:09	12:03	20:34	08:10	10(79%)
22	03:02	02:54	12:02	21:22	08:58	11(86%)

August 23, 24 ,25 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	331°14.2	137°41.0	-8°07.0	28°57.9	-26°23.7	107°25.2	-15°47.0	58°18.0	-22°40.1
1	346°16.7	152°41.4	-8°08.2	44°00.5	-26°23.7	122°27.4	-15°47.1	73°20.5	-22°40.1
2	1°19.2	167°41.9	-8°09.3	59°03.2	-26°23.6	137°29.5	-15°47.2	88°23.1	-22°40.1
3	16°21.6	182°42.3	-8°10.5	74°05.8	-26°23.5	152°31.7	-15°47.3	103°25.6	-22°40.2
4	31°24.1	197°42.8	-8°11.6	89°08.5	-26°23.4	167°33.9	-15°47.4	118°28.1	-22°40.2
5	46°26.6	212°43.2	-8°12.8	104°11.1	-26°23.4	182°36.1	-15°47.5	133°30.6	-22°40.2
6	61°29.0	227°43.7	-8°13.9	119°13.8	-26°23.3	197°38.2	-15°47.6	148°33.2	-22°40.2
7	76°31.5	242°44.1	-8°15.1	134°16.4	-26°23.2	212°40.4	-15°47.7	163°35.7	-22°40.2
8	91°34.0	257°44.6	-8°16.2	149°19.1	-26°23.1	227°42.6	-15°47.8	178°38.2	-22°40.2
9	106°36.4	272°45.0	-8°17.4	164°21.7	-26°23.0	242°44.7	-15°47.9	193°40.7	-22°40.2
10	121°38.9	287°45.4	-8°18.5	179°24.4	-26°23.0	257°46.9	-15°48.0	208°43.3	-22°40.2
11	136°41.3	302°45.9	-8°19.7	194°27.0	-26°22.9	272°49.1	-15°48.1	223°45.8	-22°40.2
12	151°43.8	317°46.3	-8°20.8	209°29.7	-26°22.8	287°51.3	-15°48.2	238°48.3	-22°40.2
13	166°46.3	332°46.8	-8°22.0	224°32.3	-26°22.7	302°53.4	-15°48.3	253°50.8	-22°40.2
14	181°48.7	347°47.2	-8°23.1	239°35.0	-26°22.6	317°55.6	-15°48.4	268°53.4	-22°40.2
15	196°51.2	2°47.7	-8°24.3	254°37.6	-26°22.5	332°57.8	-15°48.5	283°55.9	-22°40.2
16	211°53.7	17°48.1	-8°25.4	269°40.2	-26°22.5	347°59.9	-15°48.5	298°58.4	-22°40.2
17	226°56.1	32°48.6	-8°26.6	284°42.9	-26°22.4	3°02.1	-15°48.6	314°00.9	-22°40.3
18	241°58.6	47°49.0	-8°27.7	299°45.5	-26°22.3	18°04.3	-15°48.7	329°03.5	-22°40.3
19	257°01.1	62°49.5	-8°28.9	314°48.1	-26°22.2	33°06.4	-15°48.8	344°06.0	-22°40.3
20	272°03.5	77°50.0	-8°30.0	329°50.8	-26°22.1	48°08.6	-15°48.9	359°08.5	-22°40.3
21	287°06.0	92°50.4	-8°31.1	344°53.4	-26°22.0	63°10.8	-15°49.0	14°11.0	-22°40.3
22	302°08.5	107°50.9	-8°32.3	359°56.0	-26°21.9	78°13.0	-15°49.1	29°13.5	-22°40.3
23	317°10.9	122°51.3	-8°33.4	14°58.6	-26°21.9	93°15.1	-15°49.2	44°16.1	-22°40.3
Mer.pass.:1:54:		v0.4 d-1.2 m-4.3		v2.7 d0.1 m-2.4		v2.2 d-0.1 m-1.8		v2.5 d-0.0 m0.3	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	332°13.4	137°51.8	-8°34.6	30°01.3	-26°21.8	108°17.3	-15°49.3	59°18.6	-22°40.3
1	347°15.8	152°52.2	-8°35.7	45°03.9	-26°21.7	123°19.5	-15°49.4	74°21.1	-22°40.3
2	2°18.3	167°52.7	-8°36.9	60°06.5	-26°21.6	138°21.6	-15°49.5	89°23.6	-22°40.3
3	17°20.8	182°53.2	-8°38.0	75°09.1	-26°21.5	153°23.8	-15°49.6	104°26.2	-22°40.3
4	32°23.2	197°53.6	-8°39.1	90°11.7	-26°21.4	168°26.0	-15°49.7	119°28.7	-22°40.3
5	47°25.7	212°54.1	-8°40.3	105°14.4	-26°21.3	183°28.1	-15°49.8	134°31.2	-22°40.3
6	62°28.2	227°54.5	-8°41.4	120°17.0	-26°21.2	198°30.3	-15°49.9	149°33.7	-22°40.4
7	77°30.6	242°55.0	-8°42.6	135°19.6	-26°21.1	213°32.5	-15°50.0	164°36.2	-22°40.4
8	92°33.1	257°55.5	-8°43.7	150°22.2	-26°21.1	228°34.6	-15°50.1	179°38.8	-22°40.4
9	107°35.6	272°55.9	-8°44.9	165°24.8	-26°21.0	243°36.8	-15°50.2	194°41.3	-22°40.4
10	122°38.0	287°56.4	-8°46.0	180°27.4	-26°20.9	258°39.0	-15°50.2	209°43.8	-22°40.4
11	137°40.5	302°56.9	-8°47.1	195°30.0	-26°20.8	273°41.1	-15°50.3	224°46.3	-22°40.4
12	152°42.9	317°57.3	-8°48.3	210°32.6	-26°20.7	288°43.3	-15°50.4	239°48.8	-22°40.4
13	167°45.4	332°57.8	-8°49.4	225°35.2	-26°20.6	303°45.5	-15°50.5	254°51.4	-22°40.4
14	182°47.9	347°58.3	-8°50.5	240°37.8	-26°20.5	318°47.6	-15°50.6	269°53.9	-22°40.4
15	197°50.3	2°58.7	-8°51.7	255°40.4	-26°20.4	333°49.8	-15°50.7	284°56.4	-22°40.4
16	212°52.8	17°59.2	-8°52.8	270°43.0	-26°20.3	348°52.0	-15°50.8	299°58.9	-22°40.4
17	227°55.3	32°59.7	-8°54.0	285°45.6	-26°20.2	3°54.1	-15°50.9	315°01.4	-22°40.4
18	242°57.7	48°00.1	-8°55.1	300°48.2	-26°20.1	18°56.3	-15°51.0	330°04.0	-22°40.4
19	258°00.2	63°00.6	-8°56.2	315°50.8	-26°20.0	33°58.4	-15°51.1	345°06.5	-22°40.4
20	273°02.7	78°01.1	-8°57.4	330°53.4	-26°19.9	49°00.6	-15°51.2	0°09.0	-22°40.5
21	288°05.1	93°01.5	-8°58.5	345°56.0	-26°19.8	64°02.8	-15°51.3	15°11.5	-22°40.5
22	303°07.6	108°02.0	-8°59.6	0°58.6	-26°19.7	79°04.9	-15°51.4	30°14.0	-22°40.5
23	318°10.1	123°02.5	-9°00.8	16°01.2	-26°19.6	94°07.1	-15°51.5	45°16.6	-22°40.5
Mer.pass.:1:50:		v0.5 d-1.1 m-4.3		v2.6 d0.1 m-2.4		v2.2 d-0.1 m-1.8		v2.5 d-0.0 m0.3	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	333°12.5	138°03.0	-9°01.9	31°03.8	-26°19.5	109°09.3	-15°51.6	60°19.1	-22°40.5
1	348°15.0	153°03.4	-9°03.0	46°06.4	-26°19.4	124°11.4	-15°51.7	75°21.6	-22°40.5
2	3°17.4	168°03.9	-9°04.2	61°09.0	-26°19.3	139°13.6	-15°51.8	90°24.1	-22°40.5
3	18°19.9	183°04.4	-9°05.3	76°11.6	-26°19.2	154°15.7	-15°51.9	105°26.6	-22°40.5
4	33°22.4	198°04.9	-9°06.4	91°14.1	-26°19.1	169°17.9	-15°52.0	120°29.1	-22°40.5
5	48°24.8	213°05.4	-9°07.6	106°16.7	-26°19.0	184°20.1	-15°52.1	135°31.7	-22°40.5
6	63°27.3	228°05.8	-9°08.7	121°19.3	-26°18.9	199°22.2	-15°52.2	150°34.2	-22°40.5
7	78°29.8	243°06.3	-9°09.8	136°21.9	-26°18.8	214°24.4	-15°52.3	165°36.7	-22°40.5
8	93°32.2	258°06.8	-9°11.0	151°24.5	-26°18.7	229°26.6	-15°52.4	180°39.2	-22°40.5
9	108°34.7	273°07.3	-9°12.1	166°27.0	-26°18.6	244°28.7	-15°52.5	195°41.7	-22°40.5
10	123°37.2	288°07.8	-9°13.2	181°29.6	-26°18.5	259°30.9	-15°52.5	210°44.2	-22°40.5
11	138°39.6	303°08.2	-9°14.4	196°32.2	-26°18.4	274°33.0	-15°52.6	225°46.8	-22°40.6
12	153°42.1	318°08.7	-9°15.5	211°34.7	-26°18.3	289°35.2	-15°52.7	240°49.3	-22°40.6
13	168°44.6	333°09.2	-9°16.6	226°37.3	-26°18.2	304°37.4	-15°52.8	255°51.8	-22°40.6
14	183°47.0	348°09.7	-9°17.7	241°39.9	-26°18.1	319°39.5	-15°52.9	270°54.3	-22°40.6
15	198°49.5	3°10.2	-9°18.9	256°42.4	-26°18.0	334°41.7	-15°53.0	285°56.8	-22°40.6
16	213°51.9	18°10.7	-9°20.0	271°45.0	-26°17.9	349°43.8	-15°53.1	300°59.3	-22°40.6
17	228°54.4	33°11.2	-9°21.1	286°47.6	-26°17.8	4°46.0	-15°53.2	316°01.8	-22°40.6
18	243°56.9	48°11.7	-9°22.3	301°50.1	-26°17.7	19°48.1	-15°53.3	331°04.4	-22°40.6
19	258°59.3	63°12.1	-9°23.4	316°52.7	-26°17.6	34°50.3	-15°53.4	346°06.9	-22°40.6
20	274°01.8	78°12.6	-9°24.5	331°55.3	-26°17.5	49°52.5	-15°53.5	1°09.4	-22°40.6
21	289°04.3	93°13.1	-9°25.6	346°57.8	-26°17.4	64°54.6	-15°53.6	16°11.9	-22°40.6
22	304°06.7	108°13.6	-9°26.8	2°00.4	-26°17.3	79°56.8	-15°53.7	31°14.4	-22°40.6
23	319°09.2	123°14.1	-9°27.9	17°02.9	-26°17.2	94°58.9	-15°53.8	46°16.9	-22°40.6
Mer.pass.:1:46:		v0.5 d-1.1 m-4.3		v2.6 d0.1 m-2.3		v2.2 d-0.1 m-1.8		v2.5 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.9	-42°12.2
Schedar	349°36.0	56°38.2
Diphda	348°52.0	-17°53.0
Achernar	335°23.8	-57°08.4
Hamal	327°56.6	23°32.9
Polaris	316°05.0	89°20.1
Akamar	315°15.6	-40°13.7
Menkar	314°11.3	4°09.7
Mirfak	308°35.2	49°55.3
Aldebaran	290°45.4	16°32.7
Rigel	281°08.8	-8°10.8
Capella	280°29.4	46°00.7
Bellatrix	278°28.3	6°21.9
Elnath	278°08.3	28°37.2
Alnilam	275°42.9	-1°11.4
Betelgeuse	270°57.6	7°24.5
Canopus	263°54.9	-52°42.2
Sirius	258°30.7	-16°44.3
Adara	255°10.0	-28°59.8
Procyon	244°56.2	5°10.8
Pollux	243°23.6	27°58.8
Avior	234°17.2	-59°34.0
Suhail	222°50.3	-43°30.4
Miaplacidus	221°39.8	-69°47.5
Alphard	217°52.9	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.1	61°39.2
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.6
Acrux	173°05.9	-63°12.2
Gacrux	171°57.4	-57°13.0
Alioth	166°18.1	55°51.9
Spica	158°27.7	-11°15.3
Alcaid	152°56.4	49°13.6
Hadar	148°43.1	-60°27.8
Menkent	148°03.6	-36°27.6
Arcturus	145°52.5	19°05.8
Rigil Kent.	139°47.1	-60°54.7
Zubenelg.	137°01.6	-16°06.9
Kochab	137°20.5	74°05.2
Alphecca	126°08.1	26°39.6
Antares	112°21.9	-26°28.2
Atria	107°20.3	-69°03.7
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.9
Rasalhague	96°03.1	12°33.2
Etamin	90°44.2	51°29.6
Kaus Aust.	83°38.9	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.7	-26°16.2
Altair	62°04.6	8°55.3
Peacock	53°13.2	-56°40.4
Deneb	49°28.6	45°21.0
Enif	33°43.3	9°57.8
Alnair	27°38.9	-46°52.1
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.0
Markab	13°34.5	15°18.4

2018/8/2	**SHA**	**Mer.pass**
Venus	166°26.8	14:49
Mars	57°43.6	22:00
Jupiter	136°10.9	16:48
Saturn	87°03.8	20:03

2018/8/2	**SHA**	**Mer.pass**
Venus	165°38.4	14:48
Mars	57°47.9	21:56
Jupiter	136°03.9	16:44
Saturn	87°05.2	19:59

2018/8/2	**SHA**	**Mer.pass**
Venus	164°50.5	14:47
Mars	57°51.3	21:52
Jupiter	135°56.7	16:41
Saturn	87°06.6	19:55

Horizontal paralax	
Venus:	0.2
Mars:	0.3

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°18.5	11°31.7	38°01.3	12.0	-20°24.9	2.0	54.1
1	194°18.6	11°30.9	52°32.3	12.0	-20°22.9	2.1	54.1
2	209°18.8	11°30.0	67°03.3	12.0	-20°20.7	2.2	54.0
3	224°18.9	11°29.2	81°34.3	12.0	-20°18.4	2.3	54.0
4	239°19.1	11°28.3	96°05.3	12.0	-20°16.1	2.4	54.0
5	254°19.3	11°27.5	110°36.3	12.1	-20°13.6	2.5	54.0
6	269°19.4	11°26.6	125°07.4	12.1	-20°11.1	2.6	54.0
7	284°19.6	11°25.8	139°38.5	12.1	-20°08.5	2.7	54.0
8	299°19.8	11°24.9	154°09.6	12.1	-20°05.7	2.8	54.0
9	314°19.9	11°24.1	168°40.7	12.1	-20°02.9	2.9	54.0
10	329°20.1	11°23.3	183°11.8	12.1	-20°00.0	3.0	54.0
11	344°20.3	11°22.4	197°43.0	12.2	-19°57.0	3.0	54.0
12	359°20.4	11°21.6	212°14.1	12.2	-19°53.9	3.1	54.0
13	14°20.6	11°20.7	226°45.3	12.2	-19°50.7	3.2	54.0
14	29°20.7	11°19.9	241°16.5	12.2	-19°47.5	3.3	54.0
15	44°20.9	11°19.0	255°47.7	12.2	-19°44.1	3.4	54.0
16	59°21.1	11°18.2	270°19.0	12.2	-19°40.6	3.5	54.0
17	74°21.2	11°17.3	284°50.2	12.3	-19°37.1	3.6	54.0
18	89°21.4	11°16.5	299°21.5	12.3	-19°33.4	3.7	54.0
19	104°21.6	11°15.6	313°52.8	12.3	-19°29.7	3.8	54.0
20	119°21.7	11°14.8	328°24.1	12.3	-19°25.9	3.9	54.0
21	134°21.9	11°13.9	342°55.4	12.3	-19°22.0	4.0	54.0
22	149°22.1	11°13.0	357°26.8	12.4	-19°18.0	4.0	54.1
23	164°22.2	11°12.2	11°58.2	12.4	-19°13.9	4.1	54.1
	SD.=15.8	d=-0.8	S.D.=14.7				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°22.4	11°11.3	26°29.6	12.4	-19°09.7	4.2	54.1
1	194°22.6	11°10.5	41°01.0	12.4	-19°05.5	4.3	54.1
2	209°22.7	11°09.6	55°32.4	12.5	-19°01.1	4.4	54.1
3	224°22.9	11°08.8	70°03.9	12.5	-18°56.7	4.5	54.1
4	239°23.1	11°07.9	84°35.4	12.5	-18°52.1	4.6	54.1
5	254°23.3	11°07.1	99°06.9	12.5	-18°47.5	4.7	54.1
6	269°23.4	11°06.2	113°38.4	12.5	-18°42.8	4.7	54.1
7	284°23.6	11°05.4	128°10.0	12.6	-18°38.1	4.8	54.1
8	299°23.8	11°04.5	142°41.6	12.6	-18°33.2	4.9	54.1
9	314°23.9	11°03.7	157°13.2	12.6	-18°28.2	5.0	54.1
10	329°24.1	11°02.8	171°44.8	12.6	-18°23.2	5.1	54.1
11	344°24.3	11°01.9	186°16.4	12.7	-18°18.1	5.2	54.1
12	359°24.4	11°01.1	200°48.1	12.7	-18°12.9	5.2	54.1
13	14°24.6	11°00.2	215°19.8	12.7	-18°07.6	5.3	54.1
14	29°24.8	10°59.4	229°51.5	12.7	-18°02.2	5.4	54.1
15	44°24.9	10°58.5	244°23.3	12.8	-17°56.8	5.5	54.1
16	59°25.1	10°57.7	258°55.1	12.8	-17°51.2	5.6	54.1
17	74°25.3	10°56.8	273°26.9	12.8	-17°45.6	5.7	54.1
18	89°25.5	10°55.9	287°58.7	12.8	-17°39.9	5.7	54.1
19	104°25.6	10°55.1	302°30.5	12.9	-17°34.1	5.8	54.1
20	119°25.8	10°54.2	317°02.4	12.9	-17°28.3	5.9	54.1
21	134°26.0	10°53.4	331°34.3	12.9	-17°22.4	6.0	54.1
22	149°26.1	10°52.5	346°06.2	12.9	-17°16.3	6.1	54.2
23	164°26.3	10°51.7	0°38.1	13.0	-17°10.2	6.1	54.2
	SD.=15.8	d=-0.9	S.D.=14.7				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°26.5	10°50.8	15°10.1	13.0	-17°04.1	6.2	54.2
1	194°26.7	10°49.9	29°42.1	13.0	-16°57.8	6.3	54.2
2	209°26.8	10°49.1	44°14.1	13.0	-16°51.5	6.4	54.2
3	224°27.0	10°48.2	58°46.2	13.1	-16°45.1	6.4	54.2
4	239°27.2	10°47.4	73°18.2	13.1	-16°38.6	6.5	54.2
5	254°27.3	10°46.5	87°50.3	13.1	-16°32.0	6.6	54.2
6	269°27.5	10°45.6	102°22.5	13.1	-16°25.4	6.7	54.2
7	284°27.7	10°44.8	116°54.6	13.2	-16°18.7	6.7	54.2
8	299°27.9	10°43.9	131°26.8	13.2	-16°11.9	6.8	54.2
9	314°28.0	10°43.0	145°59.0	13.2	-16°05.1	6.9	54.2
10	329°28.2	10°42.2	160°31.2	13.2	-15°58.1	7.0	54.2
11	344°28.4	10°41.3	175°03.4	13.3	-15°51.1	7.0	54.2
12	359°28.6	10°40.5	189°35.7	13.3	-15°44.1	7.1	54.3
13	14°28.7	10°39.6	204°08.0	13.3	-15°36.9	7.2	54.3
14	29°28.9	10°38.7	218°40.3	13.3	-15°29.7	7.3	54.3
15	44°29.1	10°37.9	233°12.7	13.4	-15°22.4	7.3	54.3
16	59°29.3	10°37.0	247°45.1	13.4	-15°15.1	7.4	54.3
17	74°29.4	10°36.1	262°17.5	13.4	-15°07.6	7.5	54.3
18	89°29.6	10°35.3	276°49.9	13.4	-15°00.1	7.5	54.3
19	104°29.8	10°34.4	291°22.3	13.5	-14°52.6	7.6	54.3
20	119°30.0	10°33.5	305°54.8	13.5	-14°44.9	7.7	54.3
21	134°30.1	10°32.7	320°27.3	13.5	-14°37.2	7.7	54.3
22	149°30.3	10°31.8	334°59.8	13.5	-14°29.5	7.8	54.3
23	164°30.5	10°30.9	349°32.4	13.6	-14°21.6	7.9	54.3
	SD.=15.8	d=-0.9	S.D.=14.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	01:13	03:19	20:41	22:39	–:–
70	–:–	02:08	03:40	20:22	21:50	–:–
68	–:–	02:40	03:55	20:07	21:20	–:–
66	01:04	03:03	04:08	19:54	20:58	22:51
64	01:52	03:21	04:19	19:44	20:41	22:07
62	02:21	03:36	04:28	19:35	20:27	21:40
60	02:43	03:48	04:36	19:28	20:15	21:19
58	02:60	03:58	04:42	19:21	20:05	21:02
56	03:14	04:07	04:48	19:15	19:56	20:49
54	03:26	04:15	04:54	19:10	19:48	20:37
52	03:36	04:22	04:58	19:05	19:41	20:27
50	03:45	04:28	05:03	19:01	19:35	20:18
45	04:03	04:41	05:12	18:52	19:23	20:00
40	04:18	04:52	05:20	18:44	19:12	19:46
35	04:29	05:00	05:27	18:38	19:04	19:35
30	04:39	05:08	05:32	18:32	18:56	19:26
20	04:53	05:20	05:42	18:22	18:45	19:11
10	05:05	05:30	05:51	18:14	18:35	18:60
0	05:14	05:38	05:59	18:06	18:27	18:51
-10	05:21	05:46	06:07	17:58	18:19	18:44
-20	05:27	05:53	06:15	17:50	18:12	18:38
-30	05:32	06:00	06:25	17:41	18:05	18:33
-35	05:35	06:04	06:30	17:35	18:01	18:31
-40	05:37	06:08	06:36	17:29	17:57	18:29
-45	05:39	06:13	06:43	17:23	17:53	18:27
-50	05:41	06:18	06:51	17:14	17:47	18:25
-52	05:41	06:20	06:55	17:11	17:45	18:25
-54	05:42	06:23	06:59	17:06	17:43	18:24
-56	05:42	06:25	07:04	17:02	17:40	18:24
-58	05:43	06:28	07:09	16:57	17:37	18:23
-60	05:43	06:32	07:15	16:51	17:34	18:23

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	–:–	21:53	21:14	–:–	–:–	00:13
70	21:12	20:53	20:43	23:16	–:–	01:12
68	20:12	20:18	20:20	–:–	00:16	01:46
66	19:37	19:53	20:02	–:–	00:50	02:11
64	19:12	19:33	19:48	00:08	01:15	02:30
62	18:52	19:17	19:36	00:30	01:34	02:45
60	18:36	19:04	19:25	00:48	01:50	02:58
58	18:23	18:52	19:16	01:03	02:03	03:09
56	18:11	18:42	19:08	01:16	02:15	03:19
54	18:00	18:33	19:01	01:27	02:25	03:28
52	17:51	18:26	18:55	01:37	02:34	03:35
50	17:43	18:18	18:49	01:46	02:42	03:42
45	17:25	18:03	18:36	02:04	02:59	03:57
40	17:11	17:50	18:26	02:19	03:13	04:08
35	16:59	17:40	18:17	02:32	03:25	04:19
30	16:48	17:30	18:09	02:43	03:35	04:28
20	16:30	17:14	17:55	03:02	03:52	04:43
10	16:14	16:60	17:43	03:19	04:08	04:56
0	15:59	16:46	17:32	03:34	04:22	05:09
-10	15:44	16:33	17:21	03:50	04:36	05:21
-20	15:28	16:18	17:09	04:06	04:51	05:34
-30	15:10	16:02	16:55	04:25	05:09	05:49
-35	14:59	15:52	16:47	04:36	05:19	05:58
-40	14:47	15:41	16:38	04:49	05:30	06:07
-45	14:32	15:29	16:27	05:04	05:44	06:19
-50	14:14	15:13	16:14	05:22	06:00	06:33
-52	14:06	15:05	16:08	05:30	06:08	06:39
-54	13:57	14:57	16:02	05:40	06:16	06:46
-56	13:46	14:48	15:54	05:51	06:26	06:54
-58	13:34	14:37	15:46	06:03	06:37	07:03
-60	13:20	14:25	15:36	06:17	06:49	07:14

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
23	02:46	02:38	12:02	22:10	09:46	12(92%)
24	02:30	02:22	12:02	22:57	10:34	13(96%)
25	02:14	02:06	12:02	23:43	11:20	14(99%)

August 26, 27 ,28 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	334°11.7	138°14.6	-9°29.0	32°05.5	-26°17.1	110°01.1	-15°53.9	61°19.4	-22°40.6
1	349°14.1	153°15.1	-9°30.1	47°08.0	-26°16.9	125°03.3	-15°54.0	76°22.0	-22°40.7
2	4°16.6	168°15.6	-9°31.3	62°10.6	-26°16.8	140°05.4	-15°54.1	91°24.5	-22°40.7
3	19°19.0	183°16.1	-9°32.4	77°13.1	-26°16.7	155°07.6	-15°54.2	106°27.0	-22°40.7
4	34°21.5	198°16.6	-9°33.5	92°15.7	-26°16.6	170°09.7	-15°54.3	121°29.5	-22°40.7
5	49°24.0	213°17.1	-9°34.6	107°18.2	-26°16.5	185°11.9	-15°54.4	136°32.0	-22°40.7
6	64°26.4	228°17.6	-9°35.8	122°20.8	-26°16.4	200°14.0	-15°54.5	151°34.5	-22°40.7
7	79°28.9	243°18.1	-9°36.9	137°23.3	-26°16.3	215°16.2	-15°54.6	166°37.0	-22°40.7
8	94°31.4	258°18.6	-9°38.0	152°25.8	-26°16.2	230°18.3	-15°54.7	181°39.6	-22°40.7
9	109°33.8	273°19.1	-9°39.1	167°28.4	-26°16.1	245°20.5	-15°54.8	196°42.1	-22°40.7
10	124°36.3	288°19.6	-9°40.2	182°30.9	-26°15.9	260°22.7	-15°54.9	211°44.6	-22°40.7
11	139°38.8	303°20.1	-9°41.4	197°33.4	-26°15.8	275°24.8	-15°55.0	226°47.1	-22°40.7
12	154°41.2	318°20.6	-9°42.5	212°36.0	-26°15.7	290°27.0	-15°55.1	241°49.6	-22°40.7
13	169°43.7	333°21.1	-9°43.6	227°38.5	-26°15.6	305°29.1	-15°55.2	256°52.1	-22°40.7
14	184°46.2	348°21.6	-9°44.7	242°41.0	-26°15.5	320°31.3	-15°55.3	271°54.6	-22°40.7
15	199°48.6	3°22.1	-9°45.8	257°43.6	-26°15.4	335°33.4	-15°55.4	286°57.1	-22°40.8
16	214°51.1	18°22.6	-9°47.0	272°46.1	-26°15.3	350°35.6	-15°55.5	301°59.6	-22°40.8
17	229°53.5	33°23.1	-9°48.1	287°48.6	-26°15.1	5°37.7	-15°55.6	317°02.2	-22°40.8
18	244°56.0	48°23.6	-9°49.2	302°51.2	-26°15.0	20°39.9	-15°55.7	332°04.7	-22°40.8
19	259°58.5	63°24.1	-9°50.3	317°53.7	-26°14.9	35°42.0	-15°55.8	347°07.2	-22°40.8
20	275°00.9	78°24.6	-9°51.4	332°56.2	-26°14.8	50°44.2	-15°55.9	2°09.7	-22°40.8
21	290°03.4	93°25.1	-9°52.5	347°58.7	-26°14.7	65°46.3	-15°56.0	17°12.2	-22°40.8
22	305°05.9	108°25.7	-9°53.7	3°01.2	-26°14.6	80°48.5	-15°56.1	32°14.7	-22°40.8
23	320°08.3	123°26.2	-9°54.8	18°03.8	-26°14.4	95°50.6	-15°56.2	47°17.2	-22°40.8
Mer.pass.:1:42:		v0.5 d-1.1 m-4.3		v2.6 d0.1 m-2.3		v2.2 d-0.1 m-1.8		v2.5 d-0.0 m0.3	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	335°10.8	138°26.7	-9°55.9	33°06.3	-26°14.3	110°52.8	-15°56.3	62°19.7	-22°40.8
1	350°13.3	153°27.2	-9°57.0	48°08.8	-26°14.2	125°54.9	-15°56.4	77°22.2	-22°40.8
2	5°15.7	168°27.7	-9°58.1	63°11.3	-26°14.1	140°57.1	-15°56.4	92°24.7	-22°40.8
3	20°18.2	183°28.2	-9°59.2	78°13.8	-26°14.0	155°59.2	-15°56.5	107°27.3	-22°40.8
4	35°20.7	198°28.7	-10°00.3	93°16.3	-26°13.8	171°01.4	-15°56.6	122°29.8	-22°40.8
5	50°23.1	213°29.3	-10°01.5	108°18.8	-26°13.7	186°03.6	-15°56.7	137°32.3	-22°40.9
6	65°25.6	228°29.8	-10°02.6	123°21.3	-26°13.6	201°05.7	-15°56.8	152°34.8	-22°40.9
7	80°28.0	243°30.3	-10°03.7	138°23.8	-26°13.5	216°07.9	-15°56.9	167°37.3	-22°40.9
8	95°30.5	258°30.8	-10°04.8	153°26.4	-26°13.4	231°10.0	-15°57.0	182°39.8	-22°40.9
9	110°33.0	273°31.3	-10°05.9	168°28.9	-26°13.2	246°12.2	-15°57.1	197°42.3	-22°40.9
10	125°35.4	288°31.9	-10°07.0	183°31.4	-26°13.1	261°14.3	-15°57.2	212°44.8	-22°40.9
11	140°37.9	303°32.4	-10°08.1	198°33.9	-26°13.0	276°16.4	-15°57.3	227°47.3	-22°40.9
12	155°40.4	318°32.9	-10°09.2	213°36.4	-26°12.9	291°18.6	-15°57.4	242°49.8	-22°40.9
13	170°42.8	333°33.4	-10°10.3	228°38.8	-26°12.7	306°20.7	-15°57.5	257°52.3	-22°40.9
14	185°45.3	348°33.9	-10°11.4	243°41.3	-26°12.6	321°22.9	-15°57.6	272°54.8	-22°40.9
15	200°47.8	3°34.5	-10°12.6	258°43.8	-26°12.5	336°25.0	-15°57.7	287°57.3	-22°40.9
16	215°50.2	18°35.0	-10°13.7	273°46.3	-26°12.4	351°27.2	-15°57.8	302°59.9	-22°40.9
17	230°52.7	33°35.5	-10°14.8	288°48.8	-26°12.2	6°29.3	-15°57.9	318°02.4	-22°40.9
18	245°55.1	48°36.0	-10°15.9	303°51.3	-26°12.1	21°31.5	-15°58.0	333°04.9	-22°40.9
19	260°57.6	63°36.6	-10°17.0	318°53.8	-26°12.0	36°33.6	-15°58.1	348°07.4	-22°40.9
20	276°00.1	78°37.1	-10°18.1	333°56.3	-26°11.9	51°35.8	-15°58.2	3°09.9	-22°41.0
21	291°02.5	93°37.6	-10°19.2	348°58.8	-26°11.7	66°37.9	-15°58.3	18°12.4	-22°41.0
22	306°05.0	108°38.2	-10°20.3	4°01.3	-26°11.6	81°40.1	-15°58.4	33°14.9	-22°41.0
23	321°07.5	123°38.7	-10°21.4	19°03.7	-26°11.5	96°42.2	-15°58.5	48°17.4	-22°41.0
Mer.pass.:1:39:		v0.5 d-1.1 m-4.3		v2.5 d0.1 m-2.3		v2.2 d-0.1 m-1.8		v2.5 d-0.0 m0.3	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	336°09.9	138°39.2	-10°22.5	34°06.2	-26°11.3	111°44.4	-15°58.6	63°19.9	-22°41.0
1	351°12.4	153°39.8	-10°23.6	49°08.7	-26°11.2	126°46.5	-15°58.7	78°22.4	-22°41.0
2	6°14.9	168°40.3	-10°24.7	64°11.2	-26°11.1	141°48.7	-15°58.8	93°24.9	-22°41.0
3	21°17.3	183°40.8	-10°25.8	79°13.6	-26°10.9	156°50.8	-15°58.9	108°27.4	-22°41.0
4	36°19.8	198°41.4	-10°26.9	94°16.1	-26°10.8	171°52.9	-15°59.0	123°29.9	-22°41.0
5	51°22.3	213°41.9	-10°28.0	109°18.6	-26°10.7	186°55.1	-15°59.1	138°32.4	-22°41.0
6	66°24.7	228°42.4	-10°29.1	124°21.1	-26°10.6	201°57.2	-15°59.2	153°34.9	-22°41.0
7	81°27.2	243°43.0	-10°30.2	139°23.5	-26°10.4	216°59.4	-15°59.3	168°37.4	-22°41.0
8	96°29.6	258°43.5	-10°31.3	154°26.0	-26°10.3	232°01.5	-15°59.4	183°39.9	-22°41.0
9	111°32.1	273°44.1	-10°32.4	169°28.5	-26°10.2	247°03.7	-15°59.5	198°42.4	-22°41.0
10	126°34.6	288°44.6	-10°33.5	184°30.9	-26°10.0	262°05.8	-15°59.6	213°44.9	-22°41.1
11	141°37.0	303°45.1	-10°34.6	199°33.4	-26°09.9	277°08.0	-15°59.7	228°47.4	-22°41.1
12	156°39.5	318°45.7	-10°35.7	214°35.9	-26°09.8	292°10.1	-15°59.8	243°49.9	-22°41.1
13	171°42.0	333°46.2	-10°36.8	229°38.3	-26°09.6	307°12.2	-15°59.9	258°52.5	-22°41.1
14	186°44.4	348°46.8	-10°37.9	244°40.8	-26°09.5	322°14.4	-16°00.0	273°55.0	-22°41.1
15	201°46.9	3°47.3	-10°39.0	259°43.2	-26°09.4	337°16.5	-16°00.1	288°57.5	-22°41.1
16	216°49.4	18°47.9	-10°40.1	274°45.7	-26°09.2	352°18.7	-16°00.2	303°60.0	-22°41.1
17	231°51.8	33°48.4	-10°41.2	289°48.1	-26°09.1	7°20.8	-16°00.3	319°02.5	-22°41.1
18	246°54.3	48°49.0	-10°42.3	304°50.6	-26°08.9	22°23.0	-16°00.4	334°05.0	-22°41.1
19	261°56.7	63°49.5	-10°43.4	319°53.1	-26°08.8	37°25.1	-16°00.5	349°07.5	-22°41.1
20	276°59.2	78°50.1	-10°44.5	334°55.5	-26°08.7	52°27.2	-16°00.6	4°10.0	-22°41.1
21	292°01.7	93°50.6	-10°45.6	349°57.9	-26°08.5	67°29.4	-16°00.7	19°12.5	-22°41.1
22	307°04.1	108°51.2	-10°46.7	5°00.4	-26°08.4	82°31.5	-16°00.8	34°15.0	-22°41.1
23	322°06.6	123°51.7	-10°47.8	20°02.8	-26°08.3	97°33.7	-16°00.9	49°17.5	-22°41.1
Mer.pass.:1:35:		v0.5 d-1.1 m-4.3		v2.5 d0.1 m-2.2		v2.1 d-0.1 m-1.8		v2.5 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.9	-42°12.2
Schedar	349°36.0	56°38.2
Diphda	348°52.0	-17°53.0
Achernar	335°23.8	-57°08.4
Hamal	327°56.6	23°32.9
Polaris	316°03.7	89°20.1
Akamar	315°15.5	-40°13.7
Menkar	314°11.3	4°09.7
Mirfak	308°35.2	49°55.3
Aldebaran	290°45.4	16°32.7
Rigel	281°08.7	-8°10.8
Capella	280°29.4	46°00.7
Bellatrix	278°28.3	6°21.9
Elnath	278°08.3	28°37.2
Alnilam	275°42.9	-1°11.4
Betelgeuse	270°57.6	7°24.5
Canopus	263°54.9	-52°42.2
Sirius	258°30.7	-16°44.3
Adara	255°10.0	-28°59.7
Procyon	244°56.2	5°10.8
Pollux	243°23.6	27°58.8
Avior	234°17.1	-59°34.0
Suhail	222°50.3	-43°30.4
Miaplacidus	221°39.8	-69°47.5
Alphard	217°52.9	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.1	61°39.2
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.6
Acrux	173°05.9	-63°12.1
Gacrux	171°57.4	-57°13.0
Alioth	166°18.1	55°51.9
Spica	158°27.7	-11°15.3
Alcaid	152°56.4	49°13.6
Hadar	148°43.2	-60°27.8
Menkent	148°03.6	-36°27.6
Arcturus	145°52.5	19°05.8
Rigil Kent.	139°47.1	-60°54.7
Zubenelg.	137°01.6	-16°06.9
Kochab	137°20.5	74°05.2
Alphecca	126°08.1	26°39.6
Antares	112°21.9	-26°28.2
Atria	107°20.4	-69°03.7
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.9
Rasalhague	96°03.1	12°33.2
Etamin	90°44.3	51°29.6
Kaus Aust.	83°38.9	-34°22.4
Vega	80°36.4	38°48.4
Nunki	75°53.7	-26°16.3
Altair	62°04.6	8°55.3
Peacock	53°13.2	-56°40.5
Deneb	49°28.6	45°21.0
Enif	33°43.3	9°57.8
Alnair	27°38.9	-46°52.1
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.0
Markab	13°34.5	15°18.4

2018/8/2	**SHA**	**Mer.pass**
Venus	164°02.9	14:47
Mars	57°53.8	21:48
Jupiter	135°49.4	16:38
Saturn	87°07.8	19:51

2018/8/2	**SHA**	**Mer.pass**
Venus	163°15.9	14:46
Mars	57°55.5	21:44
Jupiter	135°42.0	16:34
Saturn	87°08.9	19:47

2018/8/2	**SHA**	**Mer.pass**
Venus	162°29.3	14:45
Mars	57°56.3	21:40
Jupiter	135°34.4	16:31
Saturn	87°10.0	19:43

Horizontal paralax	
Venus:	0.2
Mars:	0.3

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°30.7	10°30.1	4°04.9	13.6	-14°13.7	7.9	54.4
1	194°30.8	10°29.2	18°37.5	13.6	-14°05.8	8.0	54.4
2	209°31.0	10°28.3	33°10.1	13.6	-13°57.8	8.1	54.4
3	224°31.2	10°27.5	47°42.8	13.6	-13°49.7	8.1	54.4
4	239°31.4	10°26.6	62°15.4	13.7	-13°41.5	8.2	54.4
5	254°31.5	10°25.7	76°48.1	13.7	-13°33.3	8.2	54.4
6	269°31.7	10°24.9	91°20.8	13.7	-13°25.0	8.3	54.4
7	284°31.9	10°24.0	105°53.6	13.7	-13°16.7	8.4	54.4
8	299°32.1	10°23.1	120°26.3	13.8	-13°08.3	8.4	54.4
9	314°32.2	10°22.3	134°59.1	13.8	-12°59.8	8.5	54.5
10	329°32.4	10°21.4	149°31.9	13.8	-12°51.3	8.6	54.5
11	344°32.6	10°20.5	164°04.7	13.8	-12°42.7	8.6	54.5
12	359°32.8	10°19.6	178°37.5	13.8	-12°34.0	8.7	54.5
13	14°33.0	10°18.8	193°10.4	13.9	-12°25.3	8.7	54.5
14	29°33.1	10°17.9	207°43.3	13.9	-12°16.6	8.8	54.5
15	44°33.3	10°17.0	222°16.2	13.9	-12°07.8	8.8	54.5
16	59°33.5	10°16.2	236°49.1	13.9	-11°58.9	8.9	54.5
17	74°33.7	10°15.3	251°22.0	14.0	-11°50.0	9.0	54.5
18	89°33.8	10°14.4	265°55.0	14.0	-11°41.0	9.0	54.6
19	104°34.0	10°13.6	280°28.0	14.0	-11°32.0	9.1	54.6
20	119°34.2	10°12.7	295°01.0	14.0	-11°22.9	9.1	54.6
21	134°34.4	10°11.8	309°34.0	14.0	-11°13.7	9.2	54.6
22	149°34.6	10°10.9	324°07.0	14.0	-11°04.5	9.2	54.6
23	164°34.7	10°10.1	338°40.1	14.1	-10°55.3	9.3	54.6
	SD.=15.8	d=-0.9	S.D.=14.8				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°34.9	10°09.2	353°13.1	14.1	-10°46.0	9.3	54.6
1	194°35.1	10°08.3	7°46.2	14.1	-10°36.7	9.4	54.6
2	209°35.3	10°07.4	22°19.3	14.1	-10°27.3	9.4	54.7
3	224°35.5	10°06.6	36°52.4	14.1	-10°17.8	9.5	54.7
4	239°35.6	10°05.7	51°25.6	14.1	-10°08.3	9.5	54.7
5	254°35.8	10°04.8	65°58.7	14.2	-9°58.8	9.6	54.7
6	269°36.0	10°03.9	80°31.9	14.2	-9°49.2	9.6	54.7
7	284°36.2	10°03.1	95°05.1	14.2	-9°39.5	9.7	54.7
8	299°36.4	10°02.2	109°38.3	14.2	-9°29.9	9.7	54.7
9	314°36.6	10°01.3	124°11.5	14.2	-9°20.1	9.8	54.8
10	329°36.7	10°00.4	138°44.7	14.2	-9°10.4	9.8	54.8
11	344°36.9	9°59.6	153°17.9	14.2	-9°00.5	9.8	54.8
12	359°37.1	9°58.7	167°51.2	14.3	-8°50.7	9.9	54.8
13	14°37.3	9°57.8	182°24.4	14.3	-8°40.8	9.9	54.8
14	29°37.5	9°56.9	196°57.7	14.3	-8°30.8	10.0	54.8
15	44°37.6	9°56.0	211°31.0	14.3	-8°20.9	10.0	54.8
16	59°37.8	9°55.2	226°04.3	14.3	-8°10.8	10.0	54.9
17	74°38.0	9°54.3	240°37.6	14.3	-8°00.8	10.1	54.9
18	89°38.2	9°53.4	255°10.9	14.3	-7°50.7	10.1	54.9
19	104°38.4	9°52.5	269°44.2	14.3	-7°40.5	10.2	54.9
20	119°38.6	9°51.7	284°17.5	14.3	-7°30.3	10.2	54.9
21	134°38.7	9°50.8	298°50.9	14.3	-7°20.1	10.2	54.9
22	149°38.9	9°49.9	313°24.2	14.3	-7°09.8	10.3	54.9
23	164°39.1	9°49.0	327°57.6	14.4	-6°59.5	10.3	55.0
	SD.=15.8	d=-0.9	S.D.=14.9				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°39.3	9°48.1	342°30.9	14.4	-6°49.2	10.3	55.0
1	194°39.5	9°47.3	357°04.3	14.4	-6°38.9	10.4	55.0
2	209°39.7	9°46.4	11°37.7	14.4	-6°28.5	10.4	55.0
3	224°39.8	9°45.5	26°11.0	14.4	-6°18.0	10.4	55.0
4	239°40.0	9°44.6	40°44.4	14.4	-6°07.6	10.5	55.0
5	254°40.2	9°43.7	55°17.8	14.4	-5°57.1	10.5	55.1
6	269°40.4	9°42.9	69°51.2	14.4	-5°46.5	10.5	55.1
7	284°40.6	9°42.0	84°24.6	14.4	-5°36.0	10.6	55.1
8	299°40.8	9°41.1	98°58.0	14.4	-5°25.4	10.6	55.1
9	314°41.0	9°40.2	113°31.4	14.4	-5°14.8	10.6	55.1
10	329°41.1	9°39.3	128°04.7	14.4	-5°04.1	10.7	55.1
11	344°41.3	9°38.4	142°38.1	14.4	-4°53.5	10.7	55.2
12	359°41.5	9°37.6	157°11.5	14.4	-4°42.8	10.7	55.2
13	14°41.7	9°36.7	171°44.9	14.4	-4°32.0	10.7	55.2
14	29°41.9	9°35.8	186°18.3	14.4	-4°21.3	10.8	55.2
15	44°42.1	9°34.9	200°51.7	14.4	-4°10.5	10.8	55.2
16	59°42.3	9°34.0	215°25.1	14.4	-3°59.7	10.8	55.2
17	74°42.4	9°33.1	229°58.4	14.4	-3°48.9	10.8	55.3
18	89°42.6	9°32.3	244°31.8	14.4	-3°38.0	10.9	55.3
19	104°42.8	9°31.4	259°05.2	14.4	-3°27.2	10.9	55.3
20	119°43.0	9°30.5	273°38.6	14.4	-3°16.3	10.9	55.3
21	134°43.2	9°29.6	288°11.9	14.4	-3°05.4	10.9	55.3
22	149°43.4	9°28.7	302°45.3	14.3	-2°54.4	10.9	55.3
23	164°43.6	9°27.8	317°18.6	14.3	-2°43.5	11.0	55.4
	SD.=15.8	d=-0.9	S.D.=15.0				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	01:49	03:35	20:24	22:06	–:–
70	–:–	02:29	03:53	20:07	21:29	–:–
68	–:–	02:56	04:07	19:53	21:03	–:–
66	01:34	03:16	04:18	19:42	20:44	22:22
64	02:10	03:32	04:28	19:33	20:28	21:49
62	02:35	03:45	04:36	19:25	20:16	21:25
60	02:54	03:56	04:43	19:19	20:05	21:06
58	03:09	04:06	04:49	19:13	19:56	20:52
56	03:22	04:14	04:54	19:08	19:48	20:39
54	03:33	04:21	04:59	19:03	19:41	20:28
52	03:42	04:27	05:03	18:59	19:34	20:19
50	03:51	04:33	05:07	18:55	19:29	20:11
45	04:08	04:45	05:16	18:46	19:17	19:54
40	04:21	04:55	05:23	18:40	19:08	19:41
35	04:32	05:03	05:29	18:34	18:60	19:31
30	04:41	05:10	05:34	18:28	18:53	19:22
20	04:54	05:21	05:43	18:20	18:42	19:08
10	05:05	05:30	05:51	18:12	18:33	18:58
0	05:13	05:37	05:58	18:05	18:26	18:50
-10	05:19	05:44	06:05	17:58	18:19	18:44
-20	05:25	05:51	06:13	17:50	18:13	18:39
-30	05:29	05:57	06:21	17:42	18:06	18:34
-35	05:31	06:00	06:26	17:38	18:03	18:33
-40	05:33	06:04	06:31	17:32	17:60	18:31
-45	05:34	06:08	06:38	17:26	17:56	18:30
-50	05:35	06:12	06:45	17:19	17:52	18:29
-52	05:35	06:14	06:48	17:15	17:50	18:29
-54	05:35	06:16	06:52	17:12	17:48	18:29
-56	05:35	06:18	06:56	17:08	17:46	18:29
-58	05:35	06:21	07:01	17:03	17:43	18:29
-60	05:35	06:23	07:06	16:58	17:41	18:29

	Moonrise			**Moonset**		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	20:54	20:40	20:27	02:28	04:21	06:07
70	20:35	20:29	20:23	02:57	04:38	06:16
68	20:21	20:20	20:19	03:19	04:51	06:23
66	20:09	20:13	20:16	03:36	05:02	06:29
64	19:58	20:06	20:13	03:50	05:11	06:34
62	19:50	20:01	20:11	04:01	05:19	06:38
60	19:42	19:56	20:09	04:11	05:26	06:42
58	19:36	19:52	20:07	04:19	05:31	06:45
56	19:30	19:48	20:06	04:27	05:37	06:48
54	19:24	19:45	20:04	04:33	05:41	06:50
52	19:20	19:42	20:03	04:39	05:45	06:53
50	19:15	19:39	20:02	04:45	05:49	06:55
45	19:06	19:33	19:59	04:56	05:57	06:59
40	18:58	19:28	19:57	05:06	06:04	07:03
35	18:51	19:24	19:55	05:14	06:10	07:06
30	18:45	19:20	19:53	05:21	06:15	07:09
20	18:35	19:13	19:50	05:33	06:24	07:14
10	18:26	19:07	19:48	05:44	06:31	07:19
0	18:17	19:01	19:45	05:54	06:39	07:23
-10	18:09	18:56	19:43	06:04	06:46	07:27
-20	17:59	18:50	19:40	06:15	06:53	07:31
-30	17:49	18:43	19:38	06:26	07:02	07:36
-35	17:43	18:39	19:36	06:33	07:07	07:38
-40	17:36	18:35	19:34	06:41	07:12	07:42
-45	17:28	18:29	19:32	06:50	07:19	07:45
-50	17:18	18:23	19:29	07:01	07:26	07:49
-52	17:14	18:20	19:28	07:06	07:30	07:51
-54	17:09	18:17	19:27	07:12	07:34	07:53
-56	17:03	18:13	19:25	07:18	07:38	07:56
-58	16:57	18:10	19:23	07:25	07:43	07:58
-60	16:50	18:05	19:22	07:32	07:48	08:01

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
26	01:57	01:49	12:01	00:27	12:05	15(100%)
27	01:40	01:32	12:01	00:27	12:50	16(99%)
28	01:23	01:14	12:01	01:12	13:34	17(96%)

August 29, 30 ,31 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	337°09.1	138°52.3	-10°48.9	35°05.3	-26°08.1	112°35.8	-16°01.0	64°20.0	-22°41.1
1	352°11.5	153°52.8	-10°50.0	50°07.7	-26°08.0	127°37.9	-16°01.1	79°22.5	-22°41.2
2	7°14.0	168°53.4	-10°51.1	65°10.2	-26°07.8	142°40.1	-16°01.2	94°25.0	-22°41.2
3	22°16.5	183°53.9	-10°52.2	80°12.6	-26°07.7	157°42.2	-16°01.3	109°27.5	-22°41.2
4	37°18.9	198°54.5	-10°53.3	95°15.0	-26°07.6	172°44.4	-16°01.4	124°30.0	-22°41.2
5	52°21.4	213°55.0	-10°54.3	110°17.5	-26°07.4	187°46.5	-16°01.5	139°32.5	-22°41.2
6	67°23.9	228°55.6	-10°55.4	125°19.9	-26°07.3	202°48.6	-16°01.6	154°35.0	-22°41.2
7	82°26.3	243°56.2	-10°56.5	140°22.4	-26°07.1	217°50.8	-16°01.7	169°37.5	-22°41.2
8	97°28.8	258°56.7	-10°57.6	155°24.8	-26°07.0	232°52.9	-16°01.8	184°40.0	-22°41.2
9	112°31.2	273°57.3	-10°58.7	170°27.2	-26°06.8	247°55.1	-16°02.0	199°42.5	-22°41.2
10	127°33.7	288°57.8	-10°59.8	185°29.6	-26°06.7	262°57.2	-16°02.1	214°45.0	-22°41.2
11	142°36.2	303°58.4	-11°00.9	200°32.1	-26°06.6	277°59.3	-16°02.2	229°47.5	-22°41.2
12	157°38.6	318°59.0	-11°02.0	215°34.5	-26°06.4	293°01.5	-16°02.3	244°50.0	-22°41.2
13	172°41.1	333°59.5	-11°03.1	230°36.9	-26°06.3	308°03.6	-16°02.4	259°52.5	-22°41.2
14	187°43.6	349°00.1	-11°04.1	245°39.3	-26°06.1	323°05.8	-16°02.5	274°55.0	-22°41.2
15	202°46.0	4°00.7	-11°05.2	260°41.8	-26°06.0	338°07.9	-16°02.6	289°57.5	-22°41.2
16	217°48.5	19°01.2	-11°06.3	275°44.2	-26°05.8	353°10.0	-16°02.7	304°60.0	-22°41.3
17	232°51.0	34°01.8	-11°07.4	290°46.6	-26°05.7	8°12.2	-16°02.8	320°02.5	-22°41.3
18	247°53.4	49°02.4	-11°08.5	305°49.0	-26°05.5	23°14.3	-16°02.9	335°05.0	-22°41.3
19	262°55.9	64°02.9	-11°09.6	320°51.4	-26°05.4	38°16.4	-16°03.0	350°07.5	-22°41.3
20	277°58.3	79°03.5	-11°10.7	335°53.9	-26°05.3	53°18.6	-16°03.1	5°10.0	-22°41.3
21	293°00.8	94°04.1	-11°11.7	350°56.3	-26°05.1	68°20.7	-16°03.2	20°12.5	-22°41.3
22	308°03.3	109°04.6	-11°12.8	5°58.7	-26°05.0	83°22.8	-16°03.3	35°14.9	-22°41.3
23	323°05.7	124°05.2	-11°13.9	21°01.1	-26°04.8	98°25.0	-16°03.4	50°17.4	-22°41.3
Mer.pass.:1:31:		v0.6 d-1.1 m-4.3		v2.4 d0.1 m-2.2		v2.1 d-0.1 m-1.8		v2.5 d-0.0 m0.3	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	338°08.2	139°05.8	-11°15.0	36°03.5	-26°04.7	113°27.1	-16°03.5	65°19.9	-22°41.3
1	353°10.7	154°06.4	-11°16.1	51°05.9	-26°04.5	128°29.3	-16°03.6	80°22.4	-22°41.3
2	8°13.1	169°06.9	-11°17.1	66°08.3	-26°04.4	143°31.4	-16°03.7	95°24.9	-22°41.3
3	23°15.6	184°07.5	-11°18.2	81°10.7	-26°04.2	158°33.5	-16°03.8	110°27.4	-22°41.3
4	38°18.1	199°08.1	-11°19.3	96°13.1	-26°04.1	173°35.7	-16°03.9	125°29.9	-22°41.3
5	53°20.5	214°08.7	-11°20.4	111°15.5	-26°03.9	188°37.8	-16°04.0	140°32.4	-22°41.3
6	68°23.0	229°09.2	-11°21.5	126°17.9	-26°03.8	203°39.9	-16°04.1	155°34.9	-22°41.3
7	83°25.5	244°09.8	-11°22.5	141°20.3	-26°03.6	218°42.1	-16°04.2	170°37.4	-22°41.4
8	98°27.9	259°10.4	-11°23.6	156°22.7	-26°03.5	233°44.2	-16°04.3	185°39.9	-22°41.4
9	113°30.4	274°11.0	-11°24.7	171°25.1	-26°03.3	248°46.3	-16°04.4	200°42.4	-22°41.4
10	128°32.8	289°11.6	-11°25.8	186°27.5	-26°03.2	263°48.5	-16°04.5	215°44.9	-22°41.4
11	143°35.3	304°12.2	-11°26.9	201°29.9	-26°03.0	278°50.6	-16°04.6	230°47.4	-22°41.4
12	158°37.8	319°12.7	-11°27.9	216°32.3	-26°02.9	293°52.7	-16°04.7	245°49.9	-22°41.4
13	173°40.2	334°13.3	-11°29.0	231°34.7	-26°02.7	308°54.9	-16°04.8	260°52.4	-22°41.4
14	188°42.7	349°13.9	-11°30.1	246°37.1	-26°02.5	323°57.0	-16°04.9	275°54.9	-22°41.4
15	203°45.2	4°14.5	-11°31.2	261°39.4	-26°02.4	338°59.1	-16°05.0	290°57.4	-22°41.4
16	218°47.6	19°15.1	-11°32.2	276°41.8	-26°02.2	354°01.3	-16°05.1	305°59.9	-22°41.4
17	233°50.1	34°15.7	-11°33.3	291°44.2	-26°02.1	9°03.4	-16°05.2	321°02.4	-22°41.4
18	248°52.6	49°16.3	-11°34.4	306°46.6	-26°01.9	24°05.5	-16°05.3	336°04.9	-22°41.4
19	263°55.0	64°16.9	-11°35.4	321°49.0	-26°01.8	39°07.6	-16°05.4	351°07.3	-22°41.4
20	278°57.5	79°17.5	-11°36.5	336°51.3	-26°01.6	54°09.8	-16°05.5	6°09.8	-22°41.4
21	293°60.0	94°18.1	-11°37.6	351°53.7	-26°01.5	69°11.9	-16°05.6	21°12.3	-22°41.4
22	309°02.4	109°18.6	-11°38.7	6°56.1	-26°01.3	84°14.0	-16°05.7	36°14.8	-22°41.5
23	324°04.9	124°19.2	-11°39.7	21°58.5	-26°01.1	99°16.2	-16°05.8	51°17.3	-22°41.5
Mer.pass.:1:27:		v0.6 d-1.1 m-4.3		v2.4 d0.1 m-2.2		v2.1 d-0.1 m-1.8		v2.5 d-0.0 m0.3	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	339°07.3	139°19.8	-11°40.8	37°00.8	-26°01.0	114°18.3	-16°05.9	66°19.8	-22°41.5
1	354°09.8	154°20.4	-11°41.9	52°03.2	-26°00.8	129°20.4	-16°06.0	81°22.3	-22°41.5
2	9°12.3	169°21.0	-11°42.9	67°05.6	-26°00.7	144°22.6	-16°06.1	96°24.8	-22°41.5
3	24°14.7	184°21.6	-11°44.0	82°07.9	-26°00.5	159°24.7	-16°06.3	111°27.3	-22°41.5
4	39°17.2	199°22.2	-11°45.1	97°10.3	-26°00.3	174°26.8	-16°06.4	126°29.8	-22°41.5
5	54°19.7	214°22.8	-11°46.1	112°12.7	-26°00.2	189°28.9	-16°06.5	141°32.3	-22°41.5
6	69°22.1	229°23.4	-11°47.2	127°15.0	-26°00.0	204°31.1	-16°06.6	156°34.8	-22°41.5
7	84°24.6	244°24.0	-11°48.3	142°17.4	-25°59.9	219°33.2	-16°06.7	171°37.2	-22°41.5
8	99°27.1	259°24.6	-11°49.3	157°19.8	-25°59.7	234°35.3	-16°06.8	186°39.7	-22°41.5
9	114°29.5	274°25.2	-11°50.4	172°22.1	-25°59.5	249°37.5	-16°06.9	201°42.2	-22°41.5
10	129°32.0	289°25.8	-11°51.5	187°24.5	-25°59.4	264°39.6	-16°07.0	216°44.7	-22°41.5
11	144°34.4	304°26.5	-11°52.5	202°26.8	-25°59.2	279°41.7	-16°07.1	231°47.2	-22°41.5
12	159°36.9	319°27.1	-11°53.6	217°29.2	-25°59.1	294°43.8	-16°07.2	246°49.7	-22°41.5
13	174°39.4	334°27.7	-11°54.7	232°31.5	-25°58.9	309°46.0	-16°07.3	261°52.2	-22°41.6
14	189°41.8	349°28.3	-11°55.7	247°33.9	-25°58.7	324°48.1	-16°07.4	276°54.7	-22°41.6
15	204°44.3	4°28.9	-11°56.8	262°36.2	-25°58.6	339°50.2	-16°07.5	291°57.2	-22°41.6
16	219°46.8	19°29.5	-11°57.9	277°38.6	-25°58.4	354°52.4	-16°07.6	306°59.7	-22°41.6
17	234°49.2	34°30.1	-11°58.9	292°40.9	-25°58.2	9°54.5	-16°07.7	322°02.2	-22°41.6
18	249°51.7	49°30.7	-11°60.0	307°43.3	-25°58.1	24°56.6	-16°07.8	337°04.6	-22°41.6
19	264°54.2	64°31.3	-12°01.0	322°45.6	-25°57.9	39°58.7	-16°07.9	352°07.1	-22°41.6
20	279°56.6	79°32.0	-12°02.1	337°48.0	-25°57.7	55°00.9	-16°08.0	7°09.6	-22°41.6
21	294°59.1	94°32.6	-12°03.2	352°50.3	-25°57.6	70°03.0	-16°08.1	22°12.1	-22°41.6
22	310°01.6	109°33.2	-12°04.2	7°52.7	-25°57.4	85°05.1	-16°08.2	37°14.6	-22°41.6
23	325°04.0	124°33.8	-12°05.3	22°55.0	-25°57.2	100°07.2	-16°08.3	52°17.1	-22°41.6
Mer.pass.:1:23:		v0.6 d-1.1 m-4.4		v2.4 d0.2 m-2.2		v2.1 d-0.1 m-1.8		v2.5 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.8	-42°12.2
Schedar	349°36.0	56°38.2
Diphda	348°52.0	-17°53.0
Achernar	335°23.8	-57°08.4
Hamal	327°56.6	23°32.9
Polaris	316°02.4	89°20.2
Akamar	315°15.5	-40°13.7
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.3
Aldebaran	290°45.3	16°32.7
Rigel	281°08.7	-8°10.8
Capella	280°29.3	46°00.7
Bellatrix	278°28.3	6°21.9
Elnath	278°08.3	28°37.2
Alnilam	275°42.9	-1°11.4
Betelgeuse	270°57.6	7°24.5
Canopus	263°54.8	-52°42.2
Sirius	258°30.7	-16°44.3
Adara	255°10.0	-28°59.7
Procyon	244°56.2	5°10.8
Pollux	243°23.6	27°58.8
Avior	234°17.1	-59°34.0
Suhail	222°50.2	-43°30.3
Miaplacidus	221°39.8	-69°47.5
Alphard	217°52.9	-8°44.3
Regulus	207°40.1	11°52.7
Dubhe	193°48.1	61°39.2
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.6
Acrux	173°05.9	-63°12.1
Gacrux	171°57.4	-57°13.0
Alioth	166°18.1	55°51.9
Spica	158°27.7	-11°15.3
Alcaid	152°56.4	49°13.6
Hadar	148°43.2	-60°27.8
Menkent	148°03.6	-36°27.6
Arcturus	145°52.5	19°05.8
Rigil Kent.	139°47.2	-60°54.7
Zubenelg.	137°01.6	-16°06.9
Kochab	137°20.6	74°05.2
Alphecca	126°08.1	26°39.6
Antares	112°21.9	-26°28.2
Atria	107°20.4	-69°03.7
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.9
Rasalhague	96°03.1	12°33.2
Etamin	90°44.3	51°29.6
Kaus Aust.	83°38.9	-34°22.4
Vega	80°36.4	38°48.4
Nunki	75°53.7	-26°16.3
Altair	62°04.6	8°55.3
Peacock	53°13.2	-56°40.5
Deneb	49°28.7	45°21.0
Enif	33°43.3	9°57.8
Alnair	27°38.9	-46°52.1
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.1
Markab	13°34.5	15°18.4

2018/8/2	**SHA**	**Mer.pass**
Venus	161°43.2	14:44
Mars	57°56.2	21:36
Jupiter	135°26.7	16:27
Saturn	87°10.9	19:39

2018/8/3	**SHA**	**Mer.pass**
Venus	160°57.6	14:43
Mars	57°55.3	21:32
Jupiter	135°18.9	16:24
Saturn	87°11.7	19:35

2018/8/3	**SHA**	**Mer.pass**
Venus	160°12.5	14:42
Mars	57°53.5	21:29
Jupiter	135°11.0	16:20
Saturn	87°12.5	19:31

Horizontal paralax	
Venus:	0.3
Mars:	0.3

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°43.8	9°26.9	331°51.9	14.3	-2°32.5	11.0	55.4
1	194°43.9	9°26.0	346°25.3	14.3	-2°21.5	11.0	55.4
2	209°44.1	9°25.2	0°58.6	14.3	-2°10.5	11.0	55.4
3	224°44.3	9°24.3	15°31.9	14.3	-1°59.5	11.0	55.4
4	239°44.5	9°23.4	30°05.2	14.3	-1°48.5	11.0	55.5
5	254°44.7	9°22.5	44°38.5	14.3	-1°37.4	11.1	55.5
6	269°44.9	9°21.6	59°11.7	14.3	-1°26.4	11.1	55.5
7	284°45.1	9°20.7	73°45.0	14.3	-1°15.3	11.1	55.5
8	299°45.3	9°19.8	88°18.3	14.2	-1°04.2	11.1	55.5
9	314°45.4	9°18.9	102°51.5	14.2	-0°53.1	11.1	55.5
10	329°45.6	9°18.1	117°24.7	14.2	-0°42.0	11.1	55.6
11	344°45.8	9°17.2	131°57.9	14.2	-0°30.9	11.1	55.6
12	359°46.0	9°16.3	146°31.1	14.2	-0°19.8	11.1	55.6
13	14°46.2	9°15.4	161°04.3	14.2	-0°08.6	11.1	55.6
14	29°46.4	9°14.5	175°37.4	14.1	0°02.5	11.1	55.6
15	44°46.6	9°13.6	190°10.5	14.1	0°13.7	11.2	55.7
16	59°46.8	9°12.7	204°43.6	14.1	0°24.8	11.2	55.7
17	74°47.0	9°11.8	219°16.7	14.1	0°36.0	11.2	55.7
18	89°47.2	9°10.9	233°49.8	14.1	0°47.2	11.2	55.7
19	104°47.3	9°10.0	248°22.9	14.0	0°58.3	11.2	55.7
20	119°47.5	9°09.2	262°55.9	14.0	1°09.5	11.2	55.8
21	134°47.7	9°08.3	277°28.9	14.0	1°20.7	11.2	55.8
22	149°47.9	9°07.4	292°01.9	14.0	1°31.9	11.2	55.8
23	164°48.1	9°06.5	306°34.8	13.9	1°43.0	11.2	55.8
	SD.=15.8	d=-0.9			S.D.=15.1		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°48.3	9°05.6	321°07.7	13.9	1°54.2	11.2	55.8
1	194°48.5	9°04.7	335°40.7	13.9	2°05.4	11.2	55.9
2	209°48.7	9°03.8	350°13.5	13.9	2°16.6	11.2	55.9
3	224°48.9	9°02.9	4°46.4	13.8	2°27.8	11.2	55.9
4	239°49.1	9°02.0	19°19.2	13.8	2°38.9	11.2	55.9
5	254°49.3	9°01.1	33°52.0	13.8	2°50.1	11.2	56.0
6	269°49.4	9°00.2	48°24.8	13.7	3°01.3	11.2	56.0
7	284°49.6	8°59.3	62°57.5	13.7	3°12.4	11.2	56.0
8	299°49.8	8°58.4	77°30.2	13.7	3°23.6	11.1	56.0
9	314°50.0	8°57.5	92°02.9	13.7	3°34.7	11.1	56.0
10	329°50.2	8°56.6	106°35.5	13.6	3°45.9	11.1	56.1
11	344°50.4	8°55.7	121°08.1	13.6	3°57.0	11.1	56.1
12	359°50.6	8°54.8	135°40.7	13.6	4°08.1	11.1	56.1
13	14°50.8	8°54.0	150°13.2	13.5	4°19.2	11.1	56.1
14	29°51.0	8°53.1	164°45.7	13.5	4°30.3	11.1	56.2
15	44°51.2	8°52.2	179°18.2	13.4	4°41.4	11.1	56.2
16	59°51.4	8°51.3	193°50.6	13.4	4°52.4	11.1	56.2
17	74°51.6	8°50.4	208°23.0	13.4	5°03.5	11.0	56.2
18	89°51.8	8°49.5	222°55.3	13.3	5°14.5	11.0	56.2
19	104°52.0	8°48.6	237°27.6	13.3	5°25.6	11.0	56.3
20	119°52.1	8°47.7	251°59.9	13.2	5°36.6	11.0	56.3
21	134°52.3	8°46.8	266°32.1	13.2	5°47.6	11.0	56.3
22	149°52.5	8°45.9	281°04.3	13.2	5°58.5	11.0	56.3
23	164°52.7	8°45.0	295°36.4	13.1	6°09.5	10.9	56.4
	SD.=15.8	d=-0.9			S.D.=15.2		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°52.9	8°44.1	310°08.5	13.1	6°20.4	10.9	56.4
1	194°53.1	8°43.2	324°40.6	13.0	6°31.3	10.9	56.4
2	209°53.3	8°42.3	339°12.6	13.0	6°42.2	10.9	56.4
3	224°53.5	8°41.4	353°44.6	12.9	6°53.1	10.9	56.5
4	239°53.7	8°40.5	8°16.5	12.9	7°03.9	10.8	56.5
5	254°53.9	8°39.6	22°48.3	12.8	7°14.7	10.8	56.5
6	269°54.1	8°38.7	37°20.2	12.8	7°25.5	10.8	56.5
7	284°54.3	8°37.8	51°51.9	12.7	7°36.3	10.8	56.5
8	299°54.5	8°36.9	66°23.6	12.7	7°47.0	10.7	56.6
9	314°54.7	8°36.0	80°55.3	12.6	7°57.7	10.7	56.6
10	329°54.9	8°35.1	95°26.9	12.6	8°08.4	10.7	56.6
11	344°55.1	8°34.2	109°58.5	12.5	8°19.1	10.6	56.6
12	359°55.3	8°33.3	124°30.0	12.5	8°29.7	10.6	56.7
13	14°55.5	8°32.4	139°01.5	12.4	8°40.3	10.6	56.7
14	29°55.7	8°31.5	153°32.9	12.4	8°50.8	10.5	56.7
15	44°55.9	8°30.6	168°04.2	12.3	9°01.4	10.5	56.7
16	59°56.0	8°29.7	182°35.5	12.3	9°11.8	10.5	56.8
17	74°56.2	8°28.8	197°06.8	12.2	9°22.3	10.4	56.8
18	89°56.4	8°27.9	211°38.0	12.2	9°32.7	10.4	56.8
19	104°56.6	8°27.0	226°09.1	12.1	9°43.1	10.4	56.8
20	119°56.8	8°26.1	240°40.2	12.0	9°53.4	10.3	56.9
21	134°57.0	8°25.2	255°11.2	12.0	10°03.7	10.3	56.9
22	149°57.2	8°24.3	269°42.1	11.9	10°14.0	10.2	56.9
23	164°57.4	8°23.3	284°13.0	11.9	10°24.2	10.2	56.9
	SD.=15.8	d=-0.9			S.D.=15.4		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:15	03:51	20:07	21:40	–:–
70	–:–	02:47	04:06	19:52	21:09	–:–
68	01:08	03:10	04:18	19:40	20:47	22:42
66	01:56	03:28	04:28	19:31	20:30	21:59
64	02:26	03:42	04:37	19:23	20:16	21:32
62	02:47	03:54	04:44	19:16	20:05	21:11
60	03:04	04:04	04:50	19:10	19:55	20:54
58	03:18	04:13	04:55	19:05	19:47	20:41
56	03:30	04:20	05:00	18:60	19:40	20:30
54	03:40	04:27	05:04	18:56	19:33	20:20
52	03:49	04:33	05:08	18:52	19:27	20:11
50	03:56	04:38	05:12	18:48	19:22	20:04
45	04:12	04:49	05:19	18:41	19:11	19:48
40	04:24	04:58	05:26	18:35	19:03	19:36
35	04:34	05:05	05:31	18:30	18:56	19:26
30	04:42	05:11	05:36	18:25	18:49	19:18
20	04:55	05:21	05:44	18:17	18:39	19:06
10	05:05	05:30	05:51	18:10	18:32	18:56
0	05:12	05:36	05:57	18:04	18:25	18:49
-10	05:18	05:42	06:04	17:58	18:19	18:43
-20	05:22	05:48	06:10	17:51	18:13	18:39
-30	05:26	05:54	06:18	17:44	18:08	18:36
-35	05:27	05:57	06:22	17:40	18:05	18:35
-40	05:28	05:60	06:27	17:35	18:02	18:34
-45	05:29	06:03	06:32	17:30	17:59	18:33
-50	05:29	06:06	06:39	17:23	17:56	18:33
-52	05:29	06:08	06:42	17:20	17:54	18:33
-54	05:29	06:09	06:45	17:17	17:53	18:34
-56	05:28	06:11	06:49	17:13	17:51	18:34
-58	05:28	06:13	06:53	17:09	17:49	18:35
-60	05:27	06:15	06:57	17:05	17:47	18:36

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	20:15	20:03	19:49	07:52	09:37	11:27
70	20:17	20:11	20:04	07:53	09:32	11:14
68	20:18	20:17	20:17	07:55	09:28	11:04
66	20:19	20:22	20:26	07:56	09:24	10:55
64	20:20	20:27	20:35	07:57	09:21	10:48
62	20:21	20:31	20:42	07:58	09:19	10:42
60	20:21	20:34	20:49	07:58	09:17	10:37
58	20:22	20:37	20:54	07:59	09:15	10:32
56	20:22	20:40	20:59	07:60	09:13	10:28
54	20:23	20:42	21:04	08:00	09:11	10:24
52	20:23	20:45	21:08	08:01	09:10	10:21
50	20:24	20:47	21:11	08:01	09:09	10:18
45	20:25	20:51	21:19	08:02	09:06	10:11
40	20:25	20:55	21:26	08:03	09:03	10:05
35	20:26	20:58	21:32	08:03	09:01	10:01
30	20:27	21:01	21:37	08:04	08:60	09:56
20	20:28	21:06	21:46	08:05	08:56	09:49
10	20:29	21:11	21:54	08:06	08:54	09:43
0	20:30	21:15	22:02	08:07	08:51	09:37
-10	20:31	21:19	22:09	08:07	08:49	09:31
-20	20:32	21:24	22:17	08:08	08:46	09:25
-30	20:33	21:29	22:27	08:09	08:43	09:18
-35	20:33	21:32	22:32	08:09	08:41	09:14
-40	20:34	21:35	22:38	08:10	08:39	09:09
-45	20:35	21:40	22:46	08:11	08:36	09:04
-50	20:36	21:44	22:54	08:11	08:34	08:57
-52	20:37	21:47	22:58	08:12	08:32	08:54
-54	20:37	21:49	23:03	08:12	08:31	08:51
-56	20:38	21:52	23:08	08:13	08:29	08:47
-58	20:38	21:55	23:13	08:13	08:28	08:43
-60	20:39	21:58	23:19	08:13	08:26	08:39

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
29	01:05	00:56	12:00	01:55	14:18	18(91%)
30	00:47	00:38	12:00	02:40	15:02	19(85%)
31	00:28	00:19	12:00	03:25	15:49	20(77%)

September 01, 02 ,03 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	340°06.5	139°34.4	-12°06.3	37°57.3	-25°57.1	115°09.4	-16°08.4	67°19.6	-22°41.6
1	355°08.9	154°35.0	-12°07.4	52°59.7	-25°56.9	130°11.5	-16°08.5	82°22.1	-22°41.6
2	10°11.4	169°35.7	-12°08.5	68°02.0	-25°56.7	145°13.6	-16°08.6	97°24.5	-22°41.6
3	25°13.9	184°36.3	-12°09.5	83°04.3	-25°56.6	160°15.7	-16°08.8	112°27.0	-22°41.6
4	40°16.3	199°36.9	-12°10.6	98°06.7	-25°56.4	175°17.9	-16°08.9	127°29.5	-22°41.7
5	55°18.8	214°37.5	-12°11.6	113°09.0	-25°56.2	190°20.0	-16°09.0	142°32.0	-22°41.7
6	70°21.3	229°38.2	-12°12.7	128°11.3	-25°56.1	205°22.1	-16°09.1	157°34.5	-22°41.7
7	85°23.7	244°38.8	-12°13.7	143°13.6	-25°55.9	220°24.2	-16°09.2	172°37.0	-22°41.7
8	100°26.2	259°39.4	-12°14.8	158°16.0	-25°55.7	235°26.4	-16°09.3	187°39.5	-22°41.7
9	115°28.7	274°40.0	-12°15.8	173°18.3	-25°55.6	250°28.5	-16°09.4	202°42.0	-22°41.7
10	130°31.1	289°40.7	-12°16.9	188°20.6	-25°55.4	265°30.6	-16°09.5	217°44.4	-22°41.7
11	145°33.6	304°41.3	-12°17.9	203°22.9	-25°55.2	280°32.7	-16°09.6	232°46.9	-22°41.7
12	160°36.0	319°41.9	-12°19.0	218°25.3	-25°55.0	295°34.8	-16°09.7	247°49.4	-22°41.7
13	175°38.5	334°42.6	-12°20.0	233°27.6	-25°54.9	310°37.0	-16°09.8	262°51.9	-22°41.7
14	190°41.0	349°43.2	-12°21.1	248°29.9	-25°54.7	325°39.1	-16°09.9	277°54.4	-22°41.7
15	205°43.4	4°43.8	-12°22.1	263°32.2	-25°54.5	340°41.2	-16°10.0	292°56.9	-22°41.7
16	220°45.9	19°44.5	-12°23.2	278°34.5	-25°54.3	355°43.3	-16°10.1	307°59.4	-22°41.7
17	235°48.4	34°45.1	-12°24.2	293°36.8	-25°54.2	10°45.4	-16°10.2	323°01.8	-22°41.7
18	250°50.8	49°45.7	-12°25.3	308°39.1	-25°54.0	25°47.6	-16°10.3	338°04.3	-22°41.7
19	265°53.3	64°46.4	-12°26.3	323°41.4	-25°53.8	40°49.7	-16°10.4	353°06.8	-22°41.7
20	280°55.8	79°47.0	-12°27.4	338°43.8	-25°53.7	55°51.8	-16°10.5	8°09.3	-22°41.8
21	295°58.2	94°47.6	-12°28.4	353°46.1	-25°53.5	70°53.9	-16°10.6	23°11.8	-22°41.8
22	311°00.7	109°48.3	-12°29.5	8°48.4	-25°53.3	85°56.1	-16°10.7	38°14.3	-22°41.8
23	326°03.2	124°48.9	-12°30.5	23°50.7	-25°53.1	100°58.2	-16°10.9	53°16.7	-22°41.8
Mer.pass.:1:19:		v0.6 d-1.1 m-4.4		v2.3 d0.2 m-2.1		v2.1 d-0.1 m-1.8		v2.5 d-0.0 m0.4	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	341°05.6	139°49.6	-12°31.6	38°53.0	-25°53.0	116°00.3	-16°11.0	68°19.2	-22°41.8
1	356°08.1	154°50.2	-12°32.6	53°55.3	-25°52.8	131°02.4	-16°11.1	83°21.7	-22°41.8
2	11°10.5	169°50.9	-12°33.7	68°57.6	-25°52.6	146°04.5	-16°11.2	98°24.2	-22°41.8
3	26°13.0	184°51.5	-12°34.7	83°59.9	-25°52.4	161°06.6	-16°11.3	113°26.7	-22°41.8
4	41°15.5	199°52.2	-12°35.7	99°02.2	-25°52.2	176°08.8	-16°11.4	128°29.2	-22°41.8
5	56°17.9	214°52.8	-12°36.8	114°04.5	-25°52.1	191°10.9	-16°11.5	143°31.6	-22°41.8
6	71°20.4	229°53.4	-12°37.8	129°06.7	-25°51.9	206°13.0	-16°11.6	158°34.1	-22°41.8
7	86°22.9	244°54.1	-12°38.9	144°09.0	-25°51.7	221°15.1	-16°11.7	173°36.6	-22°41.8
8	101°25.3	259°54.7	-12°39.9	159°11.3	-25°51.5	236°17.2	-16°11.8	188°39.1	-22°41.8
9	116°27.8	274°55.4	-12°40.9	174°13.6	-25°51.3	251°19.4	-16°11.9	203°41.6	-22°41.8
10	131°30.3	289°56.1	-12°42.0	189°15.9	-25°51.2	266°21.5	-16°12.0	218°44.1	-22°41.8
11	146°32.7	304°56.7	-12°43.0	204°18.2	-25°51.0	281°23.6	-16°12.1	233°46.5	-22°41.9
12	161°35.2	319°57.4	-12°44.1	219°20.5	-25°50.8	296°25.7	-16°12.2	248°49.0	-22°41.9
13	176°37.7	334°58.0	-12°45.1	234°22.8	-25°50.6	311°27.8	-16°12.3	263°51.5	-22°41.9
14	191°40.1	349°58.7	-12°46.1	249°25.0	-25°50.4	326°29.9	-16°12.4	278°54.0	-22°41.9
15	206°42.6	4°59.3	-12°47.2	264°27.3	-25°50.3	341°32.1	-16°12.5	293°56.5	-22°41.9
16	221°45.0	19°60.0	-12°48.2	279°29.6	-25°50.1	356°34.2	-16°12.7	308°58.9	-22°41.9
17	236°47.5	35°00.7	-12°49.3	294°31.9	-25°49.9	11°36.3	-16°12.8	324°01.4	-22°41.9
18	251°50.0	50°01.3	-12°50.3	309°34.1	-25°49.7	26°38.4	-16°12.9	339°03.9	-22°41.9
19	266°52.4	65°02.0	-12°51.3	324°36.4	-25°49.5	41°40.5	-16°13.0	354°06.4	-22°41.9
20	281°54.9	80°02.6	-12°52.4	339°38.7	-25°49.3	56°42.6	-16°13.1	9°08.9	-22°41.9
21	296°57.4	95°03.3	-12°53.4	354°41.0	-25°49.2	71°44.8	-16°13.2	24°11.3	-22°41.9
22	311°59.8	110°04.0	-12°54.4	9°43.2	-25°49.0	86°46.9	-16°13.3	39°13.8	-22°41.9
23	327°02.3	125°04.6	-12°55.5	24°45.5	-25°48.8	101°49.0	-16°13.4	54°16.3	-22°41.9
Mer.pass.:1:15:		v0.6 d-1.0 m-4.4		v2.3 d0.2 m-2.1		v2.1 d-0.1 m-1.8		v2.5 d-0.0 m0.4	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	342°04.8	140°05.3	-12°56.5	39°47.8	-25°48.6	116°51.1	-16°13.5	69°18.8	-22°41.9
1	357°07.2	155°06.0	-12°57.5	54°50.0	-25°48.4	131°53.2	-16°13.6	84°21.3	-22°41.9
2	12°09.7	170°06.6	-12°58.5	69°52.3	-25°48.2	146°55.3	-16°13.7	99°23.7	-22°41.9
3	27°12.1	185°07.3	-12°59.6	84°54.5	-25°48.1	161°57.4	-16°13.8	114°26.2	-22°42.0
4	42°14.6	200°08.0	-13°00.6	99°56.8	-25°47.9	176°59.6	-16°13.9	129°28.7	-22°42.0
5	57°17.1	215°08.7	-13°01.6	114°59.1	-25°47.7	192°01.7	-16°14.0	144°31.2	-22°42.0
6	72°19.5	230°09.3	-13°02.7	130°01.3	-25°47.5	207°03.8	-16°14.1	159°33.7	-22°42.0
7	87°22.0	245°10.0	-13°03.7	145°03.6	-25°47.3	222°05.9	-16°14.3	174°36.1	-22°42.0
8	102°24.5	260°10.7	-13°04.7	160°05.8	-25°47.1	237°08.0	-16°14.4	189°38.6	-22°42.0
9	117°26.9	275°11.4	-13°05.7	175°08.1	-25°46.9	252°10.1	-16°14.5	204°41.1	-22°42.0
10	132°29.4	290°12.0	-13°06.8	190°10.3	-25°46.7	267°12.2	-16°14.6	219°43.6	-22°42.0
11	147°31.9	305°12.7	-13°07.8	205°12.6	-25°46.5	282°14.3	-16°14.7	234°46.0	-22°42.0
12	162°34.3	320°13.4	-13°08.8	220°14.8	-25°46.4	297°16.5	-16°14.8	249°48.5	-22°42.0
13	177°36.8	335°14.1	-13°09.8	235°17.1	-25°46.2	312°18.6	-16°14.9	264°51.0	-22°42.0
14	192°39.3	350°14.8	-13°10.9	250°19.3	-25°46.0	327°20.7	-16°15.0	279°53.5	-22°42.0
15	207°41.7	5°15.4	-13°11.9	265°21.6	-25°45.8	342°22.8	-16°15.1	294°56.0	-22°42.0
16	222°44.2	20°16.1	-13°12.9	280°23.8	-25°45.6	357°24.9	-16°15.2	309°58.4	-22°42.0
17	237°46.6	35°16.8	-13°13.9	295°26.1	-25°45.4	12°27.0	-16°15.3	325°00.9	-22°42.0
18	252°49.1	50°17.5	-13°15.0	310°28.3	-25°45.2	27°29.1	-16°15.4	340°03.4	-22°42.0
19	267°51.6	65°18.2	-13°16.0	325°30.5	-25°45.0	42°31.2	-16°15.5	355°05.9	-22°42.1
20	282°54.0	80°18.9	-13°17.0	340°32.8	-25°44.8	57°33.3	-16°15.6	10°08.3	-22°42.1
21	297°56.5	95°19.6	-13°18.0	355°35.0	-25°44.6	72°35.5	-16°15.8	25°10.8	-22°42.1
22	312°59.0	110°20.3	-13°19.0	10°37.2	-25°44.4	87°37.6	-16°15.9	40°13.3	-22°42.1
23	328°01.4	125°20.9	-13°20.1	25°39.5	-25°44.3	102°39.7	-16°16.0	55°15.8	-22°42.1
Mer.pass.:1:11:		v0.7 d-1.0 m-4.4		v2.3 d0.2 m-2.1		v2.1 d-0.1 m-1.8		v2.5 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.8	-42°12.2
Schedar	349°36.0	56°38.2
Diphda	348°52.0	-17°53.0
Achernar	335°23.8	-57°08.4
Hamal	327°56.6	23°32.9
Polaris	316°01.0	89°20.2
Akamar	315°15.5	-40°13.7
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.3
Aldebaran	290°45.3	16°32.7
Rigel	281°08.7	-8°10.8
Capella	280°29.3	46°00.7
Bellatrix	278°28.3	6°21.9
Elnath	278°08.2	28°37.2
Alnilam	275°42.9	-1°11.4
Betelgeuse	270°57.6	7°24.5
Canopus	263°54.8	-52°42.2
Sirius	258°30.7	-16°44.3
Adara	255°10.0	-28°59.7
Procyon	244°56.2	5°10.8
Pollux	243°23.6	27°58.8
Avior	234°17.1	-59°34.0
Suhail	222°50.2	-43°30.3
Miaplacidus	221°39.8	-69°47.5
Alphard	217°52.9	-8°44.3
Regulus	207°40.0	11°52.7
Dubhe	193°48.1	61°39.2
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.5
Acrux	173°05.9	-63°12.1
Gacrux	171°57.4	-57°13.0
Alioth	166°18.1	55°51.8
Spica	158°27.8	-11°15.3
Alcaid	152°56.4	49°13.6
Hadar	148°43.2	-60°27.8
Menkent	148°03.6	-36°27.6
Arcturus	145°52.6	19°05.8
Rigil Kent.	139°47.2	-60°54.7
Zubenelg.	137°01.6	-16°06.9
Kochab	137°20.7	74°05.2
Alphecca	126°08.1	26°39.6
Antares	112°21.9	-26°28.2
Atria	107°20.5	-69°03.7
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.9
Rasalhague	96°03.1	12°33.2
Etamin	90°44.3	51°29.6
Kaus Aust.	83°38.9	-34°22.4
Vega	80°36.4	38°48.4
Nunki	75°53.7	-26°16.3
Altair	62°04.6	8°55.3
Peacock	53°13.2	-56°40.5
Deneb	49°28.7	45°21.1
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.1
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.1
Markab	13°34.5	15°18.4

2018/9/1	**SHA**	**Mer.pass**
Venus	159°27.9	14:41
Mars	57°50.9	21:25
Jupiter	135°02.9	16:17
Saturn	87°13.1	19:27

2018/9/2	**SHA**	**Mer.pass**
Venus	158°44.0	14:40
Mars	57°47.4	21:21
Jupiter	134°54.7	16:14
Saturn	87°13.6	19:24

2018/9/3	**SHA**	**Mer.pass**
Venus	158°00.5	14:39
Mars	57°43.0	21:18
Jupiter	134°46.3	16:10
Saturn	87°14.0	19:20

Horizontal paralax	
Venus:	0.3
Mars:	0.3

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°57.6	8°22.4	298°43.8	11.8	10°34.3	10.1	57.0
1	194°57.8	8°21.5	313°14.6	11.7	10°44.5	10.1	57.0
2	209°58.0	8°20.6	327°45.3	11.7	10°54.5	10.1	57.0
3	224°58.2	8°19.7	342°16.0	11.6	11°04.6	10.0	57.1
4	239°58.4	8°18.8	356°46.5	11.5	11°14.6	10.0	57.1
5	254°58.6	8°17.9	11°17.1	11.5	11°24.5	9.9	57.1
6	269°58.8	8°17.0	25°47.5	11.4	11°34.4	9.9	57.1
7	284°59.0	8°16.1	40°17.9	11.4	11°44.2	9.8	57.2
8	299°59.2	8°15.2	54°48.2	11.3	11°54.0	9.8	57.2
9	314°59.4	8°14.3	69°18.5	11.2	12°03.7	9.7	57.2
10	329°59.6	8°13.4	83°48.6	11.2	12°13.4	9.7	57.2
11	344°59.8	8°12.5	98°18.8	11.1	12°23.1	9.6	57.3
12	0°00.0	8°11.6	112°48.8	11.0	12°32.6	9.5	57.3
13	15°00.2	8°10.7	127°18.8	10.9	12°42.1	9.5	57.3
14	30°00.4	8°09.8	141°48.7	10.9	12°51.6	9.4	57.3
15	45°00.6	8°08.8	156°18.5	10.8	13°01.0	9.4	57.4
16	60°00.8	8°07.9	170°48.3	10.7	13°10.4	9.3	57.4
17	75°01.0	8°07.0	185°18.0	10.7	13°19.6	9.3	57.4
18	90°01.2	8°06.1	199°47.6	10.6	13°28.9	9.2	57.5
19	105°01.4	8°05.2	214°17.2	10.5	13°38.0	9.1	57.5
20	120°01.6	8°04.3	228°46.7	10.4	13°47.1	9.1	57.5
21	135°01.8	8°03.4	243°16.1	10.4	13°56.1	9.0	57.5
22	150°02.0	8°02.5	257°45.4	10.3	14°05.1	8.9	57.6
23	165°02.2	8°01.6	272°14.7	10.2	14°14.0	8.9	57.6
	SD.=15.8	d=-0.9			S.D.=15.5		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°02.4	8°00.7	286°43.9	10.2	14°22.8	8.8	57.6
1	195°02.6	7°59.8	301°13.0	10.1	14°31.6	8.7	57.6
2	210°02.8	7°58.8	315°42.0	10.0	14°40.3	8.7	57.7
3	225°03.0	7°57.9	330°11.0	9.9	14°48.9	8.6	57.7
4	240°03.2	7°57.0	344°39.9	9.8	14°57.4	8.5	57.7
5	255°03.4	7°56.1	359°08.7	9.8	15°05.9	8.4	57.8
6	270°03.6	7°55.2	13°37.4	9.7	15°14.3	8.4	57.8
7	285°03.8	7°54.3	28°06.1	9.6	15°22.6	8.3	57.8
8	300°04.0	7°53.4	42°34.7	9.5	15°30.8	8.2	57.8
9	315°04.2	7°52.5	57°03.2	9.5	15°39.0	8.1	57.9
10	330°04.4	7°51.6	71°31.6	9.4	15°47.1	8.0	57.9
11	345°04.6	7°50.6	85°60.0	9.3	15°55.1	8.0	57.9
12	0°04.8	7°49.7	100°28.2	9.2	16°03.0	7.9	58.0
13	15°05.0	7°48.8	114°56.4	9.2	16°10.8	7.8	58.0
14	30°05.2	7°47.9	129°24.5	9.1	16°18.6	7.7	58.0
15	45°05.4	7°47.0	143°52.6	9.0	16°26.2	7.6	58.0
16	60°05.6	7°46.1	158°20.5	8.9	16°33.8	7.5	58.1
17	75°05.8	7°45.2	172°48.4	8.8	16°41.3	7.4	58.1
18	90°06.0	7°44.2	187°16.2	8.8	16°48.7	7.4	58.1
19	105°06.2	7°43.3	201°43.9	8.7	16°56.0	7.3	58.2
20	120°06.4	7°42.4	216°11.6	8.6	17°03.2	7.2	58.2
21	135°06.6	7°41.5	230°39.2	8.5	17°10.4	7.1	58.2
22	150°06.8	7°40.6	245°06.6	8.4	17°17.4	7.0	58.2
23	165°07.0	7°39.7	259°34.0	8.4	17°24.4	6.9	58.3
	SD.=15.9	d=-0.9			S.D.=15.7		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°07.2	7°38.8	274°01.4	8.3	17°31.2	6.8	58.3
1	195°07.4	7°37.8	288°28.6	8.2	17°38.0	6.7	58.3
2	210°07.6	7°36.9	302°55.8	8.1	17°44.6	6.6	58.4
3	225°07.8	7°36.0	317°22.9	8.1	17°51.2	6.5	58.4
4	240°08.0	7°35.1	331°49.9	8.0	17°57.6	6.4	58.4
5	255°08.3	7°34.2	346°16.9	7.9	18°04.0	6.3	58.4
6	270°08.5	7°33.3	0°43.7	7.8	18°10.2	6.2	58.5
7	285°08.7	7°32.3	15°10.5	7.7	18°16.4	6.1	58.5
8	300°08.9	7°31.4	29°37.2	7.7	18°22.4	6.0	58.5
9	315°09.1	7°30.5	44°03.8	7.6	18°28.4	5.9	58.6
10	330°09.3	7°29.6	58°30.4	7.5	18°34.2	5.8	58.6
11	345°09.5	7°28.7	72°56.9	7.4	18°39.9	5.7	58.6
12	0°09.7	7°27.8	87°23.3	7.4	18°45.5	5.6	58.6
13	15°09.9	7°26.8	101°49.6	7.3	18°51.0	5.4	58.7
14	30°10.1	7°25.9	116°15.9	7.2	18°56.4	5.3	58.7
15	45°10.3	7°25.0	130°42.0	7.1	19°01.7	5.2	58.7
16	60°10.5	7°24.1	145°08.1	7.1	19°06.9	5.1	58.8
17	75°10.7	7°23.2	159°34.2	7.0	19°11.9	5.0	58.8
18	90°10.9	7°22.2	174°00.1	6.9	19°16.9	4.9	58.8
19	105°11.1	7°21.3	188°26.0	6.8	19°21.7	4.8	58.8
20	120°11.3	7°20.4	202°51.8	6.8	19°26.4	4.6	58.9
21	135°11.5	7°19.5	217°17.6	6.7	19°31.0	4.5	58.9
22	150°11.7	7°18.6	231°43.2	6.6	19°35.4	4.4	58.9
23	165°11.9	7°17.6	246°08.8	6.6	19°39.8	4.3	59.0
	SD.=15.9	d=-0.9			S.D.=15.9		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:38	04:06	19:50	21:16	–:–
70	00:44	03:04	04:19	19:38	20:51	23:17
68	01:39	03:24	04:29	19:27	20:32	22:13
66	02:15	03:40	04:38	19:19	20:17	21:39
64	02:40	03:53	04:45	19:12	20:04	21:16
62	02:59	04:03	04:52	19:06	19:54	20:58
60	03:14	04:12	04:57	19:01	19:45	20:43
58	03:27	04:20	05:02	18:56	19:38	20:31
56	03:37	04:27	05:06	18:52	19:31	20:20
54	03:46	04:33	05:10	18:48	19:25	20:11
52	03:55	04:38	05:13	18:45	19:20	20:03
50	04:02	04:43	05:16	18:42	19:16	19:56
45	04:16	04:53	05:23	18:36	19:06	19:42
40	04:28	05:01	05:29	18:30	18:58	19:31
35	04:37	05:07	05:33	18:26	18:51	19:22
30	04:44	05:13	05:37	18:21	18:46	19:14
20	04:56	05:22	05:45	18:14	18:37	19:03
10	05:05	05:30	05:51	18:08	18:30	18:54
0	05:11	05:36	05:56	18:03	18:24	18:48
-10	05:16	05:41	06:02	17:58	18:19	18:43
-20	05:20	05:46	06:08	17:52	18:14	18:40
-30	05:22	05:50	06:14	17:45	18:10	18:37
-35	05:23	05:53	06:18	17:42	18:07	18:37
-40	05:24	05:55	06:22	17:38	18:05	18:36
-45	05:24	05:57	06:27	17:33	18:03	18:37
-50	05:23	06:00	06:33	17:28	18:00	18:37
-52	05:22	06:01	06:35	17:25	17:59	18:38
-54	05:22	06:03	06:38	17:22	17:58	18:39
-56	05:21	06:04	06:41	17:19	17:57	18:40
-58	05:20	06:05	06:45	17:16	17:55	18:41
-60	05:19	06:07	06:49	17:12	17:54	18:42

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	19:32	18:60	–:–	13:26	15:46	–:–
70	19:57	19:49	19:33	13:02	14:58	17:09
68	20:17	20:20	20:29	12:44	14:28	16:14
66	20:33	20:43	21:02	12:29	14:05	15:40
64	20:46	21:02	21:27	12:17	13:47	15:16
62	20:57	21:17	21:46	12:07	13:33	14:57
60	21:06	21:30	22:03	11:58	13:21	14:41
58	21:15	21:41	22:16	11:51	13:10	14:28
56	21:22	21:51	22:28	11:44	13:01	14:17
54	21:29	21:59	22:38	11:38	12:53	14:07
52	21:34	22:07	22:47	11:33	12:46	13:58
50	21:40	22:14	22:56	11:28	12:39	13:50
45	21:51	22:29	23:13	11:18	12:25	13:33
40	22:01	22:41	23:27	11:09	12:14	13:19
35	22:09	22:51	23:40	11:02	12:04	13:08
30	22:17	23:01	23:50	10:55	11:56	12:57
20	22:29	23:17	–:–	10:44	11:41	12:40
10	22:41	23:31	–:–	10:34	11:28	12:25
0	22:51	23:44	–:–	10:25	11:16	12:10
-10	23:02	23:57	–:–	10:16	11:04	11:56
-20	23:13	–:–	00:11	10:06	10:51	11:41
-30	23:26	–:–	00:28	09:55	10:37	11:23
-35	23:34	–:–	00:37	09:49	10:28	11:13
-40	23:43	–:–	00:48	09:42	10:19	11:02
-45	23:53	–:–	01:01	09:33	10:08	10:48
-50	–:–	00:05	01:17	09:23	09:54	10:31
-52	–:–	00:11	01:24	09:19	09:48	10:24
-54	–:–	00:18	01:33	09:14	09:41	10:15
-56	–:–	00:25	01:42	09:08	09:33	10:05
-58	–:–	00:33	01:52	09:02	09:25	09:54
-60	–:–	00:42	02:05	08:55	09:15	09:42

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
1	00:10	00:00	12:00	04:13	16:38	21(67%)
2	00:10	00:19	11:59	05:03	17:29	22(57%)
3	00:29	00:39	11:59	05:56	18:24	23(46%)

September 04, 05 ,06 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	343°03.9	140°21.6	-13°21.1	40°41.7	-25°44.1	117°41.8	-16°16.1	70°18.2	-22°42.1
1	358°06.4	155°22.3	-13°22.1	55°43.9	-25°43.9	132°43.9	-16°16.2	85°20.7	-22°42.1
2	13°08.8	170°23.0	-13°23.1	70°46.2	-25°43.7	147°46.0	-16°16.3	100°23.2	-22°42.1
3	28°11.3	185°23.7	-13°24.1	85°48.4	-25°43.5	162°48.1	-16°16.4	115°25.7	-22°42.1
4	43°13.8	200°24.4	-13°25.1	100°50.6	-25°43.3	177°50.2	-16°16.5	130°28.1	-22°42.1
5	58°16.2	215°25.1	-13°26.2	115°52.8	-25°43.1	192°52.3	-16°16.6	145°30.6	-22°42.1
6	73°18.7	230°25.8	-13°27.2	130°55.1	-25°42.9	207°54.4	-16°16.7	160°33.1	-22°42.1
7	88°21.1	245°26.5	-13°28.2	145°57.3	-25°42.7	222°56.5	-16°16.8	175°35.6	-22°42.1
8	103°23.6	260°27.2	-13°29.2	160°59.5	-25°42.5	237°58.6	-16°16.9	190°38.0	-22°42.1
9	118°26.1	275°27.9	-13°30.2	176°01.7	-25°42.3	253°00.8	-16°17.0	205°40.5	-22°42.1
10	133°28.5	290°28.6	-13°31.2	191°03.9	-25°42.1	268°02.9	-16°17.2	220°43.0	-22°42.1
11	148°31.0	305°29.3	-13°32.2	206°06.1	-25°41.9	283°05.0	-16°17.3	235°45.4	-22°42.2
12	163°33.5	320°30.0	-13°33.2	221°08.4	-25°41.7	298°07.1	-16°17.4	250°47.9	-22°42.2
13	178°35.9	335°30.8	-13°34.3	236°10.6	-25°41.5	313°09.2	-16°17.5	265°50.4	-22°42.2
14	193°38.4	350°31.5	-13°35.3	251°12.8	-25°41.3	328°11.3	-16°17.6	280°52.9	-22°42.2
15	208°40.9	5°32.2	-13°36.3	266°15.0	-25°41.1	343°13.4	-16°17.7	295°55.3	-22°42.2
16	223°43.3	20°32.9	-13°37.3	281°17.2	-25°40.9	358°15.5	-16°17.8	310°57.8	-22°42.2
17	238°45.8	35°33.6	-13°38.3	296°19.4	-25°40.7	13°17.6	-16°17.9	326°00.3	-22°42.2
18	253°48.3	50°34.3	-13°39.3	311°21.6	-25°40.5	28°19.7	-16°18.0	341°02.8	-22°42.2
19	268°50.7	65°35.0	-13°40.3	326°23.8	-25°40.3	43°21.8	-16°18.1	356°05.2	-22°42.2
20	283°53.2	80°35.7	-13°41.3	341°26.0	-25°40.1	58°23.9	-16°18.2	11°07.7	-22°42.2
21	298°55.6	95°36.5	-13°42.3	356°28.2	-25°39.9	73°26.0	-16°18.4	26°10.2	-22°42.2
22	313°58.1	110°37.2	-13°43.3	11°30.4	-25°39.7	88°28.1	-16°18.5	41°12.6	-22°42.2
23	329°00.6	125°37.9	-13°44.3	26°32.6	-25°39.5	103°30.2	-16°18.6	56°15.1	-22°42.2
Mer.pass.:1:07:		v0.7 d-1.0 m-4.4		v2.2 d0.2 m-2.0		v2.1 d-0.1 m-1.8		v2.5 d-0.0 m0.4	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	344°03.0	140°38.6	-13°45.3	41°34.8	-25°39.3	118°32.3	-16°18.7	71°17.6	-22°42.2
1	359°05.5	155°39.3	-13°46.3	56°37.0	-25°39.1	133°34.4	-16°18.8	86°20.1	-22°42.2
2	14°08.0	170°40.1	-13°47.3	71°39.2	-25°38.9	148°36.5	-16°18.9	101°22.5	-22°42.2
3	29°10.4	185°40.8	-13°48.3	86°41.4	-25°38.7	163°38.7	-16°19.0	116°25.0	-22°42.3
4	44°12.9	200°41.5	-13°49.3	101°43.6	-25°38.5	178°40.8	-16°19.1	131°27.5	-22°42.3
5	59°15.4	215°42.2	-13°50.3	116°45.8	-25°38.3	193°42.9	-16°19.2	146°29.9	-22°42.3
6	74°17.8	230°43.0	-13°51.3	131°48.0	-25°38.1	208°45.0	-16°19.3	161°32.4	-22°42.3
7	89°20.3	245°43.7	-13°52.3	146°50.1	-25°37.9	223°47.1	-16°19.4	176°34.9	-22°42.3
8	104°22.7	260°44.4	-13°53.3	161°52.3	-25°37.7	238°49.2	-16°19.5	191°37.3	-22°42.3
9	119°25.2	275°45.1	-13°54.3	176°54.5	-25°37.5	253°51.3	-16°19.7	206°39.8	-22°42.3
10	134°27.7	290°45.9	-13°55.3	191°56.7	-25°37.3	268°53.4	-16°19.8	221°42.3	-22°42.3
11	149°30.1	305°46.6	-13°56.3	206°58.9	-25°37.1	283°55.5	-16°19.9	236°44.7	-22°42.3
12	164°32.6	320°47.3	-13°57.3	222°01.1	-25°36.8	298°57.6	-16°20.0	251°47.2	-22°42.3
13	179°35.1	335°48.1	-13°58.3	237°03.2	-25°36.6	313°59.7	-16°20.1	266°49.7	-22°42.3
14	194°37.5	350°48.8	-13°59.3	252°05.4	-25°36.4	329°01.8	-16°20.2	281°52.1	-22°42.3
15	209°40.0	5°49.6	-14°00.3	267°07.6	-25°36.2	344°03.9	-16°20.3	296°54.6	-22°42.3
16	224°42.5	20°50.3	-14°01.3	282°09.8	-25°36.0	359°06.0	-16°20.4	311°57.1	-22°42.3
17	239°44.9	35°51.0	-14°02.3	297°11.9	-25°35.8	14°08.1	-16°20.5	326°59.6	-22°42.3
18	254°47.4	50°51.8	-14°03.3	312°14.1	-25°35.6	29°10.2	-16°20.6	342°02.0	-22°42.3
19	269°49.9	65°52.5	-14°04.3	327°16.3	-25°35.4	44°12.3	-16°20.8	357°04.5	-22°42.4
20	284°52.3	80°53.3	-14°05.3	342°18.4	-25°35.2	59°14.4	-16°20.9	12°07.0	-22°42.4
21	299°54.8	95°54.0	-14°06.3	357°20.6	-25°35.0	74°16.5	-16°21.0	27°09.4	-22°42.4
22	314°57.2	110°54.7	-14°07.3	12°22.8	-25°34.8	89°18.6	-16°21.1	42°11.9	-22°42.4
23	329°59.7	125°55.5	-14°08.3	27°24.9	-25°34.5	104°20.7	-16°21.2	57°14.4	-22°42.4
Mer.pass.:1:03:		v0.7 d-1.0 m-4.4		v2.2 d0.2 m-2.0		v2.1 d-0.1 m-1.8		v2.5 d-0.0 m0.4	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	345°02.2	140°56.2	-14°09.2	42°27.1	-25°34.3	119°22.8	-16°21.3	72°16.8	-22°42.4
1	0°04.6	155°57.0	-14°10.2	57°29.2	-25°34.1	134°24.9	-16°21.4	87°19.3	-22°42.4
2	15°07.1	170°57.7	-14°11.2	72°31.4	-25°33.9	149°27.0	-16°21.5	102°21.8	-22°42.4
3	30°09.6	185°58.5	-14°12.2	87°33.6	-25°33.7	164°29.1	-16°21.6	117°24.2	-22°42.4
4	45°12.0	200°59.2	-14°13.2	102°35.7	-25°33.5	179°31.2	-16°21.7	132°26.7	-22°42.4
5	60°14.5	215°60.0	-14°14.2	117°37.9	-25°33.3	194°33.3	-16°21.9	147°29.1	-22°42.4
6	75°17.0	231°00.8	-14°15.2	132°40.0	-25°33.1	209°35.4	-16°22.0	162°31.6	-22°42.4
7	90°19.4	246°01.5	-14°16.1	147°42.2	-25°32.9	224°37.5	-16°22.1	177°34.1	-22°42.4
8	105°21.9	261°02.3	-14°17.1	162°44.3	-25°32.6	239°39.6	-16°22.2	192°36.5	-22°42.4
9	120°24.4	276°03.0	-14°18.1	177°46.5	-25°32.4	254°41.7	-16°22.3	207°39.0	-22°42.4
10	135°26.8	291°03.8	-14°19.1	192°48.6	-25°32.2	269°43.8	-16°22.4	222°41.5	-22°42.4
11	150°29.3	306°04.6	-14°20.1	207°50.8	-25°32.0	284°45.9	-16°22.5	237°43.9	-22°42.5
12	165°31.7	321°05.3	-14°21.1	222°52.9	-25°31.8	299°48.0	-16°22.6	252°46.4	-22°42.5
13	180°34.2	336°06.1	-14°22.0	237°55.1	-25°31.6	314°50.1	-16°22.7	267°48.9	-22°42.5
14	195°36.7	351°06.8	-14°23.0	252°57.2	-25°31.4	329°52.2	-16°22.8	282°51.3	-22°42.5
15	210°39.1	6°07.6	-14°24.0	267°59.3	-25°31.1	344°54.2	-16°23.0	297°53.8	-22°42.5
16	225°41.6	21°08.4	-14°25.0	283°01.5	-25°30.9	359°56.3	-16°23.1	312°56.3	-22°42.5
17	240°44.1	36°09.1	-14°26.0	298°03.6	-25°30.7	14°58.4	-16°23.2	327°58.7	-22°42.5
18	255°46.5	51°09.9	-14°26.9	313°05.8	-25°30.5	30°00.5	-16°23.3	343°01.2	-22°42.5
19	270°49.0	66°10.7	-14°27.9	328°07.9	-25°30.3	45°02.6	-16°23.4	358°03.6	-22°42.5
20	285°51.5	81°11.5	-14°28.9	343°10.0	-25°30.1	60°04.7	-16°23.5	13°06.1	-22°42.5
21	300°53.9	96°12.2	-14°29.9	358°12.2	-25°29.8	75°06.8	-16°23.6	28°08.6	-22°42.5
22	315°56.4	111°13.0	-14°30.8	13°14.3	-25°29.6	90°08.9	-16°23.7	43°11.0	-22°42.5
23	330°58.9	126°13.8	-14°31.8	28°16.4	-25°29.4	105°11.0	-16°23.8	58°13.5	-22°42.5
Mer.pass.:0:59:		v0.7 d-1.0 m-4.4		v2.2 d0.2 m-2.0		v2.1 d-0.1 m-1.8		v2.5 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.8	-42°12.2
Schedar	349°35.9	56°38.2
Diphda	348°51.9	-17°53.0
Achernar	335°23.7	-57°08.4
Hamal	327°56.5	23°32.9
Polaris	315°59.4	89°20.2
Akamar	315°15.5	-40°13.7
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.3
Aldebaran	290°45.3	16°32.7
Rigel	281°08.7	-8°10.8
Capella	280°29.3	46°00.7
Bellatrix	278°28.3	6°21.9
Elnath	278°08.2	28°37.2
Alnilam	275°42.8	-1°11.4
Betelgeuse	270°57.6	7°24.5
Canopus	263°54.8	-52°42.2
Sirius	258°30.7	-16°44.2
Adara	255°09.9	-28°59.7
Procyon	244°56.2	5°10.8
Pollux	243°23.6	27°58.8
Avior	234°17.1	-59°34.0
Suhail	222°50.2	-43°30.3
Miaplacidus	221°39.8	-69°47.5
Alphard	217°52.9	-8°44.3
Regulus	207°40.0	11°52.7
Dubhe	193°48.1	61°39.1
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°12.1
Gacrux	171°57.4	-57°13.0
Alioth	166°18.1	55°51.8
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.6
Hadar	148°43.2	-60°27.8
Menkent	148°03.6	-36°27.6
Arcturus	145°52.6	19°05.8
Rigil Kent.	139°47.2	-60°54.7
Zubenelg.	137°01.7	-16°06.9
Kochab	137°20.7	74°05.2
Alphecca	126°08.1	26°39.6
Antares	112°21.9	-26°28.2
Atria	107°20.5	-69°03.7
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.9
Rasalhague	96°03.1	12°33.2
Etamin	90°44.3	51°29.6
Kaus Aust.	83°38.9	-34°22.4
Vega	80°36.4	38°48.4
Nunki	75°53.8	-26°16.3
Altair	62°04.6	8°55.3
Peacock	53°13.2	-56°40.5
Deneb	49°28.7	45°21.1
Enif	33°43.3	9°57.8
Alnair	27°38.9	-46°52.2
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.1
Markab	13°34.5	15°18.4

2018/9/4	**SHA**	**Mer.pass**
Venus	157°17.7	14:38
Mars	57°37.8	21:14
Jupiter	134°37.9	16:07
Saturn	87°14.3	19:16

2018/9/5	**SHA**	**Mer.pass**
Venus	156°35.6	14:37
Mars	57°31.8	21:11
Jupiter	134°29.3	16:04
Saturn	87°14.5	19:12

2018/9/6	**SHA**	**Mer.pass**
Venus	155°54.1	14:36
Mars	57°24.9	21:07
Jupiter	134°20.6	16:00
Saturn	87°14.6	19:08

Horizontal paralax	
Venus:	0.3
Mars:	0.3

h Sun Moon

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°12.1	7°16.7	260°34.4	6.5	19°44.0	4.2	59.0
1	195°12.3	7°15.8	274°59.8	6.4	19°48.1	4.0	59.0
2	210°12.5	7°14.9	289°25.2	6.4	19°52.1	3.9	59.0
3	225°12.8	7°14.0	303°50.6	6.3	19°56.0	3.8	59.1
4	240°13.0	7°13.0	318°15.8	6.2	19°59.7	3.7	59.1
5	255°13.2	7°12.1	332°41.0	6.2	20°03.3	3.5	59.1
6	270°13.4	7°11.2	347°06.2	6.1	20°06.8	3.4	59.1
7	285°13.6	7°10.3	1°31.2	6.0	20°10.1	3.3	59.2
8	300°13.8	7°09.4	15°56.2	6.0	20°13.3	3.2	59.2
9	315°14.0	7°08.4	30°21.2	5.9	20°16.4	3.0	59.2
10	330°14.2	7°07.5	44°46.1	5.9	20°19.4	2.9	59.3
11	345°14.4	7°06.6	59°10.9	5.8	20°22.2	2.8	59.3
12	0°14.6	7°05.7	73°35.7	5.7	20°24.9	2.6	59.3
13	15°14.8	7°04.7	88°00.4	5.7	20°27.5	2.5	59.3
14	30°15.0	7°03.8	102°25.0	5.6	20°29.9	2.4	59.4
15	45°15.2	7°02.9	116°49.6	5.6	20°32.2	2.2	59.4
16	60°15.4	7°02.0	131°14.2	5.5	20°34.4	2.1	59.4
17	75°15.6	7°01.1	145°38.7	5.5	20°36.4	2.0	59.4
18	90°15.9	7°00.1	160°03.1	5.4	20°38.3	1.8	59.5
19	105°16.1	6°59.2	174°27.5	5.4	20°40.0	1.7	59.5
20	120°16.3	6°58.3	188°51.9	5.3	20°41.6	1.5	59.5
21	135°16.5	6°57.4	203°16.1	5.3	20°43.1	1.4	59.5
22	150°16.7	6°56.4	217°40.4	5.2	20°44.5	1.3	59.6
23	165°16.9	6°55.5	232°04.6	5.2	20°45.7	1.1	59.6
	SD.=15.9	d=-0.9			S.D.=16.1		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°17.1	6°54.6	246°28.8	5.1	20°46.7	1.0	59.6
1	195°17.3	6°53.7	260°52.9	5.1	20°47.6	0.8	59.7
2	210°17.5	6°52.7	275°16.9	5.1	20°48.4	0.7	59.7
3	225°17.7	6°51.8	289°41.0	5.0	20°49.0	0.6	59.7
4	240°17.9	6°50.9	304°05.0	5.0	20°49.5	0.4	59.7
5	255°18.1	6°49.9	318°28.9	4.9	20°49.9	0.3	59.7
6	270°18.3	6°49.0	332°52.9	4.9	20°50.1	0.1	59.8
7	285°18.6	6°48.1	347°16.8	4.9	20°50.1	-0.0	59.8
8	300°18.8	6°47.2	1°40.6	4.8	20°50.0	-0.2	59.8
9	315°19.0	6°46.2	16°04.4	4.8	20°49.8	-0.3	59.8
10	330°19.2	6°45.3	30°28.2	4.8	20°49.4	-0.4	59.9
11	345°19.4	6°44.4	44°52.0	4.8	20°48.9	-0.6	59.9
12	0°19.6	6°43.5	59°15.7	4.7	20°48.2	-0.7	59.9
13	15°19.8	6°42.5	73°39.5	4.7	20°47.4	-0.9	59.9
14	30°20.0	6°41.6	88°03.1	4.7	20°46.5	-1.0	60.0
15	45°20.2	6°40.7	102°26.8	4.7	20°45.4	-1.2	60.0
16	60°20.4	6°39.7	116°50.5	4.6	20°44.1	-1.3	60.0
17	75°20.6	6°38.8	131°14.1	4.6	20°42.7	-1.5	60.0
18	90°20.9	6°37.9	145°37.7	4.6	20°41.2	-1.6	60.0
19	105°21.1	6°37.0	160°01.3	4.6	20°39.5	-1.8	60.1
20	120°21.3	6°36.0	174°24.9	4.6	20°37.7	-1.9	60.1
21	135°21.5	6°35.1	188°48.4	4.6	20°35.7	-2.1	60.1
22	150°21.7	6°34.2	203°12.0	4.6	20°33.5	-2.2	60.1
23	165°21.9	6°33.2	217°35.5	4.5	20°31.3	-2.3	60.1
	SD.=15.9	d=-0.9			S.D.=16.3		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°22.1	6°32.3	231°59.1	4.5	20°28.8	-2.5	60.2
1	195°22.3	6°31.4	246°22.6	4.5	20°26.3	-2.6	60.2
2	210°22.5	6°30.5	260°46.1	4.5	20°23.6	-2.8	60.2
3	225°22.7	6°29.5	275°09.7	4.5	20°20.7	-2.9	60.2
4	240°23.0	6°28.6	289°33.2	4.5	20°17.7	-3.1	60.2
5	255°23.2	6°27.7	303°56.7	4.5	20°14.5	-3.2	60.3
6	270°23.4	6°26.7	318°20.2	4.5	20°11.2	-3.4	60.3
7	285°23.6	6°25.8	332°43.8	4.5	20°07.8	-3.5	60.3
8	300°23.8	6°24.9	347°07.3	4.5	20°04.2	-3.7	60.3
9	315°24.0	6°23.9	1°30.8	4.5	20°00.5	-3.8	60.3
10	330°24.2	6°23.0	15°54.4	4.5	19°56.6	-3.9	60.3
11	345°24.4	6°22.1	30°17.9	4.6	19°52.6	-4.1	60.4
12	0°24.6	6°21.1	44°41.5	4.6	19°48.4	-4.2	60.4
13	15°24.8	6°20.2	59°05.0	4.6	19°44.1	-4.4	60.4
14	30°25.1	6°19.3	73°28.6	4.6	19°39.7	-4.5	60.4
15	45°25.3	6°18.3	87°52.2	4.6	19°35.1	-4.7	60.4
16	60°25.5	6°17.4	102°15.8	4.6	19°30.3	-4.8	60.4
17	75°25.7	6°16.5	116°39.5	4.6	19°25.4	-4.9	60.4
18	90°25.9	6°15.5	131°03.1	4.7	19°20.4	-5.1	60.5
19	105°26.1	6°14.6	145°26.8	4.7	19°15.3	-5.2	60.5
20	120°26.3	6°13.7	159°50.5	4.7	19°10.0	-5.4	60.5
21	135°26.5	6°12.7	174°14.2	4.7	19°04.6	-5.5	60.5
22	150°26.8	6°11.8	188°38.0	4.8	18°59.0	-5.6	60.5
23	165°27.0	6°10.9	203°01.7	4.8	18°53.3	-5.8	60.5
	SD.=15.9	d=-0.9			S.D.=16.4		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:58	04:20	19:34	20:55	–:–
70	01:16	03:20	04:31	19:23	20:33	22:31
68	02:03	03:37	04:40	19:15	20:17	21:49
66	02:32	03:51	04:48	19:08	20:03	21:21
64	02:53	04:02	04:54	19:01	19:53	21:01
62	03:10	04:12	04:59	18:56	19:43	20:45
60	03:23	04:20	05:04	18:52	19:36	20:31
58	03:35	04:27	05:08	18:48	19:29	20:20
56	03:45	04:33	05:12	18:44	19:23	20:11
54	03:53	04:38	05:15	18:41	19:18	20:03
52	04:00	04:43	05:18	18:38	19:13	19:55
50	04:07	04:47	05:21	18:36	19:09	19:49
45	04:20	04:56	05:27	18:30	19:00	19:36
40	04:31	05:04	05:31	18:25	18:53	19:26
35	04:39	05:10	05:35	18:21	18:47	19:17
30	04:46	05:15	05:39	18:18	18:42	19:10
20	04:57	05:23	05:45	18:12	18:34	19:00
10	05:05	05:29	05:51	18:07	18:28	18:52
0	05:10	05:35	05:55	18:02	18:23	18:47
-10	05:15	05:39	06:00	17:57	18:18	18:43
-20	05:17	05:43	06:05	17:52	18:15	18:40
-30	05:19	05:47	06:11	17:47	18:11	18:39
-35	05:19	05:49	06:14	17:44	18:09	18:39
-40	05:19	05:50	06:17	17:41	18:08	18:39
-45	05:18	05:52	06:21	17:37	18:06	18:40
-50	05:17	05:54	06:26	17:32	18:04	18:42
-52	05:16	05:55	06:28	17:30	18:04	18:43
-54	05:15	05:55	06:31	17:27	18:03	18:44
-56	05:13	05:56	06:33	17:25	18:02	18:45
-58	05:12	05:57	06:36	17:22	18:01	18:47
-60	05:10	05:58	06:40	17:19	18:01	18:49

	Moonrise			Moonset		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	22:53	–:–	–:–	20:05
68	20:54	21:59	23:43	17:50	18:51	19:14
66	21:39	22:43	–:–	17:05	18:07	18:42
64	22:08	23:12	–:–	16:36	17:37	18:18
62	22:31	23:34	–:–	16:13	17:15	17:59
60	22:49	23:52	–:–	15:55	16:57	17:43
58	23:04	–:–	00:07	15:40	16:42	17:30
56	23:17	–:–	00:20	15:27	16:29	17:19
54	23:28	–:–	00:31	15:16	16:18	17:08
52	23:38	–:–	00:41	15:06	16:08	16:59
50	23:47	–:–	00:50	14:58	15:59	16:51
45	–:–	00:06	01:08	14:39	15:40	16:34
40	–:–	00:22	01:24	14:24	15:24	16:20
35	–:–	00:35	01:36	14:11	15:11	16:08
30	–:–	00:46	01:48	13:59	14:60	15:57
20	00:09	01:06	02:07	13:40	14:40	15:39
10	00:25	01:23	02:24	13:23	14:23	15:23
0	00:40	01:39	02:39	13:08	14:07	15:08
-10	00:55	01:55	02:55	12:52	13:51	14:53
-20	01:11	02:12	03:12	12:35	13:34	14:37
-30	01:30	02:32	03:31	12:16	13:15	14:18
-35	01:41	02:43	03:42	12:05	13:03	14:08
-40	01:54	02:56	03:55	11:52	12:50	13:55
-45	02:08	03:12	04:10	11:36	12:34	13:40
-50	02:27	03:31	04:29	11:18	12:15	13:22
-52	02:35	03:41	04:37	11:09	12:06	13:14
-54	02:45	03:51	04:47	10:59	11:55	13:04
-56	02:56	04:03	04:58	10:48	11:44	12:53
-58	03:08	04:16	05:11	10:35	11:30	12:41
-60	03:23	04:32	05:26	10:20	11:15	12:26

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
4	00:49	00:58	11:59	06:53	19:23	24(35%)
5	01:08	01:18	11:58	07:53	20:23	25(24%)
6	01:28	01:39	11:58	08:53	21:24	26(15%)

September 07, 08 ,09 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	346°01.3	141°14.6	-14°32.8	43°18.5	-25°29.2	120°13.1	-16°23.9	73°16.0	-22°42.5
1	1°03.8	156°15.3	-14°33.8	58°20.7	-25°29.0	135°15.2	-16°24.1	88°18.4	-22°42.5
2	16°06.2	171°16.1	-14°34.7	73°22.8	-25°28.7	150°17.3	-16°24.2	103°20.9	-22°42.5
3	31°08.7	186°16.9	-14°35.7	88°24.9	-25°28.5	165°19.4	-16°24.3	118°23.3	-22°42.6
4	46°11.2	201°17.7	-14°36.7	103°27.0	-25°28.3	180°21.5	-16°24.4	133°25.8	-22°42.6
5	61°13.6	216°18.5	-14°37.6	118°29.2	-25°28.1	195°23.6	-16°24.5	148°28.3	-22°42.6
6	76°16.1	231°19.3	-14°38.6	133°31.3	-25°27.9	210°25.7	-16°24.6	163°30.7	-22°42.6
7	91°18.6	246°20.0	-14°39.6	148°33.4	-25°27.6	225°27.8	-16°24.7	178°33.2	-22°42.6
8	106°21.0	261°20.8	-14°40.6	163°35.5	-25°27.4	240°29.9	-16°24.8	193°35.6	-22°42.6
9	121°23.5	276°21.6	-14°41.5	178°37.6	-25°27.2	255°31.9	-16°24.9	208°38.1	-22°42.6
10	136°26.0	291°22.4	-14°42.5	193°39.7	-25°27.0	270°34.0	-16°25.1	223°40.6	-22°42.6
11	151°28.4	306°23.2	-14°43.5	208°41.9	-25°26.7	285°36.1	-16°25.2	238°43.0	-22°42.6
12	166°30.9	321°24.0	-14°44.4	223°44.0	-25°26.5	300°38.2	-16°25.3	253°45.5	-22°42.6
13	181°33.3	336°24.8	-14°45.4	238°46.1	-25°26.3	315°40.3	-16°25.4	268°47.9	-22°42.6
14	196°35.8	351°25.6	-14°46.4	253°48.2	-25°26.1	330°42.4	-16°25.5	283°50.4	-22°42.6
15	211°38.3	6°26.4	-14°47.3	268°50.3	-25°25.9	345°44.5	-16°25.6	298°52.9	-22°42.6
16	226°40.7	21°27.2	-14°48.3	283°52.4	-25°25.6	0°46.6	-16°25.7	313°55.3	-22°42.6
17	241°43.2	36°28.0	-14°49.2	298°54.5	-25°25.4	15°48.7	-16°25.8	328°57.8	-22°42.6
18	256°45.7	51°28.8	-14°50.2	313°56.6	-25°25.2	30°50.8	-16°26.0	344°00.2	-22°42.6
19	271°48.1	66°29.6	-14°51.2	328°58.7	-25°25.0	45°52.9	-16°26.1	359°02.7	-22°42.6
20	286°50.6	81°30.4	-14°52.1	344°00.8	-25°24.7	60°54.9	-16°26.2	14°05.1	-22°42.7
21	301°53.1	96°31.2	-14°53.1	359°02.9	-25°24.5	75°57.0	-16°26.3	29°07.6	-22°42.7
22	316°55.5	111°32.0	-14°54.0	14°05.0	-25°24.3	90°59.1	-16°26.4	44°10.1	-22°42.7
23	331°58.0	126°32.8	-14°55.0	29°07.1	-25°24.0	106°01.2	-16°26.5	59°12.5	-22°42.7
Mer.pass.:0:55:		v0.8 d-1.0 m-4.4		v2.1 d0.2 m-2.0		v2.1 d-0.1 m-1.8		v2.5 d-0.0 m0.4	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	347°00.5	141°33.6	-14°56.0	44°09.2	-25°23.8	121°03.3	-16°26.6	74°15.0	-22°42.7
1	2°02.9	156°34.4	-14°56.9	59°11.3	-25°23.6	136°05.4	-16°26.7	89°17.4	-22°42.7
2	17°05.4	171°35.2	-14°57.9	74°13.4	-25°23.4	151°07.5	-16°26.8	104°19.9	-22°42.7
3	32°07.8	186°36.0	-14°58.8	89°15.5	-25°23.1	166°09.6	-16°27.0	119°22.3	-22°42.7
4	47°10.3	201°36.9	-14°59.8	104°17.5	-25°22.9	181°11.7	-16°27.1	134°24.8	-22°42.7
5	62°12.8	216°37.7	-15°00.7	119°19.6	-25°22.7	196°13.8	-16°27.2	149°27.3	-22°42.7
6	77°15.2	231°38.5	-15°01.7	134°21.7	-25°22.5	211°15.8	-16°27.3	164°29.7	-22°42.7
7	92°17.7	246°39.3	-15°02.6	149°23.8	-25°22.2	226°17.9	-16°27.4	179°32.2	-22°42.7
8	107°20.2	261°40.1	-15°03.6	164°25.9	-25°22.0	241°20.0	-16°27.5	194°34.6	-22°42.7
9	122°22.6	276°40.9	-15°04.6	179°28.0	-25°21.8	256°22.1	-16°27.6	209°37.1	-22°42.7
10	137°25.1	291°41.8	-15°05.5	194°30.0	-25°21.5	271°24.2	-16°27.7	224°39.5	-22°42.7
11	152°27.6	306°42.6	-15°06.5	209°32.1	-25°21.3	286°26.3	-16°27.9	239°42.0	-22°42.7
12	167°30.0	321°43.4	-15°07.4	224°34.2	-25°21.1	301°28.4	-16°28.0	254°44.5	-22°42.8
13	182°32.5	336°44.2	-15°08.4	239°36.3	-25°20.8	316°30.5	-16°28.1	269°46.9	-22°42.8
14	197°35.0	351°45.1	-15°09.3	254°38.3	-25°20.6	331°32.5	-16°28.2	284°49.4	-22°42.8
15	212°37.4	6°45.9	-15°10.2	269°40.4	-25°20.4	346°34.6	-16°28.3	299°51.8	-22°42.8
16	227°39.9	21°46.7	-15°11.2	284°42.5	-25°20.1	1°36.7	-16°28.4	314°54.3	-22°42.8
17	242°42.3	36°47.6	-15°12.1	299°44.6	-25°19.9	16°38.8	-16°28.5	329°56.7	-22°42.8
18	257°44.8	51°48.4	-15°13.1	314°46.6	-25°19.7	31°40.9	-16°28.6	344°59.2	-22°42.8
19	272°47.3	66°49.2	-15°14.0	329°48.7	-25°19.4	46°43.0	-16°28.8	0°01.6	-22°42.8
20	287°49.7	81°50.1	-15°15.0	344°50.8	-25°19.2	61°45.1	-16°28.9	15°04.1	-22°42.8
21	302°52.2	96°50.9	-15°15.9	359°52.8	-25°19.0	76°47.1	-16°29.0	30°06.5	-22°42.8
22	317°54.7	111°51.7	-15°16.9	14°54.9	-25°18.7	91°49.2	-16°29.1	45°09.0	-22°42.8
23	332°57.1	126°52.6	-15°17.8	29°56.9	-25°18.5	106°51.3	-16°29.2	60°11.4	-22°42.8
Mer.pass.:0:51:		v0.8 d-1.0 m-4.4		v2.1 d0.2 m-1.9		v2.1 d-0.1 m-1.7		v2.5 d-0.0 m0.4	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	347°59.6	141°53.4	-15°18.7	44°59.0	-25°18.3	121°53.4	-16°29.3	75°13.9	-22°42.8
1	3°02.1	156°54.3	-15°19.7	60°01.1	-25°18.0	136°55.5	-16°29.4	90°16.4	-22°42.8
2	18°04.5	171°55.1	-15°20.6	75°03.1	-25°17.8	151°57.6	-16°29.5	105°18.8	-22°42.8
3	33°07.0	186°55.9	-15°21.6	90°05.2	-25°17.6	166°59.6	-16°29.7	120°21.3	-22°42.8
4	48°09.4	201°56.8	-15°22.5	105°07.2	-25°17.3	182°01.7	-16°29.8	135°23.7	-22°42.8
5	63°11.9	216°57.6	-15°23.4	120°09.3	-25°17.1	197°03.8	-16°29.9	150°26.2	-22°42.9
6	78°14.4	231°58.5	-15°24.4	135°11.3	-25°16.9	212°05.9	-16°30.0	165°28.6	-22°42.9
7	93°16.8	246°59.3	-15°25.3	150°13.4	-25°16.6	227°08.0	-16°30.1	180°31.1	-22°42.9
8	108°19.3	262°00.2	-15°26.3	165°15.4	-25°16.4	242°10.1	-16°30.2	195°33.5	-22°42.9
9	123°21.8	277°01.0	-15°27.2	180°17.5	-25°16.1	257°12.1	-16°30.3	210°36.0	-22°42.9
10	138°24.2	292°01.9	-15°28.1	195°19.5	-25°15.9	272°14.2	-16°30.4	225°38.4	-22°42.9
11	153°26.7	307°02.8	-15°29.1	210°21.6	-25°15.7	287°16.3	-16°30.6	240°40.9	-22°42.9
12	168°29.2	322°03.6	-15°30.0	225°23.6	-25°15.4	302°18.4	-16°30.7	255°43.3	-22°42.9
13	183°31.6	337°04.5	-15°30.9	240°25.7	-25°15.2	317°20.5	-16°30.8	270°45.8	-22°42.9
14	198°34.1	352°05.3	-15°31.9	255°27.7	-25°14.9	332°22.6	-16°30.9	285°48.2	-22°42.9
15	213°36.6	7°06.2	-15°32.8	270°29.7	-25°14.7	347°24.6	-16°31.0	300°50.7	-22°42.9
16	228°39.0	22°07.1	-15°33.7	285°31.8	-25°14.5	2°26.7	-16°31.1	315°53.1	-22°42.9
17	243°41.5	37°07.9	-15°34.6	300°33.8	-25°14.2	17°28.8	-16°31.2	330°55.6	-22°42.9
18	258°43.9	52°08.8	-15°35.6	315°35.9	-25°14.0	32°30.9	-16°31.3	345°58.0	-22°42.9
19	273°46.4	67°09.7	-15°36.5	330°37.9	-25°13.7	47°33.0	-16°31.5	1°00.5	-22°42.9
20	288°48.9	82°10.5	-15°37.4	345°39.9	-25°13.5	62°35.0	-16°31.6	16°02.9	-22°42.9
21	303°51.3	97°11.4	-15°38.4	0°41.9	-25°13.3	77°37.1	-16°31.7	31°05.4	-22°42.9
22	318°53.8	112°12.3	-15°39.3	15°44.0	-25°13.0	92°39.2	-16°31.8	46°07.8	-22°43.0
23	333°56.3	127°13.1	-15°40.2	30°46.0	-25°12.8	107°41.3	-16°31.9	61°10.3	-22°43.0
Mer.pass.:0:47:		v0.8 d-0.9 m-4.4		v2.1 d0.2 m-1.9		v2.1 d-0.1 m-1.7		v2.5 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.8	-42°12.2
Schedar	349°35.9	56°38.2
Diphda	348°51.9	-17°53.0
Achernar	335°23.7	-57°08.4
Hamal	327°56.5	23°32.9
Polaris	315°58.1	89°20.2
Akamar	315°15.4	-40°13.7
Menkar	314°11.2	4°09.7
Mirfak	308°35.0	49°55.3
Aldebaran	290°45.3	16°32.7
Rigel	281°08.7	-8°10.8
Capella	280°29.2	46°00.7
Bellatrix	278°28.2	6°21.9
Elnath	278°08.2	28°37.2
Alnilam	275°42.8	-1°11.4
Betelgeuse	270°57.5	7°24.6
Canopus	263°54.8	-52°42.1
Sirius	258°30.6	-16°44.2
Adara	255°09.9	-28°59.7
Procyon	244°56.1	5°10.8
Pollux	243°23.5	27°58.8
Avior	234°17.1	-59°34.0
Suhail	222°50.2	-43°30.3
Miaplacidus	221°39.8	-69°47.5
Alphard	217°52.9	-8°44.2
Regulus	207°40.0	11°52.7
Dubhe	193°48.0	61°39.1
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°12.1
Gacrux	171°57.5	-57°13.0
Alioth	166°18.1	55°51.8
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.6
Hadar	148°43.3	-60°27.7
Menkent	148°03.7	-36°27.6
Arcturus	145°52.6	19°05.8
Rigil Kent.	139°47.2	-60°54.7
Zubenelg.	137°01.7	-16°06.9
Kochab	137°20.8	74°05.2
Alphecca	126°08.2	26°39.5
Antares	112°21.9	-26°28.2
Atria	107°20.5	-69°03.7
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.9
Rasalhague	96°03.1	12°33.2
Etamin	90°44.4	51°29.6
Kaus Aust.	83°38.9	-34°22.4
Vega	80°36.4	38°48.4
Nunki	75°53.8	-26°16.3
Altair	62°04.6	8°55.3
Peacock	53°13.2	-56°40.5
Deneb	49°28.7	45°21.1
Enif	33°43.3	9°57.8
Alnair	27°38.9	-46°52.2
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.1
Markab	13°34.5	15°18.4

2018/9/7	**SHA**	**Mer.pass**
Venus	155°13.2	14:34
Mars	57°17.2	21:04
Jupiter	134°11.8	15:57
Saturn	87°14.6	19:04

2018/9/8	**SHA**	**Mer.pass**
Venus	154°33.2	14:33
Mars	57°08.7	21:00
Jupiter	134°02.9	15:54
Saturn	87°14.5	18:60

2018/9/9	**SHA**	**Mer.pass**
Venus	153°53.8	14:32
Mars	56°59.4	20:57
Jupiter	133°53.8	15:50
Saturn	87°14.3	18:56

Horizontal paralax	
Venus:	0.3
Mars:	0.3

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°27.2	6°09.9	217°25.5	4.8	18°47.4	-5.9	60.5
1	195°27.4	6°09.0	231°49.4	4.8	18°41.5	-6.0	60.5
2	210°27.6	6°08.1	246°13.2	4.9	18°35.3	-6.2	60.6
3	225°27.8	6°07.1	260°37.1	4.9	18°29.1	-6.3	60.6
4	240°28.0	6°06.2	275°01.0	4.9	18°22.7	-6.4	60.6
5	255°28.2	6°05.3	289°25.0	5.0	18°16.2	-6.6	60.6
6	270°28.4	6°04.3	303°49.0	5.0	18°09.6	-6.7	60.6
7	285°28.7	6°03.4	318°13.0	5.0	18°02.8	-6.8	60.6
8	300°28.9	6°02.5	332°37.0	5.1	17°55.9	-7.0	60.6
9	315°29.1	6°01.5	347°01.1	5.1	17°48.9	-7.1	60.6
10	330°29.3	6°00.6	1°25.3	5.2	17°41.7	-7.2	60.6
11	345°29.5	5°59.6	15°49.4	5.2	17°34.4	-7.3	60.6
12	0°29.7	5°58.7	30°13.7	5.2	17°27.0	-7.5	60.6
13	15°29.9	5°57.8	44°37.9	5.3	17°19.5	-7.6	60.6
14	30°30.1	5°56.8	59°02.2	5.3	17°11.8	-7.7	60.7
15	45°30.4	5°55.9	73°26.6	5.4	17°04.1	-7.8	60.7
16	60°30.6	5°55.0	87°51.0	5.4	16°56.2	-8.0	60.7
17	75°30.8	5°54.0	102°15.4	5.5	16°48.1	-8.1	60.7
18	90°31.0	5°53.1	116°39.9	5.5	16°40.0	-8.2	60.7
19	105°31.2	5°52.2	131°04.4	5.6	16°31.8	-8.3	60.7
20	120°31.4	5°51.2	145°29.0	5.6	16°23.4	-8.4	60.7
21	135°31.6	5°50.3	159°53.6	5.7	16°14.9	-8.5	60.7
22	150°31.9	5°49.3	174°18.3	5.7	16°06.3	-8.6	60.7
23	165°32.1	5°48.4	188°43.1	5.8	15°57.6	-8.8	60.7
	SD.=15.9	d=-0.9			S.D.=16.5		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°32.3	5°47.5	203°07.8	5.8	15°48.8	-8.9	60.7
1	195°32.5	5°46.5	217°32.7	5.9	15°39.9	-9.0	60.7
2	210°32.7	5°45.6	231°57.6	5.9	15°30.9	-9.1	60.7
3	225°32.9	5°44.6	246°22.5	6.0	15°21.7	-9.2	60.7
4	240°33.1	5°43.7	260°47.5	6.0	15°12.5	-9.3	60.7
5	255°33.4	5°42.8	275°12.6	6.1	15°03.1	-9.4	60.7
6	270°33.6	5°41.8	289°37.7	6.1	14°53.7	-9.5	60.7
7	285°33.8	5°40.9	304°02.8	6.2	14°44.1	-9.6	60.7
8	300°34.0	5°39.9	318°28.1	6.2	14°34.5	-9.7	60.7
9	315°34.2	5°39.0	332°53.3	6.3	14°24.7	-9.8	60.7
10	330°34.4	5°38.1	347°18.7	6.4	14°14.9	-9.9	60.7
11	345°34.6	5°37.1	1°44.1	6.4	14°05.0	-10.0	60.7
12	0°34.9	5°36.2	16°09.5	6.5	13°54.9	-10.1	60.7
13	15°35.1	5°35.2	30°35.0	6.5	13°44.8	-10.2	60.6
14	30°35.3	5°34.3	45°00.6	6.6	13°34.6	-10.3	60.6
15	45°35.5	5°33.4	59°26.2	6.7	13°24.3	-10.3	60.6
16	60°35.7	5°32.4	73°51.9	6.7	13°13.9	-10.4	60.6
17	75°35.9	5°31.5	88°17.7	6.8	13°03.4	-10.5	60.6
18	90°36.1	5°30.5	102°43.5	6.8	12°52.9	-10.6	60.6
19	105°36.4	5°29.6	117°09.3	6.9	12°42.2	-10.7	60.6
20	120°36.6	5°28.7	131°35.3	7.0	12°31.5	-10.8	60.6
21	135°36.8	5°27.7	146°01.2	7.0	12°20.7	-10.8	60.6
22	150°37.0	5°26.8	160°27.3	7.1	12°09.8	-10.9	60.6
23	165°37.2	5°25.8	174°53.4	7.1	11°58.9	-11.0	60.6
	SD.=15.9	d=-0.9			S.D.=16.6		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°37.4	5°24.9	189°19.6	7.2	11°47.9	-11.1	60.6
1	195°37.7	5°23.9	203°45.8	7.3	11°36.7	-11.1	60.5
2	210°37.9	5°23.0	218°12.1	7.3	11°25.6	-11.2	60.5
3	225°38.1	5°22.1	232°38.4	7.4	11°14.3	-11.3	60.5
4	240°38.3	5°21.1	247°04.8	7.4	11°03.0	-11.3	60.5
5	255°38.5	5°20.2	261°31.3	7.5	10°51.6	-11.4	60.5
6	270°38.7	5°19.2	275°57.9	7.6	10°40.2	-11.5	60.5
7	285°38.9	5°18.3	290°24.4	7.6	10°28.7	-11.5	60.5
8	300°39.2	5°17.3	304°51.1	7.7	10°17.1	-11.6	60.5
9	315°39.4	5°16.4	319°17.8	7.7	10°05.5	-11.7	60.4
10	330°39.6	5°15.5	333°44.6	7.8	9°53.8	-11.7	60.4
11	345°39.8	5°14.5	348°11.4	7.9	9°42.0	-11.8	60.4
12	0°40.0	5°13.6	2°38.3	7.9	9°30.2	-11.8	60.4
13	15°40.2	5°12.6	17°05.3	8.0	9°18.4	-11.9	60.4
14	30°40.5	5°11.7	31°32.3	8.0	9°06.5	-11.9	60.4
15	45°40.7	5°10.7	45°59.4	8.1	8°54.5	-12.0	60.3
16	60°40.9	5°09.8	60°26.5	8.2	8°42.5	-12.0	60.3
17	75°41.1	5°08.8	74°53.7	8.2	8°30.4	-12.1	60.3
18	90°41.3	5°07.9	89°20.9	8.3	8°18.3	-12.1	60.3
19	105°41.5	5°07.0	103°48.3	8.3	8°06.2	-12.2	60.3
20	120°41.8	5°06.0	118°15.6	8.4	7°54.0	-12.2	60.3
21	135°42.0	5°05.1	132°43.0	8.5	7°41.8	-12.3	60.2
22	150°42.2	5°04.1	147°10.5	8.5	7°29.5	-12.3	60.2
23	165°42.4	5°03.2	161°38.1	8.6	7°17.2	-12.3	60.2
	SD.=15.9	d=-0.9			S.D.=16.5		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	00:34	03:16	04:35	19:18	20:35	22:60
70	01:47	03:35	04:44	19:09	20:17	22:01
68	02:23	03:50	04:51	19:02	20:02	21:28
66	02:47	04:02	04:57	18:56	19:51	21:04
64	03:06	04:12	05:03	18:51	19:41	20:47
62	03:20	04:20	05:07	18:47	19:33	20:32
60	03:33	04:28	05:11	18:43	19:26	20:20
58	03:43	04:34	05:15	18:39	19:20	20:10
56	03:52	04:39	05:18	18:36	19:15	20:02
54	03:60	04:44	05:20	18:34	19:10	19:54
52	04:06	04:48	05:23	18:31	19:06	19:48
50	04:12	04:52	05:25	18:29	19:02	19:42
45	04:25	05:00	05:30	18:24	18:54	19:30
40	04:34	05:07	05:34	18:21	18:48	19:20
35	04:42	05:12	05:38	18:17	18:43	19:13
30	04:48	05:17	05:41	18:14	18:38	19:07
20	04:58	05:24	05:46	18:09	18:31	18:57
10	05:05	05:29	05:50	18:05	18:26	18:51
0	05:10	05:34	05:54	18:01	18:22	18:46
-10	05:13	05:37	05:58	17:57	18:18	18:43
-20	05:15	05:40	06:03	17:53	18:15	18:41
-30	05:15	05:43	06:07	17:49	18:13	18:40
-35	05:15	05:44	06:10	17:46	18:11	18:41
-40	05:14	05:46	06:13	17:43	18:10	18:42
-45	05:13	05:47	06:16	17:40	18:10	18:44
-50	05:10	05:48	06:20	17:36	18:09	18:46
-52	05:09	05:48	06:22	17:35	18:08	18:47
-54	05:07	05:48	06:24	17:33	18:08	18:49
-56	05:06	05:49	06:26	17:31	18:08	18:51
-58	05:04	05:49	06:28	17:28	18:08	18:53
-60	05:01	05:49	06:31	17:26	18:07	18:56

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	00:33	03:01	20:31	20:03	19:46
70	–:–	01:12	03:21	19:50	19:42	19:35
68	–:–	01:40	03:36	19:22	19:25	19:25
66	00:15	02:00	03:49	19:01	19:11	19:18
64	00:38	02:16	03:59	18:43	18:60	19:11
62	00:56	02:30	04:07	18:29	18:50	19:06
60	01:12	02:41	04:15	18:17	18:42	19:01
58	01:24	02:51	04:21	18:07	18:34	18:56
56	01:36	02:60	04:27	17:57	18:28	18:52
54	01:45	03:07	04:32	17:49	18:22	18:49
52	01:54	03:14	04:37	17:42	18:16	18:45
50	02:02	03:20	04:41	17:35	18:12	18:42
45	02:18	03:33	04:50	17:21	18:01	18:36
40	02:32	03:44	04:58	17:09	17:52	18:31
35	02:44	03:53	05:04	16:59	17:45	18:26
30	02:54	04:02	05:10	16:50	17:38	18:22
20	03:11	04:16	05:19	16:35	17:26	18:15
10	03:26	04:28	05:28	16:21	17:16	18:08
0	03:40	04:39	05:36	16:08	17:06	18:02
-10	03:54	04:50	05:44	15:55	16:57	17:56
-20	04:09	05:02	05:52	15:42	16:46	17:49
-30	04:26	05:16	06:02	15:26	16:34	17:42
-35	04:36	05:24	06:08	15:16	16:27	17:37
-40	04:47	05:33	06:14	15:06	16:19	17:32
-45	05:01	05:44	06:21	14:53	16:10	17:26
-50	05:17	05:56	06:30	14:38	15:58	17:19
-52	05:24	06:02	06:34	14:31	15:53	17:16
-54	05:33	06:09	06:38	14:23	15:47	17:12
-56	05:42	06:16	06:43	14:14	15:41	17:08
-58	05:53	06:24	06:48	14:04	15:33	17:04
-60	06:05	06:33	06:54	13:52	15:25	16:59

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
7	01:49	01:59	11:58	09:54	22:23	27(7%)
8	02:09	02:19	11:57	10:52	23:21	28(2%)
9	02:30	02:40	11:57	11:49	00:16	29(0%)

September 10, 11 ,12 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	348°58.7	142°14.0	-15°41.1	45°48.0	-25°12.5	122°43.4	-16°32.0	76°12.7	-22°43.0
1	4°01.2	157°14.9	-15°42.0	60°50.1	-25°12.3	137°45.4	-16°32.1	91°15.2	-22°43.0
2	19°03.7	172°15.8	-15°43.0	75°52.1	-25°12.0	152°47.5	-16°32.3	106°17.6	-22°43.0
3	34°06.1	187°16.6	-15°43.9	90°54.1	-25°11.8	167°49.6	-16°32.4	121°20.1	-22°43.0
4	49°08.6	202°17.5	-15°44.8	105°56.1	-25°11.6	182°51.7	-16°32.5	136°22.5	-22°43.0
5	64°11.0	217°18.4	-15°45.7	120°58.1	-25°11.3	197°53.8	-16°32.6	151°25.0	-22°43.0
6	79°13.5	232°19.3	-15°46.7	136°00.2	-25°11.1	212°55.8	-16°32.7	166°27.4	-22°43.0
7	94°16.0	247°20.2	-15°47.6	151°02.2	-25°10.8	227°57.9	-16°32.8	181°29.8	-22°43.0
8	109°18.4	262°21.1	-15°48.5	166°04.2	-25°10.6	242°60.0	-16°32.9	196°32.3	-22°43.0
9	124°20.9	277°21.9	-15°49.4	181°06.2	-25°10.3	258°02.1	-16°33.1	211°34.7	-22°43.0
10	139°23.4	292°22.8	-15°50.3	196°08.2	-25°10.1	273°04.1	-16°33.2	226°37.2	-22°43.0
11	154°25.8	307°23.7	-15°51.2	211°10.2	-25°09.8	288°06.2	-16°33.3	241°39.6	-22°43.0
12	169°28.3	322°24.6	-15°52.2	226°12.3	-25°09.6	303°08.3	-16°33.4	256°42.1	-22°43.0
13	184°30.8	337°25.5	-15°53.1	241°14.3	-25°09.3	318°10.4	-16°33.5	271°44.5	-22°43.0
14	199°33.2	352°26.4	-15°54.0	256°16.3	-25°09.1	333°12.5	-16°33.6	286°47.0	-22°43.0
15	214°35.7	7°27.3	-15°54.9	271°18.3	-25°08.9	348°14.5	-16°33.7	301°49.4	-22°43.1
16	229°38.2	22°28.2	-15°55.8	286°20.3	-25°08.6	3°16.6	-16°33.9	316°51.9	-22°43.1
17	244°40.6	37°29.1	-15°56.7	301°22.3	-25°08.4	18°18.7	-16°34.0	331°54.3	-22°43.1
18	259°43.1	52°30.0	-15°57.6	316°24.3	-25°08.1	33°20.8	-16°34.1	346°56.8	-22°43.1
19	274°45.5	67°30.9	-15°58.5	331°26.3	-25°07.9	48°22.8	-16°34.2	1°59.2	-22°43.1
20	289°48.0	82°31.8	-15°59.5	346°28.3	-25°07.6	63°24.9	-16°34.3	17°01.6	-22°43.1
21	304°50.5	97°32.7	-16°00.4	1°30.3	-25°07.4	78°27.0	-16°34.4	32°04.1	-22°43.1
22	319°52.9	112°33.6	-16°01.3	16°32.3	-25°07.1	93°29.1	-16°34.5	47°06.5	-22°43.1
23	334°55.4	127°34.5	-16°02.2	31°34.3	-25°06.9	108°31.1	-16°34.7	62°09.0	-22°43.1
Mer.pass.:0:43:		v0.9 d-0.9 m-4.4		v2.0 d0.2 m-1.9		v2.1 d-0.1 m-1.7		v2.4 d-0.0 m0.4	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	349°57.9	142°35.4	-16°03.1	46°36.3	-25°06.6	123°33.2	-16°34.8	77°11.4	-22°43.1
1	5°00.3	157°36.4	-16°04.0	61°38.3	-25°06.4	138°35.3	-16°34.9	92°13.9	-22°43.1
2	20°02.8	172°37.3	-16°04.9	76°40.3	-25°06.1	153°37.4	-16°35.0	107°16.3	-22°43.1
3	35°05.3	187°38.2	-16°05.8	91°42.2	-25°05.9	168°39.4	-16°35.1	122°18.7	-22°43.1
4	50°07.7	202°39.1	-16°06.7	106°44.2	-25°05.6	183°41.5	-16°35.2	137°21.2	-22°43.1
5	65°10.2	217°40.0	-16°07.6	121°46.2	-25°05.4	198°43.6	-16°35.3	152°23.6	-22°43.1
6	80°12.7	232°40.9	-16°08.5	136°48.2	-25°05.1	213°45.7	-16°35.5	167°26.1	-22°43.1
7	95°15.1	247°41.9	-16°09.4	151°50.2	-25°04.8	228°47.7	-16°35.6	182°28.5	-22°43.1
8	110°17.6	262°42.8	-16°10.3	166°52.2	-25°04.6	243°49.8	-16°35.7	197°31.0	-22°43.1
9	125°20.0	277°43.7	-16°11.2	181°54.2	-25°04.3	258°51.9	-16°35.8	212°33.4	-22°43.2
10	140°22.5	292°44.6	-16°12.1	196°56.1	-25°04.1	273°54.0	-16°35.9	227°35.8	-22°43.2
11	155°25.0	307°45.6	-16°13.0	211°58.1	-25°03.8	288°56.0	-16°36.0	242°38.3	-22°43.2
12	170°27.4	322°46.5	-16°13.9	227°00.1	-25°03.6	303°58.1	-16°36.1	257°40.7	-22°43.2
13	185°29.9	337°47.4	-16°14.8	242°02.1	-25°03.3	319°00.2	-16°36.3	272°43.2	-22°43.2
14	200°32.4	352°48.4	-16°15.7	257°04.1	-25°03.1	334°02.2	-16°36.4	287°45.6	-22°43.2
15	215°34.8	7°49.3	-16°16.6	272°06.0	-25°02.8	349°04.3	-16°36.5	302°48.1	-22°43.2
16	230°37.3	22°50.2	-16°17.5	287°08.0	-25°02.6	4°06.4	-16°36.6	317°50.5	-22°43.2
17	245°39.8	37°51.2	-16°18.4	302°10.0	-25°02.3	19°08.5	-16°36.7	332°52.9	-22°43.2
18	260°42.2	52°52.1	-16°19.3	317°11.9	-25°02.0	34°10.5	-16°36.8	347°55.4	-22°43.2
19	275°44.7	67°53.0	-16°20.2	332°13.9	-25°01.8	49°12.6	-16°36.9	2°57.8	-22°43.2
20	290°47.1	82°54.0	-16°21.1	347°15.9	-25°01.5	64°14.7	-16°37.1	18°00.3	-22°43.2
21	305°49.6	97°54.9	-16°22.0	2°17.8	-25°01.3	79°16.7	-16°37.2	33°02.7	-22°43.2
22	320°52.1	112°55.9	-16°22.8	17°19.8	-25°01.0	94°18.8	-16°37.3	48°05.1	-22°43.2
23	335°54.5	127°56.8	-16°23.7	32°21.8	-25°00.8	109°20.9	-16°37.4	63°07.6	-22°43.2
Mer.pass.:0:40:		v0.9 d-0.9 m-4.4		v2.0 d0.3 m-1.9		v2.1 d-0.1 m-1.7		v2.4 d-0.0 m0.4	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	350°57.0	142°57.8	-16°24.6	47°23.7	-25°00.5	124°23.0	-16°37.5	78°10.0	-22°43.2
1	5°59.5	157°58.7	-16°25.5	62°25.7	-25°00.2	139°25.0	-16°37.6	93°12.5	-22°43.2
2	21°01.9	172°59.7	-16°26.4	77°27.7	-24°60.0	154°27.1	-16°37.8	108°14.9	-22°43.2
3	36°04.4	188°00.6	-16°27.3	92°29.6	-24°59.7	169°29.2	-16°37.9	123°17.3	-22°43.3
4	51°06.9	203°01.6	-16°28.2	107°31.6	-24°59.5	184°31.2	-16°38.0	138°19.8	-22°43.3
5	66°09.3	218°02.5	-16°29.0	122°33.5	-24°59.2	199°33.3	-16°38.1	153°22.2	-22°43.3
6	81°11.8	233°03.5	-16°29.9	137°35.5	-24°58.9	214°35.4	-16°38.2	168°24.7	-22°43.3
7	96°14.3	248°04.4	-16°30.8	152°37.4	-24°58.7	229°37.4	-16°38.3	183°27.1	-22°43.3
8	111°16.7	263°05.4	-16°31.7	167°39.4	-24°58.4	244°39.5	-16°38.4	198°29.5	-22°43.3
9	126°19.2	278°06.4	-16°32.6	182°41.3	-24°58.2	259°41.6	-16°38.6	213°32.0	-22°43.3
10	141°21.6	293°07.3	-16°33.5	197°43.3	-24°57.9	274°43.7	-16°38.7	228°34.4	-22°43.3
11	156°24.1	308°08.3	-16°34.3	212°45.2	-24°57.6	289°45.7	-16°38.8	243°36.8	-22°43.3
12	171°26.6	323°09.3	-16°35.2	227°47.2	-24°57.4	304°47.8	-16°38.9	258°39.3	-22°43.3
13	186°29.0	338°10.2	-16°36.1	242°49.1	-24°57.1	319°49.9	-16°39.0	273°41.7	-22°43.3
14	201°31.5	353°11.2	-16°37.0	257°51.1	-24°56.9	334°51.9	-16°39.1	288°44.2	-22°43.3
15	216°34.0	8°12.2	-16°37.8	272°53.0	-24°56.6	349°54.0	-16°39.3	303°46.6	-22°43.3
16	231°36.4	23°13.1	-16°38.7	287°55.0	-24°56.3	4°56.1	-16°39.4	318°49.0	-22°43.3
17	246°38.9	38°14.1	-16°39.6	302°56.9	-24°56.1	19°58.1	-16°39.5	333°51.5	-22°43.3
18	261°41.4	53°15.1	-16°40.5	317°58.8	-24°55.8	35°00.2	-16°39.6	348°53.9	-22°43.3
19	276°43.8	68°16.1	-16°41.3	333°00.8	-24°55.5	50°02.3	-16°39.7	3°56.3	-22°43.3
20	291°46.3	83°17.1	-16°42.2	348°02.7	-24°55.3	65°04.3	-16°39.8	18°58.8	-22°43.4
21	306°48.7	98°18.0	-16°43.1	3°04.6	-24°55.0	80°06.4	-16°40.0	34°01.2	-22°43.4
22	321°51.2	113°19.0	-16°44.0	18°06.6	-24°54.7	95°08.5	-16°40.1	49°03.6	-22°43.4
23	336°53.7	128°20.0	-16°44.8	33°08.5	-24°54.5	110°10.5	-16°40.2	64°06.1	-22°43.4
Mer.pass.:0:36:		v0.9 d-0.9 m-4.4		v2.0 d0.3 m-1.8		v2.1 d-0.1 m-1.7		v2.4 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.8	-42°12.2
Schedar	349°35.9	56°38.3
Diphda	348°51.9	-17°53.0
Achernar	335°23.7	-57°08.4
Hamal	327°56.5	23°32.9
Polaris	315°57.0	89°20.2
Akamar	315°15.4	-40°13.7
Menkar	314°11.2	4°09.7
Mirfak	308°35.0	49°55.3
Aldebaran	290°45.3	16°32.7
Rigel	281°08.6	-8°10.8
Capella	280°29.2	46°00.7
Bellatrix	278°28.2	6°21.9
Elnath	278°08.2	28°37.2
Alnilam	275°42.8	-1°11.4
Betelgeuse	270°57.5	7°24.6
Canopus	263°54.7	-52°42.1
Sirius	258°30.6	-16°44.2
Adara	255°09.9	-28°59.7
Procyon	244°56.1	5°10.8
Pollux	243°23.5	27°58.8
Avior	234°17.0	-59°34.0
Suhail	222°50.2	-43°30.3
Miaplacidus	221°39.7	-69°47.4
Alphard	217°52.9	-8°44.2
Regulus	207°40.0	11°52.7
Dubhe	193°48.0	61°39.1
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°12.1
Gacrux	171°57.5	-57°13.0
Alioth	166°18.1	55°51.8
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.6
Hadar	148°43.3	-60°27.7
Menkent	148°03.7	-36°27.6
Arcturus	145°52.6	19°05.8
Rigil Kent.	139°47.3	-60°54.7
Zubenelg.	137°01.7	-16°06.9
Kochab	137°20.8	74°05.1
Alphecca	126°08.2	26°39.5
Antares	112°22.0	-26°28.2
Atria	107°20.6	-69°03.7
Sabik	102°08.5	-15°44.7
Shaula	96°17.1	-37°06.9
Rasalhague	96°03.1	12°33.2
Etamin	90°44.4	51°29.6
Kaus Aust.	83°39.0	-34°22.4
Vega	80°36.4	38°48.4
Nunki	75°53.8	-26°16.3
Altair	62°04.6	8°55.3
Peacock	53°13.2	-56°40.5
Deneb	49°28.7	45°21.1
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.2
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.1
Markab	13°34.5	15°18.4

2018/9/1	**SHA**	**Mer.pass**
Venus	153°15.3	14:30
Mars	56°49.3	20:54
Jupiter	133°44.6	15:47
Saturn	87°14.0	18:52

2018/9/1	**SHA**	**Mer.pass**
Venus	152°37.6	14:29
Mars	56°38.4	20:51
Jupiter	133°35.4	15:44
Saturn	87°13.6	18:48

2018/9/1	**SHA**	**Mer.pass**
Venus	152°00.8	14:27
Mars	56°26.7	20:48
Jupiter	133°26.0	15:40
Saturn	87°13.0	18:44

Horizontal paralax	
Venus:	0.3
Mars:	0.3

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°42.6	5°02.2	176°05.7	8.6	7°04.8	-12.4	60.2
1	195°42.8	5°01.3	190°33.3	8.7	6°52.5	-12.4	60.2
2	210°43.1	5°00.3	205°01.0	8.7	6°40.1	-12.4	60.1
3	225°43.3	4°59.4	219°28.8	8.8	6°27.6	-12.5	60.1
4	240°43.5	4°58.4	233°56.6	8.8	6°15.1	-12.5	60.1
5	255°43.7	4°57.5	248°24.5	8.9	6°02.6	-12.5	60.1
6	270°43.9	4°56.5	262°52.4	9.0	5°50.1	-12.5	60.0
7	285°44.1	4°55.6	277°20.4	9.0	5°37.6	-12.6	60.0
8	300°44.4	4°54.6	291°48.4	9.1	5°25.0	-12.6	60.0
9	315°44.6	4°53.7	306°16.5	9.1	5°12.4	-12.6	60.0
10	330°44.8	4°52.8	320°44.6	9.2	4°59.8	-12.6	59.9
11	345°45.0	4°51.8	335°12.8	9.2	4°47.1	-12.6	59.9
12	0°45.2	4°50.9	349°41.1	9.3	4°34.5	-12.7	59.9
13	15°45.5	4°49.9	4°09.4	9.3	4°21.8	-12.7	59.9
14	30°45.7	4°49.0	18°37.7	9.4	4°09.1	-12.7	59.8
15	45°45.9	4°48.0	33°06.1	9.4	3°56.4	-12.7	59.8
16	60°46.1	4°47.1	47°34.5	9.5	3°43.7	-12.7	59.8
17	75°46.3	4°46.1	62°03.0	9.5	3°31.0	-12.7	59.8
18	90°46.5	4°45.2	76°31.6	9.6	3°18.2	-12.7	59.7
19	105°46.8	4°44.2	91°00.1	9.6	3°05.5	-12.7	59.7
20	120°47.0	4°43.3	105°28.8	9.7	2°52.8	-12.7	59.7
21	135°47.2	4°42.3	119°57.5	9.7	2°40.0	-12.7	59.6
22	150°47.4	4°41.4	134°26.2	9.7	2°27.3	-12.8	59.6
23	165°47.6	4°40.4	148°55.0	9.8	2°14.5	-12.8	59.6
	SD.=15.9	d=-0.9			S.D.=16.4		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°47.9	4°39.5	163°23.8	9.8	2°01.8	-12.8	59.6
1	195°48.1	4°38.5	177°52.6	9.9	1°49.0	-12.7	59.5
2	210°48.3	4°37.6	192°21.5	9.9	1°36.3	-12.7	59.5
3	225°48.5	4°36.6	206°50.5	10.0	1°23.5	-12.7	59.5
4	240°48.7	4°35.7	221°19.5	10.0	1°10.8	-12.7	59.4
5	255°48.9	4°34.7	235°48.5	10.0	0°58.0	-12.7	59.4
6	270°49.2	4°33.8	250°17.5	10.1	0°45.3	-12.7	59.4
7	285°49.4	4°32.8	264°46.7	10.1	0°32.6	-12.7	59.3
8	300°49.6	4°31.9	279°15.8	10.2	0°19.9	-12.7	59.3
9	315°49.8	4°30.9	293°45.0	10.2	0°07.2	-12.7	59.3
10	330°50.0	4°30.0	308°14.2	10.2	-0°05.5	-12.7	59.2
11	345°50.3	4°29.0	322°43.5	10.3	-0°18.1	-12.7	59.2
12	0°50.5	4°28.1	337°12.8	10.3	-0°30.8	-12.6	59.2
13	15°50.7	4°27.1	351°42.1	10.4	-0°43.4	-12.6	59.1
14	30°50.9	4°26.2	6°11.5	10.4	-0°56.0	-12.6	59.1
15	45°51.1	4°25.2	20°40.9	10.4	-1°08.6	-12.6	59.1
16	60°51.4	4°24.3	35°10.3	10.5	-1°21.2	-12.6	59.0
17	75°51.6	4°23.3	49°39.8	10.5	-1°33.7	-12.5	59.0
18	90°51.8	4°22.4	64°09.3	10.5	-1°46.2	-12.5	59.0
19	105°52.0	4°21.4	78°38.9	10.6	-1°58.7	-12.5	58.9
20	120°52.2	4°20.4	93°08.4	10.6	-2°11.2	-12.5	58.9
21	135°52.5	4°19.5	107°38.0	10.6	-2°23.7	-12.4	58.9
22	150°52.7	4°18.5	122°07.7	10.7	-2°36.1	-12.4	58.8
23	165°52.9	4°17.6	136°37.4	10.7	-2°48.5	-12.4	58.8
	SD.=15.9	d=-0.9			S.D.=16.2		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°53.1	4°16.6	151°07.1	10.7	-3°00.8	-12.3	58.8
1	195°53.3	4°15.7	165°36.8	10.7	-3°13.2	-12.3	58.7
2	210°53.6	4°14.7	180°06.5	10.8	-3°25.4	-12.3	58.7
3	225°53.8	4°13.8	194°36.3	10.8	-3°37.7	-12.2	58.7
4	240°54.0	4°12.8	209°06.1	10.8	-3°49.9	-12.2	58.6
5	255°54.2	4°11.9	223°36.0	10.8	-4°02.1	-12.2	58.6
6	270°54.4	4°10.9	238°05.8	10.9	-4°14.3	-12.1	58.6
7	285°54.7	4°10.0	252°35.7	10.9	-4°26.4	-12.1	58.5
8	300°54.9	4°09.0	267°05.6	10.9	-4°38.5	-12.1	58.5
9	315°55.1	4°08.1	281°35.6	10.9	-4°50.5	-12.0	58.4
10	330°55.3	4°07.1	296°05.5	11.0	-5°02.5	-12.0	58.4
11	345°55.5	4°06.1	310°35.5	11.0	-5°14.4	-11.9	58.4
12	0°55.8	4°05.2	325°05.5	11.0	-5°26.3	-11.9	58.3
13	15°56.0	4°04.2	339°35.5	11.0	-5°38.2	-11.8	58.3
14	30°56.2	4°03.3	354°05.6	11.1	-5°50.0	-11.8	58.3
15	45°56.4	4°02.3	8°35.7	11.1	-6°01.8	-11.7	58.2
16	60°56.6	4°01.4	23°05.7	11.1	-6°13.5	-11.7	58.2
17	75°56.9	4°00.4	37°35.9	11.1	-6°25.2	-11.6	58.2
18	90°57.1	3°59.5	52°06.0	11.1	-6°36.8	-11.6	58.1
19	105°57.3	3°58.5	66°36.1	11.2	-6°48.4	-11.5	58.1
20	120°57.5	3°57.6	81°06.3	11.2	-6°59.9	-11.5	58.0
21	135°57.7	3°56.6	95°36.5	11.2	-7°11.4	-11.4	58.0
22	150°58.0	3°55.6	110°06.7	11.2	-7°22.8	-11.4	58.0
23	165°58.2	3°54.7	124°36.9	11.2	-7°34.2	-11.3	57.9
	SD.=15.9	d=-1.0			S.D.=16.0		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	01:26	03:33	04:48	19:02	20:16	22:16
70	02:12	03:49	04:56	18:55	20:00	21:36
68	02:40	04:02	05:02	18:49	19:48	21:09
66	03:01	04:13	05:07	18:44	19:38	20:49
64	03:17	04:22	05:11	18:40	19:30	20:33
62	03:31	04:29	05:15	18:37	19:22	20:20
60	03:42	04:35	05:18	18:34	19:16	20:10
58	03:51	04:41	05:21	18:31	19:11	20:00
56	03:59	04:45	05:23	18:29	19:06	19:53
54	04:06	04:50	05:26	18:26	19:02	19:46
52	04:12	04:53	05:28	18:24	18:59	19:40
50	04:17	04:57	05:30	18:23	18:55	19:35
45	04:29	05:04	05:34	18:19	18:48	19:24
40	04:37	05:10	05:37	18:16	18:43	19:15
35	04:44	05:14	05:40	18:13	18:38	19:08
30	04:50	05:18	05:42	18:11	18:35	19:03
20	04:59	05:24	05:47	18:06	18:29	18:54
10	05:05	05:29	05:50	18:03	18:24	18:49
0	05:09	05:33	05:53	17:60	18:21	18:45
-10	05:11	05:36	05:57	17:57	18:18	18:42
-20	05:12	05:38	05:60	17:54	18:16	18:41
-30	05:12	05:40	06:03	17:50	18:14	18:42
-35	05:11	05:40	06:05	17:48	18:14	18:43
-40	05:09	05:41	06:08	17:46	18:13	18:45
-45	05:07	05:41	06:10	17:44	18:13	18:47
-50	05:04	05:41	06:13	17:41	18:13	18:51
-52	05:02	05:41	06:15	17:39	18:13	18:52
-54	05:00	05:41	06:16	17:38	18:13	18:54
-56	04:58	05:41	06:18	17:36	18:14	18:57
-58	04:55	05:41	06:20	17:35	18:14	18:60
-60	04:52	05:40	06:22	17:33	18:14	19:03

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	05:14	07:17	09:17	19:32	19:19	19:05
70	05:22	07:18	09:10	19:28	19:22	19:15
68	05:29	07:18	09:04	19:25	19:24	19:23
66	05:35	07:19	08:59	19:22	19:26	19:30
64	05:40	07:19	08:55	19:20	19:28	19:36
62	05:45	07:19	08:51	19:18	19:29	19:41
60	05:48	07:19	08:48	19:16	19:31	19:45
58	05:52	07:20	08:45	19:15	19:32	19:49
56	05:54	07:20	08:43	19:13	19:33	19:53
54	05:57	07:20	08:40	19:12	19:34	19:56
52	05:59	07:20	08:38	19:11	19:35	19:59
50	06:02	07:20	08:37	19:10	19:36	20:01
45	06:06	07:21	08:33	19:08	19:37	20:07
40	06:10	07:21	08:29	19:06	19:39	20:11
35	06:13	07:21	08:26	19:04	19:40	20:16
30	06:16	07:21	08:24	19:02	19:41	20:19
20	06:22	07:22	08:20	18:60	19:43	20:25
10	06:26	07:22	08:16	18:57	19:45	20:31
0	06:30	07:22	08:13	18:55	19:46	20:36
-10	06:34	07:23	08:09	18:53	19:48	20:41
-20	06:39	07:23	08:06	18:50	19:50	20:47
-30	06:44	07:23	08:02	18:48	19:51	20:53
-35	06:47	07:24	07:59	18:46	19:53	20:57
-40	06:50	07:24	07:57	18:44	19:54	21:01
-45	06:54	07:24	07:54	18:42	19:55	21:06
-50	06:59	07:25	07:50	18:39	19:57	21:12
-52	07:01	07:25	07:49	18:38	19:58	21:15
-54	07:03	07:25	07:47	18:37	19:58	21:18
-56	07:05	07:26	07:45	18:35	19:59	21:21
-58	07:08	07:26	07:43	18:33	20:00	21:24
-60	07:11	07:26	07:40	18:32	20:02	21:29

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
10	02:50	03:01	11:56	12:42	00:16	1(1%)
11	03:11	03:22	11:56	13:34	01:08	2(4%)
12	03:32	03:43	11:56	14:24	01:59	3(10%)

September 13, 14 ,15 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	351°56.1	143°21.0	-16°45.7	48°10.4	-24°54.2	125°12.6	-16°40.3	79°08.5	-22°43.4
1	6°58.6	158°22.0	-16°46.6	63°12.4	-24°53.9	140°14.7	-16°40.4	94°10.9	-22°43.4
2	22°01.1	173°23.0	-16°47.4	78°14.3	-24°53.7	155°16.7	-16°40.5	109°13.4	-22°43.4
3	37°03.5	188°24.0	-16°48.3	93°16.2	-24°53.4	170°18.8	-16°40.6	124°15.8	-22°43.4
4	52°06.0	203°25.0	-16°49.2	108°18.1	-24°53.1	185°20.9	-16°40.8	139°18.3	-22°43.4
5	67°08.5	218°26.0	-16°50.0	123°20.1	-24°52.9	200°22.9	-16°40.9	154°20.7	-22°43.4
6	82°10.9	233°27.0	-16°50.9	138°22.0	-24°52.6	215°25.0	-16°41.0	169°23.1	-22°43.4
7	97°13.4	248°28.0	-16°51.8	153°23.9	-24°52.3	230°27.0	-16°41.1	184°25.6	-22°43.4
8	112°15.9	263°29.0	-16°52.6	168°25.8	-24°52.1	245°29.1	-16°41.2	199°28.0	-22°43.4
9	127°18.3	278°30.0	-16°53.5	183°27.8	-24°51.8	260°31.2	-16°41.3	214°30.4	-22°43.4
10	142°20.8	293°31.0	-16°54.3	198°29.7	-24°51.5	275°33.2	-16°41.5	229°32.9	-22°43.4
11	157°23.2	308°32.0	-16°55.2	213°31.6	-24°51.3	290°35.3	-16°41.6	244°35.3	-22°43.4
12	172°25.7	323°33.0	-16°56.1	228°33.5	-24°51.0	305°37.4	-16°41.7	259°37.7	-22°43.4
13	187°28.2	338°34.0	-16°56.9	243°35.4	-24°50.7	320°39.4	-16°41.8	274°40.2	-22°43.4
14	202°30.6	353°35.0	-16°57.8	258°37.3	-24°50.5	335°41.5	-16°41.9	289°42.6	-22°43.5
15	217°33.1	8°36.0	-16°58.6	273°39.2	-24°50.2	350°43.6	-16°42.0	304°45.0	-22°43.5
16	232°35.6	23°37.0	-16°59.5	288°41.2	-24°49.9	5°45.6	-16°42.2	319°47.4	-22°43.5
17	247°38.0	38°38.0	-17°00.3	303°43.1	-24°49.6	20°47.7	-16°42.3	334°49.9	-22°43.5
18	262°40.5	53°39.1	-17°01.2	318°45.0	-24°49.4	35°49.7	-16°42.4	349°52.3	-22°43.5
19	277°43.0	68°40.1	-17°02.1	333°46.9	-24°49.1	50°51.8	-16°42.5	4°54.7	-22°43.5
20	292°45.4	83°41.1	-17°02.9	348°48.8	-24°48.8	65°53.9	-16°42.6	19°57.2	-22°43.5
21	307°47.9	98°42.1	-17°03.8	3°50.7	-24°48.6	80°55.9	-16°42.7	34°59.6	-22°43.5
22	322°50.3	113°43.1	-17°04.6	18°52.6	-24°48.3	95°58.0	-16°42.9	50°02.0	-22°43.5
23	337°52.8	128°44.2	-17°05.5	33°54.5	-24°48.0	111°00.1	-16°43.0	65°04.5	-22°43.5
Mer.pass.:0:32:		v1.0 d-0.9 m-4.5		v1.9 d0.3 m-1.8		v2.1 d-0.1 m-1.7		v2.4 d-0.0 m0.4	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	352°55.3	143°45.2	-17°06.3	48°56.4	-24°47.7	126°02.1	-16°43.1	80°06.9	-22°43.5
1	7°57.7	158°46.2	-17°07.2	63°58.3	-24°47.5	141°04.2	-16°43.2	95°09.3	-22°43.5
2	23°00.2	173°47.3	-17°08.0	79°00.2	-24°47.2	156°06.2	-16°43.3	110°11.8	-22°43.5
3	38°02.7	188°48.3	-17°08.9	94°02.1	-24°46.9	171°08.3	-16°43.4	125°14.2	-22°43.5
4	53°05.1	203°49.3	-17°09.7	109°04.0	-24°46.6	186°10.4	-16°43.6	140°16.6	-22°43.5
5	68°07.6	218°50.4	-17°10.5	124°05.9	-24°46.4	201°12.4	-16°43.7	155°19.0	-22°43.5
6	83°10.1	233°51.4	-17°11.4	139°07.8	-24°46.1	216°14.5	-16°43.8	170°21.5	-22°43.5
7	98°12.5	248°52.4	-17°12.2	154°09.7	-24°45.8	231°16.5	-16°43.9	185°23.9	-22°43.5
8	113°15.0	263°53.5	-17°13.1	169°11.5	-24°45.5	246°18.6	-16°44.0	200°26.3	-22°43.5
9	128°17.5	278°54.5	-17°13.9	184°13.4	-24°45.3	261°20.7	-16°44.1	215°28.8	-22°43.6
10	143°19.9	293°55.6	-17°14.8	199°15.3	-24°45.0	276°22.7	-16°44.3	230°31.2	-22°43.6
11	158°22.4	308°56.6	-17°15.6	214°17.2	-24°44.7	291°24.8	-16°44.4	245°33.6	-22°43.6
12	173°24.8	323°57.7	-17°16.4	229°19.1	-24°44.4	306°26.8	-16°44.5	260°36.1	-22°43.6
13	188°27.3	338°58.7	-17°17.3	244°21.0	-24°44.2	321°28.9	-16°44.6	275°38.5	-22°43.6
14	203°29.8	353°59.8	-17°18.1	259°22.9	-24°43.9	336°31.0	-16°44.7	290°40.9	-22°43.6
15	218°32.2	9°00.8	-17°18.9	274°24.7	-24°43.6	351°33.0	-16°44.9	305°43.3	-22°43.6
16	233°34.7	24°01.9	-17°19.8	289°26.6	-24°43.3	6°35.1	-16°45.0	320°45.8	-22°43.6
17	248°37.2	39°03.0	-17°20.6	304°28.5	-24°43.1	21°37.1	-16°45.1	335°48.2	-22°43.6
18	263°39.6	54°04.0	-17°21.5	319°30.4	-24°42.8	36°39.2	-16°45.2	350°50.6	-22°43.6
19	278°42.1	69°05.1	-17°22.3	334°32.2	-24°42.5	51°41.2	-16°45.3	5°53.0	-22°43.6
20	293°44.6	84°06.1	-17°23.1	349°34.1	-24°42.2	66°43.3	-16°45.4	20°55.5	-22°43.6
21	308°47.0	99°07.2	-17°23.9	4°36.0	-24°41.9	81°45.4	-16°45.6	35°57.9	-22°43.6
22	323°49.5	114°08.3	-17°24.8	19°37.9	-24°41.7	96°47.4	-16°45.7	51°00.3	-22°43.6
23	338°52.0	129°09.4	-17°25.6	34°39.7	-24°41.4	111°49.5	-16°45.8	66°02.8	-22°43.6
Mer.pass.:0:28:		v1.0 d-0.8 m-4.5		v1.9 d0.3 m-1.8		v2.1 d-0.1 m-1.7		v2.4 d-0.0 m0.4	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	353°54.4	144°10.4	-17°26.4	49°41.6	-24°41.1	126°51.5	-16°45.9	81°05.2	-22°43.6
1	8°56.9	159°11.5	-17°27.3	64°43.5	-24°40.8	141°53.6	-16°46.0	96°07.6	-22°43.6
2	23°59.3	174°12.6	-17°28.1	79°45.3	-24°40.5	156°55.6	-16°46.1	111°10.0	-22°43.6
3	39°01.8	189°13.7	-17°28.9	94°47.2	-24°40.3	171°57.7	-16°46.3	126°12.5	-22°43.7
4	54°04.3	204°14.7	-17°29.7	109°49.1	-24°40.0	186°59.8	-16°46.4	141°14.9	-22°43.7
5	69°06.7	219°15.8	-17°30.6	124°50.9	-24°39.7	202°01.8	-16°46.5	156°17.3	-22°43.7
6	84°09.2	234°16.9	-17°31.4	139°52.8	-24°39.4	217°03.9	-16°46.6	171°19.7	-22°43.7
7	99°11.7	249°18.0	-17°32.2	154°54.7	-24°39.1	232°05.9	-16°46.7	186°22.2	-22°43.7
8	114°14.1	264°19.1	-17°33.0	169°56.5	-24°38.8	247°08.0	-16°46.9	201°24.6	-22°43.7
9	129°16.6	279°20.2	-17°33.9	184°58.4	-24°38.6	262°10.0	-16°47.0	216°27.0	-22°43.7
10	144°19.1	294°21.2	-17°34.7	200°00.2	-24°38.3	277°12.1	-16°47.1	231°29.4	-22°43.7
11	159°21.5	309°22.3	-17°35.5	215°02.1	-24°38.0	292°14.1	-16°47.2	246°31.9	-22°43.7
12	174°24.0	324°23.4	-17°36.3	230°03.9	-24°37.7	307°16.2	-16°47.3	261°34.3	-22°43.7
13	189°26.4	339°24.5	-17°37.1	245°05.8	-24°37.4	322°18.3	-16°47.4	276°36.7	-22°43.7
14	204°28.9	354°25.6	-17°37.9	260°07.7	-24°37.1	337°20.3	-16°47.6	291°39.1	-22°43.7
15	219°31.4	9°26.7	-17°38.8	275°09.5	-24°36.9	352°22.4	-16°47.7	306°41.5	-22°43.7
16	234°33.8	24°27.8	-17°39.6	290°11.4	-24°36.6	7°24.4	-16°47.8	321°44.0	-22°43.7
17	249°36.3	39°28.9	-17°40.4	305°13.2	-24°36.3	22°26.5	-16°47.9	336°46.4	-22°43.7
18	264°38.8	54°30.0	-17°41.2	320°15.1	-24°36.0	37°28.5	-16°48.0	351°48.8	-22°43.7
19	279°41.2	69°31.2	-17°42.0	335°16.9	-24°35.7	52°30.6	-16°48.1	6°51.2	-22°43.7
20	294°43.7	84°32.3	-17°42.8	350°18.7	-24°35.4	67°32.6	-16°48.3	21°53.7	-22°43.7
21	309°46.2	99°33.4	-17°43.6	5°20.6	-24°35.1	82°34.7	-16°48.4	36°56.1	-22°43.7
22	324°48.6	114°34.5	-17°44.4	20°22.4	-24°34.9	97°36.7	-16°48.5	51°58.5	-22°43.8
23	339°51.1	129°35.6	-17°45.3	35°24.3	-24°34.6	112°38.8	-16°48.6	67°00.9	-22°43.8
Mer.pass.:0:24:		v1.1 d-0.8 m-4.5		v1.9 d0.3 m-1.7		v2.1 d-0.1 m-1.7		v2.4 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.8	-42°12.2
Schedar	349°35.9	56°38.3
Diphda	348°51.9	-17°53.0
Achernar	335°23.7	-57°08.4
Hamal	327°56.5	23°32.9
Polaris	315°55.7	89°20.2
Akamar	315°15.4	-40°13.7
Menkar	314°11.1	4°09.7
Mirfak	308°35.0	49°55.3
Aldebaran	290°45.2	16°32.7
Rigel	281°08.6	-8°10.8
Capella	280°29.2	46°00.7
Bellatrix	278°28.2	6°21.9
Elnath	278°08.1	28°37.2
Alnilam	275°42.8	-1°11.4
Betelgeuse	270°57.5	7°24.6
Canopus	263°54.7	-52°42.1
Sirius	258°30.6	-16°44.2
Adara	255°09.9	-28°59.7
Procyon	244°56.1	5°10.8
Pollux	243°23.5	27°58.8
Avior	234°17.0	-59°33.9
Suhail	222°50.2	-43°30.3
Miaplacidus	221°39.7	-69°47.4
Alphard	217°52.9	-8°44.2
Regulus	207°40.0	11°52.7
Dubhe	193°48.0	61°39.1
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°12.1
Gacrux	171°57.5	-57°13.0
Alioth	166°18.1	55°51.8
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.6
Hadar	148°43.3	-60°27.7
Menkent	148°03.7	-36°27.6
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.3	-60°54.7
Zubenelg.	137°01.7	-16°06.9
Kochab	137°20.9	74°05.1
Alphecca	126°08.2	26°39.5
Antares	112°22.0	-26°28.2
Atria	107°20.6	-69°03.7
Sabik	102°08.5	-15°44.7
Shaula	96°17.1	-37°06.9
Rasalhague	96°03.2	12°33.2
Etamin	90°44.4	51°29.6
Kaus Aust.	83°39.0	-34°22.4
Vega	80°36.5	38°48.4
Nunki	75°53.8	-26°16.3
Altair	62°04.7	8°55.3
Peacock	53°13.3	-56°40.5
Deneb	49°28.7	45°21.1
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.2
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.1
Markab	13°34.5	15°18.4

2018/9/1	**SHA**	**Mer.pass**
Venus	151°24.9	14:26
Mars	56°14.3	20:45
Jupiter	133°16.5	15:37
Saturn	87°12.4	18:40

2018/9/1	**SHA**	**Mer.pass**
Venus	150°49.9	14:24
Mars	56°01.1	20:42
Jupiter	133°06.8	15:34
Saturn	87°11.6	18:37

2018/9/1	**SHA**	**Mer.pass**
Venus	150°16.0	14:22
Mars	55°47.2	20:39
Jupiter	132°57.1	15:30
Saturn	87°10.8	18:33

Horizontal paralax	
Venus:	0.3
Mars:	0.3

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°58.4	3°53.7	139°07.1	11.2	-7°45.5	-11.3	57.9
1	195°58.6	3°52.8	153°37.4	11.3	-7°56.7	-11.2	57.9
2	210°58.8	3°51.8	168°07.6	11.3	-8°07.9	-11.2	57.8
3	225°59.1	3°50.9	182°37.9	11.3	-8°19.1	-11.1	57.8
4	240°59.3	3°49.9	197°08.2	11.3	-8°30.2	-11.1	57.7
5	255°59.5	3°49.0	211°38.5	11.3	-8°41.2	-11.0	57.7
6	270°59.7	3°48.0	226°08.8	11.3	-8°52.1	-10.9	57.7
7	285°59.9	3°47.0	240°39.1	11.3	-9°03.1	-10.9	57.6
8	301°00.2	3°46.1	255°09.4	11.3	-9°13.9	-10.8	57.6
9	316°00.4	3°45.1	269°39.8	11.4	-9°24.7	-10.7	57.6
10	331°00.6	3°44.2	284°10.1	11.4	-9°35.4	-10.7	57.5
11	346°00.8	3°43.2	298°40.5	11.4	-9°46.0	-10.6	57.5
12	1°01.1	3°42.3	313°10.9	11.4	-9°56.6	-10.6	57.4
13	16°01.3	3°41.3	327°41.3	11.4	-10°07.2	-10.5	57.4
14	31°01.5	3°40.3	342°11.7	11.4	-10°17.6	-10.4	57.4
15	46°01.7	3°39.4	356°42.1	11.4	-10°28.0	-10.4	57.3
16	61°01.9	3°38.4	11°12.5	11.4	-10°38.3	-10.3	57.3
17	76°02.2	3°37.5	25°42.9	11.4	-10°48.6	-10.2	57.3
18	91°02.4	3°36.5	40°13.3	11.4	-10°58.8	-10.2	57.2
19	106°02.6	3°35.5	54°43.8	11.4	-11°08.9	-10.1	57.2
20	121°02.8	3°34.6	69°14.2	11.4	-11°19.0	-10.0	57.2
21	136°03.0	3°33.6	83°44.7	11.4	-11°28.9	-9.9	57.1
22	151°03.3	3°32.7	98°15.1	11.5	-11°38.8	-9.9	57.1
23	166°03.5	3°31.7	112°45.6	11.5	-11°48.7	-9.8	57.0
	SD.=15.9	d=-1.0	S.D.=15.8				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°03.7	3°30.8	127°16.0	11.5	-11°58.4	-9.7	57.0
1	196°03.9	3°29.8	141°46.5	11.5	-12°08.1	-9.7	57.0
2	211°04.2	3°28.8	156°17.0	11.5	-12°17.7	-9.6	56.9
3	226°04.4	3°27.9	170°47.4	11.5	-12°27.3	-9.5	56.9
4	241°04.6	3°26.9	185°17.9	11.5	-12°36.7	-9.4	56.9
5	256°04.8	3°26.0	199°48.4	11.5	-12°46.1	-9.4	56.8
6	271°05.0	3°25.0	214°18.9	11.5	-12°55.5	-9.3	56.8
7	286°05.3	3°24.0	228°49.4	11.5	-13°04.7	-9.2	56.8
8	301°05.5	3°23.1	243°19.9	11.5	-13°13.8	-9.1	56.7
9	316°05.7	3°22.1	257°50.3	11.5	-13°22.9	-9.0	56.7
10	331°05.9	3°21.2	272°20.8	11.5	-13°31.9	-9.0	56.7
11	346°06.1	3°20.2	286°51.3	11.5	-13°40.9	-8.9	56.6
12	1°06.4	3°19.2	301°21.8	11.5	-13°49.7	-8.8	56.6
13	16°06.6	3°18.3	315°52.3	11.5	-13°58.5	-8.7	56.6
14	31°06.8	3°17.3	330°22.8	11.5	-14°07.1	-8.6	56.5
15	46°07.0	3°16.4	344°53.3	11.5	-14°15.7	-8.6	56.5
16	61°07.3	3°15.4	359°23.8	11.5	-14°24.3	-8.5	56.4
17	76°07.5	3°14.4	13°54.3	11.5	-14°32.7	-8.4	56.4
18	91°07.7	3°13.5	28°24.8	11.5	-14°41.1	-8.3	56.4
19	106°07.9	3°12.5	42°55.3	11.5	-14°49.3	-8.2	56.3
20	121°08.1	3°11.6	57°25.8	11.5	-14°57.5	-8.1	56.3
21	136°08.4	3°10.6	71°56.3	11.5	-15°05.6	-8.1	56.3
22	151°08.6	3°09.6	86°26.8	11.5	-15°13.6	-8.0	56.2
23	166°08.8	3°08.7	100°57.3	11.5	-15°21.6	-7.9	56.2
	SD.=15.9	d=-1.0	S.D.=15.6				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°09.0	3°07.7	115°27.8	11.5	-15°29.4	-7.8	56.2
1	196°09.3	3°06.8	129°58.3	11.5	-15°37.2	-7.7	56.2
2	211°09.5	3°05.8	144°28.7	11.5	-15°44.9	-7.6	56.1
3	226°09.7	3°04.8	158°59.2	11.5	-15°52.5	-7.5	56.1
4	241°09.9	3°03.9	173°29.7	11.5	-15°60.0	-7.5	56.1
5	256°10.2	3°02.9	188°00.2	11.5	-16°07.4	-7.4	56.0
6	271°10.4	3°02.0	202°30.7	11.5	-16°14.7	-7.3	56.0
7	286°10.6	3°01.0	217°01.2	11.5	-16°21.9	-7.2	56.0
8	301°10.8	3°00.0	231°31.6	11.5	-16°29.1	-7.1	55.9
9	316°11.0	2°59.1	246°02.1	11.5	-16°36.2	-7.0	55.9
10	331°11.3	2°58.1	260°32.6	11.5	-16°43.1	-6.9	55.9
11	346°11.5	2°57.1	275°03.1	11.5	-16°50.0	-6.8	55.8
12	1°11.7	2°56.2	289°33.5	11.5	-16°56.8	-6.7	55.8
13	16°11.9	2°55.2	304°04.0	11.5	-17°03.5	-6.7	55.8
14	31°12.2	2°54.3	318°34.4	11.5	-17°10.1	-6.6	55.7
15	46°12.4	2°53.3	333°04.9	11.5	-17°16.6	-6.5	55.7
16	61°12.6	2°52.3	347°35.4	11.5	-17°23.1	-6.4	55.7
17	76°12.8	2°51.4	2°05.8	11.5	-17°29.4	-6.3	55.7
18	91°13.0	2°50.4	16°36.3	11.5	-17°35.6	-6.2	55.6
19	106°13.3	2°49.4	31°06.7	11.4	-17°41.8	-6.1	55.6
20	121°13.5	2°48.5	45°37.2	11.4	-17°47.9	-6.0	55.6
21	136°13.7	2°47.5	60°07.6	11.4	-17°53.8	-5.9	55.5
22	151°13.9	2°46.6	74°38.0	11.4	-17°59.7	-5.8	55.5
23	166°14.2	2°45.6	89°08.5	11.4	-18°05.5	-5.7	55.5
	SD.=15.9	d=-1.0	S.D.=15.3				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	01:58	03:49	05:02	18:46	19:58	21:46
70	02:32	04:03	05:08	18:41	19:45	21:14
68	02:56	04:14	05:13	18:36	19:34	20:51
66	03:14	04:23	05:16	18:33	19:26	20:34
64	03:29	04:31	05:20	18:30	19:18	20:20
62	03:40	04:37	05:23	18:27	19:12	20:08
60	03:50	04:43	05:25	18:25	19:07	19:59
58	03:58	04:47	05:27	18:22	19:02	19:51
56	04:06	04:52	05:29	18:21	18:58	19:44
54	04:12	04:55	05:31	18:19	18:55	19:38
52	04:18	04:59	05:33	18:17	18:51	19:32
50	04:22	05:01	05:34	18:16	18:49	19:27
45	04:33	05:08	05:37	18:13	18:43	19:18
40	04:40	05:13	05:40	18:11	18:38	19:10
35	04:47	05:17	05:42	18:09	18:34	19:04
30	04:52	05:20	05:44	18:07	18:31	18:59
20	04:59	05:25	05:47	18:04	18:26	18:51
10	05:04	05:29	05:50	18:01	18:22	18:47
0	05:08	05:32	05:52	17:59	18:20	18:44
-10	05:09	05:34	05:55	17:57	18:18	18:42
-20	05:10	05:35	05:57	17:54	18:16	18:42
-30	05:08	05:36	05:60	17:52	18:16	18:43
-35	05:07	05:36	06:01	17:50	18:16	18:45
-40	05:04	05:36	06:03	17:49	18:16	18:47
-45	05:01	05:35	06:05	17:47	18:17	18:51
-50	04:57	05:35	06:07	17:45	18:17	18:55
-52	04:55	05:34	06:08	17:44	18:18	18:57
-54	04:53	05:34	06:09	17:43	18:19	18:60
-56	04:50	05:33	06:10	17:42	18:19	19:03
-58	04:47	05:32	06:11	17:41	18:20	19:06
-60	04:43	05:31	06:13	17:40	18:21	19:10

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	11:17	13:21	15:52	18:50	18:28	17:39
70	10:60	12:50	14:44	19:08	18:60	18:48
68	10:47	12:28	14:08	19:23	19:23	19:25
66	10:36	12:11	13:42	19:35	19:41	19:51
64	10:27	11:57	13:22	19:45	19:56	20:12
62	10:20	11:45	13:06	19:53	20:09	20:28
60	10:13	11:35	12:53	20:01	20:19	20:42
58	10:07	11:27	12:41	20:07	20:28	20:54
56	10:02	11:19	12:32	20:13	20:37	21:04
54	09:58	11:12	12:23	20:19	20:44	21:13
52	09:54	11:06	12:15	20:23	20:50	21:22
50	09:50	11:01	12:08	20:28	20:56	21:29
45	09:42	10:49	11:53	20:37	21:09	21:45
40	09:36	10:40	11:41	20:45	21:20	21:58
35	09:30	10:31	11:30	20:51	21:29	22:09
30	09:25	10:24	11:21	20:57	21:37	22:18
20	09:16	10:12	11:06	21:08	21:51	22:35
10	09:09	10:01	10:52	21:17	22:03	22:49
0	09:02	09:51	10:40	21:25	22:14	23:03
-10	08:55	09:41	10:27	21:34	22:26	23:17
-20	08:48	09:30	10:14	21:43	22:38	23:31
-30	08:39	09:18	09:58	21:53	22:52	23:48
-35	08:35	09:11	09:50	21:60	22:60	23:58
-40	08:29	09:03	09:40	22:06	23:09	–:–
-45	08:23	08:54	09:28	22:14	23:20	–:–
-50	08:16	08:43	09:14	22:24	23:33	–:–
-52	08:12	08:38	09:07	22:29	23:40	–:–
-54	08:09	08:33	08:60	22:34	23:46	–:–
-56	08:05	08:26	08:52	22:39	23:54	–:–
-58	08:00	08:20	08:43	22:45	–:–	00:03
-60	07:55	08:12	08:32	22:52	–:–	00:12

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
13	03:54	04:04	11:55	15:13	02:49	4(18%)
14	04:15	04:25	11:55	16:02	03:38	5(26%)
15	04:36	04:47	11:55	16:51	04:26	6(36%)

September 16, 17 ,18 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	354°53.6	144°36.7	-17°46.1	50°26.1	-24°34.3	127°40.8	-16°48.7	82°03.4	-22°43.8
1	9°56.0	159°37.8	-17°46.9	65°28.0	-24°34.0	142°42.9	-16°48.9	97°05.8	-22°43.8
2	24°58.5	174°39.0	-17°47.7	80°29.8	-24°33.7	157°44.9	-16°49.0	112°08.2	-22°43.8
3	40°00.9	189°40.1	-17°48.5	95°31.6	-24°33.4	172°47.0	-16°49.1	127°10.6	-22°43.8
4	55°03.4	204°41.2	-17°49.3	110°33.5	-24°33.1	187°49.0	-16°49.2	142°13.0	-22°43.8
5	70°05.9	219°42.3	-17°50.1	125°35.3	-24°32.8	202°51.1	-16°49.3	157°15.5	-22°43.8
6	85°08.3	234°43.5	-17°50.9	140°37.1	-24°32.6	217°53.1	-16°49.5	172°17.9	-22°43.8
7	100°10.8	249°44.6	-17°51.7	155°39.0	-24°32.3	232°55.2	-16°49.6	187°20.3	-22°43.8
8	115°13.3	264°45.7	-17°52.5	170°40.8	-24°32.0	247°57.3	-16°49.7	202°22.7	-22°43.8
9	130°15.7	279°46.9	-17°53.3	185°42.6	-24°31.7	262°59.3	-16°49.8	217°25.1	-22°43.8
10	145°18.2	294°48.0	-17°54.1	200°44.4	-24°31.4	278°01.4	-16°49.9	232°27.6	-22°43.8
11	160°20.7	309°49.1	-17°54.9	215°46.3	-24°31.1	293°03.4	-16°50.0	247°30.0	-22°43.8
12	175°23.1	324°50.3	-17°55.7	230°48.1	-24°30.8	308°05.5	-16°50.2	262°32.4	-22°43.8
13	190°25.6	339°51.4	-17°56.5	245°49.9	-24°30.5	323°07.5	-16°50.3	277°34.8	-22°43.8
14	205°28.1	354°52.6	-17°57.3	260°51.7	-24°30.2	338°09.6	-16°50.4	292°37.2	-22°43.8
15	220°30.5	9°53.7	-17°58.1	275°53.6	-24°29.9	353°11.6	-16°50.5	307°39.7	-22°43.8
16	235°33.0	24°54.9	-17°58.9	290°55.4	-24°29.6	8°13.7	-16°50.6	322°42.1	-22°43.8
17	250°35.4	39°56.0	-17°59.6	305°57.2	-24°29.4	23°15.7	-16°50.8	337°44.5	-22°43.9
18	265°37.9	54°57.2	-18°00.4	320°59.0	-24°29.1	38°17.8	-16°50.9	352°46.9	-22°43.9
19	280°40.4	69°58.3	-18°01.2	336°00.8	-24°28.8	53°19.8	-16°51.0	7°49.3	-22°43.9
20	295°42.8	84°59.5	-18°02.0	351°02.7	-24°28.5	68°21.8	-16°51.1	22°51.7	-22°43.9
21	310°45.3	100°00.6	-18°02.8	6°04.5	-24°28.2	83°23.9	-16°51.2	37°54.2	-22°43.9
22	325°47.8	115°01.8	-18°03.6	21°06.3	-24°27.9	98°25.9	-16°51.4	52°56.6	-22°43.9
23	340°50.2	130°03.0	-18°04.4	36°08.1	-24°27.6	113°28.0	-16°51.5	67°59.0	-22°43.9
Mer.pass.:0:20:		v1.1 d-0.8 m-4.5		v1.8 d0.3 m-1.7		v2.1 d-0.1 m-1.7		v2.4 d-0.0 m0.4	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	355°52.7	145°04.1	-18°05.2	51°09.9	-24°27.3	128°30.0	-16°51.6	83°01.4	-22°43.9
1	10°55.2	160°05.3	-18°05.9	66°11.7	-24°27.0	143°32.1	-16°51.7	98°03.8	-22°43.9
2	25°57.6	175°06.5	-18°06.7	81°13.5	-24°26.7	158°34.1	-16°51.8	113°06.3	-22°43.9
3	41°00.1	190°07.6	-18°07.5	96°15.3	-24°26.4	173°36.2	-16°51.9	128°08.7	-22°43.9
4	56°02.5	205°08.8	-18°08.3	111°17.1	-24°26.1	188°38.2	-16°52.1	143°11.1	-22°43.9
5	71°05.0	220°10.0	-18°09.1	126°19.0	-24°25.8	203°40.3	-16°52.2	158°13.5	-22°43.9
6	86°07.5	235°11.2	-18°09.9	141°20.8	-24°25.5	218°42.3	-16°52.3	173°15.9	-22°43.9
7	101°09.9	250°12.4	-18°10.6	156°22.6	-24°25.2	233°44.4	-16°52.4	188°18.3	-22°43.9
8	116°12.4	265°13.5	-18°11.4	171°24.4	-24°24.9	248°46.4	-16°52.5	203°20.8	-22°43.9
9	131°14.9	280°14.7	-18°12.2	186°26.2	-24°24.6	263°48.5	-16°52.7	218°23.2	-22°43.9
10	146°17.3	295°15.9	-18°13.0	201°28.0	-24°24.3	278°50.5	-16°52.8	233°25.6	-22°43.9
11	161°19.8	310°17.1	-18°13.7	216°29.8	-24°24.0	293°52.6	-16°52.9	248°28.0	-22°43.9
12	176°22.3	325°18.3	-18°14.5	231°31.6	-24°23.7	308°54.6	-16°53.0	263°30.4	-22°43.9
13	191°24.7	340°19.5	-18°15.3	246°33.4	-24°23.5	323°56.7	-16°53.1	278°32.8	-22°44.0
14	206°27.2	355°20.7	-18°16.1	261°35.2	-24°23.2	338°58.7	-16°53.3	293°35.2	-22°44.0
15	221°29.7	10°21.9	-18°16.8	276°36.9	-24°22.9	354°00.7	-16°53.4	308°37.7	-22°44.0
16	236°32.1	25°23.1	-18°17.6	291°38.7	-24°22.6	9°02.8	-16°53.5	323°40.1	-22°44.0
17	251°34.6	40°24.3	-18°18.4	306°40.5	-24°22.3	24°04.8	-16°53.6	338°42.5	-22°44.0
18	266°37.0	55°25.5	-18°19.1	321°42.3	-24°22.0	39°06.9	-16°53.7	353°44.9	-22°44.0
19	281°39.5	70°26.7	-18°19.9	336°44.1	-24°21.7	54°08.9	-16°53.9	8°47.3	-22°44.0
20	296°42.0	85°27.9	-18°20.7	351°45.9	-24°21.4	69°11.0	-16°54.0	23°49.7	-22°44.0
21	311°44.4	100°29.1	-18°21.4	6°47.7	-24°21.1	84°13.0	-16°54.1	38°52.1	-22°44.0
22	326°46.9	115°30.3	-18°22.2	21°49.5	-24°20.8	99°15.1	-16°54.2	53°54.6	-22°44.0
23	341°49.4	130°31.5	-18°23.0	36°51.3	-24°20.5	114°17.1	-16°54.3	68°57.0	-22°44.0
Mer.pass.:0:16:		v1.2 d-0.8 m-4.5		v1.8 d0.3 m-1.7		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.4	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	356°51.8	145°32.7	-18°23.7	51°53.0	-24°20.2	129°19.1	-16°54.5	83°59.4	-22°44.0
1	11°54.3	160°34.0	-18°24.5	66°54.8	-24°19.9	144°21.2	-16°54.6	99°01.8	-22°44.0
2	26°56.8	175°35.2	-18°25.2	81°56.6	-24°19.5	159°23.2	-16°54.7	114°04.2	-22°44.0
3	41°59.2	190°36.4	-18°26.0	96°58.4	-24°19.2	174°25.3	-16°54.8	129°06.6	-22°44.0
4	57°01.7	205°37.6	-18°26.8	112°00.2	-24°18.9	189°27.3	-16°54.9	144°09.0	-22°44.0
5	72°04.2	220°38.8	-18°27.5	127°01.9	-24°18.6	204°29.4	-16°55.1	159°11.4	-22°44.0
6	87°06.6	235°40.1	-18°28.3	142°03.7	-24°18.3	219°31.4	-16°55.2	174°13.9	-22°44.0
7	102°09.1	250°41.3	-18°29.0	157°05.5	-24°18.0	234°33.4	-16°55.3	189°16.3	-22°44.0
8	117°11.5	265°42.5	-18°29.8	172°07.3	-24°17.7	249°35.5	-16°55.4	204°18.7	-22°44.1
9	132°14.0	280°43.8	-18°30.5	187°09.0	-24°17.4	264°37.5	-16°55.5	219°21.1	-22°44.1
10	147°16.5	295°45.0	-18°31.3	202°10.8	-24°17.1	279°39.6	-16°55.7	234°23.5	-22°44.1
11	162°18.9	310°46.2	-18°32.0	217°12.6	-24°16.8	294°41.6	-16°55.8	249°25.9	-22°44.1
12	177°21.4	325°47.5	-18°32.8	232°14.3	-24°16.5	309°43.7	-16°55.9	264°28.3	-22°44.1
13	192°23.9	340°48.7	-18°33.5	247°16.1	-24°16.2	324°45.7	-16°56.0	279°30.7	-22°44.1
14	207°26.3	355°50.0	-18°34.3	262°17.9	-24°15.9	339°47.7	-16°56.1	294°33.1	-22°44.1
15	222°28.8	10°51.2	-18°35.0	277°19.6	-24°15.6	354°49.8	-16°56.3	309°35.6	-22°44.1
16	237°31.3	25°52.5	-18°35.8	292°21.4	-24°15.3	9°51.8	-16°56.4	324°38.0	-22°44.1
17	252°33.7	40°53.7	-18°36.5	307°23.2	-24°15.0	24°53.9	-16°56.5	339°40.4	-22°44.1
18	267°36.2	55°55.0	-18°37.3	322°24.9	-24°14.7	39°55.9	-16°56.6	354°42.8	-22°44.1
19	282°38.7	70°56.2	-18°38.0	337°26.7	-24°14.4	54°57.9	-16°56.7	9°45.2	-22°44.1
20	297°41.1	85°57.5	-18°38.8	352°28.5	-24°14.1	69°60.0	-16°56.9	24°47.6	-22°44.1
21	312°43.6	100°58.8	-18°39.5	7°30.2	-24°13.8	85°02.0	-16°57.0	39°50.0	-22°44.1
22	327°46.0	116°00.0	-18°40.2	22°32.0	-24°13.5	100°04.1	-16°57.1	54°52.4	-22°44.1
23	342°48.5	131°01.3	-18°41.0	37°33.7	-24°13.1	115°06.1	-16°57.2	69°54.8	-22°44.1
Mer.pass.:0:12:		v1.2 d-0.8 m-4.5		v1.8 d0.3 m-1.7		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.8	-42°12.2
Schedar	349°35.9	56°38.3
Diphda	348°51.9	-17°53.0
Achernar	335°23.6	-57°08.4
Hamal	327°56.5	23°33.0
Polaris	315°54.3	89°20.2
Akamar	315°15.4	-40°13.7
Menkar	314°11.1	4°09.7
Mirfak	308°35.0	49°55.3
Aldebaran	290°45.2	16°32.7
Rigel	281°08.6	-8°10.8
Capella	280°29.2	46°00.8
Bellatrix	278°28.2	6°21.9
Elnath	278°08.1	28°37.2
Alnilam	275°42.8	-1°11.4
Betelgeuse	270°57.5	7°24.6
Canopus	263°54.7	-52°42.1
Sirius	258°30.6	-16°44.2
Adara	255°09.8	-28°59.7
Procyon	244°56.1	5°10.8
Pollux	243°23.5	27°58.8
Avior	234°17.0	-59°33.9
Suhail	222°50.2	-43°30.3
Miaplacidus	221°39.7	-69°47.4
Alphard	217°52.9	-8°44.2
Regulus	207°40.0	11°52.7
Dubhe	193°48.0	61°39.1
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°12.0
Gacrux	171°57.5	-57°12.9
Alioth	166°18.2	55°51.8
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.6
Hadar	148°43.3	-60°27.7
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.3	-60°54.7
Zubenelg.	137°01.7	-16°06.9
Kochab	137°20.9	74°05.1
Alphecca	126°08.2	26°39.5
Antares	112°22.0	-26°28.2
Atria	107°20.7	-69°03.7
Sabik	102°08.5	-15°44.7
Shaula	96°17.1	-37°06.9
Rasalhague	96°03.2	12°33.2
Etamin	90°44.4	51°29.6
Kaus Aust.	83°39.0	-34°22.4
Vega	80°36.5	38°48.4
Nunki	75°53.8	-26°16.3
Altair	62°04.7	8°55.3
Peacock	53°13.3	-56°40.5
Deneb	49°28.7	45°21.1
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.2
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.1
Markab	13°34.5	15°18.4

2018/9/1	**SHA**	**Mer.pass**
Venus	149°43.2	14:20
Mars	55°32.6	20:36
Jupiter	132°47.3	15:27
Saturn	87°09.8	18:29

2018/9/1	**SHA**	**Mer.pass**
Venus	149°11.4	14:19
Mars	55°17.2	20:33
Jupiter	132°37.3	15:24
Saturn	87°08.7	18:25

2018/9/1	**SHA**	**Mer.pass**
Venus	148°40.9	14:17
Mars	55°01.2	20:30
Jupiter	132°27.3	15:21
Saturn	87°07.5	18:21

Horizontal paralax	
Venus:	0.3
Mars:	0.3

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	181°14.4	2°44.6	103°38.9	11.4	-18°11.2	-5.6	55.5
1	196°14.6	2°43.7	118°09.4	11.4	-18°16.8	-5.5	55.4
2	211°14.8	2°42.7	132°39.8	11.4	-18°22.2	-5.4	55.4
3	226°15.1	2°41.7	147°10.2	11.4	-18°27.7	-5.4	55.4
4	241°15.3	2°40.8	161°40.6	11.4	-18°33.0	-5.3	55.4
5	256°15.5	2°39.8	176°11.1	11.4	-18°38.2	-5.2	55.3
6	271°15.7	2°38.8	190°41.5	11.4	-18°43.3	-5.1	55.3
7	286°15.9	2°37.9	205°11.9	11.4	-18°48.3	-5.0	55.3
8	301°16.2	2°36.9	219°42.3	11.4	-18°53.2	-4.9	55.3
9	316°16.4	2°36.0	234°12.8	11.4	-18°58.1	-4.8	55.2
10	331°16.6	2°35.0	248°43.2	11.4	-19°02.8	-4.7	55.2
11	346°16.8	2°34.0	263°13.6	11.4	-19°07.4	-4.6	55.2
12	1°17.1	2°33.1	277°44.0	11.4	-19°12.0	-4.5	55.2
13	16°17.3	2°32.1	292°14.4	11.4	-19°16.4	-4.4	55.1
14	31°17.5	2°31.1	306°44.8	11.4	-19°20.8	-4.3	55.1
15	46°17.7	2°30.2	321°15.3	11.4	-19°25.0	-4.2	55.1
16	61°18.0	2°29.2	335°45.7	11.4	-19°29.2	-4.1	55.1
17	76°18.2	2°28.2	350°16.1	11.4	-19°33.2	-4.0	55.0
18	91°18.4	2°27.3	4°46.5	11.4	-19°37.2	-3.9	55.0
19	106°18.6	2°26.3	19°16.9	11.4	-19°41.1	-3.8	55.0
20	121°18.8	2°25.3	33°47.3	11.4	-19°44.8	-3.7	55.0
21	136°19.1	2°24.4	48°17.7	11.4	-19°48.5	-3.6	55.0
22	151°19.3	2°23.4	62°48.2	11.4	-19°52.0	-3.5	54.9
23	166°19.5	2°22.4	77°18.6	11.4	-19°55.5	-3.4	54.9
	SD.=15.9	d=-1.0			S.D.=15.1		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	181°19.7	2°21.5	91°49.0	11.4	-19°58.9	-3.3	54.9
1	196°20.0	2°20.5	106°19.4	11.4	-20°02.2	-3.2	54.9
2	211°20.2	2°19.5	120°49.8	11.4	-20°05.3	-3.1	54.9
3	226°20.4	2°18.6	135°20.2	11.4	-20°08.4	-3.0	54.8
4	241°20.6	2°17.6	149°50.7	11.4	-20°11.4	-2.9	54.8
5	256°20.9	2°16.7	164°21.1	11.4	-20°14.3	-2.8	54.8
6	271°21.1	2°15.7	178°51.5	11.4	-20°17.0	-2.7	54.8
7	286°21.3	2°14.7	193°22.0	11.4	-20°19.7	-2.6	54.8
8	301°21.5	2°13.8	207°52.4	11.4	-20°22.3	-2.5	54.7
9	316°21.7	2°12.8	222°22.8	11.4	-20°24.8	-2.4	54.7
10	331°22.0	2°11.8	236°53.3	11.4	-20°27.2	-2.3	54.7
11	346°22.2	2°10.9	251°23.7	11.4	-20°29.4	-2.2	54.7
12	1°22.4	2°09.9	265°54.2	11.5	-20°31.6	-2.1	54.7
13	16°22.6	2°08.9	280°24.6	11.5	-20°33.7	-2.0	54.7
14	31°22.9	2°08.0	294°55.1	11.5	-20°35.7	-1.9	54.6
15	46°23.1	2°07.0	309°25.6	11.5	-20°37.6	-1.8	54.6
16	61°23.3	2°06.0	323°56.0	11.5	-20°39.4	-1.7	54.6
17	76°23.5	2°05.1	338°26.5	11.5	-20°41.1	-1.6	54.6
18	91°23.8	2°04.1	352°57.0	11.5	-20°42.6	-1.5	54.6
19	106°24.0	2°03.1	7°27.5	11.5	-20°44.1	-1.4	54.6
20	121°24.2	2°02.2	21°58.0	11.5	-20°45.5	-1.3	54.5
21	136°24.4	2°01.2	36°28.5	11.5	-20°46.8	-1.2	54.5
22	151°24.7	2°00.2	50°59.0	11.5	-20°48.0	-1.1	54.5
23	166°24.9	1°59.3	65°29.5	11.5	-20°49.1	-1.0	54.5
	SD.=15.9	d=-1.0			S.D.=15.0		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	181°25.1	1°58.3	80°00.0	11.5	-20°50.1	-0.9	54.5
1	196°25.3	1°57.3	94°30.6	11.5	-20°51.0	-0.8	54.5
2	211°25.5	1°56.4	109°01.1	11.5	-20°51.8	-0.7	54.5
3	226°25.8	1°55.4	123°31.7	11.6	-20°52.5	-0.6	54.4
4	241°26.0	1°54.4	138°02.2	11.6	-20°53.1	-0.5	54.4
5	256°26.2	1°53.5	152°32.8	11.6	-20°53.6	-0.4	54.4
6	271°26.4	1°52.5	167°03.4	11.6	-20°54.0	-0.3	54.4
7	286°26.7	1°51.5	181°34.0	11.6	-20°54.3	-0.3	54.4
8	301°26.9	1°50.5	196°04.6	11.6	-20°54.5	-0.2	54.4
9	316°27.1	1°49.6	210°35.2	11.6	-20°54.6	-0.1	54.4
10	331°27.3	1°48.6	225°05.8	11.6	-20°54.6	0.0	54.4
11	346°27.6	1°47.6	239°36.4	11.6	-20°54.5	0.1	54.4
12	1°27.8	1°46.7	254°07.1	11.7	-20°54.3	0.2	54.3
13	16°28.0	1°45.7	268°37.7	11.7	-20°54.0	0.3	54.3
14	31°28.2	1°44.7	283°08.4	11.7	-20°53.6	0.4	54.3
15	46°28.5	1°43.8	297°39.1	11.7	-20°53.1	0.5	54.3
16	61°28.7	1°42.8	312°09.8	11.7	-20°52.5	0.6	54.3
17	76°28.9	1°41.8	326°40.5	11.7	-20°51.9	0.7	54.3
18	91°29.1	1°40.9	341°11.2	11.7	-20°51.1	0.8	54.3
19	106°29.3	1°39.9	355°42.0	11.7	-20°50.2	0.9	54.3
20	121°29.6	1°38.9	10°12.7	11.8	-20°49.2	1.0	54.3
21	136°29.8	1°38.0	24°43.5	11.8	-20°48.2	1.1	54.3
22	151°30.0	1°37.0	39°14.3	11.8	-20°47.0	1.2	54.3
23	166°30.2	1°36.0	53°45.0	11.8	-20°45.7	1.3	54.2
	SD.=15.9	d=-1.0			S.D.=14.9		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	02:23	04:05	05:16	18:31	19:41	21:20
70	02:51	04:16	05:20	18:27	19:30	20:54
68	03:11	04:26	05:23	18:24	19:21	20:34
66	03:27	04:33	05:26	18:21	19:13	20:19
64	03:39	04:40	05:28	18:19	19:07	20:07
62	03:50	04:45	05:30	18:17	19:02	19:57
60	03:58	04:50	05:32	18:15	18:57	19:49
58	04:06	04:54	05:34	18:14	18:53	19:41
56	04:12	04:58	05:35	18:13	18:50	19:35
54	04:18	05:01	05:36	18:11	18:47	19:29
52	04:23	05:04	05:38	18:10	18:44	19:25
50	04:27	05:06	05:39	18:09	18:42	19:20
45	04:37	05:11	05:41	18:07	18:37	19:11
40	04:44	05:15	05:43	18:06	18:33	19:05
35	04:49	05:19	05:44	18:04	18:30	18:59
30	04:54	05:22	05:46	18:03	18:27	18:55
20	05:00	05:26	05:48	18:01	18:23	18:49
10	05:04	05:29	05:50	17:59	18:20	18:45
0	05:07	05:31	05:51	17:58	18:18	18:42
-10	05:07	05:32	05:53	17:56	18:17	18:42
-20	05:07	05:32	05:54	17:55	18:17	18:42
-30	05:04	05:32	05:56	17:53	18:17	18:45
-35	05:02	05:32	05:57	17:53	18:18	18:47
-40	04:59	05:31	05:58	17:52	18:19	18:50
-45	04:56	05:30	05:59	17:51	18:20	18:54
-50	04:50	05:28	06:00	17:50	18:22	18:60
-52	04:48	05:27	06:01	17:49	18:23	19:02
-54	04:45	05:26	06:01	17:49	18:24	19:05
-56	04:42	05:25	06:02	17:48	18:25	19:09
-58	04:38	05:24	06:03	17:47	18:27	19:13
-60	04:33	05:22	06:04	17:47	18:28	19:17

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	–:–	–:–	–:–	–:–	–:–
70	16:54	–:–	–:–	18:20	–:–	–:–
68	15:43	17:06	18:00	19:31	19:50	20:37
66	15:06	16:18	17:11	20:08	20:38	21:26
64	14:41	15:48	16:40	20:35	21:09	21:57
62	14:20	15:25	16:16	20:55	21:32	22:20
60	14:04	15:06	15:58	21:12	21:50	22:39
58	13:50	14:51	15:42	21:26	22:06	22:54
56	13:38	14:38	15:29	21:38	22:19	23:08
54	13:28	14:27	15:17	21:48	22:30	23:19
52	13:19	14:17	15:07	21:58	22:40	23:29
50	13:11	14:08	14:58	22:06	22:49	23:38
45	12:53	13:49	14:39	22:24	23:08	23:57
40	12:39	13:33	14:23	22:39	23:24	–:–
35	12:27	13:20	14:10	22:51	23:37	–:–
30	12:17	13:09	13:59	23:02	23:48	–:–
20	11:59	12:50	13:39	23:21	–:–	00:08
10	11:43	12:33	13:22	23:37	–:–	00:25
0	11:28	12:17	13:06	23:52	–:–	00:41
-10	11:14	12:02	12:50	–:–	00:07	00:57
-20	10:59	11:45	12:33	–:–	00:24	01:14
-30	10:41	11:26	12:13	–:–	00:42	01:33
-35	10:31	11:15	12:02	–:–	00:53	01:45
-40	10:19	11:02	11:49	00:09	01:06	01:58
-45	10:05	10:47	11:33	00:22	01:20	02:13
-50	09:48	10:28	11:14	00:38	01:39	02:32
-52	09:41	10:20	11:05	00:46	01:47	02:41
-54	09:32	10:10	10:55	00:54	01:57	02:51
-56	09:22	09:59	10:44	01:04	02:07	03:03
-58	09:11	09:46	10:31	01:15	02:20	03:16
-60	08:58	09:32	10:15	01:27	02:34	03:31

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
16	04:57	05:08	11:54	17:40	05:15	7(46%)
17	05:19	05:30	11:54	18:29	06:04	8(55%)
18	05:40	05:51	11:54	19:17	06:53	9(65%)

September 19, 20 ,21 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	357°51.0	146°02.6	-18°41.7	52°35.5	-24°12.8	130°08.1	-16°57.3	84°57.2	-22°44.1
1	12°53.4	161°03.8	-18°42.4	67°37.2	-24°12.5	145°10.2	-16°57.5	99°59.6	-22°44.1
2	27°55.9	176°05.1	-18°43.2	82°39.0	-24°12.2	160°12.2	-16°57.6	115°02.1	-22°44.1
3	42°58.4	191°06.4	-18°43.9	97°40.8	-24°11.9	175°14.3	-16°57.7	130°04.5	-22°44.1
4	58°00.8	206°07.7	-18°44.7	112°42.5	-24°11.6	190°16.3	-16°57.8	145°06.9	-22°44.2
5	73°03.3	221°08.9	-18°45.4	127°44.3	-24°11.3	205°18.3	-16°57.9	160°09.3	-22°44.2
6	88°05.8	236°10.2	-18°46.1	142°46.0	-24°11.0	220°20.4	-16°58.1	175°11.7	-22°44.2
7	103°08.2	251°11.5	-18°46.9	157°47.8	-24°10.7	235°22.4	-16°58.2	190°14.1	-22°44.2
8	118°10.7	266°12.8	-18°47.6	172°49.5	-24°10.4	250°24.5	-16°58.3	205°16.5	-22°44.2
9	133°13.1	281°14.1	-18°48.3	187°51.2	-24°10.1	265°26.5	-16°58.4	220°18.9	-22°44.2
10	148°15.6	296°15.4	-18°49.0	202°53.0	-24°09.7	280°28.5	-16°58.5	235°21.3	-22°44.2
11	163°18.1	311°16.7	-18°49.8	217°54.7	-24°09.4	295°30.6	-16°58.7	250°23.7	-22°44.2
12	178°20.5	326°18.0	-18°50.5	232°56.5	-24°09.1	310°32.6	-16°58.8	265°26.1	-22°44.2
13	193°23.0	341°19.3	-18°51.2	247°58.2	-24°08.8	325°34.6	-16°58.9	280°28.5	-22°44.2
14	208°25.5	356°20.6	-18°51.9	262°60.0	-24°08.5	340°36.7	-16°59.0	295°30.9	-22°44.2
15	223°27.9	11°21.9	-18°52.7	278°01.7	-24°08.2	355°38.7	-16°59.1	310°33.3	-22°44.2
16	238°30.4	26°23.2	-18°53.4	293°03.4	-24°07.9	10°40.8	-16°59.3	325°35.8	-22°44.2
17	253°32.9	41°24.5	-18°54.1	308°05.2	-24°07.6	25°42.8	-16°59.4	340°38.2	-22°44.2
18	268°35.3	56°25.8	-18°54.8	323°06.9	-24°07.2	40°44.8	-16°59.5	355°40.6	-22°44.2
19	283°37.8	71°27.1	-18°55.5	338°08.6	-24°06.9	55°46.9	-16°59.6	10°43.0	-22°44.2
20	298°40.3	86°28.4	-18°56.3	353°10.4	-24°06.6	70°48.9	-16°59.7	25°45.4	-22°44.2
21	313°42.7	101°29.7	-18°57.0	8°12.1	-24°06.3	85°50.9	-16°59.9	40°47.8	-22°44.2
22	328°45.2	116°31.0	-18°57.7	23°13.8	-24°06.0	100°53.0	-16°60.0	55°50.2	-22°44.2
23	343°47.6	131°32.4	-18°58.4	38°15.6	-24°05.7	115°55.0	-17°00.1	70°52.6	-22°44.2
Mer.pass.:0:08:		v1.3 d-0.7 m-4.5		v1.8 d0.3 m-1.6		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	358°50.1	146°33.7	-18°59.1	53°17.3	-24°05.4	130°57.0	-17°00.2	85°55.0	-22°44.3
1	13°52.6	161°35.0	-18°59.8	68°19.0	-24°05.0	145°59.1	-17°00.4	100°57.4	-22°44.3
2	28°55.0	176°36.3	-19°00.5	83°20.8	-24°04.7	161°01.1	-17°00.5	115°59.8	-22°44.3
3	43°57.5	191°37.7	-19°01.3	98°22.5	-24°04.4	176°03.1	-17°00.6	131°02.2	-22°44.3
4	58°60.0	206°39.0	-19°02.0	113°24.2	-24°04.1	191°05.2	-17°00.7	146°04.6	-22°44.3
5	74°02.4	221°40.3	-19°02.7	128°25.9	-24°03.8	206°07.2	-17°00.8	161°07.0	-22°44.3
6	89°04.9	236°41.7	-19°03.4	143°27.7	-24°03.5	221°09.2	-17°01.0	176°09.4	-22°44.3
7	104°07.4	251°43.0	-19°04.1	158°29.4	-24°03.1	236°11.3	-17°01.1	191°11.8	-22°44.3
8	119°09.8	266°44.4	-19°04.8	173°31.1	-24°02.8	251°13.3	-17°01.2	206°14.2	-22°44.3
9	134°12.3	281°45.7	-19°05.5	188°32.8	-24°02.5	266°15.4	-17°01.3	221°16.6	-22°44.3
10	149°14.8	296°47.0	-19°06.2	203°34.5	-24°02.2	281°17.4	-17°01.4	236°19.0	-22°44.3
11	164°17.2	311°48.4	-19°06.9	218°36.2	-24°01.9	296°19.4	-17°01.6	251°21.4	-22°44.3
12	179°19.7	326°49.7	-19°07.6	233°38.0	-24°01.6	311°21.5	-17°01.7	266°23.8	-22°44.3
13	194°22.1	341°51.1	-19°08.3	248°39.7	-24°01.2	326°23.5	-17°01.8	281°26.2	-22°44.3
14	209°24.6	356°52.5	-19°09.0	263°41.4	-24°00.9	341°25.5	-17°01.9	296°28.6	-22°44.3
15	224°27.1	11°53.8	-19°09.7	278°43.1	-24°00.6	356°27.6	-17°02.0	311°31.0	-22°44.3
16	239°29.5	26°55.2	-19°10.4	293°44.8	-24°00.3	11°29.6	-17°02.2	326°33.4	-22°44.3
17	254°32.0	41°56.5	-19°11.1	308°46.5	-23°60.0	26°31.6	-17°02.3	341°35.8	-22°44.3
18	269°34.5	56°57.9	-19°11.8	323°48.2	-23°59.6	41°33.6	-17°02.4	356°38.2	-22°44.3
19	284°36.9	71°59.3	-19°12.5	338°49.9	-23°59.3	56°35.7	-17°02.5	11°40.6	-22°44.3
20	299°39.4	87°00.6	-19°13.2	353°51.7	-23°59.0	71°37.7	-17°02.7	26°43.0	-22°44.3
21	314°41.9	102°02.0	-19°13.8	8°53.4	-23°58.7	86°39.7	-17°02.8	41°45.4	-22°44.4
22	329°44.3	117°03.4	-19°14.5	23°55.1	-23°58.4	101°41.8	-17°02.9	56°47.8	-22°44.4
23	344°46.8	132°04.8	-19°15.2	38°56.8	-23°58.0	116°43.8	-17°03.0	71°50.2	-22°44.4
Mer.pass.:0:04:		v1.3 d-0.7 m-4.5		v1.7 d0.3 m-1.6		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	359°49.2	147°06.2	-19°15.9	53°58.5	-23°57.7	131°45.8	-17°03.1	86°52.6	-22°44.4
1	14°51.7	162°07.5	-19°16.6	69°00.2	-23°57.4	146°47.9	-17°03.3	101°55.0	-22°44.4
2	29°54.2	177°08.9	-19°17.3	84°01.9	-23°57.1	161°49.9	-17°03.4	116°57.4	-22°44.4
3	44°56.6	192°10.3	-19°18.0	99°03.6	-23°56.8	176°51.9	-17°03.5	131°59.8	-22°44.4
4	59°59.1	207°11.7	-19°18.7	114°05.3	-23°56.4	191°54.0	-17°03.6	147°02.2	-22°44.4
5	75°01.6	222°13.1	-19°19.3	129°07.0	-23°56.1	206°56.0	-17°03.7	162°04.6	-22°44.4
6	90°04.0	237°14.5	-19°20.0	144°08.7	-23°55.8	221°58.0	-17°03.9	177°07.0	-22°44.4
7	105°06.5	252°15.9	-19°20.7	159°10.4	-23°55.5	237°00.1	-17°04.0	192°09.4	-22°44.4
8	120°09.0	267°17.3	-19°21.4	174°12.1	-23°55.1	252°02.1	-17°04.1	207°11.8	-22°44.4
9	135°11.4	282°18.7	-19°22.0	189°13.8	-23°54.8	267°04.1	-17°04.2	222°14.2	-22°44.4
10	150°13.9	297°20.1	-19°22.7	204°15.4	-23°54.5	282°06.1	-17°04.4	237°16.6	-22°44.4
11	165°16.4	312°21.5	-19°23.4	219°17.1	-23°54.2	297°08.2	-17°04.5	252°19.0	-22°44.4
12	180°18.8	327°22.9	-19°24.1	234°18.8	-23°53.8	312°10.2	-17°04.6	267°21.4	-22°44.4
13	195°21.3	342°24.3	-19°24.7	249°20.5	-23°53.5	327°12.2	-17°04.7	282°23.8	-22°44.4
14	210°23.7	357°25.7	-19°25.4	264°22.2	-23°53.2	342°14.3	-17°04.8	297°26.2	-22°44.4
15	225°26.2	12°27.2	-19°26.1	279°23.9	-23°52.9	357°16.3	-17°05.0	312°28.6	-22°44.4
16	240°28.7	27°28.6	-19°26.8	294°25.6	-23°52.5	12°18.3	-17°05.1	327°31.0	-22°44.4
17	255°31.1	42°30.0	-19°27.4	309°27.3	-23°52.2	27°20.3	-17°05.2	342°33.4	-22°44.4
18	270°33.6	57°31.4	-19°28.1	324°29.0	-23°51.9	42°22.4	-17°05.3	357°35.8	-22°44.5
19	285°36.1	72°32.9	-19°28.8	339°30.6	-23°51.6	57°24.4	-17°05.5	12°38.2	-22°44.5
20	300°38.5	87°34.3	-19°29.4	354°32.3	-23°51.2	72°26.4	-17°05.6	27°40.6	-22°44.5
21	315°41.0	102°35.7	-19°30.1	9°34.0	-23°50.9	87°28.5	-17°05.7	42°43.0	-22°44.5
22	330°43.5	117°37.2	-19°30.7	24°35.7	-23°50.6	102°30.5	-17°05.8	57°45.4	-22°44.5
23	345°45.9	132°38.6	-19°31.4	39°37.4	-23°50.2	117°32.5	-17°05.9	72°47.8	-22°44.5
Mer.pass.:23:56		v1.4 d-0.7 m-4.5		v1.7 d0.3 m-1.6		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.7
Ankaa	353°11.8	-42°12.2
Schedar	349°35.9	56°38.3
Diphda	348°51.9	-17°53.0
Achernar	335°23.6	-57°08.5
Hamal	327°56.5	23°33.0
Polaris	315°53.1	89°20.2
Akamar	315°15.4	-40°13.7
Menkar	314°11.1	4°09.7
Mirfak	308°34.9	49°55.4
Aldebaran	290°45.2	16°32.7
Rigel	281°08.6	-8°10.8
Capella	280°29.1	46°00.8
Bellatrix	278°28.1	6°21.9
Elnath	278°08.1	28°37.2
Alnilam	275°42.7	-1°11.4
Betelgeuse	270°57.4	7°24.6
Canopus	263°54.6	-52°42.1
Sirius	258°30.6	-16°44.2
Adara	255°09.8	-28°59.7
Procyon	244°56.1	5°10.8
Pollux	243°23.5	27°58.7
Avior	234°16.9	-59°33.9
Suhail	222°50.1	-43°30.3
Miaplacidus	221°39.6	-69°47.4
Alphard	217°52.8	-8°44.2
Regulus	207°40.0	11°52.7
Dubhe	193°48.0	61°39.1
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°12.0
Gacrux	171°57.5	-57°12.9
Alioth	166°18.2	55°51.8
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.5
Hadar	148°43.3	-60°27.7
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.3	-60°54.7
Zubenelg.	137°01.7	-16°06.9
Kochab	137°20.9	74°05.1
Alphecca	126°08.2	26°39.5
Antares	112°22.0	-26°28.2
Atria	107°20.7	-69°03.7
Sabik	102°08.5	-15°44.7
Shaula	96°17.1	-37°06.9
Rasalhague	96°03.2	12°33.2
Etamin	90°44.5	51°29.6
Kaus Aust.	83°39.0	-34°22.4
Vega	80°36.5	38°48.4
Nunki	75°53.8	-26°16.3
Altair	62°04.7	8°55.3
Peacock	53°13.3	-56°40.5
Deneb	49°28.7	45°21.1
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.2
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.1
Markab	13°34.5	15°18.5

2018/9/1	**SHA**	**Mer.pass**
Venus	148°11.6	14:15
Mars	54°44.5	20:27
Jupiter	132°17.2	15:17
Saturn	87°06.3	18:17

2018/9/2	**SHA**	**Mer.pass**
Venus	147°43.6	14:12
Mars	54°27.2	20:25
Jupiter	132°06.9	15:14
Saturn	87°04.9	18:13

2018/9/2	**SHA**	**Mer.pass**
Venus	147°16.9	14:10
Mars	54°09.2	20:22
Jupiter	131°56.6	15:11
Saturn	87°03.4	18:10

Horizontal paralax	
Venus:	0.3
Mars:	0.3

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°30.5	1°35.1	68°15.9	11.8	-20°44.4	1.4	54.2
1	196°30.7	1°34.1	82°46.7	11.8	-20°42.9	1.5	54.2
2	211°30.9	1°33.1	97°17.5	11.9	-20°41.4	1.6	54.2
3	226°31.1	1°32.2	111°48.4	11.9	-20°39.7	1.7	54.2
4	241°31.4	1°31.2	126°19.3	11.9	-20°38.0	1.8	54.2
5	256°31.6	1°30.2	140°50.2	11.9	-20°36.1	1.9	54.2
6	271°31.8	1°29.2	155°21.1	11.9	-20°34.2	2.0	54.2
7	286°32.0	1°28.3	169°52.0	11.9	-20°32.2	2.1	54.2
8	301°32.2	1°27.3	184°22.9	12.0	-20°30.0	2.2	54.2
9	316°32.5	1°26.3	198°53.9	12.0	-20°27.8	2.3	54.2
10	331°32.7	1°25.4	213°24.9	12.0	-20°25.5	2.4	54.2
11	346°32.9	1°24.4	227°55.9	12.0	-20°23.1	2.5	54.2
12	1°33.1	1°23.4	242°26.9	12.0	-20°20.6	2.6	54.2
13	16°33.4	1°22.5	256°57.9	12.0	-20°18.0	2.6	54.2
14	31°33.6	1°21.5	271°29.0	12.1	-20°15.3	2.7	54.2
15	46°33.8	1°20.5	286°00.1	12.1	-20°12.5	2.8	54.2
16	61°34.0	1°19.6	300°31.2	12.1	-20°09.6	2.9	54.2
17	76°34.3	1°18.6	315°02.3	12.1	-20°06.7	3.0	54.2
18	91°34.5	1°17.6	329°33.4	12.1	-20°03.6	3.1	54.2
19	106°34.7	1°16.6	344°04.6	12.2	-20°00.5	3.2	54.2
20	121°34.9	1°15.7	358°35.7	12.2	-19°57.2	3.3	54.2
21	136°35.1	1°14.7	13°06.9	12.2	-19°53.9	3.4	54.2
22	151°35.4	1°13.7	27°38.2	12.2	-19°50.4	3.5	54.2
23	166°35.6	1°12.8	42°09.4	12.3	-19°46.9	3.6	54.2
	SD.=15.9	d=-1.0	S.D.=14.8				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°35.8	1°11.8	56°40.7	12.3	-19°43.3	3.7	54.2
1	196°36.0	1°10.8	71°11.9	12.3	-19°39.6	3.7	54.2
2	211°36.3	1°09.9	85°43.2	12.3	-19°35.8	3.8	54.2
3	226°36.5	1°08.9	100°14.6	12.3	-19°31.9	3.9	54.2
4	241°36.7	1°07.9	114°45.9	12.4	-19°28.0	4.0	54.2
5	256°36.9	1°06.9	129°17.3	12.4	-19°23.9	4.1	54.2
6	271°37.2	1°06.0	143°48.7	12.4	-19°19.8	4.2	54.2
7	286°37.4	1°05.0	158°20.1	12.4	-19°15.5	4.3	54.2
8	301°37.6	1°04.0	172°51.5	12.4	-19°11.2	4.4	54.2
9	316°37.8	1°03.1	187°23.0	12.5	-19°06.8	4.5	54.2
10	331°38.0	1°02.1	201°54.5	12.5	-19°02.3	4.5	54.2
11	346°38.3	1°01.1	216°26.0	12.5	-18°57.7	4.6	54.2
12	1°38.5	1°00.1	230°57.5	12.5	-18°53.0	4.7	54.2
13	16°38.7	0°59.2	245°29.1	12.6	-18°48.3	4.8	54.2
14	31°38.9	0°58.2	260°00.7	12.6	-18°43.4	4.9	54.2
15	46°39.2	0°57.2	274°32.3	12.6	-18°38.5	5.0	54.2
16	61°39.4	0°56.3	289°03.9	12.6	-18°33.5	5.1	54.2
17	76°39.6	0°55.3	303°35.5	12.7	-18°28.4	5.1	54.2
18	91°39.8	0°54.3	318°07.2	12.7	-18°23.2	5.2	54.2
19	106°40.0	0°53.4	332°38.9	12.7	-18°17.9	5.3	54.2
20	121°40.3	0°52.4	347°10.6	12.7	-18°12.6	5.4	54.2
21	136°40.5	0°51.4	1°42.3	12.8	-18°07.1	5.5	54.2
22	151°40.7	0°50.4	16°14.1	12.8	-18°01.6	5.6	54.2
23	166°40.9	0°49.5	30°45.9	12.8	-17°56.0	5.6	54.2
	SD.=15.9	d=-1.0	S.D.=14.8				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°41.2	0°48.5	45°17.7	12.8	-17°50.3	5.7	54.2
1	196°41.4	0°47.5	59°49.6	12.8	-17°44.6	5.8	54.2
2	211°41.6	0°46.6	74°21.4	12.9	-17°38.7	5.9	54.2
3	226°41.8	0°45.6	88°53.3	12.9	-17°32.8	6.0	54.2
4	241°42.0	0°44.6	103°25.2	12.9	-17°26.8	6.0	54.2
5	256°42.3	0°43.6	117°57.1	12.9	-17°20.7	6.1	54.3
6	271°42.5	0°42.7	132°29.1	13.0	-17°14.5	6.2	54.3
7	286°42.7	0°41.7	147°01.1	13.0	-17°08.3	6.3	54.3
8	301°42.9	0°40.7	161°33.1	13.0	-17°02.0	6.4	54.3
9	316°43.2	0°39.8	176°05.1	13.0	-16°55.6	6.4	54.3
10	331°43.4	0°38.8	190°37.2	13.1	-16°49.1	6.5	54.3
11	346°43.6	0°37.8	205°09.2	13.1	-16°42.5	6.6	54.3
12	1°43.8	0°36.8	219°41.3	13.1	-16°35.9	6.7	54.3
13	16°44.0	0°35.9	234°13.5	13.1	-16°29.2	6.7	54.3
14	31°44.3	0°34.9	248°45.6	13.2	-16°22.4	6.8	54.3
15	46°44.5	0°33.9	263°17.8	13.2	-16°15.5	6.9	54.3
16	61°44.7	0°33.0	277°50.0	13.2	-16°08.6	7.0	54.3
17	76°44.9	0°32.0	292°22.2	13.2	-16°01.6	7.0	54.3
18	91°45.2	0°31.0	306°54.4	13.3	-15°54.5	7.1	54.4
19	106°45.4	0°30.0	321°26.7	13.3	-15°47.4	7.2	54.4
20	121°45.6	0°29.1	335°59.0	13.3	-15°40.1	7.3	54.4
21	136°45.8	0°28.1	350°31.3	13.3	-15°32.8	7.3	54.4
22	151°46.0	0°27.1	5°03.6	13.3	-15°25.5	7.4	54.4
23	166°46.3	0°26.2	19°36.0	13.4	-15°18.0	7.5	54.4
	SD.=15.9	d=-1.0	S.D.=14.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	02:44	04:20	05:29	18:15	19:24	20:57
70	03:07	04:29	05:32	18:13	19:15	20:35
68	03:25	04:37	05:34	18:11	19:07	20:19
66	03:39	04:44	05:35	18:10	19:01	20:05
64	03:50	04:49	05:37	18:08	18:56	19:55
62	03:59	04:53	05:38	18:07	18:52	19:46
60	04:07	04:57	05:39	18:06	18:48	19:38
58	04:13	05:01	05:40	18:05	18:45	19:32
56	04:19	05:04	05:41	18:05	18:42	19:26
54	04:24	05:06	05:42	18:04	18:39	19:21
52	04:28	05:09	05:42	18:03	18:37	19:17
50	04:32	05:11	05:43	18:03	18:35	19:13
45	04:40	05:15	05:44	18:02	18:31	19:05
40	04:47	05:18	05:45	18:01	18:28	18:59
35	04:51	05:21	05:46	17:60	18:25	18:55
30	04:55	05:23	05:47	17:59	18:23	18:51
20	05:01	05:26	05:48	17:58	18:20	18:46
10	05:04	05:28	05:49	17:57	18:18	18:43
0	05:06	05:30	05:50	17:57	18:17	18:41
-10	05:06	05:30	05:51	17:56	18:17	18:41
-20	05:04	05:30	05:52	17:56	18:18	18:43
-30	05:01	05:28	05:52	17:55	18:19	18:47
-35	04:58	05:27	05:53	17:55	18:20	18:50
-40	04:54	05:26	05:53	17:55	18:22	18:53
-45	04:50	05:24	05:53	17:54	18:24	18:58
-50	04:44	05:21	05:54	17:54	18:26	19:04
-52	04:41	05:20	05:54	17:54	18:28	19:07
-54	04:37	05:19	05:54	17:54	18:29	19:11
-56	04:33	05:17	05:54	17:54	18:31	19:15
-58	04:29	05:15	05:54	17:54	18:33	19:20
-60	04:24	05:13	05:55	17:54	18:35	19:25

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	–:–	–:–	19:38	–:–	–:–	23:54
70	–:–	19:13	18:60	–:–	22:42	–:–
68	18:23	18:31	18:33	21:54	23:24	–:–
66	17:44	18:02	18:13	22:33	23:52	–:–
64	17:16	17:40	17:56	23:00	–:–	00:13
62	16:55	17:23	17:43	23:21	–:–	00:30
60	16:38	17:08	17:31	23:38	–:–	00:44
58	16:23	16:56	17:21	23:52	–:–	00:57
56	16:11	16:45	17:12	–:–	00:04	01:07
54	16:00	16:35	17:04	–:–	00:15	01:16
52	15:50	16:27	16:57	–:–	00:24	01:24
50	15:42	16:19	16:51	–:–	00:33	01:32
45	15:24	16:03	16:37	–:–	00:51	01:47
40	15:09	15:49	16:26	00:13	01:05	02:00
35	14:56	15:38	16:16	00:26	01:17	02:11
30	14:45	15:28	16:08	00:37	01:28	02:21
20	14:26	15:11	15:53	00:57	01:46	02:37
10	14:10	14:56	15:40	01:14	02:02	02:51
0	13:54	14:42	15:28	01:29	02:17	03:04
-10	13:39	14:28	15:16	01:45	02:32	03:17
-20	13:22	14:12	15:03	02:02	02:48	03:31
-30	13:03	13:55	14:48	02:21	03:06	03:47
-35	12:52	13:45	14:39	02:33	03:17	03:57
-40	12:40	13:33	14:29	02:46	03:29	04:07
-45	12:25	13:20	14:18	03:01	03:43	04:19
-50	12:06	13:03	14:04	03:20	03:60	04:34
-52	11:57	12:55	13:57	03:28	04:08	04:41
-54	11:48	12:46	13:50	03:38	04:17	04:49
-56	11:37	12:37	13:42	03:49	04:27	04:58
-58	11:24	12:25	13:32	04:02	04:39	05:07
-60	11:09	12:12	13:22	04:17	04:52	05:19

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
19	06:02	06:12	11:53	20:05	07:41	10(73%)
20	06:23	06:34	11:53	20:52	08:29	11(81%)
21	06:45	06:55	11:53	21:39	09:16	12(88%)

September 22, 23 ,24 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	0°48.4	147°40.0	-19°32.1	54°39.0	-23°49.9	132°34.5	-17°06.1	87°50.2	-22°44.5
1	15°50.9	162°41.5	-19°32.7	69°40.7	-23°49.6	147°36.6	-17°06.2	102°52.6	-22°44.5
2	30°53.3	177°42.9	-19°33.4	84°42.4	-23°49.3	162°38.6	-17°06.3	117°55.0	-22°44.5
3	45°55.8	192°44.4	-19°34.0	99°44.1	-23°48.9	177°40.6	-17°06.4	132°57.4	-22°44.5
4	60°58.2	207°45.8	-19°34.7	114°45.7	-23°48.6	192°42.6	-17°06.5	147°59.8	-22°44.5
5	76°00.7	222°47.3	-19°35.4	129°47.4	-23°48.3	207°44.7	-17°06.7	163°02.2	-22°44.5
6	91°03.2	237°48.7	-19°36.0	144°49.1	-23°47.9	222°46.7	-17°06.8	178°04.5	-22°44.5
7	106°05.6	252°50.2	-19°36.7	159°50.8	-23°47.6	237°48.7	-17°06.9	193°06.9	-22°44.5
8	121°08.1	267°51.6	-19°37.3	174°52.4	-23°47.3	252°50.8	-17°07.0	208°09.3	-22°44.5
9	136°10.6	282°53.1	-19°38.0	189°54.1	-23°47.0	267°52.8	-17°07.2	223°11.7	-22°44.5
10	151°13.0	297°54.6	-19°38.6	204°55.8	-23°46.6	282°54.8	-17°07.3	238°14.1	-22°44.5
11	166°15.5	312°56.0	-19°39.3	219°57.4	-23°46.3	297°56.8	-17°07.4	253°16.5	-22°44.5
12	181°18.0	327°57.5	-19°39.9	234°59.1	-23°46.0	312°58.9	-17°07.5	268°18.9	-22°44.5
13	196°20.4	342°59.0	-19°40.6	250°00.8	-23°45.6	328°00.9	-17°07.6	283°21.3	-22°44.5
14	211°22.9	358°00.5	-19°41.2	265°02.4	-23°45.3	343°02.9	-17°07.8	298°23.7	-22°44.5
15	226°25.3	13°01.9	-19°41.8	280°04.1	-23°45.0	358°04.9	-17°07.9	313°26.1	-22°44.6
16	241°27.8	28°03.4	-19°42.5	295°05.7	-23°44.6	13°07.0	-17°08.0	328°28.5	-22°44.6
17	256°30.3	43°04.9	-19°43.1	310°07.4	-23°44.3	28°09.0	-17°08.1	343°30.9	-22°44.6
18	271°32.7	58°06.4	-19°43.8	325°09.1	-23°44.0	43°11.0	-17°08.3	358°33.3	-22°44.6
19	286°35.2	73°07.9	-19°44.4	340°10.7	-23°43.6	58°13.0	-17°08.4	13°35.7	-22°44.6
20	301°37.7	88°09.4	-19°45.0	355°12.4	-23°43.3	73°15.1	-17°08.5	28°38.1	-22°44.6
21	316°40.1	103°10.9	-19°45.7	10°14.0	-23°43.0	88°17.1	-17°08.6	43°40.4	-22°44.6
22	331°42.6	118°12.4	-19°46.3	25°15.7	-23°42.6	103°19.1	-17°08.8	58°42.8	-22°44.6
23	346°45.1	133°13.9	-19°46.9	40°17.4	-23°42.3	118°21.1	-17°08.9	73°45.2	-22°44.6
Mer.pass.:23:52		v1.4 d-0.7 m-4.5		v1.7 d0.3 m-1.6		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	1°47.5	148°15.4	-19°47.6	55°19.0	-23°42.0	133°23.1	-17°09.0	88°47.6	-22°44.6
1	16°50.0	163°16.9	-19°48.2	70°20.7	-23°41.6	148°25.2	-17°09.1	103°50.0	-22°44.6
2	31°52.5	178°18.4	-19°48.8	85°22.3	-23°41.3	163°27.2	-17°09.2	118°52.4	-22°44.6
3	46°54.9	193°19.9	-19°49.5	100°24.0	-23°41.0	178°29.2	-17°09.4	133°54.8	-22°44.6
4	61°57.4	208°21.4	-19°50.1	115°25.6	-23°40.6	193°31.2	-17°09.5	148°57.2	-22°44.6
5	76°59.8	223°22.9	-19°50.7	130°27.3	-23°40.3	208°33.3	-17°09.6	163°59.6	-22°44.6
6	92°02.3	238°24.5	-19°51.3	145°28.9	-23°39.9	223°35.3	-17°09.7	179°02.0	-22°44.6
7	107°04.8	253°26.0	-19°52.0	160°30.6	-23°39.6	238°37.3	-17°09.9	194°04.4	-22°44.6
8	122°07.2	268°27.5	-19°52.6	175°32.2	-23°39.3	253°39.3	-17°10.0	209°06.7	-22°44.6
9	137°09.7	283°29.0	-19°53.2	190°33.8	-23°38.9	268°41.3	-17°10.1	224°09.1	-22°44.6
10	152°12.2	298°30.6	-19°53.8	205°35.5	-23°38.6	283°43.4	-17°10.2	239°11.5	-22°44.6
11	167°14.6	313°32.1	-19°54.4	220°37.1	-23°38.3	298°45.4	-17°10.3	254°13.9	-22°44.6
12	182°17.1	328°33.6	-19°55.1	235°38.8	-23°37.9	313°47.4	-17°10.5	269°16.3	-22°44.6
13	197°19.6	343°35.2	-19°55.7	250°40.4	-23°37.6	328°49.4	-17°10.6	284°18.7	-22°44.7
14	212°22.0	358°36.7	-19°56.3	265°42.1	-23°37.2	343°51.5	-17°10.7	299°21.1	-22°44.7
15	227°24.5	13°38.3	-19°56.9	280°43.7	-23°36.9	358°53.5	-17°10.8	314°23.5	-22°44.7
16	242°26.9	28°39.8	-19°57.5	295°45.3	-23°36.6	13°55.5	-17°11.0	329°25.9	-22°44.7
17	257°29.4	43°41.3	-19°58.1	310°47.0	-23°36.2	28°57.5	-17°11.1	344°28.2	-22°44.7
18	272°31.9	58°42.9	-19°58.7	325°48.6	-23°35.9	43°59.5	-17°11.2	359°30.6	-22°44.7
19	287°34.3	73°44.5	-19°59.4	340°50.2	-23°35.6	59°01.6	-17°11.3	14°33.0	-22°44.7
20	302°36.8	88°46.0	-19°60.0	355°51.9	-23°35.2	74°03.6	-17°11.5	29°35.4	-22°44.7
21	317°39.3	103°47.6	-20°00.6	10°53.5	-23°34.9	89°05.6	-17°11.6	44°37.8	-22°44.7
22	332°41.7	118°49.1	-20°01.2	25°55.1	-23°34.5	104°07.6	-17°11.7	59°40.2	-22°44.7
23	347°44.2	133°50.7	-20°01.8	40°56.8	-23°34.2	119°09.6	-17°11.8	74°42.6	-22°44.7
Mer.pass.:23:48		v1.5 d-0.6 m-4.5		v1.7 d0.3 m-1.5		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	2°46.7	148°52.3	-20°02.4	55°58.4	-23°33.8	134°11.7	-17°11.9	89°45.0	-22°44.7
1	17°49.1	163°53.8	-20°03.0	71°00.0	-23°33.5	149°13.7	-17°12.1	104°47.3	-22°44.7
2	32°51.6	178°55.4	-20°03.6	86°01.7	-23°33.2	164°15.7	-17°12.2	119°49.7	-22°44.7
3	47°54.1	193°57.0	-20°04.2	101°03.3	-23°32.8	179°17.7	-17°12.3	134°52.1	-22°44.7
4	62°56.5	208°58.6	-20°04.8	116°04.9	-23°32.5	194°19.7	-17°12.4	149°54.5	-22°44.7
5	77°59.0	224°00.1	-20°05.4	131°06.5	-23°32.1	209°21.8	-17°12.6	164°56.9	-22°44.7
6	93°01.4	239°01.7	-20°06.0	146°08.2	-23°31.8	224°23.8	-17°12.7	179°59.3	-22°44.7
7	108°03.9	254°03.3	-20°06.6	161°09.8	-23°31.5	239°25.8	-17°12.8	195°01.7	-22°44.7
8	123°06.4	269°04.9	-20°07.2	176°11.4	-23°31.1	254°27.8	-17°12.9	210°04.0	-22°44.7
9	138°08.8	284°06.5	-20°07.8	191°13.0	-23°30.8	269°29.8	-17°13.1	225°06.4	-22°44.7
10	153°11.3	299°08.1	-20°08.3	206°14.6	-23°30.4	284°31.8	-17°13.2	240°08.8	-22°44.7
11	168°13.8	314°09.7	-20°08.9	221°16.3	-23°30.1	299°33.9	-17°13.3	255°11.2	-22°44.7
12	183°16.2	329°11.3	-20°09.5	236°17.9	-23°29.7	314°35.9	-17°13.4	270°13.6	-22°44.8
13	198°18.7	344°12.9	-20°10.1	251°19.5	-23°29.4	329°37.9	-17°13.5	285°16.0	-22°44.8
14	213°21.2	359°14.5	-20°10.7	266°21.1	-23°29.0	344°39.9	-17°13.7	300°18.4	-22°44.8
15	228°23.6	14°16.1	-20°11.3	281°22.7	-23°28.7	359°41.9	-17°13.8	315°20.7	-22°44.8
16	243°26.1	29°17.7	-20°11.9	296°24.3	-23°28.4	14°43.9	-17°13.9	330°23.1	-22°44.8
17	258°28.5	44°19.4	-20°12.4	311°26.0	-23°28.0	29°46.0	-17°14.0	345°25.5	-22°44.8
18	273°31.0	59°21.0	-20°13.0	326°27.6	-23°27.7	44°48.0	-17°14.2	0°27.9	-22°44.8
19	288°33.5	74°22.6	-20°13.6	341°29.2	-23°27.3	59°50.0	-17°14.3	15°30.3	-22°44.8
20	303°35.9	89°24.2	-20°14.2	356°30.8	-23°27.0	74°52.0	-17°14.4	30°32.7	-22°44.8
21	318°38.4	104°25.8	-20°14.8	11°32.4	-23°26.6	89°54.0	-17°14.5	45°35.0	-22°44.8
22	333°40.9	119°27.5	-20°15.3	26°34.0	-23°26.3	104°56.0	-17°14.7	60°37.4	-22°44.8
23	348°43.3	134°29.1	-20°15.9	41°35.6	-23°25.9	119°58.1	-17°14.8	75°39.8	-22°44.8
Mer.pass.:23:44		v1.6 d-0.6 m-4.5		v1.6 d0.3 m-1.5		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.7
Ankaa	353°11.7	-42°12.2
Schedar	349°35.9	56°38.3
Diphda	348°51.9	-17°53.0
Achernar	335°23.6	-57°08.5
Hamal	327°56.4	23°33.0
Polaris	315°52.1	89°20.3
Akamar	315°15.3	-40°13.7
Menkar	314°11.1	4°09.7
Mirfak	308°34.9	49°55.4
Aldebaran	290°45.2	16°32.7
Rigel	281°08.6	-8°10.8
Capella	280°29.1	46°00.8
Bellatrix	278°28.1	6°21.9
Elnath	278°08.1	28°37.2
Alnilam	275°42.7	-1°11.4
Betelgeuse	270°57.4	7°24.6
Canopus	263°54.6	-52°42.1
Sirius	258°30.5	-16°44.2
Adara	255°09.8	-28°59.7
Procyon	244°56.0	5°10.8
Pollux	243°23.4	27°58.7
Avior	234°16.9	-59°33.9
Suhail	222°50.1	-43°30.3
Miaplacidus	221°39.6	-69°47.4
Alphard	217°52.8	-8°44.2
Regulus	207°40.0	11°52.7
Dubhe	193°48.0	61°39.1
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°12.0
Gacrux	171°57.5	-57°12.9
Alioth	166°18.2	55°51.7
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.5
Hadar	148°43.3	-60°27.7
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.4	-60°54.7
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.0	74°05.1
Alphecca	126°08.2	26°39.5
Antares	112°22.0	-26°28.2
Atria	107°20.7	-69°03.7
Sabik	102°08.5	-15°44.7
Shaula	96°17.1	-37°06.9
Rasalhague	96°03.2	12°33.2
Etamin	90°44.5	51°29.6
Kaus Aust.	83°39.0	-34°22.4
Vega	80°36.5	38°48.4
Nunki	75°53.8	-26°16.3
Altair	62°04.7	8°55.3
Peacock	53°13.3	-56°40.5
Deneb	49°28.8	45°21.1
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.2
Fomalhaut	15°19.8	-29°31.3
Scheat	13°49.6	28°11.1
Markab	13°34.5	15°18.5

2018/9/2	**SHA**	**Mer.pass**
Venus	146°51.6	14:08
Mars	53°50.7	20:19
Jupiter	131°46.2	15:08
Saturn	87°01.8	18:06

2018/9/2	**SHA**	**Mer.pass**
Venus	146°27.9	14:06
Mars	53°31.5	20:17
Jupiter	131°35.6	15:04
Saturn	87°00.1	18:02

2018/9/2	**SHA**	**Mer.pass**
Venus	146°05.6	14:03
Mars	53°11.7	20:14
Jupiter	131°25.0	15:01
Saturn	86°58.3	17:58

Horizontal paralax	
Venus:	0.4
Mars:	0.3

h Sun Moon

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	181°46.5	0°25.2	34°08.3	13.4	-15°10.5	7.6	54.4
1	196°46.7	0°24.2	48°40.7	13.4	-15°02.9	7.6	54.4
2	211°46.9	0°23.2	63°13.1	13.4	-14°55.3	7.7	54.4
3	226°47.2	0°22.3	77°45.6	13.4	-14°47.5	7.8	54.4
4	241°47.4	0°21.3	92°18.0	13.5	-14°39.7	7.8	54.5
5	256°47.6	0°20.3	106°50.5	13.5	-14°31.9	7.9	54.5
6	271°47.8	0°19.3	121°23.0	13.5	-14°23.9	8.0	54.5
7	286°48.0	0°18.4	135°55.6	13.5	-14°15.9	8.0	54.5
8	301°48.3	0°17.4	150°28.1	13.6	-14°07.9	8.1	54.5
9	316°48.5	0°16.4	165°00.7	13.6	-13°59.8	8.2	54.5
10	331°48.7	0°15.5	179°33.2	13.6	-13°51.6	8.2	54.5
11	346°48.9	0°14.5	194°05.8	13.6	-13°43.3	8.3	54.5
12	1°49.1	0°13.5	208°38.5	13.6	-13°35.0	8.4	54.6
13	16°49.4	0°12.5	223°11.1	13.7	-13°26.6	8.4	54.6
14	31°49.6	0°11.6	237°43.8	13.7	-13°18.1	8.5	54.6
15	46°49.8	0°10.6	252°16.4	13.7	-13°09.6	8.5	54.6
16	61°50.0	0°09.6	266°49.1	13.7	-13°01.0	8.6	54.6
17	76°50.2	0°08.7	281°21.9	13.7	-12°52.4	8.7	54.6
18	91°50.5	0°07.7	295°54.6	13.7	-12°43.7	8.7	54.6
19	106°50.7	0°06.7	310°27.3	13.8	-12°34.9	8.8	54.6
20	121°50.9	0°05.7	325°00.1	13.8	-12°26.1	8.8	54.7
21	136°51.1	0°04.8	339°32.9	13.8	-12°17.3	8.9	54.7
22	151°51.4	0°03.8	354°05.7	13.8	-12°08.3	9.0	54.7
23	166°51.6	0°02.8	8°38.5	13.8	-11°59.3	9.0	54.7
	SD.=15.9	d=-1.0			S.D.=14.8		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	181°51.8	0°01.8	23°11.4	13.8	-11°50.3	9.1	54.7
1	196°52.0	0°00.9	37°44.2	13.9	-11°41.2	9.1	54.7
2	211°52.2	-0°00.1	52°17.1	13.9	-11°32.0	9.2	54.7
3	226°52.5	-0°01.1	66°50.0	13.9	-11°22.8	9.2	54.8
4	241°52.7	-0°02.0	81°22.8	13.9	-11°13.5	9.3	54.8
5	256°52.9	-0°03.0	95°55.8	13.9	-11°04.2	9.4	54.8
6	271°53.1	-0°04.0	110°28.7	13.9	-10°54.8	9.4	54.8
7	286°53.3	-0°05.0	125°01.6	13.9	-10°45.3	9.5	54.8
8	301°53.6	-0°05.9	139°34.6	14.0	-10°35.8	9.5	54.8
9	316°53.8	-0°06.9	154°07.5	14.0	-10°26.3	9.6	54.9
10	331°54.0	-0°07.9	168°40.5	14.0	-10°16.7	9.6	54.9
11	346°54.2	-0°08.9	183°13.5	14.0	-10°07.1	9.7	54.9
12	1°54.4	-0°09.8	197°46.5	14.0	-9°57.4	9.7	54.9
13	16°54.7	-0°10.8	212°19.5	14.0	-9°47.6	9.8	54.9
14	31°54.9	-0°11.8	226°52.5	14.0	-9°37.8	9.8	54.9
15	46°55.1	-0°12.7	241°25.5	14.0	-9°28.0	9.9	54.9
16	61°55.3	-0°13.7	255°58.6	14.0	-9°18.1	9.9	55.0
17	76°55.5	-0°14.7	270°31.6	14.0	-9°08.2	10.0	55.0
18	91°55.8	-0°15.7	285°04.7	14.1	-8°58.2	10.0	55.0
19	106°56.0	-0°16.6	299°37.7	14.1	-8°48.1	10.1	55.0
20	121°56.2	-0°17.6	314°10.8	14.1	-8°38.1	10.1	55.0
21	136°56.4	-0°18.6	328°43.9	14.1	-8°28.0	10.1	55.0
22	151°56.6	-0°19.6	343°17.0	14.1	-8°17.8	10.2	55.1
23	166°56.8	-0°20.5	357°50.0	14.1	-8°07.6	10.2	55.1
	SD.=15.9	d=-1.0			S.D.=14.9		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	181°57.1	-0°21.5	12°23.1	14.1	-7°57.3	10.3	55.1
1	196°57.3	-0°22.5	26°56.2	14.1	-7°47.1	10.3	55.1
2	211°57.5	-0°23.4	41°29.4	14.1	-7°36.7	10.3	55.1
3	226°57.7	-0°24.4	56°02.5	14.1	-7°26.4	10.4	55.1
4	241°57.9	-0°25.4	70°35.6	14.1	-7°16.0	10.4	55.2
5	256°58.2	-0°26.4	85°08.7	14.1	-7°05.5	10.5	55.2
6	271°58.4	-0°27.3	99°41.8	14.1	-6°55.0	10.5	55.2
7	286°58.6	-0°28.3	114°14.9	14.1	-6°44.5	10.5	55.2
8	301°58.8	-0°29.3	128°48.1	14.1	-6°33.9	10.6	55.2
9	316°59.0	-0°30.3	143°21.2	14.1	-6°23.4	10.6	55.3
10	331°59.3	-0°31.2	157°54.3	14.1	-6°12.7	10.6	55.3
11	346°59.5	-0°32.2	172°27.4	14.1	-6°02.1	10.7	55.3
12	1°59.7	-0°33.2	187°00.6	14.1	-5°51.4	10.7	55.3
13	16°59.9	-0°34.2	201°33.7	14.1	-5°40.6	10.7	55.3
14	32°00.1	-0°35.1	216°06.8	14.1	-5°29.9	10.8	55.3
15	47°00.4	-0°36.1	230°39.9	14.1	-5°19.1	10.8	55.4
16	62°00.6	-0°37.1	245°13.1	14.1	-5°08.3	10.8	55.4
17	77°00.8	-0°38.0	259°46.2	14.1	-4°57.4	10.9	55.4
18	92°01.0	-0°39.0	274°19.3	14.1	-4°46.5	10.9	55.4
19	107°01.2	-0°40.0	288°52.4	14.1	-4°35.6	10.9	55.4
20	122°01.4	-0°41.0	303°25.5	14.1	-4°24.7	11.0	55.5
21	137°01.7	-0°41.9	317°58.6	14.1	-4°13.7	11.0	55.5
22	152°01.9	-0°42.9	332°31.7	14.1	-4°02.7	11.0	55.5
23	167°02.1	-0°43.9	347°04.8	14.1	-3°51.7	11.0	55.5
	SD.=15.9	d=-1.0			S.D.=15.0		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:04	04:34	05:42	17:60	19:08	20:36
70	03:23	04:42	05:43	17:59	19:00	20:18
68	03:38	04:48	05:44	17:59	18:54	20:04
66	03:50	04:53	05:45	17:58	18:49	19:52
64	03:60	04:58	05:45	17:58	18:45	19:43
62	04:08	05:01	05:46	17:57	18:42	19:35
60	04:15	05:05	05:46	17:57	18:39	19:28
58	04:20	05:07	05:47	17:57	18:36	19:23
56	04:25	05:10	05:47	17:57	18:34	19:18
54	04:30	05:12	05:47	17:56	18:32	19:13
52	04:34	05:14	05:47	17:56	18:30	19:10
50	04:37	05:15	05:48	17:56	18:28	19:06
45	04:44	05:19	05:48	17:56	18:25	18:59
40	04:50	05:21	05:48	17:56	18:23	18:54
35	04:54	05:23	05:49	17:56	18:21	18:50
30	04:57	05:25	05:49	17:56	18:19	18:47
20	05:01	05:27	05:49	17:55	18:17	18:43
10	05:04	05:28	05:49	17:55	18:16	18:41
0	05:04	05:28	05:49	17:56	18:16	18:40
-10	05:04	05:28	05:49	17:56	18:17	18:41
-20	05:01	05:27	05:49	17:56	18:18	18:44
-30	04:57	05:25	05:48	17:57	18:21	18:48
-35	04:54	05:23	05:48	17:57	18:22	18:52
-40	04:49	05:21	05:48	17:57	18:25	18:56
-45	04:44	05:18	05:48	17:58	18:27	19:02
-50	04:37	05:15	05:47	17:59	18:31	19:09
-52	04:33	05:13	05:47	17:59	18:33	19:13
-54	04:29	05:11	05:46	17:59	18:35	19:17
-56	04:25	05:09	05:46	17:60	18:37	19:21
-58	04:20	05:07	05:46	18:00	18:40	19:27
-60	04:14	05:04	05:45	18:01	18:42	19:33

	Moonrise			Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	19:13	18:57	18:43	–:–	01:53	03:43
70	18:51	18:44	18:37	00:31	02:14	03:54
68	18:34	18:33	18:32	00:57	02:30	04:03
66	18:19	18:24	18:27	01:16	02:43	04:11
64	18:08	18:16	18:23	01:32	02:54	04:17
62	17:58	18:10	18:20	01:45	03:03	04:22
60	17:49	18:04	18:17	01:56	03:11	04:27
58	17:42	17:59	18:14	02:06	03:18	04:31
56	17:35	17:54	18:12	02:14	03:24	04:35
54	17:29	17:50	18:10	02:21	03:29	04:38
52	17:24	17:47	18:08	02:28	03:34	04:41
50	17:19	17:43	18:06	02:34	03:38	04:44
45	17:08	17:36	18:03	02:47	03:48	04:50
40	16:59	17:30	17:59	02:57	03:55	04:55
35	16:52	17:25	17:57	03:06	04:02	04:59
30	16:45	17:20	17:54	03:14	04:08	05:03
20	16:33	17:12	17:50	03:27	04:18	05:09
10	16:23	17:05	17:46	03:39	04:27	05:14
0	16:14	16:58	17:43	03:50	04:35	05:20
-10	16:04	16:52	17:39	04:01	04:43	05:25
-20	15:54	16:44	17:35	04:13	04:52	05:30
-30	15:42	16:36	17:31	04:26	05:02	05:36
-35	15:35	16:31	17:29	04:33	05:07	05:40
-40	15:27	16:26	17:26	04:42	05:14	05:44
-45	15:18	16:20	17:23	04:52	05:21	05:48
-50	15:07	16:12	17:19	05:04	05:30	05:54
-52	15:02	16:09	17:17	05:10	05:34	05:56
-54	14:56	16:05	17:15	05:16	05:39	05:59
-56	14:50	16:01	17:13	05:23	05:44	06:02
-58	14:43	15:56	17:10	05:30	05:49	06:05
-60	14:35	15:51	17:08	05:39	05:55	06:09

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
22	07:06	07:16	11:52	22:24	10:01	13(93%)
23	07:27	07:38	11:52	23:08	10:46	14(97%)
24	07:48	07:59	11:52	23:53	11:31	15(99%)

September 25, 26 ,27 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	3°45.8	149°30.7	-20°16.5	56°37.2	-23°25.6	135°00.1	-17°14.9	90°42.2	-22°44.8
1	18°48.3	164°32.4	-20°17.0	71°38.8	-23°25.2	150°02.1	-17°15.0	105°44.6	-22°44.8
2	33°50.7	179°34.0	-20°17.6	86°40.4	-23°24.9	165°04.1	-17°15.1	120°47.0	-22°44.8
3	48°53.2	194°35.7	-20°18.2	101°42.0	-23°24.5	180°06.1	-17°15.3	135°49.3	-22°44.8
4	63°55.7	209°37.3	-20°18.8	116°43.6	-23°24.2	195°08.1	-17°15.4	150°51.7	-22°44.8
5	78°58.1	224°39.0	-20°19.3	131°45.2	-23°23.8	210°10.1	-17°15.5	165°54.1	-22°44.8
6	94°00.6	239°40.6	-20°19.9	146°46.8	-23°23.5	225°12.2	-17°15.6	180°56.5	-22°44.8
7	109°03.0	254°42.3	-20°20.4	161°48.4	-23°23.1	240°14.2	-17°15.8	195°58.9	-22°44.8
8	124°05.5	269°43.9	-20°21.0	176°50.0	-23°22.8	255°16.2	-17°15.9	211°01.2	-22°44.8
9	139°08.0	284°45.6	-20°21.6	191°51.6	-23°22.4	270°18.2	-17°16.0	226°03.6	-22°44.8
10	154°10.4	299°47.3	-20°22.1	206°53.2	-23°22.1	285°20.2	-17°16.1	241°06.0	-22°44.8
11	169°12.9	314°48.9	-20°22.7	221°54.8	-23°21.7	300°22.2	-17°16.3	256°08.4	-22°44.9
12	184°15.4	329°50.6	-20°23.2	236°56.4	-23°21.4	315°24.2	-17°16.4	271°10.8	-22°44.9
13	199°17.8	344°52.3	-20°23.8	251°58.0	-23°21.0	330°26.3	-17°16.5	286°13.1	-22°44.9
14	214°20.3	359°54.0	-20°24.4	266°59.6	-23°20.7	345°28.3	-17°16.6	301°15.5	-22°44.9
15	229°22.8	14°55.6	-20°24.9	282°01.2	-23°20.3	0°30.3	-17°16.8	316°17.9	-22°44.9
16	244°25.2	29°57.3	-20°25.5	297°02.8	-23°20.0	15°32.3	-17°16.9	331°20.3	-22°44.9
17	259°27.7	44°59.0	-20°26.0	312°04.4	-23°19.6	30°34.3	-17°17.0	346°22.7	-22°44.9
18	274°30.1	60°00.7	-20°26.6	327°06.0	-23°19.3	45°36.3	-17°17.1	1°25.0	-22°44.9
19	289°32.6	75°02.4	-20°27.1	342°07.6	-23°18.9	60°38.3	-17°17.2	16°27.4	-22°44.9
20	304°35.1	90°04.1	-20°27.7	357°09.2	-23°18.6	75°40.4	-17°17.4	31°29.8	-22°44.9
21	319°37.5	105°05.8	-20°28.2	12°10.7	-23°18.2	90°42.4	-17°17.5	46°32.2	-22°44.9
22	334°40.0	120°07.5	-20°28.7	27°12.3	-23°17.9	105°44.4	-17°17.6	61°34.6	-22°44.9
23	349°42.5	135°09.2	-20°29.3	42°13.9	-23°17.5	120°46.4	-17°17.7	76°36.9	-22°44.9
Mer.pass.:23:41		v1.6 d-0.6 m-4.5		v1.6 d0.3 m-1.5		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	4°44.9	150°10.9	-20°29.8	57°15.5	-23°17.2	135°48.4	-17°17.9	91°39.3	-22°44.9
1	19°47.4	165°12.6	-20°30.4	72°17.1	-23°16.8	150°50.4	-17°18.0	106°41.7	-22°44.9
2	34°49.9	180°14.3	-20°30.9	87°18.7	-23°16.4	165°52.4	-17°18.1	121°44.1	-22°44.9
3	49°52.3	195°16.0	-20°31.4	102°20.3	-23°16.1	180°54.4	-17°18.2	136°46.5	-22°44.9
4	64°54.8	210°17.7	-20°32.0	117°21.8	-23°15.7	195°56.4	-17°18.4	151°48.8	-22°44.9
5	79°57.3	225°19.5	-20°32.5	132°23.4	-23°15.4	210°58.5	-17°18.5	166°51.2	-22°44.9
6	94°59.7	240°21.2	-20°33.0	147°25.0	-23°15.0	226°00.5	-17°18.6	181°53.6	-22°44.9
7	110°02.2	255°22.9	-20°33.6	162°26.6	-23°14.7	241°02.5	-17°18.7	196°56.0	-22°44.9
8	125°04.6	270°24.6	-20°34.1	177°28.1	-23°14.3	256°04.5	-17°18.9	211°58.3	-22°44.9
9	140°07.1	285°26.4	-20°34.6	192°29.7	-23°14.0	271°06.5	-17°19.0	227°00.7	-22°44.9
10	155°09.6	300°28.1	-20°35.2	207°31.3	-23°13.6	286°08.5	-17°19.1	242°03.1	-22°44.9
11	170°12.0	315°29.9	-20°35.7	222°32.9	-23°13.2	301°10.5	-17°19.2	257°05.5	-22°45.0
12	185°14.5	330°31.6	-20°36.2	237°34.4	-23°12.9	316°12.5	-17°19.4	272°07.8	-22°45.0
13	200°17.0	345°33.3	-20°36.7	252°36.0	-23°12.5	331°14.5	-17°19.5	287°10.2	-22°45.0
14	215°19.4	0°35.1	-20°37.3	267°37.6	-23°12.2	346°16.5	-17°19.6	302°12.6	-22°45.0
15	230°21.9	15°36.8	-20°37.8	282°39.2	-23°11.8	1°18.6	-17°19.7	317°15.0	-22°45.0
16	245°24.4	30°38.6	-20°38.3	297°40.7	-23°11.5	16°20.6	-17°19.9	332°17.3	-22°45.0
17	260°26.8	45°40.4	-20°38.8	312°42.3	-23°11.1	31°22.6	-17°20.0	347°19.7	-22°45.0
18	275°29.3	60°42.1	-20°39.3	327°43.9	-23°10.7	46°24.6	-17°20.1	2°22.1	-22°45.0
19	290°31.8	75°43.9	-20°39.8	342°45.4	-23°10.4	61°26.6	-17°20.2	17°24.5	-22°45.0
20	305°34.2	90°45.6	-20°40.4	357°47.0	-23°10.0	76°28.6	-17°20.3	32°26.8	-22°45.0
21	320°36.7	105°47.4	-20°40.9	12°48.6	-23°09.7	91°30.6	-17°20.5	47°29.2	-22°45.0
22	335°39.1	120°49.2	-20°41.4	27°50.1	-23°09.3	106°32.6	-17°20.6	62°31.6	-22°45.0
23	350°41.6	135°51.0	-20°41.9	42°51.7	-23°08.9	121°34.6	-17°20.7	77°34.0	-22°45.0
Mer.pass.:23:37		v1.7 d-0.5 m-4.5		v1.6 d0.4 m-1.4		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	5°44.1	150°52.7	-20°42.4	57°53.3	-23°08.6	136°36.6	-17°20.8	92°36.3	-22°45.0
1	20°46.5	165°54.5	-20°42.9	72°54.8	-23°08.2	151°38.6	-17°21.0	107°38.7	-22°45.0
2	35°49.0	180°56.3	-20°43.4	87°56.4	-23°07.9	166°40.6	-17°21.1	122°41.1	-22°45.0
3	50°51.5	195°58.1	-20°43.9	102°57.9	-23°07.5	181°42.7	-17°21.2	137°43.5	-22°45.0
4	65°53.9	210°59.9	-20°44.4	117°59.5	-23°07.1	196°44.7	-17°21.3	152°45.8	-22°45.0
5	80°56.4	226°01.7	-20°44.9	133°01.1	-23°06.8	211°46.7	-17°21.5	167°48.2	-22°45.0
6	95°58.9	241°03.5	-20°45.4	148°02.6	-23°06.4	226°48.7	-17°21.6	182°50.6	-22°45.0
7	111°01.3	256°05.3	-20°45.9	163°04.2	-23°06.0	241°50.7	-17°21.7	197°53.0	-22°45.0
8	126°03.8	271°07.1	-20°46.4	178°05.7	-23°05.7	256°52.7	-17°21.8	212°55.3	-22°45.0
9	141°06.2	286°08.9	-20°46.9	193°07.3	-23°05.3	271°54.7	-17°22.0	227°57.7	-22°45.0
10	156°08.7	301°10.7	-20°47.4	208°08.8	-23°05.0	286°56.7	-17°22.1	243°00.1	-22°45.0
11	171°11.2	316°12.5	-20°47.9	223°10.4	-23°04.6	301°58.7	-17°22.2	258°02.5	-22°45.1
12	186°13.6	331°14.3	-20°48.4	238°11.9	-23°04.2	317°00.7	-17°22.3	273°04.8	-22°45.1
13	201°16.1	346°16.2	-20°48.9	253°13.5	-23°03.9	332°02.7	-17°22.5	288°07.2	-22°45.1
14	216°18.6	1°18.0	-20°49.4	268°15.0	-23°03.5	347°04.7	-17°22.6	303°09.6	-22°45.1
15	231°21.0	16°19.8	-20°49.9	283°16.6	-23°03.1	2°06.7	-17°22.7	318°11.9	-22°45.1
16	246°23.5	31°21.6	-20°50.3	298°18.1	-23°02.8	17°08.7	-17°22.8	333°14.3	-22°45.1
17	261°26.0	46°23.5	-20°50.8	313°19.7	-23°02.4	32°10.7	-17°23.0	348°16.7	-22°45.1
18	276°28.4	61°25.3	-20°51.3	328°21.2	-23°02.0	47°12.7	-17°23.1	3°19.1	-22°45.1
19	291°30.9	76°27.1	-20°51.8	343°22.8	-23°01.7	62°14.8	-17°23.2	18°21.4	-22°45.1
20	306°33.4	91°29.0	-20°52.3	358°24.3	-23°01.3	77°16.8	-17°23.3	33°23.8	-22°45.1
21	321°35.8	106°30.8	-20°52.7	13°25.9	-23°00.9	92°18.8	-17°23.5	48°26.2	-22°45.1
22	336°38.3	121°32.7	-20°53.2	28°27.4	-23°00.6	107°20.8	-17°23.6	63°28.5	-22°45.1
23	351°40.7	136°34.5	-20°53.7	43°28.9	-23°00.2	122°22.8	-17°23.7	78°30.9	-22°45.1
Mer.pass.:23:33		v1.8 d-0.5 m-4.5		v1.6 d0.4 m-1.4		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.7
Ankaa	353°11.7	-42°12.3
Schedar	349°35.9	56°38.3
Diphda	348°51.9	-17°53.0
Achernar	335°23.6	-57°08.5
Hamal	327°56.4	23°33.0
Polaris	315°51.1	89°20.3
Akamar	315°15.3	-40°13.7
Menkar	314°11.1	4°09.7
Mirfak	308°34.9	49°55.4
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°10.8
Capella	280°29.1	46°00.8
Bellatrix	278°28.1	6°21.9
Elnath	278°08.0	28°37.2
Alnilam	275°42.7	-1°11.4
Betelgeuse	270°57.4	7°24.6
Canopus	263°54.6	-52°42.1
Sirius	258°30.5	-16°44.2
Adara	255°09.8	-28°59.7
Procyon	244°56.0	5°10.8
Pollux	243°23.4	27°58.7
Avior	234°16.9	-59°33.9
Suhail	222°50.1	-43°30.3
Miaplacidus	221°39.6	-69°47.4
Alphard	217°52.8	-8°44.2
Regulus	207°40.0	11°52.7
Dubhe	193°48.0	61°39.0
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°12.0
Gacrux	171°57.5	-57°12.9
Alioth	166°18.2	55°51.7
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.5
Hadar	148°43.4	-60°27.7
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.4	-60°54.6
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.0	74°05.1
Alphecca	126°08.2	26°39.5
Antares	112°22.0	-26°28.2
Atria	107°20.8	-69°03.7
Sabik	102°08.5	-15°44.7
Shaula	96°17.1	-37°06.9
Rasalhague	96°03.2	12°33.2
Etamin	90°44.5	51°29.6
Kaus Aust.	83°39.1	-34°22.4
Vega	80°36.5	38°48.4
Nunki	75°53.9	-26°16.3
Altair	62°04.7	8°55.3
Peacock	53°13.3	-56°40.5
Deneb	49°28.8	45°21.1
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.2
Fomalhaut	15°19.8	-29°31.4
Scheat	13°49.6	28°11.2
Markab	13°34.5	15°18.5

2018/9/2	**SHA**	**Mer.pass**
Venus	145°44.9	14:00
Mars	52°51.4	20:11
Jupiter	131°14.3	14:58
Saturn	86°56.4	17:54

2018/9/2	**SHA**	**Mer.pass**
Venus	145°26.0	13:58
Mars	52°30.6	20:09
Jupiter	131°03.5	14:55
Saturn	86°54.4	17:51

2018/9/2	**SHA**	**Mer.pass**
Venus	145°08.7	13:55
Mars	52°09.2	20:06
Jupiter	130°52.6	14:52
Saturn	86°52.3	17:47

Horizontal paralax	
Venus:	0.4
Mars:	0.3

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°02.3	-0°44.9	1°37.8	14.1	-3°40.6	11.1	55.5
1	197°02.5	-0°45.8	16°10.9	14.1	-3°29.6	11.1	55.5
2	212°02.7	-0°46.8	30°44.0	14.1	-3°18.5	11.1	55.6
3	227°03.0	-0°47.8	45°17.0	14.0	-3°07.4	11.1	55.6
4	242°03.2	-0°48.8	59°50.1	14.0	-2°56.2	11.1	55.6
5	257°03.4	-0°49.7	74°23.1	14.0	-2°45.1	11.2	55.6
6	272°03.6	-0°50.7	88°56.1	14.0	-2°33.9	11.2	55.6
7	287°03.8	-0°51.7	103°29.1	14.0	-2°22.7	11.2	55.7
8	302°04.1	-0°52.6	118°02.1	14.0	-2°11.5	11.2	55.7
9	317°04.3	-0°53.6	132°35.1	14.0	-2°00.2	11.2	55.7
10	332°04.5	-0°54.6	147°08.1	14.0	-1°49.0	11.3	55.7
11	347°04.7	-0°55.6	161°41.0	13.9	-1°37.7	11.3	55.7
12	2°04.9	-0°56.5	176°14.0	13.9	-1°26.4	11.3	55.8
13	17°05.1	-0°57.5	190°46.9	13.9	-1°15.1	11.3	55.8
14	32°05.4	-0°58.5	205°19.8	13.9	-1°03.8	11.3	55.8
15	47°05.6	-0°59.5	219°52.7	13.9	-0°52.5	11.3	55.8
16	62°05.8	-1°00.4	234°25.6	13.9	-0°41.2	11.3	55.8
17	77°06.0	-1°01.4	248°58.4	13.8	-0°29.8	11.4	55.9
18	92°06.2	-1°02.4	263°31.3	13.8	-0°18.5	11.4	55.9
19	107°06.4	-1°03.3	278°04.1	13.8	-0°07.1	11.4	55.9
20	122°06.7	-1°04.3	292°36.9	13.8	0°04.3	11.4	55.9
21	137°06.9	-1°05.3	307°09.7	13.8	0°15.6	11.4	55.9
22	152°07.1	-1°06.3	321°42.4	13.7	0°27.0	11.4	56.0
23	167°07.3	-1°07.2	336°15.2	13.7	0°38.4	11.4	56.0
	SD.=15.9	d=-1.0	S.D.=15.1				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°07.5	-1°08.2	350°47.9	13.7	0°49.8	11.4	56.0
1	197°07.7	-1°09.2	5°20.6	13.7	1°01.2	11.4	56.0
2	212°07.9	-1°10.2	19°53.3	13.7	1°12.6	11.4	56.0
3	227°08.2	-1°11.1	34°25.9	13.6	1°24.1	11.4	56.1
4	242°08.4	-1°12.1	48°58.5	13.6	1°35.5	11.4	56.1
5	257°08.6	-1°13.1	63°31.1	13.6	1°46.9	11.4	56.1
6	272°08.8	-1°14.1	78°03.7	13.6	1°58.3	11.4	56.1
7	287°09.0	-1°15.0	92°36.2	13.5	2°09.7	11.4	56.1
8	302°09.2	-1°16.0	107°08.7	13.5	2°21.1	11.4	56.2
9	317°09.5	-1°17.0	121°41.2	13.5	2°32.5	11.4	56.2
10	332°09.7	-1°17.9	136°13.7	13.4	2°43.9	11.4	56.2
11	347°09.9	-1°18.9	150°46.1	13.4	2°55.3	11.4	56.2
12	2°10.1	-1°19.9	165°18.5	13.4	3°06.7	11.4	56.2
13	17°10.3	-1°20.9	179°50.9	13.3	3°18.1	11.4	56.3
14	32°10.5	-1°21.8	194°23.2	13.3	3°29.5	11.4	56.3
15	47°10.7	-1°22.8	208°55.5	13.3	3°40.9	11.4	56.3
16	62°11.0	-1°23.8	223°27.8	13.3	3°52.2	11.4	56.3
17	77°11.2	-1°24.8	238°00.0	13.2	4°03.6	11.4	56.3
18	92°11.4	-1°25.7	252°32.2	13.2	4°14.9	11.3	56.4
19	107°11.6	-1°26.7	267°04.4	13.1	4°26.3	11.3	56.4
20	122°11.8	-1°27.7	281°36.5	13.1	4°37.6	11.3	56.4
21	137°12.0	-1°28.6	296°08.6	13.1	4°48.9	11.3	56.4
22	152°12.2	-1°29.6	310°40.6	13.0	5°00.2	11.3	56.4
23	167°12.5	-1°30.6	325°12.7	13.0	5°11.5	11.3	56.5
	SD.=16.0	d=-1.0	S.D.=15.3				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°12.7	-1°31.6	339°44.6	13.0	5°22.7	11.3	56.5
1	197°12.9	-1°32.5	354°16.6	12.9	5°34.0	11.2	56.5
2	212°13.1	-1°33.5	8°48.5	12.9	5°45.2	11.2	56.5
3	227°13.3	-1°34.5	23°20.3	12.8	5°56.4	11.2	56.5
4	242°13.5	-1°35.5	37°52.2	12.8	6°07.6	11.2	56.6
5	257°13.7	-1°36.4	52°23.9	12.8	6°18.8	11.2	56.6
6	272°14.0	-1°37.4	66°55.7	12.7	6°29.9	11.1	56.6
7	287°14.2	-1°38.4	81°27.4	12.7	6°41.0	11.1	56.6
8	302°14.4	-1°39.3	95°59.0	12.6	6°52.1	11.1	56.6
9	317°14.6	-1°40.3	110°30.6	12.6	7°03.2	11.1	56.7
10	332°14.8	-1°41.3	125°02.2	12.5	7°14.2	11.0	56.7
11	347°15.0	-1°42.3	139°33.7	12.5	7°25.2	11.0	56.7
12	2°15.2	-1°43.2	154°05.2	12.4	7°36.2	11.0	56.7
13	17°15.4	-1°44.2	168°36.6	12.4	7°47.2	10.9	56.7
14	32°15.7	-1°45.2	183°08.0	12.4	7°58.1	10.9	56.8
15	47°15.9	-1°46.2	197°39.3	12.3	8°09.0	10.9	56.8
16	62°16.1	-1°47.1	212°10.6	12.3	8°19.9	10.8	56.8
17	77°16.3	-1°48.1	226°41.8	12.2	8°30.7	10.8	56.8
18	92°16.5	-1°49.1	241°13.0	12.2	8°41.5	10.8	56.9
19	107°16.7	-1°50.0	255°44.1	12.1	8°52.2	10.7	56.9
20	122°16.9	-1°51.0	270°15.2	12.1	9°03.0	10.7	56.9
21	137°17.1	-1°52.0	284°46.2	12.0	9°13.7	10.7	56.9
22	152°17.4	-1°53.0	299°17.2	12.0	9°24.3	10.6	56.9
23	167°17.6	-1°53.9	313°48.1	11.9	9°34.9	10.6	57.0
	SD.=16.0	d=-1.0	S.D.=15.4				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:21	04:48	05:56	17:44	18:52	20:17
70	03:38	04:54	05:55	17:45	18:46	20:01
68	03:51	04:59	05:55	17:46	18:41	19:49
66	04:01	05:03	05:54	17:47	18:38	19:39
64	04:09	05:07	05:54	17:47	18:34	19:31
62	04:16	05:09	05:54	17:48	18:32	19:24
60	04:22	05:12	05:53	17:48	18:29	19:19
58	04:27	05:14	05:53	17:48	18:27	19:14
56	04:32	05:16	05:53	17:49	18:26	19:09
54	04:36	05:17	05:53	17:49	18:24	19:06
52	04:39	05:19	05:52	17:49	18:23	19:02
50	04:42	05:20	05:52	17:50	18:22	18:59
45	04:48	05:22	05:52	17:50	18:19	18:54
40	04:53	05:24	05:51	17:51	18:18	18:49
35	04:56	05:26	05:51	17:51	18:17	18:46
30	04:59	05:27	05:50	17:52	18:16	18:43
20	05:02	05:28	05:50	17:53	18:15	18:40
10	05:04	05:28	05:49	17:54	18:15	18:39
0	05:03	05:27	05:48	17:55	18:15	18:39
-10	05:02	05:26	05:47	17:56	18:17	18:41
-20	04:58	05:24	05:46	17:57	18:19	18:45
-30	04:53	05:21	05:45	17:58	18:22	18:50
-35	04:49	05:19	05:44	17:59	18:25	18:54
-40	04:44	05:16	05:43	18:00	18:27	18:59
-45	04:38	05:12	05:42	18:02	18:31	19:06
-50	04:30	05:08	05:40	18:03	18:36	19:14
-52	04:26	05:06	05:40	18:04	18:38	19:18
-54	04:21	05:04	05:39	18:05	18:40	19:23
-56	04:16	05:01	05:38	18:06	18:43	19:28
-58	04:11	04:58	05:37	18:07	18:46	19:34
-60	04:04	04:55	05:36	18:08	18:50	19:41

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	18:31	18:18	18:05	05:29	07:16	09:06
70	18:30	18:24	18:17	05:33	07:13	08:56
68	18:30	18:29	18:28	05:36	07:10	08:47
66	18:30	18:33	18:36	05:39	07:08	08:40
64	18:30	18:36	18:43	05:41	07:07	08:34
62	18:29	18:39	18:50	05:43	07:05	08:29
60	18:29	18:42	18:55	05:45	07:04	08:25
58	18:29	18:44	19:00	05:46	07:03	08:21
56	18:29	18:46	19:04	05:48	07:02	08:17
54	18:29	18:48	19:08	05:49	07:01	08:14
52	18:29	18:50	19:12	05:50	06:60	08:11
50	18:28	18:51	19:15	05:51	06:59	08:09
45	18:28	18:54	19:22	05:53	06:57	08:03
40	18:28	18:57	19:28	05:55	06:56	07:59
35	18:28	18:60	19:33	05:56	06:55	07:55
30	18:28	19:02	19:38	05:58	06:54	07:51
20	18:28	19:06	19:46	06:00	06:52	07:45
10	18:27	19:09	19:53	06:02	06:50	07:40
0	18:27	19:13	19:59	06:04	06:49	07:35
-10	18:27	19:16	20:06	06:06	06:47	07:30
-20	18:27	19:19	20:13	06:08	06:46	07:25
-30	18:27	19:23	20:22	06:10	06:44	07:19
-35	18:27	19:26	20:26	06:11	06:43	07:15
-40	18:27	19:28	20:32	06:13	06:41	07:11
-45	18:26	19:32	20:38	06:14	06:40	07:07
-50	18:26	19:35	20:46	06:16	06:38	07:01
-52	18:26	19:37	20:49	06:17	06:37	06:59
-54	18:26	19:39	20:53	06:18	06:37	06:56
-56	18:26	19:41	20:57	06:19	06:36	06:53
-58	18:26	19:43	21:02	06:20	06:35	06:50
-60	18:26	19:46	21:08	06:21	06:33	06:46

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
25	08:09	08:20	11:51	00:37	12:15	16(100%)
26	08:30	08:40	11:51	00:37	13:00	17(98%)
27	08:51	09:01	11:50	01:23	13:47	18(94%)

September 28, 29 ,30 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	6°43.2	151°36.4	-20°54.2	58°30.5	-22°59.8	137°24.8	-17°23.8	93°33.3	-22°45.1
1	21°45.7	166°38.2	-20°54.6	73°32.0	-22°59.5	152°26.8	-17°24.0	108°35.6	-22°45.1
2	36°48.1	181°40.1	-20°55.1	88°33.6	-22°59.1	167°28.8	-17°24.1	123°38.0	-22°45.1
3	51°50.6	196°42.0	-20°55.6	103°35.1	-22°58.7	182°30.8	-17°24.2	138°40.4	-22°45.1
4	66°53.1	211°43.8	-20°56.0	118°36.6	-22°58.4	197°32.8	-17°24.3	153°42.8	-22°45.1
5	81°55.5	226°45.7	-20°56.5	133°38.2	-22°58.0	212°34.8	-17°24.5	168°45.1	-22°45.1
6	96°58.0	241°47.6	-20°57.0	148°39.7	-22°57.6	227°36.8	-17°24.6	183°47.5	-22°45.1
7	112°00.5	256°49.5	-20°57.4	163°41.3	-22°57.3	242°38.8	-17°24.7	198°49.9	-22°45.1
8	127°02.9	271°51.3	-20°57.9	178°42.8	-22°56.9	257°40.8	-17°24.8	213°52.2	-22°45.1
9	142°05.4	286°53.2	-20°58.4	193°44.3	-22°56.5	272°42.8	-17°25.0	228°54.6	-22°45.1
10	157°07.8	301°55.1	-20°58.8	208°45.9	-22°56.2	287°44.8	-17°25.1	243°57.0	-22°45.1
11	172°10.3	316°57.0	-20°59.3	223°47.4	-22°55.8	302°46.8	-17°25.2	258°59.3	-22°45.1
12	187°12.8	331°58.9	-20°59.7	238°48.9	-22°55.4	317°48.8	-17°25.3	274°01.7	-22°45.1
13	202°15.2	347°00.8	-21°00.2	253°50.4	-22°55.0	332°50.8	-17°25.5	289°04.1	-22°45.2
14	217°17.7	2°02.7	-21°00.6	268°52.0	-22°54.7	347°52.8	-17°25.6	304°06.4	-22°45.2
15	232°20.2	17°04.6	-21°01.1	283°53.5	-22°54.3	2°54.8	-17°25.7	319°08.8	-22°45.2
16	247°22.6	32°06.5	-21°01.5	298°55.0	-22°53.9	17°56.8	-17°25.8	334°11.2	-22°45.2
17	262°25.1	47°08.4	-21°02.0	313°56.6	-22°53.6	32°58.8	-17°26.0	349°13.5	-22°45.2
18	277°27.6	62°10.3	-21°02.4	328°58.1	-22°53.2	48°00.8	-17°26.1	4°15.9	-22°45.2
19	292°30.0	77°12.2	-21°02.9	343°59.6	-22°52.8	63°02.8	-17°26.2	19°18.3	-22°45.2
20	307°32.5	92°14.2	-21°03.3	359°01.1	-22°52.5	78°04.8	-17°26.3	34°20.6	-22°45.2
21	322°35.0	107°16.1	-21°03.8	14°02.7	-22°52.1	93°06.8	-17°26.5	49°23.0	-22°45.2
22	337°37.4	122°18.0	-21°04.2	29°04.2	-22°51.7	108°08.8	-17°26.6	64°25.4	-22°45.2
23	352°39.9	137°19.9	-21°04.7	44°05.7	-22°51.3	123°10.8	-17°26.7	79°27.7	-22°45.2
Mer.pass.:23:29		v1.9 d-0.5 m-4.5		v1.5 d0.4 m-1.4		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	7°42.3	152°21.9	-21°05.1	59°07.2	-22°51.0	138°12.8	-17°26.8	94°30.1	-22°45.2
1	22°44.8	167°23.8	-21°05.5	74°08.7	-22°50.6	153°14.8	-17°27.0	109°32.5	-22°45.2
2	37°47.3	182°25.7	-21°06.0	89°10.3	-22°50.2	168°16.8	-17°27.1	124°34.8	-22°45.2
3	52°49.7	197°27.7	-21°06.4	104°11.8	-22°49.8	183°18.8	-17°27.2	139°37.2	-22°45.2
4	67°52.2	212°29.6	-21°06.8	119°13.3	-22°49.5	198°20.8	-17°27.3	154°39.6	-22°45.2
5	82°54.7	227°31.6	-21°07.3	134°14.8	-22°49.1	213°22.8	-17°27.5	169°41.9	-22°45.2
6	97°57.1	242°33.5	-21°07.7	149°16.3	-22°48.7	228°24.8	-17°27.6	184°44.3	-22°45.2
7	112°59.6	257°35.5	-21°08.1	164°17.8	-22°48.3	243°26.8	-17°27.7	199°46.7	-22°45.2
8	128°02.1	272°37.5	-21°08.5	179°19.4	-22°48.0	258°28.8	-17°27.8	214°49.0	-22°45.2
9	143°04.5	287°39.4	-21°09.0	194°20.9	-22°47.6	273°30.8	-17°28.0	229°51.4	-22°45.2
10	158°07.0	302°41.4	-21°09.4	209°22.4	-22°47.2	288°32.8	-17°28.1	244°53.7	-22°45.2
11	173°09.5	317°43.4	-21°09.8	224°23.9	-22°46.8	303°34.8	-17°28.2	259°56.1	-22°45.2
12	188°11.9	332°45.3	-21°10.2	239°25.4	-22°46.5	318°36.8	-17°28.3	274°58.5	-22°45.2
13	203°14.4	347°47.3	-21°10.6	254°26.9	-22°46.1	333°38.8	-17°28.5	290°00.8	-22°45.2
14	218°16.8	2°49.3	-21°11.1	269°28.4	-22°45.7	348°40.8	-17°28.6	305°03.2	-22°45.2
15	233°19.3	17°51.3	-21°11.5	284°29.9	-22°45.3	3°42.8	-17°28.7	320°05.6	-22°45.3
16	248°21.8	32°53.3	-21°11.9	299°31.4	-22°45.0	18°44.8	-17°28.8	335°07.9	-22°45.3
17	263°24.2	47°55.2	-21°12.3	314°32.9	-22°44.6	33°46.8	-17°29.0	350°10.3	-22°45.3
18	278°26.7	62°57.2	-21°12.7	329°34.5	-22°44.2	48°48.8	-17°29.1	5°12.7	-22°45.3
19	293°29.2	77°59.2	-21°13.1	344°36.0	-22°43.8	63°50.8	-17°29.2	20°15.0	-22°45.3
20	308°31.6	93°01.2	-21°13.5	359°37.5	-22°43.4	78°52.8	-17°29.3	35°17.4	-22°45.3
21	323°34.1	108°03.2	-21°13.9	14°39.0	-22°43.1	93°54.8	-17°29.5	50°19.7	-22°45.3
22	338°36.6	123°05.2	-21°14.3	29°40.5	-22°42.7	108°56.8	-17°29.6	65°22.1	-22°45.3
23	353°39.0	138°07.2	-21°14.7	44°42.0	-22°42.3	123°58.8	-17°29.7	80°24.5	-22°45.3
Mer.pass.:23:25		v1.9 d-0.4 m-4.5		v1.5 d0.4 m-1.4		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	8°41.5	153°09.3	-21°15.1	59°43.5	-22°41.9	139°00.8	-17°29.8	95°26.8	-22°45.3
1	23°43.9	168°11.3	-21°15.5	74°45.0	-22°41.5	154°02.8	-17°30.0	110°29.2	-22°45.3
2	38°46.4	183°13.3	-21°15.9	89°46.5	-22°41.2	169°04.8	-17°30.1	125°31.5	-22°45.3
3	53°48.9	198°15.3	-21°16.3	104°48.0	-22°40.8	184°06.8	-17°30.2	140°33.9	-22°45.3
4	68°51.3	213°17.3	-21°16.7	119°49.5	-22°40.4	199°08.8	-17°30.3	155°36.3	-22°45.3
5	83°53.8	228°19.4	-21°17.1	134°51.0	-22°40.0	214°10.8	-17°30.5	170°38.6	-22°45.3
6	98°56.3	243°21.4	-21°17.5	149°52.5	-22°39.6	229°12.8	-17°30.6	185°41.0	-22°45.3
7	113°58.7	258°23.4	-21°17.9	164°53.9	-22°39.3	244°14.8	-17°30.7	200°43.3	-22°45.3
8	129°01.2	273°25.5	-21°18.3	179°55.4	-22°38.9	259°16.8	-17°30.8	215°45.7	-22°45.3
9	144°03.7	288°27.5	-21°18.7	194°56.9	-22°38.5	274°18.8	-17°31.0	230°48.1	-22°45.3
10	159°06.1	303°29.6	-21°19.1	209°58.4	-22°38.1	289°20.8	-17°31.1	245°50.4	-22°45.3
11	174°08.6	318°31.6	-21°19.4	224°59.9	-22°37.7	304°22.7	-17°31.2	260°52.8	-22°45.3
12	189°11.1	333°33.7	-21°19.8	240°01.4	-22°37.4	319°24.7	-17°31.3	275°55.1	-22°45.3
13	204°13.5	348°35.7	-21°20.2	255°02.9	-22°37.0	334°26.7	-17°31.5	290°57.5	-22°45.3
14	219°16.0	3°37.8	-21°20.6	270°04.4	-22°36.6	349°28.7	-17°31.6	305°59.9	-22°45.3
15	234°18.4	18°39.9	-21°21.0	285°05.9	-22°36.2	4°30.7	-17°31.7	321°02.2	-22°45.3
16	249°20.9	33°41.9	-21°21.3	300°07.4	-22°35.8	19°32.7	-17°31.8	336°04.6	-22°45.3
17	264°23.4	48°44.0	-21°21.7	315°08.9	-22°35.4	34°34.7	-17°32.0	351°06.9	-22°45.3
18	279°25.8	63°46.1	-21°22.1	330°10.3	-22°35.1	49°36.7	-17°32.1	6°09.3	-22°45.3
19	294°28.3	78°48.2	-21°22.5	345°11.8	-22°34.7	64°38.7	-17°32.2	21°11.7	-22°45.4
20	309°30.8	93°50.2	-21°22.8	0°13.3	-22°34.3	79°40.7	-17°32.3	36°14.0	-22°45.4
21	324°33.2	108°52.3	-21°23.2	15°14.8	-22°33.9	94°42.7	-17°32.5	51°16.4	-22°45.4
22	339°35.7	123°54.4	-21°23.6	30°16.3	-22°33.5	109°44.7	-17°32.6	66°18.7	-22°45.4
23	354°38.2	138°56.5	-21°23.9	45°17.8	-22°33.1	124°46.7	-17°32.7	81°21.1	-22°45.4
Mer.pass.:23:21		v2.0 d-0.4 m-4.5		v1.5 d0.4 m-1.3		v2.0 d-0.1 m-1.7		v2.4 d-0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.7
Ankaa	353°11.7	-42°12.3
Schedar	349°35.9	56°38.4
Diphda	348°51.9	-17°53.0
Achernar	335°23.6	-57°08.5
Hamal	327°56.4	23°33.0
Polaris	315°50.1	89°20.3
Akamar	315°15.3	-40°13.7
Menkar	314°11.1	4°09.7
Mirfak	308°34.9	49°55.4
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°10.8
Capella	280°29.0	46°00.8
Bellatrix	278°28.1	6°21.9
Elnath	278°08.0	28°37.2
Alnilam	275°42.7	-1°11.4
Betelgeuse	270°57.4	7°24.6
Canopus	263°54.5	-52°42.1
Sirius	258°30.5	-16°44.2
Adara	255°09.8	-28°59.7
Procyon	244°56.0	5°10.8
Pollux	243°23.4	27°58.7
Avior	234°16.9	-59°33.9
Suhail	222°50.1	-43°30.2
Miaplacidus	221°39.5	-69°47.4
Alphard	217°52.8	-8°44.2
Regulus	207°39.9	11°52.6
Dubhe	193°48.0	61°39.0
Denebola	182°30.3	14°28.3
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°12.0
Gacrux	171°57.5	-57°12.9
Alioth	166°18.2	55°51.7
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.5
Hadar	148°43.4	-60°27.7
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.4	-60°54.6
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.1	74°05.1
Alphecca	126°08.2	26°39.5
Antares	112°22.0	-26°28.2
Atria	107°20.8	-69°03.7
Sabik	102°08.6	-15°44.7
Shaula	96°17.2	-37°06.9
Rasalhague	96°03.2	12°33.2
Etamin	90°44.6	51°29.6
Kaus Aust.	83°39.1	-34°22.4
Vega	80°36.6	38°48.4
Nunki	75°53.9	-26°16.3
Altair	62°04.7	8°55.3
Peacock	53°13.4	-56°40.6
Deneb	49°28.8	45°21.2
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.2
Fomalhaut	15°19.8	-29°31.4
Scheat	13°49.6	28°11.2
Markab	13°34.5	15°18.5

2018/9/2	**SHA**	**Mer.pass**
Venus	144°53.2	13:52
Mars	51°47.3	20:04
Jupiter	130°41.6	14:48
Saturn	86°50.1	17:43

2018/9/2	**SHA**	**Mer.pass**
Venus	144°39.5	13:49
Mars	51°24.9	20:02
Jupiter	130°30.5	14:45
Saturn	86°47.8	17:39

2018/9/3	**SHA**	**Mer.pass**
Venus	144°27.8	13:46
Mars	51°02.0	19:59
Jupiter	130°19.3	14:42
Saturn	86°45.3	17:35

Horizontal paralax	
Venus:	0.4
Mars:	0.2

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°17.8	-1°54.9	328°19.0	11.8	9°45.5	10.5	57.0
1	197°18.0	-1°55.9	342°49.8	11.8	9°56.0	10.5	57.0
2	212°18.2	-1°56.9	357°20.6	11.7	10°06.5	10.5	57.0
3	227°18.4	-1°57.8	11°51.3	11.7	10°16.9	10.4	57.0
4	242°18.6	-1°58.8	26°22.0	11.6	10°27.3	10.4	57.1
5	257°18.8	-1°59.8	40°52.6	11.6	10°37.7	10.3	57.1
6	272°19.0	-2°00.7	55°23.1	11.5	10°48.0	10.3	57.1
7	287°19.3	-2°01.7	69°53.6	11.5	10°58.2	10.2	57.1
8	302°19.5	-2°02.7	84°24.0	11.4	11°08.4	10.2	57.1
9	317°19.7	-2°03.7	98°54.4	11.3	11°18.6	10.1	57.2
10	332°19.9	-2°04.6	113°24.7	11.3	11°28.7	10.1	57.2
11	347°20.1	-2°05.6	127°55.0	11.2	11°38.8	10.0	57.2
12	2°20.3	-2°06.6	142°25.2	11.2	11°48.8	10.0	57.2
13	17°20.5	-2°07.5	156°55.3	11.1	11°58.7	9.9	57.2
14	32°20.7	-2°08.5	171°25.4	11.0	12°08.6	9.9	57.3
15	47°20.9	-2°09.5	185°55.4	11.0	12°18.4	9.8	57.3
16	62°21.1	-2°10.5	200°25.4	10.9	12°28.2	9.7	57.3
17	77°21.4	-2°11.4	214°55.3	10.9	12°37.9	9.7	57.3
18	92°21.6	-2°12.4	229°25.1	10.8	12°47.6	9.6	57.3
19	107°21.8	-2°13.4	243°54.9	10.7	12°57.2	9.6	57.4
20	122°22.0	-2°14.4	258°24.6	10.7	13°06.7	9.5	57.4
21	137°22.2	-2°15.3	272°54.2	10.6	13°16.2	9.4	57.4
22	152°22.4	-2°16.3	287°23.8	10.6	13°25.6	9.4	57.4
23	167°22.6	-2°17.3	301°53.3	10.5	13°35.0	9.3	57.4
	SD.=16.0	d=-1.0			S.D.=15.5		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°22.8	-2°18.2	316°22.8	10.4	13°44.2	9.2	57.5
1	197°23.0	-2°19.2	330°52.2	10.4	13°53.4	9.2	57.5
2	212°23.2	-2°20.2	345°21.5	10.3	14°02.6	9.1	57.5
3	227°23.5	-2°21.2	359°50.8	10.2	14°11.7	9.0	57.5
4	242°23.7	-2°22.1	14°20.0	10.2	14°20.7	9.0	57.5
5	257°23.9	-2°23.1	28°49.1	10.1	14°29.6	8.9	57.6
6	272°24.1	-2°24.1	43°18.2	10.0	14°38.5	8.8	57.6
7	287°24.3	-2°25.0	57°47.2	10.0	14°47.2	8.7	57.6
8	302°24.5	-2°26.0	72°16.1	9.9	14°56.0	8.7	57.6
9	317°24.7	-2°27.0	86°45.0	9.8	15°04.6	8.6	57.6
10	332°24.9	-2°28.0	101°13.8	9.8	15°13.1	8.5	57.7
11	347°25.1	-2°28.9	115°42.5	9.7	15°21.6	8.4	57.7
12	2°25.3	-2°29.9	130°11.2	9.6	15°30.0	8.4	57.7
13	17°25.5	-2°30.9	144°39.8	9.6	15°38.3	8.3	57.7
14	32°25.7	-2°31.8	159°08.4	9.5	15°46.6	8.2	57.7
15	47°25.9	-2°32.8	173°36.8	9.4	15°54.7	8.1	57.8
16	62°26.2	-2°33.8	188°05.3	9.4	16°02.8	8.0	57.8
17	77°26.4	-2°34.8	202°33.6	9.3	16°10.8	7.9	57.8
18	92°26.6	-2°35.7	217°01.9	9.2	16°18.7	7.9	57.8
19	107°26.8	-2°36.7	231°30.1	9.2	16°26.5	7.8	57.8
20	122°27.0	-2°37.7	245°58.2	9.1	16°34.2	7.7	57.9
21	137°27.2	-2°38.6	260°26.3	9.0	16°41.9	7.6	57.9
22	152°27.4	-2°39.6	274°54.3	9.0	16°49.4	7.5	57.9
23	167°27.6	-2°40.6	289°22.3	8.9	16°56.9	7.4	57.9
	SD.=16.0	d=-1.0			S.D.=15.7		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°27.8	-2°41.6	303°50.1	8.8	17°04.3	7.3	57.9
1	197°28.0	-2°42.5	318°17.9	8.8	17°11.5	7.2	58.0
2	212°28.2	-2°43.5	332°45.7	8.7	17°18.7	7.1	58.0
3	227°28.4	-2°44.5	347°13.4	8.6	17°25.8	7.0	58.0
4	242°28.6	-2°45.4	1°41.0	8.6	17°32.8	6.9	58.0
5	257°28.8	-2°46.4	16°08.5	8.5	17°39.7	6.8	58.0
6	272°29.0	-2°47.4	30°36.0	8.4	17°46.5	6.7	58.1
7	287°29.2	-2°48.3	45°03.4	8.4	17°53.1	6.6	58.1
8	302°29.5	-2°49.3	59°30.8	8.3	17°59.7	6.5	58.1
9	317°29.7	-2°50.3	73°58.0	8.3	18°06.2	6.4	58.1
10	332°29.9	-2°51.3	88°25.3	8.2	18°12.6	6.3	58.1
11	347°30.1	-2°52.2	102°52.4	8.1	18°18.9	6.2	58.1
12	2°30.3	-2°53.2	117°19.5	8.1	18°25.1	6.1	58.2
13	17°30.5	-2°54.2	131°46.5	8.0	18°31.1	6.0	58.2
14	32°30.7	-2°55.1	146°13.5	7.9	18°37.1	5.9	58.2
15	47°30.9	-2°56.1	160°40.4	7.9	18°43.0	5.8	58.2
16	62°31.1	-2°57.1	175°07.3	7.8	18°48.7	5.7	58.2
17	77°31.3	-2°58.0	189°34.0	7.7	18°54.4	5.6	58.3
18	92°31.5	-2°59.0	204°00.8	7.7	18°59.9	5.5	58.3
19	107°31.7	-2°60.0	218°27.4	7.6	19°05.3	5.4	58.3
20	122°31.9	-3°01.0	232°54.0	7.6	19°10.6	5.3	58.3
21	137°32.1	-3°01.9	247°20.6	7.5	19°15.8	5.1	58.3
22	152°32.3	-3°02.9	261°47.0	7.4	19°20.9	5.0	58.4
23	167°32.5	-3°03.9	276°13.5	7.4	19°25.9	4.9	58.4
	SD.=16.0	d=-1.0			S.D.=15.8		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:38	05:02	06:09	17:29	18:36	19:59
70	03:52	05:06	06:07	17:31	18:32	19:46
68	04:03	05:10	06:05	17:33	18:29	19:35
66	04:11	05:13	06:04	17:35	18:26	19:27
64	04:19	05:15	06:03	17:37	18:24	19:20
62	04:25	05:17	06:01	17:38	18:22	19:14
60	04:30	05:19	06:00	17:39	18:20	19:09
58	04:34	05:20	05:60	17:40	18:19	19:05
56	04:38	05:22	05:59	17:41	18:18	19:01
54	04:41	05:23	05:58	17:42	18:17	18:58
52	04:44	05:24	05:57	17:42	18:16	18:55
50	04:47	05:24	05:57	17:43	18:15	18:53
45	04:52	05:26	05:55	17:45	18:14	18:48
40	04:56	05:27	05:54	17:46	18:13	18:44
35	04:58	05:28	05:53	17:47	18:12	18:42
30	05:00	05:28	05:52	17:48	18:12	18:40
20	05:03	05:28	05:50	17:50	18:12	18:38
10	05:03	05:28	05:49	17:52	18:13	18:37
0	05:02	05:26	05:47	17:54	18:14	18:38
-10	04:60	05:24	05:45	17:55	18:16	18:41
-20	04:56	05:21	05:43	17:58	18:20	18:45
-30	04:49	05:17	05:41	18:00	18:24	18:52
-35	04:45	05:14	05:40	18:02	18:27	18:57
-40	04:39	05:11	05:38	18:03	18:30	19:02
-45	04:32	05:07	05:36	18:05	18:35	19:10
-50	04:23	05:01	05:34	18:08	18:40	19:19
-52	04:18	04:59	05:33	18:09	18:43	19:24
-54	04:13	04:56	05:32	18:10	18:46	19:29
-56	04:08	04:53	05:30	18:12	18:49	19:35
-58	04:01	04:49	05:29	18:13	18:53	19:41
-60	03:54	04:45	05:27	18:15	18:57	19:49

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	17:47	17:20	–:–	11:04	13:18	–:–
70	18:10	18:00	17:45	10:43	12:38	14:46
68	18:27	18:28	18:33	10:27	12:11	13:58
66	18:41	18:50	19:04	10:14	11:51	13:28
64	18:53	19:07	19:28	10:04	11:35	13:05
62	19:03	19:21	19:46	09:55	11:21	12:47
60	19:12	19:33	20:02	09:47	11:10	12:32
58	19:19	19:43	20:15	09:40	11:00	12:19
56	19:26	19:52	20:26	09:34	10:52	12:08
54	19:32	20:00	20:36	09:29	10:44	11:59
52	19:37	20:08	20:45	09:24	10:37	11:50
50	19:42	20:14	20:53	09:20	10:31	11:42
45	19:53	20:28	21:10	09:10	10:18	11:26
40	20:02	20:40	21:24	09:02	10:07	11:13
35	20:10	20:50	21:36	08:56	09:58	11:01
30	20:17	20:59	21:46	08:50	09:50	10:52
20	20:28	21:14	22:04	08:40	09:36	10:35
10	20:39	21:28	22:20	08:31	09:24	10:20
0	20:49	21:40	22:35	08:23	09:13	10:06
-10	20:58	21:53	22:50	08:14	09:02	09:52
-20	21:09	22:07	23:05	08:06	08:50	09:37
-30	21:21	22:22	23:24	07:56	08:36	09:21
-35	21:28	22:31	23:34	07:50	08:28	09:11
-40	21:36	22:42	23:47	07:43	08:19	08:60
-45	21:46	22:54	–:–	07:36	08:08	08:47
-50	21:57	23:09	–:–	07:27	07:56	08:31
-52	22:03	23:16	–:–	07:23	07:50	08:23
-54	22:09	23:24	–:–	07:18	07:43	08:15
-56	22:15	23:33	–:–	07:13	07:36	08:06
-58	22:23	23:43	–:–	07:07	07:28	07:55
-60	22:31	23:54	–:–	07:01	07:19	07:43

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
28	09:11	09:21	11:50	02:10	14:35	19(88%)
29	09:31	09:41	11:50	03:00	15:26	20(80%)
30	09:51	10:01	11:49	03:53	16:20	21(71%)

October 01, 02 ,03 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	9°40.6	153°58.6	-21°24.3	60°19.2	-22°32.7	139°48.7	-17°32.8	96°23.4	-22°45.4
1	24°43.1	169°00.7	-21°24.6	75°20.7	-22°32.4	154°50.7	-17°33.0	111°25.8	-22°45.4
2	39°45.6	184°02.8	-21°25.0	90°22.2	-22°32.0	169°52.7	-17°33.1	126°28.2	-22°45.4
3	54°48.0	199°04.9	-21°25.4	105°23.7	-22°31.6	184°54.7	-17°33.2	141°30.5	-22°45.4
4	69°50.5	214°07.0	-21°25.7	120°25.2	-22°31.2	199°56.6	-17°33.4	156°32.9	-22°45.4
5	84°52.9	229°09.1	-21°26.1	135°26.6	-22°30.8	214°58.6	-17°33.5	171°35.2	-22°45.4
6	99°55.4	244°11.3	-21°26.4	150°28.1	-22°30.4	230°00.6	-17°33.6	186°37.6	-22°45.4
7	114°57.9	259°13.4	-21°26.8	165°29.6	-22°30.0	245°02.6	-17°33.7	201°39.9	-22°45.4
8	130°00.3	274°15.5	-21°27.1	180°31.1	-22°29.6	260°04.6	-17°33.9	216°42.3	-22°45.4
9	145°02.8	289°17.6	-21°27.5	195°32.5	-22°29.3	275°06.6	-17°34.0	231°44.7	-22°45.4
10	160°05.3	304°19.8	-21°27.8	210°34.0	-22°28.9	290°08.6	-17°34.1	246°47.0	-22°45.4
11	175°07.7	319°21.9	-21°28.2	225°35.5	-22°28.5	305°10.6	-17°34.2	261°49.4	-22°45.4
12	190°10.2	334°24.0	-21°28.5	240°37.0	-22°28.1	320°12.6	-17°34.4	276°51.7	-22°45.4
13	205°12.7	349°26.2	-21°28.8	255°38.4	-22°27.7	335°14.6	-17°34.5	291°54.1	-22°45.4
14	220°15.1	4°28.3	-21°29.2	270°39.9	-22°27.3	350°16.6	-17°34.6	306°56.4	-22°45.4
15	235°17.6	19°30.5	-21°29.5	285°41.4	-22°26.9	5°18.6	-17°34.7	321°58.8	-22°45.4
16	250°20.0	34°32.6	-21°29.8	300°42.8	-22°26.5	20°20.5	-17°34.9	337°01.1	-22°45.4
17	265°22.5	49°34.8	-21°30.2	315°44.3	-22°26.1	35°22.5	-17°35.0	352°03.5	-22°45.4
18	280°25.0	64°36.9	-21°30.5	330°45.8	-22°25.8	50°24.5	-17°35.1	7°05.9	-22°45.4
19	295°27.4	79°39.1	-21°30.8	345°47.2	-22°25.4	65°26.5	-17°35.2	22°08.2	-22°45.4
20	310°29.9	94°41.3	-21°31.2	0°48.7	-22°25.0	80°28.5	-17°35.4	37°10.6	-22°45.4
21	325°32.4	109°43.4	-21°31.5	15°50.2	-22°24.6	95°30.5	-17°35.5	52°12.9	-22°45.4
22	340°34.8	124°45.6	-21°31.8	30°51.6	-22°24.2	110°32.5	-17°35.6	67°15.3	-22°45.4
23	355°37.3	139°47.8	-21°32.2	45°53.1	-22°23.8	125°34.5	-17°35.7	82°17.6	-22°45.4
Mer.pass.:23:17		v2.1 d-0.4 m-4.5		v1.5 d0.4 m-1.3		v2.0 d-0.1 m-1.6		v2.4 d-0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	10°39.8	154°50.0	-21°32.5	60°54.6	-22°23.4	140°36.5	-17°35.9	97°20.0	-22°45.5
1	25°42.2	169°52.1	-21°32.8	75°56.0	-22°23.0	155°38.5	-17°36.0	112°22.3	-22°45.5
2	40°44.7	184°54.3	-21°33.1	90°57.5	-22°22.6	170°40.4	-17°36.1	127°24.7	-22°45.5
3	55°47.2	199°56.5	-21°33.4	105°58.9	-22°22.2	185°42.4	-17°36.2	142°27.0	-22°45.5
4	70°49.6	214°58.7	-21°33.7	121°00.4	-22°21.8	200°44.4	-17°36.4	157°29.4	-22°45.5
5	85°52.1	230°00.9	-21°34.1	136°01.9	-22°21.4	215°46.4	-17°36.5	172°31.7	-22°45.5
6	100°54.5	245°03.1	-21°34.4	151°03.3	-22°21.1	230°48.4	-17°36.6	187°34.1	-22°45.5
7	115°57.0	260°05.3	-21°34.7	166°04.8	-22°20.7	245°50.4	-17°36.8	202°36.4	-22°45.5
8	130°59.5	275°07.5	-21°35.0	181°06.2	-22°20.3	260°52.4	-17°36.9	217°38.8	-22°45.5
9	146°01.9	290°09.7	-21°35.3	196°07.7	-22°19.9	275°54.4	-17°37.0	232°41.1	-22°45.5
10	161°04.4	305°12.0	-21°35.6	211°09.1	-22°19.5	290°56.4	-17°37.1	247°43.5	-22°45.5
11	176°06.9	320°14.2	-21°35.9	226°10.6	-22°19.1	305°58.3	-17°37.3	262°45.8	-22°45.5
12	191°09.3	335°16.4	-21°36.2	241°12.0	-22°18.7	321°00.3	-17°37.4	277°48.2	-22°45.5
13	206°11.8	350°18.6	-21°36.5	256°13.5	-22°18.3	336°02.3	-17°37.5	292°50.5	-22°45.5
14	221°14.3	5°20.9	-21°36.8	271°14.9	-22°17.9	351°04.3	-17°37.6	307°52.9	-22°45.5
15	236°16.7	20°23.1	-21°37.1	286°16.4	-22°17.5	6°06.3	-17°37.8	322°55.2	-22°45.5
16	251°19.2	35°25.3	-21°37.4	301°17.8	-22°17.1	21°08.3	-17°37.9	337°57.6	-22°45.5
17	266°21.7	50°27.6	-21°37.7	316°19.3	-22°16.7	36°10.3	-17°38.0	352°59.9	-22°45.5
18	281°24.1	65°29.8	-21°38.0	331°20.7	-22°16.3	51°12.3	-17°38.1	8°02.3	-22°45.5
19	296°26.6	80°32.1	-21°38.3	346°22.2	-22°15.9	66°14.2	-17°38.3	23°04.6	-22°45.5
20	311°29.0	95°34.3	-21°38.5	1°23.6	-22°15.5	81°16.2	-17°38.4	38°07.0	-22°45.5
21	326°31.5	110°36.6	-21°38.8	16°25.1	-22°15.1	96°18.2	-17°38.5	53°09.3	-22°45.5
22	341°34.0	125°38.8	-21°39.1	31°26.5	-22°14.7	111°20.2	-17°38.6	68°11.7	-22°45.5
23	356°36.4	140°41.1	-21°39.4	46°28.0	-22°14.3	126°22.2	-17°38.8	83°14.0	-22°45.5
Mer.pass.:23:13		v2.2 d-0.3 m-4.4		v1.5 d0.4 m-1.3		v2.0 d-0.1 m-1.6		v2.4 d-0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	11°38.9	155°43.4	-21°39.7	61°29.4	-22°13.9	141°24.2	-17°38.9	98°16.4	-22°45.5
1	26°41.4	170°45.6	-21°40.0	76°30.9	-22°13.5	156°26.2	-17°39.0	113°18.7	-22°45.5
2	41°43.8	185°47.9	-21°40.2	91°32.3	-22°13.1	171°28.1	-17°39.1	128°21.1	-22°45.5
3	56°46.3	200°50.2	-21°40.5	106°33.7	-22°12.7	186°30.1	-17°39.3	143°23.4	-22°45.5
4	71°48.8	215°52.5	-21°40.8	121°35.2	-22°12.3	201°32.1	-17°39.4	158°25.8	-22°45.5
5	86°51.2	230°54.8	-21°41.0	136°36.6	-22°11.9	216°34.1	-17°39.5	173°28.1	-22°45.5
6	101°53.7	245°57.0	-21°41.3	151°38.1	-22°11.5	231°36.1	-17°39.7	188°30.5	-22°45.6
7	116°56.2	260°59.3	-21°41.6	166°39.5	-22°11.1	246°38.1	-17°39.8	203°32.8	-22°45.6
8	131°58.6	276°01.6	-21°41.8	181°40.9	-22°10.7	261°40.1	-17°39.9	218°35.2	-22°45.6
9	147°01.1	291°03.9	-21°42.1	196°42.4	-22°10.3	276°42.0	-17°40.0	233°37.5	-22°45.6
10	162°03.5	306°06.2	-21°42.4	211°43.8	-22°09.9	291°44.0	-17°40.2	248°39.9	-22°45.6
11	177°06.0	321°08.6	-21°42.6	226°45.2	-22°09.5	306°46.0	-17°40.3	263°42.2	-22°45.6
12	192°08.5	336°10.9	-21°42.9	241°46.7	-22°09.1	321°48.0	-17°40.4	278°44.6	-22°45.6
13	207°10.9	351°13.2	-21°43.1	256°48.1	-22°08.7	336°50.0	-17°40.5	293°46.9	-22°45.6
14	222°13.4	6°15.5	-21°43.4	271°49.5	-22°08.3	351°52.0	-17°40.7	308°49.3	-22°45.6
15	237°15.9	21°17.8	-21°43.7	286°51.0	-22°07.9	6°54.0	-17°40.8	323°51.6	-22°45.6
16	252°18.3	36°20.1	-21°43.9	301°52.4	-22°07.5	21°55.9	-17°40.9	338°54.0	-22°45.6
17	267°20.8	51°22.5	-21°44.2	316°53.8	-22°07.1	36°57.9	-17°41.0	353°56.3	-22°45.6
18	282°23.3	66°24.8	-21°44.4	331°55.3	-22°06.7	51°59.9	-17°41.2	8°58.6	-22°45.6
19	297°25.7	81°27.1	-21°44.6	346°56.7	-22°06.3	67°01.9	-17°41.3	24°01.0	-22°45.6
20	312°28.2	96°29.5	-21°44.9	1°58.1	-22°05.9	82°03.9	-17°41.4	39°03.3	-22°45.6
21	327°30.6	111°31.8	-21°45.1	16°59.6	-22°05.5	97°05.9	-17°41.6	54°05.7	-22°45.6
22	342°33.1	126°34.2	-21°45.4	32°01.0	-22°05.1	112°07.8	-17°41.7	69°08.0	-22°45.6
23	357°35.6	141°36.5	-21°45.6	47°02.4	-22°04.7	127°09.8	-17°41.8	84°10.4	-22°45.6
Mer.pass.:23:09		v2.3 d-0.3 m-4.4		v1.4 d0.4 m-1.3		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.7
Ankaa	353°11.7	-42°12.3
Schedar	349°35.8	56°38.4
Diphda	348°51.9	-17°53.0
Achernar	335°23.6	-57°08.5
Hamal	327°56.4	23°33.0
Polaris	315°48.9	89°20.3
Akamar	315°15.3	-40°13.7
Menkar	314°11.0	4°09.7
Mirfak	308°34.8	49°55.4
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°10.8
Capella	280°29.0	46°00.8
Bellatrix	278°28.1	6°21.9
Elnath	278°08.0	28°37.2
Alnilam	275°42.7	-1°11.4
Betelgeuse	270°57.4	7°24.6
Canopus	263°54.5	-52°42.1
Sirius	258°30.5	-16°44.2
Adara	255°09.7	-28°59.7
Procyon	244°56.0	5°10.8
Pollux	243°23.4	27°58.7
Avior	234°16.8	-59°33.9
Suhail	222°50.1	-43°30.2
Miaplacidus	221°39.5	-69°47.4
Alphard	217°52.8	-8°44.2
Regulus	207°39.9	11°52.6
Dubhe	193°47.9	61°39.0
Denebola	182°30.3	14°28.2
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°12.0
Gacrux	171°57.5	-57°12.9
Alioth	166°18.2	55°51.7
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.5
Hadar	148°43.4	-60°27.7
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.4	-60°54.6
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.1	74°05.0
Alphecca	126°08.3	26°39.5
Antares	112°22.0	-26°28.2
Atria	107°20.9	-69°03.7
Sabik	102°08.6	-15°44.7
Shaula	96°17.2	-37°06.9
Rasalhague	96°03.2	12°33.2
Etamin	90°44.6	51°29.6
Kaus Aust.	83°39.1	-34°22.4
Vega	80°36.6	38°48.4
Nunki	75°53.9	-26°16.3
Altair	62°04.7	8°55.3
Peacock	53°13.4	-56°40.6
Deneb	49°28.8	45°21.2
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.2
Fomalhaut	15°19.8	-29°31.4
Scheat	13°49.6	28°11.2
Markab	13°34.5	15°18.5

2018/10/	**SHA**	**Mer.pass**
Venus	144°18.0	13:42
Mars	50°38.6	19:57
Jupiter	130°08.0	14:39
Saturn	86°42.8	17:32

2018/10/	**SHA**	**Mer.pass**
Venus	144°10.2	13:39
Mars	50°14.8	19:54
Jupiter	129°56.7	14:36
Saturn	86°40.2	17:28

2018/10/	**SHA**	**Mer.pass**
Venus	144°04.5	13:35
Mars	49°50.5	19:52
Jupiter	129°45.3	14:32
Saturn	86°37.5	17:24

Horizontal paralax	
Venus:	0.4
Mars:	0.2

h Sun Moon

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	182°32.7	-3°04.8	290°39.8	7.3	19°30.7	4.8	58.4
1	197°32.9	-3°05.8	305°06.1	7.3	19°35.5	4.7	58.4
2	212°33.1	-3°06.8	319°32.4	7.2	19°40.1	4.6	58.4
3	227°33.3	-3°07.7	333°58.6	7.2	19°44.6	4.4	58.5
4	242°33.5	-3°08.7	348°24.7	7.1	19°49.0	4.3	58.5
5	257°33.7	-3°09.7	2°50.8	7.1	19°53.2	4.2	58.5
6	272°33.9	-3°10.7	17°16.8	7.0	19°57.4	4.1	58.5
7	287°34.1	-3°11.6	31°42.8	6.9	20°01.4	4.0	58.5
8	302°34.3	-3°12.6	46°08.7	6.9	20°05.3	3.8	58.5
9	317°34.5	-3°13.6	60°34.6	6.8	20°09.0	3.7	58.6
10	332°34.7	-3°14.5	75°00.4	6.8	20°12.7	3.6	58.6
11	347°35.0	-3°15.5	89°26.2	6.7	20°16.2	3.5	58.6
12	2°35.2	-3°16.5	103°51.9	6.7	20°19.6	3.3	58.6
13	17°35.4	-3°17.4	118°17.5	6.6	20°22.9	3.2	58.6
14	32°35.6	-3°18.4	132°43.2	6.6	20°26.0	3.1	58.7
15	47°35.8	-3°19.4	147°08.8	6.6	20°29.1	3.0	58.7
16	62°36.0	-3°20.3	161°34.3	6.5	20°31.9	2.8	58.7
17	77°36.2	-3°21.3	175°59.8	6.5	20°34.7	2.7	58.7
18	92°36.4	-3°22.3	190°25.2	6.4	20°37.3	2.6	58.7
19	107°36.6	-3°23.2	204°50.6	6.4	20°39.8	2.4	58.7
20	122°36.8	-3°24.2	219°16.0	6.3	20°42.2	2.3	58.8
21	137°37.0	-3°25.2	233°41.3	6.3	20°44.5	2.2	58.8
22	152°37.2	-3°26.2	248°06.6	6.3	20°46.6	2.0	58.8
23	167°37.4	-3°27.1	262°31.8	6.2	20°48.5	1.9	58.8
	SD.=16.0	d=-1.0			S.D.=15.9		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	182°37.6	-3°28.1	276°57.0	6.2	20°50.4	1.8	58.8
1	197°37.8	-3°29.1	291°22.2	6.1	20°52.1	1.6	58.9
2	212°38.0	-3°30.0	305°47.3	6.1	20°53.7	1.5	58.9
3	227°38.2	-3°31.0	320°12.4	6.1	20°55.1	1.4	58.9
4	242°38.4	-3°32.0	334°37.5	6.0	20°56.4	1.2	58.9
5	257°38.6	-3°32.9	349°02.5	6.0	20°57.6	1.1	58.9
6	272°38.8	-3°33.9	3°27.5	6.0	20°58.6	1.0	58.9
7	287°39.0	-3°34.9	17°52.5	6.0	20°59.5	0.8	59.0
8	302°39.2	-3°35.8	32°17.4	5.9	21°00.3	0.7	59.0
9	317°39.4	-3°36.8	46°42.4	5.9	21°00.9	0.6	59.0
10	332°39.6	-3°37.8	61°07.2	5.9	21°01.4	0.4	59.0
11	347°39.8	-3°38.7	75°32.1	5.9	21°01.8	0.3	59.0
12	2°40.0	-3°39.7	89°57.0	5.8	21°02.0	0.1	59.0
13	17°40.1	-3°40.7	104°21.8	5.8	21°02.1	0.0	59.1
14	32°40.3	-3°41.6	118°46.6	5.8	21°02.0	-0.1	59.1
15	47°40.5	-3°42.6	133°11.4	5.8	21°01.8	-0.3	59.1
16	62°40.7	-3°43.6	147°36.1	5.8	21°01.5	-0.4	59.1
17	77°40.9	-3°44.5	162°00.9	5.7	21°01.0	-0.5	59.1
18	92°41.1	-3°45.5	176°25.6	5.7	21°00.4	-0.7	59.1
19	107°41.3	-3°46.5	190°50.3	5.7	20°59.6	-0.8	59.2
20	122°41.5	-3°47.4	205°15.0	5.7	20°58.7	-1.0	59.2
21	137°41.7	-3°48.4	219°39.7	5.7	20°57.7	-1.1	59.2
22	152°41.9	-3°49.4	234°04.4	5.7	20°56.5	-1.2	59.2
23	167°42.1	-3°50.3	248°29.0	5.7	20°55.2	-1.4	59.2
	SD.=16.0	d=-1.0			S.D.=16.1		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	182°42.3	-3°51.3	262°53.7	5.7	20°53.8	-1.5	59.2
1	197°42.5	-3°52.3	277°18.3	5.6	20°52.2	-1.7	59.2
2	212°42.7	-3°53.2	291°43.0	5.6	20°50.4	-1.8	59.3
3	227°42.9	-3°54.2	306°07.6	5.6	20°48.6	-1.9	59.3
4	242°43.1	-3°55.2	320°32.2	5.6	20°46.6	-2.1	59.3
5	257°43.3	-3°56.1	334°56.9	5.6	20°44.4	-2.2	59.3
6	272°43.5	-3°57.1	349°21.5	5.6	20°42.1	-2.4	59.3
7	287°43.7	-3°58.1	3°46.1	5.6	20°39.7	-2.5	59.3
8	302°43.9	-3°59.0	18°10.8	5.6	20°37.1	-2.6	59.3
9	317°44.1	-4°00.0	32°35.4	5.6	20°34.4	-2.8	59.4
10	332°44.3	-4°01.0	47°00.0	5.6	20°31.6	-2.9	59.4
11	347°44.5	-4°01.9	61°24.7	5.6	20°28.6	-3.0	59.4
12	2°44.7	-4°02.9	75°49.3	5.7	20°25.5	-3.2	59.4
13	17°44.9	-4°03.9	90°14.0	5.7	20°22.2	-3.3	59.4
14	32°45.1	-4°04.8	104°38.7	5.7	20°18.9	-3.5	59.4
15	47°45.3	-4°05.8	119°03.3	5.7	20°15.3	-3.6	59.4
16	62°45.4	-4°06.8	133°28.0	5.7	20°11.7	-3.7	59.5
17	77°45.6	-4°07.7	147°52.7	5.7	20°07.9	-3.9	59.5
18	92°45.8	-4°08.7	162°17.4	5.7	20°03.9	-4.0	59.5
19	107°46.0	-4°09.7	176°42.2	5.7	19°59.8	-4.1	59.5
20	122°46.2	-4°10.6	191°06.9	5.8	19°55.6	-4.3	59.5
21	137°46.4	-4°11.6	205°31.7	5.8	19°51.3	-4.4	59.5
22	152°46.6	-4°12.6	219°56.5	5.8	19°46.8	-4.5	59.5
23	167°46.8	-4°13.5	234°21.3	5.8	19°42.2	-4.7	59.5
	SD.=16.0	d=-1.0			S.D.=16.2		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:54	05:15	06:23	17:14	18:21	19:42
70	04:05	05:18	06:19	17:18	18:18	19:30
68	04:14	05:21	06:16	17:21	18:16	19:22
66	04:22	05:22	06:13	17:24	18:14	19:15
64	04:28	05:24	06:11	17:26	18:13	19:09
62	04:33	05:25	06:09	17:28	18:12	19:04
60	04:37	05:26	06:08	17:30	18:11	18:60
58	04:41	05:27	06:06	17:31	18:10	18:56
56	04:44	05:28	06:05	17:33	18:10	18:53
54	04:47	05:28	06:03	17:34	18:09	18:50
52	04:49	05:29	06:02	17:35	18:09	18:48
50	04:51	05:29	06:01	17:37	18:09	18:46
45	04:56	05:30	05:59	17:39	18:08	18:42
40	04:59	05:30	05:57	17:41	18:08	18:39
35	05:01	05:30	05:55	17:43	18:08	18:37
30	05:02	05:30	05:54	17:44	18:08	18:36
20	05:04	05:29	05:51	17:47	18:09	18:35
10	05:03	05:28	05:49	17:50	18:11	18:35
0	05:01	05:25	05:46	17:53	18:13	18:37
-10	04:58	05:22	05:44	17:55	18:16	18:41
-20	04:53	05:19	05:41	17:58	18:20	18:46
-30	04:45	05:13	05:37	18:02	18:26	18:54
-35	04:40	05:10	05:35	18:04	18:29	18:59
-40	04:34	05:06	05:33	18:06	18:34	19:06
-45	04:26	05:01	05:30	18:09	18:39	19:14
-50	04:16	04:55	05:27	18:12	18:45	19:24
-52	04:11	04:52	05:26	18:14	18:48	19:29
-54	04:05	04:48	05:24	18:16	18:52	19:35
-56	03:59	04:45	05:22	18:18	18:55	19:42
-58	03:52	04:40	05:20	18:20	18:60	19:49
-60	03:43	04:36	05:18	18:22	19:05	19:58

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	19:50	–:–	–:–	18:45
68	18:49	19:37	21:09	15:40	16:54	17:25
66	19:33	20:25	21:47	14:57	16:06	16:47
64	20:02	20:56	22:13	14:28	15:34	16:20
62	20:24	21:20	22:34	14:06	15:11	15:59
60	20:42	21:38	22:50	13:48	14:52	15:42
58	20:57	21:54	23:04	13:33	14:37	15:28
56	21:10	22:07	23:16	13:20	14:23	15:16
54	21:22	22:19	23:27	13:09	14:12	15:05
52	21:32	22:29	23:36	12:59	14:02	14:55
50	21:40	22:38	23:45	12:50	13:53	14:47
45	21:59	22:57	–:–	12:32	13:33	14:28
40	22:15	23:13	–:–	12:17	13:18	14:13
35	22:28	23:26	–:–	12:04	13:04	14:01
30	22:39	23:37	–:–	11:53	12:53	13:50
20	22:59	23:57	–:–	11:34	12:33	13:31
10	23:16	–:–	00:14	11:17	12:16	13:14
0	23:32	–:–	00:30	11:02	11:60	12:58
-10	23:48	–:–	00:46	10:46	11:43	12:43
-20	–:–	00:05	01:04	10:30	11:26	12:26
-30	–:–	00:25	01:23	10:11	11:06	12:07
-35	–:–	00:36	01:35	09:59	10:54	11:55
-40	–:–	00:50	01:48	09:47	10:41	11:42
-45	00:01	01:05	02:04	09:32	10:25	11:27
-50	00:19	01:25	02:23	09:13	10:06	11:08
-52	00:28	01:34	02:32	09:05	09:56	10:59
-54	00:37	01:44	02:42	08:55	09:46	10:49
-56	00:48	01:56	02:54	08:44	09:34	10:37
-58	00:60	02:09	03:07	08:32	09:21	10:24
-60	01:14	02:25	03:23	08:17	09:05	10:09

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
1	10:11	10:20	11:49	04:48	17:16	22(60%)
2	10:30	10:40	11:49	05:45	18:14	23(49%)
3	10:49	10:59	11:49	06:44	19:13	24(38%)

October 04, 05 ,06 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	12°38.0	156°38.9	-21°45.8	62°03.8	-22°04.3	142°11.8	-17°41.9	99°12.7	-22°45.6
1	27°40.5	171°41.2	-21°46.1	77°05.3	-22°03.9	157°13.8	-17°42.1	114°15.1	-22°45.6
2	42°43.0	186°43.6	-21°46.3	92°06.7	-22°03.5	172°15.8	-17°42.2	129°17.4	-22°45.6
3	57°45.4	201°46.0	-21°46.5	107°08.1	-22°03.1	187°17.7	-17°42.3	144°19.8	-22°45.6
4	72°47.9	216°48.3	-21°46.8	122°09.5	-22°02.7	202°19.7	-17°42.4	159°22.1	-22°45.6
5	87°50.4	231°50.7	-21°47.0	137°11.0	-22°02.3	217°21.7	-17°42.6	174°24.4	-22°45.6
6	102°52.8	246°53.1	-21°47.2	152°12.4	-22°01.9	232°23.7	-17°42.7	189°26.8	-22°45.6
7	117°55.3	261°55.5	-21°47.5	167°13.8	-22°01.5	247°25.7	-17°42.8	204°29.1	-22°45.6
8	132°57.8	276°57.9	-21°47.7	182°15.2	-22°01.0	262°27.7	-17°42.9	219°31.5	-22°45.6
9	148°00.2	292°00.3	-21°47.9	197°16.6	-22°00.6	277°29.6	-17°43.1	234°33.8	-22°45.6
10	163°02.7	307°02.7	-21°48.1	212°18.1	-22°00.2	292°31.6	-17°43.2	249°36.2	-22°45.6
11	178°05.1	322°05.0	-21°48.3	227°19.5	-21°59.8	307°33.6	-17°43.3	264°38.5	-22°45.6
12	193°07.6	337°07.4	-21°48.5	242°20.9	-21°59.4	322°35.6	-17°43.4	279°40.8	-22°45.6
13	208°10.1	352°09.9	-21°48.8	257°22.3	-21°59.0	337°37.6	-17°43.6	294°43.2	-22°45.6
14	223°12.5	7°12.3	-21°49.0	272°23.7	-21°58.6	352°39.5	-17°43.7	309°45.5	-22°45.7
15	238°15.0	22°14.7	-21°49.2	287°25.1	-21°58.2	7°41.5	-17°43.8	324°47.9	-22°45.7
16	253°17.5	37°17.1	-21°49.4	302°26.6	-21°57.8	22°43.5	-17°44.0	339°50.2	-22°45.7
17	268°19.9	52°19.5	-21°49.6	317°28.0	-21°57.4	37°45.5	-17°44.1	354°52.6	-22°45.7
18	283°22.4	67°21.9	-21°49.8	332°29.4	-21°57.0	52°47.5	-17°44.2	9°54.9	-22°45.7
19	298°24.9	82°24.4	-21°50.0	347°30.8	-21°56.6	67°49.4	-17°44.3	24°57.2	-22°45.7
20	313°27.3	97°26.8	-21°50.2	2°32.2	-21°56.2	82°51.4	-17°44.5	39°59.6	-22°45.7
21	328°29.8	112°29.2	-21°50.4	17°33.6	-21°55.7	97°53.4	-17°44.6	55°01.9	-22°45.7
22	343°32.3	127°31.7	-21°50.6	32°35.0	-21°55.3	112°55.4	-17°44.7	70°04.3	-22°45.7
23	358°34.7	142°34.1	-21°50.8	47°36.4	-21°54.9	127°57.4	-17°44.8	85°06.6	-22°45.7
Mer.pass.:23:05		v2.4 d-0.2 m-4.4		v1.4 d0.4 m-1.2		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	13°37.2	157°36.6	-21°51.0	62°37.8	-21°54.5	142°59.3	-17°45.0	100°08.9	-22°45.7
1	28°39.6	172°39.0	-21°51.1	77°39.2	-21°54.1	158°01.3	-17°45.1	115°11.3	-22°45.7
2	43°42.1	187°41.5	-21°51.3	92°40.7	-21°53.7	173°03.3	-17°45.2	130°13.6	-22°45.7
3	58°44.6	202°43.9	-21°51.5	107°42.1	-21°53.3	188°05.3	-17°45.3	145°16.0	-22°45.7
4	73°47.0	217°46.4	-21°51.7	122°43.5	-21°52.9	203°07.3	-17°45.5	160°18.3	-22°45.7
5	88°49.5	232°48.8	-21°51.9	137°44.9	-21°52.5	218°09.2	-17°45.6	175°20.7	-22°45.7
6	103°52.0	247°51.3	-21°52.1	152°46.3	-21°52.0	233°11.2	-17°45.7	190°23.0	-22°45.7
7	118°54.4	262°53.8	-21°52.2	167°47.7	-21°51.6	248°13.2	-17°45.9	205°25.3	-22°45.7
8	133°56.9	277°56.3	-21°52.4	182°49.1	-21°51.2	263°15.2	-17°46.0	220°27.7	-22°45.7
9	148°59.4	292°58.7	-21°52.6	197°50.5	-21°50.8	278°17.2	-17°46.1	235°30.0	-22°45.7
10	164°01.8	308°01.2	-21°52.8	212°51.9	-21°50.4	293°19.1	-17°46.2	250°32.3	-22°45.7
11	179°04.3	323°03.7	-21°52.9	227°53.3	-21°50.0	308°21.1	-17°46.4	265°34.7	-22°45.7
12	194°06.8	338°06.2	-21°53.1	242°54.7	-21°49.6	323°23.1	-17°46.5	280°37.0	-22°45.7
13	209°09.2	353°08.7	-21°53.3	257°56.1	-21°49.2	338°25.1	-17°46.6	295°39.4	-22°45.7
14	224°11.7	8°11.2	-21°53.4	272°57.5	-21°48.7	353°27.0	-17°46.7	310°41.7	-22°45.7
15	239°14.1	23°13.7	-21°53.6	287°58.9	-21°48.3	8°29.0	-17°46.9	325°44.0	-22°45.7
16	254°16.6	38°16.2	-21°53.7	303°00.3	-21°47.9	23°31.0	-17°47.0	340°46.4	-22°45.7
17	269°19.1	53°18.7	-21°53.9	318°01.7	-21°47.5	38°33.0	-17°47.1	355°48.7	-22°45.7
18	284°21.5	68°21.2	-21°54.1	333°03.1	-21°47.1	53°34.9	-17°47.3	10°51.1	-22°45.7
19	299°24.0	83°23.7	-21°54.2	348°04.5	-21°46.7	68°36.9	-17°47.4	25°53.4	-22°45.7
20	314°26.5	98°26.3	-21°54.4	3°05.8	-21°46.3	83°38.9	-17°47.5	40°55.7	-22°45.7
21	329°28.9	113°28.8	-21°54.5	18°07.2	-21°45.8	98°40.9	-17°47.6	55°58.1	-22°45.7
22	344°31.4	128°31.3	-21°54.7	33°08.6	-21°45.4	113°42.9	-17°47.8	71°00.4	-22°45.7
23	359°33.9	143°33.9	-21°54.8	48°10.0	-21°45.0	128°44.8	-17°47.9	86°02.7	-22°45.7
Mer.pass.:23:01		v2.4 d-0.2 m-4.4		v1.4 d0.4 m-1.2		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	14°36.3	158°36.4	-21°55.0	63°11.4	-21°44.6	143°46.8	-17°48.0	101°05.1	-22°45.8
1	29°38.8	173°38.9	-21°55.1	78°12.8	-21°44.2	158°48.8	-17°48.1	116°07.4	-22°45.8
2	44°41.2	188°41.5	-21°55.2	93°14.2	-21°43.8	173°50.8	-17°48.3	131°09.8	-22°45.8
3	59°43.7	203°44.0	-21°55.4	108°15.6	-21°43.3	188°52.7	-17°48.4	146°12.1	-22°45.8
4	74°46.2	218°46.6	-21°55.5	123°17.0	-21°42.9	203°54.7	-17°48.5	161°14.4	-22°45.8
5	89°48.6	233°49.1	-21°55.6	138°18.4	-21°42.5	218°56.7	-17°48.6	176°16.8	-22°45.8
6	104°51.1	248°51.7	-21°55.8	153°19.7	-21°42.1	233°58.7	-17°48.8	191°19.1	-22°45.8
7	119°53.6	263°54.3	-21°55.9	168°21.1	-21°41.7	249°00.6	-17°48.9	206°21.4	-22°45.8
8	134°56.0	278°56.8	-21°56.0	183°22.5	-21°41.2	264°02.6	-17°49.0	221°23.8	-22°45.8
9	149°58.5	293°59.4	-21°56.2	198°23.9	-21°40.8	279°04.6	-17°49.2	236°26.1	-22°45.8
10	165°01.0	309°02.0	-21°56.3	213°25.3	-21°40.4	294°06.6	-17°49.3	251°28.4	-22°45.8
11	180°03.4	324°04.6	-21°56.4	228°26.7	-21°40.0	309°08.5	-17°49.4	266°30.8	-22°45.8
12	195°05.9	339°07.1	-21°56.5	243°28.1	-21°39.6	324°10.5	-17°49.5	281°33.1	-22°45.8
13	210°08.4	354°09.7	-21°56.6	258°29.4	-21°39.1	339°12.5	-17°49.7	296°35.4	-22°45.8
14	225°10.8	9°12.3	-21°56.8	273°30.8	-21°38.7	354°14.5	-17°49.8	311°37.8	-22°45.8
15	240°13.3	24°14.9	-21°56.9	288°32.2	-21°38.3	9°16.4	-17°49.9	326°40.1	-22°45.8
16	255°15.7	39°17.5	-21°57.0	303°33.6	-21°37.9	24°18.4	-17°50.0	341°42.4	-22°45.8
17	270°18.2	54°20.1	-21°57.1	318°35.0	-21°37.5	39°20.4	-17°50.2	356°44.8	-22°45.8
18	285°20.7	69°22.7	-21°57.2	333°36.3	-21°37.0	54°22.3	-17°50.3	11°47.1	-22°45.8
19	300°23.1	84°25.3	-21°57.3	348°37.7	-21°36.6	69°24.3	-17°50.4	26°49.4	-22°45.8
20	315°25.6	99°28.0	-21°57.4	3°39.1	-21°36.2	84°26.3	-17°50.6	41°51.8	-22°45.8
21	330°28.1	114°30.6	-21°57.5	18°40.5	-21°35.8	99°28.3	-17°50.7	56°54.1	-22°45.8
22	345°30.5	129°33.2	-21°57.6	33°41.8	-21°35.4	114°30.2	-17°50.8	71°56.4	-22°45.8
23	0°33.0	144°35.8	-21°57.7	48°43.2	-21°34.9	129°32.2	-17°50.9	86°58.8	-22°45.8
Mer.pass.:22:57		v2.5 d-0.1 m-4.4		v1.4 d0.4 m-1.2		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.7
Ankaa	353°11.7	-42°12.3
Schedar	349°35.8	56°38.4
Diphda	348°51.9	-17°53.0
Achernar	335°23.6	-57°08.5
Hamal	327°56.4	23°33.0
Polaris	315°47.9	89°20.3
Akamar	315°15.3	-40°13.7
Menkar	314°11.0	4°09.7
Mirfak	308°34.8	49°55.4
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°10.8
Capella	280°29.0	46°00.8
Bellatrix	278°28.0	6°21.9
Elnath	278°08.0	28°37.2
Alnilam	275°42.6	-1°11.4
Betelgeuse	270°57.3	7°24.6
Canopus	263°54.5	-52°42.1
Sirius	258°30.5	-16°44.2
Adara	255°09.7	-28°59.7
Procyon	244°56.0	5°10.8
Pollux	243°23.3	27°58.7
Avior	234°16.8	-59°33.9
Suhail	222°50.0	-43°30.2
Miaplacidus	221°39.5	-69°47.4
Alphard	217°52.8	-8°44.2
Regulus	207°39.9	11°52.6
Dubhe	193°47.9	61°39.0
Denebola	182°30.3	14°28.2
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°12.0
Gacrux	171°57.5	-57°12.9
Alioth	166°18.2	55°51.7
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.5
Hadar	148°43.4	-60°27.6
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.4	-60°54.6
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.1	74°05.0
Alphecca	126°08.3	26°39.5
Antares	112°22.1	-26°28.2
Atria	107°20.9	-69°03.7
Sabik	102°08.6	-15°44.7
Shaula	96°17.2	-37°06.9
Rasalhague	96°03.3	12°33.2
Etamin	90°44.6	51°29.6
Kaus Aust.	83°39.1	-34°22.4
Vega	80°36.6	38°48.4
Nunki	75°53.9	-26°16.3
Altair	62°04.7	8°55.3
Peacock	53°13.4	-56°40.6
Deneb	49°28.8	45°21.2
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.3
Fomalhaut	15°19.8	-29°31.4
Scheat	13°49.6	28°11.2
Markab	13°34.5	15°18.5

2018/10/	**SHA**	**Mer.pass**
Venus	144°00.8	13:31
Mars	49°25.8	19:50
Jupiter	129°33.8	14:29
Saturn	86°34.7	17:20

2018/10/	**SHA**	**Mer.pass**
Venus	143°59.4	13:27
Mars	49°00.7	19:48
Jupiter	129°22.2	14:26
Saturn	86°31.8	17:17

2018/10/	**SHA**	**Mer.pass**
Venus	144°00.1	13:23
Mars	48°35.1	19:45
Jupiter	129°10.5	14:23
Saturn	86°28.8	17:13

Horizontal paralax	
Venus:	0.4
Mars:	0.2

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°47.0	-4°14.5	248°46.1	5.8	19°37.5	-4.8	59.6
1	197°47.2	-4°15.4	263°10.9	5.8	19°32.6	-4.9	59.6
2	212°47.4	-4°16.4	277°35.8	5.9	19°27.6	-5.1	59.6
3	227°47.6	-4°17.4	292°00.7	5.9	19°22.4	-5.2	59.6
4	242°47.8	-4°18.3	306°25.6	5.9	19°17.2	-5.3	59.6
5	257°48.0	-4°19.3	320°50.5	5.9	19°11.7	-5.5	59.6
6	272°48.1	-4°20.3	335°15.5	6.0	19°06.2	-5.6	59.6
7	287°48.3	-4°21.2	349°40.4	6.0	19°00.6	-5.7	59.6
8	302°48.5	-4°22.2	4°05.5	6.0	18°54.8	-5.9	59.6
9	317°48.7	-4°23.2	18°30.5	6.1	18°48.9	-6.0	59.7
10	332°48.9	-4°24.1	32°55.6	6.1	18°42.8	-6.1	59.7
11	347°49.1	-4°25.1	47°20.7	6.1	18°36.6	-6.2	59.7
12	2°49.3	-4°26.0	61°45.8	6.2	18°30.3	-6.4	59.7
13	17°49.5	-4°27.0	76°11.0	6.2	18°23.9	-6.5	59.7
14	32°49.7	-4°28.0	90°36.2	6.2	18°17.4	-6.6	59.7
15	47°49.9	-4°28.9	105°01.4	6.3	18°10.7	-6.7	59.7
16	62°50.1	-4°29.9	119°26.7	6.3	18°03.9	-6.8	59.7
17	77°50.2	-4°30.9	133°52.0	6.3	17°57.0	-7.0	59.7
18	92°50.4	-4°31.8	148°17.4	6.4	17°50.0	-7.1	59.7
19	107°50.6	-4°32.8	162°42.7	6.4	17°42.9	-7.2	59.7
20	122°50.8	-4°33.8	177°08.2	6.4	17°35.6	-7.3	59.7
21	137°51.0	-4°34.7	191°33.6	6.5	17°28.2	-7.4	59.8
22	152°51.2	-4°35.7	205°59.1	6.5	17°20.7	-7.6	59.8
23	167°51.4	-4°36.6	220°24.7	6.6	17°13.1	-7.7	59.8
	SD.=16.0	d=-1.0			S.D.=16.2		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°51.6	-4°37.6	234°50.2	6.6	17°05.4	-7.8	59.8
1	197°51.8	-4°38.6	249°15.9	6.6	16°57.5	-7.9	59.8
2	212°52.0	-4°39.5	263°41.5	6.7	16°49.6	-8.0	59.8
3	227°52.1	-4°40.5	278°07.2	6.7	16°41.5	-8.1	59.8
4	242°52.3	-4°41.5	292°33.0	6.8	16°33.3	-8.2	59.8
5	257°52.5	-4°42.4	306°58.8	6.8	16°25.0	-8.3	59.8
6	272°52.7	-4°43.4	321°24.6	6.9	16°16.6	-8.4	59.8
7	287°52.9	-4°44.3	335°50.5	6.9	16°08.1	-8.6	59.8
8	302°53.1	-4°45.3	350°16.4	6.9	15°59.5	-8.7	59.8
9	317°53.3	-4°46.3	4°42.4	7.0	15°50.8	-8.8	59.8
10	332°53.5	-4°47.2	19°08.4	7.0	15°42.0	-8.9	59.8
11	347°53.6	-4°48.2	33°34.4	7.1	15°33.1	-9.0	59.8
12	2°53.8	-4°49.1	48°00.5	7.1	15°24.1	-9.1	59.8
13	17°54.0	-4°50.1	62°26.7	7.2	15°15.0	-9.2	59.8
14	32°54.2	-4°51.1	76°52.9	7.2	15°05.7	-9.3	59.8
15	47°54.4	-4°52.0	91°19.1	7.3	14°56.4	-9.4	59.8
16	62°54.6	-4°53.0	105°45.4	7.3	14°47.0	-9.5	59.8
17	77°54.8	-4°54.0	120°11.8	7.4	14°37.5	-9.6	59.8
18	92°55.0	-4°54.9	134°38.2	7.4	14°27.9	-9.6	59.8
19	107°55.1	-4°55.9	149°04.6	7.5	14°18.2	-9.7	59.8
20	122°55.3	-4°56.8	163°31.1	7.5	14°08.4	-9.8	59.8
21	137°55.5	-4°57.8	177°57.6	7.6	13°58.5	-9.9	59.8
22	152°55.7	-4°58.8	192°24.2	7.6	13°48.6	-10.0	59.8
23	167°55.9	-4°59.7	206°50.8	7.7	13°38.5	-10.1	59.8
	SD.=16.0	d=-1.0			S.D.=16.3		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°56.1	-5°00.7	221°17.5	7.7	13°28.4	-10.2	59.8
1	197°56.2	-5°01.6	235°44.2	7.8	13°18.1	-10.3	59.8
2	212°56.4	-5°02.6	250°11.0	7.8	13°07.8	-10.4	59.8
3	227°56.6	-5°03.6	264°37.8	7.9	12°57.4	-10.4	59.8
4	242°56.8	-5°04.5	279°04.7	7.9	12°47.0	-10.5	59.8
5	257°57.0	-5°05.5	293°31.6	7.9	12°36.4	-10.6	59.8
6	272°57.2	-5°06.4	307°58.6	8.0	12°25.8	-10.7	59.8
7	287°57.4	-5°07.4	322°25.6	8.0	12°15.1	-10.7	59.8
8	302°57.5	-5°08.4	336°52.7	8.1	12°04.3	-10.8	59.8
9	317°57.7	-5°09.3	351°19.8	8.1	11°53.4	-10.9	59.8
10	332°57.9	-5°10.3	5°47.0	8.2	11°42.5	-11.0	59.8
11	347°58.1	-5°11.2	20°14.2	8.2	11°31.5	-11.0	59.8
12	2°58.3	-5°12.2	34°41.5	8.3	11°20.4	-11.1	59.8
13	17°58.5	-5°13.1	49°08.8	8.3	11°09.3	-11.2	59.8
14	32°58.6	-5°14.1	63°36.2	8.4	10°58.1	-11.2	59.8
15	47°58.8	-5°15.1	78°03.6	8.4	10°46.8	-11.3	59.8
16	62°59.0	-5°16.0	92°31.0	8.5	10°35.5	-11.4	59.8
17	77°59.2	-5°17.0	106°58.5	8.5	10°24.0	-11.4	59.8
18	92°59.4	-5°17.9	121°26.1	8.6	10°12.6	-11.5	59.8
19	107°59.5	-5°18.9	135°53.7	8.6	10°01.1	-11.6	59.8
20	122°59.7	-5°19.9	150°21.3	8.7	9°49.5	-11.6	59.8
21	137°59.9	-5°20.8	164°49.0	8.7	9°37.8	-11.7	59.8
22	153°00.1	-5°21.8	179°16.8	8.8	9°26.1	-11.7	59.8
23	168°00.3	-5°22.7	193°44.5	8.8	9°14.4	-11.8	59.7
	SD.=16.0	d=-1.0			S.D.=16.3		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:09	05:29	06:36	16:58	18:05	19:25
70	04:18	05:30	06:31	17:04	18:04	19:16
68	04:26	05:31	06:27	17:08	18:04	19:09
66	04:32	05:32	06:23	17:12	18:03	19:03
64	04:37	05:32	06:20	17:16	18:03	18:58
62	04:41	05:33	06:17	17:18	18:02	18:54
60	04:45	05:33	06:15	17:21	18:02	18:50
58	04:48	05:33	06:13	17:23	18:02	18:48
56	04:50	05:34	06:11	17:25	18:02	18:45
54	04:53	05:34	06:09	17:27	18:02	18:43
52	04:55	05:34	06:07	17:29	18:02	18:41
50	04:56	05:34	06:06	17:30	18:02	18:40
45	04:59	05:33	06:03	17:33	18:03	18:37
40	05:02	05:33	06:00	17:36	18:03	18:34
35	05:03	05:32	05:58	17:39	18:04	18:33
30	05:04	05:32	05:56	17:41	18:05	18:32
20	05:04	05:30	05:52	17:45	18:07	18:32
10	05:03	05:27	05:48	17:48	18:09	18:34
0	05:00	05:24	05:45	17:52	18:12	18:37
-10	04:56	05:21	05:42	17:55	18:16	18:41
-20	04:50	05:16	05:38	17:59	18:21	18:47
-30	04:41	05:10	05:34	18:04	18:28	18:56
-35	04:36	05:06	05:31	18:06	18:32	19:02
-40	04:29	05:01	05:28	18:09	18:37	19:09
-45	04:20	04:55	05:25	18:13	18:43	19:18
-50	04:09	04:48	05:21	18:17	18:50	19:30
-52	04:03	04:45	05:19	18:19	18:54	19:35
-54	03:57	04:41	05:17	18:21	18:57	19:41
-56	03:50	04:36	05:14	18:24	19:02	19:49
-58	03:42	04:32	05:12	18:26	19:07	19:57
-60	03:33	04:26	05:09	18:29	19:13	20:07

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	21:22	–:–	00:09	19:15	18:28	18:06
70	22:25	–:–	00:35	18:11	17:59	17:51
68	23:01	–:–	00:56	17:35	17:38	17:38
66	23:26	–:–	01:11	17:09	17:21	17:28
64	23:45	–:–	01:24	16:49	17:07	17:19
62	–:–	00:01	01:35	16:32	16:55	17:12
60	–:–	00:14	01:44	16:19	16:45	17:05
58	–:–	00:26	01:52	16:07	16:36	16:59
56	–:–	00:35	01:60	15:56	16:28	16:54
54	–:–	00:44	02:06	15:47	16:21	16:49
52	–:–	00:52	02:11	15:39	16:15	16:45
50	–:–	00:59	02:17	15:32	16:09	16:41
45	00:02	01:14	02:28	15:16	15:57	16:33
40	00:17	01:26	02:37	15:03	15:47	16:26
35	00:29	01:36	02:44	14:52	15:38	16:20
30	00:40	01:45	02:51	14:42	15:30	16:14
20	00:58	02:01	03:03	14:25	15:17	16:05
10	01:14	02:14	03:13	14:11	15:05	15:57
0	01:29	02:27	03:23	13:57	14:54	15:49
-10	01:44	02:40	03:33	13:43	14:43	15:41
-20	01:60	02:53	03:43	13:28	14:31	15:33
-30	02:18	03:08	03:54	13:11	14:17	15:23
-35	02:29	03:17	04:01	13:01	14:09	15:17
-40	02:41	03:28	04:09	12:49	13:59	15:11
-45	02:55	03:39	04:17	12:35	13:48	15:03
-50	03:13	03:54	04:28	12:19	13:35	14:54
-52	03:21	04:00	04:33	12:11	13:29	14:50
-54	03:30	04:08	04:38	12:02	13:22	14:45
-56	03:40	04:16	04:44	11:52	13:14	14:40
-58	03:52	04:25	04:51	11:41	13:06	14:34
-60	04:05	04:36	04:58	11:28	12:56	14:27

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
4	11:08	11:17	11:48	07:42	20:11	25(27%)
5	11:26	11:35	11:48	08:40	21:08	26(17%)
6	11:44	11:53	11:48	09:35	22:02	27(9%)

October 07, 08 ,09 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	15°35.5	159°38.4	-21°57.8	63°44.6	-21°34.5	144°34.2	-17°51.1	102°01.1	-22°45.8
1	30°37.9	174°41.1	-21°57.9	78°46.0	-21°34.1	159°36.2	-17°51.2	117°03.4	-22°45.8
2	45°40.4	189°43.7	-21°58.0	93°47.3	-21°33.7	174°38.1	-17°51.3	132°05.8	-22°45.8
3	60°42.8	204°46.4	-21°58.1	108°48.7	-21°33.2	189°40.1	-17°51.4	147°08.1	-22°45.8
4	75°45.3	219°49.0	-21°58.2	123°50.1	-21°32.8	204°42.1	-17°51.6	162°10.4	-22°45.8
5	90°47.8	234°51.7	-21°58.2	138°51.5	-21°32.4	219°44.0	-17°51.7	177°12.8	-22°45.8
6	105°50.2	249°54.3	-21°58.3	153°52.8	-21°32.0	234°46.0	-17°51.8	192°15.1	-22°45.8
7	120°52.7	264°57.0	-21°58.4	168°54.2	-21°31.5	249°48.0	-17°52.0	207°17.4	-22°45.8
8	135°55.2	279°59.6	-21°58.5	183°55.6	-21°31.1	264°50.0	-17°52.1	222°19.8	-22°45.8
9	150°57.6	295°02.3	-21°58.6	198°56.9	-21°30.7	279°51.9	-17°52.2	237°22.1	-22°45.8
10	166°00.1	310°05.0	-21°58.6	213°58.3	-21°30.3	294°53.9	-17°52.3	252°24.4	-22°45.8
11	181°02.6	325°07.6	-21°58.7	228°59.7	-21°29.8	309°55.9	-17°52.5	267°26.8	-22°45.8
12	196°05.0	340°10.3	-21°58.8	244°01.0	-21°29.4	324°57.8	-17°52.6	282°29.1	-22°45.8
13	211°07.5	355°13.0	-21°58.8	259°02.4	-21°29.0	339°59.8	-17°52.7	297°31.4	-22°45.9
14	226°10.0	10°15.7	-21°58.9	274°03.8	-21°28.6	355°01.8	-17°52.8	312°33.7	-22°45.9
15	241°12.4	25°18.4	-21°59.0	289°05.1	-21°28.1	10°03.8	-17°53.0	327°36.1	-22°45.9
16	256°14.9	40°21.1	-21°59.0	304°06.5	-21°27.7	25°05.7	-17°53.1	342°38.4	-22°45.9
17	271°17.3	55°23.7	-21°59.1	319°07.9	-21°27.3	40°07.7	-17°53.2	357°40.7	-22°45.9
18	286°19.8	70°26.4	-21°59.2	334°09.2	-21°26.9	55°09.7	-17°53.3	12°43.1	-22°45.9
19	301°22.3	85°29.2	-21°59.2	349°10.6	-21°26.4	70°11.6	-17°53.5	27°45.4	-22°45.9
20	316°24.7	100°31.9	-21°59.3	4°11.9	-21°26.0	85°13.6	-17°53.6	42°47.7	-22°45.9
21	331°27.2	115°34.6	-21°59.3	19°13.3	-21°25.6	100°15.6	-17°53.7	57°50.1	-22°45.9
22	346°29.7	130°37.3	-21°59.4	34°14.7	-21°25.1	115°17.6	-17°53.9	72°52.4	-22°45.9
23	1°32.1	145°40.0	-21°59.4	49°16.0	-21°24.7	130°19.5	-17°54.0	87°54.7	-22°45.9
Mer.pass.:22:53		v2.6 d-0.1 m-4.4		v1.4 d0.4 m-1.2		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	16°34.6	160°42.7	-21°59.5	64°17.4	-21°24.3	145°21.5	-17°54.1	102°57.0	-22°45.9
1	31°37.1	175°45.5	-21°59.5	79°18.7	-21°23.9	160°23.5	-17°54.2	117°59.4	-22°45.9
2	46°39.5	190°48.2	-21°59.5	94°20.1	-21°23.4	175°25.4	-17°54.4	133°01.7	-22°45.9
3	61°42.0	205°50.9	-21°59.6	109°21.4	-21°23.0	190°27.4	-17°54.5	148°04.0	-22°45.9
4	76°44.4	220°53.7	-21°59.6	124°22.8	-21°22.6	205°29.4	-17°54.6	163°06.4	-22°45.9
5	91°46.9	235°56.4	-21°59.6	139°24.2	-21°22.1	220°31.3	-17°54.7	178°08.7	-22°45.9
6	106°49.4	250°59.2	-21°59.7	154°25.5	-21°21.7	235°33.3	-17°54.9	193°11.0	-22°45.9
7	121°51.8	266°01.9	-21°59.7	169°26.9	-21°21.3	250°35.3	-17°55.0	208°13.3	-22°45.9
8	136°54.3	281°04.7	-21°59.7	184°28.2	-21°20.8	265°37.2	-17°55.1	223°15.7	-22°45.9
9	151°56.8	296°07.4	-21°59.8	199°29.6	-21°20.4	280°39.2	-17°55.3	238°18.0	-22°45.9
10	166°59.2	311°10.2	-21°59.8	214°30.9	-21°20.0	295°41.2	-17°55.4	253°20.3	-22°45.9
11	182°01.7	326°12.9	-21°59.8	229°32.3	-21°19.6	310°43.1	-17°55.5	268°22.6	-22°45.9
12	197°04.2	341°15.7	-21°59.8	244°33.6	-21°19.1	325°45.1	-17°55.6	283°25.0	-22°45.9
13	212°06.6	356°18.5	-21°59.8	259°35.0	-21°18.7	340°47.1	-17°55.8	298°27.3	-22°45.9
14	227°09.1	11°21.3	-21°59.8	274°36.3	-21°18.3	355°49.1	-17°55.9	313°29.6	-22°45.9
15	242°11.6	26°24.0	-21°59.9	289°37.7	-21°17.8	10°51.0	-17°56.0	328°32.0	-22°45.9
16	257°14.0	41°26.8	-21°59.9	304°39.0	-21°17.4	25°53.0	-17°56.1	343°34.3	-22°45.9
17	272°16.5	56°29.6	-21°59.9	319°40.4	-21°17.0	40°55.0	-17°56.3	358°36.6	-22°45.9
18	287°18.9	71°32.4	-21°59.9	334°41.7	-21°16.5	55°56.9	-17°56.4	13°38.9	-22°45.9
19	302°21.4	86°35.2	-21°59.9	349°43.0	-21°16.1	70°58.9	-17°56.5	28°41.3	-22°45.9
20	317°23.9	101°38.0	-21°59.9	4°44.4	-21°15.7	86°00.9	-17°56.7	43°43.6	-22°45.9
21	332°26.3	116°40.8	-21°59.9	19°45.7	-21°15.2	101°02.8	-17°56.8	58°45.9	-22°45.9
22	347°28.8	131°43.6	-21°59.9	34°47.1	-21°14.8	116°04.8	-17°56.9	73°48.2	-22°45.9
23	2°31.3	146°46.4	-21°59.9	49°48.4	-21°14.4	131°06.8	-17°57.0	88°50.6	-22°45.9
Mer.pass.:22:49		v2.7 d-0.0 m-4.4		v1.4 d0.4 m-1.1		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	17°33.7	161°49.3	-21°59.9	64°49.8	-21°13.9	146°08.7	-17°57.2	103°52.9	-22°45.9
1	32°36.2	176°52.1	-21°59.9	79°51.1	-21°13.5	161°10.7	-17°57.3	118°55.2	-22°45.9
2	47°38.7	191°54.9	-21°59.8	94°52.5	-21°13.1	176°12.7	-17°57.4	133°57.5	-22°45.9
3	62°41.1	206°57.7	-21°59.8	109°53.8	-21°12.6	191°14.6	-17°57.5	148°59.9	-22°45.9
4	77°43.6	222°00.6	-21°59.8	124°55.1	-21°12.2	206°16.6	-17°57.7	164°02.2	-22°45.9
5	92°46.1	237°03.4	-21°59.8	139°56.5	-21°11.7	221°18.5	-17°57.8	179°04.5	-22°45.9
6	107°48.5	252°06.2	-21°59.8	154°57.8	-21°11.3	236°20.5	-17°57.9	194°06.8	-22°46.0
7	122°51.0	267°09.1	-21°59.8	169°59.1	-21°10.9	251°22.5	-17°58.1	209°09.2	-22°46.0
8	137°53.4	282°11.9	-21°59.7	185°00.5	-21°10.4	266°24.4	-17°58.2	224°11.5	-22°46.0
9	152°55.9	297°14.8	-21°59.7	200°01.8	-21°10.0	281°26.4	-17°58.3	239°13.8	-22°46.0
10	167°58.4	312°17.6	-21°59.7	215°03.2	-21°09.6	296°28.4	-17°58.4	254°16.1	-22°46.0
11	183°00.8	327°20.5	-21°59.6	230°04.5	-21°09.1	311°30.3	-17°58.6	269°18.4	-22°46.0
12	198°03.3	342°23.4	-21°59.6	245°05.8	-21°08.7	326°32.3	-17°58.7	284°20.8	-22°46.0
13	213°05.8	357°26.2	-21°59.6	260°07.2	-21°08.2	341°34.3	-17°58.8	299°23.1	-22°46.0
14	228°08.2	12°29.1	-21°59.5	275°08.5	-21°07.8	356°36.2	-17°58.9	314°25.4	-22°46.0
15	243°10.7	27°32.0	-21°59.5	290°09.8	-21°07.4	11°38.2	-17°59.1	329°27.7	-22°46.0
16	258°13.2	42°34.8	-21°59.4	305°11.2	-21°06.9	26°40.2	-17°59.2	344°30.1	-22°46.0
17	273°15.6	57°37.7	-21°59.4	320°12.5	-21°06.5	41°42.1	-17°59.3	359°32.4	-22°46.0
18	288°18.1	72°40.6	-21°59.3	335°13.8	-21°06.0	56°44.1	-17°59.5	14°34.7	-22°46.0
19	303°20.5	87°43.5	-21°59.3	350°15.1	-21°05.6	71°46.1	-17°59.6	29°37.0	-22°46.0
20	318°23.0	102°46.4	-21°59.2	5°16.5	-21°05.2	86°48.0	-17°59.7	44°39.3	-22°46.0
21	333°25.5	117°49.3	-21°59.2	20°17.8	-21°04.7	101°50.0	-17°59.8	59°41.7	-22°46.0
22	348°27.9	132°52.2	-21°59.1	35°19.1	-21°04.3	116°51.9	-17°60.0	74°44.0	-22°46.0
23	3°30.4	147°55.1	-21°59.1	50°20.5	-21°03.8	131°53.9	-18°00.1	89°46.3	-22°46.0
Mer.pass.:22:46		v2.8 d0.0 m-4.3		v1.3 d0.4 m-1.1		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.7
Ankaa	353°11.7	-42°12.3
Schedar	349°35.8	56°38.4
Diphda	348°51.9	-17°53.0
Achernar	335°23.5	-57°08.5
Hamal	327°56.4	23°33.0
Polaris	315°47.2	89°20.3
Akamar	315°15.2	-40°13.7
Menkar	314°11.0	4°09.8
Mirfak	308°34.8	49°55.4
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°10.8
Capella	280°28.9	46°00.8
Bellatrix	278°28.0	6°21.9
Elnath	278°07.9	28°37.2
Alnilam	275°42.6	-1°11.4
Betelgeuse	270°57.3	7°24.6
Canopus	263°54.5	-52°42.1
Sirius	258°30.4	-16°44.2
Adara	255°09.7	-28°59.7
Procyon	244°55.9	5°10.8
Pollux	243°23.3	27°58.7
Avior	234°16.8	-59°33.9
Suhail	222°50.0	-43°30.2
Miaplacidus	221°39.4	-69°47.3
Alphard	217°52.7	-8°44.2
Regulus	207°39.9	11°52.6
Dubhe	193°47.9	61°39.0
Denebola	182°30.2	14°28.2
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°11.9
Gacrux	171°57.5	-57°12.9
Alioth	166°18.2	55°51.7
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.5
Hadar	148°43.4	-60°27.6
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.4	-60°54.6
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.2	74°05.0
Alphecca	126°08.3	26°39.5
Antares	112°22.1	-26°28.2
Atria	107°20.9	-69°03.7
Sabik	102°08.6	-15°44.7
Shaula	96°17.2	-37°06.9
Rasalhague	96°03.3	12°33.2
Etamin	90°44.6	51°29.6
Kaus Aust.	83°39.1	-34°22.4
Vega	80°36.6	38°48.4
Nunki	75°53.9	-26°16.3
Altair	62°04.8	8°55.3
Peacock	53°13.4	-56°40.6
Deneb	49°28.9	45°21.2
Enif	33°43.4	9°57.8
Alnair	27°38.9	-46°52.3
Fomalhaut	15°19.8	-29°31.4
Scheat	13°49.6	28°11.2
Markab	13°34.5	15°18.5

2018/10/	**SHA**	**Mer.pass**
Venus	144°03.0	13:19
Mars	48°09.1	19:43
Jupiter	128°58.7	14:20
Saturn	86°25.7	17:09

2018/10/	**SHA**	**Mer.pass**
Venus	144°08.1	13:15
Mars	47°42.8	19:41
Jupiter	128°46.9	14:17
Saturn	86°22.5	17:06

2018/10/	**SHA**	**Mer.pass**
Venus	144°15.5	13:10
Mars	47°16.0	19:39
Jupiter	128°35.0	14:14
Saturn	86°19.2	17:02

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	183°00.5	-5°23.7	208°12.4	8.9	9°02.6	-11.8	59.7
1	198°00.6	-5°24.6	222°40.3	8.9	8°50.7	-11.9	59.7
2	213°00.8	-5°25.6	237°08.2	8.9	8°38.8	-11.9	59.7
3	228°01.0	-5°26.6	251°36.1	9.0	8°26.8	-12.0	59.7
4	243°01.2	-5°27.5	266°04.1	9.0	8°14.8	-12.0	59.7
5	258°01.4	-5°28.5	280°32.2	9.1	8°02.8	-12.1	59.7
6	273°01.5	-5°29.4	295°00.3	9.1	7°50.7	-12.1	59.7
7	288°01.7	-5°30.4	309°28.4	9.2	7°38.5	-12.2	59.7
8	303°01.9	-5°31.3	323°56.6	9.2	7°26.3	-12.2	59.7
9	318°02.1	-5°32.3	338°24.9	9.2	7°14.1	-12.2	59.7
10	333°02.3	-5°33.3	352°53.1	9.3	7°01.9	-12.3	59.6
11	348°02.4	-5°34.2	7°21.4	9.3	6°49.6	-12.3	59.6
12	3°02.6	-5°35.2	21°49.8	9.4	6°37.2	-12.4	59.6
13	18°02.8	-5°36.1	36°18.2	9.4	6°24.9	-12.4	59.6
14	33°03.0	-5°37.1	50°46.6	9.5	6°12.4	-12.4	59.6
15	48°03.1	-5°38.0	65°15.1	9.5	6°00.0	-12.5	59.6
16	63°03.3	-5°39.0	79°43.6	9.5	5°47.5	-12.5	59.6
17	78°03.5	-5°39.9	94°12.2	9.6	5°35.1	-12.5	59.6
18	93°03.7	-5°40.9	108°40.7	9.6	5°22.5	-12.5	59.5
19	108°03.9	-5°41.9	123°09.4	9.6	5°10.0	-12.6	59.5
20	123°04.0	-5°42.8	137°38.0	9.7	4°57.4	-12.6	59.5
21	138°04.2	-5°43.8	152°06.7	9.7	4°44.8	-12.6	59.5
22	153°04.4	-5°44.7	166°35.5	9.8	4°32.2	-12.6	59.5
23	168°04.6	-5°45.7	181°04.3	9.8	4°19.6	-12.6	59.5
	SD.=16.0	d=-1.0			S.D.=16.3		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	183°04.7	-5°46.6	195°33.1	9.8	4°06.9	-12.7	59.4
1	198°04.9	-5°47.6	210°01.9	9.9	3°54.2	-12.7	59.4
2	213°05.1	-5°48.5	224°30.8	9.9	3°41.5	-12.7	59.4
3	228°05.3	-5°49.5	238°59.7	9.9	3°28.8	-12.7	59.4
4	243°05.4	-5°50.4	253°28.7	10.0	3°16.1	-12.7	59.4
5	258°05.6	-5°51.4	267°57.6	10.0	3°03.4	-12.7	59.4
6	273°05.8	-5°52.4	282°26.6	10.0	2°50.6	-12.7	59.3
7	288°06.0	-5°53.3	296°55.7	10.1	2°37.9	-12.8	59.3
8	303°06.1	-5°54.3	311°24.8	10.1	2°25.1	-12.8	59.3
9	318°06.3	-5°55.2	325°53.9	10.1	2°12.3	-12.8	59.3
10	333°06.5	-5°56.2	340°23.0	10.2	1°59.6	-12.8	59.3
11	348°06.7	-5°57.1	354°52.2	10.2	1°46.8	-12.8	59.3
12	3°06.8	-5°58.1	9°21.4	10.2	1°34.0	-12.8	59.2
13	18°07.0	-5°59.0	23°50.6	10.2	1°21.2	-12.8	59.2
14	33°07.2	-5°60.0	38°19.8	10.3	1°08.5	-12.8	59.2
15	48°07.4	-6°00.9	52°49.1	10.3	0°55.7	-12.8	59.2
16	63°07.5	-6°01.9	67°18.4	10.3	0°42.9	-12.8	59.2
17	78°07.7	-6°02.8	81°47.8	10.3	0°30.2	-12.8	59.1
18	93°07.9	-6°03.8	96°17.1	10.4	0°17.4	-12.8	59.1
19	108°08.1	-6°04.7	110°46.5	10.4	0°04.6	-12.8	59.1
20	123°08.2	-6°05.7	125°15.9	10.4	-0°08.1	-12.7	59.1
21	138°08.4	-6°06.6	139°45.3	10.4	-0°20.8	-12.7	59.0
22	153°08.6	-6°07.6	154°14.8	10.5	-0°33.6	-12.7	59.0
23	168°08.7	-6°08.5	168°44.3	10.5	-0°46.3	-12.7	59.0
	SD.=16.0	d=-1.0			S.D.=16.2		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	183°08.9	-6°09.5	183°13.8	10.5	-0°59.0	-12.7	59.0
1	198°09.1	-6°10.4	197°43.3	10.5	-1°11.7	-12.7	59.0
2	213°09.3	-6°11.4	212°12.8	10.6	-1°24.3	-12.7	58.9
3	228°09.4	-6°12.3	226°42.4	10.6	-1°37.0	-12.6	58.9
4	243°09.6	-6°13.3	241°12.0	10.6	-1°49.6	-12.6	58.9
5	258°09.8	-6°14.3	255°41.6	10.6	-2°02.2	-12.6	58.9
6	273°09.9	-6°15.2	270°11.2	10.6	-2°14.8	-12.6	58.8
7	288°10.1	-6°16.2	284°40.8	10.6	-2°27.4	-12.6	58.8
8	303°10.3	-6°17.1	299°10.5	10.7	-2°39.9	-12.5	58.8
9	318°10.5	-6°18.1	313°40.2	10.7	-2°52.5	-12.5	58.8
10	333°10.6	-6°19.0	328°09.8	10.7	-3°05.0	-12.5	58.7
11	348°10.8	-6°20.0	342°39.6	10.7	-3°17.4	-12.5	58.7
12	3°11.0	-6°20.9	357°09.3	10.7	-3°29.9	-12.4	58.7
13	18°11.1	-6°21.8	11°39.0	10.7	-3°42.3	-12.4	58.7
14	33°11.3	-6°22.8	26°08.8	10.8	-3°54.6	-12.4	58.6
15	48°11.5	-6°23.7	40°38.5	10.8	-4°07.0	-12.3	58.6
16	63°11.6	-6°24.7	55°08.3	10.8	-4°19.3	-12.3	58.6
17	78°11.8	-6°25.6	69°38.1	10.8	-4°31.6	-12.3	58.5
18	93°12.0	-6°26.6	84°07.9	10.8	-4°43.8	-12.2	58.5
19	108°12.1	-6°27.5	98°37.7	10.8	-4°56.0	-12.2	58.5
20	123°12.3	-6°28.5	113°07.6	10.8	-5°08.2	-12.1	58.5
21	138°12.5	-6°29.4	127°37.4	10.8	-5°20.3	-12.1	58.4
22	153°12.7	-6°30.4	142°07.3	10.9	-5°32.4	-12.1	58.4
23	168°12.8	-6°31.3	156°37.1	10.9	-5°44.5	-12.0	58.4
	SD.=16.0	d=-1.0			S.D.=16.1		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:23	05:42	06:50	16:43	17:51	19:09
70	04:31	05:42	06:43	16:50	17:51	19:02
68	04:37	05:42	06:38	16:56	17:52	18:56
66	04:42	05:41	06:33	17:01	17:52	18:51
64	04:46	05:41	06:29	17:05	17:53	18:47
62	04:49	05:41	06:25	17:09	17:53	18:44
60	04:52	05:40	06:22	17:12	17:53	18:42
58	04:54	05:40	06:19	17:15	17:54	18:39
56	04:56	05:39	06:17	17:17	17:54	18:37
54	04:58	05:39	06:14	17:20	17:55	18:36
52	04:60	05:39	06:12	17:22	17:55	18:34
50	05:01	05:38	06:11	17:24	17:56	18:33
45	05:03	05:37	06:06	17:28	17:57	18:31
40	05:05	05:36	06:03	17:31	17:58	18:30
35	05:05	05:35	06:00	17:35	17:60	18:29
30	05:06	05:33	05:57	17:37	18:01	18:29
20	05:05	05:31	05:53	17:42	18:04	18:30
10	05:03	05:27	05:48	17:47	18:08	18:32
0	04:59	05:24	05:44	17:51	18:12	18:36
-10	04:54	05:19	05:40	17:55	18:16	18:41
-20	04:47	05:13	05:35	17:60	18:22	18:48
-30	04:38	05:06	05:30	18:05	18:30	18:58
-35	04:31	05:01	05:27	18:09	18:34	19:04
-40	04:24	04:56	05:23	18:12	18:40	19:12
-45	04:14	04:49	05:19	18:17	18:47	19:22
-50	04:01	04:41	05:14	18:22	18:55	19:35
-52	03:55	04:37	05:12	18:24	18:59	19:41
-54	03:49	04:33	05:09	18:27	19:03	19:48
-56	03:41	04:28	05:07	18:30	19:08	19:56
-58	03:32	04:23	05:03	18:33	19:14	20:05
-60	03:22	04:16	04:60	18:37	19:20	20:16

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	02:24	04:30	06:31	17:51	17:37	17:23
70	02:38	04:34	06:28	17:43	17:36	17:29
68	02:48	04:38	06:25	17:37	17:36	17:35
66	02:57	04:41	06:22	17:32	17:36	17:39
64	03:04	04:43	06:20	17:28	17:36	17:43
62	03:11	04:46	06:19	17:24	17:36	17:46
60	03:16	04:47	06:17	17:21	17:35	17:49
58	03:21	04:49	06:16	17:18	17:35	17:52
56	03:25	04:51	06:14	17:16	17:35	17:54
54	03:29	04:52	06:13	17:13	17:35	17:56
52	03:33	04:53	06:12	17:11	17:35	17:58
50	03:36	04:54	06:11	17:09	17:35	17:60
45	03:42	04:57	06:10	17:05	17:35	18:04
40	03:48	04:59	06:08	17:01	17:34	18:07
35	03:53	05:00	06:07	16:58	17:34	18:10
30	03:57	05:02	06:05	16:55	17:34	18:12
20	04:04	05:05	06:03	16:50	17:34	18:16
10	04:11	05:07	06:01	16:46	17:34	18:20
0	04:17	05:09	05:60	16:42	17:33	18:24
-10	04:23	05:11	05:58	16:38	17:33	18:27
-20	04:29	05:14	05:57	16:33	17:33	18:31
-30	04:37	05:16	05:55	16:28	17:32	18:35
-35	04:41	05:18	05:54	16:25	17:32	18:38
-40	04:46	05:20	05:52	16:22	17:32	18:40
-45	04:51	05:22	05:51	16:18	17:31	18:44
-50	04:58	05:24	05:49	16:13	17:31	18:48
-52	05:01	05:25	05:48	16:11	17:31	18:49
-54	05:04	05:26	05:48	16:08	17:31	18:51
-56	05:07	05:28	05:47	16:06	17:30	18:54
-58	05:12	05:29	05:46	16:03	17:30	18:56
-60	05:16	05:31	05:45	15:59	17:30	18:59

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
7	12:02	12:10	11:47	10:29	22:55	28(4%)
8	12:19	12:27	11:47	11:21	23:46	29(1%)
9	12:36	12:44	11:47	12:11	00:36	0(0%)

October 10, 11 ,12 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	18°32.9	162°58.0	-21°59.0	65°21.8	-21°03.4	146°55.9	-18°00.2	104°48.6	-22°46.0
1	33°35.3	178°00.9	-21°58.9	80°23.1	-21°03.0	161°57.8	-18°00.3	119°50.9	-22°46.0
2	48°37.8	193°03.8	-21°58.9	95°24.4	-21°02.5	176°59.8	-18°00.5	134°53.3	-22°46.0
3	63°40.3	208°06.8	-21°58.8	110°25.8	-21°02.1	192°01.8	-18°00.6	149°55.6	-22°46.0
4	78°42.7	223°09.7	-21°58.7	125°27.1	-21°01.6	207°03.7	-18°00.7	164°57.9	-22°46.0
5	93°45.2	238°12.6	-21°58.7	140°28.4	-21°01.2	222°05.7	-18°00.9	180°00.2	-22°46.0
6	108°47.7	253°15.6	-21°58.6	155°29.7	-21°00.8	237°07.6	-18°01.0	195°02.5	-22°46.0
7	123°50.1	268°18.5	-21°58.5	170°31.1	-21°00.3	252°09.6	-18°01.1	210°04.9	-22°46.0
8	138°52.6	283°21.4	-21°58.4	185°32.4	-20°59.9	267°11.6	-18°01.2	225°07.2	-22°46.0
9	153°55.0	298°24.4	-21°58.3	200°33.7	-20°59.4	282°13.5	-18°01.4	240°09.5	-22°46.0
10	168°57.5	313°27.3	-21°58.3	215°35.0	-20°59.0	297°15.5	-18°01.5	255°11.8	-22°46.0
11	183°60.0	328°30.3	-21°58.2	230°36.3	-20°58.5	312°17.5	-18°01.6	270°14.1	-22°46.0
12	199°02.4	343°33.2	-21°58.1	245°37.7	-20°58.1	327°19.4	-18°01.8	285°16.5	-22°46.0
13	214°04.9	358°36.2	-21°58.0	260°39.0	-20°57.7	342°21.4	-18°01.9	300°18.8	-22°46.0
14	229°07.4	13°39.2	-21°57.9	275°40.3	-20°57.2	357°23.3	-18°02.0	315°21.1	-22°46.0
15	244°09.8	28°42.1	-21°57.8	290°41.6	-20°56.8	12°25.3	-18°02.1	330°23.4	-22°46.0
16	259°12.3	43°45.1	-21°57.7	305°42.9	-20°56.3	27°27.3	-18°02.3	345°25.7	-22°46.0
17	274°14.8	58°48.1	-21°57.6	320°44.3	-20°55.9	42°29.2	-18°02.4	0°28.1	-22°46.0
18	289°17.2	73°51.0	-21°57.5	335°45.6	-20°55.4	57°31.2	-18°02.5	15°30.4	-22°46.0
19	304°19.7	88°54.0	-21°57.4	350°46.9	-20°55.0	72°33.1	-18°02.6	30°32.7	-22°46.0
20	319°22.1	103°57.0	-21°57.3	5°48.2	-20°54.5	87°35.1	-18°02.8	45°35.0	-22°46.0
21	334°24.6	119°00.0	-21°57.2	20°49.5	-20°54.1	102°37.1	-18°02.9	60°37.3	-22°46.0
22	349°27.1	134°03.0	-21°57.1	35°50.8	-20°53.6	117°39.0	-18°03.0	75°39.6	-22°46.0
23	4°29.5	149°06.0	-21°56.9	50°52.1	-20°53.2	132°41.0	-18°03.2	90°42.0	-22°46.0
Mer.pass.:22:42		v2.9 d0.1 m-4.3		v1.3 d0.4 m-1.1		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	19°32.0	164°09.0	-21°56.8	65°53.5	-20°52.7	147°42.9	-18°03.3	105°44.3	-22°46.0
1	34°34.5	179°12.0	-21°56.7	80°54.8	-20°52.3	162°44.9	-18°03.4	120°46.6	-22°46.0
2	49°36.9	194°15.0	-21°56.6	95°56.1	-20°51.9	177°46.9	-18°03.5	135°48.9	-22°46.0
3	64°39.4	209°18.0	-21°56.5	110°57.4	-20°51.4	192°48.8	-18°03.7	150°51.2	-22°46.0
4	79°41.9	224°21.0	-21°56.3	125°58.7	-20°51.0	207°50.8	-18°03.8	165°53.5	-22°46.0
5	94°44.3	239°24.1	-21°56.2	141°00.0	-20°50.5	222°52.7	-18°03.9	180°55.9	-22°46.0
6	109°46.8	254°27.1	-21°56.1	156°01.3	-20°50.1	237°54.7	-18°04.0	195°58.2	-22°46.0
7	124°49.3	269°30.1	-21°55.9	171°02.6	-20°49.6	252°56.7	-18°04.2	211°00.5	-22°46.1
8	139°51.7	284°33.2	-21°55.8	186°03.9	-20°49.2	267°58.6	-18°04.3	226°02.8	-22°46.1
9	154°54.2	299°36.2	-21°55.7	201°05.2	-20°48.7	283°00.6	-18°04.4	241°05.1	-22°46.1
10	169°56.6	314°39.2	-21°55.5	216°06.5	-20°48.3	298°02.5	-18°04.6	256°07.4	-22°46.1
11	184°59.1	329°42.3	-21°55.4	231°07.8	-20°47.8	313°04.5	-18°04.7	271°09.7	-22°46.1
12	200°01.6	344°45.3	-21°55.2	246°09.2	-20°47.4	328°06.5	-18°04.8	286°12.1	-22°46.1
13	215°04.0	359°48.4	-21°55.1	261°10.5	-20°46.9	343°08.4	-18°04.9	301°14.4	-22°46.1
14	230°06.5	14°51.4	-21°54.9	276°11.8	-20°46.5	358°10.4	-18°05.1	316°16.7	-22°46.1
15	245°09.0	29°54.5	-21°54.8	291°13.1	-20°46.0	13°12.3	-18°05.2	331°19.0	-22°46.1
16	260°11.4	44°57.5	-21°54.6	306°14.4	-20°45.6	28°14.3	-18°05.3	346°21.3	-22°46.1
17	275°13.9	60°00.6	-21°54.5	321°15.7	-20°45.1	43°16.3	-18°05.4	1°23.6	-22°46.1
18	290°16.4	75°03.7	-21°54.3	336°17.0	-20°44.7	58°18.2	-18°05.6	16°25.9	-22°46.1
19	305°18.8	90°06.8	-21°54.2	351°18.3	-20°44.2	73°20.2	-18°05.7	31°28.3	-22°46.1
20	320°21.3	105°09.8	-21°54.0	6°19.6	-20°43.8	88°22.1	-18°05.8	46°30.6	-22°46.1
21	335°23.7	120°12.9	-21°53.8	21°20.9	-20°43.3	103°24.1	-18°06.0	61°32.9	-22°46.1
22	350°26.2	135°16.0	-21°53.7	36°22.2	-20°42.8	118°26.0	-18°06.1	76°35.2	-22°46.1
23	5°28.7	150°19.1	-21°53.5	51°23.5	-20°42.4	133°28.0	-18°06.2	91°37.5	-22°46.1
Mer.pass.:22:38		v3.0 d0.1 m-4.3		v1.3 d0.4 m-1.1		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	20°31.1	165°22.2	-21°53.3	66°24.8	-20°41.9	148°30.0	-18°06.3	106°39.8	-22°46.1
1	35°33.6	180°25.3	-21°53.1	81°26.1	-20°41.5	163°31.9	-18°06.5	121°42.1	-22°46.1
2	50°36.1	195°28.4	-21°52.9	96°27.4	-20°41.0	178°33.9	-18°06.6	136°44.5	-22°46.1
3	65°38.5	210°31.5	-21°52.8	111°28.7	-20°40.6	193°35.8	-18°06.7	151°46.8	-22°46.1
4	80°41.0	225°34.6	-21°52.6	126°29.9	-20°40.1	208°37.8	-18°06.8	166°49.1	-22°46.1
5	95°43.5	240°37.7	-21°52.4	141°31.2	-20°39.7	223°39.7	-18°07.0	181°51.4	-22°46.1
6	110°45.9	255°40.8	-21°52.2	156°32.5	-20°39.2	238°41.7	-18°07.1	196°53.7	-22°46.1
7	125°48.4	270°43.9	-21°52.0	171°33.8	-20°38.8	253°43.7	-18°07.2	211°56.0	-22°46.1
8	140°50.9	285°47.1	-21°51.8	186°35.1	-20°38.3	268°45.6	-18°07.4	226°58.3	-22°46.1
9	155°53.3	300°50.2	-21°51.6	201°36.4	-20°37.9	283°47.6	-18°07.5	242°00.6	-22°46.1
10	170°55.8	315°53.3	-21°51.4	216°37.7	-20°37.4	298°49.5	-18°07.6	257°02.9	-22°46.1
11	185°58.2	330°56.5	-21°51.2	231°39.0	-20°36.9	313°51.5	-18°07.7	272°05.3	-22°46.1
12	201°00.7	345°59.6	-21°51.0	246°40.3	-20°36.5	328°53.4	-18°07.9	287°07.6	-22°46.1
13	216°03.2	1°02.7	-21°50.8	261°41.6	-20°36.0	343°55.4	-18°08.0	302°09.9	-22°46.1
14	231°05.6	16°05.9	-21°50.6	276°42.9	-20°35.6	358°57.3	-18°08.1	317°12.2	-22°46.1
15	246°08.1	31°09.0	-21°50.4	291°44.2	-20°35.1	13°59.3	-18°08.3	332°14.5	-22°46.1
16	261°10.6	46°12.2	-21°50.2	306°45.4	-20°34.7	29°01.3	-18°08.4	347°16.8	-22°46.1
17	276°13.0	61°15.3	-21°50.0	321°46.7	-20°34.2	44°03.2	-18°08.5	2°19.1	-22°46.1
18	291°15.5	76°18.5	-21°49.8	336°48.0	-20°33.7	59°05.2	-18°08.6	17°21.4	-22°46.1
19	306°18.0	91°21.7	-21°49.5	351°49.3	-20°33.3	74°07.1	-18°08.8	32°23.7	-22°46.1
20	321°20.4	106°24.8	-21°49.3	6°50.6	-20°32.8	89°09.1	-18°08.9	47°26.1	-22°46.1
21	336°22.9	121°28.0	-21°49.1	21°51.9	-20°32.4	104°11.0	-18°09.0	62°28.4	-22°46.1
22	351°25.4	136°31.2	-21°48.9	36°53.2	-20°31.9	119°13.0	-18°09.1	77°30.7	-22°46.1
23	6°27.8	151°34.3	-21°48.6	51°54.5	-20°31.5	134°14.9	-18°09.3	92°33.0	-22°46.1
Mer.pass.:22:34		v3.1 d0.2 m-4.3		v1.3 d0.5 m-1.1		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.7
Ankaa	353°11.7	-42°12.3
Schedar	349°35.8	56°38.4
Diphda	348°51.9	-17°53.0
Achernar	335°23.5	-57°08.5
Hamal	327°56.4	23°33.0
Polaris	315°46.4	89°20.3
Akamar	315°15.2	-40°13.8
Menkar	314°11.0	4°09.7
Mirfak	308°34.8	49°55.4
Aldebaran	290°45.1	16°32.7
Rigel	281°08.4	-8°10.8
Capella	280°28.9	46°00.8
Bellatrix	278°28.0	6°21.9
Elnath	278°07.9	28°37.2
Alnilam	275°42.6	-1°11.4
Betelgeuse	270°57.3	7°24.6
Canopus	263°54.4	-52°42.1
Sirius	258°30.4	-16°44.2
Adara	255°09.7	-28°59.7
Procyon	244°55.9	5°10.8
Pollux	243°23.3	27°58.7
Avior	234°16.7	-59°33.9
Suhail	222°50.0	-43°30.2
Miaplacidus	221°39.4	-69°47.3
Alphard	217°52.7	-8°44.2
Regulus	207°39.9	11°52.6
Dubhe	193°47.9	61°39.0
Denebola	182°30.2	14°28.2
Gienah	175°48.9	-17°38.5
Acrux	173°06.0	-63°11.9
Gacrux	171°57.4	-57°12.8
Alioth	166°18.2	55°51.6
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.4
Hadar	148°43.4	-60°27.6
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.4	-60°54.6
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.2	74°05.0
Alphecca	126°08.3	26°39.5
Antares	112°22.1	-26°28.2
Atria	107°21.0	-69°03.7
Sabik	102°08.6	-15°44.7
Shaula	96°17.2	-37°06.9
Rasalhague	96°03.3	12°33.2
Etamin	90°44.7	51°29.6
Kaus Aust.	83°39.1	-34°22.4
Vega	80°36.6	38°48.4
Nunki	75°53.9	-26°16.3
Altair	62°04.8	8°55.3
Peacock	53°13.5	-56°40.6
Deneb	49°28.9	45°21.2
Enif	33°43.4	9°57.8
Alnair	27°39.0	-46°52.3
Fomalhaut	15°19.8	-29°31.4
Scheat	13°49.6	28°11.2
Markab	13°34.5	15°18.5

2018/10/	**SHA**	**Mer.pass**
Venus	144°25.1	13:06
Mars	46°48.9	19:37
Jupiter	128°23.0	14:10
Saturn	86°15.8	16:58

2018/10/	**SHA**	**Mer.pass**
Venus	144°37.0	13:01
Mars	46°21.4	19:35
Jupiter	128°10.9	14:07
Saturn	86°12.3	16:54

2018/10/	**SHA**	**Mer.pass**
Venus	144°51.0	12:56
Mars	45°53.6	19:33
Jupiter	127°58.8	14:04
Saturn	86°08.7	16:51

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°13.0	-6°32.3	171°07.0	10.9	-5°56.5	-12.0	58.4
1	198°13.2	-6°33.2	185°36.9	10.9	-6°08.4	-11.9	58.3
2	213°13.3	-6°34.2	200°06.8	10.9	-6°20.3	-11.9	58.3
3	228°13.5	-6°35.1	214°36.7	10.9	-6°32.2	-11.8	58.3
4	243°13.7	-6°36.1	229°06.6	10.9	-6°44.0	-11.8	58.2
5	258°13.8	-6°37.0	243°36.5	10.9	-6°55.8	-11.8	58.2
6	273°14.0	-6°38.0	258°06.4	10.9	-7°07.5	-11.7	58.2
7	288°14.2	-6°38.9	272°36.3	10.9	-7°19.2	-11.7	58.1
8	303°14.3	-6°39.9	287°06.3	10.9	-7°30.8	-11.6	58.1
9	318°14.5	-6°40.8	301°36.2	10.9	-7°42.4	-11.5	58.1
10	333°14.6	-6°41.8	316°06.1	10.9	-7°53.9	-11.5	58.1
11	348°14.8	-6°42.7	330°36.1	11.0	-8°05.4	-11.4	58.0
12	3°15.0	-6°43.6	345°06.1	11.0	-8°16.8	-11.4	58.0
13	18°15.1	-6°44.6	359°36.0	11.0	-8°28.2	-11.3	58.0
14	33°15.3	-6°45.5	14°06.0	11.0	-8°39.5	-11.3	57.9
15	48°15.5	-6°46.5	28°35.9	11.0	-8°50.7	-11.2	57.9
16	63°15.6	-6°47.4	43°05.9	11.0	-9°01.9	-11.2	57.9
17	78°15.8	-6°48.4	57°35.9	11.0	-9°13.0	-11.1	57.8
18	93°16.0	-6°49.3	72°05.8	11.0	-9°24.1	-11.0	57.8
19	108°16.1	-6°50.3	86°35.8	11.0	-9°35.1	-11.0	57.8
20	123°16.3	-6°51.2	101°05.8	11.0	-9°46.1	-10.9	57.8
21	138°16.5	-6°52.2	115°35.8	11.0	-9°56.9	-10.8	57.7
22	153°16.6	-6°53.1	130°05.8	11.0	-10°07.7	-10.8	57.7
23	168°16.8	-6°54.0	144°35.7	11.0	-10°18.5	-10.7	57.7
	SD.=16.0	d=-0.9			S.D.=15.9		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°16.9	-6°55.0	159°05.7	11.0	-10°29.2	-10.6	57.6
1	198°17.1	-6°55.9	173°35.7	11.0	-10°39.8	-10.6	57.6
2	213°17.3	-6°56.9	188°05.7	11.0	-10°50.3	-10.5	57.6
3	228°17.4	-6°57.8	202°35.7	11.0	-11°00.8	-10.4	57.5
4	243°17.6	-6°58.8	217°05.6	11.0	-11°11.2	-10.4	57.5
5	258°17.7	-6°59.7	231°35.6	11.0	-11°21.6	-10.3	57.5
6	273°17.9	-7°00.6	246°05.6	11.0	-11°31.8	-10.2	57.4
7	288°18.1	-7°01.6	260°35.6	11.0	-11°42.0	-10.2	57.4
8	303°18.2	-7°02.5	275°05.5	11.0	-11°52.2	-10.1	57.4
9	318°18.4	-7°03.5	289°35.5	11.0	-12°02.2	-10.0	57.3
10	333°18.6	-7°04.4	304°05.5	11.0	-12°12.2	-9.9	57.3
11	348°18.7	-7°05.4	318°35.5	11.0	-12°22.1	-9.9	57.3
12	3°18.9	-7°06.3	333°05.4	11.0	-12°31.9	-9.8	57.2
13	18°19.0	-7°07.2	347°35.4	11.0	-12°41.7	-9.7	57.2
14	33°19.2	-7°08.2	2°05.3	11.0	-12°51.4	-9.6	57.2
15	48°19.4	-7°09.1	16°35.3	11.0	-13°01.0	-9.6	57.2
16	63°19.5	-7°10.1	31°05.3	11.0	-13°10.5	-9.5	57.1
17	78°19.7	-7°11.0	45°35.2	10.9	-13°19.9	-9.4	57.1
18	93°19.8	-7°12.0	60°05.2	10.9	-13°29.3	-9.3	57.1
19	108°20.0	-7°12.9	74°35.1	10.9	-13°38.6	-9.2	57.0
20	123°20.1	-7°13.8	89°05.0	10.9	-13°47.8	-9.2	57.0
21	138°20.3	-7°14.8	103°35.0	10.9	-13°56.9	-9.1	57.0
22	153°20.5	-7°15.7	118°04.9	10.9	-14°05.9	-9.0	56.9
23	168°20.6	-7°16.7	132°34.8	10.9	-14°14.9	-8.9	56.9
	SD.=16.0	d=-0.9			S.D.=15.7		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°20.8	-7°17.6	147°04.8	10.9	-14°23.7	-8.8	56.9
1	198°20.9	-7°18.5	161°34.7	10.9	-14°32.5	-8.7	56.8
2	213°21.1	-7°19.5	176°04.6	10.9	-14°41.2	-8.7	56.8
3	228°21.2	-7°20.4	190°34.5	10.9	-14°49.8	-8.6	56.8
4	243°21.4	-7°21.4	205°04.4	10.9	-14°58.3	-8.5	56.7
5	258°21.6	-7°22.3	219°34.3	10.9	-15°06.8	-8.4	56.7
6	273°21.7	-7°23.2	234°04.2	10.9	-15°15.1	-8.3	56.7
7	288°21.9	-7°24.2	248°34.1	10.9	-15°23.4	-8.2	56.6
8	303°22.0	-7°25.1	263°04.0	10.9	-15°31.6	-8.1	56.6
9	318°22.2	-7°26.0	277°33.9	10.9	-15°39.7	-8.0	56.6
10	333°22.3	-7°27.0	292°03.8	10.9	-15°47.7	-8.0	56.6
11	348°22.5	-7°27.9	306°33.7	10.9	-15°55.6	-7.9	56.5
12	3°22.6	-7°28.9	321°03.5	10.9	-16°03.4	-7.8	56.5
13	18°22.8	-7°29.8	335°33.4	10.9	-16°11.1	-7.7	56.5
14	33°23.0	-7°30.7	350°03.3	10.9	-16°18.7	-7.6	56.4
15	48°23.1	-7°31.7	4°33.2	10.9	-16°26.3	-7.5	56.4
16	63°23.3	-7°32.6	19°03.0	10.9	-16°33.7	-7.4	56.4
17	78°23.4	-7°33.5	33°32.9	10.9	-16°41.1	-7.3	56.3
18	93°23.6	-7°34.5	48°02.7	10.9	-16°48.4	-7.2	56.3
19	108°23.7	-7°35.4	62°32.6	10.8	-16°55.5	-7.1	56.3
20	123°23.9	-7°36.4	77°02.4	10.8	-17°02.6	-7.0	56.2
21	138°24.0	-7°37.3	91°32.3	10.8	-17°09.6	-6.9	56.2
22	153°24.2	-7°38.2	106°02.1	10.8	-17°16.5	-6.8	56.2
23	168°24.3	-7°39.2	120°31.9	10.8	-17°23.3	-6.7	56.2
	SD.=16.0	d=-0.9			S.D.=15.5		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:37	05:55	07:04	16:27	17:36	18:54
70	04:43	05:54	06:56	16:36	17:38	18:48
68	04:48	05:52	06:48	16:43	17:40	18:44
66	04:51	05:51	06:43	16:49	17:41	18:40
64	04:55	05:50	06:37	16:55	17:42	18:37
62	04:57	05:48	06:33	16:59	17:44	18:35
60	04:59	05:47	06:29	17:03	17:45	18:33
58	05:01	05:46	06:26	17:07	17:46	18:31
56	05:02	05:45	06:23	17:10	17:47	18:30
54	05:04	05:45	06:20	17:12	17:48	18:29
52	05:05	05:44	06:18	17:15	17:49	18:28
50	05:05	05:43	06:15	17:17	17:50	18:27
45	05:07	05:41	06:10	17:22	17:52	18:26
40	05:08	05:39	06:06	17:27	17:54	18:25
35	05:08	05:37	06:02	17:31	17:56	18:25
30	05:07	05:35	05:59	17:34	17:58	18:26
20	05:06	05:31	05:53	17:40	18:02	18:27
10	05:03	05:27	05:48	17:45	18:06	18:31
0	04:58	05:23	05:43	17:50	18:11	18:35
-10	04:53	05:17	05:38	17:55	18:16	18:41
-20	04:45	05:11	05:33	18:01	18:23	18:49
-30	04:34	05:02	05:27	18:07	18:32	19:00
-35	04:27	04:57	05:23	18:11	18:37	19:07
-40	04:18	04:51	05:19	18:15	18:43	19:16
-45	04:08	04:44	05:14	18:21	18:51	19:27
-50	03:54	04:35	05:08	18:27	19:00	19:41
-52	03:48	04:30	05:05	18:29	19:05	19:47
-54	03:40	04:25	05:02	18:33	19:09	19:55
-56	03:32	04:20	04:59	18:36	19:15	20:04
-58	03:22	04:14	04:55	18:40	19:21	20:14
-60	03:10	04:07	04:51	18:44	19:29	20:26

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	08:32	10:36	12:54	17:08	16:48	16:14
70	08:20	10:12	12:08	17:22	17:13	17:02
68	08:10	09:54	11:38	17:33	17:32	17:32
66	08:02	09:40	11:16	17:43	17:48	17:55
64	07:55	09:28	10:58	17:51	18:01	18:14
62	07:50	09:18	10:44	17:58	18:11	18:29
60	07:45	09:10	10:32	18:04	18:21	18:41
58	07:40	09:03	10:22	18:09	18:29	18:52
56	07:36	08:56	10:12	18:14	18:36	19:02
54	07:33	08:50	10:05	18:18	18:42	19:10
52	07:30	08:45	09:57	18:22	18:48	19:18
50	07:27	08:40	09:51	18:26	18:53	19:25
45	07:21	08:30	09:37	18:33	19:05	19:39
40	07:16	08:22	09:26	18:40	19:14	19:51
35	07:11	08:15	09:16	18:45	19:22	20:02
30	07:08	08:08	09:08	18:50	19:30	20:11
20	07:01	07:58	08:53	18:59	19:42	20:27
10	06:55	07:48	08:41	19:06	19:53	20:40
0	06:50	07:39	08:29	19:14	20:03	20:53
-10	06:44	07:31	08:18	19:21	20:14	21:06
-20	06:39	07:22	08:05	19:28	20:25	21:20
-30	06:32	07:11	07:51	19:37	20:37	21:36
-35	06:29	07:05	07:43	19:42	20:44	21:45
-40	06:25	06:58	07:34	19:48	20:53	21:56
-45	06:20	06:50	07:23	19:54	21:03	22:08
-50	06:14	06:41	07:10	20:02	21:14	22:23
-52	06:12	06:37	07:04	20:06	21:20	22:30
-54	06:09	06:32	06:58	20:10	21:26	22:38
-56	06:06	06:27	06:50	20:15	21:33	22:47
-58	06:02	06:21	06:42	20:20	21:40	22:57
-60	05:59	06:14	06:33	20:25	21:49	23:09

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
10	12:52	13:00	11:47	13:01	00:36	1(2%)
11	13:08	13:15	11:46	13:51	01:26	2(7%)
12	13:23	13:30	11:46	14:41	02:16	3(13%)

October 13, 14 ,15 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	21°30.3	166°37.5	-21°48.4	66°55.7	-20°31.0	149°16.9	-18°09.4	107°35.3	-22°46.1
1	36°32.7	181°40.7	-21°48.2	81°57.0	-20°30.5	164°18.8	-18°09.5	122°37.6	-22°46.1
2	51°35.2	196°43.9	-21°47.9	96°58.3	-20°30.1	179°20.8	-18°09.7	137°39.9	-22°46.1
3	66°37.7	211°47.1	-21°47.7	111°59.6	-20°29.6	194°22.8	-18°09.8	152°42.2	-22°46.1
4	81°40.1	226°50.3	-21°47.4	127°00.9	-20°29.2	209°24.7	-18°09.9	167°44.5	-22°46.1
5	96°42.6	241°53.5	-21°47.2	142°02.1	-20°28.7	224°26.7	-18°10.0	182°46.8	-22°46.1
6	111°45.1	256°56.7	-21°46.9	157°03.4	-20°28.2	239°28.6	-18°10.2	197°49.1	-22°46.1
7	126°47.5	271°59.9	-21°46.7	172°04.7	-20°27.8	254°30.6	-18°10.3	212°51.4	-22°46.1
8	141°50.0	287°03.1	-21°46.4	187°06.0	-20°27.3	269°32.5	-18°10.4	227°53.8	-22°46.1
9	156°52.5	302°06.3	-21°46.2	202°07.3	-20°26.9	284°34.5	-18°10.5	242°56.1	-22°46.1
10	171°54.9	317°09.5	-21°45.9	217°08.5	-20°26.4	299°36.4	-18°10.7	257°58.4	-22°46.1
11	186°57.4	332°12.8	-21°45.7	232°09.8	-20°25.9	314°38.4	-18°10.8	273°00.7	-22°46.1
12	201°59.9	347°16.0	-21°45.4	247°11.1	-20°25.5	329°40.3	-18°10.9	288°03.0	-22°46.1
13	217°02.3	2°19.2	-21°45.1	262°12.4	-20°25.0	344°42.3	-18°11.1	303°05.3	-22°46.1
14	232°04.8	17°22.5	-21°44.9	277°13.7	-20°24.5	359°44.2	-18°11.2	318°07.6	-22°46.1
15	247°07.2	32°25.7	-21°44.6	292°14.9	-20°24.1	14°46.2	-18°11.3	333°09.9	-22°46.1
16	262°09.7	47°28.9	-21°44.3	307°16.2	-20°23.6	29°48.1	-18°11.4	348°12.2	-22°46.1
17	277°12.2	62°32.2	-21°44.1	322°17.5	-20°23.2	44°50.1	-18°11.6	3°14.5	-22°46.1
18	292°14.6	77°35.4	-21°43.8	337°18.8	-20°22.7	59°52.0	-18°11.7	18°16.8	-22°46.1
19	307°17.1	92°38.7	-21°43.5	352°20.0	-20°22.2	74°54.0	-18°11.8	33°19.1	-22°46.2
20	322°19.6	107°41.9	-21°43.2	7°21.3	-20°21.8	89°55.9	-18°11.9	48°21.4	-22°46.2
21	337°22.0	122°45.2	-21°42.9	22°22.6	-20°21.3	104°57.9	-18°12.1	63°23.7	-22°46.2
22	352°24.5	137°48.4	-21°42.7	37°23.8	-20°20.8	119°59.9	-18°12.2	78°26.0	-22°46.2
23	7°27.0	152°51.7	-21°42.4	52°25.1	-20°20.4	135°01.8	-18°12.3	93°28.4	-22°46.2
Mer.pass.:22:30		v3.2 d0.2 m-4.2		v1.3 d0.5 m-1.0		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	22°29.4	167°55.0	-21°42.1	67°26.4	-20°19.9	150°03.8	-18°12.5	108°30.7	-22°46.2
1	37°31.9	182°58.2	-21°41.8	82°27.7	-20°19.4	165°05.7	-18°12.6	123°33.0	-22°46.2
2	52°34.3	198°01.5	-21°41.5	97°28.9	-20°19.0	180°07.7	-18°12.7	138°35.3	-22°46.2
3	67°36.8	213°04.8	-21°41.2	112°30.2	-20°18.5	195°09.6	-18°12.8	153°37.6	-22°46.2
4	82°39.3	228°08.1	-21°40.9	127°31.5	-20°18.0	210°11.6	-18°13.0	168°39.9	-22°46.2
5	97°41.7	243°11.4	-21°40.6	142°32.7	-20°17.6	225°13.5	-18°13.1	183°42.2	-22°46.2
6	112°44.2	258°14.6	-21°40.3	157°34.0	-20°17.1	240°15.5	-18°13.2	198°44.5	-22°46.2
7	127°46.7	273°17.9	-21°40.0	172°35.3	-20°16.6	255°17.4	-18°13.3	213°46.8	-22°46.2
8	142°49.1	288°21.2	-21°39.6	187°36.5	-20°16.2	270°19.4	-18°13.5	228°49.1	-22°46.2
9	157°51.6	303°24.5	-21°39.3	202°37.8	-20°15.7	285°21.3	-18°13.6	243°51.4	-22°46.2
10	172°54.1	318°27.8	-21°39.0	217°39.1	-20°15.2	300°23.3	-18°13.7	258°53.7	-22°46.2
11	187°56.5	333°31.1	-21°38.7	232°40.3	-20°14.8	315°25.2	-18°13.9	273°56.0	-22°46.2
12	202°59.0	348°34.5	-21°38.4	247°41.6	-20°14.3	330°27.2	-18°14.0	288°58.3	-22°46.2
13	218°01.5	3°37.8	-21°38.1	262°42.9	-20°13.8	345°29.1	-18°14.1	304°00.6	-22°46.2
14	233°03.9	18°41.1	-21°37.7	277°44.1	-20°13.4	0°31.1	-18°14.2	319°02.9	-22°46.2
15	248°06.4	33°44.4	-21°37.4	292°45.4	-20°12.9	15°33.0	-18°14.4	334°05.2	-22°46.2
16	263°08.8	48°47.7	-21°37.1	307°46.6	-20°12.4	30°35.0	-18°14.5	349°07.5	-22°46.2
17	278°11.3	63°51.0	-21°36.7	322°47.9	-20°12.0	45°36.9	-18°14.6	4°09.8	-22°46.2
18	293°13.8	78°54.4	-21°36.4	337°49.2	-20°11.5	60°38.9	-18°14.8	19°12.1	-22°46.2
19	308°16.2	93°57.7	-21°36.1	352°50.4	-20°11.0	75°40.8	-18°14.9	34°14.4	-22°46.2
20	323°18.7	109°01.0	-21°35.7	7°51.7	-20°10.6	90°42.8	-18°15.0	49°16.7	-22°46.2
21	338°21.2	124°04.4	-21°35.4	22°52.9	-20°10.1	105°44.7	-18°15.1	64°19.0	-22°46.2
22	353°23.6	139°07.7	-21°35.0	37°54.2	-20°09.6	120°46.7	-18°15.3	79°21.3	-22°46.2
23	8°26.1	154°11.1	-21°34.7	52°55.5	-20°09.1	135°48.6	-18°15.4	94°23.6	-22°46.2
Mer.pass.:22:26		v3.3 d0.3 m-4.2		v1.3 d0.5 m-1.0		v2.0 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	23°28.6	169°14.4	-21°34.3	67°56.7	-20°08.7	150°50.6	-18°15.5	109°25.9	-22°46.2
1	38°31.0	184°17.8	-21°34.0	82°58.0	-20°08.2	165°52.5	-18°15.6	124°28.2	-22°46.2
2	53°33.5	199°21.1	-21°33.6	97°59.2	-20°07.7	180°54.4	-18°15.8	139°30.5	-22°46.2
3	68°36.0	214°24.5	-21°33.2	113°00.5	-20°07.3	195°56.4	-18°15.9	154°32.8	-22°46.2
4	83°38.4	229°27.9	-21°32.9	128°01.7	-20°06.8	210°58.3	-18°16.0	169°35.1	-22°46.2
5	98°40.9	244°31.2	-21°32.5	143°03.0	-20°06.3	226°00.3	-18°16.2	184°37.4	-22°46.2
6	113°43.3	259°34.6	-21°32.2	158°04.3	-20°05.8	241°02.2	-18°16.3	199°39.7	-22°46.2
7	128°45.8	274°38.0	-21°31.8	173°05.5	-20°05.4	256°04.2	-18°16.4	214°42.0	-22°46.2
8	143°48.3	289°41.3	-21°31.4	188°06.8	-20°04.9	271°06.1	-18°16.5	229°44.3	-22°46.2
9	158°50.7	304°44.7	-21°31.0	203°08.0	-20°04.4	286°08.1	-18°16.7	244°46.6	-22°46.2
10	173°53.2	319°48.1	-21°30.7	218°09.3	-20°03.9	301°10.0	-18°16.8	259°48.9	-22°46.2
11	188°55.7	334°51.5	-21°30.3	233°10.5	-20°03.5	316°12.0	-18°16.9	274°51.2	-22°46.2
12	203°58.1	349°54.9	-21°29.9	248°11.8	-20°03.0	331°13.9	-18°17.0	289°53.5	-22°46.2
13	219°00.6	4°58.3	-21°29.5	263°13.0	-20°02.5	346°15.9	-18°17.2	304°55.8	-22°46.2
14	234°03.1	20°01.7	-21°29.1	278°14.3	-20°02.1	1°17.8	-18°17.3	319°58.1	-22°46.2
15	249°05.5	35°05.1	-21°28.7	293°15.5	-20°01.6	16°19.8	-18°17.4	335°00.4	-22°46.2
16	264°08.0	50°08.5	-21°28.3	308°16.8	-20°01.1	31°21.7	-18°17.6	350°02.7	-22°46.2
17	279°10.4	65°11.9	-21°28.0	323°18.0	-20°00.6	46°23.7	-18°17.7	5°05.0	-22°46.2
18	294°12.9	80°15.3	-21°27.6	338°19.3	-20°00.2	61°25.6	-18°17.8	20°07.3	-22°46.2
19	309°15.4	95°18.7	-21°27.2	353°20.5	-19°59.7	76°27.6	-18°17.9	35°09.6	-22°46.2
20	324°17.8	110°22.1	-21°26.8	8°21.8	-19°59.2	91°29.5	-18°18.1	50°11.9	-22°46.2
21	339°20.3	125°25.5	-21°26.4	23°23.0	-19°58.7	106°31.4	-18°18.2	65°14.2	-22°46.2
22	354°22.8	140°29.0	-21°25.9	38°24.3	-19°58.2	121°33.4	-18°18.3	80°16.5	-22°46.2
23	9°25.2	155°32.4	-21°25.5	53°25.5	-19°57.8	136°35.3	-18°18.4	95°18.8	-22°46.2
Mer.pass.:22:22		v3.4 d0.4 m-4.2		v1.3 d0.5 m-1.0		v1.9 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.7
Ankaa	353°11.7	-42°12.3
Schedar	349°35.8	56°38.4
Diphda	348°51.9	-17°53.0
Achernar	335°23.5	-57°08.6
Hamal	327°56.4	23°33.0
Polaris	315°45.5	89°20.4
Akamar	315°15.2	-40°13.8
Menkar	314°11.0	4°09.7
Mirfak	308°34.7	49°55.4
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°10.8
Capella	280°28.9	46°00.8
Bellatrix	278°28.0	6°21.9
Elnath	278°07.9	28°37.2
Alnilam	275°42.6	-1°11.4
Betelgeuse	270°57.3	7°24.5
Canopus	263°54.4	-52°42.1
Sirius	258°30.4	-16°44.2
Adara	255°09.6	-28°59.7
Procyon	244°55.9	5°10.8
Pollux	243°23.3	27°58.7
Avior	234°16.7	-59°33.9
Suhail	222°50.0	-43°30.2
Miaplacidus	221°39.3	-69°47.3
Alphard	217°52.7	-8°44.2
Regulus	207°39.9	11°52.6
Dubhe	193°47.8	61°38.9
Denebola	182°30.2	14°28.2
Gienah	175°48.9	-17°38.5
Acrux	173°05.9	-63°11.9
Gacrux	171°57.4	-57°12.8
Alioth	166°18.1	55°51.6
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.4
Hadar	148°43.4	-60°27.6
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.4	-60°54.6
Zubenelg.	137°01.8	-16°06.9
Kochab	137°21.2	74°05.0
Alphecca	126°08.3	26°39.5
Antares	112°22.1	-26°28.2
Atria	107°21.0	-69°03.6
Sabik	102°08.6	-15°44.7
Shaula	96°17.2	-37°06.9
Rasalhague	96°03.3	12°33.2
Etamin	90°44.7	51°29.6
Kaus Aust.	83°39.1	-34°22.4
Vega	80°36.7	38°48.4
Nunki	75°53.9	-26°16.3
Altair	62°04.8	8°55.3
Peacock	53°13.5	-56°40.6
Deneb	49°28.9	45°21.2
Enif	33°43.4	9°57.8
Alnair	27°39.0	-46°52.3
Fomalhaut	15°19.8	-29°31.4
Scheat	13°49.6	28°11.2
Markab	13°34.5	15°18.5

2018/10/	**SHA**	**Mer.pass**
Venus	145°07.2	12:51
Mars	45°25.5	19:31
Jupiter	127°46.6	14:01
Saturn	86°05.0	16:47

2018/10/	**SHA**	**Mer.pass**
Venus	145°25.5	12:46
Mars	44°57.0	19:29
Jupiter	127°34.3	13:58
Saturn	86°01.2	16:43

2018/10/	**SHA**	**Mer.pass**
Venus	145°45.9	12:40
Mars	44°28.2	19:27
Jupiter	127°22.0	13:55
Saturn	85°57.4	16:40

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°24.5	-7°40.1	135°01.8	10.8	-17°30.0	-6.6	56.1
1	198°24.6	-7°41.0	149°31.6	10.8	-17°36.6	-6.6	56.1
2	213°24.8	-7°42.0	164°01.4	10.8	-17°43.1	-6.5	56.1
3	228°24.9	-7°42.9	178°31.3	10.8	-17°49.5	-6.4	56.0
4	243°25.1	-7°43.8	193°01.1	10.8	-17°55.8	-6.3	56.0
5	258°25.2	-7°44.8	207°30.9	10.8	-18°02.0	-6.2	56.0
6	273°25.4	-7°45.7	222°00.7	10.8	-18°08.1	-6.1	56.0
7	288°25.5	-7°46.6	236°30.5	10.8	-18°14.1	-6.0	55.9
8	303°25.7	-7°47.6	251°00.4	10.8	-18°20.1	-5.9	55.9
9	318°25.9	-7°48.5	265°30.2	10.8	-18°25.9	-5.8	55.9
10	333°26.0	-7°49.4	280°00.0	10.8	-18°31.6	-5.7	55.8
11	348°26.2	-7°50.4	294°29.8	10.8	-18°37.2	-5.6	55.8
12	3°26.3	-7°51.3	308°59.6	10.8	-18°42.7	-5.5	55.8
13	18°26.4	-7°52.3	323°29.4	10.8	-18°48.2	-5.4	55.8
14	33°26.6	-7°53.2	337°59.3	10.8	-18°53.5	-5.3	55.7
15	48°26.7	-7°54.1	352°29.1	10.8	-18°58.7	-5.2	55.7
16	63°26.9	-7°55.0	6°58.9	10.8	-19°03.8	-5.1	55.7
17	78°27.0	-7°56.0	21°28.7	10.8	-19°08.8	-5.0	55.6
18	93°27.2	-7°56.9	35°58.5	10.8	-19°13.8	-4.9	55.6
19	108°27.3	-7°57.8	50°28.4	10.8	-19°18.6	-4.8	55.6
20	123°27.5	-7°58.8	64°58.2	10.8	-19°23.3	-4.7	55.6
21	138°27.6	-7°59.7	79°28.0	10.8	-19°27.9	-4.6	55.5
22	153°27.8	-8°00.6	93°57.8	10.8	-19°32.4	-4.5	55.5
23	168°27.9	-8°01.6	108°27.7	10.8	-19°36.8	-4.4	55.5
	SD.=16.0	d=-0.9	S.D.=15.3				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°28.1	-8°02.5	122°57.5	10.8	-19°41.1	-4.3	55.5
1	198°28.2	-8°03.4	137°27.3	10.8	-19°45.4	-4.2	55.4
2	213°28.4	-8°04.4	151°57.2	10.8	-19°49.5	-4.1	55.4
3	228°28.5	-8°05.3	166°27.0	10.8	-19°53.5	-4.0	55.4
4	243°28.7	-8°06.2	180°56.9	10.9	-19°57.4	-3.8	55.4
5	258°28.8	-8°07.2	195°26.7	10.9	-20°01.2	-3.7	55.3
6	273°29.0	-8°08.1	209°56.6	10.9	-20°04.8	-3.6	55.3
7	288°29.1	-8°09.0	224°26.4	10.9	-20°08.4	-3.5	55.3
8	303°29.2	-8°09.9	238°56.3	10.9	-20°11.9	-3.4	55.3
9	318°29.4	-8°10.9	253°26.2	10.9	-20°15.3	-3.3	55.2
10	333°29.5	-8°11.8	267°56.1	10.9	-20°18.6	-3.2	55.2
11	348°29.7	-8°12.7	282°26.0	10.9	-20°21.8	-3.1	55.2
12	3°29.8	-8°13.7	296°55.9	10.9	-20°24.8	-3.0	55.2
13	18°30.0	-8°14.6	311°25.8	10.9	-20°27.8	-2.9	55.2
14	33°30.1	-8°15.5	325°55.7	10.9	-20°30.7	-2.8	55.1
15	48°30.3	-8°16.4	340°25.6	10.9	-20°33.5	-2.7	55.1
16	63°30.4	-8°17.4	354°55.5	10.9	-20°36.1	-2.6	55.1
17	78°30.5	-8°18.3	9°25.5	10.9	-20°38.7	-2.5	55.1
18	93°30.7	-8°19.2	23°55.4	11.0	-20°41.1	-2.4	55.0
19	108°30.8	-8°20.2	38°25.4	11.0	-20°43.5	-2.3	55.0
20	123°31.0	-8°21.1	52°55.3	11.0	-20°45.7	-2.2	55.0
21	138°31.1	-8°22.0	67°25.3	11.0	-20°47.9	-2.1	55.0
22	153°31.3	-8°22.9	81°55.3	11.0	-20°49.9	-2.0	55.0
23	168°31.4	-8°23.9	96°25.3	11.0	-20°51.8	-1.9	54.9
	SD.=16.0	d=-0.9	S.D.=15.1				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°31.5	-8°24.8	110°55.3	11.0	-20°53.7	-1.8	54.9
1	198°31.7	-8°25.7	125°25.3	11.0	-20°55.4	-1.7	54.9
2	213°31.8	-8°26.6	139°55.4	11.0	-20°57.0	-1.6	54.9
3	228°32.0	-8°27.6	154°25.4	11.1	-20°58.6	-1.5	54.9
4	243°32.1	-8°28.5	168°55.5	11.1	-20°60.0	-1.4	54.8
5	258°32.2	-8°29.4	183°25.6	11.1	-21°01.3	-1.3	54.8
6	273°32.4	-8°30.3	197°55.7	11.1	-21°02.5	-1.2	54.8
7	288°32.5	-8°31.3	212°25.8	11.1	-21°03.6	-1.1	54.8
8	303°32.7	-8°32.2	226°55.9	11.1	-21°04.6	-1.0	54.8
9	318°32.8	-8°33.1	241°26.0	11.1	-21°05.6	-0.9	54.8
10	333°32.9	-8°34.0	255°56.2	11.2	-21°06.4	-0.8	54.7
11	348°33.1	-8°35.0	270°26.4	11.2	-21°07.1	-0.7	54.7
12	3°33.2	-8°35.9	284°56.5	11.2	-21°07.7	-0.5	54.7
13	18°33.4	-8°36.8	299°26.7	11.2	-21°08.2	-0.4	54.7
14	33°33.5	-8°37.7	313°57.0	11.2	-21°08.6	-0.3	54.7
15	48°33.6	-8°38.7	328°27.2	11.2	-21°08.9	-0.2	54.7
16	63°33.8	-8°39.6	342°57.5	11.3	-21°09.1	-0.1	54.6
17	78°33.9	-8°40.5	357°27.7	11.3	-21°09.1	-0.0	54.6
18	93°34.0	-8°41.4	11°58.0	11.3	-21°09.1	0.1	54.6
19	108°34.2	-8°42.4	26°28.3	11.3	-21°09.0	0.2	54.6
20	123°34.3	-8°43.3	40°58.7	11.3	-21°08.8	0.3	54.6
21	138°34.5	-8°44.2	55°29.0	11.4	-21°08.5	0.4	54.6
22	153°34.6	-8°45.1	69°59.4	11.4	-21°08.1	0.5	54.6
23	168°34.7	-8°46.0	84°29.8	11.4	-21°07.6	0.6	54.5
	SD.=16.0	d=-0.9	S.D.=15.0				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:50	06:09	07:19	16:11	17:21	18:39
70	04:55	06:05	07:08	16:22	17:25	18:35
68	04:58	06:03	06:60	16:31	17:28	18:32
66	05:01	06:00	06:52	16:38	17:30	18:29
64	05:03	05:58	06:46	16:44	17:32	18:27
62	05:05	05:56	06:41	16:50	17:35	18:26
60	05:06	05:54	06:37	16:54	17:36	18:24
58	05:07	05:53	06:33	16:58	17:38	18:23
56	05:08	05:51	06:29	17:02	17:40	18:22
54	05:09	05:50	06:26	17:05	17:41	18:22
52	05:10	05:49	06:23	17:08	17:42	18:21
50	05:10	05:47	06:20	17:11	17:44	18:21
45	05:11	05:45	06:14	17:17	17:47	18:21
40	05:11	05:42	06:09	17:22	17:49	18:21
35	05:10	05:39	06:05	17:27	17:52	18:21
30	05:09	05:37	06:01	17:30	17:55	18:22
20	05:07	05:32	05:54	17:37	17:60	18:25
10	05:03	05:27	05:48	17:43	18:05	18:29
0	04:58	05:22	05:43	17:49	18:10	18:34
-10	04:51	05:16	05:37	17:55	18:17	18:41
-20	04:42	05:08	05:31	18:02	18:24	18:50
-30	04:30	04:59	05:23	18:09	18:34	19:02
-35	04:23	04:53	05:19	18:14	18:39	19:10
-40	04:13	04:46	05:14	18:19	18:46	19:20
-45	04:02	04:38	05:08	18:24	18:55	19:31
-50	03:47	04:28	05:02	18:31	19:05	19:46
-52	03:40	04:23	04:58	18:35	19:10	19:54
-54	03:32	04:18	04:55	18:38	19:16	20:02
-56	03:23	04:12	04:51	18:42	19:22	20:12
-58	03:12	04:05	04:47	18:47	19:29	20:23
-60	02:59	03:57	04:42	18:52	19:37	20:36

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	–:–	–:–	–:–	–:–
70	14:14	–:–	–:–	16:40	–:–	–:–
68	13:19	14:54	16:05	17:35	17:44	18:16
66	12:47	14:07	15:10	18:08	18:31	19:11
64	12:23	13:37	14:37	18:33	19:01	19:44
62	12:04	13:14	14:13	18:52	19:24	20:08
60	11:48	12:56	13:53	19:08	19:43	20:28
58	11:35	12:41	13:37	19:21	19:58	20:44
56	11:24	12:28	13:24	19:33	20:11	20:57
54	11:14	12:17	13:12	19:43	20:22	21:09
52	11:05	12:07	13:02	19:52	20:32	21:19
50	10:57	11:58	12:52	20:00	20:41	21:29
45	10:41	11:40	12:33	20:18	21:00	21:48
40	10:27	11:24	12:17	20:32	21:16	22:04
35	10:15	11:11	12:04	20:44	21:29	22:17
30	10:05	11:00	11:52	20:54	21:40	22:29
20	09:48	10:41	11:32	21:12	22:00	22:49
10	09:33	10:25	11:15	21:28	22:17	23:06
0	09:19	10:09	10:59	21:43	22:33	23:22
-10	09:05	09:54	10:42	21:58	22:49	23:38
-20	08:50	09:37	10:25	22:14	23:06	23:56
-30	08:33	09:18	10:05	22:32	23:26	–:–
-35	08:24	09:07	09:54	22:43	23:37	–:–
-40	08:12	08:55	09:41	22:55	23:50	–:–
-45	07:59	08:40	09:25	23:09	–:–	00:06
-50	07:43	08:22	09:06	23:27	–:–	00:25
-52	07:36	08:13	08:57	23:35	–:–	00:34
-54	07:28	08:03	08:46	23:45	–:–	00:44
-56	07:18	07:53	08:35	23:55	–:–	00:55
-58	07:08	07:40	08:22	–:–	00:07	01:09
-60	06:56	07:26	08:06	–:–	00:21	01:24

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
13	13:38	13:45	11:46	15:31	03:06	4(21%)
14	13:52	13:59	11:46	16:21	03:56	5(29%)
15	14:06	14:13	11:45	17:10	04:45	6(38%)

October 16, 17 ,18 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	24°27.7	170°35.8	-21°25.1	68°26.8	-19°57.3	151°37.3	-18°18.6	110°21.1	-22°46.2
1	39°30.2	185°39.2	-21°24.7	83°28.0	-19°56.8	166°39.2	-18°18.7	125°23.4	-22°46.2
2	54°32.6	200°42.7	-21°24.3	98°29.2	-19°56.3	181°41.2	-18°18.8	140°25.7	-22°46.2
3	69°35.1	215°46.1	-21°23.9	113°30.5	-19°55.9	196°43.1	-18°19.0	155°28.0	-22°46.2
4	84°37.6	230°49.6	-21°23.4	128°31.7	-19°55.4	211°45.1	-18°19.1	170°30.3	-22°46.2
5	99°40.0	245°53.0	-21°23.0	143°33.0	-19°54.9	226°47.0	-18°19.2	185°32.6	-22°46.2
6	114°42.5	260°56.4	-21°22.6	158°34.2	-19°54.4	241°49.0	-18°19.3	200°34.9	-22°46.2
7	129°44.9	275°59.9	-21°22.2	173°35.5	-19°54.0	256°50.9	-18°19.5	215°37.2	-22°46.2
8	144°47.4	291°03.3	-21°21.7	188°36.7	-19°53.5	271°52.8	-18°19.6	230°39.5	-22°46.2
9	159°49.9	306°06.8	-21°21.3	203°37.9	-19°53.0	286°54.8	-18°19.7	245°41.8	-22°46.2
10	174°52.3	321°10.3	-21°20.9	218°39.2	-19°52.5	301°56.7	-18°19.8	260°44.1	-22°46.2
11	189°54.8	336°13.7	-21°20.4	233°40.4	-19°52.0	316°58.7	-18°20.0	275°46.4	-22°46.2
12	204°57.3	351°17.2	-21°20.0	248°41.7	-19°51.6	332°00.6	-18°20.1	290°48.7	-22°46.2
13	219°59.7	6°20.7	-21°19.5	263°42.9	-19°51.1	347°02.6	-18°20.2	305°51.0	-22°46.2
14	235°02.2	21°24.1	-21°19.1	278°44.1	-19°50.6	2°04.5	-18°20.4	320°53.3	-22°46.2
15	250°04.7	36°27.6	-21°18.6	293°45.4	-19°50.1	17°06.5	-18°20.5	335°55.6	-22°46.2
16	265°07.1	51°31.1	-21°18.2	308°46.6	-19°49.6	32°08.4	-18°20.6	350°57.9	-22°46.2
17	280°09.6	66°34.6	-21°17.7	323°47.8	-19°49.2	47°10.3	-18°20.7	6°00.2	-22°46.2
18	295°12.1	81°38.0	-21°17.3	338°49.1	-19°48.7	62°12.3	-18°20.9	21°02.5	-22°46.2
19	310°14.5	96°41.5	-21°16.8	353°50.3	-19°48.2	77°14.2	-18°21.0	36°04.7	-22°46.2
20	325°17.0	111°45.0	-21°16.4	8°51.6	-19°47.7	92°16.2	-18°21.1	51°07.0	-22°46.2
21	340°19.4	126°48.5	-21°15.9	23°52.8	-19°47.2	107°18.1	-18°21.2	66°09.3	-22°46.2
22	355°21.9	141°52.0	-21°15.4	38°54.0	-19°46.7	122°20.1	-18°21.4	81°11.6	-22°46.2
23	10°24.4	156°55.5	-21°14.9	53°55.3	-19°46.3	137°22.0	-18°21.5	96°13.9	-22°46.2
Mer.pass.:22:18		v3.4 d0.4 m-4.1		v1.2 d0.5 m-0.9		v1.9 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	25°26.8	171°59.0	-21°14.5	68°56.5	-19°45.8	152°23.9	-18°21.6	111°16.2	-22°46.2
1	40°29.3	187°02.5	-21°14.0	83°57.7	-19°45.3	167°25.9	-18°21.8	126°18.5	-22°46.2
2	55°31.8	202°06.0	-21°13.5	98°59.0	-19°44.8	182°27.8	-18°21.9	141°20.8	-22°46.2
3	70°34.2	217°09.5	-21°13.0	114°00.2	-19°44.3	197°29.8	-18°22.0	156°23.1	-22°46.2
4	85°36.7	232°13.0	-21°12.6	129°01.4	-19°43.9	212°31.7	-18°22.1	171°25.4	-22°46.2
5	100°39.2	247°16.5	-21°12.1	144°02.7	-19°43.4	227°33.7	-18°22.3	186°27.7	-22°46.2
6	115°41.6	262°20.1	-21°11.6	159°03.9	-19°42.9	242°35.6	-18°22.4	201°30.0	-22°46.2
7	130°44.1	277°23.6	-21°11.1	174°05.1	-19°42.4	257°37.5	-18°22.5	216°32.3	-22°46.2
8	145°46.6	292°27.1	-21°10.6	189°06.3	-19°41.9	272°39.5	-18°22.6	231°34.6	-22°46.2
9	160°49.0	307°30.6	-21°10.1	204°07.6	-19°41.4	287°41.4	-18°22.8	246°36.9	-22°46.2
10	175°51.5	322°34.2	-21°09.6	219°08.8	-19°40.9	302°43.4	-18°22.9	261°39.1	-22°46.2
11	190°53.9	337°37.7	-21°09.1	234°10.0	-19°40.5	317°45.3	-18°23.0	276°41.4	-22°46.2
12	205°56.4	352°41.2	-21°08.6	249°11.3	-19°40.0	332°47.3	-18°23.2	291°43.7	-22°46.2
13	220°58.9	7°44.8	-21°08.1	264°12.5	-19°39.5	347°49.2	-18°23.3	306°46.0	-22°46.2
14	236°01.3	22°48.3	-21°07.6	279°13.7	-19°39.0	2°51.1	-18°23.4	321°48.3	-22°46.2
15	251°03.8	37°51.8	-21°07.1	294°14.9	-19°38.5	17°53.1	-18°23.5	336°50.6	-22°46.3
16	266°06.3	52°55.4	-21°06.6	309°16.2	-19°38.0	32°55.0	-18°23.7	351°52.9	-22°46.3
17	281°08.7	67°58.9	-21°06.1	324°17.4	-19°37.5	47°57.0	-18°23.8	6°55.2	-22°46.3
18	296°11.2	83°02.5	-21°05.5	339°18.6	-19°37.1	62°58.9	-18°23.9	21°57.5	-22°46.3
19	311°13.7	98°06.0	-21°05.0	354°19.8	-19°36.6	78°00.8	-18°24.0	36°59.8	-22°46.3
20	326°16.1	113°09.6	-21°04.5	9°21.1	-19°36.1	93°02.8	-18°24.2	52°02.1	-22°46.3
21	341°18.6	128°13.2	-21°04.0	24°22.3	-19°35.6	108°04.7	-18°24.3	67°04.4	-22°46.3
22	356°21.0	143°16.7	-21°03.4	39°23.5	-19°35.1	123°06.7	-18°24.4	82°06.6	-22°46.3
23	11°23.5	158°20.3	-21°02.9	54°24.7	-19°34.6	138°08.6	-18°24.6	97°08.9	-22°46.3
Mer.pass.:22:14		v3.5 d0.5 m-4.1		v1.2 d0.5 m-0.9		v1.9 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	26°26.0	173°23.9	-21°02.4	69°26.0	-19°34.1	153°10.6	-18°24.7	112°11.2	-22°46.3
1	41°28.4	188°27.4	-21°01.9	84°27.2	-19°33.6	168°12.5	-18°24.8	127°13.5	-22°46.3
2	56°30.9	203°31.0	-21°01.3	99°28.4	-19°33.2	183°14.4	-18°24.9	142°15.8	-22°46.3
3	71°33.4	218°34.6	-21°00.8	114°29.6	-19°32.7	198°16.4	-18°25.1	157°18.1	-22°46.3
4	86°35.8	233°38.2	-21°00.2	129°30.8	-19°32.2	213°18.3	-18°25.2	172°20.4	-22°46.3
5	101°38.3	248°41.7	-20°59.7	144°32.1	-19°31.7	228°20.3	-18°25.3	187°22.7	-22°46.3
6	116°40.8	263°45.3	-20°59.1	159°33.3	-19°31.2	243°22.2	-18°25.4	202°25.0	-22°46.3
7	131°43.2	278°48.9	-20°58.6	174°34.5	-19°30.7	258°24.1	-18°25.6	217°27.3	-22°46.3
8	146°45.7	293°52.5	-20°58.0	189°35.7	-19°30.2	273°26.1	-18°25.7	232°29.5	-22°46.3
9	161°48.2	308°56.1	-20°57.5	204°36.9	-19°29.7	288°28.0	-18°25.8	247°31.8	-22°46.3
10	176°50.6	323°59.7	-20°56.9	219°38.2	-19°29.2	303°30.0	-18°26.0	262°34.1	-22°46.3
11	191°53.1	339°03.3	-20°56.4	234°39.4	-19°28.8	318°31.9	-18°26.1	277°36.4	-22°46.3
12	206°55.5	354°06.9	-20°55.8	249°40.6	-19°28.3	333°33.8	-18°26.2	292°38.7	-22°46.3
13	221°58.0	9°10.5	-20°55.2	264°41.8	-19°27.8	348°35.8	-18°26.3	307°41.0	-22°46.3
14	237°00.5	24°14.1	-20°54.7	279°43.0	-19°27.3	3°37.7	-18°26.5	322°43.3	-22°46.3
15	252°02.9	39°17.7	-20°54.1	294°44.2	-19°26.8	18°39.6	-18°26.6	337°45.6	-22°46.3
16	267°05.4	54°21.3	-20°53.5	309°45.4	-19°26.3	33°41.6	-18°26.7	352°47.9	-22°46.3
17	282°07.9	69°24.9	-20°53.0	324°46.7	-19°25.8	48°43.5	-18°26.8	7°50.1	-22°46.3
18	297°10.3	84°28.5	-20°52.4	339°47.9	-19°25.3	63°45.5	-18°27.0	22°52.4	-22°46.3
19	312°12.8	99°32.1	-20°51.8	354°49.1	-19°24.8	78°47.4	-18°27.1	37°54.7	-22°46.3
20	327°15.3	114°35.7	-20°51.2	9°50.3	-19°24.3	93°49.3	-18°27.2	52°57.0	-22°46.3
21	342°17.7	129°39.4	-20°50.6	24°51.5	-19°23.8	108°51.3	-18°27.4	67°59.3	-22°46.3
22	357°20.2	144°43.0	-20°50.1	39°52.7	-19°23.3	123°53.2	-18°27.5	83°01.6	-22°46.3
23	12°22.7	159°46.6	-20°49.5	54°53.9	-19°22.8	138°55.2	-18°27.6	98°03.9	-22°46.3
Mer.pass.:22:10		v3.6 d0.5 m-4.1		v1.2 d0.5 m-0.9		v1.9 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.7
Ankaa	353°11.7	-42°12.3
Schedar	349°35.8	56°38.4
Diphda	348°51.9	-17°53.1
Achernar	335°23.5	-57°08.6
Hamal	327°56.4	23°33.0
Polaris	315°44.7	89°20.4
Akamar	315°15.2	-40°13.8
Menkar	314°11.0	4°09.7
Mirfak	308°34.7	49°55.4
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°10.8
Capella	280°28.9	46°00.8
Bellatrix	278°28.0	6°21.9
Elnath	278°07.9	28°37.2
Alnilam	275°42.5	-1°11.4
Betelgeuse	270°57.3	7°24.5
Canopus	263°54.4	-52°42.2
Sirius	258°30.4	-16°44.3
Adara	255°09.6	-28°59.7
Procyon	244°55.9	5°10.7
Pollux	243°23.2	27°58.7
Avior	234°16.7	-59°33.9
Suhail	222°49.9	-43°30.2
Miaplacidus	221°39.3	-69°47.3
Alphard	217°52.7	-8°44.3
Regulus	207°39.8	11°52.6
Dubhe	193°47.8	61°38.9
Denebola	182°30.2	14°28.2
Gienah	175°48.9	-17°38.5
Acrux	173°05.9	-63°11.9
Gacrux	171°57.4	-57°12.8
Alioth	166°18.1	55°51.6
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.4
Hadar	148°43.4	-60°27.6
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.7
Rigil Kent.	139°47.4	-60°54.6
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.2	74°05.0
Alphecca	126°08.3	26°39.5
Antares	112°22.1	-26°28.2
Atria	107°21.0	-69°03.6
Sabik	102°08.6	-15°44.7
Shaula	96°17.2	-37°06.9
Rasalhague	96°03.3	12°33.2
Etamin	90°44.7	51°29.6
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.7	38°48.4
Nunki	75°53.9	-26°16.3
Altair	62°04.8	8°55.3
Peacock	53°13.5	-56°40.6
Deneb	49°28.9	45°21.2
Enif	33°43.4	9°57.8
Alnair	27°39.0	-46°52.3
Fomalhaut	15°19.8	-29°31.4
Scheat	13°49.6	28°11.2
Markab	13°34.5	15°18.5

2018/10/	**SHA**	**Mer.pass**
Venus	146°08.1	12:35
Mars	43°59.1	19:25
Jupiter	127°09.6	13:52
Saturn	85°53.4	16:36

2018/10/	**SHA**	**Mer.pass**
Venus	146°32.2	12:29
Mars	43°29.7	19:23
Jupiter	126°57.1	13:49
Saturn	85°49.4	16:32

2018/10/	**SHA**	**Mer.pass**
Venus	146°57.9	12:23
Mars	42°60.0	19:21
Jupiter	126°44.6	13:46
Saturn	85°45.3	16:29

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°34.9	-8°47.0	99°00.2	11.4	-21°07.0	0.7	54.5
1	198°35.0	-8°47.9	113°30.6	11.4	-21°06.2	0.8	54.5
2	213°35.1	-8°48.8	128°01.1	11.5	-21°05.4	0.9	54.5
3	228°35.3	-8°49.7	142°31.5	11.5	-21°04.5	1.0	54.5
4	243°35.4	-8°50.6	157°02.0	11.5	-21°03.5	1.1	54.5
5	258°35.5	-8°51.6	171°32.5	11.5	-21°02.4	1.2	54.5
6	273°35.7	-8°52.5	186°03.1	11.5	-21°01.2	1.3	54.5
7	288°35.8	-8°53.4	200°33.6	11.6	-20°59.9	1.4	54.4
8	303°35.9	-8°54.3	215°04.2	11.6	-20°58.5	1.5	54.4
9	318°36.1	-8°55.2	229°34.8	11.6	-20°57.0	1.6	54.4
10	333°36.2	-8°56.2	244°05.5	11.6	-20°55.4	1.7	54.4
11	348°36.3	-8°57.1	258°36.1	11.7	-20°53.7	1.7	54.4
12	3°36.5	-8°58.0	273°06.8	11.7	-20°51.9	1.8	54.4
13	18°36.6	-8°58.9	287°37.5	11.7	-20°50.0	1.9	54.4
14	33°36.7	-8°59.8	302°08.2	11.7	-20°48.0	2.0	54.4
15	48°36.9	-9°00.8	316°39.0	11.8	-20°45.9	2.1	54.4
16	63°37.0	-9°01.7	331°09.8	11.8	-20°43.7	2.2	54.4
17	78°37.1	-9°02.6	345°40.6	11.8	-20°41.4	2.3	54.3
18	93°37.3	-9°03.5	0°11.4	11.8	-20°39.0	2.4	54.3
19	108°37.4	-9°04.4	14°42.2	11.9	-20°36.6	2.5	54.3
20	123°37.5	-9°05.3	29°13.1	11.9	-20°34.0	2.6	54.3
21	138°37.7	-9°06.3	43°44.0	11.9	-20°31.3	2.7	54.3
22	153°37.8	-9°07.2	58°15.0	11.9	-20°28.6	2.8	54.3
23	168°37.9	-9°08.1	72°45.9	12.0	-20°25.7	2.9	54.3
	SD.=16.0	d=-0.9	S.D.=14.9				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°38.0	-9°09.0	87°16.9	12.0	-20°22.8	3.0	54.3
1	198°38.2	-9°09.9	101°47.9	12.0	-20°19.8	3.1	54.3
2	213°38.3	-9°10.8	116°19.0	12.1	-20°16.6	3.2	54.3
3	228°38.4	-9°11.8	130°50.0	12.1	-20°13.4	3.3	54.3
4	243°38.6	-9°12.7	145°21.1	12.1	-20°10.1	3.4	54.3
5	258°38.7	-9°13.6	159°52.2	12.1	-20°06.7	3.5	54.3
6	273°38.8	-9°14.5	174°23.4	12.2	-20°03.2	3.5	54.3
7	288°38.9	-9°15.4	188°54.6	12.2	-19°59.6	3.6	54.3
8	303°39.1	-9°16.3	203°25.8	12.2	-19°55.9	3.7	54.3
9	318°39.2	-9°17.2	217°57.0	12.2	-19°52.1	3.8	54.3
10	333°39.3	-9°18.2	232°28.3	12.3	-19°48.3	3.9	54.3
11	348°39.5	-9°19.1	246°59.5	12.3	-19°44.3	4.0	54.3
12	3°39.6	-9°20.0	261°30.9	12.3	-19°40.3	4.1	54.3
13	18°39.7	-9°20.9	276°02.2	12.4	-19°36.2	4.2	54.2
14	33°39.8	-9°21.8	290°33.6	12.4	-19°31.9	4.3	54.2
15	48°40.0	-9°22.7	305°05.0	12.4	-19°27.6	4.4	54.2
16	63°40.1	-9°23.6	319°36.4	12.4	-19°23.2	4.4	54.2
17	78°40.2	-9°24.5	334°07.9	12.5	-19°18.8	4.5	54.2
18	93°40.3	-9°25.5	348°39.3	12.5	-19°14.2	4.6	54.2
19	108°40.5	-9°26.4	3°10.9	12.5	-19°09.5	4.7	54.2
20	123°40.6	-9°27.3	17°42.4	12.6	-19°04.8	4.8	54.2
21	138°40.7	-9°28.2	32°14.0	12.6	-18°59.9	4.9	54.2
22	153°40.8	-9°29.1	46°45.6	12.6	-18°55.0	5.0	54.2
23	168°41.0	-9°30.0	61°17.2	12.6	-18°50.0	5.0	54.2
	SD.=16.0	d=-0.9	S.D.=14.8				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°41.1	-9°30.9	75°48.9	12.7	-18°44.9	5.1	54.2
1	198°41.2	-9°31.8	90°20.5	12.7	-18°39.8	5.2	54.2
2	213°41.3	-9°32.7	104°52.2	12.7	-18°34.5	5.3	54.2
3	228°41.5	-9°33.6	119°24.0	12.8	-18°29.2	5.4	54.3
4	243°41.6	-9°34.6	133°55.8	12.8	-18°23.8	5.5	54.3
5	258°41.7	-9°35.5	148°27.6	12.8	-18°18.2	5.5	54.3
6	273°41.8	-9°36.4	162°59.4	12.8	-18°12.7	5.6	54.3
7	288°41.9	-9°37.3	177°31.2	12.9	-18°07.0	5.7	54.3
8	303°42.1	-9°38.2	192°03.1	12.9	-18°01.2	5.8	54.3
9	318°42.2	-9°39.1	206°35.0	12.9	-17°55.4	5.9	54.3
10	333°42.3	-9°40.0	221°07.0	13.0	-17°49.5	6.0	54.3
11	348°42.4	-9°40.9	235°38.9	13.0	-17°43.5	6.0	54.3
12	3°42.6	-9°41.8	250°10.9	13.0	-17°37.4	6.1	54.3
13	18°42.7	-9°42.7	264°42.9	13.0	-17°31.3	6.2	54.3
14	33°42.8	-9°43.6	279°15.0	13.1	-17°25.0	6.3	54.3
15	48°42.9	-9°44.5	293°47.1	13.1	-17°18.7	6.4	54.3
16	63°43.0	-9°45.4	308°19.2	13.1	-17°12.3	6.4	54.3
17	78°43.2	-9°46.4	322°51.3	13.1	-17°05.9	6.5	54.3
18	93°43.3	-9°47.3	337°23.4	13.2	-16°59.3	6.6	54.3
19	108°43.4	-9°48.2	351°55.6	13.2	-16°52.7	6.7	54.3
20	123°43.5	-9°49.1	6°27.8	13.2	-16°46.0	6.7	54.3
21	138°43.6	-9°50.0	21°00.1	13.2	-16°39.2	6.8	54.3
22	153°43.7	-9°50.9	35°32.3	13.3	-16°32.4	6.9	54.3
23	168°43.9	-9°51.8	50°04.6	13.3	-16°25.5	7.0	54.4
	SD.=16.1	d=-0.9	S.D.=14.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:04	06:22	07:34	15:55	17:07	18:25
70	05:06	06:17	07:21	16:08	17:12	18:22
68	05:09	06:13	07:11	16:18	17:16	18:20
66	05:10	06:10	07:02	16:27	17:20	18:19
64	05:12	06:07	06:55	16:34	17:23	18:18
62	05:13	06:04	06:49	16:40	17:26	18:17
60	05:13	06:01	06:44	16:46	17:28	18:16
58	05:14	05:59	06:39	16:50	17:30	18:16
56	05:14	05:57	06:35	16:55	17:32	18:15
54	05:14	05:55	06:31	16:58	17:34	18:15
52	05:15	05:54	06:28	17:02	17:36	18:15
50	05:15	05:52	06:25	17:05	17:38	18:15
45	05:14	05:48	06:18	17:12	17:42	18:16
40	05:14	05:45	06:12	17:18	17:45	18:17
35	05:12	05:42	06:07	17:23	17:48	18:18
30	05:11	05:39	06:03	17:27	17:51	18:19
20	05:07	05:33	05:55	17:35	17:57	18:23
10	05:03	05:27	05:49	17:42	18:03	18:28
0	04:57	05:21	05:42	17:49	18:10	18:34
-10	04:49	05:14	05:35	17:55	18:17	18:42
-20	04:40	05:06	05:28	18:03	18:25	18:51
-30	04:27	04:56	05:20	18:11	18:36	19:05
-35	04:18	04:49	05:15	18:16	18:42	19:13
-40	04:08	04:42	05:10	18:22	18:50	19:23
-45	03:56	04:33	05:03	18:28	18:59	19:36
-50	03:40	04:22	04:55	18:36	19:10	19:52
-52	03:32	04:16	04:52	18:40	19:16	20:00
-54	03:23	04:10	04:48	18:44	19:22	20:09
-56	03:13	04:04	04:43	18:49	19:29	20:20
-58	03:01	03:56	04:39	18:54	19:36	20:32
-60	02:47	03:47	04:33	18:59	19:45	20:46

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	–:–	–:–	18:14	–:–	–:–	21:05
70	–:–	17:44	17:21	–:–	19:58	21:57
68	16:37	16:46	16:48	19:26	20:55	22:29
66	15:50	16:12	16:24	20:12	21:29	22:52
64	15:19	15:47	16:06	20:42	21:53	23:10
62	14:56	15:28	15:50	21:05	22:12	23:25
60	14:38	15:12	15:37	21:23	22:28	23:38
58	14:23	14:58	15:26	21:38	22:41	23:49
56	14:10	14:47	15:16	21:51	22:52	23:58
54	13:58	14:36	15:07	22:03	23:02	–:–
52	13:48	14:27	14:60	22:13	23:11	–:–
50	13:39	14:19	14:53	22:21	23:19	–:–
45	13:20	14:01	14:38	22:40	23:36	–:–
40	13:05	13:47	14:25	22:55	23:50	–:–
35	12:52	13:35	14:15	23:08	–:–	00:01
30	12:40	13:24	14:05	23:19	–:–	00:11
20	12:21	13:06	13:49	23:39	–:–	00:29
10	12:03	12:50	13:35	23:55	–:–	00:44
0	11:48	12:35	13:22	–:–	00:11	00:58
-10	11:32	12:21	13:09	–:–	00:26	01:12
-20	11:15	12:05	12:55	–:–	00:43	01:27
-30	10:55	11:46	12:39	00:16	01:02	01:44
-35	10:44	11:36	12:29	00:27	01:13	01:54
-40	10:30	11:23	12:19	00:40	01:25	02:06
-45	10:15	11:09	12:06	00:56	01:40	02:19
-50	09:56	10:51	11:51	01:15	01:59	02:35
-52	09:47	10:43	11:43	01:24	02:07	02:43
-54	09:37	10:33	11:35	01:35	02:17	02:51
-56	09:25	10:23	11:26	01:46	02:27	03:00
-58	09:12	10:11	11:16	01:59	02:40	03:11
-60	08:56	09:57	11:04	02:15	02:54	03:23

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
16	14:19	14:26	11:45	17:59	05:34	7(48%)
17	14:32	14:38	11:45	18:46	06:23	8(57%)
18	14:44	14:50	11:45	19:33	07:10	9(66%)

October 19, 20 ,21 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	27°25.1	174°50.2	-20°48.9	69°55.2	-19°22.3	153°57.1	-18°27.7	113°06.2	-22°46.3
1	42°27.6	189°53.9	-20°48.3	84°56.4	-19°21.9	168°59.0	-18°27.9	128°08.4	-22°46.3
2	57°30.0	204°57.5	-20°47.7	99°57.6	-19°21.4	184°01.0	-18°28.0	143°10.7	-22°46.3
3	72°32.5	220°01.1	-20°47.1	114°58.8	-19°20.9	199°02.9	-18°28.1	158°13.0	-22°46.3
4	87°35.0	235°04.8	-20°46.5	129°60.0	-19°20.4	214°04.8	-18°28.2	173°15.3	-22°46.3
5	102°37.4	250°08.4	-20°45.9	145°01.2	-19°19.9	229°06.8	-18°28.4	188°17.6	-22°46.3
6	117°39.9	265°12.0	-20°45.3	160°02.4	-19°19.4	244°08.7	-18°28.5	203°19.9	-22°46.3
7	132°42.4	280°15.7	-20°44.7	175°03.6	-19°18.9	259°10.7	-18°28.6	218°22.2	-22°46.3
8	147°44.8	295°19.3	-20°44.1	190°04.8	-19°18.4	274°12.6	-18°28.7	233°24.4	-22°46.3
9	162°47.3	310°23.0	-20°43.4	205°06.0	-19°17.9	289°14.5	-18°28.9	248°26.7	-22°46.3
10	177°49.8	325°26.6	-20°42.8	220°07.2	-19°17.4	304°16.5	-18°29.0	263°29.0	-22°46.3
11	192°52.2	340°30.3	-20°42.2	235°08.4	-19°16.9	319°18.4	-18°29.1	278°31.3	-22°46.3
12	207°54.7	355°33.9	-20°41.6	250°09.7	-19°16.4	334°20.3	-18°29.3	293°33.6	-22°46.3
13	222°57.1	10°37.6	-20°41.0	265°10.9	-19°15.9	349°22.3	-18°29.4	308°35.9	-22°46.3
14	237°59.6	25°41.3	-20°40.3	280°12.1	-19°15.4	4°24.2	-18°29.5	323°38.1	-22°46.3
15	253°02.1	40°44.9	-20°39.7	295°13.3	-19°14.9	19°26.1	-18°29.6	338°40.4	-22°46.3
16	268°04.5	55°48.6	-20°39.1	310°14.5	-19°14.4	34°28.1	-18°29.8	353°42.7	-22°46.3
17	283°07.0	70°52.2	-20°38.5	325°15.7	-19°13.9	49°30.0	-18°29.9	8°45.0	-22°46.3
18	298°09.5	85°55.9	-20°37.8	340°16.9	-19°13.4	64°32.0	-18°30.0	23°47.3	-22°46.3
19	313°11.9	100°59.6	-20°37.2	355°18.1	-19°12.9	79°33.9	-18°30.1	38°49.6	-22°46.3
20	328°14.4	116°03.3	-20°36.5	10°19.3	-19°12.4	94°35.8	-18°30.3	53°51.9	-22°46.3
21	343°16.9	131°06.9	-20°35.9	25°20.5	-19°11.9	109°37.8	-18°30.4	68°54.1	-22°46.3
22	358°19.3	146°10.6	-20°35.3	40°21.7	-19°11.4	124°39.7	-18°30.5	83°56.4	-22°46.3
23	13°21.8	161°14.3	-20°34.6	55°22.9	-19°10.9	139°41.6	-18°30.7	98°58.7	-22°46.3
Mer.pass.:22:06		v3.6 d0.6 m-4.0		v1.2 d0.5 m-0.9		v1.9 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	28°24.3	176°18.0	-20°34.0	70°24.1	-19°10.4	154°43.6	-18°30.8	114°01.0	-22°46.3
1	43°26.7	191°21.6	-20°33.3	85°25.3	-19°09.9	169°45.5	-18°30.9	129°03.3	-22°46.3
2	58°29.2	206°25.3	-20°32.7	100°26.5	-19°09.4	184°47.4	-18°31.0	144°05.6	-22°46.3
3	73°31.6	221°29.0	-20°32.0	115°27.7	-19°08.9	199°49.4	-18°31.2	159°07.8	-22°46.3
4	88°34.1	236°32.7	-20°31.3	130°28.9	-19°08.4	214°51.3	-18°31.3	174°10.1	-22°46.3
5	103°36.6	251°36.4	-20°30.7	145°30.1	-19°07.9	229°53.2	-18°31.4	189°12.4	-22°46.3
6	118°39.0	266°40.1	-20°30.0	160°31.3	-19°07.4	244°55.2	-18°31.5	204°14.7	-22°46.3
7	133°41.5	281°43.8	-20°29.4	175°32.5	-19°06.9	259°57.1	-18°31.7	219°17.0	-22°46.3
8	148°44.0	296°47.5	-20°28.7	190°33.7	-19°06.4	274°59.0	-18°31.8	234°19.2	-22°46.3
9	163°46.4	311°51.2	-20°28.0	205°34.9	-19°05.9	290°01.0	-18°31.9	249°21.5	-22°46.3
10	178°48.9	326°54.9	-20°27.3	220°36.1	-19°05.4	305°02.9	-18°32.0	264°23.8	-22°46.3
11	193°51.4	341°58.6	-20°26.7	235°37.3	-19°04.9	320°04.9	-18°32.2	279°26.1	-22°46.3
12	208°53.8	357°02.3	-20°26.0	250°38.5	-19°04.4	335°06.8	-18°32.3	294°28.4	-22°46.3
13	223°56.3	12°06.0	-20°25.3	265°39.7	-19°03.9	350°08.7	-18°32.4	309°30.7	-22°46.3
14	238°58.7	27°09.7	-20°24.6	280°40.9	-19°03.4	5°10.7	-18°32.6	324°32.9	-22°46.3
15	254°01.2	42°13.4	-20°23.9	295°42.1	-19°02.9	20°12.6	-18°32.7	339°35.2	-22°46.3
16	269°03.7	57°17.1	-20°23.3	310°43.2	-19°02.4	35°14.5	-18°32.8	354°37.5	-22°46.3
17	284°06.1	72°20.8	-20°22.6	325°44.4	-19°01.9	50°16.5	-18°32.9	9°39.8	-22°46.3
18	299°08.6	87°24.5	-20°21.9	340°45.6	-19°01.4	65°18.4	-18°33.1	24°42.1	-22°46.3
19	314°11.1	102°28.2	-20°21.2	355°46.8	-19°00.9	80°20.3	-18°33.2	39°44.3	-22°46.3
20	329°13.5	117°32.0	-20°20.5	10°48.0	-19°00.4	95°22.3	-18°33.3	54°46.6	-22°46.3
21	344°16.0	132°35.7	-20°19.8	25°49.2	-18°59.9	110°24.2	-18°33.4	69°48.9	-22°46.3
22	359°18.5	147°39.4	-20°19.1	40°50.4	-18°59.4	125°26.1	-18°33.6	84°51.2	-22°46.3
23	14°20.9	162°43.1	-20°18.4	55°51.6	-18°58.9	140°28.1	-18°33.7	99°53.5	-22°46.3
Mer.pass.:22:02		v3.7 d0.7 m-4.0		v1.2 d0.5 m-0.9		v1.9 d-0.1 m-1.6		v2.3 d-0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	29°23.4	177°46.9	-20°17.7	70°52.8	-18°58.4	155°30.0	-18°33.8	114°55.7	-22°46.3
1	44°25.9	192°50.6	-20°17.0	85°54.0	-18°57.9	170°31.9	-18°33.9	129°58.0	-22°46.3
2	59°28.3	207°54.3	-20°16.3	100°55.2	-18°57.4	185°33.9	-18°34.1	145°00.3	-22°46.3
3	74°30.8	222°58.0	-20°15.6	115°56.4	-18°56.9	200°35.8	-18°34.2	160°02.6	-22°46.3
4	89°33.2	238°01.8	-20°14.9	130°57.5	-18°56.3	215°37.7	-18°34.3	175°04.9	-22°46.3
5	104°35.7	253°05.5	-20°14.1	145°58.7	-18°55.8	230°39.7	-18°34.5	190°07.1	-22°46.3
6	119°38.2	268°09.2	-20°13.4	160°59.9	-18°55.3	245°41.6	-18°34.6	205°09.4	-22°46.3
7	134°40.6	283°13.0	-20°12.7	176°01.1	-18°54.8	260°43.5	-18°34.7	220°11.7	-22°46.3
8	149°43.1	298°16.7	-20°12.0	191°02.3	-18°54.3	275°45.4	-18°34.8	235°14.0	-22°46.3
9	164°45.6	313°20.4	-20°11.3	206°03.5	-18°53.8	290°47.4	-18°35.0	250°16.2	-22°46.3
10	179°48.0	328°24.2	-20°10.5	221°04.7	-18°53.3	305°49.3	-18°35.1	265°18.5	-22°46.3
11	194°50.5	343°27.9	-20°09.8	236°05.9	-18°52.8	320°51.2	-18°35.2	280°20.8	-22°46.3
12	209°53.0	358°31.7	-20°09.1	251°07.0	-18°52.3	335°53.2	-18°35.3	295°23.1	-22°46.3
13	224°55.4	13°35.4	-20°08.3	266°08.2	-18°51.8	350°55.1	-18°35.5	310°25.4	-22°46.3
14	239°57.9	28°39.2	-20°07.6	281°09.4	-18°51.3	5°57.0	-18°35.6	325°27.6	-22°46.3
15	255°00.4	43°42.9	-20°06.9	296°10.6	-18°50.8	20°59.0	-18°35.7	340°29.9	-22°46.3
16	270°02.8	58°46.7	-20°06.1	311°11.8	-18°50.3	36°00.9	-18°35.8	355°32.2	-22°46.3
17	285°05.3	73°50.4	-20°05.4	326°13.0	-18°49.8	51°02.8	-18°36.0	10°34.5	-22°46.3
18	300°07.7	88°54.2	-20°04.6	341°14.1	-18°49.2	66°04.8	-18°36.1	25°36.7	-22°46.3
19	315°10.2	103°57.9	-20°03.9	356°15.3	-18°48.7	81°06.7	-18°36.2	40°39.0	-22°46.3
20	330°12.7	119°01.7	-20°03.1	11°16.5	-18°48.2	96°08.6	-18°36.4	55°41.3	-22°46.3
21	345°15.1	134°05.4	-20°02.4	26°17.7	-18°47.7	111°10.6	-18°36.5	70°43.6	-22°46.3
22	0°17.6	149°09.2	-20°01.6	41°18.9	-18°47.2	126°12.5	-18°36.6	85°45.9	-22°46.3
23	15°20.1	164°12.9	-20°00.9	56°20.1	-18°46.7	141°14.4	-18°36.7	100°48.1	-22°46.3
Mer.pass.:21:58		v3.7 d0.7 m-3.9		v1.2 d0.5 m-0.8		v1.9 d-0.1 m-1.6		v2.3 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.7
Ankaa	353°11.7	-42°12.3
Schedar	349°35.8	56°38.5
Diphda	348°51.9	-17°53.1
Achernar	335°23.5	-57°08.6
Hamal	327°56.4	23°33.0
Polaris	315°44.2	89°20.4
Akamar	315°15.2	-40°13.8
Menkar	314°11.0	4°09.7
Mirfak	308°34.7	49°55.5
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°10.8
Capella	280°28.8	46°00.8
Bellatrix	278°27.9	6°21.9
Elnath	278°07.8	28°37.2
Alnilam	275°42.5	-1°11.4
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.3	-52°42.2
Sirius	258°30.3	-16°44.3
Adara	255°09.6	-28°59.7
Procyon	244°55.9	5°10.7
Pollux	243°23.2	27°58.7
Avior	234°16.6	-59°33.9
Suhail	222°49.9	-43°30.2
Miaplacidus	221°39.2	-69°47.3
Alphard	217°52.7	-8°44.3
Regulus	207°39.8	11°52.6
Dubhe	193°47.8	61°38.9
Denebola	182°30.2	14°28.2
Gienah	175°48.9	-17°38.5
Acrux	173°05.9	-63°11.9
Gacrux	171°57.4	-57°12.8
Alioth	166°18.1	55°51.6
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.4
Hadar	148°43.4	-60°27.6
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.6
Rigil Kent.	139°47.5	-60°54.6
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.9
Alphecca	126°08.3	26°39.4
Antares	112°22.1	-26°28.2
Atria	107°21.0	-69°03.6
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.3	12°33.1
Etamin	90°44.7	51°29.6
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.7	38°48.4
Nunki	75°54.0	-26°16.3
Altair	62°04.8	8°55.3
Peacock	53°13.5	-56°40.6
Deneb	49°28.9	45°21.2
Enif	33°43.5	9°57.8
Alnair	27°39.0	-46°52.3
Fomalhaut	15°19.8	-29°31.4
Scheat	13°49.6	28°11.2
Markab	13°34.5	15°18.5

2018/10/	**SHA**	**Mer.pass**
Venus	147°25.1	12:18
Mars	42°30.0	19:19
Jupiter	126°32.0	13:42
Saturn	85°41.0	16:25

2018/10/	**SHA**	**Mer.pass**
Venus	147°53.7	12:12
Mars	41°59.8	19:17
Jupiter	126°19.3	13:39
Saturn	85°36.7	16:21

2018/10/	**SHA**	**Mer.pass**
Venus	148°23.5	12:06
Mars	41°29.4	19:15
Jupiter	126°06.6	13:36
Saturn	85°32.3	16:18

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°44.0	-9°52.7	64°36.9	13.3	-16°18.5	7.0	54.4
1	198°44.1	-9°53.6	79°09.2	13.3	-16°11.4	7.1	54.4
2	213°44.2	-9°54.5	93°41.6	13.4	-16°04.2	7.2	54.4
3	228°44.3	-9°55.4	108°14.0	13.4	-15°57.0	7.3	54.4
4	243°44.5	-9°56.3	122°46.4	13.4	-15°49.7	7.3	54.4
5	258°44.6	-9°57.2	137°18.8	13.4	-15°42.4	7.4	54.4
6	273°44.7	-9°58.1	151°51.3	13.5	-15°34.9	7.5	54.4
7	288°44.8	-9°59.0	166°23.7	13.5	-15°27.4	7.5	54.4
8	303°44.9	-9°59.9	180°56.2	13.5	-15°19.9	7.6	54.4
9	318°45.0	-10°00.8	195°28.8	13.5	-15°12.2	7.7	54.4
10	333°45.1	-10°01.7	210°01.3	13.6	-15°04.5	7.8	54.5
11	348°45.3	-10°02.6	224°33.9	13.6	-14°56.7	7.8	54.5
12	3°45.4	-10°03.5	239°06.5	13.6	-14°48.8	7.9	54.5
13	18°45.5	-10°04.4	253°39.1	13.6	-14°40.9	8.0	54.5
14	33°45.6	-10°05.3	268°11.7	13.6	-14°32.9	8.0	54.5
15	48°45.7	-10°06.2	282°44.4	13.7	-14°24.9	8.1	54.5
16	63°45.8	-10°07.1	297°17.0	13.7	-14°16.8	8.2	54.5
17	78°45.9	-10°08.0	311°49.7	13.7	-14°08.6	8.2	54.5
18	93°46.1	-10°08.9	326°22.4	13.7	-14°00.3	8.3	54.6
19	108°46.2	-10°09.8	340°55.2	13.7	-13°52.0	8.4	54.6
20	123°46.3	-10°10.7	355°27.9	13.8	-13°43.6	8.4	54.6
21	138°46.4	-10°11.6	10°00.7	13.8	-13°35.1	8.5	54.6
22	153°46.5	-10°12.5	24°33.5	13.8	-13°26.6	8.5	54.6
23	168°46.6	-10°13.4	39°06.3	13.8	-13°18.1	8.6	54.6
	SD.=16.1	d=-0.9	S.D.=14.8				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°46.7	-10°14.3	53°39.1	13.8	-13°09.4	8.7	54.6
1	198°46.8	-10°15.2	68°12.0	13.8	-13°00.7	8.7	54.7
2	213°46.9	-10°16.1	82°44.8	13.9	-12°51.9	8.8	54.7
3	228°47.1	-10°17.0	97°17.7	13.9	-12°43.1	8.9	54.7
4	243°47.2	-10°17.9	111°50.6	13.9	-12°34.2	8.9	54.7
5	258°47.3	-10°18.8	126°23.5	13.9	-12°25.3	9.0	54.7
6	273°47.4	-10°19.7	140°56.4	13.9	-12°16.3	9.0	54.7
7	288°47.5	-10°20.6	155°29.3	13.9	-12°07.2	9.1	54.7
8	303°47.6	-10°21.5	170°02.3	14.0	-11°58.1	9.2	54.8
9	318°47.7	-10°22.4	184°35.2	14.0	-11°48.9	9.2	54.8
10	333°47.8	-10°23.3	199°08.2	14.0	-11°39.7	9.3	54.8
11	348°47.9	-10°24.2	213°41.2	14.0	-11°30.4	9.3	54.8
12	3°48.0	-10°25.1	228°14.2	14.0	-11°21.0	9.4	54.8
13	18°48.1	-10°26.0	242°47.2	14.0	-11°11.6	9.4	54.8
14	33°48.3	-10°26.9	257°20.2	14.0	-11°02.2	9.5	54.9
15	48°48.4	-10°27.8	271°53.3	14.0	-10°52.6	9.5	54.9
16	63°48.5	-10°28.6	286°26.3	14.0	-10°43.1	9.6	54.9
17	78°48.6	-10°29.5	300°59.4	14.1	-10°33.5	9.6	54.9
18	93°48.7	-10°30.4	315°32.4	14.1	-10°23.8	9.7	54.9
19	108°48.8	-10°31.3	330°05.5	14.1	-10°14.1	9.8	54.9
20	123°48.9	-10°32.2	344°38.6	14.1	-10°04.3	9.8	55.0
21	138°49.0	-10°33.1	359°11.7	14.1	-9°54.4	9.9	55.0
22	153°49.1	-10°34.0	13°44.8	14.1	-9°44.6	9.9	55.0
23	168°49.2	-10°34.9	28°17.9	14.1	-9°34.6	10.0	55.0
	SD.=16.1	d=-0.9	S.D.=14.9				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°49.3	-10°35.8	42°51.0	14.1	-9°24.6	10.0	55.0
1	198°49.4	-10°36.7	57°24.1	14.1	-9°14.6	10.1	55.1
2	213°49.5	-10°37.6	71°57.2	14.1	-9°04.5	10.1	55.1
3	228°49.6	-10°38.5	86°30.3	14.1	-8°54.4	10.1	55.1
4	243°49.7	-10°39.4	101°03.4	14.1	-8°44.2	10.2	55.1
5	258°49.8	-10°40.2	115°36.6	14.1	-8°34.0	10.2	55.1
6	273°49.9	-10°41.1	130°09.7	14.1	-8°23.8	10.3	55.2
7	288°50.0	-10°42.0	144°42.8	14.1	-8°13.5	10.3	55.2
8	303°50.1	-10°42.9	159°16.0	14.1	-8°03.1	10.4	55.2
9	318°50.2	-10°43.8	173°49.1	14.1	-7°52.7	10.4	55.2
10	333°50.3	-10°44.7	188°22.2	14.1	-7°42.3	10.5	55.2
11	348°50.4	-10°45.6	202°55.4	14.1	-7°31.8	10.5	55.3
12	3°50.5	-10°46.5	217°28.5	14.1	-7°21.3	10.5	55.3
13	18°50.6	-10°47.4	232°01.6	14.1	-7°10.7	10.6	55.3
14	33°50.7	-10°48.2	246°34.8	14.1	-7°00.1	10.6	55.3
15	48°50.9	-10°49.1	261°07.9	14.1	-6°49.5	10.7	55.3
16	63°51.0	-10°50.0	275°41.0	14.1	-6°38.8	10.7	55.4
17	78°51.1	-10°50.9	290°14.1	14.1	-6°28.1	10.7	55.4
18	93°51.1	-10°51.8	304°47.2	14.1	-6°17.3	10.8	55.4
19	108°51.2	-10°52.7	319°20.3	14.1	-6°06.5	10.8	55.4
20	123°51.3	-10°53.6	333°53.4	14.1	-5°55.7	10.9	55.5
21	138°51.4	-10°54.5	348°26.5	14.1	-5°44.8	10.9	55.5
22	153°51.5	-10°55.3	2°59.6	14.1	-5°33.9	10.9	55.5
23	168°51.6	-10°56.2	17°32.7	14.1	-5°23.0	11.0	55.5
	SD.=16.1	d=-0.9	S.D.=15.0				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:16	06:35	07:49	15:39	16:53	18:11
70	05:18	06:29	07:34	15:54	16:59	18:10
68	05:19	06:23	07:22	16:06	17:04	18:09
66	05:19	06:19	07:13	16:16	17:09	18:08
64	05:20	06:15	07:04	16:24	17:13	18:08
62	05:20	06:12	06:58	16:31	17:17	18:08
60	05:20	06:09	06:51	16:37	17:20	18:08
58	05:20	06:06	06:46	16:42	17:23	18:08
56	05:20	06:03	06:41	16:47	17:25	18:08
54	05:20	06:01	06:37	16:52	17:28	18:09
52	05:20	05:59	06:33	16:56	17:30	18:09
50	05:19	05:57	06:30	16:59	17:32	18:10
45	05:18	05:52	06:22	17:07	17:37	18:11
40	05:17	05:48	06:16	17:13	17:41	18:12
35	05:15	05:44	06:10	17:19	17:45	18:14
30	05:13	05:41	06:05	17:24	17:48	18:16
20	05:08	05:34	05:56	17:33	17:55	18:21
10	05:03	05:27	05:49	17:41	18:02	18:27
0	04:56	05:20	05:41	17:48	18:09	18:34
-10	04:48	05:13	05:34	17:56	18:17	18:42
-20	04:37	05:04	05:26	18:04	18:26	18:53
-30	04:23	04:52	05:17	18:13	18:38	19:07
-35	04:14	04:45	05:11	18:19	18:45	19:16
-40	04:03	04:37	05:05	18:25	18:53	19:27
-45	03:50	04:27	04:58	18:32	19:03	19:41
-50	03:33	04:15	04:49	18:41	19:16	19:58
-52	03:24	04:09	04:45	18:45	19:22	20:07
-54	03:15	04:03	04:41	18:50	19:28	20:17
-56	03:04	03:55	04:36	18:55	19:36	20:28
-58	02:51	03:47	04:30	19:01	19:44	20:41
-60	02:35	03:38	04:24	19:07	19:54	20:58

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	17:37	17:17	17:02	23:16	–:–	01:09
70	17:09	17:01	16:53	23:43	–:–	01:24
68	16:48	16:47	16:45	–:–	00:03	01:36
66	16:32	16:36	16:39	–:–	00:19	01:46
64	16:18	16:27	16:34	–:–	00:32	01:54
62	16:06	16:19	16:29	–:–	00:42	02:01
60	15:56	16:12	16:25	–:–	00:52	02:07
58	15:48	16:06	16:21	–:–	00:60	02:13
56	15:40	16:00	16:18	–:–	01:07	02:17
54	15:33	15:55	16:15	00:06	01:13	02:22
52	15:27	15:51	16:12	00:13	01:19	02:25
50	15:21	15:47	16:10	00:20	01:24	02:29
45	15:09	15:38	16:05	00:34	01:35	02:36
40	14:59	15:31	16:00	00:46	01:44	02:43
35	14:51	15:24	15:56	00:56	01:51	02:48
30	14:43	15:19	15:53	01:04	01:58	02:52
20	14:30	15:09	15:47	01:19	02:10	03:00
10	14:19	15:01	15:42	01:32	02:20	03:07
0	14:08	14:53	15:37	01:44	02:30	03:14
-10	13:57	14:45	15:32	01:56	02:39	03:20
-20	13:45	14:36	15:27	02:09	02:49	03:27
-30	13:32	14:26	15:21	02:24	03:00	03:35
-35	13:24	14:21	15:17	02:32	03:07	03:40
-40	13:16	14:14	15:14	02:42	03:14	03:45
-45	13:05	14:06	15:09	02:53	03:23	03:50
-50	12:53	13:57	15:03	03:06	03:33	03:57
-52	12:47	13:53	15:01	03:12	03:38	04:00
-54	12:41	13:49	14:58	03:19	03:43	04:04
-56	12:33	13:43	14:55	03:27	03:49	04:08
-58	12:25	13:38	14:52	03:36	03:55	04:12
-60	12:16	13:31	14:48	03:45	04:03	04:17

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
19	14:56	15:01	11:44	20:18	07:56	10(75%)
20	15:07	15:12	11:44	21:03	08:41	11(83%)
21	15:17	15:22	11:44	21:47	09:25	12(89%)

October 22, 23 ,24 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	30°22.5	179°16.7	-20°00.1	71°21.2	-18°46.2	156°16.4	-18°36.9	115°50.4	-22°46.3
1	45°25.0	194°20.5	-19°59.4	86°22.4	-18°45.7	171°18.3	-18°37.0	130°52.7	-22°46.3
2	60°27.5	209°24.2	-19°58.6	101°23.6	-18°45.2	186°20.2	-18°37.1	145°55.0	-22°46.3
3	75°29.9	224°28.0	-19°57.8	116°24.8	-18°44.6	201°22.1	-18°37.2	160°57.2	-22°46.3
4	90°32.4	239°31.7	-19°57.1	131°26.0	-18°44.1	216°24.1	-18°37.4	175°59.5	-22°46.3
5	105°34.8	254°35.5	-19°56.3	146°27.1	-18°43.6	231°26.0	-18°37.5	191°01.8	-22°46.3
6	120°37.3	269°39.3	-19°55.5	161°28.3	-18°43.1	246°27.9	-18°37.6	206°04.1	-22°46.3
7	135°39.8	284°43.1	-19°54.8	176°29.5	-18°42.6	261°29.9	-18°37.7	221°06.3	-22°46.3
8	150°42.2	299°46.8	-19°54.0	191°30.7	-18°42.1	276°31.8	-18°37.9	236°08.6	-22°46.3
9	165°44.7	314°50.6	-19°53.2	206°31.9	-18°41.6	291°33.7	-18°38.0	251°10.9	-22°46.3
10	180°47.2	329°54.4	-19°52.4	221°33.0	-18°41.1	306°35.7	-18°38.1	266°13.2	-22°46.3
11	195°49.6	344°58.1	-19°51.7	236°34.2	-18°40.5	321°37.6	-18°38.2	281°15.4	-22°46.3
12	210°52.1	0°01.9	-19°50.9	251°35.4	-18°40.0	336°39.5	-18°38.4	296°17.7	-22°46.3
13	225°54.6	15°05.7	-19°50.1	266°36.6	-18°39.5	351°41.4	-18°38.5	311°20.0	-22°46.3
14	240°57.0	30°09.5	-19°49.3	281°37.7	-18°39.0	6°43.4	-18°38.6	326°22.3	-22°46.3
15	255°59.5	45°13.2	-19°48.5	296°38.9	-18°38.5	21°45.3	-18°38.8	341°24.5	-22°46.3
16	271°02.0	60°17.0	-19°47.7	311°40.1	-18°38.0	36°47.2	-18°38.9	356°26.8	-22°46.3
17	286°04.4	75°20.8	-19°46.9	326°41.3	-18°37.5	51°49.2	-18°39.0	11°29.1	-22°46.3
18	301°06.9	90°24.6	-19°46.1	341°42.4	-18°37.0	66°51.1	-18°39.1	26°31.3	-22°46.3
19	316°09.3	105°28.4	-19°45.3	356°43.6	-18°36.4	81°53.0	-18°39.3	41°33.6	-22°46.3
20	331°11.8	120°32.1	-19°44.5	11°44.8	-18°35.9	96°54.9	-18°39.4	56°35.9	-22°46.3
21	346°14.3	135°35.9	-19°43.7	26°46.0	-18°35.4	111°56.9	-18°39.5	71°38.2	-22°46.3
22	1°16.7	150°39.7	-19°42.9	41°47.1	-18°34.9	126°58.8	-18°39.6	86°40.4	-22°46.3
23	16°19.2	165°43.5	-19°42.1	56°48.3	-18°34.4	142°00.7	-18°39.8	101°42.7	-22°46.3
Mer.pass.:21:54		v3.8 d0.8 m-3.8		v1.2 d0.5 m-0.8		v1.9 d-0.1 m-1.6		v2.3 d0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	31°21.7	180°47.3	-19°41.3	71°49.5	-18°33.9	157°02.7	-18°39.9	116°45.0	-22°46.3
1	46°24.1	195°51.1	-19°40.5	86°50.6	-18°33.3	172°04.6	-18°40.0	131°47.3	-22°46.3
2	61°26.6	210°54.9	-19°39.7	101°51.8	-18°32.8	187°06.5	-18°40.1	146°49.5	-22°46.3
3	76°29.1	225°58.6	-19°38.9	116°53.0	-18°32.3	202°08.4	-18°40.3	161°51.8	-22°46.3
4	91°31.5	241°02.4	-19°38.1	131°54.2	-18°31.8	217°10.4	-18°40.4	176°54.1	-22°46.3
5	106°34.0	256°06.2	-19°37.3	146°55.3	-18°31.3	232°12.3	-18°40.5	191°56.3	-22°46.3
6	121°36.4	271°10.0	-19°36.5	161°56.5	-18°30.8	247°14.2	-18°40.6	206°58.6	-22°46.3
7	136°38.9	286°13.8	-19°35.6	176°57.7	-18°30.2	262°16.1	-18°40.8	222°00.9	-22°46.3
8	151°41.4	301°17.6	-19°34.8	191°58.8	-18°29.7	277°18.1	-18°40.9	237°03.2	-22°46.3
9	166°43.8	316°21.4	-19°34.0	207°00.0	-18°29.2	292°20.0	-18°41.0	252°05.4	-22°46.3
10	181°46.3	331°25.2	-19°33.2	222°01.2	-18°28.7	307°21.9	-18°41.2	267°07.7	-22°46.3
11	196°48.8	346°29.0	-19°32.3	237°02.3	-18°28.2	322°23.9	-18°41.3	282°10.0	-22°46.3
12	211°51.2	1°32.8	-19°31.5	252°03.5	-18°27.6	337°25.8	-18°41.4	297°12.2	-22°46.3
13	226°53.7	16°36.6	-19°30.7	267°04.7	-18°27.1	352°27.7	-18°41.5	312°14.5	-22°46.3
14	241°56.2	31°40.4	-19°29.8	282°05.8	-18°26.6	7°29.6	-18°41.7	327°16.8	-22°46.3
15	256°58.6	46°44.2	-19°29.0	297°07.0	-18°26.1	22°31.6	-18°41.8	342°19.1	-22°46.3
16	272°01.1	61°48.0	-19°28.2	312°08.2	-18°25.6	37°33.5	-18°41.9	357°21.3	-22°46.3
17	287°03.6	76°51.8	-19°27.3	327°09.3	-18°25.1	52°35.4	-18°42.0	12°23.6	-22°46.3
18	302°06.0	91°55.6	-19°26.5	342°10.5	-18°24.5	67°37.3	-18°42.2	27°25.9	-22°46.3
19	317°08.5	106°59.4	-19°25.6	357°11.7	-18°24.0	82°39.3	-18°42.3	42°28.1	-22°46.3
20	332°10.9	122°03.2	-19°24.8	12°12.8	-18°23.5	97°41.2	-18°42.4	57°30.4	-22°46.3
21	347°13.4	137°07.0	-19°23.9	27°14.0	-18°23.0	112°43.1	-18°42.5	72°32.7	-22°46.3
22	2°15.9	152°10.8	-19°23.1	42°15.2	-18°22.4	127°45.0	-18°42.7	87°34.9	-22°46.3
23	17°18.3	167°14.6	-19°22.2	57°16.3	-18°21.9	142°47.0	-18°42.8	102°37.2	-22°46.3
Mer.pass.:21:50		v3.8 d0.8 m-3.7		v1.2 d0.5 m-0.8		v1.9 d-0.1 m-1.6		v2.3 d0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	32°20.8	182°18.4	-19°21.4	72°17.5	-18°21.4	157°48.9	-18°42.9	117°39.5	-22°46.3
1	47°23.3	197°22.2	-19°20.5	87°18.6	-18°20.9	172°50.8	-18°43.0	132°41.8	-22°46.3
2	62°25.7	212°26.0	-19°19.7	102°19.8	-18°20.4	187°52.8	-18°43.2	147°44.0	-22°46.3
3	77°28.2	227°29.8	-19°18.8	117°21.0	-18°19.8	202°54.7	-18°43.3	162°46.3	-22°46.3
4	92°30.7	242°33.6	-19°18.0	132°22.1	-18°19.3	217°56.6	-18°43.4	177°48.6	-22°46.3
5	107°33.1	257°37.4	-19°17.1	147°23.3	-18°18.8	232°58.5	-18°43.5	192°50.8	-22°46.3
6	122°35.6	272°41.2	-19°16.2	162°24.5	-18°18.3	248°00.5	-18°43.7	207°53.1	-22°46.3
7	137°38.0	287°45.0	-19°15.4	177°25.6	-18°17.8	263°02.4	-18°43.8	222°55.4	-22°46.3
8	152°40.5	302°48.8	-19°14.5	192°26.8	-18°17.2	278°04.3	-18°43.9	237°57.6	-22°46.2
9	167°43.0	317°52.6	-19°13.6	207°27.9	-18°16.7	293°06.2	-18°44.0	252°59.9	-22°46.2
10	182°45.4	332°56.4	-19°12.8	222°29.1	-18°16.2	308°08.2	-18°44.2	268°02.2	-22°46.2
11	197°47.9	348°00.3	-19°11.9	237°30.3	-18°15.7	323°10.1	-18°44.3	283°04.4	-22°46.2
12	212°50.4	3°04.1	-19°11.0	252°31.4	-18°15.1	338°12.0	-18°44.4	298°06.7	-22°46.2
13	227°52.8	18°07.9	-19°10.1	267°32.6	-18°14.6	353°13.9	-18°44.6	313°09.0	-22°46.2
14	242°55.3	33°11.7	-19°09.3	282°33.7	-18°14.1	8°15.9	-18°44.7	328°11.2	-22°46.2
15	257°57.8	48°15.5	-19°08.4	297°34.9	-18°13.6	23°17.8	-18°44.8	343°13.5	-22°46.2
16	273°00.2	63°19.3	-19°07.5	312°36.0	-18°13.0	38°19.7	-18°44.9	358°15.8	-22°46.2
17	288°02.7	78°23.1	-19°06.6	327°37.2	-18°12.5	53°21.6	-18°45.1	13°18.0	-22°46.2
18	303°05.2	93°26.9	-19°05.7	342°38.4	-18°12.0	68°23.6	-18°45.2	28°20.3	-22°46.2
19	318°07.6	108°30.7	-19°04.9	357°39.5	-18°11.5	83°25.5	-18°45.3	43°22.6	-22°46.2
20	333°10.1	123°34.5	-19°04.0	12°40.7	-18°10.9	98°27.4	-18°45.4	58°24.8	-22°46.2
21	348°12.5	138°38.3	-19°03.1	27°41.8	-18°10.4	113°29.3	-18°45.6	73°27.1	-22°46.2
22	3°15.0	153°42.2	-19°02.2	42°43.0	-18°09.9	128°31.2	-18°45.7	88°29.4	-22°46.2
23	18°17.5	168°46.0	-19°01.3	57°44.1	-18°09.4	143°33.2	-18°45.8	103°31.6	-22°46.2
Mer.pass.:21:47		v3.8 d0.9 m-3.7		v1.2 d0.5 m-0.8		v1.9 d-0.1 m-1.6		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.7
Ankaa	353°11.7	-42°12.4
Schedar	349°35.8	56°38.5
Diphda	348°51.9	-17°53.1
Achernar	335°23.5	-57°08.6
Hamal	327°56.4	23°33.0
Polaris	315°43.7	89°20.4
Akamar	315°15.2	-40°13.8
Menkar	314°11.0	4°09.7
Mirfak	308°34.7	49°55.5
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°10.8
Capella	280°28.8	46°00.8
Bellatrix	278°27.9	6°21.9
Elnath	278°07.8	28°37.2
Alnilam	275°42.5	-1°11.4
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.3	-52°42.2
Sirius	258°30.3	-16°44.3
Adara	255°09.6	-28°59.7
Procyon	244°55.8	5°10.7
Pollux	243°23.2	27°58.7
Avior	234°16.6	-59°33.9
Suhail	222°49.9	-43°30.2
Miaplacidus	221°39.2	-69°47.3
Alphard	217°52.6	-8°44.3
Regulus	207°39.8	11°52.6
Dubhe	193°47.8	61°38.9
Denebola	182°30.2	14°28.2
Gienah	175°48.8	-17°38.5
Acrux	173°05.9	-63°11.9
Gacrux	171°57.4	-57°12.8
Alioth	166°18.1	55°51.6
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.4
Hadar	148°43.4	-60°27.6
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.6
Rigil Kent.	139°47.5	-60°54.5
Zubenelg.	137°01.8	-16°06.9
Kochab	137°21.3	74°04.9
Alphecca	126°08.3	26°39.4
Antares	112°22.1	-26°28.2
Atria	107°21.1	-69°03.6
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.3	12°33.1
Etamin	90°44.7	51°29.6
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.7	38°48.4
Nunki	75°54.0	-26°16.3
Altair	62°04.8	8°55.3
Peacock	53°13.5	-56°40.6
Deneb	49°29.0	45°21.2
Enif	33°43.5	9°57.8
Alnair	27°39.0	-46°52.3
Fomalhaut	15°19.8	-29°31.4
Scheat	13°49.7	28°11.2
Markab	13°34.5	15°18.5

2018/10/	**SHA**	**Mer.pass**
Venus	148°54.2	11:60
Mars	40°58.7	19:13
Jupiter	125°53.8	13:33
Saturn	85°27.9	16:14

2018/10/	**SHA**	**Mer.pass**
Venus	149°25.6	11:54
Mars	40°27.8	19:11
Jupiter	125°41.0	13:30
Saturn	85°23.3	16:11

2018/10/	**SHA**	**Mer.pass**
Venus	149°57.6	11:48
Mars	39°56.7	19:09
Jupiter	125°28.1	13:27
Saturn	85°18.7	16:07

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°51.7	-10°57.1	32°05.8	14.1	-5°12.0	11.0	55.5
1	198°51.8	-10°58.0	46°38.9	14.1	-5°01.0	11.0	55.6
2	213°51.9	-10°58.9	61°11.9	14.0	-4°50.0	11.1	55.6
3	228°52.0	-10°59.8	75°45.0	14.0	-4°38.9	11.1	55.6
4	243°52.1	-11°00.6	90°18.0	14.0	-4°27.8	11.1	55.6
5	258°52.2	-11°01.5	104°51.0	14.0	-4°16.7	11.1	55.7
6	273°52.3	-11°02.4	119°24.0	14.0	-4°05.5	11.2	55.7
7	288°52.4	-11°03.3	133°57.0	14.0	-3°54.3	11.2	55.7
8	303°52.5	-11°04.2	148°30.0	14.0	-3°43.1	11.2	55.7
9	318°52.6	-11°05.1	163°03.0	14.0	-3°31.9	11.3	55.8
10	333°52.7	-11°05.9	177°35.9	13.9	-3°20.6	11.3	55.8
11	348°52.8	-11°06.8	192°08.9	13.9	-3°09.3	11.3	55.8
12	3°52.9	-11°07.7	206°41.8	13.9	-2°58.0	11.3	55.8
13	18°53.0	-11°08.6	221°14.7	13.9	-2°46.6	11.4	55.9
14	33°53.1	-11°09.5	235°47.6	13.9	-2°35.3	11.4	55.9
15	48°53.2	-11°10.3	250°20.4	13.9	-2°23.9	11.4	55.9
16	63°53.3	-11°11.2	264°53.3	13.8	-2°12.5	11.4	55.9
17	78°53.4	-11°12.1	279°26.1	13.8	-2°01.1	11.4	55.9
18	93°53.5	-11°13.0	293°58.9	13.8	-1°49.6	11.5	56.0
19	108°53.5	-11°13.9	308°31.7	13.8	-1°38.1	11.5	56.0
20	123°53.6	-11°14.7	323°04.5	13.8	-1°26.7	11.5	56.0
21	138°53.7	-11°15.6	337°37.2	13.7	-1°15.1	11.5	56.0
22	153°53.8	-11°16.5	352°09.9	13.7	-1°03.6	11.5	56.1
23	168°53.9	-11°17.4	6°42.6	13.7	-0°52.1	11.5	56.1
	SD.=16.1	d=-0.9	S.D.=15.2				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°54.0	-11°18.3	21°15.3	13.7	-0°40.5	11.6	56.1
1	198°54.1	-11°19.1	35°48.0	13.6	-0°29.0	11.6	56.1
2	213°54.2	-11°20.0	50°20.6	13.6	-0°17.4	11.6	56.2
3	228°54.3	-11°20.9	64°53.2	13.6	-0°05.8	11.6	56.2
4	243°54.4	-11°21.8	79°25.7	13.6	0°05.8	11.6	56.2
5	258°54.5	-11°22.6	93°58.3	13.5	0°17.4	11.6	56.2
6	273°54.5	-11°23.5	108°30.8	13.5	0°29.0	11.6	56.3
7	288°54.6	-11°24.4	123°03.3	13.5	0°40.7	11.6	56.3
8	303°54.7	-11°25.3	137°35.7	13.4	0°52.3	11.6	56.3
9	318°54.8	-11°26.1	152°08.1	13.4	1°04.0	11.7	56.3
10	333°54.9	-11°27.0	166°40.5	13.4	1°15.6	11.7	56.4
11	348°55.0	-11°27.9	181°12.9	13.3	1°27.3	11.7	56.4
12	3°55.1	-11°28.8	195°45.2	13.3	1°38.9	11.7	56.4
13	18°55.2	-11°29.6	210°17.5	13.3	1°50.6	11.7	56.4
14	33°55.2	-11°30.5	224°49.8	13.2	2°02.3	11.7	56.5
15	48°55.3	-11°31.4	239°22.0	13.2	2°14.0	11.7	56.5
16	63°55.4	-11°32.3	253°54.2	13.2	2°25.6	11.7	56.5
17	78°55.5	-11°33.1	268°26.3	13.1	2°37.3	11.7	56.5
18	93°55.6	-11°34.0	282°58.4	13.1	2°49.0	11.7	56.6
19	108°55.7	-11°34.9	297°30.5	13.1	3°00.6	11.7	56.6
20	123°55.8	-11°35.8	312°02.5	13.0	3°12.3	11.7	56.6
21	138°55.8	-11°36.6	326°34.5	13.0	3°24.0	11.7	56.6
22	153°55.9	-11°37.5	341°06.5	12.9	3°35.6	11.7	56.7
23	168°56.0	-11°38.4	355°38.4	12.9	3°47.3	11.6	56.7
	SD.=16.1	d=-0.9	S.D.=15.3				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°56.1	-11°39.2	10°10.3	12.9	3°58.9	11.6	56.7
1	198°56.2	-11°40.1	24°42.1	12.8	4°10.6	11.6	56.7
2	213°56.3	-11°41.0	39°13.9	12.8	4°22.2	11.6	56.8
3	228°56.3	-11°41.9	53°45.7	12.7	4°33.8	11.6	56.8
4	243°56.4	-11°42.7	68°17.4	12.7	4°45.4	11.6	56.8
5	258°56.5	-11°43.6	82°49.0	12.6	4°57.0	11.6	56.8
6	273°56.6	-11°44.5	97°20.6	12.6	5°08.6	11.6	56.9
7	288°56.7	-11°45.3	111°52.2	12.5	5°20.2	11.6	56.9
8	303°56.8	-11°46.2	126°23.7	12.5	5°31.7	11.5	56.9
9	318°56.8	-11°47.1	140°55.2	12.5	5°43.3	11.5	56.9
10	333°56.9	-11°47.9	155°26.6	12.4	5°54.8	11.5	57.0
11	348°57.0	-11°48.8	169°58.0	12.4	6°06.3	11.5	57.0
12	3°57.1	-11°49.7	184°29.3	12.3	6°17.8	11.5	57.0
13	18°57.2	-11°50.5	199°00.6	12.3	6°29.2	11.4	57.0
14	33°57.2	-11°51.4	213°31.9	12.2	6°40.7	11.4	57.1
15	48°57.3	-11°52.3	228°03.0	12.2	6°52.1	11.4	57.1
16	63°57.4	-11°53.1	242°34.2	12.1	7°03.5	11.4	57.1
17	78°57.5	-11°54.0	257°05.2	12.1	7°14.8	11.4	57.1
18	93°57.5	-11°54.9	271°36.3	12.0	7°26.2	11.3	57.2
19	108°57.6	-11°55.7	286°07.2	11.9	7°37.5	11.3	57.2
20	123°57.7	-11°56.6	300°38.2	11.9	7°48.8	11.3	57.2
21	138°57.8	-11°57.5	315°09.0	11.8	8°00.0	11.2	57.2
22	153°57.9	-11°58.3	329°39.8	11.8	8°11.3	11.2	57.2
23	168°57.9	-11°59.2	344°10.6	11.7	8°22.5	11.2	57.3
	SD.=16.1	d=-0.9	S.D.=15.5				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:29	06:48	08:04	15:23	16:38	17:57
70	05:29	06:40	07:47	15:40	16:46	17:58
68	05:29	06:34	07:34	15:53	16:53	17:58
66	05:29	06:28	07:23	16:04	16:59	17:59
64	05:28	06:24	07:14	16:14	17:04	17:59
62	05:28	06:19	07:06	16:22	17:08	17:60
60	05:27	06:16	06:59	16:29	17:12	18:00
58	05:26	06:12	06:53	16:35	17:15	18:01
56	05:26	06:09	06:48	16:40	17:18	18:02
54	05:25	06:06	06:43	16:45	17:21	18:02
52	05:24	06:04	06:39	16:49	17:24	18:03
50	05:24	06:01	06:35	16:53	17:26	18:04
45	05:22	05:56	06:26	17:02	17:32	18:06
40	05:20	05:51	06:19	17:09	17:37	18:08
35	05:17	05:47	06:13	17:16	17:41	18:11
30	05:15	05:43	06:07	17:21	17:45	18:13
20	05:09	05:35	05:58	17:31	17:53	18:19
10	05:03	05:28	05:49	17:39	18:01	18:26
0	04:55	05:20	05:41	17:48	18:09	18:33
-10	04:46	05:11	05:33	17:56	18:18	18:43
-20	04:35	05:01	05:24	18:05	18:28	18:54
-30	04:20	04:49	05:14	18:15	18:40	19:10
-35	04:10	04:41	05:08	18:21	18:48	19:19
-40	03:59	04:33	05:01	18:28	18:57	19:31
-45	03:44	04:22	04:53	18:36	19:08	19:46
-50	03:26	04:09	04:43	18:46	19:21	20:05
-52	03:17	04:02	04:39	18:51	19:28	20:14
-54	03:06	03:55	04:34	18:56	19:35	20:25
-56	02:54	03:47	04:29	19:01	19:43	20:37
-58	02:40	03:38	04:22	19:08	19:52	20:52
-60	02:22	03:28	04:16	19:15	20:03	21:09

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	16:49	16:36	16:22	02:57	04:45	06:36
70	16:46	16:39	16:32	03:04	04:45	06:28
68	16:43	16:41	16:40	03:10	04:45	06:22
66	16:41	16:44	16:47	03:15	04:45	06:17
64	16:40	16:46	16:52	03:19	04:45	06:13
62	16:38	16:47	16:57	03:22	04:44	06:09
60	16:37	16:49	17:02	03:25	04:44	06:06
58	16:36	16:50	17:06	03:28	04:44	06:03
56	16:35	16:51	17:09	03:30	04:44	06:00
54	16:34	16:52	17:12	03:32	04:44	05:58
52	16:33	16:53	17:15	03:34	04:44	05:56
50	16:32	16:54	17:18	03:36	04:44	05:54
45	16:30	16:56	17:24	03:39	04:44	05:50
40	16:29	16:58	17:28	03:43	04:44	05:47
35	16:28	16:59	17:33	03:45	04:44	05:44
30	16:27	17:01	17:36	03:48	04:44	05:41
20	16:25	17:03	17:43	03:52	04:43	05:37
10	16:23	17:05	17:48	03:55	04:43	05:33
0	16:22	17:07	17:54	03:58	04:43	05:29
-10	16:20	17:09	17:59	04:02	04:43	05:25
-20	16:18	17:11	18:05	04:05	04:43	05:22
-30	16:16	17:13	18:12	04:09	04:43	05:17
-35	16:15	17:15	18:16	04:11	04:42	05:15
-40	16:14	17:16	18:20	04:14	04:42	05:12
-45	16:13	17:18	18:25	04:16	04:42	05:08
-50	16:11	17:20	18:32	04:20	04:42	05:04
-52	16:10	17:21	18:35	04:21	04:42	05:03
-54	16:09	17:23	18:38	04:23	04:42	05:01
-56	16:09	17:24	18:41	04:25	04:41	04:58
-58	16:08	17:25	18:45	04:27	04:41	04:56
-60	16:06	17:27	18:50	04:29	04:41	04:53

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
22	15:27	15:31	11:44	22:32	10:09	13(95%)
23	15:36	15:40	11:44	23:18	10:54	14(98%)
24	15:44	15:48	11:44	00:05	11:41	15(100%)

October 25, 26 ,27 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	33°19.9	183°49.8	-19°00.4	72°45.3	-18°08.8	158°35.1	-18°45.9	118°33.9	-22°46.2
1	48°22.4	198°53.6	-18°59.5	87°46.4	-18°08.3	173°37.0	-18°46.1	133°36.2	-22°46.2
2	63°24.9	213°57.4	-18°58.6	102°47.6	-18°07.8	188°38.9	-18°46.2	148°38.4	-22°46.2
3	78°27.3	229°01.2	-18°57.7	117°48.8	-18°07.2	203°40.9	-18°46.3	163°40.7	-22°46.2
4	93°29.8	244°05.0	-18°56.8	132°49.9	-18°06.7	218°42.8	-18°46.4	178°43.0	-22°46.2
5	108°32.3	259°08.8	-18°55.9	147°51.1	-18°06.2	233°44.7	-18°46.6	193°45.2	-22°46.2
6	123°34.7	274°12.6	-18°55.0	162°52.2	-18°05.7	248°46.6	-18°46.7	208°47.5	-22°46.2
7	138°37.2	289°16.4	-18°54.1	177°53.4	-18°05.1	263°48.6	-18°46.8	223°49.8	-22°46.2
8	153°39.7	304°20.3	-18°53.2	192°54.5	-18°04.6	278°50.5	-18°46.9	238°52.0	-22°46.2
9	168°42.1	319°24.1	-18°52.3	207°55.7	-18°04.1	293°52.4	-18°47.1	253°54.3	-22°46.2
10	183°44.6	334°27.9	-18°51.4	222°56.8	-18°03.5	308°54.3	-18°47.2	268°56.6	-22°46.2
11	198°47.0	349°31.7	-18°50.5	237°58.0	-18°03.0	323°56.2	-18°47.3	283°58.8	-22°46.2
12	213°49.5	4°35.5	-18°49.5	252°59.1	-18°02.5	338°58.2	-18°47.4	299°01.1	-22°46.2
13	228°52.0	19°39.3	-18°48.6	268°00.3	-18°02.0	354°00.1	-18°47.6	314°03.3	-22°46.2
14	243°54.4	34°43.1	-18°47.7	283°01.4	-18°01.4	9°02.0	-18°47.7	329°05.6	-22°46.2
15	258°56.9	49°46.9	-18°46.8	298°02.6	-18°00.9	24°03.9	-18°47.8	344°07.9	-22°46.2
16	273°59.4	64°50.7	-18°45.9	313°03.7	-18°00.4	39°05.9	-18°47.9	359°10.1	-22°46.2
17	289°01.8	79°54.5	-18°45.0	328°04.9	-17°59.8	54°07.8	-18°48.1	14°12.4	-22°46.2
18	304°04.3	94°58.4	-18°44.0	343°06.0	-17°59.3	69°09.7	-18°48.2	29°14.7	-22°46.2
19	319°06.8	110°02.2	-18°43.1	358°07.2	-17°58.8	84°11.6	-18°48.3	44°16.9	-22°46.2
20	334°09.2	125°06.0	-18°42.2	13°08.3	-17°58.2	99°13.5	-18°48.4	59°19.2	-22°46.2
21	349°11.7	140°09.8	-18°41.3	28°09.5	-17°57.7	114°15.5	-18°48.6	74°21.5	-22°46.2
22	4°14.1	155°13.6	-18°40.3	43°10.6	-17°57.2	129°17.4	-18°48.7	89°23.7	-22°46.2
23	19°16.6	170°17.4	-18°39.4	58°11.8	-17°56.6	144°19.3	-18°48.8	104°26.0	-22°46.2
Mer.pass.:21:43		v3.8 d0.9 m-3.7		v1.2 d0.5 m-0.8		v1.9 d-0.1 m-1.6		v2.3 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	34°19.1	185°21.2	-18°38.5	73°12.9	-17°56.1	159°21.2	-18°48.9	119°28.2	-22°46.2
1	49°21.5	200°25.0	-18°37.5	88°14.0	-17°55.6	174°23.2	-18°49.1	134°30.5	-22°46.2
2	64°24.0	215°28.8	-18°36.6	103°15.2	-17°55.0	189°25.1	-18°49.2	149°32.8	-22°46.2
3	79°26.5	230°32.6	-18°35.7	118°16.3	-17°54.5	204°27.0	-18°49.3	164°35.0	-22°46.2
4	94°28.9	245°36.4	-18°34.7	133°17.5	-17°54.0	219°28.9	-18°49.4	179°37.3	-22°46.2
5	109°31.4	260°40.2	-18°33.8	148°18.6	-17°53.4	234°30.8	-18°49.6	194°39.6	-22°46.2
6	124°33.9	275°44.0	-18°32.9	163°19.8	-17°52.9	249°32.8	-18°49.7	209°41.8	-22°46.2
7	139°36.3	290°47.8	-18°31.9	178°20.9	-17°52.4	264°34.7	-18°49.8	224°44.1	-22°46.2
8	154°38.8	305°51.7	-18°31.0	193°22.1	-17°51.8	279°36.6	-18°49.9	239°46.3	-22°46.2
9	169°41.3	320°55.5	-18°30.0	208°23.2	-17°51.3	294°38.5	-18°50.1	254°48.6	-22°46.2
10	184°43.7	335°59.3	-18°29.1	223°24.3	-17°50.8	309°40.4	-18°50.2	269°50.9	-22°46.2
11	199°46.2	351°03.1	-18°28.1	238°25.5	-17°50.2	324°42.4	-18°50.3	284°53.1	-22°46.2
12	214°48.6	6°06.9	-18°27.2	253°26.6	-17°49.7	339°44.3	-18°50.4	299°55.4	-22°46.2
13	229°51.1	21°10.7	-18°26.2	268°27.8	-17°49.2	354°46.2	-18°50.6	314°57.6	-22°46.2
14	244°53.6	36°14.5	-18°25.3	283°28.9	-17°48.6	9°48.1	-18°50.7	329°59.9	-22°46.2
15	259°56.0	51°18.3	-18°24.3	298°30.1	-17°48.1	24°50.0	-18°50.8	345°02.2	-22°46.2
16	274°58.5	66°22.1	-18°23.4	313°31.2	-17°47.6	39°52.0	-18°51.0	0°04.4	-22°46.2
17	290°01.0	81°25.9	-18°22.4	328°32.3	-17°47.0	54°53.9	-18°51.1	15°06.7	-22°46.2
18	305°03.4	96°29.7	-18°21.5	343°33.5	-17°46.5	69°55.8	-18°51.2	30°08.9	-22°46.2
19	320°05.9	111°33.5	-18°20.5	358°34.6	-17°46.0	84°57.7	-18°51.3	45°11.2	-22°46.2
20	335°08.4	126°37.3	-18°19.6	13°35.8	-17°45.4	99°59.6	-18°51.5	60°13.5	-22°46.2
21	350°10.8	141°41.1	-18°18.6	28°36.9	-17°44.9	115°01.6	-18°51.6	75°15.7	-22°46.2
22	5°13.3	156°44.9	-18°17.6	43°38.0	-17°44.4	130°03.5	-18°51.7	90°18.0	-22°46.2
23	20°15.8	171°48.7	-18°16.7	58°39.2	-17°43.8	145°05.4	-18°51.8	105°20.2	-22°46.2
Mer.pass.:21:39		v3.8 d0.9 m-3.7		v1.1 d0.5 m-0.7		v1.9 d-0.1 m-1.6		v2.3 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	35°18.2	186°52.4	-18°15.7	73°40.3	-17°43.3	160°07.3	-18°52.0	120°22.5	-22°46.2
1	50°20.7	201°56.2	-18°14.8	88°41.5	-17°42.7	175°09.2	-18°52.1	135°24.8	-22°46.2
2	65°23.1	217°00.0	-18°13.8	103°42.6	-17°42.2	190°11.2	-18°52.2	150°27.0	-22°46.2
3	80°25.6	232°03.8	-18°12.8	118°43.7	-17°41.7	205°13.1	-18°52.3	165°29.3	-22°46.2
4	95°28.1	247°07.6	-18°11.9	133°44.9	-17°41.1	220°15.0	-18°52.5	180°31.5	-22°46.2
5	110°30.5	262°11.4	-18°10.9	148°46.0	-17°40.6	235°16.9	-18°52.6	195°33.8	-22°46.2
6	125°33.0	277°15.2	-18°09.9	163°47.1	-17°40.0	250°18.8	-18°52.7	210°36.1	-22°46.2
7	140°35.5	292°19.0	-18°08.9	178°48.3	-17°39.5	265°20.8	-18°52.8	225°38.3	-22°46.2
8	155°37.9	307°22.8	-18°08.0	193°49.4	-17°39.0	280°22.7	-18°53.0	240°40.6	-22°46.2
9	170°40.4	322°26.6	-18°07.0	208°50.5	-17°38.4	295°24.6	-18°53.1	255°42.8	-22°46.2
10	185°42.9	337°30.3	-18°06.0	223°51.7	-17°37.9	310°26.5	-18°53.2	270°45.1	-22°46.2
11	200°45.3	352°34.1	-18°05.0	238°52.8	-17°37.3	325°28.4	-18°53.3	285°47.3	-22°46.2
12	215°47.8	7°37.9	-18°04.1	253°54.0	-17°36.8	340°30.3	-18°53.5	300°49.6	-22°46.2
13	230°50.2	22°41.7	-18°03.1	268°55.1	-17°36.3	355°32.3	-18°53.6	315°51.9	-22°46.2
14	245°52.7	37°45.5	-18°02.1	283°56.2	-17°35.7	10°34.2	-18°53.7	330°54.1	-22°46.2
15	260°55.2	52°49.3	-18°01.1	298°57.4	-17°35.2	25°36.1	-18°53.8	345°56.4	-22°46.2
16	275°57.6	67°53.0	-18°00.2	313°58.5	-17°34.6	40°38.0	-18°53.9	0°58.6	-22°46.2
17	291°00.1	82°56.8	-17°59.2	328°59.6	-17°34.1	55°39.9	-18°54.1	16°00.9	-22°46.2
18	306°02.6	98°00.6	-17°58.2	344°00.8	-17°33.6	70°41.9	-18°54.2	31°03.1	-22°46.2
19	321°05.0	113°04.4	-17°57.2	359°01.9	-17°33.0	85°43.8	-18°54.3	46°05.4	-22°46.1
20	336°07.5	128°08.2	-17°56.2	14°03.0	-17°32.5	100°45.7	-18°54.4	61°07.7	-22°46.1
21	351°10.0	143°11.9	-17°55.2	29°04.2	-17°31.9	115°47.6	-18°54.6	76°09.9	-22°46.1
22	6°12.4	158°15.7	-17°54.2	44°05.3	-17°31.4	130°49.5	-18°54.7	91°12.2	-22°46.1
23	21°14.9	173°19.5	-17°53.3	59°06.4	-17°30.9	145°51.4	-18°54.8	106°14.4	-22°46.1
Mer.pass.:21:35		v3.8 d1.0 m-3.7		v1.1 d0.5 m-0.7		v1.9 d-0.1 m-1.6		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.8	-42°12.4
Schedar	349°35.9	56°38.5
Diphda	348°51.9	-17°53.1
Achernar	335°23.5	-57°08.6
Hamal	327°56.3	23°33.0
Polaris	315°43.2	89°20.4
Akamar	315°15.2	-40°13.8
Menkar	314°10.9	4°09.7
Mirfak	308°34.7	49°55.5
Aldebaran	290°45.0	16°32.7
Rigel	281°08.3	-8°10.8
Capella	280°28.8	46°00.8
Bellatrix	278°27.9	6°21.9
Elnath	278°07.8	28°37.2
Alnilam	275°42.5	-1°11.4
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.3	-52°42.2
Sirius	258°30.3	-16°44.3
Adara	255°09.5	-28°59.7
Procyon	244°55.8	5°10.7
Pollux	243°23.2	27°58.7
Avior	234°16.5	-59°33.9
Suhail	222°49.9	-43°30.2
Miaplacidus	221°39.1	-69°47.3
Alphard	217°52.6	-8°44.3
Regulus	207°39.8	11°52.6
Dubhe	193°47.7	61°38.9
Denebola	182°30.2	14°28.2
Gienah	175°48.8	-17°38.5
Acrux	173°05.9	-63°11.9
Gacrux	171°57.4	-57°12.8
Alioth	166°18.1	55°51.6
Spica	158°27.8	-11°15.3
Alcaid	152°56.5	49°13.4
Hadar	148°43.4	-60°27.6
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.6
Rigil Kent.	139°47.5	-60°54.5
Zubenelg.	137°01.8	-16°06.9
Kochab	137°21.3	74°04.9
Alphecca	126°08.3	26°39.4
Antares	112°22.1	-26°28.2
Atria	107°21.1	-69°03.6
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.3	12°33.1
Etamin	90°44.8	51°29.6
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.7	38°48.4
Nunki	75°54.0	-26°16.3
Altair	62°04.8	8°55.3
Peacock	53°13.6	-56°40.6
Deneb	49°29.0	45°21.2
Enif	33°43.5	9°57.8
Alnair	27°39.0	-46°52.3
Fomalhaut	15°19.8	-29°31.4
Scheat	13°49.7	28°11.2
Markab	13°34.5	15°18.5

2018/10/	**SHA**	**Mer.pass**
Venus	150°29.8	11:42
Mars	39°25.4	19:08
Jupiter	125°15.2	13:24
Saturn	85°14.0	16:03

2018/10/	**SHA**	**Mer.pass**
Venus	151°02.1	11:36
Mars	38°53.8	19:06
Jupiter	125°02.2	13:21
Saturn	85°09.2	15:60

2018/10/	**SHA**	**Mer.pass**
Venus	151°34.2	11:30
Mars	38°22.1	19:04
Jupiter	124°49.1	13:18
Saturn	85°04.3	15:56

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°58.0	-12°00.0	358°41.3	11.7	8°33.6	11.1	57.3
1	198°58.1	-12°00.9	13°11.9	11.6	8°44.7	11.1	57.3
2	213°58.2	-12°01.8	27°42.5	11.6	8°55.8	11.1	57.3
3	228°58.2	-12°02.6	42°13.0	11.5	9°06.9	11.0	57.4
4	243°58.3	-12°03.5	56°43.5	11.4	9°17.9	11.0	57.4
5	258°58.4	-12°04.4	71°13.9	11.4	9°28.9	11.0	57.4
6	273°58.5	-12°05.2	85°44.3	11.3	9°39.8	10.9	57.4
7	288°58.5	-12°06.1	100°14.6	11.3	9°50.7	10.9	57.5
8	303°58.6	-12°06.9	114°44.8	11.2	10°01.6	10.8	57.5
9	318°58.7	-12°07.8	129°15.0	11.1	10°12.4	10.8	57.5
10	333°58.8	-12°08.7	143°45.1	11.1	10°23.2	10.7	57.5
11	348°58.8	-12°09.5	158°15.1	11.0	10°33.9	10.7	57.5
12	3°58.9	-12°10.4	172°45.1	11.0	10°44.6	10.7	57.6
13	18°59.0	-12°11.2	187°15.0	10.9	10°55.2	10.6	57.6
14	33°59.0	-12°12.1	201°44.9	10.8	11°05.8	10.6	57.6
15	48°59.1	-12°13.0	216°14.7	10.8	11°16.3	10.5	57.6
16	63°59.2	-12°13.8	230°44.4	10.7	11°26.8	10.5	57.7
17	78°59.3	-12°14.7	245°14.1	10.6	11°37.2	10.4	57.7
18	93°59.3	-12°15.5	259°43.7	10.6	11°47.6	10.3	57.7
19	108°59.4	-12°16.4	274°13.3	10.5	11°57.9	10.3	57.7
20	123°59.5	-12°17.2	288°42.8	10.4	12°08.2	10.2	57.7
21	138°59.5	-12°18.1	303°12.2	10.4	12°18.4	10.2	57.8
22	153°59.6	-12°19.0	317°41.5	10.3	12°28.5	10.1	57.8
23	168°59.7	-12°19.8	332°10.8	10.2	12°38.6	10.1	57.8
	SD.=16.1	d=-0.9	S.D.=15.6				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°59.7	-12°20.7	346°40.0	10.2	12°48.7	10.0	57.8
1	198°59.8	-12°21.5	1°09.2	10.1	12°58.6	9.9	57.8
2	213°59.9	-12°22.4	15°38.2	10.1	13°08.5	9.9	57.9
3	228°60.0	-12°23.2	30°07.3	10.0	13°18.3	9.8	57.9
4	244°00.0	-12°24.1	44°36.2	9.9	13°28.1	9.7	57.9
5	259°00.1	-12°24.9	59°05.1	9.8	13°37.8	9.7	57.9
6	274°00.2	-12°25.8	73°33.9	9.8	13°47.4	9.6	57.9
7	289°00.2	-12°26.6	88°02.7	9.7	13°57.0	9.5	58.0
8	304°00.3	-12°27.5	102°31.3	9.6	14°06.5	9.5	58.0
9	319°00.4	-12°28.3	116°60.0	9.6	14°15.9	9.4	58.0
10	334°00.4	-12°29.2	131°28.5	9.5	14°25.3	9.3	58.0
11	349°00.5	-12°30.1	145°57.0	9.4	14°34.5	9.2	58.0
12	4°00.5	-12°30.9	160°25.4	9.4	14°43.7	9.2	58.1
13	19°00.6	-12°31.8	174°53.7	9.3	14°52.8	9.1	58.1
14	34°00.7	-12°32.6	189°22.0	9.2	15°01.9	9.0	58.1
15	49°00.7	-12°33.5	203°50.2	9.2	15°10.8	8.9	58.1
16	64°00.8	-12°34.3	218°18.4	9.1	15°19.7	8.8	58.1
17	79°00.9	-12°35.2	232°46.4	9.0	15°28.5	8.8	58.2
18	94°00.9	-12°36.0	247°14.4	9.0	15°37.2	8.7	58.2
19	109°01.0	-12°36.9	261°42.4	8.9	15°45.8	8.6	58.2
20	124°01.1	-12°37.7	276°10.2	8.8	15°54.4	8.5	58.2
21	139°01.1	-12°38.6	290°38.0	8.8	16°02.8	8.4	58.2
22	154°01.2	-12°39.4	305°05.8	8.7	16°11.2	8.3	58.2
23	169°01.2	-12°40.2	319°33.4	8.6	16°19.5	8.2	58.3
	SD.=16.1	d=-0.9	S.D.=15.8				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°01.3	-12°41.1	334°01.0	8.6	16°27.7	8.1	58.3
1	199°01.4	-12°41.9	348°28.5	8.5	16°35.8	8.0	58.3
2	214°01.4	-12°42.8	2°56.0	8.4	16°43.8	8.0	58.3
3	229°01.5	-12°43.6	17°23.4	8.4	16°51.7	7.9	58.3
4	244°01.5	-12°44.5	31°50.7	8.3	16°59.5	7.8	58.3
5	259°01.6	-12°45.3	46°18.0	8.2	17°07.2	7.7	58.4
6	274°01.7	-12°46.2	60°45.2	8.2	17°14.8	7.6	58.4
7	289°01.7	-12°47.0	75°12.3	8.1	17°22.3	7.5	58.4
8	304°01.8	-12°47.9	89°39.4	8.0	17°29.8	7.4	58.4
9	319°01.8	-12°48.7	104°06.4	8.0	17°37.1	7.3	58.4
10	334°01.9	-12°49.6	118°33.3	7.9	17°44.3	7.2	58.4
11	349°02.0	-12°50.4	133°00.2	7.8	17°51.4	7.1	58.5
12	4°02.0	-12°51.2	147°27.0	7.8	17°58.4	7.0	58.5
13	19°02.1	-12°52.1	161°53.8	7.7	18°05.3	6.9	58.5
14	34°02.1	-12°52.9	176°20.5	7.7	18°12.1	6.7	58.5
15	49°02.2	-12°53.8	190°47.1	7.6	18°18.8	6.6	58.5
16	64°02.2	-12°54.6	205°13.7	7.5	18°25.4	6.5	58.5
17	79°02.3	-12°55.5	219°40.2	7.5	18°31.9	6.4	58.5
18	94°02.3	-12°56.3	234°06.6	7.4	18°38.2	6.3	58.6
19	109°02.4	-12°57.1	248°33.0	7.4	18°44.5	6.2	58.6
20	124°02.5	-12°58.0	262°59.3	7.3	18°50.6	6.1	58.6
21	139°02.5	-12°58.8	277°25.6	7.2	18°56.7	6.0	58.6
22	154°02.6	-12°59.7	291°51.8	7.2	19°02.6	5.9	58.6
23	169°02.6	-13°00.5	306°17.9	7.1	19°08.4	5.7	58.6
	SD.=16.1	d=-0.8	S.D.=15.9				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:42	07:02	08:21	15:06	16:24	17:44
70	05:40	06:52	08:01	15:25	16:34	17:46
68	05:39	06:44	07:46	15:41	16:42	17:47
66	05:37	06:38	07:33	15:53	16:49	17:49
64	05:36	06:32	07:23	16:04	16:55	17:50
62	05:35	06:27	07:14	16:13	16:60	17:52
60	05:34	06:23	07:07	16:20	17:04	17:53
58	05:33	06:19	06:60	16:27	17:08	17:54
56	05:32	06:15	06:54	16:33	17:12	17:55
54	05:30	06:12	06:49	16:38	17:15	17:56
52	05:29	06:09	06:44	16:43	17:18	17:58
50	05:28	06:06	06:39	16:48	17:21	17:59
45	05:25	05:60	06:30	16:57	17:27	18:02
40	05:23	05:54	06:22	17:05	17:33	18:05
35	05:20	05:49	06:15	17:12	17:38	18:08
30	05:17	05:45	06:09	17:18	17:43	18:11
20	05:10	05:36	05:59	17:29	17:51	18:17
10	05:03	05:28	05:49	17:38	17:60	18:25
0	04:55	05:19	05:41	17:47	18:09	18:33
-10	04:45	05:10	05:32	17:56	18:18	18:43
-20	04:33	04:59	05:22	18:06	18:29	18:56
-30	04:16	04:46	05:11	18:18	18:43	19:12
-35	04:06	04:38	05:04	18:24	18:51	19:22
-40	03:54	04:28	04:57	18:32	19:00	19:35
-45	03:38	04:17	04:48	18:41	19:12	19:51
-50	03:19	04:03	04:38	18:51	19:27	20:11
-52	03:09	03:56	04:33	18:56	19:34	20:21
-54	02:57	03:48	04:27	19:02	19:41	20:33
-56	02:44	03:39	04:21	19:08	19:50	20:46
-58	02:29	03:30	04:15	19:15	20:00	21:02
-60	02:09	03:18	04:07	19:23	20:12	21:22

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	16:05	15:40	–:–	08:34	10:44	–:–
70	16:24	16:14	15:58	08:17	10:13	12:20
68	16:38	16:38	16:40	08:04	09:50	11:40
66	16:50	16:57	17:08	07:53	09:32	11:12
64	17:01	17:12	17:30	07:44	09:17	10:51
62	17:09	17:25	17:47	07:36	09:05	10:34
60	17:17	17:36	18:02	07:30	08:55	10:20
58	17:24	17:46	18:15	07:24	08:46	10:08
56	17:29	17:54	18:25	07:19	08:38	09:58
54	17:35	18:02	18:35	07:14	08:31	09:49
52	17:40	18:08	18:43	07:10	08:25	09:40
50	17:44	18:14	18:51	07:06	08:20	09:33
45	17:54	18:28	19:08	06:58	08:08	09:18
40	18:01	18:39	19:21	06:51	07:58	09:05
35	18:08	18:48	19:33	06:46	07:49	08:54
30	18:14	18:56	19:43	06:41	07:42	08:44
20	18:25	19:11	20:00	06:32	07:29	08:28
10	18:34	19:23	20:15	06:24	07:18	08:14
0	18:43	19:35	20:30	06:17	07:08	08:01
-10	18:52	19:47	20:44	06:10	06:57	07:48
-20	19:01	19:60	20:60	06:02	06:46	07:34
-30	19:12	20:14	21:17	05:54	06:33	07:17
-35	19:19	20:23	21:28	05:49	06:26	07:08
-40	19:26	20:33	21:40	05:43	06:18	06:57
-45	19:34	20:44	21:54	05:37	06:08	06:45
-50	19:45	20:59	22:11	05:29	05:57	06:30
-52	19:49	21:05	22:19	05:25	05:51	06:23
-54	19:55	21:12	22:29	05:21	05:46	06:15
-56	20:01	21:21	22:39	05:17	05:39	06:06
-58	20:07	21:30	22:51	05:12	05:32	05:56
-60	20:15	21:41	23:04	05:07	05:23	05:45

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
25	15:52	15:56	11:44	00:05	12:30	16(99%)
26	15:59	16:02	11:43	00:55	13:21	17(96%)
27	16:05	16:08	11:43	01:47	14:15	18(91%)

October 28, 29 ,30 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	36°17.4	188°23.3	-17°52.3	74°07.5	-17°30.3	160°53.4	-18°54.9	121°16.7	-22°46.1
1	51°19.8	203°27.0	-17°51.3	89°08.7	-17°29.8	175°55.3	-18°55.1	136°18.9	-22°46.1
2	66°22.3	218°30.8	-17°50.3	104°09.8	-17°29.2	190°57.2	-18°55.2	151°21.2	-22°46.1
3	81°24.7	233°34.6	-17°49.3	119°10.9	-17°28.7	205°59.1	-18°55.3	166°23.4	-22°46.1
4	96°27.2	248°38.3	-17°48.3	134°12.1	-17°28.1	221°01.0	-18°55.4	181°25.7	-22°46.1
5	111°29.7	263°42.1	-17°47.3	149°13.2	-17°27.6	236°02.9	-18°55.6	196°28.0	-22°46.1
6	126°32.1	278°45.9	-17°46.3	164°14.3	-17°27.1	251°04.9	-18°55.7	211°30.2	-22°46.1
7	141°34.6	293°49.6	-17°45.3	179°15.5	-17°26.5	266°06.8	-18°55.8	226°32.5	-22°46.1
8	156°37.1	308°53.4	-17°44.3	194°16.6	-17°26.0	281°08.7	-18°55.9	241°34.7	-22°46.1
9	171°39.5	323°57.2	-17°43.3	209°17.7	-17°25.4	296°10.6	-18°56.1	256°37.0	-22°46.1
10	186°42.0	339°00.9	-17°42.3	224°18.8	-17°24.9	311°12.5	-18°56.2	271°39.2	-22°46.1
11	201°44.5	354°04.7	-17°41.3	239°20.0	-17°24.3	326°14.4	-18°56.3	286°41.5	-22°46.1
12	216°46.9	9°08.4	-17°40.3	254°21.1	-17°23.8	341°16.4	-18°56.4	301°43.7	-22°46.1
13	231°49.4	24°12.2	-17°39.3	269°22.2	-17°23.2	356°18.3	-18°56.6	316°46.0	-22°46.1
14	246°51.9	39°15.9	-17°38.3	284°23.3	-17°22.7	11°20.2	-18°56.7	331°48.2	-22°46.1
15	261°54.3	54°19.7	-17°37.3	299°24.5	-17°22.1	26°22.1	-18°56.8	346°50.5	-22°46.1
16	276°56.8	69°23.4	-17°36.3	314°25.6	-17°21.6	41°24.0	-18°56.9	1°52.8	-22°46.1
17	291°59.2	84°27.2	-17°35.3	329°26.7	-17°21.1	56°25.9	-18°57.1	16°55.0	-22°46.1
18	307°01.7	99°30.9	-17°34.3	344°27.9	-17°20.5	71°27.8	-18°57.2	31°57.3	-22°46.1
19	322°04.2	114°34.7	-17°33.3	359°29.0	-17°20.0	86°29.8	-18°57.3	46°59.5	-22°46.1
20	337°06.6	129°38.4	-17°32.3	14°30.1	-17°19.4	101°31.7	-18°57.4	62°01.8	-22°46.1
21	352°09.1	144°42.2	-17°31.3	29°31.2	-17°18.9	116°33.6	-18°57.6	77°04.0	-22°46.1
22	7°11.6	159°45.9	-17°30.3	44°32.4	-17°18.3	131°35.5	-18°57.7	92°06.3	-22°46.1
23	22°14.0	174°49.7	-17°29.3	59°33.5	-17°17.8	146°37.4	-18°57.8	107°08.5	-22°46.1
Mer.pass.:21:31		v3.8 d1.0 m-3.7		v1.1 d0.5 m-0.7		v1.9 d-0.1 m-1.6		v2.3 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	37°16.5	189°53.4	-17°28.3	74°34.6	-17°17.2	161°39.3	-18°57.9	122°10.8	-22°46.1
1	52°19.0	204°57.2	-17°27.3	89°35.7	-17°16.7	176°41.3	-18°58.1	137°13.0	-22°46.1
2	67°21.4	220°00.9	-17°26.2	104°36.8	-17°16.1	191°43.2	-18°58.2	152°15.3	-22°46.1
3	82°23.9	235°04.6	-17°25.2	119°38.0	-17°15.6	206°45.1	-18°58.3	167°17.5	-22°46.1
4	97°26.4	250°08.4	-17°24.2	134°39.1	-17°15.0	221°47.0	-18°58.4	182°19.8	-22°46.1
5	112°28.8	265°12.1	-17°23.2	149°40.2	-17°14.5	236°48.9	-18°58.6	197°22.0	-22°46.1
6	127°31.3	280°15.8	-17°22.2	164°41.3	-17°13.9	251°50.8	-18°58.7	212°24.3	-22°46.1
7	142°33.7	295°19.6	-17°21.2	179°42.5	-17°13.4	266°52.7	-18°58.8	227°26.5	-22°46.1
8	157°36.2	310°23.3	-17°20.2	194°43.6	-17°12.8	281°54.7	-18°58.9	242°28.8	-22°46.1
9	172°38.7	325°27.0	-17°19.2	209°44.7	-17°12.3	296°56.6	-18°59.1	257°31.0	-22°46.1
10	187°41.1	340°30.7	-17°18.1	224°45.8	-17°11.7	311°58.5	-18°59.2	272°33.3	-22°46.1
11	202°43.6	355°34.5	-17°17.1	239°46.9	-17°11.2	327°00.4	-18°59.3	287°35.6	-22°46.1
12	217°46.1	10°38.2	-17°16.1	254°48.1	-17°10.6	342°02.3	-18°59.4	302°37.8	-22°46.1
13	232°48.5	25°41.9	-17°15.1	269°49.2	-17°10.1	357°04.2	-18°59.6	317°40.1	-22°46.1
14	247°51.0	40°45.6	-17°14.1	284°50.3	-17°09.5	12°06.1	-18°59.7	332°42.3	-22°46.1
15	262°53.5	55°49.3	-17°13.0	299°51.4	-17°09.0	27°08.1	-18°59.8	347°44.6	-22°46.1
16	277°55.9	70°53.0	-17°12.0	314°52.5	-17°08.4	42°10.0	-18°59.9	2°46.8	-22°46.1
17	292°58.4	85°56.8	-17°11.0	329°53.7	-17°07.9	57°11.9	-19°00.1	17°49.1	-22°46.1
18	308°00.9	101°00.5	-17°10.0	344°54.8	-17°07.3	72°13.8	-19°00.2	32°51.3	-22°46.1
19	323°03.3	116°04.2	-17°09.0	359°55.9	-17°06.8	87°15.7	-19°00.3	47°53.6	-22°46.1
20	338°05.8	131°07.9	-17°07.9	14°57.0	-17°06.2	102°17.6	-19°00.4	62°55.8	-22°46.1
21	353°08.2	146°11.6	-17°06.9	29°58.1	-17°05.7	117°19.5	-19°00.5	77°58.1	-22°46.1
22	8°10.7	161°15.3	-17°05.9	44°59.2	-17°05.1	132°21.4	-19°00.7	93°00.3	-22°46.1
23	23°13.2	176°19.0	-17°04.9	60°00.4	-17°04.6	147°23.4	-19°00.8	108°02.6	-22°46.1
Mer.pass.:21:27		v3.7 d1.0 m-3.7		v1.1 d0.5 m-0.7		v1.9 d-0.1 m-1.6		v2.3 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	38°15.6	191°22.7	-17°03.9	75°01.5	-17°04.0	162°25.3	-19°00.9	123°04.8	-22°46.0
1	53°18.1	206°26.4	-17°02.8	90°02.6	-17°03.5	177°27.2	-19°01.0	138°07.1	-22°46.0
2	68°20.6	221°30.1	-17°01.8	105°03.7	-17°02.9	192°29.1	-19°01.2	153°09.3	-22°46.0
3	83°23.0	236°33.8	-17°00.8	120°04.8	-17°02.4	207°31.0	-19°01.3	168°11.6	-22°46.0
4	98°25.5	251°37.5	-16°59.8	135°05.9	-17°01.8	222°32.9	-19°01.4	183°13.8	-22°46.0
5	113°28.0	266°41.2	-16°58.7	150°07.1	-17°01.2	237°34.8	-19°01.5	198°16.0	-22°46.0
6	128°30.4	281°44.9	-16°57.7	165°08.2	-17°00.7	252°36.7	-19°01.7	213°18.3	-22°46.0
7	143°32.9	296°48.5	-16°56.7	180°09.3	-17°00.1	267°38.7	-19°01.8	228°20.5	-22°46.0
8	158°35.3	311°52.2	-16°55.6	195°10.4	-16°59.6	282°40.6	-19°01.9	243°22.8	-22°46.0
9	173°37.8	326°55.9	-16°54.6	210°11.5	-16°59.0	297°42.5	-19°02.0	258°25.0	-22°46.0
10	188°40.3	341°59.6	-16°53.6	225°12.6	-16°58.5	312°44.4	-19°02.2	273°27.3	-22°46.0
11	203°42.7	357°03.3	-16°52.6	240°13.7	-16°57.9	327°46.3	-19°02.3	288°29.5	-22°46.0
12	218°45.2	12°06.9	-16°51.5	255°14.9	-16°57.4	342°48.2	-19°02.4	303°31.8	-22°46.0
13	233°47.7	27°10.6	-16°50.5	270°16.0	-16°56.8	357°50.1	-19°02.5	318°34.0	-22°46.0
14	248°50.1	42°14.3	-16°49.5	285°17.1	-16°56.2	12°52.0	-19°02.7	333°36.3	-22°46.0
15	263°52.6	57°18.0	-16°48.4	300°18.2	-16°55.7	27°54.0	-19°02.8	348°38.5	-22°46.0
16	278°55.1	72°21.6	-16°47.4	315°19.3	-16°55.1	42°55.9	-19°02.9	3°40.8	-22°46.0
17	293°57.5	87°25.3	-16°46.4	330°20.4	-16°54.6	57°57.8	-19°03.0	18°43.0	-22°46.0
18	308°60.0	102°29.0	-16°45.4	345°21.5	-16°54.0	72°59.7	-19°03.1	33°45.3	-22°46.0
19	324°02.5	117°32.6	-16°44.3	0°22.6	-16°53.5	88°01.6	-19°03.3	48°47.5	-22°46.0
20	339°04.9	132°36.3	-16°43.3	15°23.8	-16°52.9	103°03.5	-19°03.4	63°49.8	-22°46.0
21	354°07.4	147°39.9	-16°42.3	30°24.9	-16°52.4	118°05.4	-19°03.5	78°52.0	-22°46.0
22	9°09.8	162°43.6	-16°41.2	45°26.0	-16°51.8	133°07.3	-19°03.6	93°54.3	-22°46.0
23	24°12.3	177°47.2	-16°40.2	60°27.1	-16°51.2	148°09.2	-19°03.8	108°56.5	-22°46.0
Mer.pass.:21:23		v3.7 d1.0 m-3.7		v1.1 d0.6 m-0.6		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.8	-42°12.4
Schedar	349°35.9	56°38.5
Diphda	348°51.9	-17°53.1
Achernar	335°23.5	-57°08.6
Hamal	327°56.3	23°33.0
Polaris	315°42.6	89°20.4
Akamar	315°15.2	-40°13.8
Menkar	314°10.9	4°09.7
Mirfak	308°34.7	49°55.5
Aldebaran	290°44.9	16°32.7
Rigel	281°08.3	-8°10.8
Capella	280°28.8	46°00.8
Bellatrix	278°27.9	6°21.9
Elnath	278°07.8	28°37.2
Alnilam	275°42.5	-1°11.5
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.3	-52°42.2
Sirius	258°30.3	-16°44.3
Adara	255°09.5	-28°59.7
Procyon	244°55.8	5°10.7
Pollux	243°23.1	27°58.7
Avior	234°16.5	-59°33.9
Suhail	222°49.8	-43°30.2
Miaplacidus	221°39.1	-69°47.3
Alphard	217°52.6	-8°44.3
Regulus	207°39.8	11°52.6
Dubhe	193°47.7	61°38.9
Denebola	182°30.2	14°28.2
Gienah	175°48.8	-17°38.5
Acrux	173°05.8	-63°11.9
Gacrux	171°57.3	-57°12.8
Alioth	166°18.1	55°51.5
Spica	158°27.7	-11°15.3
Alcaid	152°56.5	49°13.3
Hadar	148°43.4	-60°27.5
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.6
Rigil Kent.	139°47.4	-60°54.5
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.9
Alphecca	126°08.3	26°39.4
Antares	112°22.1	-26°28.2
Atria	107°21.1	-69°03.6
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.4	12°33.1
Etamin	90°44.8	51°29.6
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.7	38°48.4
Nunki	75°54.0	-26°16.3
Altair	62°04.8	8°55.3
Peacock	53°13.6	-56°40.6
Deneb	49°29.0	45°21.2
Enif	33°43.5	9°57.8
Alnair	27°39.1	-46°52.3
Fomalhaut	15°19.9	-29°31.4
Scheat	13°49.7	28°11.2
Markab	13°34.5	15°18.5

2018/10/	**SHA**	**Mer.pass**
Venus	152°05.9	11:24
Mars	37°50.2	19:02
Jupiter	124°36.0	13:15
Saturn	84°59.3	15:53

2018/10/	**SHA**	**Mer.pass**
Venus	152°36.9	11:18
Mars	37°18.1	19:00
Jupiter	124°22.8	13:12
Saturn	84°54.3	15:49

2018/10/	**SHA**	**Mer.pass**
Venus	153°07.1	11:12
Mars	36°45.8	18:58
Jupiter	124°09.6	13:09
Saturn	84°49.2	15:45

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°02.7	-13°01.3	320°44.0	7.1	19°14.0	5.6	58.6
1	199°02.7	-13°02.2	335°10.1	7.0	19°19.6	5.5	58.7
2	214°02.8	-13°03.0	349°36.1	7.0	19°25.0	5.4	58.7
3	229°02.8	-13°03.8	4°02.0	6.9	19°30.4	5.3	58.7
4	244°02.9	-13°04.7	18°27.9	6.9	19°35.6	5.1	58.7
5	259°02.9	-13°05.5	32°53.7	6.8	19°40.7	5.0	58.7
6	274°03.0	-13°06.4	47°19.5	6.8	19°45.6	4.9	58.7
7	289°03.0	-13°07.2	61°45.2	6.7	19°50.5	4.8	58.7
8	304°03.1	-13°08.0	76°10.9	6.7	19°55.2	4.7	58.7
9	319°03.1	-13°08.9	90°36.5	6.6	19°59.8	4.5	58.8
10	334°03.2	-13°09.7	105°02.1	6.6	20°04.2	4.4	58.8
11	349°03.2	-13°10.5	119°27.7	6.5	20°08.6	4.3	58.8
12	4°03.3	-13°11.4	133°53.2	6.5	20°12.8	4.1	58.8
13	19°03.3	-13°12.2	148°18.6	6.4	20°16.9	4.0	58.8
14	34°03.4	-13°13.0	162°44.0	6.4	20°20.8	3.9	58.8
15	49°03.4	-13°13.9	177°09.4	6.3	20°24.7	3.8	58.8
16	64°03.5	-13°14.7	191°34.7	6.3	20°28.4	3.6	58.8
17	79°03.5	-13°15.5	205°60.0	6.3	20°31.9	3.5	58.8
18	94°03.6	-13°16.4	220°25.2	6.2	20°35.4	3.4	58.9
19	109°03.6	-13°17.2	234°50.4	6.2	20°38.7	3.2	58.9
20	124°03.7	-13°18.0	249°15.6	6.2	20°41.8	3.1	58.9
21	139°03.7	-13°18.9	263°40.7	6.1	20°44.9	3.0	58.9
22	154°03.8	-13°19.7	278°05.8	6.1	20°47.8	2.8	58.9
23	169°03.8	-13°20.5	292°30.9	6.1	20°50.6	2.7	58.9
	SD.=16.1	d=-0.8	S.D.=16.0				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°03.8	-13°21.4	306°55.9	6.0	20°53.2	2.6	58.9
1	199°03.9	-13°22.2	321°20.9	6.0	20°55.7	2.4	58.9
2	214°03.9	-13°23.0	335°45.9	6.0	20°58.1	2.3	58.9
3	229°04.0	-13°23.9	350°10.9	5.9	21°00.3	2.2	58.9
4	244°04.0	-13°24.7	4°35.8	5.9	21°02.4	2.0	59.0
5	259°04.1	-13°25.5	19°00.7	5.9	21°04.4	1.9	59.0
6	274°04.1	-13°26.3	33°25.5	5.9	21°06.2	1.8	59.0
7	289°04.2	-13°27.2	47°50.4	5.8	21°07.9	1.6	59.0
8	304°04.2	-13°28.0	62°15.2	5.8	21°09.4	1.5	59.0
9	319°04.2	-13°28.8	76°40.0	5.8	21°10.8	1.3	59.0
10	334°04.3	-13°29.7	91°04.8	5.8	21°12.1	1.2	59.0
11	349°04.3	-13°30.5	105°29.6	5.8	21°13.2	1.1	59.0
12	4°04.4	-13°31.3	119°54.3	5.7	21°14.2	0.9	59.0
13	19°04.4	-13°32.1	134°19.0	5.7	21°15.1	0.8	59.0
14	34°04.4	-13°33.0	148°43.8	5.7	21°15.8	0.6	59.0
15	49°04.5	-13°33.8	163°08.5	5.7	21°16.4	0.5	59.0
16	64°04.5	-13°34.6	177°33.2	5.7	21°16.8	0.4	59.0
17	79°04.6	-13°35.4	191°57.9	5.7	21°17.1	0.2	59.1
18	94°04.6	-13°36.3	206°22.5	5.7	21°17.3	0.1	59.1
19	109°04.6	-13°37.1	220°47.2	5.7	21°17.3	-0.1	59.1
20	124°04.7	-13°37.9	235°11.9	5.7	21°17.1	-0.2	59.1
21	139°04.7	-13°38.7	249°36.5	5.7	21°16.9	-0.3	59.1
22	154°04.8	-13°39.5	264°01.2	5.7	21°16.5	-0.5	59.1
23	169°04.8	-13°40.4	278°25.9	5.7	21°15.9	-0.6	59.1
	SD.=16.1	d=-0.8	S.D.=16.1				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°04.8	-13°41.2	292°50.5	5.7	21°15.2	-0.8	59.1
1	199°04.9	-13°42.0	307°15.2	5.7	21°14.4	-0.9	59.1
2	214°04.9	-13°42.8	321°39.8	5.7	21°13.4	-1.0	59.1
3	229°04.9	-13°43.7	336°04.5	5.7	21°12.3	-1.2	59.1
4	244°05.0	-13°44.5	350°29.2	5.7	21°11.1	-1.3	59.1
5	259°05.0	-13°45.3	4°53.8	5.7	21°09.7	-1.5	59.1
6	274°05.0	-13°46.1	19°18.5	5.7	21°08.2	-1.6	59.1
7	289°05.1	-13°46.9	33°43.2	5.7	21°06.5	-1.7	59.1
8	304°05.1	-13°47.8	48°07.9	5.7	21°04.7	-1.9	59.1
9	319°05.1	-13°48.6	62°32.6	5.7	21°02.7	-2.0	59.1
10	334°05.2	-13°49.4	76°57.4	5.7	21°00.6	-2.2	59.2
11	349°05.2	-13°50.2	91°22.1	5.7	20°58.4	-2.3	59.2
12	4°05.2	-13°51.0	105°46.9	5.8	20°56.1	-2.4	59.2
13	19°05.3	-13°51.8	120°11.6	5.8	20°53.5	-2.6	59.2
14	34°05.3	-13°52.7	134°36.4	5.8	20°50.9	-2.7	59.2
15	49°05.3	-13°53.5	149°01.2	5.8	20°48.1	-2.8	59.2
16	64°05.4	-13°54.3	163°26.0	5.8	20°45.2	-3.0	59.2
17	79°05.4	-13°55.1	177°50.9	5.9	20°42.2	-3.1	59.2
18	94°05.4	-13°55.9	192°15.8	5.9	20°39.0	-3.3	59.2
19	109°05.5	-13°56.7	206°40.7	5.9	20°35.7	-3.4	59.2
20	124°05.5	-13°57.6	221°05.6	5.9	20°32.2	-3.5	59.2
21	139°05.5	-13°58.4	235°30.5	6.0	20°28.6	-3.7	59.2
22	154°05.6	-13°59.2	249°55.5	6.0	20°24.9	-3.8	59.2
23	169°05.6	-13°60.0	264°20.5	6.0	20°21.0	-3.9	59.2
	SD.=16.1	d=-0.8	S.D.=16.1				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:54	07:15	08:38	14:48	16:11	17:32
70	05:51	07:04	08:15	15:11	16:22	17:35
68	05:48	06:55	07:58	15:28	16:31	17:37
66	05:46	06:47	07:44	15:42	16:39	17:40
64	05:44	06:41	07:32	15:54	16:46	17:42
62	05:42	06:35	07:23	16:04	16:52	17:44
60	05:41	06:30	07:14	16:12	16:57	17:46
58	05:39	06:25	07:07	16:20	17:01	17:47
56	05:37	06:21	07:00	16:26	17:05	17:49
54	05:36	06:17	06:54	16:32	17:09	17:51
52	05:34	06:14	06:49	16:37	17:13	17:52
50	05:33	06:11	06:44	16:42	17:16	17:54
45	05:29	06:04	06:34	16:53	17:23	17:58
40	05:26	05:58	06:25	17:01	17:29	18:01
35	05:22	05:52	06:18	17:09	17:35	18:05
30	05:19	05:47	06:11	17:16	17:40	18:08
20	05:11	05:37	06:00	17:27	17:50	18:16
10	05:03	05:28	05:50	17:37	17:59	18:24
0	04:54	05:19	05:40	17:47	18:08	18:33
-10	04:44	05:09	05:31	17:57	18:19	18:44
-20	04:30	04:57	05:20	18:08	18:30	18:57
-30	04:13	04:43	05:08	18:20	18:45	19:15
-35	04:02	04:34	05:01	18:27	18:54	19:26
-40	03:49	04:24	04:53	18:35	19:04	19:39
-45	03:33	04:12	04:44	18:45	19:17	19:56
-50	03:12	03:56	04:32	18:56	19:32	20:17
-52	03:01	03:49	04:27	19:02	19:40	20:28
-54	02:49	03:41	04:21	19:08	19:48	20:41
-56	02:34	03:32	04:14	19:15	19:58	20:55
-58	02:17	03:21	04:07	19:22	20:09	21:13
-60	01:55	03:08	03:59	19:31	20:21	21:36

	Moonrise			**Moonset**		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	16:48	17:20	18:43	13:29	14:59	15:40
66	17:30	18:14	19:27	12:48	14:06	14:55
64	17:59	18:47	19:57	12:19	13:33	14:25
62	18:21	19:11	20:19	11:58	13:09	14:03
60	18:39	19:30	20:37	11:40	12:50	13:44
58	18:54	19:46	20:52	11:26	12:34	13:29
56	19:06	19:59	21:05	11:13	12:21	13:16
54	19:17	20:11	21:16	11:02	12:09	13:05
52	19:27	20:22	21:26	10:53	11:58	12:55
50	19:36	20:31	21:35	10:44	11:49	12:46
45	19:55	20:50	21:54	10:26	11:30	12:27
40	20:10	21:06	22:09	10:11	11:14	12:11
35	20:23	21:20	22:22	09:58	11:00	11:58
30	20:35	21:32	22:33	09:47	10:49	11:47
20	20:54	21:52	22:52	09:28	10:29	11:27
10	21:11	22:09	23:09	09:12	10:11	11:10
0	21:27	22:26	23:24	08:57	09:55	10:54
-10	21:43	22:42	23:40	08:42	09:39	10:37
-20	22:00	22:60	23:56	08:25	09:21	10:20
-30	22:20	23:20	–:–	08:06	09:01	10:00
-35	22:31	23:32	–:–	07:56	08:49	09:48
-40	22:45	23:45	–:–	07:43	08:36	09:35
-45	23:00	–:–	00:01	07:28	08:20	09:19
-50	23:20	–:–	00:21	07:10	08:00	08:60
-52	23:29	–:–	00:30	07:02	07:51	08:50
-54	23:39	–:–	00:41	06:52	07:40	08:40
-56	23:51	–:–	00:53	06:42	07:28	08:28
-58	–:–	00:05	01:07	06:30	07:15	08:14
-60	–:–	00:20	01:23	06:16	06:59	07:58

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
28	16:11	16:13	11:43	02:43	15:11	19(83%)
29	16:15	16:17	11:43	03:40	16:10	20(74%)
30	16:19	16:21	11:43	04:39	17:08	21(64%)

October 31, 01 ,02 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	39°14.8	192°50.9	-16°39.2	75°28.2	-16°50.7	163°11.2	-19°03.9	123°58.8	-22°46.0
1	54°17.2	207°54.5	-16°38.1	90°29.3	-16°50.1	178°13.1	-19°04.0	139°01.0	-22°46.0
2	69°19.7	222°58.2	-16°37.1	105°30.4	-16°49.6	193°15.0	-19°04.1	154°03.2	-22°46.0
3	84°22.2	238°01.8	-16°36.1	120°31.5	-16°49.0	208°16.9	-19°04.3	169°05.5	-22°46.0
4	99°24.6	253°05.5	-16°35.0	135°32.6	-16°48.4	223°18.8	-19°04.4	184°07.7	-22°46.0
5	114°27.1	268°09.1	-16°34.0	150°33.7	-16°47.9	238°20.7	-19°04.5	199°10.0	-22°46.0
6	129°29.6	283°12.7	-16°33.0	165°34.8	-16°47.3	253°22.6	-19°04.6	214°12.2	-22°46.0
7	144°32.0	298°16.4	-16°31.9	180°36.0	-16°46.8	268°24.5	-19°04.8	229°14.5	-22°46.0
8	159°34.5	313°20.0	-16°30.9	195°37.1	-16°46.2	283°26.4	-19°04.9	244°16.7	-22°46.0
9	174°37.0	328°23.6	-16°29.9	210°38.2	-16°45.6	298°28.4	-19°05.0	259°19.0	-22°46.0
10	189°39.4	343°27.3	-16°28.8	225°39.3	-16°45.1	313°30.3	-19°05.1	274°21.2	-22°46.0
11	204°41.9	358°30.9	-16°27.8	240°40.4	-16°44.5	328°32.2	-19°05.3	289°23.5	-22°46.0
12	219°44.3	13°34.5	-16°26.8	255°41.5	-16°44.0	343°34.1	-19°05.4	304°25.7	-22°46.0
13	234°46.8	28°38.1	-16°25.7	270°42.6	-16°43.4	358°36.0	-19°05.5	319°27.9	-22°46.0
14	249°49.3	43°41.8	-16°24.7	285°43.7	-16°42.8	13°37.9	-19°05.6	334°30.2	-22°46.0
15	264°51.7	58°45.4	-16°23.7	300°44.8	-16°42.3	28°39.8	-19°05.7	349°32.4	-22°46.0
16	279°54.2	73°49.0	-16°22.6	315°45.9	-16°41.7	43°41.7	-19°05.9	4°34.7	-22°46.0
17	294°56.7	88°52.6	-16°21.6	330°47.0	-16°41.2	58°43.6	-19°06.0	19°36.9	-22°46.0
18	309°59.1	103°56.2	-16°20.6	345°48.1	-16°40.6	73°45.5	-19°06.1	34°39.2	-22°45.9
19	325°01.6	118°59.8	-16°19.5	0°49.2	-16°40.0	88°47.5	-19°06.2	49°41.4	-22°45.9
20	340°04.1	134°03.4	-16°18.5	15°50.3	-16°39.5	103°49.4	-19°06.4	64°43.6	-22°45.9
21	355°06.5	149°07.0	-16°17.5	30°51.4	-16°38.9	118°51.3	-19°06.5	79°45.9	-22°45.9
22	10°09.0	164°10.6	-16°16.4	45°52.5	-16°38.4	133°53.2	-19°06.6	94°48.1	-22°45.9
23	25°11.5	179°14.2	-16°15.4	60°53.6	-16°37.8	148°55.1	-19°06.7	109°50.4	-22°45.9
Mer.pass.:21:19		v3.6 d1.0 m-3.7		v1.1 d0.6 m-0.6		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	40°13.9	194°17.8	-16°14.4	75°54.7	-16°37.2	163°57.0	-19°06.9	124°52.6	-22°45.9
1	55°16.4	209°21.4	-16°13.3	90°55.8	-16°36.7	178°58.9	-19°07.0	139°54.9	-22°45.9
2	70°18.8	224°25.0	-16°12.3	105°57.0	-16°36.1	194°00.8	-19°07.1	154°57.1	-22°45.9
3	85°21.3	239°28.6	-16°11.2	120°58.1	-16°35.5	209°02.7	-19°07.2	169°59.4	-22°45.9
4	100°23.8	254°32.2	-16°10.2	135°59.2	-16°35.0	224°04.6	-19°07.3	185°01.6	-22°45.9
5	115°26.2	269°35.7	-16°09.2	151°00.3	-16°34.4	239°06.5	-19°07.5	200°03.8	-22°45.9
6	130°28.7	284°39.3	-16°08.1	166°01.4	-16°33.8	254°08.5	-19°07.6	215°06.1	-22°45.9
7	145°31.2	299°42.9	-16°07.1	181°02.5	-16°33.3	269°10.4	-19°07.7	230°08.3	-22°45.9
8	160°33.6	314°46.5	-16°06.1	196°03.6	-16°32.7	284°12.3	-19°07.8	245°10.6	-22°45.9
9	175°36.1	329°50.0	-16°05.0	211°04.7	-16°32.1	299°14.2	-19°08.0	260°12.8	-22°45.9
10	190°38.6	344°53.6	-16°04.0	226°05.8	-16°31.6	314°16.1	-19°08.1	275°15.0	-22°45.9
11	205°41.0	359°57.2	-16°03.0	241°06.9	-16°31.0	329°18.0	-19°08.2	290°17.3	-22°45.9
12	220°43.5	15°00.7	-16°01.9	256°08.0	-16°30.5	344°19.9	-19°08.3	305°19.5	-22°45.9
13	235°45.9	30°04.3	-16°00.9	271°09.1	-16°29.9	359°21.8	-19°08.5	320°21.8	-22°45.9
14	250°48.4	45°07.8	-15°59.9	286°10.2	-16°29.3	14°23.7	-19°08.6	335°24.0	-22°45.9
15	265°50.9	60°11.4	-15°58.8	301°11.3	-16°28.8	29°25.6	-19°08.7	350°26.3	-22°45.9
16	280°53.3	75°15.0	-15°57.8	316°12.4	-16°28.2	44°27.5	-19°08.8	5°28.5	-22°45.9
17	295°55.8	90°18.5	-15°56.8	331°13.5	-16°27.6	59°29.4	-19°08.9	20°30.7	-22°45.9
18	310°58.3	105°22.0	-15°55.7	346°14.6	-16°27.1	74°31.4	-19°09.1	35°33.0	-22°45.9
19	326°00.7	120°25.6	-15°54.7	1°15.7	-16°26.5	89°33.3	-19°09.2	50°35.2	-22°45.9
20	341°03.2	135°29.1	-15°53.7	16°16.8	-16°25.9	104°35.2	-19°09.3	65°37.5	-22°45.9
21	356°05.7	150°32.7	-15°52.6	31°17.9	-16°25.4	119°37.1	-19°09.4	80°39.7	-22°45.9
22	11°08.1	165°36.2	-15°51.6	46°18.9	-16°24.8	134°39.0	-19°09.6	95°41.9	-22°45.9
23	26°10.6	180°39.7	-15°50.6	61°20.0	-16°24.2	149°40.9	-19°09.7	110°44.2	-22°45.9
Mer.pass.:21:15		v3.6 d1.0 m-3.7		v1.1 d0.6 m-0.6		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	41°13.1	195°43.3	-15°49.6	76°21.1	-16°23.7	164°42.8	-19°09.8	125°46.4	-22°45.9
1	56°15.5	210°46.8	-15°48.5	91°22.2	-16°23.1	179°44.7	-19°09.9	140°48.7	-22°45.9
2	71°18.0	225°50.3	-15°47.5	106°23.3	-16°22.5	194°46.6	-19°10.1	155°50.9	-22°45.9
3	86°20.4	240°53.8	-15°46.5	121°24.4	-16°21.9	209°48.5	-19°10.2	170°53.1	-22°45.9
4	101°22.9	255°57.4	-15°45.4	136°25.5	-16°21.4	224°50.4	-19°10.3	185°55.4	-22°45.9
5	116°25.4	271°00.9	-15°44.4	151°26.6	-16°20.8	239°52.3	-19°10.4	200°57.6	-22°45.9
6	131°27.8	286°04.4	-15°43.4	166°27.7	-16°20.2	254°54.2	-19°10.5	215°59.9	-22°45.8
7	146°30.3	301°07.9	-15°42.3	181°28.8	-16°19.7	269°56.1	-19°10.7	231°02.1	-22°45.8
8	161°32.8	316°11.4	-15°41.3	196°29.9	-16°19.1	284°58.0	-19°10.8	246°04.3	-22°45.8
9	176°35.2	331°14.9	-15°40.3	211°31.0	-16°18.5	299°60.0	-19°10.9	261°06.6	-22°45.8
10	191°37.7	346°18.4	-15°39.3	226°32.1	-16°18.0	315°01.9	-19°11.0	276°08.8	-22°45.8
11	206°40.2	1°21.9	-15°38.2	241°33.2	-16°17.4	330°03.8	-19°11.2	291°11.1	-22°45.8
12	221°42.6	16°25.4	-15°37.2	256°34.3	-16°16.8	345°05.7	-19°11.3	306°13.3	-22°45.8
13	236°45.1	31°28.9	-15°36.2	271°35.4	-16°16.2	0°07.6	-19°11.4	321°15.5	-22°45.8
14	251°47.6	46°32.4	-15°35.2	286°36.5	-16°15.7	15°09.5	-19°11.5	336°17.8	-22°45.8
15	266°50.0	61°35.9	-15°34.1	301°37.6	-16°15.1	30°11.4	-19°11.6	351°20.0	-22°45.8
16	281°52.5	76°39.4	-15°33.1	316°38.7	-16°14.5	45°13.3	-19°11.8	6°22.2	-22°45.8
17	296°54.9	91°42.8	-15°32.1	331°39.7	-16°14.0	60°15.2	-19°11.9	21°24.5	-22°45.8
18	311°57.4	106°46.3	-15°31.1	346°40.8	-16°13.4	75°17.1	-19°12.0	36°26.7	-22°45.8
19	326°59.9	121°49.8	-15°30.0	1°41.9	-16°12.8	90°19.0	-19°12.1	51°29.0	-22°45.8
20	342°02.3	136°53.3	-15°29.0	16°43.0	-16°12.2	105°20.9	-19°12.3	66°31.2	-22°45.8
21	357°04.8	151°56.7	-15°28.0	31°44.1	-16°11.7	120°22.8	-19°12.4	81°33.4	-22°45.8
22	12°07.3	167°00.2	-15°27.0	46°45.2	-16°11.1	135°24.7	-19°12.5	96°35.7	-22°45.8
23	27°09.7	182°03.7	-15°25.9	61°46.3	-16°10.5	150°26.6	-19°12.6	111°37.9	-22°45.8
Mer.pass.:21:11		v3.5 d1.0 m-3.7		v1.1 d0.6 m-0.6		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.8	-42°12.4
Schedar	349°35.9	56°38.5
Diphda	348°51.9	-17°53.1
Achernar	335°23.5	-57°08.6
Hamal	327°56.3	23°33.0
Polaris	315°42.1	89°20.5
Akamar	315°15.2	-40°13.8
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.5
Aldebaran	290°44.9	16°32.7
Rigel	281°08.3	-8°10.8
Capella	280°28.7	46°00.8
Bellatrix	278°27.9	6°21.9
Elnath	278°07.8	28°37.2
Alnilam	275°42.5	-1°11.5
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.2	-52°42.2
Sirius	258°30.3	-16°44.3
Adara	255°09.5	-28°59.8
Procyon	244°55.8	5°10.7
Pollux	243°23.1	27°58.7
Avior	234°16.5	-59°33.9
Suhail	222°49.8	-43°30.2
Miaplacidus	221°39.0	-69°47.3
Alphard	217°52.6	-8°44.3
Regulus	207°39.7	11°52.6
Dubhe	193°47.7	61°38.8
Denebola	182°30.1	14°28.2
Gienah	175°48.8	-17°38.5
Acrux	173°05.8	-63°11.9
Gacrux	171°57.3	-57°12.8
Alioth	166°18.1	55°51.5
Spica	158°27.7	-11°15.3
Alcaid	152°56.5	49°13.3
Hadar	148°43.3	-60°27.5
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.6
Rigil Kent.	139°47.4	-60°54.5
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.9
Alphecca	126°08.3	26°39.4
Antares	112°22.1	-26°28.2
Atria	107°21.1	-69°03.6
Sabik	102°08.7	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.4	12°33.1
Etamin	90°44.8	51°29.6
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.8	38°48.4
Nunki	75°54.0	-26°16.3
Altair	62°04.9	8°55.3
Peacock	53°13.6	-56°40.6
Deneb	49°29.0	45°21.2
Enif	33°43.5	9°57.8
Alnair	27°39.1	-46°52.3
Fomalhaut	15°19.9	-29°31.4
Scheat	13°49.7	28°11.2
Markab	13°34.5	15°18.5

2018/10/	**SHA**	**Mer.pass**
Venus	153°36.1	11:06
Mars	36°13.4	18:57
Jupiter	123°56.4	13:06
Saturn	84°44.0	15:42

2018/11/	**SHA**	**Mer.pass**
Venus	154°03.9	11:00
Mars	35°40.8	18:55
Jupiter	123°43.1	13:03
Saturn	84°38.7	15:38

2018/11/	**SHA**	**Mer.pass**
Venus	154°30.2	10:55
Mars	35°08.1	18:53
Jupiter	123°29.7	12:59
Saturn	84°33.4	15:35

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°05.6	-14°00.8	278°45.5	6.0	20°17.0	-4.1	59.2
1	199°05.6	-14°01.6	293°10.6	6.1	20°12.9	-4.2	59.2
2	214°05.7	-14°02.4	307°35.7	6.1	20°08.6	-4.3	59.2
3	229°05.7	-14°03.2	322°00.8	6.1	20°04.2	-4.5	59.2
4	244°05.7	-14°04.1	336°26.0	6.2	19°59.7	-4.6	59.2
5	259°05.7	-14°04.9	350°51.2	6.2	19°55.1	-4.7	59.2
6	274°05.8	-14°05.7	5°16.4	6.2	19°50.3	-4.8	59.2
7	289°05.8	-14°06.5	19°41.7	6.3	19°45.4	-5.0	59.2
8	304°05.8	-14°07.3	34°07.0	6.3	19°40.3	-5.1	59.2
9	319°05.9	-14°08.1	48°32.3	6.4	19°35.2	-5.2	59.2
10	334°05.9	-14°08.9	62°57.7	6.4	19°29.9	-5.4	59.2
11	349°05.9	-14°09.7	77°23.1	6.4	19°24.5	-5.5	59.2
12	4°05.9	-14°10.5	91°48.6	6.5	19°18.9	-5.6	59.2
13	19°06.0	-14°11.3	106°14.1	6.5	19°13.3	-5.7	59.2
14	34°06.0	-14°12.1	120°39.6	6.6	19°07.5	-5.9	59.2
15	49°06.0	-14°12.9	135°05.2	6.6	19°01.6	-6.0	59.2
16	64°06.0	-14°13.8	149°30.8	6.6	18°55.5	-6.1	59.2
17	79°06.0	-14°14.6	163°56.5	6.7	18°49.4	-6.2	59.2
18	94°06.1	-14°15.4	178°22.2	6.7	18°43.1	-6.3	59.2
19	109°06.1	-14°16.2	192°47.9	6.8	18°36.7	-6.5	59.2
20	124°06.1	-14°17.0	207°13.8	6.8	18°30.2	-6.6	59.2
21	139°06.1	-14°17.8	221°39.6	6.9	18°23.6	-6.7	59.2
22	154°06.2	-14°18.6	236°05.5	6.9	18°16.8	-6.8	59.2
23	169°06.2	-14°19.4	250°31.5	7.0	18°09.9	-6.9	59.2
	SD.=16.1	d=-0.8			S.D.=16.2		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°06.2	-14°20.2	264°57.5	7.0	18°03.0	-7.0	59.2
1	199°06.2	-14°21.0	279°23.5	7.1	17°55.9	-7.1	59.2
2	214°06.2	-14°21.8	293°49.6	7.1	17°48.7	-7.3	59.2
3	229°06.3	-14°22.6	308°15.7	7.2	17°41.3	-7.4	59.2
4	244°06.3	-14°23.4	322°41.9	7.2	17°33.9	-7.5	59.2
5	259°06.3	-14°24.2	337°08.2	7.3	17°26.4	-7.6	59.2
6	274°06.3	-14°25.0	351°34.5	7.3	17°18.7	-7.7	59.2
7	289°06.3	-14°25.8	6°00.8	7.4	17°11.0	-7.8	59.2
8	304°06.3	-14°26.6	20°27.2	7.4	17°03.1	-7.9	59.2
9	319°06.4	-14°27.4	34°53.7	7.5	16°55.1	-8.0	59.2
10	334°06.4	-14°28.2	49°20.2	7.5	16°47.1	-8.1	59.2
11	349°06.4	-14°29.0	63°46.7	7.6	16°38.9	-8.2	59.2
12	4°06.4	-14°29.8	78°13.3	7.6	16°30.6	-8.3	59.2
13	19°06.4	-14°30.6	92°40.0	7.7	16°22.2	-8.4	59.2
14	34°06.4	-14°31.4	107°06.7	7.7	16°13.8	-8.5	59.2
15	49°06.5	-14°32.2	121°33.5	7.8	16°05.2	-8.6	59.2
16	64°06.5	-14°33.0	136°00.3	7.8	15°56.5	-8.7	59.2
17	79°06.5	-14°33.8	150°27.2	7.9	15°47.7	-8.8	59.2
18	94°06.5	-14°34.6	164°54.1	8.0	15°38.9	-8.9	59.2
19	109°06.5	-14°35.4	179°21.1	8.0	15°29.9	-9.0	59.2
20	124°06.5	-14°36.2	193°48.1	8.1	15°20.8	-9.1	59.2
21	139°06.5	-14°37.0	208°15.2	8.1	15°11.7	-9.2	59.2
22	154°06.5	-14°37.8	222°42.4	8.2	15°02.4	-9.3	59.2
23	169°06.6	-14°38.6	237°09.6	8.2	14°53.1	-9.4	59.2
	SD.=16.1	d=-0.8			S.D.=16.2		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°06.6	-14°39.4	251°36.8	8.3	14°43.7	-9.5	59.2
1	199°06.6	-14°40.1	266°04.1	8.3	14°34.2	-9.6	59.2
2	214°06.6	-14°40.9	280°31.5	8.4	14°24.6	-9.6	59.2
3	229°06.6	-14°41.7	294°58.9	8.4	14°14.9	-9.7	59.2
4	244°06.6	-14°42.5	309°26.4	8.5	14°05.1	-9.8	59.2
5	259°06.6	-14°43.3	323°53.9	8.5	13°55.3	-9.9	59.2
6	274°06.6	-14°44.1	338°21.5	8.6	13°45.3	-10.0	59.2
7	289°06.6	-14°44.9	352°49.1	8.7	13°35.3	-10.1	59.1
8	304°06.6	-14°45.7	7°16.8	8.7	13°25.2	-10.1	59.1
9	319°06.7	-14°46.5	21°44.5	8.8	13°15.1	-10.2	59.1
10	334°06.7	-14°47.3	36°12.3	8.8	13°04.8	-10.3	59.1
11	349°06.7	-14°48.1	50°40.1	8.9	12°54.5	-10.4	59.1
12	4°06.7	-14°48.8	65°08.0	8.9	12°44.1	-10.4	59.1
13	19°06.7	-14°49.6	79°36.0	9.0	12°33.6	-10.5	59.1
14	34°06.7	-14°50.4	94°04.0	9.0	12°23.1	-10.6	59.1
15	49°06.7	-14°51.2	108°32.0	9.1	12°12.5	-10.7	59.1
16	64°06.7	-14°52.0	123°00.1	9.1	12°01.8	-10.7	59.1
17	79°06.7	-14°52.8	137°28.2	9.2	11°51.0	-10.8	59.1
18	94°06.7	-14°53.6	151°56.4	9.2	11°40.2	-10.9	59.1
19	109°06.7	-14°54.4	166°24.7	9.3	11°29.3	-10.9	59.1
20	124°06.7	-14°55.1	180°53.0	9.3	11°18.4	-11.0	59.1
21	139°06.7	-14°55.9	195°21.3	9.4	11°07.4	-11.0	59.1
22	154°06.7	-14°56.7	209°49.7	9.4	10°56.3	-11.1	59.1
23	169°06.7	-14°57.5	224°18.2	9.5	10°45.1	-11.2	59.1
	SD.=16.1	d=-0.8			S.D.=16.1		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:06	07:29	08:56	14:30	15:57	17:20
70	06:02	07:16	08:30	14:56	16:10	17:24
68	05:58	07:05	08:10	15:16	16:21	17:28
66	05:55	06:56	07:55	15:31	16:29	17:31
64	05:52	06:49	07:42	15:44	16:37	17:34
62	05:50	06:42	07:31	15:55	16:44	17:36
60	05:47	06:37	07:22	16:04	16:49	17:39
58	05:45	06:32	07:14	16:12	16:55	17:41
56	05:43	06:27	07:07	16:20	16:59	17:43
54	05:41	06:23	07:00	16:26	17:04	17:45
52	05:39	06:19	06:55	16:32	17:07	17:47
50	05:37	06:15	06:49	16:37	17:11	17:49
45	05:33	06:08	06:38	16:48	17:19	17:54
40	05:29	06:01	06:29	16:58	17:26	17:58
35	05:25	05:55	06:21	17:06	17:32	18:02
30	05:21	05:49	06:14	17:13	17:38	18:06
20	05:13	05:39	06:01	17:26	17:48	18:14
10	05:04	05:29	05:50	17:37	17:58	18:23
0	04:54	05:19	05:40	17:47	18:08	18:33
-10	04:43	05:08	05:30	17:58	18:19	18:45
-20	04:28	04:55	05:18	18:09	18:32	18:59
-30	04:10	04:40	05:05	18:22	18:47	19:17
-35	03:59	04:31	04:58	18:30	18:57	19:29
-40	03:45	04:20	04:49	18:39	19:08	19:43
-45	03:27	04:07	04:39	18:49	19:21	20:01
-50	03:05	03:51	04:27	19:02	19:38	20:24
-52	02:53	03:43	04:21	19:07	19:46	20:36
-54	02:40	03:34	04:15	19:14	19:55	20:49
-56	02:24	03:24	04:07	19:21	20:05	21:05
-58	02:05	03:12	03:59	19:29	20:17	21:25
-60	01:41	02:58	03:50	19:39	20:31	21:51

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	–:–	21:26	23:46	–:–	16:56	16:29
70	19:47	22:02	–:–	16:38	16:20	16:09
68	20:33	22:27	–:–	15:51	15:54	15:53
66	21:03	22:46	–:–	15:21	15:33	15:41
64	21:25	23:01	–:–	14:58	15:17	15:30
62	21:43	23:14	–:–	14:39	15:04	15:21
60	21:57	23:25	–:–	14:24	14:52	15:13
58	22:10	23:34	–:–	14:11	14:42	15:06
56	22:21	23:42	–:–	13:60	14:33	14:60
54	22:30	23:49	–:–	13:50	14:25	14:54
52	22:39	23:56	–:–	13:41	14:18	14:49
50	22:46	–:–	00:02	13:33	14:12	14:44
45	23:02	–:–	00:14	13:16	13:58	14:34
40	23:16	–:–	00:25	13:02	13:47	14:26
35	23:27	–:–	00:33	12:50	13:37	14:19
30	23:37	–:–	00:41	12:40	13:29	14:13
20	23:53	–:–	00:54	12:22	13:14	14:01
10	–:–	00:08	01:06	12:07	13:01	13:52
0	–:–	00:22	01:17	11:52	12:48	13:43
-10	–:–	00:35	01:28	11:37	12:36	13:33
-20	–:–	00:50	01:39	11:21	12:23	13:23
-30	00:16	01:06	01:53	11:03	12:07	13:12
-35	00:27	01:16	02:00	10:52	11:58	13:05
-40	00:39	01:27	02:09	10:40	11:48	12:58
-45	00:55	01:40	02:19	10:25	11:36	12:49
-50	01:13	01:56	02:31	10:08	11:21	12:38
-52	01:22	02:03	02:37	09:59	11:15	12:33
-54	01:31	02:11	02:43	09:50	11:07	12:27
-56	01:42	02:20	02:50	09:39	10:58	12:21
-58	01:55	02:30	02:57	09:27	10:49	12:14
-60	02:09	02:42	03:06	09:13	10:37	12:06

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
31	16:22	16:24	11:43	05:38	18:06	22(52%)
1	16:25	16:26	11:43	06:35	19:02	23(41%)
2	16:26	16:27	11:43	07:29	19:56	24(30%)

November 03, 04 ,05 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	42°12.2	197°07.1	-15°24.9	76°47.4	-16°10.0	165°28.5	-19°12.7	126°40.1	-22°45.8
1	57°14.7	212°10.6	-15°23.9	91°48.5	-16°09.4	180°30.5	-19°12.9	141°42.4	-22°45.8
2	72°17.1	227°14.0	-15°22.9	106°49.6	-16°08.8	195°32.4	-19°13.0	156°44.6	-22°45.8
3	87°19.6	242°17.5	-15°21.9	121°50.7	-16°08.2	210°34.3	-19°13.1	171°46.9	-22°45.8
4	102°22.0	257°20.9	-15°20.8	136°51.7	-16°07.7	225°36.2	-19°13.2	186°49.1	-22°45.8
5	117°24.5	272°24.4	-15°19.8	151°52.8	-16°07.1	240°38.1	-19°13.4	201°51.3	-22°45.8
6	132°27.0	287°27.8	-15°18.8	166°53.9	-16°06.5	255°40.0	-19°13.5	216°53.6	-22°45.8
7	147°29.4	302°31.2	-15°17.8	181°55.0	-16°05.9	270°41.9	-19°13.6	231°55.8	-22°45.8
8	162°31.9	317°34.7	-15°16.8	196°56.1	-16°05.4	285°43.8	-19°13.7	246°58.0	-22°45.8
9	177°34.4	332°38.1	-15°15.7	211°57.2	-16°04.8	300°45.7	-19°13.8	262°00.3	-22°45.8
10	192°36.8	347°41.5	-15°14.7	226°58.3	-16°04.2	315°47.6	-19°14.0	277°02.5	-22°45.8
11	207°39.3	2°45.0	-15°13.7	241°59.4	-16°03.6	330°49.5	-19°14.1	292°04.7	-22°45.8
12	222°41.8	17°48.4	-15°12.7	257°00.5	-16°03.1	345°51.4	-19°14.2	307°07.0	-22°45.8
13	237°44.2	32°51.8	-15°11.7	272°01.5	-16°02.5	0°53.3	-19°14.3	322°09.2	-22°45.8
14	252°46.7	47°55.2	-15°10.7	287°02.6	-16°01.9	15°55.2	-19°14.5	337°11.5	-22°45.7
15	267°49.2	62°58.6	-15°09.7	302°03.7	-16°01.3	30°57.1	-19°14.6	352°13.7	-22°45.7
16	282°51.6	78°02.0	-15°08.6	317°04.8	-16°00.8	45°59.0	-19°14.7	7°15.9	-22°45.7
17	297°54.1	93°05.5	-15°07.6	332°05.9	-16°00.2	61°00.9	-19°14.8	22°18.2	-22°45.7
18	312°56.5	108°08.9	-15°06.6	347°07.0	-15°59.6	76°02.8	-19°14.9	37°20.4	-22°45.7
19	327°59.0	123°12.3	-15°05.6	2°08.1	-15°59.0	91°04.7	-19°15.1	52°22.6	-22°45.7
20	343°01.5	138°15.7	-15°04.6	17°09.1	-15°58.5	106°06.6	-19°15.2	67°24.9	-22°45.7
21	358°03.9	153°19.0	-15°03.6	32°10.2	-15°57.9	121°08.5	-19°15.3	82°27.1	-22°45.7
22	13°06.4	168°22.4	-15°02.6	47°11.3	-15°57.3	136°10.4	-19°15.4	97°29.3	-22°45.7
23	28°08.9	183°25.8	-15°01.6	62°12.4	-15°56.7	151°12.3	-19°15.6	112°31.6	-22°45.7
Mer.pass.:21:07		v3.5 d1.0 m-3.8		v1.1 d0.6 m-0.6		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	43°11.3	198°29.2	-15°00.6	77°13.5	-15°56.1	166°14.3	-19°15.7	127°33.8	-22°45.7
1	58°13.8	213°32.6	-14°59.6	92°14.6	-15°55.6	181°16.2	-19°15.8	142°36.0	-22°45.7
2	73°16.3	228°36.0	-14°58.5	107°15.7	-15°55.0	196°18.1	-19°15.9	157°38.3	-22°45.7
3	88°18.7	243°39.3	-14°57.5	122°16.7	-15°54.4	211°20.0	-19°16.0	172°40.5	-22°45.7
4	103°21.2	258°42.7	-14°56.5	137°17.8	-15°53.8	226°21.9	-19°16.2	187°42.7	-22°45.7
5	118°23.6	273°46.1	-14°55.5	152°18.9	-15°53.3	241°23.8	-19°16.3	202°45.0	-22°45.7
6	133°26.1	288°49.4	-14°54.5	167°20.0	-15°52.7	256°25.7	-19°16.4	217°47.2	-22°45.7
7	148°28.6	303°52.8	-14°53.5	182°21.1	-15°52.1	271°27.6	-19°16.5	232°49.4	-22°45.7
8	163°31.0	318°56.2	-14°52.5	197°22.1	-15°51.5	286°29.5	-19°16.7	247°51.7	-22°45.7
9	178°33.5	333°59.5	-14°51.5	212°23.2	-15°50.9	301°31.4	-19°16.8	262°53.9	-22°45.7
10	193°36.0	349°02.9	-14°50.5	227°24.3	-15°50.4	316°33.3	-19°16.9	277°56.1	-22°45.7
11	208°38.4	4°06.2	-14°49.5	242°25.4	-15°49.8	331°35.2	-19°17.0	292°58.4	-22°45.7
12	223°40.9	19°09.6	-14°48.5	257°26.5	-15°49.2	346°37.1	-19°17.1	308°00.6	-22°45.7
13	238°43.4	34°12.9	-14°47.5	272°27.6	-15°48.6	1°39.0	-19°17.3	323°02.8	-22°45.7
14	253°45.8	49°16.2	-14°46.5	287°28.6	-15°48.0	16°40.9	-19°17.4	338°05.1	-22°45.7
15	268°48.3	64°19.6	-14°45.5	302°29.7	-15°47.5	31°42.8	-19°17.5	353°07.3	-22°45.7
16	283°50.8	79°22.9	-14°44.5	317°30.8	-15°46.9	46°44.7	-19°17.6	8°09.5	-22°45.7
17	298°53.2	94°26.2	-14°43.6	332°31.9	-15°46.3	61°46.6	-19°17.7	23°11.8	-22°45.7
18	313°55.7	109°29.6	-14°42.6	347°33.0	-15°45.7	76°48.5	-19°17.9	38°14.0	-22°45.6
19	328°58.1	124°32.9	-14°41.6	2°34.0	-15°45.1	91°50.4	-19°18.0	53°16.2	-22°45.6
20	344°00.6	139°36.2	-14°40.6	17°35.1	-15°44.6	106°52.3	-19°18.1	68°18.5	-22°45.6
21	359°03.1	154°39.5	-14°39.6	32°36.2	-15°44.0	121°54.2	-19°18.2	83°20.7	-22°45.6
22	14°05.5	169°42.8	-14°38.6	47°37.3	-15°43.4	136°56.1	-19°18.4	98°22.9	-22°45.6
23	29°08.0	184°46.1	-14°37.6	62°38.4	-15°42.8	151°58.0	-19°18.5	113°25.1	-22°45.6
Mer.pass.:21:03		v3.4 d1.0 m-3.9		v1.1 d0.6 m-0.5		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	44°10.5	199°49.4	-14°36.6	77°39.4	-15°42.2	166°59.9	-19°18.6	128°27.4	-22°45.6
1	59°12.9	214°52.7	-14°35.6	92°40.5	-15°41.6	182°01.8	-19°18.7	143°29.6	-22°45.6
2	74°15.4	229°56.0	-14°34.7	107°41.6	-15°41.1	197°03.7	-19°18.8	158°31.8	-22°45.6
3	89°17.9	244°59.3	-14°33.7	122°42.7	-15°40.5	212°05.6	-19°19.0	173°34.1	-22°45.6
4	104°20.3	260°02.6	-14°32.7	137°43.7	-15°39.9	227°07.5	-19°19.1	188°36.3	-22°45.6
5	119°22.8	275°05.9	-14°31.7	152°44.8	-15°39.3	242°09.4	-19°19.2	203°38.5	-22°45.6
6	134°25.3	290°09.2	-14°30.7	167°45.9	-15°38.7	257°11.3	-19°19.3	218°40.8	-22°45.6
7	149°27.7	305°12.5	-14°29.7	182°47.0	-15°38.1	272°13.2	-19°19.4	233°43.0	-22°45.6
8	164°30.2	320°15.7	-14°28.8	197°48.1	-15°37.6	287°15.1	-19°19.6	248°45.2	-22°45.6
9	179°32.6	335°19.0	-14°27.8	212°49.1	-15°37.0	302°17.0	-19°19.7	263°47.5	-22°45.6
10	194°35.1	350°22.3	-14°26.8	227°50.2	-15°36.4	317°18.9	-19°19.8	278°49.7	-22°45.6
11	209°37.6	5°25.5	-14°25.8	242°51.3	-15°35.8	332°20.8	-19°19.9	293°51.9	-22°45.6
12	224°40.0	20°28.8	-14°24.8	257°52.4	-15°35.2	347°22.7	-19°20.1	308°54.1	-22°45.6
13	239°42.5	35°32.1	-14°23.9	272°53.4	-15°34.6	2°24.6	-19°20.2	323°56.4	-22°45.6
14	254°45.0	50°35.3	-14°22.9	287°54.5	-15°34.0	17°26.5	-19°20.3	338°58.6	-22°45.6
15	269°47.4	65°38.6	-14°21.9	302°55.6	-15°33.5	32°28.4	-19°20.4	354°00.8	-22°45.6
16	284°49.9	80°41.8	-14°21.0	317°56.7	-15°32.9	47°30.3	-19°20.5	9°03.1	-22°45.6
17	299°52.4	95°45.1	-14°20.0	332°57.7	-15°32.3	62°32.2	-19°20.7	24°05.3	-22°45.6
18	314°54.8	110°48.3	-14°19.0	347°58.8	-15°31.7	77°34.1	-19°20.8	39°07.5	-22°45.6
19	329°57.3	125°51.5	-14°18.0	2°59.9	-15°31.1	92°36.0	-19°20.9	54°09.7	-22°45.6
20	344°59.7	140°54.8	-14°17.1	18°01.0	-15°30.5	107°37.9	-19°21.0	69°12.0	-22°45.5
21	0°02.2	155°58.0	-14°16.1	33°02.0	-15°29.9	122°39.8	-19°21.1	84°14.2	-22°45.5
22	15°04.7	171°01.2	-14°15.1	48°03.1	-15°29.4	137°41.7	-19°21.3	99°16.4	-22°45.5
23	30°07.1	186°04.4	-14°14.2	63°04.2	-15°28.8	152°43.6	-19°21.4	114°18.7	-22°45.5
Mer.pass.:20:59		v3.3 d1.0 m-4.0		v1.1 d0.6 m-0.5		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.8	-42°12.4
Schedar	349°35.9	56°38.5
Diphda	348°51.9	-17°53.1
Achernar	335°23.5	-57°08.7
Hamal	327°56.3	23°33.1
Polaris	315°42.0	89°20.5
Akamar	315°15.2	-40°13.9
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.5
Aldebaran	290°44.9	16°32.7
Rigel	281°08.3	-8°10.8
Capella	280°28.7	46°00.8
Bellatrix	278°27.8	6°21.9
Elnath	278°07.7	28°37.2
Alnilam	275°42.4	-1°11.5
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.2	-52°42.2
Sirius	258°30.2	-16°44.3
Adara	255°09.5	-28°59.8
Procyon	244°55.7	5°10.7
Pollux	243°23.1	27°58.7
Avior	234°16.4	-59°33.9
Suhail	222°49.8	-43°30.2
Miaplacidus	221°39.0	-69°47.3
Alphard	217°52.6	-8°44.3
Regulus	207°39.7	11°52.6
Dubhe	193°47.6	61°38.8
Denebola	182°30.1	14°28.2
Gienah	175°48.8	-17°38.5
Acrux	173°05.8	-63°11.9
Gacrux	171°57.3	-57°12.8
Alioth	166°18.1	55°51.5
Spica	158°27.7	-11°15.3
Alcaid	152°56.5	49°13.3
Hadar	148°43.3	-60°27.5
Menkent	148°03.7	-36°27.5
Arcturus	145°52.6	19°05.6
Rigil Kent.	139°47.4	-60°54.5
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.9
Alphecca	126°08.3	26°39.4
Antares	112°22.1	-26°28.2
Atria	107°21.1	-69°03.6
Sabik	102°08.7	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.4	12°33.1
Etamin	90°44.8	51°29.6
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.8	38°48.4
Nunki	75°54.0	-26°16.3
Altair	62°04.9	8°55.3
Peacock	53°13.6	-56°40.6
Deneb	49°29.0	45°21.2
Enif	33°43.5	9°57.8
Alnair	27°39.1	-46°52.3
Fomalhaut	15°19.9	-29°31.4
Scheat	13°49.7	28°11.2
Markab	13°34.6	15°18.5

2018/11/	**SHA**	**Mer.pass**
Venus	154°54.9	10:49
Mars	34°35.2	18:51
Jupiter	123°16.4	12:56
Saturn	84°28.0	15:31

2018/11/	**SHA**	**Mer.pass**
Venus	155°17.9	10:44
Mars	34°02.2	18:50
Jupiter	123°02.9	12:53
Saturn	84°22.5	15:27

2018/11/	**SHA**	**Mer.pass**
Venus	155°39.0	10:38
Mars	33°29.0	18:48
Jupiter	122°49.5	12:50
Saturn	84°16.9	15:24

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°06.7	-14°58.3	238°46.7	9.5	10°33.9	-11.2	59.0
1	199°06.7	-14°59.1	253°15.2	9.6	10°22.7	-11.3	59.0
2	214°06.7	-14°59.8	267°43.8	9.6	10°11.4	-11.3	59.0
3	229°06.7	-15°00.6	282°12.4	9.7	9°60.0	-11.4	59.0
4	244°06.7	-15°01.4	296°41.1	9.7	9°48.6	-11.5	59.0
5	259°06.7	-15°02.2	311°09.8	9.7	9°37.1	-11.5	59.0
6	274°06.8	-15°03.0	325°38.6	9.8	9°25.6	-11.6	59.0
7	289°06.8	-15°03.8	340°07.4	9.8	9°14.0	-11.6	59.0
8	304°06.8	-15°04.5	354°36.2	9.9	9°02.3	-11.7	59.0
9	319°06.8	-15°05.3	9°05.1	9.9	8°50.7	-11.7	59.0
10	334°06.8	-15°06.1	23°34.1	10.0	8°38.9	-11.8	59.0
11	349°06.7	-15°06.9	38°03.1	10.0	8°27.1	-11.8	59.0
12	4°06.7	-15°07.7	52°32.1	10.0	8°15.3	-11.8	59.0
13	19°06.7	-15°08.4	67°01.2	10.1	8°03.5	-11.9	58.9
14	34°06.7	-15°09.2	81°30.3	10.1	7°51.6	-11.9	58.9
15	49°06.7	-15°10.0	95°59.4	10.2	7°39.6	-12.0	58.9
16	64°06.7	-15°10.8	110°28.6	10.2	7°27.6	-12.0	58.9
17	79°06.7	-15°11.5	124°57.9	10.2	7°15.6	-12.0	58.9
18	94°06.7	-15°12.3	139°27.1	10.3	7°03.5	-12.1	58.9
19	109°06.7	-15°13.1	153°56.4	10.3	6°51.4	-12.1	58.9
20	124°06.7	-15°13.9	168°25.8	10.4	6°39.3	-12.2	58.9
21	139°06.7	-15°14.6	182°55.1	10.4	6°27.1	-12.2	58.9
22	154°06.7	-15°15.4	197°24.6	10.4	6°14.9	-12.2	58.9
23	169°06.7	-15°16.2	211°54.0	10.5	6°02.7	-12.2	58.8
	SD.=16.1	d=-0.8	S.D.=16.1				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°06.7	-15°17.0	226°23.5	10.5	5°50.4	-12.3	58.8
1	199°06.7	-15°17.7	240°53.0	10.5	5°38.1	-12.3	58.8
2	214°06.7	-15°18.5	255°22.6	10.6	5°25.8	-12.3	58.8
3	229°06.7	-15°19.3	269°52.2	10.6	5°13.5	-12.4	58.8
4	244°06.7	-15°20.1	284°21.8	10.6	5°01.1	-12.4	58.8
5	259°06.7	-15°20.8	298°51.4	10.7	4°48.7	-12.4	58.8
6	274°06.7	-15°21.6	313°21.1	10.7	4°36.3	-12.4	58.8
7	289°06.7	-15°22.4	327°50.8	10.7	4°23.9	-12.4	58.7
8	304°06.6	-15°23.1	342°20.6	10.8	4°11.4	-12.5	58.7
9	319°06.6	-15°23.9	356°50.3	10.8	3°58.9	-12.5	58.7
10	334°06.6	-15°24.7	11°20.1	10.8	3°46.5	-12.5	58.7
11	349°06.6	-15°25.4	25°49.9	10.8	3°33.9	-12.5	58.7
12	4°06.6	-15°26.2	40°19.8	10.9	3°21.4	-12.5	58.7
13	19°06.6	-15°27.0	54°49.7	10.9	3°08.9	-12.5	58.7
14	34°06.6	-15°27.7	69°19.6	10.9	2°56.3	-12.6	58.7
15	49°06.6	-15°28.5	83°49.5	10.9	2°43.8	-12.6	58.6
16	64°06.6	-15°29.3	98°19.5	11.0	2°31.2	-12.6	58.6
17	79°06.6	-15°30.0	112°49.4	11.0	2°18.6	-12.6	58.6
18	94°06.5	-15°30.8	127°19.4	11.0	2°06.0	-12.6	58.6
19	109°06.5	-15°31.6	141°49.5	11.0	1°53.5	-12.6	58.6
20	124°06.5	-15°32.3	156°19.5	11.1	1°40.9	-12.6	58.6
21	139°06.5	-15°33.1	170°49.6	11.1	1°28.3	-12.6	58.6
22	154°06.5	-15°33.9	185°19.6	11.1	1°15.6	-12.6	58.5
23	169°06.5	-15°34.6	199°49.7	11.1	1°03.0	-12.6	58.5
	SD.=16.1	d=-0.8	S.D.=16.0				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°06.5	-15°35.4	214°19.9	11.1	0°50.4	-12.6	58.5
1	199°06.4	-15°36.2	228°50.0	11.1	0°37.8	-12.6	58.5
2	214°06.4	-15°36.9	243°20.2	11.2	0°25.2	-12.6	58.5
3	229°06.4	-15°37.7	257°50.3	11.2	0°12.6	-12.6	58.5
4	244°06.4	-15°38.4	272°20.5	11.2	0°00.0	-12.6	58.5
5	259°06.4	-15°39.2	286°50.7	11.2	-0°12.6	-12.6	58.4
6	274°06.4	-15°40.0	301°21.0	11.2	-0°25.2	-12.6	58.4
7	289°06.3	-15°40.7	315°51.2	11.2	-0°37.7	-12.6	58.4
8	304°06.3	-15°41.5	330°21.4	11.3	-0°50.3	-12.6	58.4
9	319°06.3	-15°42.2	344°51.7	11.3	-1°02.8	-12.6	58.4
10	334°06.3	-15°43.0	359°22.0	11.3	-1°15.4	-12.5	58.4
11	349°06.3	-15°43.8	13°52.3	11.3	-1°27.9	-12.5	58.3
12	4°06.3	-15°44.5	28°22.6	11.3	-1°40.4	-12.5	58.3
13	19°06.2	-15°45.3	42°52.9	11.3	-1°52.9	-12.5	58.3
14	34°06.2	-15°46.0	57°23.2	11.3	-2°05.4	-12.5	58.3
15	49°06.2	-15°46.8	71°53.5	11.3	-2°17.9	-12.5	58.3
16	64°06.2	-15°47.5	86°23.8	11.3	-2°30.4	-12.4	58.2
17	79°06.2	-15°48.3	100°54.2	11.3	-2°42.8	-12.4	58.2
18	94°06.1	-15°49.1	115°24.5	11.4	-2°55.2	-12.4	58.2
19	109°06.1	-15°49.8	129°54.9	11.4	-3°07.6	-12.4	58.2
20	124°06.1	-15°50.6	144°25.2	11.4	-3°20.0	-12.4	58.2
21	139°06.1	-15°51.3	158°55.6	11.4	-3°32.3	-12.3	58.2
22	154°06.0	-15°52.1	173°26.0	11.4	-3°44.6	-12.3	58.1
23	169°06.0	-15°52.8	187°56.3	11.4	-3°56.9	-12.3	58.1
	SD.=16.1	d=-0.8	S.D.=16.0				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:18	07:42	09:16	14:10	15:43	17:08
70	06:12	07:28	08:45	14:41	15:58	17:13
68	06:08	07:16	08:23	15:03	16:10	17:18
66	06:04	07:06	08:06	15:20	16:20	17:22
64	05:60	06:57	07:52	15:35	16:29	17:26
62	05:57	06:50	07:40	15:46	16:36	17:29
60	05:54	06:44	07:30	15:57	16:42	17:32
58	05:51	06:38	07:21	16:05	16:48	17:35
56	05:49	06:33	07:13	16:13	16:53	17:38
54	05:46	06:28	07:06	16:20	16:58	17:40
52	05:44	06:24	07:00	16:26	17:02	17:42
50	05:42	06:20	06:54	16:32	17:06	17:45
45	05:37	06:11	06:42	16:44	17:15	17:50
40	05:32	06:04	06:32	16:54	17:23	17:55
35	05:27	05:57	06:24	17:03	17:29	17:59
30	05:23	05:51	06:16	17:11	17:36	18:04
20	05:14	05:40	06:03	17:24	17:47	18:13
10	05:04	05:29	05:51	17:36	17:58	18:23
0	04:54	05:19	05:40	17:47	18:08	18:33
-10	04:42	05:07	05:29	17:58	18:20	18:46
-20	04:27	04:54	05:17	18:10	18:34	19:01
-30	04:07	04:38	05:03	18:25	18:50	19:20
-35	03:55	04:28	04:55	18:33	18:60	19:33
-40	03:41	04:16	04:46	18:42	19:12	19:48
-45	03:22	04:02	04:35	18:53	19:26	20:06
-50	02:58	03:45	04:22	19:07	19:44	20:31
-52	02:46	03:36	04:15	19:13	19:52	20:43
-54	02:31	03:27	04:08	19:20	20:02	20:58
-56	02:14	03:16	04:01	19:28	20:13	21:16
-58	01:53	03:04	03:52	19:37	20:26	21:38
-60	01:24	02:49	03:42	19:47	20:41	22:08

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	01:52	03:52	16:11	15:56	15:42
70	00:04	01:60	03:52	16:01	15:53	15:45
68	00:18	02:06	03:52	15:52	15:50	15:48
66	00:29	02:11	03:51	15:45	15:48	15:50
64	00:39	02:16	03:51	15:39	15:46	15:53
62	00:47	02:20	03:51	15:34	15:44	15:54
60	00:54	02:23	03:51	15:29	15:43	15:56
58	00:60	02:26	03:51	15:25	15:42	15:57
56	01:05	02:29	03:51	15:21	15:40	15:59
54	01:10	02:31	03:51	15:18	15:39	15:60
52	01:15	02:33	03:51	15:15	15:38	16:01
50	01:18	02:35	03:51	15:12	15:37	16:02
45	01:27	02:39	03:51	15:06	15:36	16:04
40	01:34	02:43	03:51	15:01	15:34	16:05
35	01:40	02:46	03:51	14:57	15:32	16:07
30	01:45	02:49	03:51	14:53	15:31	16:08
20	01:55	02:53	03:51	14:46	15:29	16:10
10	02:03	02:57	03:51	14:40	15:27	16:12
0	02:10	03:01	03:51	14:35	15:25	16:14
-10	02:18	03:05	03:51	14:29	15:23	16:16
-20	02:25	03:09	03:51	14:23	15:21	16:18
-30	02:35	03:14	03:51	14:16	15:18	16:20
-35	02:40	03:16	03:51	14:12	15:17	16:22
-40	02:46	03:19	03:51	14:07	15:15	16:23
-45	02:52	03:23	03:51	14:01	15:14	16:25
-50	03:01	03:27	03:51	13:55	15:11	16:27
-52	03:04	03:29	03:51	13:52	15:10	16:28
-54	03:09	03:31	03:51	13:49	15:09	16:29
-56	03:13	03:33	03:52	13:45	15:08	16:30
-58	03:18	03:36	03:52	13:41	15:06	16:31
-60	03:24	03:39	03:52	13:36	15:05	16:33

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
3	16:27	16:27	11:43	08:22	20:47	25(20%)
4	16:27	16:26	11:43	09:13	21:37	26(12%)
5	16:26	16:25	11:43	10:02	22:27	27(6%)

November 06, 07 ,08 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	45°09.6	201°07.7	-14°13.2	78°05.2	-15°28.2	167°45.5	-19°21.5	129°20.9	-22°45.5
1	60°12.1	216°10.9	-14°12.3	93°06.3	-15°27.6	182°47.4	-19°21.6	144°23.1	-22°45.5
2	75°14.5	231°14.1	-14°11.3	108°07.4	-15°27.0	197°49.3	-19°21.7	159°25.3	-22°45.5
3	90°17.0	246°17.3	-14°10.3	123°08.5	-15°26.4	212°51.2	-19°21.9	174°27.6	-22°45.5
4	105°19.5	261°20.5	-14°09.4	138°09.5	-15°25.8	227°53.1	-19°22.0	189°29.8	-22°45.5
5	120°21.9	276°23.7	-14°08.4	153°10.6	-15°25.2	242°55.0	-19°22.1	204°32.0	-22°45.5
6	135°24.4	291°26.9	-14°07.5	168°11.7	-15°24.6	257°56.9	-19°22.2	219°34.3	-22°45.5
7	150°26.9	306°30.1	-14°06.5	183°12.8	-15°24.1	272°58.8	-19°22.4	234°36.5	-22°45.5
8	165°29.3	321°33.3	-14°05.5	198°13.8	-15°23.5	288°00.7	-19°22.5	249°38.7	-22°45.5
9	180°31.8	336°36.5	-14°04.6	213°14.9	-15°22.9	303°02.6	-19°22.6	264°40.9	-22°45.5
10	195°34.2	351°39.7	-14°03.6	228°16.0	-15°22.3	318°04.5	-19°22.7	279°43.2	-22°45.5
11	210°36.7	6°42.8	-14°02.7	243°17.0	-15°21.7	333°06.4	-19°22.8	294°45.4	-22°45.5
12	225°39.2	21°46.0	-14°01.7	258°18.1	-15°21.1	348°08.3	-19°23.0	309°47.6	-22°45.5
13	240°41.6	36°49.2	-14°00.8	273°19.2	-15°20.5	3°10.2	-19°23.1	324°49.8	-22°45.5
14	255°44.1	51°52.3	-13°59.8	288°20.2	-15°19.9	18°12.1	-19°23.2	339°52.1	-22°45.5
15	270°46.6	66°55.5	-13°58.9	303°21.3	-15°19.3	33°14.0	-19°23.3	354°54.3	-22°45.5
16	285°49.0	81°58.7	-13°58.0	318°22.4	-15°18.8	48°15.9	-19°23.4	9°56.5	-22°45.5
17	300°51.5	97°01.8	-13°57.0	333°23.5	-15°18.2	63°17.8	-19°23.6	24°58.7	-22°45.5
18	315°54.0	112°05.0	-13°56.1	348°24.5	-15°17.6	78°19.7	-19°23.7	40°01.0	-22°45.5
19	330°56.4	127°08.1	-13°55.1	3°25.6	-15°17.0	93°21.6	-19°23.8	55°03.2	-22°45.5
20	345°58.9	142°11.3	-13°54.2	18°26.7	-15°16.4	108°23.5	-19°23.9	70°05.4	-22°45.5
21	1°01.3	157°14.4	-13°53.3	33°27.7	-15°15.8	123°25.4	-19°24.0	85°07.6	-22°45.4
22	16°03.8	172°17.6	-13°52.3	48°28.8	-15°15.2	138°27.3	-19°24.2	100°09.9	-22°45.4
23	31°06.3	187°20.7	-13°51.4	63°29.9	-15°14.6	153°29.2	-19°24.3	115°12.1	-22°45.4
Mer.pass.:20:55		v3.2 d1.0 m-4.0		v1.1 d0.6 m-0.5		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	46°08.7	202°23.8	-13°50.4	78°30.9	-15°14.0	168°31.1	-19°24.4	130°14.3	-22°45.4
1	61°11.2	217°27.0	-13°49.5	93°32.0	-15°13.4	183°33.0	-19°24.5	145°16.6	-22°45.4
2	76°13.7	232°30.1	-13°48.6	108°33.1	-15°12.8	198°34.9	-19°24.6	160°18.8	-22°45.4
3	91°16.1	247°33.2	-13°47.6	123°34.1	-15°12.2	213°36.8	-19°24.8	175°21.0	-22°45.4
4	106°18.6	262°36.3	-13°46.7	138°35.2	-15°11.6	228°38.7	-19°24.9	190°23.2	-22°45.4
5	121°21.1	277°39.4	-13°45.8	153°36.3	-15°11.1	243°40.6	-19°25.0	205°25.5	-22°45.4
6	136°23.5	292°42.5	-13°44.9	168°37.3	-15°10.5	258°42.5	-19°25.1	220°27.7	-22°45.4
7	151°26.0	307°45.6	-13°43.9	183°38.4	-15°09.9	273°44.4	-19°25.2	235°29.9	-22°45.4
8	166°28.5	322°48.7	-13°43.0	198°39.5	-15°09.3	288°46.3	-19°25.4	250°32.1	-22°45.4
9	181°30.9	337°51.8	-13°42.1	213°40.5	-15°08.7	303°48.2	-19°25.5	265°34.3	-22°45.4
10	196°33.4	352°54.9	-13°41.2	228°41.6	-15°08.1	318°50.1	-19°25.6	280°36.6	-22°45.4
11	211°35.8	7°58.0	-13°40.2	243°42.7	-15°07.5	333°52.0	-19°25.7	295°38.8	-22°45.4
12	226°38.3	23°01.1	-13°39.3	258°43.7	-15°06.9	348°53.9	-19°25.8	310°41.0	-22°45.4
13	241°40.8	38°04.2	-13°38.4	273°44.8	-15°06.3	3°55.8	-19°26.0	325°43.2	-22°45.4
14	256°43.2	53°07.3	-13°37.5	288°45.8	-15°05.7	18°57.7	-19°26.1	340°45.5	-22°45.4
15	271°45.7	68°10.4	-13°36.6	303°46.9	-15°05.1	33°59.6	-19°26.2	355°47.7	-22°45.4
16	286°48.2	83°13.4	-13°35.7	318°48.0	-15°04.5	49°01.5	-19°26.3	10°49.9	-22°45.4
17	301°50.6	98°16.5	-13°34.8	333°49.0	-15°03.9	64°03.4	-19°26.4	25°52.1	-22°45.4
18	316°53.1	113°19.6	-13°33.8	348°50.1	-15°03.3	79°05.3	-19°26.6	40°54.4	-22°45.4
19	331°55.6	128°22.6	-13°32.9	3°51.2	-15°02.7	94°07.2	-19°26.7	55°56.6	-22°45.3
20	346°58.0	143°25.7	-13°32.0	18°52.2	-15°02.1	109°09.1	-19°26.8	70°58.8	-22°45.3
21	2°00.5	158°28.7	-13°31.1	33°53.3	-15°01.5	124°11.0	-19°26.9	86°01.0	-22°45.3
22	17°03.0	173°31.8	-13°30.2	48°54.4	-15°00.9	139°12.9	-19°27.0	101°03.3	-22°45.3
23	32°05.4	188°34.8	-13°29.3	63°55.4	-15°00.3	154°14.8	-19°27.2	116°05.5	-22°45.3
Mer.pass.:20:51		v3.1 d0.9 m-4.0		v1.1 d0.6 m-0.5		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	47°07.9	203°37.9	-13°28.4	78°56.5	-14°59.8	169°16.7	-19°27.3	131°07.7	-22°45.3
1	62°10.3	218°40.9	-13°27.5	93°57.5	-14°59.2	184°18.6	-19°27.4	146°09.9	-22°45.3
2	77°12.8	233°43.9	-13°26.6	108°58.6	-14°58.6	199°20.5	-19°27.5	161°12.1	-22°45.3
3	92°15.3	248°47.0	-13°25.7	123°59.7	-14°58.0	214°22.4	-19°27.6	176°14.4	-22°45.3
4	107°17.7	263°50.0	-13°24.8	139°00.7	-14°57.4	229°24.3	-19°27.8	191°16.6	-22°45.3
5	122°20.2	278°53.0	-13°23.9	154°01.8	-14°56.8	244°26.2	-19°27.9	206°18.8	-22°45.3
6	137°22.7	293°56.0	-13°23.0	169°02.8	-14°56.2	259°28.1	-19°28.0	221°21.0	-22°45.3
7	152°25.1	308°59.0	-13°22.1	184°03.9	-14°55.6	274°30.0	-19°28.1	236°23.3	-22°45.3
8	167°27.6	324°02.1	-13°21.2	199°05.0	-14°55.0	289°31.9	-19°28.2	251°25.5	-22°45.3
9	182°30.1	339°05.1	-13°20.4	214°06.0	-14°54.4	304°33.7	-19°28.4	266°27.7	-22°45.3
10	197°32.5	354°08.1	-13°19.5	229°07.1	-14°53.8	319°35.6	-19°28.5	281°29.9	-22°45.3
11	212°35.0	9°11.1	-13°18.6	244°08.1	-14°53.2	334°37.5	-19°28.6	296°32.1	-22°45.3
12	227°37.4	24°14.1	-13°17.7	259°09.2	-14°52.6	349°39.4	-19°28.7	311°34.4	-22°45.3
13	242°39.9	39°17.0	-13°16.8	274°10.3	-14°52.0	4°41.3	-19°28.8	326°36.6	-22°45.3
14	257°42.4	54°20.0	-13°15.9	289°11.3	-14°51.4	19°43.2	-19°29.0	341°38.8	-22°45.3
15	272°44.8	69°23.0	-13°15.1	304°12.4	-14°50.8	34°45.1	-19°29.1	356°41.0	-22°45.3
16	287°47.3	84°26.0	-13°14.2	319°13.4	-14°50.2	49°47.0	-19°29.2	11°43.2	-22°45.2
17	302°49.8	99°29.0	-13°13.3	334°14.5	-14°49.6	64°48.9	-19°29.3	26°45.5	-22°45.2
18	317°52.2	114°31.9	-13°12.4	349°15.6	-14°49.0	79°50.8	-19°29.4	41°47.7	-22°45.2
19	332°54.7	129°34.9	-13°11.5	4°16.6	-14°48.4	94°52.7	-19°29.6	56°49.9	-22°45.2
20	347°57.2	144°37.9	-13°10.7	19°17.7	-14°47.8	109°54.6	-19°29.7	71°52.1	-22°45.2
21	2°59.6	159°40.8	-13°09.8	34°18.7	-14°47.2	124°56.5	-19°29.8	86°54.3	-22°45.2
22	18°02.1	174°43.8	-13°08.9	49°19.8	-14°46.6	139°58.4	-19°29.9	101°56.6	-22°45.2
23	33°04.6	189°46.8	-13°08.1	64°20.8	-14°46.0	155°00.3	-19°30.0	116°58.8	-22°45.2
Mer.pass.:20:48		v3.0 d0.9 m-4.1		v1.1 d0.6 m-0.5		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.8	-42°12.4
Schedar	349°35.9	56°38.5
Diphda	348°51.9	-17°53.1
Achernar	335°23.5	-57°08.7
Hamal	327°56.3	23°33.1
Polaris	315°41.8	89°20.5
Akamar	315°15.2	-40°13.9
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.5
Aldebaran	290°44.9	16°32.7
Rigel	281°08.3	-8°10.9
Capella	280°28.7	46°00.8
Bellatrix	278°27.8	6°21.9
Elnath	278°07.7	28°37.2
Alnilam	275°42.4	-1°11.5
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.2	-52°42.2
Sirius	258°30.2	-16°44.3
Adara	255°09.5	-28°59.8
Procyon	244°55.7	5°10.7
Pollux	243°23.1	27°58.7
Avior	234°16.4	-59°33.9
Suhail	222°49.8	-43°30.2
Miaplacidus	221°38.9	-69°47.3
Alphard	217°52.5	-8°44.3
Regulus	207°39.7	11°52.6
Dubhe	193°47.6	61°38.8
Denebola	182°30.1	14°28.1
Gienah	175°48.8	-17°38.5
Acrux	173°05.8	-63°11.8
Gacrux	171°57.3	-57°12.8
Alioth	166°18.0	55°51.5
Spica	158°27.7	-11°15.3
Alcaid	152°56.5	49°13.3
Hadar	148°43.3	-60°27.5
Menkent	148°03.7	-36°27.4
Arcturus	145°52.6	19°05.6
Rigil Kent.	139°47.4	-60°54.5
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.8
Alphecca	126°08.3	26°39.4
Antares	112°22.1	-26°28.2
Atria	107°21.2	-69°03.6
Sabik	102°08.7	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.4	12°33.1
Etamin	90°44.8	51°29.5
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.8	38°48.4
Nunki	75°54.0	-26°16.3
Altair	62°04.9	8°55.3
Peacock	53°13.7	-56°40.6
Deneb	49°29.1	45°21.2
Enif	33°43.5	9°57.8
Alnair	27°39.1	-46°52.3
Fomalhaut	15°19.9	-29°31.4
Scheat	13°49.7	28°11.2
Markab	13°34.6	15°18.5

2018/11/	**SHA**	**Mer.pass**
Venus	155°58.1	10:33
Mars	32°55.6	18:46
Jupiter	122°35.9	12:47
Saturn	84°11.3	15:20

2018/11/	**SHA**	**Mer.pass**
Venus	156°15.1	10:28
Mars	32°22.2	18:45
Jupiter	122°22.4	12:44
Saturn	84°05.6	15:17

2018/11/	**SHA**	**Mer.pass**
Venus	156°30.0	10:23
Mars	31°48.6	18:43
Jupiter	122°08.8	12:41
Saturn	83°59.8	15:13

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°06.0	-15°53.6	202°26.7	11.4	-4°09.2	-12.2	58.1
1	199°06.0	-15°54.3	216°57.1	11.4	-4°21.4	-12.2	58.1
2	214°06.0	-15°55.1	231°27.5	11.4	-4°33.6	-12.2	58.1
3	229°05.9	-15°55.8	245°57.9	11.4	-4°45.8	-12.2	58.0
4	244°05.9	-15°56.6	260°28.3	11.4	-4°57.9	-12.1	58.0
5	259°05.9	-15°57.3	274°58.7	11.4	-5°10.0	-12.1	58.0
6	274°05.9	-15°58.1	289°29.0	11.4	-5°22.1	-12.1	58.0
7	289°05.8	-15°58.8	303°59.4	11.4	-5°34.1	-12.0	58.0
8	304°05.8	-15°59.6	318°29.8	11.4	-5°46.1	-12.0	57.9
9	319°05.8	-16°00.3	333°00.2	11.4	-5°58.1	-11.9	57.9
10	334°05.8	-16°01.1	347°30.6	11.4	-6°10.0	-11.9	57.9
11	349°05.7	-16°01.8	2°01.0	11.4	-6°21.9	-11.9	57.9
12	4°05.7	-16°02.6	16°31.4	11.4	-6°33.8	-11.8	57.9
13	19°05.7	-16°03.3	31°01.7	11.4	-6°45.6	-11.8	57.8
14	34°05.6	-16°04.1	45°32.1	11.4	-6°57.3	-11.7	57.8
15	49°05.6	-16°04.8	60°02.5	11.4	-7°09.1	-11.7	57.8
16	64°05.6	-16°05.5	74°32.8	11.4	-7°20.7	-11.7	57.8
17	79°05.6	-16°06.3	89°03.2	11.4	-7°32.4	-11.6	57.8
18	94°05.5	-16°07.0	103°33.6	11.4	-7°43.9	-11.6	57.7
19	109°05.5	-16°07.8	118°03.9	11.3	-7°55.5	-11.5	57.7
20	124°05.5	-16°08.5	132°34.2	11.3	-8°06.9	-11.5	57.7
21	139°05.4	-16°09.3	147°04.6	11.3	-8°18.4	-11.4	57.7
22	154°05.4	-16°10.0	161°34.9	11.3	-8°29.8	-11.4	57.6
23	169°05.4	-16°10.8	176°05.2	11.3	-8°41.1	-11.3	57.6
	SD.=16.1	d=-0.8			S.D.=15.8		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°05.3	-16°11.5	190°35.5	11.3	-8°52.4	-11.3	57.6
1	199°05.3	-16°12.2	205°05.8	11.3	-9°03.6	-11.2	57.6
2	214°05.3	-16°13.0	219°36.1	11.3	-9°14.8	-11.1	57.6
3	229°05.2	-16°13.7	234°06.4	11.3	-9°25.9	-11.1	57.5
4	244°05.2	-16°14.5	248°36.7	11.3	-9°36.9	-11.0	57.5
5	259°05.2	-16°15.2	263°07.0	11.3	-9°47.9	-11.0	57.5
6	274°05.1	-16°15.9	277°37.2	11.3	-9°58.9	-10.9	57.5
7	289°05.1	-16°16.7	292°07.5	11.2	-10°09.8	-10.8	57.4
8	304°05.1	-16°17.4	306°37.7	11.2	-10°20.6	-10.8	57.4
9	319°05.0	-16°18.1	321°07.9	11.2	-10°31.3	-10.7	57.4
10	334°05.0	-16°18.9	335°38.1	11.2	-10°42.0	-10.7	57.4
11	349°05.0	-16°19.6	350°08.3	11.2	-10°52.7	-10.6	57.3
12	4°04.9	-16°20.3	4°38.5	11.2	-11°03.2	-10.5	57.3
13	19°04.9	-16°21.1	19°08.7	11.2	-11°13.7	-10.5	57.3
14	34°04.9	-16°21.8	33°38.9	11.2	-11°24.2	-10.4	57.3
15	49°04.8	-16°22.6	48°09.0	11.1	-11°34.5	-10.3	57.2
16	64°04.8	-16°23.3	62°39.2	11.1	-11°44.8	-10.3	57.2
17	79°04.7	-16°24.0	77°09.3	11.1	-11°55.1	-10.2	57.2
18	94°04.7	-16°24.8	91°39.4	11.1	-12°05.2	-10.1	57.2
19	109°04.7	-16°25.5	106°09.5	11.1	-12°15.3	-10.1	57.1
20	124°04.6	-16°26.2	120°39.6	11.1	-12°25.3	-10.0	57.1
21	139°04.6	-16°26.9	135°09.7	11.1	-12°35.3	-9.9	57.1
22	154°04.5	-16°27.7	149°39.8	11.1	-12°45.2	-9.8	57.1
23	169°04.5	-16°28.4	164°09.8	11.0	-12°55.0	-9.8	57.1
	SD.=16.1	d=-0.7			S.D.=15.7		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°04.5	-16°29.1	178°39.8	11.0	-13°04.7	-9.7	57.0
1	199°04.4	-16°29.9	193°09.9	11.0	-13°14.3	-9.6	57.0
2	214°04.4	-16°30.6	207°39.9	11.0	-13°23.9	-9.5	57.0
3	229°04.3	-16°31.3	222°09.9	11.0	-13°33.4	-9.5	57.0
4	244°04.3	-16°32.1	236°39.9	11.0	-13°42.8	-9.4	56.9
5	259°04.3	-16°32.8	251°09.8	11.0	-13°52.2	-9.3	56.9
6	274°04.2	-16°33.5	265°39.8	10.9	-14°01.4	-9.2	56.9
7	289°04.2	-16°34.2	280°09.7	10.9	-14°10.6	-9.1	56.9
8	304°04.1	-16°35.0	294°39.6	10.9	-14°19.7	-9.1	56.8
9	319°04.1	-16°35.7	309°09.5	10.9	-14°28.7	-9.0	56.8
10	334°04.0	-16°36.4	323°39.4	10.9	-14°37.7	-8.9	56.8
11	349°04.0	-16°37.1	338°09.3	10.9	-14°46.5	-8.8	56.8
12	4°03.9	-16°37.9	352°39.2	10.9	-14°55.3	-8.7	56.7
13	19°03.9	-16°38.6	7°09.0	10.8	-15°04.0	-8.6	56.7
14	34°03.9	-16°39.3	21°38.9	10.8	-15°12.6	-8.6	56.7
15	49°03.8	-16°40.0	36°08.7	10.8	-15°21.1	-8.5	56.6
16	64°03.8	-16°40.7	50°38.5	10.8	-15°29.5	-8.4	56.6
17	79°03.7	-16°41.5	65°08.3	10.8	-15°37.8	-8.3	56.6
18	94°03.7	-16°42.2	79°38.1	10.8	-15°46.1	-8.2	56.6
19	109°03.6	-16°42.9	94°07.9	10.8	-15°54.3	-8.1	56.5
20	124°03.6	-16°43.6	108°37.6	10.8	-16°02.3	-8.0	56.5
21	139°03.5	-16°44.4	123°07.4	10.7	-16°10.3	-7.9	56.5
22	154°03.5	-16°45.1	137°37.1	10.7	-16°18.2	-7.8	56.5
23	169°03.4	-16°45.8	152°06.8	10.7	-16°26.0	-7.8	56.4
	SD.=16.1	d=-0.7			S.D.=15.6		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:29	07:56	09:37	13:49	15:30	16:56
70	06:23	07:40	09:01	14:25	15:46	17:03
68	06:17	07:26	08:36	14:50	15:60	17:09
66	06:12	07:15	08:17	15:10	16:11	17:14
64	06:08	07:06	08:01	15:25	16:21	17:19
62	06:04	06:58	07:48	15:38	16:29	17:23
60	06:00	06:51	07:37	15:49	16:36	17:26
58	05:57	06:44	07:28	15:59	16:42	17:29
56	05:54	06:39	07:19	16:07	16:48	17:32
54	05:51	06:34	07:12	16:15	16:53	17:35
52	05:49	06:29	07:05	16:21	16:58	17:38
50	05:46	06:25	06:59	16:27	17:02	17:41
45	05:40	06:15	06:46	16:40	17:11	17:46
40	05:35	06:07	06:36	16:51	17:20	17:52
35	05:30	06:00	06:27	17:00	17:27	17:57
30	05:25	05:53	06:18	17:09	17:34	18:02
20	05:15	05:41	06:04	17:23	17:46	18:12
10	05:05	05:30	05:52	17:35	17:57	18:22
0	04:54	05:19	05:40	17:47	18:09	18:34
-10	04:41	05:06	05:28	17:59	18:21	18:47
-20	04:25	04:52	05:16	18:12	18:35	19:03
-30	04:05	04:35	05:01	18:27	18:53	19:23
-35	03:52	04:25	04:52	18:36	19:03	19:36
-40	03:36	04:13	04:42	18:46	19:15	19:52
-45	03:17	03:58	04:31	18:57	19:30	20:12
-50	02:51	03:39	04:17	19:12	19:49	20:38
-52	02:38	03:30	04:10	19:19	19:58	20:51
-54	02:23	03:20	04:03	19:26	20:09	21:07
-56	02:04	03:09	03:54	19:34	20:21	21:26
-58	01:40	02:55	03:45	19:44	20:34	21:51
-60	01:06	02:39	03:34	19:55	20:51	22:28

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	05:50	07:52	10:02	15:27	15:09	14:42
70	05:42	07:34	09:28	15:37	15:28	15:17
68	05:36	07:20	09:04	15:46	15:44	15:42
66	05:30	07:08	08:46	15:53	15:57	16:02
64	05:26	06:59	08:31	15:59	16:07	16:18
62	05:22	06:51	08:18	16:05	16:16	16:31
60	05:18	06:44	08:08	16:09	16:24	16:42
58	05:15	06:38	07:59	16:13	16:31	16:52
56	05:13	06:33	07:51	16:17	16:37	17:00
54	05:10	06:28	07:44	16:20	16:43	17:08
52	05:08	06:24	07:37	16:23	16:48	17:15
50	05:06	06:20	07:32	16:26	16:52	17:21
45	05:02	06:11	07:19	16:32	17:02	17:35
40	04:58	06:04	07:09	16:37	17:10	17:46
35	04:55	05:58	07:01	16:41	17:17	17:55
30	04:52	05:53	06:53	16:45	17:23	18:03
20	04:48	05:44	06:40	16:52	17:34	18:18
10	04:44	05:36	06:29	16:58	17:44	18:31
0	04:40	05:29	06:18	17:03	17:53	18:42
-10	04:36	05:22	06:08	17:09	18:02	18:54
-20	04:32	05:14	05:57	17:15	18:11	19:07
-30	04:28	05:05	05:44	17:22	18:22	19:22
-35	04:25	05:00	05:37	17:25	18:28	19:30
-40	04:23	04:55	05:29	17:30	18:36	19:40
-45	04:19	04:48	05:19	17:35	18:44	19:51
-50	04:15	04:41	05:08	17:41	18:54	20:05
-52	04:14	04:37	05:03	17:44	18:59	20:12
-54	04:12	04:33	04:57	17:47	19:04	20:19
-56	04:10	04:29	04:50	17:51	19:10	20:27
-58	04:07	04:24	04:43	17:55	19:17	20:36
-60	04:05	04:19	04:35	17:59	19:24	20:46

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
6	16:24	16:23	11:43	10:51	23:16	28(2%)
7	16:21	16:20	11:43	11:40	00:05	29(0%)
8	16:18	16:16	11:43	12:30	00:05	1(1%)

November 09, 10 ,11 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	48°07.0	204°49.7	-13°07.2	79°21.9	-14°45.4	170°02.2	-19°30.2	132°01.0	-22°45.2
1	63°09.5	219°52.6	-13°06.3	94°23.0	-14°44.8	185°04.1	-19°30.3	147°03.2	-22°45.2
2	78°11.9	234°55.6	-13°05.5	109°24.0	-14°44.2	200°06.0	-19°30.4	162°05.4	-22°45.2
3	93°14.4	249°58.5	-13°04.6	124°25.1	-14°43.6	215°07.9	-19°30.5	177°07.7	-22°45.2
4	108°16.9	265°01.5	-13°03.8	139°26.1	-14°43.0	230°09.8	-19°30.6	192°09.9	-22°45.2
5	123°19.3	280°04.4	-13°02.9	154°27.2	-14°42.4	245°11.7	-19°30.7	207°12.1	-22°45.2
6	138°21.8	295°07.3	-13°02.0	169°28.2	-14°41.8	260°13.6	-19°30.9	222°14.3	-22°45.2
7	153°24.3	310°10.2	-13°01.2	184°29.3	-14°41.2	275°15.5	-19°31.0	237°16.5	-22°45.2
8	168°26.7	325°13.2	-13°00.3	199°30.4	-14°40.6	290°17.4	-19°31.1	252°18.8	-22°45.2
9	183°29.2	340°16.1	-12°59.5	214°31.4	-14°39.9	305°19.2	-19°31.2	267°21.0	-22°45.2
10	198°31.7	355°19.0	-12°58.6	229°32.5	-14°39.3	320°21.1	-19°31.3	282°23.2	-22°45.2
11	213°34.1	10°21.9	-12°57.8	244°33.5	-14°38.7	335°23.0	-19°31.5	297°25.4	-22°45.2
12	228°36.6	25°24.8	-12°56.9	259°34.6	-14°38.1	350°24.9	-19°31.6	312°27.6	-22°45.2
13	243°39.1	40°27.7	-12°56.1	274°35.6	-14°37.5	5°26.8	-19°31.7	327°29.8	-22°45.1
14	258°41.5	55°30.6	-12°55.2	289°36.7	-14°36.9	20°28.7	-19°31.8	342°32.1	-22°45.1
15	273°44.0	70°33.5	-12°54.4	304°37.7	-14°36.3	35°30.6	-19°31.9	357°34.3	-22°45.1
16	288°46.4	85°36.4	-12°53.6	319°38.8	-14°35.7	50°32.5	-19°32.1	12°36.5	-22°45.1
17	303°48.9	100°39.2	-12°52.7	334°39.8	-14°35.1	65°34.4	-19°32.2	27°38.7	-22°45.1
18	318°51.4	115°42.1	-12°51.9	349°40.9	-14°34.5	80°36.3	-19°32.3	42°40.9	-22°45.1
19	333°53.8	130°45.0	-12°51.0	4°42.0	-14°33.9	95°38.2	-19°32.4	57°43.2	-22°45.1
20	348°56.3	145°47.9	-12°50.2	19°43.0	-14°33.3	110°40.1	-19°32.5	72°45.4	-22°45.1
21	3°58.8	160°50.7	-12°49.4	34°44.1	-14°32.7	125°42.0	-19°32.7	87°47.6	-22°45.1
22	19°01.2	175°53.6	-12°48.5	49°45.1	-14°32.1	140°43.9	-19°32.8	102°49.8	-22°45.1
23	34°03.7	190°56.5	-12°47.7	64°46.2	-14°31.5	155°45.8	-19°32.9	117°52.0	-22°45.1
Mer.pass.:20:44		v2.9 d0.9 m-4.1		v1.1 d0.6 m-0.4		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	49°06.2	205°59.3	-12°46.9	79°47.2	-14°30.9	170°47.7	-19°33.0	132°54.2	-22°45.1
1	64°08.6	221°02.2	-12°46.1	94°48.3	-14°30.3	185°49.6	-19°33.1	147°56.5	-22°45.1
2	79°11.1	236°05.0	-12°45.2	109°49.3	-14°29.7	200°51.5	-19°33.2	162°58.7	-22°45.1
3	94°13.6	251°07.9	-12°44.4	124°50.4	-14°29.1	215°53.4	-19°33.4	178°00.9	-22°45.1
4	109°16.0	266°10.7	-12°43.6	139°51.4	-14°28.5	230°55.2	-19°33.5	193°03.1	-22°45.1
5	124°18.5	281°13.5	-12°42.8	154°52.5	-14°27.8	245°57.1	-19°33.6	208°05.3	-22°45.1
6	139°20.9	296°16.4	-12°42.0	169°53.5	-14°27.2	260°59.0	-19°33.7	223°07.5	-22°45.1
7	154°23.4	311°19.2	-12°41.1	184°54.6	-14°26.6	276°00.9	-19°33.8	238°09.8	-22°45.1
8	169°25.9	326°22.0	-12°40.3	199°55.6	-14°26.0	291°02.8	-19°34.0	253°12.0	-22°45.0
9	184°28.3	341°24.8	-12°39.5	214°56.7	-14°25.4	306°04.7	-19°34.1	268°14.2	-22°45.0
10	199°30.8	356°27.7	-12°38.7	229°57.7	-14°24.8	321°06.6	-19°34.2	283°16.4	-22°45.0
11	214°33.3	11°30.5	-12°37.9	244°58.8	-14°24.2	336°08.5	-19°34.3	298°18.6	-22°45.0
12	229°35.7	26°33.3	-12°37.1	259°59.8	-14°23.6	351°10.4	-19°34.4	313°20.8	-22°45.0
13	244°38.2	41°36.1	-12°36.3	275°00.9	-14°23.0	6°12.3	-19°34.5	328°23.1	-22°45.0
14	259°40.7	56°38.9	-12°35.5	290°01.9	-14°22.4	21°14.2	-19°34.7	343°25.3	-22°45.0
15	274°43.1	71°41.7	-12°34.7	305°03.0	-14°21.8	36°16.1	-19°34.8	358°27.5	-22°45.0
16	289°45.6	86°44.5	-12°33.9	320°04.0	-14°21.2	51°18.0	-19°34.9	13°29.7	-22°45.0
17	304°48.0	101°47.3	-12°33.1	335°05.1	-14°20.5	66°19.9	-19°35.0	28°31.9	-22°45.0
18	319°50.5	116°50.0	-12°32.3	350°06.1	-14°19.9	81°21.8	-19°35.1	43°34.1	-22°45.0
19	334°53.0	131°52.8	-12°31.5	5°07.2	-14°19.3	96°23.6	-19°35.3	58°36.3	-22°45.0
20	349°55.4	146°55.6	-12°30.7	20°08.2	-14°18.7	111°25.5	-19°35.4	73°38.6	-22°45.0
21	4°57.9	161°58.4	-12°29.9	35°09.3	-14°18.1	126°27.4	-19°35.5	88°40.8	-22°45.0
22	20°00.4	177°01.1	-12°29.1	50°10.3	-14°17.5	141°29.3	-19°35.6	103°43.0	-22°45.0
23	35°02.8	192°03.9	-12°28.3	65°11.4	-14°16.9	156°31.2	-19°35.7	118°45.2	-22°45.0
Mer.pass.:20:40		v2.9 d0.8 m-4.2		v1.1 d0.6 m-0.4		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	50°05.3	207°06.7	-12°27.5	80°12.4	-14°16.3	171°33.1	-19°35.9	133°47.4	-22°45.0
1	65°07.8	222°09.4	-12°26.8	95°13.5	-14°15.7	186°35.0	-19°36.0	148°49.6	-22°45.0
2	80°10.2	237°12.2	-12°26.0	110°14.5	-14°15.1	201°36.9	-19°36.1	163°51.8	-22°44.9
3	95°12.7	252°14.9	-12°25.2	125°15.5	-14°14.4	216°38.8	-19°36.2	178°54.1	-22°44.9
4	110°15.2	267°17.7	-12°24.4	140°16.6	-14°13.8	231°40.7	-19°36.3	193°56.3	-22°44.9
5	125°17.6	282°20.4	-12°23.6	155°17.6	-14°13.2	246°42.6	-19°36.4	208°58.5	-22°44.9
6	140°20.1	297°23.2	-12°22.9	170°18.7	-14°12.6	261°44.5	-19°36.6	224°00.7	-22°44.9
7	155°22.5	312°25.9	-12°22.1	185°19.7	-14°12.0	276°46.4	-19°36.7	239°02.9	-22°44.9
8	170°25.0	327°28.6	-12°21.3	200°20.8	-14°11.4	291°48.3	-19°36.8	254°05.1	-22°44.9
9	185°27.5	342°31.3	-12°20.6	215°21.8	-14°10.8	306°50.1	-19°36.9	269°07.3	-22°44.9
10	200°29.9	357°34.1	-12°19.8	230°22.9	-14°10.2	321°52.0	-19°37.0	284°09.6	-22°44.9
11	215°32.4	12°36.8	-12°19.0	245°23.9	-14°09.6	336°53.9	-19°37.1	299°11.8	-22°44.9
12	230°34.9	27°39.5	-12°18.3	260°25.0	-14°08.9	351°55.8	-19°37.3	314°14.0	-22°44.9
13	245°37.3	42°42.2	-12°17.5	275°26.0	-14°08.3	6°57.7	-19°37.4	329°16.2	-22°44.9
14	260°39.8	57°44.9	-12°16.7	290°27.1	-14°07.7	21°59.6	-19°37.5	344°18.4	-22°44.9
15	275°42.3	72°47.6	-12°16.0	305°28.1	-14°07.1	37°01.5	-19°37.6	359°20.6	-22°44.9
16	290°44.7	87°50.3	-12°15.2	320°29.1	-14°06.5	52°03.4	-19°37.7	14°22.8	-22°44.9
17	305°47.2	102°53.0	-12°14.5	335°30.2	-14°05.9	67°05.3	-19°37.9	29°25.0	-22°44.9
18	320°49.7	117°55.7	-12°13.7	350°31.2	-14°05.3	82°07.2	-19°38.0	44°27.3	-22°44.9
19	335°52.1	132°58.4	-12°13.0	5°32.3	-14°04.6	97°09.1	-19°38.1	59°29.5	-22°44.9
20	350°54.6	148°01.1	-12°12.2	20°33.3	-14°04.0	112°11.0	-19°38.2	74°31.7	-22°44.8
21	5°57.0	163°03.8	-12°11.5	35°34.4	-14°03.4	127°12.9	-19°38.3	89°33.9	-22°44.8
22	20°59.5	178°06.4	-12°10.7	50°35.4	-14°02.8	142°14.7	-19°38.4	104°36.1	-22°44.8
23	36°02.0	193°09.1	-12°10.0	65°36.4	-14°02.2	157°16.6	-19°38.6	119°38.3	-22°44.8
Mer.pass.:20:36		v2.8 d0.8 m-4.2		v1.0 d0.6 m-0.4		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.8	-42°12.4
Schedar	349°35.9	56°38.5
Diphda	348°51.9	-17°53.1
Achernar	335°23.6	-57°08.7
Hamal	327°56.3	23°33.1
Polaris	315°41.5	89°20.5
Akamar	315°15.2	-40°13.9
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.5
Aldebaran	290°44.9	16°32.7
Rigel	281°08.3	-8°10.9
Capella	280°28.7	46°00.8
Bellatrix	278°27.8	6°21.9
Elnath	278°07.7	28°37.2
Alnilam	275°42.4	-1°11.5
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.2	-52°42.2
Sirius	258°30.2	-16°44.3
Adara	255°09.4	-28°59.8
Procyon	244°55.7	5°10.7
Pollux	243°23.0	27°58.7
Avior	234°16.4	-59°33.9
Suhail	222°49.7	-43°30.2
Miaplacidus	221°38.9	-69°47.3
Alphard	217°52.5	-8°44.3
Regulus	207°39.7	11°52.5
Dubhe	193°47.6	61°38.8
Denebola	182°30.1	14°28.1
Gienah	175°48.8	-17°38.5
Acrux	173°05.7	-63°11.8
Gacrux	171°57.3	-57°12.8
Alioth	166°18.0	55°51.5
Spica	158°27.7	-11°15.3
Alcaid	152°56.5	49°13.3
Hadar	148°43.3	-60°27.5
Menkent	148°03.7	-36°27.4
Arcturus	145°52.6	19°05.6
Rigil Kent.	139°47.4	-60°54.5
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.8
Alphecca	126°08.3	26°39.4
Antares	112°22.1	-26°28.2
Atria	107°21.2	-69°03.5
Sabik	102°08.7	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.4	12°33.1
Etamin	90°44.9	51°29.5
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.8	38°48.4
Nunki	75°54.0	-26°16.3
Altair	62°04.9	8°55.3
Peacock	53°13.7	-56°40.6
Deneb	49°29.1	45°21.2
Enif	33°43.5	9°57.8
Alnair	27°39.1	-46°52.3
Fomalhaut	15°19.9	-29°31.5
Scheat	13°49.7	28°11.2
Markab	13°34.6	15°18.5

2018/11/	**SHA**	**Mer.pass**
Venus	156°42.7	10:19
Mars	31°14.9	18:41
Jupiter	121°55.2	12:38
Saturn	83°54.0	15:10

2018/11/	**SHA**	**Mer.pass**
Venus	156°53.2	10:14
Mars	30°41.1	18:40
Jupiter	121°41.5	12:35
Saturn	83°48.1	15:06

2018/11/	**SHA**	**Mer.pass**
Venus	157°01.4	10:10
Mars	30°07.1	18:38
Jupiter	121°27.8	12:32
Saturn	83°42.1	15:03

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°03.4	-16°46.5	166°36.5	10.7	-16°33.7	-7.7	56.4
1	199°03.3	-16°47.2	181°06.2	10.7	-16°41.3	-7.6	56.4
2	214°03.3	-16°47.9	195°35.9	10.7	-16°48.9	-7.5	56.4
3	229°03.2	-16°48.7	210°05.6	10.7	-16°56.3	-7.4	56.3
4	244°03.2	-16°49.4	224°35.2	10.7	-17°03.6	-7.3	56.3
5	259°03.1	-16°50.1	239°04.9	10.6	-17°10.9	-7.2	56.3
6	274°03.1	-16°50.8	253°34.5	10.6	-17°18.0	-7.1	56.3
7	289°03.0	-16°51.5	268°04.1	10.6	-17°25.1	-7.0	56.2
8	304°03.0	-16°52.2	282°33.8	10.6	-17°32.1	-6.9	56.2
9	319°02.9	-16°52.9	297°03.4	10.6	-17°38.9	-6.8	56.2
10	334°02.9	-16°53.7	311°32.9	10.6	-17°45.7	-6.7	56.2
11	349°02.8	-16°54.4	326°02.5	10.6	-17°52.4	-6.6	56.1
12	4°02.8	-16°55.1	340°32.1	10.6	-17°58.9	-6.5	56.1
13	19°02.7	-16°55.8	355°01.7	10.6	-18°05.4	-6.4	56.1
14	34°02.6	-16°56.5	9°31.2	10.6	-18°11.8	-6.3	56.1
15	49°02.6	-16°57.2	24°00.8	10.5	-18°18.0	-6.2	56.0
16	64°02.5	-16°57.9	38°30.3	10.5	-18°24.2	-6.1	56.0
17	79°02.5	-16°58.6	52°59.8	10.5	-18°30.3	-6.0	56.0
18	94°02.4	-16°59.3	67°29.4	10.5	-18°36.3	-5.9	56.0
19	109°02.4	-17°00.1	81°58.9	10.5	-18°42.1	-5.8	55.9
20	124°02.3	-17°00.8	96°28.4	10.5	-18°47.9	-5.7	55.9
21	139°02.3	-17°01.5	110°57.9	10.5	-18°53.6	-5.6	55.9
22	154°02.2	-17°02.2	125°27.4	10.5	-18°59.2	-5.5	55.9
23	169°02.1	-17°02.9	139°56.9	10.5	-19°04.6	-5.4	55.8
	SD.=16.1	d=-0.7	S.D.=15.4				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°02.1	-17°03.6	154°26.4	10.5	-19°10.0	-5.3	55.8
1	199°02.0	-17°04.3	168°55.9	10.5	-19°15.3	-5.2	55.8
2	214°02.0	-17°05.0	183°25.4	10.5	-19°20.4	-5.1	55.8
3	229°01.9	-17°05.7	197°54.8	10.5	-19°25.5	-5.0	55.7
4	244°01.8	-17°06.4	212°24.3	10.5	-19°30.4	-4.9	55.7
5	259°01.8	-17°07.1	226°53.8	10.5	-19°35.3	-4.8	55.7
6	274°01.7	-17°07.8	241°23.3	10.5	-19°40.0	-4.7	55.7
7	289°01.7	-17°08.5	255°52.7	10.5	-19°44.7	-4.6	55.7
8	304°01.6	-17°09.2	270°22.2	10.5	-19°49.2	-4.5	55.6
9	319°01.5	-17°09.9	284°51.7	10.5	-19°53.6	-4.4	55.6
10	334°01.5	-17°10.6	299°21.1	10.5	-19°58.0	-4.3	55.6
11	349°01.4	-17°11.3	313°50.6	10.5	-20°02.2	-4.2	55.6
12	4°01.4	-17°12.0	328°20.1	10.5	-20°06.3	-4.1	55.5
13	19°01.3	-17°12.7	342°49.5	10.5	-20°10.3	-4.0	55.5
14	34°01.2	-17°13.4	357°19.0	10.5	-20°14.2	-3.9	55.5
15	49°01.2	-17°14.1	11°48.5	10.5	-20°18.0	-3.7	55.5
16	64°01.1	-17°14.8	26°18.0	10.5	-20°21.7	-3.6	55.4
17	79°01.0	-17°15.5	40°47.4	10.5	-20°25.3	-3.5	55.4
18	94°01.0	-17°16.2	55°16.9	10.5	-20°28.8	-3.4	55.4
19	109°00.9	-17°16.9	69°46.4	10.5	-20°32.1	-3.3	55.4
20	124°00.8	-17°17.6	84°15.9	10.5	-20°35.4	-3.2	55.4
21	139°00.8	-17°18.3	98°45.4	10.5	-20°38.6	-3.1	55.3
22	154°00.7	-17°19.0	113°14.9	10.5	-20°41.6	-3.0	55.3
23	169°00.6	-17°19.7	127°44.4	10.5	-20°44.6	-2.9	55.3
	SD.=16.1	d=-0.7	S.D.=15.2				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°00.6	-17°20.4	142°14.0	10.5	-20°47.4	-2.8	55.3
1	199°00.5	-17°21.1	156°43.5	10.5	-20°50.2	-2.7	55.2
2	214°00.4	-17°21.8	171°13.0	10.5	-20°52.8	-2.6	55.2
3	229°00.4	-17°22.5	185°42.6	10.6	-20°55.3	-2.5	55.2
4	244°00.3	-17°23.2	200°12.2	10.6	-20°57.7	-2.4	55.2
5	259°00.2	-17°23.8	214°41.7	10.6	-21°00.0	-2.3	55.2
6	274°00.2	-17°24.5	229°11.3	10.6	-21°02.2	-2.1	55.1
7	289°00.1	-17°25.2	243°40.9	10.6	-21°04.3	-2.0	55.1
8	304°00.0	-17°25.9	258°10.5	10.6	-21°06.3	-1.9	55.1
9	318°60.0	-17°26.6	272°40.1	10.6	-21°08.2	-1.8	55.1
10	333°59.9	-17°27.3	287°09.8	10.6	-21°10.0	-1.7	55.1
11	348°59.8	-17°28.0	301°39.4	10.7	-21°11.6	-1.6	55.0
12	3°59.7	-17°28.7	316°09.1	10.7	-21°13.2	-1.5	55.0
13	18°59.7	-17°29.4	330°38.7	10.7	-21°14.6	-1.4	55.0
14	33°59.6	-17°30.0	345°08.4	10.7	-21°16.0	-1.3	55.0
15	48°59.5	-17°30.7	359°38.1	10.7	-21°17.2	-1.2	55.0
16	63°59.5	-17°31.4	14°07.8	10.7	-21°18.4	-1.1	54.9
17	78°59.4	-17°32.1	28°37.6	10.7	-21°19.4	-1.0	54.9
18	93°59.3	-17°32.8	43°07.3	10.8	-21°20.3	-0.9	54.9
19	108°59.2	-17°33.5	57°37.1	10.8	-21°21.1	-0.8	54.9
20	123°59.2	-17°34.2	72°06.9	10.8	-21°21.9	-0.7	54.9
21	138°59.1	-17°34.8	86°36.7	10.8	-21°22.5	-0.6	54.9
22	153°59.0	-17°35.5	101°06.6	10.8	-21°23.0	-0.4	54.8
23	168°58.9	-17°36.2	115°36.4	10.9	-21°23.4	-0.3	54.8
	SD.=16.2	d=-0.7	S.D.=15.1				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:41	08:10	10:02	13:25	15:16	16:46
70	06:33	07:51	09:18	14:09	15:35	16:54
68	06:26	07:37	08:49	14:37	15:50	17:01
66	06:20	07:24	08:28	14:59	16:02	17:06
64	06:15	07:14	08:11	15:16	16:13	17:12
62	06:11	07:05	07:57	15:30	16:22	17:16
60	06:07	06:57	07:45	15:42	16:29	17:20
58	06:03	06:51	07:35	15:52	16:36	17:24
56	05:59	06:45	07:26	16:01	16:43	17:28
54	05:56	06:39	07:18	16:09	16:48	17:31
52	05:53	06:34	07:11	16:16	16:53	17:34
50	05:51	06:29	07:04	16:23	16:58	17:37
45	05:44	06:19	06:51	16:37	17:08	17:43
40	05:38	06:11	06:39	16:48	17:17	17:49
35	05:32	06:03	06:29	16:58	17:25	17:55
30	05:27	05:56	06:21	17:07	17:32	18:00
20	05:16	05:43	06:06	17:22	17:45	18:11
10	05:06	05:31	05:53	17:35	17:57	18:22
0	04:54	05:19	05:40	17:47	18:09	18:34
-10	04:40	05:06	05:28	18:00	18:22	18:48
-20	04:24	04:51	05:14	18:14	18:37	19:05
-30	04:02	04:33	04:59	18:29	18:55	19:26
-35	03:49	04:22	04:50	18:39	19:06	19:40
-40	03:33	04:09	04:39	18:49	19:19	19:56
-45	03:12	03:54	04:27	19:02	19:35	20:17
-50	02:45	03:34	04:12	19:17	19:55	20:45
-52	02:31	03:25	04:05	19:24	20:05	20:59
-54	02:14	03:14	03:57	19:32	20:16	21:16
-56	01:53	03:01	03:48	19:41	20:28	21:37
-58	01:26	02:47	03:38	19:51	20:43	22:06
-60	00:43	02:29	03:27	20:03	21:01	22:54

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	–:–	–:–	–:–	–:–
70	11:31	–:–	–:–	14:59	–:–	–:–
68	10:49	12:31	14:02	15:42	15:45	15:60
66	10:21	11:49	13:03	16:11	16:27	16:58
64	09:59	11:21	12:29	16:33	16:56	17:32
62	09:42	10:59	12:05	16:51	17:18	17:57
60	09:28	10:42	11:45	17:05	17:36	18:17
58	09:16	10:27	11:29	17:18	17:51	18:33
56	09:06	10:15	11:15	17:29	18:04	18:46
54	08:56	10:04	11:03	17:38	18:15	18:58
52	08:48	09:54	10:53	17:47	18:25	19:09
50	08:41	09:45	10:44	17:55	18:33	19:18
45	08:25	09:27	10:24	18:11	18:52	19:38
40	08:12	09:12	10:08	18:24	19:07	19:54
35	08:02	08:60	09:55	18:36	19:20	20:08
30	07:52	08:49	09:43	18:46	19:31	20:19
20	07:36	08:30	09:23	19:03	19:51	20:40
10	07:22	08:14	09:06	19:19	20:08	20:57
0	07:08	07:59	08:49	19:33	20:23	21:14
-10	06:55	07:44	08:33	19:47	20:39	21:30
-20	06:41	07:28	08:16	20:02	20:56	21:47
-30	06:26	07:09	07:56	20:20	21:15	22:08
-35	06:16	06:59	07:45	20:30	21:27	22:19
-40	06:06	06:47	07:31	20:42	21:40	22:33
-45	05:54	06:32	07:16	20:55	21:55	22:49
-50	05:39	06:15	06:57	21:12	22:14	23:08
-52	05:32	06:07	06:47	21:20	22:23	23:18
-54	05:24	05:57	06:37	21:29	22:33	23:28
-56	05:16	05:47	06:26	21:39	22:44	23:40
-58	05:06	05:35	06:13	21:50	22:57	23:54
-60	04:55	05:22	05:57	22:04	23:12	–:–

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
9	16:14	16:11	11:43	13:20	00:55	2(4%)
10	16:08	16:05	11:43	14:11	01:45	3(9%)
11	16:02	15:59	11:44	15:01	02:36	4(15%)

November 12, 13 ,14 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	51°04.4	208°11.8	-12°09.2	80°37.5	-14°01.6	172°18.5	-19°38.7	134°40.5	-22°44.8
1	66°06.9	223°14.4	-12°08.5	95°38.5	-14°01.0	187°20.4	-19°38.8	149°42.7	-22°44.8
2	81°09.4	238°17.1	-12°07.7	110°39.6	-14°00.3	202°22.3	-19°38.9	164°44.9	-22°44.8
3	96°11.8	253°19.7	-12°07.0	125°40.6	-13°59.7	217°24.2	-19°39.0	179°47.2	-22°44.8
4	111°14.3	268°22.4	-12°06.3	140°41.7	-13°59.1	232°26.1	-19°39.1	194°49.4	-22°44.8
5	126°16.8	283°25.0	-12°05.5	155°42.7	-13°58.5	247°28.0	-19°39.3	209°51.6	-22°44.8
6	141°19.2	298°27.7	-12°04.8	170°43.7	-13°57.9	262°29.9	-19°39.4	224°53.8	-22°44.8
7	156°21.7	313°30.3	-12°04.1	185°44.8	-13°57.3	277°31.8	-19°39.5	239°56.0	-22°44.8
8	171°24.2	328°33.0	-12°03.3	200°45.8	-13°56.7	292°33.7	-19°39.6	254°58.2	-22°44.8
9	186°26.6	343°35.6	-12°02.6	215°46.9	-13°56.0	307°35.6	-19°39.7	270°00.4	-22°44.8
10	201°29.1	358°38.2	-12°01.9	230°47.9	-13°55.4	322°37.4	-19°39.9	285°02.6	-22°44.8
11	216°31.5	13°40.8	-12°01.2	245°49.0	-13°54.8	337°39.3	-19°40.0	300°04.8	-22°44.8
12	231°34.0	28°43.5	-12°00.5	260°50.0	-13°54.2	352°41.2	-19°40.1	315°07.1	-22°44.8
13	246°36.5	43°46.1	-11°59.7	275°51.0	-13°53.6	7°43.1	-19°40.2	330°09.3	-22°44.7
14	261°38.9	58°48.7	-11°59.0	290°52.1	-13°53.0	22°45.0	-19°40.3	345°11.5	-22°44.7
15	276°41.4	73°51.3	-11°58.3	305°53.1	-13°52.3	37°46.9	-19°40.4	0°13.7	-22°44.7
16	291°43.9	88°53.9	-11°57.6	320°54.2	-13°51.7	52°48.8	-19°40.6	15°15.9	-22°44.7
17	306°46.3	103°56.5	-11°56.9	335°55.2	-13°51.1	67°50.7	-19°40.7	30°18.1	-22°44.7
18	321°48.8	118°59.1	-11°56.2	350°56.2	-13°50.5	82°52.6	-19°40.8	45°20.3	-22°44.7
19	336°51.3	134°01.7	-11°55.5	5°57.3	-13°49.9	97°54.5	-19°40.9	60°22.5	-22°44.7
20	351°53.7	149°04.3	-11°54.8	20°58.3	-13°49.2	112°56.4	-19°41.0	75°24.7	-22°44.7
21	6°56.2	164°06.9	-11°54.1	35°59.4	-13°48.6	127°58.2	-19°41.1	90°26.9	-22°44.7
22	21°58.7	179°09.4	-11°53.4	51°00.4	-13°48.0	143°00.1	-19°41.3	105°29.2	-22°44.7
23	37°01.1	194°12.0	-11°52.7	66°01.4	-13°47.4	158°02.0	-19°41.4	120°31.4	-22°44.7
Mer.pass.:20:32		v2.7 d0.7 m-4.2		v1.0 d0.6 m-0.4		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	52°03.6	209°14.6	-11°52.0	81°02.5	-13°46.8	173°03.9	-19°41.5	135°33.6	-22°44.7
1	67°06.0	224°17.2	-11°51.3	96°03.5	-13°46.2	188°05.8	-19°41.6	150°35.8	-22°44.7
2	82°08.5	239°19.7	-11°50.6	111°04.5	-13°45.5	203°07.7	-19°41.7	165°38.0	-22°44.7
3	97°11.0	254°22.3	-11°49.9	126°05.6	-13°44.9	218°09.6	-19°41.8	180°40.2	-22°44.7
4	112°13.4	269°24.8	-11°49.2	141°06.6	-13°44.3	233°11.5	-19°42.0	195°42.4	-22°44.7
5	127°15.9	284°27.4	-11°48.5	156°07.7	-13°43.7	248°13.4	-19°42.1	210°44.6	-22°44.7
6	142°18.4	299°29.9	-11°47.8	171°08.7	-13°43.1	263°15.3	-19°42.2	225°46.8	-22°44.6
7	157°20.8	314°32.5	-11°47.1	186°09.7	-13°42.4	278°17.1	-19°42.3	240°49.0	-22°44.6
8	172°23.3	329°35.0	-11°46.5	201°10.8	-13°41.8	293°19.0	-19°42.4	255°51.2	-22°44.6
9	187°25.8	344°37.6	-11°45.8	216°11.8	-13°41.2	308°20.9	-19°42.5	270°53.5	-22°44.6
10	202°28.2	359°40.1	-11°45.1	231°12.9	-13°40.6	323°22.8	-19°42.7	285°55.7	-22°44.6
11	217°30.7	14°42.6	-11°44.4	246°13.9	-13°39.9	338°24.7	-19°42.8	300°57.9	-22°44.6
12	232°33.1	29°45.2	-11°43.8	261°14.9	-13°39.3	353°26.6	-19°42.9	316°00.1	-22°44.6
13	247°35.6	44°47.7	-11°43.1	276°16.0	-13°38.7	8°28.5	-19°43.0	331°02.3	-22°44.6
14	262°38.1	59°50.2	-11°42.4	291°17.0	-13°38.1	23°30.4	-19°43.1	346°04.5	-22°44.6
15	277°40.5	74°52.7	-11°41.7	306°18.0	-13°37.5	38°32.3	-19°43.2	1°06.7	-22°44.6
16	292°43.0	89°55.2	-11°41.1	321°19.1	-13°36.8	53°34.2	-19°43.4	16°08.9	-22°44.6
17	307°45.5	104°57.7	-11°40.4	336°20.1	-13°36.2	68°36.0	-19°43.5	31°11.1	-22°44.6
18	322°47.9	120°00.2	-11°39.7	351°21.1	-13°35.6	83°37.9	-19°43.6	46°13.3	-22°44.6
19	337°50.4	135°02.7	-11°39.1	6°22.2	-13°35.0	98°39.8	-19°43.7	61°15.5	-22°44.6
20	352°52.9	150°05.2	-11°38.4	21°23.2	-13°34.4	113°41.7	-19°43.8	76°17.7	-22°44.6
21	7°55.3	165°07.7	-11°37.8	36°24.2	-13°33.7	128°43.6	-19°43.9	91°19.9	-22°44.6
22	22°57.8	180°10.2	-11°37.1	51°25.3	-13°33.1	143°45.5	-19°44.1	106°22.2	-22°44.5
23	38°00.3	195°12.7	-11°36.5	66°26.3	-13°32.5	158°47.4	-19°44.2	121°24.4	-22°44.5
Mer.pass.:20:28		v2.6 d0.7 m-4.2		v1.0 d0.6 m-0.4		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	53°02.7	210°15.2	-11°35.8	81°27.4	-13°31.9	173°49.3	-19°44.3	136°26.6	-22°44.5
1	68°05.2	225°17.6	-11°35.2	96°28.4	-13°31.2	188°51.2	-19°44.4	151°28.8	-22°44.5
2	83°07.6	240°20.1	-11°34.5	111°29.4	-13°30.6	203°53.1	-19°44.5	166°31.0	-22°44.5
3	98°10.1	255°22.6	-11°33.9	126°30.5	-13°30.0	218°54.9	-19°44.6	181°33.2	-22°44.5
4	113°12.6	270°25.0	-11°33.2	141°31.5	-13°29.4	233°56.8	-19°44.8	196°35.4	-22°44.5
5	128°15.0	285°27.5	-11°32.6	156°32.5	-13°28.7	248°58.7	-19°44.9	211°37.6	-22°44.5
6	143°17.5	300°29.9	-11°32.0	171°33.6	-13°28.1	264°00.6	-19°45.0	226°39.8	-22°44.5
7	158°20.0	315°32.4	-11°31.3	186°34.6	-13°27.5	279°02.5	-19°45.1	241°42.0	-22°44.5
8	173°22.4	330°34.8	-11°30.7	201°35.6	-13°26.9	294°04.4	-19°45.2	256°44.2	-22°44.5
9	188°24.9	345°37.3	-11°30.0	216°36.7	-13°26.2	309°06.3	-19°45.3	271°46.4	-22°44.5
10	203°27.4	0°39.7	-11°29.4	231°37.7	-13°25.6	324°08.2	-19°45.4	286°48.6	-22°44.5
11	218°29.8	15°42.2	-11°28.8	246°38.7	-13°25.0	339°10.1	-19°45.6	301°50.8	-22°44.5
12	233°32.3	30°44.6	-11°28.2	261°39.8	-13°24.4	354°11.9	-19°45.7	316°53.0	-22°44.5
13	248°34.8	45°47.0	-11°27.5	276°40.8	-13°23.7	9°13.8	-19°45.8	331°55.2	-22°44.4
14	263°37.2	60°49.4	-11°26.9	291°41.8	-13°23.1	24°15.7	-19°45.9	346°57.4	-22°44.4
15	278°39.7	75°51.9	-11°26.3	306°42.9	-13°22.5	39°17.6	-19°46.0	1°59.7	-22°44.4
16	293°42.1	90°54.3	-11°25.7	321°43.9	-13°21.9	54°19.5	-19°46.1	17°01.9	-22°44.4
17	308°44.6	105°56.7	-11°25.1	336°44.9	-13°21.2	69°21.4	-19°46.3	32°04.1	-22°44.4
18	323°47.1	120°59.1	-11°24.4	351°46.0	-13°20.6	84°23.3	-19°46.4	47°06.3	-22°44.4
19	338°49.5	136°01.5	-11°23.8	6°47.0	-13°20.0	99°25.2	-19°46.5	62°08.5	-22°44.4
20	353°52.0	151°03.9	-11°23.2	21°48.0	-13°19.4	114°27.0	-19°46.6	77°10.7	-22°44.4
21	8°54.5	166°06.3	-11°22.6	36°49.0	-13°18.7	129°28.9	-19°46.7	92°12.9	-22°44.4
22	23°56.9	181°08.7	-11°22.0	51°50.1	-13°18.1	144°30.8	-19°46.8	107°15.1	-22°44.4
23	38°59.4	196°11.1	-11°21.4	66°51.1	-13°17.5	159°32.7	-19°47.0	122°17.3	-22°44.4
Mer.pass.:20:24		v2.5 d0.6 m-4.3		v1.0 d0.6 m-0.3		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.8	-42°12.4
Schedar	349°35.9	56°38.6
Diphda	348°51.9	-17°53.1
Achernar	335°23.6	-57°08.7
Hamal	327°56.3	23°33.1
Polaris	315°41.2	89°20.5
Akamar	315°15.1	-40°13.9
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.5
Aldebaran	290°44.9	16°32.7
Rigel	281°08.2	-8°10.9
Capella	280°28.6	46°00.8
Bellatrix	278°27.8	6°21.9
Elnath	278°07.7	28°37.2
Alnilam	275°42.4	-1°11.5
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.1	-52°42.2
Sirius	258°30.2	-16°44.3
Adara	255°09.4	-28°59.8
Procyon	244°55.7	5°10.7
Pollux	243°23.0	27°58.7
Avior	234°16.3	-59°33.9
Suhail	222°49.7	-43°30.3
Miaplacidus	221°38.8	-69°47.3
Alphard	217°52.5	-8°44.3
Regulus	207°39.7	11°52.5
Dubhe	193°47.5	61°38.8
Denebola	182°30.1	14°28.1
Gienah	175°48.7	-17°38.5
Acrux	173°05.7	-63°11.8
Gacrux	171°57.2	-57°12.8
Alioth	166°18.0	55°51.4
Spica	158°27.7	-11°15.3
Alcaid	152°56.5	49°13.3
Hadar	148°43.3	-60°27.5
Menkent	148°03.6	-36°27.4
Arcturus	145°52.6	19°05.6
Rigil Kent.	139°47.4	-60°54.5
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.8
Alphecca	126°08.3	26°39.3
Antares	112°22.1	-26°28.2
Atria	107°21.2	-69°03.5
Sabik	102°08.7	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.4	12°33.1
Etamin	90°44.9	51°29.5
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.8	38°48.4
Nunki	75°54.0	-26°16.3
Altair	62°04.9	8°55.3
Peacock	53°13.7	-56°40.6
Deneb	49°29.1	45°21.2
Enif	33°43.5	9°57.8
Alnair	27°39.1	-46°52.3
Fomalhaut	15°19.9	-29°31.5
Scheat	13°49.7	28°11.2
Markab	13°34.6	15°18.5

2018/11/	**SHA**	**Mer.pass**
Venus	157°07.3	10:05
Mars	29°33.1	18:36
Jupiter	121°14.1	12:29
Saturn	83°36.1	14:59

2018/11/	**SHA**	**Mer.pass**
Venus	157°11.0	10:01
Mars	28°58.9	18:35
Jupiter	121°00.3	12:26
Saturn	83°30.0	14:56

2018/11/	**SHA**	**Mer.pass**
Venus	157°12.4	09:57
Mars	28°24.6	18:33
Jupiter	120°46.6	12:23
Saturn	83°23.8	14:52

Horizontal paralax	
Venus:	0.5
Mars:	0.2

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°58.9	-17°36.9	130°06.3	10.9	-21°23.6	-0.2	54.8
1	198°58.8	-17°37.6	144°36.2	10.9	-21°23.8	-0.1	54.8
2	213°58.7	-17°38.2	159°06.1	10.9	-21°23.9	-0.0	54.8
3	228°58.6	-17°38.9	173°36.0	11.0	-21°23.9	0.1	54.8
4	243°58.6	-17°39.6	188°06.0	11.0	-21°23.8	0.2	54.7
5	258°58.5	-17°40.3	202°36.0	11.0	-21°23.5	0.3	54.7
6	273°58.4	-17°41.0	217°06.0	11.0	-21°23.2	0.4	54.7
7	288°58.3	-17°41.6	231°36.0	11.0	-21°22.8	0.5	54.7
8	303°58.2	-17°42.3	246°06.1	11.1	-21°22.2	0.6	54.7
9	318°58.2	-17°43.0	260°36.2	11.1	-21°21.6	0.7	54.7
10	333°58.1	-17°43.7	275°06.3	11.1	-21°20.8	0.8	54.6
11	348°58.0	-17°44.3	289°36.4	11.1	-21°20.0	0.9	54.6
12	3°57.9	-17°45.0	304°06.6	11.2	-21°19.0	1.0	54.6
13	18°57.8	-17°45.7	318°36.8	11.2	-21°18.0	1.1	54.6
14	33°57.8	-17°46.4	333°07.0	11.2	-21°16.8	1.2	54.6
15	48°57.7	-17°47.0	347°37.2	11.3	-21°15.6	1.3	54.6
16	63°57.6	-17°47.7	2°07.5	11.3	-21°14.2	1.4	54.6
17	78°57.5	-17°48.4	16°37.8	11.3	-21°12.8	1.5	54.5
18	93°57.4	-17°49.1	31°08.1	11.3	-21°11.2	1.6	54.5
19	108°57.4	-17°49.7	45°38.5	11.4	-21°09.5	1.7	54.5
20	123°57.3	-17°50.4	60°08.9	11.4	-21°07.8	1.8	54.5
21	138°57.2	-17°51.1	74°39.3	11.4	-21°05.9	1.9	54.5
22	153°57.1	-17°51.7	89°09.8	11.5	-21°04.0	2.0	54.5
23	168°57.0	-17°52.4	103°40.3	11.5	-21°01.9	2.1	54.5
	SD.=16.2	d=-0.7	S.D.=15.0				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°56.9	-17°53.1	118°10.8	11.5	-20°59.8	2.2	54.5
1	198°56.9	-17°53.7	132°41.3	11.6	-20°57.5	2.3	54.4
2	213°56.8	-17°54.4	147°11.9	11.6	-20°55.2	2.4	54.4
3	228°56.7	-17°55.1	161°42.5	11.6	-20°52.7	2.5	54.4
4	243°56.6	-17°55.7	176°13.1	11.7	-20°50.2	2.6	54.4
5	258°56.5	-17°56.4	190°43.8	11.7	-20°47.5	2.7	54.4
6	273°56.4	-17°57.1	205°14.5	11.7	-20°44.8	2.8	54.4
7	288°56.3	-17°57.7	219°45.3	11.8	-20°42.0	2.9	54.4
8	303°56.2	-17°58.4	234°16.0	11.8	-20°39.1	3.0	54.4
9	318°56.2	-17°59.1	248°46.8	11.8	-20°36.0	3.1	54.4
10	333°56.1	-17°59.7	263°17.7	11.9	-20°32.9	3.2	54.4
11	348°56.0	-18°00.4	277°48.5	11.9	-20°29.7	3.3	54.4
12	3°55.9	-18°01.0	292°19.5	11.9	-20°26.4	3.3	54.3
13	18°55.8	-18°01.7	306°50.4	12.0	-20°23.0	3.4	54.3
14	33°55.7	-18°02.4	321°21.4	12.0	-20°19.5	3.5	54.3
15	48°55.6	-18°03.0	335°52.4	12.0	-20°15.9	3.6	54.3
16	63°55.5	-18°03.7	350°23.4	12.1	-20°12.3	3.7	54.3
17	78°55.4	-18°04.4	4°54.5	12.1	-20°08.5	3.8	54.3
18	93°55.4	-18°05.0	19°25.6	12.1	-20°04.6	3.9	54.3
19	108°55.3	-18°05.7	33°56.8	12.2	-20°00.7	4.0	54.3
20	123°55.2	-18°06.3	48°28.0	12.2	-19°56.7	4.1	54.3
21	138°55.1	-18°07.0	62°59.2	12.2	-19°52.5	4.2	54.3
22	153°55.0	-18°07.6	77°30.4	12.3	-19°48.3	4.3	54.3
23	168°54.9	-18°08.3	92°01.7	12.3	-19°44.0	4.3	54.3
	SD.=16.2	d=-0.7	S.D.=14.9				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°54.8	-18°08.9	106°33.1	12.3	-19°39.6	4.4	54.3
1	198°54.7	-18°09.6	121°04.4	12.4	-19°35.1	4.5	54.3
2	213°54.6	-18°10.3	135°35.8	12.4	-19°30.6	4.6	54.3
3	228°54.5	-18°10.9	150°07.3	12.5	-19°25.9	4.7	54.3
4	243°54.4	-18°11.6	164°38.7	12.5	-19°21.2	4.8	54.2
5	258°54.3	-18°12.2	179°10.3	12.5	-19°16.3	4.9	54.2
6	273°54.2	-18°12.9	193°41.8	12.6	-19°11.4	5.0	54.2
7	288°54.1	-18°13.5	208°13.4	12.6	-19°06.4	5.0	54.2
8	303°54.0	-18°14.2	222°45.0	12.6	-19°01.3	5.1	54.2
9	318°53.9	-18°14.8	237°16.7	12.7	-18°56.2	5.2	54.2
10	333°53.9	-18°15.5	251°48.3	12.7	-18°50.9	5.3	54.2
11	348°53.8	-18°16.1	266°20.1	12.7	-18°45.6	5.4	54.2
12	3°53.7	-18°16.8	280°51.8	12.8	-18°40.1	5.5	54.2
13	18°53.6	-18°17.4	295°23.6	12.8	-18°34.6	5.5	54.2
14	33°53.5	-18°18.1	309°55.4	12.8	-18°29.1	5.6	54.2
15	48°53.4	-18°18.7	324°27.3	12.9	-18°23.4	5.7	54.2
16	63°53.3	-18°19.4	338°59.2	12.9	-18°17.6	5.8	54.2
17	78°53.2	-18°20.0	353°31.1	13.0	-18°11.8	5.9	54.2
18	93°53.1	-18°20.7	8°03.1	13.0	-18°05.9	5.9	54.2
19	108°53.0	-18°21.3	22°35.1	13.0	-17°59.9	6.0	54.2
20	123°52.9	-18°21.9	37°07.2	13.1	-17°53.8	6.1	54.2
21	138°52.8	-18°22.6	51°39.2	13.1	-17°47.7	6.2	54.2
22	153°52.7	-18°23.2	66°11.3	13.1	-17°41.5	6.3	54.2
23	168°52.6	-18°23.9	80°43.5	13.2	-17°35.2	6.3	54.2
	SD.=16.2	d=-0.7	S.D.=14.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:52	08:24	10:32	12:55	15:03	16:35
70	06:43	08:03	09:36	13:51	15:24	16:45
68	06:35	07:47	09:03	14:24	15:41	16:53
66	06:28	07:33	08:39	14:48	15:54	16:59
64	06:22	07:22	08:21	15:07	16:05	17:05
62	06:17	07:13	08:05	15:22	16:15	17:10
60	06:13	07:04	07:53	15:35	16:24	17:15
58	06:09	06:57	07:42	15:46	16:31	17:19
56	06:05	06:50	07:32	15:56	16:38	17:23
54	06:01	06:44	07:24	16:04	16:44	17:27
52	05:58	06:39	07:16	16:12	16:49	17:30
50	05:55	06:34	07:09	16:19	16:54	17:33
45	05:48	06:23	06:55	16:33	17:05	17:40
40	05:41	06:14	06:43	16:45	17:14	17:47
35	05:35	06:06	06:32	16:56	17:23	17:53
30	05:29	05:58	06:23	17:05	17:30	17:59
20	05:18	05:44	06:08	17:21	17:44	18:10
10	05:06	05:32	05:54	17:35	17:57	18:22
0	04:54	05:19	05:41	17:48	18:10	18:35
-10	04:39	05:05	05:28	18:01	18:23	18:49
-20	04:22	04:50	05:13	18:15	18:39	19:07
-30	04:00	04:31	04:57	18:32	18:58	19:29
-35	03:46	04:20	04:47	18:42	19:09	19:43
-40	03:29	04:06	04:36	18:53	19:23	20:01
-45	03:07	03:50	04:23	19:06	19:40	20:22
-50	02:38	03:29	04:08	19:22	20:01	20:52
-52	02:23	03:19	04:00	19:30	20:11	21:07
-54	02:05	03:07	03:52	19:38	20:23	21:26
-56	01:43	02:54	03:42	19:48	20:36	21:49
-58	01:11	02:38	03:32	19:58	20:52	22:22
-60	00:05	02:19	03:19	20:11	21:12	–:–

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	15:48	–:–	–:–	19:16
68	14:51	15:03	15:05	16:54	18:22	19:57
66	13:53	14:22	14:37	17:51	19:03	20:26
64	13:20	13:53	14:15	18:24	19:31	20:47
62	12:55	13:32	13:57	18:49	19:53	21:04
60	12:36	13:14	13:42	19:08	20:10	21:18
58	12:20	12:59	13:30	19:24	20:24	21:30
56	12:06	12:47	13:19	19:38	20:37	21:41
54	11:54	12:36	13:10	19:50	20:47	21:50
52	11:44	12:26	13:01	20:00	20:57	21:58
50	11:34	12:17	12:53	20:09	21:06	22:05
45	11:15	11:59	12:37	20:29	21:24	22:21
40	10:59	11:44	12:24	20:45	21:38	22:34
35	10:45	11:31	12:12	20:58	21:51	22:45
30	10:33	11:20	12:02	21:10	22:02	22:54
20	10:13	11:00	11:45	21:30	22:20	23:11
10	09:56	10:44	11:30	21:47	22:36	23:25
0	09:39	10:28	11:16	22:03	22:51	23:38
-10	09:23	10:12	11:01	22:19	23:06	23:51
-20	09:05	09:56	10:46	22:36	23:22	–:–
-30	08:45	09:36	10:29	22:56	23:40	–:–
-35	08:34	09:25	10:19	23:08	23:51	–:–
-40	08:20	09:12	10:07	23:21	–:–	00:03
-45	08:04	08:57	09:53	23:36	–:–	00:17
-50	07:45	08:38	09:36	23:55	–:–	00:35
-52	07:35	08:29	09:29	–:–	00:04	00:43
-54	07:25	08:19	09:20	–:–	00:14	00:52
-56	07:13	08:08	09:10	–:–	00:26	01:02
-58	06:59	07:55	08:58	–:–	00:39	01:14
-60	06:43	07:40	08:45	00:10	00:54	01:27

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
12	15:56	15:52	11:44	15:51	03:26	5(22%)
13	15:48	15:44	11:44	16:39	04:15	6(31%)
14	15:39	15:35	11:44	17:26	05:03	7(40%)

November 15, 16 ,17 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	54°01.9	211°13.5	-11°20.8	81°52.1	-13°16.9	174°34.6	-19°47.1	137°19.5	-22°44.4
1	69°04.3	226°15.9	-11°20.2	96°53.2	-13°16.2	189°36.5	-19°47.2	152°21.7	-22°44.4
2	84°06.8	241°18.2	-11°19.6	111°54.2	-13°15.6	204°38.4	-19°47.3	167°23.9	-22°44.4
3	99°09.2	256°20.6	-11°19.0	126°55.2	-13°15.0	219°40.3	-19°47.4	182°26.1	-22°44.4
4	114°11.7	271°23.0	-11°18.4	141°56.3	-13°14.3	234°42.2	-19°47.5	197°28.3	-22°44.3
5	129°14.2	286°25.3	-11°17.8	156°57.3	-13°13.7	249°44.0	-19°47.6	212°30.5	-22°44.3
6	144°16.6	301°27.7	-11°17.2	171°58.3	-13°13.1	264°45.9	-19°47.8	227°32.7	-22°44.3
7	159°19.1	316°30.1	-11°16.6	186°59.4	-13°12.5	279°47.8	-19°47.9	242°34.9	-22°44.3
8	174°21.6	331°32.4	-11°16.0	202°00.4	-13°11.8	294°49.7	-19°48.0	257°37.1	-22°44.3
9	189°24.0	346°34.8	-11°15.5	217°01.4	-13°11.2	309°51.6	-19°48.1	272°39.3	-22°44.3
10	204°26.5	1°37.1	-11°14.9	232°02.4	-13°10.6	324°53.5	-19°48.2	287°41.5	-22°44.3
11	219°29.0	16°39.5	-11°14.3	247°03.5	-13°09.9	339°55.4	-19°48.3	302°43.7	-22°44.3
12	234°31.4	31°41.8	-11°13.7	262°04.5	-13°09.3	354°57.3	-19°48.5	317°45.9	-22°44.3
13	249°33.9	46°44.1	-11°13.1	277°05.5	-13°08.7	9°59.1	-19°48.6	332°48.1	-22°44.3
14	264°36.4	61°46.5	-11°12.6	292°06.6	-13°08.1	25°01.0	-19°48.7	347°50.3	-22°44.3
15	279°38.8	76°48.8	-11°12.0	307°07.6	-13°07.4	40°02.9	-19°48.8	2°52.5	-22°44.3
16	294°41.3	91°51.1	-11°11.4	322°08.6	-13°06.8	55°04.8	-19°48.9	17°54.7	-22°44.3
17	309°43.7	106°53.4	-11°10.9	337°09.6	-13°06.2	70°06.7	-19°49.0	32°56.9	-22°44.3
18	324°46.2	121°55.8	-11°10.3	352°10.7	-13°05.5	85°08.6	-19°49.1	47°59.2	-22°44.3
19	339°48.7	136°58.1	-11°09.7	7°11.7	-13°04.9	100°10.5	-19°49.3	63°01.4	-22°44.2
20	354°51.1	152°00.4	-11°09.2	22°12.7	-13°04.3	115°12.4	-19°49.4	78°03.6	-22°44.2
21	9°53.6	167°02.7	-11°08.6	37°13.8	-13°03.6	130°14.2	-19°49.5	93°05.8	-22°44.2
22	24°56.1	182°05.0	-11°08.0	52°14.8	-13°03.0	145°16.1	-19°49.6	108°08.0	-22°44.2
23	39°58.5	197°07.3	-11°07.5	67°15.8	-13°02.4	160°18.0	-19°49.7	123°10.2	-22°44.2
Mer.pass.:20:20		v2.4 d0.6 m-4.3		v1.0 d0.6 m-0.3		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	55°01.0	212°09.6	-11°06.9	82°16.8	-13°01.8	175°19.9	-19°49.8	138°12.4	-22°44.2
1	70°03.5	227°11.9	-11°06.4	97°17.9	-13°01.1	190°21.8	-19°49.9	153°14.6	-22°44.2
2	85°05.9	242°14.1	-11°05.8	112°18.9	-13°00.5	205°23.7	-19°50.1	168°16.8	-22°44.2
3	100°08.4	257°16.4	-11°05.3	127°19.9	-12°59.9	220°25.6	-19°50.2	183°19.0	-22°44.2
4	115°10.9	272°18.7	-11°04.7	142°21.0	-12°59.2	235°27.5	-19°50.3	198°21.2	-22°44.2
5	130°13.3	287°21.0	-11°04.2	157°22.0	-12°58.6	250°29.3	-19°50.4	213°23.4	-22°44.2
6	145°15.8	302°23.3	-11°03.6	172°23.0	-12°58.0	265°31.2	-19°50.5	228°25.6	-22°44.2
7	160°18.2	317°25.5	-11°03.1	187°24.0	-12°57.3	280°33.1	-19°50.6	243°27.8	-22°44.2
8	175°20.7	332°27.8	-11°02.6	202°25.1	-12°56.7	295°35.0	-19°50.8	258°30.0	-22°44.2
9	190°23.2	347°30.0	-11°02.0	217°26.1	-12°56.1	310°36.9	-19°50.9	273°32.2	-22°44.1
10	205°25.6	2°32.3	-11°01.5	232°27.1	-12°55.4	325°38.8	-19°51.0	288°34.4	-22°44.1
11	220°28.1	17°34.6	-11°01.0	247°28.1	-12°54.8	340°40.7	-19°51.1	303°36.6	-22°44.1
12	235°30.6	32°36.8	-11°00.4	262°29.2	-12°54.2	355°42.6	-19°51.2	318°38.8	-22°44.1
13	250°33.0	47°39.0	-10°59.9	277°30.2	-12°53.5	10°44.4	-19°51.3	333°41.0	-22°44.1
14	265°35.5	62°41.3	-10°59.4	292°31.2	-12°52.9	25°46.3	-19°51.4	348°43.2	-22°44.1
15	280°38.0	77°43.5	-10°58.9	307°32.2	-12°52.3	40°48.2	-19°51.6	3°45.4	-22°44.1
16	295°40.4	92°45.8	-10°58.3	322°33.3	-12°51.6	55°50.1	-19°51.7	18°47.6	-22°44.1
17	310°42.9	107°48.0	-10°57.8	337°34.3	-12°51.0	70°52.0	-19°51.8	33°49.8	-22°44.1
18	325°45.3	122°50.2	-10°57.3	352°35.3	-12°50.4	85°53.9	-19°51.9	48°52.0	-22°44.1
19	340°47.8	137°52.4	-10°56.8	7°36.3	-12°49.7	100°55.8	-19°52.0	63°54.2	-22°44.1
20	355°50.3	152°54.7	-10°56.3	22°37.4	-12°49.1	115°57.6	-19°52.1	78°56.4	-22°44.1
21	10°52.7	167°56.9	-10°55.8	37°38.4	-12°48.5	130°59.5	-19°52.2	93°58.6	-22°44.1
22	25°55.2	182°59.1	-10°55.2	52°39.4	-12°47.8	146°01.4	-19°52.4	109°00.8	-22°44.1
23	40°57.7	198°01.3	-10°54.7	67°40.4	-12°47.2	161°03.3	-19°52.5	124°03.0	-22°44.0
Mer.pass.:20:16		v2.3 d0.6 m-4.3		v1.0 d0.6 m-0.3		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	56°00.1	213°03.5	-10°54.2	82°41.5	-12°46.6	176°05.2	-19°52.6	139°05.2	-22°44.0
1	71°02.6	228°05.7	-10°53.7	97°42.5	-12°45.9	191°07.1	-19°52.7	154°07.4	-22°44.0
2	86°05.1	243°07.9	-10°53.2	112°43.5	-12°45.3	206°09.0	-19°52.8	169°09.6	-22°44.0
3	101°07.5	258°10.1	-10°52.7	127°44.5	-12°44.6	221°10.8	-19°52.9	184°11.8	-22°44.0
4	116°10.0	273°12.3	-10°52.2	142°45.6	-12°44.0	236°12.7	-19°53.0	199°14.0	-22°44.0
5	131°12.5	288°14.4	-10°51.7	157°46.6	-12°43.4	251°14.6	-19°53.2	214°16.2	-22°44.0
6	146°14.9	303°16.6	-10°51.2	172°47.6	-12°42.7	266°16.5	-19°53.3	229°18.4	-22°44.0
7	161°17.4	318°18.8	-10°50.7	187°48.6	-12°42.1	281°18.4	-19°53.4	244°20.6	-22°44.0
8	176°19.8	333°21.0	-10°50.3	202°49.6	-12°41.5	296°20.3	-19°53.5	259°22.8	-22°44.0
9	191°22.3	348°23.2	-10°49.8	217°50.7	-12°40.8	311°22.2	-19°53.6	274°25.0	-22°44.0
10	206°24.8	3°25.3	-10°49.3	232°51.7	-12°40.2	326°24.1	-19°53.7	289°27.2	-22°44.0
11	221°27.2	18°27.5	-10°48.8	247°52.7	-12°39.6	341°25.9	-19°53.8	304°29.4	-22°44.0
12	236°29.7	33°29.6	-10°48.3	262°53.7	-12°38.9	356°27.8	-19°53.9	319°31.6	-22°44.0
13	251°32.2	48°31.8	-10°47.8	277°54.8	-12°38.3	11°29.7	-19°54.1	334°33.8	-22°43.9
14	266°34.6	63°33.9	-10°47.4	292°55.8	-12°37.6	26°31.6	-19°54.2	349°36.0	-22°43.9
15	281°37.1	78°36.1	-10°46.9	307°56.8	-12°37.0	41°33.5	-19°54.3	4°38.2	-22°43.9
16	296°39.6	93°38.2	-10°46.4	322°57.8	-12°36.4	56°35.4	-19°54.4	19°40.4	-22°43.9
17	311°42.0	108°40.4	-10°45.9	337°58.8	-12°35.7	71°37.3	-19°54.5	34°42.6	-22°43.9
18	326°44.5	123°42.5	-10°45.5	352°59.9	-12°35.1	86°39.1	-19°54.6	49°44.7	-22°43.9
19	341°47.0	138°44.6	-10°45.0	8°00.9	-12°34.5	101°41.0	-19°54.7	64°46.9	-22°43.9
20	356°49.4	153°46.8	-10°44.5	23°01.9	-12°33.8	116°42.9	-19°54.9	79°49.1	-22°43.9
21	11°51.9	168°48.9	-10°44.1	38°02.9	-12°33.2	131°44.8	-19°55.0	94°51.3	-22°43.9
22	26°54.3	183°51.0	-10°43.6	53°04.0	-12°32.5	146°46.7	-19°55.1	109°53.5	-22°43.9
23	41°56.8	198°53.1	-10°43.2	68°05.0	-12°31.9	161°48.6	-19°55.2	124°55.7	-22°43.9
Mer.pass.:20:12		v2.2 d0.5 m-4.3		v1.0 d0.6 m-0.3		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.8	-42°12.4
Schedar	349°35.9	56°38.6
Diphda	348°51.9	-17°53.1
Achernar	335°23.6	-57°08.7
Hamal	327°56.3	23°33.1
Polaris	315°41.3	89°20.6
Akamar	315°15.1	-40°13.9
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.6
Aldebaran	290°44.9	16°32.7
Rigel	281°08.2	-8°10.9
Capella	280°28.6	46°00.8
Bellatrix	278°27.8	6°21.9
Elnath	278°07.7	28°37.2
Alnilam	275°42.4	-1°11.5
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.1	-52°42.3
Sirius	258°30.2	-16°44.3
Adara	255°09.4	-28°59.8
Procyon	244°55.7	5°10.7
Pollux	243°23.0	27°58.7
Avior	234°16.3	-59°33.9
Suhail	222°49.7	-43°30.3
Miaplacidus	221°38.8	-69°47.3
Alphard	217°52.5	-8°44.3
Regulus	207°39.6	11°52.5
Dubhe	193°47.5	61°38.8
Denebola	182°30.0	14°28.1
Gienah	175°48.7	-17°38.5
Acrux	173°05.7	-63°11.8
Gacrux	171°57.2	-57°12.7
Alioth	166°18.0	55°51.4
Spica	158°27.7	-11°15.3
Alcaid	152°56.5	49°13.2
Hadar	148°43.3	-60°27.5
Menkent	148°03.6	-36°27.4
Arcturus	145°52.6	19°05.5
Rigil Kent.	139°47.4	-60°54.5
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.8
Alphecca	126°08.3	26°39.3
Antares	112°22.1	-26°28.2
Atria	107°21.2	-69°03.5
Sabik	102°08.7	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.4	12°33.1
Etamin	90°44.9	51°29.5
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.8	38°48.4
Nunki	75°54.1	-26°16.3
Altair	62°04.9	8°55.3
Peacock	53°13.7	-56°40.6
Deneb	49°29.1	45°21.2
Enif	33°43.6	9°57.8
Alnair	27°39.1	-46°52.4
Fomalhaut	15°19.9	-29°31.5
Scheat	13°49.7	28°11.2
Markab	13°34.6	15°18.5

2018/11/	**SHA**	**Mer.pass**
Venus	157°11.6	09:54
Mars	27°50.3	18:31
Jupiter	120°32.7	12:20
Saturn	83°17.6	14:49

2018/11/	**SHA**	**Mer.pass**
Venus	157°08.6	09:50
Mars	27°15.8	18:30
Jupiter	120°18.9	12:17
Saturn	83°11.4	14:45

2018/11/	**SHA**	**Mer.pass**
Venus	157°03.4	09:46
Mars	26°41.3	18:28
Jupiter	120°05.1	12:14
Saturn	83°05.0	14:42

Horizontal paralax	
Venus:	0.4
Mars:	0.2

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°52.5	-18°24.5	95°15.7	13.2	-17°28.8	6.4	54.2
1	198°52.4	-18°25.2	109°47.9	13.2	-17°22.3	6.5	54.2
2	213°52.3	-18°25.8	124°20.1	13.3	-17°15.8	6.6	54.2
3	228°52.2	-18°26.4	138°52.4	13.3	-17°09.2	6.6	54.2
4	243°52.1	-18°27.1	153°24.7	13.3	-17°02.5	6.7	54.3
5	258°51.9	-18°27.7	167°57.0	13.4	-16°55.8	6.8	54.3
6	273°51.8	-18°28.4	182°29.4	13.4	-16°48.9	6.9	54.3
7	288°51.7	-18°29.0	197°01.8	13.4	-16°42.0	6.9	54.3
8	303°51.6	-18°29.6	211°34.2	13.5	-16°35.0	7.0	54.3
9	318°51.5	-18°30.3	226°06.7	13.5	-16°28.0	7.1	54.3
10	333°51.4	-18°30.9	240°39.2	13.5	-16°20.9	7.2	54.3
11	348°51.3	-18°31.5	255°11.7	13.5	-16°13.7	7.2	54.3
12	3°51.2	-18°32.2	269°44.3	13.6	-16°06.4	7.3	54.3
13	18°51.1	-18°32.8	284°16.9	13.6	-15°59.0	7.4	54.3
14	33°51.0	-18°33.4	298°49.5	13.6	-15°51.6	7.4	54.3
15	48°50.9	-18°34.1	313°22.1	13.7	-15°44.2	7.5	54.3
16	63°50.8	-18°34.7	327°54.8	13.7	-15°36.6	7.6	54.3
17	78°50.7	-18°35.3	342°27.5	13.7	-15°29.0	7.7	54.3
18	93°50.6	-18°36.0	357°00.3	13.7	-15°21.3	7.7	54.3
19	108°50.5	-18°36.6	11°33.0	13.8	-15°13.6	7.8	54.3
20	123°50.4	-18°37.2	26°05.8	13.8	-15°05.7	7.9	54.3
21	138°50.2	-18°37.9	40°38.6	13.8	-14°57.8	7.9	54.4
22	153°50.1	-18°38.5	55°11.5	13.9	-14°49.9	8.0	54.4
23	168°50.0	-18°39.1	69°44.3	13.9	-14°41.9	8.1	54.4
	SD.=16.2	d=-0.6	S.D.=14.8				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°49.9	-18°39.7	84°17.2	13.9	-14°33.8	8.1	54.4
1	198°49.8	-18°40.4	98°50.2	13.9	-14°25.6	8.2	54.4
2	213°49.7	-18°41.0	113°23.1	14.0	-14°17.4	8.2	54.4
3	228°49.6	-18°41.6	127°56.1	14.0	-14°09.1	8.3	54.4
4	243°49.5	-18°42.3	142°29.1	14.0	-14°00.8	8.4	54.4
5	258°49.4	-18°42.9	157°02.1	14.0	-13°52.4	8.4	54.4
6	273°49.2	-18°43.5	171°35.1	14.1	-13°43.9	8.5	54.4
7	288°49.1	-18°44.1	186°08.2	14.1	-13°35.4	8.6	54.5
8	303°49.0	-18°44.8	200°41.3	14.1	-13°26.8	8.6	54.5
9	318°48.9	-18°45.4	215°14.4	14.1	-13°18.1	8.7	54.5
10	333°48.8	-18°46.0	229°47.5	14.1	-13°09.4	8.7	54.5
11	348°48.7	-18°46.6	244°20.6	14.2	-13°00.7	8.8	54.5
12	3°48.6	-18°47.2	258°53.8	14.2	-12°51.8	8.9	54.5
13	18°48.5	-18°47.9	273°27.0	14.2	-12°42.9	8.9	54.5
14	33°48.3	-18°48.5	288°00.2	14.2	-12°34.0	9.0	54.6
15	48°48.2	-18°49.1	302°33.4	14.2	-12°25.0	9.0	54.6
16	63°48.1	-18°49.7	317°06.7	14.2	-12°15.9	9.1	54.6
17	78°48.0	-18°50.3	331°39.9	14.3	-12°06.8	9.1	54.6
18	93°47.9	-18°51.0	346°13.2	14.3	-11°57.6	9.2	54.6
19	108°47.8	-18°51.6	0°46.5	14.3	-11°48.4	9.3	54.6
20	123°47.6	-18°52.2	15°19.8	14.3	-11°39.1	9.3	54.6
21	138°47.5	-18°52.8	29°53.1	14.3	-11°29.7	9.4	54.7
22	153°47.4	-18°53.4	44°26.4	14.3	-11°20.3	9.4	54.7
23	168°47.3	-18°54.0	58°59.8	14.4	-11°10.9	9.5	54.7
	SD.=16.2	d=-0.6	S.D.=14.8				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°47.2	-18°54.7	73°33.1	14.4	-11°01.4	9.5	54.7
1	198°47.0	-18°55.3	88°06.5	14.4	-10°51.8	9.6	54.7
2	213°46.9	-18°55.9	102°39.9	14.4	-10°42.2	9.6	54.7
3	228°46.8	-18°56.5	117°13.3	14.4	-10°32.6	9.7	54.8
4	243°46.7	-18°57.1	131°46.7	14.4	-10°22.9	9.7	54.8
5	258°46.6	-18°57.7	146°20.1	14.4	-10°13.1	9.8	54.8
6	273°46.4	-18°58.3	160°53.5	14.4	-10°03.3	9.8	54.8
7	288°46.3	-18°58.9	175°27.0	14.4	-9°53.4	9.9	54.8
8	303°46.2	-18°59.5	190°00.4	14.4	-9°43.5	9.9	54.8
9	318°46.1	-19°00.2	204°33.8	14.5	-9°33.6	10.0	54.9
10	333°46.0	-19°00.8	219°07.3	14.5	-9°23.5	10.0	54.9
11	348°45.8	-19°01.4	233°40.8	14.5	-9°13.5	10.1	54.9
12	3°45.7	-19°02.0	248°14.2	14.5	-9°03.4	10.1	54.9
13	18°45.6	-19°02.6	262°47.7	14.5	-8°53.2	10.2	54.9
14	33°45.5	-19°03.2	277°21.2	14.5	-8°43.1	10.2	55.0
15	48°45.3	-19°03.8	291°54.6	14.5	-8°32.8	10.3	55.0
16	63°45.2	-19°04.4	306°28.1	14.5	-8°22.5	10.3	55.0
17	78°45.1	-19°05.0	321°01.6	14.5	-8°12.2	10.3	55.0
18	93°45.0	-19°05.6	335°35.1	14.5	-8°01.8	10.4	55.1
19	108°44.8	-19°06.2	350°08.6	14.5	-7°51.4	10.4	55.1
20	123°44.7	-19°06.8	4°42.0	14.5	-7°41.0	10.5	55.1
21	138°44.6	-19°07.4	19°15.5	14.5	-7°30.5	10.5	55.1
22	153°44.5	-19°08.0	33°49.0	14.5	-7°19.9	10.6	55.1
23	168°44.3	-19°08.6	48°22.5	14.5	-7°09.4	10.6	55.2
	SD.=16.2	d=-0.6	S.D.=14.9				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:03	08:39	11:27	12:02	14:50	16:26
70	06:52	08:15	09:56	13:33	15:13	16:36
68	06:43	07:57	09:17	14:11	15:32	16:45
66	06:36	07:42	08:51	14:38	15:46	16:52
64	06:30	07:30	08:30	14:58	15:59	16:59
62	06:24	07:20	08:14	15:15	16:09	17:05
60	06:19	07:11	08:00	15:29	16:18	17:10
58	06:14	07:03	07:48	15:40	16:26	17:15
56	06:10	06:56	07:38	15:51	16:33	17:19
54	06:06	06:50	07:29	15:60	16:39	17:23
52	06:02	06:44	07:21	16:08	16:45	17:26
50	05:59	06:38	07:14	16:15	16:50	17:30
45	05:51	06:27	06:59	16:30	17:02	17:38
40	05:44	06:17	06:46	16:43	17:12	17:45
35	05:38	06:08	06:35	16:54	17:21	17:51
30	05:31	06:00	06:26	17:03	17:29	17:58
20	05:19	05:46	06:09	17:20	17:43	18:10
10	05:07	05:33	05:55	17:35	17:57	18:22
0	04:54	05:19	05:41	17:48	18:10	18:36
-10	04:39	05:05	05:27	18:02	18:25	18:51
-20	04:21	04:49	05:13	18:17	18:41	19:09
-30	03:58	04:29	04:55	18:34	19:01	19:32
-35	03:43	04:17	04:45	18:45	19:13	19:47
-40	03:26	04:03	04:34	18:56	19:27	20:05
-45	03:03	03:46	04:20	19:10	19:44	20:28
-50	02:32	03:24	04:03	19:27	20:06	20:59
-52	02:16	03:14	03:56	19:35	20:17	21:15
-54	01:57	03:02	03:47	19:44	20:30	21:35
-56	01:31	02:47	03:37	19:54	20:44	22:02
-58	00:54	02:31	03:26	20:06	21:01	22:42
-60	–:–	02:10	03:12	20:19	21:23	–:–

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	16:08	15:41	15:24	20:32	22:30	–:–
70	15:31	15:20	15:11	21:07	22:50	–:–
68	15:05	15:03	15:01	21:32	23:06	–:–
66	14:45	14:49	14:52	21:52	23:19	–:–
64	14:28	14:38	14:45	22:07	23:29	–:–
62	14:15	14:28	14:39	22:20	23:38	–:–
60	14:04	14:20	14:33	22:31	23:45	–:–
58	13:54	14:12	14:28	22:40	23:52	–:–
56	13:45	14:06	14:24	22:48	23:58	–:–
54	13:37	14:00	14:20	22:56	–:–	00:03
52	13:30	13:55	14:17	23:02	–:–	00:08
50	13:24	13:50	14:14	23:08	–:–	00:12
45	13:10	13:40	14:07	23:20	–:–	00:21
40	12:59	13:31	14:01	23:31	–:–	00:29
35	12:49	13:24	13:56	23:40	–:–	00:35
30	12:41	13:17	13:51	23:47	–:–	00:41
20	12:26	13:06	13:43	–:–	00:01	00:51
10	12:13	12:56	13:37	–:–	00:12	00:59
0	12:01	12:46	13:30	–:–	00:23	01:07
-10	11:49	12:37	13:24	–:–	00:34	01:15
-20	11:37	12:27	13:17	00:05	00:45	01:24
-30	11:22	12:15	13:09	00:21	00:58	01:33
-35	11:13	12:08	13:04	00:30	01:06	01:39
-40	11:03	12:01	12:59	00:41	01:14	01:45
-45	10:52	11:52	12:53	00:53	01:24	01:52
-50	10:38	11:41	12:46	01:08	01:36	02:01
-52	10:31	11:36	12:43	01:15	01:42	02:05
-54	10:24	11:30	12:39	01:23	01:48	02:09
-56	10:16	11:24	12:35	01:31	01:54	02:14
-58	10:06	11:17	12:30	01:41	02:02	02:19
-60	09:56	11:10	12:25	01:52	02:10	02:25

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
15	15:30	15:25	11:44	18:12	05:49	8(49%)
16	15:20	15:14	11:44	18:56	06:34	9(58%)
17	15:09	15:03	11:44	19:40	07:18	10(68%)

November 18, 19 ,20 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	56°59.3	213°55.3	-10°42.7	83°06.0	-12°31.3	176°50.5	-19°55.3	139°57.9	-22°43.9
1	72°01.7	228°57.4	-10°42.2	98°07.0	-12°30.6	191°52.3	-19°55.4	155°00.1	-22°43.9
2	87°04.2	243°59.5	-10°41.8	113°08.0	-12°30.0	206°54.2	-19°55.5	170°02.3	-22°43.8
3	102°06.7	259°01.6	-10°41.3	128°09.1	-12°29.3	221°56.1	-19°55.7	185°04.5	-22°43.8
4	117°09.1	274°03.7	-10°40.9	143°10.1	-12°28.7	236°58.0	-19°55.8	200°06.7	-22°43.8
5	132°11.6	289°05.8	-10°40.4	158°11.1	-12°28.1	251°59.9	-19°55.9	215°08.9	-22°43.8
6	147°14.1	304°07.9	-10°40.0	173°12.1	-12°27.4	267°01.8	-19°56.0	230°11.1	-22°43.8
7	162°16.5	319°10.0	-10°39.6	188°13.1	-12°26.8	282°03.6	-19°56.1	245°13.3	-22°43.8
8	177°19.0	334°12.0	-10°39.1	203°14.2	-12°26.1	297°05.5	-19°56.2	260°15.5	-22°43.8
9	192°21.4	349°14.1	-10°38.7	218°15.2	-12°25.5	312°07.4	-19°56.3	275°17.7	-22°43.8
10	207°23.9	4°16.2	-10°38.2	233°16.2	-12°24.9	327°09.3	-19°56.4	290°19.9	-22°43.8
11	222°26.4	19°18.3	-10°37.8	248°17.2	-12°24.2	342°11.2	-19°56.6	305°22.1	-22°43.8
12	237°28.8	34°20.3	-10°37.4	263°18.2	-12°23.6	357°13.1	-19°56.7	320°24.3	-22°43.8
13	252°31.3	49°22.4	-10°36.9	278°19.3	-12°22.9	12°15.0	-19°56.8	335°26.5	-22°43.8
14	267°33.8	64°24.5	-10°36.5	293°20.3	-12°22.3	27°16.8	-19°56.9	350°28.7	-22°43.8
15	282°36.2	79°26.5	-10°36.1	308°21.3	-12°21.7	42°18.7	-19°57.0	5°30.9	-22°43.7
16	297°38.7	94°28.6	-10°35.7	323°22.3	-12°21.0	57°20.6	-19°57.1	20°33.1	-22°43.7
17	312°41.2	109°30.6	-10°35.2	338°23.3	-12°20.4	72°22.5	-19°57.2	35°35.3	-22°43.7
18	327°43.6	124°32.7	-10°34.8	353°24.3	-12°19.7	87°24.4	-19°57.3	50°37.5	-22°43.7
19	342°46.1	139°34.7	-10°34.4	8°25.4	-12°19.1	102°26.3	-19°57.5	65°39.7	-22°43.7
20	357°48.6	154°36.8	-10°34.0	23°26.4	-12°18.4	117°28.2	-19°57.6	80°41.9	-22°43.7
21	12°51.0	169°38.8	-10°33.6	38°27.4	-12°17.8	132°30.0	-19°57.7	95°44.1	-22°43.7
22	27°53.5	184°40.9	-10°33.1	53°28.4	-12°17.2	147°31.9	-19°57.8	110°46.2	-22°43.7
23	42°55.9	199°42.9	-10°32.7	68°29.4	-12°16.5	162°33.8	-19°57.9	125°48.4	-22°43.7
Mer.pass.:20:08		v2.1 d0.5 m-4.3		v1.0 d0.6 m-0.3		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	57°58.4	214°44.9	-10°32.3	83°30.5	-12°15.9	177°35.7	-19°58.0	140°50.6	-22°43.7
1	73°00.9	229°46.9	-10°31.9	98°31.5	-12°15.2	192°37.6	-19°58.1	155°52.8	-22°43.7
2	88°03.3	244°49.0	-10°31.5	113°32.5	-12°14.6	207°39.5	-19°58.2	170°55.0	-22°43.7
3	103°05.8	259°51.0	-10°31.1	128°33.5	-12°13.9	222°41.3	-19°58.4	185°57.2	-22°43.7
4	118°08.3	274°53.0	-10°30.7	143°34.5	-12°13.3	237°43.2	-19°58.5	200°59.4	-22°43.6
5	133°10.7	289°55.0	-10°30.3	158°35.5	-12°12.7	252°45.1	-19°58.6	216°01.6	-22°43.6
6	148°13.2	304°57.0	-10°29.9	173°36.6	-12°12.0	267°47.0	-19°58.7	231°03.8	-22°43.6
7	163°15.7	319°59.0	-10°29.5	188°37.6	-12°11.4	282°48.9	-19°58.8	246°06.0	-22°43.6
8	178°18.1	335°01.0	-10°29.1	203°38.6	-12°10.7	297°50.8	-19°58.9	261°08.2	-22°43.6
9	193°20.6	350°03.0	-10°28.7	218°39.6	-12°10.1	312°52.6	-19°59.0	276°10.4	-22°43.6
10	208°23.1	5°05.0	-10°28.4	233°40.6	-12°09.4	327°54.5	-19°59.1	291°12.6	-22°43.6
11	223°25.5	20°07.0	-10°28.0	248°41.6	-12°08.8	342°56.4	-19°59.3	306°14.8	-22°43.6
12	238°28.0	35°09.0	-10°27.6	263°42.7	-12°08.1	357°58.3	-19°59.4	321°17.0	-22°43.6
13	253°30.4	50°11.0	-10°27.2	278°43.7	-12°07.5	13°00.2	-19°59.5	336°19.2	-22°43.6
14	268°32.9	65°12.9	-10°26.8	293°44.7	-12°06.9	28°02.1	-19°59.6	351°21.4	-22°43.6
15	283°35.4	80°14.9	-10°26.4	308°45.7	-12°06.2	43°04.0	-19°59.7	6°23.5	-22°43.6
16	298°37.8	95°16.9	-10°26.1	323°46.7	-12°05.6	58°05.8	-19°59.8	21°25.7	-22°43.5
17	313°40.3	110°18.8	-10°25.7	338°47.7	-12°04.9	73°07.7	-19°59.9	36°27.9	-22°43.5
18	328°42.8	125°20.8	-10°25.3	353°48.8	-12°04.3	88°09.6	-20°00.0	51°30.1	-22°43.5
19	343°45.2	140°22.8	-10°24.9	8°49.8	-12°03.6	103°11.5	-20°00.2	66°32.3	-22°43.5
20	358°47.7	155°24.7	-10°24.6	23°50.8	-12°03.0	118°13.4	-20°00.3	81°34.5	-22°43.5
21	13°50.2	170°26.7	-10°24.2	38°51.8	-12°02.3	133°15.3	-20°00.4	96°36.7	-22°43.5
22	28°52.6	185°28.6	-10°23.8	53°52.8	-12°01.7	148°17.1	-20°00.5	111°38.9	-22°43.5
23	43°55.1	200°30.6	-10°23.5	68°53.8	-12°01.0	163°19.0	-20°00.6	126°41.1	-22°43.5
Mer.pass.:20:04		v2.0 d0.4 m-4.4		v1.0 d0.6 m-0.2		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	58°57.5	215°32.5	-10°23.1	83°54.8	-12°00.4	178°20.9	-20°00.7	141°43.3	-22°43.5
1	74°00.0	230°34.5	-10°22.8	98°55.9	-11°59.8	193°22.8	-20°00.8	156°45.5	-22°43.5
2	89°02.5	245°36.4	-10°22.4	113°56.9	-11°59.1	208°24.7	-20°00.9	171°47.7	-22°43.5
3	104°04.9	260°38.3	-10°22.1	128°57.9	-11°58.5	223°26.6	-20°01.1	186°49.9	-22°43.5
4	119°07.4	275°40.3	-10°21.7	143°58.9	-11°57.8	238°28.4	-20°01.2	201°52.1	-22°43.4
5	134°09.9	290°42.2	-10°21.4	158°59.9	-11°57.2	253°30.3	-20°01.3	216°54.2	-22°43.4
6	149°12.3	305°44.1	-10°21.0	174°00.9	-11°56.5	268°32.2	-20°01.4	231°56.4	-22°43.4
7	164°14.8	320°46.0	-10°20.7	189°01.9	-11°55.9	283°34.1	-20°01.5	246°58.6	-22°43.4
8	179°17.3	335°47.9	-10°20.3	204°03.0	-11°55.2	298°36.0	-20°01.6	262°00.8	-22°43.4
9	194°19.7	350°49.8	-10°20.0	219°04.0	-11°54.6	313°37.9	-20°01.7	277°03.0	-22°43.4
10	209°22.2	5°51.8	-10°19.6	234°05.0	-11°53.9	328°39.7	-20°01.8	292°05.2	-22°43.4
11	224°24.7	20°53.7	-10°19.3	249°06.0	-11°53.3	343°41.6	-20°01.9	307°07.4	-22°43.4
12	239°27.1	35°55.6	-10°19.0	264°07.0	-11°52.6	358°43.5	-20°02.1	322°09.6	-22°43.4
13	254°29.6	50°57.5	-10°18.6	279°08.0	-11°52.0	13°45.4	-20°02.2	337°11.8	-22°43.4
14	269°32.0	65°59.3	-10°18.3	294°09.0	-11°51.3	28°47.3	-20°02.3	352°14.0	-22°43.4
15	284°34.5	81°01.2	-10°18.0	309°10.1	-11°50.7	43°49.2	-20°02.4	7°16.2	-22°43.4
16	299°37.0	96°03.1	-10°17.6	324°11.1	-11°50.0	58°51.0	-20°02.5	22°18.4	-22°43.3
17	314°39.4	111°05.0	-10°17.3	339°12.1	-11°49.4	73°52.9	-20°02.6	37°20.5	-22°43.3
18	329°41.9	126°06.9	-10°17.0	354°13.1	-11°48.7	88°54.8	-20°02.7	52°22.7	-22°43.3
19	344°44.4	141°08.8	-10°16.7	9°14.1	-11°48.1	103°56.7	-20°02.8	67°24.9	-22°43.3
20	359°46.8	156°10.6	-10°16.3	24°15.1	-11°47.4	118°58.6	-20°02.9	82°27.1	-22°43.3
21	14°49.3	171°12.5	-10°16.0	39°16.1	-11°46.8	134°00.5	-20°03.1	97°29.3	-22°43.3
22	29°51.8	186°14.4	-10°15.7	54°17.1	-11°46.1	149°02.3	-20°03.2	112°31.5	-22°43.3
23	44°54.2	201°16.2	-10°15.4	69°18.2	-11°45.5	164°04.2	-20°03.3	127°33.7	-22°43.3
Mer.pass.:20:00		v1.9 d0.4 m-4.4		v1.0 d0.6 m-0.2		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.8	-42°12.4
Schedar	349°35.9	56°38.6
Diphda	348°51.9	-17°53.1
Achernar	335°23.6	-57°08.7
Hamal	327°56.3	23°33.1
Polaris	315°41.5	89°20.6
Akamar	315°15.1	-40°13.9
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.6
Aldebaran	290°44.8	16°32.7
Rigel	281°08.2	-8°10.9
Capella	280°28.6	46°00.9
Bellatrix	278°27.8	6°21.9
Elnath	278°07.6	28°37.2
Alnilam	275°42.4	-1°11.5
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.1	-52°42.3
Sirius	258°30.1	-16°44.3
Adara	255°09.4	-28°59.8
Procyon	244°55.6	5°10.7
Pollux	243°23.0	27°58.7
Avior	234°16.3	-59°33.9
Suhail	222°49.6	-43°30.3
Miaplacidus	221°38.7	-69°47.3
Alphard	217°52.4	-8°44.3
Regulus	207°39.6	11°52.5
Dubhe	193°47.4	61°38.8
Denebola	182°30.0	14°28.1
Gienah	175°48.7	-17°38.5
Acrux	173°05.6	-63°11.8
Gacrux	171°57.2	-57°12.7
Alioth	166°17.9	55°51.4
Spica	158°27.7	-11°15.3
Alcaid	152°56.4	49°13.2
Hadar	148°43.2	-60°27.5
Menkent	148°03.6	-36°27.4
Arcturus	145°52.6	19°05.5
Rigil Kent.	139°47.4	-60°54.4
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.8
Alphecca	126°08.3	26°39.3
Antares	112°22.1	-26°28.2
Atria	107°21.2	-69°03.5
Sabik	102°08.7	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.4	12°33.1
Etamin	90°44.9	51°29.5
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.8	38°48.3
Nunki	75°54.1	-26°16.3
Altair	62°04.9	8°55.2
Peacock	53°13.7	-56°40.6
Deneb	49°29.1	45°21.2
Enif	33°43.6	9°57.8
Alnair	27°39.2	-46°52.4
Fomalhaut	15°19.9	-29°31.5
Scheat	13°49.7	28°11.2
Markab	13°34.6	15°18.5

2018/11/	**SHA**	**Mer.pass**
Venus	156°56.0	09:43
Mars	26°06.7	18:26
Jupiter	119°51.2	12:11
Saturn	82°58.7	14:38

2018/11/	**SHA**	**Mer.pass**
Venus	156°46.5	09:40
Mars	25°32.0	18:25
Jupiter	119°37.3	12:08
Saturn	82°52.2	14:34

2018/11/	**SHA**	**Mer.pass**
Venus	156°35.0	09:37
Mars	24°57.3	18:23
Jupiter	119°23.4	12:05
Saturn	82°45.7	14:31

Horizontal paralax	
Venus:	0.4
Mars:	0.2

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	183°44.2	-19°09.2	62°55.9	14.5	-6°58.7	10.6	55.2
1	198°44.1	-19°09.8	77°29.4	14.5	-6°48.1	10.7	55.2
2	213°43.9	-19°10.4	92°02.9	14.5	-6°37.4	10.7	55.2
3	228°43.8	-19°11.0	106°36.3	14.5	-6°26.7	10.8	55.3
4	243°43.7	-19°11.6	121°09.8	14.4	-6°15.9	10.8	55.3
5	258°43.6	-19°12.2	135°43.2	14.4	-6°05.1	10.8	55.3
6	273°43.4	-19°12.8	150°16.6	14.4	-5°54.2	10.9	55.3
7	288°43.3	-19°13.4	164°50.1	14.4	-5°43.4	10.9	55.4
8	303°43.2	-19°14.0	179°23.5	14.4	-5°32.4	10.9	55.4
9	318°43.0	-19°14.6	193°56.9	14.4	-5°21.5	11.0	55.4
10	333°42.9	-19°15.2	208°30.3	14.4	-5°10.5	11.0	55.4
11	348°42.8	-19°15.8	223°03.7	14.4	-4°59.5	11.0	55.5
12	3°42.7	-19°16.4	237°37.0	14.4	-4°48.5	11.1	55.5
13	18°42.5	-19°17.0	252°10.4	14.3	-4°37.4	11.1	55.5
14	33°42.4	-19°17.6	266°43.7	14.3	-4°26.3	11.1	55.5
15	48°42.3	-19°18.1	281°17.1	14.3	-4°15.1	11.2	55.6
16	63°42.1	-19°18.7	295°50.4	14.3	-4°03.9	11.2	55.6
17	78°42.0	-19°19.3	310°23.7	14.3	-3°52.7	11.2	55.6
18	93°41.9	-19°19.9	324°56.9	14.3	-3°41.5	11.2	55.6
19	108°41.7	-19°20.5	339°30.2	14.2	-3°30.3	11.3	55.7
20	123°41.6	-19°21.1	354°03.4	14.2	-3°19.0	11.3	55.7
21	138°41.5	-19°21.7	8°36.7	14.2	-3°07.7	11.3	55.7
22	153°41.3	-19°22.3	23°09.9	14.2	-2°56.3	11.4	55.7
23	168°41.2	-19°22.9	37°43.0	14.2	-2°45.0	11.4	55.8
	SD.=16.2	d=-0.6	S.D.=15.1				

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	183°41.0	-19°23.4	52°16.2	14.1	-2°33.6	11.4	55.8
1	198°40.9	-19°24.0	66°49.3	14.1	-2°22.2	11.4	55.8
2	213°40.8	-19°24.6	81°22.4	14.1	-2°10.7	11.4	55.9
3	228°40.6	-19°25.2	95°55.5	14.1	-1°59.3	11.5	55.9
4	243°40.5	-19°25.8	110°28.6	14.0	-1°47.8	11.5	55.9
5	258°40.4	-19°26.4	125°01.6	14.0	-1°36.3	11.5	55.9
6	273°40.2	-19°26.9	139°34.6	14.0	-1°24.8	11.5	56.0
7	288°40.1	-19°27.5	154°07.6	14.0	-1°13.2	11.5	56.0
8	303°39.9	-19°28.1	168°40.5	13.9	-1°01.7	11.6	56.0
9	318°39.8	-19°28.7	183°13.5	13.9	-0°50.1	11.6	56.1
10	333°39.7	-19°29.3	197°46.3	13.9	-0°38.5	11.6	56.1
11	348°39.5	-19°29.8	212°19.2	13.8	-0°26.9	11.6	56.1
12	3°39.4	-19°30.4	226°52.0	13.8	-0°15.3	11.6	56.1
13	18°39.2	-19°31.0	241°24.8	13.8	-0°03.6	11.6	56.2
14	33°39.1	-19°31.6	255°57.6	13.7	0°08.0	11.7	56.2
15	48°39.0	-19°32.2	270°30.3	13.7	0°19.7	11.7	56.2
16	63°38.8	-19°32.7	285°03.0	13.7	0°31.4	11.7	56.3
17	78°38.7	-19°33.3	299°35.6	13.6	0°43.0	11.7	56.3
18	93°38.5	-19°33.9	314°08.3	13.6	0°54.7	11.7	56.3
19	108°38.4	-19°34.5	328°40.8	13.6	1°06.5	11.7	56.4
20	123°38.3	-19°35.0	343°13.4	13.5	1°18.2	11.7	56.4
21	138°38.1	-19°35.6	357°45.9	13.5	1°29.9	11.7	56.4
22	153°38.0	-19°36.2	12°18.3	13.4	1°41.6	11.7	56.4
23	168°37.8	-19°36.7	26°50.7	13.4	1°53.4	11.7	56.5
	SD.=16.2	d=-0.6	S.D.=15.2				

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	183°37.7	-19°37.3	41°23.1	13.4	2°05.1	11.7	56.5
1	198°37.5	-19°37.9	55°55.5	13.3	2°16.9	11.8	56.5
2	213°37.4	-19°38.5	70°27.7	13.3	2°28.6	11.8	56.6
3	228°37.2	-19°39.0	84°60.0	13.2	2°40.4	11.8	56.6
4	243°37.1	-19°39.6	99°32.2	13.2	2°52.1	11.8	56.6
5	258°37.0	-19°40.2	114°04.3	13.1	3°03.9	11.8	56.7
6	273°36.8	-19°40.7	128°36.4	13.1	3°15.7	11.8	56.7
7	288°36.7	-19°41.3	143°08.5	13.0	3°27.4	11.8	56.7
8	303°36.5	-19°41.9	157°40.5	13.0	3°39.2	11.8	56.8
9	318°36.4	-19°42.4	172°12.5	12.9	3°50.9	11.8	56.8
10	333°36.2	-19°43.0	186°44.4	12.9	4°02.7	11.7	56.8
11	348°36.1	-19°43.6	201°16.2	12.8	4°14.4	11.7	56.9
12	3°35.9	-19°44.1	215°48.0	12.8	4°26.2	11.7	56.9
13	18°35.8	-19°44.7	230°19.8	12.7	4°37.9	11.7	56.9
14	33°35.6	-19°45.2	244°51.5	12.7	4°49.6	11.7	57.0
15	48°35.5	-19°45.8	259°23.1	12.6	5°01.3	11.7	57.0
16	63°35.3	-19°46.4	273°54.7	12.6	5°13.1	11.7	57.0
17	78°35.2	-19°46.9	288°26.3	12.5	5°24.7	11.7	57.0
18	93°35.0	-19°47.5	302°57.7	12.4	5°36.4	11.7	57.1
19	108°34.9	-19°48.0	317°29.2	12.4	5°48.1	11.7	57.1
20	123°34.7	-19°48.6	332°00.5	12.3	5°59.8	11.6	57.1
21	138°34.6	-19°49.2	346°31.8	12.3	6°11.4	11.6	57.2
22	153°34.4	-19°49.7	1°03.1	12.2	6°23.0	11.6	57.2
23	168°34.3	-19°50.3	15°34.3	12.2	6°34.6	11.6	57.2
	SD.=16.2	d=-0.6	S.D.=15.4				

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:13	08:53	–:–	–:–	14:37	16:16
70	07:01	08:27	10:17	13:12	15:03	16:28
68	06:52	08:07	09:32	13:58	15:23	16:38
66	06:44	07:51	09:02	14:28	15:39	16:46
64	06:36	07:38	08:40	14:50	15:52	16:53
62	06:30	07:27	08:22	15:08	16:03	16:60
60	06:25	07:17	08:08	15:23	16:13	17:05
58	06:20	07:09	07:55	15:35	16:21	17:10
56	06:15	07:01	07:44	15:46	16:29	17:15
54	06:11	06:55	07:35	15:55	16:36	17:19
52	06:07	06:49	07:27	16:04	16:42	17:23
50	06:03	06:43	07:19	16:11	16:47	17:27
45	05:55	06:31	07:03	16:28	16:60	17:35
40	05:47	06:20	06:49	16:41	17:10	17:43
35	05:40	06:11	06:38	16:52	17:19	17:50
30	05:34	06:03	06:28	17:02	17:28	17:57
20	05:21	05:48	06:11	17:20	17:43	18:10
10	05:08	05:34	05:56	17:35	17:57	18:23
0	04:54	05:20	05:42	17:49	18:11	18:36
-10	04:39	05:05	05:27	18:03	18:26	18:52
-20	04:20	04:48	05:12	18:19	18:43	19:11
-30	03:56	04:28	04:54	18:37	19:03	19:35
-35	03:41	04:15	04:44	18:48	19:16	19:50
-40	03:22	04:01	04:32	18:60	19:31	20:09
-45	02:59	03:43	04:17	19:14	19:49	20:33
-50	02:26	03:20	03:60	19:32	20:12	21:06
-52	02:09	03:09	03:51	19:40	20:23	21:23
-54	01:48	02:56	03:42	19:50	20:36	21:45
-56	01:20	02:41	03:32	20:00	20:52	22:15
-58	00:32	02:23	03:20	20:13	21:10	23:08
-60	–:–	02:00	03:06	20:27	21:33	–:–

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	15:09	14:55	14:42	00:20	02:07	03:55
70	15:03	14:56	14:48	00:30	02:10	03:52
68	14:58	14:56	14:54	00:39	02:13	03:48
66	14:54	14:56	14:58	00:46	02:15	03:46
64	14:51	14:56	15:02	00:52	02:17	03:43
62	14:48	14:56	15:05	00:57	02:18	03:41
60	14:45	14:57	15:08	01:02	02:20	03:40
58	14:43	14:57	15:11	01:06	02:21	03:38
56	14:41	14:57	15:14	01:09	02:22	03:37
54	14:39	14:57	15:16	01:12	02:23	03:36
52	14:37	14:57	15:18	01:15	02:24	03:35
50	14:35	14:57	15:19	01:17	02:25	03:34
45	14:32	14:57	15:23	01:23	02:26	03:31
40	14:29	14:57	15:27	01:28	02:28	03:30
35	14:27	14:58	15:30	01:32	02:29	03:28
30	14:24	14:58	15:32	01:35	02:30	03:27
20	14:21	14:58	15:37	01:41	02:32	03:24
10	14:17	14:58	15:41	01:46	02:34	03:22
0	14:14	14:58	15:44	01:51	02:35	03:20
-10	14:11	14:59	15:48	01:56	02:37	03:18
-20	14:07	14:59	15:52	02:01	02:38	03:16
-30	14:03	14:59	15:57	02:07	02:40	03:14
-35	14:01	14:59	15:60	02:10	02:41	03:12
-40	13:59	14:60	16:03	02:14	02:42	03:11
-45	13:56	14:60	16:06	02:18	02:43	03:09
-50	13:52	15:00	16:11	02:23	02:45	03:07
-52	13:51	15:00	16:13	02:26	02:46	03:06
-54	13:49	15:01	16:15	02:28	02:46	03:05
-56	13:47	15:01	16:17	02:31	02:47	03:03
-58	13:45	15:01	16:20	02:34	02:48	03:02
-60	13:42	15:01	16:23	02:38	02:49	03:01

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
18	14:57	14:51	11:45	20:24	08:02	11(76%)
19	14:44	14:38	11:45	21:09	08:46	12(84%)
20	14:31	14:24	11:45	21:55	09:32	13(91%)

November 21, 22 ,23 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	59°56.7	216°18.1	-10°15.1	84°19.2	-11°44.8	179°06.1	-20°03.4	142°35.9	-22°43.3
1	74°59.1	231°20.0	-10°14.8	99°20.2	-11°44.2	194°08.0	-20°03.5	157°38.1	-22°43.3
2	90°01.6	246°21.8	-10°14.5	114°21.2	-11°43.5	209°09.9	-20°03.6	172°40.3	-22°43.3
3	105°04.1	261°23.7	-10°14.1	129°22.2	-11°42.9	224°11.8	-20°03.7	187°42.5	-22°43.2
4	120°06.5	276°25.5	-10°13.8	144°23.2	-11°42.2	239°13.6	-20°03.8	202°44.6	-22°43.2
5	135°09.0	291°27.3	-10°13.5	159°24.2	-11°41.6	254°15.5	-20°03.9	217°46.8	-22°43.2
6	150°11.5	306°29.2	-10°13.2	174°25.2	-11°40.9	269°17.4	-20°04.1	232°49.0	-22°43.2
7	165°13.9	321°31.0	-10°12.9	189°26.2	-11°40.3	284°19.3	-20°04.2	247°51.2	-22°43.2
8	180°16.4	336°32.9	-10°12.6	204°27.3	-11°39.6	299°21.2	-20°04.3	262°53.4	-22°43.2
9	195°18.9	351°34.7	-10°12.3	219°28.3	-11°39.0	314°23.1	-20°04.4	277°55.6	-22°43.2
10	210°21.3	6°36.5	-10°12.1	234°29.3	-11°38.3	329°24.9	-20°04.5	292°57.8	-22°43.2
11	225°23.8	21°38.3	-10°11.8	249°30.3	-11°37.7	344°26.8	-20°04.6	307°60.0	-22°43.2
12	240°26.3	36°40.2	-10°11.5	264°31.3	-11°37.0	359°28.7	-20°04.7	323°02.2	-22°43.2
13	255°28.7	51°42.0	-10°11.2	279°32.3	-11°36.4	14°30.6	-20°04.8	338°04.4	-22°43.2
14	270°31.2	66°43.8	-10°10.9	294°33.3	-11°35.7	29°32.5	-20°04.9	353°06.5	-22°43.2
15	285°33.6	81°45.6	-10°10.6	309°34.3	-11°35.1	44°34.3	-20°05.1	8°08.7	-22°43.1
16	300°36.1	96°47.4	-10°10.3	324°35.3	-11°34.4	59°36.2	-20°05.2	23°10.9	-22°43.1
17	315°38.6	111°49.2	-10°10.1	339°36.4	-11°33.8	74°38.1	-20°05.3	38°13.1	-22°43.1
18	330°41.0	126°51.0	-10°09.8	354°37.4	-11°33.1	89°40.0	-20°05.4	53°15.3	-22°43.1
19	345°43.5	141°52.8	-10°09.5	9°38.4	-11°32.5	104°41.9	-20°05.5	68°17.5	-22°43.1
20	0°46.0	156°54.6	-10°09.2	24°39.4	-11°31.8	119°43.8	-20°05.6	83°19.7	-22°43.1
21	15°48.4	171°56.4	-10°09.0	39°40.4	-11°31.2	134°45.6	-20°05.7	98°21.9	-22°43.1
22	30°50.9	186°58.2	-10°08.7	54°41.4	-11°30.5	149°47.5	-20°05.8	113°24.1	-22°43.1
23	45°53.4	201°59.9	-10°08.4	69°42.4	-11°29.9	164°49.4	-20°05.9	128°26.2	-22°43.1
Mer.pass.:19:56		v1.9 d0.3 m-4.4		v1.0 d0.7 m-0.2		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	60°55.8	217°01.7	-10°08.2	84°43.4	-11°29.2	179°51.3	-20°06.1	143°28.4	-22°43.1
1	75°58.3	232°03.5	-10°07.9	99°44.4	-11°28.5	194°53.2	-20°06.2	158°30.6	-22°43.1
2	91°00.8	247°05.3	-10°07.6	114°45.4	-11°27.9	209°55.1	-20°06.3	173°32.8	-22°43.0
3	106°03.2	262°07.0	-10°07.4	129°46.5	-11°27.2	224°56.9	-20°06.4	188°35.0	-22°43.0
4	121°05.7	277°08.8	-10°07.1	144°47.5	-11°26.6	239°58.8	-20°06.5	203°37.2	-22°43.0
5	136°08.1	292°10.6	-10°06.9	159°48.5	-11°25.9	255°00.7	-20°06.6	218°39.4	-22°43.0
6	151°10.6	307°12.3	-10°06.6	174°49.5	-11°25.3	270°02.6	-20°06.7	233°41.6	-22°43.0
7	166°13.1	322°14.1	-10°06.4	189°50.5	-11°24.6	285°04.5	-20°06.8	248°43.7	-22°43.0
8	181°15.5	337°15.8	-10°06.1	204°51.5	-11°24.0	300°06.3	-20°06.9	263°45.9	-22°43.0
9	196°18.0	352°17.6	-10°05.9	219°52.5	-11°23.3	315°08.2	-20°07.0	278°48.1	-22°43.0
10	211°20.5	7°19.3	-10°05.6	234°53.5	-11°22.7	330°10.1	-20°07.2	293°50.3	-22°43.0
11	226°22.9	22°21.1	-10°05.4	249°54.5	-11°22.0	345°12.0	-20°07.3	308°52.5	-22°43.0
12	241°25.4	37°22.8	-10°05.1	264°55.5	-11°21.3	0°13.9	-20°07.4	323°54.7	-22°43.0
13	256°27.9	52°24.6	-10°04.9	279°56.5	-11°20.7	15°15.8	-20°07.5	338°56.9	-22°42.9
14	271°30.3	67°26.3	-10°04.6	294°57.5	-11°20.0	30°17.6	-20°07.6	353°59.1	-22°42.9
15	286°32.8	82°28.0	-10°04.4	309°58.6	-11°19.4	45°19.5	-20°07.7	9°01.2	-22°42.9
16	301°35.2	97°29.7	-10°04.2	324°59.6	-11°18.7	60°21.4	-20°07.8	24°03.4	-22°42.9
17	316°37.7	112°31.5	-10°03.9	340°00.6	-11°18.1	75°23.3	-20°07.9	39°05.6	-22°42.9
18	331°40.2	127°33.2	-10°03.7	355°01.6	-11°17.4	90°25.2	-20°08.0	54°07.8	-22°42.9
19	346°42.6	142°34.9	-10°03.5	10°02.6	-11°16.8	105°27.0	-20°08.1	69°10.0	-22°42.9
20	1°45.1	157°36.6	-10°03.2	25°03.6	-11°16.1	120°28.9	-20°08.3	84°12.2	-22°42.9
21	16°47.6	172°38.3	-10°03.0	40°04.6	-11°15.4	135°30.8	-20°08.4	99°14.4	-22°42.9
22	31°50.0	187°40.0	-10°02.8	55°05.6	-11°14.8	150°32.7	-20°08.5	114°16.6	-22°42.9
23	46°52.5	202°41.7	-10°02.6	70°06.6	-11°14.1	165°34.6	-20°08.6	129°18.7	-22°42.9
Mer.pass.:19:53		v1.8 d0.3 m-4.4		v1.0 d0.7 m-0.2		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	61°55.0	217°43.4	-10°02.4	85°07.6	-11°13.5	180°36.5	-20°08.7	144°20.9	-22°42.8
1	76°57.4	232°45.1	-10°02.1	100°08.6	-11°12.8	195°38.3	-20°08.8	159°23.1	-22°42.8
2	91°59.9	247°46.8	-10°01.9	115°09.6	-11°12.2	210°40.2	-20°08.9	174°25.3	-22°42.8
3	107°02.4	262°48.5	-10°01.7	130°10.6	-11°11.5	225°42.1	-20°09.0	189°27.5	-22°42.8
4	122°04.8	277°50.2	-10°01.5	145°11.7	-11°10.8	240°44.0	-20°09.1	204°29.7	-22°42.8
5	137°07.3	292°51.9	-10°01.3	160°12.7	-11°10.2	255°45.9	-20°09.2	219°31.9	-22°42.8
6	152°09.7	307°53.6	-10°01.1	175°13.7	-11°09.5	270°47.7	-20°09.3	234°34.0	-22°42.8
7	167°12.2	322°55.3	-10°00.9	190°14.7	-11°08.9	285°49.6	-20°09.5	249°36.2	-22°42.8
8	182°14.7	337°56.9	-10°00.7	205°15.7	-11°08.2	300°51.5	-20°09.6	264°38.4	-22°42.8
9	197°17.1	352°58.6	-10°00.5	220°16.7	-11°07.6	315°53.4	-20°09.7	279°40.6	-22°42.8
10	212°19.6	8°00.3	-10°00.3	235°17.7	-11°06.9	330°55.3	-20°09.8	294°42.8	-22°42.8
11	227°22.1	23°01.9	-10°00.1	250°18.7	-11°06.2	345°57.2	-20°09.9	309°45.0	-22°42.7
12	242°24.5	38°03.6	-9°59.9	265°19.7	-11°05.6	0°59.0	-20°10.0	324°47.2	-22°42.7
13	257°27.0	53°05.3	-9°59.7	280°20.7	-11°04.9	16°00.9	-20°10.1	339°49.3	-22°42.7
14	272°29.5	68°06.9	-9°59.5	295°21.7	-11°04.3	31°02.8	-20°10.2	354°51.5	-22°42.7
15	287°31.9	83°08.6	-9°59.3	310°22.7	-11°03.6	46°04.7	-20°10.3	9°53.7	-22°42.7
16	302°34.4	98°10.2	-9°59.1	325°23.7	-11°02.9	61°06.6	-20°10.4	24°55.9	-22°42.7
17	317°36.9	113°11.9	-9°58.9	340°24.7	-11°02.3	76°08.4	-20°10.5	39°58.1	-22°42.7
18	332°39.3	128°13.5	-9°58.7	355°25.7	-11°01.6	91°10.3	-20°10.7	55°00.3	-22°42.7
19	347°41.8	143°15.1	-9°58.5	10°26.7	-11°01.0	106°12.2	-20°10.8	70°02.4	-22°42.7
20	2°44.2	158°16.8	-9°58.4	25°27.7	-11°00.3	121°14.1	-20°10.9	85°04.6	-22°42.7
21	17°46.7	173°18.4	-9°58.2	40°28.8	-10°59.6	136°16.0	-20°11.0	100°06.8	-22°42.6
22	32°49.2	188°20.0	-9°58.0	55°29.8	-10°59.0	151°17.8	-20°11.1	115°09.0	-22°42.6
23	47°51.6	203°21.7	-9°57.8	70°30.8	-10°58.3	166°19.7	-20°11.2	130°11.2	-22°42.6
Mer.pass.:19:49		v1.7 d0.2 m-4.4		v1.0 d0.7 m-0.2		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.8	-42°12.5
Schedar	349°35.9	56°38.6
Diphda	348°51.9	-17°53.1
Achernar	335°23.6	-57°08.7
Hamal	327°56.3	23°33.1
Polaris	315°41.6	89°20.6
Akamar	315°15.1	-40°13.9
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.6
Aldebaran	290°44.8	16°32.7
Rigel	281°08.2	-8°10.9
Capella	280°28.6	46°00.9
Bellatrix	278°27.8	6°21.9
Elnath	278°07.6	28°37.2
Alnilam	275°42.3	-1°11.5
Betelgeuse	270°57.0	7°24.5
Canopus	263°54.1	-52°42.3
Sirius	258°30.1	-16°44.3
Adara	255°09.4	-28°59.8
Procyon	244°55.6	5°10.7
Pollux	243°22.9	27°58.7
Avior	234°16.2	-59°34.0
Suhail	222°49.6	-43°30.3
Miaplacidus	221°38.7	-69°47.4
Alphard	217°52.4	-8°44.3
Regulus	207°39.6	11°52.5
Dubhe	193°47.4	61°38.8
Denebola	182°30.0	14°28.1
Gienah	175°48.7	-17°38.5
Acrux	173°05.6	-63°11.8
Gacrux	171°57.1	-57°12.7
Alioth	166°17.9	55°51.4
Spica	158°27.6	-11°15.3
Alcaid	152°56.4	49°13.2
Hadar	148°43.2	-60°27.5
Menkent	148°03.6	-36°27.4
Arcturus	145°52.6	19°05.5
Rigil Kent.	139°47.4	-60°54.4
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.7
Alphecca	126°08.3	26°39.3
Antares	112°22.1	-26°28.2
Atria	107°21.2	-69°03.5
Sabik	102°08.7	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.4	12°33.1
Etamin	90°44.9	51°29.5
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.9	38°48.3
Nunki	75°54.1	-26°16.3
Altair	62°04.9	8°55.2
Peacock	53°13.8	-56°40.6
Deneb	49°29.2	45°21.2
Enif	33°43.6	9°57.8
Alnair	27°39.2	-46°52.4
Fomalhaut	15°19.9	-29°31.5
Scheat	13°49.8	28°11.2
Markab	13°34.6	15°18.5

2018/11/	**SHA**	**Mer.pass**
Venus	156°21.4	09:34
Mars	24°22.5	18:21
Jupiter	119°09.4	12:02
Saturn	82°39.2	14:27

2018/11/	**SHA**	**Mer.pass**
Venus	156°05.9	09:31
Mars	23°47.6	18:20
Jupiter	118°55.5	11:59
Saturn	82°32.6	14:24

2018/11/	**SHA**	**Mer.pass**
Venus	155°48.5	09:28
Mars	23°12.7	18:18
Jupiter	118°41.5	11:56
Saturn	82°26.0	14:21

Horizontal paralax	
Venus:	0.4
Mars:	0.2

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°34.1	-19°50.8	30°05.4	12.1	6°46.2	11.6	57.3
1	198°34.0	-19°51.4	44°36.4	12.0	6°57.8	11.6	57.3
2	213°33.8	-19°51.9	59°07.4	12.0	7°09.3	11.5	57.3
3	228°33.7	-19°52.5	73°38.4	11.9	7°20.9	11.5	57.4
4	243°33.5	-19°53.0	88°09.2	11.8	7°32.4	11.5	57.4
5	258°33.3	-19°53.6	102°40.0	11.8	7°43.9	11.5	57.4
6	273°33.2	-19°54.2	117°10.8	11.7	7°55.3	11.4	57.5
7	288°33.0	-19°54.7	131°41.5	11.6	8°06.7	11.4	57.5
8	303°32.9	-19°55.3	146°12.1	11.6	8°18.1	11.4	57.5
9	318°32.7	-19°55.8	160°42.6	11.5	8°29.5	11.4	57.6
10	333°32.6	-19°56.4	175°13.1	11.4	8°40.9	11.3	57.6
11	348°32.4	-19°56.9	189°43.5	11.4	8°52.2	11.3	57.6
12	3°32.3	-19°57.5	204°13.8	11.3	9°03.4	11.3	57.6
13	18°32.1	-19°58.0	218°44.1	11.2	9°14.7	11.2	57.7
14	33°31.9	-19°58.5	233°14.3	11.2	9°25.9	11.2	57.7
15	48°31.8	-19°59.1	247°44.4	11.1	9°37.1	11.2	57.7
16	63°31.6	-19°59.6	262°14.4	11.0	9°48.2	11.1	57.8
17	78°31.5	-20°00.2	276°44.4	10.9	9°59.3	11.1	57.8
18	93°31.3	-20°00.7	291°14.3	10.9	10°10.4	11.0	57.8
19	108°31.2	-20°01.3	305°44.1	10.8	10°21.4	11.0	57.9
20	123°31.0	-20°01.8	320°13.9	10.7	10°32.4	11.0	57.9
21	138°30.8	-20°02.4	334°43.6	10.6	10°43.3	10.9	57.9
22	153°30.7	-20°02.9	349°13.2	10.6	10°54.2	10.9	58.0
23	168°30.5	-20°03.4	3°42.7	10.5	11°05.0	10.8	58.0
	SD.=16.2	d=-0.6	S.D.=15.6				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°30.4	-20°04.0	18°12.2	10.4	11°15.8	10.8	58.0
1	198°30.2	-20°04.5	32°41.5	10.3	11°26.6	10.7	58.0
2	213°30.0	-20°05.1	47°10.8	10.3	11°37.2	10.7	58.1
3	228°29.9	-20°05.6	61°40.1	10.2	11°47.9	10.6	58.1
4	243°29.7	-20°06.1	76°09.2	10.1	11°58.5	10.6	58.1
5	258°29.5	-20°06.7	90°38.3	10.0	12°09.0	10.5	58.2
6	273°29.4	-20°07.2	105°07.3	9.9	12°19.5	10.5	58.2
7	288°29.2	-20°07.8	119°36.2	9.9	12°29.9	10.4	58.2
8	303°29.1	-20°08.3	134°05.0	9.8	12°40.3	10.3	58.3
9	318°28.9	-20°08.8	148°33.7	9.7	12°50.6	10.3	58.3
10	333°28.7	-20°09.4	163°02.4	9.6	13°00.8	10.2	58.3
11	348°28.6	-20°09.9	177°31.0	9.5	13°11.0	10.1	58.3
12	3°28.4	-20°10.4	191°59.5	9.5	13°21.1	10.1	58.4
13	18°28.2	-20°11.0	206°27.9	9.4	13°31.2	10.0	58.4
14	33°28.1	-20°11.5	220°56.3	9.3	13°41.2	10.0	58.4
15	48°27.9	-20°12.0	235°24.5	9.2	13°51.1	9.9	58.4
16	63°27.7	-20°12.5	249°52.7	9.1	14°00.9	9.8	58.5
17	78°27.6	-20°13.1	264°20.8	9.1	14°10.7	9.7	58.5
18	93°27.4	-20°13.6	278°48.9	9.0	14°20.4	9.7	58.5
19	108°27.2	-20°14.1	293°16.8	8.9	14°30.0	9.6	58.6
20	123°27.1	-20°14.7	307°44.6	8.8	14°39.6	9.5	58.6
21	138°26.9	-20°15.2	322°12.4	8.7	14°49.1	9.4	58.6
22	153°26.7	-20°15.7	336°40.1	8.7	14°58.5	9.4	58.6
23	168°26.6	-20°16.2	351°07.7	8.6	15°07.8	9.3	58.7
	SD.=16.2	d=-0.5	S.D.=15.8				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°26.4	-20°16.8	5°35.3	8.5	15°17.0	9.2	58.7
1	198°26.2	-20°17.3	20°02.7	8.4	15°26.2	9.1	58.7
2	213°26.1	-20°17.8	34°30.1	8.3	15°35.3	9.0	58.7
3	228°25.9	-20°18.3	48°57.4	8.2	15°44.3	8.9	58.8
4	243°25.7	-20°18.9	63°24.6	8.2	15°53.2	8.9	58.8
5	258°25.5	-20°19.4	77°51.7	8.1	16°02.0	8.8	58.8
6	273°25.4	-20°19.9	92°18.7	8.0	16°10.7	8.7	58.8
7	288°25.2	-20°20.4	106°45.7	7.9	16°19.4	8.6	58.9
8	303°25.0	-20°20.9	121°12.5	7.8	16°27.9	8.5	58.9
9	318°24.9	-20°21.5	135°39.3	7.8	16°36.4	8.4	58.9
10	333°24.7	-20°22.0	150°06.1	7.7	16°44.7	8.3	58.9
11	348°24.5	-20°22.5	164°32.7	7.6	16°53.0	8.2	59.0
12	3°24.3	-20°23.0	178°59.3	7.5	17°01.2	8.1	59.0
13	18°24.2	-20°23.5	193°25.7	7.4	17°09.2	8.0	59.0
14	33°24.0	-20°24.1	207°52.1	7.4	17°17.2	7.9	59.0
15	48°23.8	-20°24.6	222°18.5	7.3	17°25.1	7.8	59.0
16	63°23.6	-20°25.1	236°44.7	7.2	17°32.8	7.7	59.1
17	78°23.5	-20°25.6	251°10.9	7.1	17°40.5	7.6	59.1
18	93°23.3	-20°26.1	265°37.0	7.1	17°48.0	7.5	59.1
19	108°23.1	-20°26.6	280°03.0	7.0	17°55.5	7.4	59.1
20	123°22.9	-20°27.1	294°28.9	6.9	18°02.8	7.3	59.1
21	138°22.8	-20°27.7	308°54.8	6.8	18°10.1	7.2	59.2
22	153°22.6	-20°28.2	323°20.6	6.8	18°17.2	7.1	59.2
23	168°22.4	-20°28.7	337°46.3	6.7	18°24.2	7.0	59.2
	SD.=16.2	d=-0.5	S.D.=16.0				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:23	09:07	–:–	–:–	14:24	16:08
70	07:10	08:38	10:44	12:47	14:53	16:21
68	06:60	08:17	09:47	13:45	15:15	16:32
66	06:51	07:60	09:13	14:18	15:32	16:41
64	06:43	07:46	08:49	14:42	15:46	16:48
62	06:36	07:34	08:30	15:01	15:58	16:55
60	06:30	07:23	08:15	15:17	16:08	17:01
58	06:25	07:15	08:02	15:30	16:17	17:07
56	06:20	07:07	07:50	15:41	16:25	17:12
54	06:15	06:60	07:40	15:51	16:32	17:16
52	06:11	06:53	07:32	16:00	16:39	17:21
50	06:07	06:47	07:24	16:08	16:45	17:25
45	05:58	06:34	07:07	16:25	16:57	17:34
40	05:50	06:23	06:53	16:39	17:08	17:42
35	05:43	06:14	06:41	16:51	17:18	17:49
30	05:36	06:05	06:31	17:01	17:27	17:56
20	05:23	05:49	06:13	17:19	17:43	18:10
10	05:09	05:35	05:57	17:35	17:57	18:23
0	04:55	05:20	05:42	17:50	18:12	18:37
-10	04:39	05:05	05:28	18:05	18:27	18:54
-20	04:19	04:48	05:12	18:21	18:45	19:13
-30	03:55	04:27	04:53	18:40	19:06	19:38
-35	03:39	04:14	04:42	18:51	19:19	19:54
-40	03:20	03:58	04:30	19:03	19:34	20:13
-45	02:55	03:40	04:15	19:18	19:53	20:38
-50	02:21	03:16	03:56	19:37	20:17	21:13
-52	02:03	03:04	03:48	19:45	20:29	21:32
-54	01:40	02:51	03:38	19:55	20:43	21:55
-56	01:07	02:35	03:27	20:06	20:59	22:29
-58	–:–	02:15	03:14	20:19	21:19	–:–
-60	–:–	01:51	02:59	20:34	21:44	–:–

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	14:26	14:05	13:24	05:50	07:56	10:29
70	14:40	14:30	14:17	05:38	07:32	09:38
68	14:51	14:50	14:50	05:28	07:14	09:06
66	15:01	15:06	15:14	05:20	06:59	08:42
64	15:09	15:19	15:33	05:14	06:48	08:24
62	15:16	15:30	15:49	05:08	06:37	08:09
60	15:22	15:39	16:02	05:03	06:29	07:57
58	15:27	15:47	16:13	04:58	06:21	07:46
56	15:32	15:55	16:23	04:55	06:15	07:37
54	15:37	16:01	16:32	04:51	06:09	07:28
52	15:40	16:07	16:40	04:48	06:04	07:21
50	15:44	16:12	16:47	04:45	05:59	07:14
45	15:52	16:24	17:02	04:39	05:49	07:00
40	15:58	16:34	17:15	04:34	05:40	06:49
35	16:04	16:42	17:25	04:29	05:33	06:39
30	16:09	16:49	17:35	04:25	05:26	06:30
20	16:18	17:02	17:51	04:19	05:15	06:15
10	16:25	17:13	18:05	04:13	05:06	06:02
0	16:33	17:24	18:19	04:07	04:57	05:50
-10	16:40	17:35	18:32	04:02	04:48	05:38
-20	16:48	17:46	18:47	03:56	04:38	05:25
-30	16:57	17:59	19:04	03:49	04:27	05:10
-35	17:02	18:07	19:14	03:45	04:21	05:01
-40	17:08	18:16	19:25	03:41	04:14	04:52
-45	17:15	18:26	19:38	03:36	04:06	04:40
-50	17:24	18:39	19:54	03:30	03:56	04:27
-52	17:27	18:44	20:02	03:27	03:51	04:20
-54	17:32	18:51	20:10	03:24	03:46	04:13
-56	17:37	18:58	20:20	03:21	03:41	04:05
-58	17:42	19:06	20:31	03:17	03:35	03:57
-60	17:48	19:16	20:43	03:13	03:28	03:47

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
21	14:17	14:09	11:45	22:44	10:19	14(96%)
22	14:02	13:54	11:46	23:36	11:10	15(99%)
23	13:46	13:38	11:46	00:32	12:04	16(100%)

November 24, 25 ,26 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	62°54.1	218°23.3	-9°57.7	85°31.8	-10°57.7	181°21.6	-20°11.3	145°13.4	-22°42.6
1	77°56.6	233°24.9	-9°57.5	100°32.8	-10°57.0	196°23.5	-20°11.4	160°15.6	-22°42.6
2	92°59.0	248°26.5	-9°57.3	115°33.8	-10°56.3	211°25.4	-20°11.5	175°17.7	-22°42.6
3	108°01.5	263°28.2	-9°57.1	130°34.8	-10°55.7	226°27.3	-20°11.6	190°19.9	-22°42.6
4	123°04.0	278°29.8	-9°57.0	145°35.8	-10°55.0	241°29.1	-20°11.7	205°22.1	-22°42.6
5	138°06.4	293°31.4	-9°56.8	160°36.8	-10°54.4	256°31.0	-20°11.9	220°24.3	-22°42.6
6	153°08.9	308°33.0	-9°56.6	175°37.8	-10°53.7	271°32.9	-20°12.0	235°26.5	-22°42.6
7	168°11.4	323°34.6	-9°56.5	190°38.8	-10°53.0	286°34.8	-20°12.1	250°28.7	-22°42.5
8	183°13.8	338°36.2	-9°56.3	205°39.8	-10°52.4	301°36.7	-20°12.2	265°30.8	-22°42.5
9	198°16.3	353°37.8	-9°56.2	220°40.8	-10°51.7	316°38.5	-20°12.3	280°33.0	-22°42.5
10	213°18.7	8°39.4	-9°56.0	235°41.8	-10°51.1	331°40.4	-20°12.4	295°35.2	-22°42.5
11	228°21.2	23°41.0	-9°55.9	250°42.8	-10°50.4	346°42.3	-20°12.5	310°37.4	-22°42.5
12	243°23.7	38°42.5	-9°55.7	265°43.8	-10°49.7	1°44.2	-20°12.6	325°39.6	-22°42.5
13	258°26.1	53°44.1	-9°55.6	280°44.8	-10°49.1	16°46.1	-20°12.7	340°41.8	-22°42.5
14	273°28.6	68°45.7	-9°55.4	295°45.8	-10°48.4	31°47.9	-20°12.8	355°43.9	-22°42.5
15	288°31.1	83°47.3	-9°55.3	310°46.8	-10°47.7	46°49.8	-20°12.9	10°46.1	-22°42.5
16	303°33.5	98°48.9	-9°55.1	325°47.8	-10°47.1	61°51.7	-20°13.0	25°48.3	-22°42.5
17	318°36.0	113°50.4	-9°55.0	340°48.8	-10°46.4	76°53.6	-20°13.2	40°50.5	-22°42.5
18	333°38.5	128°52.0	-9°54.8	355°49.8	-10°45.8	91°55.5	-20°13.3	55°52.7	-22°42.4
19	348°40.9	143°53.6	-9°54.7	10°50.8	-10°45.1	106°57.3	-20°13.4	70°54.9	-22°42.4
20	3°43.4	158°55.1	-9°54.6	25°51.8	-10°44.4	121°59.2	-20°13.5	85°57.0	-22°42.4
21	18°45.9	173°56.7	-9°54.4	40°52.8	-10°43.8	137°01.1	-20°13.6	100°59.2	-22°42.4
22	33°48.3	188°58.3	-9°54.3	55°53.8	-10°43.1	152°03.0	-20°13.7	116°01.4	-22°42.4
23	48°50.8	203°59.8	-9°54.2	70°54.8	-10°42.4	167°04.9	-20°13.8	131°03.6	-22°42.4
Mer.pass.:19:45		v1.6 d0.2 m-4.4		v1.0 d0.7 m-0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	63°53.2	219°01.4	-9°54.0	85°55.9	-10°41.8	182°06.7	-20°13.9	146°05.8	-22°42.4
1	78°55.7	234°02.9	-9°53.9	100°56.9	-10°41.1	197°08.6	-20°14.0	161°08.0	-22°42.4
2	93°58.2	249°04.4	-9°53.8	115°57.9	-10°40.5	212°10.5	-20°14.1	176°10.1	-22°42.4
3	109°00.6	264°06.0	-9°53.6	130°58.9	-10°39.8	227°12.4	-20°14.2	191°12.3	-22°42.4
4	124°03.1	279°07.5	-9°53.5	145°59.9	-10°39.1	242°14.3	-20°14.3	206°14.5	-22°42.3
5	139°05.6	294°09.1	-9°53.4	161°00.9	-10°38.5	257°16.1	-20°14.5	221°16.7	-22°42.3
6	154°08.0	309°10.6	-9°53.3	176°01.9	-10°37.8	272°18.0	-20°14.6	236°18.9	-22°42.3
7	169°10.5	324°12.1	-9°53.2	191°02.9	-10°37.1	287°19.9	-20°14.7	251°21.0	-22°42.3
8	184°13.0	339°13.6	-9°53.0	206°03.9	-10°36.5	302°21.8	-20°14.8	266°23.2	-22°42.3
9	199°15.4	354°15.2	-9°52.9	221°04.9	-10°35.8	317°23.7	-20°14.9	281°25.4	-22°42.3
10	214°17.9	9°16.7	-9°52.8	236°05.9	-10°35.1	332°25.6	-20°15.0	296°27.6	-22°42.3
11	229°20.3	24°18.2	-9°52.7	251°06.9	-10°34.5	347°27.4	-20°15.1	311°29.8	-22°42.3
12	244°22.8	39°19.7	-9°52.6	266°07.9	-10°33.8	2°29.3	-20°15.2	326°32.0	-22°42.3
13	259°25.3	54°21.2	-9°52.5	281°08.9	-10°33.1	17°31.2	-20°15.3	341°34.1	-22°42.3
14	274°27.7	69°22.7	-9°52.4	296°09.9	-10°32.5	32°33.1	-20°15.4	356°36.3	-22°42.2
15	289°30.2	84°24.3	-9°52.3	311°10.9	-10°31.8	47°35.0	-20°15.5	11°38.5	-22°42.2
16	304°32.7	99°25.8	-9°52.2	326°11.9	-10°31.2	62°36.8	-20°15.6	26°40.7	-22°42.2
17	319°35.1	114°27.3	-9°52.1	341°12.9	-10°30.5	77°38.7	-20°15.7	41°42.9	-22°42.2
18	334°37.6	129°28.7	-9°52.0	356°13.9	-10°29.8	92°40.6	-20°15.8	56°45.0	-22°42.2
19	349°40.1	144°30.2	-9°51.9	11°14.9	-10°29.2	107°42.5	-20°16.0	71°47.2	-22°42.2
20	4°42.5	159°31.7	-9°51.8	26°15.9	-10°28.5	122°44.4	-20°16.1	86°49.4	-22°42.2
21	19°45.0	174°33.2	-9°51.7	41°16.9	-10°27.8	137°46.2	-20°16.2	101°51.6	-22°42.2
22	34°47.5	189°34.7	-9°51.6	56°17.9	-10°27.2	152°48.1	-20°16.3	116°53.8	-22°42.2
23	49°49.9	204°36.2	-9°51.5	71°18.9	-10°26.5	167°50.0	-20°16.4	131°55.9	-22°42.1
Mer.pass.:19:41		v1.5 d0.1 m-4.4		v1.0 d0.7 m-0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	64°52.4	219°37.7	-9°51.4	86°19.9	-10°25.8	182°51.9	-20°16.5	146°58.1	-22°42.1
1	79°54.8	234°39.1	-9°51.3	101°20.9	-10°25.2	197°53.8	-20°16.6	162°00.3	-22°42.1
2	94°57.3	249°40.6	-9°51.3	116°21.9	-10°24.5	212°55.6	-20°16.7	177°02.5	-22°42.1
3	109°59.8	264°42.1	-9°51.2	131°22.9	-10°23.8	227°57.5	-20°16.8	192°04.7	-22°42.1
4	125°02.2	279°43.6	-9°51.1	146°23.9	-10°23.2	242°59.4	-20°16.9	207°06.8	-22°42.1
5	140°04.7	294°45.0	-9°51.0	161°24.9	-10°22.5	258°01.3	-20°17.0	222°09.0	-22°42.1
6	155°07.2	309°46.5	-9°50.9	176°25.9	-10°21.8	273°03.2	-20°17.1	237°11.2	-22°42.1
7	170°09.6	324°47.9	-9°50.9	191°26.9	-10°21.2	288°05.0	-20°17.2	252°13.4	-22°42.1
8	185°12.1	339°49.4	-9°50.8	206°27.9	-10°20.5	303°06.9	-20°17.3	267°15.6	-22°42.1
9	200°14.6	354°50.8	-9°50.7	221°28.9	-10°19.8	318°08.8	-20°17.5	282°17.7	-22°42.0
10	215°17.0	9°52.3	-9°50.6	236°29.9	-10°19.2	333°10.7	-20°17.6	297°19.9	-22°42.0
11	230°19.5	24°53.7	-9°50.6	251°30.9	-10°18.5	348°12.6	-20°17.7	312°22.1	-22°42.0
12	245°22.0	39°55.2	-9°50.5	266°31.9	-10°17.8	3°14.4	-20°17.8	327°24.3	-22°42.0
13	260°24.4	54°56.6	-9°50.4	281°32.9	-10°17.1	18°16.3	-20°17.9	342°26.5	-22°42.0
14	275°26.9	69°58.1	-9°50.4	296°33.9	-10°16.5	33°18.2	-20°18.0	357°28.6	-22°42.0
15	290°29.3	84°59.5	-9°50.3	311°34.9	-10°15.8	48°20.1	-20°18.1	12°30.8	-22°42.0
16	305°31.8	100°00.9	-9°50.3	326°35.9	-10°15.1	63°21.9	-20°18.2	27°33.0	-22°42.0
17	320°34.3	115°02.4	-9°50.2	341°36.9	-10°14.5	78°23.8	-20°18.3	42°35.2	-22°42.0
18	335°36.7	130°03.8	-9°50.1	356°37.9	-10°13.8	93°25.7	-20°18.4	57°37.4	-22°42.0
19	350°39.2	145°05.2	-9°50.1	11°38.9	-10°13.1	108°27.6	-20°18.5	72°39.5	-22°41.9
20	5°41.7	160°06.6	-9°50.0	26°39.9	-10°12.5	123°29.5	-20°18.6	87°41.7	-22°41.9
21	20°44.1	175°08.1	-9°50.0	41°40.9	-10°11.8	138°31.3	-20°18.7	102°43.9	-22°41.9
22	35°46.6	190°09.5	-9°49.9	56°41.9	-10°11.1	153°33.2	-20°18.8	117°46.1	-22°41.9
23	50°49.1	205°10.9	-9°49.9	71°42.9	-10°10.5	168°35.1	-20°18.9	132°48.2	-22°41.9
Mer.pass.:19:37		v1.5 d0.1 m-4.4		v1.0 d0.7 m-0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.8	-42°12.5
Schedar	349°35.9	56°38.6
Diphda	348°51.9	-17°53.1
Achernar	335°23.6	-57°08.8
Hamal	327°56.3	23°33.1
Polaris	315°41.6	89°20.6
Akamar	315°15.1	-40°14.0
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.6
Aldebaran	290°44.8	16°32.7
Rigel	281°08.2	-8°10.9
Capella	280°28.6	46°00.9
Bellatrix	278°27.7	6°21.9
Elnath	278°07.6	28°37.2
Alnilam	275°42.3	-1°11.5
Betelgeuse	270°57.0	7°24.5
Canopus	263°54.0	-52°42.3
Sirius	258°30.1	-16°44.4
Adara	255°09.3	-28°59.8
Procyon	244°55.6	5°10.7
Pollux	243°22.9	27°58.7
Avior	234°16.2	-59°34.0
Suhail	222°49.6	-43°30.3
Miaplacidus	221°38.6	-69°47.4
Alphard	217°52.4	-8°44.3
Regulus	207°39.6	11°52.5
Dubhe	193°47.4	61°38.8
Denebola	182°30.0	14°28.1
Gienah	175°48.7	-17°38.5
Acrux	173°05.5	-63°11.8
Gacrux	171°57.1	-57°12.7
Alioth	166°17.9	55°51.4
Spica	158°27.6	-11°15.3
Alcaid	152°56.4	49°13.2
Hadar	148°43.2	-60°27.5
Menkent	148°03.6	-36°27.4
Arcturus	145°52.5	19°05.5
Rigil Kent.	139°47.3	-60°54.4
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.7
Alphecca	126°08.3	26°39.3
Antares	112°22.1	-26°28.2
Atria	107°21.2	-69°03.5
Sabik	102°08.7	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.4	12°33.1
Etamin	90°44.9	51°29.5
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.9	38°48.3
Nunki	75°54.1	-26°16.3
Altair	62°04.9	8°55.2
Peacock	53°13.8	-56°40.6
Deneb	49°29.2	45°21.2
Enif	33°43.6	9°57.8
Alnair	27°39.2	-46°52.4
Fomalhaut	15°19.9	-29°31.5
Scheat	13°49.8	28°11.2
Markab	13°34.6	15°18.5

2018/11/	**SHA**	**Mer.pass**
Venus	155°29.2	09:25
Mars	22°37.7	18:17
Jupiter	118°27.5	11:53
Saturn	82°19.3	14:17

2018/11/	**SHA**	**Mer.pass**
Venus	155°08.1	09:23
Mars	22°02.6	18:15
Jupiter	118°13.5	11:50
Saturn	82°12.5	14:14

2018/11/	**SHA**	**Mer.pass**
Venus	154°45.3	09:21
Mars	21°27.5	18:13
Jupiter	117°59.5	11:47
Saturn	82°05.7	14:10

Horizontal paralax	
Venus:	0.4
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°22.2	-20°29.2	352°11.9	6.6	18°31.1	6.8	59.2
1	198°22.1	-20°29.7	6°37.5	6.5	18°37.9	6.7	59.2
2	213°21.9	-20°30.2	21°03.0	6.5	18°44.5	6.6	59.3
3	228°21.7	-20°30.7	35°28.4	6.4	18°51.1	6.5	59.3
4	243°21.5	-20°31.2	49°53.8	6.3	18°57.5	6.4	59.3
5	258°21.3	-20°31.7	64°19.1	6.3	19°03.8	6.3	59.3
6	273°21.2	-20°32.2	78°44.3	6.2	19°10.0	6.1	59.3
7	288°21.0	-20°32.7	93°09.4	6.1	19°16.1	6.0	59.4
8	303°20.8	-20°33.2	107°34.5	6.1	19°22.0	5.9	59.4
9	318°20.6	-20°33.7	121°59.6	6.0	19°27.8	5.8	59.4
10	333°20.4	-20°34.2	136°24.5	5.9	19°33.5	5.6	59.4
11	348°20.3	-20°34.7	150°49.4	5.9	19°39.1	5.5	59.4
12	3°20.1	-20°35.2	165°14.3	5.8	19°44.6	5.4	59.4
13	18°19.9	-20°35.7	179°39.0	5.7	19°49.9	5.3	59.5
14	33°19.7	-20°36.2	194°03.7	5.7	19°55.1	5.1	59.5
15	48°19.5	-20°36.7	208°28.4	5.6	20°00.1	5.0	59.5
16	63°19.4	-20°37.2	222°53.0	5.6	20°05.0	4.9	59.5
17	78°19.2	-20°37.7	237°17.6	5.5	20°09.8	4.7	59.5
18	93°19.0	-20°38.2	251°42.1	5.5	20°14.5	4.6	59.5
19	108°18.8	-20°38.7	266°06.5	5.4	20°19.0	4.5	59.5
20	123°18.6	-20°39.2	280°30.9	5.4	20°23.4	4.3	59.6
21	138°18.4	-20°39.7	294°55.2	5.3	20°27.7	4.2	59.6
22	153°18.3	-20°40.2	309°19.5	5.3	20°31.8	4.0	59.6
23	168°18.1	-20°40.7	323°43.8	5.2	20°35.8	3.9	59.6
	SD.=16.2	d=-0.5	S.D.=16.2				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°17.9	-20°41.2	338°08.0	5.2	20°39.6	3.8	59.6
1	198°17.7	-20°41.7	352°32.1	5.1	20°43.3	3.6	59.6
2	213°17.5	-20°42.2	6°56.2	5.1	20°46.9	3.5	59.6
3	228°17.3	-20°42.7	21°20.3	5.0	20°50.3	3.4	59.6
4	243°17.1	-20°43.2	35°44.3	5.0	20°53.6	3.2	59.6
5	258°17.0	-20°43.7	50°08.3	5.0	20°56.7	3.1	59.7
6	273°16.8	-20°44.2	64°32.3	4.9	20°59.7	2.9	59.7
7	288°16.6	-20°44.7	78°56.2	4.9	21°02.6	2.8	59.7
8	303°16.4	-20°45.1	93°20.1	4.9	21°05.3	2.6	59.7
9	318°16.2	-20°45.6	107°43.9	4.8	21°07.8	2.5	59.7
10	333°16.0	-20°46.1	122°07.7	4.8	21°10.3	2.3	59.7
11	348°15.8	-20°46.6	136°31.5	4.8	21°12.5	2.2	59.7
12	3°15.6	-20°47.1	150°55.3	4.8	21°14.7	2.1	59.7
13	18°15.4	-20°47.6	165°19.0	4.7	21°16.6	1.9	59.7
14	33°15.3	-20°48.1	179°42.7	4.7	21°18.5	1.8	59.7
15	48°15.1	-20°48.5	194°06.4	4.7	21°20.2	1.6	59.7
16	63°14.9	-20°49.0	208°30.1	4.7	21°21.7	1.5	59.7
17	78°14.7	-20°49.5	222°53.8	4.6	21°23.1	1.3	59.8
18	93°14.5	-20°50.0	237°17.4	4.6	21°24.3	1.2	59.8
19	108°14.3	-20°50.5	251°41.0	4.6	21°25.4	1.0	59.8
20	123°14.1	-20°51.0	266°04.6	4.6	21°26.4	0.9	59.8
21	138°13.9	-20°51.4	280°28.2	4.6	21°27.2	0.7	59.8
22	153°13.7	-20°51.9	294°51.8	4.6	21°27.8	0.6	59.8
23	168°13.5	-20°52.4	309°15.4	4.6	21°28.3	0.4	59.8
	SD.=16.2	d=-0.5	S.D.=16.3				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°13.3	-20°52.9	323°39.0	4.6	21°28.7	0.3	59.8
1	198°13.1	-20°53.3	338°02.6	4.6	21°28.9	0.1	59.8
2	213°13.0	-20°53.8	352°26.1	4.6	21°28.9	-0.0	59.8
3	228°12.8	-20°54.3	6°49.7	4.6	21°28.8	-0.2	59.8
4	243°12.6	-20°54.8	21°13.3	4.6	21°28.6	-0.3	59.8
5	258°12.4	-20°55.2	35°36.8	4.6	21°28.2	-0.5	59.8
6	273°12.2	-20°55.7	50°00.4	4.6	21°27.6	-0.6	59.8
7	288°12.0	-20°56.2	64°24.0	4.6	21°26.9	-0.8	59.8
8	303°11.8	-20°56.7	78°47.6	4.6	21°26.1	-0.9	59.8
9	318°11.6	-20°57.1	93°11.2	4.6	21°25.1	-1.1	59.8
10	333°11.4	-20°57.6	107°34.8	4.6	21°23.9	-1.2	59.8
11	348°11.2	-20°58.1	121°58.4	4.6	21°22.7	-1.4	59.8
12	3°11.0	-20°58.5	136°22.0	4.6	21°21.2	-1.5	59.8
13	18°10.8	-20°59.0	150°45.7	4.7	21°19.6	-1.7	59.8
14	33°10.6	-20°59.5	165°09.4	4.7	21°17.9	-1.8	59.8
15	48°10.4	-20°60.0	179°33.0	4.7	21°16.0	-2.0	59.8
16	63°10.2	-21°00.4	193°56.8	4.7	21°14.0	-2.1	59.8
17	78°10.0	-21°00.9	208°20.5	4.7	21°11.8	-2.3	59.8
18	93°09.8	-21°01.4	222°44.2	4.8	21°09.5	-2.4	59.8
19	108°09.6	-21°01.8	237°08.0	4.8	21°07.0	-2.5	59.8
20	123°09.4	-21°02.3	251°31.8	4.8	21°04.4	-2.7	59.8
21	138°09.2	-21°02.7	265°55.7	4.9	21°01.6	-2.8	59.8
22	153°09.0	-21°03.2	280°19.6	4.9	20°58.7	-3.0	59.8
23	168°08.8	-21°03.7	294°43.5	4.9	20°55.6	-3.1	59.8
	SD.=16.2	d=-0.5	S.D.=16.3				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:33	09:21	–:–	–:–	14:12	15:60
70	07:19	08:49	11:29	12:04	14:44	16:14
68	07:07	08:26	10:02	13:31	15:07	16:26
66	06:58	08:08	09:25	14:09	15:26	16:35
64	06:49	07:53	08:58	14:35	15:40	16:44
62	06:42	07:40	08:38	14:55	15:53	16:51
60	06:36	07:29	08:22	15:12	16:04	16:58
58	06:30	07:20	08:08	15:26	16:13	17:03
56	06:25	07:12	07:56	15:37	16:22	17:09
54	06:20	07:04	07:46	15:48	16:29	17:14
52	06:15	06:58	07:36	15:57	16:36	17:18
50	06:11	06:51	07:28	16:05	16:42	17:22
45	06:02	06:38	07:11	16:23	16:56	17:32
40	05:53	06:26	06:56	16:37	17:07	17:40
35	05:45	06:16	06:44	16:50	17:17	17:48
30	05:38	06:07	06:33	17:00	17:26	17:56
20	05:24	05:51	06:15	17:19	17:43	18:10
10	05:10	05:36	05:59	17:35	17:58	18:24
0	04:56	05:21	05:43	17:51	18:13	18:38
-10	04:39	05:05	05:28	18:06	18:29	18:55
-20	04:19	04:47	05:11	18:23	18:47	19:15
-30	03:53	04:26	04:52	18:42	19:09	19:41
-35	03:37	04:12	04:41	18:53	19:22	19:57
-40	03:17	03:56	04:28	19:07	19:38	20:17
-45	02:52	03:37	04:12	19:22	19:58	20:43
-50	02:16	03:12	03:53	19:41	20:23	21:20
-52	01:56	02:60	03:44	19:50	20:35	21:40
-54	01:31	02:46	03:34	20:01	20:50	22:05
-56	00:54	02:29	03:23	20:12	21:07	22:45
-58	–:–	02:08	03:09	20:26	21:28	–:–
-60	–:–	01:41	02:54	20:42	21:56	–:–

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	–:–	–:–	–:–	–:–
70	13:42	–:–	–:–	12:12	–:–	–:–
68	14:53	15:10	16:15	11:02	12:50	13:52
66	15:30	16:04	17:08	10:25	11:56	12:59
64	15:56	16:37	17:40	09:59	11:23	12:26
62	16:17	17:01	18:04	09:39	10:59	12:02
60	16:34	17:20	18:24	09:23	10:40	11:43
58	16:48	17:36	18:39	09:09	10:24	11:27
56	17:00	17:50	18:53	08:57	10:11	11:13
54	17:11	18:02	19:05	08:47	09:59	11:01
52	17:21	18:12	19:15	08:37	09:49	10:51
50	17:29	18:21	19:24	08:29	09:39	10:41
45	17:47	18:41	19:44	08:12	09:20	10:22
40	18:02	18:57	19:59	07:57	09:04	10:06
35	18:15	19:11	20:13	07:45	08:51	09:52
30	18:26	19:23	20:24	07:35	08:39	09:40
20	18:45	19:43	20:44	07:17	08:19	09:20
10	19:01	20:01	21:01	07:01	08:02	09:03
0	19:17	20:17	21:18	06:46	07:45	08:46
-10	19:33	20:34	21:34	06:32	07:29	08:29
-20	19:49	20:51	21:51	06:16	07:12	08:12
-30	20:09	21:12	22:11	05:58	06:52	07:51
-35	20:20	21:24	22:23	05:47	06:40	07:39
-40	20:33	21:38	22:36	05:36	06:27	07:26
-45	20:48	21:54	22:52	05:22	06:11	07:09
-50	21:07	22:14	23:11	05:04	05:52	06:49
-52	21:16	22:24	23:20	04:56	05:42	06:40
-54	21:26	22:34	23:30	04:48	05:32	06:29
-56	21:38	22:47	23:42	04:38	05:20	06:17
-58	21:51	23:01	23:55	04:26	05:07	06:03
-60	22:07	23:17	–:–	04:13	04:51	05:46

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
24	13:29	13:20	11:46	00:32	13:01	17(98%)
25	13:12	13:03	11:46	01:31	14:01	18(93%)
26	12:54	12:44	11:47	02:31	15:01	19(86%)

November 27, 28 ,29 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	65°51.5	220°12.3	-9°49.8	86°43.9	-10°09.8	183°37.0	-20°19.1	147°50.4	-22°41.9
1	80°54.0	235°13.7	-9°49.8	101°44.9	-10°09.1	198°38.9	-20°19.2	162°52.6	-22°41.9
2	95°56.5	250°15.1	-9°49.8	116°45.9	-10°08.5	213°40.7	-20°19.3	177°54.8	-22°41.9
3	110°58.9	265°16.5	-9°49.7	131°46.9	-10°07.8	228°42.6	-20°19.4	192°57.0	-22°41.9
4	126°01.4	280°17.9	-9°49.7	146°47.9	-10°07.1	243°44.5	-20°19.5	207°59.1	-22°41.8
5	141°03.8	295°19.3	-9°49.6	161°48.9	-10°06.4	258°46.4	-20°19.6	223°01.3	-22°41.8
6	156°06.3	310°20.7	-9°49.6	176°49.9	-10°05.8	273°48.3	-20°19.7	238°03.5	-22°41.8
7	171°08.8	325°22.1	-9°49.6	191°50.9	-10°05.1	288°50.1	-20°19.8	253°05.7	-22°41.8
8	186°11.2	340°23.5	-9°49.5	206°51.8	-10°04.4	303°52.0	-20°19.9	268°07.9	-22°41.8
9	201°13.7	355°24.8	-9°49.5	221°52.8	-10°03.8	318°53.9	-20°20.0	283°10.0	-22°41.8
10	216°16.2	10°26.2	-9°49.5	236°53.8	-10°03.1	333°55.8	-20°20.1	298°12.2	-22°41.8
11	231°18.6	25°27.6	-9°49.5	251°54.8	-10°02.4	348°57.7	-20°20.2	313°14.4	-22°41.8
12	246°21.1	40°29.0	-9°49.4	266°55.8	-10°01.7	3°59.5	-20°20.3	328°16.6	-22°41.8
13	261°23.6	55°30.4	-9°49.4	281°56.8	-10°01.1	19°01.4	-20°20.4	343°18.7	-22°41.7
14	276°26.0	70°31.7	-9°49.4	296°57.8	-10°00.4	34°03.3	-20°20.5	358°20.9	-22°41.7
15	291°28.5	85°33.1	-9°49.4	311°58.8	-9°59.7	49°05.2	-20°20.6	13°23.1	-22°41.7
16	306°31.0	100°34.5	-9°49.3	326°59.8	-9°59.1	64°07.1	-20°20.8	28°25.3	-22°41.7
17	321°33.4	115°35.8	-9°49.3	342°00.8	-9°58.4	79°08.9	-20°20.9	43°27.5	-22°41.7
18	336°35.9	130°37.2	-9°49.3	357°01.8	-9°57.7	94°10.8	-20°21.0	58°29.6	-22°41.7
19	351°38.3	145°38.5	-9°49.3	12°02.8	-9°57.0	109°12.7	-20°21.1	73°31.8	-22°41.7
20	6°40.8	160°39.9	-9°49.3	27°03.8	-9°56.4	124°14.6	-20°21.2	88°34.0	-22°41.7
21	21°43.3	175°41.2	-9°49.3	42°04.8	-9°55.7	139°16.5	-20°21.3	103°36.2	-22°41.7
22	36°45.7	190°42.6	-9°49.3	57°05.8	-9°55.0	154°18.3	-20°21.4	118°38.3	-22°41.7
23	51°48.2	205°43.9	-9°49.3	72°06.8	-9°54.4	169°20.2	-20°21.5	133°40.5	-22°41.6
Mer.pass.:19:33		v1.4 d0.0 m-4.4		v1.0 d0.7 m-0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	66°50.7	220°45.3	-9°49.2	87°07.8	-9°53.7	184°22.1	-20°21.6	148°42.7	-22°41.6
1	81°53.1	235°46.6	-9°49.2	102°08.8	-9°53.0	199°24.0	-20°21.7	163°44.9	-22°41.6
2	96°55.6	250°48.0	-9°49.2	117°09.8	-9°52.3	214°25.8	-20°21.8	178°47.0	-22°41.6
3	111°58.1	265°49.3	-9°49.2	132°10.8	-9°51.7	229°27.7	-20°21.9	193°49.2	-22°41.6
4	127°00.5	280°50.6	-9°49.2	147°11.8	-9°51.0	244°29.6	-20°22.0	208°51.4	-22°41.6
5	142°03.0	295°52.0	-9°49.2	162°12.8	-9°50.3	259°31.5	-20°22.1	223°53.6	-22°41.6
6	157°05.5	310°53.3	-9°49.2	177°13.8	-9°49.7	274°33.4	-20°22.2	238°55.7	-22°41.6
7	172°07.9	325°54.6	-9°49.3	192°14.8	-9°49.0	289°35.2	-20°22.3	253°57.9	-22°41.6
8	187°10.4	340°55.9	-9°49.3	207°15.8	-9°48.3	304°37.1	-20°22.4	269°00.1	-22°41.5
9	202°12.8	355°57.2	-9°49.3	222°16.8	-9°47.6	319°39.0	-20°22.5	284°02.3	-22°41.5
10	217°15.3	10°58.6	-9°49.3	237°17.8	-9°47.0	334°40.9	-20°22.6	299°04.5	-22°41.5
11	232°17.8	25°59.9	-9°49.3	252°18.7	-9°46.3	349°42.8	-20°22.8	314°06.6	-22°41.5
12	247°20.2	41°01.2	-9°49.3	267°19.7	-9°45.6	4°44.6	-20°22.9	329°08.8	-22°41.5
13	262°22.7	56°02.5	-9°49.3	282°20.7	-9°44.9	19°46.5	-20°23.0	344°11.0	-22°41.5
14	277°25.2	71°03.8	-9°49.3	297°21.7	-9°44.3	34°48.4	-20°23.1	359°13.2	-22°41.5
15	292°27.6	86°05.1	-9°49.4	312°22.7	-9°43.6	49°50.3	-20°23.2	14°15.3	-22°41.5
16	307°30.1	101°06.4	-9°49.4	327°23.7	-9°42.9	64°52.2	-20°23.3	29°17.5	-22°41.5
17	322°32.6	116°07.7	-9°49.4	342°24.7	-9°42.2	79°54.0	-20°23.4	44°19.7	-22°41.4
18	337°35.0	131°09.0	-9°49.4	357°25.7	-9°41.6	94°55.9	-20°23.5	59°21.9	-22°41.4
19	352°37.5	146°10.3	-9°49.4	12°26.7	-9°40.9	109°57.8	-20°23.6	74°24.0	-22°41.4
20	7°39.9	161°11.6	-9°49.5	27°27.7	-9°40.2	124°59.7	-20°23.7	89°26.2	-22°41.4
21	22°42.4	176°12.8	-9°49.5	42°28.7	-9°39.5	140°01.6	-20°23.8	104°28.4	-22°41.4
22	37°44.9	191°14.1	-9°49.5	57°29.7	-9°38.9	155°03.4	-20°23.9	119°30.6	-22°41.4
23	52°47.3	206°15.4	-9°49.6	72°30.7	-9°38.2	170°05.3	-20°24.0	134°32.7	-22°41.4
Mer.pass.:19:29		v1.3 d0.0 m-4.4		v1.0 d0.7 m-0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	67°49.8	221°16.7	-9°49.6	87°31.7	-9°37.5	185°07.2	-20°24.1	149°34.9	-22°41.4
1	82°52.3	236°18.0	-9°49.6	102°32.7	-9°36.8	200°09.1	-20°24.2	164°37.1	-22°41.4
2	97°54.7	251°19.2	-9°49.7	117°33.7	-9°36.2	215°10.9	-20°24.3	179°39.3	-22°41.3
3	112°57.2	266°20.5	-9°49.7	132°34.7	-9°35.5	230°12.8	-20°24.4	194°41.4	-22°41.3
4	127°59.7	281°21.8	-9°49.7	147°35.7	-9°34.8	245°14.7	-20°24.5	209°43.6	-22°41.3
5	143°02.1	296°23.0	-9°49.8	162°36.6	-9°34.1	260°16.6	-20°24.6	224°45.8	-22°41.3
6	158°04.6	311°24.3	-9°49.8	177°37.6	-9°33.5	275°18.5	-20°24.7	239°48.0	-22°41.3
7	173°07.1	326°25.6	-9°49.9	192°38.6	-9°32.8	290°20.3	-20°24.8	254°50.1	-22°41.3
8	188°09.5	341°26.8	-9°49.9	207°39.6	-9°32.1	305°22.2	-20°25.0	269°52.3	-22°41.3
9	203°12.0	356°28.1	-9°50.0	222°40.6	-9°31.4	320°24.1	-20°25.1	284°54.5	-22°41.3
10	218°14.4	11°29.3	-9°50.0	237°41.6	-9°30.8	335°26.0	-20°25.2	299°56.7	-22°41.3
11	233°16.9	26°30.6	-9°50.1	252°42.6	-9°30.1	350°27.9	-20°25.3	314°58.8	-22°41.2
12	248°19.4	41°31.8	-9°50.1	267°43.6	-9°29.4	5°29.7	-20°25.4	330°01.0	-22°41.2
13	263°21.8	56°33.1	-9°50.2	282°44.6	-9°28.7	20°31.6	-20°25.5	345°03.2	-22°41.2
14	278°24.3	71°34.3	-9°50.2	297°45.6	-9°28.0	35°33.5	-20°25.6	0°05.3	-22°41.2
15	293°26.8	86°35.5	-9°50.3	312°46.6	-9°27.4	50°35.4	-20°25.7	15°07.5	-22°41.2
16	308°29.2	101°36.8	-9°50.3	327°47.6	-9°26.7	65°37.2	-20°25.8	30°09.7	-22°41.2
17	323°31.7	116°38.0	-9°50.4	342°48.6	-9°26.0	80°39.1	-20°25.9	45°11.9	-22°41.2
18	338°34.2	131°39.2	-9°50.5	357°49.6	-9°25.3	95°41.0	-20°26.0	60°14.0	-22°41.2
19	353°36.6	146°40.5	-9°50.5	12°50.5	-9°24.7	110°42.9	-20°26.1	75°16.2	-22°41.1
20	8°39.1	161°41.7	-9°50.6	27°51.5	-9°24.0	125°44.8	-20°26.2	90°18.4	-22°41.1
21	23°41.6	176°42.9	-9°50.7	42°52.5	-9°23.3	140°46.6	-20°26.3	105°20.6	-22°41.1
22	38°44.0	191°44.1	-9°50.7	57°53.5	-9°22.6	155°48.5	-20°26.4	120°22.7	-22°41.1
23	53°46.5	206°45.4	-9°50.8	72°54.5	-9°22.0	170°50.4	-20°26.5	135°24.9	-22°41.1
Mer.pass.:19:25		v1.3 d-0.0 m-4.5		v1.0 d0.7 m-0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.9	-42°12.5
Schedar	349°36.0	56°38.6
Diphda	348°51.9	-17°53.1
Achernar	335°23.6	-57°08.8
Hamal	327°56.3	23°33.1
Polaris	315°41.7	89°20.6
Akamar	315°15.1	-40°14.0
Menkar	314°10.9	4°09.7
Mirfak	308°34.5	49°55.6
Aldebaran	290°44.8	16°32.7
Rigel	281°08.2	-8°10.9
Capella	280°28.5	46°00.9
Bellatrix	278°27.7	6°21.9
Elnath	278°07.6	28°37.2
Alnilam	275°42.3	-1°11.5
Betelgeuse	270°57.0	7°24.5
Canopus	263°54.0	-52°42.3
Sirius	258°30.1	-16°44.4
Adara	255°09.3	-28°59.8
Procyon	244°55.6	5°10.7
Pollux	243°22.9	27°58.7
Avior	234°16.2	-59°34.0
Suhail	222°49.6	-43°30.3
Miaplacidus	221°38.6	-69°47.4
Alphard	217°52.4	-8°44.3
Regulus	207°39.5	11°52.5
Dubhe	193°47.3	61°38.7
Denebola	182°30.0	14°28.1
Gienah	175°48.6	-17°38.6
Acrux	173°05.5	-63°11.8
Gacrux	171°57.1	-57°12.7
Alioth	166°17.9	55°51.4
Spica	158°27.6	-11°15.3
Alcaid	152°56.4	49°13.2
Hadar	148°43.1	-60°27.5
Menkent	148°03.6	-36°27.4
Arcturus	145°52.5	19°05.5
Rigil Kent.	139°47.3	-60°54.4
Zubenelg.	137°01.7	-16°06.9
Kochab	137°21.3	74°04.7
Alphecca	126°08.3	26°39.3
Antares	112°22.1	-26°28.2
Atria	107°21.1	-69°03.5
Sabik	102°08.7	-15°44.7
Shaula	96°17.3	-37°06.9
Rasalhague	96°03.4	12°33.0
Etamin	90°44.9	51°29.4
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.9	38°48.3
Nunki	75°54.1	-26°16.3
Altair	62°04.9	8°55.2
Peacock	53°13.8	-56°40.6
Deneb	49°29.2	45°21.2
Enif	33°43.6	9°57.8
Alnair	27°39.2	-46°52.4
Fomalhaut	15°20.0	-29°31.5
Scheat	13°49.8	28°11.2
Markab	13°34.6	15°18.5

2018/11/	**SHA**	**Mer.pass**
Venus	154°20.8	09:18
Mars	20°52.3	18:12
Jupiter	117°45.5	11:44
Saturn	81°58.9	14:07

2018/11/	**SHA**	**Mer.pass**
Venus	153°54.6	09:16
Mars	20°17.1	18:10
Jupiter	117°31.4	11:41
Saturn	81°52.0	14:03

2018/11/	**SHA**	**Mer.pass**
Venus	153°26.9	09:14
Mars	19°41.9	18:09
Jupiter	117°17.4	11:38
Saturn	81°45.1	13:60

Horizontal paralax	
Venus:	0.4
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°08.6	-21°04.1	309°07.4	5.0	20°52.4	-3.3	59.8
1	198°08.4	-21°04.6	323°31.4	5.0	20°49.1	-3.4	59.8
2	213°08.2	-21°05.1	337°55.4	5.0	20°45.6	-3.6	59.8
3	228°08.0	-21°05.5	352°19.4	5.1	20°42.0	-3.7	59.8
4	243°07.8	-21°06.0	6°43.5	5.1	20°38.2	-3.8	59.8
5	258°07.6	-21°06.4	21°07.6	5.1	20°34.3	-4.0	59.8
6	273°07.4	-21°06.9	35°31.8	5.2	20°30.3	-4.1	59.8
7	288°07.2	-21°07.3	49°56.0	5.2	20°26.1	-4.2	59.8
8	303°07.0	-21°07.8	64°20.3	5.3	20°21.8	-4.4	59.8
9	318°06.8	-21°08.3	78°44.6	5.3	20°17.3	-4.5	59.7
10	333°06.6	-21°08.7	93°08.9	5.4	20°12.7	-4.7	59.7
11	348°06.4	-21°09.2	107°33.3	5.4	20°08.0	-4.8	59.7
12	3°06.2	-21°09.6	121°57.8	5.5	20°03.2	-4.9	59.7
13	18°06.0	-21°10.1	136°22.3	5.5	19°58.2	-5.1	59.7
14	33°05.8	-21°10.5	150°46.8	5.6	19°53.0	-5.2	59.7
15	48°05.6	-21°11.0	165°11.4	5.6	19°47.8	-5.3	59.7
16	63°05.3	-21°11.4	179°36.1	5.7	19°42.4	-5.5	59.7
17	78°05.1	-21°11.9	194°00.8	5.7	19°36.9	-5.6	59.7
18	93°04.9	-21°12.3	208°25.6	5.8	19°31.2	-5.7	59.7
19	108°04.7	-21°12.8	222°50.4	5.9	19°25.4	-5.8	59.7
20	123°04.5	-21°13.2	237°15.3	5.9	19°19.5	-6.0	59.7
21	138°04.3	-21°13.7	251°40.2	6.0	19°13.5	-6.1	59.7
22	153°04.1	-21°14.1	266°05.2	6.0	19°07.4	-6.2	59.7
23	168°03.9	-21°14.6	280°30.3	6.1	19°01.1	-6.3	59.6
	SD.=16.2	d=-0.5			S.D.=16.3		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°03.7	-21°15.0	294°55.4	6.2	18°54.7	-6.5	59.6
1	198°03.5	-21°15.4	309°20.6	6.2	18°48.2	-6.6	59.6
2	213°03.3	-21°15.9	323°45.8	6.3	18°41.5	-6.7	59.6
3	228°03.1	-21°16.3	338°11.1	6.3	18°34.7	-6.8	59.6
4	243°02.9	-21°16.8	352°36.5	6.4	18°27.9	-6.9	59.6
5	258°02.6	-21°17.2	7°01.9	6.5	18°20.9	-7.1	59.6
6	273°02.4	-21°17.7	21°27.4	6.5	18°13.8	-7.2	59.6
7	288°02.2	-21°18.1	35°53.0	6.6	18°06.5	-7.3	59.6
8	303°02.0	-21°18.5	50°18.6	6.7	17°59.2	-7.4	59.6
9	318°01.8	-21°19.0	64°44.3	6.7	17°51.7	-7.5	59.5
10	333°01.6	-21°19.4	79°10.1	6.8	17°44.2	-7.6	59.5
11	348°01.4	-21°19.8	93°35.9	6.9	17°36.5	-7.7	59.5
12	3°01.2	-21°20.3	108°01.8	6.9	17°28.7	-7.8	59.5
13	18°00.9	-21°20.7	122°27.8	7.0	17°20.8	-7.9	59.5
14	33°00.7	-21°21.2	136°53.8	7.1	17°12.8	-8.1	59.5
15	48°00.5	-21°21.6	151°20.0	7.1	17°04.7	-8.2	59.5
16	63°00.3	-21°22.0	165°46.1	7.2	16°56.5	-8.3	59.5
17	78°00.1	-21°22.5	180°12.4	7.3	16°48.2	-8.4	59.4
18	92°59.9	-21°22.9	194°38.7	7.4	16°39.8	-8.5	59.4
19	107°59.7	-21°23.3	209°05.1	7.4	16°31.3	-8.6	59.4
20	122°59.5	-21°23.8	223°31.5	7.5	16°22.6	-8.7	59.4
21	137°59.2	-21°24.2	237°58.1	7.6	16°13.9	-8.8	59.4
22	152°59.0	-21°24.6	252°24.7	7.6	16°05.1	-8.9	59.4
23	167°58.8	-21°25.0	266°51.3	7.7	15°56.2	-8.9	59.4
	SD.=16.2	d=-0.4			S.D.=16.3		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°58.6	-21°25.5	281°18.1	7.8	15°47.2	-9.0	59.4
1	197°58.4	-21°25.9	295°44.9	7.8	15°38.1	-9.1	59.3
2	212°58.2	-21°26.3	310°11.8	7.9	15°29.0	-9.2	59.3
3	227°57.9	-21°26.7	324°38.7	8.0	15°19.7	-9.3	59.3
4	242°57.7	-21°27.2	339°05.7	8.1	15°10.3	-9.4	59.3
5	257°57.5	-21°27.6	353°32.8	8.1	15°00.9	-9.5	59.3
6	272°57.3	-21°28.0	7°60.0	8.2	14°51.4	-9.6	59.3
7	287°57.1	-21°28.4	22°27.2	8.3	14°41.7	-9.7	59.3
8	302°56.8	-21°28.9	36°54.5	8.3	14°32.1	-9.7	59.2
9	317°56.6	-21°29.3	51°21.9	8.4	14°22.3	-9.8	59.2
10	332°56.4	-21°29.7	65°49.3	8.5	14°12.4	-9.9	59.2
11	347°56.2	-21°30.1	80°16.8	8.5	14°02.5	-10.0	59.2
12	2°56.0	-21°30.6	94°44.4	8.6	13°52.4	-10.1	59.2
13	17°55.8	-21°31.0	109°12.0	8.7	13°42.4	-10.1	59.2
14	32°55.5	-21°31.4	123°39.8	8.7	13°32.2	-10.2	59.2
15	47°55.3	-21°31.8	138°07.5	8.8	13°21.9	-10.3	59.1
16	62°55.1	-21°32.2	152°35.4	8.9	13°11.6	-10.4	59.1
17	77°54.9	-21°32.6	167°03.3	8.9	13°01.2	-10.4	59.1
18	92°54.6	-21°33.1	181°31.3	9.0	12°50.8	-10.5	59.1
19	107°54.4	-21°33.5	195°59.3	9.1	12°40.2	-10.6	59.1
20	122°54.2	-21°33.9	210°27.4	9.1	12°29.6	-10.6	59.1
21	137°54.0	-21°34.3	224°55.6	9.2	12°19.0	-10.7	59.1
22	152°53.8	-21°34.7	239°23.9	9.3	12°08.2	-10.8	59.0
23	167°53.5	-21°35.1	253°52.2	9.3	11°57.4	-10.8	59.0
	SD.=16.2	d=-0.4			S.D.=16.2		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:42	09:36	–:–	–:–	13:59	15:53
70	07:27	09:00	–:–	–:–	14:35	16:08
68	07:15	08:35	10:18	13:17	15:00	16:20
66	07:04	08:15	09:36	13:60	15:20	16:31
64	06:55	07:60	09:07	14:28	15:36	16:40
62	06:48	07:46	08:46	14:50	15:49	16:48
60	06:41	07:35	08:28	15:07	16:00	16:54
58	06:35	07:25	08:14	15:22	16:10	17:01
56	06:29	07:17	08:01	15:34	16:19	17:06
54	06:24	07:09	07:51	15:45	16:27	17:11
52	06:19	07:02	07:41	15:54	16:34	17:16
50	06:15	06:55	07:32	16:03	16:40	17:21
45	06:05	06:41	07:14	16:21	16:54	17:31
40	05:56	06:29	06:59	16:36	17:06	17:40
35	05:48	06:19	06:47	16:49	17:16	17:48
30	05:40	06:10	06:36	16:60	17:26	17:55
20	05:26	05:53	06:17	17:19	17:43	18:10
10	05:12	05:37	05:60	17:36	17:58	18:24
0	04:56	05:22	05:44	17:52	18:14	18:40
-10	04:39	05:06	05:28	18:07	18:30	18:57
-20	04:19	04:47	05:11	18:25	18:49	19:17
-30	03:52	04:25	04:52	18:45	19:11	19:44
-35	03:36	04:11	04:40	18:56	19:25	20:01
-40	03:15	03:55	04:27	19:10	19:42	20:21
-45	02:49	03:35	04:11	19:26	20:02	20:48
-50	02:11	03:09	03:51	19:46	20:28	21:26
-52	01:50	02:56	03:41	19:55	20:41	21:47
-54	01:23	02:41	03:31	20:06	20:56	22:16
-56	00:39	02:24	03:19	20:18	21:14	23:03
-58	–:–	02:02	03:05	20:32	21:36	–:–
-60	–:–	01:32	02:48	20:49	22:07	–:–

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	–:–	18:43	21:15	–:–	15:31	14:53
70	16:59	19:31	21:38	15:13	14:42	14:28
68	18:05	20:02	21:55	14:07	14:10	14:10
66	18:40	20:24	22:09	13:31	13:47	13:54
64	19:06	20:42	22:21	13:05	13:28	13:42
62	19:26	20:57	22:30	12:45	13:13	13:31
60	19:42	21:09	22:38	12:28	12:60	13:22
58	19:56	21:19	22:46	12:14	12:48	13:14
56	20:07	21:29	22:52	12:02	12:39	13:07
54	20:18	21:37	22:58	11:51	12:30	13:01
52	20:27	21:44	23:03	11:42	12:22	12:55
50	20:35	21:51	23:07	11:33	12:15	12:50
45	20:52	22:04	23:17	11:15	12:00	12:38
40	21:06	22:16	23:26	11:01	11:48	12:29
35	21:18	22:26	23:33	10:48	11:37	12:21
30	21:29	22:34	23:39	10:37	11:28	12:14
20	21:47	22:49	23:49	10:18	11:12	12:01
10	22:02	23:02	23:59	10:02	10:58	11:50
0	22:17	23:14	–:–	09:46	10:44	11:40
-10	22:32	23:26	–:–	09:31	10:31	11:29
-20	22:47	23:38	–:–	09:14	10:17	11:18
-30	23:05	23:53	–:–	08:55	10:00	11:05
-35	23:15	–:–	00:01	08:43	09:50	10:58
-40	23:27	–:–	00:11	08:31	09:39	10:49
-45	23:41	–:–	00:22	08:15	09:26	10:39
-50	23:58	–:–	00:35	07:56	09:10	10:27
-52	–:–	00:06	00:42	07:47	09:03	10:21
-54	–:–	00:14	00:49	07:37	08:54	10:15
-56	–:–	00:24	00:56	07:26	08:45	10:08
-58	–:–	00:36	01:05	07:13	08:34	09:60
-60	00:11	00:49	01:15	06:58	08:22	09:51

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
27	12:35	12:25	11:47	03:31	16:01	20(77%)
28	12:15	12:05	11:47	04:30	16:59	21(67%)
29	11:55	11:44	11:48	05:26	17:53	22(56%)

November 30, 01 ,02 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	68°48.9	221°46.6	-9°50.9	87°55.5	-9°21.3	185°52.3	-20°26.6	150°27.1	-22°41.1
1	83°51.4	236°47.8	-9°50.9	102°56.5	-9°20.6	200°54.2	-20°26.7	165°29.3	-22°41.1
2	98°53.9	251°49.0	-9°51.0	117°57.5	-9°19.9	215°56.0	-20°26.8	180°31.4	-22°41.1
3	113°56.3	266°50.2	-9°51.1	132°58.5	-9°19.2	230°57.9	-20°26.9	195°33.6	-22°41.1
4	128°58.8	281°51.4	-9°51.2	147°59.5	-9°18.6	245°59.8	-20°27.0	210°35.8	-22°41.0
5	144°01.3	296°52.6	-9°51.2	163°00.5	-9°17.9	261°01.7	-20°27.1	225°37.9	-22°41.0
6	159°03.7	311°53.8	-9°51.3	178°01.5	-9°17.2	276°03.5	-20°27.2	240°40.1	-22°41.0
7	174°06.2	326°55.0	-9°51.4	193°02.5	-9°16.5	291°05.4	-20°27.3	255°42.3	-22°41.0
8	189°08.7	341°56.2	-9°51.5	208°03.4	-9°15.8	306°07.3	-20°27.4	270°44.5	-22°41.0
9	204°11.1	356°57.4	-9°51.6	223°04.4	-9°15.2	321°09.2	-20°27.6	285°46.6	-22°41.0
10	219°13.6	11°58.6	-9°51.6	238°05.4	-9°14.5	336°11.1	-20°27.7	300°48.8	-22°41.0
11	234°16.0	26°59.8	-9°51.7	253°06.4	-9°13.8	351°12.9	-20°27.8	315°51.0	-22°41.0
12	249°18.5	42°01.0	-9°51.8	268°07.4	-9°13.1	6°14.8	-20°27.9	330°53.2	-22°41.0
13	264°21.0	57°02.2	-9°51.9	283°08.4	-9°12.4	21°16.7	-20°28.0	345°55.3	-22°40.9
14	279°23.4	72°03.3	-9°52.0	298°09.4	-9°11.8	36°18.6	-20°28.1	0°57.5	-22°40.9
15	294°25.9	87°04.5	-9°52.1	313°10.4	-9°11.1	51°20.5	-20°28.2	15°59.7	-22°40.9
16	309°28.4	102°05.7	-9°52.2	328°11.4	-9°10.4	66°22.3	-20°28.3	31°01.8	-22°40.9
17	324°30.8	117°06.9	-9°52.3	343°12.4	-9°09.7	81°24.2	-20°28.4	46°04.0	-22°40.9
18	339°33.3	132°08.0	-9°52.4	358°13.4	-9°09.0	96°26.1	-20°28.5	61°06.2	-22°40.9
19	354°35.8	147°09.2	-9°52.5	13°14.3	-9°08.4	111°28.0	-20°28.6	76°08.4	-22°40.9
20	9°38.2	162°10.4	-9°52.6	28°15.3	-9°07.7	126°29.8	-20°28.7	91°10.5	-22°40.9
21	24°40.7	177°11.5	-9°52.7	43°16.3	-9°07.0	141°31.7	-20°28.8	106°12.7	-22°40.8
22	39°43.2	192°12.7	-9°52.8	58°17.3	-9°06.3	156°33.6	-20°28.9	121°14.9	-22°40.8
23	54°45.6	207°13.8	-9°52.9	73°18.3	-9°05.6	171°35.5	-20°29.0	136°17.0	-22°40.8
Mer.pass.:19:21		v1.2 d-0.1 m-4.5		v1.0 d0.7 m-0.0		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	69°48.1	222°15.0	-9°53.0	88°19.3	-9°05.0	186°37.4	-20°29.1	151°19.2	-22°40.8
1	84°50.5	237°16.2	-9°53.1	103°20.3	-9°04.3	201°39.2	-20°29.2	166°21.4	-22°40.8
2	99°53.0	252°17.3	-9°53.2	118°21.3	-9°03.6	216°41.1	-20°29.3	181°23.6	-22°40.8
3	114°55.5	267°18.5	-9°53.3	133°22.3	-9°02.9	231°43.0	-20°29.4	196°25.7	-22°40.8
4	129°57.9	282°19.6	-9°53.4	148°23.3	-9°02.2	246°44.9	-20°29.5	211°27.9	-22°40.8
5	145°00.4	297°20.7	-9°53.6	163°24.2	-9°01.6	261°46.8	-20°29.6	226°30.1	-22°40.7
6	160°02.9	312°21.9	-9°53.7	178°25.2	-9°00.9	276°48.6	-20°29.7	241°32.2	-22°40.7
7	175°05.3	327°23.0	-9°53.8	193°26.2	-9°00.2	291°50.5	-20°29.8	256°34.4	-22°40.7
8	190°07.8	342°24.2	-9°53.9	208°27.2	-8°59.5	306°52.4	-20°29.9	271°36.6	-22°40.7
9	205°10.3	357°25.3	-9°54.0	223°28.2	-8°58.8	321°54.3	-20°30.0	286°38.8	-22°40.7
10	220°12.7	12°26.4	-9°54.1	238°29.2	-8°58.1	336°56.1	-20°30.1	301°40.9	-22°40.7
11	235°15.2	27°27.6	-9°54.3	253°30.2	-8°57.5	351°58.0	-20°30.2	316°43.1	-22°40.7
12	250°17.7	42°28.7	-9°54.4	268°31.2	-8°56.8	6°59.9	-20°30.3	331°45.3	-22°40.7
13	265°20.1	57°29.8	-9°54.5	283°32.2	-8°56.1	22°01.8	-20°30.4	346°47.4	-22°40.7
14	280°22.6	72°30.9	-9°54.6	298°33.1	-8°55.4	37°03.7	-20°30.5	1°49.6	-22°40.6
15	295°25.0	87°32.0	-9°54.8	313°34.1	-8°54.7	52°05.5	-20°30.6	16°51.8	-22°40.6
16	310°27.5	102°33.2	-9°54.9	328°35.1	-8°54.1	67°07.4	-20°30.7	31°54.0	-22°40.6
17	325°30.0	117°34.3	-9°55.0	343°36.1	-8°53.4	82°09.3	-20°30.8	46°56.1	-22°40.6
18	340°32.4	132°35.4	-9°55.2	358°37.1	-8°52.7	97°11.2	-20°30.9	61°58.3	-22°40.6
19	355°34.9	147°36.5	-9°55.3	13°38.1	-8°52.0	112°13.0	-20°31.0	77°00.5	-22°40.6
20	10°37.4	162°37.6	-9°55.4	28°39.1	-8°51.3	127°14.9	-20°31.1	92°02.6	-22°40.6
21	25°39.8	177°38.7	-9°55.6	43°40.1	-8°50.6	142°16.8	-20°31.3	107°04.8	-22°40.6
22	40°42.3	192°39.8	-9°55.7	58°41.1	-8°50.0	157°18.7	-20°31.4	122°07.0	-22°40.5
23	55°44.8	207°40.9	-9°55.8	73°42.0	-8°49.3	172°20.6	-20°31.5	137°09.1	-22°40.5
Mer.pass.:19:17		v1.2 d-0.1 m-4.5		v1.0 d0.7 m-0.0		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	70°47.2	222°42.0	-9°56.0	88°43.0	-8°48.6	187°22.4	-20°31.6	152°11.3	-22°40.5
1	85°49.7	237°43.1	-9°56.1	103°44.0	-8°47.9	202°24.3	-20°31.7	167°13.5	-22°40.5
2	100°52.1	252°44.2	-9°56.3	118°45.0	-8°47.2	217°26.2	-20°31.8	182°15.7	-22°40.5
3	115°54.6	267°45.3	-9°56.4	133°46.0	-8°46.5	232°28.1	-20°31.9	197°17.8	-22°40.5
4	130°57.1	282°46.4	-9°56.6	148°47.0	-8°45.9	247°30.0	-20°32.0	212°20.0	-22°40.5
5	145°59.5	297°47.5	-9°56.7	163°48.0	-8°45.2	262°31.8	-20°32.1	227°22.2	-22°40.5
6	161°02.0	312°48.6	-9°56.9	178°49.0	-8°44.5	277°33.7	-20°32.2	242°24.3	-22°40.4
7	176°04.5	327°49.6	-9°57.0	193°49.9	-8°43.8	292°35.6	-20°32.3	257°26.5	-22°40.4
8	191°06.9	342°50.7	-9°57.2	208°50.9	-8°43.1	307°37.5	-20°32.4	272°28.7	-22°40.4
9	206°09.4	357°51.8	-9°57.3	223°51.9	-8°42.4	322°39.3	-20°32.5	287°30.8	-22°40.4
10	221°11.9	12°52.9	-9°57.5	238°52.9	-8°41.7	337°41.2	-20°32.6	302°33.0	-22°40.4
11	236°14.3	27°53.9	-9°57.6	253°53.9	-8°41.1	352°43.1	-20°32.7	317°35.2	-22°40.4
12	251°16.8	42°55.0	-9°57.8	268°54.9	-8°40.4	7°45.0	-20°32.8	332°37.3	-22°40.4
13	266°19.3	57°56.1	-9°57.9	283°55.9	-8°39.7	22°46.9	-20°32.9	347°39.5	-22°40.4
14	281°21.7	72°57.1	-9°58.1	298°56.9	-8°39.0	37°48.7	-20°33.0	2°41.7	-22°40.3
15	296°24.2	87°58.2	-9°58.3	313°57.8	-8°38.3	52°50.6	-20°33.1	17°43.9	-22°40.3
16	311°26.6	102°59.3	-9°58.4	328°58.8	-8°37.6	67°52.5	-20°33.2	32°46.0	-22°40.3
17	326°29.1	118°00.3	-9°58.6	343°59.8	-8°37.0	82°54.4	-20°33.3	47°48.2	-22°40.3
18	341°31.6	133°01.4	-9°58.8	359°00.8	-8°36.3	97°56.2	-20°33.4	62°50.4	-22°40.3
19	356°34.0	148°02.4	-9°58.9	14°01.8	-8°35.6	112°58.1	-20°33.5	77°52.5	-22°40.3
20	11°36.5	163°03.5	-9°59.1	29°02.8	-8°34.9	128°00.0	-20°33.6	92°54.7	-22°40.3
21	26°39.0	178°04.5	-9°59.3	44°03.8	-8°34.2	143°01.9	-20°33.7	107°56.9	-22°40.3
22	41°41.4	193°05.6	-9°59.4	59°04.7	-8°33.5	158°03.8	-20°33.8	122°59.0	-22°40.2
23	56°43.9	208°06.6	-9°59.6	74°05.7	-8°32.8	173°05.6	-20°33.9	138°01.2	-22°40.2
Mer.pass.:19:13		v1.1 d-0.1 m-4.5		v1.0 d0.7 m0.0		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.5	29°11.8
Ankaa	353°11.9	-42°12.5
Schedar	349°36.0	56°38.6
Diphda	348°51.9	-17°53.1
Achernar	335°23.6	-57°08.8
Hamal	327°56.3	23°33.1
Polaris	315°42.2	89°20.6
Akamar	315°15.1	-40°14.0
Menkar	314°10.9	4°09.7
Mirfak	308°34.5	49°55.6
Aldebaran	290°44.8	16°32.7
Rigel	281°08.2	-8°10.9
Capella	280°28.5	46°00.9
Bellatrix	278°27.7	6°21.9
Elnath	278°07.6	28°37.2
Alnilam	275°42.3	-1°11.5
Betelgeuse	270°57.0	7°24.5
Canopus	263°54.0	-52°42.3
Sirius	258°30.1	-16°44.4
Adara	255°09.3	-28°59.9
Procyon	244°55.6	5°10.7
Pollux	243°22.9	27°58.7
Avior	234°16.1	-59°34.0
Suhail	222°49.5	-43°30.3
Miaplacidus	221°38.5	-69°47.4
Alphard	217°52.3	-8°44.4
Regulus	207°39.5	11°52.5
Dubhe	193°47.3	61°38.7
Denebola	182°29.9	14°28.1
Gienah	175°48.6	-17°38.6
Acrux	173°05.5	-63°11.8
Gacrux	171°57.0	-57°12.7
Alioth	166°17.8	55°51.4
Spica	158°27.6	-11°15.3
Alcaid	152°56.4	49°13.1
Hadar	148°43.1	-60°27.5
Menkent	148°03.5	-36°27.4
Arcturus	145°52.5	19°05.5
Rigil Kent.	139°47.3	-60°54.4
Zubenelg.	137°01.6	-16°06.9
Kochab	137°21.2	74°04.7
Alphecca	126°08.3	26°39.3
Antares	112°22.1	-26°28.2
Atria	107°21.1	-69°03.5
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.8
Rasalhague	96°03.4	12°33.0
Etamin	90°44.9	51°29.4
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.9	38°48.3
Nunki	75°54.1	-26°16.3
Altair	62°04.9	8°55.2
Peacock	53°13.8	-56°40.6
Deneb	49°29.2	45°21.1
Enif	33°43.6	9°57.8
Alnair	27°39.2	-46°52.4
Fomalhaut	15°20.0	-29°31.5
Scheat	13°49.8	28°11.2
Markab	13°34.6	15°18.5

2018/11/	**SHA**	**Mer.pass**
Venus	152°57.6	09:12
Mars	19°06.6	18:07
Jupiter	117°03.3	11:35
Saturn	81°38.1	13:56

2018/12/	**SHA**	**Mer.pass**
Venus	152°26.9	09:10
Mars	18°31.2	18:06
Jupiter	116°49.3	11:32
Saturn	81°31.1	13:53

2018/12/	**SHA**	**Mer.pass**
Venus	151°54.8	09:09
Mars	17°55.8	18:04
Jupiter	116°35.2	11:29
Saturn	81°24.1	13:49

Horizontal paralax	
Venus:	0.3
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°53.3	-21°35.5	268°20.6	9.4	11°46.6	-10.9	59.0
1	197°53.1	-21°35.9	282°49.0	9.5	11°35.7	-10.9	59.0
2	212°52.9	-21°36.4	297°17.5	9.5	11°24.7	-11.0	59.0
3	227°52.6	-21°36.8	311°46.1	9.6	11°13.6	-11.1	59.0
4	242°52.4	-21°37.2	326°14.7	9.7	11°02.5	-11.1	58.9
5	257°52.2	-21°37.6	340°43.4	9.7	10°51.4	-11.2	58.9
6	272°52.0	-21°38.0	355°12.1	9.8	10°40.2	-11.2	58.9
7	287°51.7	-21°38.4	9°40.9	9.8	10°28.9	-11.3	58.9
8	302°51.5	-21°38.8	24°09.8	9.9	10°17.6	-11.3	58.9
9	317°51.3	-21°39.2	38°38.7	10.0	10°06.3	-11.4	58.9
10	332°51.1	-21°39.6	53°07.7	10.0	9°54.8	-11.4	58.8
11	347°50.8	-21°40.0	67°36.8	10.1	9°43.4	-11.5	58.8
12	2°50.6	-21°40.4	82°05.9	10.1	9°31.9	-11.5	58.8
13	17°50.4	-21°40.8	96°35.0	10.2	9°20.3	-11.6	58.8
14	32°50.1	-21°41.2	111°04.2	10.2	9°08.7	-11.6	58.8
15	47°49.9	-21°41.6	125°33.5	10.3	8°57.1	-11.7	58.8
16	62°49.7	-21°42.0	140°02.8	10.3	8°45.4	-11.7	58.7
17	77°49.5	-21°42.4	154°32.2	10.4	8°33.6	-11.8	58.7
18	92°49.2	-21°42.8	169°01.6	10.5	8°21.9	-11.8	58.7
19	107°49.0	-21°43.2	183°31.1	10.5	8°10.1	-11.8	58.7
20	122°48.8	-21°43.6	198°00.6	10.6	7°58.2	-11.9	58.7
21	137°48.5	-21°44.0	212°30.2	10.6	7°46.3	-11.9	58.6
22	152°48.3	-21°44.4	226°59.8	10.7	7°34.4	-11.9	58.6
23	167°48.1	-21°44.8	241°29.5	10.7	7°22.5	-12.0	58.6
	SD.=16.2	d=-0.4			S.D.=16.1		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°47.9	-21°45.2	255°59.3	10.8	7°10.5	-12.0	58.6
1	197°47.6	-21°45.6	270°29.0	10.8	6°58.4	-12.0	58.6
2	212°47.4	-21°46.0	284°58.9	10.8	6°46.4	-12.1	58.6
3	227°47.2	-21°46.4	299°28.7	10.9	6°34.3	-12.1	58.5
4	242°46.9	-21°46.8	313°58.6	10.9	6°22.2	-12.1	58.5
5	257°46.7	-21°47.1	328°28.6	11.0	6°10.1	-12.1	58.5
6	272°46.5	-21°47.5	342°58.6	11.0	5°57.9	-12.2	58.5
7	287°46.2	-21°47.9	357°28.6	11.1	5°45.7	-12.2	58.5
8	302°46.0	-21°48.3	11°58.7	11.1	5°33.5	-12.2	58.4
9	317°45.8	-21°48.7	26°28.9	11.1	5°21.3	-12.2	58.4
10	332°45.5	-21°49.1	40°59.0	11.2	5°09.0	-12.3	58.4
11	347°45.3	-21°49.5	55°29.2	11.2	4°56.8	-12.3	58.4
12	2°45.1	-21°49.9	69°59.5	11.3	4°44.5	-12.3	58.4
13	17°44.8	-21°50.2	84°29.8	11.3	4°32.2	-12.3	58.4
14	32°44.6	-21°50.6	99°00.1	11.3	4°19.9	-12.3	58.3
15	47°44.4	-21°51.0	113°30.5	11.4	4°07.5	-12.3	58.3
16	62°44.1	-21°51.4	128°00.8	11.4	3°55.2	-12.4	58.3
17	77°43.9	-21°51.8	142°31.3	11.4	3°42.8	-12.4	58.3
18	92°43.7	-21°52.2	157°01.7	11.5	3°30.4	-12.4	58.3
19	107°43.4	-21°52.5	171°32.2	11.5	3°18.0	-12.4	58.2
20	122°43.2	-21°52.9	186°02.8	11.5	3°05.6	-12.4	58.2
21	137°42.9	-21°53.3	200°33.3	11.6	2°53.2	-12.4	58.2
22	152°42.7	-21°53.7	215°03.9	11.6	2°40.8	-12.4	58.2
23	167°42.5	-21°54.0	229°34.5	11.6	2°28.4	-12.4	58.2
	SD.=16.2	d=-0.4			S.D.=16.0		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°42.2	-21°54.4	244°05.2	11.7	2°15.9	-12.4	58.2
1	197°42.0	-21°54.8	258°35.8	11.7	2°03.5	-12.4	58.1
2	212°41.8	-21°55.2	273°06.5	11.7	1°51.1	-12.4	58.1
3	227°41.5	-21°55.5	287°37.3	11.7	1°38.6	-12.4	58.1
4	242°41.3	-21°55.9	302°08.0	11.8	1°26.2	-12.4	58.1
5	257°41.0	-21°56.3	316°38.8	11.8	1°13.7	-12.4	58.1
6	272°40.8	-21°56.7	331°09.6	11.8	1°01.3	-12.4	58.0
7	287°40.6	-21°57.0	345°40.4	11.8	0°48.9	-12.4	58.0
8	302°40.3	-21°57.4	0°11.2	11.9	0°36.4	-12.4	58.0
9	317°40.1	-21°57.8	14°42.1	11.9	0°24.0	-12.4	58.0
10	332°39.8	-21°58.2	29°13.0	11.9	0°11.6	-12.4	58.0
11	347°39.6	-21°58.5	43°43.9	11.9	-0°00.9	-12.4	57.9
12	2°39.4	-21°58.9	58°14.8	11.9	-0°13.3	-12.4	57.9
13	17°39.1	-21°59.3	72°45.8	11.9	-0°25.7	-12.4	57.9
14	32°38.9	-21°59.6	87°16.7	12.0	-0°38.1	-12.4	57.9
15	47°38.6	-21°60.0	101°47.7	12.0	-0°50.5	-12.4	57.9
16	62°38.4	-22°00.4	116°18.7	12.0	-1°02.8	-12.4	57.9
17	77°38.2	-22°00.7	130°49.7	12.0	-1°15.2	-12.4	57.8
18	92°37.9	-22°01.1	145°20.7	12.0	-1°27.6	-12.3	57.8
19	107°37.7	-22°01.4	159°51.7	12.0	-1°39.9	-12.3	57.8
20	122°37.4	-22°01.8	174°22.8	12.0	-1°52.2	-12.3	57.8
21	137°37.2	-22°02.2	188°53.8	12.1	-2°04.5	-12.3	57.8
22	152°36.9	-22°02.5	203°24.9	12.1	-2°16.8	-12.3	57.7
23	167°36.7	-22°02.9	217°55.9	12.1	-2°29.1	-12.3	57.7
	SD.=16.2	d=-0.4			S.D.=15.9		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:51	09:50	–:–	–:–	13:47	15:46
70	07:34	09:11	–:–	–:–	14:27	16:03
68	07:21	08:43	10:36	13:02	14:54	16:16
66	07:10	08:23	09:46	13:51	15:15	16:27
64	07:01	08:06	09:16	14:22	15:31	16:36
62	06:53	07:52	08:53	14:45	15:45	16:45
60	06:46	07:40	08:35	15:03	15:57	16:52
58	06:39	07:30	08:20	15:18	16:07	16:58
56	06:33	07:21	08:07	15:31	16:16	17:04
54	06:28	07:13	07:55	15:42	16:25	17:10
52	06:23	07:06	07:45	15:52	16:32	17:15
50	06:18	06:59	07:36	16:01	16:39	17:19
45	06:08	06:45	07:18	16:20	16:53	17:30
40	05:59	06:32	07:02	16:35	17:05	17:39
35	05:50	06:22	06:49	16:48	17:16	17:47
30	05:43	06:12	06:38	16:60	17:26	17:55
20	05:28	05:55	06:19	17:19	17:43	18:10
10	05:13	05:39	06:01	17:37	17:59	18:25
0	04:57	05:23	05:45	17:53	18:15	18:41
-10	04:40	05:06	05:29	18:09	18:32	18:59
-20	04:19	04:47	05:12	18:27	18:51	19:20
-30	03:52	04:24	04:51	18:47	19:14	19:47
-35	03:35	04:10	04:39	18:59	19:28	20:04
-40	03:13	03:54	04:26	19:13	19:45	20:25
-45	02:46	03:33	04:09	19:29	20:06	20:53
-50	02:07	03:06	03:49	19:50	20:32	21:32
-52	01:45	02:53	03:39	19:60	20:46	21:55
-54	01:15	02:38	03:28	20:11	21:02	22:26
-56	00:18	02:19	03:16	20:23	21:21	23:31
-58	–:–	01:55	03:01	20:38	21:44	–:–
-60	–:–	01:23	02:44	20:56	22:18	–:–

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	23:24	–:–	01:24	14:32	14:16	14:01
70	23:35	–:–	01:26	14:19	14:10	14:02
68	23:44	–:–	01:29	14:08	14:06	14:03
66	23:51	–:–	01:30	13:59	14:02	14:04
64	23:57	–:–	01:32	13:51	13:58	14:04
62	–:–	00:03	01:33	13:45	13:56	14:05
60	–:–	00:07	01:34	13:39	13:53	14:05
58	–:–	00:11	01:35	13:34	13:51	14:06
56	–:–	00:15	01:36	13:29	13:49	14:06
54	–:–	00:18	01:37	13:25	13:47	14:07
52	–:–	00:21	01:38	13:22	13:45	14:07
50	–:–	00:24	01:39	13:18	13:44	14:07
45	–:–	00:29	01:40	13:11	13:40	14:08
40	–:–	00:34	01:41	13:05	13:37	14:08
35	–:–	00:38	01:42	12:59	13:35	14:09
30	–:–	00:42	01:43	12:55	13:33	14:09
20	–:–	00:48	01:45	12:46	13:29	14:10
10	–:–	00:53	01:46	12:39	13:25	14:10
0	00:07	00:59	01:48	12:32	13:22	14:11
-10	00:16	01:04	01:49	12:25	13:19	14:11
-20	00:25	01:09	01:51	12:18	13:15	14:12
-30	00:36	01:15	01:52	12:09	13:11	14:12
-35	00:42	01:19	01:53	12:04	13:09	14:13
-40	00:49	01:23	01:54	11:58	13:06	14:13
-45	00:57	01:28	01:56	11:52	13:03	14:13
-50	01:06	01:33	01:57	11:44	12:59	14:14
-52	01:11	01:36	01:58	11:40	12:58	14:14
-54	01:16	01:38	01:59	11:36	12:56	14:14
-56	01:21	01:41	01:60	11:31	12:54	14:14
-58	01:27	01:45	02:00	11:26	12:51	14:15
-60	01:34	01:49	02:01	11:20	12:49	14:15

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
30	11:33	11:23	11:48	06:19	18:45	23(45%)
1	11:12	11:00	11:49	07:10	19:35	24(34%)
2	10:49	10:38	11:49	07:59	20:23	25(24%)

December 03, 04 ,05 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	71°46.4	223°07.7	-9°59.8	89°06.7	-8°32.2	188°07.5	-20°34.0	153°03.4	-22°40.2
1	86°48.8	238°08.7	-9°60.0	104°07.7	-8°31.5	203°09.4	-20°34.1	168°05.5	-22°40.2
2	101°51.3	253°09.7	-10°00.1	119°08.7	-8°30.8	218°11.3	-20°34.2	183°07.7	-22°40.2
3	116°53.8	268°10.8	-10°00.3	134°09.7	-8°30.1	233°13.1	-20°34.3	198°09.9	-22°40.2
4	131°56.2	283°11.8	-10°00.5	149°10.7	-8°29.4	248°15.0	-20°34.4	213°12.0	-22°40.2
5	146°58.7	298°12.8	-10°00.7	164°11.7	-8°28.7	263°16.9	-20°34.5	228°14.2	-22°40.2
6	162°01.1	313°13.9	-10°00.8	179°12.6	-8°28.0	278°18.8	-20°34.6	243°16.4	-22°40.1
7	177°03.6	328°14.9	-10°01.0	194°13.6	-8°27.3	293°20.7	-20°34.7	258°18.5	-22°40.1
8	192°06.1	343°15.9	-10°01.2	209°14.6	-8°26.7	308°22.5	-20°34.8	273°20.7	-22°40.1
9	207°08.5	358°16.9	-10°01.4	224°15.6	-8°26.0	323°24.4	-20°34.9	288°22.9	-22°40.1
10	222°11.0	13°18.0	-10°01.6	239°16.6	-8°25.3	338°26.3	-20°35.0	303°25.0	-22°40.1
11	237°13.5	28°19.0	-10°01.8	254°17.6	-8°24.6	353°28.2	-20°35.1	318°27.2	-22°40.1
12	252°15.9	43°20.0	-10°02.0	269°18.5	-8°23.9	8°30.1	-20°35.2	333°29.4	-22°40.1
13	267°18.4	58°21.0	-10°02.2	284°19.5	-8°23.2	23°31.9	-20°35.3	348°31.5	-22°40.1
14	282°20.9	73°22.0	-10°02.4	299°20.5	-8°22.5	38°33.8	-20°35.4	3°33.7	-22°40.0
15	297°23.3	88°23.0	-10°02.5	314°21.5	-8°21.9	53°35.7	-20°35.5	18°35.9	-22°40.0
16	312°25.8	103°24.0	-10°02.7	329°22.5	-8°21.2	68°37.6	-20°35.6	33°38.1	-22°40.0
17	327°28.2	118°25.0	-10°02.9	344°23.5	-8°20.5	83°39.4	-20°35.7	48°40.2	-22°40.0
18	342°30.7	133°26.0	-10°03.1	359°24.5	-8°19.8	98°41.3	-20°35.8	63°42.4	-22°40.0
19	357°33.2	148°27.0	-10°03.3	14°25.4	-8°19.1	113°43.2	-20°35.9	78°44.6	-22°40.0
20	12°35.6	163°28.0	-10°03.5	29°26.4	-8°18.4	128°45.1	-20°36.0	93°46.7	-22°40.0
21	27°38.1	178°29.0	-10°03.7	44°27.4	-8°17.7	143°47.0	-20°36.1	108°48.9	-22°39.9
22	42°40.6	193°30.0	-10°03.9	59°28.4	-8°17.0	158°48.8	-20°36.2	123°51.1	-22°39.9
23	57°43.0	208°31.0	-10°04.1	74°29.4	-8°16.3	173°50.7	-20°36.3	138°53.2	-22°39.9
Mer.pass.:19:09		v1.0 d-0.2 m-4.5		v1.0 d0.7 m0.0		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	72°45.5	223°32.0	-10°04.3	89°30.4	-8°15.7	188°52.6	-20°36.4	153°55.4	-22°39.9
1	87°48.0	238°33.0	-10°04.6	104°31.3	-8°15.0	203°54.5	-20°36.5	168°57.6	-22°39.9
2	102°50.4	253°34.0	-10°04.8	119°32.3	-8°14.3	218°56.3	-20°36.6	183°59.7	-22°39.9
3	117°52.9	268°34.9	-10°05.0	134°33.3	-8°13.6	233°58.2	-20°36.7	199°01.9	-22°39.9
4	132°55.4	283°35.9	-10°05.2	149°34.3	-8°12.9	249°00.1	-20°36.8	214°04.1	-22°39.9
5	147°57.8	298°36.9	-10°05.4	164°35.3	-8°12.2	264°02.0	-20°36.9	229°06.2	-22°39.8
6	163°00.3	313°37.9	-10°05.6	179°36.3	-8°11.5	279°03.9	-20°37.0	244°08.4	-22°39.8
7	178°02.7	328°38.9	-10°05.8	194°37.3	-8°10.8	294°05.7	-20°37.1	259°10.6	-22°39.8
8	193°05.2	343°39.8	-10°06.0	209°38.2	-8°10.1	309°07.6	-20°37.2	274°12.7	-22°39.8
9	208°07.7	358°40.8	-10°06.3	224°39.2	-8°09.5	324°09.5	-20°37.3	289°14.9	-22°39.8
10	223°10.1	13°41.8	-10°06.5	239°40.2	-8°08.8	339°11.4	-20°37.4	304°17.1	-22°39.8
11	238°12.6	28°42.7	-10°06.7	254°41.2	-8°08.1	354°13.2	-20°37.5	319°19.2	-22°39.8
12	253°15.1	43°43.7	-10°06.9	269°42.2	-8°07.4	9°15.1	-20°37.6	334°21.4	-22°39.8
13	268°17.5	58°44.6	-10°07.1	284°43.2	-8°06.7	24°17.0	-20°37.7	349°23.5	-22°39.7
14	283°20.0	73°45.6	-10°07.4	299°44.1	-8°06.0	39°18.9	-20°37.8	4°25.7	-22°39.7
15	298°22.5	88°46.6	-10°07.6	314°45.1	-8°05.3	54°20.8	-20°37.9	19°27.9	-22°39.7
16	313°24.9	103°47.5	-10°07.8	329°46.1	-8°04.6	69°22.6	-20°38.0	34°30.0	-22°39.7
17	328°27.4	118°48.5	-10°08.0	344°47.1	-8°03.9	84°24.5	-20°38.1	49°32.2	-22°39.7
18	343°29.9	133°49.4	-10°08.3	359°48.1	-8°03.2	99°26.4	-20°38.2	64°34.4	-22°39.7
19	358°32.3	148°50.4	-10°08.5	14°49.0	-8°02.6	114°28.3	-20°38.3	79°36.5	-22°39.7
20	13°34.8	163°51.3	-10°08.7	29°50.0	-8°01.9	129°30.2	-20°38.4	94°38.7	-22°39.6
21	28°37.2	178°52.2	-10°08.9	44°51.0	-8°01.2	144°32.0	-20°38.5	109°40.9	-22°39.6
22	43°39.7	193°53.2	-10°09.2	59°52.0	-8°00.5	159°33.9	-20°38.6	124°43.0	-22°39.6
23	58°42.2	208°54.1	-10°09.4	74°53.0	-7°59.8	174°35.8	-20°38.7	139°45.2	-22°39.6
Mer.pass.:19:05		v1.0 d-0.2 m-4.5		v1.0 d0.7 m0.0		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	73°44.6	223°55.1	-10°09.7	89°54.0	-7°59.1	189°37.7	-20°38.8	154°47.4	-22°39.6
1	88°47.1	238°56.0	-10°09.9	104°54.9	-7°58.4	204°39.5	-20°38.9	169°49.5	-22°39.6
2	103°49.6	253°56.9	-10°10.1	119°55.9	-7°57.7	219°41.4	-20°39.0	184°51.7	-22°39.6
3	118°52.0	268°57.9	-10°10.4	134°56.9	-7°57.0	234°43.3	-20°39.1	199°53.9	-22°39.6
4	133°54.5	283°58.8	-10°10.6	149°57.9	-7°56.3	249°45.2	-20°39.2	214°56.0	-22°39.5
5	148°57.0	298°59.7	-10°10.8	164°58.9	-7°55.6	264°47.1	-20°39.3	229°58.2	-22°39.5
6	163°59.4	314°00.6	-10°11.1	179°59.9	-7°55.0	279°48.9	-20°39.4	245°00.4	-22°39.5
7	179°01.9	329°01.6	-10°11.3	195°00.8	-7°54.3	294°50.8	-20°39.5	260°02.5	-22°39.5
8	194°04.3	344°02.5	-10°11.6	210°01.8	-7°53.6	309°52.7	-20°39.6	275°04.7	-22°39.5
9	209°06.8	359°03.4	-10°11.8	225°02.8	-7°52.9	324°54.6	-20°39.7	290°06.9	-22°39.5
10	224°09.3	14°04.3	-10°12.1	240°03.8	-7°52.2	339°56.4	-20°39.8	305°09.0	-22°39.5
11	239°11.7	29°05.2	-10°12.3	255°04.8	-7°51.5	354°58.3	-20°39.9	320°11.2	-22°39.4
12	254°14.2	44°06.1	-10°12.6	270°05.7	-7°50.8	10°00.2	-20°40.0	335°13.3	-22°39.4
13	269°16.7	59°07.1	-10°12.8	285°06.7	-7°50.1	25°02.1	-20°40.1	350°15.5	-22°39.4
14	284°19.1	74°08.0	-10°13.1	300°07.7	-7°49.4	40°04.0	-20°40.2	5°17.7	-22°39.4
15	299°21.6	89°08.9	-10°13.3	315°08.7	-7°48.7	55°05.8	-20°40.3	20°19.8	-22°39.4
16	314°24.1	104°09.8	-10°13.6	330°09.7	-7°48.0	70°07.7	-20°40.4	35°22.0	-22°39.4
17	329°26.5	119°10.7	-10°13.8	345°10.6	-7°47.3	85°09.6	-20°40.5	50°24.2	-22°39.4
18	344°29.0	134°11.6	-10°14.1	0°11.6	-7°46.6	100°11.5	-20°40.6	65°26.3	-22°39.3
19	359°31.5	149°12.5	-10°14.4	15°12.6	-7°46.0	115°13.4	-20°40.7	80°28.5	-22°39.3
20	14°33.9	164°13.4	-10°14.6	30°13.6	-7°45.3	130°15.2	-20°40.8	95°30.7	-22°39.3
21	29°36.4	179°14.3	-10°14.9	45°14.6	-7°44.6	145°17.1	-20°40.9	110°32.8	-22°39.3
22	44°38.8	194°15.1	-10°15.1	60°15.6	-7°43.9	160°19.0	-20°41.0	125°35.0	-22°39.3
23	59°41.3	209°16.0	-10°15.4	75°16.5	-7°43.2	175°20.9	-20°41.1	140°37.2	-22°39.3
Mer.pass.:19:01		v0.9 d-0.2 m-4.5		v1.0 d0.7 m0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.8
Ankaa	353°11.9	-42°12.5
Schedar	349°36.0	56°38.6
Diphda	348°51.9	-17°53.2
Achernar	335°23.7	-57°08.8
Hamal	327°56.3	23°33.1
Polaris	315°42.7	89°20.7
Akamar	315°15.2	-40°14.0
Menkar	314°10.9	4°09.7
Mirfak	308°34.5	49°55.6
Aldebaran	290°44.8	16°32.7
Rigel	281°08.2	-8°10.9
Capella	280°28.5	46°00.9
Bellatrix	278°27.7	6°21.9
Elnath	278°07.6	28°37.2
Alnilam	275°42.3	-1°11.5
Betelgeuse	270°57.0	7°24.5
Canopus	263°54.0	-52°42.4
Sirius	258°30.1	-16°44.4
Adara	255°09.3	-28°59.9
Procyon	244°55.5	5°10.6
Pollux	243°22.9	27°58.7
Avior	234°16.1	-59°34.0
Suhail	222°49.5	-43°30.3
Miaplacidus	221°38.5	-69°47.4
Alphard	217°52.3	-8°44.4
Regulus	207°39.5	11°52.5
Dubhe	193°47.2	61°38.7
Denebola	182°29.9	14°28.0
Gienah	175°48.6	-17°38.6
Acrux	173°05.4	-63°11.8
Gacrux	171°57.0	-57°12.7
Alioth	166°17.8	55°51.3
Spica	158°27.6	-11°15.3
Alcaid	152°56.3	49°13.1
Hadar	148°43.1	-60°27.4
Menkent	148°03.5	-36°27.4
Arcturus	145°52.5	19°05.5
Rigil Kent.	139°47.3	-60°54.4
Zubenelg.	137°01.6	-16°06.9
Kochab	137°21.2	74°04.7
Alphecca	126°08.3	26°39.2
Antares	112°22.1	-26°28.2
Atria	107°21.1	-69°03.5
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.8
Rasalhague	96°03.4	12°33.0
Etamin	90°44.9	51°29.4
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.9	38°48.3
Nunki	75°54.1	-26°16.3
Altair	62°05.0	8°55.2
Peacock	53°13.8	-56°40.6
Deneb	49°29.2	45°21.1
Enif	33°43.6	9°57.8
Alnair	27°39.2	-46°52.4
Fomalhaut	15°20.0	-29°31.5
Scheat	13°49.8	28°11.2
Markab	13°34.6	15°18.5

2018/12/	**SHA**	**Mer.pass**
Venus	151°21.3	09:07
Mars	17°20.4	18:02
Jupiter	116°21.2	11:26
Saturn	81°17.0	13:46

2018/12/	**SHA**	**Mer.pass**
Venus	150°46.5	09:05
Mars	16°44.9	18:01
Jupiter	116°07.1	11:23
Saturn	81°09.9	13:42

2018/12/	**SHA**	**Mer.pass**
Venus	150°10.4	09:04
Mars	16°09.3	17:59
Jupiter	115°53.0	11:20
Saturn	81°02.7	13:39

Horizontal paralax	
Venus:	0.3
Mars:	0.1

h Sun Moon

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	182°36.4	-22°03.2	232°27.0	12.1	-2°41.3	-12.2	57.7
1	197°36.2	-22°03.6	246°58.1	12.1	-2°53.5	-12.2	57.7
2	212°36.0	-22°04.0	261°29.2	12.1	-3°05.7	-12.2	57.7
3	227°35.7	-22°04.3	276°00.3	12.1	-3°17.9	-12.2	57.6
4	242°35.5	-22°04.7	290°31.4	12.1	-3°30.1	-12.1	57.6
5	257°35.2	-22°05.0	305°02.5	12.1	-3°42.2	-12.1	57.6
6	272°35.0	-22°05.4	319°33.7	12.1	-3°54.3	-12.1	57.6
7	287°34.7	-22°05.7	334°04.8	12.1	-4°06.4	-12.1	57.6
8	302°34.5	-22°06.1	348°35.9	12.1	-4°18.5	-12.0	57.5
9	317°34.2	-22°06.4	3°07.0	12.1	-4°30.5	-12.0	57.5
10	332°34.0	-22°06.8	17°38.2	12.1	-4°42.5	-12.0	57.5
11	347°33.7	-22°07.1	32°09.3	12.1	-4°54.5	-12.0	57.5
12	2°33.5	-22°07.5	46°40.4	12.1	-5°06.4	-11.9	57.5
13	17°33.2	-22°07.8	61°11.6	12.1	-5°18.3	-11.9	57.4
14	32°33.0	-22°08.2	75°42.7	12.1	-5°30.2	-11.9	57.4
15	47°32.8	-22°08.5	90°13.8	12.1	-5°42.0	-11.8	57.4
16	62°32.5	-22°08.9	104°44.9	12.1	-5°53.8	-11.8	57.4
17	77°32.3	-22°09.2	119°16.1	12.1	-6°05.6	-11.7	57.4
18	92°32.0	-22°09.6	133°47.2	12.1	-6°17.3	-11.7	57.3
19	107°31.8	-22°09.9	148°18.3	12.1	-6°29.0	-11.7	57.3
20	122°31.5	-22°10.3	162°49.4	12.1	-6°40.7	-11.6	57.3
21	137°31.3	-22°10.6	177°20.5	12.1	-6°52.3	-11.6	57.3
22	152°31.0	-22°11.0	191°51.6	12.1	-7°03.9	-11.6	57.3
23	167°30.8	-22°11.3	206°22.7	12.1	-7°15.4	-11.5	57.2
	SD.=16.2	d=-0.4			S.D.=15.7		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	182°30.5	-22°11.6	220°53.8	12.1	-7°26.9	-11.5	57.2
1	197°30.3	-22°12.0	235°24.8	12.1	-7°38.3	-11.4	57.2
2	212°30.0	-22°12.3	249°55.9	12.1	-7°49.7	-11.4	57.2
3	227°29.8	-22°12.7	264°26.9	12.1	-8°01.1	-11.3	57.2
4	242°29.5	-22°13.0	278°58.0	12.0	-8°12.4	-11.3	57.1
5	257°29.2	-22°13.3	293°29.0	12.0	-8°23.6	-11.2	57.1
6	272°29.0	-22°13.7	308°00.1	12.0	-8°34.8	-11.2	57.1
7	287°28.7	-22°14.0	322°31.1	12.0	-8°46.0	-11.1	57.1
8	302°28.5	-22°14.3	337°02.1	12.0	-8°57.1	-11.1	57.1
9	317°28.2	-22°14.7	351°33.1	12.0	-9°08.2	-11.0	57.0
10	332°28.0	-22°15.0	6°04.0	12.0	-9°19.2	-11.0	57.0
11	347°27.7	-22°15.3	20°35.0	12.0	-9°30.2	-10.9	57.0
12	2°27.5	-22°15.7	35°05.9	11.9	-9°41.1	-10.9	57.0
13	17°27.2	-22°16.0	49°36.9	11.9	-9°51.9	-10.8	57.0
14	32°27.0	-22°16.3	64°07.8	11.9	-10°02.7	-10.8	56.9
15	47°26.7	-22°16.7	78°38.7	11.9	-10°13.4	-10.7	56.9
16	62°26.5	-22°17.0	93°09.6	11.9	-10°24.1	-10.7	56.9
17	77°26.2	-22°17.3	107°40.5	11.9	-10°34.7	-10.6	56.9
18	92°26.0	-22°17.7	122°11.3	11.8	-10°45.3	-10.5	56.9
19	107°25.7	-22°18.0	136°42.2	11.8	-10°55.8	-10.5	56.8
20	122°25.4	-22°18.3	151°13.0	11.8	-11°06.3	-10.4	56.8
21	137°25.2	-22°18.6	165°43.8	11.8	-11°16.6	-10.4	56.8
22	152°24.9	-22°19.0	180°14.6	11.8	-11°27.0	-10.3	56.8
23	167°24.7	-22°19.3	194°45.3	11.8	-11°37.2	-10.2	56.8
	SD.=16.2	d=-0.3			S.D.=15.6		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	182°24.4	-22°19.6	209°16.1	11.7	-11°47.4	-10.2	56.7
1	197°24.2	-22°19.9	223°46.8	11.7	-11°57.5	-10.1	56.7
2	212°23.9	-22°20.2	238°17.5	11.7	-12°07.6	-10.0	56.7
3	227°23.6	-22°20.6	252°48.2	11.7	-12°17.6	-10.0	56.7
4	242°23.4	-22°20.9	267°18.9	11.7	-12°27.5	-9.9	56.7
5	257°23.1	-22°21.2	281°49.6	11.6	-12°37.4	-9.8	56.6
6	272°22.9	-22°21.5	296°20.2	11.6	-12°47.2	-9.8	56.6
7	287°22.6	-22°21.8	310°50.8	11.6	-12°56.9	-9.7	56.6
8	302°22.4	-22°22.2	325°21.4	11.6	-13°06.6	-9.6	56.6
9	317°22.1	-22°22.5	339°52.0	11.6	-13°16.1	-9.5	56.6
10	332°21.8	-22°22.8	354°22.5	11.5	-13°25.6	-9.5	56.5
11	347°21.6	-22°23.1	8°53.1	11.5	-13°35.1	-9.4	56.5
12	2°21.3	-22°23.4	23°23.6	11.5	-13°44.4	-9.3	56.5
13	17°21.1	-22°23.7	37°54.1	11.5	-13°53.7	-9.3	56.5
14	32°20.8	-22°24.1	52°24.5	11.5	-14°02.9	-9.2	56.5
15	47°20.5	-22°24.4	66°55.0	11.4	-14°12.1	-9.1	56.4
16	62°20.3	-22°24.7	81°25.4	11.4	-14°21.1	-9.0	56.4
17	77°20.0	-22°25.0	95°55.8	11.4	-14°30.1	-8.9	56.4
18	92°19.8	-22°25.3	110°26.2	11.4	-14°39.0	-8.9	56.4
19	107°19.5	-22°25.6	124°56.6	11.3	-14°47.9	-8.8	56.4
20	122°19.2	-22°25.9	139°26.9	11.3	-14°56.6	-8.7	56.3
21	137°19.0	-22°26.2	153°57.2	11.3	-15°05.3	-8.6	56.3
22	152°18.7	-22°26.5	168°27.5	11.3	-15°13.9	-8.5	56.3
23	167°18.4	-22°26.8	182°57.8	11.3	-15°22.4	-8.5	56.3
	SD.=16.2	d=-0.3			S.D.=15.5		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:59	10:04	–:–	–:–	13:36	15:41
70	07:41	09:20	–:–	–:–	14:19	15:58
68	07:28	08:51	10:55	12:45	14:48	16:12
66	07:16	08:30	09:57	13:43	15:10	16:24
64	07:06	08:12	09:24	14:16	15:28	16:34
62	06:58	07:58	08:60	14:40	15:42	16:42
60	06:50	07:45	08:41	14:59	15:54	16:50
58	06:43	07:35	08:25	15:15	16:05	16:57
56	06:37	07:25	08:11	15:29	16:15	17:03
54	06:32	07:17	07:60	15:40	16:23	17:08
52	06:27	07:10	07:50	15:51	16:30	17:13
50	06:22	07:03	07:40	15:60	16:37	17:18
45	06:11	06:48	07:21	16:19	16:52	17:29
40	06:01	06:35	07:05	16:35	17:05	17:39
35	05:53	06:24	06:52	16:48	17:16	17:47
30	05:45	06:14	06:40	16:60	17:26	17:55
20	05:29	05:57	06:20	17:20	17:44	18:11
10	05:14	05:40	06:03	17:37	17:60	18:26
0	04:58	05:24	05:46	17:54	18:16	18:42
-10	04:40	05:07	05:30	18:11	18:33	19:00
-20	04:19	04:48	05:12	18:29	18:53	19:22
-30	03:51	04:24	04:51	18:49	19:16	19:49
-35	03:34	04:10	04:39	19:02	19:31	20:07
-40	03:12	03:53	04:25	19:16	19:48	20:29
-45	02:44	03:32	04:08	19:33	20:09	20:57
-50	02:03	03:04	03:47	19:54	20:37	21:38
-52	01:40	02:50	03:37	20:04	20:51	22:02
-54	01:07	02:34	03:26	20:15	21:07	22:36
-56	–:–	02:15	03:13	20:28	21:27	–:–
-58	–:–	01:50	02:58	20:44	21:52	–:–
-60	–:–	01:15	02:40	21:02	22:29	–:–

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	03:20	05:17	07:21	13:47	13:30	13:08
70	03:15	05:04	06:55	13:54	13:45	13:35
68	03:11	04:53	06:35	14:01	13:58	13:56
66	03:07	04:44	06:20	14:06	14:08	14:12
64	03:05	04:36	06:07	14:10	14:17	14:26
62	03:02	04:30	05:57	14:14	14:25	14:37
60	02:60	04:24	05:48	14:18	14:31	14:47
58	02:58	04:20	05:40	14:21	14:37	14:56
56	02:56	04:15	05:33	14:24	14:42	15:03
54	02:55	04:11	05:27	14:26	14:47	15:10
52	02:53	04:08	05:21	14:28	14:51	15:16
50	02:52	04:05	05:16	14:30	14:55	15:22
45	02:49	03:58	05:05	14:35	15:03	15:34
40	02:47	03:52	04:57	14:39	15:10	15:44
35	02:45	03:47	04:49	14:42	15:16	15:52
30	02:44	03:43	04:42	14:45	15:21	15:60
20	02:41	03:36	04:31	14:50	15:31	16:13
10	02:38	03:29	04:21	14:54	15:39	16:24
0	02:36	03:23	04:12	14:59	15:46	16:35
-10	02:33	03:18	04:02	15:03	15:54	16:46
-20	02:31	03:11	03:53	15:07	16:02	16:57
-30	02:28	03:04	03:42	15:12	16:12	17:10
-35	02:27	03:00	03:35	15:15	16:17	17:18
-40	02:25	02:56	03:28	15:18	16:23	17:27
-45	02:23	02:50	03:20	15:22	16:30	17:37
-50	02:20	02:44	03:10	15:27	16:39	17:50
-52	02:19	02:41	03:05	15:29	16:43	17:55
-54	02:18	02:38	02:60	15:31	16:47	18:02
-56	02:17	02:35	02:54	15:34	16:52	18:09
-58	02:15	02:31	02:48	15:37	16:58	18:17
-60	02:14	02:26	02:41	15:40	17:04	18:26

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
3	10:26	10:14	11:49	08:47	21:10	26(15%)
4	10:02	09:50	11:50	09:34	21:59	27(8%)
5	09:38	09:25	11:50	10:23	22:47	28(4%)

December 06, 07 ,08 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	74°43.8	224°16.9	-10°15.7	90°17.5	-7°42.5	190°22.7	-20°41.2	155°39.3	-22°39.3
1	89°46.2	239°17.8	-10°15.9	105°18.5	-7°41.8	205°24.6	-20°41.3	170°41.5	-22°39.3
2	104°48.7	254°18.7	-10°16.2	120°19.5	-7°41.1	220°26.5	-20°41.4	185°43.6	-22°39.2
3	119°51.2	269°19.6	-10°16.5	135°20.5	-7°40.4	235°28.4	-20°41.5	200°45.8	-22°39.2
4	134°53.6	284°20.4	-10°16.7	150°21.4	-7°39.7	250°30.3	-20°41.6	215°48.0	-22°39.2
5	149°56.1	299°21.3	-10°17.0	165°22.4	-7°39.0	265°32.1	-20°41.7	230°50.1	-22°39.2
6	164°58.6	314°22.2	-10°17.3	180°23.4	-7°38.3	280°34.0	-20°41.8	245°52.3	-22°39.2
7	180°01.0	329°23.1	-10°17.5	195°24.4	-7°37.6	295°35.9	-20°41.9	260°54.5	-22°39.2
8	195°03.5	344°23.9	-10°17.8	210°25.4	-7°36.9	310°37.8	-20°42.0	275°56.6	-22°39.2
9	210°06.0	359°24.8	-10°18.1	225°26.3	-7°36.2	325°39.6	-20°42.1	290°58.8	-22°39.1
10	225°08.4	14°25.7	-10°18.4	240°27.3	-7°35.5	340°41.5	-20°42.2	306°00.9	-22°39.1
11	240°10.9	29°26.5	-10°18.6	255°28.3	-7°34.9	355°43.4	-20°42.2	321°03.1	-22°39.1
12	255°13.3	44°27.4	-10°18.9	270°29.3	-7°34.2	10°45.3	-20°42.3	336°05.3	-22°39.1
13	270°15.8	59°28.3	-10°19.2	285°30.3	-7°33.5	25°47.2	-20°42.4	351°07.4	-22°39.1
14	285°18.3	74°29.1	-10°19.5	300°31.2	-7°32.8	40°49.0	-20°42.5	6°09.6	-22°39.1
15	300°20.7	89°30.0	-10°19.8	315°32.2	-7°32.1	55°50.9	-20°42.6	21°11.8	-22°39.1
16	315°23.2	104°30.8	-10°20.0	330°33.2	-7°31.4	70°52.8	-20°42.7	36°13.9	-22°39.0
17	330°25.7	119°31.7	-10°20.3	345°34.2	-7°30.7	85°54.7	-20°42.8	51°16.1	-22°39.0
18	345°28.1	134°32.5	-10°20.6	0°35.1	-7°30.0	100°56.6	-20°42.9	66°18.3	-22°39.0
19	0°30.6	149°33.4	-10°20.9	15°36.1	-7°29.3	115°58.4	-20°43.0	81°20.4	-22°39.0
20	15°33.1	164°34.2	-10°21.2	30°37.1	-7°28.6	131°00.3	-20°43.1	96°22.6	-22°39.0
21	30°35.5	179°35.1	-10°21.5	45°38.1	-7°27.9	146°02.2	-20°43.2	111°24.7	-22°39.0
22	45°38.0	194°35.9	-10°21.8	60°39.1	-7°27.2	161°04.1	-20°43.3	126°26.9	-22°39.0
23	60°40.5	209°36.8	-10°22.0	75°40.0	-7°26.5	176°05.9	-20°43.4	141°29.1	-22°38.9
Mer.pass.:18:57		v0.9 d-0.3 m-4.5		v1.0 d0.7 m0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	75°42.9	224°37.6	-10°22.3	90°41.0	-7°25.8	191°07.8	-20°43.5	156°31.2	-22°38.9
1	90°45.4	239°38.4	-10°22.6	105°42.0	-7°25.1	206°09.7	-20°43.6	171°33.4	-22°38.9
2	105°47.8	254°39.3	-10°22.9	120°43.0	-7°24.4	221°11.6	-20°43.7	186°35.6	-22°38.9
3	120°50.3	269°40.1	-10°23.2	135°44.0	-7°23.7	236°13.5	-20°43.8	201°37.7	-22°38.9
4	135°52.8	284°40.9	-10°23.5	150°44.9	-7°23.0	251°15.3	-20°43.9	216°39.9	-22°38.9
5	150°55.2	299°41.8	-10°23.8	165°45.9	-7°22.3	266°17.2	-20°44.0	231°42.0	-22°38.9
6	165°57.7	314°42.6	-10°24.1	180°46.9	-7°21.6	281°19.1	-20°44.1	246°44.2	-22°38.9
7	181°00.2	329°43.4	-10°24.4	195°47.9	-7°20.9	296°21.0	-20°44.2	261°46.4	-22°38.8
8	196°02.6	344°44.2	-10°24.7	210°48.8	-7°20.2	311°22.9	-20°44.3	276°48.5	-22°38.8
9	211°05.1	359°45.1	-10°25.0	225°49.8	-7°19.5	326°24.7	-20°44.4	291°50.7	-22°38.8
10	226°07.6	14°45.9	-10°25.3	240°50.8	-7°18.9	341°26.6	-20°44.5	306°52.8	-22°38.8
11	241°10.0	29°46.7	-10°25.6	255°51.8	-7°18.2	356°28.5	-20°44.6	321°55.0	-22°38.8
12	256°12.5	44°47.5	-10°25.9	270°52.8	-7°17.5	11°30.4	-20°44.7	336°57.2	-22°38.8
13	271°14.9	59°48.3	-10°26.2	285°53.7	-7°16.8	26°32.2	-20°44.8	351°59.3	-22°38.8
14	286°17.4	74°49.1	-10°26.5	300°54.7	-7°16.1	41°34.1	-20°44.9	7°01.5	-22°38.7
15	301°19.9	89°49.9	-10°26.8	315°55.7	-7°15.4	56°36.0	-20°45.0	22°03.7	-22°38.7
16	316°22.3	104°50.8	-10°27.1	330°56.7	-7°14.7	71°37.9	-20°45.1	37°05.8	-22°38.7
17	331°24.8	119°51.6	-10°27.5	345°57.6	-7°14.0	86°39.8	-20°45.2	52°08.0	-22°38.7
18	346°27.3	134°52.4	-10°27.8	0°58.6	-7°13.3	101°41.6	-20°45.3	67°10.1	-22°38.7
19	1°29.7	149°53.2	-10°28.1	15°59.6	-7°12.6	116°43.5	-20°45.4	82°12.3	-22°38.7
20	16°32.2	164°54.0	-10°28.4	31°00.6	-7°11.9	131°45.4	-20°45.5	97°14.5	-22°38.7
21	31°34.7	179°54.8	-10°28.7	46°01.6	-7°11.2	146°47.3	-20°45.6	112°16.6	-22°38.6
22	46°37.1	194°55.6	-10°29.0	61°02.5	-7°10.5	161°49.2	-20°45.6	127°18.8	-22°38.6
23	61°39.6	209°56.4	-10°29.3	76°03.5	-7°09.8	176°51.0	-20°45.7	142°20.9	-22°38.6
Mer.pass.:18:54		v0.8 d-0.3 m-4.4		v1.0 d0.7 m0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	76°42.1	224°57.1	-10°29.7	91°04.5	-7°09.1	191°52.9	-20°45.8	157°23.1	-22°38.6
1	91°44.5	239°57.9	-10°30.0	106°05.5	-7°08.4	206°54.8	-20°45.9	172°25.3	-22°38.6
2	106°47.0	254°58.7	-10°30.3	121°06.4	-7°07.7	221°56.7	-20°46.0	187°27.4	-22°38.6
3	121°49.4	269°59.5	-10°30.6	136°07.4	-7°07.0	236°58.5	-20°46.1	202°29.6	-22°38.6
4	136°51.9	285°00.3	-10°30.9	151°08.4	-7°06.3	252°00.4	-20°46.2	217°31.8	-22°38.5
5	151°54.4	300°01.1	-10°31.3	166°09.4	-7°05.6	267°02.3	-20°46.3	232°33.9	-22°38.5
6	166°56.8	315°01.9	-10°31.6	181°10.3	-7°04.9	282°04.2	-20°46.4	247°36.1	-22°38.5
7	181°59.3	330°02.6	-10°31.9	196°11.3	-7°04.2	297°06.1	-20°46.5	262°38.2	-22°38.5
8	197°01.8	345°03.4	-10°32.2	211°12.3	-7°03.5	312°07.9	-20°46.6	277°40.4	-22°38.5
9	212°04.2	0°04.2	-10°32.6	226°13.3	-7°02.8	327°09.8	-20°46.7	292°42.6	-22°38.5
10	227°06.7	15°05.0	-10°32.9	241°14.3	-7°02.1	342°11.7	-20°46.8	307°44.7	-22°38.4
11	242°09.2	30°05.7	-10°33.2	256°15.2	-7°01.4	357°13.6	-20°46.9	322°46.9	-22°38.4
12	257°11.6	45°06.5	-10°33.5	271°16.2	-7°00.7	12°15.5	-20°47.0	337°49.0	-22°38.4
13	272°14.1	60°07.3	-10°33.9	286°17.2	-7°00.0	27°17.3	-20°47.1	352°51.2	-22°38.4
14	287°16.6	75°08.0	-10°34.2	301°18.2	-6°59.3	42°19.2	-20°47.2	7°53.4	-22°38.4
15	302°19.0	90°08.8	-10°34.5	316°19.1	-6°58.6	57°21.1	-20°47.3	22°55.5	-22°38.4
16	317°21.5	105°09.6	-10°34.9	331°20.1	-6°57.9	72°23.0	-20°47.4	37°57.7	-22°38.4
17	332°23.9	120°10.3	-10°35.2	346°21.1	-6°57.2	87°24.9	-20°47.5	52°59.8	-22°38.3
18	347°26.4	135°11.1	-10°35.5	1°22.1	-6°56.5	102°26.7	-20°47.6	68°02.0	-22°38.3
19	2°28.9	150°11.8	-10°35.9	16°23.0	-6°55.8	117°28.6	-20°47.7	83°04.2	-22°38.3
20	17°31.3	165°12.6	-10°36.2	31°24.0	-6°55.1	132°30.5	-20°47.8	98°06.3	-22°38.3
21	32°33.8	180°13.3	-10°36.5	46°25.0	-6°54.4	147°32.4	-20°47.9	113°08.5	-22°38.3
22	47°36.3	195°14.1	-10°36.9	61°26.0	-6°53.7	162°34.2	-20°48.0	128°10.6	-22°38.3
23	62°38.7	210°14.8	-10°37.2	76°26.9	-6°53.0	177°36.1	-20°48.0	143°12.8	-22°38.3
Mer.pass.:18:50		v0.8 d-0.3 m-4.4		v1.0 d0.7 m0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.8
Ankaa	353°11.9	-42°12.5
Schedar	349°36.0	56°38.6
Diphda	348°51.9	-17°53.2
Achernar	335°23.7	-57°08.8
Hamal	327°56.3	23°33.1
Polaris	315°43.0	89°20.7
Akamar	315°15.2	-40°14.0
Menkar	314°10.9	4°09.7
Mirfak	308°34.5	49°55.6
Aldebaran	290°44.8	16°32.7
Rigel	281°08.2	-8°10.9
Capella	280°28.5	46°00.9
Bellatrix	278°27.7	6°21.9
Elnath	278°07.6	28°37.2
Alnilam	275°42.3	-1°11.5
Betelgeuse	270°57.0	7°24.5
Canopus	263°54.0	-52°42.4
Sirius	258°30.1	-16°44.4
Adara	255°09.3	-28°59.9
Procyon	244°55.5	5°10.6
Pollux	243°22.8	27°58.7
Avior	234°16.1	-59°34.0
Suhail	222°49.5	-43°30.3
Miaplacidus	221°38.4	-69°47.4
Alphard	217°52.3	-8°44.4
Regulus	207°39.5	11°52.5
Dubhe	193°47.2	61°38.7
Denebola	182°29.9	14°28.0
Gienah	175°48.6	-17°38.6
Acrux	173°05.4	-63°11.8
Gacrux	171°57.0	-57°12.7
Alioth	166°17.8	55°51.3
Spica	158°27.5	-11°15.3
Alcaid	152°56.3	49°13.1
Hadar	148°43.1	-60°27.4
Menkent	148°03.5	-36°27.4
Arcturus	145°52.5	19°05.5
Rigil Kent.	139°47.2	-60°54.4
Zubenelg.	137°01.6	-16°06.9
Kochab	137°21.2	74°04.6
Alphecca	126°08.2	26°39.2
Antares	112°22.1	-26°28.2
Atria	107°21.1	-69°03.4
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.8
Rasalhague	96°03.4	12°33.0
Etamin	90°44.9	51°29.4
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.9	38°48.3
Nunki	75°54.1	-26°16.3
Altair	62°05.0	8°55.2
Peacock	53°13.8	-56°40.6
Deneb	49°29.2	45°21.1
Enif	33°43.6	9°57.8
Alnair	27°39.3	-46°52.4
Fomalhaut	15°20.0	-29°31.5
Scheat	13°49.8	28°11.2
Markab	13°34.7	15°18.5

2018/12/	**SHA**	**Mer.pass**
Venus	149°33.1	09:02
Mars	15°33.7	17:58
Jupiter	115°39.0	11:17
Saturn	80°55.5	13:35

2018/12/	**SHA**	**Mer.pass**
Venus	148°54.7	09:01
Mars	14°58.1	17:56
Jupiter	115°24.9	11:14
Saturn	80°48.3	13:32

2018/12/	**SHA**	**Mer.pass**
Venus	148°15.1	08:60
Mars	14°22.4	17:55
Jupiter	115°10.9	11:11
Saturn	80°41.1	13:29

Horizontal paralax	
Venus:	0.3
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°18.2	-22°27.1	197°28.0	11.2	-15°30.8	-8.4	56.3
1	197°17.9	-22°27.4	211°58.2	11.2	-15°39.1	-8.3	56.2
2	212°17.7	-22°27.7	226°28.5	11.2	-15°47.4	-8.2	56.2
3	227°17.4	-22°28.0	240°58.6	11.2	-15°55.5	-8.1	56.2
4	242°17.1	-22°28.4	255°28.8	11.2	-16°03.6	-8.0	56.2
5	257°16.9	-22°28.7	269°58.9	11.1	-16°11.6	-8.0	56.2
6	272°16.6	-22°29.0	284°29.1	11.1	-16°19.5	-7.9	56.1
7	287°16.3	-22°29.3	298°59.2	11.1	-16°27.4	-7.8	56.1
8	302°16.1	-22°29.6	313°29.2	11.1	-16°35.1	-7.7	56.1
9	317°15.8	-22°29.9	327°59.3	11.0	-16°42.7	-7.6	56.1
10	332°15.5	-22°30.1	342°29.3	11.0	-16°50.3	-7.5	56.1
11	347°15.3	-22°30.4	356°59.4	11.0	-16°57.8	-7.4	56.0
12	2°15.0	-22°30.7	11°29.4	11.0	-17°05.1	-7.3	56.0
13	17°14.7	-22°31.0	25°59.3	11.0	-17°12.4	-7.2	56.0
14	32°14.5	-22°31.3	40°29.3	10.9	-17°19.6	-7.2	56.0
15	47°14.2	-22°31.6	54°59.2	10.9	-17°26.7	-7.1	56.0
16	62°13.9	-22°31.9	69°29.1	10.9	-17°33.7	-7.0	55.9
17	77°13.7	-22°32.2	83°59.0	10.9	-17°40.7	-6.9	55.9
18	92°13.4	-22°32.5	98°28.9	10.9	-17°47.5	-6.8	55.9
19	107°13.1	-22°32.8	112°58.8	10.9	-17°54.2	-6.7	55.9
20	122°12.9	-22°33.1	127°28.6	10.8	-18°00.9	-6.6	55.9
21	137°12.6	-22°33.4	141°58.4	10.8	-18°07.4	-6.5	55.8
22	152°12.3	-22°33.7	156°28.2	10.8	-18°13.8	-6.4	55.8
23	167°12.1	-22°33.9	170°58.0	10.8	-18°20.2	-6.3	55.8
	SD.=16.2	d=-0.3	S.D.=15.3				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°11.8	-22°34.2	185°27.8	10.8	-18°26.4	-6.2	55.8
1	197°11.5	-22°34.5	199°57.6	10.7	-18°32.6	-6.1	55.8
2	212°11.3	-22°34.8	214°27.3	10.7	-18°38.7	-6.0	55.7
3	227°11.0	-22°35.1	228°57.0	10.7	-18°44.6	-5.9	55.7
4	242°10.7	-22°35.4	243°26.7	10.7	-18°50.5	-5.8	55.7
5	257°10.5	-22°35.7	257°56.4	10.7	-18°56.2	-5.7	55.7
6	272°10.2	-22°35.9	272°26.1	10.7	-19°01.9	-5.6	55.7
7	287°09.9	-22°36.2	286°55.8	10.7	-19°07.4	-5.5	55.6
8	302°09.7	-22°36.5	301°25.4	10.6	-19°12.9	-5.4	55.6
9	317°09.4	-22°36.8	315°55.1	10.6	-19°18.3	-5.3	55.6
10	332°09.1	-22°37.1	330°24.7	10.6	-19°23.5	-5.2	55.6
11	347°08.9	-22°37.3	344°54.3	10.6	-19°28.7	-5.1	55.6
12	2°08.6	-22°37.6	359°23.9	10.6	-19°33.7	-5.0	55.5
13	17°08.3	-22°37.9	13°53.5	10.6	-19°38.7	-4.9	55.5
14	32°08.0	-22°38.2	28°23.1	10.6	-19°43.5	-4.8	55.5
15	47°07.8	-22°38.4	42°52.6	10.6	-19°48.3	-4.7	55.5
16	62°07.5	-22°38.7	57°22.2	10.6	-19°52.9	-4.6	55.5
17	77°07.2	-22°39.0	71°51.8	10.5	-19°57.5	-4.5	55.4
18	92°07.0	-22°39.3	86°21.3	10.5	-20°01.9	-4.4	55.4
19	107°06.7	-22°39.5	100°50.8	10.5	-20°06.2	-4.3	55.4
20	122°06.4	-22°39.8	115°20.4	10.5	-20°10.5	-4.2	55.4
21	137°06.1	-22°40.1	129°49.9	10.5	-20°14.6	-4.1	55.4
22	152°05.9	-22°40.4	144°19.4	10.5	-20°18.6	-4.0	55.4
23	167°05.6	-22°40.6	158°48.9	10.5	-20°22.5	-3.9	55.3
	SD.=16.2	d=-0.3	S.D.=15.2				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°05.3	-22°40.9	173°18.4	10.5	-20°26.3	-3.8	55.3
1	197°05.0	-22°41.2	187°47.9	10.5	-20°30.0	-3.6	55.3
2	212°04.8	-22°41.4	202°17.4	10.5	-20°33.6	-3.5	55.3
3	227°04.5	-22°41.7	216°46.9	10.5	-20°37.1	-3.4	55.3
4	242°04.2	-22°42.0	231°16.4	10.5	-20°40.5	-3.3	55.2
5	257°03.9	-22°42.2	245°45.9	10.5	-20°43.8	-3.2	55.2
6	272°03.7	-22°42.5	260°15.4	10.5	-20°46.9	-3.1	55.2
7	287°03.4	-22°42.7	274°44.9	10.5	-20°50.0	-3.0	55.2
8	302°03.1	-22°43.0	289°14.4	10.5	-20°53.0	-2.9	55.2
9	317°02.8	-22°43.3	303°43.9	10.5	-20°55.8	-2.8	55.2
10	332°02.6	-22°43.5	318°13.4	10.5	-20°58.5	-2.7	55.1
11	347°02.3	-22°43.8	332°42.9	10.5	-21°01.2	-2.6	55.1
12	2°02.0	-22°44.1	347°12.4	10.5	-21°03.7	-2.5	55.1
13	17°01.7	-22°44.3	1°41.9	10.5	-21°06.1	-2.4	55.1
14	32°01.5	-22°44.6	16°11.4	10.5	-21°08.4	-2.3	55.1
15	47°01.2	-22°44.8	30°41.0	10.5	-21°10.6	-2.2	55.0
16	62°00.9	-22°45.1	45°10.5	10.5	-21°12.7	-2.0	55.0
17	77°00.6	-22°45.3	59°40.0	10.5	-21°14.7	-1.9	55.0
18	92°00.4	-22°45.6	74°09.6	10.5	-21°16.6	-1.8	55.0
19	107°00.1	-22°45.8	88°39.1	10.6	-21°18.4	-1.7	55.0
20	121°59.8	-22°46.1	103°08.7	10.6	-21°20.1	-1.6	55.0
21	136°59.5	-22°46.4	117°38.2	10.6	-21°21.6	-1.5	54.9
22	151°59.3	-22°46.6	132°07.8	10.6	-21°23.1	-1.4	54.9
23	166°59.0	-22°46.9	146°37.4	10.6	-21°24.4	-1.3	54.9
	SD.=16.2	d=-0.3	S.D.=15.1				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:06	10:17	–:–	–:–	13:26	15:37
70	07:48	09:29	–:–	–:–	14:13	15:55
68	07:33	08:59	11:18	12:25	14:44	16:09
66	07:21	08:36	10:06	13:36	15:07	16:21
64	07:11	08:18	09:31	14:12	15:25	16:32
62	07:02	08:03	09:06	14:37	15:40	16:40
60	06:54	07:50	08:46	14:57	15:53	16:48
58	06:47	07:39	08:30	15:13	16:03	16:55
56	06:41	07:29	08:16	15:27	16:13	17:02
54	06:35	07:21	08:04	15:39	16:22	17:07
52	06:30	07:13	07:53	15:49	16:30	17:13
50	06:25	07:06	07:44	15:59	16:37	17:18
45	06:14	06:51	07:24	16:18	16:52	17:29
40	06:04	06:38	07:08	16:35	17:05	17:39
35	05:55	06:27	06:55	16:48	17:16	17:48
30	05:47	06:17	06:43	17:00	17:26	17:56
20	05:31	05:58	06:22	17:20	17:44	18:12
10	05:16	05:42	06:04	17:38	18:01	18:27
0	04:59	05:25	05:48	17:55	18:18	18:44
-10	04:41	05:08	05:31	18:12	18:35	19:02
-20	04:19	04:48	05:13	18:30	18:55	19:24
-30	03:51	04:24	04:51	18:52	19:19	19:52
-35	03:33	04:10	04:39	19:04	19:34	20:10
-40	03:11	03:52	04:24	19:19	19:51	20:32
-45	02:42	03:31	04:07	19:36	20:13	21:01
-50	02:00	03:02	03:46	19:57	20:41	21:44
-52	01:36	02:48	03:36	20:08	20:55	22:09
-54	01:00	02:32	03:24	20:20	21:12	22:45
-56	–:–	02:11	03:11	20:33	21:33	–:–
-58	–:–	01:45	02:55	20:49	21:59	–:–
-60	–:–	01:07	02:36	21:08	22:39	–:–

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	09:47	–:–	–:–	12:24	–:–	–:–
70	08:52	11:13	–:–	13:20	12:43	–:–
68	08:19	10:03	11:44	13:54	13:54	13:59
66	07:55	09:27	10:49	14:19	14:30	14:53
64	07:37	09:01	10:17	14:38	14:57	15:26
62	07:21	08:41	09:53	14:54	15:17	15:50
60	07:09	08:25	09:34	15:07	15:34	16:09
58	06:58	08:11	09:18	15:19	15:48	16:25
56	06:48	07:60	09:04	15:29	15:60	16:39
54	06:40	07:49	08:53	15:37	16:11	16:51
52	06:32	07:40	08:42	15:45	16:20	17:01
50	06:26	07:32	08:33	15:52	16:28	17:10
45	06:11	07:15	08:14	16:08	16:46	17:30
40	05:60	07:01	07:58	16:20	17:01	17:46
35	05:50	06:49	07:45	16:31	17:13	17:60
30	05:41	06:38	07:33	16:41	17:24	18:11
20	05:26	06:20	07:14	16:57	17:43	18:31
10	05:13	06:05	06:57	17:11	17:59	18:49
0	05:01	05:50	06:41	17:24	18:15	19:05
-10	04:48	05:36	06:25	17:38	18:30	19:21
-20	04:36	05:21	06:08	17:52	18:46	19:39
-30	04:21	05:03	05:48	18:09	19:05	19:59
-35	04:12	04:53	05:37	18:18	19:16	20:11
-40	04:03	04:41	05:24	18:29	19:29	20:24
-45	03:52	04:28	05:09	18:42	19:44	20:40
-50	03:38	04:11	04:50	18:58	20:02	20:60
-52	03:32	04:04	04:41	19:05	20:10	21:09
-54	03:25	03:55	04:31	19:13	20:20	21:20
-56	03:17	03:45	04:20	19:23	20:31	21:31
-58	03:09	03:34	04:08	19:33	20:44	21:45
-60	02:59	03:22	03:53	19:45	20:58	22:01

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
6	09:13	09:00	11:51	11:12	23:37	29(1%)
7	08:47	08:34	11:51	12:02	00:27	0(0%)
8	08:21	08:08	11:51	12:52	00:27	1(1%)

December 09, 10 ,11 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	77°41.2	225°15.6	-10°37.6	91°27.9	-6°52.3	192°38.0	-20°48.1	158°15.0	-22°38.2
1	92°43.7	240°16.3	-10°37.9	106°28.9	-6°51.6	207°39.9	-20°48.2	173°17.1	-22°38.2
2	107°46.1	255°17.1	-10°38.3	121°29.9	-6°50.9	222°41.8	-20°48.3	188°19.3	-22°38.2
3	122°48.6	270°17.8	-10°38.6	136°30.8	-6°50.2	237°43.6	-20°48.4	203°21.4	-22°38.2
4	137°51.1	285°18.6	-10°38.9	151°31.8	-6°49.5	252°45.5	-20°48.5	218°23.6	-22°38.2
5	152°53.5	300°19.3	-10°39.3	166°32.8	-6°48.8	267°47.4	-20°48.6	233°25.8	-22°38.2
6	167°56.0	315°20.0	-10°39.6	181°33.8	-6°48.1	282°49.3	-20°48.7	248°27.9	-22°38.2
7	182°58.4	330°20.8	-10°40.0	196°34.7	-6°47.4	297°51.2	-20°48.8	263°30.1	-22°38.1
8	198°00.9	345°21.5	-10°40.3	211°35.7	-6°46.7	312°53.0	-20°48.9	278°32.2	-22°38.1
9	213°03.4	0°22.2	-10°40.7	226°36.7	-6°46.0	327°54.9	-20°49.0	293°34.4	-22°38.1
10	228°05.8	15°23.0	-10°41.0	241°37.7	-6°45.3	342°56.8	-20°49.1	308°36.6	-22°38.1
11	243°08.3	30°23.7	-10°41.4	256°38.6	-6°44.6	357°58.7	-20°49.2	323°38.7	-22°38.1
12	258°10.8	45°24.4	-10°41.7	271°39.6	-6°43.9	13°00.6	-20°49.3	338°40.9	-22°38.1
13	273°13.2	60°25.1	-10°42.1	286°40.6	-6°43.2	28°02.4	-20°49.4	353°43.0	-22°38.1
14	288°15.7	75°25.9	-10°42.5	301°41.6	-6°42.5	43°04.3	-20°49.5	8°45.2	-22°38.0
15	303°18.2	90°26.6	-10°42.8	316°42.5	-6°41.8	58°06.2	-20°49.6	23°47.3	-22°38.0
16	318°20.6	105°27.3	-10°43.2	331°43.5	-6°41.1	73°08.1	-20°49.7	38°49.5	-22°38.0
17	333°23.1	120°28.0	-10°43.5	346°44.5	-6°40.4	88°10.0	-20°49.8	53°51.7	-22°38.0
18	348°25.6	135°28.7	-10°43.9	1°45.5	-6°39.7	103°11.8	-20°49.9	68°53.8	-22°38.0
19	3°28.0	150°29.5	-10°44.2	16°46.4	-6°39.0	118°13.7	-20°50.0	83°56.0	-22°38.0
20	18°30.5	165°30.2	-10°44.6	31°47.4	-6°38.3	133°15.6	-20°50.0	98°58.1	-22°37.9
21	33°32.9	180°30.9	-10°45.0	46°48.4	-6°37.6	148°17.5	-20°50.1	114°00.3	-22°37.9
22	48°35.4	195°31.6	-10°45.3	61°49.4	-6°36.9	163°19.3	-20°50.2	129°02.5	-22°37.9
23	63°37.9	210°32.3	-10°45.7	76°50.3	-6°36.2	178°21.2	-20°50.3	144°04.6	-22°37.9
Mer.pass.:18:46		v0.7 d-0.3 m-4.4		v1.0 d0.7 m0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	78°40.3	225°33.0	-10°46.1	91°51.3	-6°35.5	193°23.1	-20°50.4	159°06.8	-22°37.9
1	93°42.8	240°33.7	-10°46.4	106°52.3	-6°34.8	208°25.0	-20°50.5	174°08.9	-22°37.9
2	108°45.3	255°34.4	-10°46.8	121°53.2	-6°34.1	223°26.9	-20°50.6	189°11.1	-22°37.9
3	123°47.7	270°35.1	-10°47.2	136°54.2	-6°33.4	238°28.7	-20°50.7	204°13.3	-22°37.8
4	138°50.2	285°35.8	-10°47.5	151°55.2	-6°32.7	253°30.6	-20°50.8	219°15.4	-22°37.8
5	153°52.7	300°36.5	-10°47.9	166°56.2	-6°32.0	268°32.5	-20°50.9	234°17.6	-22°37.8
6	168°55.1	315°37.2	-10°48.3	181°57.1	-6°31.3	283°34.4	-20°51.0	249°19.7	-22°37.8
7	183°57.6	330°37.9	-10°48.6	196°58.1	-6°30.6	298°36.3	-20°51.1	264°21.9	-22°37.8
8	199°00.0	345°38.6	-10°49.0	211°59.1	-6°29.9	313°38.1	-20°51.2	279°24.0	-22°37.8
9	214°02.5	0°39.2	-10°49.4	227°00.1	-6°29.2	328°40.0	-20°51.3	294°26.2	-22°37.8
10	229°05.0	15°39.9	-10°49.7	242°01.0	-6°28.5	343°41.9	-20°51.4	309°28.4	-22°37.7
11	244°07.4	30°40.6	-10°50.1	257°02.0	-6°27.8	358°43.8	-20°51.5	324°30.5	-22°37.7
12	259°09.9	45°41.3	-10°50.5	272°03.0	-6°27.1	13°45.7	-20°51.6	339°32.7	-22°37.7
13	274°12.4	60°42.0	-10°50.9	287°04.0	-6°26.4	28°47.5	-20°51.6	354°34.8	-22°37.7
14	289°14.8	75°42.7	-10°51.3	302°04.9	-6°25.7	43°49.4	-20°51.7	9°37.0	-22°37.7
15	304°17.3	90°43.3	-10°51.6	317°05.9	-6°25.0	58°51.3	-20°51.8	24°39.1	-22°37.7
16	319°19.8	105°44.0	-10°52.0	332°06.9	-6°24.3	73°53.2	-20°51.9	39°41.3	-22°37.6
17	334°22.2	120°44.7	-10°52.4	347°07.8	-6°23.5	88°55.1	-20°52.0	54°43.5	-22°37.6
18	349°24.7	135°45.4	-10°52.8	2°08.8	-6°22.8	103°56.9	-20°52.1	69°45.6	-22°37.6
19	4°27.2	150°46.0	-10°53.2	17°09.8	-6°22.1	118°58.8	-20°52.2	84°47.8	-22°37.6
20	19°29.6	165°46.7	-10°53.5	32°10.8	-6°21.4	134°00.7	-20°52.3	99°49.9	-22°37.6
21	34°32.1	180°47.4	-10°53.9	47°11.7	-6°20.7	149°02.6	-20°52.4	114°52.1	-22°37.6
22	49°34.5	195°48.0	-10°54.3	62°12.7	-6°20.0	164°04.5	-20°52.5	129°54.3	-22°37.6
23	64°37.0	210°48.7	-10°54.7	77°13.7	-6°19.3	179°06.3	-20°52.6	144°56.4	-22°37.5
Mer.pass.:18:42		v0.7 d-0.4 m-4.4		v1.0 d0.7 m0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	79°39.5	225°49.4	-10°55.1	92°14.6	-6°18.6	194°08.2	-20°52.7	159°58.6	-22°37.5
1	94°41.9	240°50.0	-10°55.5	107°15.6	-6°17.9	209°10.1	-20°52.8	175°00.7	-22°37.5
2	109°44.4	255°50.7	-10°55.8	122°16.6	-6°17.2	224°12.0	-20°52.9	190°02.9	-22°37.5
3	124°46.9	270°51.3	-10°56.2	137°17.6	-6°16.5	239°13.9	-20°53.0	205°05.0	-22°37.5
4	139°49.3	285°52.0	-10°56.6	152°18.5	-6°15.8	254°15.7	-20°53.1	220°07.2	-22°37.5
5	154°51.8	300°52.7	-10°57.0	167°19.5	-6°15.1	269°17.6	-20°53.1	235°09.4	-22°37.4
6	169°54.3	315°53.3	-10°57.4	182°20.5	-6°14.4	284°19.5	-20°53.2	250°11.5	-22°37.4
7	184°56.7	330°54.0	-10°57.8	197°21.4	-6°13.7	299°21.4	-20°53.3	265°13.7	-22°37.4
8	199°59.2	345°54.6	-10°58.2	212°22.4	-6°13.0	314°23.3	-20°53.4	280°15.8	-22°37.4
9	215°01.7	0°55.2	-10°58.6	227°23.4	-6°12.3	329°25.1	-20°53.5	295°18.0	-22°37.4
10	230°04.1	15°55.9	-10°59.0	242°24.4	-6°11.6	344°27.0	-20°53.6	310°20.1	-22°37.4
11	245°06.6	30°56.5	-10°59.4	257°25.3	-6°10.9	359°28.9	-20°53.7	325°22.3	-22°37.4
12	260°09.0	45°57.2	-10°59.8	272°26.3	-6°10.2	14°30.8	-20°53.8	340°24.5	-22°37.3
13	275°11.5	60°57.8	-11°00.2	287°27.3	-6°09.5	29°32.7	-20°53.9	355°26.6	-22°37.3
14	290°14.0	75°58.5	-11°00.6	302°28.2	-6°08.8	44°34.5	-20°54.0	10°28.8	-22°37.3
15	305°16.4	90°59.1	-11°01.0	317°29.2	-6°08.1	59°36.4	-20°54.1	25°30.9	-22°37.3
16	320°18.9	105°59.7	-11°01.4	332°30.2	-6°07.4	74°38.3	-20°54.2	40°33.1	-22°37.3
17	335°21.4	121°00.4	-11°01.8	347°31.2	-6°06.6	89°40.2	-20°54.3	55°35.2	-22°37.3
18	350°23.8	136°01.0	-11°02.2	2°32.1	-6°05.9	104°42.1	-20°54.4	70°37.4	-22°37.2
19	5°26.3	151°01.6	-11°02.6	17°33.1	-6°05.2	119°43.9	-20°54.4	85°39.5	-22°37.2
20	20°28.8	166°02.3	-11°03.0	32°34.1	-6°04.5	134°45.8	-20°54.5	100°41.7	-22°37.2
21	35°31.2	181°02.9	-11°03.4	47°35.0	-6°03.8	149°47.7	-20°54.6	115°43.9	-22°37.2
22	50°33.7	196°03.5	-11°03.8	62°36.0	-6°03.1	164°49.6	-20°54.7	130°46.0	-22°37.2
23	65°36.2	211°04.1	-11°04.2	77°37.0	-6°02.4	179°51.5	-20°54.8	145°48.2	-22°37.2
Mer.pass.:18:38		v0.7 d-0.4 m-4.4		v1.0 d0.7 m0.1		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.8
Ankaa	353°11.9	-42°12.5
Schedar	349°36.0	56°38.6
Diphda	348°51.9	-17°53.2
Achernar	335°23.7	-57°08.8
Hamal	327°56.3	23°33.1
Polaris	315°43.4	89°20.7
Akamar	315°15.2	-40°14.0
Menkar	314°10.9	4°09.7
Mirfak	308°34.5	49°55.6
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°10.9
Capella	280°28.5	46°00.9
Bellatrix	278°27.7	6°21.9
Elnath	278°07.5	28°37.2
Alnilam	275°42.3	-1°11.5
Betelgeuse	270°56.9	7°24.5
Canopus	263°54.0	-52°42.4
Sirius	258°30.0	-16°44.4
Adara	255°09.2	-28°59.9
Procyon	244°55.5	5°10.6
Pollux	243°22.8	27°58.6
Avior	234°16.0	-59°34.0
Suhail	222°49.4	-43°30.3
Miaplacidus	221°38.4	-69°47.4
Alphard	217°52.3	-8°44.4
Regulus	207°39.4	11°52.5
Dubhe	193°47.1	61°38.7
Denebola	182°29.9	14°28.0
Gienah	175°48.5	-17°38.6
Acrux	173°05.3	-63°11.8
Gacrux	171°56.9	-57°12.7
Alioth	166°17.7	55°51.3
Spica	158°27.5	-11°15.4
Alcaid	152°56.3	49°13.1
Hadar	148°43.0	-60°27.4
Menkent	148°03.5	-36°27.4
Arcturus	145°52.5	19°05.4
Rigil Kent.	139°47.2	-60°54.4
Zubenelg.	137°01.6	-16°07.0
Kochab	137°21.1	74°04.6
Alphecca	126°08.2	26°39.2
Antares	112°22.1	-26°28.2
Atria	107°21.1	-69°03.4
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.8
Rasalhague	96°03.4	12°33.0
Etamin	90°44.9	51°29.4
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.9	38°48.3
Nunki	75°54.1	-26°16.3
Altair	62°05.0	8°55.2
Peacock	53°13.8	-56°40.5
Deneb	49°29.2	45°21.1
Enif	33°43.6	9°57.8
Alnair	27°39.3	-46°52.4
Fomalhaut	15°20.0	-29°31.5
Scheat	13°49.8	28°11.2
Markab	13°34.7	15°18.5

2018/12/	**SHA**	**Mer.pass**
Venus	147°34.4	08:59
Mars	13°46.7	17:53
Jupiter	114°56.8	11:08
Saturn	80°33.8	13:25

2018/12/	**SHA**	**Mer.pass**
Venus	146°52.7	08:57
Mars	13°11.0	17:51
Jupiter	114°42.8	11:05
Saturn	80°26.4	13:22

2018/12/	**SHA**	**Mer.pass**
Venus	146°09.9	08:56
Mars	12°35.2	17:50
Jupiter	114°28.7	11:02
Saturn	80°19.1	13:18

Horizontal paralax	
Venus:	0.3
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°58.7	-22°47.1	161°07.0	10.6	-21°25.7	-1.2	54.9
1	196°58.4	-22°47.4	175°36.6	10.6	-21°26.8	-1.1	54.9
2	211°58.1	-22°47.6	190°06.2	10.6	-21°27.8	-1.0	54.9
3	226°57.9	-22°47.8	204°35.9	10.6	-21°28.7	-0.9	54.8
4	241°57.6	-22°48.1	219°05.5	10.7	-21°29.5	-0.8	54.8
5	256°57.3	-22°48.3	233°35.2	10.7	-21°30.2	-0.6	54.8
6	271°57.0	-22°48.6	248°04.9	10.7	-21°30.8	-0.5	54.8
7	286°56.7	-22°48.8	262°34.6	10.7	-21°31.3	-0.4	54.8
8	301°56.5	-22°49.1	277°04.3	10.7	-21°31.7	-0.3	54.8
9	316°56.2	-22°49.3	291°34.1	10.7	-21°32.0	-0.2	54.8
10	331°55.9	-22°49.6	306°03.8	10.8	-21°32.2	-0.1	54.7
11	346°55.6	-22°49.8	320°33.6	10.8	-21°32.2	-0.0	54.7
12	1°55.3	-22°50.0	335°03.4	10.8	-21°32.2	0.1	54.7
13	16°55.1	-22°50.3	349°33.2	10.8	-21°32.0	0.2	54.7
14	31°54.8	-22°50.5	4°03.0	10.8	-21°31.8	0.3	54.7
15	46°54.5	-22°50.8	18°32.9	10.9	-21°31.4	0.4	54.7
16	61°54.2	-22°51.0	33°02.8	10.9	-21°31.0	0.5	54.7
17	76°53.9	-22°51.2	47°32.7	10.9	-21°30.4	0.6	54.6
18	91°53.7	-22°51.5	62°02.6	10.9	-21°29.7	0.7	54.6
19	106°53.4	-22°51.7	76°32.6	11.0	-21°29.0	0.8	54.6
20	121°53.1	-22°51.9	91°02.6	11.0	-21°28.1	0.9	54.6
21	136°52.8	-22°52.2	105°32.6	11.0	-21°27.1	1.0	54.6
22	151°52.5	-22°52.4	120°02.6	11.0	-21°26.0	1.1	54.6
23	166°52.3	-22°52.6	134°32.7	11.1	-21°24.8	1.2	54.6
	SD.=16.2	d=-0.2	S.D.=15.0				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°52.0	-22°52.9	149°02.7	11.1	-21°23.5	1.3	54.5
1	196°51.7	-22°53.1	163°32.9	11.1	-21°22.1	1.4	54.5
2	211°51.4	-22°53.3	178°03.0	11.2	-21°20.6	1.5	54.5
3	226°51.1	-22°53.6	192°33.2	11.2	-21°19.0	1.6	54.5
4	241°50.8	-22°53.8	207°03.4	11.2	-21°17.3	1.8	54.5
5	256°50.6	-22°54.0	221°33.6	11.2	-21°15.5	1.9	54.5
6	271°50.3	-22°54.2	236°03.9	11.3	-21°13.6	2.0	54.5
7	286°50.0	-22°54.5	250°34.2	11.3	-21°11.6	2.1	54.5
8	301°49.7	-22°54.7	265°04.5	11.3	-21°09.5	2.2	54.4
9	316°49.4	-22°54.9	279°34.8	11.4	-21°07.3	2.3	54.4
10	331°49.1	-22°55.1	294°05.2	11.4	-21°05.0	2.4	54.4
11	346°48.9	-22°55.4	308°35.7	11.4	-21°02.6	2.4	54.4
12	1°48.6	-22°55.6	323°06.1	11.5	-21°00.1	2.5	54.4
13	16°48.3	-22°55.8	337°36.6	11.5	-20°57.5	2.6	54.4
14	31°48.0	-22°56.0	352°07.1	11.5	-20°54.8	2.7	54.4
15	46°47.7	-22°56.2	6°37.7	11.6	-20°52.1	2.8	54.4
16	61°47.4	-22°56.5	21°08.3	11.6	-20°49.2	2.9	54.4
17	76°47.1	-22°56.7	35°38.9	11.6	-20°46.2	3.0	54.3
18	91°46.9	-22°56.9	50°09.6	11.7	-20°43.1	3.1	54.3
19	106°46.6	-22°57.1	64°40.3	11.7	-20°39.9	3.2	54.3
20	121°46.3	-22°57.3	79°11.0	11.8	-20°36.7	3.3	54.3
21	136°46.0	-22°57.5	93°41.8	11.8	-20°33.3	3.4	54.3
22	151°45.7	-22°57.8	108°12.6	11.8	-20°29.8	3.5	54.3
23	166°45.4	-22°58.0	122°43.4	11.9	-20°26.3	3.6	54.3
	SD.=16.2	d=-0.2	S.D.=14.9				

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°45.1	-22°58.2	137°14.3	11.9	-20°22.6	3.7	54.3
1	196°44.9	-22°58.4	151°45.3	11.9	-20°18.9	3.8	54.3
2	211°44.6	-22°58.6	166°16.2	12.0	-20°15.0	3.9	54.3
3	226°44.3	-22°58.8	180°47.2	12.0	-20°11.1	4.0	54.3
4	241°44.0	-22°59.0	195°18.3	12.1	-20°07.1	4.1	54.2
5	256°43.7	-22°59.2	209°49.4	12.1	-20°03.0	4.2	54.2
6	271°43.4	-22°59.4	224°20.5	12.1	-19°58.8	4.2	54.2
7	286°43.1	-22°59.6	238°51.6	12.2	-19°54.5	4.3	54.2
8	301°42.8	-22°59.8	253°22.8	12.2	-19°50.1	4.4	54.2
9	316°42.6	-23°00.1	267°54.1	12.3	-19°45.7	4.5	54.2
10	331°42.3	-23°00.3	282°25.4	12.3	-19°41.1	4.6	54.2
11	346°42.0	-23°00.5	296°56.7	12.3	-19°36.5	4.7	54.2
12	1°41.7	-23°00.7	311°28.0	12.4	-19°31.8	4.8	54.2
13	16°41.4	-23°00.9	325°59.4	12.4	-19°26.9	4.9	54.2
14	31°41.1	-23°01.1	340°30.9	12.5	-19°22.0	4.9	54.2
15	46°40.8	-23°01.3	355°02.4	12.5	-19°17.0	5.0	54.2
16	61°40.5	-23°01.5	9°33.9	12.5	-19°12.0	5.1	54.2
17	76°40.2	-23°01.7	24°05.4	12.6	-19°06.8	5.2	54.2
18	91°40.0	-23°01.9	38°37.0	12.6	-19°01.6	5.3	54.2
19	106°39.7	-23°02.1	53°08.7	12.7	-18°56.2	5.4	54.2
20	121°39.4	-23°02.3	67°40.4	12.7	-18°50.8	5.5	54.2
21	136°39.1	-23°02.5	82°12.1	12.7	-18°45.3	5.5	54.1
22	151°38.8	-23°02.6	96°43.9	12.8	-18°39.8	5.6	54.1
23	166°38.5	-23°02.8	111°15.7	12.8	-18°34.1	5.7	54.1
	SD.=16.2	d=-0.2	S.D.=14.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:12	10:29	–:–	–:–	13:16	15:33
70	07:53	09:37	–:–	–:–	14:08	15:52
68	07:38	09:05	–:–	–:–	14:40	16:07
66	07:26	08:41	10:15	13:30	15:04	16:20
64	07:15	08:22	09:37	14:08	15:23	16:30
62	07:06	08:07	09:11	14:34	15:38	16:39
60	06:58	07:54	08:51	14:55	15:51	16:47
58	06:51	07:43	08:34	15:11	16:02	16:55
56	06:44	07:33	08:20	15:26	16:12	17:01
54	06:38	07:24	08:07	15:38	16:21	17:07
52	06:33	07:16	07:57	15:49	16:29	17:12
50	06:28	07:09	07:47	15:58	16:36	17:18
45	06:16	06:53	07:27	16:18	16:52	17:29
40	06:06	06:40	07:11	16:35	17:05	17:39
35	05:57	06:29	06:57	16:49	17:17	17:48
30	05:49	06:19	06:45	17:01	17:27	17:57
20	05:33	06:00	06:24	17:21	17:45	18:13
10	05:17	05:43	06:06	17:39	18:02	18:28
0	05:00	05:27	05:49	17:57	18:19	18:45
-10	04:42	05:09	05:32	18:14	18:37	19:04
-20	04:20	04:49	05:13	18:32	18:57	19:26
-30	03:51	04:25	04:52	18:54	19:21	19:54
-35	03:33	04:10	04:39	19:07	19:36	20:13
-40	03:11	03:52	04:25	19:21	19:54	20:35
-45	02:41	03:30	04:07	19:39	20:16	21:05
-50	01:58	03:01	03:45	20:01	20:45	21:48
-52	01:32	02:47	03:35	20:11	20:59	22:14
-54	00:54	02:30	03:23	20:23	21:17	22:54
-56	–:–	02:09	03:09	20:37	21:38	–:–
-58	–:–	01:41	02:53	20:53	22:06	–:–
-60	–:–	00:59	02:34	21:13	22:49	–:–

	Moonrise			**Moonset**		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	14:21	–:–	–:–	16:28
68	12:57	13:19	13:22	14:30	15:51	17:27
66	11:51	12:28	12:47	15:36	16:41	18:01
64	11:16	11:57	12:22	16:11	17:12	18:26
62	10:50	11:33	12:03	16:36	17:36	18:45
60	10:30	11:14	11:46	16:56	17:54	19:01
58	10:14	10:59	11:33	17:13	18:10	19:14
56	09:60	10:45	11:21	17:27	18:23	19:25
54	09:48	10:34	11:11	17:39	18:34	19:35
52	09:37	10:23	11:01	17:50	18:45	19:44
50	09:28	10:14	10:53	17:59	18:54	19:52
45	09:08	09:55	10:36	18:19	19:13	20:09
40	08:51	09:39	10:21	18:35	19:28	20:23
35	08:38	09:26	10:09	18:49	19:41	20:35
30	08:26	09:14	09:58	19:01	19:52	20:45
20	08:05	08:54	09:40	19:21	20:12	21:02
10	07:48	08:37	09:24	19:39	20:29	21:18
0	07:31	08:21	09:09	19:55	20:44	21:32
-10	07:15	08:05	08:54	20:12	20:60	21:46
-20	06:57	07:47	08:38	20:29	21:17	22:01
-30	06:37	07:27	08:20	20:49	21:36	22:18
-35	06:25	07:16	08:09	21:01	21:47	22:28
-40	06:11	07:02	07:56	21:15	21:60	22:39
-45	05:55	06:47	07:42	21:31	22:15	22:53
-50	05:36	06:27	07:24	21:50	22:33	23:09
-52	05:26	06:18	07:15	21:60	22:42	23:17
-54	05:16	06:08	07:06	22:10	22:52	23:25
-56	05:04	05:56	06:55	22:22	23:02	23:34
-58	04:50	05:42	06:43	22:36	23:15	23:45
-60	04:34	05:26	06:29	22:52	23:30	23:57

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
9	07:55	07:42	11:52	13:43	01:18	2(5%)
10	07:28	07:14	11:52	14:32	02:08	3(10%)
11	07:01	06:47	11:53	15:20	02:56	4(16%)

December 12, 13 ,14 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	80°38.6	226°04.7	-11°04.6	92°38.0	-6°01.7	194°53.3	-20°54.9	160°50.3	-22°37.1
1	95°41.1	241°05.4	-11°05.0	107°38.9	-6°01.0	209°55.2	-20°55.0	175°52.5	-22°37.1
2	110°43.5	256°06.0	-11°05.4	122°39.9	-6°00.3	224°57.1	-20°55.1	190°54.6	-22°37.1
3	125°46.0	271°06.6	-11°05.8	137°40.9	-5°59.6	239°59.0	-20°55.2	205°56.8	-22°37.1
4	140°48.5	286°07.2	-11°06.2	152°41.8	-5°58.9	255°00.9	-20°55.3	220°59.0	-22°37.1
5	155°50.9	301°07.8	-11°06.6	167°42.8	-5°58.2	270°02.8	-20°55.4	236°01.1	-22°37.1
6	170°53.4	316°08.4	-11°07.1	182°43.8	-5°57.5	285°04.6	-20°55.5	251°03.3	-22°37.1
7	185°55.9	331°09.1	-11°07.5	197°44.7	-5°56.8	300°06.5	-20°55.6	266°05.4	-22°37.0
8	200°58.3	346°09.7	-11°07.9	212°45.7	-5°56.1	315°08.4	-20°55.6	281°07.6	-22°37.0
9	216°00.8	1°10.3	-11°08.3	227°46.7	-5°55.4	330°10.3	-20°55.7	296°09.7	-22°37.0
10	231°03.3	16°10.9	-11°08.7	242°47.7	-5°54.7	345°12.2	-20°55.8	311°11.9	-22°37.0
11	246°05.7	31°11.5	-11°09.1	257°48.6	-5°53.9	0°14.0	-20°55.9	326°14.0	-22°37.0
12	261°08.2	46°12.1	-11°09.5	272°49.6	-5°53.2	15°15.9	-20°56.0	341°16.2	-22°37.0
13	276°10.7	61°12.7	-11°10.0	287°50.6	-5°52.5	30°17.8	-20°56.1	356°18.4	-22°36.9
14	291°13.1	76°13.3	-11°10.4	302°51.5	-5°51.8	45°19.7	-20°56.2	11°20.5	-22°36.9
15	306°15.6	91°13.9	-11°10.8	317°52.5	-5°51.1	60°21.6	-20°56.3	26°22.7	-22°36.9
16	321°18.0	106°14.5	-11°11.2	332°53.5	-5°50.4	75°23.4	-20°56.4	41°24.8	-22°36.9
17	336°20.5	121°15.1	-11°11.6	347°54.4	-5°49.7	90°25.3	-20°56.5	56°27.0	-22°36.9
18	351°23.0	136°15.7	-11°12.1	2°55.4	-5°49.0	105°27.2	-20°56.6	71°29.1	-22°36.9
19	6°25.4	151°16.2	-11°12.5	17°56.4	-5°48.3	120°29.1	-20°56.7	86°31.3	-22°36.8
20	21°27.9	166°16.8	-11°12.9	32°57.4	-5°47.6	135°31.0	-20°56.8	101°33.4	-22°36.8
21	36°30.4	181°17.4	-11°13.3	47°58.3	-5°46.9	150°32.8	-20°56.8	116°35.6	-22°36.8
22	51°32.8	196°18.0	-11°13.8	62°59.3	-5°46.2	165°34.7	-20°56.9	131°37.8	-22°36.8
23	66°35.3	211°18.6	-11°14.2	78°00.3	-5°45.5	180°36.6	-20°57.0	146°39.9	-22°36.8
Mer.pass.:18:34		v0.6 d-0.4 m-4.4		v1.0 d0.7 m0.2		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	81°37.8	226°19.2	-11°14.6	93°01.2	-5°44.8	195°38.5	-20°57.1	161°42.1	-22°36.8
1	96°40.2	241°19.8	-11°15.0	108°02.2	-5°44.1	210°40.4	-20°57.2	176°44.2	-22°36.8
2	111°42.7	256°20.3	-11°15.5	123°03.2	-5°43.3	225°42.3	-20°57.3	191°46.4	-22°36.7
3	126°45.1	271°20.9	-11°15.9	138°04.1	-5°42.6	240°44.1	-20°57.4	206°48.5	-22°36.7
4	141°47.6	286°21.5	-11°16.3	153°05.1	-5°41.9	255°46.0	-20°57.5	221°50.7	-22°36.7
5	156°50.1	301°22.1	-11°16.7	168°06.1	-5°41.2	270°47.9	-20°57.6	236°52.8	-22°36.7
6	171°52.5	316°22.6	-11°17.2	183°07.0	-5°40.5	285°49.8	-20°57.7	251°55.0	-22°36.7
7	186°55.0	331°23.2	-11°17.6	198°08.0	-5°39.8	300°51.7	-20°57.8	266°57.2	-22°36.7
8	201°57.5	346°23.8	-11°18.0	213°09.0	-5°39.1	315°53.5	-20°57.8	281°59.3	-22°36.6
9	216°59.9	1°24.3	-11°18.5	228°10.0	-5°38.4	330°55.4	-20°57.9	297°01.5	-22°36.6
10	232°02.4	16°24.9	-11°18.9	243°10.9	-5°37.7	345°57.3	-20°58.0	312°03.6	-22°36.6
11	247°04.9	31°25.5	-11°19.3	258°11.9	-5°37.0	0°59.2	-20°58.1	327°05.8	-22°36.6
12	262°07.3	46°26.0	-11°19.8	273°12.9	-5°36.3	16°01.1	-20°58.2	342°07.9	-22°36.6
13	277°09.8	61°26.6	-11°20.2	288°13.8	-5°35.6	31°02.9	-20°58.3	357°10.1	-22°36.6
14	292°12.3	76°27.2	-11°20.6	303°14.8	-5°34.9	46°04.8	-20°58.4	12°12.2	-22°36.5
15	307°14.7	91°27.7	-11°21.1	318°15.8	-5°34.1	61°06.7	-20°58.5	27°14.4	-22°36.5
16	322°17.2	106°28.3	-11°21.5	333°16.7	-5°33.4	76°08.6	-20°58.6	42°16.5	-22°36.5
17	337°19.6	121°28.8	-11°22.0	348°17.7	-5°32.7	91°10.5	-20°58.7	57°18.7	-22°36.5
18	352°22.1	136°29.4	-11°22.4	3°18.7	-5°32.0	106°12.4	-20°58.8	72°20.9	-22°36.5
19	7°24.6	151°29.9	-11°22.8	18°19.6	-5°31.3	121°14.2	-20°58.8	87°23.0	-22°36.5
20	22°27.0	166°30.5	-11°23.3	33°20.6	-5°30.6	136°16.1	-20°58.9	102°25.2	-22°36.4
21	37°29.5	181°31.0	-11°23.7	48°21.6	-5°29.9	151°18.0	-20°59.0	117°27.3	-22°36.4
22	52°32.0	196°31.6	-11°24.2	63°22.5	-5°29.2	166°19.9	-20°59.1	132°29.5	-22°36.4
23	67°34.4	211°32.1	-11°24.6	78°23.5	-5°28.5	181°21.8	-20°59.2	147°31.6	-22°36.4
Mer.pass.:18:30		v0.6 d-0.4 m-4.4		v1.0 d0.7 m0.2		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	82°36.9	226°32.7	-11°25.1	93°24.5	-5°27.8	196°23.6	-20°59.3	162°33.8	-22°36.4
1	97°39.4	241°33.2	-11°25.5	108°25.4	-5°27.1	211°25.5	-20°59.4	177°35.9	-22°36.4
2	112°41.8	256°33.8	-11°25.9	123°26.4	-5°26.3	226°27.4	-20°59.5	192°38.1	-22°36.3
3	127°44.3	271°34.3	-11°26.4	138°27.4	-5°25.6	241°29.3	-20°59.6	207°40.2	-22°36.3
4	142°46.8	286°34.8	-11°26.8	153°28.3	-5°24.9	256°31.2	-20°59.7	222°42.4	-22°36.3
5	157°49.2	301°35.4	-11°27.3	168°29.3	-5°24.2	271°33.1	-20°59.8	237°44.6	-22°36.3
6	172°51.7	316°35.9	-11°27.7	183°30.3	-5°23.5	286°34.9	-20°59.8	252°46.7	-22°36.3
7	187°54.1	331°36.4	-11°28.2	198°31.2	-5°22.8	301°36.8	-20°59.9	267°48.9	-22°36.3
8	202°56.6	346°37.0	-11°28.6	213°32.2	-5°22.1	316°38.7	-21°00.0	282°51.0	-22°36.2
9	217°59.1	1°37.5	-11°29.1	228°33.2	-5°21.4	331°40.6	-21°00.1	297°53.2	-22°36.2
10	233°01.5	16°38.0	-11°29.5	243°34.1	-5°20.7	346°42.5	-21°00.2	312°55.3	-22°36.2
11	248°04.0	31°38.6	-11°30.0	258°35.1	-5°20.0	1°44.3	-21°00.3	327°57.5	-22°36.2
12	263°06.5	46°39.1	-11°30.4	273°36.1	-5°19.3	16°46.2	-21°00.4	342°59.6	-22°36.2
13	278°08.9	61°39.6	-11°30.9	288°37.0	-5°18.5	31°48.1	-21°00.5	358°01.8	-22°36.2
14	293°11.4	76°40.1	-11°31.3	303°38.0	-5°17.8	46°50.0	-21°00.6	13°03.9	-22°36.1
15	308°13.9	91°40.6	-11°31.8	318°39.0	-5°17.1	61°51.9	-21°00.7	28°06.1	-22°36.1
16	323°16.3	106°41.2	-11°32.2	333°39.9	-5°16.4	76°53.8	-21°00.7	43°08.2	-22°36.1
17	338°18.8	121°41.7	-11°32.7	348°40.9	-5°15.7	91°55.6	-21°00.8	58°10.4	-22°36.1
18	353°21.2	136°42.2	-11°33.2	3°41.9	-5°15.0	106°57.5	-21°00.9	73°12.6	-22°36.1
19	8°23.7	151°42.7	-11°33.6	18°42.8	-5°14.3	121°59.4	-21°01.0	88°14.7	-22°36.1
20	23°26.2	166°43.2	-11°34.1	33°43.8	-5°13.6	137°01.3	-21°01.1	103°16.9	-22°36.0
21	38°28.6	181°43.7	-11°34.5	48°44.8	-5°12.9	152°03.2	-21°01.2	118°19.0	-22°36.0
22	53°31.1	196°44.3	-11°35.0	63°45.7	-5°12.2	167°05.1	-21°01.3	133°21.2	-22°36.0
23	68°33.6	211°44.8	-11°35.5	78°46.7	-5°11.4	182°06.9	-21°01.4	148°23.3	-22°36.0
Mer.pass.:18:26		v0.5 d-0.4 m-4.4		v1.0 d0.7 m0.2		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.8
Ankaa	353°11.9	-42°12.5
Schedar	349°36.0	56°38.6
Diphda	348°51.9	-17°53.2
Achernar	335°23.7	-57°08.8
Hamal	327°56.3	23°33.1
Polaris	315°44.0	89°20.7
Akamar	315°15.2	-40°14.0
Menkar	314°10.9	4°09.7
Mirfak	308°34.5	49°55.6
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°10.9
Capella	280°28.5	46°00.9
Bellatrix	278°27.7	6°21.8
Elnath	278°07.5	28°37.2
Alnilam	275°42.3	-1°11.5
Betelgeuse	270°56.9	7°24.5
Canopus	263°54.0	-52°42.4
Sirius	258°30.0	-16°44.4
Adara	255°09.2	-28°59.9
Procyon	244°55.5	5°10.6
Pollux	243°22.8	27°58.6
Avior	234°16.0	-59°34.0
Suhail	222°49.4	-43°30.4
Miaplacidus	221°38.3	-69°47.4
Alphard	217°52.3	-8°44.4
Regulus	207°39.4	11°52.4
Dubhe	193°47.1	61°38.7
Denebola	182°29.8	14°28.0
Gienah	175°48.5	-17°38.6
Acrux	173°05.3	-63°11.8
Gacrux	171°56.9	-57°12.7
Alioth	166°17.7	55°51.3
Spica	158°27.5	-11°15.4
Alcaid	152°56.3	49°13.1
Hadar	148°43.0	-60°27.4
Menkent	148°03.4	-36°27.4
Arcturus	145°52.4	19°05.4
Rigil Kent.	139°47.2	-60°54.4
Zubenelg.	137°01.6	-16°07.0
Kochab	137°21.1	74°04.6
Alphecca	126°08.2	26°39.2
Antares	112°22.0	-26°28.2
Atria	107°21.1	-69°03.4
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.8
Rasalhague	96°03.4	12°33.0
Etamin	90°44.9	51°29.4
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.9	38°48.2
Nunki	75°54.1	-26°16.3
Altair	62°05.0	8°55.2
Peacock	53°13.8	-56°40.5
Deneb	49°29.3	45°21.1
Enif	33°43.6	9°57.8
Alnair	27°39.3	-46°52.4
Fomalhaut	15°20.0	-29°31.5
Scheat	13°49.8	28°11.2
Markab	13°34.7	15°18.5

2018/12/	**SHA**	**Mer.pass**
Venus	145°26.1	08:55
Mars	11°59.3	17:48
Jupiter	114°14.7	10:59
Saturn	80°11.7	13:15

2018/12/	**SHA**	**Mer.pass**
Venus	144°41.4	08:54
Mars	11°23.5	17:47
Jupiter	114°00.7	10:56
Saturn	80°04.3	13:11

2018/12/	**SHA**	**Mer.pass**
Venus	143°55.8	08:54
Mars	10°47.6	17:45
Jupiter	113°46.7	10:53
Saturn	79°56.9	13:08

Horizontal paralax	
Venus:	0.3
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°38.2	-23°03.0	125°47.5	12.9	-18°28.4	5.8	54.1
1	196°37.9	-23°03.2	140°19.4	12.9	-18°22.6	5.9	54.1
2	211°37.6	-23°03.4	154°51.3	12.9	-18°16.7	5.9	54.1
3	226°37.3	-23°03.6	169°23.3	13.0	-18°10.7	6.0	54.1
4	241°37.0	-23°03.8	183°55.3	13.0	-18°04.6	6.1	54.1
5	256°36.8	-23°04.0	198°27.4	13.1	-17°58.5	6.2	54.1
6	271°36.5	-23°04.2	212°59.5	13.1	-17°52.3	6.2	54.1
7	286°36.2	-23°04.4	227°31.6	13.2	-17°46.0	6.3	54.1
8	301°35.9	-23°04.6	242°03.8	13.2	-17°39.6	6.4	54.1
9	316°35.6	-23°04.7	256°36.0	13.2	-17°33.2	6.5	54.1
10	331°35.3	-23°04.9	271°08.2	13.3	-17°26.7	6.6	54.1
11	346°35.0	-23°05.1	285°40.5	13.3	-17°20.1	6.6	54.1
12	1°34.7	-23°05.3	300°12.8	13.3	-17°13.4	6.7	54.1
13	16°34.4	-23°05.5	314°45.2	13.4	-17°06.7	6.8	54.1
14	31°34.1	-23°05.7	329°17.6	13.4	-16°59.9	6.8	54.1
15	46°33.8	-23°05.8	343°50.1	13.5	-16°53.0	6.9	54.1
16	61°33.5	-23°06.0	358°22.5	13.5	-16°46.0	7.0	54.1
17	76°33.3	-23°06.2	12°55.1	13.5	-16°39.0	7.1	54.1
18	91°33.0	-23°06.4	27°27.6	13.6	-16°31.9	7.1	54.1
19	106°32.7	-23°06.6	42°00.2	13.6	-16°24.7	7.2	54.1
20	121°32.4	-23°06.7	56°32.9	13.7	-16°17.5	7.3	54.1
21	136°32.1	-23°06.9	71°05.5	13.7	-16°10.2	7.3	54.1
22	151°31.8	-23°07.1	85°38.2	13.7	-16°02.8	7.4	54.1
23	166°31.5	-23°07.3	100°11.0	13.8	-15°55.4	7.5	54.1
	SD.=16.2	d=-0.2	S.D.=14.8				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°31.2	-23°07.4	114°43.8	13.8	-15°47.8	7.5	54.1
1	196°30.9	-23°07.6	129°16.6	13.8	-15°40.3	7.6	54.1
2	211°30.6	-23°07.8	143°49.4	13.9	-15°32.6	7.7	54.1
3	226°30.3	-23°08.0	158°22.3	13.9	-15°24.9	7.7	54.1
4	241°30.0	-23°08.1	172°55.2	13.9	-15°17.1	7.8	54.1
5	256°29.7	-23°08.3	187°28.2	14.0	-15°09.3	7.9	54.2
6	271°29.4	-23°08.5	202°01.2	14.0	-15°01.4	7.9	54.2
7	286°29.1	-23°08.6	216°34.2	14.0	-14°53.4	8.0	54.2
8	301°28.8	-23°08.8	231°07.3	14.1	-14°45.4	8.1	54.2
9	316°28.5	-23°09.0	245°40.3	14.1	-14°37.3	8.1	54.2
10	331°28.3	-23°09.1	260°13.5	14.1	-14°29.1	8.2	54.2
11	346°28.0	-23°09.3	274°46.6	14.2	-14°20.9	8.3	54.2
12	1°27.7	-23°09.5	289°19.8	14.2	-14°12.6	8.3	54.2
13	16°27.4	-23°09.6	303°53.0	14.2	-14°04.2	8.4	54.2
14	31°27.1	-23°09.8	318°26.3	14.3	-13°55.8	8.4	54.2
15	46°26.8	-23°10.0	332°59.5	14.3	-13°47.4	8.5	54.2
16	61°26.5	-23°10.1	347°32.8	14.3	-13°38.8	8.6	54.2
17	76°26.2	-23°10.3	2°06.2	14.3	-13°30.3	8.6	54.2
18	91°25.9	-23°10.4	16°39.5	14.4	-13°21.6	8.7	54.2
19	106°25.6	-23°10.6	31°12.9	14.4	-13°12.9	8.7	54.2
20	121°25.3	-23°10.8	45°46.3	14.4	-13°04.2	8.8	54.3
21	136°25.0	-23°10.9	60°19.8	14.5	-12°55.3	8.8	54.3
22	151°24.7	-23°11.1	74°53.2	14.5	-12°46.5	8.9	54.3
23	166°24.4	-23°11.2	89°26.7	14.5	-12°37.6	9.0	54.3
	SD.=16.2	d=-0.2	S.D.=14.8				

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°24.1	-23°11.4	104°00.2	14.5	-12°28.6	9.0	54.3
1	196°23.8	-23°11.5	118°33.8	14.6	-12°19.5	9.1	54.3
2	211°23.5	-23°11.7	133°07.3	14.6	-12°10.5	9.1	54.3
3	226°23.2	-23°11.8	147°40.9	14.6	-12°01.3	9.2	54.3
4	241°22.9	-23°12.0	162°14.5	14.6	-11°52.1	9.2	54.3
5	256°22.6	-23°12.1	176°48.2	14.6	-11°42.9	9.3	54.3
6	271°22.3	-23°12.3	191°21.8	14.7	-11°33.6	9.3	54.4
7	286°22.0	-23°12.4	205°55.5	14.7	-11°24.2	9.4	54.4
8	301°21.7	-23°12.6	220°29.2	14.7	-11°14.9	9.4	54.4
9	316°21.4	-23°12.7	235°02.9	14.7	-11°05.4	9.5	54.4
10	331°21.1	-23°12.9	249°36.6	14.7	-10°55.9	9.5	54.4
11	346°20.8	-23°13.0	264°10.4	14.8	-10°46.4	9.6	54.4
12	1°20.5	-23°13.2	278°44.1	14.8	-10°36.8	9.6	54.4
13	16°20.2	-23°13.3	293°17.9	14.8	-10°27.1	9.7	54.4
14	31°19.9	-23°13.5	307°51.7	14.8	-10°17.4	9.7	54.5
15	46°19.6	-23°13.6	322°25.5	14.8	-10°07.7	9.8	54.5
16	61°19.3	-23°13.7	336°59.4	14.8	-9°57.9	9.8	54.5
17	76°19.0	-23°13.9	351°33.2	14.8	-9°48.1	9.8	54.5
18	91°18.7	-23°14.0	6°07.0	14.9	-9°38.2	9.9	54.5
19	106°18.4	-23°14.2	20°40.9	14.9	-9°28.3	9.9	54.5
20	121°18.1	-23°14.3	35°14.8	14.9	-9°18.4	10.0	54.6
21	136°17.8	-23°14.4	49°48.7	14.9	-9°08.4	10.0	54.6
22	151°17.5	-23°14.6	64°22.6	14.9	-8°58.3	10.1	54.6
23	166°17.2	-23°14.7	78°56.5	14.9	-8°48.2	10.1	54.6
	SD.=16.2	d=-0.2	S.D.=14.8				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:17	10:40	–:–	–:–	13:08	15:31
70	07:58	09:44	–:–	–:–	14:04	15:50
68	07:42	09:10	–:–	–:–	14:38	16:06
66	07:29	08:46	10:23	13:25	15:02	16:19
64	07:19	08:27	09:43	14:05	15:22	16:29
62	07:09	08:11	09:16	14:32	15:37	16:39
60	07:01	07:58	08:55	14:53	15:51	16:47
58	06:54	07:46	08:38	15:11	16:02	16:54
56	06:47	07:36	08:23	15:25	16:12	17:01
54	06:41	07:27	08:11	15:37	16:21	17:07
52	06:36	07:19	07:60	15:48	16:29	17:13
50	06:30	07:12	07:50	15:58	16:36	17:18
45	06:19	06:56	07:30	16:19	16:52	17:29
40	06:09	06:43	07:13	16:35	17:06	17:40
35	05:59	06:31	06:59	16:49	17:17	17:49
30	05:51	06:21	06:47	17:01	17:28	17:57
20	05:35	06:02	06:26	17:22	17:46	18:14
10	05:19	05:45	06:08	17:41	18:03	18:30
0	05:02	05:28	05:50	17:58	18:20	18:47
-10	04:43	05:10	05:33	18:15	18:38	19:05
-20	04:21	04:50	05:14	18:34	18:59	19:28
-30	03:52	04:25	04:53	18:56	19:23	19:57
-35	03:34	04:10	04:40	19:09	19:38	20:15
-40	03:11	03:52	04:25	19:24	19:56	20:38
-45	02:41	03:30	04:07	19:41	20:19	21:08
-50	01:56	03:01	03:45	20:04	20:48	21:53
-52	01:30	02:46	03:34	20:14	21:03	22:19
-54	00:48	02:28	03:22	20:27	21:20	23:02
-56	–:–	02:07	03:08	20:41	21:42	–:–
-58	–:–	01:38	02:52	20:57	22:11	–:–
-60	–:–	00:53	02:32	21:17	22:57	–:–

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	14:45	14:07	13:46	17:41	19:52	21:44
70	13:53	13:40	13:30	18:32	20:18	21:58
68	13:21	13:19	13:17	19:04	20:38	22:10
66	12:57	13:03	13:06	19:27	20:53	22:20
64	12:38	12:49	12:57	19:45	21:06	22:28
62	12:23	12:38	12:49	19:59	21:16	22:34
60	12:10	12:28	12:42	20:12	21:25	22:40
58	11:59	12:19	12:36	20:23	21:33	22:45
56	11:49	12:12	12:31	20:32	21:40	22:50
54	11:41	12:05	12:26	20:40	21:46	22:54
52	11:33	11:59	12:21	20:47	21:52	22:58
50	11:26	11:53	12:18	20:54	21:57	23:01
45	11:11	11:42	12:09	21:08	22:08	23:08
40	10:58	11:32	12:02	21:20	22:17	23:14
35	10:48	11:23	11:56	21:29	22:24	23:20
30	10:39	11:16	11:50	21:38	22:31	23:24
20	10:23	11:03	11:41	21:53	22:43	23:32
10	10:09	10:51	11:32	22:06	22:53	23:39
0	09:56	10:41	11:24	22:18	23:02	23:45
-10	09:43	10:30	11:17	22:30	23:11	23:51
-20	09:29	10:19	11:08	22:42	23:21	23:58
-30	09:12	10:05	10:58	22:57	23:32	–:–
-35	09:03	09:58	10:53	23:05	23:39	–:–
-40	08:52	09:49	10:47	23:15	23:46	–:–
-45	08:40	09:39	10:39	23:26	23:54	–:–
-50	08:24	09:27	10:30	23:39	–:–	00:05
-52	08:17	09:21	10:26	23:45	–:–	00:09
-54	08:09	09:14	10:22	23:52	–:–	00:14
-56	07:60	09:07	10:16	23:60	–:–	00:20
-58	07:50	08:59	10:11	–:–	00:08	00:27
-60	07:38	08:50	10:04	–:–	00:18	00:34

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
12	06:33	06:19	11:53	16:06	03:43	5(23%)
13	06:05	05:51	11:54	16:51	04:29	6(32%)
14	05:37	05:22	11:54	17:34	05:13	7(41%)

December 15, 16 ,17 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	83°36.0	226°45.3	-11°35.9	93°47.7	-5°10.7	197°08.8	-21°01.5	163°25.5	-22°36.0
1	98°38.5	241°45.8	-11°36.4	108°48.6	-5°10.0	212°10.7	-21°01.6	178°27.6	-22°36.0
2	113°41.0	256°46.3	-11°36.8	123°49.6	-5°09.3	227°12.6	-21°01.6	193°29.8	-22°35.9
3	128°43.4	271°46.8	-11°37.3	138°50.6	-5°08.6	242°14.5	-21°01.7	208°31.9	-22°35.9
4	143°45.9	286°47.3	-11°37.8	153°51.5	-5°07.9	257°16.3	-21°01.8	223°34.1	-22°35.9
5	158°48.4	301°47.8	-11°38.2	168°52.5	-5°07.2	272°18.2	-21°01.9	238°36.2	-22°35.9
6	173°50.8	316°48.3	-11°38.7	183°53.5	-5°06.5	287°20.1	-21°02.0	253°38.4	-22°35.9
7	188°53.3	331°48.8	-11°39.2	198°54.4	-5°05.8	302°22.0	-21°02.1	268°40.5	-22°35.9
8	203°55.7	346°49.3	-11°39.6	213°55.4	-5°05.1	317°23.9	-21°02.2	283°42.7	-22°35.8
9	218°58.2	1°49.8	-11°40.1	228°56.4	-5°04.3	332°25.8	-21°02.3	298°44.9	-22°35.8
10	234°00.7	16°50.3	-11°40.6	243°57.3	-5°03.6	347°27.6	-21°02.4	313°47.0	-22°35.8
11	249°03.1	31°50.7	-11°41.0	258°58.3	-5°02.9	2°29.5	-21°02.4	328°49.2	-22°35.8
12	264°05.6	46°51.2	-11°41.5	273°59.3	-5°02.2	17°31.4	-21°02.5	343°51.3	-22°35.8
13	279°08.1	61°51.7	-11°42.0	289°00.2	-5°01.5	32°33.3	-21°02.6	358°53.5	-22°35.8
14	294°10.5	76°52.2	-11°42.4	304°01.2	-5°00.8	47°35.2	-21°02.7	13°55.6	-22°35.7
15	309°13.0	91°52.7	-11°42.9	319°02.2	-5°00.1	62°37.1	-21°02.8	28°57.8	-22°35.7
16	324°15.5	106°53.2	-11°43.4	334°03.1	-4°59.4	77°38.9	-21°02.9	43°59.9	-22°35.7
17	339°17.9	121°53.7	-11°43.8	349°04.1	-4°58.7	92°40.8	-21°03.0	59°02.1	-22°35.7
18	354°20.4	136°54.1	-11°44.3	4°05.1	-4°57.9	107°42.7	-21°03.1	74°04.2	-22°35.7
19	9°22.9	151°54.6	-11°44.8	19°06.0	-4°57.2	122°44.6	-21°03.2	89°06.4	-22°35.7
20	24°25.3	166°55.1	-11°45.3	34°07.0	-4°56.5	137°46.5	-21°03.2	104°08.5	-22°35.6
21	39°27.8	181°55.6	-11°45.7	49°08.0	-4°55.8	152°48.4	-21°03.3	119°10.7	-22°35.6
22	54°30.2	196°56.0	-11°46.2	64°08.9	-4°55.1	167°50.2	-21°03.4	134°12.8	-22°35.6
23	69°32.7	211°56.5	-11°46.7	79°09.9	-4°54.4	182°52.1	-21°03.5	149°15.0	-22°35.6
Mer.pass.:18:22		v0.5 d-0.5 m-4.4		v1.0 d0.7 m0.2		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	84°35.2	226°57.0	-11°47.2	94°10.9	-4°53.7	197°54.0	-21°03.6	164°17.1	-22°35.6
1	99°37.6	241°57.5	-11°47.6	109°11.8	-4°53.0	212°55.9	-21°03.7	179°19.3	-22°35.6
2	114°40.1	256°57.9	-11°48.1	124°12.8	-4°52.2	227°57.8	-21°03.8	194°21.5	-22°35.5
3	129°42.6	271°58.4	-11°48.6	139°13.8	-4°51.5	242°59.7	-21°03.9	209°23.6	-22°35.5
4	144°45.0	286°58.9	-11°49.1	154°14.7	-4°50.8	258°01.5	-21°03.9	224°25.8	-22°35.5
5	159°47.5	301°59.3	-11°49.6	169°15.7	-4°50.1	273°03.4	-21°04.0	239°27.9	-22°35.5
6	174°50.0	316°59.8	-11°50.0	184°16.6	-4°49.4	288°05.3	-21°04.1	254°30.1	-22°35.5
7	189°52.4	332°00.2	-11°50.5	199°17.6	-4°48.7	303°07.2	-21°04.2	269°32.2	-22°35.5
8	204°54.9	347°00.7	-11°51.0	214°18.6	-4°48.0	318°09.1	-21°04.3	284°34.4	-22°35.4
9	219°57.3	2°01.2	-11°51.5	229°19.5	-4°47.3	333°11.0	-21°04.4	299°36.5	-22°35.4
10	234°59.8	17°01.6	-11°52.0	244°20.5	-4°46.6	348°12.8	-21°04.5	314°38.7	-22°35.4
11	250°02.3	32°02.1	-11°52.4	259°21.5	-4°45.8	3°14.7	-21°04.6	329°40.8	-22°35.4
12	265°04.7	47°02.5	-11°52.9	274°22.4	-4°45.1	18°16.6	-21°04.7	344°43.0	-22°35.4
13	280°07.2	62°03.0	-11°53.4	289°23.4	-4°44.4	33°18.5	-21°04.7	359°45.1	-22°35.4
14	295°09.7	77°03.4	-11°53.9	304°24.4	-4°43.7	48°20.4	-21°04.8	14°47.3	-22°35.3
15	310°12.1	92°03.9	-11°54.4	319°25.3	-4°43.0	63°22.3	-21°04.9	29°49.4	-22°35.3
16	325°14.6	107°04.3	-11°54.9	334°26.3	-4°42.3	78°24.1	-21°05.0	44°51.6	-22°35.3
17	340°17.1	122°04.8	-11°55.4	349°27.3	-4°41.6	93°26.0	-21°05.1	59°53.7	-22°35.3
18	355°19.5	137°05.2	-11°55.8	4°28.2	-4°40.9	108°27.9	-21°05.2	74°55.9	-22°35.3
19	10°22.0	152°05.7	-11°56.3	19°29.2	-4°40.1	123°29.8	-21°05.3	89°58.0	-22°35.2
20	25°24.5	167°06.1	-11°56.8	34°30.1	-4°39.4	138°31.7	-21°05.4	105°00.2	-22°35.2
21	40°26.9	182°06.5	-11°57.3	49°31.1	-4°38.7	153°33.6	-21°05.4	120°02.3	-22°35.2
22	55°29.4	197°07.0	-11°57.8	64°32.1	-4°38.0	168°35.5	-21°05.5	135°04.5	-22°35.2
23	70°31.8	212°07.4	-11°58.3	79°33.0	-4°37.3	183°37.3	-21°05.6	150°06.6	-22°35.2
Mer.pass.:18:18		v0.5 d-0.5 m-4.4		v1.0 d0.7 m0.2		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	85°34.3	227°07.9	-11°58.8	94°34.0	-4°36.6	198°39.2	-21°05.7	165°08.8	-22°35.2
1	100°36.8	242°08.3	-11°59.3	109°35.0	-4°35.9	213°41.1	-21°05.8	180°10.9	-22°35.1
2	115°39.2	257°08.7	-11°59.8	124°35.9	-4°35.2	228°43.0	-21°05.9	195°13.1	-22°35.1
3	130°41.7	272°09.2	-12°00.2	139°36.9	-4°34.4	243°44.9	-21°06.0	210°15.2	-22°35.1
4	145°44.2	287°09.6	-12°00.7	154°37.9	-4°33.7	258°46.8	-21°06.1	225°17.4	-22°35.1
5	160°46.6	302°10.0	-12°01.2	169°38.8	-4°33.0	273°48.6	-21°06.1	240°19.6	-22°35.1
6	175°49.1	317°10.4	-12°01.7	184°39.8	-4°32.3	288°50.5	-21°06.2	255°21.7	-22°35.1
7	190°51.6	332°10.9	-12°02.2	199°40.7	-4°31.6	303°52.4	-21°06.3	270°23.9	-22°35.0
8	205°54.0	347°11.3	-12°02.7	214°41.7	-4°30.9	318°54.3	-21°06.4	285°26.0	-22°35.0
9	220°56.5	2°11.7	-12°03.2	229°42.7	-4°30.2	333°56.2	-21°06.5	300°28.2	-22°35.0
10	235°58.9	17°12.1	-12°03.7	244°43.6	-4°29.4	348°58.1	-21°06.6	315°30.3	-22°35.0
11	251°01.4	32°12.6	-12°04.2	259°44.6	-4°28.7	3°59.9	-21°06.7	330°32.5	-22°35.0
12	266°03.9	47°13.0	-12°04.7	274°45.6	-4°28.0	19°01.8	-21°06.7	345°34.6	-22°35.0
13	281°06.3	62°13.4	-12°05.2	289°46.5	-4°27.3	34°03.7	-21°06.8	0°36.8	-22°34.9
14	296°08.8	77°13.8	-12°05.7	304°47.5	-4°26.6	49°05.6	-21°06.9	15°38.9	-22°34.9
15	311°11.3	92°14.2	-12°06.2	319°48.5	-4°25.9	64°07.5	-21°07.0	30°41.1	-22°34.9
16	326°13.7	107°14.6	-12°06.7	334°49.4	-4°25.2	79°09.4	-21°07.1	45°43.2	-22°34.9
17	341°16.2	122°15.1	-12°07.2	349°50.4	-4°24.5	94°11.3	-21°07.2	60°45.4	-22°34.9
18	356°18.7	137°15.5	-12°07.7	4°51.3	-4°23.7	109°13.1	-21°07.3	75°47.5	-22°34.8
19	11°21.1	152°15.9	-12°08.2	19°52.3	-4°23.0	124°15.0	-21°07.4	90°49.7	-22°34.8
20	26°23.6	167°16.3	-12°08.7	34°53.3	-4°22.3	139°16.9	-21°07.4	105°51.8	-22°34.8
21	41°26.1	182°16.7	-12°09.2	49°54.2	-4°21.6	154°18.8	-21°07.5	120°54.0	-22°34.8
22	56°28.5	197°17.1	-12°09.7	64°55.2	-4°20.9	169°20.7	-21°07.6	135°56.1	-22°34.8
23	71°31.0	212°17.5	-12°10.2	79°56.2	-4°20.2	184°22.6	-21°07.7	150°58.3	-22°34.8
Mer.pass.:18:14		v0.4 d-0.5 m-4.4		v1.0 d0.7 m0.2		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.8
Ankaa	353°11.9	-42°12.5
Schedar	349°36.1	56°38.6
Diphda	348°51.9	-17°53.2
Achernar	335°23.7	-57°08.8
Hamal	327°56.3	23°33.1
Polaris	315°44.9	89°20.7
Akamar	315°15.2	-40°14.0
Menkar	314°10.9	4°09.7
Mirfak	308°34.5	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.5	46°00.9
Bellatrix	278°27.7	6°21.8
Elnath	278°07.5	28°37.2
Alnilam	275°42.3	-1°11.6
Betelgeuse	270°56.9	7°24.5
Canopus	263°53.9	-52°42.4
Sirius	258°30.0	-16°44.4
Adara	255°09.2	-28°59.9
Procyon	244°55.5	5°10.6
Pollux	243°22.8	27°58.6
Avior	234°16.0	-59°34.1
Suhail	222°49.4	-43°30.4
Miaplacidus	221°38.3	-69°47.4
Alphard	217°52.2	-8°44.4
Regulus	207°39.4	11°52.4
Dubhe	193°47.1	61°38.7
Denebola	182°29.8	14°28.0
Gienah	175°48.5	-17°38.6
Acrux	173°05.3	-63°11.8
Gacrux	171°56.9	-57°12.7
Alioth	166°17.7	55°51.3
Spica	158°27.5	-11°15.4
Alcaid	152°56.2	49°13.1
Hadar	148°43.0	-60°27.4
Menkent	148°03.4	-36°27.4
Arcturus	145°52.4	19°05.4
Rigil Kent.	139°47.1	-60°54.4
Zubenelg.	137°01.6	-16°07.0
Kochab	137°21.1	74°04.6
Alphecca	126°08.2	26°39.2
Antares	112°22.0	-26°28.2
Atria	107°21.0	-69°03.4
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.8
Rasalhague	96°03.4	12°33.0
Etamin	90°44.9	51°29.3
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.9	38°48.2
Nunki	75°54.1	-26°16.3
Altair	62°05.0	8°55.2
Peacock	53°13.9	-56°40.5
Deneb	49°29.3	45°21.1
Enif	33°43.6	9°57.8
Alnair	27°39.3	-46°52.4
Fomalhaut	15°20.0	-29°31.5
Scheat	13°49.8	28°11.2
Markab	13°34.7	15°18.5

2018/12/	**SHA**	**Mer.pass**
Venus	143°09.2	08:53
Mars	10°11.6	17:44
Jupiter	113°32.8	10:50
Saturn	79°49.4	13:04

2018/12/	**SHA**	**Mer.pass**
Venus	142°21.8	08:52
Mars	9°35.7	17:42
Jupiter	113°18.8	10:47
Saturn	79°42.0	13:01

2018/12/	**SHA**	**Mer.pass**
Venus	141°33.5	08:51
Mars	8°59.7	17:41
Jupiter	113°04.9	10:44
Saturn	79°34.5	12:58

Horizontal paralax	
Venus:	0.3
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°16.9	-23°14.9	93°30.4	14.9	-8°38.1	10.2	54.6
1	196°16.6	-23°15.0	108°04.3	14.9	-8°27.9	10.2	54.6
2	211°16.3	-23°15.1	122°38.3	14.9	-8°17.7	10.2	54.7
3	226°16.0	-23°15.3	137°12.2	14.9	-8°07.4	10.3	54.7
4	241°15.7	-23°15.4	151°46.2	14.9	-7°57.2	10.3	54.7
5	256°15.4	-23°15.5	166°20.1	15.0	-7°46.8	10.4	54.7
6	271°15.1	-23°15.7	180°54.1	15.0	-7°36.4	10.4	54.7
7	286°14.8	-23°15.8	195°28.0	15.0	-7°26.0	10.4	54.7
8	301°14.5	-23°15.9	210°02.0	15.0	-7°15.6	10.5	54.8
9	316°14.2	-23°16.0	224°36.0	15.0	-7°05.1	10.5	54.8
10	331°13.9	-23°16.2	239°09.9	15.0	-6°54.6	10.5	54.8
11	346°13.6	-23°16.3	253°43.9	15.0	-6°44.0	10.6	54.8
12	1°13.3	-23°16.4	268°17.9	15.0	-6°33.4	10.6	54.8
13	16°13.0	-23°16.5	282°51.8	15.0	-6°22.8	10.6	54.9
14	31°12.7	-23°16.7	297°25.8	15.0	-6°12.1	10.7	54.9
15	46°12.4	-23°16.8	311°59.7	15.0	-6°01.5	10.7	54.9
16	61°12.1	-23°16.9	326°33.7	15.0	-5°50.7	10.7	54.9
17	76°11.8	-23°17.0	341°07.6	14.9	-5°40.0	10.8	55.0
18	91°11.5	-23°17.2	355°41.6	14.9	-5°29.2	10.8	55.0
19	106°11.2	-23°17.3	10°15.5	14.9	-5°18.3	10.8	55.0
20	121°10.9	-23°17.4	24°49.5	14.9	-5°07.5	10.9	55.0
21	136°10.6	-23°17.5	39°23.4	14.9	-4°56.6	10.9	55.0
22	151°10.3	-23°17.6	53°57.3	14.9	-4°45.7	10.9	55.1
23	166°10.0	-23°17.8	68°31.2	14.9	-4°34.7	11.0	55.1
	SD.=16.2	d=-0.1	S.D.=14.9				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°09.7	-23°17.9	83°05.1	14.9	-4°23.8	11.0	55.1
1	196°09.4	-23°18.0	97°39.0	14.9	-4°12.8	11.0	55.1
2	211°09.1	-23°18.1	112°12.8	14.9	-4°01.7	11.0	55.2
3	226°08.8	-23°18.2	126°46.7	14.8	-3°50.7	11.1	55.2
4	241°08.5	-23°18.3	141°20.5	14.8	-3°39.6	11.1	55.2
5	256°08.2	-23°18.4	155°54.4	14.8	-3°28.5	11.1	55.2
6	271°07.9	-23°18.6	170°28.2	14.8	-3°17.4	11.1	55.3
7	286°07.6	-23°18.7	185°02.0	14.8	-3°06.2	11.2	55.3
8	301°07.3	-23°18.8	199°35.7	14.8	-2°55.0	11.2	55.3
9	316°07.0	-23°18.9	214°09.5	14.7	-2°43.8	11.2	55.3
10	331°06.7	-23°19.0	228°43.2	14.7	-2°32.6	11.2	55.4
11	346°06.4	-23°19.1	243°16.9	14.7	-2°21.4	11.3	55.4
12	1°06.1	-23°19.2	257°50.6	14.7	-2°10.1	11.3	55.4
13	16°05.8	-23°19.3	272°24.3	14.7	-1°58.8	11.3	55.5
14	31°05.5	-23°19.4	286°58.0	14.6	-1°47.5	11.3	55.5
15	46°05.2	-23°19.5	301°31.6	14.6	-1°36.1	11.3	55.5
16	61°04.9	-23°19.6	316°05.2	14.6	-1°24.8	11.4	55.5
17	76°04.6	-23°19.7	330°38.8	14.6	-1°13.4	11.4	55.6
18	91°04.3	-23°19.8	345°12.3	14.5	-1°02.0	11.4	55.6
19	106°04.0	-23°19.9	359°45.8	14.5	-0°50.6	11.4	55.6
20	121°03.7	-23°20.0	14°19.3	14.5	-0°39.2	11.4	55.7
21	136°03.3	-23°20.1	28°52.8	14.4	-0°27.8	11.4	55.7
22	151°03.0	-23°20.2	43°26.2	14.4	-0°16.3	11.5	55.7
23	166°02.7	-23°20.3	57°59.6	14.4	-0°04.9	11.5	55.7
	SD.=16.3	d=-0.1	S.D.=15.0				

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°02.4	-23°20.4	72°33.0	14.3	0°06.6	11.5	55.8
1	196°02.1	-23°20.5	87°06.3	14.3	0°18.1	11.5	55.8
2	211°01.8	-23°20.6	101°39.6	14.3	0°29.6	11.5	55.8
3	226°01.5	-23°20.7	116°12.9	14.2	0°41.1	11.5	55.9
4	241°01.2	-23°20.8	130°46.1	14.2	0°52.6	11.5	55.9
5	256°00.9	-23°20.9	145°19.3	14.2	1°04.1	11.5	55.9
6	271°00.6	-23°21.0	159°52.4	14.1	1°15.7	11.5	56.0
7	286°00.3	-23°21.1	174°25.5	14.1	1°27.2	11.6	56.0
8	300°60.0	-23°21.2	188°58.6	14.0	1°38.8	11.6	56.0
9	315°59.7	-23°21.3	203°31.6	14.0	1°50.4	11.6	56.1
10	330°59.4	-23°21.3	218°04.6	14.0	2°01.9	11.6	56.1
11	345°59.1	-23°21.4	232°37.6	13.9	2°13.5	11.6	56.1
12	0°58.8	-23°21.5	247°10.5	13.9	2°25.1	11.6	56.2
13	15°58.5	-23°21.6	261°43.3	13.8	2°36.7	11.6	56.2
14	30°58.2	-23°21.7	276°16.1	13.8	2°48.2	11.6	56.2
15	45°57.9	-23°21.8	290°48.9	13.7	2°59.8	11.6	56.3
16	60°57.6	-23°21.9	305°21.6	13.7	3°11.4	11.6	56.3
17	75°57.2	-23°21.9	319°54.3	13.6	3°23.0	11.6	56.3
18	90°56.9	-23°22.0	334°26.9	13.6	3°34.6	11.6	56.4
19	105°56.6	-23°22.1	348°59.4	13.5	3°46.2	11.6	56.4
20	120°56.3	-23°22.2	3°31.9	13.5	3°57.8	11.6	56.4
21	135°56.0	-23°22.3	18°04.4	13.4	4°09.4	11.6	56.5
22	150°55.7	-23°22.3	32°36.8	13.4	4°20.9	11.6	56.5
23	165°55.4	-23°22.4	47°09.2	13.3	4°32.5	11.6	56.5
	SD.=16.3	d=-0.1	S.D.=15.2				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:21	10:49	–:–	–:–	13:02	15:30
70	08:01	09:49	–:–	–:–	14:02	15:50
68	07:46	09:14	–:–	–:–	14:37	16:05
66	07:33	08:49	10:29	13:22	15:02	16:18
64	07:22	08:30	09:47	14:04	15:21	16:29
62	07:12	08:14	09:19	14:32	15:37	16:39
60	07:04	08:01	08:58	14:53	15:51	16:47
58	06:56	07:49	08:41	15:10	16:02	16:55
56	06:50	07:39	08:26	15:25	16:12	17:01
54	06:44	07:30	08:13	15:38	16:21	17:08
52	06:38	07:22	08:02	15:49	16:30	17:13
50	06:33	07:14	07:53	15:59	16:37	17:18
45	06:21	06:58	07:32	16:19	16:53	17:30
40	06:11	06:45	07:15	16:36	17:06	17:40
35	06:01	06:33	07:01	16:50	17:18	17:50
30	05:53	06:22	06:49	17:02	17:29	17:59
20	05:36	06:04	06:28	17:23	17:47	18:15
10	05:20	05:46	06:09	17:42	18:05	18:31
0	05:03	05:29	05:52	17:59	18:22	18:48
-10	04:44	05:11	05:34	18:17	18:40	19:07
-20	04:22	04:51	05:15	18:36	19:00	19:30
-30	03:53	04:26	04:53	18:58	19:25	19:59
-35	03:34	04:11	04:41	19:11	19:40	20:17
-40	03:11	03:53	04:26	19:26	19:59	20:40
-45	02:41	03:30	04:08	19:44	20:21	21:11
-50	01:56	03:01	03:45	20:06	20:51	21:56
-52	01:28	02:46	03:34	20:17	21:06	22:23
-54	00:44	02:28	03:22	20:29	21:24	23:09
-56	–:–	02:06	03:08	20:43	21:46	–:–
-58	–:–	01:37	02:51	21:00	22:15	–:–
-60	–:–	00:48	02:31	21:20	23:04	–:–

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	13:30	13:16	13:02	23:30	–:–	01:15
70	13:21	13:13	13:06	23:36	–:–	01:15
68	13:14	13:11	13:08	23:42	–:–	01:14
66	13:08	13:09	13:11	23:46	–:–	01:14
64	13:02	13:08	13:13	23:50	–:–	01:14
62	12:58	13:06	13:14	23:53	–:–	01:14
60	12:54	13:05	13:16	23:56	–:–	01:14
58	12:50	13:04	13:17	23:59	–:–	01:13
56	12:47	13:03	13:19	–:–	00:01	01:13
54	12:44	13:02	13:20	–:–	00:03	01:13
52	12:42	13:01	13:21	–:–	00:05	01:13
50	12:39	13:00	13:22	–:–	00:06	01:13
45	12:34	12:59	13:24	–:–	00:10	01:13
40	12:30	12:58	13:25	–:–	00:13	01:13
35	12:26	12:56	13:27	–:–	00:15	01:12
30	12:23	12:55	13:28	–:–	00:18	01:12
20	12:17	12:54	13:31	–:–	00:22	01:12
10	12:12	12:52	13:33	–:–	00:25	01:12
0	12:07	12:51	13:35	–:–	00:28	01:11
-10	12:03	12:49	13:37	–:–	00:31	01:11
-20	11:58	12:48	13:39	–:–	00:34	01:11
-30	11:52	12:46	13:41	00:06	00:38	01:11
-35	11:48	12:45	13:43	00:10	00:40	01:10
-40	11:45	12:44	13:44	00:15	00:43	01:10
-45	11:40	12:42	13:46	00:21	00:45	01:10
-50	11:35	12:41	13:48	00:27	00:49	01:10
-52	11:32	12:40	13:50	00:31	00:50	01:09
-54	11:30	12:39	13:51	00:34	00:52	01:09
-56	11:27	12:38	13:52	00:38	00:54	01:09
-58	11:23	12:37	13:53	00:42	00:56	01:09
-60	11:20	12:36	13:55	00:47	00:58	01:09

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
15	05:08	04:53	11:55	18:17	05:56	8(50%)
16	04:39	04:24	11:55	19:00	06:39	9(60%)
17	04:10	03:55	11:56	19:45	07:22	10(69%)

December 18, 19 ,20 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	86°33.4	227°17.9	-12°10.7	94°57.1	-4°19.5	199°24.5	-21°07.8	166°00.4	-22°34.7
1	101°35.9	242°18.3	-12°11.2	109°58.1	-4°18.7	214°26.3	-21°07.9	181°02.6	-22°34.7
2	116°38.4	257°18.7	-12°11.7	124°59.0	-4°18.0	229°28.2	-21°08.0	196°04.7	-22°34.7
3	131°40.8	272°19.1	-12°12.2	140°00.0	-4°17.3	244°30.1	-21°08.0	211°06.9	-22°34.7
4	146°43.3	287°19.5	-12°12.7	155°01.0	-4°16.6	259°32.0	-21°08.1	226°09.0	-22°34.7
5	161°45.8	302°19.9	-12°13.2	170°01.9	-4°15.9	274°33.9	-21°08.2	241°11.2	-22°34.7
6	176°48.2	317°20.3	-12°13.7	185°02.9	-4°15.2	289°35.8	-21°08.3	256°13.3	-22°34.6
7	191°50.7	332°20.7	-12°14.3	200°03.9	-4°14.5	304°37.7	-21°08.4	271°15.5	-22°34.6
8	206°53.2	347°21.1	-12°14.8	215°04.8	-4°13.7	319°39.5	-21°08.5	286°17.6	-22°34.6
9	221°55.6	2°21.5	-12°15.3	230°05.8	-4°13.0	334°41.4	-21°08.6	301°19.8	-22°34.6
10	236°58.1	17°21.8	-12°15.8	245°06.7	-4°12.3	349°43.3	-21°08.6	316°21.9	-22°34.6
11	252°00.6	32°22.2	-12°16.3	260°07.7	-4°11.6	4°45.2	-21°08.7	331°24.1	-22°34.5
12	267°03.0	47°22.6	-12°16.8	275°08.7	-4°10.9	19°47.1	-21°08.8	346°26.2	-22°34.5
13	282°05.5	62°23.0	-12°17.3	290°09.6	-4°10.2	34°49.0	-21°08.9	1°28.4	-22°34.5
14	297°07.9	77°23.4	-12°17.8	305°10.6	-4°09.5	49°50.9	-21°09.0	16°30.5	-22°34.5
15	312°10.4	92°23.8	-12°18.3	320°11.6	-4°08.7	64°52.7	-21°09.1	31°32.7	-22°34.5
16	327°12.9	107°24.1	-12°18.8	335°12.5	-4°08.0	79°54.6	-21°09.2	46°34.8	-22°34.5
17	342°15.3	122°24.5	-12°19.4	350°13.5	-4°07.3	94°56.5	-21°09.2	61°37.0	-22°34.4
18	357°17.8	137°24.9	-12°19.9	5°14.4	-4°06.6	109°58.4	-21°09.3	76°39.1	-22°34.4
19	12°20.3	152°25.3	-12°20.4	20°15.4	-4°05.9	125°00.3	-21°09.4	91°41.3	-22°34.4
20	27°22.7	167°25.6	-12°20.9	35°16.4	-4°05.2	140°02.2	-21°09.5	106°43.4	-22°34.4
21	42°25.2	182°26.0	-12°21.4	50°17.3	-4°04.4	155°04.1	-21°09.6	121°45.6	-22°34.4
22	57°27.7	197°26.4	-12°21.9	65°18.3	-4°03.7	170°05.9	-21°09.7	136°47.7	-22°34.3
23	72°30.1	212°26.8	-12°22.4	80°19.2	-4°03.0	185°07.8	-21°09.8	151°49.9	-22°34.3
Mer.pass.:18:10		v0.4 d-0.5 m-4.4		v1.0 d0.7 m0.3		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	87°32.6	227°27.1	-12°23.0	95°20.2	-4°02.3	200°09.7	-21°09.8	166°52.0	-22°34.3
1	102°35.0	242°27.5	-12°23.5	110°21.2	-4°01.6	215°11.6	-21°09.9	181°54.2	-22°34.3
2	117°37.5	257°27.9	-12°24.0	125°22.1	-4°00.9	230°13.5	-21°10.0	196°56.3	-22°34.3
3	132°40.0	272°28.2	-12°24.5	140°23.1	-4°00.2	245°15.4	-21°10.1	211°58.5	-22°34.3
4	147°42.4	287°28.6	-12°25.0	155°24.1	-3°59.4	260°17.3	-21°10.2	227°00.6	-22°34.2
5	162°44.9	302°29.0	-12°25.6	170°25.0	-3°58.7	275°19.1	-21°10.3	242°02.8	-22°34.2
6	177°47.4	317°29.3	-12°26.1	185°26.0	-3°58.0	290°21.0	-21°10.4	257°04.9	-22°34.2
7	192°49.8	332°29.7	-12°26.6	200°26.9	-3°57.3	305°22.9	-21°10.4	272°07.1	-22°34.2
8	207°52.3	347°30.0	-12°27.1	215°27.9	-3°56.6	320°24.8	-21°10.5	287°09.2	-22°34.2
9	222°54.8	2°30.4	-12°27.6	230°28.9	-3°55.9	335°26.7	-21°10.6	302°11.4	-22°34.1
10	237°57.2	17°30.7	-12°28.1	245°29.8	-3°55.1	350°28.6	-21°10.7	317°13.5	-22°34.1
11	252°59.7	32°31.1	-12°28.7	260°30.8	-3°54.4	5°30.5	-21°10.8	332°15.7	-22°34.1
12	268°02.2	47°31.4	-12°29.2	275°31.7	-3°53.7	20°32.3	-21°10.9	347°17.8	-22°34.1
13	283°04.6	62°31.8	-12°29.7	290°32.7	-3°53.0	35°34.2	-21°11.0	2°20.0	-22°34.1
14	298°07.1	77°32.1	-12°30.2	305°33.7	-3°52.3	50°36.1	-21°11.0	17°22.1	-22°34.1
15	313°09.5	92°32.5	-12°30.8	320°34.6	-3°51.6	65°38.0	-21°11.1	32°24.3	-22°34.0
16	328°12.0	107°32.8	-12°31.3	335°35.6	-3°50.9	80°39.9	-21°11.2	47°26.4	-22°34.0
17	343°14.5	122°33.2	-12°31.8	350°36.5	-3°50.1	95°41.8	-21°11.3	62°28.6	-22°34.0
18	358°16.9	137°33.5	-12°32.3	5°37.5	-3°49.4	110°43.7	-21°11.4	77°30.7	-22°34.0
19	13°19.4	152°33.9	-12°32.9	20°38.5	-3°48.7	125°45.6	-21°11.5	92°32.9	-22°34.0
20	28°21.9	167°34.2	-12°33.4	35°39.4	-3°48.0	140°47.4	-21°11.5	107°35.0	-22°33.9
21	43°24.3	182°34.6	-12°33.9	50°40.4	-3°47.3	155°49.3	-21°11.6	122°37.2	-22°33.9
22	58°26.8	197°34.9	-12°34.4	65°41.3	-3°46.6	170°51.2	-21°11.7	137°39.3	-22°33.9
23	73°29.3	212°35.2	-12°35.0	80°42.3	-3°45.8	185°53.1	-21°11.8	152°41.5	-22°33.9
Mer.pass.:18:06		v0.4 d-0.5 m-4.4		v1.0 d0.7 m0.3		v1.9 d-0.1 m-1.6		v2.2 d0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	88°31.7	227°35.6	-12°35.5	95°43.3	-3°45.1	200°55.0	-21°11.9	167°43.6	-22°33.9
1	103°34.2	242°35.9	-12°36.0	110°44.2	-3°44.4	215°56.9	-21°12.0	182°45.8	-22°33.9
2	118°36.7	257°36.2	-12°36.5	125°45.2	-3°43.7	230°58.8	-21°12.0	197°47.9	-22°33.8
3	133°39.1	272°36.6	-12°37.1	140°46.1	-3°43.0	246°00.7	-21°12.1	212°50.1	-22°33.8
4	148°41.6	287°36.9	-12°37.6	155°47.1	-3°42.3	261°02.5	-21°12.2	227°52.2	-22°33.8
5	163°44.0	302°37.2	-12°38.1	170°48.1	-3°41.5	276°04.4	-21°12.3	242°54.4	-22°33.8
6	178°46.5	317°37.6	-12°38.7	185°49.0	-3°40.8	291°06.3	-21°12.4	257°56.5	-22°33.8
7	193°49.0	332°37.9	-12°39.2	200°50.0	-3°40.1	306°08.2	-21°12.5	272°58.7	-22°33.7
8	208°51.4	347°38.2	-12°39.7	215°50.9	-3°39.4	321°10.1	-21°12.6	288°00.8	-22°33.7
9	223°53.9	2°38.5	-12°40.3	230°51.9	-3°38.7	336°12.0	-21°12.6	303°03.0	-22°33.7
10	238°56.4	17°38.9	-12°40.8	245°52.9	-3°38.0	351°13.9	-21°12.7	318°05.1	-22°33.7
11	253°58.8	32°39.2	-12°41.3	260°53.8	-3°37.2	6°15.8	-21°12.8	333°07.3	-22°33.7
12	269°01.3	47°39.5	-12°41.8	275°54.8	-3°36.5	21°17.6	-21°12.9	348°09.4	-22°33.6
13	284°03.8	62°39.8	-12°42.4	290°55.7	-3°35.8	36°19.5	-21°13.0	3°11.6	-22°33.6
14	299°06.2	77°40.1	-12°42.9	305°56.7	-3°35.1	51°21.4	-21°13.1	18°13.7	-22°33.6
15	314°08.7	92°40.5	-12°43.4	320°57.7	-3°34.4	66°23.3	-21°13.1	33°15.9	-22°33.6
16	329°11.2	107°40.8	-12°44.0	335°58.6	-3°33.7	81°25.2	-21°13.2	48°18.0	-22°33.6
17	344°13.6	122°41.1	-12°44.5	350°59.6	-3°32.9	96°27.1	-21°13.3	63°20.2	-22°33.6
18	359°16.1	137°41.4	-12°45.1	6°00.5	-3°32.2	111°29.0	-21°13.4	78°22.3	-22°33.5
19	14°18.5	152°41.7	-12°45.6	21°01.5	-3°31.5	126°30.9	-21°13.5	93°24.5	-22°33.5
20	29°21.0	167°42.0	-12°46.1	36°02.5	-3°30.8	141°32.7	-21°13.6	108°26.6	-22°33.5
21	44°23.5	182°42.3	-12°46.7	51°03.4	-3°30.1	156°34.6	-21°13.6	123°28.8	-22°33.5
22	59°25.9	197°42.6	-12°47.2	66°04.4	-3°29.4	171°36.5	-21°13.7	138°30.9	-22°33.5
23	74°28.4	212°42.9	-12°47.7	81°05.3	-3°28.6	186°38.4	-21°13.8	153°33.1	-22°33.4
Mer.pass.:18:02		v0.3 d-0.5 m-4.4		v1.0 d0.7 m0.3		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.8
Ankaa	353°11.9	-42°12.5
Schedar	349°36.1	56°38.6
Diphda	348°52.0	-17°53.2
Achernar	335°23.7	-57°08.8
Hamal	327°56.3	23°33.1
Polaris	315°45.6	89°20.7
Akamar	315°15.2	-40°14.0
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.5	46°00.9
Bellatrix	278°27.7	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.5
Canopus	263°53.9	-52°42.4
Sirius	258°30.0	-16°44.5
Adara	255°09.2	-28°59.9
Procyon	244°55.4	5°10.6
Pollux	243°22.8	27°58.6
Avior	234°16.0	-59°34.1
Suhail	222°49.4	-43°30.4
Miaplacidus	221°38.3	-69°47.5
Alphard	217°52.2	-8°44.4
Regulus	207°39.4	11°52.4
Dubhe	193°47.0	61°38.7
Denebola	182°29.8	14°28.0
Gienah	175°48.5	-17°38.6
Acrux	173°05.2	-63°11.8
Gacrux	171°56.8	-57°12.7
Alioth	166°17.6	55°51.3
Spica	158°27.4	-11°15.4
Alcaid	152°56.2	49°13.1
Hadar	148°42.9	-60°27.4
Menkent	148°03.4	-36°27.4
Arcturus	145°52.4	19°05.4
Rigil Kent.	139°47.1	-60°54.4
Zubenelg.	137°01.5	-16°07.0
Kochab	137°21.0	74°04.6
Alphecca	126°08.2	26°39.2
Antares	112°22.0	-26°28.2
Atria	107°21.0	-69°03.4
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.8
Rasalhague	96°03.4	12°33.0
Etamin	90°44.9	51°29.3
Kaus Aust.	83°39.3	-34°22.4
Vega	80°36.9	38°48.2
Nunki	75°54.1	-26°16.3
Altair	62°05.0	8°55.2
Peacock	53°13.9	-56°40.5
Deneb	49°29.3	45°21.1
Enif	33°43.7	9°57.8
Alnair	27°39.3	-46°52.4
Fomalhaut	15°20.0	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.7	15°18.5

2018/12/	**SHA**	**Mer.pass**
Venus	140°44.5	08:51
Mars	8°23.7	17:39
Jupiter	112°51.0	10:41
Saturn	79°27.0	12:54

2018/12/	**SHA**	**Mer.pass**
Venus	139°54.5	08:50
Mars	7°47.6	17:38
Jupiter	112°37.1	10:38
Saturn	79°19.5	12:51

2018/12/	**SHA**	**Mer.pass**
Venus	139°03.8	08:49
Mars	7°11.5	17:36
Jupiter	112°23.3	10:35
Saturn	79°11.9	12:47

Horizontal paralax	
Venus:	0.3
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°55.1	-23°22.5	61°41.5	13.3	4°44.1	11.6	56.6
1	195°54.8	-23°22.6	76°13.7	13.2	4°55.7	11.6	56.6
2	210°54.5	-23°22.7	90°45.9	13.2	5°07.2	11.6	56.6
3	225°54.2	-23°22.7	105°18.0	13.1	5°18.8	11.5	56.7
4	240°53.9	-23°22.8	119°50.1	13.0	5°30.3	11.5	56.7
5	255°53.6	-23°22.9	134°22.1	13.0	5°41.8	11.5	56.7
6	270°53.3	-23°22.9	148°54.0	12.9	5°53.3	11.5	56.8
7	285°53.0	-23°23.0	163°25.9	12.8	6°04.8	11.5	56.8
8	300°52.7	-23°23.1	177°57.7	12.8	6°16.3	11.5	56.9
9	315°52.4	-23°23.2	192°29.5	12.7	6°27.8	11.5	56.9
10	330°52.0	-23°23.2	207°01.1	12.7	6°39.3	11.5	56.9
11	345°51.7	-23°23.3	221°32.8	12.6	6°50.7	11.4	57.0
12	0°51.4	-23°23.4	236°04.3	12.5	7°02.1	11.4	57.0
13	15°51.1	-23°23.4	250°35.8	12.5	7°13.6	11.4	57.0
14	30°50.8	-23°23.5	265°07.2	12.4	7°25.0	11.4	57.1
15	45°50.5	-23°23.6	279°38.6	12.3	7°36.3	11.4	57.1
16	60°50.2	-23°23.6	294°09.8	12.2	7°47.7	11.3	57.1
17	75°49.9	-23°23.7	308°41.1	12.2	7°59.0	11.3	57.2
18	90°49.6	-23°23.8	323°12.2	12.1	8°10.3	11.3	57.2
19	105°49.3	-23°23.8	337°43.2	12.0	8°21.6	11.3	57.3
20	120°49.0	-23°23.9	352°14.2	12.0	8°32.8	11.2	57.3
21	135°48.7	-23°23.9	6°45.2	11.9	8°44.1	11.2	57.3
22	150°48.4	-23°24.0	21°16.0	11.8	8°55.3	11.2	57.4
23	165°48.1	-23°24.1	35°46.7	11.7	9°06.4	11.2	57.4
	SD.=16.3	d=-0.1	S.D.=15.4				

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°47.7	-23°24.1	50°17.4	11.6	9°17.6	11.1	57.4
1	195°47.4	-23°24.2	64°48.0	11.6	9°28.7	11.1	57.5
2	210°47.1	-23°24.2	79°18.6	11.5	9°39.8	11.1	57.5
3	225°46.8	-23°24.3	93°49.0	11.4	9°50.8	11.0	57.6
4	240°46.5	-23°24.3	108°19.4	11.3	10°01.8	11.0	57.6
5	255°46.2	-23°24.4	122°49.7	11.2	10°12.8	11.0	57.6
6	270°45.9	-23°24.4	137°19.9	11.2	10°23.7	10.9	57.7
7	285°45.6	-23°24.5	151°50.0	11.1	10°34.6	10.9	57.7
8	300°45.3	-23°24.5	166°20.0	11.0	10°45.5	10.8	57.8
9	315°45.0	-23°24.6	180°50.0	10.9	10°56.3	10.8	57.8
10	330°44.7	-23°24.6	195°19.8	10.8	11°07.1	10.8	57.8
11	345°44.4	-23°24.7	209°49.6	10.7	11°17.8	10.7	57.9
12	0°44.0	-23°24.7	224°19.3	10.7	11°28.5	10.7	57.9
13	15°43.7	-23°24.8	238°48.9	10.6	11°39.2	10.6	57.9
14	30°43.4	-23°24.8	253°18.5	10.5	11°49.7	10.6	58.0
15	45°43.1	-23°24.9	267°47.9	10.4	12°00.3	10.5	58.0
16	60°42.8	-23°24.9	282°17.2	10.3	12°10.8	10.5	58.1
17	75°42.5	-23°25.0	296°46.5	10.2	12°21.2	10.4	58.1
18	90°42.2	-23°25.0	311°15.7	10.1	12°31.6	10.4	58.1
19	105°41.9	-23°25.1	325°44.7	10.0	12°42.0	10.3	58.2
20	120°41.6	-23°25.1	340°13.7	9.9	12°52.2	10.3	58.2
21	135°41.3	-23°25.1	354°42.6	9.8	13°02.5	10.2	58.2
22	150°41.0	-23°25.2	9°11.4	9.8	13°12.6	10.1	58.3
23	165°40.7	-23°25.2	23°40.1	9.7	13°22.7	10.1	58.3
	SD.=16.3	d=-0.1	S.D.=15.7				

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°40.3	-23°25.3	38°08.7	9.6	13°32.8	10.0	58.4
1	195°40.0	-23°25.3	52°37.2	9.5	13°42.8	10.0	58.4
2	210°39.7	-23°25.3	67°05.7	9.4	13°52.7	9.9	58.4
3	225°39.4	-23°25.4	81°34.0	9.3	14°02.5	9.8	58.5
4	240°39.1	-23°25.4	96°02.2	9.2	14°12.3	9.8	58.5
5	255°38.8	-23°25.4	110°30.4	9.1	14°22.1	9.7	58.5
6	270°38.5	-23°25.5	124°58.4	9.0	14°31.7	9.6	58.6
7	285°38.2	-23°25.5	139°26.4	8.9	14°41.3	9.5	58.6
8	300°37.9	-23°25.5	153°54.2	8.8	14°50.8	9.5	58.7
9	315°37.6	-23°25.6	168°22.0	8.7	15°00.2	9.4	58.7
10	330°37.3	-23°25.6	182°49.7	8.6	15°09.6	9.3	58.7
11	345°37.0	-23°25.6	197°17.2	8.5	15°18.9	9.2	58.8
12	0°36.6	-23°25.6	211°44.7	8.4	15°28.1	9.2	58.8
13	15°36.3	-23°25.7	226°12.1	8.3	15°37.2	9.1	58.8
14	30°36.0	-23°25.7	240°39.4	8.2	15°46.2	9.0	58.9
15	45°35.7	-23°25.7	255°06.5	8.1	15°55.2	8.9	58.9
16	60°35.4	-23°25.8	269°33.6	8.0	16°04.1	8.8	58.9
17	75°35.1	-23°25.8	284°00.6	7.9	16°12.9	8.7	59.0
18	90°34.8	-23°25.8	298°27.5	7.8	16°21.6	8.7	59.0
19	105°34.5	-23°25.8	312°54.3	7.7	16°30.2	8.6	59.0
20	120°34.2	-23°25.8	327°21.0	7.6	16°38.7	8.5	59.1
21	135°33.9	-23°25.9	341°47.6	7.5	16°47.1	8.4	59.1
22	150°33.6	-23°25.9	356°14.1	7.5	16°55.5	8.3	59.1
23	165°33.2	-23°25.9	10°40.5	7.4	17°03.7	8.2	59.2
	SD.=16.3	d=-0.0	S.D.=15.9				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:24	10:55	–:–	–:–	12:59	15:30
70	08:04	09:53	–:–	–:–	14:01	15:50
68	07:48	09:18	–:–	–:–	14:36	16:06
66	07:35	08:52	10:33	13:21	15:02	16:19
64	07:24	08:33	09:51	14:04	15:21	16:30
62	07:14	08:16	09:22	14:32	15:38	16:40
60	07:06	08:03	09:01	14:53	15:51	16:48
58	06:59	07:51	08:43	15:11	16:03	16:56
56	06:52	07:41	08:28	15:26	16:13	17:02
54	06:46	07:32	08:16	15:38	16:22	17:09
52	06:40	07:24	08:05	15:50	16:30	17:14
50	06:35	07:16	07:55	15:59	16:38	17:19
45	06:23	07:00	07:34	16:20	16:54	17:31
40	06:12	06:47	07:17	16:37	17:08	17:42
35	06:03	06:35	07:03	16:51	17:19	17:51
30	05:54	06:24	06:51	17:04	17:30	17:60
20	05:38	06:05	06:29	17:25	17:49	18:16
10	05:22	05:48	06:11	17:43	18:06	18:33
0	05:05	05:31	05:53	18:01	18:23	18:50
-10	04:46	05:13	05:36	18:18	18:41	19:09
-20	04:23	04:52	05:17	18:37	19:02	19:31
-30	03:54	04:27	04:55	18:59	19:27	20:00
-35	03:35	04:12	04:42	19:13	19:42	20:19
-40	03:12	03:54	04:27	19:28	20:00	20:42
-45	02:41	03:31	04:09	19:46	20:23	21:13
-50	01:56	03:01	03:46	20:08	20:53	21:58
-52	01:28	02:46	03:35	20:19	21:08	22:26
-54	00:42	02:28	03:23	20:31	21:26	23:13
-56	–:–	02:06	03:09	20:46	21:48	–:–
-58	–:–	01:36	02:52	21:03	22:18	–:–
-60	–:–	00:46	02:31	21:23	23:09	–:–

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	12:48	12:30	12:03	03:04	05:01	07:16
70	12:58	12:49	12:37	02:56	04:44	06:43
68	13:06	13:04	13:02	02:50	04:31	06:19
66	13:13	13:16	13:22	02:45	04:20	06:01
64	13:19	13:26	13:37	02:41	04:11	05:46
62	13:24	13:35	13:50	02:37	04:03	05:34
60	13:28	13:43	14:02	02:33	03:57	05:23
58	13:32	13:49	14:11	02:31	03:51	05:14
56	13:36	13:55	14:20	02:28	03:46	05:06
54	13:39	14:01	14:28	02:26	03:41	04:59
52	13:42	14:06	14:34	02:24	03:37	04:53
50	13:44	14:10	14:41	02:22	03:33	04:48
45	13:50	14:20	14:54	02:18	03:25	04:35
40	13:55	14:28	15:05	02:14	03:18	04:25
35	13:59	14:35	15:15	02:11	03:13	04:17
30	14:03	14:41	15:23	02:09	03:07	04:09
20	14:09	14:51	15:38	02:04	02:59	03:56
10	14:15	15:01	15:50	02:00	02:51	03:45
0	14:21	15:10	16:02	01:56	02:44	03:34
-10	14:26	15:19	16:15	01:53	02:36	03:24
-20	14:32	15:28	16:28	01:49	02:29	03:13
-30	14:39	15:39	16:43	01:44	02:20	02:60
-35	14:43	15:46	16:51	01:42	02:15	02:52
-40	14:47	15:53	17:01	01:39	02:09	02:44
-45	14:52	16:02	17:13	01:35	02:03	02:34
-50	14:59	16:12	17:27	01:31	01:55	02:23
-52	15:02	16:17	17:34	01:29	01:51	02:17
-54	15:05	16:22	17:42	01:27	01:47	02:11
-56	15:08	16:28	17:50	01:25	01:43	02:05
-58	15:12	16:35	17:60	01:23	01:38	01:57
-60	15:17	16:42	18:10	01:20	01:33	01:49

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
18	03:41	03:26	11:56	20:32	08:08	11(79%)
19	03:11	02:56	11:57	21:21	08:56	12(87%)
20	02:41	02:27	11:57	22:15	09:48	13(93%)

December 21, 22 ,23 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	89°30.9	227°43.2	-12°48.3	96°06.3	-3°27.9	201°40.3	-21°13.9	168°35.2	-22°33.4
1	104°33.3	242°43.5	-12°48.8	111°07.3	-3°27.2	216°42.2	-21°14.0	183°37.4	-22°33.4
2	119°35.8	257°43.9	-12°49.3	126°08.2	-3°26.5	231°44.1	-21°14.1	198°39.5	-22°33.4
3	134°38.3	272°44.2	-12°49.9	141°09.2	-3°25.8	246°46.0	-21°14.1	213°41.7	-22°33.4
4	149°40.7	287°44.5	-12°50.4	156°10.1	-3°25.1	261°47.9	-21°14.2	228°43.8	-22°33.3
5	164°43.2	302°44.7	-12°51.0	171°11.1	-3°24.3	276°49.7	-21°14.3	243°46.0	-22°33.3
6	179°45.7	317°45.0	-12°51.5	186°12.1	-3°23.6	291°51.6	-21°14.4	258°48.1	-22°33.3
7	194°48.1	332°45.3	-12°52.0	201°13.0	-3°22.9	306°53.5	-21°14.5	273°50.3	-22°33.3
8	209°50.6	347°45.6	-12°52.6	216°14.0	-3°22.2	321°55.4	-21°14.6	288°52.4	-22°33.3
9	224°53.0	2°45.9	-12°53.1	231°14.9	-3°21.5	336°57.3	-21°14.6	303°54.6	-22°33.3
10	239°55.5	17°46.2	-12°53.7	246°15.9	-3°20.8	351°59.2	-21°14.7	318°56.7	-22°33.2
11	254°58.0	32°46.5	-12°54.2	261°16.9	-3°20.0	7°01.1	-21°14.8	333°58.9	-22°33.2
12	270°00.4	47°46.8	-12°54.7	276°17.8	-3°19.3	22°03.0	-21°14.9	349°01.0	-22°33.2
13	285°02.9	62°47.1	-12°55.3	291°18.8	-3°18.6	37°04.9	-21°15.0	4°03.1	-22°33.2
14	300°05.4	77°47.4	-12°55.8	306°19.7	-3°17.9	52°06.7	-21°15.1	19°05.3	-22°33.2
15	315°07.8	92°47.7	-12°56.4	321°20.7	-3°17.2	67°08.6	-21°15.1	34°07.4	-22°33.1
16	330°10.3	107°47.9	-12°56.9	336°21.6	-3°16.5	82°10.5	-21°15.2	49°09.6	-22°33.1
17	345°12.8	122°48.2	-12°57.5	351°22.6	-3°15.7	97°12.4	-21°15.3	64°11.7	-22°33.1
18	0°15.2	137°48.5	-12°58.0	6°23.6	-3°15.0	112°14.3	-21°15.4	79°13.9	-22°33.1
19	15°17.7	152°48.8	-12°58.6	21°24.5	-3°14.3	127°16.2	-21°15.5	94°16.0	-22°33.1
20	30°20.1	167°49.1	-12°59.1	36°25.5	-3°13.6	142°18.1	-21°15.5	109°18.2	-22°33.0
21	45°22.6	182°49.3	-12°59.6	51°26.4	-3°12.9	157°20.0	-21°15.6	124°20.3	-22°33.0
22	60°25.1	197°49.6	-13°00.2	66°27.4	-3°12.1	172°21.9	-21°15.7	139°22.5	-22°33.0
23	75°27.5	212°49.9	-13°00.7	81°28.4	-3°11.4	187°23.7	-21°15.8	154°24.6	-22°33.0
Mer.pass.:17:58		v0.3 d-0.5 m-4.4		v1.0 d0.7 m0.3		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	90°30.0	227°50.2	-13°01.3	96°29.3	-3°10.7	202°25.6	-21°15.9	169°26.8	-22°33.0
1	105°32.5	242°50.4	-13°01.8	111°30.3	-3°10.0	217°27.5	-21°16.0	184°28.9	-22°33.0
2	120°34.9	257°50.7	-13°02.4	126°31.2	-3°09.3	232°29.4	-21°16.0	199°31.1	-22°32.9
3	135°37.4	272°51.0	-13°02.9	141°32.2	-3°08.6	247°31.3	-21°16.1	214°33.2	-22°32.9
4	150°39.9	287°51.2	-13°03.5	156°33.1	-3°07.8	262°33.2	-21°16.2	229°35.4	-22°32.9
5	165°42.3	302°51.5	-13°04.0	171°34.1	-3°07.1	277°35.1	-21°16.3	244°37.5	-22°32.9
6	180°44.8	317°51.8	-13°04.6	186°35.1	-3°06.4	292°37.0	-21°16.4	259°39.7	-22°32.9
7	195°47.3	332°52.0	-13°05.1	201°36.0	-3°05.7	307°38.9	-21°16.4	274°41.8	-22°32.8
8	210°49.7	347°52.3	-13°05.7	216°37.0	-3°05.0	322°40.7	-21°16.5	289°44.0	-22°32.8
9	225°52.2	2°52.6	-13°06.2	231°37.9	-3°04.3	337°42.6	-21°16.6	304°46.1	-22°32.8
10	240°54.6	17°52.8	-13°06.8	246°38.9	-3°03.5	352°44.5	-21°16.7	319°48.3	-22°32.8
11	255°57.1	32°53.1	-13°07.3	261°39.8	-3°02.8	7°46.4	-21°16.8	334°50.4	-22°32.8
12	270°59.6	47°53.4	-13°07.9	276°40.8	-3°02.1	22°48.3	-21°16.9	349°52.6	-22°32.7
13	286°02.0	62°53.6	-13°08.4	291°41.8	-3°01.4	37°50.2	-21°16.9	4°54.7	-22°32.7
14	301°04.5	77°53.9	-13°09.0	306°42.7	-3°00.7	52°52.1	-21°17.0	19°56.9	-22°32.7
15	316°07.0	92°54.1	-13°09.5	321°43.7	-2°59.9	67°54.0	-21°17.1	34°59.0	-22°32.7
16	331°09.4	107°54.4	-13°10.1	336°44.6	-2°59.2	82°55.9	-21°17.2	50°01.1	-22°32.7
17	346°11.9	122°54.6	-13°10.6	351°45.6	-2°58.5	97°57.8	-21°17.3	65°03.3	-22°32.6
18	1°14.4	137°54.9	-13°11.2	6°46.6	-2°57.8	112°59.7	-21°17.3	80°05.4	-22°32.6
19	16°16.8	152°55.1	-13°11.7	21°47.5	-2°57.1	128°01.5	-21°17.4	95°07.6	-22°32.6
20	31°19.3	167°55.4	-13°12.3	36°48.5	-2°56.4	143°03.4	-21°17.5	110°09.7	-22°32.6
21	46°21.8	182°55.6	-13°12.8	51°49.4	-2°55.6	158°05.3	-21°17.6	125°11.9	-22°32.6
22	61°24.2	197°55.9	-13°13.4	66°50.4	-2°54.9	173°07.2	-21°17.7	140°14.0	-22°32.5
23	76°26.7	212°56.1	-13°13.9	81°51.3	-2°54.2	188°09.1	-21°17.8	155°16.2	-22°32.5
Mer.pass.:17:55		v0.3 d-0.5 m-4.4		v1.0 d0.7 m0.3		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	91°29.1	227°56.4	-13°14.5	96°52.3	-2°53.5	203°11.0	-21°17.8	170°18.3	-22°32.5
1	106°31.6	242°56.6	-13°15.0	111°53.3	-2°52.8	218°12.9	-21°17.9	185°20.5	-22°32.5
2	121°34.1	257°56.8	-13°15.6	126°54.2	-2°52.0	233°14.8	-21°18.0	200°22.6	-22°32.5
3	136°36.5	272°57.1	-13°16.2	141°55.2	-2°51.3	248°16.7	-21°18.1	215°24.8	-22°32.5
4	151°39.0	287°57.3	-13°16.7	156°56.1	-2°50.6	263°18.6	-21°18.2	230°26.9	-22°32.4
5	166°41.5	302°57.6	-13°17.3	171°57.1	-2°49.9	278°20.4	-21°18.2	245°29.1	-22°32.4
6	181°43.9	317°57.8	-13°17.8	186°58.0	-2°49.2	293°22.3	-21°18.3	260°31.2	-22°32.4
7	196°46.4	332°58.0	-13°18.4	201°59.0	-2°48.4	308°24.2	-21°18.4	275°33.4	-22°32.4
8	211°48.9	347°58.3	-13°18.9	216°59.9	-2°47.7	323°26.1	-21°18.5	290°35.5	-22°32.4
9	226°51.3	2°58.5	-13°19.5	232°00.9	-2°47.0	338°28.0	-21°18.6	305°37.7	-22°32.3
10	241°53.8	17°58.7	-13°20.1	247°01.9	-2°46.3	353°29.9	-21°18.6	320°39.8	-22°32.3
11	256°56.3	32°58.9	-13°20.6	262°02.8	-2°45.6	8°31.8	-21°18.7	335°42.0	-22°32.3
12	271°58.7	47°59.2	-13°21.2	277°03.8	-2°44.9	23°33.7	-21°18.8	350°44.1	-22°32.3
13	287°01.2	62°59.4	-13°21.7	292°04.7	-2°44.1	38°35.6	-21°18.9	5°46.3	-22°32.3
14	302°03.6	77°59.6	-13°22.3	307°05.7	-2°43.4	53°37.5	-21°19.0	20°48.4	-22°32.2
15	317°06.1	92°59.9	-13°22.8	322°06.6	-2°42.7	68°39.4	-21°19.0	35°50.5	-22°32.2
16	332°08.6	108°00.1	-13°23.4	337°07.6	-2°42.0	83°41.3	-21°19.1	50°52.7	-22°32.2
17	347°11.0	123°00.3	-13°24.0	352°08.6	-2°41.3	98°43.1	-21°19.2	65°54.8	-22°32.2
18	2°13.5	138°00.5	-13°24.5	7°09.5	-2°40.5	113°45.0	-21°19.3	80°57.0	-22°32.2
19	17°16.0	153°00.7	-13°25.1	22°10.5	-2°39.8	128°46.9	-21°19.4	95°59.1	-22°32.1
20	32°18.4	168°01.0	-13°25.6	37°11.4	-2°39.1	143°48.8	-21°19.4	111°01.3	-22°32.1
21	47°20.9	183°01.2	-13°26.2	52°12.4	-2°38.4	158°50.7	-21°19.5	126°03.4	-22°32.1
22	62°23.4	198°01.4	-13°26.8	67°13.3	-2°37.7	173°52.6	-21°19.6	141°05.6	-22°32.1
23	77°25.8	213°01.6	-13°27.3	82°14.3	-2°36.9	188°54.5	-21°19.7	156°07.7	-22°32.1
Mer.pass.:17:51		v0.2 d-0.6 m-4.4		v1.0 d0.7 m0.3		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.8
Ankaa	353°12.0	-42°12.5
Schedar	349°36.1	56°38.6
Diphda	348°52.0	-17°53.2
Achernar	335°23.8	-57°08.8
Hamal	327°56.4	23°33.1
Polaris	315°46.3	89°20.8
Akamar	315°15.2	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°00.9
Bellatrix	278°27.7	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.5
Canopus	263°53.9	-52°42.5
Sirius	258°30.0	-16°44.5
Adara	255°09.2	-28°60.0
Procyon	244°55.4	5°10.6
Pollux	243°22.7	27°58.6
Avior	234°15.9	-59°34.1
Suhail	222°49.4	-43°30.4
Miaplacidus	221°38.2	-69°47.5
Alphard	217°52.2	-8°44.4
Regulus	207°39.3	11°52.4
Dubhe	193°47.0	61°38.7
Denebola	182°29.8	14°28.0
Gienah	175°48.4	-17°38.6
Acrux	173°05.2	-63°11.8
Gacrux	171°56.8	-57°12.8
Alioth	166°17.6	55°51.3
Spica	158°27.4	-11°15.4
Alcaid	152°56.2	49°13.0
Hadar	148°42.9	-60°27.4
Menkent	148°03.4	-36°27.4
Arcturus	145°52.4	19°05.4
Rigil Kent.	139°47.1	-60°54.4
Zubenelg.	137°01.5	-16°07.0
Kochab	137°21.0	74°04.6
Alphecca	126°08.2	26°39.2
Antares	112°22.0	-26°28.2
Atria	107°21.0	-69°03.4
Sabik	102°08.6	-15°44.7
Shaula	96°17.3	-37°06.8
Rasalhague	96°03.3	12°33.0
Etamin	90°44.9	51°29.3
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.9	38°48.2
Nunki	75°54.1	-26°16.3
Altair	62°05.0	8°55.2
Peacock	53°13.9	-56°40.5
Deneb	49°29.3	45°21.1
Enif	33°43.7	9°57.8
Alnair	27°39.3	-46°52.3
Fomalhaut	15°20.0	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.7	15°18.5

2018/12/	**SHA**	**Mer.pass**
Venus	138°12.4	08:49
Mars	6°35.4	17:34
Jupiter	112°09.4	10:32
Saturn	79°04.3	12:44

2018/12/	**SHA**	**Mer.pass**
Venus	137°20.2	08:48
Mars	5°59.3	17:33
Jupiter	111°55.6	10:29
Saturn	78°56.8	12:40

2018/12/	**SHA**	**Mer.pass**
Venus	136°27.2	08:48
Mars	5°23.1	17:31
Jupiter	111°41.8	10:26
Saturn	78°49.2	12:37

Horizontal paralax	
Venus:	0.3
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°32.9	-23°25.9	25°06.8	7.3	17°11.9	8.1	59.2
1	195°32.6	-23°25.9	39°33.0	7.2	17°19.9	8.0	59.2
2	210°32.3	-23°26.0	53°59.1	7.1	17°27.8	7.9	59.3
3	225°32.0	-23°26.0	68°25.1	7.0	17°35.7	7.8	59.3
4	240°31.7	-23°26.0	82°51.1	6.9	17°43.4	7.7	59.3
5	255°31.4	-23°26.0	97°16.9	6.8	17°51.1	7.6	59.4
6	270°31.1	-23°26.0	111°42.6	6.7	17°58.6	7.5	59.4
7	285°30.8	-23°26.0	126°08.3	6.6	18°06.1	7.4	59.4
8	300°30.5	-23°26.0	140°33.8	6.5	18°13.4	7.3	59.5
9	315°30.1	-23°26.1	154°59.3	6.4	18°20.6	7.2	59.5
10	330°29.8	-23°26.1	169°24.7	6.3	18°27.7	7.0	59.5
11	345°29.5	-23°26.1	183°49.9	6.2	18°34.7	6.9	59.6
12	0°29.2	-23°26.1	198°15.1	6.1	18°41.6	6.8	59.6
13	15°28.9	-23°26.1	212°40.2	6.1	18°48.3	6.7	59.6
14	30°28.6	-23°26.1	227°05.2	6.0	18°55.0	6.6	59.7
15	45°28.3	-23°26.1	241°30.2	5.9	19°01.5	6.5	59.7
16	60°28.0	-23°26.1	255°55.0	5.8	19°07.9	6.3	59.7
17	75°27.7	-23°26.1	270°19.7	5.7	19°14.2	6.2	59.7
18	90°27.4	-23°26.1	284°44.4	5.6	19°20.3	6.1	59.8
19	105°27.1	-23°26.1	299°09.0	5.5	19°26.4	6.0	59.8
20	120°26.7	-23°26.1	313°33.5	5.5	19°32.3	5.8	59.8
21	135°26.4	-23°26.1	327°57.9	5.4	19°38.0	5.7	59.9
22	150°26.1	-23°26.1	342°22.2	5.3	19°43.7	5.6	59.9
23	165°25.8	-23°26.1	356°46.5	5.2	19°49.2	5.5	59.9
	SD.=16.3	d=-0.0	S.D.=16.2				

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°25.5	-23°26.1	11°10.7	5.1	19°54.6	5.3	59.9
1	195°25.2	-23°26.1	25°34.8	5.1	19°59.9	5.2	60.0
2	210°24.9	-23°26.1	39°58.8	5.0	20°05.0	5.1	60.0
3	225°24.6	-23°26.1	54°22.7	4.9	20°10.0	4.9	60.0
4	240°24.3	-23°26.1	68°46.6	4.8	20°14.9	4.8	60.0
5	255°24.0	-23°26.1	83°10.4	4.8	20°19.6	4.7	60.1
6	270°23.6	-23°26.1	97°34.1	4.7	20°24.2	4.5	60.1
7	285°23.3	-23°26.1	111°57.8	4.6	20°28.6	4.4	60.1
8	300°23.0	-23°26.1	126°21.4	4.6	20°32.9	4.2	60.1
9	315°22.7	-23°26.1	140°44.9	4.5	20°37.1	4.1	60.2
10	330°22.4	-23°26.1	155°08.3	4.4	20°41.1	4.0	60.2
11	345°22.1	-23°26.1	169°31.7	4.4	20°45.0	3.8	60.2
12	0°21.8	-23°26.0	183°55.1	4.3	20°48.8	3.7	60.2
13	15°21.5	-23°26.0	198°18.3	4.2	20°52.3	3.5	60.2
14	30°21.2	-23°26.0	212°41.6	4.2	20°55.8	3.4	60.3
15	45°20.9	-23°26.0	227°04.7	4.1	20°59.1	3.2	60.3
16	60°20.5	-23°26.0	241°27.8	4.1	21°02.2	3.1	60.3
17	75°20.2	-23°26.0	255°50.9	4.0	21°05.2	2.9	60.3
18	90°19.9	-23°26.0	270°13.9	4.0	21°08.1	2.8	60.3
19	105°19.6	-23°25.9	284°36.8	3.9	21°10.8	2.6	60.4
20	120°19.3	-23°25.9	298°59.7	3.9	21°13.3	2.5	60.4
21	135°19.0	-23°25.9	313°22.6	3.8	21°15.7	2.3	60.4
22	150°18.7	-23°25.9	327°45.4	3.8	21°18.0	2.2	60.4
23	165°18.4	-23°25.9	342°08.2	3.8	21°20.1	2.0	60.4
	SD.=16.3	d=0.0	S.D.=16.4				

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°18.1	-23°25.9	356°30.9	3.7	21°22.0	1.9	60.5
1	195°17.8	-23°25.8	10°53.6	3.7	21°23.8	1.7	60.5
2	210°17.4	-23°25.8	25°16.2	3.6	21°25.4	1.5	60.5
3	225°17.1	-23°25.8	39°38.9	3.6	21°26.9	1.4	60.5
4	240°16.8	-23°25.8	54°01.4	3.6	21°28.2	1.2	60.5
5	255°16.5	-23°25.7	68°24.0	3.5	21°29.4	1.1	60.5
6	270°16.2	-23°25.7	82°46.5	3.5	21°30.4	0.9	60.5
7	285°15.9	-23°25.7	97°09.1	3.5	21°31.2	0.8	60.6
8	300°15.6	-23°25.7	111°31.5	3.5	21°31.9	0.6	60.6
9	315°15.3	-23°25.6	125°54.0	3.5	21°32.4	0.4	60.6
10	330°15.0	-23°25.6	140°16.5	3.4	21°32.8	0.3	60.6
11	345°14.7	-23°25.6	154°38.9	3.4	21°33.0	0.1	60.6
12	0°14.3	-23°25.5	169°01.3	3.4	21°33.0	-0.0	60.6
13	15°14.0	-23°25.5	183°23.7	3.4	21°32.9	-0.2	60.6
14	30°13.7	-23°25.5	197°46.1	3.4	21°32.7	-0.3	60.6
15	45°13.4	-23°25.4	212°08.5	3.4	21°32.2	-0.5	60.6
16	60°13.1	-23°25.4	226°30.8	3.4	21°31.6	-0.7	60.7
17	75°12.8	-23°25.4	240°53.2	3.4	21°30.9	-0.8	60.7
18	90°12.5	-23°25.3	255°15.6	3.4	21°30.0	-1.0	60.7
19	105°12.2	-23°25.3	269°38.0	3.4	21°28.9	-1.1	60.7
20	120°11.9	-23°25.3	284°00.3	3.4	21°27.7	-1.3	60.7
21	135°11.6	-23°25.2	298°22.7	3.4	21°26.3	-1.5	60.7
22	150°11.2	-23°25.2	312°45.1	3.4	21°24.8	-1.6	60.7
23	165°10.9	-23°25.2	327°07.5	3.4	21°23.1	-1.8	60.7
	SD.=16.3	d=0.0	S.D.=16.5				

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:26	10:58	–:–	–:–	12:59	15:31
70	08:06	09:55	–:–	–:–	14:02	15:51
68	07:50	09:19	–:–	–:–	14:38	16:07
66	07:37	08:54	10:35	13:22	15:03	16:20
64	07:26	08:34	09:52	14:05	15:23	16:31
62	07:16	08:18	09:24	14:33	15:39	16:41
60	07:08	08:05	09:02	14:55	15:53	16:49
58	07:00	07:53	08:45	15:12	16:04	16:57
56	06:53	07:43	08:30	15:27	16:14	17:04
54	06:47	07:33	08:17	15:40	16:24	17:10
52	06:42	07:25	08:06	15:51	16:32	17:16
50	06:36	07:18	07:56	16:01	16:39	17:21
45	06:24	07:02	07:36	16:22	16:55	17:33
40	06:14	06:48	07:19	16:38	17:09	17:43
35	06:05	06:36	07:04	16:53	17:21	17:53
30	05:56	06:26	06:52	17:05	17:31	18:01
20	05:39	06:07	06:31	17:26	17:50	18:18
10	05:23	05:49	06:12	17:45	18:08	18:34
0	05:06	05:32	05:55	18:02	18:25	18:51
-10	04:47	05:14	05:37	18:20	18:43	19:10
-20	04:24	04:54	05:18	18:39	19:03	19:33
-30	03:55	04:29	04:56	19:01	19:28	20:02
-35	03:37	04:13	04:43	19:14	19:44	20:21
-40	03:13	03:55	04:28	19:29	20:02	20:44
-45	02:43	03:32	04:10	19:47	20:25	21:14
-50	01:57	03:03	03:47	20:10	20:54	22:00
-52	01:29	02:48	03:36	20:21	21:10	22:28
-54	00:42	02:29	03:24	20:33	21:28	23:15
-56	–:–	02:07	03:10	20:47	21:50	–:–
-58	–:–	01:37	02:53	21:04	22:20	–:–
-60	–:–	00:46	02:32	21:25	23:11	–:–

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	–:–	–:–	–:–	–:–
70	12:18	–:–	–:–	08:58	–:–	–:–
68	13:03	13:09	13:46	08:14	10:12	11:46
66	13:33	13:56	14:45	07:45	09:26	10:47
64	13:55	14:26	15:19	07:23	08:56	10:13
62	14:13	14:49	15:44	07:06	08:34	09:48
60	14:28	15:07	16:04	06:51	08:16	09:28
58	14:41	15:23	16:20	06:39	08:00	09:12
56	14:52	15:36	16:34	06:28	07:48	08:58
54	15:02	15:47	16:46	06:19	07:36	08:46
52	15:11	15:57	16:56	06:11	07:26	08:35
50	15:19	16:06	17:06	06:03	07:18	08:26
45	15:35	16:26	17:26	05:47	06:59	08:06
40	15:49	16:41	17:42	05:34	06:44	07:50
35	16:01	16:55	17:56	05:23	06:31	07:36
30	16:11	17:06	18:08	05:14	06:19	07:24
20	16:29	17:26	18:28	04:57	06:00	07:04
10	16:45	17:43	18:46	04:43	05:43	06:46
0	16:59	17:60	19:02	04:29	05:28	06:29
-10	17:14	18:16	19:19	04:16	05:12	06:13
-20	17:30	18:34	19:37	04:01	04:55	05:55
-30	17:48	18:54	19:57	03:45	04:36	05:34
-35	17:59	19:06	20:09	03:35	04:25	05:22
-40	18:11	19:19	20:23	03:24	04:12	05:09
-45	18:25	19:35	20:39	03:12	03:57	04:52
-50	18:43	19:55	20:59	02:56	03:39	04:32
-52	18:52	20:05	21:09	02:49	03:30	04:23
-54	19:01	20:15	21:20	02:41	03:20	04:12
-56	19:12	20:27	21:32	02:32	03:09	03:60
-58	19:24	20:41	21:46	02:22	02:57	03:46
-60	19:38	20:58	22:02	02:11	02:42	03:29

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
21	02:12	01:57	11:58	23:13	10:44	14(98%)
22	01:42	01:27	11:58	00:14	11:43	15(100%)
23	01:12	00:57	11:59	00:14	12:45	16(99%)

December 24, 25 ,26 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	92°28.3	228°01.8	-13°27.9	97°15.3	-2°36.2	203°56.4	-21°19.8	171°09.9	-22°32.0
1	107°30.8	243°02.0	-13°28.4	112°16.2	-2°35.5	218°58.3	-21°19.8	186°12.0	-22°32.0
2	122°33.2	258°02.2	-13°29.0	127°17.2	-2°34.8	234°00.2	-21°19.9	201°14.2	-22°32.0
3	137°35.7	273°02.5	-13°29.6	142°18.1	-2°34.1	249°02.1	-21°20.0	216°16.3	-22°32.0
4	152°38.1	288°02.7	-13°30.1	157°19.1	-2°33.4	264°04.0	-21°20.1	231°18.5	-22°32.0
5	167°40.6	303°02.9	-13°30.7	172°20.0	-2°32.6	279°05.8	-21°20.2	246°20.6	-22°31.9
6	182°43.1	318°03.1	-13°31.3	187°21.0	-2°31.9	294°07.7	-21°20.2	261°22.8	-22°31.9
7	197°45.5	333°03.3	-13°31.8	202°21.9	-2°31.2	309°09.6	-21°20.3	276°24.9	-22°31.9
8	212°48.0	348°03.5	-13°32.4	217°22.9	-2°30.5	324°11.5	-21°20.4	291°27.1	-22°31.9
9	227°50.5	3°03.7	-13°32.9	232°23.9	-2°29.8	339°13.4	-21°20.5	306°29.2	-22°31.9
10	242°52.9	18°03.9	-13°33.5	247°24.8	-2°29.0	354°15.3	-21°20.6	321°31.3	-22°31.8
11	257°55.4	33°04.1	-13°34.1	262°25.8	-2°28.3	9°17.2	-21°20.6	336°33.5	-22°31.8
12	272°57.9	48°04.3	-13°34.6	277°26.7	-2°27.6	24°19.1	-21°20.7	351°35.6	-22°31.8
13	288°00.3	63°04.5	-13°35.2	292°27.7	-2°26.9	39°21.0	-21°20.8	6°37.8	-22°31.8
14	303°02.8	78°04.7	-13°35.8	307°28.6	-2°26.2	54°22.9	-21°20.9	21°39.9	-22°31.8
15	318°05.3	93°04.9	-13°36.3	322°29.6	-2°25.4	69°24.8	-21°21.0	36°42.1	-22°31.7
16	333°07.7	108°05.1	-13°36.9	337°30.5	-2°24.7	84°26.7	-21°21.0	51°44.2	-22°31.7
17	348°10.2	123°05.3	-13°37.5	352°31.5	-2°24.0	99°28.6	-21°21.1	66°46.4	-22°31.7
18	3°12.6	138°05.5	-13°38.0	7°32.5	-2°23.3	114°30.5	-21°21.2	81°48.5	-22°31.7
19	18°15.1	153°05.6	-13°38.6	22°33.4	-2°22.6	129°32.3	-21°21.3	96°50.7	-22°31.7
20	33°17.6	168°05.8	-13°39.2	37°34.4	-2°21.8	144°34.2	-21°21.4	111°52.8	-22°31.6
21	48°20.0	183°06.0	-13°39.7	52°35.3	-2°21.1	159°36.1	-21°21.4	126°55.0	-22°31.6
22	63°22.5	198°06.2	-13°40.3	67°36.3	-2°20.4	174°38.0	-21°21.5	141°57.1	-22°31.6
23	78°25.0	213°06.4	-13°40.9	82°37.2	-2°19.7	189°39.9	-21°21.6	156°59.3	-22°31.6
Mer.pass.:17:47		v0.2 d-0.6 m-4.4		v1.0 d0.7 m0.4		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	93°27.4	228°06.6	-13°41.4	97°38.2	-2°19.0	204°41.8	-21°21.7	172°01.4	-22°31.6
1	108°29.9	243°06.8	-13°42.0	112°39.1	-2°18.2	219°43.7	-21°21.8	187°03.5	-22°31.5
2	123°32.4	258°06.9	-13°42.6	127°40.1	-2°17.5	234°45.6	-21°21.8	202°05.7	-22°31.5
3	138°34.8	273°07.1	-13°43.1	142°41.0	-2°16.8	249°47.5	-21°21.9	217°07.8	-22°31.5
4	153°37.3	288°07.3	-13°43.7	157°42.0	-2°16.1	264°49.4	-21°22.0	232°10.0	-22°31.5
5	168°39.8	303°07.5	-13°44.3	172°43.0	-2°15.4	279°51.3	-21°22.1	247°12.1	-22°31.5
6	183°42.2	318°07.7	-13°44.8	187°43.9	-2°14.7	294°53.2	-21°22.1	262°14.3	-22°31.4
7	198°44.7	333°07.8	-13°45.4	202°44.9	-2°13.9	309°55.1	-21°22.2	277°16.4	-22°31.4
8	213°47.1	348°08.0	-13°46.0	217°45.8	-2°13.2	324°57.0	-21°22.3	292°18.6	-22°31.4
9	228°49.6	3°08.2	-13°46.6	232°46.8	-2°12.5	339°58.9	-21°22.4	307°20.7	-22°31.4
10	243°52.1	18°08.4	-13°47.1	247°47.7	-2°11.8	355°00.7	-21°22.5	322°22.9	-22°31.4
11	258°54.5	33°08.5	-13°47.7	262°48.7	-2°11.1	10°02.6	-21°22.5	337°25.0	-22°31.3
12	273°57.0	48°08.7	-13°48.3	277°49.6	-2°10.3	25°04.5	-21°22.6	352°27.2	-22°31.3
13	288°59.5	63°08.9	-13°48.8	292°50.6	-2°09.6	40°06.4	-21°22.7	7°29.3	-22°31.3
14	304°01.9	78°09.0	-13°49.4	307°51.5	-2°08.9	55°08.3	-21°22.8	22°31.5	-22°31.3
15	319°04.4	93°09.2	-13°50.0	322°52.5	-2°08.2	70°10.2	-21°22.9	37°33.6	-22°31.3
16	334°06.9	108°09.4	-13°50.5	337°53.5	-2°07.5	85°12.1	-21°22.9	52°35.8	-22°31.2
17	349°09.3	123°09.5	-13°51.1	352°54.4	-2°06.7	100°14.0	-21°23.0	67°37.9	-22°31.2
18	4°11.8	138°09.7	-13°51.7	7°55.4	-2°06.0	115°15.9	-21°23.1	82°40.0	-22°31.2
19	19°14.2	153°09.9	-13°52.3	22°56.3	-2°05.3	130°17.8	-21°23.2	97°42.2	-22°31.2
20	34°16.7	168°10.0	-13°52.8	37°57.3	-2°04.6	145°19.7	-21°23.2	112°44.3	-22°31.2
21	49°19.2	183°10.2	-13°53.4	52°58.2	-2°03.9	160°21.6	-21°23.3	127°46.5	-22°31.1
22	64°21.6	198°10.3	-13°54.0	67°59.2	-2°03.1	175°23.5	-21°23.4	142°48.6	-22°31.1
23	79°24.1	213°10.5	-13°54.5	83°00.1	-2°02.4	190°25.4	-21°23.5	157°50.8	-22°31.1
Mer.pass.:17:43		v0.2 d-0.6 m-4.3		v1.0 d0.7 m0.4		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	94°26.6	228°10.7	-13°55.1	98°01.1	-2°01.7	205°27.3	-21°23.6	172°52.9	-22°31.1
1	109°29.0	243°10.8	-13°55.7	113°02.0	-2°01.0	220°29.2	-21°23.6	187°55.1	-22°31.1
2	124°31.5	258°11.0	-13°56.3	128°03.0	-2°00.3	235°31.1	-21°23.7	202°57.2	-22°31.0
3	139°34.0	273°11.1	-13°56.8	143°03.9	-1°59.5	250°33.0	-21°23.8	217°59.4	-22°31.0
4	154°36.4	288°11.3	-13°57.4	158°04.9	-1°58.8	265°34.9	-21°23.9	233°01.5	-22°31.0
5	169°38.9	303°11.4	-13°58.0	173°05.9	-1°58.1	280°36.7	-21°23.9	248°03.7	-22°31.0
6	184°41.4	318°11.6	-13°58.6	188°06.8	-1°57.4	295°38.6	-21°24.0	263°05.8	-22°31.0
7	199°43.8	333°11.7	-13°59.1	203°07.8	-1°56.7	310°40.5	-21°24.1	278°07.9	-22°30.9
8	214°46.3	348°11.9	-13°59.7	218°08.7	-1°55.9	325°42.4	-21°24.2	293°10.1	-22°30.9
9	229°48.7	3°12.0	-14°00.3	233°09.7	-1°55.2	340°44.3	-21°24.3	308°12.2	-22°30.9
10	244°51.2	18°12.2	-14°00.8	248°10.6	-1°54.5	355°46.2	-21°24.3	323°14.4	-22°30.9
11	259°53.7	33°12.3	-14°01.4	263°11.6	-1°53.8	10°48.1	-21°24.4	338°16.5	-22°30.9
12	274°56.1	48°12.4	-14°02.0	278°12.5	-1°53.1	25°50.0	-21°24.5	353°18.7	-22°30.8
13	289°58.6	63°12.6	-14°02.6	293°13.5	-1°52.3	40°51.9	-21°24.6	8°20.8	-22°30.8
14	305°01.1	78°12.7	-14°03.1	308°14.4	-1°51.6	55°53.8	-21°24.6	23°23.0	-22°30.8
15	320°03.5	93°12.9	-14°03.7	323°15.4	-1°50.9	70°55.7	-21°24.7	38°25.1	-22°30.8
16	335°06.0	108°13.0	-14°04.3	338°16.3	-1°50.2	85°57.6	-21°24.8	53°27.3	-22°30.8
17	350°08.5	123°13.1	-14°04.9	353°17.3	-1°49.5	100°59.5	-21°24.9	68°29.4	-22°30.7
18	5°10.9	138°13.3	-14°05.4	8°18.2	-1°48.7	116°01.4	-21°25.0	83°31.6	-22°30.7
19	20°13.4	153°13.4	-14°06.0	23°19.2	-1°48.0	131°03.3	-21°25.0	98°33.7	-22°30.7
20	35°15.9	168°13.5	-14°06.6	38°20.2	-1°47.3	146°05.2	-21°25.1	113°35.9	-22°30.7
21	50°18.3	183°13.7	-14°07.2	53°21.1	-1°46.6	161°07.1	-21°25.2	128°38.0	-22°30.7
22	65°20.8	198°13.8	-14°07.8	68°22.1	-1°45.9	176°09.0	-21°25.3	143°40.1	-22°30.6
23	80°23.2	213°13.9	-14°08.3	83°23.0	-1°45.1	191°10.9	-21°25.3	158°42.3	-22°30.6
Mer.pass.:17:39		v0.2 d-0.6 m-4.3		v1.0 d0.7 m0.4		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.8
Ankaa	353°12.0	-42°12.5
Schedar	349°36.1	56°38.6
Diphda	348°52.0	-17°53.2
Achernar	335°23.8	-57°08.8
Hamal	327°56.4	23°33.1
Polaris	315°47.0	89°20.8
Akamar	315°15.2	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.5	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°00.9
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.5
Canopus	263°53.9	-52°42.5
Sirius	258°30.0	-16°44.5
Adara	255°09.2	-28°60.0
Procyon	244°55.4	5°10.6
Pollux	243°22.7	27°58.6
Avior	234°15.9	-59°34.1
Suhail	222°49.3	-43°30.4
Miaplacidus	221°38.2	-69°47.5
Alphard	217°52.2	-8°44.4
Regulus	207°39.3	11°52.4
Dubhe	193°46.9	61°38.7
Denebola	182°29.7	14°28.0
Gienah	175°48.4	-17°38.6
Acrux	173°05.1	-63°11.8
Gacrux	171°56.7	-57°12.8
Alioth	166°17.6	55°51.3
Spica	158°27.4	-11°15.4
Alcaid	152°56.2	49°13.0
Hadar	148°42.8	-60°27.4
Menkent	148°03.3	-36°27.4
Arcturus	145°52.3	19°05.4
Rigil Kent.	139°47.0	-60°54.4
Zubenelg.	137°01.5	-16°07.0
Kochab	137°20.9	74°04.5
Alphecca	126°08.1	26°39.1
Antares	112°22.0	-26°28.2
Atria	107°20.9	-69°03.4
Sabik	102°08.6	-15°44.7
Shaula	96°17.2	-37°06.8
Rasalhague	96°03.3	12°33.0
Etamin	90°44.9	51°29.3
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.9	38°48.2
Nunki	75°54.1	-26°16.3
Altair	62°05.0	8°55.2
Peacock	53°13.9	-56°40.5
Deneb	49°29.3	45°21.1
Enif	33°43.7	9°57.8
Alnair	27°39.3	-46°52.3
Fomalhaut	15°20.0	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.7	15°18.5

2018/12/	**SHA**	**Mer.pass**
Venus	135°33.5	08:48
Mars	4°47.0	17:30
Jupiter	111°28.1	10:23
Saturn	78°41.6	12:34

2018/12/	**SHA**	**Mer.pass**
Venus	134°39.2	08:47
Mars	4°10.8	17:28
Jupiter	111°14.4	10:20
Saturn	78°34.0	12:30

2018/12/	**SHA**	**Mer.pass**
Venus	133°44.1	08:47
Mars	3°34.5	17:27
Jupiter	111°00.7	10:17
Saturn	78°26.4	12:27

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°10.6	-23°25.1	341°29.9	3.4	21°21.2	-1.9	60.7
1	195°10.3	-23°25.1	355°52.3	3.4	21°19.2	-2.1	60.7
2	210°10.0	-23°25.0	10°14.7	3.4	21°17.0	-2.3	60.7
3	225°09.7	-23°25.0	24°37.2	3.5	21°14.7	-2.4	60.7
4	240°09.4	-23°24.9	38°59.7	3.5	21°12.2	-2.6	60.7
5	255°09.1	-23°24.9	53°22.1	3.5	21°09.5	-2.7	60.7
6	270°08.8	-23°24.9	67°44.7	3.5	21°06.7	-2.9	60.7
7	285°08.5	-23°24.8	82°07.2	3.6	21°03.8	-3.0	60.7
8	300°08.1	-23°24.8	96°29.8	3.6	21°00.6	-3.2	60.7
9	315°07.8	-23°24.7	110°52.4	3.6	20°57.4	-3.3	60.7
10	330°07.5	-23°24.7	125°15.0	3.6	20°53.9	-3.5	60.7
11	345°07.2	-23°24.6	139°37.6	3.7	20°50.4	-3.7	60.7
12	0°06.9	-23°24.6	154°00.3	3.7	20°46.6	-3.8	60.7
13	15°06.6	-23°24.5	168°23.1	3.8	20°42.8	-4.0	60.7
14	30°06.3	-23°24.5	182°45.8	3.8	20°38.7	-4.1	60.7
15	45°06.0	-23°24.4	197°08.7	3.8	20°34.5	-4.3	60.7
16	60°05.7	-23°24.4	211°31.5	3.9	20°30.2	-4.4	60.7
17	75°05.4	-23°24.3	225°54.4	3.9	20°25.7	-4.6	60.7
18	90°05.0	-23°24.3	240°17.3	4.0	20°21.1	-4.7	60.7
19	105°04.7	-23°24.2	254°40.3	4.0	20°16.3	-4.9	60.7
20	120°04.4	-23°24.1	269°03.4	4.1	20°11.4	-5.0	60.7
21	135°04.1	-23°24.1	283°26.5	4.1	20°06.3	-5.1	60.7
22	150°03.8	-23°24.0	297°49.6	4.2	20°01.1	-5.3	60.7
23	165°03.5	-23°24.0	312°12.8	4.2	19°55.7	-5.4	60.7
	SD.=16.3	d=0.0			S.D.=16.6		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°03.2	-23°23.9	326°36.1	4.3	19°50.2	-5.6	60.7
1	195°02.9	-23°23.8	340°59.4	4.3	19°44.6	-5.7	60.7
2	210°02.6	-23°23.8	355°22.7	4.4	19°38.8	-5.8	60.7
3	225°02.3	-23°23.7	9°46.2	4.5	19°32.9	-6.0	60.7
4	240°02.0	-23°23.7	24°09.7	4.5	19°26.9	-6.1	60.7
5	255°01.6	-23°23.6	38°33.2	4.6	19°20.7	-6.3	60.6
6	270°01.3	-23°23.5	52°56.8	4.6	19°14.3	-6.4	60.6
7	285°01.0	-23°23.5	67°20.5	4.7	19°07.9	-6.5	60.6
8	300°00.7	-23°23.4	81°44.2	4.8	19°01.3	-6.7	60.6
9	315°00.4	-23°23.3	96°08.1	4.8	18°54.6	-6.8	60.6
10	330°00.1	-23°23.3	110°31.9	4.9	18°47.7	-6.9	60.6
11	344°59.8	-23°23.2	124°55.9	5.0	18°40.7	-7.0	60.6
12	359°59.5	-23°23.1	139°19.9	5.1	18°33.6	-7.2	60.6
13	14°59.2	-23°23.1	153°44.0	5.1	18°26.4	-7.3	60.6
14	29°58.9	-23°23.0	168°08.2	5.2	18°19.0	-7.4	60.5
15	44°58.6	-23°22.9	182°32.4	5.3	18°11.6	-7.5	60.5
16	59°58.2	-23°22.8	196°56.7	5.3	18°03.9	-7.7	60.5
17	74°57.9	-23°22.8	211°21.1	5.4	17°56.2	-7.8	60.5
18	89°57.6	-23°22.7	225°45.6	5.5	17°48.4	-7.9	60.5
19	104°57.3	-23°22.6	240°10.1	5.6	17°40.4	-8.0	60.5
20	119°57.0	-23°22.5	254°34.7	5.7	17°32.3	-8.1	60.5
21	134°56.7	-23°22.5	268°59.4	5.7	17°24.1	-8.2	60.4
22	149°56.4	-23°22.4	283°24.2	5.8	17°15.8	-8.4	60.4
23	164°56.1	-23°22.3	297°49.0	5.9	17°07.4	-8.5	60.4
	SD.=16.3	d=0.1			S.D.=16.6		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°55.8	-23°22.2	312°14.0	6.0	16°58.9	-8.6	60.4
1	194°55.5	-23°22.1	326°39.0	6.1	16°50.3	-8.7	60.4
2	209°55.2	-23°22.1	341°04.1	6.1	16°41.5	-8.8	60.4
3	224°54.8	-23°22.0	355°29.2	6.2	16°32.7	-8.9	60.4
4	239°54.5	-23°21.9	9°54.5	6.3	16°23.7	-9.0	60.3
5	254°54.2	-23°21.8	24°19.8	6.4	16°14.6	-9.1	60.3
6	269°53.9	-23°21.7	38°45.3	6.5	16°05.5	-9.2	60.3
7	284°53.6	-23°21.6	53°10.8	6.5	15°56.2	-9.3	60.3
8	299°53.3	-23°21.6	67°36.3	6.6	15°46.9	-9.4	60.3
9	314°53.0	-23°21.5	82°02.0	6.7	15°37.4	-9.5	60.2
10	329°52.7	-23°21.4	96°27.8	6.8	15°27.9	-9.6	60.2
11	344°52.4	-23°21.3	110°53.6	6.9	15°18.2	-9.7	60.2
12	359°52.1	-23°21.2	125°19.5	7.0	15°08.5	-9.8	60.2
13	14°51.8	-23°21.1	139°45.5	7.0	14°58.7	-9.9	60.2
14	29°51.5	-23°21.0	154°11.6	7.1	14°48.8	-10.0	60.1
15	44°51.2	-23°20.9	168°37.7	7.2	14°38.8	-10.0	60.1
16	59°50.8	-23°20.8	183°04.0	7.3	14°28.7	-10.1	60.1
17	74°50.5	-23°20.8	197°30.3	7.4	14°18.5	-10.2	60.1
18	89°50.2	-23°20.7	211°56.7	7.5	14°08.3	-10.3	60.1
19	104°49.9	-23°20.6	226°23.2	7.5	13°57.9	-10.4	60.0
20	119°49.6	-23°20.5	240°49.8	7.6	13°47.5	-10.5	60.0
21	134°49.3	-23°20.4	255°16.5	7.7	13°37.0	-10.5	60.0
22	149°49.0	-23°20.3	269°43.2	7.8	13°26.4	-10.6	60.0
23	164°48.7	-23°20.2	284°10.1	7.9	13°15.8	-10.7	59.9
	SD.=16.3	d=0.1			S.D.=16.5		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:27	10:57	–:–	–:–	13:03	15:33
70	08:07	09:55	–:–	–:–	14:05	15:53
68	07:51	09:20	–:–	–:–	14:40	16:09
66	07:38	08:55	10:35	13:25	15:05	16:22
64	07:27	08:35	09:53	14:07	15:25	16:33
62	07:17	08:19	09:25	14:35	15:41	16:43
60	07:09	08:06	09:03	14:57	15:54	16:51
58	07:01	07:54	08:46	15:14	16:06	16:59
56	06:55	07:44	08:31	15:29	16:16	17:06
54	06:48	07:35	08:18	15:42	16:25	17:12
52	06:43	07:26	08:07	15:53	16:34	17:17
50	06:37	07:19	07:58	16:03	16:41	17:23
45	06:26	07:03	07:37	16:23	16:57	17:34
40	06:15	06:49	07:20	16:40	17:11	17:45
35	06:06	06:38	07:06	16:54	17:22	17:54
30	05:57	06:27	06:53	17:07	17:33	18:03
20	05:41	06:08	06:32	17:28	17:52	18:19
10	05:25	05:51	06:14	17:46	18:09	18:36
0	05:08	05:34	05:56	18:04	18:26	18:53
-10	04:49	05:16	05:39	18:21	18:44	19:11
-20	04:26	04:55	05:20	18:40	19:05	19:34
-30	03:57	04:30	04:58	19:02	19:30	20:03
-35	03:38	04:15	04:45	19:15	19:45	20:22
-40	03:15	03:57	04:30	19:30	20:03	20:45
-45	02:44	03:34	04:12	19:48	20:26	21:15
-50	01:59	03:04	03:49	20:11	20:55	22:01
-52	01:31	02:49	03:38	20:22	21:10	22:29
-54	00:45	02:31	03:26	20:34	21:28	23:14
-56	–:–	02:09	03:12	20:48	21:51	–:–
-58	–:–	01:39	02:55	21:05	22:20	–:–
-60	–:–	00:49	02:34	21:25	23:10	–:–

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	–:–	18:36	–:–	–:–	13:18
70	–:–	16:46	19:05	–:–	13:05	12:47
68	15:25	17:27	19:27	12:18	12:24	12:25
66	16:09	17:54	19:44	11:34	11:56	12:06
64	16:38	18:15	19:57	11:04	11:34	11:52
62	17:01	18:32	20:09	10:42	11:17	11:39
60	17:19	18:46	20:19	10:23	11:02	11:29
58	17:33	18:58	20:27	10:08	10:49	11:19
56	17:46	19:08	20:35	09:55	10:39	11:11
54	17:57	19:18	20:41	09:44	10:29	11:04
52	18:07	19:26	20:47	09:34	10:20	10:57
50	18:16	19:33	20:52	09:25	10:13	10:51
45	18:34	19:48	21:04	09:06	09:56	10:38
40	18:50	20:01	21:14	08:50	09:43	10:28
35	19:02	20:12	21:22	08:37	09:31	10:19
30	19:14	20:21	21:29	08:25	09:21	10:10
20	19:33	20:38	21:41	08:06	09:03	09:56
10	19:49	20:52	21:52	07:48	08:48	09:44
0	20:05	21:05	22:02	07:32	08:34	09:32
-10	20:20	21:18	22:12	07:16	08:19	09:21
-20	20:37	21:32	22:23	06:58	08:04	09:08
-30	20:56	21:48	22:35	06:38	07:46	08:54
-35	21:07	21:57	22:42	06:27	07:35	08:45
-40	21:19	22:08	22:50	06:13	07:23	08:36
-45	21:34	22:20	22:59	05:57	07:09	08:24
-50	21:53	22:35	23:10	05:37	06:51	08:10
-52	22:01	22:42	23:15	05:28	06:43	08:04
-54	22:11	22:50	23:21	05:17	06:34	07:57
-56	22:22	22:59	23:27	05:05	06:23	07:49
-58	22:34	23:09	23:34	04:51	06:11	07:39
-60	22:48	23:20	23:42	04:35	05:58	07:29

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
24	00:43	00:28	11:59	01:17	13:48	17(96%)
25	00:13	00:02	12:00	02:19	14:49	18(89%)
26	00:17	00:32	12:00	03:18	15:47	19(81%)

December 27, 28 ,29 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	95°25.7	228°14.1	-14°08.9	98°24.0	-1°44.4	206°12.8	-21°25.4	173°44.4	-22°30.6
1	110°28.2	243°14.2	-14°09.5	113°24.9	-1°43.7	221°14.7	-21°25.5	188°46.6	-22°30.6
2	125°30.6	258°14.3	-14°10.1	128°25.9	-1°43.0	236°16.6	-21°25.6	203°48.7	-22°30.5
3	140°33.1	273°14.4	-14°10.6	143°26.8	-1°42.3	251°18.5	-21°25.6	218°50.9	-22°30.5
4	155°35.6	288°14.6	-14°11.2	158°27.8	-1°41.5	266°20.3	-21°25.7	233°53.0	-22°30.5
5	170°38.0	303°14.7	-14°11.8	173°28.7	-1°40.8	281°22.2	-21°25.8	248°55.2	-22°30.5
6	185°40.5	318°14.8	-14°12.4	188°29.7	-1°40.1	296°24.1	-21°25.9	263°57.3	-22°30.5
7	200°43.0	333°14.9	-14°12.9	203°30.6	-1°39.4	311°26.0	-21°26.0	278°59.5	-22°30.4
8	215°45.4	348°15.0	-14°13.5	218°31.6	-1°38.7	326°27.9	-21°26.0	294°01.6	-22°30.4
9	230°47.9	3°15.2	-14°14.1	233°32.5	-1°37.9	341°29.8	-21°26.1	309°03.7	-22°30.4
10	245°50.4	18°15.3	-14°14.7	248°33.5	-1°37.2	356°31.7	-21°26.2	324°05.9	-22°30.4
11	260°52.8	33°15.4	-14°15.3	263°34.4	-1°36.5	11°33.6	-21°26.3	339°08.0	-22°30.4
12	275°55.3	48°15.5	-14°15.8	278°35.4	-1°35.8	26°35.5	-21°26.3	354°10.2	-22°30.3
13	290°57.7	63°15.6	-14°16.4	293°36.3	-1°35.1	41°37.4	-21°26.4	9°12.3	-22°30.3
14	306°00.2	78°15.7	-14°17.0	308°37.3	-1°34.3	56°39.3	-21°26.5	24°14.5	-22°30.3
15	321°02.7	93°15.8	-14°17.6	323°38.2	-1°33.6	71°41.2	-21°26.6	39°16.6	-22°30.3
16	336°05.1	108°16.0	-14°18.1	338°39.2	-1°32.9	86°43.1	-21°26.6	54°18.8	-22°30.3
17	351°07.6	123°16.1	-14°18.7	353°40.1	-1°32.2	101°45.0	-21°26.7	69°20.9	-22°30.2
18	6°10.1	138°16.2	-14°19.3	8°41.1	-1°31.5	116°46.9	-21°26.8	84°23.1	-22°30.2
19	21°12.5	153°16.3	-14°19.9	23°42.1	-1°30.7	131°48.8	-21°26.9	99°25.2	-22°30.2
20	36°15.0	168°16.4	-14°20.5	38°43.0	-1°30.0	146°50.7	-21°26.9	114°27.4	-22°30.2
21	51°17.5	183°16.5	-14°21.0	53°44.0	-1°29.3	161°52.6	-21°27.0	129°29.5	-22°30.2
22	66°19.9	198°16.6	-14°21.6	68°44.9	-1°28.6	176°54.5	-21°27.1	144°31.6	-22°30.1
23	81°22.4	213°16.7	-14°22.2	83°45.9	-1°27.9	191°56.4	-21°27.2	159°33.8	-22°30.1
Mer.pass.:17:35		v0.1 d-0.6 m-4.3		v1.0 d0.7 m0.4		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	96°24.8	228°16.8	-14°22.8	98°46.8	-1°27.1	206°58.3	-21°27.2	174°35.9	-22°30.1
1	111°27.3	243°16.9	-14°23.4	113°47.8	-1°26.4	222°00.2	-21°27.3	189°38.1	-22°30.1
2	126°29.8	258°17.0	-14°23.9	128°48.7	-1°25.7	237°02.1	-21°27.4	204°40.2	-22°30.0
3	141°32.2	273°17.1	-14°24.5	143°49.7	-1°25.0	252°04.0	-21°27.5	219°42.4	-22°30.0
4	156°34.7	288°17.2	-14°25.1	158°50.6	-1°24.3	267°05.9	-21°27.6	234°44.5	-22°30.0
5	171°37.2	303°17.3	-14°25.7	173°51.6	-1°23.5	282°07.8	-21°27.6	249°46.7	-22°30.0
6	186°39.6	318°17.4	-14°26.3	188°52.5	-1°22.8	297°09.7	-21°27.7	264°48.8	-22°30.0
7	201°42.1	333°17.5	-14°26.8	203°53.5	-1°22.1	312°11.6	-21°27.8	279°51.0	-22°29.9
8	216°44.6	348°17.6	-14°27.4	218°54.4	-1°21.4	327°13.5	-21°27.9	294°53.1	-22°29.9
9	231°47.0	3°17.7	-14°28.0	233°55.4	-1°20.7	342°15.4	-21°27.9	309°55.3	-22°29.9
10	246°49.5	18°17.7	-14°28.6	248°56.3	-1°19.9	357°17.3	-21°28.0	324°57.4	-22°29.9
11	261°52.0	33°17.8	-14°29.2	263°57.3	-1°19.2	12°19.2	-21°28.1	339°59.5	-22°29.9
12	276°54.4	48°17.9	-14°29.7	278°58.2	-1°18.5	27°21.1	-21°28.2	355°01.7	-22°29.8
13	291°56.9	63°18.0	-14°30.3	293°59.2	-1°17.8	42°23.0	-21°28.2	10°03.8	-22°29.8
14	306°59.3	78°18.1	-14°30.9	309°00.1	-1°17.1	57°24.9	-21°28.3	25°06.0	-22°29.8
15	322°01.8	93°18.2	-14°31.5	324°01.1	-1°16.3	72°26.8	-21°28.4	40°08.1	-22°29.8
16	337°04.3	108°18.3	-14°32.1	339°02.0	-1°15.6	87°28.7	-21°28.5	55°10.3	-22°29.8
17	352°06.7	123°18.3	-14°32.6	354°03.0	-1°14.9	102°30.6	-21°28.5	70°12.4	-22°29.7
18	7°09.2	138°18.4	-14°33.2	9°03.9	-1°14.2	117°32.5	-21°28.6	85°14.6	-22°29.7
19	22°11.7	153°18.5	-14°33.8	24°04.9	-1°13.5	132°34.4	-21°28.7	100°16.7	-22°29.7
20	37°14.1	168°18.6	-14°34.4	39°05.8	-1°12.7	147°36.3	-21°28.8	115°18.9	-22°29.7
21	52°16.6	183°18.7	-14°35.0	54°06.8	-1°12.0	162°38.2	-21°28.8	130°21.0	-22°29.6
22	67°19.1	198°18.7	-14°35.5	69°07.7	-1°11.3	177°40.1	-21°28.9	145°23.1	-22°29.6
23	82°21.5	213°18.8	-14°36.1	84°08.7	-1°10.6	192°42.0	-21°29.0	160°25.3	-22°29.6
Mer.pass.:17:31		v0.1 d-0.6 m-4.3		v1.0 d0.7 m0.4		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	97°24.0	228°18.9	-14°36.7	99°09.6	-1°09.8	207°43.9	-21°29.1	175°27.4	-22°29.6
1	112°26.5	243°19.0	-14°37.3	114°10.6	-1°09.1	222°45.8	-21°29.1	190°29.6	-22°29.6
2	127°28.9	258°19.0	-14°37.9	129°11.5	-1°08.4	237°47.7	-21°29.2	205°31.7	-22°29.5
3	142°31.4	273°19.1	-14°38.5	144°12.5	-1°07.7	252°49.6	-21°29.3	220°33.9	-22°29.5
4	157°33.8	288°19.2	-14°39.0	159°13.4	-1°07.0	267°51.5	-21°29.4	235°36.0	-22°29.5
5	172°36.3	303°19.3	-14°39.6	174°14.4	-1°06.2	282°53.4	-21°29.4	250°38.2	-22°29.5
6	187°38.8	318°19.3	-14°40.2	189°15.3	-1°05.5	297°55.3	-21°29.5	265°40.3	-22°29.5
7	202°41.2	333°19.4	-14°40.8	204°16.3	-1°04.8	312°57.2	-21°29.6	280°42.5	-22°29.4
8	217°43.7	348°19.5	-14°41.4	219°17.2	-1°04.1	327°59.1	-21°29.7	295°44.6	-22°29.4
9	232°46.2	3°19.5	-14°41.9	234°18.2	-1°03.4	343°01.0	-21°29.7	310°46.7	-22°29.4
10	247°48.6	18°19.6	-14°42.5	249°19.1	-1°02.6	358°02.9	-21°29.8	325°48.9	-22°29.4
11	262°51.1	33°19.6	-14°43.1	264°20.1	-1°01.9	13°04.8	-21°29.9	340°51.0	-22°29.3
12	277°53.6	48°19.7	-14°43.7	279°21.0	-1°01.2	28°06.7	-21°29.9	355°53.2	-22°29.3
13	292°56.0	63°19.8	-14°44.3	294°22.0	-1°00.5	43°08.6	-21°30.0	10°55.3	-22°29.3
14	307°58.5	78°19.8	-14°44.9	309°22.9	-0°59.8	58°10.5	-21°30.1	25°57.5	-22°29.3
15	323°00.9	93°19.9	-14°45.4	324°23.9	-0°59.0	73°12.4	-21°30.2	40°59.6	-22°29.3
16	338°03.4	108°19.9	-14°46.0	339°24.8	-0°58.3	88°14.3	-21°30.2	56°01.8	-22°29.2
17	353°05.9	123°20.0	-14°46.6	354°25.8	-0°57.6	103°16.2	-21°30.3	71°03.9	-22°29.2
18	8°08.3	138°20.1	-14°47.2	9°26.7	-0°56.9	118°18.1	-21°30.4	86°06.1	-22°29.2
19	23°10.8	153°20.1	-14°47.8	24°27.7	-0°56.2	133°20.0	-21°30.5	101°08.2	-22°29.2
20	38°13.3	168°20.2	-14°48.4	39°28.6	-0°55.4	148°21.9	-21°30.5	116°10.3	-22°29.2
21	53°15.7	183°20.2	-14°48.9	54°29.6	-0°54.7	163°23.8	-21°30.6	131°12.5	-22°29.1
22	68°18.2	198°20.3	-14°49.5	69°30.5	-0°54.0	178°25.7	-21°30.7	146°14.6	-22°29.1
23	83°20.7	213°20.3	-14°50.1	84°31.5	-0°53.3	193°27.6	-21°30.8	161°16.8	-22°29.1
Mer.pass.:17:27		v0.1 d-0.6 m-4.3		v1.0 d0.7 m0.4		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.8
Ankaa	353°12.0	-42°12.5
Schedar	349°36.1	56°38.6
Diphda	348°52.0	-17°53.2
Achernar	335°23.8	-57°08.8
Hamal	327°56.4	23°33.1
Polaris	315°48.1	89°20.8
Akamar	315°15.2	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°53.9	-52°42.5
Sirius	258°30.0	-16°44.5
Adara	255°09.2	-28°60.0
Procyon	244°55.4	5°10.6
Pollux	243°22.7	27°58.6
Avior	234°15.9	-59°34.1
Suhail	222°49.3	-43°30.4
Miaplacidus	221°38.2	-69°47.5
Alphard	217°52.1	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°46.9	61°38.7
Denebola	182°29.7	14°28.0
Gienah	175°48.4	-17°38.6
Acrux	173°05.1	-63°11.8
Gacrux	171°56.7	-57°12.8
Alioth	166°17.5	55°51.2
Spica	158°27.4	-11°15.4
Alcaid	152°56.1	49°13.0
Hadar	148°42.8	-60°27.4
Menkent	148°03.3	-36°27.5
Arcturus	145°52.3	19°05.4
Rigil Kent.	139°47.0	-60°54.4
Zubenelg.	137°01.5	-16°07.0
Kochab	137°20.9	74°04.5
Alphecca	126°08.1	26°39.1
Antares	112°22.0	-26°28.2
Atria	107°20.9	-69°03.4
Sabik	102°08.6	-15°44.7
Shaula	96°17.2	-37°06.8
Rasalhague	96°03.3	12°32.9
Etamin	90°44.9	51°29.3
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.9	38°48.2
Nunki	75°54.0	-26°16.3
Altair	62°05.0	8°55.2
Peacock	53°13.9	-56°40.5
Deneb	49°29.3	45°21.1
Enif	33°43.7	9°57.8
Alnair	27°39.3	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.7	15°18.5

2018/12/	**SHA**	**Mer.pass**
Venus	132°48.3	08:47
Mars	2°58.3	17:25
Jupiter	110°47.1	10:14
Saturn	78°18.7	12:23

2018/12/	**SHA**	**Mer.pass**
Venus	131°51.9	08:47
Mars	2°22.0	17:24
Jupiter	110°33.4	10:11
Saturn	78°11.1	12:20

2018/12/	**SHA**	**Mer.pass**
Venus	130°54.9	08:47
Mars	1°45.6	17:22
Jupiter	110°19.9	10:08
Saturn	78°03.5	12:16

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°48.4	-23°20.1	298°37.0	8.0	13°05.1	-10.8	59.9
1	194°48.1	-23°20.0	313°04.0	8.0	12°54.3	-10.8	59.9
2	209°47.8	-23°19.9	327°31.0	8.1	12°43.4	-10.9	59.9
3	224°47.5	-23°19.8	341°58.2	8.2	12°32.5	-11.0	59.9
4	239°47.2	-23°19.7	356°25.4	8.3	12°21.5	-11.0	59.8
5	254°46.8	-23°19.6	10°52.7	8.4	12°10.5	-11.1	59.8
6	269°46.5	-23°19.5	25°20.1	8.4	11°59.3	-11.2	59.8
7	284°46.2	-23°19.4	39°47.6	8.5	11°48.2	-11.2	59.8
8	299°45.9	-23°19.3	54°15.2	8.6	11°36.9	-11.3	59.7
9	314°45.6	-23°19.2	68°42.8	8.7	11°25.6	-11.3	59.7
10	329°45.3	-23°19.0	83°10.5	8.7	11°14.2	-11.4	59.7
11	344°45.0	-23°18.9	97°38.3	8.8	11°02.8	-11.4	59.7
12	359°44.7	-23°18.8	112°06.1	8.9	10°51.4	-11.5	59.6
13	14°44.4	-23°18.7	126°34.1	9.0	10°39.8	-11.6	59.6
14	29°44.1	-23°18.6	141°02.1	9.1	10°28.2	-11.6	59.6
15	44°43.8	-23°18.5	155°30.2	9.1	10°16.6	-11.7	59.5
16	59°43.5	-23°18.4	169°58.4	9.2	10°04.9	-11.7	59.5
17	74°43.2	-23°18.3	184°26.6	9.3	9°53.2	-11.8	59.5
18	89°42.9	-23°18.2	198°54.9	9.3	9°41.4	-11.8	59.5
19	104°42.5	-23°18.0	213°23.3	9.4	9°29.6	-11.8	59.4
20	119°42.2	-23°17.9	227°51.7	9.5	9°17.7	-11.9	59.4
21	134°41.9	-23°17.8	242°20.3	9.6	9°05.8	-11.9	59.4
22	149°41.6	-23°17.7	256°48.9	9.6	8°53.9	-12.0	59.4
23	164°41.3	-23°17.6	271°17.5	9.7	8°41.9	-12.0	59.3
	SD.=16.3	d=0.1			S.D.=16.3		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°41.0	-23°17.5	285°46.3	9.8	8°29.9	-12.0	59.3
1	194°40.7	-23°17.3	300°15.1	9.8	8°17.8	-12.1	59.3
2	209°40.4	-23°17.2	314°43.9	9.9	8°05.7	-12.1	59.3
3	224°40.1	-23°17.1	329°12.9	10.0	7°53.6	-12.1	59.2
4	239°39.8	-23°17.0	343°41.9	10.0	7°41.4	-12.2	59.2
5	254°39.5	-23°16.9	358°10.9	10.1	7°29.2	-12.2	59.2
6	269°39.2	-23°16.7	12°40.1	10.2	7°17.0	-12.2	59.1
7	284°38.9	-23°16.6	27°09.3	10.2	7°04.8	-12.3	59.1
8	299°38.6	-23°16.5	41°38.5	10.3	6°52.5	-12.3	59.1
9	314°38.3	-23°16.4	56°07.8	10.3	6°40.2	-12.3	59.1
10	329°38.0	-23°16.2	70°37.2	10.4	6°27.9	-12.3	59.0
11	344°37.7	-23°16.1	85°06.7	10.5	6°15.5	-12.4	59.0
12	359°37.3	-23°16.0	99°36.2	10.5	6°03.1	-12.4	59.0
13	14°37.0	-23°15.8	114°05.7	10.6	5°50.7	-12.4	58.9
14	29°36.7	-23°15.7	128°35.3	10.6	5°38.3	-12.4	58.9
15	44°36.4	-23°15.6	143°05.0	10.7	5°25.9	-12.4	58.9
16	59°36.1	-23°15.5	157°34.7	10.8	5°13.5	-12.5	58.9
17	74°35.8	-23°15.3	172°04.5	10.8	5°01.0	-12.5	58.8
18	89°35.5	-23°15.2	186°34.3	10.9	4°48.5	-12.5	58.8
19	104°35.2	-23°15.1	201°04.2	10.9	4°36.0	-12.5	58.8
20	119°34.9	-23°14.9	215°34.1	11.0	4°23.5	-12.5	58.7
21	134°34.6	-23°14.8	230°04.1	11.0	4°11.0	-12.5	58.7
22	149°34.3	-23°14.7	244°34.2	11.1	3°58.5	-12.5	58.7
23	164°34.0	-23°14.5	259°04.3	11.1	3°45.9	-12.5	58.7
	SD.=16.3	d=0.1			S.D.=16.2		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°33.7	-23°14.4	273°34.4	11.2	3°33.4	-12.5	58.6
1	194°33.4	-23°14.2	288°04.6	11.2	3°20.9	-12.5	58.6
2	209°33.1	-23°14.1	302°34.8	11.3	3°08.3	-12.6	58.6
3	224°32.8	-23°14.0	317°05.1	11.3	2°55.8	-12.6	58.5
4	239°32.5	-23°13.8	331°35.4	11.3	2°43.2	-12.6	58.5
5	254°32.2	-23°13.7	346°05.7	11.4	2°30.6	-12.6	58.5
6	269°31.9	-23°13.5	0°36.2	11.4	2°18.1	-12.6	58.5
7	284°31.6	-23°13.4	15°06.6	11.5	2°05.5	-12.6	58.4
8	299°31.3	-23°13.2	29°37.1	11.5	1°53.0	-12.6	58.4
9	314°30.9	-23°13.1	44°07.6	11.5	1°40.4	-12.6	58.4
10	329°30.6	-23°13.0	58°38.2	11.6	1°27.8	-12.5	58.3
11	344°30.3	-23°12.8	73°08.8	11.6	1°15.3	-12.5	58.3
12	359°30.0	-23°12.7	87°39.4	11.7	1°02.8	-12.5	58.3
13	14°29.7	-23°12.5	102°10.1	11.7	0°50.2	-12.5	58.2
14	29°29.4	-23°12.4	116°40.8	11.7	0°37.7	-12.5	58.2
15	44°29.1	-23°12.2	131°11.5	11.8	0°25.2	-12.5	58.2
16	59°28.8	-23°12.1	145°42.3	11.8	0°12.7	-12.5	58.2
17	74°28.5	-23°11.9	160°13.1	11.8	0°00.2	-12.5	58.1
18	89°28.2	-23°11.8	174°43.9	11.9	-0°12.3	-12.5	58.1
19	104°27.9	-23°11.6	189°14.8	11.9	-0°24.8	-12.5	58.1
20	119°27.6	-23°11.5	203°45.7	11.9	-0°37.2	-12.4	58.0
21	134°27.3	-23°11.3	218°16.6	11.9	-0°49.7	-12.4	58.0
22	149°27.0	-23°11.1	232°47.6	12.0	-1°02.1	-12.4	58.0
23	164°26.7	-23°11.0	247°18.6	12.0	-1°14.5	-12.4	58.0
	SD.=16.3	d=0.1			S.D.=16.0		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:26	10:53	–:–	–:–	13:10	15:37
70	08:07	09:54	–:–	–:–	14:09	15:56
68	07:51	09:20	–:–	–:–	14:44	16:12
66	07:38	08:55	10:33	13:30	15:08	16:25
64	07:27	08:35	09:52	14:11	15:28	16:36
62	07:18	08:20	09:25	14:38	15:44	16:45
60	07:09	08:06	09:03	14:60	15:57	16:54
58	07:02	07:55	08:46	15:17	16:09	17:01
56	06:55	07:44	08:32	15:32	16:19	17:08
54	06:49	07:35	08:19	15:44	16:28	17:14
52	06:44	07:27	08:08	15:55	16:36	17:20
50	06:38	07:20	07:58	16:05	16:43	17:25
45	06:27	07:04	07:38	16:25	16:59	17:36
40	06:16	06:50	07:21	16:42	17:13	17:47
35	06:07	06:39	07:07	16:56	17:24	17:56
30	05:58	06:28	06:55	17:08	17:35	18:05
20	05:42	06:10	06:34	17:30	17:54	18:21
10	05:26	05:52	06:15	17:48	18:11	18:37
0	05:09	05:35	05:58	18:05	18:28	18:54
-10	04:50	05:17	05:40	18:23	18:46	19:13
-20	04:28	04:57	05:21	18:42	19:06	19:35
-30	03:59	04:32	04:59	19:03	19:31	20:04
-35	03:40	04:17	04:47	19:16	19:46	20:23
-40	03:17	03:59	04:32	19:31	20:04	20:46
-45	02:47	03:36	04:14	19:49	20:26	21:16
-50	02:02	03:07	03:51	20:12	20:56	22:01
-52	01:34	02:52	03:41	20:22	21:11	22:28
-54	00:50	02:34	03:28	20:34	21:28	23:11
-56	–:–	02:12	03:14	20:48	21:50	–:–
-58	–:–	01:43	02:58	21:05	22:19	–:–
-60	–:–	00:55	02:37	21:25	23:07	–:–

	Moonrise			**Moonset**		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	20:54	22:59	–:–	12:53	12:35	12:20
70	21:09	23:04	–:–	12:36	12:27	12:19
68	21:20	23:08	–:–	12:23	12:21	12:18
66	21:30	23:12	–:–	12:12	12:15	12:17
64	21:38	23:15	–:–	12:03	12:10	12:17
62	21:45	23:18	–:–	11:55	12:06	12:16
60	21:51	23:20	–:–	11:48	12:03	12:16
58	21:56	23:22	–:–	11:42	11:60	12:15
56	22:00	23:24	–:–	11:36	11:57	12:15
54	22:04	23:25	–:–	11:31	11:54	12:14
52	22:08	23:27	–:–	11:27	11:52	12:14
50	22:11	23:28	–:–	11:23	11:50	12:14
45	22:18	23:31	–:–	11:14	11:45	12:13
40	22:24	23:33	–:–	11:06	11:41	12:12
35	22:30	23:35	–:–	11:00	11:37	12:12
30	22:34	23:37	–:–	10:54	11:34	12:11
20	22:42	23:40	–:–	10:45	11:29	12:11
10	22:49	23:43	–:–	10:36	11:24	12:10
0	22:55	23:46	–:–	10:28	11:20	12:09
-10	23:02	23:48	–:–	10:19	11:15	12:08
-20	23:09	23:51	–:–	10:10	11:10	12:08
-30	23:16	23:54	–:–	10:00	11:05	12:07
-35	23:21	23:56	–:–	09:54	11:01	12:06
-40	23:26	23:58	–:–	09:47	10:58	12:05
-45	23:32	–:–	00:01	09:40	10:53	12:05
-50	23:39	–:–	00:04	09:30	10:48	12:04
-52	23:42	–:–	00:05	09:25	10:46	12:03
-54	23:45	–:–	00:06	09:21	10:43	12:03
-56	23:49	–:–	00:08	09:15	10:40	12:02
-58	23:53	–:–	00:10	09:09	10:37	12:02
-60	23:58	–:–	00:12	09:02	10:33	12:01

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
27	00:46	01:01	12:01	04:14	16:41	20(71%)
28	01:16	01:31	12:01	05:07	17:32	21(60%)
29	01:45	02:00	12:02	05:57	18:21	22(49%)

December 30, 31 ,01 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	98°23.1	228°20.4	-14°50.7	99°32.4	-0°52.6	208°29.5	-21°30.8	176°18.9	-22°29.1
1	113°25.6	243°20.4	-14°51.3	114°33.4	-0°51.8	223°31.4	-21°30.9	191°21.1	-22°29.0
2	128°28.1	258°20.5	-14°51.8	129°34.3	-0°51.1	238°33.3	-21°31.0	206°23.2	-22°29.0
3	143°30.5	273°20.5	-14°52.4	144°35.3	-0°50.4	253°35.2	-21°31.1	221°25.4	-22°29.0
4	158°33.0	288°20.5	-14°53.0	159°36.2	-0°49.7	268°37.1	-21°31.1	236°27.5	-22°29.0
5	173°35.4	303°20.6	-14°53.6	174°37.2	-0°49.0	283°39.0	-21°31.2	251°29.7	-22°29.0
6	188°37.9	318°20.6	-14°54.2	189°38.1	-0°48.2	298°40.9	-21°31.3	266°31.8	-22°28.9
7	203°40.4	333°20.7	-14°54.8	204°39.1	-0°47.5	313°42.8	-21°31.4	281°33.9	-22°28.9
8	218°42.8	348°20.7	-14°55.3	219°40.0	-0°46.8	328°44.7	-21°31.4	296°36.1	-22°28.9
9	233°45.3	3°20.8	-14°55.9	234°40.9	-0°46.1	343°46.6	-21°31.5	311°38.2	-22°28.9
10	248°47.8	18°20.8	-14°56.5	249°41.9	-0°45.4	358°48.5	-21°31.6	326°40.4	-22°28.9
11	263°50.2	33°20.8	-14°57.1	264°42.8	-0°44.6	13°50.4	-21°31.6	341°42.5	-22°28.8
12	278°52.7	48°20.9	-14°57.7	279°43.8	-0°43.9	28°52.3	-21°31.7	356°44.7	-22°28.8
13	293°55.2	63°20.9	-14°58.3	294°44.7	-0°43.2	43°54.2	-21°31.8	11°46.8	-22°28.8
14	308°57.6	78°20.9	-14°58.8	309°45.7	-0°42.5	58°56.1	-21°31.9	26°49.0	-22°28.8
15	324°00.1	93°21.0	-14°59.4	324°46.6	-0°41.7	73°58.0	-21°31.9	41°51.1	-22°28.7
16	339°02.5	108°21.0	-15°00.0	339°47.6	-0°41.0	88°59.9	-21°32.0	56°53.3	-22°28.7
17	354°05.0	123°21.0	-15°00.6	354°48.5	-0°40.3	104°01.8	-21°32.1	71°55.4	-22°28.7
18	9°07.5	138°21.1	-15°01.2	9°49.5	-0°39.6	119°03.7	-21°32.2	86°57.5	-22°28.7
19	24°09.9	153°21.1	-15°01.8	24°50.4	-0°38.9	134°05.6	-21°32.2	101°59.7	-22°28.7
20	39°12.4	168°21.1	-15°02.3	39°51.4	-0°38.1	149°07.5	-21°32.3	117°01.8	-22°28.6
21	54°14.9	183°21.1	-15°02.9	54°52.3	-0°37.4	164°09.4	-21°32.4	132°04.0	-22°28.6
22	69°17.3	198°21.2	-15°03.5	69°53.3	-0°36.7	179°11.3	-21°32.4	147°06.1	-22°28.6
23	84°19.8	213°21.2	-15°04.1	84°54.2	-0°36.0	194°13.2	-21°32.5	162°08.3	-22°28.6
Mer.pass.:17:23		v0.0 d-0.6 m-4.3		v0.9 d0.7 m0.5		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	99°22.3	228°21.2	-15°04.7	99°55.2	-0°35.3	209°15.1	-21°32.6	177°10.4	-22°28.5
1	114°24.7	243°21.2	-15°05.3	114°56.1	-0°34.5	224°17.0	-21°32.7	192°12.6	-22°28.5
2	129°27.2	258°21.3	-15°05.8	129°57.1	-0°33.8	239°18.9	-21°32.7	207°14.7	-22°28.5
3	144°29.7	273°21.3	-15°06.4	144°58.0	-0°33.1	254°20.8	-21°32.8	222°16.9	-22°28.5
4	159°32.1	288°21.3	-15°07.0	159°59.0	-0°32.4	269°22.7	-21°32.9	237°19.0	-22°28.5
5	174°34.6	303°21.3	-15°07.6	174°59.9	-0°31.7	284°24.6	-21°33.0	252°21.1	-22°28.4
6	189°37.0	318°21.3	-15°08.2	190°00.8	-0°30.9	299°26.5	-21°33.0	267°23.3	-22°28.4
7	204°39.5	333°21.4	-15°08.8	205°01.8	-0°30.2	314°28.4	-21°33.1	282°25.4	-22°28.4
8	219°42.0	348°21.4	-15°09.3	220°02.7	-0°29.5	329°30.3	-21°33.2	297°27.6	-22°28.4
9	234°44.4	3°21.4	-15°09.9	235°03.7	-0°28.8	344°32.2	-21°33.2	312°29.7	-22°28.4
10	249°46.9	18°21.4	-15°10.5	250°04.6	-0°28.1	359°34.1	-21°33.3	327°31.9	-22°28.3
11	264°49.4	33°21.4	-15°11.1	265°05.6	-0°27.3	14°36.0	-21°33.4	342°34.0	-22°28.3
12	279°51.8	48°21.4	-15°11.7	280°06.5	-0°26.6	29°38.0	-21°33.5	357°36.2	-22°28.3
13	294°54.3	63°21.4	-15°12.2	295°07.5	-0°25.9	44°39.9	-21°33.5	12°38.3	-22°28.3
14	309°56.8	78°21.4	-15°12.8	310°08.4	-0°25.2	59°41.8	-21°33.6	27°40.5	-22°28.2
15	324°59.2	93°21.4	-15°13.4	325°09.4	-0°24.5	74°43.7	-21°33.7	42°42.6	-22°28.2
16	340°01.7	108°21.5	-15°14.0	340°10.3	-0°23.7	89°45.6	-21°33.7	57°44.7	-22°28.2
17	355°04.2	123°21.5	-15°14.6	355°11.3	-0°23.0	104°47.5	-21°33.8	72°46.9	-22°28.2
18	10°06.6	138°21.5	-15°15.2	10°12.2	-0°22.3	119°49.4	-21°33.9	87°49.0	-22°28.2
19	25°09.1	153°21.5	-15°15.7	25°13.2	-0°21.6	134°51.3	-21°34.0	102°51.2	-22°28.1
20	40°11.5	168°21.5	-15°16.3	40°14.1	-0°20.9	149°53.2	-21°34.0	117°53.3	-22°28.1
21	55°14.0	183°21.5	-15°16.9	55°15.0	-0°20.1	164°55.1	-21°34.1	132°55.5	-22°28.1
22	70°16.5	198°21.5	-15°17.5	70°16.0	-0°19.4	179°57.0	-21°34.2	147°57.6	-22°28.1
23	85°18.9	213°21.5	-15°18.1	85°16.9	-0°18.7	194°58.9	-21°34.2	162°59.8	-22°28.0
Mer.pass.:17:19		v0.0 d-0.6 m-4.3		v0.9 d0.7 m0.5		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	100°21.4	228°21.5	-15°18.7	100°17.9	-0°18.0	210°00.8	-21°34.3	178°01.9	-22°28.0
1	115°23.9	243°21.5	-15°19.2	115°18.8	-0°17.3	225°02.7	-21°34.4	193°04.1	-22°28.0
2	130°26.3	258°21.5	-15°19.8	130°19.8	-0°16.5	240°04.6	-21°34.5	208°06.2	-22°28.0
3	145°28.8	273°21.5	-15°20.4	145°20.7	-0°15.8	255°06.5	-21°34.5	223°08.3	-22°28.0
4	160°31.3	288°21.5	-15°21.0	160°21.7	-0°15.1	270°08.4	-21°34.6	238°10.5	-22°27.9
5	175°33.7	303°21.4	-15°21.6	175°22.6	-0°14.4	285°10.3	-21°34.7	253°12.6	-22°27.9
6	190°36.2	318°21.4	-15°22.2	190°23.6	-0°13.7	300°12.2	-21°34.7	268°14.8	-22°27.9
7	205°38.7	333°21.4	-15°22.7	205°24.5	-0°12.9	315°14.1	-21°34.8	283°16.9	-22°27.9
8	220°41.1	348°21.4	-15°23.3	220°25.4	-0°12.2	330°16.0	-21°34.9	298°19.1	-22°27.8
9	235°43.6	3°21.4	-15°23.9	235°26.4	-0°11.5	345°17.9	-21°35.0	313°21.2	-22°27.8
10	250°46.0	18°21.4	-15°24.5	250°27.3	-0°10.8	0°19.9	-21°35.0	328°23.4	-22°27.8
11	265°48.5	33°21.4	-15°25.1	265°28.3	-0°10.1	15°21.8	-21°35.1	343°25.5	-22°27.8
12	280°51.0	48°21.4	-15°25.6	280°29.2	-0°09.3	30°23.7	-21°35.2	358°27.6	-22°27.8
13	295°53.4	63°21.4	-15°26.2	295°30.2	-0°08.6	45°25.6	-21°35.2	13°29.8	-22°27.7
14	310°55.9	78°21.3	-15°26.8	310°31.1	-0°07.9	60°27.5	-21°35.3	28°31.9	-22°27.7
15	325°58.4	93°21.3	-15°27.4	325°32.1	-0°07.2	75°29.4	-21°35.4	43°34.1	-22°27.7
16	341°00.8	108°21.3	-15°28.0	340°33.0	-0°06.4	90°31.3	-21°35.5	58°36.2	-22°27.7
17	356°03.3	123°21.3	-15°28.5	355°34.0	-0°05.7	105°33.2	-21°35.5	73°38.4	-22°27.6
18	11°05.8	138°21.3	-15°29.1	10°34.9	-0°05.0	120°35.1	-21°35.6	88°40.5	-22°27.6
19	26°08.2	153°21.2	-15°29.7	25°35.8	-0°04.3	135°37.0	-21°35.7	103°42.7	-22°27.6
20	41°10.7	168°21.2	-15°30.3	40°36.8	-0°03.6	150°38.9	-21°35.7	118°44.8	-22°27.6
21	56°13.1	183°21.2	-15°30.9	55°37.7	-0°02.8	165°40.8	-21°35.8	133°47.0	-22°27.6
22	71°15.6	198°21.2	-15°31.5	70°38.7	-0°02.1	180°42.7	-21°35.9	148°49.1	-22°27.5
23	86°18.1	213°21.2	-15°32.0	85°39.6	-0°01.4	195°44.6	-21°36.0	163°51.2	-22°27.5
Mer.pass.:17:15		v-0.0 d-0.6 m-4.3		v0.9 d0.7 m0.5		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.8
Ankaa	353°12.0	-42°12.5
Schedar	349°36.2	56°38.6
Diphda	348°52.0	-17°53.2
Achernar	335°23.8	-57°08.8
Hamal	327°56.4	23°33.1
Polaris	315°49.1	89°20.8
Akamar	315°15.2	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°53.9	-52°42.5
Sirius	258°30.0	-16°44.5
Adara	255°09.2	-28°60.0
Procyon	244°55.4	5°10.6
Pollux	243°22.7	27°58.6
Avior	234°15.9	-59°34.1
Suhail	222°49.3	-43°30.4
Miaplacidus	221°38.1	-69°47.5
Alphard	217°52.1	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°46.8	61°38.7
Denebola	182°29.7	14°27.9
Gienah	175°48.4	-17°38.7
Acrux	173°05.0	-63°11.8
Gacrux	171°56.7	-57°12.8
Alioth	166°17.5	55°51.2
Spica	158°27.4	-11°15.4
Alcaid	152°56.1	49°13.0
Hadar	148°42.8	-60°27.4
Menkent	148°03.3	-36°27.5
Arcturus	145°52.3	19°05.3
Rigil Kent.	139°46.9	-60°54.4
Zubenelg.	137°01.4	-16°07.0
Kochab	137°20.8	74°04.5
Alphecca	126°08.1	26°39.1
Antares	112°21.9	-26°28.2
Atria	107°20.9	-69°03.4
Sabik	102°08.5	-15°44.7
Shaula	96°17.2	-37°06.8
Rasalhague	96°03.3	12°32.9
Etamin	90°44.9	51°29.3
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.9	38°48.1
Nunki	75°54.0	-26°16.3
Altair	62°05.0	8°55.2
Peacock	53°13.9	-56°40.5
Deneb	49°29.3	45°21.0
Enif	33°43.7	9°57.8
Alnair	27°39.3	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.7	15°18.5

2018/12/	**SHA**	**Mer.pass**
Venus	129°57.2	08:47
Mars	1°09.3	17:21
Jupiter	110°06.3	10:05
Saturn	77°55.8	12:13

2018/12/	**SHA**	**Mer.pass**
Venus	128°59.0	08:47
Mars	0°32.9	17:19
Jupiter	109°52.8	10:02
Saturn	77°48.2	12:10

2019/1/1	**SHA**	**Mer.pass**
Venus	128°00.1	08:47
Mars	359°56.5	17:18
Jupiter	109°39.4	09:59
Saturn	77°40.5	12:06

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°26.4	-23°10.8	261°49.6	12.0	-1°26.9	-12.4	57.9
1	194°26.1	-23°10.7	276°20.6	12.0	-1°39.2	-12.4	57.9
2	209°25.8	-23°10.5	290°51.7	12.1	-1°51.6	-12.3	57.9
3	224°25.5	-23°10.4	305°22.7	12.1	-2°03.9	-12.3	57.8
4	239°25.2	-23°10.2	319°53.8	12.1	-2°16.2	-12.3	57.8
5	254°24.9	-23°10.0	334°25.0	12.1	-2°28.5	-12.3	57.8
6	269°24.6	-23°09.9	348°56.1	12.1	-2°40.8	-12.2	57.8
7	284°24.3	-23°09.7	3°27.3	12.2	-2°53.0	-12.2	57.7
8	299°24.0	-23°09.5	17°58.4	12.2	-3°05.2	-12.2	57.7
9	314°23.7	-23°09.4	32°29.6	12.2	-3°17.4	-12.2	57.7
10	329°23.4	-23°09.2	47°00.8	12.2	-3°29.5	-12.1	57.6
11	344°23.1	-23°09.0	61°32.1	12.2	-3°41.7	-12.1	57.6
12	359°22.8	-23°08.9	76°03.3	12.2	-3°53.8	-12.1	57.6
13	14°22.5	-23°08.7	90°34.6	12.3	-4°05.8	-12.0	57.6
14	29°22.2	-23°08.5	105°05.8	12.3	-4°17.9	-12.0	57.5
15	44°21.9	-23°08.4	119°37.1	12.3	-4°29.9	-12.0	57.5
16	59°21.6	-23°08.2	134°08.4	12.3	-4°41.8	-12.0	57.5
17	74°21.3	-23°08.0	148°39.7	12.3	-4°53.8	-11.9	57.5
18	89°21.0	-23°07.9	163°11.0	12.3	-5°05.7	-11.9	57.4
19	104°20.7	-23°07.7	177°42.3	12.3	-5°17.5	-11.8	57.4
20	119°20.4	-23°07.5	192°13.7	12.3	-5°29.4	-11.8	57.4
21	134°20.1	-23°07.3	206°45.0	12.3	-5°41.1	-11.8	57.3
22	149°19.8	-23°07.2	221°16.4	12.3	-5°52.9	-11.7	57.3
23	164°19.5	-23°07.0	235°47.7	12.4	-6°04.6	-11.7	57.3
	SD.=16.3	d=0.2			S.D.=15.8		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°19.2	-23°06.8	250°19.1	12.4	-6°16.3	-11.7	57.3
1	194°18.9	-23°06.6	264°50.4	12.4	-6°27.9	-11.6	57.2
2	209°18.6	-23°06.5	279°21.8	12.4	-6°39.5	-11.6	57.2
3	224°18.3	-23°06.3	293°53.2	12.4	-6°51.0	-11.5	57.2
4	239°18.0	-23°06.1	308°24.5	12.4	-7°02.6	-11.5	57.2
5	254°17.7	-23°05.9	322°55.9	12.4	-7°14.0	-11.4	57.1
6	269°17.4	-23°05.7	337°27.3	12.4	-7°25.4	-11.4	57.1
7	284°17.1	-23°05.6	351°58.6	12.4	-7°36.8	-11.3	57.1
8	299°16.8	-23°05.4	6°30.0	12.4	-7°48.1	-11.3	57.1
9	314°16.5	-23°05.2	21°01.4	12.4	-7°59.4	-11.3	57.0
10	329°16.2	-23°05.0	35°32.8	12.4	-8°10.6	-11.2	57.0
11	344°15.9	-23°04.8	50°04.1	12.4	-8°21.8	-11.2	57.0
12	359°15.6	-23°04.6	64°35.5	12.4	-8°32.9	-11.1	56.9
13	14°15.3	-23°04.4	79°06.8	12.4	-8°44.0	-11.1	56.9
14	29°15.0	-23°04.3	93°38.2	12.3	-8°55.0	-11.0	56.9
15	44°14.7	-23°04.1	108°09.5	12.3	-9°06.0	-10.9	56.9
16	59°14.4	-23°03.9	122°40.9	12.3	-9°16.9	-10.9	56.8
17	74°14.1	-23°03.7	137°12.2	12.3	-9°27.8	-10.8	56.8
18	89°13.8	-23°03.5	151°43.5	12.3	-9°38.6	-10.8	56.8
19	104°13.5	-23°03.3	166°14.9	12.3	-9°49.4	-10.7	56.8
20	119°13.2	-23°03.1	180°46.2	12.3	-10°00.1	-10.7	56.7
21	134°12.9	-23°02.9	195°17.5	12.3	-10°10.7	-10.6	56.7
22	149°12.6	-23°02.7	209°48.8	12.3	-10°21.3	-10.6	56.7
23	164°12.3	-23°02.5	224°20.0	12.3	-10°31.8	-10.5	56.7
	SD.=16.3	d=0.2			S.D.=15.6		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°12.0	-23°02.3	238°51.3	12.3	-10°42.3	-10.4	56.6
1	194°11.7	-23°02.1	253°22.6	12.3	-10°52.7	-10.4	56.6
2	209°11.4	-23°01.9	267°53.8	12.2	-11°03.1	-10.3	56.6
3	224°11.1	-23°01.7	282°25.0	12.2	-11°13.3	-10.3	56.6
4	239°10.8	-23°01.5	296°56.3	12.2	-11°23.6	-10.2	56.5
5	254°10.5	-23°01.3	311°27.5	12.2	-11°33.7	-10.1	56.5
6	269°10.2	-23°01.1	325°58.7	12.2	-11°43.8	-10.1	56.5
7	284°09.9	-23°00.9	340°29.9	12.2	-11°53.9	-10.0	56.5
8	299°09.6	-23°00.7	355°01.0	12.2	-12°03.8	-9.9	56.5
9	314°09.3	-23°00.5	9°32.2	12.1	-12°13.7	-9.9	56.4
10	329°09.0	-23°00.3	24°03.3	12.1	-12°23.6	-9.8	56.4
11	344°08.7	-23°00.1	38°34.4	12.1	-12°33.3	-9.7	56.4
12	359°08.4	-22°59.9	53°05.5	12.1	-12°43.1	-9.7	56.4
13	14°08.2	-22°59.7	67°36.6	12.1	-12°52.7	-9.6	56.3
14	29°07.9	-22°59.5	82°07.7	12.1	-13°02.3	-9.5	56.3
15	44°07.6	-22°59.3	96°38.7	12.0	-13°11.7	-9.5	56.3
16	59°07.3	-22°59.1	111°09.8	12.0	-13°21.2	-9.4	56.3
17	74°07.0	-22°58.9	125°40.8	12.0	-13°30.5	-9.3	56.2
18	89°06.7	-22°58.7	140°11.8	12.0	-13°39.8	-9.2	56.2
19	104°06.4	-22°58.5	154°42.8	12.0	-13°49.0	-9.2	56.2
20	119°06.1	-22°58.3	169°13.7	12.0	-13°58.2	-9.1	56.2
21	134°05.8	-22°58.0	183°44.7	11.9	-14°07.2	-9.0	56.2
22	149°05.5	-22°57.8	198°15.6	11.9	-14°16.2	-8.9	56.1
23	164°05.2	-22°57.6	212°46.5	11.9	-14°25.1	-8.9	56.1
	SD.=16.3	d=0.2			S.D.=15.5		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:25	10:46	–:–	–:–	13:20	15:41
70	08:06	09:51	–:–	–:–	14:15	16:01
68	07:50	09:18	–:–	–:–	14:48	16:16
66	07:38	08:54	10:30	13:37	15:12	16:29
64	07:27	08:35	09:51	14:16	15:32	16:39
62	07:18	08:19	09:24	14:43	15:47	16:49
60	07:09	08:06	09:03	15:03	16:00	16:57
58	07:02	07:54	08:46	15:20	16:12	17:04
56	06:56	07:44	08:31	15:35	16:22	17:11
54	06:50	07:36	08:19	15:47	16:31	17:17
52	06:44	07:28	08:08	15:58	16:39	17:22
50	06:39	07:20	07:59	16:08	16:46	17:27
45	06:27	07:05	07:38	16:28	17:02	17:39
40	06:17	06:51	07:22	16:44	17:15	17:49
35	06:08	06:40	07:08	16:58	17:26	17:58
30	05:59	06:29	06:56	17:10	17:37	18:07
20	05:43	06:11	06:35	17:31	17:55	18:23
10	05:27	05:54	06:16	17:50	18:12	18:39
0	05:11	05:37	05:59	18:07	18:29	18:55
-10	04:52	05:19	05:42	18:24	18:47	19:14
-20	04:30	04:59	05:23	18:43	19:07	19:36
-30	04:01	04:34	05:01	19:04	19:32	20:05
-35	03:43	04:19	04:49	19:17	19:47	20:23
-40	03:20	04:01	04:34	19:32	20:05	20:46
-45	02:50	03:39	04:16	19:50	20:27	21:16
-50	02:05	03:10	03:54	20:12	20:56	21:60
-52	01:39	02:55	03:43	20:22	21:10	22:26
-54	00:57	02:38	03:31	20:34	21:28	23:07
-56	–:–	02:16	03:17	20:48	21:49	–:–
-58	–:–	01:48	03:01	21:04	22:17	–:–
-60	–:–	01:02	02:41	21:24	23:01	–:–

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	00:56	02:52	04:52	12:06	11:50	11:30
70	00:54	02:42	04:31	12:11	12:02	11:53
68	00:52	02:33	04:14	12:16	12:13	12:10
66	00:50	02:26	04:01	12:19	12:21	12:25
64	00:49	02:20	03:50	12:23	12:29	12:36
62	00:47	02:15	03:41	12:25	12:35	12:46
60	00:46	02:11	03:34	12:28	12:41	12:55
58	00:45	02:07	03:27	12:30	12:46	13:03
56	00:45	02:04	03:21	12:32	12:50	13:10
54	00:44	02:00	03:15	12:34	12:54	13:16
52	00:43	01:58	03:10	12:35	12:57	13:21
50	00:42	01:55	03:06	12:37	13:01	13:26
45	00:41	01:50	02:57	12:40	13:08	13:37
40	00:40	01:45	02:49	12:43	13:14	13:46
35	00:39	01:41	02:42	12:45	13:19	13:53
30	00:38	01:38	02:36	12:47	13:23	14:00
20	00:37	01:32	02:26	12:51	13:31	14:12
10	00:35	01:27	02:17	12:54	13:38	14:22
0	00:34	01:22	02:09	12:57	13:44	14:32
-10	00:33	01:17	02:01	13:00	13:51	14:42
-20	00:32	01:12	01:52	13:03	13:58	14:52
-30	00:31	01:06	01:43	13:07	14:06	15:04
-35	00:30	01:03	01:37	13:09	14:11	15:11
-40	00:29	00:59	01:31	13:11	14:16	15:19
-45	00:28	00:55	01:23	13:14	14:22	15:28
-50	00:27	00:50	01:15	13:17	14:29	15:39
-52	00:27	00:48	01:11	13:19	14:33	15:45
-54	00:26	00:45	01:06	13:20	14:36	15:50
-56	00:25	00:43	01:01	13:22	14:40	15:57
-58	00:25	00:40	00:56	13:24	14:45	16:04
-60	00:24	00:36	00:50	13:27	14:50	16:12

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
30	02:14	02:29	12:02	06:45	19:09	23(38%)
31	02:43	02:58	12:02	07:33	19:56	24(28%)
1	03:12	03:26	12:03	08:20	20:44	25(19%)