

## Appendix B

# Excerpts from the Nautical Almanac

## A2 ALTITUDE CORRECTION TABLES 10°-90°—SUN, STARS, PLANETS

OCT.—MAR. SUN			APR.—SEPT.			STARS AND PLANETS		DIP		
App. Alt.	Lower Limb	Upper Limb	App. Alt.	Lower Limb	Upper Limb	App. Alt.	Corr <sup>n</sup>	Ht. of Eye	Corr <sup>n</sup>	Ht. of Eye
9 33	+10.8	-21.5	9 39	+10.6	-21.2	9 55	-5.3	m		ft.
9 45	+10.9	-21.4	9 50	+10.7	-21.1	10 07	-5.2	2.4	-2.8	8.0
9 56	+11.0	-21.3	10 02	+10.8	-21.0	10 20	-5.1	2.6	-2.9	8.6
10 08	+11.1	-21.2	10 14	+10.9	-20.9	10 32	-5.0	2.8	-3.0	9.2
10 20	+11.2	-21.1	10 27	+11.0	-20.8	10 46	-4.9	3.0	-3.1	9.8
10 33	+11.3	-21.0	10 40	+11.1	-20.7	10 59	-4.8	3.2	-3.2	10.5
10 46	+11.4	-20.9	10 53	+11.2	-20.6	11 14	-4.7	3.4	-3.3	11.2
11 00	+11.5	-20.8	11 07	+11.3	-20.5	11 29	-4.6	3.6	-3.4	11.9
11 15	+11.6	-20.7	11 22	+11.4	-20.4	11 44	-4.5	3.8	-3.5	12.6
11 30	+11.7	-20.6	11 37	+11.5	-20.3	12 00	-4.4	4.0	-3.6	13.3
11 45	+11.8	-20.5	11 53	+11.6	-20.2	12 17	-4.3	4.3	-3.7	14.1
12 01	+11.9	-20.4	12 10	+11.7	-20.1	12 35	-4.2	4.5	-3.8	14.9
12 18	+12.0	-20.3	12 27	+11.8	-20.0	12 53	-4.1	4.7	-3.9	15.7
12 36	+12.1	-20.2	12 45	+11.9	-19.9	13 12	-4.0	5.0	-4.0	16.5
12 54	+12.2	-20.1	13 04	+12.0	-19.8	13 32	-3.9	5.2	-4.1	17.4
13 14	+12.3	-20.0	13 24	+12.1	-19.7	13 53	-3.8	5.5	-4.2	18.3
13 34	+12.4	-19.9	13 44	+12.2	-19.6	14 16	-3.7	5.8	-4.3	19.1
13 55	+12.5	-19.8	14 06	+12.3	-19.5	14 39	-3.6	6.1	-4.4	20.1
14 17	+12.6	-19.7	14 29	+12.4	-19.4	15 03	-3.5	6.3	-4.5	21.0
14 41	+12.7	-19.6	14 53	+12.5	-19.3	15 29	-3.4	6.6	-4.6	22.0
15 05	+12.8	-19.5	15 18	+12.6	-19.2	15 56	-3.3	6.9	-4.7	22.9
15 31	+12.9	-19.4	15 45	+12.7	-19.1	16 25	-3.2	7.2	-4.8	23.9
15 59	+13.0	-19.3	16 13	+12.8	-19.0	16 55	-3.1	7.5	-4.9	24.9
16 27	+13.1	-19.2	16 43	+12.9	-18.9	17 27	-3.0	7.9	-5.0	26.0
16 58	+13.2	-19.1	17 14	+13.0	-18.8	18 01	-2.9	8.2	-5.1	27.1
17 30	+13.3	-19.0	17 47	+13.1	-18.7	18 37	-2.8	8.5	-5.2	28.1
18 05	+13.4	-18.9	18 23	+13.2	-18.6	19 16	-2.7	8.8	-5.3	29.2
18 41	+13.5	-18.8	19 00	+13.3	-18.5	19 56	-2.6	9.2	-5.4	30.4
19 20	+13.6	-18.7	19 41	+13.4	-18.4	20 40	-2.5	9.5	-5.5	31.5
20 02	+13.7	-18.6	20 24	+13.5	-18.3	21 27	-2.4	9.9	-5.6	32.7
20 46	+13.8	-18.5	21 10	+13.6	-18.2	22 17	-2.3	10.3	-5.7	33.9
21 34	+13.9	-18.4	21 59	+13.7	-18.1	23 11	-2.2	10.6	-5.8	35.1
22 25	+14.0	-18.3	22 52	+13.8	-18.0	24 09	-2.1	11.0	-5.9	36.3
23 20	+14.1	-18.2	23 49	+13.9	-17.9	25 12	-2.0	11.4	-6.0	37.6
24 20	+14.2	-18.1	24 51	+14.0	-17.8	26 20	-1.9	11.8	-6.1	38.9
25 24	+14.3	-18.0	25 58	+14.1	-17.7	27 34	-1.8	12.2	-6.2	40.1
26 34	+14.4	-17.9	27 11	+14.2	-17.6	28 54	-1.7	12.6	-6.3	41.5
27 50	+14.5	-17.8	28 31	+14.3	-17.5	30 22	-1.6	13.0	-6.4	42.8
29 13	+14.6	-17.7	29 58	+14.4	-17.4	31 58	-1.5	13.4	-6.5	44.2
30 44	+14.7	-17.6	31 33	+14.5	-17.3	33 43	-1.4	13.8	-6.6	45.5
32 24	+14.8	-17.5	33 18	+14.6	-17.2	35 38	-1.3	14.2	-6.7	46.9
34 15	+14.9	-17.4	35 15	+14.7	-17.1	37 45	-1.2	14.7	-6.8	48.4
36 17	+15.0	-17.3	37 24	+14.8	-17.0	40 06	-1.1	15.1	-6.9	49.8
38 34	+15.1	-17.2	39 48	+14.9	-16.9	42 42	-1.0	15.5	-7.0	51.3
41 06	+15.2	-17.1	42 28	+15.0	-16.8	45 34	-0.9	16.0	-7.1	52.8
43 56	+15.3	-17.0	45 29	+15.1	-16.7	48 45	-0.8	16.5	-7.2	54.3
47 07	+15.4	-16.9	48 52	+15.2	-16.6	52 16	-0.7	16.9	-7.3	55.8
50 43	+15.5	-16.8	52 41	+15.3	-16.5	56 09	-0.6	17.4	-7.4	57.4
54 46	+15.6	-16.7	56 59	+15.4	-16.4	60 26	-0.5	17.9	-7.5	58.9
59 21	+15.7	-16.6	61 50	+15.5	-16.3	65 06	-0.4	18.4	-7.6	60.5
64 28	+15.8	-16.5	67 15	+15.6	-16.2	70 09	-0.3	18.8	-7.7	62.1
70 10	+15.9	-16.4	73 14	+15.7	-16.1	75 32	-0.2	19.3	-7.8	63.8
76 24	+16.0	-16.3	79 42	+15.8	-16.0	81 12	-0.1	19.8	-7.9	65.4
83 05	+16.1	-16.2	86 31	+15.9	-15.9	87 03	0.0	20.4	-8.0	67.1
90 00			90 00			90 00	0.0	20.9	-8.1	68.8
								21.4		70.5

App. Alt. = Apparent altitude = Sextant altitude corrected for index error and dip.



ALTITUDE CORRECTION TABLES 0°-10°—SUN, STARS, PLANETS A<sub>3</sub>

App. Alt.	OCT.—MAR. SUN APR.—SEPT.				STARS PLANETS
	Lower Limb	Upper Limb	Lower Limb	Upper Limb	
0 00	-17.5	-49.8	-17.8	-49.6	-33.8
0 03	16.9	49.2	17.2	49.0	33.2
0 06	16.3	48.6	16.6	48.4	32.6
0 09	15.7	48.0	16.0	47.8	32.0
0 12	15.2	47.5	15.4	47.2	31.5
0 15	14.6	46.9	14.8	46.6	30.9
0 18	-14.1	-46.4	-14.3	-46.1	-30.4
0 21	13.5	45.8	13.8	45.6	29.8
0 24	13.0	45.3	13.3	45.1	29.3
0 27	12.5	44.8	12.8	44.6	28.8
0 30	12.0	44.3	12.3	44.1	28.3
0 33	11.6	43.9	11.8	43.6	27.9
0 36	-11.1	-43.4	-11.3	-43.1	-27.4
0 39	10.6	42.9	10.9	42.7	26.9
0 42	10.2	42.5	10.5	42.3	26.5
0 45	9.8	42.1	10.0	41.8	26.1
0 48	9.4	41.7	9.6	41.4	25.7
0 51	9.0	41.3	9.2	41.0	25.3
0 54	-8.6	-40.9	-8.8	-40.6	-24.9
0 57	8.2	40.5	8.4	40.2	24.5
1 00	7.8	40.1	8.0	39.8	24.1
1 03	7.4	39.7	7.7	39.5	23.7
1 06	7.1	39.4	7.3	39.1	23.4
1 09	6.7	39.0	7.0	38.8	23.0
1 12	-6.4	-38.7	-6.6	-38.4	-22.7
1 15	6.0	38.3	6.3	38.1	22.3
1 18	5.7	38.0	6.0	37.8	22.0
1 21	5.4	37.7	5.7	37.5	21.7
1 24	5.1	37.4	5.3	37.1	21.4
1 27	4.8	37.1	5.0	36.8	21.1
1 30	-4.5	-36.8	-4.7	-36.5	-20.8
1 35	4.0	36.3	4.3	36.1	20.3
1 40	3.6	35.9	3.8	35.6	19.9
1 45	3.1	35.4	3.4	35.2	19.4
1 50	2.7	35.0	2.9	34.7	19.0
1 55	2.3	34.6	2.5	34.3	18.6
2 00	-1.9	-34.2	-2.1	-33.9	-18.2
2 05	1.5	33.8	1.7	33.5	17.8
2 10	1.1	33.4	1.4	33.2	17.4
2 15	0.8	33.1	1.0	32.8	17.1
2 20	0.4	32.7	0.7	32.5	16.7
2 25	-0.1	32.4	-0.3	32.1	16.4
2 30	+0.2	-32.1	0.0	-31.8	-16.1
2 35	0.5	31.8	0.3	31.5	15.8
2 40	0.8	31.5	0.6	31.2	15.4
2 45	1.1	31.2	0.9	30.9	15.2
2 50	1.4	30.9	1.2	30.6	14.9
2 55	1.7	30.6	1.4	30.4	14.6
3 00	+2.0	-30.3	+1.7	-30.1	-14.3
3 05	2.2	30.1	2.0	29.8	14.1
3 10	2.5	29.8	2.2	29.6	13.8
3 15	2.7	29.6	2.5	29.3	13.6
3 20	2.9	29.4	2.7	29.1	13.4
3 25	3.2	29.1	2.9	28.9	13.1
3 30	+3.4	-28.9	+3.1	-28.7	-12.9
3 30	+3.4	-28.9	+3.1	-28.7	-12.9
3 35	3.6	28.7	3.3	28.5	12.7
3 40	3.8	28.5	3.6	28.2	12.5
3 45	4.0	28.3	3.8	28.0	12.3
3 50	4.2	28.1	4.0	27.8	12.1
3 55	4.4	27.9	4.1	27.7	11.9
4 00	+4.6	-27.7	+4.3	-27.5	-11.7
4 05	4.8	27.5	4.5	27.3	11.5
4 10	4.9	27.4	4.7	27.1	11.4
4 15	5.1	27.2	4.9	26.9	11.2
4 20	5.3	27.0	5.0	26.8	11.0
4 25	5.4	26.9	5.2	26.6	10.9
4 30	+5.6	-26.7	+5.3	-26.5	-10.7
4 35	5.7	26.6	5.5	26.3	10.6
4 40	5.9	26.4	5.6	26.2	10.4
4 45	6.0	26.3	5.8	26.0	10.3
4 50	6.2	26.1	5.9	25.9	10.1
4 55	6.3	26.0	6.1	25.7	10.0
5 00	+6.4	-25.9	+6.2	-25.6	-9.8
5 05	6.6	25.7	6.3	25.5	9.7
5 10	6.7	25.6	6.5	25.3	9.6
5 15	6.8	25.5	6.6	25.2	9.5
5 20	7.0	25.3	6.7	25.1	9.3
5 25	7.1	25.2	6.8	25.0	9.2
5 30	+7.2	-25.1	+6.9	-24.9	-9.1
5 35	7.3	25.0	7.1	24.7	9.0
5 40	7.4	24.9	7.2	24.6	8.9
5 45	7.5	24.8	7.3	24.5	8.8
5 50	7.6	24.7	7.4	24.4	8.7
5 55	7.7	24.6	7.5	24.3	8.6
6 00	+7.8	-24.5	+7.6	-24.2	-8.5
6 10	8.0	24.3	7.8	24.0	8.3
6 20	8.2	24.1	8.0	23.8	8.1
6 30	8.4	23.9	8.2	23.6	7.9
6 40	8.6	23.7	8.3	23.5	7.7
6 50	8.7	23.6	8.5	23.3	7.6
7 00	+8.9	-23.4	+8.7	-23.1	-7.4
7 10	9.1	23.2	8.8	23.0	7.2
7 20	9.2	23.1	9.0	22.8	7.1
7 30	9.3	23.0	9.1	22.7	6.9
7 40	9.5	22.8	9.2	22.6	6.8
7 50	9.6	22.7	9.4	22.4	6.7
8 00	+9.7	-22.6	+9.5	-22.3	-6.6
8 10	9.9	22.4	9.6	22.2	6.4
8 20	10.0	22.3	9.7	22.1	6.3
8 30	10.1	22.2	9.9	21.9	6.2
8 40	10.2	22.1	10.0	21.8	6.1
8 50	10.3	22.0	10.1	21.7	6.0
9 00	+10.4	-21.9	+10.2	-21.6	-5.9
9 10	10.5	21.8	10.3	21.5	5.8
9 20	10.6	21.7	10.4	21.4	5.7
9 30	10.7	21.6	10.5	21.3	5.6
9 40	10.8	21.5	10.6	21.2	5.5
9 50	10.9	21.4	10.6	21.2	5.4
10 00	+11.0	-21.3	+10.7	-21.1	-5.3

Additional corrections for temperature and pressure are given on the following page.

For bubble sextant observations ignore dip and use the star corrections for Sun, planets and stars.



## FEBRUARY 27, 28, 29 (FRI., SAT., SUN.)

UT	ARIES	VENUS -4.2	MARS +1.1	JUPITER -2.5	SATURN -0.1	STARS
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name SHA Dec
27 00	156 10.7	136 47.4 N 8 57.6	113 52.2 N17 14.0	349 38.9 N 7 18.4	59 15.9 N22 45.0	Acamar 315 23.9 S40 17.6
01	171 13.1	151 47.3 8 58.9	128 53.1 14.5	4 41.7 18.5	74 18.4 45.0	Achernar 335 32.3 S57 13.2
02	186 15.6	166 47.1 9 00.1	143 54.0 15.0	19 44.4 18.6	89 20.9 45.0	Acruz 173 17.3 S63 07.2
03	201 18.1	181 47.0 01.4	158 54.8 15.5	34 47.2 18.7	104 23.4 45.0	Adhara 255 18.1 S28 58.8
04	216 20.5	196 46.9 02.6	173 55.7 16.0	49 50.0 18.9	119 25.9 45.0	Aldebaran 290 57.8 N16 31.1
05	231 23.0	211 46.7 03.8	188 56.6 16.5	64 52.7 19.0	134 28.4 45.0	
06	246 25.4	226 46.6 N 9 05.1	203 57.4 N17 17.0	79 55.5 N 7 19.1	149 30.9 N22 45.0	Alioth 166 26.4 N55 56.1
07	261 27.9	241 46.5 06.3	218 58.3 17.5	94 58.2 19.3	164 33.4 45.0	Alkaid 153 04.1 N49 17.3
08	276 30.4	256 46.3 07.6	233 59.2 17.9	110 01.0 19.4	179 36.0 45.0	Al Na'ir 27 53.2 S46 56.6
09	291 32.8	271 46.2 08.8	249 00.0 18.4	125 03.8 19.5	194 38.5 45.0	Alnilam 275 53.7 S 1 12.0
10	306 35.3	286 46.1 10.0	264 00.9 18.9	140 06.5 19.6	209 41.0 45.0	Alphard 218 03.0 S 8 40.6
11	321 37.8	301 46.0 11.3	279 01.8 19.4	155 09.3 19.8	224 43.5 45.1	
12	336 40.2	316 45.8 N 9 12.5	294 02.6 N17 19.9	170 12.1 N 7 19.9	239 46.0 N22 45.1	Alphecca 126 17.1 N26 41.7
13	351 42.7	331 45.7 13.7	309 03.5 20.4	185 14.8 20.0	254 48.5 45.1	Alpheratz 357 51.5 N29 06.7
14	6 45.2	346 45.6 15.0	324 04.4 20.9	200 17.6 20.2	269 51.0 45.1	Altair 62 15.6 N 8 52.5
15	21 47.6	1 45.4 16.2	339 05.2 21.4	215 20.3 20.3	284 53.5 45.1	Ankaa 353 23.1 S42 17.3
16	36 50.1	16 45.3 17.5	354 06.1 21.9	230 23.1 20.4	299 56.0 45.1	Antares 112 35.3 S26 26.5
17	51 52.6	31 45.2 18.7	9 07.0 22.4	245 25.9 20.5	314 58.5 45.1	
18	66 55.0	46 45.0 N 9 19.9	24 07.8 N17 22.8	260 28.6 N 7 20.7	330 01.1 N22 45.1	Arcturus 146 02.2 N19 09.4
19	81 57.5	61 44.9 21.2	39 08.7 23.3	275 31.4 20.8	345 03.6 45.1	Atria 107 43.9 S69 01.9
20	96 59.9	76 44.8 22.4	54 09.6 23.8	290 34.2 20.9	0 06.1 45.1	Avior 234 20.7 S59 31.5
21	112 02.4	91 44.6 23.6	69 10.4 24.3	305 36.9 21.1	15 08.6 45.1	Beatrix 278 39.8 N 6 21.2
22	127 04.9	106 44.5 24.9	84 11.3 24.8	320 39.7 21.2	30 11.1 45.1	Betelgeuse 271 09.1 N 7 24.5
23	142 07.3	121 44.4 26.1	99 12.2 25.3	335 42.5 21.3	45 13.6 45.2	
28 00	157 09.8	136 44.2 N 9 27.3	114 13.0 N17 25.8	350 45.2 N 7 21.5	60 16.1 N22 45.2	Canopus 263 59.2 S52 42.1
01	172 12.3	151 44.1 28.6	129 13.9 26.3	5 48.0 21.6	75 18.6 45.2	Capella 280 45.2 N46 00.3
02	187 14.7	166 44.0 29.8	144 14.7 26.7	20 50.7 21.7	90 21.1 45.2	Deneb 49 37.0 N45 17.4
03	202 17.2	181 43.8 31.0	159 15.6 27.2	35 53.5 21.8	105 23.6 45.2	Denebola 182 40.8 N14 32.9
04	217 19.7	196 43.7 32.3	174 16.5 27.7	50 56.3 22.0	120 26.1 45.2	Diphda 349 03.4 S17 58.1
05	232 22.1	211 43.6 33.5	189 17.3 28.2	65 59.0 22.1	135 28.6 45.2	
06	247 24.6	226 43.5 N 9 34.7	204 18.2 N17 28.7	81 01.8 N 7 22.2	150 31.1 N22 45.2	Dubhe 193 59.6 N61 43.7
07	262 27.0	241 43.3 36.0	219 19.1 29.2	96 04.6 22.4	165 33.7 45.2	Elnath 278 21.8 N28 36.8
08	277 29.5	256 43.2 37.2	234 19.9 29.7	111 07.3 22.5	180 36.2 45.2	Eltanin 90 49.7 N51 28.9
09	292 32.0	271 43.1 38.4	249 20.8 30.1	126 10.1 22.6	195 38.7 45.2	Enif 33 54.6 N 9 53.4
10	307 34.4	286 42.9 39.7	264 21.7 30.6	141 12.9 22.7	210 41.2 45.2	Fomalhaut 15 32.3 S29 36.2
11	322 36.9	301 42.8 40.9	279 22.5 31.1	156 15.6 22.9	225 43.7 45.3	
12	337 39.4	316 42.7 N 9 42.1	294 23.4 N17 31.6	171 18.4 N 7 23.0	240 46.2 N22 45.3	Gacrux 172 08.9 S57 08.1
13	352 41.8	331 42.5 43.3	309 24.2 32.1	186 21.2 23.1	255 48.7 45.3	Gienah 175 59.6 S17 33.9
14	7 44.3	346 42.4 44.6	324 25.1 32.6	201 23.9 23.3	270 51.2 45.3	Hadar 148 58.2 S60 23.4
15	22 46.8	1 42.3 45.8	339 26.0 33.1	216 26.7 23.4	285 53.7 45.3	Hamal 328 09.3 N23 28.9
16	37 49.2	16 42.1 47.0	354 26.8 33.5	231 29.4 23.5	300 56.2 45.3	Kaus Aust. 83 53.7 S34 23.0
17	52 51.7	31 42.0 48.3	9 27.7 34.0	246 32.2 23.6	315 58.7 45.3	
18	67 54.2	46 41.9 N 9 49.5	24 28.6 N17 34.5	261 35.0 N 7 23.8	331 01.2 N22 45.3	Kochab 137 18.8 N74 08.0
19	82 56.6	61 41.7 50.7	39 29.4 35.0	276 37.7 23.9	346 03.7 45.3	Markab 13 46.0 N15 13.5
20	97 59.1	76 41.6 51.9	54 30.3 35.5	291 40.5 24.0	1 06.2 45.3	Menkar 314 22.8 N 4 06.3
21	113 01.5	91 41.5 53.2	69 31.1 36.0	306 43.3 24.2	16 08.7 45.3	Menkent 148 16.1 S36 23.4
22	128 04.0	106 41.4 54.4	84 32.0 36.4	321 46.0 24.3	31 11.2 45.3	Miaplacidus 221 40.7 S69 44.1
23	143 06.5	121 41.2 55.6	99 32.9 36.9	336 48.8 24.4	46 13.7 45.4	
29 00	158 08.9	136 41.1 N 9 56.8	114 33.7 N17 37.4	351 51.6 N 7 24.5	61 16.2 N22 45.4	Mirak 308 51.1 N49 52.7
01	173 11.4	151 41.0 58.1	129 34.6 37.9	6 54.3 24.7	76 18.7 45.4	Nunki 76 07.6 S26 17.6
02	188 13.9	166 40.8 9 59.3	144 35.4 38.4	21 57.1 24.8	91 21.2 45.4	Peacock 53 31.0 S56 43.4
03	203 16.3	181 40.7 10 00.5	159 36.3 38.8	36 59.9 24.9	106 23.7 45.4	Pollux 243 36.4 N28 01.1
04	218 18.8	196 40.6 01.7	174 37.2 39.3	52 02.6 25.1	121 26.2 45.4	Procyon 245 07.1 N 5 12.9
05	233 21.3	211 40.4 03.0	189 38.0 39.8	67 05.4 25.2	136 28.7 45.4	
06	248 23.7	226 40.3 N10 04.2	204 38.9 N17 40.3	82 08.1 N 7 25.3	151 31.2 N22 45.4	Rasalhague 96 13.3 N12 33.1
07	263 26.2	241 40.2 05.4	219 39.7 40.8	97 10.9 25.4	166 33.7 45.4	Regulus 207 50.9 N11 56.8
08	278 28.7	256 40.1 06.6	234 40.6 41.3	112 13.7 25.6	181 36.2 45.4	Rigel 281 19.0 S 8 11.9
09	293 31.1	271 39.9 07.8	249 41.5 41.7	127 16.4 25.7	196 38.7 45.4	Rigel Kent. 140 01.8 S60 51.0
10	308 33.6	286 39.8 09.1	264 42.3 42.2	142 19.2 25.8	211 41.2 45.4	Sabik 102 21.0 S15 43.9
11	323 36.0	301 39.7 10.3	279 43.2 42.7	157 22.0 26.0	226 43.7 45.5	
12	338 38.5	316 39.5 N10 11.5	294 44.0 N17 43.2	172 24.7 N 7 26.1	241 46.2 N22 45.5	Schedar 349 49.7 N56 33.6
13	353 41.0	331 39.4 12.7	309 44.9 43.7	187 27.5 26.2	256 48.7 45.5	Shaula 96 32.0 S37 06.4
14	8 43.4	346 39.3 13.9	324 45.8 44.1	202 30.3 26.3	271 51.2 45.5	Sirius 258 40.0 S16 43.4
15	23 45.9	1 39.1 15.2	339 46.6 44.6	217 33.0 26.5	286 53.7 45.5	Spica 158 38.8 S11 11.0
16	38 48.4	16 39.0 16.4	354 47.5 45.1	232 35.8 26.6	301 56.2 45.5	Suhail 222 57.5 S43 27.0
17	53 50.8	31 38.9 17.6	9 48.3 45.6	247 38.6 26.7	316 58.7 45.5	
18	68 53.3	46 38.7 N10 18.8	24 49.2 N17 46.0	262 41.3 N 7 26.9	332 01.2 N22 45.5	Vega 80 44.1 N38 46.9
19	83 55.8	61 38.6 20.0	39 50.0 46.5	277 44.1 27.0	347 03.7 45.5	Zuben'ubi 137 13.4 S16 03.6
20	98 58.2	76 38.5 21.2	54 50.9 47.0	292 46.9 27.1	2 06.2 45.5	
21	114 00.7	91 38.4 22.5	69 51.8 47.5	307 49.6 27.3	17 08.7 45.5	SHA Mer.Pass.
22	129 03.2	106 38.2 23.7	84 52.6 48.0	322 52.4 27.4	32 11.2 45.5	Venus 339 34.4 14 53
23	144 05.6	121 38.1 24.9	99 53.5 48.4	337 55.2 27.5	47 13.7 45.5	Mars 317 03.2 16 22
						Jupiter 193 35.4 0 37
						Saturn 263 06.3 19 56
	h m					
Mer.Pass. 13	29.1	v -0.1 d 1.2	v 0.9 d 0.5	v 2.8 d 0.1	v 2.5 d 0.0	



## FEBRUARY 27, 28, 29 (FRI., SAT., SUN.)

UT	SUN		MOON						Lat.	Twilight		Sunrise	Moonrise			
	GHA	Dec	GHA	<i>v</i>	Dec	<i>d</i>	HP	Naut.		Civil	27		28	29	1	
F R I D A Y	27 00	176 46.3 S 8 40.3	103 24.8 13.4	N20	07.3	9.6	54.4	N 72	05 18	06 36	07 46					
	01	191 46.4 39.3	117 57.2 13.4	20	16.9	9.5	54.4	N 70	05 22	06 33	07 35					
	02	206 46.5 38.4	132 29.6 13.3	20	26.4	9.4	54.4	68	05 26	06 30	07 26	06 30				
	03	221 46.6 37.4	147 01.9 13.3	20	35.8	9.4	54.4	66	05 28	06 27	07 19	07 18				
	04	236 46.7 36.5	161 34.2 13.2	20	45.2	9.2	54.4	64	05 30	06 25	07 13	07 49	07 35			
	05	251 46.8 35.6	176 06.4 13.2	20	54.4	9.2	54.4	62	05 32	06 23	07 08	08 13	08 13	08 19	08 44	
	06	266 46.9 S 8 34.6	190 38.6 13.1	N21	03.6	9.0	54.4	60	05 33	06 21	07 03	08 32	08 41	08 59	09 35	
	07	281 47.0 33.7	205 10.7 13.1	21	12.6	9.0	54.4	N 58	05 35	06 20	06 59	08 47	09 02	09 26	10 07	
	08	296 47.1 32.8	219 42.8 13.0	21	21.6	8.9	54.4	56	05 35	06 18	06 56	09 01	09 20	09 48	10 30	
	09	311 47.2 31.8	234 14.8 13.0	21	30.5	8.8	54.3	54	05 36	06 17	06 53	09 13	09 34	10 06	10 50	
	10	326 47.4 30.9	248 46.8 12.9	21	39.3	8.7	54.3	52	05 37	06 16	06 50	09 23	09 47	10 21	11 06	
	11	341 47.5 29.9	263 18.7 12.8	21	48.0	8.5	54.3	50	05 37	06 14	06 47	09 32	09 59	10 34	11 20	
	12	356 47.6 S 8 29.0	277 50.5 12.8	N21	56.5	8.5	54.3	45	05 38	06 11	06 41	09 52	10 23	11 01	11 48	
	13	11 47.7 28.1	292 22.3 12.8	22	05.0	8.4	54.3	N 40	05 37	06 09	06 36	10 08	10 42	11 22	12 11	
	14	26 47.8 27.1	306 54.1 12.7	22	13.4	8.3	54.3	35	05 37	06 06	06 32	10 21	10 58	11 40	12 29	
	15	41 47.9 26.2	321 25.8 12.6	22	21.7	8.2	54.3	30	05 36	06 04	06 28	10 33	11 12	11 56	12 45	
	16	56 48.0 25.2	335 57.4 12.6	22	29.9	8.1	54.3	20	05 33	05 59	06 21	10 54	11 36	12 22	13 12	
	17	71 48.1 24.3	350 29.0 12.6	22	38.0	8.0	54.3	N 10	05 29	05 54	06 15	11 11	11 56	12 44	13 35	
	18	86 48.2 S 8 23.4	5 00.6 12.5	N22	46.0	7.9	54.3	0	05 24	05 48	06 09	11 28	12 16	13 05	13 57	
	19	101 48.3 22.4	19 32.1 12.4	22	53.9	7.8	54.3	S 10	05 17	05 42	06 03	11 45	12 35	13 27	14 19	
	20	116 48.4 21.5	34 03.5 12.4	23	01.7	7.7	54.3	20	05 09	05 35	05 57	12 03	12 56	13 49	14 42	
	21	131 48.5 20.5	48 34.9 12.3	23	09.4	7.6	54.3	30	04 57	05 25	05 50	12 24	13 20	14 16	15 09	
	22	146 48.7 19.6	63 06.2 12.3	23	17.0	7.5	54.3	35	04 49	05 20	05 45	12 36	13 35	14 32	15 25	
	23	161 48.8 18.7	77 37.5 12.2	23	24.5	7.4	54.3	40	04 40	05 13	05 40	12 50	13 51	14 50	15 44	
24							45	04 28	05 04	05 35	13 07	14 11	15 12	16 06		
S A T U R D A Y	28 00	176 48.9 S 8 17.7	92 08.7 12.1	N23	31.9	7.3	54.3	S 50	04 13	04 54	05 28	13 28	14 37	15 40	16 35	
	01	191 49.0 16.8	106 39.8 12.1	23	39.2	7.1	54.3	52	04 06	04 49	05 25	13 38	14 49	15 54	16 49	
	02	206 49.1 15.8	121 10.9 12.1	23	46.3	7.1	54.3	54	03 57	04 44	05 21	13 50	15 03	16 10	17 05	
	03	221 49.2 14.9	135 42.0 12.0	23	53.4	7.0	54.3	56	03 48	04 38	05 17	14 03	15 19	16 28	17 25	
	04	236 49.3 14.0	150 13.0 11.9	24	00.4	6.8	54.2	58	03 37	04 31	05 13	14 18	15 39	16 52	17 49	
	05	251 49.4 13.0	164 43.9 11.9	24	07.2	6.7	54.2	S 60	03 24	04 23	05 08	14 36	16 03	17 23	18 21	
	06	266 49.5 S 8 12.1	179 14.8 11.9	N24	13.9	6.7	54.2									
	07	281 49.7 11.1	193 45.7 11.8	24	20.6	6.5	54.2	Lat.	Sunset	Twilight		Moonset				
	08	296 49.8 10.2	208 16.5 11.7	24	27.1	6.4	54.2			Civil	Naut.	27	28	29	1	
	09	311 49.9 09.2	222 47.2 11.7	24	33.5	6.3	54.2									
	10	326 50.0 08.3	237 17.9 11.6	24	39.8	6.2	54.2									
	11	341 50.1 07.4	251 48.5 11.6	24	46.0	6.1	54.2									
	12	356 50.2 S 8 06.4	266 19.1 11.5	N24	52.1	5.9	54.2	N 72	16 42	17 52	19 10					
	13	11 50.3 05.5	280 49.6 11.4	24	58.0	5.9	54.2	N 70	16 52	17 55	19 05					
	14	26 50.5 04.5	295 20.0 11.5	25	03.9	5.7	54.2	68	17 00	17 57	19 02	03 48				
	15	41 50.6 03.6	309 50.5 11.3	25	09.6	5.7	54.2	66	17 07	18 00	18 59	03 00				
	16	56 50.7 02.6	324 20.8 11.3	25	15.3	5.5	54.2	64	17 13	18 02	18 57	02 30	04 22			
	17	71 50.8 01.7	338 51.1 11.3	25	20.8	5.4	54.2	62	17 19	18 03	18 55	02 07	03 44	05 21	06 43	
	18	86 50.9 S 8 00.8	353 21.4 11.2	N25	26.2	5.2	54.2	60	17 23	18 05	18 53	01 49	03 17	04 41	05 51	
	19	101 51.0 7 59.8	7 51.6 11.2	25	31.4	5.2	54.3	N 58	17 27	18 07	18 52	01 34	02 57	04 14	05 20	
	20	116 51.1 58.9	22 21.8 11.1	25	36.6	5.0	54.3	56	17 31	18 08	18 51	01 21	02 39	03 53	04 56	
	21	131 51.3 57.9	36 51.9 11.0	25	41.6	4.9	54.3	54	17 34	18 09	18 50	01 10	02 25	03 35	04 37	
	22	146 51.4 57.0	51 21.9 11.0	25	46.5	4.8	54.3	52	17 37	18 11	18 50	01 00	02 12	03 20	04 21	
	23	161 51.5 56.0	65 51.9 11.0	25	51.3	4.7	54.3	50	17 39	18 12	18 49	00 52	02 01	03 07	04 07	
24							45	17 45	18 15	18 49	00 33	01 38	02 41	03 38		
S U N D A Y	29 00	176 51.6 S 7 55.1	80 21.9 10.9	N25	56.0	4.6	54.3	N 40	17 50	18 17	18 49	00 18	01 20	02 20	03 16	
	01	191 51.7 54.1	94 51.8 10.9	26	00.6	4.4	54.3	35	17 54	18 20	18 49	00 06	01 04	02 02	02 58	
	02	206 51.8 53.2	109 21.7 10.8	26	05.0	4.4	54.3	30	17 58	18 22	18 50	24 51	00 51	01 47	02 42	
	03	221 52.0 52.2	123 51.5 10.8	26	09.4	4.1	54.3	20	18 04	18 27	18 52	24 28	00 28	01 22	02 15	
	04	236 52.1 51.3	138 21.3 10.7	26	13.5	4.1	54.3	N 10	18 10	18 32	18 56	24 09	00 09	01 00	01 52	
	05	251 52.2 50.3	152 51.0 10.7	26	17.6	4.0	54.3	0	18 16	18 37	19 01	23 51	24 39	00 39	01 30	
	06	266 52.3 S 7 49.4	167 20.7 10.6	N26	21.6	3.8	54.3	S 10	18 22	18 43	19 08	23 33	24 19	00 19	01 09	
	07	281 52.4 48.5	181 50.3 10.6	26	25.4	3.7	54.3	20	18 28	18 50	19 16	23 13	23 57	24 45	00 45	
	08	296 52.5 47.5	196 19.9 10.5	26	29.1	3.6	54.3	30	18 35	18 59	19 28	22 51	23 32	24 19	00 19	
	09	311 52.7 46.6	210 49.4 10.5	26	32.7	3.4	54.3	35	18 39	19 05	19 36	22 38	23 17	24 03	00 03	
	10	326 52.8 45.6	225 18.9 10.5	26	36.1	3.4	54.3	40	18 44	19 12	19 45	22 23	23 00	23 44	24 36	
	11	341 52.9 44.7	239 48.4 10.4	26	39.5	3.2	54.3	45	18 50	19 20	19 56	22 05	22 39	23 22	24 14	
	12	356 53.0 S 7 43.7	254 17.8 10.4	N26	42.7	3.0	54.3	S 50	18 56	19 30	20 11	21 43	22 14	22 54	23 45	
	13	11 53.1 42.8	268 47.2 10.3	26	45.7	3.0	54.3	52	19 00	19 35	20 18	21 33	22 01	22 40	23 31	
	14	26 53.3 41.8	283 16.5 10.3	26	48.7	2.8	54.4	54	19 03	19 40	20 26	21 21	21 47	22 24	23 15	
	15	41 53.4 40.9	297 45.8 10.3	26	51.5	2.7	54.4	56	19 07	19 46	20 35	21 07	21 30	22 05	22 56	
	16	56 53.5 39.9	312 15.1 10.2	26	54.2	2.6	54.4	58	19 11	19 53	20 46	20 52	21 10	21 41	22 32	
	17	71 53.6 39.0	326 44.3 10.2	26	56.8	2.4	54.4	S 60	19 16	20 01	20 58	20 33	20 45	21 10	21 59	
	18	86 53.7 S 7 38.0	341 13.5 10.1	N26	59.2	2.3	54.4									
	19	101 53.9 37.1	355 42.6 10.1	27	01.5	2.2	54.4									
	20	116 54.0 36.1	10 11.7 10.1	27	03.7	2.0	54.4	Day	Eqn. of Time		Mer.	Mer. Pass.				
	21	131 54.1 35.2	24 40.8 10.0	27	05.7	1.9	54.4		00 <sup>h</sup>	12 <sup>h</sup>	Pass.	Upper	Lower	Age	Phase	
	22	146 54.2 34.2	39 09.8 10.0	27	07.6	1.8	54.4	d	m s	m s	h m	h m	h m	d	%	
	23	161 54.3 33.3	53 38.8 10.0	N27	09.4	1.7	54.4	27	12 55	12 50	12 13	17 39	05 16	07 44		
							28	12 45	12 39	12 13	18 27	06 03	08 54			
							29	12 34	12 28	12 12	19 18	06 52	09 63			
	SD 16.2	d 0.9	SD	14.8	14.8	14.8										



## MARCH 1, 2, 3 (MON., TUES., WED.)

UT	ARIES	VENUS -4.2	MARS +1.1	JUPITER -2.5	SATURN -0.1	STARS
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name SHA Dec
<b>M O N D A Y</b>						
100	159 08.1	136 38.0 N10 26.1	114 54.3 N17 48.9	352 57.9 N 7 27.6	62 16.2 N22 45.6	Acamar 315 23.9 S40 17.5
01	174 10.5	151 37.8 27.3	129 55.2 49.4	8 00.7 27.8	77 18.7 45.6	Achernar 335 32.3 S57 13.2
02	189 13.0	166 37.7 28.5	144 56.0 49.9	23 03.5 27.9	92 21.2 45.6	Acrux 173 17.2 S63 07.2
03	204 15.5	181 37.6 29.8	159 56.9 50.3	38 06.2 28.0	107 23.7 45.6	Adhara 255 18.1 S28 58.8
04	219 17.9	196 37.5 31.0	174 57.8 50.8	53 09.0 28.2	122 26.2 45.6	Aldebaran 290 57.8 N16 31.1
05	234 20.4	211 37.3 32.2	189 58.6 51.3	68 11.8 28.3	137 28.7 45.6	
06	249 22.9	226 37.2 N10 33.4	204 59.5 N17 51.8	83 14.5 N 7 28.4	152 31.2 N22 45.6	Alioth 166 26.3 N55 56.1
07	264 25.3	241 37.1 34.6	220 00.3 52.2	98 17.3 28.5	167 33.7 45.6	Alkaid 153 04.1 N49 17.3
08	279 27.8	256 36.9 35.8	235 01.2 52.7	113 20.1 28.7	182 36.2 45.6	Al Na'ir 27 53.1 S46 56.6
09	294 30.3	271 36.8 37.0	250 02.0 53.2	128 22.8 28.8	197 38.7 45.6	Alnilam 275 53.7 S 1 12.0
10	309 32.7	286 36.7 38.2	265 02.9 53.7	143 25.6 28.9	212 41.2 45.6	Alphard 218 03.0 S 8 40.6
11	324 35.2	301 36.5 39.5	280 03.7 54.1	158 28.4 29.1	227 43.7 45.6	
12	339 37.6	316 36.4 N10 40.7	295 04.6 N17 54.6	173 31.1 N 7 29.2	242 46.2 N22 45.7	Alphecca 126 17.0 N26 41.7
13	354 40.1	331 36.3 41.9	310 05.5 55.1	188 33.9 29.3	257 48.7 45.7	Alpheratz 357 51.5 N29 06.7
14	9 42.6	346 36.2 43.1	325 06.3 55.6	203 36.7 29.4	272 51.2 45.7	Altair 62 15.6 N 8 52.5
15	24 45.0	1 36.0 44.3	340 07.2 56.0	218 39.4 29.6	287 53.7 45.7	Ankaa 353 23.1 S42 17.3
16	39 47.5	16 35.9 45.5	355 08.0 56.5	233 42.2 29.7	302 56.2 45.7	Antares 112 35.3 S26 26.5
17	54 50.0	31 35.8 46.7	10 08.9 57.0	248 45.0 29.8	317 58.7 45.7	
18	69 52.4	46 35.6 N10 47.9	25 09.7 N17 57.5	263 47.7 N 7 30.0	333 01.2 N22 45.7	Arcturus 146 02.1 N19 09.4
19	84 54.9	61 35.5 49.1	40 10.6 57.9	278 50.5 30.1	348 03.6 45.7	Atria 107 43.8 S69 01.9
20	99 57.4	76 35.4 50.3	55 11.4 58.4	293 53.2 30.2	3 06.1 45.7	Avior 234 20.7 S59 31.5
21	114 59.8	91 35.3 51.5	70 12.3 58.9	308 56.0 30.3	18 08.6 45.7	Bellatrix 278 39.8 N 6 21.2
22	130 02.3	106 35.1 52.7	85 13.1 59.3	323 58.8 30.5	33 11.1 45.7	Betelgeuse 271 09.1 N 7 24.5
23	145 04.8	121 35.0 54.0	100 14.0 59.8	339 01.5 30.6	48 13.6 45.7	
<b>T U E S D A Y</b>						
200	160 07.2	136 34.9 N10 55.2	115 14.9 N18 00.3	354 04.3 N 7 30.7	63 16.1 N22 45.7	Canopus 263 59.2 S52 42.1
01	175 09.7	151 34.7 56.4	130 15.7 00.8	9 07.1 30.9	78 18.6 45.8	Capella 280 45.2 N46 00.3
02	190 12.1	166 34.6 57.6	145 16.6 01.2	24 09.8 31.0	93 21.1 45.8	Deneb 49 37.0 N45 17.4
03	205 14.6	181 34.5 58.8	160 17.4 01.7	39 12.6 31.1	108 23.6 45.8	Denebola 182 40.7 N14 32.9
04	220 17.1	196 34.3 59.9	175 18.3 02.2	54 15.4 31.2	123 26.1 45.8	Diphda 349 03.4 S17 58.1
05	235 19.5	211 34.2 01.2	190 19.1 02.6	69 18.1 31.4	138 28.6 45.8	
06	250 22.0	226 34.1 N11 02.4	205 20.0 N18 03.1	84 20.9 N 7 31.5	153 31.1 N22 45.8	Dubhe 193 59.6 N61 43.7
07	265 24.5	241 34.0 03.6	220 20.8 03.6	99 23.7 31.6	168 33.6 45.8	Elnath 278 21.8 N28 36.8
08	280 26.9	256 33.8 04.8	235 21.7 04.1	114 26.4 31.8	183 36.0 45.8	Eltanin 90 49.7 N51 28.9
09	295 29.4	271 33.7 06.0	250 22.5 04.5	129 29.2 31.9	198 38.5 45.8	Enif 33 54.6 N 9 53.4
10	310 31.9	286 33.6 07.2	265 23.4 05.0	144 32.0 32.0	213 41.0 45.8	Fomalhaut 15 32.3 S29 36.2
11	325 34.3	301 33.4 08.4	280 24.2 05.5	159 34.7 32.2	228 43.5 45.8	
12	340 36.8	316 33.3 N11 09.6	295 25.1 N18 05.9	174 37.5 N 7 32.3	243 46.0 N22 45.8	Gacrux 172 08.9 S57 08.1
13	355 39.3	331 33.2 10.8	310 25.9 06.4	189 40.3 32.4	258 48.5 45.8	Gienah 175 59.6 S17 33.9
14	10 41.7	346 33.1 12.0	325 26.8 06.9	204 43.0 32.5	273 51.0 45.9	Hadar 148 58.2 S60 23.4
15	25 44.2	1 32.9 13.2	340 27.6 07.3	219 45.8 32.7	288 53.5 45.9	Hamal 328 09.3 N23 28.9
16	40 46.6	16 32.8 14.4	355 28.5 07.8	234 48.6 32.8	303 56.0 45.9	Kaus Aust. 83 53.6 S34 23.0
17	55 49.1	31 32.7 15.6	10 29.3 08.3	249 51.3 32.9	318 58.5 45.9	
18	70 51.6	46 32.5 N11 16.8	25 30.2 N18 08.7	264 54.1 N 7 33.1	334 00.9 N22 45.9	Kochab 137 18.7 N74 08.0
19	85 54.0	61 32.4 18.0	40 31.0 09.2	279 56.9 33.2	349 03.4 45.9	Markab 13 46.0 N15 13.5
20	100 56.5	76 32.3 19.2	55 31.9 09.7	294 59.6 33.3	4 05.9 45.9	Menkar 314 22.8 N 4 06.3
21	115 59.0	91 32.2 20.4	70 32.7 10.1	310 02.4 33.4	19 08.4 45.9	Menkent 148 16.1 S36 23.4
22	131 01.4	106 32.0 21.6	85 33.6 10.6	325 05.2 33.6	34 10.9 45.9	Miaplacidus 221 40.8 S69 44.1
23	146 03.9	121 31.9 22.8	100 34.4 11.1	340 08.0 33.7	49 13.4 45.9	
<b>W E D N E S D A Y</b>						
300	161 06.4	136 31.8 N11 24.0	115 35.3 N18 11.5	355 10.7 N 7 33.8	64 15.9 N22 45.9	Mirak 308 51.1 N49 52.7
01	176 08.8	151 31.6 25.2	130 36.1 12.0	10 13.5 34.0	79 18.4 45.9	Nunki 76 07.5 S26 17.6
02	191 11.3	166 31.5 26.4	145 37.0 12.5	25 16.3 34.1	94 20.8 45.9	Peacock 53 31.0 S56 43.3
03	206 13.8	181 31.4 27.6	160 37.8 12.9	40 19.0 34.2	109 23.3 46.0	Pollux 243 36.4 N28 01.1
04	221 16.2	196 31.3 28.7	175 38.7 13.4	55 21.8 34.3	124 25.8 46.0	Procyon 245 07.1 N 5 12.9
05	236 18.7	211 31.1 29.9	190 39.5 13.9	70 24.6 34.5	139 28.3 46.0	
06	251 21.1	226 31.0 N11 31.1	205 40.4 N18 14.3	85 27.3 N 7 34.6	154 30.8 N22 46.0	Rasalhague 96 13.3 N12 33.1
07	266 23.6	241 30.9 32.3	220 41.2 14.8	100 30.1 34.7	169 33.3 46.0	Regulus 207 50.9 N11 56.8
08	281 26.1	256 30.7 33.5	235 42.1 15.3	115 32.9 34.9	184 35.8 46.0	Rigel 281 19.0 S 8 11.9
09	296 28.5	271 30.6 34.7	250 42.9 15.7	130 35.6 35.0	199 38.2 46.0	Rigel Kent. 140 01.7 S60 51.0
10	311 31.0	286 30.5 35.9	265 43.8 16.2	145 38.4 35.1	214 40.7 46.0	Sabik 102 21.0 S15 43.9
11	326 33.5	301 30.4 37.1	280 44.6 16.7	160 41.2 35.2	229 43.2 46.0	
12	341 35.9	316 30.2 N11 38.3	295 45.5 N18 17.1	175 43.9 N 7 35.4	244 45.7 N22 46.0	Schedar 349 49.7 N56 33.6
13	356 38.4	331 30.1 39.5	310 46.3 17.6	190 46.7 35.5	259 48.2 46.0	Shaula 96 31.9 S37 06.4
14	11 40.9	346 30.0 40.7	325 47.2 18.0	205 49.5 35.6	274 50.7 46.0	Sirius 258 40.0 S16 43.4
15	26 43.3	1 29.8 41.8	340 48.0 18.5	220 52.2 35.8	289 53.2 46.0	Spica 158 38.8 S11 11.0
16	41 45.8	16 29.7 43.0	355 48.9 19.0	235 55.0 35.9	304 55.6 46.1	Suhail 222 57.5 S43 27.0
17	56 48.2	31 29.6 44.2	10 49.7 19.4	250 57.8 36.0	319 58.1 46.1	
18	71 50.7	46 29.5 N11 45.4	25 50.6 N18 19.9	266 00.5 N 7 36.1	335 00.6 N22 46.1	Vega 80 44.1 N38 46.9
19	86 53.2	61 29.3 46.6	40 51.4 20.4	281 03.3 36.3	350 03.1 46.1	Zuben'ubi 137 13.4 S16 03.6
20	101 55.6	76 29.2 47.8	55 52.3 20.8	296 06.1 36.4	5 05.6 46.1	
21	116 58.1	91 29.1 49.0	70 53.1 21.3	311 08.8 36.5	20 08.1 46.1	
22	132 00.6	106 29.0 50.2	85 54.0 21.7	326 11.6 36.7	35 10.5 46.1	
23	147 03.0	121 28.8 51.3	100 54.8 22.2	341 14.4 36.8	50 13.0 46.1	
	h m					
Mer. Pass.	13 17.3	0 0.1 d 1.2	0 0.9 d 0.5	0 2.8 d 0.1	0 2.5 d 0.0	
						SHA Mer. Pass.
						Venus 336 27.6 14 54
						Mars 315 07.6 16 18
						Jupiter 193 57.1 0 24
						Saturn 263 08.9 19 44



## MARCH 1, 2, 3 (MON., TUES., WED.)

UT	SUN							MOON							Lat.	Twilight			Sunrise	Moonrise						
	GHA		Dec		GHA		Dec		d		HP		Naut.	Civil		1	2	3		4						
d h	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'
MONDAY	100	176	54.5	S 7	32.3	68	07.8	10.0	N27	11.1	1.5	54.4	N 72	05 03	06 21	07 30	<div></div>	<div></div>	<div></div>	<div></div>						
	01	191	54.6		31.4	82	36.8	9.9	27	12.6	1.4	54.5	N 70	05 09	06 19	07 21	<div></div>	<div></div>	<div></div>	<div></div>						
	02	206	54.7		30.4	97	05.7	9.9	27	14.0	1.2	54.5	68	05 14	06 18	07 14	<div></div>	<div></div>	<div></div>	<div></div>					11 14	
	03	221	54.8		29.5	111	34.6	9.8	27	15.2	1.1	54.5	66	05 17	06 17	07 08	<div></div>	<div></div>	<div></div>	<div></div>					12 19	
	04	236	55.0		28.5	126	03.4	9.8	27	16.3	1.0	54.5	64	05 20	06 15	07 03	<div></div>	<div></div>	<div></div>	<div></div>					12 53	
	05	251	55.1		27.6	140	32.2	9.8	27	17.3	0.9	54.5	62	05 23	06 14	06 59	08 44	09 55	11 34	13 18						
	06	266	55.2	S 7	26.6	155	01.0	9.8	N27	18.2	0.7	54.5	60	05 25	06 13	06 55	09 35	10 39	12 04	13 38						
	07	281	55.3		25.7	169	29.8	9.8	27	18.9	0.6	54.5	N 58	05 27	06 12	06 51	10 07	11 08	12 26	13 54						
	08	296	55.4		24.7	183	58.6	9.7	27	19.5	0.4	54.5	56	05 28	06 11	06 48	10 30	11 30	12 45	14 06						
	09	311	55.6		23.8	198	27.3	9.7	27	19.9	0.3	54.6	54	05 29	06 10	06 46	10 50	11 48	13 00	14 20						
	10	326	55.7		22.8	212	56.0	9.7	27	20.2	0.2	54.6	52	05 30	06 09	06 43	11 06	12 04	13 13	14 30						
	11	341	55.8		21.9	227	24.7	9.6	27	20.4	0.0	54.6	50	05 31	06 08	06 41	11 20	12 17	13 25	14 39						
	12	356	55.9	S 7	20.9	241	53.3	9.7	N27	20.4	0.1	54.6	45	05 32	06 06	06 36	11 48	12 45	13 49	14 59						
	13	371	56.1		20.0	256	22.0	9.6	27	20.3	0.2	54.6	N 40	05 33	06 04	06 32	12 11	13 06	14 08	15 15						
	14	386	56.2		19.0	270	50.6	9.6	27	20.1	0.4	54.6	35	05 33	06 03	06 28	12 29	13 24	14 24	15 28						
	15	401	56.3		18.0	285	19.2	9.6	27	19.7	0.5	54.6	30	05 33	06 01	06 25	12 45	13 40	14 38	15 39						
	16	416	56.4		17.1	299	47.8	9.6	27	19.2	0.6	54.7	20	05 31	05 57	06 19	13 12	14 06	15 02	15 59						
	17	431	56.6		16.1	314	16.4	9.5	27	18.6	0.8	54.7	N 10	05 28	05 53	06 14	13 35	14 28	15 22	16 16						
	18	446	56.7	S 7	15.2	328	44.9	9.6	N27	17.8	0.9	54.7	0	05 24	05 48	06 09	13 57	14 49	15 41	16 32						
	19	461	56.8		14.2	343	13.5	9.5	27	16.9	1.0	54.7	S 10	05 18	05 43	06 04	14 19	15 10	16 00	16 48						
	20	476	57.0		13.3	357	42.0	9.5	27	15.9	1.2	54.7	20	05 10	05 36	05 58	14 42	15 32	16 20	17 04						
	21	491	57.1		12.3	372	10.5	9.5	27	14.7	1.4	54.7	30	04 59	05 28	05 52	15 09	15 58	16 43	17 24						
	22	506	57.2		11.4	386	39.0	9.5	27	13.3	1.4	54.8	35	04 52	05 22	05 48	15 25	16 14	16 57	17 35						
	23	521	57.3		10.4	401	07.5	9.5	27	11.9	1.6	54.8	40	04 43	05 16	05 44	15 44	16 31	17 13	17 48						
24	536	57.4		9.4	416	38.0	9.5	27	10.3	1.8	54.8	45	04 33	05 09	05 39	16 06	16 53	17 31	18 03							
25	551	57.5	S 7	09.5	55	36.0	9.5	N27	10.3	1.8	54.8	S 50	04 19	04 59	05 33	16 35	17 20	17 54	18 21							
26	566	57.6		08.5	70	04.5	9.5	27	08.5	1.8	54.8	52	04 12	04 55	05 30	16 49	17 33	18 05	18 30							
27	581	57.7		07.5	84	33.0	9.4	27	06.7	2.1	54.8	54	04 05	04 50	05 27	17 05	17 48	18 18	18 39							
28	596	57.8		06.6	99	01.4	9.5	27	04.6	2.1	54.8	56	03 56	04 45	05 24	17 25	18 05	18 32	18 50							
29	611	58.0		05.6	113	29.9	9.5	27	02.5	2.3	54.9	58	03 46	04 38	05 20	17 49	18 26	18 49	19 03							
30	626	58.1		04.7	127	58.4	9.4	27	00.2	2.4	54.9	S 60	03 35	04 31	05 16	18 21	18 53	19 09	19 17							
31	641	58.2	S 7	03.7	142	26.8	9.5	N26	57.8	2.6	54.9	Lat.		Sunset		Twilight		Moonset				1	2	3	4	
32	656	58.4		02.8	156	55.3	9.5	26	55.2	2.7	54.9															
33	671	58.5		01.8	171	23.8	9.4	26	52.5	2.9	54.9															
34	686	58.6		00.9	185	52.2	9.5	26	49.6	2.9	55.0															
35	701	58.7		00.0	200	20.7	9.5	26	46.7	3.2	55.0															
36	716	58.9		58.9	214	49.2	9.5	26	43.5	3.2	55.0	N 72	16 56	18 05	19 24	<div></div>	<div></div>	<div></div>	<div></div>							
37	731	59.0	S 6	58.0	229	17.7	9.4	N26	40.3	3.4	55.0	N 70	17 05	18 07	19 18	<div></div>	<div></div>	<div></div>	<div></div>							
38	746	59.1		57.0	243	46.1	9.5	26	36.9	3.5	55.0	68	17 12	18 08	19 13	<div></div>	<div></div>	<div></div>	<div></div>					09 38		
39	761	59.3		56.1	258	14.6	9.5	26	33.4	3.7	55.1	66	17 18	18 09	19 09	<div></div>	<div></div>	<div></div>	<div></div>					08 33		
40	776	59.4		55.1	272	43.1	9.5	26	29.7	3.8	55.1	64	17 23	18 10	19 05	<div></div>	<div></div>	<div></div>	<div></div>					07 57		
41	791	59.5		54.2	287	11.6	9.5	26	25.9	4.0	55.1	62	17 27	18 12	19 03	06 43	07 20	07 30	07 31							
42	806	59.7		53.2	301	40.1	9.6	26	21.9	4.0	55.1	60	17 31	18 12	19 01	05 51	06 36	06 59	07 11							
43	821	59.8	S 6	52.2	316	08.7	9.5	N26	17.9	4.3	55.1	N 58	17 34	18 13	18 59	05 20	06 07	06 36	06 54							
44	836	59.9		51.3	330	37.2	9.5	26	13.6	4.3	55.2	56	17 37	18 14	18 57	04 56	05 44	06 18	06 40							
45	851	60.0		50.3	345	05.7	9.6	26	09.3	4.5	55.2	54	17 40	18 15	18 56	04 37	05 26	06 02	06 27							
46	866	60.2		49.4	359	34.3	9.6	26	04.8	4.6	55.2	52	17 42	18 16	18 55	04 21	05 10	05 48	06 17							
47	881	60.3		48.4	374	02.9	9.6	26	00.2	4.8	55.2	50	17 44	18 17	18 54	04 07	04 57	05 36	06 07							
48	896	60.4		47.5	388	31.5	9.6	25	55.4	4.9	55.2	45	17 49	18 19	18 53	03 38	04 29	05 11	05 46							
49	911	00.6	S 6	46.5	43	00.1	9.6	N25	50.5	5.0	55.3	N 40	17 53	18 20	18 52	03 16	04 07	04 51	05 29							
50	926	00.7		45.5	57	28.7	9.7	25	45.5	5.2	55.3	35	17 57	18 22	18 51	02 58	03 49	04 35	05 15							
51	941	00.8		44.6	71	57.4	9.6	25	40.3	5.3	55.3	30	18 00	18 24	18 52	02 42	03 33	04 20	05 03							
52	956	01.0		43.6	86	26.0	9.7	25	35.0	5.5	55.3	20	18 06	18 28	18 53	02 15	03 07	03 56	04 42							
53	971	01.1		42.7	100	54.7	9.7	25	29.5	5.5	55.4	N 10	18 11	18 32	18 56	01 52	02 44	03 34	04 23							
54	986	01.2		41.7	115	23.4	9.7	25	24.0	5.7	55.4	0	18 15	18 36	19 00	01 30	02 22	03 14	04 06							
55	1001	01.4	S 6	40.7	129	52.1	9.8	N25	18.3	5.9	55.4	S 10	18 20	18 41	19 06	01 09	02 01	02 54	03 48							
56	1016	01.5		39.8	144	20.9	9.7	25	12.4	6.0	55.4	20	18 26	18 48	19 14	00 45	01 38	02 33	03 29							
57	1031	01.6		38.8	158	49.6	9.8	25	06.4	6.1	55.5	30	18 32	18 56	19 25	00 19	01 11	02 07	03 05							
58	1046	01.8		37.9	173	18.4	9.8	25	00.3	6.2	55.5	35	18 35	19 01	19 31	00 03	00 55	01 53	02 57							
59	1061	01.9		37																						



## MARCH 10, 11, 12 (WED., THURS., FRI.)

UT	ARIES	VENUS -4.3	MARS +1.2	JUPITER -2.5	SATURN +0.0	STARS		
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name	SHA Dec
1000	168 00.3	136 10.5 N14 38.0	117 56.1 N19 26.5	2 55.5 N 7 55.2	71 10.8 N22 47.1	Acamar	315 24.0 S40 17.5	
01	183 02.8	151 10.4 39.1	132 56.9 26.9	17 58.3 55.3	86 13.2 47.1	Achernar	335 32.4 S57 13.2	
02	198 05.2	166 10.2 40.2	147 57.7 27.4	33 01.1 55.5	101 15.7 47.1	Acrux	173 17.2 S63 07.3	
03	213 07.7	181 10.1 41.3	162 58.6 27.8	48 03.8 55.6	116 18.1 47.1	Adhara	255 18.1 S28 58.8	
04	228 10.2	196 10.0 42.4	177 59.4 28.2	63 06.6 55.7	131 20.6 47.1	Aldebaran	290 57.8 N16 31.1	
05	243 12.6	211 09.9 43.6	193 00.2 28.6	78 09.4 55.8	146 23.0 47.1			
06	258 15.1	226 09.7 N14 44.7	208 01.1 N19 29.1	93 12.1 N 7 56.0	161 25.5 N22 47.1	Alioth	166 26.3 N55 56.1	
07	273 17.6	241 09.6 45.8	223 01.9 29.5	108 14.9 56.1	176 27.9 47.1	Alkaid	153 04.0 N49 17.3	
08	288 20.0	256 09.5 46.9	238 02.7 29.9	123 17.6 56.2	191 30.4 47.1	Al Na'ir	27 53.1 S46 56.6	
09	303 22.5	271 09.4 48.0	253 03.5 30.3	138 20.4 56.3	206 32.8 47.1	Alnilam	275 53.8 S 1 12.0	
10	318 25.0	286 09.3 49.1	268 04.4 30.8	153 23.2 56.5	221 35.3 47.1	Alphard	218 03.0 S 8 40.6	
11	333 27.4	301 09.1 50.2	283 05.2 31.2	168 25.9 56.6	236 37.7 47.1			
12	348 29.9	316 09.0 N14 51.3	298 06.0 N19 31.6	183 28.7 N 7 56.7	251 40.2 N22 47.1	Alphecca	126 17.0 N26 41.7	
13	3 32.4	331 08.9 52.4	313 06.8 32.0	198 31.5 56.8	266 42.6 47.1	Alpheratz	357 51.5 N29 06.7	
14	18 34.8	346 08.8 53.5	328 07.6 32.4	213 34.2 57.0	281 45.1 47.1	Altair	62 15.6 N 8 52.5	
15	33 37.3	1 08.6 54.6	343 08.5 32.9	228 37.0 57.1	296 47.5 47.2	Ankaa	353 23.1 S42 17.2	
16	48 39.7	16 08.5 55.7	358 09.3 33.3	243 39.8 57.2	311 50.0 47.2	Antares	112 35.2 S26 26.5	
17	63 42.2	31 08.4 56.8	13 10.1 33.7	258 42.5 57.3	326 52.4 47.2			
18	78 44.7	46 08.3 N14 57.9	28 10.9 N19 34.1	273 45.3 N 7 57.5	341 54.9 N22 47.2	Arcturus	146 02.1 N19 09.4	
19	93 47.1	61 08.1 14 59.0	43 11.8 34.6	288 48.0 57.6	356 57.3 47.2	Atria	107 43.7 S69 01.9	
20	108 49.6	76 08.0 15 00.1	58 12.6 35.0	303 50.8 57.7	11 59.8 47.2	Avior	234 20.7 S59 31.5	
21	123 52.1	91 07.9 01.2	73 13.4 35.4	318 53.6 57.8	27 02.2 47.2	Bellatrix	278 39.8 N 6 21.2	
22	138 54.5	106 07.8 02.3	88 14.2 35.8	333 56.3 58.0	42 04.7 47.2	Betelgeuse	271 09.2 N 7 24.5	
23	153 57.0	121 07.6 03.4	103 15.1 36.2	348 59.1 58.1	57 07.1 47.2			
1100	168 59.5	136 07.5 N15 04.5	118 15.9 N19 36.7	4 01.9 N 7 58.2	72 09.6 N22 47.2	Canopus	263 59.3 S52 42.1	
01	184 01.9	151 07.4 05.6	133 16.7 37.1	19 04.6 58.3	87 12.0 47.2	Capella	280 45.3 N46 00.4	
02	199 04.4	166 07.3 06.7	148 17.5 37.5	34 07.4 58.5	102 14.5 47.2	Deneb	49 36.9 N45 17.4	
03	214 06.9	181 07.1 07.8	163 18.4 37.9	49 10.2 58.6	117 16.9 47.2	Denebola	182 40.7 N14 32.9	
04	229 09.3	196 07.0 08.9	178 19.2 38.3	64 12.9 58.7	132 19.4 47.2	Diphda	349 03.4 S17 58.0	
05	244 11.8	211 06.9 10.0	193 20.0 38.8	79 15.7 58.8	147 21.8 47.2			
06	259 14.2	226 06.8 N15 11.1	208 20.8 N19 39.2	94 18.4 N 7 59.0	162 24.3 N22 47.2	Dubhe	193 59.6 N61 43.7	
07	274 16.7	241 06.6 12.2	223 21.6 39.6	109 21.2 59.1	177 26.7 47.2	Elnath	278 21.9 N28 36.8	
08	289 19.2	256 06.5 13.3	238 22.5 40.0	124 24.0 59.2	192 29.1 47.2	Eltanin	90 49.6 N51 28.9	
09	304 21.6	271 06.4 14.4	253 23.3 40.4	139 26.7 59.3	207 31.6 47.3	Enif	33 54.6 N 9 53.4	
10	319 24.1	286 06.3 15.5	268 24.1 40.8	154 29.5 59.5	222 34.0 47.3	Fomalhaut	15 32.3 S29 36.2	
11	334 26.6	301 06.1 16.6	283 24.9 41.3	169 32.3 59.6	237 36.5 47.3			
12	349 29.0	316 06.0 N15 17.7	298 25.7 N19 41.7	184 35.0 N 7 59.7	252 38.9 N22 47.3	Gacrux	172 08.8 S57 08.1	
13	4 31.5	331 05.9 18.7	313 26.6 42.1	199 37.8 59.8	267 41.4 47.3	Gienah	175 59.6 S17 33.9	
14	19 34.0	346 05.8 19.8	328 27.4 42.5	214 40.6 7 59.9	282 43.8 47.3	Hadar	148 58.1 S60 23.5	
15	34 36.4	1 05.6 20.9	343 28.2 42.9	229 43.3 8 00.1	297 46.3 47.3	Hamal	328 09.3 N23 28.9	
16	49 38.9	16 05.5 22.0	358 29.0 43.3	244 46.1 00.2	312 48.7 47.3	Kaus Aust.	83 53.6 S34 23.0	
17	64 41.3	31 05.4 23.1	13 29.9 43.8	259 48.8 00.3	327 51.1 47.3			
18	79 43.8	46 05.3 N15 24.2	28 30.7 N19 44.2	274 51.6 N 8 00.4	342 53.6 N22 47.3	Kochab	137 18.5 N74 08.0	
19	94 46.3	61 05.1 25.3	43 31.5 44.6	289 54.4 00.6	357 56.0 47.3	Markab	13 46.0 N15 13.4	
20	109 48.7	76 05.0 26.4	58 32.3 45.0	304 57.1 00.7	12 58.5 47.3	Menkar	314 22.9 N 4 06.3	
21	124 51.2	91 04.9 27.4	73 33.1 45.4	319 59.9 00.8	28 00.9 47.3	Menkent	148 16.0 S36 23.4	
22	139 53.7	106 04.8 28.5	88 34.0 45.8	335 02.7 00.9	43 03.4 47.3	Miaplacidus	221 40.8 S69 44.1	
23	154 56.1	121 04.7 29.6	103 34.8 46.2	350 05.4 01.1	58 05.8 47.3			
1200	169 58.6	136 04.5 N15 30.7	118 35.6 N19 46.7	5 08.2 N 8 01.2	73 08.2 N22 47.3	Mirfak	308 51.2 N49 52.7	
01	185 01.1	151 04.4 31.8	133 36.4 47.1	20 10.9 01.3	88 10.7 47.3	Nunki	76 07.5 S26 17.6	
02	200 03.5	166 04.3 32.9	148 37.2 47.5	35 13.7 01.4	103 13.1 47.3	Peacock	53 30.9 S56 43.3	
03	215 06.0	181 04.2 33.9	163 38.1 47.9	50 16.5 01.6	118 15.6 47.4	Pollux	243 36.4 N28 01.1	
04	230 08.5	196 04.0 35.0	178 38.9 48.3	65 19.2 01.7	133 18.0 47.4	Procyon	245 07.2 N 5 12.9	
05	245 10.9	211 03.9 36.1	193 39.7 48.7	80 22.0 01.8	148 20.5 47.4			
06	260 13.4	226 03.8 N15 37.2	208 40.5 N19 49.1	95 24.7 N 8 01.9	163 22.9 N22 47.4	Rasalhague	96 13.2 N12 33.1	
07	275 15.8	241 03.7 38.3	223 41.3 49.6	110 27.5 02.0	178 25.3 47.4	Regulus	207 50.9 N11 56.8	
08	290 18.3	256 03.5 39.4	238 42.1 50.0	125 30.3 02.2	193 27.8 47.4	Rigel	281 19.1 S 8 11.9	
09	305 20.8	271 03.4 40.4	253 43.0 50.4	140 33.0 02.3	208 30.2 47.4	Rigel Kent.	140 01.6 S60 51.0	
10	320 23.2	286 03.3 41.5	268 43.8 50.8	155 35.8 02.4	223 32.7 47.4	Sabik	102 20.9 S15 43.9	
11	335 25.7	301 03.2 42.6	283 44.6 51.2	170 38.6 02.5	238 35.1 47.4			
12	350 28.2	316 03.0 N15 43.7	298 45.4 N19 51.6	185 41.3 N 8 02.7	253 37.5 N22 47.4	Schedar	349 49.7 N56 33.6	
13	5 30.6	331 02.9 44.7	313 46.2 52.0	200 44.1 02.8	268 40.0 47.4	Shaula	96 31.9 S37 06.4	
14	20 33.1	346 02.8 45.8	328 47.1 52.4	215 46.8 02.9	283 42.4 47.4	Sirius	258 40.1 S16 43.4	
15	35 35.6	1 02.7 46.9	343 47.9 52.8	230 49.6 03.0	298 44.9 47.4	Spica	158 38.7 S11 11.1	
16	50 38.0	16 02.6 48.0	358 48.7 53.3	245 52.4 03.2	313 47.3 47.4	Suhail	222 57.6 S43 27.1	
17	65 40.5	31 02.4 49.0	13 49.5 53.7	260 55.1 03.3	328 49.7 47.4			
18	80 43.0	46 02.3 N15 50.1	28 50.3 N19 54.1	275 57.9 N 8 03.4	343 52.2 N22 47.4	Vega	80 44.1 N38 46.8	
19	95 45.4	61 02.2 51.2	43 51.1 54.5	291 00.6 03.5	358 54.6 47.4	Zuben'ubi	137 13.4 S16 03.6	
20	110 47.9	76 02.1 52.3	58 52.0 54.9	306 03.4 03.6	13 57.0 47.4			
21	125 50.3	91 01.9 53.3	73 52.8 55.3	321 06.2 03.8	28 59.5 47.4			
22	140 52.8	106 01.8 54.4	88 53.6 55.7	336 08.9 03.9	44 01.9 47.5	Venus	327 08.0 h 14 56	
23	155 55.3	121 01.7 55.5	103 54.4 56.1	351 11.7 04.0	59 04.4 47.5	Mars	309 16.4 h 16 06	
						Jupiter	195 02.4 h 23 40	
						Saturn	263 10.1 h 19 08	
Mer. Pass. 12 41.9		$v -0.1 \quad d \quad 1.1$	$v \quad 0.8 \quad d \quad 0.4$	$v \quad 2.8 \quad d \quad 0.1$	$v \quad 2.4 \quad d \quad 0.0$			



## MARCH 10, 11, 12 (WED., THURS., FRI.)

UT	SUN				MOON							Lat.	Twilight		Sunrise	Moonrise							
	GHA		Dec		GHA		v	Dec	d	HP	Naut.		Civil	10		11	12	13					
	°	'			°	'													°	'			
WEDNESDAY	d h	°	'	°	'	°	'	°	'	°	'	°	'	h m	h m	h m	h m	h m	h m	h m	h m		
	00	177	25.4	S	4	03.5	320	48.4	11.1	S	9	55.2	15.3	59.1	N 72	04 15	05 36	06 43	25 47	01 47	■	■	
	01	192	25.6			02.5	335	18.5	11.1		10	10.5	15.3	59.1	N 70	04 26	05 39	06 39	24 59	00 59	■	■	
	02	207	25.8			01.5	349	48.6	10.9		10	25.8	15.2	59.1	68	04 35	05 41	06 36	24 28	00 28	03 41	■	
	03	222	25.9		4	00.5		4	18.5	11.0		10	41.0	15.2	59.1	66	04 43	05 43	06 34	24 06	00 06	02 30	■
	04	237	26.1		3	59.6		18	48.5	10.8		10	56.2	15.1	59.1	64	04 49	05 45	06 32	23 48	25 54	01 54	04 26
	05	252	26.2			58.6		33	18.3	10.8		11	11.3	15.0	59.1	62	04 54	05 46	06 30	23 34	25 29	01 29	03 30
	06	267	26.4	S	3	57.6		47	48.1	10.7	S	11	26.3	15.0	59.1	60	04 58	05 47	06 28	23 22	25 09	01 09	02 58
	07	282	26.6			56.6		62	17.8	10.7		11	41.3	14.9	59.2	N 58	05 02	05 48	06 27	23 11	24 53	00 53	02 33
	08	297	26.7			55.6		76	47.5	10.6		11	56.2	14.9	59.2	56	05 05	05 48	06 25	23 02	24 39	00 39	02 14
	09	312	26.9			54.7		91	17.1	10.5		12	11.1	14.8	59.2	54	05 08	05 49	06 24	22 55	24 27	00 27	01 58
	10	327	27.1			53.7		105	46.6	10.4		12	25.9	14.8	59.2	52	05 10	05 49	06 23	22 47	24 16	00 16	01 44
	11	342	27.2			52.7		120	16.0	10.4		12	40.7	14.6	59.2	50	05 12	05 50	06 22	22 41	24 07	00 07	01 32
	12	357	27.4	S	3	51.7		134	45.4	10.3	S	12	55.3	14.7	59.2	45	05 16	05 50	06 20	22 28	23 48	25 07	01 07
	13	12	27.5			50.7		149	14.7	10.3		13	10.0	14.5	59.2	N 40	05 19	05 51	06 18	22 16	23 32	24 47	00 47
	14	27	27.7			49.7		163	44.0	10.1		13	24.5	14.5	59.2	35	05 21	05 51	06 16	22 07	23 18	24 30	00 30
	15	42	27.9			48.8		178	13.1	10.1		13	39.0	14.4	59.2	30	05 23	05 51	06 14	21 59	23 07	24 16	00 16
	16	57	28.0			47.8		192	42.2	10.0		13	53.4	14.3	59.2	20	05 24	05 50	06 12	21 45	22 47	23 52	24 57
	17	72	28.2			46.8		207	11.2	10.0		14	07.7	14.3	59.2	N 10	05 24	05 48	06 09	21 32	22 30	23 31	24 34
	18	87	28.4	S	3	45.8		221	40.2	9.8	S	14	22.0	14.2	59.2	0	05 22	05 46	06 07	21 21	22 15	23 12	24 13
	19	102	28.5			44.8		236	09.0	9.8		14	36.2	14.1	59.2	S 10	05 19	05 43	06 04	21 10	21 59	22 53	23 51
	20	117	28.7			43.9		250	37.8	9.7		14	50.3	14.0	59.2	20	05 13	05 39	06 01	20 58	21 43	22 33	23 29
	21	132	28.9			42.9		265	06.5	9.7		15	04.3	13.9	59.3	30	05 06	05 34	05 58	20 44	21 24	22 09	23 02
	22	147	29.0			41.9		279	35.2	9.5		15	18.2	13.9	59.3	35	05 01	05 30	05 56	20 36	21 13	21 56	22 47
	23	162	29.2			40.9		294	03.7	9.5		15	32.1	13.8	59.3	40	04 54	05 26	05 54	20 28	21 00	21 40	22 29
															45	04 46	05 21	05 51	20 17	20 46	21 21	22 07	
THURSDAY	11 00	177	29.4	S	3	39.9	308	32.2	9.4	S	15	45.9	13.6	59.3	S 50	04 36	05 15	05 48	20 05	20 28	20 58	21 40	
	01	192	29.5			39.0	323	00.6	9.3		15	59.5	13.6	59.3	52	04 31	05 12	05 46	19 59	20 19	20 47	21 26	
	02	207	29.7			38.0	337	28.9	9.3		16	13.1	13.5	59.3	54	04 25	05 09	05 45	19 53	20 10	20 34	21 11	
	03	222	29.8			37.0	351	57.2	9.1		16	26.6	13.5	59.3	56	04 19	05 05	05 43	19 46	20 00	20 20	20 53	
	04	237	30.0			36.0		6	25.3	9.1		16	40.1	13.3	59.3	58	04 12	05 01	05 41	19 38	19 48	20 03	20 32
	05	252	30.2			35.0	20	53.4	9.0		16	53.4	13.2	59.3	S 60	04 03	04 56	05 38	19 30	19 34	19 43	20 04	
	06	267	30.3	S	3	34.0	35	21.4	8.9	S	17	06.6	13.2	59.3	Lat.		Twilight		Moonset				
	07	282	30.5			33.1	49	49.3	8.8		17	19.8	13.0	59.3	Sunset	Civil		Naut.	10	11	12	13	
	08	297	30.7			32.1	64	17.1	8.7		17	32.8	12.9	59.3		h m	h m	h m	h m	h m	h m	h m	
	09	312	30.8			31.1	78	44.8	8.7		17	45.7	12.9	59.3	N 72	17 39	18 46	20 08	06 12	04 54	■	■	
	10	327	31.0			30.1	93	12.5	8.5		17	58.6	12.7	59.3	N 70	17 42	18 43	19 56	06 31	05 45	■	■	
	11	342	31.2			29.1	107	40.0	8.5		18	11.3	12.6	59.3	68	17 45	18 41	19 47	06 46	06 17	04 59	■	
	12	357	31.3	S	3	28.1	122	07.5	8.4	S	18	23.9	12.5	59.3	66	17 48	18 39	19 39	06 58	06 41	06 10	■	
	13	12	31.5			27.2	136	34.9	8.3		18	36.4	12.5	59.3	64	17 50	18 37	19 33	07 09	07 00	06 47	06 17	
	14	27	31.7			26.2	151	02.2	8.2		18	48.9	12.3	59.3	62	17 52	18 36	19 28	07 18	07 15	07 13	07 13	
	15	42	31.8			25.2	165	29.4	8.2		19	01.2	12.1	59.3	60	17 53	18 35	19 23	07 26	07 28	07 34	07 47	
	16	57	32.0			24.2	179	56.6	8.0		19	13.3	12.1	59.3	N 58	17 55	18 34	19 20	07 32	07 40	07 51	08 11	
	17	72	32.2			23.2	194	23.6	8.0		19	25.4	12.0	59.3	56	17 56	18 33	19 16	07 38	07 50	08 06	08 31	
	18	87	32.3	S	3	22.2	208	50.6	7.8	S	19	37.4	11.8	59.3	54	17 57	18 32	19 13	07 44	07 58	08 18	08 48	
	19	102	32.5			21.3	223	17.4	7.8		19	49.2	11.8	59.3	52	17 58	18 32	19 11	07 49	08 06	08 29	09 02	
	20	117	32.7			20.3	237	44.2	7.7		20	01.0	11.6	59.3	50	17 59	18 31	19 09	07 53	08 13	08 39	09 15	
	21	132	32.8			19.3	252	10.9	7.6		20	12.6	11.5	59.3	45	18 01	18 30	19 04	08 03	08 29	09 00	09 40	
	22	147	33.0			18.3	266	37.5	7.5		20	24.1	11.3	59.3	N 40	18 03	18 30	19 01	08 11	08 41	09 17	10 01	
	23	162	33.2			17.3	281	04.0	7.5		20	35.4	11.3	59.3	35	18 04	18 30	18 59	08 18	08 52	09 31	10 18	
	FRIDAY	12 00	177	33.3	S	3	16.3	295	30.5	7.3	S	20	46.7	11.1	59.3	30	18 06	18 30	18 58	08 25	09 02	09 44	10 33
01		192	33.5			15.4	309	56.8	7.2		20	57.8	11.0	59.3	20	18 08	18 31	18 56	08 35	09 18	10 05	10 58	
02		207	33.7			14.4	324	23.0	7.2		21	08.8	10.8	59.3	N 10	18 11	18 32	18 56	08 45	09 32	10 24	11 20	
03		222	33.8			13.4	338	49.2	7.1		21	19.6	10.8	59.3	0	18 13	18 34	18 58	08 54	09 46	10 42	11 41	
04		237	34.0			12.4	353	15.3	7.0		21	30.4	10.6	59.3	S 10	18 16	18 37	19 01	09 03	10 00	10 59	12 01	
05		252	34.2			11.4	7	41.3	6.9		21	41.0	10.4	59.3	20	18 18	18 40	19 06	09 13	10 14	11 18	12 23	
06		267	34.4	S	3	10.4	22	07.2	6.8	S	21	51.4	10.4	59.3	30	18 21	18 45	19 14	09 24	10 31	11 40	12 49	
07		282	34.5			09.5	36	33.0	6.7		22	01.8	10.2	59.3	35	18 23	18 49	19 19	09 30	10 41	11 53	13 04	
08		297	34.7			08.5	50	58.7	6.7		22	12.0	10.0	59.3	40	18 26	18 53	19 25	09 38	10 52	12 08	13 21	
09		312	34.9			07.5	65	24.4	6.6		22	22.0	9.9	59.3	45	18 28	18 58	19 33	09 46				



## MARCH 19, 20, 21 (FRI., SAT., SUN.)

UT	ARIES	VENUS -4.3	MARS +1.3	JUPITER -2.5	SATURN +0.0	STARS
d h	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name SHA Dec
19 00	176 52.6	135 44.3 N18 23.9	120 51.3 N20 52.6	12 51.1 N 8 21.2	79 55.5 N22 48.1	Acamar 315 24.0 S40 17.5
01	191 55.0	150 44.2 24.9	135 52.1 53.0	27 53.8 21.3	94 57.9 48.1	Achernar 335 32.4 S57 13.1
02	206 57.5	165 44.1 25.9	150 52.9 53.3	42 56.6 21.4	110 00.3 48.1	Acrux 173 17.2 S63 07.3
03	222 00.0	180 44.0 26.9	165 53.7 53.7	57 59.3 21.6	125 02.8 48.1	Adhara 255 18.2 S28 58.8
04	237 02.4	195 43.9 27.8	180 54.5 54.1	73 02.1 21.7	140 05.2 48.1	Aldebaran 290 57.9 N16 31.1
05	252 04.9	210 43.8 28.8	195 55.3 54.4	88 04.8 21.8	155 07.6 48.1	
06	267 07.4	225 43.6 N18 29.8	210 56.1 N20 54.8	103 07.6 N 8 21.9	170 10.0 N22 48.1	Alloth 166 26.2 N55 56.1
07	282 09.8	240 43.5 30.7	225 56.9 55.2	118 10.3 22.0	185 12.4 48.1	Alkaid 153 04.0 N49 17.4
08	297 12.3	255 43.4 31.7	240 57.7 55.5	133 13.0 22.1	200 14.8 48.1	Al Na'ir 27 53.0 S46 56.5
09	312 14.8	270 43.3 32.7	255 58.5 55.9	148 15.8 22.2	215 17.2 48.1	Alnilam 275 53.8 S 1 12.0
10	327 17.2	285 43.2 33.7	270 59.3 56.3	163 18.5 22.4	230 19.6 48.1	Alphard 218 03.0 S 8 40.7
11	342 19.7	300 43.1 34.6	286 00.1 56.6	178 21.3 22.5	245 22.0 48.2	
12	357 22.1	315 43.0 N18 35.6	301 00.8 N20 57.0	193 24.0 N 8 22.6	260 24.4 N22 48.2	Alphecca 126 16.9 N26 41.8
13	12 24.6	330 42.8 36.6	316 01.6 57.4	208 26.8 22.7	275 26.8 48.2	Alpheratz 357 51.5 N29 06.6
14	27 27.1	345 42.7 37.5	331 02.4 57.7	223 29.5 22.8	290 29.2 48.2	Altair 62 15.5 N 8 52.5
15	42 29.5	0 42.6 38.5	346 03.2 58.1	238 32.3 22.9	305 31.6 48.2	Ankaa 353 23.1 S42 17.2
16	57 32.0	15 42.5 39.4	1 04.0 58.5	253 35.0 23.0	320 34.0 48.2	Antares 112 35.1 S26 26.5
17	72 34.5	30 42.4 40.4	16 04.8 58.8	268 37.7 23.2	335 36.4 48.2	
18	87 36.9	45 42.3 N18 41.4	31 05.6 N20 59.2	283 40.5 N 8 23.3	350 38.8 N22 48.2	Arcturus 146 02.0 N19 09.4
19	102 39.4	60 42.2 42.3	46 06.4 59.6	298 43.2 23.4	5 41.2 48.2	Atria 107 43.5 S69 02.0
20	117 41.9	75 42.1 43.3	61 07.2 20 59.9	313 46.0 23.5	20 43.6 48.2	Avior 234 20.8 S59 31.5
21	132 44.3	90 41.9 44.3	76 08.0 21 00.3	328 48.7 23.6	35 46.0 48.2	Bellatrix 278 39.9 N 6 21.2
22	147 46.8	105 41.8 45.2	91 08.8 00.7	343 51.5 23.7	50 48.4 48.2	Betelgeuse 271 09.2 N 7 24.5
23	162 49.2	120 41.7 46.2	106 09.6 01.0	358 54.2 23.8	65 50.8 48.2	
20 00	177 51.7	135 41.6 N18 47.1	121 10.4 N21 01.4	13 57.0 N 8 23.9	80 53.2 N22 48.2	Canopus 263 59.3 S52 42.1
01	192 54.2	150 41.5 48.1	136 11.2 01.8	28 59.7 24.1	95 55.6 48.2	Capella 280 45.3 N46 00.3
02	207 56.6	165 41.4 49.1	151 12.0 02.1	44 02.4 24.2	110 58.0 48.2	Deneb 49 36.9 N45 17.3
03	222 59.1	180 41.3 50.0	166 12.8 02.5	59 05.2 24.3	126 00.4 48.2	Denebola 182 40.7 N14 32.9
04	238 01.6	195 41.2 51.0	181 13.5 02.8	74 07.9 24.4	141 02.8 48.2	Diphda 349 03.4 S17 58.0
05	253 04.0	210 41.0 51.9	196 14.3 03.2	89 10.7 24.5	156 05.2 48.2	
06	268 06.5	225 40.9 N18 52.9	211 15.1 N21 03.6	104 13.4 N 8 24.6	171 07.6 N22 48.2	Dubhe 193 59.6 N61 43.8
07	283 09.0	240 40.8 53.8	226 15.9 03.9	119 16.2 24.7	186 10.0 48.2	Elnath 278 21.9 N28 36.8
08	298 11.4	255 40.7 54.8	241 16.7 04.3	134 18.9 24.8	201 12.4 48.2	Eltanin 90 49.5 N51 28.9
09	313 13.9	270 40.6 55.7	256 17.5 04.7	149 21.6 25.0	216 14.8 48.2	Enif 33 54.6 N 9 53.4
10	328 16.4	285 40.5 56.7	271 18.3 05.0	164 24.4 25.1	231 17.2 48.2	Fomalhaut 15 32.2 S29 36.2
11	343 18.8	300 40.4 57.6	286 19.1 05.4	179 27.1 25.2	246 19.6 48.2	
12	358 21.3	315 40.3 N18 58.6	301 19.9 N21 05.7	194 29.9 N 8 25.3	261 22.0 N22 48.2	Gacrux 172 08.8 S57 08.2
13	13 23.7	330 40.2 18 59.5	316 20.7 06.1	209 32.6 25.4	276 24.4 48.2	Gienah 175 59.5 S17 34.0
14	28 26.2	345 40.0 19 00.5	331 21.5 06.5	224 35.4 25.5	291 26.8 48.2	Hadar 148 58.0 S60 23.5
15	43 28.7	0 39.9 01.4	346 22.3 06.8	239 38.1 25.6	306 29.2 48.3	Hamal 328 09.3 N23 28.9
16	58 31.1	15 39.8 02.4	1 23.0 07.2	254 40.8 25.7	321 31.6 48.3	Kaus Aust. 83 53.5 S34 23.0
17	73 33.6	30 39.7 03.3	16 23.8 07.5	269 43.6 25.9	336 34.0 48.3	
18	88 36.1	45 39.6 N19 04.3	31 24.6 N21 07.9	284 46.3 N 8 26.0	351 36.4 N22 48.3	Kochab 137 18.4 N74 08.0
19	103 38.5	60 39.5 05.2	46 25.4 08.3	299 49.1 26.1	6 38.8 48.3	Markab 13 46.0 N15 13.4
20	118 41.0	75 39.4 06.2	61 26.2 08.6	314 51.8 26.2	21 41.2 48.3	Menkar 314 22.9 N 4 06.3
21	133 43.5	90 39.3 07.1	76 27.0 09.0	329 54.5 26.3	36 43.6 48.3	Menkent 148 16.0 S36 23.4
22	148 45.9	105 39.2 08.1	91 27.8 09.3	344 57.3 26.4	51 46.0 48.3	Miaplacidus 221 40.9 S69 44.2
23	163 48.4	120 39.1 09.0	106 28.6 09.7	0 00.0 26.5	66 48.4 48.3	
21 00	178 50.8	135 38.9 N19 09.9	121 29.4 N21 10.0	15 02.8 N 8 26.6	81 50.8 N22 48.3	Mirfak 308 51.3 N49 52.7
01	193 53.3	150 38.8 10.9	136 30.2 10.4	30 05.5 26.7	96 53.2 48.3	Nunki 76 07.4 S26 17.6
02	208 55.8	165 38.7 11.8	151 31.0 10.8	45 08.2 26.9	111 55.6 48.3	Peacock 53 30.8 S56 43.3
03	223 58.2	180 38.6 12.8	166 31.7 11.1	60 11.0 27.0	126 58.0 48.3	Pollux 243 36.4 N28 01.1
04	239 00.7	195 38.5 13.7	181 32.5 11.5	75 13.7 27.1	142 00.4 48.3	Procyon 245 07.2 N 5 12.9
05	254 03.2	210 38.4 14.6	196 33.3 11.8	90 16.5 27.2	157 02.8 48.3	
06	269 05.6	225 38.3 N19 15.6	211 34.1 N21 12.2	105 19.2 N 8 27.3	172 05.2 N22 48.3	Rasalhague 96 13.2 N12 33.1
07	284 08.1	240 38.2 16.5	226 34.9 12.5	120 21.9 27.4	187 07.6 48.3	Regulus 207 50.9 N11 56.8
08	299 10.6	255 38.1 17.4	241 35.7 12.9	135 24.7 27.5	202 10.0 48.3	Rigel 281 19.1 S 8 11.9
09	314 13.0	270 38.0 18.4	256 36.5 13.3	150 27.4 27.6	217 12.4 48.3	Rigel Kent. 140 01.6 S60 51.0
10	329 15.5	285 37.9 19.3	271 37.3 13.6	165 30.2 27.7	232 14.8 48.3	Sabik 102 20.8 S15 43.9
11	344 18.0	300 37.7 20.2	286 38.1 14.0	180 32.9 27.9	247 17.2 48.3	
12	359 20.4	315 37.6 N19 21.2	301 38.8 N21 14.3	195 35.6 N 8 28.0	262 19.6 N22 48.3	Schedar 349 49.7 N56 33.5
13	14 22.9	330 37.5 22.1	316 39.6 14.7	210 38.4 28.1	277 22.0 48.3	Shaula 96 31.8 S37 06.4
14	29 25.3	345 37.4 23.0	331 40.4 15.0	225 41.1 28.2	292 24.4 48.3	Sirius 258 40.1 S16 43.4
15	44 27.8	0 37.3 24.0	346 41.2 15.4	240 43.9 28.3	307 26.8 48.3	Spica 158 38.7 S11 11.1
16	59 30.3	15 37.2 24.9	1 42.0 15.7	255 46.6 28.4	322 29.1 48.3	Suhail 222 57.6 S43 27.1
17	74 32.7	30 37.1 25.8	16 42.8 16.1	270 49.3 28.5	337 31.5 48.3	
18	89 35.2	45 37.0 N19 26.8	31 43.6 N21 16.4	285 52.1 N 8 28.6	352 33.9 N22 48.3	Vega 80 44.0 N38 46.8
19	104 37.7	60 36.9 27.7	46 44.4 16.8	300 54.8 28.7	7 36.3 48.3	Zuben'ubi 137 13.3 S16 03.6
20	119 40.1	75 36.8 28.6	61 45.1 17.1	315 57.5 28.8	22 38.7 48.3	
21	134 42.6	90 36.7 29.5	76 45.9 17.5	331 00.3 29.0	37 41.1 48.3	
22	149 45.1	105 36.6 30.5	91 46.7 17.8	346 03.0 29.1	52 43.5 48.4	Venus 317 49.9 14 57
23	164 47.5	120 36.5 31.4	106 47.5 18.2	1 05.8 29.2	67 45.9 48.4	Mars 303 18.7 15 54
						Jupiter 196 05.2 23 00
						Saturn 263 01.5 18 33
Mer. Pass. 12 06.6		$\mu$ -0.1 $d$ 0.9	$\nu$ 0.8 $d$ 0.4	$\nu$ 2.7 $d$ 0.1	$\nu$ 2.4 $d$ 0.0	



## MARCH 19, 20, 21 (FRI., SAT., SUN.)

UT	SUN				MOON				Lat.	Twilight		Sunrise	Moonrise				
	GHA		Dec		GHA		Dec			Naut.	Civil		19	20	21	22	
	d	h	m	s	d	m	s	HP									
1900 FRI DAY	178	02.9	S	0	30.5	198	24.4	11.8	\$14	08.7	13.7	05 57	07 53	07 11	06 39	06 08	
	01	193	03.1		29.5	212	55.2	11.8	13	55.0	13.6	05 58	07 32	07 02	06 38	06 14	
	02	208	03.3		28.5	227	26.0	11.9	13	41.4	13.8	05 59	07 15	06 54	06 37	06 19	
	03	223	03.5		27.5	241	56.9	11.9	13	27.6	13.8	05 59	07 01	06 48	06 36	06 24	
	04	238	03.7		26.5	256	27.8	12.1	13	13.8	13.8	06 00	06 50	06 42	06 35	06 28	
	05	253	03.8		25.5	270	58.9	12.1	13	00.0	13.9	06 01	06 40	06 37	06 34	06 31	
	06	268	04.0	S	0	24.5	285	30.0	12.2	\$12	46.1	13.9	06 01	06 24	06 29	06 33	06 37
	07	283	04.2		23.5	300	01.2	12.3	12	32.2	14.1	06 02	06 18	06 26	06 33	06 39	
	08	298	04.4		22.6	314	32.5	12.4	12	18.1	14.0	06 02	06 12	06 23	06 32	06 41	
	09	313	04.6		21.6	329	03.9	12.4	12	04.1	14.1	06 02	06 06	06 20	06 32	06 43	
	10	328	04.8		20.6	343	35.3	12.5	11	50.0	14.2	06 02	06 02	06 17	06 31	06 45	
	11	343	04.9		19.6	358	06.8	12.6	11	35.8	14.2	06 03	06 03	06 18	06 31	06 49	
	12	358	05.1	S	0	18.6	12	38.4	12.6	\$11	21.6	14.2	06 03	05 42	06 07	06 30	06 52
	13	13	05.3		17.6	27	10.0	12.8	11	07.4	14.3	06 03	05 35	06 03	06 29	06 55	
	14	28	05.5		16.6	41	41.8	12.8	10	53.1	14.3	06 04	05 28	06 00	06 29	06 57	
	15	43	05.7		15.6	56	13.6	12.8	10	38.8	14.4	06 04	05 16	05 53	06 28	07 02	
	16	58	05.9		14.6	70	45.4	13.0	10	24.4	14.4	06 04	05 06	05 48	06 27	07 06	
	17	73	06.0		13.7	85	17.4	13.0	10	10.0	14.4	06 04	04 56	05 43	06 27	07 10	
	18	88	06.2	S	0	12.7	99	49.4	13.0	\$9	55.6	14.5	06 04	04 47	05 38	06 26	07 13
	19	103	06.4		11.7	114	21.4	13.2	9	41.1	14.5	06 04	04 36	05 32	06 25	07 17	
	20	118	06.6		10.7	128	53.6	13.2	9	26.6	14.5	06 04	04 25	05 26	06 25	07 22	
	21	133	06.8		09.7	143	25.8	13.2	9	12.1	14.6	06 04	04 18	05 22	06 24	07 25	
	22	148	07.0		08.7	157	58.0	13.3	8	57.5	14.6	06 04	04 10	05 18	06 24	07 28	
	23	163	07.1		07.7	172	30.3	13.4	8	42.9	14.6	06 04	04 01	05 13	06 23	07 31	
2000 SAT DAY	178	07.3	S	0	06.7	187	02.7	13.5	\$8	28.3	14.7	06 02	03 49	05 07	06 22	07 36	
	01	193	07.5		05.7	201	35.2	13.5	8	13.6	14.7	06 02	03 44	05 05	06 22	07 38	
	02	208	07.7		04.8	216	07.7	13.5	7	58.9	14.7	06 02	03 38	05 02	06 22	07 40	
	03	223	07.9		03.8	230	40.2	13.7	7	44.2	14.7	06 01	03 32	04 58	06 21	07 42	
	04	238	08.1		02.8	245	12.9	13.6	7	29.5	14.8	06 01	03 25	04 55	06 21	07 45	
	05	253	08.2		01.8	259	45.5	13.8	7	14.7	14.7	06 01	03 16	04 51	06 20	07 48	
	06	268	08.4	S	0	00.8	274	18.3	13.7	\$7	00.0	14.8	06 01	03 10	04 51	06 20	
	07	283	08.6	N	0	00.2	288	51.0	13.9	6	45.2	14.9	06 02	03 04	04 51	06 20	
	08	298	08.8		01.2	303	23.9	13.9	6	30.3	14.8	06 02	03 00	04 51	06 20	07 48	
	09	313	09.0		02.2	317	56.8	13.9	6	15.5	14.9	06 02	02 54	04 51	06 20	07 48	
	10	328	09.2		03.1	332	29.7	14.0	6	00.6	14.8	06 02	02 48	04 51	06 20	07 48	
	11	343	09.4		04.1	347	02.7	14.0	5	45.8	14.9	06 02	02 42	04 51	06 20	07 48	
	12	358	09.5	N	0	05.1	1	35.7	14.1	\$5	30.9	14.9	06 02	02 36	04 51	06 20	
	13	13	09.7		06.1	16	08.8	14.2	5	16.0	14.9	06 02	02 30	04 51	06 20	07 48	
	14	28	09.9		07.1	30	42.0	14.1	5	01.1	14.9	06 02	02 24	04 51	06 20	07 48	
	15	43	10.1		08.1	45	15.1	14.3	4	46.2	15.0	06 02	02 18	04 51	06 20	07 48	
	16	58	10.3		09.1	59	48.4	14.2	4	31.2	14.9	06 02	02 12	04 51	06 20	07 48	
	17	73	10.5		10.1	74	21.6	14.3	4	16.3	14.9	06 02	02 06	04 51	06 20	07 48	
	18	88	10.6	N	0	11.1	88	54.9	14.4	\$4	01.4	15.0	06 02	02 00	04 51	06 20	
	19	103	10.8		12.0	103	28.3	14.4	3	46.4	14.9	06 02	01 54	04 51	06 20	07 48	
	20	118	11.0		13.0	118	01.7	14.4	3	31.5	15.0	06 02	01 48	04 51	06 20	07 48	
	21	133	11.2		14.0	132	35.1	14.5	3	16.5	14.9	06 02	01 42	04 51	06 20	07 48	
	22	148	11.4		15.0	147	08.6	14.5	3	01.6	15.0	06 02	01 36	04 51	06 20	07 48	
	23	163	11.6		16.0	161	42.1	14.5	2	46.6	15.0	06 02	01 30	04 51	06 20	07 48	
2100 SUN DAY	178	11.8	N	0	17.0	176	15.6	14.6	\$2	31.6	14.9	06 02	01 24	04 51	06 20	07 48	
	01	193	11.9		18.0	190	49.2	14.6	2	16.7	15.0	06 02	01 18	04 51	06 20	07 48	
	02	208	12.1		19.0	205	22.8	14.6	2	01.7	14.9	06 02	01 12	04 51	06 20	07 48	
	03	223	12.3		19.9	219	56.4	14.7	1	46.8	15.0	06 02	01 06	04 51	06 20	07 48	
	04	238	12.5		20.9	234	30.1	14.7	1	31.8	14.9	06 02	01 00	04 51	06 20	07 48	
	05	253	12.7		21.9	249	03.8	14.7	1	16.9	14.9	06 02	00 54	04 51	06 20	07 48	
	06	268	12.9	N	0	22.9	263	37.5	14.8	\$1	02.0	15.0	06 02	00 48	04 51	06 20	
	07	283	13.1		23.9	278	11.3	14.8	0	47.0	14.9	06 02	00 42	04 51	06 20	07 48	
	08	298	13.2		24.9	292	45.1	14.8	0	32.1	14.9	06 02	00 36	04 51	06 20	07 48	
	09	313	13.4		25.9	307	18.9	14.8	0	17.2	14.9	06 02	00 30	04 51	06 20	07 48	
	10	328	13.6		26.9	321	52.7	14.9	\$0	02.3	14.9	06 02	00 24	04 51	06 20	07 48	
	11	343	13.8		27.8	336	26.6	14.9	N	0	12.6	14.8	06 02	00 18	04 51	06 20	
	12	358	14.0	N	0	28.8	351	00.5	14.9	\$0	27.4	14.9	06 02	00 12	04 51	06 20	
	13	13	14.2		29.8	5	34.4	14.9	0	42.3	14.8	06 02	00 06	04 51	06 20	07 48	
	14	28	14.4		30.8	20	08.3	14.9	0	57.1	14.9	06 02	00 00	04 51	06 20	07 48	
	15	43	14.5		31.8	34	42.2	15.0	1	12.0	14.8	06 02	00 00	04 51	06 20	07 48	
	16	58	14.7		32.8	49	16.2	15.0	1	26.8	14.8	06 02	00 00	04 51	06 20	07 48	
	17	73	14.9		33.8	63	50.2	15.0	1	41.6	14.7	06 02	00 00	04 51	06 20	07 48	
	18	88	15.1	N	0	34.8	78	24.2	15.0	\$1	56.3	14.8	06 02	00 00	04 51	06 20	
	19	103	15.3		35.7	92	58.2	15.1	2	11.1	14.7	06 02	00 00	04 51	06 20	07 48	
	20	118	15.5		36.7	107	32.3	15.0	2	25.8	14.7	06 02	00 00	04 51	06 20	07 48	
	21	133	15.7		37.7	122	06.3	15.1	2	40.5	14.7	06 02	00 00	04 51	06 20	07 48	
	22	148	15.9		38.7	136	40.4	15.0	2	55.2	14.7	06 02	00 00	04 51	06 20	07 48	
	23	163	16.0		39.7	151	14.4	15.1	N	3	09.9	14.6	06 02	00 00	04 51	06 20	
SD 16.1		d	1.0		SD	15.6	15.5	15.3									
				</													



## MARCH 28, 29, 30 (SUN., MON., TUES.)

UT	ARIES	VENUS -4.4	MARS +1.4	JUPITER -2.4	SATURN +0.0	STARS
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name SHA Dec
SUNDAY	28 00 185 44.8	135 23.1 N21 37.3	123 40.3 N22 06.1	22 40.9 N 8 44.2	88 30.6 N22 48.7	Acamar 315 24.1 S40 17.5
	01 200 47.3	150 23.0 38.1	138 41.1 06.4	37 43.6 44.3	103 33.0 48.7	Achernar 335 32.4 S57 13.1
	02 215 49.7	165 23.0 38.9	153 41.9 06.7	52 46.3 44.4	118 35.3 48.7	Acrux 173 17.1 S63 07.4
	03 230 52.2	180 22.9 39.7	168 42.6 07.1	67 49.1 44.5	133 37.7 48.7	Adhara 255 18.2 S28 58.8
	04 245 54.7	195 22.8 40.5	183 43.4 07.4	82 51.8 44.6	148 40.1 48.7	Aldebaran 290 57.9 N16 31.1
	05 260 57.1	210 22.7 41.3	198 44.2 07.7	97 54.5 44.7	163 42.4 48.7	
	06 275 59.6	225 22.7 N21 42.1	213 45.0 N22 08.0	112 57.2 N 8 44.8	178 44.8 N22 48.7	Alioth 166 26.2 N55 56.2
	07 291 02.1	240 22.6 42.9	228 45.7 08.3	127 59.9 44.9	193 47.2 48.7	Alkaid 153 03.9 N49 17.4
	08 306 04.5	255 22.5 43.7	243 46.5 08.6	143 02.6 45.0	208 49.5 48.7	Al Na'ir 27 53.0 S46 56.5
	09 321 07.0	270 22.5 44.5	258 47.3 08.9	158 05.3 45.1	223 51.9 48.7	Alnilam 275 53.8 S 1 12.0
	10 336 09.5	285 22.4 45.3	273 48.0 09.2	173 08.0 45.2	238 54.2 48.7	Alphard 218 03.0 S 8 40.7
	11 351 11.9	300 22.3 46.1	288 48.8 09.5	188 10.7 45.3	253 56.6 48.7	
	12 6 14.4	315 22.2 N21 46.9	303 49.6 N22 09.8	203 13.5 N 8 45.4	268 59.0 N22 48.7	Alphecca 126 16.8 N26 41.8
	13 21 16.8	330 22.2 47.7	318 50.3 10.1	218 16.2 45.5	284 01.3 48.7	Alpheratz 357 51.5 N29 06.6
	14 36 19.3	345 22.1 48.5	333 51.1 10.4	233 18.9 45.6	299 03.7 48.7	Altair 62 15.4 N 8 52.5
	15 51 21.8	0 22.0 49.3	348 51.9 10.7	248 21.6 45.7	314 06.0 48.7	Ankaa 353 23.1 S42 17.1
	16 66 24.2	15 22.0 50.1	3 52.6 11.0	263 24.3 45.8	329 08.4 48.7	Antares 112 35.0 S26 26.5
	17 81 26.7	30 21.9 50.9	18 53.4 11.3	278 27.0 45.9	344 10.8 48.7	
	18 96 29.2	45 21.8 N21 51.7	33 54.2 N22 11.7	293 29.7 N 8 46.0	359 13.1 N22 48.7	Arcturus 146 02.0 N19 09.5
	19 111 31.6	60 21.8 52.5	48 54.9 12.0	308 32.4 46.1	14 15.5 48.7	Atria 107 43.3 S69 02.0
	20 126 34.1	75 21.7 53.3	63 55.7 12.3	323 35.1 46.1	29 17.8 48.7	Avior 234 20.9 S59 31.6
	21 141 36.6	90 21.6 54.1	78 56.5 12.6	338 37.8 46.2	44 20.2 48.7	Bellatrix 278 39.9 N 6 21.2
	22 156 39.0	105 21.6 54.9	93 57.2 12.9	353 40.5 46.3	59 22.6 48.7	Beteiguse 271 09.2 N 7 24.5
	23 171 41.5	120 21.5 55.7	108 58.0 13.2	8 43.3 46.4	74 24.9 48.7	
MONDAY	29 00 186 44.0	135 21.4 N21 56.5	123 58.8 N22 13.5	23 46.0 N 8 46.5	89 27.3 N22 48.7	Canopus 263 59.4 S52 42.1
	01 201 46.4	150 21.4 57.3	138 59.5 13.8	38 48.7 46.6	104 29.6 48.7	Capella 280 45.4 N46 00.3
	02 216 48.9	165 21.3 58.1	154 00.3 14.1	53 51.4 46.7	119 32.0 48.7	Deneb 49 36.8 N45 17.3
	03 231 51.3	180 21.2 58.9	169 01.1 14.4	68 54.1 46.8	134 34.3 48.7	Denebola 182 40.7 N14 32.9
	04 246 53.8	195 21.2 59.6	184 01.8 14.7	83 56.8 46.9	149 36.7 48.7	Diphda 349 03.4 S17 58.0
	05 261 56.3	210 21.1 22 00.4	199 02.6 15.0	98 59.5 47.0	164 39.1 48.7	
	06 276 58.7	225 21.0 N22 01.2	214 03.4 N22 15.3	114 02.2 N 8 47.1	179 41.4 N22 48.7	Dubhe 193 59.6 N61 43.8
	07 292 01.2	240 21.0 02.0	229 04.1 15.6	129 04.9 47.2	194 43.8 48.7	Elnath 278 21.9 N28 36.8
	08 307 03.7	255 20.9 02.8	244 04.9 15.9	144 07.6 47.3	209 46.1 48.7	Eltanin 90 49.4 N51 28.9
	09 322 06.1	270 20.8 03.6	259 05.7 16.2	159 10.3 47.4	224 48.5 48.7	Enif 33 54.5 N 9 53.4
	10 337 08.6	285 20.8 04.4	274 06.4 16.5	174 13.0 47.5	239 50.8 48.7	Fomalhaut 15 32.2 S29 36.1
	11 352 11.1	300 20.7 05.1	289 07.2 16.8	189 15.7 47.6	254 53.2 48.7	
	12 7 13.5	315 20.7 N22 05.9	304 08.0 N22 17.1	204 18.4 N 8 47.7	269 55.5 N22 48.7	Gacrux 172 08.8 S57 08.2
	13 22 16.0	330 20.6 06.7	319 08.7 17.4	219 21.1 47.8	284 57.9 48.7	Glenah 175 59.5 S17 34.0
	14 37 18.5	345 20.5 07.5	334 09.5 17.7	234 23.8 47.9	300 00.3 48.7	Hadar 148 57.9 S60 23.6
	15 52 20.9	0 20.5 08.3	349 10.3 18.0	249 26.6 47.9	315 02.6 48.7	Hamal 328 09.4 N23 28.9
	16 67 23.4	15 20.4 09.0	4 11.0 18.3	264 29.3 48.0	330 05.0 48.7	Kaus Aust. 83 53.4 S34 23.0
	17 82 25.8	30 20.4 09.8	19 11.8 18.6	279 32.0 48.1	345 07.3 48.7	
	18 97 28.3	45 20.3 N22 10.6	34 12.6 N22 18.9	294 34.7 N 8 48.2	0 09.7 N22 48.7	Kochab 137 18.3 N74 08.1
	19 112 30.8	60 20.2 11.4	49 13.3 19.2	309 37.4 48.3	15 12.0 48.7	Markab 13 45.9 N15 13.4
	20 127 33.2	75 20.2 12.1	64 14.1 19.5	324 40.1 48.4	30 14.4 48.7	Menkar 314 22.9 N 4 06.3
	21 142 35.7	90 20.1 12.9	79 14.9 19.8	339 42.8 48.5	45 16.7 48.7	Menkent 148 15.9 S36 23.5
	22 157 38.2	105 20.1 13.7	94 15.6 20.1	354 45.5 48.6	60 19.1 48.7	Miaplacidus 221 41.0 S69 44.2
	23 172 40.6	120 20.0 14.5	109 16.4 20.4	9 48.2 48.7	75 21.5 48.7	
TUESDAY	30 00 187 43.1	135 19.9 N22 15.2	124 17.2 N22 20.7	24 50.9 N 8 48.8	90 23.8 N22 48.7	Mirfak 308 51.3 N49 52.7
	01 202 45.6	150 19.9 16.0	139 17.9 21.0	39 53.6 48.9	105 26.2 48.7	Nunki 76 07.3 S26 17.6
	02 217 48.0	165 19.8 16.8	154 18.7 21.3	54 56.3 49.0	120 28.5 48.7	Peacock 53 30.7 S56 43.3
	03 232 50.5	180 19.8 17.5	169 19.5 21.5	69 59.0 49.1	135 30.9 48.7	Pollux 243 36.5 N28 01.1
	04 247 53.0	195 19.7 18.3	184 20.2 21.8	85 01.7 49.2	150 33.2 48.7	Procyon 245 07.2 N 5 12.9
	05 262 55.4	210 19.7 19.1	199 21.0 22.1	100 04.4 49.3	165 35.6 48.7	
	06 277 57.9	225 19.6 N22 19.8	214 21.7 N22 22.4	115 07.1 N 8 49.3	180 37.9 N22 48.7	Rasalhague 96 13.1 N12 33.1
	07 293 00.3	240 19.6 20.6	229 22.5 22.7	130 09.8 49.4	195 40.3 48.7	Regulus 207 50.9 N11 56.8
	08 308 02.8	255 19.5 21.4	244 23.3 23.0	145 12.5 49.5	210 42.6 48.7	Rigel 281 19.1 S 8 11.9
	09 323 05.3	270 19.4 22.1	259 24.0 23.3	160 15.2 49.6	225 45.0 48.7	Rigel Kent. 140 01.5 S60 51.1
	10 338 07.7	285 19.4 22.9	274 24.8 23.6	175 17.9 49.7	240 47.3 48.7	Sabik 102 20.8 S15 43.9
	11 353 10.2	300 19.3 23.6	289 25.6 23.9	190 20.6 49.8	255 49.7 48.7	
	12 8 12.7	315 19.3 N22 24.4	304 26.3 N22 24.2	205 23.3 N 8 49.9	270 52.0 N22 48.7	Schedar 349 49.7 N56 33.5
	13 23 15.1	330 19.2 25.2	319 27.1 24.5	220 26.0 50.0	285 54.4 48.7	Shaula 96 31.7 S37 06.4
	14 38 17.6	345 19.2 25.9	334 27.9 24.8	235 28.7 50.1	300 56.7 48.7	Sirius 258 40.2 S16 43.4
	15 53 20.1	0 19.1 26.7	349 28.6 25.1	250 31.4 50.2	315 59.1 48.7	Spica 158 38.6 S11 11.1
	16 68 22.5	15 19.1 27.4	4 29.4 25.4	265 34.1 50.3	331 01.4 48.7	Suhail 222 57.7 S43 27.1
	17 83 25.0	30 19.0 28.2	19 30.1 25.6	280 36.8 50.4	346 03.8 48.7	
	18 98 27.4	45 19.0 N22 29.0	34 30.9 N22 25.9	295 39.5 N 8 50.4	1 06.1 N22 48.7	Vega 80 43.9 N38 46.8
	19 113 29.9	60 18.9 29.7	49 31.7 26.2	310 42.2 50.5	16 08.5 48.7	Zuben'ubi 137 13.2 S16 03.7
	20 128 32.4	75 18.9 30.5	64 32.4 26.5	325 44.9 50.6	31 10.8 48.7	
	21 143 34.8	90 18.8 31.2	79 33.2 26.8	340 47.6 50.7	46 13.2 48.8	
	22 158 37.3	105 18.8 32.0	94 34.0 27.1	355 50.3 50.8	61 15.5 48.8	Venus 308 37.5 14 59
	23 173 39.8	120 18.7 32.7	109 34.7 27.4	10 53.0 50.9	76 17.9 48.8	Mars 297 14.8 15 43
Mer. Pass. 11 31.2						Jupiter 197 02.0 22 21
						Saturn 262 43.3 17 59



## MARCH 28, 29, 30 (SUN., MON., TUES.)

UT	SUN		MOON				Lat.	Twilight		Sunrise	Moonrise						
	GHA	Dec	GHA	v	Dec	d		HP	Naut.		Civil	28	29	30	31		
SUNDAY	d h	m s	d h	m s	d h	m s	d h	m s	N 72	h m	h m	h m	h m	h m	h m	h m	
	178 43.3	N 3 02.2	99 16.9	10.3	N27 06.2	2.6	54.2	02 07	03 58	05 10							
	01 193 43.5	03.1	113 46.2	10.3	27 08.8	2.4	54.3	02 41	04 12	05 16							
	02 208 43.7	04.1	128 45.5	10.3	27 11.2	2.3	54.3	03 05	04 23	05 21							
	03 223 43.9	05.1	142 44.8	10.3	27 13.5	2.2	54.3	03 23	04 32	05 25						09 12	
	04 238 44.1	06.1	157 44.1	10.2	27 15.7	2.0	54.3	03 37	04 39	05 28						10 08	
	05 253 44.3	07.1	171 43.3	10.2	27 17.7	1.9	54.3	03 49	04 46	05 31	06 34	07 24	08 57	10 41			
	06 268 44.5	N 3 08.0	186 42.5	10.1	N27 19.6	1.8	54.3	03 59	04 51	05 34	07 25	08 17	09 34	11 05			
	07 283 44.6	09.0	200 41.6	10.2	27 21.4	1.6	54.3	04 07	04 56	05 36	07 57	08 49	10 00	11 24			
	08 298 44.8	10.0	215 40.8	10.1	27 23.0	1.5	54.3	04 14	05 00	05 38	08 20	09 13	10 21	11 44			
	09 313 45.0	11.0	229 39.9	10.1	27 24.5	1.4	54.3	04 21	05 04	05 40	08 40	09 32	10 38	11 54			
	10 328 45.2	11.9	244 39.0	10.0	27 25.9	1.3	54.3	04 26	05 07	05 41	08 56	09 48	10 53	12 06			
	11 343 45.4	12.9	258 38.0	10.1	27 27.2	1.1	54.3	04 31	05 10	05 43	09 10	10 02	11 05	12 16			
	12 358 45.6	N 3 13.9	273 37.1	10.0	N27 28.3	1.0	54.3	04 41	05 16	05 46	09 38	10 31	11 31	12 38			
	13 13 45.8	14.9	287 36.1	10.0	27 29.3	0.8	54.3	04 49	05 21	05 49	10 01	10 53	11 52	12 56			
	14 28 46.0	15.8	302 35.1	10.0	27 30.1	0.8	54.3	05 01	05 25	05 51	10 19	11 12	12 09	13 11			
	15 43 46.2	16.8	316 34.1	9.9	27 30.9	0.5	54.4	05 05	05 29	05 53	10 35	11 27	12 24	13 23			
	16 58 46.3	17.8	331 33.0	10.0	27 31.4	0.5	54.4	05 08	05 34	05 56	11 02	11 54	12 49	13 45			
	17 73 46.5	18.8	345 32.0	9.9	27 31.9	0.3	54.4	N 10	05 13	05 38	05 59	11 26	12 18	13 11	14 04		
	18 88 46.7	N 3 19.7	0 00.9	9.9	N27 32.2	0.2	54.4	0	05 17	05 41	06 01	11 48	12 39	13 31	14 21		
	19 103 46.9	20.7	14 29.8	9.9	27 32.4	0.0	54.4	S 10	05 18	05 43	06 04	12 09	13 01	13 51	14 39		
	20 118 47.1	21.7	28 58.7	9.9	27 32.4	0.0	54.4	20	05 19	05 44	06 06	12 33	13 24	14 12	15 00		
	21 133 47.3	22.7	43 27.6	9.9	27 32.4	0.3	54.4	30	05 17	05 45	06 09	13 00	13 51	14 37	15 19		
	22 148 47.5	23.6	57 56.5	9.9	27 32.1	0.3	54.4	35	05 16	05 45	06 11	13 16	14 07	14 51	15 31		
	23 163 47.7	24.6	72 25.4	9.8	27 31.8	0.5	54.4	40	05 14	05 45	06 12	13 35	14 25	15 08	15 45		
	24 178 47.9	N 3 25.6	86 54.2	9.9	N27 31.3	0.6	54.5	45	05 11	05 45	06 14	13 58	14 47	15 28	16 02		
25 193 48.0	26.5	101 23.1	9.8	27 30.7	0.8	54.5	S 50	05 07	05 44	06 16	14 27	15 15	15 54	16 23			
26 208 48.2	27.5	115 51.9	9.9	27 29.9	0.9	54.5	52	05 05	05 44	06 17	14 41	15 29	16 06	16 33			
27 223 48.4	28.5	130 20.8	9.8	27 29.0	1.0	54.5	54	05 02	05 43	06 19	14 58	15 45	16 20	16 44			
28 238 48.6	29.5	144 49.6	9.8	27 28.0	1.2	54.5	56	04 59	05 43	06 20	15 18	16 04	16 36	16 56			
29 253 48.8	30.4	159 18.4	9.8	27 26.8	1.3	54.5	58	04 56	05 42	06 21	15 43	16 27	16 55	17 11			
30 268 49.0	N 3 31.4	173 47.2	9.8	N27 25.5	1.4	54.5	S 60	04 52	05 41	06 23	16 16	16 58	17 18	17 28			
MONDAY	01 283 49.2	32.4	188 16.0	9.8	27 24.1	1.6	54.5	Lat.	Sunset	Twilight		Moonset					
	02 298 49.4	33.4	202 44.8	9.8	27 22.5	1.7	54.6			Civil	Naut.	28	29	30	31		
	03 313 49.5	34.3	217 13.6	9.8	27 20.8	1.8	54.6										
	04 328 49.7	35.3	231 42.4	9.8	27 19.0	2.0	54.6										
	05 343 49.9	36.3	246 11.2	9.9	27 17.0	2.1	54.6										
	06 358 50.1	N 3 37.3	260 40.1	9.8	N27 14.9	2.2	54.6	N 72	h m	h m	h m	h m	h m	h m	h m	h m	
	07 13 50.3	38.2	275 08.9	9.8	27 12.7	2.4	54.6	N 70	18 56	20 01	21 33						
	08 28 50.5	39.2	289 37.7	9.8	27 10.3	2.5	54.7	68	18 51	19 49	21 09						
	09 43 50.7	40.2	304 06.5	9.8	27 07.8	2.7	54.7	66	18 47	19 40	20 50					07 16	
	10 58 50.9	41.1	318 35.3	9.8	27 05.1	2.8	54.7	64	18 43	19 32	20 35					06 19	
	11 73 51.1	42.1	333 04.1	9.9	27 02.3	2.9	54.7	62	18 40	19 26	20 23	04 32	05 30	05 44	05 46		
	12 88 51.2	N 3 43.1	347 33.0	9.8	N26 59.4	3.1	54.7	60	18 37	19 20	20 13	03 41	04 37	05 07	05 21		
	13 103 51.4	44.1	2 01.8	9.8	26 56.3	3.2	54.7	N 58	18 35	19 15	20 04	03 10	04 05	04 40	05 01		
	14 118 51.6	45.0	16 30.6	9.9	26 53.1	3.3	54.8	56	18 33	19 11	19 57	02 46	03 41	04 19	04 45		
	15 133 51.8	46.0	30 59.5	9.9	26 49.8	3.5	54.8	54	18 31	19 07	19 50	02 27	03 21	04 02	04 31		
	16 148 52.0	47.0	45 28.4	9.8	26 46.3	3.6	54.8	52	18 29	19 03	19 44	02 11	03 05	03 47	04 18		
	17 163 52.2	47.9	59 57.2	9.9	26 42.7	3.7	54.8	50	18 28	19 00	19 39	01 57	02 51	03 34	04 07		
	18 178 52.4	N 3 48.9	74 26.1	9.9	N26 39.0	3.8	54.8	45	18 24	18 54	19 29	01 29	02 22	03 07	03 45		
	19 193 52.6	49.9	88 55.0	9.9	26 35.2	4.1	54.9	N 40	18 21	18 49	19 21	01 07	02 00	02 46	03 26		
	20 208 52.7	50.9	103 23.9	10.0	26 31.1	4.1	54.9	35	18 19	18 45	19 14	00 48	01 41	02 28	03 11		
	21 223 52.9	51.8	117 52.9	9.9	26 27.0	4.3	54.9	30	18 17	18 41	19 09	00 32	01 25	02 13	02 57		
	22 238 53.1	52.8	132 21.8	10.0	26 22.7	4.4	54.9	20	18 14	18 36	19 01	00 06	00 58	01 47	02 34		
	23 253 53.3	53.8	146 50.8	9.9	26 18.3	4.5	54.9	N 10	18 11	18 32	18 56	24 34	00 34	01 25	02 14		
	24 268 53.5	N 3 54.7	161 19.7	10.0	N26 13.8	4.7	55.0	0	18 08	18 29	18 53	24 12	00 12	01 04	01 55		
	25 283 53.7	55.7	175 48.7	10.1	26 09.1	4.8	55.0	S 10	18 05	18 26	18 51	23 51	24 43	00 43	01 36		
	26 298 53.9	56.7	190 17.8	10.0	26 04.3	4.9	55.0	20	18 03	18 25	18 50	23 27	24 20	00 20	01 16		
27 313 54.1	57.6	204 46.8	10.0	25 59.4	5.1	55.0	30	18 00	18 24	18 51	23 00	23 54	24 52	00 52			
28 328 54.3	58.6	219 15.8	10.1	25 54.3	5.2	55.0	35	17 58	18 23	18 53	22 44	23 39	24 38	00 38			
29 343 54.4	59.6	233 44.9	10.1	25 49.1	5.3	55.1	40	17 56	18 23	18 55	22 25	23 20	24 22	00 22			
30 358 54.6	N 4 00.6	248 14.0	10.1	N25 43.8	5.4	55.1	45	17 54	18 24	18 58	22 02	22 59	24 03	00 03			
TUESDAY	01 13 54.8	01.5	262 43.1	10.1	25 38.4	5.6	55.1	S 50	17 52	18 24	19 02	21 33	22 31	23 38	24 52		
	02 28 55.0	02.5	277 12.2	10.2	25 32.8	5.8	55.1	52	17 51	18 25	19 04	21 18	22 17	23 26	24 43		
	03 43 55.2	03.5	291 41.4	10.2	25 27.0	5.8	55.2	54	17 50	18 25	19 06	21 02	22 01	23 13	24 32		
	04 58 55.4	04.4	306 10.6	10.2	25 21.2	6.0	55.2	56	17 48	18 25	19 09	20 42	21 42	22 57	24 20		
	05 73 55.6	05.4	320 39.8	10.2	25 15.2	6.1	55.2	58	17 47	18 26	19 12	20 17	21 19	22 39	24 06		
	06 88 55.8	N 4 06.4	335 09.0	10.3	N25 09.1	6.2	55.2	S 60	17 45	18 27	19 15	19 43	20 49	22 15	23 50		
	07 103 55.9	07.3	349 38.3	10.2	25 02.9	6.4	55.2	SUN		MOON							
	08 118 56.1	08.3	4 07.5	10.4	24 56.5	6.5	55.3	Day	Eqn. of Time		Mer.	Mer. Pass.		Age	Phase		
	09 133 56.3	09.3	18 36.9	10.3	24 50.0	6.6	55.3		00h	12h	Pass.	Upper	Lower				
	10 148 56.5	10.2	33 06.2	10.4	24 43.4	6.8	55.3	d	m s	m s	h m	h m	h m	d	%		
	11 163 56.7	11.2	47 35.6	10.3	N24 36.6	6.9	55.3	28	05 05	05 40	12 05	18 00	05 34	08 45			
	12 SD 16.0	d 1.0	SD 14.8	14.9	15.0			29	04 49	05 24	12 05	18 52	06 26	09 55			
	13							30	04 31	05 06	12 04	19 43	07 17	10 64			



## APRIL 18, 19, 20 (SUN., MON., TUES.)

UT	ARIES	VENUS -4.5	MARS +1.5	JUPITER -2.3	SATURN +0.1	STARS				
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name	SHA	Dec	
SUNDAY	18 00 206 26.7	136 02.4 N26 34.5	129 56.8 N24 03.8	44 58.8 N 9 20.3	107 57.8 N22 47.9		Acamar	315 24.1 S40 17.4		
	01 221 29.2	151 02.7 34.9	144 57.5 04.0	60 01.4 20.3	123 00.1 47.9		Achernar	335 32.4 S57 13.0		
	02 236 31.7	166 03.0 35.2	159 58.2 04.1	75 04.0 20.3	138 02.3 47.9		Acruz	173 17.2 S63 07.5		
	03 251 34.1	181 03.3 35.6	174 58.9 04.3	90 06.6 20.4	153 04.6 47.9		Adhara	255 18.3 S28 58.8		
	04 266 36.6	196 03.7 35.9	189 59.7 04.4	105 09.2 20.4	168 06.9 47.9		Aldebaran	290 58.0 N16 31.1		
	05 281 39.0	211 04.0 36.3	205 00.4 04.6	120 11.8 20.5	183 09.1 47.9					
	06 296 41.5	226 04.3 N26 36.6	220 01.1 N24 04.7	135 14.4 N 9 20.5	198 11.4 N22 47.8		Alioth	166 26.2 N55 56.3		
	07 311 44.0	241 04.6 37.0	235 01.9 04.9	150 16.9 20.6	213 13.7 47.8		Alkaid	153 03.9 N49 17.5		
	08 326 46.4	256 05.0 37.4	250 02.6 05.0	165 19.5 20.6	228 15.9 47.8		Al Na'ir	27 52.8 S46 56.6		
	09 341 48.9	271 05.3 37.7	265 03.3 05.2	180 22.1 20.6	243 18.2 47.8		Anilam	275 53.9 S 1 12.2		
	10 356 51.4	286 05.6 38.1	280 04.0 05.3	195 24.7 20.7	258 20.5 47.8		Alphard	218 03.1 S 8 40.7		
	11 11 53.8	301 06.0 38.4	295 04.8 05.5	210 27.3 20.7	273 22.8 47.8					
	12 26 56.3	316 06.3 N26 38.8	310 05.5 N24 05.6	225 29.9 N 9 20.8	288 25.0 N22 47.8		Alphecca	126 16.7 N26 41.8		
	13 41 58.8	331 06.7 39.1	325 06.2 05.8	240 32.5 20.8	303 27.3 47.8		Alpheratz	357 51.4 N29 06.6		
	14 57 01.2	346 07.0 39.5	340 07.0 05.9	255 35.0 20.8	318 29.6 47.8		Altair	62 15.3 N 8 52.5		
	15 72 03.7	1 07.3 39.8	355 07.7 06.1	270 37.7 20.9	333 31.8 47.8		Ankaa	353 23.0 S42 17.0		
	16 87 06.1	16 07.7 40.2	10 08.4 06.2	285 40.2 20.9	348 34.1 47.8		Antares	112 34.9 S26 26.6		
	17 102 08.6	31 08.0 40.5	25 09.1 06.4	300 42.8 21.0	3 36.4 47.8					
	18 117 11.1	46 08.4 N26 40.9	40 09.9 N24 06.5	315 45.4 N 9 21.0	18 38.6 N22 47.8		Arcturus	146 01.9 N19 09.5		
	19 132 13.5	61 08.7 41.2	55 10.6 06.7	330 48.0 21.1	33 40.9 47.8		Atria	107 43.0 S69 02.0		
	20 147 16.0	76 09.1 41.6	70 11.3 06.8	345 50.6 21.1	48 43.2 47.8		Avior	234 21.1 S59 31.6		
	21 162 18.5	91 09.4 41.9	85 12.0 07.0	0 53.1 21.1	63 45.4 47.8		Bellatrix	278 40.0 N 6 21.2		
	22 177 20.9	106 09.8 42.2	100 12.8 07.1	15 55.7 21.2	78 47.7 47.8		Betelgeuse	271 09.3 N 7 24.5		
23 192 23.4	121 10.1 42.6	115 13.5 07.3	30 58.3 21.2	93 50.0 47.8						
MONDAY	19 00 207 25.9	136 10.5 N26 42.9	130 14.2 N24 07.4	46 00.9 N 9 21.3	108 52.2 N22 47.8		Canopus	263 59.6 S52 42.1		
	01 222 28.3	151 10.8 43.3	145 14.9 07.6	61 03.5 21.3	123 54.5 47.8		Capella	280 45.5 N46 00.3		
	02 237 30.8	166 11.2 43.6	160 15.7 07.7	76 06.0 21.3	138 56.8 47.7		Deneb	49 36.6 N45 17.3		
	03 252 33.3	181 11.5 43.9	175 16.4 07.9	91 08.6 21.4	153 59.1 47.7		Denebola	182 40.7 N14 32.9		
	04 267 35.7	196 11.9 44.3	190 17.1 08.0	106 11.2 21.4	169 01.3 47.7		Diphda	349 03.4 S17 57.9		
	05 282 38.2	211 12.3 44.6	205 17.9 08.2	121 13.8 21.5	184 03.6 47.7					
	06 297 40.6	226 12.6 N26 45.0	220 18.6 N24 08.3	136 16.4 N 9 21.5	199 05.9 N22 47.7		Dubhe	193 59.7 N61 43.9		
	07 312 43.1	241 13.0 45.3	235 19.3 08.5	151 18.9 21.5	214 08.1 47.7		Einah	278 22.0 N28 36.8		
	08 327 45.6	256 13.4 45.6	250 20.0 08.6	166 21.5 21.6	229 10.4 47.7		Eltanin	90 49.2 N51 28.9		
	09 342 48.0	271 13.7 46.0	265 20.8 08.7	181 24.1 21.6	244 12.7 47.7		Enif	33 54.4 N 9 53.4		
	10 357 50.5	286 14.1 46.3	280 21.5 08.9	196 26.7 21.7	259 14.9 47.7		Fomalhaut	15 32.1 S29 36.1		
	11 12 53.0	301 14.5 46.6	295 22.2 09.0	211 29.3 21.7	274 17.2 47.7					
	12 27 55.4	316 14.8 N26 46.9	310 22.9 N24 09.2	226 31.8 N 9 21.7	289 19.4 N22 47.7		Gacrux	172 08.8 S57 08.3		
	13 42 57.9	331 15.2 47.3	325 23.7 09.6	241 34.4 21.8	304 21.7 47.7		Gienah	175 59.5 N17 34.0		
	14 58 00.4	346 15.6 47.6	340 24.4 09.5	256 37.0 21.8	319 24.0 47.7		Hadar	148 57.8 S60 23.7		
	15 73 02.8	1 16.0 47.9	355 25.1 09.6	271 39.6 21.8	334 26.2 47.7		Hamal	328 09.4 N23 28.8		
	16 88 05.3	16 16.4 48.3	10 25.8 09.7	286 42.2 21.9	349 28.5 47.7		Kaus Aust.	83 53.2 S34 23.0		
	17 103 07.7	31 16.7 48.6	25 26.6 09.9	301 44.7 21.9	4 30.8 47.7					
	18 118 10.2	46 17.1 N26 48.9	40 27.3 N24 10.0	316 47.3 N 9 22.0	19 33.0 N22 47.7		Kochab	137 18.1 N74 08.2		
	19 133 12.7	61 17.5 49.2	55 28.0 10.2	331 49.9 22.0	34 35.3 47.7		Markab	13 45.8 N15 13.4		
	20 148 15.1	76 17.9 49.6	70 28.7 10.3	346 52.5 22.0	49 37.6 47.7		Menkar	314 22.9 N 4 06.3		
	21 163 17.6	91 18.3 49.9	85 29.5 10.4	1 55.0 22.1	64 39.8 47.6		Menkent	148 15.8 S36 23.5		
	22 178 20.1	106 18.7 50.2	100 30.2 10.6	16 57.6 22.1	79 42.1 47.6		Miaplacidus	221 41.3 S69 44.3		
23 193 22.5	121 19.1 50.5	115 30.9 10.7	32 00.2 22.1	94 44.4 47.6						
TUESDAY	20 00 208 25.0	136 19.4 N26 50.8	130 31.6 N24 10.9	47 02.8 N 9 22.2	109 46.6 N22 47.6		Mirlak	308 51.3 N49 52.6		
	01 223 27.5	151 19.8 51.2	145 32.4 11.0	62 05.3 22.2	124 48.9 47.6		Nunki	76 07.1 S26 17.6		
	02 238 29.9	166 20.2 51.5	160 33.1 11.1	77 07.9 22.3	139 51.2 47.6		Peacock	53 30.5 S56 43.2		
	03 253 32.4	181 20.6 51.8	175 33.8 11.3	92 10.5 22.3	154 53.4 47.6		Pollux	243 36.6 N28 01.1		
	04 268 34.9	196 21.0 52.1	190 34.6 11.4	107 13.1 22.3	169 55.7 47.6		Procyon	245 07.3 N 5 12.9		
	05 283 37.3	211 21.4 52.4	205 35.3 11.6	122 15.6 22.4	184 57.9 47.6					
	06 298 39.8	226 21.8 N26 52.7	220 36.0 N24 11.7	137 18.2 N 9 22.4	200 00.2 N22 47.6		Rasalhague	96 13.0 N12 33.1		
	07 313 42.2	241 22.2 53.0	235 36.7 11.8	152 20.8 22.4	215 02.5 47.6		Regulus	207 51.0 N11 56.8		
	08 328 44.7	256 22.6 53.4	250 37.5 12.0	167 23.4 22.5	230 04.7 47.6		Rigel	281 19.2 S 8 11.9		
	09 343 47.2	271 23.0 53.7	265 38.2 12.1	182 25.9 22.5	245 07.0 47.6		Rigel Kent.	140 01.3 S60 51.2		
	10 358 49.6	286 23.4 54.0	280 38.9 12.2	197 28.5 22.6	260 09.3 47.6		Sabik	102 20.6 S15 43.9		
	11 13 52.1	301 23.9 54.3	295 39.6 12.4	212 31.1 22.6	275 11.5 47.6					
	12 28 54.6	316 24.3 N26 54.6	310 40.4 N24 12.5	227 33.7 N 9 22.6	290 13.8 N22 47.6		Schedar	349 49.6 N56 33.4		
	13 43 57.0	331 24.7 54.9	325 41.1 12.6	242 36.2 22.7	305 16.0 47.6		Shaula	96 31.5 S37 06.4		
	14 58 59.5	346 25.1 55.2	340 41.8 12.8	257 38.8 22.7	320 18.3 47.5		Sirius	258 40.3 S16 43.4		
	15 74 02.0	1 25.5 55.5	355 42.5 12.9	272 41.4 22.7	335 20.6 47.5		Spica	158 38.6 S11 11.1		
	16 89 04.4	16 25.9 55.8	10 43.3 13.1	287 43.9 22.8	350 22.8 47.5		Suhail	222 57.8 S43 27.2		
	17 104 06.9	31 26.3 56.1	25 44.0 13.2	302 46.5 22.8	5 25.1 47.5					
	18 119 09.4	46 26.8 N26 56.4	40 44.7 N24 13.3	317 49.1 N 9 22.8	20 27.3 N22 47.5		Vega	80 43.7 N38 46.9		
	19 134 11.8	61 27.2 56.7	55 45.4 13.5	332 51.6 22.9	35 29.6 47.5		Zuben'ubi	137 13.2 S16 03.7		
	20 149 14.3	76 27.6 57.0	70 46.2 13.6	347 54.2 22.9	50 31.9 47.5			SHA	Mer.Pass.	
	21 164 16.7	91 28.0 57.3	85 46.9 13.7	2 56.8 22.9	65 34.1 47.5					
	22 179 19.2	106 28.5 57.6	100 47.6 13.8	17 59.4 23.0	80 36.4 47.5		Venus	288 44.6 14 55		
23 194 21.7	121 28.9 57.9	115 48.3 14.0	33 01.9 23.0	95 38.6 47.5		Mars	282 48.4 15 18			
						Jupiter	198 35.0 20 52			
						Saturn	261 26.4 16 42			



## APRIL 18, 19, 20 (SUN., MON., TUES.)

UT	SUN				MOON				Lat.	Twilight		Sunrise	Moonrise					
										18	19		20	21				
	GHA	Dec	GHA	u	Dec	d	HP	Naut.							Civil	h m	h m	h m
d h	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	°	h m	h m	h m	h m	h m	h m	h m	h m	h m
1800	180 09.6	N10 52.2	195 49.8	15.4	N 1	37.6	14.6	55.8	N 72	////	01 07	03 14	04 32	03 59	03 17	01 40		
01	195 09.8	53.0	210 24.2	15.4	1	52.2	14.6	55.8	N 70	////	02 03	03 34	04 36	04 11	03 41	02 53		
02	210 09.9	53.9	224 58.6	15.4	2	06.8	14.7	55.8	68	////	02 35	03 50	04 38	04 21	04 00	03 31		
03	225 10.0	54.8	239 33.0	15.4	2	21.5	14.6	55.8	66	00 58	02 58	04 03	04 41	04 29	04 15	03 58		
04	240 10.2	55.6	254 07.4	15.4	2	36.1	14.5	55.8	64	01 47	03 17	04 14	04 43	04 36	04 28	04 19		
05	255 10.3	56.5	268 41.8	15.4	2	50.6	14.6	55.7	62	02 17	03 31	04 23	04 45	04 42	04 39	04 36		
06	270 10.4	N10 57.4	283 16.2	15.5	N 3	05.2	14.5	55.7	60	02 38	03 43	04 31	04 46	04 47	04 48	04 50		
07	285 10.6	58.3	297 50.7	15.4	3	19.7	14.5	55.7	N 58	02 55	03 54	04 38	04 48	04 51	04 56	05 02		
08	300 10.7	10 59.1	312 25.1	15.4	3	34.2	14.5	55.7	56	03 10	04 03	04 44	04 49	04 55	05 03	05 13		
09	315 10.9	11 00.0	326 59.5	15.5	3	48.7	14.5	55.7	54	03 21	04 11	04 49	04 50	04 59	05 09	05 22		
10	330 11.0	00.9	341 34.0	15.4	4	03.2	14.4	55.7	52	03 32	04 18	04 54	04 51	05 03	05 15	05 30		
11	345 11.1	01.7	356 08.4	15.5	4	17.6	14.4	55.6	50	03 41	04 24	04 59	04 52	05 06	05 20	05 38		
12	0 11.3	N11 02.6	10 42.9	15.4	N 4	32.0	14.4	55.6	45	03 59	04 37	05 08	04 54	05 12	05 32	05 54		
13	15 11.4	03.5	25 17.3	15.4	4	46.4	14.4	55.6	N 40	04 14	04 48	05 16	04 56	05 18	05 41	06 07		
14	30 11.5	04.3	39 51.7	15.5	5	00.8	14.3	55.6	35	04 25	04 56	05 23	04 58	05 23	05 49	06 19		
15	45 11.7	05.2	54 26.2	15.4	5	15.1	14.3	55.6	30	04 35	05 04	05 29	04 59	05 27	05 57	06 29		
16	60 11.8	06.1	69 00.6	15.4	5	29.4	14.3	55.5	20	04 50	05 16	05 39	05 02	05 35	06 09	06 46		
17	75 11.9	06.9	83 35.0	15.5	5	43.7	14.2	55.5	N 10	05 01	05 26	05 48	05 04	05 42	06 20	07 01		
18	90 12.1	N11 07.8	98 09.5	15.4	N 5	57.9	14.2	55.5	0	05 10	05 35	05 56	05 06	05 48	06 31	07 15		
19	105 12.2	08.7	112 43.9	15.4	6	12.1	14.2	55.5	S 10	05 18	05 42	06 04	05 08	05 54	06 41	07 29		
20	120 12.4	09.5	127 18.3	15.4	6	26.3	14.1	55.5	20	05 24	05 50	06 12	05 10	06 01	06 53	07 45		
21	135 12.5	10.4	141 52.7	15.4	6	40.4	14.1	55.4	30	05 29	05 57	06 22	05 13	06 09	07 06	08 03		
22	150 12.6	11.3	156 27.1	15.4	6	54.5	14.0	55.4	35	05 32	06 01	06 27	05 14	06 14	07 13	08 13		
23	165 12.8	12.1	171 01.5	15.3	7	08.5	14.1	55.4	40	05 34	06 06	06 33	05 16	06 19	07 22	08 25		
1900	180 12.9	N11 13.0	185 35.8	15.4	N 7	22.6	14.0	55.4	45	05 36	06 10	06 40	05 18	06 25	07 32	08 39		
01	195 13.0	13.9	200 10.2	15.4	7	36.6	13.9	55.4	S 50	05 38	06 16	06 49	05 20	06 32	07 44	08 57		
02	210 13.2	14.7	214 44.6	15.3	7	50.5	13.9	55.4	52	05 39	06 18	06 53	05 22	06 36	07 50	09 05		
03	225 13.3	15.6	229 18.9	15.3	8	04.4	13.9	55.3	54	05 39	06 21	06 57	05 23	06 40	07 57	09 14		
04	240 13.4	16.4	243 53.2	15.3	8	18.3	13.8	55.3	56	05 40	06 23	07 02	05 24	06 44	08 04	09 24		
05	255 13.6	17.3	258 27.5	15.3	8	32.1	13.8	55.3	58	05 41	06 26	07 07	05 26	06 48	08 12	09 36		
06	270 13.7	N11 18.2	273 01.8	15.3	N 8	45.9	13.7	55.3	S 60	05 41	06 30	07 13	05 27	06 54	08 21	09 50		
07	285 13.8	19.0	287 36.1	15.2	8	59.6	13.7	55.3										
08	300 14.0	19.9	302 10.3	15.3	9	13.3	13.7	55.3	Lat.	Sunset								
09	315 14.1	20.8	316 44.6	15.2	9	27.0	13.6	55.2										
10	330 14.2	21.6	331 18.8	15.2	9	40.6	13.5	55.2										
11	345 14.4	22.5	345 53.0	15.2	N 9	54.1	13.6	55.2										
12	0 14.5	N11 23.3																
13	15 14.6	24.2	A partial eclipse of the Sun occurs on this date. See page 5.															
14	30 14.8	25.1																
15	45 14.9	25.9																
16	60 15.0	26.8																
17	75 15.2	27.6																
18	90 15.3	N11 28.5	87 51.7	15.0	N11	27.7	13.1	55.1										
19	105 15.4	29.4	102 25.7	15.0	11	40.8	13.1	55.1	N 58	19 22	20 06	21 05	18 05	19 28	20 52	22 17		
20	120 15.5	30.2	116 59.7	14.9	11	53.9	13.0	55.0	56	19 16	19 57	20 51	18 02	19 22	20 42	22 03		
21	135 15.7	31.1	131 33.6	14.9	12	06.9	13.0	55.0	54	19 10	19 49	20 39	18 00	19 17	20 34	21 51		
22	150 15.8	31.9	146 07.5	14.9	12	19.9	13.0	55.0	52	19 05	19 42	20 28	17 57	19 12	20 26	21 40		
23	165 15.9	32.8	160 41.4	14.9	12	32.9	12.8	55.0	50	19 01	19 35	20 19	17 55	19 07	20 19	21 31		
2000	180 16.1	N11 33.6	175 15.3	14.8	N12	45.7	12.8	55.0	45	18 51	19 22	20 00	17 50	18 57	20 04	21 11		
01	195 16.2	34.5	189 49.1	14.8	12	58.5	12.8	55.0	N 40	18 43	19 11	19 45	17 46	18 49	19 52	20 55		
02	210 16.3	35.4	204 22.9	14.8	13	11.3	12.7	54.9	35	18 36	19 02	19 34	17 43	18 42	19 42	20 42		
03	225 16.5	36.2	218 56.7	14.7	13	24.0	12.6	54.9	30	18 30	18 55	19 24	17 40	18 36	19 33	20 30		
04	240 16.6	37.1	233 30.4	14.7	13	36.6	12.6	54.9	20	18 20	18 42	19 09	17 35	18 26	19 18	20 10		
05	255 16.7	37.9	248 04.1	14.7	13	49.2	12.5	54.9	N 10	18 11	18 32	18 57	17 30	18 17	19 04	19 53		
06	270 16.8	N11 38.8	262 37.8	14.6	N14	01.7	12.4	54.9	0	18 02	18 23	18 48	17 26	18 08	18 52	19 37		
07	285 17.0	39.6	277 11.4	14.6	14	14.1	12.4	54.9	S 10	17 54	18 16	18 40	17 22	18 00	18 39	19 21		
08	300 17.1	40.5	291 45.0	14.5	14	26.5	12.3	54.9	20	17 46	18 08	18 34	17 17	17 51	18 26	19 04		
09	315 17.2	41.3	306 18.5	14.5	14	38.8	12.2	54.8	30	17 36	18 00	18 28	17 12	17 41	18 11	18 45		
10	330 17.4	42.2	320 52.0	14.5	14	51.0	12.2	54.8	35	17 31	17 56	18 26	17 09	17 35	18 03	18 33		
11	345 17.5	43.0	335 25.5	14.5	15	03.2	12.1	54.8	40	17 24	17 52	18 23	17 06	17 28	17 53	18 20		
12	0 17.6	N11 43.9	349 59.0	14.4	N15	15.3	12.1	54.8	45	17 17	17 47	18 21	17 02	17 21	17 41	18 05		
13	15 17.7	44.7	4 32.4	14.3	15	27.4	11.9	54.8	S 50	17 08	17 42	18 19	16 58	17 11	17 27	17 47		
14	30 17.9	45.6	19 05.7	14.3	15	39.3	11.9	54.8	52	17 05	17 39	18 18	16 55	17 07	17 21	17 38		
15	45 18.0	46.4	33 39.0	14.3	15	51.2	11.8	54.8	54	17 00	17 37	18 18	16 53	17 03	17 14	17 28		
16	60 18.1	47.3	48 12.3	14.3	16	03.0												



## MAY 6, 7, 8 (THURS., FRI., SAT.)

95

UT	SUN		MOON						Lat.	Twilight		Sunrise	Moonrise						
	GHA	Dec	GHA	u	Dec	d	HP	Naut.		Civil	6		7	8	9				
d h	°	'	°	'	°	'	°	'	°	'	h m	h m	h m	h m	h m	h m	h m	h m	
THURSDAY	N 72	///	///						00 40	///	///	///	///	///	///	///	///	///	
	N 70	///	///						01 51	///	///	///	///	///	///	///	///	///	
	68	///	///						02 27	///	///	///	///	///	///	///	///	///	
	66	///	///						01 10	02 53	///	///	///	///	///	///	///	///	
	64	///	///						01 54	03 12	///	///	///	///	///	///	///	///	
	62	///	///						02 23	03 28	24 30	00 30	02 36	03 13	///	///	///	///	
	60	01 02	02 44						03 41	23 51	25 29	01 29	02 23	///	///	///	///	///	
	N 58	01 42	03 01						03 53	23 24	24 54	00 54	01 52	///	///	///	///	///	
	56	02 09	03 16						04 02	23 03	24 29	00 29	01 28	///	///	///	///	///	
	54	02 29	03 28						04 11	22 45	24 08	00 08	01 09	///	///	///	///	///	
	52	02 45	03 39						04 19	22 30	23 51	24 53	00 53	///	///	///	///	///	
	50	02 59	03 48						04 26	22 17	23 37	24 39	00 39	///	///	///	///	///	
	45	03 26	04 07						04 41	21 51	23 07	24 10	00 10	///	///	///	///	///	
	N 40	03 46	04 23						04 53	21 30	22 44	23 48	24 39	///	///	///	///	///	
	35	04 02	04 36						05 03	21 13	22 25	23 29	24 22	///	///	///	///	///	
	30	04 16	04 46						05 12	20 58	22 09	23 13	24 08	///	///	///	///	///	
	20	04 37	05 04						05 27	20 32	21 41	22 46	23 44	///	///	///	///	///	
	N 10	04 53	05 19						05 41	20 11	21 18	22 22	23 22	///	///	///	///	///	
	0	05 06	05 31						05 53	19 51	20 56	22 01	23 03	///	///	///	///	///	
	S 10	05 18	05 43						06 05	19 31	20 34	21 39	22 43	///	///	///	///	///	
	20	05 29	05 55						06 18	19 09	20 10	21 15	22 21	///	///	///	///	///	
	30	05 39	06 08						06 33	18 45	19 43	20 48	21 57	///	///	///	///	///	
	35	05 45	06 15						06 41	18 31	19 27	20 32	21 42	///	///	///	///	///	
	40	05 50	06 22						06 51	18 14	19 09	20 13	21 25	///	///	///	///	///	
45	05 56	06 31						07 02	17 54	18 46	19 51	21 05	///	///	///	///	///		
S 50	06 02	06 41						07 16	17 30	18 18	19 22	20 39	///	///	///	///	///		
52	06 05	06 45						07 22	17 18	18 04	19 08	20 27	///	///	///	///	///		
54	06 08	06 50						07 29	17 05	17 48	18 51	20 12	///	///	///	///	///		
56	06 11	06 56						07 37	16 49	17 29	18 32	19 56	///	///	///	///	///		
58	06 14	07 02						07 46	16 31	17 06	18 07	19 36	///	///	///	///	///		
S 60	06 18	07 08						07 56	16 09	16 35	17 35	19 10	///	///	///	///	///		
FRIDAY	Lat.		Sunset		Twilight		Moonset												
					Civil		Naut.		6		7		8		9				
	°	'	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	
	N 72	23 39	///	///	///	///	///	///	///	///	///	///	///	///	///	///	///	///	
	N 70	22 08	///	///	///	///	///	///	///	///	///	///	///	///	///	///	///	///	
	68	21 30	///	///	///	///	///	///	///	///	///	///	///	///	///	///	///	///	
	66	21 03	22 52	///	///	///	///	///	02 19	///	///	///	///	///	///	///	///	///	
	64	20 43	22 03	///	///	///	///	///	03 05	///	///	///	///	///	///	///	///	///	
	62	20 27	21 33	///	///	///	///	///	03 35	03 34	03 46	05 24	///	///	///	///	///	///	
	60	20 13	21 11	22 59	///	///	///	///	03 58	04 13	04 52	06 14	///	///	///	///	///	///	
	N 58	20 02	20 54	22 15	///	///	///	///	04 17	04 41	05 27	06 44	///	///	///	///	///	///	
	56	19 52	20 39	21 47	///	///	///	///	04 33	05 02	05 53	07 08	///	///	///	///	///	///	
	54	19 43	20 27	21 26	///	///	///	///	04 46	05 20	06 13	07 27	///	///	///	///	///	///	
	52	19 35	20 16	21 10	///	///	///	///	04 58	05 36	06 30	07 43	///	///	///	///	///	///	
	50	19 28	20 06	20 56	///	///	///	///	05 09	05 49	06 45	07 57	///	///	///	///	///	///	
	45	19 13	19 46	20 28	///	///	///	///	05 31	06 16	07 14	08 25	///	///	///	///	///	///	
	N 40	19 01	19 31	20 08	///	///	///	///	05 49	06 38	07 38	08 47	///	///	///	///	///	///	
	35	18 50	19 18	19 51	///	///	///	///	06 04	06 56	07 57	09 05	///	///	///	///	///	///	
	30	18 41	19 07	19 38	///	///	///	///	06 17	07 11	08 13	09 21	///	///	///	///	///	///	
	20	18 26	18 49	19 17	///	///	///	///	06 40	07 37	08 41	09 47	///	///	///	///	///	///	
	N 10	18 12	18 35	19 00	///	///	///	///	06 59	08 00	09 05	10 10	///	///	///	///	///	///	
	0	18 00	18 22	18 47	///	///	///	///	07 18	08 21	09 27	10 31	///	///	///	///	///	///	
	S 10	17 48	18 10	18 35	///	///	///	///	07 36	08 43	09 49	10 52	///	///	///	///	///	///	
	20	17 35	17 58	18 24	///	///	///	///	07 56	09 05	10 13	11 14	///	///	///	///	///	///	
30	17 20	17 45	18 13	///	///	///	///	08 19	09 32	10 40	11 40	///	///	///	///	///	///		
35	17 11	17 38	18 08	///	///	///	///	08 32	09 48	10 56	11 55	///	///	///	///	///	///		
40	17 02	17 30	18 03	///	///	///	///	08 48	10 06	11 15	12 13	///	///	///	///	///	///		
45	16 50	17 22	17 57	///	///	///	///	09 07	10 28	11 38	12 34	///	///	///	///	///	///		
S 50	16 37	17 11	17 50	///	///	///	///	09 30	10 56	12 07	13 00	///	///	///	///	///	///		
52	16 30	17 07	17 47	///	///	///	///	09 41	11 09	12 21	13 13	///	///	///	///	///	///		
54	16 23	17 02	17 45	///	///	///	///	09 54	11 25	12 38	13 28	///	///	///	///	///	///		
56	16 15	16 56	17 41	///	///	///	///	10 09	11 44	12 58	13 45	///	///	///	///	///	///		
58	16 07	16 50	17 38	///	///	///	///	10 27	12 07	13 22	14 05	///	///	///	///	///	///		
S 60	15 56	16 44	17 34	///	///	///	///	10 48	12 37	13 55	14 31	///	///	///	///	///	///		
SATURDAY	Day		Eqn. of Time		Mer.		Mer. Pass.		Age		Phase								
	d	m s	d	m s	h m	h m	h m	h m	d	%									
	6	03 24	03 26	11 57	01 03	13 34	17 96	///	///	///	///	///	///	///	///	///	///	///	
	7	03 28	03 30	11 57	02 06	14 38	18 90	///	///	///	///	///	///	///	///	///	///	///	
	8	03 32	03 33	11 56	03 11	15 44	19 82	///	///	///	///	///	///	///	///	///	///	///	
	SD	15.9	d 0.7	SD	16.6	16.5	16.4												



## MAY 9, 10, 11 (SUN., MON., TUES.)

UT	SUN			MOON				Lat.	Twilight		Sunrise	Moonrise					
	GHA		Dec	GHA		v	Dec		d	HP		Naut.	Civil	9	10	11	12
d h																	
00	180	53.7	N17 23.4	298	45.0	3.0	S27 11.9	3.2	59.9	N 72							05 02
01	195	53.7	24.1	313	07.0	3.0	27 08.7	3.5	59.9	N 70	////	////	01 29				04 25
02	210	53.7	24.8	327	29.0	3.0	27 05.2	3.6	59.9	68	////	////	02 12			04 47	03 59
03	225	53.8	25.4	341	51.0	3.2	27 01.6	3.9	59.9	66	////	00 36	02 41			04 03	03 38
04	240	53.8	26.1	356	13.2	3.3	26 57.7	4.0	59.8	64	////	01 38	03 02		03 56	03 34	03 22
05	255	53.8	26.7	10	35.5	3.3	26 53.7	4.2	59.8	62	////	02 11	03 19	03 13	03 13	03 11	03 08
06	270	53.9	N17 27.4	24	57.8	3.4	S26 49.5	4.4	59.8	60	00 32	02 34	03 34	02 23	02 44	02 53	02 56
07	285	53.9	28.1	39	20.2	3.5	26 45.1	4.5	59.7	N 58	01 28	02 53	03 46	01 52	02 22	02 38	02 46
08	300	53.9	28.7	53	42.7	3.7	26 40.6	4.8	59.7	56	01 58	03 08	03 56	01 28	02 04	02 24	02 37
09	315	53.9	29.4	68	05.4	3.7	26 35.8	4.9	59.7	54	02 20	03 21	04 05	01 09	01 48	02 13	02 30
10	330	54.0	30.0	82	28.1	3.8	26 30.9	5.1	59.7	52	02 38	03 33	04 14	00 53	01 35	02 03	02 22
11	345	54.0	30.7	96	50.9	3.9	26 25.8	5.3	59.6	50	02 52	03 43	04 21	00 39	01 23	01 54	02 16
12	0	54.0	N17 31.4	111	13.8	4.0	S26 20.5	5.5	59.6	45	03 21	04 03	04 37	00 10	00 58	01 34	02 02
13	15	54.0	32.0	125	36.8	4.1	26 15.0	5.6	59.6	N 40	03 42	04 19	04 49	24 39	00 39	01 19	01 51
14	30	54.1	32.7	139	59.9	4.2	26 09.4	5.8	59.5	35	03 59	04 33	05 00	24 22	00 22	01 05	01 41
15	45	54.1	33.3	154	23.1	4.4	26 03.6	6.0	59.5	30	04 13	04 44	05 10	24 08	00 08	00 54	01 32
16	60	54.1	34.0	168	46.5	4.4	25 57.6	6.1	59.5	20	04 35	05 02	05 26	23 44	24 34	00 34	01 17
17	75	54.1	34.7	183	09.9	4.5	25 51.5	6.4	59.5	N 10	04 52	05 18	05 40	23 22	24 16	00 16	00 54
18	90	54.2	N17 35.3	197	33.4	4.7	S25 45.1	6.4	59.4	0	05 06	05 31	05 53	23 03	24 00	00 00	00 01
19	105	54.2	36.0	211	57.1	4.8	25 38.7	6.7	59.4	S 10	05 18	05 44	06 06	22 43	23 43	24 39	00 39
20	120	54.2	36.6	226	20.9	4.9	25 32.0	6.8	59.4	20	05 30	05 56	06 19	22 21	23 25	24 26	00 26
21	135	54.2	37.3	240	44.8	4.9	25 25.2	6.9	59.3	30	05 41	06 10	06 35	21 57	23 05	24 10	00 10
22	150	54.3	37.9	255	08.7	5.2	25 18.3	7.2	59.3	35	05 47	06 17	06 44	21 42	22 53	24 01	00 01
23	165	54.3	38.6	269	32.9	5.2	25 11.1	7.2	59.3	40	05 53	06 25	06 54	21 25	22 39	23 51	25 00
00	180	54.3	N17 39.2	283	57.1	5.3	S25 03.9	7.5	59.2	45	05 59	06 34	07 06	21 05	22 22	23 39	24 52
01	195	54.3	39.9	298	21.4	5.5	24 56.4	7.6	59.2	S 50	06 06	06 45	07 20	20 39	22 02	23 24	24 43
02	210	54.4	40.5	312	45.9	5.6	24 48.8	7.7	59.2	52	06 09	06 50	07 27	20 27	21 52	23 17	24 38
03	225	54.4	41.2	327	10.5	5.7	24 41.1	7.9	59.1	54	06 12	06 55	07 34	20 12	21 41	23 09	24 33
04	240	54.4	41.8	341	35.2	5.8	24 33.2	8.0	59.1	56	06 16	07 01	07 43	19 56	21 29	23 01	24 28
05	255	54.4	42.5	356	00.0	6.0	24 25.2	8.2	59.1	58	06 19	07 07	07 52	19 36	21 14	22 51	24 22
06	270	54.4	N17 43.1	10	25.0	6.0	S24 17.0	8.3	59.1	S 60	06 23	07 15	08 03	19 10	20 57	22 39	24 16
07	285	54.5	43.8	24	50.0	6.2	24 08.7	8.5	59.0	Lat.	Sunset	Twilight		Moonset			
08	300	54.5	44.4	39	15.2	6.3	24 00.2	8.6	59.0			Civil	Naut.	9	10	11	12
09	315	54.5	45.1	53	40.5	6.5	23 51.6	8.7	59.0			h m	h m	h m	h m	h m	h m
10	330	54.5	45.7	68	06.0	6.5	23 42.9	8.9	58.9	N 72							
11	345	54.6	46.4	82	31.5	6.7	23 34.0	9.0	58.9	N 70	22 31	////	////				09 29
12	0	54.6	N17 47.0	96	57.2	6.8	S23 25.0	9.2	58.9	68	21 45	////	////			07 55	10 29
13	15	54.6	47.7	111	23.0	7.0	23 15.8	9.3	58.8	66	21 15	23 36	////			08 38	10 48
14	30	54.6	48.3	125	49.0	7.0	23 06.5	9.4	58.8	64	20 53	22 20	////		06 49	09 07	11 03
15	45	54.6	49.0	140	15.0	7.2	22 57.1	9.5	58.8	62	20 35	21 45	////	05 24	07 31	09 28	11 15
16	60	54.7	49.6	154	41.2	7.3	22 47.6	9.7	58.7	60	20 21	21 21	23 38	06 14	07 59	09 46	11 26
17	75	54.7	50.3	169	07.5	7.4	22 37.9	9.8	58.7	N 58	20 08	21 02	22 30	06 44	08 21	10 00	11 35
18	90	54.7	N17 50.9	183	33.9	7.6	S22 28.1	9.9	58.7	56	19 58	20 46	21 58	07 08	08 39	10 12	11 43
19	105	54.7	51.5	198	00.5	7.7	22 18.2	10.0	58.6	54	19 48	20 33	21 35	07 27	08 54	10 23	11 50
20	120	54.7	52.2	212	27.2	7.8	22 08.2	10.1	58.6	52	19 40	20 21	21 17	07 43	09 06	10 33	11 56
21	135	54.7	52.8	226	54.0	7.9	21 58.1	10.3	58.6	50	19 33	20 11	21 02	07 57	09 18	10 41	12 02
22	150	54.8	53.5	241	20.9	8.1	21 47.8	10.4	58.6	45	19 17	19 50	20 33	08 25	09 41	10 59	12 14
23	165	54.8	54.1	255	48.0	8.2	21 37.4	10.5	58.5	N 40	19 04	19 34	20 11	08 47	10 00	11 14	12 24
00	180	54.8	N17 54.8	270	15.2	8.3	S21 26.9	10.6	58.5	35	18 53	19 21	19 54	09 05	10 16	11 26	12 33
01	195	54.8	55.4	284	42.5	8.4	21 16.3	10.7	58.5	30	18 43	19 09	19 40	09 21	10 29	11 36	12 40
02	210	54.8	56.0	299	09.9	8.5	21 05.6	10.8	58.4	20	18 27	18 51	19 18	09 47	10 52	11 55	12 53
03	225	54.8	56.7	313	37.4	8.7	20 54.8	10.9	58.4	N 10	18 13	18 35	19 01	10 10	11 12	12 10	13 04
04	240	54.9	57.3	328	05.1	8.8	20 43.9	11.1	58.4	0	18 00	18 22	18 47	10 31	11 30	12 25	13 14
05	255	54.9	57.9	342	32.9	8.9	20 32.8	11.1	58.3	S 10	17 47	18 09	18 34	10 52	11 49	12 39	13 25
06	270	54.9	N17 58.6	357	00.8	9.1	S20 21.7	11.2	58.3	20	17 33	17 56	18 23	11 14	12 08	12 55	13 36
07	285	54.9	59.2	11	28.9	9.1	20 10.5	11.4	58.3	30	17 18	17 43	18 12	11 40	12 30	13 12	13 48
08	300	54.9	17 59.9	25	57.0	9.3	19 59.1	11.4	58.2	35	17 09	17 35	18 06	11 55	12 43	13 22	13 55
09	315	54.9	18 00.5	40	25.3	9.4	19 47.7	11.5	58.2	40	16 58	17 27	18 00	12 13	12 58	13 34	14 03
10	330	55.0	01.1	54	53.7	9.5	19 36.2	11.6	58.2	45	16 46	17 18	17 53	12 34	13 16	13 47	14 12
11	345	55.0	01.8	69	22.2	9.7	19 24.6	11.7	58.1	S 50	16 32	17 07	17 46	13 00	13 37	14 04	14 23
12	0	55.0	N18 02.4	83	50.9	9.7	S19 12.9	11.8	58.1	52	16 25	17 02	17 43	13 13	13 48	14 11	14 28
13	15	55.0	03.0	98	19.6	9.9	19 01.1	11.9	58.1	54	16 18	16 57	17 40	13 28	13 59	14 20	14 34
14	30	55.0	03.7	112	48.5	10.0	18 49.2	12.0	58.0	56	16 10	16 51	17 36	13 45	14 12	14 29	14 40
15	45	55.0	04.3	127	17.5	10.1	18 37.2	12.1	58.0	58	16 00	16 45	17 33	14 05	14 28	14 40	14 47
16	60	55.0	04.9	141	46.6	10.2	18 25.1	12.1	58.0	S 60	15 49	16 37	17 29	14 31	14 46	14 52	14 55
17	75	55.0	05.6	156	15.8	10.3	18 13.0	12.2	57.9	Lat.	Sunset	Twilight		Moonset			
18	90</																



## JUNE 23, 24, 25 (WED., THURS., FRI.)

UT	ARIES			VENUS -4.3			MARS +1.8			JUPITER -1.9			SATURN +0.1			STARS		
	GHA	GHA	Dec	GHA	GHA	Dec	GHA	GHA	Dec	GHA	GHA	Dec	GHA	GHA	Dec	Name	SHA	Dec
WEDNESDAY	271 29.9	202 01.9	N18 53.3	149 36.7	N21 28.1	107 23.7	N 8 03.2	165 27.7	N22 19.8	Acamar	315 23.9	S40 17.0						
	286 32.4	217 05.0	52.8	164 37.5	27.7	122 25.8	03.1	180 29.9	19.8	Achernar	335 32.0	S57 12.6						
	301 34.8	232 08.2	52.4	179 38.3	27.4	137 28.0	02.9	195 32.0	19.8	Acrux	173 17.5	S63 07.7						
	316 37.3	247 11.3	51.9	194 39.1	27.1	152 30.2	02.8	210 34.1	19.7	Adhara	255 18.5	S28 58.6						
	331 39.8	262 14.4	51.4	209 40.0	26.7	167 32.3	02.7	225 36.2	19.7	Aldebaran	290 57.8	N16 31.1						
	346 42.2	277 17.5	51.0	224 40.8	26.4	182 34.5	02.5	240 38.4	19.7									
	1 44.7	292 20.6	N18 50.5	239 41.6	N21 26.1	197 36.7	N 8 02.4	255 40.5	N22 19.6	Alioth	166 26.5	N55 56.5						
	16 47.2	307 23.7	50.0	254 42.4	25.7	212 38.8	02.3	270 42.6	19.6	Alkaid	153 04.0	N49 17.7						
	31 49.6	322 26.8	49.6	269 43.2	25.4	227 41.0	02.2	285 44.7	19.6	Al Na'ir	27 52.1	S46 56.2						
	46 52.1	337 29.9	49.1	284 44.0	25.0	242 43.2	02.0	300 46.8	19.5	Alnilam	275 53.9	S 1 11.9						
	61 54.6	352 33.0	48.6	299 44.8	24.7	257 45.3	01.9	315 49.0	19.5	Alphard	218 03.3	S 8 40.6						
	76 57.0	7 36.0	48.2	314 45.6	24.4	272 47.5	01.8	330 51.1	19.5									
	91 59.5	22 39.1	N18 47.7	329 46.4	N21 24.0	287 49.7	N 8 01.6	345 53.2	N22 19.5	Alphecca	126 16.6	N26 42.0						
	107 02.0	37 42.2	47.3	344 47.3	23.7	302 51.8	01.5	0 55.3	19.4	Alpheratz	357 50.9	N29 06.7						
	122 04.4	52 45.3	46.8	359 48.1	23.4	317 54.0	01.4	15 57.4	19.4	Altair	62 14.8	N 8 52.7						
	137 06.9	67 48.3	46.3	14 48.9	23.0	332 56.1	01.2	30 59.6	19.4	Ankaa	353 22.5	S42 16.7						
	152 09.3	82 51.4	45.9	29 49.7	22.7	347 58.3	01.1	46 01.7	19.3	Antares	112 34.6	S26 26.6						
	167 11.8	97 54.4	45.4	44 50.5	22.3	3 00.5	01.0	61 03.8	19.3									
	182 14.3	112 57.5	N18 45.0	59 51.3	N21 22.0	18 02.6	N 8 00.9	76 05.9	N22 19.3	Arcturus	146 01.9	N19 09.7						
	197 16.7	128 00.5	44.5	74 52.1	21.7	33 04.8	00.7	91 08.0	19.2	Atria	107 42.4	S69 02.3						
	212 19.2	143 03.6	44.1	89 52.9	21.3	48 07.0	00.6	106 10.2	19.2	Avior	234 21.6	S59 31.5						
	227 21.7	158 06.6	43.6	104 53.8	21.0	63 09.1	00.5	121 12.3	19.2	Bellatrix	278 39.9	N 6 21.3						
	242 24.1	173 09.6	43.2	119 54.6	20.6	78 11.3	00.3	136 14.4	19.1	Betelgeuse	271 09.3	N 7 24.6						
	257 26.6	188 12.7	42.7	134 55.4	20.3	93 13.5	00.2	151 16.5	19.1									
THURSDAY	272 29.1	203 15.7	N18 42.3	149 56.2	N21 20.0	108 15.6	N 8 00.1	166 18.6	N22 19.1	Canopus	263 59.9	S52 41.8						
	287 31.5	218 18.7	41.9	164 57.0	19.6	123 17.8	7 59.9	181 20.8	19.0	Capella	280 45.4	N46 00.2						
	302 34.0	233 21.7	41.4	179 57.8	19.3	138 19.9	59.8	196 22.9	19.0	Deneb	49 36.0	N45 17.5						
	317 36.4	248 24.8	41.0	194 58.6	18.9	153 22.1	59.7	211 25.0	19.0	Denebola	182 40.8	N14 33.0						
	332 38.9	263 27.8	40.5	209 59.5	18.6	168 24.3	59.5	226 27.1	19.0	Diphda	349 03.0	S17 57.7						
	347 41.4	278 30.8	40.1	225 00.3	18.3	183 26.4	59.4	241 29.2	18.9									
	2 43.8	293 33.8	N18 39.7	240 01.1	N21 17.9	198 28.6	N 7 59.3	256 31.4	N22 18.9	Dubhe	194 00.2	N61 44.0						
	17 46.3	308 36.8	39.2	255 01.9	17.6	213 30.7	59.2	271 33.5	18.9	Elnath	278 21.9	N28 36.7						
	32 48.8	323 39.8	38.8	270 02.7	17.2	228 32.9	59.0	286 35.6	18.8	Eltanin	90 48.9	N51 29.2						
	47 51.2	338 42.8	38.4	285 03.5	16.9	243 35.1	58.9	301 37.7	18.8	Enif	33 53.9	N 9 53.6						
	62 53.7	353 45.7	38.0	300 04.3	16.5	258 37.2	58.8	316 39.8	18.8	Fomalhaut	15 31.5	S29 35.8						
	77 56.2	8 48.7	37.5	315 05.2	16.2	273 39.4	58.6	331 42.0	18.7									
	92 58.6	23 51.7	N18 37.1	330 06.0	N21 15.9	288 41.6	N 7 58.5	346 44.1	N22 18.7	Gacrux	172 09.0	S57 08.5						
	108 01.1	38 54.7	36.7	345 06.8	15.5	303 43.7	58.4	1 46.2	18.7	Gienah	175 59.6	S17 34.0						
	123 03.6	53 57.6	36.3	0 07.6	15.2	318 45.9	58.2	16 48.3	18.6	Hadar	148 57.9	S60 23.9						
	138 06.0	69 00.6	35.8	15 08.4	14.8	333 48.0	58.1	31 50.4	18.6	Hamal	328 09.0	N23 28.9						
	153 08.5	84 03.6	35.4	30 09.2	14.5	348 50.2	58.0	46 52.5	18.6	Kaus Aust.	83 52.7	S34 23.0						
	168 10.9	99 06.5	35.0	45 10.1	14.1	3 52.3	57.8	61 54.7	18.5									
	183 13.4	114 09.5	N18 34.6	60 10.9	N21 13.8	18 54.5	N 7 57.7	76 56.8	N22 18.5	Kochab	137 18.5	N74 08.5						
	198 15.9	129 12.4	34.2	75 11.7	13.4	33 56.7	57.6	91 58.9	18.5	Markab	13 45.3	N15 13.6						
	213 18.3	144 15.4	33.7	90 12.5	13.1	48 58.8	57.4	107 01.0	18.4	Menkar	314 22.7	N 4 06.4						
	228 20.8	159 18.3	33.3	105 13.3	12.8	64 01.0	57.3	122 03.1	18.4	Menkent	148 15.8	S36 23.7						
	243 23.3	174 21.2	32.9	120 14.1	12.4	79 03.1	57.2	137 05.3	18.4	Miaplacidus	221 42.2	S69 44.2						
	258 25.7	189 24.2	32.5	135 15.0	12.1	94 05.3	57.0	152 07.4	18.3									
FRIDAY	273 28.2	204 27.1	N18 32.1	150 15.8	N21 11.7	109 07.5	N 7 56.9	167 09.5	N22 18.3	Mirak	308 51.0	N49 52.5						
	288 30.7	219 30.0	31.7	165 16.6	11.4	124 09.6	56.8	182 11.6	18.3	Nunki	76 06.7	S26 17.5						
	303 33.1	234 32.9	31.3	180 17.4	11.0	139 11.8	56.6	197 13.7	18.3	Peacock	53 29.6	S56 43.2						
	318 35.6	249 35.8	30.9	195 18.2	10.7	154 13.9	56.5	212 15.9	18.2	Pollux	243 36.7	N28 01.1						
	333 38.1	264 38.7	30.5	210 19.0	10.3	169 16.1	56.4	227 18.0	18.2	Procyon	245 07.4	N 5 12.9						
	348 40.5	279 41.7	30.1	225 19.9	10.0	184 18.2	56.2	242 20.1	18.2									
	3 43.0	294 44.6	N18 29.7	240 20.7	N21 09.6	199 20.4	N 7 56.1	257 22.2	N22 18.1	Rasalhague	96 12.7	N12 33.3						
	18 45.4	309 47.4	29.3	255 21.5	09.3	214 22.6	56.0	272 24.3	18.1	Regulus	207 51.2	N11 56.9						
	33 47.9	324 50.3	28.9	270 22.3	08.9	229 24.7	55.9	287 26.5	18.1	Rigel	281 19.2	S 8 11.7						
	48 50.4	339 53.2	28.5	285 23.1	08.6	244 26.9	55.7	302 28.6	18.0	Rigel Kent.	140 01.4	S60 51.4						
	63 52.8	354 56.1	28.1	300 23.9	08.2	259 29.0	55.6	317 30.7	18.0	Sabik	102 20.3	S15 43.9						
	78 55.3	9 59.0	27.7	315 24.8	07.9	274 31.2	55.5	332 32.8	18.0									
	93 57.8	25 01.9	N18 27.3	330 25.6	N21 07.5	289 33.3	N 7 55.3	347 34.9	N22 17.9	Schedar	349 49.0	N56 33.4						
	109 00.2	40 04.7	26.9	345 26.4	07.2	304 35.5	55.2	2 37.1	17.9	Shaula	96 31.1	S37 06.5						
	124 02.7	55 07.6	26.5	0 27.2	06.8	319 37.6	55.0	17 39.2	17.9	Sirius	258 40.3	S16 43.2						
	139 05.2	70 10.5	26.2	15 28.0	06.5	334 39.8	54.9	32 41.3	17.8	Spica	158 38.6	S11 11.1						
	154 07.6	85 13.3	25.8	30 28.9	06.1	349 42.0	54.8	47 43.4	17.8	Suhail	222 58.1	S43 27.1						
	169 10.1	100 16.2	25.4	45 29.7	05.8	4 44.1	54.6	62 45.5	17.8									
	184 12.5	115 19.0	N18 25.0	60 30.5	N21 05.4	19 46.3	N 7 54.5	77 47.6	N22 17.7	Vega	80 43.3	N38 47.1						
	199 15.0	130 21.9	24.6	75 31.3	05.1	34 48.4	54.4	92 49.8	17.7	Zuben'ubi	137 13.1	S16 03.7						
	214 17.5	145 24.7	24.2	90 32.1	04.7	49 50.6	54.2	107 51.9	17.7									
	229 19.9	160 27.6	23.9	105 33.0	04.4	64 52.7	54.1	122 54.0	17.6									
	244 22.4	175 30.4	23.5	120 33.8	04.0	79 54.9	54.0	137 56.1	17.6	Venus	290 46.7	10 25						
	259 24.9	190 33.2	23.1	135 34.6	03.7	94 57.0	53.8	152 58.2	17.6	Mars	237 27.1	13 59						
										Jupiter	195 46.6	16 45						
										Saturn	253 49.6	12 53						
Mer.Pass.	5 49.1	v 3.0	d 0.4	v 0.8	d 0.3	v 2.2	d 0.1	v 2.1	d 0.0									



## JUNE 23, 24, 25 (WED., THURS., FRI.)

UT	SUN				MOON				Lat.	Twilight		Sunrise	Moonrise			
	GHA	Dec	GHA	u	Dec	d	HP	Naut.		Civil	23		24	25	26	
d h	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	h m	h m	h m	h m	h m	h m	h m	h m
WEDNESDAY	23 00	179 27.5	N23 25.6	118 43.7	13.8	N16 23.0	11.8	55.3	N 72	00	00	06 36	09 06	11 16	13 27	
	01	194 27.4	25.6	133 16.5	13.8	16 11.2	12.0	55.3	N 70	00	00	07 11	09 21	11 20	13 21	
	02	209 27.2	25.6	147 49.3	13.8	15 59.2	11.9	55.4	68	00	00	07 36	09 32	11 24	13 16	
	03	224 27.1	25.5	162 22.1	13.8	15 47.3	12.1	55.4	66	00	00	07 55	09 42	11 26	13 12	
	04	239 27.0	25.5	176 54.9	14.0	15 35.2	12.1	55.4	64	00	00	08 11	09 50	11 29	13 09	
	05	254 26.8	25.5	191 27.9	13.9	15 23.1	12.3	55.4	62	00	00	08 23	09 57	11 31	13 06	
	06	269 26.7	N23 25.4	206 00.8	14.0	N15 10.8	12.2	55.4	60	00 51	02 37	08 34	10 03	11 32	13 04	
	07	284 26.6	25.4	220 33.8	14.0	14 58.6	12.4	55.5	N 58	01 42	02 57	08 43	10 08	11 34	13 01	
	08	299 26.4	25.4	235 06.8	14.0	14 46.2	12.4	55.5	56	02 11	03 14	08 51	10 13	11 35	13 00	
	09	314 26.3	25.3	249 39.8	14.1	14 33.8	12.5	55.5	54	02 34	03 28	08 58	10 17	11 36	12 58	
	10	329 26.2	25.3	264 12.9	14.1	14 21.3	12.6	55.5	52	02 52	03 41	09 05	10 21	11 37	12 56	
	11	344 26.0	25.2	278 46.0	14.1	14 08.7	12.7	55.6	50	03 07	03 52	09 10	10 24	11 38	12 55	
	12	359 25.9	N23 25.2	293 19.1	14.1	N13 56.0	12.7	55.6	45	03 37	04 14	09 23	10 31	11 41	12 52	
	13	14 25.7	25.1	307 52.2	14.2	13 43.3	12.8	55.6	N 40	03 59	04 32	09 33	10 37	11 42	12 49	
	14	29 25.6	25.1	322 25.4	14.2	13 30.5	12.8	55.6	35	04 17	04 47	09 42	10 43	11 44	12 47	
	15	44 25.5	25.1	336 58.6	14.3	13 17.7	12.9	55.7	30	04 33	05 00	09 49	10 47	11 45	12 45	
	16	59 25.3	25.0	351 31.9	14.2	13 04.8	13.0	55.7	20	04 51	05 18	10 02	10 55	11 48	12 42	
	17	74 25.2	25.0	6 05.1	14.3	12 51.8	13.1	55.7	N 10	05 10	05 36	10 14	11 02	11 50	12 39	
	18	89 25.1	N23 24.9	20 38.4	14.3	N12 38.7	13.1	55.8	0	05 27	05 53	10 24	11 08	11 52	12 36	
	19	104 24.9	24.9	35 11.7	14.4	12 25.6	13.2	55.8	S 10	06 11	06 35	10 35	11 15	11 54	12 34	
	20	119 24.8	24.8	49 45.1	14.3	12 12.4	13.2	55.8	20	06 00	06 30	10 46	11 21	11 56	12 31	
	21	134 24.7	24.8	64 18.4	14.4	11 59.2	13.3	55.8	30	06 09	06 40	10 59	11 29	11 58	12 28	
	22	149 24.5	24.7	78 51.8	14.4	11 45.9	13.4	55.9	35	06 18	06 52	11 06	11 34	12 00	12 26	
	23	164 24.4	24.7	93 25.2	14.4	11 32.5	13.4	55.9	40	06 28	07 06	11 15	11 44	12 03	12 22	
THURSDAY	24 00	179 24.3	N23 24.6	107 58.6	14.5	N11 19.1	13.5	55.9	S 50	06 40	07 22	11 36	11 51	12 05	12 19	
	01	194 24.1	24.6	122 32.1	14.4	11 05.6	13.5	55.9	52	06 45	07 29	11 41	11 54	12 06	12 18	
	02	209 24.0	24.5	137 05.5	14.5	10 52.1	13.6	56.0	54	06 51	07 37	11 47	11 58	12 07	12 17	
	03	224 23.9	24.5	151 39.0	14.5	10 38.5	13.7	56.0	56	06 57	07 46	11 54	12 02	12 09	12 15	
	04	239 23.7	24.4	166 12.5	14.5	10 24.8	13.7	56.0	58	07 04	07 57	12 01	12 06	12 10	12 14	
	05	254 23.6	24.4	180 46.0	14.5	10 11.1	13.8	56.1	S 60	07 11	08 08	12 10	12 11	12 11	12 12	
	06	269 23.5	N23 24.3	195 19.5	14.5	N 9 57.3	13.8	56.1								
	07	284 23.3	24.3	209 53.0	14.6	9 43.5	13.9	56.1	Lat.	Sunset	Twilight		Moonset			
	08	299 23.2	24.2	224 26.6	14.5	9 29.6	13.9	56.1			Civil	Naut.	23	24	25	26
	09	314 23.1	24.1	239 00.1	14.6	9 15.7	14.0	56.2								
	10	329 22.9	24.1	253 33.7	14.5	9 01.7	14.0	56.2								
	11	344 22.8	24.0	268 07.2	14.6	8 47.7	14.1	56.2								
	12	359 22.7	N23 24.0	282 40.8	14.6	N 8 33.6	14.2	56.3	N 72	00	00	02 12	01 16	00 39	12 03	
	13	14 22.5	23.9	297 14.4	14.6	8 19.4	14.2	56.3	N 70	00	00	01 35	00 59	00 32	12 00	
	14	29 22.4	23.8	311 48.0	14.6	8 05.2	14.2	56.3	68	00	00	01 09	00 45	00 26	11 59	
	15	44 22.3	23.8	326 21.6	14.5	7 51.0	14.3	56.4	66	00	00	00 48	00 33	00 21	11 56	
	16	59 22.1	23.7	340 55.1	14.6	7 36.7	14.3	56.4	64	22 32	00	00 32	00 24	00 16	11 50	
	17	74 22.0	23.7	355 28.7	14.6	7 22.4	14.4	56.4	62	21 54	00	00 18	00 15	00 12	11 47	
	18	89 21.9	N23 23.6	10 02.3	14.6	N 7 08.0	14.4	56.4	60	21 28	23 13	00 07	00 08	00 09	11 40	
	19	104 21.7	23.5	24 35.9	14.6	6 53.6	14.5	56.5	N 58	21 07	22 23	24 02	00 02	00 06	11 33	
	20	119 21.6	23.5	39 09.5	14.6	6 39.1	14.5	56.5	56	20 51	21 53	23 56	24 03	00 03	11 30	
	21	134 21.5	23.4	53 43.1	14.6	6 24.6	14.6	56.5	54	20 36	21 31	23 17	23 51	00 01	11 27	
	22	149 21.3	23.3	68 16.7	14.6	6 10.0	14.6	56.6	52	20 24	21 13	22 31	23 47	24 11	11 24	
	23	164 21.2	23.3	82 50.3	14.5	5 55.4	14.6	56.6	50	20 13	20 58	22 03	23 42	24 11	11 21	
FRIDAY	25 00	179 21.1	N23 23.2	97 23.8	14.6	N 5 40.8	14.7	56.6	45	19 51	20 28	21 18	23 33	24 11	11 18	
	01	194 20.9	23.1	111 57.4	14.6	5 26.1	14.7	56.7	N 40	19 33	20 06	20 47	23 26	23 49	11 15	
	02	209 20.8	23.1	126 31.0	14.5	5 11.4	14.8	56.7	35	19 18	19 47	20 24	23 19	23 46	11 12	
	03	224 20.7	23.0	141 04.5	14.5	4 56.6	14.8	56.7	30	19 05	19 32	20 06	23 13	23 43	11 09	
	04	239 20.5	22.9	155 38.0	14.6	4 41.8	14.8	56.8	20	18 43	19 07	19 36	23 03	23 38	11 06	
	05	254 20.4	22.8	170 11.6	14.5	4 27.0	14.9	56.8	N 10	18 24	18 47	19 14	22 54	23 33	11 03	
	06	269 20.3	N23 22.8	184 45.1	14.5	N 4 12.1	14.9	56.8	0	18 06	18 29	18 55	22 45	23 29	11 00	
	07	284 20.1	22.7	199 18.6	14.4	3 57.2	14.9	56.9	S 10	17 49	18 12	18 38	22 37	23 25	10 57	
	08	299 20.0	22.6	213 52.0	14.5	3 42.3	15.0	56.9	20	17 30	17 54	18 22	22 28	23 20	10 54	
	09	314 19.9	22.6	228 25.5	14.4	3 27.3	15.0	56.9	30	17 09	17 35	18 05	22 17	23 15	10 51	
	10	329 19.7	22.5	242 58.9	14.5	3 12.3	15.1	57.0	35	16 57	17 25	17 56	22 11	23 12	10 48	
	11	344 19.6	22.4	257 32.4	14.4	2 57.2	15.0	57.0	40	16 42	17 13	17 47	22 04	23 08	10 45	
	12	359 19.5	N23 22.3	272 05.8	14.3	N 2 42.2	15.1	57.0	45	16 26	17 00	17 37	21 56	23 04	10 42	
	13	14 19.3	22.3	286 39.1	14.4	2 27.1	15.1	57.1	S 50	16 05	16 43	17 25	21 46	22 59	10 39	
	14	29 19.2	22.2	301 12.5	14.3	2 12.0	15.2	57.1	52	15 55	16 36	17 20	21 41	22 57	10 36	
	15	44 19.1	22.1	315 45.8	14.3	1 56.8	15.2	57.1	54	15 44	16 28	17 14	21 36	22 55	10 33	
	16	59 19.0	22.0	330 19.1	14.3	1 41.6	15.2	57.2	56	15 31	16 19	17 08	21 30	22 52	10 30	
	17	74 18.8	21.9	344 52.4	14.2	1 26.4	15.2	57.2	58	15 17	16 08	17 01	21 24	22 49	10 27	
	18	89 18.7	N23 21.9	359 25.6	14.3	N 1 11.2	15.3	57.2	S 60	14 59	15 57	16 54	21 16	22 45	10 24	
	19	104 18.6	21.8	13 58.9	14.1	0 55.9	15.2	57.3								
	20	119 18.4	21.7	28 32.0	14.2	0 40.7	15.3	57.3								
	21	134 18.3	21.6	43 05.2	14.1	0 25.4	15.3	57.3								
	22	149 18.2	21.5	57 38.3	14.1	N 0 10.1	15.4	57.4								
	23	164 18.0	21.4	72 11.4	14.0	S 0 05.3	15.3	57.4								
								SUN				MOON				
								Day	Eqn. of Time		Mer.	Mer. Pass.		Age Phase		
									00h	12h	Pass.	Upper	Lower			
								d	m s	m s	h m	h m	h m	d %		
								23	02 10	02 16	12 02	16 35	04 13	06 27		
								24	02 23	02 29	12 02	17 19				



## JUNE 26, 27, 28 (SAT., SUN., MON.)

UT	ARIES			VENUS -4.3			MARS +1.8			JUPITER -1.9			SATURN +0.1			STARS		
	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Name	SHA	Dec				
26 00	274 27.3	205 36.0	N18 22.7	150 35.4	N21 03.3	109 59.2	N 7 53.7	168 00.4	N22 17.5	Acamar	315 23.9	S40 17.0						
01	289 29.8	220 38.9	22.4	165 36.2	03.0	125 01.3	53.6	183 02.5	17.5	Achernar	335 31.9	S57 12.6						
02	304 32.3	235 41.7	22.0	180 37.1	02.6	140 03.5	53.4	198 04.6	17.5	Acrux	173 17.6	S63 07.7						
03	319 34.7	250 44.5	21.6	195 37.9	02.3	155 05.7	53.3	213 06.7	17.4	Adhara	255 18.5	S28 58.6						
04	334 37.2	265 47.3	21.3	210 38.7	01.9	170 07.8	53.2	228 08.8	17.4	Aldebaran	290 57.8	N16 31.1						
05	349 39.7	280 50.1	20.9	225 39.5	01.6	185 10.0	53.0	243 11.0	17.4									
06	4 42.1	295 52.9	N18 20.5	240 40.3	N21 01.2	200 12.1	N 7 52.9	258 13.1	N22 17.3	Alioth	166 26.5	N55 56.5						
07	19 44.6	310 55.7	20.2	255 41.2	00.8	215 14.3	52.8	273 15.2	17.3	Alkaid	153 04.1	N49 17.7						
08	34 47.0	325 58.5	19.8	270 42.0	00.5	230 16.4	52.6	288 17.3	17.3	Al Na'ir	27 52.1	S46 56.2						
09	49 49.5	341 01.3	19.4	285 42.8	21 00.1	245 18.6	52.5	303 19.4	17.3	Alnilam	275 53.9	S 1 11.8						
10	64 52.0	356 04.1	19.1	300 43.6	20 59.8	260 20.7	52.4	318 21.5	17.2	Alphard	218 03.3	S 8 40.6						
11	79 54.4	11 06.8	18.7	315 44.4	59.4	275 22.9	52.2	333 23.7	17.2									
12	94 56.9	26 09.6	N18 18.4	330 45.3	N20 59.1	290 25.0	N 7 52.1	348 25.8	N22 17.2	Alphecca	126 16.6	N26 42.1						
13	109 59.4	41 12.4	18.0	345 46.1	58.7	305 27.2	52.0	3 27.9	17.1	Alpheratz	357 50.9	N29 06.7						
14	125 01.8	56 15.1	17.7	0 46.9	58.4	320 29.3	51.8	18 30.0	17.1	Altair	62 14.8	N 8 52.7						
15	140 04.3	71 17.9	17.3	15 47.7	58.0	335 31.5	51.7	33 32.1	17.1	Ankaa	353 22.5	S42 16.7						
16	155 06.8	86 20.7	17.0	30 48.6	57.6	350 33.6	51.5	48 34.3	17.0	Antares	112 34.6	S26 26.6						
17	170 09.2	101 23.4	16.6	45 49.4	57.3	5 35.8	51.4	63 36.4	17.0									
18	185 11.7	116 26.2	N18 16.3	60 50.2	N20 56.9	20 37.9	N 7 51.3	78 38.5	N22 17.0	Arcturus	146 02.0	N19 09.7						
19	200 14.1	131 28.9	15.9	75 51.0	56.6	35 40.1	51.1	93 40.6	16.9	Atria	107 42.4	S69 02.3						
20	215 16.6	146 31.7	15.6	90 51.8	56.2	50 42.2	51.0	108 42.7	16.9	Avior	234 21.7	S59 31.5						
21	230 19.1	161 34.4	15.2	105 52.7	55.9	65 44.4	50.9	123 44.9	16.9	Bellatrix	278 39.9	N 6 21.3						
22	245 21.5	176 37.1	14.9	120 53.5	55.5	80 46.5	50.7	138 47.0	16.8	Betelgeuse	271 09.3	N 7 24.6						
23	260 24.0	191 39.9	14.6	135 54.3	55.1	95 48.7	50.6	153 49.1	16.8									
27 00	275 26.5	206 42.6	N18 14.2	150 55.1	N20 54.8	110 50.8	N 7 50.5	168 51.2	N22 16.8	Canopus	263 59.9	S52 41.8						
01	290 28.9	221 45.3	13.9	165 56.0	54.4	125 53.0	50.3	183 53.3	16.7	Capella	280 45.4	N46 00.2						
02	305 31.4	236 48.0	13.5	180 56.8	54.1	140 55.1	50.2	198 55.4	16.7	Deneb	49 36.0	N45 17.5						
03	320 33.9	251 50.7	13.2	195 57.6	53.7	155 57.3	50.1	213 57.6	16.7	Denebola	182 40.9	N14 33.0						
04	335 36.3	266 53.4	12.9	210 58.4	53.3	170 59.4	49.9	228 59.7	16.6	Diphda	349 02.9	S17 57.7						
05	350 38.8	281 56.1	12.5	225 59.3	53.0	186 01.6	49.8	244 01.8	16.6									
06	5 41.3	296 58.8	N18 12.2	241 00.1	N20 52.6	201 03.7	N 7 49.6	259 03.9	N22 16.6	Dubhe	194 00.2	N61 44.0						
07	20 43.7	312 01.5	11.9	256 00.9	52.3	216 05.9	49.5	274 06.0	16.5	Einath	278 21.9	N28 36.7						
08	35 46.2	327 04.2	11.6	271 01.7	51.9	231 08.0	49.4	289 08.2	16.5	Eltanin	90 48.9	N51 29.2						
09	50 48.6	342 06.9	11.2	286 02.6	51.5	246 10.2	49.2	304 10.3	16.5	Enif	33 53.9	N 9 53.6						
10	65 51.1	357 09.6	10.9	301 03.4	51.2	261 12.3	49.1	319 12.4	16.4	Fomalhaut	15 31.5	S29 35.8						
11	80 53.6	12 12.3	10.6	316 04.2	50.8	276 14.4	49.0	334 14.5	16.4									
12	95 56.0	27 14.9	N18 10.3	331 05.0	N20 50.5	291 16.6	N 7 48.8	349 16.6	N22 16.4	Gacrux	172 09.1	S57 08.5						
13	110 58.5	42 17.6	09.9	346 05.9	50.1	306 18.7	48.7	4 18.7	16.3	Gienah	175 59.6	S17 34.0						
14	126 01.0	57 20.3	09.6	1 06.7	49.7	321 20.9	48.5	19 20.9	16.3	Hadar	148 57.9	S60 23.9						
15	141 03.4	72 22.9	09.3	16 07.5	49.4	336 23.0	48.4	34 23.0	16.3	Hamal	328 09.0	N23 28.9						
16	156 05.9	87 25.6	09.0	31 08.3	49.0	351 25.2	48.3	49 25.1	16.2	Kaus Aust.	83 52.7	S34 23.0						
17	171 08.4	102 28.2	08.7	46 09.2	48.6	6 27.3	48.1	64 27.2	16.2									
18	186 10.8	117 30.9	N18 08.4	61 10.0	N20 48.3	21 29.5	N 7 48.0	79 29.3	N22 16.2	Kochab	137 18.5	N74 08.5						
19	201 13.3	132 33.5	08.1	76 10.8	47.9	36 31.6	47.9	94 31.5	16.1	Markab	13 45.3	N15 13.6						
20	216 15.8	147 36.2	07.8	91 11.6	47.6	51 33.8	47.7	109 33.6	16.1	Menkar	314 22.7	N 4 06.5						
21	231 18.2	162 38.8	07.4	106 12.5	47.2	66 35.9	47.6	124 35.7	16.1	Menkent	148 15.9	S36 23.7						
22	246 20.7	177 41.4	07.1	121 13.3	46.8	81 38.0	47.4	139 37.8	16.0	Mlaplacidus	221 42.3	S69 44.2						
23	261 23.1	192 44.1	06.8	136 14.1	46.5	96 40.2	47.3	154 39.9	16.0									
28 00	276 25.6	207 46.7	N18 06.5	151 14.9	N20 46.1	111 42.3	N 7 47.2	169 42.0	N22 16.0	Mirtak	308 51.0	N49 52.5						
01	291 28.1	222 49.3	06.2	166 15.8	45.7	126 44.5	47.0	184 44.2	15.9	Nunki	76 06.7	S26 17.5						
02	306 30.5	237 51.9	05.9	181 16.6	45.4	141 46.6	46.9	199 46.3	15.9	Peacock	53 29.6	S56 43.2						
03	321 33.0	252 54.5	05.6	196 17.4	45.0	156 48.8	46.8	214 48.4	15.9	Pollux	243 36.7	N28 01.1						
04	336 35.5	267 57.2	05.3	211 18.2	44.6	171 50.9	46.6	229 50.5	15.8	Procyon	245 07.4	N 5 13.0						
05	351 37.9	282 59.8	05.0	226 19.1	44.3	186 53.1	46.5	244 52.6	15.8									
06	6 40.4	298 02.4	N18 04.7	241 19.9	N20 43.9	201 55.2	N 7 46.3	259 54.7	N22 15.8	Rasalhague	96 12.7	N12 33.3						
07	21 42.9	313 05.0	04.4	256 20.7	43.5	216 57.3	46.2	274 56.9	15.7	Regulus	207 51.2	N11 56.9						
08	36 45.3	328 07.5	04.2	271 21.6	43.2	231 59.5	46.1	289 59.0	15.7	Rigel	281 19.2	S 8 11.7						
09	51 47.8	343 10.1	03.9	286 22.4	42.8	247 01.6	45.9	305 01.1	15.7	Rigel Kent.	140 01.4	S60 51.5						
10	66 50.3	358 12.7	03.6	301 23.2	42.4	262 03.8	45.8	320 03.2	15.6	Sabik	102 20.3	S15 43.9						
11	81 52.7	13 15.3	03.3	316 24.0	42.1	277 05.9	45.6	335 05.3	15.6									
12	96 55.2	28 17.9	N18 03.0	331 24.9	N20 41.7	292 08.1	N 7 45.5	350 07.5	N22 15.6	Schedar	349 48.9	N56 33.4						
13	111 57.6	43 20.4	02.7	346 25.7	41.3	307 10.2	45.4	5 09.6	15.5	Shaula	96 31.1	S37 06.5						
14	127 00.1	58 23.0	02.4	1 26.5	41.0	322 12.3	45.2	20 11.7	15.5	Sirius	258 40.3	S16 43.2						
15	142 02.6	73 25.6	02.1	16 27.4	40.6	337 14.5	45.1	35 13.8	15.5	Spica	158 38.6	S11 11.1						
16	157 05.0	88 28.1	01.9	31 28.2	40.2	352 16.6	44.9	50 15.9	15.4	Suhail	222 58.1	S43 27.1						
17	172 07.5	103 30.7	01.6	46 29.0	39.9	7 18.8	44.8	65 18.0	15.4									
18	187 10.0	118 33.2	N18 01.3	61 29.8	N20 39.5	22 20.9	N 7 44.7	80 20.2	N22 15.4	Vega	80 43.3	N38 47.2						
19	202 12.4	133 35.8	01.0	76 30.7	39.1	37 23.1	44.5	95 22.3	15.3	Zuben'ubi	137 13.1	S16 03.7						
20	217 14.9	148 38.3	00.8	91 31.5	38.8	52 25.2	44.4	110 24.4	15.3									
21	232 17.4	163 40.8	00.5	106 32.3	38.4	67 27.3	44.2	125 26.5	15.3									
22	247 19.8	178 43.4	00.2	121 33.2	38.0	82 29.5	44.1	140 28.6	15.2	Venus	291 16.1	h m						
23	262 22.3	193 45.9	N17 59.9	136 34.0	37.6	97 31.6	44.0	155 30.7	15.2	Mars	235 28.7	13 56						
										Jupiter	195 24.3	16 34						
										Saturn	253 24.7	12 43						
Mer. Pass.	5 37.3	v 2.7 d 0.3		v 0.8 d 0.4		v 2.1 d 0.1		v 2.1 d 0.0										



## JUNE 26, 27, 28 (SAT., SUN., MON.)

UT	SUN		MOON						Lat.	Twilight		Sunrise	Moonrise				
	GHA	Dec	GHA	$\nu$	Dec	$d$	HP	Naut.		Civil	26		27	28	29		
SATURDAY	d h	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	h m	h m	h m	h m	h m	h m	h m	h m
	179 17.9	N23 21.4	86 44.4	14.0	S 0 20.6	15.4	57.5	N 72	00 00	00 00	00 00	13 27	15 50	19 21	22 43	26 06	29 29
	01 194 17.8	21.3	101 17.4	14.0	0 36.0	15.4	57.5	N 70	00 00	00 00	00 00	13 21	15 32	18 13	21 37	25 10	28 33
	02 209 17.6	21.2	115 50.4	13.9	0 51.4	15.4	57.5	68	00 00	00 00	00 00	13 16	15 17	17 37	20 50	24 23	27 46
	03 224 17.5	21.1	130 23.3	13.9	1 06.8	15.4	57.6	66	00 00	00 00	00 00	13 12	15 05	17 12	19 50	23 23	26 46
	04 239 17.4	21.0	144 56.2	13.8	1 22.2	15.5	57.6	64	00 00	00 00	01 35	13 09	14 55	16 52	19 06	22 39	25 62
	05 254 17.2	20.9	159 29.0	13.8	1 37.7	15.4	57.6	62	00 00	00 00	02 13	13 06	14 47	16 37	18 37	21 53	25 16
	06 269 17.1	N23 20.8	174 01.8	13.8	S 1 53.1	15.5	57.7	60	00 00	00 55	02 39	13 04	14 40	16 23	18 15	21 10	24 33
	07 284 17.0	20.7	188 34.6	13.7	2 08.6	15.4	57.7	N 58	01 44	02 59	03 16	13 01	14 34	16 12	17 58	20 27	23 50
	08 299 16.9	20.7	203 07.3	13.6	2 24.0	15.5	57.7	56	02 13	03 16	03 42	13 00	14 28	16 03	17 43	20 04	23 27
	09 314 16.7	20.6	217 39.9	13.6	2 39.5	15.5	57.8	54	02 35	03 30	03 53	12 58	14 23	15 54	17 30	19 41	22 44
	10 329 16.6	20.5	232 12.5	13.6	2 55.0	15.5	57.8	52	02 53	03 42	04 03	12 56	14 19	15 47	17 19	19 18	22 21
	11 344 16.5	20.4	246 45.1	13.5	3 10.5	15.5	57.9	50	03 08	03 58	04 15	12 55	14 15	15 40	17 09	19 00	22 04
	12 359 16.3	N23 20.3	261 17.6	13.4	S 3 26.0	15.5	57.9	45	03 19	04 00	04 33	12 52	14 06	15 25	16 48	18 31	21 10
	13 14 16.2	20.2	275 50.0	13.4	3 41.5	15.5	57.9	N 40	04 00	04 18	04 48	12 49	13 59	15 13	16 31	18 04	20 47
	14 29 16.1	20.1	290 22.4	13.3	3 57.0	15.5	58.0	35	04 18	04 34	05 01	12 45	13 48	14 54	16 05	17 17	18 39
	15 44 15.9	20.0	304 54.7	13.3	4 12.5	15.5	58.0	30	04 29	04 59	05 23	12 42	13 39	14 39	15 45	16 57	18 19
	16 59 15.8	19.9	319 27.0	13.2	4 28.0	15.5	58.0	N 10	04 52	05 19	05 42	12 39	13 31	14 26	15 27	16 39	17 51
	17 74 15.7	19.8	333 59.2	13.1	4 43.5	15.5	58.1	0	05 11	05 37	05 59	12 36	13 23	14 14	15 10	16 22	17 34
	18 89 15.6	N23 19.7	348 31.3	13.1	S 4 59.0	15.5	58.1	S 10	05 28	05 54	06 17	12 34	13 16	14 02	14 54	16 06	17 18
	19 104 15.4	19.6	3 03.4	13.0	5 14.5	15.5	58.1	20	05 44	06 11	06 35	12 31	13 08	13 50	14 37	15 49	16 61
	20 119 15.3	19.5	17 35.4	12.9	5 30.0	15.5	58.2	30	06 00	06 30	06 56	12 28	13 00	13 35	14 17	15 29	16 41
	21 134 15.2	19.4	32 07.3	12.9	5 45.5	15.5	58.2	35	06 09	06 41	07 09	12 26	12 55	13 27	14 05	15 17	16 29
	22 149 15.0	19.3	46 39.2	12.8	6 01.0	15.5	58.3	40	06 18	06 52	07 23	12 24	12 49	13 18	13 52	15 04	16 16
	23 164 14.9	19.2	61 11.0	12.7	6 16.5	15.5	58.3	45	06 28	07 06	07 39	12 22	12 43	13 07	13 37	14 49	16 01
SUNDAY	00 179 14.8	N23 19.1	75 42.7	12.7	S 6 32.0	15.4	58.3	S 50	06 40	07 22	08 00	12 19	12 35	12 54	13 18	14 30	15 42
	01 194 14.6	19.0	90 14.4	12.6	6 47.4	15.5	58.4	52	06 45	07 29	08 10	12 18	12 31	12 47	13 09	14 21	15 33
	02 209 14.5	18.9	104 46.0	12.5	7 02.9	15.4	58.4	54	06 51	07 37	08 21	12 17	12 28	12 41	12 59	14 11	15 23
	03 224 14.4	18.8	119 17.5	12.4	7 18.3	15.4	58.4	56	06 57	07 46	08 34	12 15	12 23	12 33	12 48	14 01	15 13
	04 239 14.3	18.7	133 48.9	12.4	7 33.7	15.4	58.5	58	07 04	07 56	08 48	12 14	12 19	12 25	12 35	13 45	14 57
	05 254 14.1	18.6	148 20.3	12.3	7 49.1	15.4	58.5	S 60	07 11	08 08	09 05	12 12	12 13	12 16	12 21	13 31	14 43
	06 269 14.0	N23 18.5	162 51.6	12.2	S 8 04.5	15.4	58.6	Lat.		Sunset		Twilight		Moonset			
	07 284 13.9	18.4	177 22.8	12.1	8 19.9	15.3	58.6	Sunset		Civil		Naut.		26	27	28	29
	08 299 13.7	18.3	191 53.9	12.0	8 35.2	15.3	58.6	h m		h m		h m		h m	h m	h m	h m
	09 314 13.6	18.2	206 24.9	12.0	8 50.5	15.3	58.7	N 72	00 00	00 00	00 00	(00 23)	22 50	21 08	19 26	17 44	16 02
	10 329 13.5	18.0	220 55.9	11.8	9 05.8	15.3	58.7	N 70	00 00	00 00	00 00	(00 23)	22 50	21 08	19 26	17 44	16 02
	11 344 13.4	17.9	235 26.7	11.8	9 21.1	15.2	58.7	68	00 00	00 00	00 00	(00 23)	22 50	21 08	19 26	17 44	16 02
	12 359 13.2	N23 17.8	249 57.5	11.7	S 9 36.3	15.3	58.8	66	00 00	00 00	00 00	(00 23)	22 50	21 08	19 26	17 44	16 02
	13 14 13.1	17.7	264 28.2	11.6	9 51.6	15.1	58.8	64	22 30	00 00	00 00	(00 23)	22 50	21 08	19 26	17 44	16 02
	14 29 13.0	17.6	278 58.8	11.5	10 06.7	15.2	58.9	62	21 53	00 00	00 00	(00 23)	22 50	21 08	19 26	17 44	16 02
	15 44 12.8	17.5	293 29.3	11.4	10 21.9	15.1	58.9	60	21 27	23 09	00 00	(00 23)	22 50	21 08	19 26	17 44	16 02
	16 59 12.7	17.4	307 59.7	11.3	10 37.0	15.1	58.9	N 58	21 07	22 22	00 00	(00 23)	22 50	21 08	19 26	17 44	16 02
	17 74 12.6	17.3	322 30.0	11.2	10 52.1	15.1	59.0	56	20 50	21 52	00 00	(00 23)	22 50	21 08	19 26	17 44	16 02
	18 89 12.5	N23 17.1	337 00.2	11.1	S11 07.2	15.0	59.0	54	20 36	21 30	23 14	00 10	00 20	00 31	00 46	01 01	01 19
	19 104 12.3	17.0	351 30.3	11.0	11 22.2	15.0	59.0	52	20 24	21 13	22 30	00 11	00 23	00 37	00 55	01 10	01 28
	20 119 12.2	16.9	6 00.3	10.9	11 37.2	14.9	59.1	50	20 13	20 58	22 03	00 11	00 25	00 42	01 02	01 19	01 36
	21 134 12.1	16.8	20 30.2	10.9	11 52.1	14.9	59.1	45	19 51	20 28	21 18	00 11	00 30	00 52	01 19	01 36	01 54
	22 149 12.0	16.7	35 00.1	10.7	12 07.0	14.8	59.2	N 40	19 33	20 06	20 47	00 11	00 35	01 01	01 32	01 59	02 26
	23 164 11.8	16.6	49 29.8	10.6	12 21.8	14.8	59.2	35	19 18	19 48	20 24	00 12	00 39	01 09	01 43	02 10	02 37
MONDAY	00 179 11.7	N23 16.4	63 59.4	10.5	S12 36.6	14.8	59.2	30	19 05	19 32	20 06	00 12	00 42	01 15	01 53	02 21	02 48
	01 194 11.6	16.3	78 28.9	10.4	12 51.4	14.7	59.3	20	18 43	19 08	19 37	00 12	00 48	01 27	02 11	02 40	03 09
	02 209 11.4	16.2	92 58.3	10.2	13 06.1	14.6	59.3	N 10	18 24	18 47	19 14	00 13	00 53	01 37	02 26	03 15	04 04
	03 224 11.3	16.1	107 27.5	10.2	13 20.7	14.6	59.3	0	18 07	18 29	18 56	00 13	00 58	01 47	02 40	03 29	04 18
	04 239 11.2	16.0	121 56.7	10.1	13 35.3	14.6	59.4	S 10	17 49	18 12	18 39	00 13	01 03	01 57	02 55	03 44	04 33
	05 254 11.1	15.8	136 25.8	9.9	13 49.9	14.5	59.4	20	17 31	17 55	18 22	00 13	01 09	02 07	03 10	04 09	05 00
	06 269 10.9	N23 15.7	150 54.7	9.9	S14 04.4	14.4	59.4	30	17 10	17 36	18 06	00 14	01 15	02 19	03 28	04 17	05 06
	07 284 10.8	15.6	165 23.6	9.7	14 18.8	14.3	59.5	35	16 58	17 26	17 57	00 14	01 18	02 26	03 38	04 27	05 16
	08 299 10.7	15.5	179 52.3	9.6	14 33.1	14.3	59.5	40	16 44	17 14	17 48	00 14	01 22	02 34	03 50	04 40	05 29
	09 314 10.6	15.3	194 20.9	9.5	14 47.4	14.3	59.6	45	16 27	17 01	17 38	00 14	01 27	02 43	04 04	04 54	05 43
	10 329 10.4	15.2	208 49.4	9.4	15 01.7	14.1	59.6	S 50	16 06	16 45	17 26	00 15	01 32	02 55	04 21	04 91	05 40
	11 344 10.3	15.1	223 17.8	9.2	15 15.8	14.1	59.6	52	15 56	16 37	17 21	00 15	01 35	03 00	04 30	05 00	05 49
	12 359 10.2	N23 15.0	237 46.0	9.1	S15 29.9	14.1	59.7	54	15 45	16 29	17 15	00 15	01 38	03 06	04 39	05 09	05 58
	13 14 10.1	14.8	252 14.1	9.1	15 44.0	13.9	59.7	56	15 33	16 20	17 09	00 15	01 41	03 12	04 49	05 19	06 08
	14 29 9.9	14.7	266 42.2	8.9	15 57.9	13.9	59.7	58	15 18	16 10	17 02	00 15	01 45	03 19	05 01	05 31	06 20
	15 44 9.8	14.6	281 10.1</														



JUNE 29, 30, JULY 1 (TUES., WED., THURS.)																		
UT	ARIES			VENUS -4.4			MARS +1.8			JUPITER -1.9			SATURN +0.1			STARS		
	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Name	SHA	Dec		
d h	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "		° ' "	° ' "		
TUESDAY	29 00	277 24.7	208 48.4 N17 59.7	151 34.8 N20 37.3	112 33.8 N 7 43.8	170 32.9 N22 15.2	Acamar	315 23.8 S40 17.0										
	01	292 27.2	223 51.0 59.4	166 35.6 36.9	127 35.9 43.7	185 35.0 15.1	Achernar	335 31.9 S57 12.6										
	02	307 29.7	238 53.5 59.1	181 36.5 36.5	142 38.0 43.5	200 37.1 15.1	Acrux	173 17.6 S63 07.7										
	03	322 32.1	253 56.0 58.9	196 37.3 36.2	157 40.2 43.4	215 39.2 15.1	Adhara	255 18.5 S28 58.6										
	04	337 34.6	268 58.5 58.6	211 38.1 35.8	172 42.3 43.3	230 41.3 15.0	Aldebaran	290 57.8 N16 31.1										
	05	352 37.1	284 01.0 58.3	226 39.0 35.4	187 44.5 43.1	245 43.5 15.0												
	06	7 39.5	299 03.5 N17 58.1	241 39.8 N20 35.0	202 46.6 N 7 43.0	260 45.6 N22 15.0	Alioth	166 26.5 N55 56.5										
	07	22 42.0	314 06.0 57.8	256 40.6 34.7	217 48.7 42.8	275 47.7 14.9	Alkaid	153 04.1 N49 17.7										
	08	37 44.5	329 08.5 57.6	271 41.5 34.3	232 50.9 42.7	290 49.8 14.9	Al Na'ir	27 52.1 S46 56.2										
	09	52 46.9	344 11.0 57.3	286 42.3 33.9	247 53.0 42.6	305 51.9 14.9	Alnilam	275 53.9 S 1 11.8										
	10	67 49.4	359 13.5 57.1	301 43.1 33.6	262 55.1 42.4	320 54.0 14.8	Alphard	218 03.3 S 8 40.6										
	11	82 51.9	14 15.9 56.8	316 43.9 33.2	277 57.3 42.3	335 56.2 14.8												
	12	97 54.3	29 18.4 N17 56.5	331 44.8 N20 32.8	292 59.4 N 7 42.1	350 58.3 N22 14.8	Alphecca	126 16.7 N26 42.1										
	13	112 56.8	44 20.9 56.3	346 45.6 32.4	308 01.6 42.0	6 00.4 14.7	Alpheratz	357 50.9 N29 06.7										
	14	127 59.2	59 23.4 56.0	1 46.4 32.1	323 03.7 41.9	21 02.5 14.7	Altair	62 14.8 N 8 52.7										
	15	143 01.7	74 25.8 55.8	16 47.3 31.7	338 05.8 41.7	36 04.6 14.7	Ankaa	353 22.5 S42 16.7										
	16	158 04.2	89 28.3 55.6	31 48.1 31.3	353 08.0 41.6	51 06.7 14.6	Antares	112 34.6 S26 26.6										
	17	173 06.6	104 30.7 55.3	46 48.9 30.9	8 10.1 41.4	66 08.9 14.6												
	18	188 09.1	119 33.2 N17 55.1	61 49.8 N20 30.6	23 12.2 N 7 41.3	81 11.0 N22 14.6	Arcturus	146 02.0 N19 09.7										
	19	203 11.6	134 35.6 54.8	76 50.6 30.2	38 14.4 41.2	96 13.1 14.5	Atria	107 42.4 S69 02.3										
	20	218 14.0	149 38.1 54.6	91 51.4 29.8	53 16.5 41.0	111 15.2 14.5	Avior	234 21.7 S59 31.4										
	21	233 16.5	164 40.5 54.3	106 52.3 29.4	68 18.7 40.9	126 17.3 14.5	Bellatrix	278 39.9 N 6 21.3										
	22	248 19.0	179 42.9 54.1	121 53.1 29.1	83 20.8 40.7	141 19.4 14.4	Betelgeuse	271 09.3 N 7 24.6										
	23	263 21.4	194 45.4 53.9	136 53.9 28.7	98 22.9 40.6	156 21.6 14.4												
WEDNESDAY	30 00	278 23.9	209 47.8 N17 53.6	151 54.8 N20 28.3	113 25.1 N 7 40.4	171 23.7 N22 14.4	Canopus	263 59.9 S52 41.8										
	01	293 26.4	224 50.2 53.4	166 55.6 27.9	128 27.2 40.3	186 25.8 14.3	Capella	280 45.4 N46 00.2										
	02	308 28.8	239 52.6 53.2	181 56.4 27.6	143 29.3 40.2	201 27.9 14.3	Deneb	49 36.0 N45 17.6										
	03	323 31.3	254 55.1 52.9	196 57.3 27.2	158 31.5 40.0	216 30.0 14.3	Denebola	182 40.9 N14 33.0										
	04	338 33.7	269 57.5 52.7	211 58.1 26.8	173 33.6 39.9	231 32.2 14.2	Diphda	349 02.9 S17 57.6										
	05	353 36.2	284 59.9 52.5	226 58.9 26.4	188 35.7 39.7	246 34.3 14.2												
	06	8 38.7	300 02.3 N17 52.2	241 59.8 N20 26.0	203 37.9 N 7 39.6	261 36.4 N22 14.2	Dubhe	194 00.2 N61 44.0										
	07	23 41.1	315 04.7 52.0	257 00.6 25.7	218 40.0 39.5	276 38.5 14.1	Elnath	278 21.9 N28 36.7										
	08	38 43.6	330 07.1 51.8	272 01.4 25.3	233 42.1 39.3	291 40.6 14.1	Eltanin	90 48.9 N51 29.3										
	09	53 46.1	345 09.5 51.6	287 02.3 24.9	248 44.3 39.2	306 42.7 14.1	Enif	33 53.8 N 9 53.6										
	10	68 48.5	0 11.9 51.3	302 03.1 24.5	263 46.4 39.0	321 44.9 14.0	Fomalhaut	15 31.5 S29 35.8										
	11	83 51.0	15 14.2 51.1	317 03.9 24.2	278 48.6 38.9	336 47.0 14.0												
	12	98 53.5	30 16.6 N17 50.9	332 04.8 N20 23.8	293 50.7 N 7 38.7	351 49.1 N22 14.0	Gacrux	172 09.1 S57 08.5										
	13	113 55.9	45 19.0 50.7	347 05.6 23.4	308 52.8 38.6	6 51.2 13.9	Gienah	175 59.7 S17 34.0										
	14	128 58.4	60 21.4 50.5	2 06.4 23.0	323 55.0 38.5	21 53.3 13.9	Hadar	148 58.0 S60 23.9										
	15	144 00.9	75 23.7 50.3	17 07.3 22.6	338 57.1 38.3	36 55.4 13.8	Hamal	328 08.9 N23 28.9										
	16	159 03.3	90 26.1 50.0	32 08.1 22.3	353 59.2 38.2	51 57.6 13.8	Kaus Aust.	83 52.7 S34 23.0										
	17	174 05.8	105 28.4 49.8	47 08.9 21.9	9 01.4 38.0	66 59.7 13.8												
	18	189 08.2	120 30.8 N17 49.6	62 09.8 N20 21.5	24 03.5 N 7 37.9	82 01.8 N22 13.7	Kochab	137 18.6 N74 08.5										
	19	204 10.7	135 33.2 49.4	77 10.6 21.1	39 05.6 37.7	97 03.9 13.7	Markab	13 45.3 N15 13.6										
	20	219 13.2	150 35.5 49.2	92 11.5 20.7	54 07.7 37.6	112 06.0 13.7	Menkar	314 22.6 N 4 06.5										
	21	234 15.6	165 37.8 49.0	107 12.3 20.3	69 09.9 37.5	127 08.1 13.6	Menkent	148 15.9 S36 23.7										
	22	249 18.1	180 40.2 48.8	122 13.1 20.0	84 12.0 37.3	142 10.3 13.6	Miaplacidus	221 42.3 S69 44.2										
	23	264 20.6	195 42.5 48.6	137 14.0 19.6	99 14.1 37.2	157 12.4 13.6												
THURSDAY	1 00	279 23.0	210 44.8 N17 48.4	152 14.8 N20 19.2	114 16.3 N 7 37.0	172 14.5 N22 13.5	Mirfak	308 51.0 N49 52.5										
	01	294 25.5	225 47.2 48.2	167 15.6 18.8	129 18.4 36.9	187 16.6 13.5	Nunki	76 06.6 S26 17.5										
	02	309 28.0	240 49.5 48.0	182 16.5 18.4	144 20.5 36.7	202 18.7 13.5	Peacock	53 29.6 S56 43.2										
	03	324 30.4	255 51.8 47.8	197 17.3 18.1	159 22.7 36.6	217 20.8 13.4	Pollux	243 36.7 N28 01.1										
	04	339 32.9	270 54.1 47.4	212 18.1 17.7	174 24.8 36.4	232 23.0 13.4	Procyon	245 07.4 N 5 13.0										
	05	354 35.4	285 56.4 47.6	227 19.0 17.3	189 26.9 36.3	247 25.1 13.4												
	06	9 37.8	300 58.7 N17 47.2	242 19.8 N20 16.9	204 29.1 N 7 36.2	262 27.2 N22 13.3	Rasalhague	96 12.7 N12 33.4										
	07	24 40.3	316 01.1 47.0	257 20.7 16.5	219 31.2 36.0	277 29.3 13.3	Regulus	207 51.2 N11 56.9										
	08	39 42.7	331 03.4 46.8	272 21.5 16.1	234 33.3 35.9	292 31.4 13.3	Rigel	281 19.2 S 8 11.7										
	09	54 45.2	346 05.6 46.6	287 22.3 15.7	249 35.5 35.7	307 33.5 13.2	Rigel Kent.	140 01.4 S60 51.5										
	10	69 47.7	1 07.9 46.4	302 23.2 15.4	264 37.6 35.6	322 35.7 13.2	Sabik	102 20.3 S15 43.9										
	11	84 50.1	16 10.2 46.3	317 24.0 15.0	279 39.7 35.4	337 37.8 13.2												
	12	99 52.6	31 12.5 N17 46.1	332 24.8 N20 14.6	294 41.8 N 7 35.3	352 39.9 N22 13.1	Schedar	349 48.9 N56 33.4										
	13	114 55.1	46 14.8 45.9	347 25.7 14.2	309 44.0 35.2	7 42.0 13.1	Shaula	96 31.1 S37 06.5										
	14	129 57.5	61 17.1 45.7	2 26.5 13.8	324 46.1 35.0	22 44.1 13.1	Sirius	258 40.3 S16 43.2										
	15	145 00.0	76 19.3 45.5	17 27.4 13.4	339 48.2 34.9	37 46.2 13.0	Spica	158 38.6 S11 11.1										
	16	160 02.5	91 21.6 45.3	32 28.2 13.1	354 50.4 34.7	52 48.4 13.0	Suhail	222 58.1 S43 27.1										
	17	175 04.9	106 23.9 45.2	47 29.0 12.7	9 52.5 34.6	67 50.5 13.0												
	18	190 07.4	121 26.1 N17 45.0	62 29.9 N20 12.3	24 54.6 N 7 34.4	82 52.6 N22 12.9	Vega	80 43.3 N38 47.2										
	19	205 09.9	136 28.4 44.8	77 30.7 11.9	39 56.8 34.3	97 54.7 12.9	Zuben'ubi	137 13.1 S16 03.7										
	20	220 12.3	151 30.6 44.6	92 31.5 11.5	54 58.9 34.1	112 56.8 12.9												



## JUNE 29, 30, JULY 1 (TUES., WED., THURS.)

UT	SUN				MOON							Lat.	Twilight		Sunrise	Moonrise			
	GHA	Dec	GHA	v	Dec	d	HP	Naut.	Civil	29	30		1	2					
d h	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	h m	h m	h m	h m	h m	h m	h m	h m				
TUESDAY	29 00	179 08.7	N23 13.4	51 15.4	7.6	S18 13.0	13.1	60.1	N 72										
	01	194 08.6		65 42.0	7.5	18 26.1	12.9	60.1	N 70										
	02	209 08.4		80 08.5	7.4	18 39.0	12.8	60.1	68										
	03	224 08.3	13.0	94 34.9	7.2	18 51.8	12.7	60.2	66	///	///	00 07	19 50						
	04	239 08.2	12.8	109 01.1	7.1	19 04.5	12.6	60.2	64	///	///	01 40	19 06						
	05	254 08.1	12.7	123 27.2	6.9	19 17.1	12.5	60.2	62	///	///	02 16	18 37	20 49	22 54	23 32			
	06	269 07.9	N23 12.5	137 53.1	6.9	S19 29.6	12.4	60.3	60	///	01 01	02 41	18 15	20 11	21 50	22 46			
	07	284 07.8	12.4	152 19.0	6.7	19 42.0	12.3	60.3	N 58	///	01 47	03 01	17 58	19 44	21 16	22 15			
	08	299 07.7	12.3	166 44.7	6.5	19 54.3	12.2	60.3	56	///	02 16	03 18	17 43	19 23	20 51	21 53			
	09	314 07.6	12.1	181 10.2	6.4	20 06.5	12.0	60.3	54	00 56	02 38	03 32	17 30	19 06	20 31	21 33			
	10	329 07.4	12.0	195 35.6	6.3	20 18.5	12.0	60.4	52	01 39	02 55	03 44	17 19	18 51	20 14	21 17			
	11	344 07.3	11.8	210 00.9	6.2	20 30.5	11.8	60.4	50	02 06	03 10	03 54	17 09	18 38	19 59	21 03			
	12	359 07.2	N23 11.7	224 26.1	6.0	S20 42.3	11.7	60.4	45	02 50	03 39	04 17	16 48	18 12	19 30	20 35			
	13	14 07.1	11.5	238 51.1	5.9	20 54.0	11.6	60.5	N 40	03 20	04 02	04 34	16 31	17 51	19 07	20 13			
	14	29 06.9	11.4	253 16.0	5.7	21 05.6	11.4	60.5	35	03 43	04 20	04 49	16 17	17 34	18 48	19 54			
	15	44 06.8	11.2	267 40.7	5.7	21 17.0	11.3	60.5	30	04 02	04 35	05 02	16 05	17 19	18 31	19 38			
	16	59 06.7	11.1	282 05.4	5.4	21 28.3	11.2	60.5	20	04 30	04 59	05 24	15 45	16 54	18 04	19 11			
	17	74 06.6	11.0	296 29.8	5.4	21 39.5	11.0	60.6	N 10	04 53	05 20	05 43	15 27	16 32	17 40	18 48			
	18	89 06.4	N23 10.8	310 54.2	5.2	S21 50.5	11.0	60.6	0	05 11	05 38	06 00	15 10	16 12	17 18	18 26			
	19	104 06.3	10.7	325 18.4	5.1	22 01.5	10.7	60.6	S 10	05 28	05 54	06 17	14 54	15 52	16 56	18 04			
	20	119 06.2	10.5	339 42.5	4.9	22 12.2	10.7	60.6	20	05 44	06 12	06 36	14 37	15 31	16 33	17 41			
	21	134 06.1	10.4	354 06.4	4.8	22 22.9	10.4	60.7	30	06 00	06 30	06 57	14 17	15 07	16 06	17 14			
	22	149 06.0	10.2	8 30.2	4.7	22 33.3	10.4	60.7	35	06 09	06 41	07 09	14 05	14 52	15 50	16 58			
	23	164 05.8	10.0	22 53.9	4.6	22 43.7	10.2	60.7	40	06 18	06 52	07 23	13 52	14 36	15 31	16 39			
WEDNESDAY	30 00	179 05.7	N23 09.9	37 17.5	4.4	S22 53.9	10.0	60.7	45	06 28	07 06	07 39	13 37	14 16	15 09	16 17			
	01	194 05.6	09.7	51 40.9	4.3	23 03.9	9.9	60.8	S 50	06 40	07 21	08 00	13 18	13 52	14 41	15 48			
	02	209 05.5	09.6	66 04.2	4.2	23 13.8	9.7	60.8	52	06 45	07 29	08 09	13 09	13 40	14 27	15 34			
	03	224 05.3	09.4	80 27.4	4.0	23 23.5	9.6	60.8	54	06 51	07 37	08 20	12 59	13 27	14 11	15 18			
	04	239 05.2	09.3	94 50.4	3.9	23 33.1	9.5	60.8	56	06 57	07 46	08 33	12 48	13 12	13 52	14 58			
	05	254 05.1	09.1	109 13.3	3.8	23 42.6	9.2	60.9	58	07 03	07 56	08 47	12 35	12 54	13 29	14 34			
	06	269 05.0	N23 09.0	123 36.1	3.6	S23 51.8	9.1	60.9	S 60	07 11	08 07	09 04	12 21	12 32	12 59	14 03			
	07	284 04.9	08.8	137 58.7	3.6	24 00.9	8.9	60.9	Lat.		Sunset		Twilight		Moonset				
	08	299 04.7	08.6	152 21.3	3.4	24 09.8	8.8	60.9					Civil		29		30		
	09	314 04.6	08.5	166 43.7	3.3	24 18.6	8.6	60.9					Naut.		1		2		
	10	329 04.5	08.3	181 06.0	3.1	24 27.2	8.4	61.0											
	11	344 04.4	08.2	195 28.1	3.1	24 35.6	8.3	61.0											
	12	359 04.3	N23 08.0	209 50.2	2.9	S24 43.9	8.0	61.0	N 72	0	0	0	0	22 43	22 43	23 28	00 13		
	13	14 04.1	07.8	224 12.1	2.9	24 51.9	7.9	61.0	N 70	0	0	0	0	22 43	22 43	23 28	00 13		
	14	29 04.0	07.7	238 34.0	2.7	24 59.8	7.8	61.0	68	00 01	///	///	22 43	22 43	23 28	00 13			
	15	44 03.9	07.5	252 55.7	2.6	25 07.6	7.5	61.1	66	22 26	///	///	23 28	23 28	23 58	24 13	00 13		
	16	59 03.8	07.4	267 17.3	2.5	25 15.1	7.3	61.1	64	21 51	///	///	23 58	23 58	24 13	00 13			
	17	74 03.6	07.2	281 38.8	2.4	25 22.4	7.2	61.1	62	21 25	23 04	///	00 14	00 21	00 36	01 17			
	18	89 03.5	N23 07.0	296 00.2	2.2	S25 29.6	7.0	61.1	N 58	21 06	22 19	///	00 26	00 39	01 04	01 52			
	19	104 03.4	06.9	310 21.4	2.2	25 36.6	6.8	61.1	56	20 49	21 51	///	00 37	00 55	01 25	02 17			
	20	119 03.3	06.7	324 42.6	2.1	25 43.4	6.6	61.1	54	20 35	21 29	23 09	00 46	01 08	01 43	02 37			
	21	134 03.2	06.5	339 03.7	2.0	25 50.0	6.4	61.2	52	20 23	21 12	22 28	00 55	01 20	01 58	02 54			
	22	149 03.0	06.4	353 24.7	1.9	25 56.4	6.2	61.2	50	20 13	20 57	22 01	01 02	01 31	02 11	03 09			
	23	164 02.9	06.2	7 45.6	1.8	26 02.6	6.0	61.2	45	19 51	20 28	21 17	01 19	01 53	02 38	03 38			
THURSDAY	1 00	179 02.8	N23 06.0	22 06.4	1.7	S26 08.6	5.8	61.2	N 40	19 33	20 05	20 47	01 32	02 11	03 00	04 02			
	01	194 02.7	05.8	36 27.1	1.6	26 14.4	5.6	61.2	35	19 18	19 48	20 24	01 43	02 26	03 18	04 21			
	02	209 02.6	05.7	50 47.7	1.5	26 20.0	5.4	61.2	30	19 05	19 33	20 06	01 53	02 39	03 33	04 37			
	03	224 02.5	05.5	65 08.2	1.5	26 25.4	5.3	61.2	20	18 43	19 08	19 37	02 11	03 01	03 59	05 05			
	04	239 02.3	05.3	79 28.7	1.4	26 30.7	5.0	61.2	N 10	18 25	18 48	19 15	02 26	03 21	04 22	05 29			
	05	254 02.2	05.2	93 49.1	1.3	26 35.7	4.8	61.3	0	18 07	18 30	18 56	02 40	03 39	04 43	05 51			
	06	269 02.1	N23 05.0	108 09.4	1.2	S26 40.5	4.6	61.3	S 10	17 50	18 13	18 39	02 55	03 57	05 04	06 13			
	07	284 02.0	04.8	122 29.6	1.2	26 45.1	4.3	61.3	20	17 32	17 56	18 23	03 10	04 17	05 27	06 36			
	08	299 01.9	04.6	136 49.8	1.1	26 49.4	4.2	61.3	30	17 11	17 37	18 07	03 28	04 40	05 54	07 04			
	09	314 01.7	04.5	151 09.9	1.0	26 53.6	4.0	61.3	35	16 59	17 27	17 59	03 38	04 53	06 09	07 20			
	10	329 01.6	04.3	165 29.9	1.0	26 57.6	3.8	61.3	40	16 45	17 15	17 49	03 50	05 09	06 27	07 39			
	11	344 01.5	04.1	179 49.9	0.9	27 01.4	3.5	61.3	45	16 28	17 02	17 39	04 04	05 28	06 49	08 01			
	12	359 01.4	N23 03.9	194 09.8	0.8	S27 04.9	3.3	61.3	S 50	16 08	16 46	17 28	04 21	05 51	07 17	08 30			
	13	14 01.3	03.7	208 29.6	0.8	27 08.2	3.2	61.3	52	15 58	16 39	17 22	04 30	06 02	07 31	08 45			
	14	29 01.1	03.6	222 49.4	0.8	27 11.4	2.9	61.3	54	15 47	16 31	17 17	04 39	06 15	07 47	09 01			
	15	44 01.0	03.4	237 09.2	0.7	27 14.3	2.6	61.3	56	15 35	16 22	17 11	04 49	06 30	08 05	09 20			
	16	59 00.9	03.2	251 28.9	0.7	27 16.9	2.5	61.3	58	15 20	16 12	17 04	05 01	06 47	08 28	09 44			
	17	74 00.8	03.0	265 48.6	0.6	27 19.4	2.3	61.3	S 60	15 03	16 00	16 57	05 15	07 08	08 58	10 16			
	18	89 00.7	N23 02.8	280 08.2	0.6	S27 21.7	2.0	61.3	Day		SUN		Mer.		MOON				
	19	104 00.6	02.7	294 27.8	0.6	27 23.7	1.8	61.3					Mer. Pass.		Age Phase				
	20	119 00.4	02.5	308 47.4	0.6	27 25.5	1.6	61.3					Upper Lower						
	21	134 00.3	02.3	323 07.0	0.5	27 27.1	1.4	61.3											
	22	149 00.2	02.1	337 26.5	0.5	27 28.5	1.2	61.3											
	23	164 00.1	01.9	351 46.0	0.5	S27 29.7	0.9	61.3											
								d	m s		h m		h m		d	%			
								29	03 25 03 31		12 04		21 25 08 55		12 87				
								30	03 37 03 43		12 04		22 28 09 55		13 94				
								1	03 49 03 54		12 04		23 34 11 01		14 98				
								SD 15.8 d 0.2		SD 16.5				16.6		16.7			



## JULY 2, 3, 4 (FRI., SAT., SUN.)

UT	ARIES	VENUS -4.4	MARS +1.8	JUPITER -1.8	SATURN +0.1	STARS
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name SHA Dec
200	280 22.2	211 39.6 N17 43.9	152 34.9 N20 10.0	115 07.4 N 7 33.6	173 05.3 N22 12.7	Acamar 315 23.8 S40 17.0
01	295 24.6	226 41.8 43.8	167 35.7 09.6	130 09.5 33.4	188 07.4 12.7	Achernar 335 31.9 S57 12.6
02	310 27.1	241 44.1 43.6	182 36.6 09.2	145 11.6 33.3	203 09.5 12.6	Acruz 173 17.6 S63 07.7
03	325 29.6	256 46.3 43.4	197 37.4 08.8	160 13.8 33.1	218 11.6 12.6	Adhara 255 18.5 S28 58.6
04	340 32.0	271 48.5 43.3	212 38.3 08.4	175 15.9 33.0	233 13.8 12.6	Aldebaran 290 57.8 N16 31.1
05	355 34.5	286 50.7 43.1	227 39.1 08.0	190 18.0 32.8	248 15.9 12.5	
06	10 37.0	301 52.9 N17 42.9	242 39.9 N20 07.6	205 20.2 N 7 32.7	263 18.0 N22 12.5	Alioth 166 26.5 N55 56.5
07	25 39.4	316 55.1 42.8	257 40.8 07.2	220 22.3 32.5	278 20.1 12.5	Alkaid 153 04.1 N49 17.7
08	40 41.9	331 57.4 42.6	272 41.6 06.8	235 24.4 32.4	293 22.2 12.4	Al Na'ir 27 52.0 S46 56.2
09	55 44.4	346 59.6 42.5	287 42.5 06.5	250 26.5 32.2	308 24.3 12.4	Alnilam 275 53.8 S 1 11.8
10	70 46.8	2 01.7 42.3	302 43.3 06.1	265 28.7 32.1	323 26.5 12.4	Alphard 218 03.3 S 8 40.6
11	85 49.3	17 03.9 42.2	317 44.1 05.7	280 30.8 32.0	338 28.6 12.3	
12	100 51.7	32 06.1 N17 42.0	332 45.0 N20 05.3	295 32.9 N 7 31.8	353 30.7 N22 12.3	Alphecca 126 16.7 N26 42.1
13	115 54.2	47 08.3 41.9	347 45.8 04.9	310 35.0 31.7	8 32.8 12.3	Alpheratz 357 50.8 N29 06.7
14	130 56.7	62 10.5 41.7	2 46.7 04.5	325 37.2 31.5	23 34.9 12.2	Altair 62 14.8 N 8 52.7
15	145 59.1	77 12.7 41.5	17 47.5 04.1	340 39.3 31.4	38 37.0 12.2	Ankaa 353 22.4 S42 16.7
16	161 01.6	92 14.9 41.4	32 48.3 03.7	355 41.4 31.2	53 39.2 12.2	Antares 112 34.6 S26 26.6
17	176 04.1	107 17.0 41.3	47 49.2 03.3	10 43.5 31.1	68 41.3 12.1	
18	191 06.5	122 19.2 N17 41.1	62 50.0 N20 02.9	25 45.7 N 7 30.9	83 43.4 N22 12.1	Arcturus 146 02.0 N19 09.7
19	206 09.0	137 21.4 41.0	77 50.9 02.5	40 47.8 30.8	98 45.5 12.1	Atria 107 42.4 S69 02.4
20	221 11.5	152 23.5 40.8	92 51.7 02.1	55 49.9 30.6	113 47.6 12.0	Avior 234 21.7 S59 31.4
21	236 13.9	167 25.7 40.7	107 52.6 01.8	70 52.0 30.5	128 49.7 12.0	Bellatrix 278 39.9 N 6 21.3
22	251 16.4	182 27.8 40.5	122 53.4 01.4	85 54.2 30.3	143 51.9 12.0	Betelgeuse 271 09.2 N 7 24.6
23	266 18.9	197 30.0 40.4	137 54.2 01.0	100 56.3 30.2	158 54.0 11.9	
300	281 21.3	212 32.1 N17 40.3	152 55.1 N20 00.6	115 58.4 N 7 30.0	173 56.1 N22 11.9	Canopus 263 59.8 S52 41.7
01	296 23.8	227 34.2 40.1	167 55.9 20 00.2	131 00.5 29.9	188 58.2 11.8	Capella 280 45.3 N46 00.2
02	311 26.2	242 36.4 40.0	182 56.8 19 59.8	146 02.7 29.8	204 00.3 11.8	Deneb 49 36.0 N45 17.6
03	326 28.7	257 38.5 39.8	197 57.6 19 59.4	161 04.8 29.6	219 02.4 11.8	Denebola 182 40.9 N14 33.0
04	341 31.2	272 40.6 39.7	212 58.5 59.0	176 06.9 29.5	234 04.6 11.7	Diphda 349 02.9 S17 57.6
05	356 33.6	287 42.8 39.6	227 59.3 58.6	191 09.0 29.3	249 06.7 11.7	
06	11 36.1	302 44.9 N17 39.4	243 00.1 N19 58.2	206 11.1 N 7 29.2	264 08.8 N22 11.7	Dubhe 194 00.2 N61 44.0
07	26 38.6	317 47.0 39.3	258 01.0 57.8	221 13.3 29.0	279 10.9 11.6	Elnath 278 21.9 N28 36.7
08	41 41.0	332 49.1 39.2	273 01.8 57.4	236 15.4 28.9	294 13.0 11.6	Eltanin 90 48.9 N51 29.3
09	56 43.5	347 51.2 39.1	288 02.7 57.0	251 17.5 28.7	309 15.1 11.6	Enif 33 53.8 N 9 53.6
10	71 46.0	2 53.3 38.9	303 03.5 56.6	266 19.6 28.6	324 17.3 11.5	Fomalhaut 15 31.4 S29 35.8
11	86 48.4	17 55.4 38.8	318 04.4 56.2	281 21.8 28.4	339 19.4 11.5	
12	101 50.9	32 57.5 N17 38.7	333 05.2 N19 55.8	296 23.9 N 7 28.3	354 21.5 N22 11.5	Gacrux 172 09.1 S57 08.5
13	116 53.3	47 59.6 38.6	348 06.0 55.4	311 26.0 28.1	9 23.6 11.4	Gienah 175 59.7 S17 34.0
14	131 55.8	63 01.7 38.4	3 06.9 55.0	326 28.1 28.0	24 25.7 11.4	Hadar 148 58.0 S60 23.9
15	146 58.3	78 03.8 38.3	18 07.7 54.6	341 30.2 27.8	39 27.8 11.4	Hamal 328 08.9 N23 28.9
16	162 00.7	93 05.9 38.2	33 08.6 54.2	356 32.4 27.7	54 29.9 11.3	Kaus Aust. 83 52.7 S34 23.0
17	177 03.2	108 08.0 38.1	48 09.4 53.8	11 34.5 27.5	69 32.1 11.3	
18	192 05.7	123 10.0 N17 38.0	63 10.3 N19 53.4	26 36.6 N 7 27.4	84 34.2 N22 11.3	Kochab 137 18.6 N74 08.5
19	207 08.1	138 12.1 37.9	78 11.1 53.0	41 38.7 27.2	99 36.3 11.2	Markab 13 45.2 N15 13.6
20	222 10.6	153 14.2 37.7	93 12.0 52.7	56 40.8 27.1	114 38.4 11.2	Menkar 314 22.6 N 4 06.5
21	237 13.1	168 16.2 37.6	108 12.8 52.3	71 43.0 26.9	129 40.5 11.1	Menkent 148 15.9 S36 23.7
22	252 15.5	183 18.3 37.5	123 13.7 51.9	86 45.1 26.8	144 42.6 11.1	Miaplacidus 221 42.3 S69 44.2
23	267 18.0	198 20.4 37.4	138 14.5 51.5	101 47.2 26.7	159 44.8 11.1	
400	282 20.5	213 22.4 N17 37.3	153 15.3 N19 51.1	116 49.3 N 7 26.5	174 46.9 N22 11.0	Mirfak 308 50.9 N49 52.5
01	297 22.9	228 24.5 37.2	168 16.2 50.7	131 51.4 26.4	189 49.0 11.0	Nunki 76 06.6 S26 17.5
02	312 25.4	243 26.5 37.1	183 17.0 50.3	146 53.6 26.2	204 51.1 11.0	Peacock 53 29.6 S56 43.2
03	327 27.8	258 28.5 37.0	198 17.9 49.9	161 55.7 26.1	219 53.2 10.9	Pollux 243 36.7 N28 01.1
04	342 30.3	273 30.6 36.9	213 18.7 49.5	176 57.8 25.9	234 55.3 10.9	Procyon 245 07.4 N 5 13.0
05	357 32.8	288 32.6 36.8	228 19.6 49.1	191 59.9 25.8	249 57.5 10.9	
06	12 35.2	303 34.7 N17 36.7	243 20.4 N19 48.7	207 02.0 N 7 25.6	264 59.6 N22 10.8	Rasalhague 96 12.6 N12 33.4
07	27 37.7	318 36.7 36.6	258 21.3 48.3	222 04.2 25.5	280 01.7 10.8	Regulus 207 51.2 N11 56.9
08	42 40.2	333 38.7 36.5	273 22.1 47.9	237 06.3 25.3	295 03.8 10.8	Rigel 281 19.1 S 8 11.7
09	57 42.6	348 40.7 36.4	288 23.0 47.5	252 08.4 25.2	310 05.9 10.7	Rigel Kent. 140 01.4 S60 51.5
10	72 45.1	3 42.7 36.3	303 23.8 47.1	267 10.5 25.0	325 08.0 10.7	Sabik 102 20.3 S15 43.9
11	87 47.6	18 44.7 36.2	318 24.7 46.6	282 12.6 24.9	340 10.2 10.7	
12	102 50.0	33 46.8 N17 36.1	333 25.5 N19 46.2	297 14.7 N 7 24.7	355 12.3 N22 10.6	Schedar 349 48.8 N56 33.4
13	117 52.5	48 48.8 36.0	348 26.3 45.8	312 16.9 24.6	10 14.4 10.6	Shaula 96 31.1 S37 06.5
14	132 55.0	63 50.8 35.9	3 27.2 45.4	327 19.0 24.4	25 16.5 10.5	Sirius 258 40.3 S16 43.2
15	147 57.4	78 52.8 35.8	18 28.0 45.0	342 21.1 24.3	40 18.6 10.5	Spica 158 38.6 S11 11.1
16	162 59.9	93 54.8 35.7	33 28.9 44.6	357 23.2 24.1	55 20.7 10.5	Suhail 222 58.1 S43 27.0
17	178 02.3	108 56.7 35.6	48 29.7 44.2	12 25.3 24.0	70 22.9 10.4	
18	193 04.8	123 58.7 N17 35.6	63 30.6 N19 43.8	27 27.4 N 7 23.8	85 25.0 N22 10.4	Vega 80 43.3 N38 47.2
19	208 07.3	139 00.7 35.5	78 31.4 43.4	42 29.6 23.7	100 27.1 10.4	Zuben'ubi 137 13.1 S16 03.7
20	223 09.7	154 02.7 35.4	93 32.3 43.0	57 31.7 23.5	115 29.2 10.3	
21	238 12.2	169 04.7 35.3	108 33.1 42.6	72 33.8 23.4	130 31.3 10.3	SHA Mer.Pass.
22	253 14.7	184 06.6 35.2	123 34.0 42.2	87 35.9 23.2	145 33.4 10.3	Venus 291 10.8 9 48
23	268 17.1	199 08.6 35.1	138 34.8 41.8	102 38.0 23.1	160 35.5 10.2	Mars 231 33.8 13 48
						Jupiter 194 37.1 16 14
						Saturn 252 34.8 12 23
h m						
Mer.Pass. 5 13.7		h 2.1 d 0.1	v 0.8 d 0.4	v 2.1 d 0.1	v 2.1 d 0.0	



## JULY 2, 3, 4 (FRI., SAT., SUN.)

UT	SUN		MOON						Lat.	Twilight		Sunrise	Moonrise					
	GHA	Dec	GHA	u	Dec	d	HP	Naut.		Civil	2		3	4	5			
d h	° ' "	° ' "	° ' "	'	° ' "	'	'	'	°	h m	h m	h m	h m	h m	h m	h m	h m	
F R I D A Y	200	179 00.0	N23 01.7	6 05.5	0.5	S27 30.6	0.7	61.3	N 72									
	01	193 59.9	01.5	20 25.0	0.5	27 31.3	0.5	61.3	N 70								01 58	
	02	208 59.7	01.4	34 44.5	0.5	27 31.8	0.3	61.3	68								00 54	
	03	223 59.6	01.2	49 04.0	0.4	27 32.1	0.0	61.3	66			00 37					193 38	
	04	238 59.5	01.0	63 23.4	0.5	27 32.1	0.1	61.3	64			01 45					23 41	
	05	253 59.4	00.8	77 42.9	0.5	27 32.0	0.4	61.3	62			02 20	23 32	23 34	23 32	23 29		
	06	268 59.3	N23 00.6	92 02.4	0.5	S27 31.6	0.6	61.3	60		01 09	02 45	22 46	23 07	23 15	23 19		
	07	283 59.2	00.4	106 21.9	0.5	27 31.0	0.8	61.3	N 58		01 52	03 04	22 15	22 46	23 01	23 10		
	08	298 59.0	00.2	120 41.4	0.6	27 30.2	1.1	61.3	56		02 20	03 20	21 52	22 28	22 49	23 06		
	09	313 58.9	23 00.0	135 01.0	0.5	27 29.1	1.2	61.3	54	01 03	02 41	03 34	21 33	22 13	22 38	22 55		
	10	328 58.8	22 59.8	149 20.5	0.6	27 27.9	1.5	61.3	52	01 43	02 58	03 46	21 17	22 00	22 29	22 49		
	11	343 58.7	59.6	163 40.1	0.7	27 26.4	1.7	61.3	50	02 09	03 13	03 56	21 03	21 49	22 20	22 43		
	12	358 58.6	N22 59.4	177 59.8	0.6	S27 24.7	2.0	61.3	45	02 52	03 41	04 18	20 35	21 25	22 02	22 30		
	13	13 58.5	59.2	192 19.4	0.7	27 22.7	2.1	61.3	N 40	03 22	04 03	04 36	20 13	21 06	21 47	22 20		
	14	28 58.4	59.0	206 39.1	0.7	27 20.6	2.4	61.3	35	03 45	04 21	04 51	19 54	20 49	21 34	22 11		
	15	43 58.2	58.8	220 58.8	0.8	27 18.2	2.5	61.3	30	04 03	04 36	05 03	19 38	20 35	21 23	22 03		
	16	58 58.1	58.6	235 18.6	0.8	27 15.7	2.8	61.3	20	04 31	05 00	05 25	19 11	20 12	21 04	21 49		
	17	73 58.0	58.5	249 38.4	0.9	27 12.9	3.0	61.3	N 10	04 53	05 20	05 43	18 48	19 51	20 47	21 37		
	18	88 57.9	N22 58.3	263 58.3	0.9	S27 09.9	3.2	61.2	0	05 12	05 38	06 01	18 26	19 31	20 31	21 26		
	19	103 57.8	58.1	278 18.2	1.0	27 06.7	3.4	61.2	S 10	05 29	05 55	06 18	18 04	19 17	20 16	21 14		
	20	118 57.7	57.9	292 38.2	1.1	27 03.3	3.7	61.2	20	05 44	06 12	06 36	17 41	18 51	19 59	21 07		
	21	133 57.6	57.6	306 58.3	1.1	26 59.6	3.8	61.2	30	06 00	06 30	06 56	17 14	18 27	19 39	20 48		
	22	148 57.4	57.4	321 18.4	1.2	26 55.8	4.1	61.2	35	06 09	06 41	07 09	16 58	18 12	19 28	20 40		
	23	163 57.3	57.2	335 38.6	1.2	26 51.7	4.3	61.2	40	06 18	06 52	07 22	16 39	17 56	19 14	20 31		
									45	06 28	07 05	07 39	16 17	17 36	18 59	20 20		
S A T U R D A Y	300	178 57.2	N22 57.0	349 58.8	1.4	S26 47.4	4.4	61.2	S 50	06 39	07 21	07 59	15 48	17 11	18 39	20 06		
	01	193 57.1	56.8	4 19.2	1.4	26 43.0	4.7	61.2	52	06 44	07 28	08 08	15 34	16 58	18 30	20 00		
	02	208 57.0	56.6	18 39.6	1.5	26 38.3	4.9	61.1	54	06 50	07 36	08 19	15 18	16 45	18 20	19 53		
	03	223 56.9	56.4	33 00.7	1.5	26 33.4	5.1	61.1	56	06 56	07 45	08 31	14 58	16 28	18 08	19 45		
	04	238 56.8	56.2	47 20.6	1.7	26 28.3	5.2	61.1	58	07 02	07 54	08 45	14 34	16 09	17 54	19 36		
	05	253 56.6	56.0	61 41.3	1.8	26 23.1	5.5	61.1	S 60	07 10	08 06	09 02	14 03	15 45	17 38	19 26		
	06	268 56.5	N22 55.8	76 02.1	1.8	S26 17.6	5.7	61.1										
	07	283 56.4	55.6	90 22.9	1.9	26 11.9	5.9	61.1	Lat.	Sunset	Twilight		Moonset					
	08	298 56.3	55.4	104 43.8	2.1	26 06.0	6.0	61.0			Civil	Naut.	2	3	4	5		
	09	313 56.2	55.2	119 04.9	2.1	26 00.0	6.3	61.0	N 72	h m	h m	h m	h m	h m	h m	h m	h m	
	10	328 56.1	55.0	133 26.0	2.2	25 53.7	6.5	61.0	N 70									
	11	343 56.0	54.8	147 47.2	2.4	25 47.2	6.6	61.0	68									
	12	358 55.9	N22 54.6	162 08.6	2.4	S25 40.6	6.8	61.0	66	23 26							03 53	
	13	13 55.7	54.3	176 30.0	2.5	25 33.8	7.0	60.9	64	22 21							04 55	
	14	28 55.6	54.1	190 51.5	2.7	25 26.8	7.2	60.9	62	21 48							05 30	
	15	43 55.5	53.9	205 13.2	2.8	25 19.6	7.4	60.9	60	21 23			00 13	01 58	04 10	06 14		
	16	58 55.4	53.7	219 35.0	2.9	25 12.2	7.6	60.9	N 58	21 04	22 15		01 52	03 14	04 57	06 43		
	17	73 55.3	53.5	233 56.9	3.0	25 04.6	7.7	60.8	56	20 48	21 48		02 17	03 37	05 14	06 54		
	18	88 55.2	N22 53.3	248 18.9	3.1	S24 56.9	7.9	60.8	54	20 34	21 27	23 03	02 37	03 56	05 29	07 04		
	19	103 55.1	53.1	262 41.0	3.2	24 49.0	8.1	60.8	52	20 22	21 10	22 24	02 54	04 11	05 41	07 13		
	20	118 55.0	52.8	277 03.2	3.4	24 40.9	8.3	60.8	50	20 12	20 56	21 59	03 09	04 25	05 52	07 21		
	21	133 54.9	52.6	291 25.6	3.5	24 32.6	8.4	60.8	45	19 50	20 27	21 16	03 38	04 53	06 15	07 38		
	22	148 54.7	52.4	305 48.1	3.6	24 24.2	8.6	60.7	N 40	19 32	20 05	20 46	04 02	05 15	06 33	07 51		
	23	163 54.6	52.2	320 10.7	3.7	24 15.6	8.8	60.7	35	19 18	19 47	20 24	04 21	05 33	06 48	08 03		
	S U N D A Y	400	178 54.5	N22 52.0	334 33.4	3.9	S24 06.8	8.9	60.7	30	19 05	19 32	20 05	04 37	05 48	07 01	08 13	
01		193 54.4	51.7	348 56.3	4.0	23 57.9	9.1	60.7	20	18 44	19 08	19 37	05 05	06 14	07 24	08 30		
02		208 54.3	51.5	3 19.3	4.1	23 48.8	9.2	60.6	N 10	18 25	18 48	19 15	05 29	06 37	07 43	08 44		
03		223 54.2	51.3	17 42.4	4.3	23 39.6	9.4	60.6	0	18 08	18 30	18 56	05 51	06 58	08 01	08 58		
04		238 54.1	51.1	32 05.7	4.4	23 30.2	9.6	60.6	S 10	17 51	18 14	18 40	06 13	07 18	08 18	09 12		
05		253 54.0	50.8	46 29.1	4.5	23 20.6	9.7	60.5	20	17 33	17 57	18 24	06 36	07 41	08 37	09 26		
06		268 53.9	N22 50.6	60 52.6	4.6	S23 10.9	9.8	60.5	30	17 12	17 38	18 08	07 04	08 06	08 59	09 42		
07		283 53.8	50.4	75 16.2	4.8	23 01.1	10.0	60.5	35	17 00	17 28	18 00	07 20	08 21	09 11	09 52		
08		298 53.6	50.2	89 40.0	4.9	22 51.1	10.2	60.5	40	16 46	17 17	17 51	07 39	08 38	09 26	10 02		
09		313 53.5	49.9	104 03.9	5.1	22 40.9	10.3	60.4	45	16 30	17 04	17 41	08 01	08 59	09 43	10 15		
10		328 53.4	49.7	118 28.0	5.2	22 30.6	10.4	60.4	S 50	16 10	16 48	17 29	08 30	09 25	10 03	10 30		
11		343 53.3	49.5	132 52.2	5.3	22 20.2	10.6	60.4	52	16 00	16 41	17 24	08 45	09 38	10 13	10 37		
12		358 53.2	N22 49.3	147 16.5	5.5	S22 09.6	10.7	60.3	54	15 50	16 33	17 19	09 01	09 52	10 24	10 45		
13		13 53.1	49.0	161 41.0	5.6	21 58.9	10.8	60.3	56	15 37	16 24	17 13	09 20	10 09	10 37	10 54		
14		28 53.0	48.8	176 05.6	5.7	21 48.1	11.0	60.3	58	15 23	16 14	17 06	09 44	10 28	10 51	11 03		
15		43 52.9	48.6	190 30.3	5.9	21 37.1	11.1	60.2	S 60	15 07	16 03	16 59	10 16	10 53	11 08	11 14		
16		58 52.8	48.3	204 55.2	6.0	21 26.0	11.2	60.2										
17		73 52.7	48.1	219 20.2	6.2	21 14.8	11.4	60.2										
18		88 52.6	N22 47.9	233 45.4	6.3	S21 03.4	11.4	60.1										
19		103 52.5	47.7	248 10.7	6.4	20 52.0	11.6	60.1										
20		118 52.3	47.4	262 36.1	6.6	20 40.4	11.7	60.1										
21		133 52.2	47.2	277 01.7	6.7	20 28.7	11.9	60.0										
22		148 52.1	46.9	291 27.4	6.8	20 16.8	11.9	60.0										
23		163 52.0	46.7	305 53.2	7.0	S20 04.9	12.1	60.0										
		SD 15.8	d 0.2	SD 16.7	16.6	16.4												
									SUN			MOON						



## AUGUST 16, 17, 18 (MON., TUES., WED.)

UT	ARIES	VENUS -4.3	MARS +1.8	JUPITER -1.7	SATURN +0.2	STARS
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name SHA Dec
d h	° ' "	° ' " ° ' "	° ' " ° ' "	° ' " ° ' "	° ' " ° ' "	° ' " ° ' "
16 00	324 43.4	226 29.1 N19 52.7	168 52.3 N11 13.7	152 06.2 N 4 22.4	211 22.4 N21 29.3	Acamar 315 23.4 S40 16.8
01	339 45.9	241 29.1 52.8	183 53.2 13.1	167 08.2 22.2	226 24.5 29.3	Achernar 335 31.3 S57 12.5
02	354 48.4	256 29.0 52.8	198 54.2 12.6	182 10.2 22.0	241 26.7 29.2	Acrux 173 18.0 S63 07.6
03	9 50.8	271 29.0 52.9	213 55.1 12.0	197 12.2 21.8	256 28.8 29.2	Adhara 255 18.3 S28 58.4
04	24 53.3	286 28.9 52.9	228 56.1 11.4	212 14.2 21.6	271 31.0 29.2	Aldebaran 290 57.5 N16 31.2
05	39 55.8	301 28.9 53.0	243 57.1 10.8	227 16.2 21.4	286 33.1 29.1	
06	54 58.2	316 28.8 N19 53.0	258 58.0 N11 10.2	242 18.2 N 4 21.2	301 35.3 N21 29.1	Alioth 166 26.8 N55 56.4
07	70 00.7	331 28.8 53.0	273 59.0 09.6	257 20.2 21.0	316 37.4 29.0	Alkaid 153 04.3 N49 17.7
08	85 03.2	346 28.7 53.1	288 59.9 09.0	272 22.2 20.8	331 39.6 29.0	Al Na'ir 27 51.7 S46 56.3
09	100 05.6	1 28.6 53.1	304 00.9 08.5	287 24.2 20.6	346 41.7 28.9	Alnilam 275 53.6 S 1 11.7
10	115 08.1	16 28.6 53.2	319 01.9 07.9	302 26.2 20.4	1 43.9 28.9	Alphard 218 03.2 S 8 40.5
11	130 10.5	31 28.5 53.2	334 02.8 07.3	317 28.2 20.2	16 46.0 28.9	
12	145 13.0	46 28.5 N19 53.2	349 03.8 N11 06.7	332 30.2 N 4 20.0	31 48.2 N21 28.8	Alphecca 126 16.8 N26 42.1
13	160 15.5	61 28.4 53.3	4 04.8 06.1	347 32.2 19.8	46 50.3 28.8	Alpheratz 357 50.5 N29 06.9
14	175 17.9	76 28.3 53.3	19 05.7 05.5	2 34.2 19.6	61 52.5 28.7	Altair 62 14.7 N 8 52.8
15	190 20.4	91 28.3 53.3	34 06.7 04.9	17 36.2 19.4	76 54.7 28.7	Ankaa 353 22.0 S42 16.7
16	205 22.9	106 28.2 53.4	49 07.6 04.4	32 38.2 19.2	91 56.8 28.6	Antares 112 34.7 S26 26.7
17	220 25.3	121 28.2 53.4	64 08.6 03.8	47 40.2 19.0	106 59.0 28.6	
18	235 27.8	136 28.1 N19 53.4	79 09.6 N11 03.2	62 42.2 N 4 18.8	122 01.1 N21 28.6	Arcturus 146 02.1 N19 09.7
19	250 30.3	151 28.0 53.5	94 10.5 02.6	77 44.2 18.6	137 03.3 28.5	Atria 107 42.7 S69 02.5
20	265 32.7	166 28.0 53.5	109 11.5 02.0	92 46.2 18.4	152 05.4 28.5	Avior 234 21.7 S59 31.2
21	280 35.2	181 27.9 53.5	124 12.5 01.4	107 48.2 18.2	167 07.6 28.4	Bellatrix 278 39.6 N 6 21.4
22	295 37.7	196 27.8 53.6	139 13.4 00.8	122 50.2 18.0	182 09.7 28.4	Betelgeuse 271 09.0 N 7 24.7
23	310 40.1	211 27.7 53.6	154 14.4 00.3	137 52.2 17.8	197 11.9 28.3	
17 00	325 42.6	226 27.7 N19 53.6	169 15.3 N10 59.7	152 54.2 N 4 17.6	212 14.0 N21 28.3	Canopus 263 59.6 S52 41.5
01	340 45.0	241 27.6 53.7	184 16.3 59.1	167 56.2 17.4	227 16.2 28.3	Capella 280 44.9 N46 00.1
02	355 47.5	256 27.5 53.7	199 17.3 58.5	182 58.2 17.2	242 18.4 28.2	Deneb 49 35.9 N45 17.8
03	10 50.0	271 27.5 53.7	214 18.2 57.9	198 00.2 17.0	257 20.5 28.2	Denebola 182 40.9 N14 33.0
04	25 52.4	286 27.4 53.7	229 19.2 57.3	213 02.2 16.8	272 22.7 28.1	Diphda 349 02.5 S17 57.5
05	40 54.9	301 27.3 53.8	244 20.2 56.7	228 04.2 16.6	287 24.8 28.1	
06	55 57.4	316 27.2 N19 53.8	259 21.1 N10 56.1	243 06.2 N 4 16.4	302 27.0 N21 28.0	Dubhe 194 00.4 N61 43.8
07	70 59.8	331 27.2 53.8	274 22.1 55.6	258 08.1 16.2	317 29.1 28.0	Elnath 278 21.6 N28 36.7
08	86 02.3	346 27.1 53.8	289 23.0 55.0	273 10.1 16.0	332 31.3 28.0	Eltanin 90 49.1 N51 29.5
09	101 04.8	1 27.0 53.9	304 24.0 54.4	288 12.1 15.8	347 33.4 27.9	Enif 33 53.6 N 9 53.8
10	116 07.2	16 26.9 53.9	319 25.0 53.9	303 14.1 15.6	2 35.6 27.9	Fomalhaut 15 31.1 S29 35.8
11	131 09.7	31 26.8 53.9	334 25.9 53.2	318 16.1 15.4	17 37.8 27.8	
12	146 12.1	46 26.8 N19 53.9	349 26.9 N10 52.6	333 18.1 N 4 15.1	32 39.9 N21 27.8	Gacrux 172 09.4 S57 08.4
13	161 14.6	61 26.7 53.9	4 27.9 52.0	348 20.1 14.9	47 42.1 27.7	Gienah 175 59.8 S17 34.0
14	176 17.1	76 26.6 54.0	19 28.8 51.4	3 22.1 14.7	62 44.2 27.7	Hadar 148 58.3 S60 23.9
15	191 19.5	91 26.5 54.0	34 29.8 50.8	18 24.1 14.5	77 46.4 27.7	Hamal 328 08.5 N23 29.0
16	206 22.0	106 26.4 54.0	49 30.8 50.3	33 26.1 14.3	92 48.5 27.6	Kaus Aust. 83 52.7 S34 23.1
17	221 24.5	121 26.3 54.0	64 31.7 49.7	48 28.1 14.1	107 50.7 27.6	
18	236 26.9	136 26.3 N19 54.0	79 32.7 N10 49.1	63 30.1 N 4 13.9	122 52.8 N21 27.5	Kochab 137 19.4 N74 08.5
19	251 29.4	151 26.2 54.1	94 33.6 48.5	78 32.1 13.7	137 55.0 27.5	Markab 13 45.0 N15 13.8
20	266 31.9	166 26.1 54.1	109 34.6 47.9	93 34.1 13.5	152 57.2 27.4	Menkar 314 22.3 N 4 06.6
21	281 34.3	181 26.0 54.1	124 35.6 47.3	108 36.1 13.3	167 59.3 27.4	Menkent 148 16.0 S36 23.7
22	296 36.8	196 25.9 54.1	139 36.5 46.7	123 38.1 13.1	183 01.5 27.4	Miaplacidus 221 42.5 S69 44.0
23	311 39.3	211 25.8 54.1	154 37.5 46.1	138 40.1 12.9	198 03.6 27.3	
18 00	326 41.7	226 25.7 N19 54.1	169 38.5 N10 45.5	153 42.1 N 4 12.7	213 05.8 N21 27.3	Mirtak 308 50.4 N49 52.5
01	341 44.2	241 25.6 54.1	184 39.4 44.9	168 44.1 12.5	228 07.9 27.2	Nunki 76 06.6 S26 17.6
02	356 46.6	256 25.5 54.2	199 40.4 44.4	183 46.1 12.3	243 10.1 27.2	Peacock 53 29.4 S56 43.3
03	11 49.1	271 25.5 54.2	214 41.4 43.8	198 48.1 12.1	258 12.3 27.1	Pollux 243 36.5 N28 01.1
04	26 51.6	286 25.4 54.2	229 42.3 43.2	213 50.1 11.9	273 14.4 27.1	Procyon 245 07.3 N 5 13.0
05	41 54.0	301 25.3 54.2	244 43.3 42.6	228 52.1 11.7	288 16.6 27.1	
06	56 56.5	316 25.2 N19 54.2	259 44.3 N10 42.0	243 54.1 N 4 11.5	303 18.7 N21 27.0	Rasalhague 96 12.7 N12 33.5
07	71 59.0	331 25.1 54.2	274 45.2 41.4	258 56.1 11.3	318 20.9 27.0	Regulus 207 51.2 N11 56.9
08	87 01.4	346 25.0 54.2	289 46.2 40.8	273 58.1 11.1	333 23.0 26.9	Rigel 281 18.9 S 8 11.5
09	102 03.9	1 24.9 54.2	304 47.2 40.2	289 00.1 10.9	348 25.2 26.9	Rigel Kent. 140 01.8 S60 51.5
10	117 06.4	16 24.8 54.2	319 48.1 39.6	304 02.0 10.7	3 27.4 26.8	Sabik 102 20.4 S15 43.9
11	132 08.8	31 24.7 54.2	334 49.1 39.0	319 04.0 10.5	18 29.5 26.8	
12	147 11.3	46 24.6 N19 54.2	349 50.0 N10 38.5	334 06.0 N 4 10.3	33 31.7 N21 26.8	Schedar 349 48.4 N56 33.6
13	162 13.7	61 24.5 54.2	4 51.0 37.9	349 08.0 10.1	48 33.8 26.7	Shaula 96 31.1 S37 06.6
14	177 16.2	76 24.4 54.2	19 52.0 37.3	4 10.0 09.9	63 36.0 26.7	Sirius 258 40.1 S16 43.0
15	192 18.7	91 24.3 54.3	34 52.9 36.7	19 12.0 09.7	78 38.1 26.6	Spica 158 38.8 S11 11.1
16	207 21.1	106 24.2 54.3	49 53.9 36.1	34 14.0 09.5	93 40.3 26.6	Suhail 222 58.1 S43 26.9
17	222 23.6	121 24.1 54.3	64 54.9 35.5	49 16.0 09.3	108 42.5 26.5	
18	237 26.1	136 24.0 N19 54.3	79 55.8 N10 34.9	64 18.0 N 4 09.1	123 44.6 N21 26.5	Vega 80 43.4 N38 47.4
19	252 28.5	151 23.8 54.3	94 56.8 34.3	79 20.0 08.9	138 46.8 26.5	Zuben'ubi 137 13.2 S16 03.7
20	267 31.0	166 23.7 54.3	109 57.8 33.7	94 22.0 08.7	153 48.9 26.4	
21	282 33.5	181 23.6 54.3	124 58.7 33.1	109 24.0 08.5	168 51.1 26.4	SHA Mer.Pass.
22	297 35.9	196 23.5 54.3	139 59.7 32.5	124 26.0 08.2	183 53.3 26.3	Venus 260 45.1 8 54
23	312 38.4	211 23.4 54.3	155 00.7 31.9	139 28.0 08.0	198 55.4 26.3	Mars 203 32.8 12 42
	n m					Jupiter 187 11.6 13 47
Mer.Pass. 2 16.8	v -0.1 d 0.0		v 1.0 d 0.6	v 2.0 d 0.2	v 2.2 d 0.0	Saturn 246 31.5 9 50



## AUGUST 16, 17, 18 (MON., TUES., WED.)

UT	SUN				MOON				Lat.	Twilight		Sunrise	Moonrise					
	GHA		Dec		GHA		Dec			Naut.	Civil		16	17	18	19		
	h	m	h	m	h	m	h	m					h	m	h	m	h	m
MONDAY	16 00	178 55.8	N13 41.9	177 56.3	13.0	N18 25.6	11.2	55.3	N 72	///	///	07 40		04 07	06 26	08 34		
	01	193 55.9	41.1	192 28.3	13.0	18 14.4	11.3	55.3	N 70	///	01 03	03 08	02 01	04 31	06 35	08 34		
	02	208 56.1	40.3	207 00.3	13.0	18 03.1	11.4	55.3	68	///	02 00	03 29	02 43	04 49	06 43	08 34		
	03	223 56.2	39.5	221 32.3	13.1	17 51.7	11.4	55.3	66	///	02 33	03 45	03 11	05 04	06 50	08 34		
	04	238 56.3	38.7	226 04.4	13.1	17 40.3	11.6	55.3	64	00 56	02 56	03 59	03 32	05 16	06 55	08 34		
	05	253 56.4	37.9	250 36.5	13.2	17 28.7	11.6	55.4	62	01 47	03 14	04 10	03 49	05 26	07 00	08 34		
	06	268 56.6	N13 37.2	265 08.7	13.2	N17 17.1	11.7	55.4	60	02 16	03 29	04 20	04 03	05 34	07 04	08 34		
	07	283 56.7	36.4	279 40.9	13.3	17 05.4	11.8	55.4	N 58	02 38	03 42	04 28	04 15	05 42	07 08	08 34		
	08	298 56.8	35.6	294 13.2	13.3	16 53.6	11.9	55.4	56	02 55	03 52	04 35	04 25	05 48	07 11	08 33		
	09	313 57.0	34.8	308 45.5	13.3	16 41.7	12.0	55.4	54	03 10	04 02	04 42	04 34	05 54	07 14	08 33		
	10	328 57.1	34.0	323 17.8	13.4	16 29.7	12.0	55.5	52	03 22	04 10	04 48	04 42	05 59	07 16	08 33		
	11	343 57.2	33.2	337 50.2	13.4	16 17.7	12.1	55.5	50	03 32	04 17	04 53	04 50	06 04	07 18	08 33		
	12	358 57.4	N13 32.4	352 22.6	13.5	N16 05.6	12.2	55.5	45	03 54	04 33	05 04	05 05	06 14	07 24	08 33		
	13	13 57.5	31.6	6 55.1	13.5	15 53.4	12.3	55.5	N 40	04 10	04 45	05 14	05 18	06 23	07 28	08 33		
	14	28 57.6	30.8	21 27.6	13.6	15 41.1	12.4	55.5	35	04 23	04 55	05 22	05 28	06 30	07 31	08 33		
	15	43 57.7	30.0	36 00.2	13.6	15 28.7	12.4	55.6	30	04 34	05 04	05 29	05 38	06 36	07 35	08 33		
	16	58 57.9	29.2	50 32.8	13.6	15 16.3	12.5	55.6	20	04 51	05 18	05 41	05 54	06 47	07 40	08 33		
	17	73 58.0	28.4	65 05.4	13.7	15 03.8	12.6	55.6	N 10	05 04	05 29	05 51	06 08	06 57	07 45	08 33		
	18	88 58.1	N13 27.6	79 38.1	13.7	N14 51.2	12.6	55.6	0	05 15	05 39	06 01	06 20	07 06	07 49	08 33		
	19	103 58.3	26.8	94 10.8	13.7	14 38.6	12.7	55.6	S 10	05 24	05 49	06 10	06 33	07 14	07 54	08 33		
	20	118 58.4	26.0	108 43.5	13.8	14 25.9	12.8	55.6	20	05 32	05 58	06 20	06 47	07 24	07 59	08 33		
	21	133 58.5	25.2	123 16.3	13.8	14 13.1	12.9	55.7	30	05 39	06 07	06 31	07 03	07 34	08 04	08 33		
	22	148 58.7	24.4	137 49.1	13.9	14 00.2	12.9	55.7	35	05 42	06 12	06 38	07 12	07 41	08 07	08 33		
	23	163 58.8	23.6	152 22.0	13.9	13 47.3	13.0	55.7	40	05 46	06 17	06 45	07 22	07 47	08 11	08 33		
									45	05 49	06 23	06 54	07 34	07 56	08 15	08 33		
TUESDAY	17 00	178 58.9	N13 22.8	166 54.9	13.9	N13 34.3	13.1	55.7	S 50	05 52	06 30	07 04	07 49	08 05	08 20	08 33		
	01	193 59.1	22.0	181 27.8	14.0	13 21.2	13.1	55.7	52	05 54	06 33	07 09	07 55	08 10	08 22	08 33		
	02	208 59.2	21.2	196 00.8	14.0	13 08.1	13.2	55.8	54	05 55	06 37	07 14	08 03	08 14	08 24	08 33		
	03	223 59.3	20.4	210 33.8	14.0	12 54.9	13.3	55.8	56	05 57	06 40	07 19	08 11	08 20	08 27	08 33		
	04	238 59.5	19.6	225 06.8	14.1	12 41.6	13.3	55.8	58	05 58	06 44	07 26	08 20	08 26	08 30	08 33		
	05	253 59.6	18.8	239 39.9	14.0	12 28.3	13.4	55.8	S 60	06 00	06 49	07 33	08 31	08 33	08 33	08 33		
	06	268 59.7	N13 18.0	254 12.9	14.2	N12 14.9	13.4	55.8										
	07	283 59.9	17.2	268 46.1	14.1	12 01.5	13.5	55.9	Lat.	Sunset	Twilight		Moonset					
	08	299 00.0	16.4	283 19.2	14.2	11 48.0	13.6	55.9			Civil	Naut.	16	17	18	19		
	09	314 00.1	15.6	297 52.4	14.2	11 34.4	13.6	55.9										
	10	329 00.3	14.8	312 25.6	14.2	11 20.8	13.7	55.9										
	11	344 00.4	14.0	326 58.8	14.3	11 07.1	13.8	55.9	N 72	21 23	///	///	22 07	21 21	20 47	20 15		
	12	359 00.5	N13 13.2	341 32.1	14.3	N10 53.3	13.8	56.0	N 70	20 56	22 52	///	21 40	21 09	20 43	20 19		
	13	14 00.7	12.4	356 05.4	14.3	10 39.5	13.8	56.0	68	20 36	22 02	///	21 20	20 59	20 40	20 22		
	14	29 00.8	11.6	10 38.7	14.3	10 25.7	13.9	56.0	66	20 20	21 31	///	21 04	20 50	20 37	20 25		
	15	44 01.0	10.8	25 12.0	14.4	10 11.8	14.0	56.0	64	20 07	21 09	23 01	20 51	20 43	20 35	20 27		
	16	59 01.1	10.0	39 45.4	14.3	9 57.8	14.0	56.0	62	19 56	20 51	22 16	20 40	20 36	20 33	20 30		
	17	74 01.2	09.2	54 18.7	14.3	9 43.8	14.0	56.1	60	19 47	20 37	21 48	20 30	20 31	20 31	20 31		
	18	89 01.4	N13 08.4	68 52.1	14.4	N 9 29.8	14.1	56.1	N 58	19 38	20 24	21 27	20 22	20 26	20 30	20 33		
	19	104 01.5	07.6	83 25.5	14.5	9 15.7	14.2	56.1	56	19 31	20 14	21 10	20 14	20 22	20 28	20 35		
	20	119 01.6	06.7	97 59.0	14.4	9 01.5	14.2	56.1	54	19 25	20 05	20 56	20 07	20 18	20 27	20 36		
	21	134 01.8	05.9	112 32.4	14.5	8 47.3	14.3	56.1	52	19 19	19 57	20 44	20 01	20 14	20 26	20 37		
	22	149 01.9	05.1	127 05.9	14.5	8 33.0	14.3	56.2	50	19 14	19 49	20 34	19 56	20 11	20 25	20 38		
	23	164 02.1	04.3	141 39.4	14.5	8 18.7	14.3	56.2	45	19 03	19 34	20 13	19 44	20 04	20 23	20 41		
WEDNESDAY	18 00	179 02.2	N13 03.5	156 12.9	14.5	N 8 04.4	14.4	56.2	N 40	18 54	19 22	19 57	19 34	19 58	20 21	20 43		
	01	194 02.3	02.7	170 46.4	14.6	7 50.0	14.4	56.2	35	18 46	19 12	19 44	19 25	19 53	20 19	20 45		
	02	209 02.5	01.9	185 20.0	14.5	7 35.6	14.5	56.2	30	18 39	19 04	19 33	19 18	19 48	20 17	20 46		
	03	224 02.6	01.1	199 53.5	14.6	7 21.1	14.5	56.3	20	18 27	18 50	19 17	19 05	19 40	20 15	20 49		
	04	239 02.7	13 00.3	214 27.1	14.6	7 06.6	14.6	56.3	N 10	18 17	18 38	19 04	18 53	19 33	20 12	20 52		
	05	254 02.9	12 59.5	229 00.7	14.5	6 52.0	14.6	56.3	0	18 07	18 29	18 53	18 42	19 27	20 10	20 54		
	06	269 03.0	N12 58.7	243 34.2	14.6	N 6 37.4	14.6	56.3	S 10	17 58	18 19	18 44	18 31	19 20	20 08	20 56		
	07	284 03.2	57.8	258 07.8	14.6	6 22.8	14.7	56.3	20	17 48	18 11	18 37	18 20	19 13	20 05	20 59		
	08	299 03.3	57.0	272 41.4	14.6	6 08.1	14.7	56.4	30	17 37	18 01	18 30	18 06	19 04	20 03	21 01		
	09	314 03.4	56.2	287 15.0	14.7	5 53.4	14.7	56.4	35	17 30	17 56	18 26	17 58	18 59	20 01	21 03		
	10	329 03.6	55.4	301 48.7	14.6	5 38.7	14.8	56.4	40	17 23	17 51	18 23	17 49	18 54	19 59	21 05		
	11	344 03.7	54.6	316 22.3	14.6	5 23.9	14.8	56.4	45	17 15	17 45	18 20	17 38	18 48	19 57	21 07		
	12	359 03.9	N12 53.8	330 55.9	14.6	N 5 09.1	14.8	56.5	S 50	17 05	17 38	18 16	17 25	18 40	19 54	21 10		
	13	14 04.0	53.0	345 29.5	14.7	4 54.3	14.9	56.5	52	17 00	17 35	18 15	17 19	18 36	19 53	21 11		
	14	29 04.2	52.2	0 03.2	14.6	4 39.4	14.9	56.5	54	16 55	17 32	18 14	17 13	18 32	19 52	21 12		
	15	44 04.3	51.3	14 36.8	14.6	4 24.5	14.9	56.5	56	16 49	17 28	18 12	17 05	18 28	19 50	21 13		
	16	59 04.4	50.5	29 10.4	14.6	4 09.6	15.0	56.5	58	16 43	17 24	18 11	16 56	18 23	19 49	21 15		
	17	74 04.6	49.7	43 44.0	14.7	3 54.6	14.9	56.6	S 60	16 36	17 20	18 09	16 47	18 17	19 47	21 17		
	18	89 04.7	N12 48.9	58 17.7	14.6	N 3 29.7	15.1	56.6			SUN		MOON					
	19	104 04.9	48.1	72 51.3	14.6	3 24.6	15.0	56.6	Day		Eqn. of Time		Mer.		Mer. Pass.		Age	Phase
	20	119 05.0	47.3	87 24.9	14.6	3 09.6	15.0	56.6		</								



## AUGUST 22, 23, 24 (SUN., MON., TUES.)

UT	ARIES	VENUS -4.3	MARS +1.8	JUPITER -1.7	SATURN +0.2	STARS
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name SHA Dec
2200	330 38.3	226 13.4 N19 52.2	171 11.4 N 9 48.4	156 53.4 N 3 53.1	216 33.2 N21 23.2	Acamar 315 23.4 S40 16.8
01	345 40.7	241 13.2 52.1	186 12.4 47.8	171 59.4 52.9	231 35.4 23.1	Achernar 335 31.3 S57 12.5
02	0 43.2	256 13.1 52.1	201 13.3 47.2	186 57.4 52.7	246 37.6 23.1	Acruz 173 18.0 S63 07.6
03	15 45.7	271 12.9 52.0	216 14.3 46.6	201 59.4 52.5	261 39.7 23.0	Adhara 255 18.3 S28 58.4
04	30 48.1	286 12.7 52.0	231 15.3 46.0	217 01.4 52.3	276 41.9 23.0	Aldebaran 290 57.4 N16 31.2
05	45 50.6	301 12.6 51.9	246 16.3 45.4	232 03.4 52.1	291 44.1 22.9	
06	60 53.1	316 12.4 N19 51.8	261 17.2 N 9 44.8	247 05.4 N 3 51.9	306 46.2 N21 22.9	Alioth 166 26.9 N55 56.4
07	75 55.5	331 12.2 51.8	276 18.2 44.2	262 07.4 51.7	321 48.4 22.9	Alkaid 153 04.4 N49 17.7
08	90 58.0	346 12.1 51.7	291 19.2 43.5	277 09.3 51.5	336 50.6 22.8	Al Na'ir 27 51.7 S46 56.3
09	106 00.4	1 11.9 51.7	306 20.1 42.9	292 11.3 51.3	351 52.7 22.8	Alnilam 275 53.5 S 1 11.7
10	121 02.9	16 11.7 51.6	321 21.1 42.3	307 13.3 51.1	6 54.9 22.7	Alphard 218 03.2 S 8 40.5
11	136 05.4	31 11.5 51.5	336 22.1 41.7	322 15.3 50.9	21 57.1 22.7	
12	151 07.8	46 11.4 N19 51.5	351 23.1 N 9 41.1	337 17.3 N 3 50.6	36 59.2 N21 22.7	Alphecca 126 16.8 N26 42.1
13	166 10.3	61 11.2 51.4	6 24.0 40.5	352 19.3 50.4	52 01.4 22.6	Alpheratz 357 50.5 N29 06.9
14	181 12.8	76 11.0 51.3	21 25.0 39.9	7 21.3 50.2	67 03.6 22.6	Altair 62 14.7 N 8 52.9
15	196 15.2	91 10.9 51.3	36 26.0 39.3	22 23.3 50.0	82 05.7 22.5	Ankaa 353 22.0 S42 16.7
16	211 17.7	106 10.7 51.2	51 26.9 38.7	37 25.3 49.8	97 07.9 22.5	Antares 112 34.7 S26 26.6
17	226 20.2	121 10.5 51.1	66 27.9 38.1	52 27.3 49.6	112 10.1 22.4	
18	241 22.6	136 10.3 N19 51.1	81 28.9 N 9 37.5	67 29.2 N 3 49.4	127 12.2 N21 22.4	Arcturus 146 02.1 N19 09.7
19	256 25.1	151 10.1 51.0	96 29.9 36.9	82 31.2 49.2	142 14.4 22.4	Atria 107 42.8 S69 02.5
20	271 27.5	166 10.0 50.9	111 30.8 36.3	97 33.2 49.0	157 16.6 22.3	Avior 234 21.6 S59 31.2
21	286 30.0	181 09.8 50.9	126 31.8 35.7	112 35.2 48.8	172 18.7 22.3	Bellatrix 278 39.6 N 6 21.4
22	301 32.5	196 09.6 50.8	141 32.8 35.1	127 37.2 48.6	187 20.9 22.2	Betelgeuse 271 09.0 N 7 24.7
23	316 34.9	211 09.4 50.7	156 33.8 34.5	142 39.2 48.4	202 23.1 22.2	
2300	331 37.4	226 09.3 N19 50.7	171 34.7 N 9 33.9	157 41.2 N 3 48.2	217 25.2 N21 22.1	Canopus 263 59.6 S52 41.5
01	346 39.9	241 09.1 50.6	186 35.7 33.3	172 43.2 48.0	232 27.4 22.1	Capella 280 44.9 N46 00.1
02	1 42.3	256 08.9 50.5	201 36.7 32.7	187 45.2 47.8	247 29.6 22.1	Deneb 49 35.9 N45 17.8
03	16 44.8	271 08.7 50.4	216 37.7 32.1	202 47.1 47.6	262 31.7 22.0	Denebola 182 41.0 N14 33.0
04	31 47.3	286 08.5 50.4	231 38.6 31.5	217 49.1 47.4	277 33.9 22.0	Diphda 349 02.5 S17 57.5
05	46 49.7	301 08.3 50.3	246 39.6 30.9	232 51.1 47.1	292 36.1 21.9	
06	61 52.2	316 08.2 N19 50.2	261 40.6 N 9 30.3	247 53.1 N 3 46.9	307 38.2 N21 21.9	Dubhe 194 00.4 N61 43.8
07	76 54.7	331 08.0 50.1	276 41.5 29.7	262 55.1 46.7	322 40.4 21.8	Elnath 278 21.5 N28 36.7
08	91 57.1	346 07.8 50.1	291 42.5 29.1	277 57.1 46.5	337 42.6 21.8	Eltanin 90 49.1 N51 29.5
09	106 59.6	1 07.6 50.0	306 43.5 28.5	292 59.1 46.3	352 44.7 21.8	Enif 33 53.6 N 9 53.8
10	122 02.0	16 07.4 49.9	321 44.5 27.9	308 01.1 46.1	7 46.9 21.7	Fomalhaut 15 31.1 S29 35.8
11	137 04.5	31 07.2 49.8	336 45.4 27.3	323 03.0 45.9	22 49.1 21.7	
12	152 07.0	46 07.1 N19 49.7	351 46.4 N 9 26.7	338 05.0 N 3 45.7	37 51.2 N21 21.6	Gacrux 172 09.4 S57 08.4
13	167 09.4	61 06.9 49.7	6 47.4 26.1	353 07.0 45.5	52 53.4 21.6	Gienah 175 59.8 S17 34.0
14	182 11.9	76 06.7 49.6	21 48.4 25.4	8 09.0 45.3	67 55.6 21.5	Hadar 148 58.4 S60 23.9
15	197 14.4	91 06.5 49.5	36 49.3 24.8	23 11.0 45.1	82 57.7 21.5	Hamal 328 08.5 N23 29.1
16	212 16.8	106 06.3 49.4	51 50.3 24.2	38 13.0 44.9	97 59.9 21.5	Kaus Aust. 83 52.7 S34 23.1
17	227 19.3	121 06.1 49.3	66 51.3 23.6	53 15.0 44.7	113 02.1 21.4	
18	242 21.8	136 05.9 N19 49.2	81 52.3 N 9 23.0	68 17.0 N 3 44.5	128 04.2 N21 21.4	Kochab 137 19.6 N74 08.5
19	257 24.2	151 05.7 49.1	96 53.2 22.4	83 19.0 44.3	143 06.4 21.3	Markab 13 45.0 N15 13.8
20	272 26.7	166 05.5 49.1	111 54.2 21.8	98 20.9 44.0	158 08.6 21.3	Menkar 314 22.2 N 4 06.6
21	287 29.2	181 05.3 49.0	126 55.2 21.2	113 22.9 43.8	173 10.8 21.2	Menkent 148 16.1 S36 23.6
22	302 31.6	196 05.1 48.9	141 56.2 20.6	128 24.9 43.6	188 12.9 21.2	Miaplacidus 221 42.5 S69 44.0
23	317 34.1	211 04.9 48.8	156 57.1 20.0	143 26.9 43.4	203 15.1 21.2	
2400	332 36.5	226 04.7 N19 48.7	171 58.1 N 9 19.4	158 28.9 N 3 43.2	218 17.3 N21 21.1	Mirak 308 50.4 N49 52.5
01	347 39.0	241 04.6 48.6	186 59.1 18.8	173 30.9 43.0	233 19.4 21.1	Nunki 76 06.6 S26 17.6
02	2 41.5	256 04.4 48.5	202 00.1 18.2	188 32.9 42.8	248 21.6 21.0	Peacock 53 29.4 S56 43.4
03	17 43.9	271 04.2 48.4	217 01.0 17.6	203 34.9 42.6	263 23.8 21.0	Pollux 243 36.4 N28 01.0
04	32 46.4	286 04.0 48.3	232 02.0 17.0	218 36.8 42.4	278 25.9 21.0	Procyon 245 07.2 N 5 13.0
05	47 48.9	301 03.8 48.2	247 03.0 16.4	233 38.8 42.2	293 28.1 20.9	
06	62 51.3	316 03.6 N19 48.1	262 04.0 N 9 15.8	248 40.8 N 3 42.0	308 30.3 N21 20.9	Rasalhague 96 12.7 N12 33.5
07	77 53.8	331 03.4 48.1	277 04.9 15.1	263 42.8 41.8	323 32.5 20.8	Regulus 207 51.2 N11 56.9
08	92 56.3	346 03.2 48.0	292 05.9 14.5	278 44.8 41.6	338 34.6 20.8	Rigel 281 18.8 S 8 11.5
09	107 58.7	1 03.0 47.9	307 06.9 13.9	293 46.8 41.4	353 36.8 20.7	Rigel Kent. 140 01.8 S60 51.5
10	123 01.2	16 02.8 47.8	322 07.9 13.3	308 48.8 41.2	8 39.0 20.7	Sabik 102 20.4 S15 43.9
11	138 03.7	31 02.6 47.7	337 08.8 12.7	323 50.7 40.9	23 41.1 20.7	
12	153 06.1	46 02.4 N19 47.6	352 09.8 N 9 12.1	338 52.7 N 3 40.7	38 43.3 N21 20.6	Schedar 349 48.3 N56 33.6
13	168 08.6	61 02.2 47.5	7 10.8 11.5	353 54.7 40.5	53 45.5 20.6	Shaula 96 31.2 S37 06.6
14	183 11.0	76 02.0 47.4	22 11.8 10.9	8 56.7 40.3	68 47.6 20.5	Sirius 258 40.1 S16 43.0
15	198 13.5	91 01.7 47.3	37 12.7 10.3	23 58.7 40.1	83 49.8 20.5	Spica 158 38.8 S11 11.0
16	213 16.0	106 01.5 47.2	52 13.7 09.7	39 00.7 39.9	98 52.0 20.4	Suhail 222 58.1 S43 26.8
17	228 18.4	121 01.3 47.1	67 14.7 09.1	54 02.7 39.7	113 54.2 20.4	
18	243 20.9	136 01.1 N19 46.9	82 15.7 N 9 08.5	69 04.7 N 3 39.5	128 56.3 N21 20.4	Vega 80 43.4 N38 47.4
19	258 23.4	151 00.9 46.8	97 16.6 07.9	84 06.6 39.3	143 58.5 20.3	Zuben'ubi 137 13.2 S16 03.7
20	273 25.8	166 00.7 46.7	112 17.6 07.3	99 08.6 39.1	159 00.7 20.3	
21	288 28.3	181 00.5 46.6	127 18.6 06.6	114 10.6 38.9	174 02.8 20.2	SHA Mer.Pass.
22	303 30.8	196 00.3 46.5	142 19.6 06.0	129 12.6 38.7	189 05.0 20.2	Venus 254 31.9 8 55
23	318 33.2	211 00.1 46.4	157 20.5 05.4	144 14.6 38.5	204 07.2 20.1	Mars 199 57.3 12 33
						Jupiter 186 03.8 13 27
						Saturn 245 47.8 9 29
Mer.Pass.	h m	u -0.2 d 0.1	u 1.0 d 0.6	u 2.0 d 0.2	u 2.2 d 0.0	



## AUGUST 22, 23, 24 (SUN., MON., TUES.)

UT	SUN				MOON							Lat.	Twilight		Sunrise	Moonrise					
	GHA		Dec		GHA	<i>u</i>	Dec	<i>d</i>	HP	Naut.	Civil		22	23		24	25				
	<i>d</i>	<i>h</i>	<i>m</i>	<i>s</i>	<i>m</i>	<i>s</i>	<i>m</i>	<i>s</i>	<i>m</i>	<i>s</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>				
22	00	179	16.5	N 11	44.3	132	18.7	10.8	S 15	40.4	13.4	58.3	N 72	01 04	03 16	15 58	14 56	14 22	17 29	17 44	19 47
	01	194	16.6		43.5	126	48.5	10.6	15	53.8	13.4	58.3	N 70	02 03	03 37	15 58	14 56	14 22	17 29	17 44	19 47
	02	209	16.8		42.6	141	18.1	10.6	16	07.2	13.3	58.3	68	03 01	04 06	14 22	17 29	17 44	19 47	19 47	
	03	224	16.9		41.8	155	47.7	10.5	16	20.5	13.3	58.3	64	04 01	05 17	13 57	16 12	16 12	18 27	18 27	
	04	239	17.1		40.9	170	17.2	10.3	16	33.8	13.1	58.3	62	05 01	06 26	13 38	15 36	15 36	17 44	17 44	
	05	254	17.3		40.1	184	46.5	10.3	16	46.9	13.1	58.4	60	06 01	07 46	13 22	15 10	15 10	16 58	16 58	
	06	269	17.4	N 11	39.2	199	15.8	10.2	S 17	00.0	13.0	58.4	N 58	07 01	08 57	13 09	14 50	14 50	16 29	16 29	
	07	284	17.6		38.4	213	45.0	10.0	17	13.0	12.9	58.4	56	08 01	09 56	12 57	14 33	14 33	16 06	16 06	
	08	299	17.7		37.6	228	14.0	10.0	17	25.9	12.9	58.4	54	09 01	10 56	12 47	14 19	14 19	15 48	15 48	
	09	314	17.9		36.7	242	43.0	9.9	17	38.8	12.7	58.5	52	10 01	11 56	12 39	14 06	14 06	15 32	15 32	
SUNDAY	10	329	18.1		35.9	257	11.9	9.7	17	51.5	12.7	58.5	50	11 01	12 51	12 31	13 55	13 55	15 18	15 18	
	11	344	18.2		35.0	271	40.6	9.7	18	04.2	12.6	58.5	45	12 01	13 51	12 14	13 33	13 33	14 51	14 51	
	12	359	18.4	N 11	34.2	286	09.3	9.5	S 18	16.8	12.4	58.5	N 40	13 01	14 51	12 01	13 15	13 15	14 29	14 29	
	13	374	18.6		33.3	300	37.8	9.5	18	29.2	12.4	58.5	35	14 01	15 50	11 49	13 00	13 00	14 11	14 11	
	14	389	18.7		32.5	315	06.3	9.3	18	41.6	12.3	58.6	30	15 01	16 50	11 39	12 47	12 47	13 56	13 56	
	15	404	18.9		31.6	329	34.6	9.2	18	53.9	12.2	58.6	20	16 01	17 50	11 22	12 25	12 25	13 30	13 30	
	16	419	19.0		30.8	344	02.8	9.2	19	06.1	12.1	58.6	N 10	17 01	18 50	11 07	12 06	12 06	13 08	13 08	
	17	434	19.2		30.0	358	31.0	9.0	19	18.2	12.0	58.6	0	18 01	19 50	10 54	11 48	11 48	12 47	12 47	
	18	449	19.4	N 11	29.1	373	59.0	8.9	S 19	30.2	11.9	58.6	S 10	19 01	20 50	10 40	11 30	11 30	12 26	12 26	
	19	464	19.5		28.3	387	26.9	8.8	19	42.1	11.8	58.7	20	20 01	21 50	10 26	11 12	11 12	12 04	12 04	
MONDAY	20	479	19.7		27.4	401	54.7	8.7	19	53.9	11.7	58.7	30	21 01	22 50	10 09	10 50	10 50	11 39	11 39	
	21	494	19.8		26.6	415	82.4	8.6	20	05.6	11.6	58.7	35	22 01	23 50	09 51	10 38	10 38	11 24	11 24	
	22	509	20.0		25.7	429	110.0	8.4	20	17.2	11.5	58.7	40	23 01	24 50	09 36	10 24	10 24	11 07	11 07	
	23	524	20.2		24.9	443	17.4	8.4	20	28.7	11.4	58.7	45	24 01	25 50	09 21	10 07	10 07	10 46	10 46	
	23 00	179	20.3	N 11	24.0	99	44.8	8.2	S 20	40.1	11.3	58.8	S 50	05 42	06 19	06 52	09 21	09 46	10 20	11 09	11 09
	01	194	20.5		23.2	114	12.0	8.2	20	51.4	11.1	58.8	52	06 42	07 19	06 56	09 14	09 36	10 08	10 55	10 55
	02	209	20.7		22.3	128	39.2	8.0	21	02.5	11.0	58.8	54	07 42	08 19	06 41	08 58	09 06	09 25	09 54	10 38
	03	224	20.8		21.5	143	06.2	7.9	21	13.5	11.0	58.8	56	08 42	09 19	06 26	08 58	09 13	09 37	10 19	10 19
	04	239	21.0		20.6	157	33.1	7.8	21	24.5	10.8	58.8	58	09 42	10 19	06 11	08 37	08 59	09 18	09 54	10 38
	05	254	21.2		19.8	171	59.9	7.7	21	35.3	10.6	58.9	S 60	10 42	11 19	05 56	08 21	08 42	08 53	09 22	09 22
TUESDAY	06	269	21.3	N 11	18.9	186	26.6	7.5	S 21	45.9	10.6	58.9									
	07	284	21.5		18.1	200	53.1	7.5	21	56.5	10.4	58.9									
	08	299	21.7		17.2	215	19.6	7.3	22	06.9	10.4	58.9									
	09	314	21.8		16.4	229	45.9	7.3	22	17.3	10.1	58.9									
	10	329	22.0		15.5	244	12.2	7.1	22	27.4	10.1	59.0									
	11	344	22.2		14.7	258	38.3	7.0	22	37.5	9.9	59.0	N 72	20 45	22 48	17 54	18 57	18 57	19 59	20 22	
	12	359	22.3	N 11	13.8	273	04.3	6.9	S 22	47.4	9.8	59.0	N 70	21 45	23 48	18 57	19 59	19 59	20 22	20 22	
	13	374	22.5		13.0	287	30.2	6.8	22	57.2	9.7	59.0	68	22 45	24 48	19 59	20 22	20 22	20 22	20 22	
	14	389	22.6		12.1	301	56.0	6.7	23	06.9	9.5	59.0	66	23 45	25 48	20 09	20 16	20 16	20 13	20 13	
	15	404	22.8		11.3	316	21.7	6.5	23	16.4	9.4	59.1	64	24 45	26 48	20 09	20 06	20 06	19 59	19 59	
WEDNESDAY	16	419	23.0		10.4	330	47.2	6.5	23	25.8	9.2	59.1	62	25 45	27 48	20 09	20 06	20 06	19 59	19 59	
	17	434	23.1		09.6	345	12.7	6.3	23	35.0	9.2	59.1	60	26 45	28 48	20 09	20 06	20 06	19 59	19 59	
	18	449	23.3	N 11	08.7	359	38.0	6.2	S 23	44.2	8.9	59.1	N 58	27 45	29 48	20 09	20 06	20 06	19 59	19 59	
	19	464	23.5		07.8	373	59.0	6.1	23	53.1	8.8	59.1	56	28 45	30 48	20 09	20 06	20 06	19 59	19 59	
	20	479	23.6		07.0	387	26.9	6.1	24	01.9	8.7	59.2	54	29 45	31 48	20 09	20 06	20 06	19 59	19 59	
	21	494	23.8		06.1	401	54.7	5.9	24	10.6	8.6	59.2	52	30 45	32 48	20 09	20 06	20 06	19 59	19 59	
	22	509	24.0		05.3	415	82.4	5.8	24	19.2	8.3	59.2	50	31 45	33 48	20 09	20 06	20 06	19 59	19 59	
	23	524	24.2		04.4	429	110.0	5.6	24	27.5	8.3	59.2	45	32 45	34 48	20 09	20 06	20 06	19 59	19 59	
	24 00	179	24.3	N 11	03.6	86	07.7	5.6	S 24	35.8	8.0	59.2	N 40	18 45	19 13	19 47	22 04	22 42	23 30	24 30	
	01	194	24.5		02.7	100	32.3	5.5	24	43.8	8.0	59.2	35	19 45	19 56	19 47	22 04	22 42	23 30	24 30	
02	209	24.7		01.9	114	56.8	5.4	24	51.8	7.7	59.3	30	20 45	20 56	19 47	22 04	22 42	23 30	24 30		
03	224	24.8		01.0	129	21.2	5.2	24	59.5	7.6	59.3	20	21 45	21 56	19 47	22 04	22 42	23 30	24 30		
04	239	25.0		00.1	143	45.4	5.2	25	07.1	7.5	59.3	N 10	22 45	22 56	19 47	22 04	22 42	23 30	24 30		
05	254	25.2		00.3	157	09.6	5.1	25	14.6	7.3	59.3	0	23 45	23 56	19 47	22 04	22 42	23 30	24 30		
06	269	25.3	N 10	58.4	172	33.7	4.9	S 25	21.9	7.1	59.3	S 10	24 45	24 56	19 47	22 04	22 42	23 30	24 30		
07	284	25.5		57.6	186	57.6	4.9	25	29.0	7.0	59.4	20	25 45	25 56	19 47	22 04	22 42	23 30	24 30		
08	299	25.7		56.7	201	21.5	4.7	25	36.0	6.8	59.4	30	26 45	26 56	19 47	22 04	22 42	23 30	24 30		
09	314	25.8		55.8	215	45.2	4.7	25	42.8	6.6	59.4	35	27 45	27 56	19 47	22 04	22 42	23 30	24 30		
10	329	26.0		55.0	230	08.9	4.6	25	49.4	6.5	59.4	40	28 45	28 56	19 47	22 04	22 42	23 30	24 30		
11	344	26.2		54.1	244	32.5	4.5	25	55.9	6.3	59.4	45	29 45	29 56	19 47	22 04	22 42	23 30	24 30		
12	359	26.4	N 10	53.3	258	56.0	4.4	S 26	02.2	6.1	59.4	S 50	30 45	30 56	19 47	22 04	22 42	23 30	24 30		
13	374	26.5																			



## SEPTEMBER 15, 16, 17 (WED., THURS., FRI.)

UT	ARIES	VENUS -4.2	MARS +1.7	JUPITER -1.7	SATURN +0.2	STARS		
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name	SHA Dec
15	00 354 17.6	223 21.0 N17 05.8	180 38.6 N 3 47.7	175 52.5 N 1 51.7	237 37.7 N21 00.0	237 37.7 N21 00.0	Acamar	315 23.2 S40 16.9
01	9 20.1	238 20.6 05.3	195 39.6 47.0	190 54.5 51.4	252 40.0 00.0	252 40.0 00.0	Achernar	335 31.1 S57 12.6
02	24 22.5	253 20.2 04.7	210 40.5 46.4	205 56.5 51.2	267 42.2 21 00.0	267 42.2 21 00.0	Acrux	173 18.1 S63 07.5
03	39 25.0	268 19.9 04.2	225 41.5 45.7	220 58.4 51.0	282 44.4 20 59.9	282 44.4 20 59.9	Adhara	255 18.1 S28 58.3
04	54 27.5	283 19.5 03.7	240 42.5 45.1	236 00.4 50.8	297 46.7 59.9	297 46.7 59.9	Aldebaran	290 57.2 N16 31.3
05	69 29.9	298 19.1 03.1	255 43.5 44.5	251 02.4 50.6	312 48.9 59.9	312 48.9 59.9		
06	84 32.4	313 18.7 N17 02.6	270 44.5 N 3 43.8	266 04.3 N 1 50.4	327 51.1 N20 59.8	327 51.1 N20 59.8	Alloth	166 26.9 N55 56.3
07	99 34.8	328 18.4 02.1	285 45.5 43.2	281 06.3 50.2	342 53.3 59.8	342 53.3 59.8	Alkaid	153 04.5 N49 17.6
08	114 37.3	343 18.0 01.5	300 46.5 42.5	296 08.3 49.9	357 55.6 59.8	357 55.6 59.8	Al Na'ir	27 51.7 S46 56.4
09	129 39.8	358 17.6 01.0	315 47.5 41.9	311 10.2 49.7	12 57.8 59.7	12 57.8 59.7	Alnilam	275 53.4 S 1 11.7
10	144 42.2	13 17.2 17 00.4	330 48.5 41.2	326 12.2 49.5	28 00.0 59.7	28 00.0 59.7	Alphard	218 03.1 S 8 40.5
11	159 44.7	28 16.9 16 59.9	345 49.5 40.6	341 14.2 49.3	43 02.3 59.6	43 02.3 59.6		
12	174 47.2	43 16.5 N16 59.4	0 50.5 N 3 39.9	356 16.2 N 1 49.1	58 04.5 N20 59.6	58 04.5 N20 59.6	Alphecca	126 16.9 N26 42.1
13	189 49.6	58 16.1 58.8	15 51.4 39.3	11 18.1 48.9	73 06.7 59.6	73 06.7 59.6	Alpheratz	357 50.4 N29 07.0
14	204 52.1	73 15.7 58.3	30 52.4 38.6	26 20.1 48.7	88 09.0 59.5	88 09.0 59.5	Altair	62 14.8 N 8 52.9
15	219 54.6	88 15.3 57.7	45 53.4 38.0	41 22.1 48.4	103 11.2 59.5	103 11.2 59.5	Ankaa	353 21.9 S42 16.7
16	234 57.0	103 15.0 57.2	60 54.4 37.3	56 24.0 48.2	118 13.4 59.5	118 13.4 59.5	Antares	112 34.9 S26 26.6
17	249 59.5	118 14.6 56.6	75 55.4 36.7	71 26.0 48.0	133 15.7 59.4	133 15.7 59.4		
18	265 01.9	133 14.2 N16 56.1	90 56.4 N 3 36.1	86 28.0 N 1 47.8	148 17.9 N20 59.4	148 17.9 N20 59.4	Arcturus	146 02.2 N19 09.7
19	280 04.4	148 13.8 55.5	105 57.4 35.4	101 29.9 47.6	163 20.1 59.4	163 20.1 59.4	Atria	107 43.1 S69 02.5
20	295 06.9	163 13.5 55.0	120 58.4 34.8	116 31.9 47.4	178 22.4 59.3	178 22.4 59.3	Avior	234 21.4 S59 31.1
21	310 09.3	178 13.1 54.4	135 59.4 34.1	131 33.9 47.2	193 24.6 59.3	193 24.6 59.3	Bellatrix	278 39.4 N 6 21.4
22	325 11.8	193 12.7 53.9	151 00.4 33.5	146 35.8 46.9	208 26.8 59.2	208 26.8 59.2	Betelgeuse	271 08.8 N 7 24.7
23	340 14.3	208 12.3 53.3	166 01.4 32.8	161 37.8 46.7	223 29.1 59.2	223 29.1 59.2		
16	00 355 16.7	223 22.0 N16 52.8	181 02.4 N 3 32.2	176 35.8 N 1 46.5	238 31.3 N20 59.2	238 31.3 N20 59.2	Canopus	263 59.3 S52 41.4
01	10 19.2	238 11.6 52.2	196 03.3 31.5	191 41.7 46.3	253 33.5 59.1	253 33.5 59.1	Capella	280 44.6 N46 00.1
02	25 21.7	253 11.2 51.7	211 04.3 30.9	206 43.7 46.1	268 35.8 59.1	268 35.8 59.1	Deneb	49 36.0 N45 17.9
03	40 24.1	268 10.8 51.1	226 05.3 30.2	221 45.7 45.9	283 38.0 59.1	283 38.0 59.1	Denebola	182 40.9 N14 32.9
04	55 26.6	283 10.4 50.6	241 06.3 29.6	236 47.7 45.7	298 40.2 59.0	298 40.2 59.0	Diphda	349 02.4 S17 57.5
05	70 29.1	298 10.1 50.0	256 07.3 28.9	251 49.6 45.4	313 42.5 59.0	313 42.5 59.0		
06	85 31.5	313 09.7 N16 49.4	271 08.3 N 3 28.3	266 51.6 N 1 45.2	328 44.7 N20 59.0	328 44.7 N20 59.0	Dubhe	194 00.4 N61 43.6
07	100 34.0	328 09.3 48.9	286 09.3 27.6	281 53.6 45.0	343 46.9 58.9	343 46.9 58.9	El Nath	278 21.3 N28 36.8
08	115 36.4	343 08.9 48.3	301 10.3 27.0	296 55.5 44.8	358 49.2 58.9	358 49.2 58.9	Eltanin	90 49.3 N51 29.5
09	130 38.9	358 08.6 47.8	316 11.3 26.3	311 57.5 44.6	13 51.4 58.8	13 51.4 58.8	Enif	33 53.6 N 9 53.8
10	145 41.4	13 08.2 47.2	331 12.3 25.7	326 59.5 44.4	28 53.6 58.8	28 53.6 58.8	Fomalhaut	15 31.1 S29 35.8
11	160 43.8	28 07.8 46.6	346 13.3 25.1	342 01.4 44.2	43 55.9 58.8	43 55.9 58.8		
12	175 46.3	43 07.4 N16 46.1	1 14.3 N 3 24.4	357 03.4 N 1 43.9	58 58.1 N20 58.7	58 58.1 N20 58.7	Gacrux	172 09.5 S57 08.3
13	190 48.8	58 07.0 45.5	16 15.2 23.8	12 05.4 43.7	74 00.3 58.7	74 00.3 58.7	Gienah	175 59.8 S17 33.9
14	205 51.2	73 06.7 44.9	31 16.2 23.1	27 07.3 43.5	89 02.6 58.7	89 02.6 58.7	Hadar	148 58.5 S60 23.8
15	220 53.7	88 06.3 44.4	46 17.2 22.5	42 09.3 43.3	104 04.8 58.6	104 04.8 58.6	Hamal	328 08.3 N23 29.1
16	235 56.2	103 05.9 43.8	61 18.2 21.8	57 11.3 43.1	119 07.0 58.6	119 07.0 58.6	Kaus Aust.	83 52.8 S34 23.1
17	250 58.6	118 05.5 43.2	76 19.2 21.2	72 13.2 42.9	134 09.3 58.6	134 09.3 58.6		
18	266 01.1	133 05.2 N16 42.7	91 20.2 N 3 20.5	87 15.2 N 1 42.7	149 11.5 N20 58.5	149 11.5 N20 58.5	Kochab	137 20.0 N74 08.4
19	281 03.5	148 04.8 42.1	106 21.2 19.9	102 17.2 42.4	164 13.8 58.5	164 13.8 58.5	Markab	13 44.9 N15 13.9
20	296 06.0	163 04.4 41.5	121 22.2 19.2	117 19.1 42.2	179 16.0 58.5	179 16.0 58.5	Menkar	314 22.1 N 4 06.6
21	311 08.5	178 04.0 41.0	136 23.2 18.6	132 23.1 42.0	194 18.2 58.4	194 18.2 58.4	Menkent	148 16.1 S36 23.6
22	326 10.9	193 03.6 40.4	151 24.2 17.9	147 23.1 41.8	209 20.5 58.4	209 20.5 58.4	Mlaplacidus	221 42.3 S69 43.8
23	341 13.4	208 03.3 39.8	166 25.2 17.3	162 25.1 41.6	224 22.7 58.3	224 22.7 58.3		
17	00 356 15.9	223 02.9 N16 39.2	181 26.2 N 3 16.6	177 27.0 N 1 41.4	239 24.9 N20 58.3	239 24.9 N20 58.3	Miraf	308 50.1 N49 52.6
01	11 18.3	238 02.5 38.7	196 27.1 16.0	192 29.0 41.2	254 27.2 58.3	254 27.2 58.3	Nunki	76 06.7 S26 17.6
02	26 20.8	253 02.1 38.1	211 28.1 15.3	207 31.0 40.9	269 29.4 58.2	269 29.4 58.2	Peacock	53 29.5 S56 43.4
03	41 23.3	268 01.8 37.5	226 29.1 14.7	222 32.9 40.7	284 31.6 58.2	284 31.6 58.2	Pollux	243 36.3 N28 01.0
04	56 25.7	283 01.4 36.9	241 30.1 14.0	237 34.9 40.5	299 33.9 58.2	299 33.9 58.2	Procyon	245 07.1 N 5 13.0
05	71 28.2	298 01.0 36.4	256 31.1 13.4	252 36.9 40.3	314 36.1 58.1	314 36.1 58.1		
06	86 30.7	313 00.6 N16 35.8	271 32.1 N 3 12.7	267 38.8 N 1 40.1	329 38.4 N20 58.1	329 38.4 N20 58.1	Rasalhague	96 12.8 N12 33.5
07	101 33.1	328 00.2 35.2	286 33.1 12.1	282 40.8 39.9	344 40.6 58.1	344 40.6 58.1	Regulus	207 51.1 N11 56.9
08	116 35.6	342 59.9 34.6	301 34.1 11.4	297 42.8 39.7	359 42.8 58.0	359 42.8 58.0	Rigel	281 18.6 S 8 11.5
09	131 38.0	357 59.5 34.1	316 35.1 10.8	312 44.7 39.4	14 45.1 58.0	14 45.1 58.0	Rigel Kent.	140 02.0 S60 51.4
10	146 40.5	12 59.1 33.5	331 36.1 10.2	327 46.7 39.2	29 47.3 58.0	29 47.3 58.0	Sabik	102 20.5 S15 43.9
11	161 43.0	27 58.7 32.9	346 37.1 09.5	342 48.7 39.0	44 49.5 57.9	44 49.5 57.9		
12	176 45.4	42 58.3 N16 32.3	1 38.1 N 3 08.9	357 50.6 N 1 38.8	59 51.8 N20 57.9	59 51.8 N20 57.9	Schedar	349 48.2 N56 33.8
13	191 47.9	57 58.0 31.7	16 39.0 08.2	12 52.6 38.6	74 54.0 57.9	74 54.0 57.9	Shaula	96 31.3 S37 06.6
14	206 50.4	72 57.6 31.1	31 40.0 07.6	27 54.6 38.4	89 56.3 57.8	89 56.3 57.8	Sirius	258 39.9 S16 43.0
15	221 52.8	87 57.2 30.6	46 41.0 06.9	42 56.5 38.2	104 58.5 57.8	104 58.5 57.8	Spica	158 38.8 S11 11.0
16	236 55.3	102 56.8 30.0	61 42.0 06.3	57 58.5 37.9	120 00.7 57.7	120 00.7 57.7	Suhail	222 58.0 S43 26.7
17	251 57.8	117 56.4 29.4	76 43.0 05.6	73 00.5 37.7	135 03.0 57.7	135 03.0 57.7		
18	267 00.2	132 56.1 N16 28.8	91 44.0 N 3 05.0	88 02.4 N 1 37.5	150 05.2 N20 57.7	150 05.2 N20 57.7	Vega	80 43.5 N38 47.4
19	282 02.7	147 55.7 28.2	106 45.0 04.3	103 04.4 37.3	165 07.5 57.6	165 07.5 57.6	Zuben'ubi	137 13.3 S16 03.6
20	297 05.1	162 55.3 27.6	121 46.0 03.7	118 06.4 37.1	180 09.7 57.6	180 09.7 57.6		
21	312 07.6	177 54.9 27.0	136 47.0 03.0	133 08.4 36.9	195 11.9 57.6	195 11.9 57.6		
22	327 10.1	192 54.6 26.4	151 48.0 02.4	148 10.3 36.7	210 14.2 57.5	210 14.2 57.5	Venus	227 55.2 h m 9 07
23	342 12.5	207 54.2 25.8	166 49.0 01.7	163 12.3 36.4	225 16.4 57.5	225 16.4 57.5	Mars	185 45.6 h m 11 55
							Jupiter	181 23.0 h m 12 12
							Saturn	243 14.6 h m 8 05
Mer. Pass.	0 18.8	v -0.4 d 0.6	v 1.0 d 0.6	v 2.0 d 0.2	v 2.2 d 0.0			



UT	ARIES	VENUS -4.1	MARS +1.7	JUPITER -1.7	SATURN +0.2	STARS		
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name	SHA Dec
F R I D A Y	24 00 3 09.6	221 59.1 N14 51.5	184 12.7 N 1 27.3	182 57.6 N 1 05.4	245 42.8 N20 52.6	Acamar	315 23.1 S40 16.9	
	01 18 12.3	236 58.8 50.8	199 13.6 26.6	197 59.6 05.2	260 45.0 52.6	Achernar	335 31.0 S57 12.6	
	02 33 14.8	251 58.4 50.1	214 14.6 26.0	213 01.6 04.9	275 47.3 52.6	Acrux	173 18.1 S63 07.4	
	03 48 17.2	266 58.0 49.4	229 15.6 25.3	228 03.5 04.7	290 49.5 52.5	Adhara	255 18.0 S28 58.3	
	04 63 19.7	281 57.6 48.6	244 16.6 24.7	243 05.5 04.5	305 51.8 52.5	Aldebaran	290 57.1 N16 31.3	
	05 78 22.2	296 57.2 47.9	259 17.6 24.0	258 07.5 04.3	320 54.1 52.5			
	06 93 24.6	311 56.9 N14 47.2	274 18.6 N 1 23.4	273 09.4 N 1 04.1	335 56.3 N20 52.4	Alloth	166 26.9 N55 56.2	
	07 108 27.1	326 56.5 46.5	289 19.6 22.7	288 11.4 03.9	350 58.6 52.4	Alkaid	153 04.5 N49 17.6	
	08 123 29.6	341 56.1 45.8	304 20.6 22.1	303 13.4 03.7	6 00.8 52.4	Al Na'ir	27 51.7 S46 56.6	
	09 138 32.0	356 55.7 45.1	319 21.6 21.4	318 15.3 03.4	21 03.1 52.3	Anilam	275 53.3 S 1 11.1	
	10 153 34.5	11 55.4 44.4	334 22.6 20.8	333 17.3 03.2	36 05.4 52.3	Alphard	218 03.1 S 8 40.5	
	11 168 37.0	26 55.0 43.6	349 23.5 20.1	348 19.3 03.0	51 07.6 52.3			
	12 183 39.4	41 54.6 N14 42.9	4 24.5 N 1 19.5	3 21.2 N 1 02.8	66 09.9 N20 52.2	Alphecca	126 17.0 N26 42.1	
	13 198 41.9	56 54.2 42.2	19 25.5 18.8	18 23.2 02.6	81 12.2 52.2	Alpheratz	357 50.4 N29 07.1	
	14 213 44.3	71 53.8 41.5	34 26.5 18.2	33 25.2 02.4	96 14.4 52.2	Altair	62 14.8 N 8 52.9	
	15 228 46.8	86 53.5 40.8	49 27.5 17.5	48 27.2 02.2	111 16.7 52.1	Ankaa	353 21.8 S42 16.8	
	16 243 49.3	101 53.1 40.1	64 28.5 16.8	63 29.1 01.9	126 19.0 52.1	Antares	112 34.9 S26 26.6	
	17 258 51.7	116 52.7 39.3	79 29.5 16.2	78 31.1 01.7	141 21.2 52.1			
	18 273 54.2	131 52.3 N14 38.6	94 30.5 N 1 15.5	93 33.1 N 1 01.5	156 23.5 N20 52.0	Arcturus	146 02.2 N19 09.6	
	19 288 56.7	146 52.0 37.9	109 31.5 14.9	108 35.0 01.3	171 25.7 52.0	Atria	107 43.2 S69 02.5	
	20 303 59.1	161 51.6 37.2	124 32.5 14.2	123 37.0 01.1	186 28.0 52.0	Avior	234 21.4 S59 31.1	
	21 319 01.6	176 51.2 36.4	139 33.4 13.6	138 39.0 00.9	201 30.3 52.0	Bellatrix	278 39.3 N 6 21.4	
	22 334 04.1	191 50.8 35.7	154 34.4 12.9	153 40.9 00.7	216 32.5 51.9	Betelgeuse	271 08.7 N 7 24.7	
	23 349 06.5	206 50.4 35.0	169 35.4 12.3	168 42.9 00.4	231 34.8 51.9			
S A T U R D A Y	25 00 4 09.0	221 50.1 N14 34.3	184 36.4 N 1 11.6	183 44.9 N 1 00.2	246 37.1 N20 51.9	Canopus	263 59.2 S52 41.4	
	01 19 11.4	236 49.7 33.5	199 37.4 11.0	198 46.8 1 00.0	261 39.3 51.8	Capella	280 44.5 N46 00.1	
	02 34 13.9	251 49.3 32.8	214 38.4 10.3	213 48.8 0 59.8	276 41.6 51.8	Deneb	49 36.0 N45 18.0	
	03 49 16.4	266 48.9 32.1	229 39.4 09.7	228 50.8 59.6	291 43.9 51.8	Denebola	182 40.9 N14 32.9	
	04 64 18.8	281 48.6 31.4	244 40.4 09.0	243 52.7 59.4	306 46.1 51.7	Diphda	349 02.4 S17 57.5	
	05 79 21.3	296 48.2 30.6	259 41.4 08.4	258 54.7 59.2	321 48.4 51.7			
	06 94 23.8	311 47.8 N14 29.9	274 42.3 N 1 07.7	273 56.7 N 0 58.9	336 50.7 N20 51.7	Dubhe	194 00.3 N61 43.6	
	07 109 26.2	326 47.4 29.2	289 43.3 07.0	288 58.6 58.7	351 52.9 51.6	Eltnath	278 21.2 N28 36.8	
	08 124 28.7	341 47.1 28.4	304 44.3 06.4	304 00.6 58.5	6 55.2 51.6	Eltanin	90 49.4 N51 29.5	
	09 139 31.2	356 46.7 2						



## OCTOBER 21, 22, 23 (THURS., FRI., SAT.)

UT	ARIES	VENUS -4.0	MARS +1.7	JUPITER -1.7	SATURN +0.1	STARS
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name SHA Dec
21 00	29 46.6	218 09.2 N 4 56.6	194 44.2 S 5 35.6	204 16.7 S 1 10.6	270 43.4 N 20 37.6	Acamar 315 23.0 S 40 17.0
01	44 49.0	233 08.9 55.5	209 45.2 36.3	219 18.7 10.8	285 45.8 37.6	Achernar 335 30.9 S 57 12.7
02	59 51.5	248 08.6 54.4	224 46.1 36.9	234 20.7 11.0	300 48.2 37.6	Acrux 173 18.0 S 63 07.3
03	74 54.0	263 08.2 53.4	239 47.1 37.6	249 22.7 11.2	315 50.6 37.5	Adhara 255 17.8 S 28 58.3
04	89 56.4	278 07.9 52.3	254 48.0 38.2	264 24.7 11.4	330 52.9 37.5	Aldebaran 290 57.0 N 16 31.3
05	104 58.9	293 07.6 51.2	269 49.0 38.9	279 26.6 11.6	345 55.3 37.5	
06	120 01.4	308 07.2 N 4 50.1	284 49.9 S 5 39.5	294 28.6 S 1 11.8	0 57.7 N 20 37.5	Alioth 166 26.9 N 55 56.0
07	135 03.8	323 06.9 49.0	299 50.9 40.1	309 30.6 12.0	16 00.1 37.5	Alkaid 153 04.5 N 49 17.4
08	150 06.3	338 06.6 47.9	314 51.8 40.8	324 32.6 12.2	31 02.4 37.5	Al Na'ir 27 51.8 S 46 56.5
09	165 08.8	353 06.3 46.9	329 52.8 41.4	339 34.6 12.4	46 04.8 37.5	Anilam 275 53.1 S 1 11.7
10	180 11.2	8 05.9 45.8	344 53.7 42.1	354 36.6 12.6	61 07.2 37.5	Alphard 218 02.9 S 8 40.5
11	195 13.7	23 05.6 44.7	359 54.7 42.7	9 38.6 12.8	76 09.6 37.4	
12	210 16.2	38 05.3 N 4 43.6	14 55.6 S 5 43.4	24 40.5 S 1 13.0	91 12.0 N 20 37.4	Alphecca 126 17.0 N 26 42.0
13	225 18.6	53 04.9 42.5	29 56.6 44.0	39 42.5 13.2	106 14.3 37.4	Alpheratz 357 50.4 N 29 07.1
14	240 21.1	68 04.6 41.4	44 57.5 44.7	54 44.5 13.4	121 16.7 37.4	Altair 62 14.9 N 8 52.9
15	255 23.5	83 04.3 40.4	59 58.5 45.3	69 46.5 13.6	136 19.1 37.4	Ankaa 353 21.8 S 42 16.9
16	270 26.0	98 03.9 39.3	74 59.4 45.9	84 48.5 13.8	151 21.5 37.4	Antares 112 35.0 S 26 26.6
17	285 28.5	113 03.6 38.2	90 00.4 46.6	99 50.5 14.1	166 23.8 37.4	
18	300 30.9	128 03.3 N 4 37.1	105 01.3 S 5 47.2	114 52.5 S 1 14.3	181 26.2 N 20 37.4	Arcturus 146 02.2 N 19 09.5
19	315 33.4	143 02.9 36.0	120 02.3 47.9	129 54.4 14.5	196 28.6 37.3	Atria 107 43.5 S 69 02.4
20	330 35.9	158 02.6 34.9	135 03.2 48.5	144 56.4 14.7	211 31.0 37.3	Avior 234 21.0 S 59 31.0
21	345 38.3	173 02.3 33.8	150 04.2 49.2	159 58.4 14.9	226 33.4 37.3	Bellatrix 278 39.1 N 6 21.4
22	0 40.8	188 01.9 32.7	165 05.1 49.8	175 00.4 15.1	241 35.7 37.3	Beteigeuse 271 08.5 N 7 24.7
23	15 43.3	203 01.6 31.6	180 06.1 50.4	190 02.4 15.3	256 38.1 37.3	
22 00	30 45.7	218 01.3 N 4 30.6	195 07.0 S 5 51.1	205 04.4 S 1 15.5	271 40.5 N 20 37.3	Canopus 263 59.0 S 52 41.5
01	45 48.2	233 01.0 29.5	210 08.0 51.7	220 06.4 15.7	286 42.9 37.3	Capella 280 44.2 N 46 00.2
02	60 50.7	248 00.6 28.4	225 08.9 52.4	235 08.4 15.9	301 45.3 37.3	Deneb 49 36.2 N 45 18.0
03	75 53.1	263 00.3 27.3	240 09.9 53.0	250 10.3 16.1	316 47.6 37.2	Denebola 182 40.8 N 14 32.8
04	90 55.6	278 00.0 26.2	255 10.8 53.6	265 12.3 16.3	331 50.0 37.2	Diphda 349 02.3 S 17 57.6
05	105 58.0	293 59.6 25.1	270 11.8 54.3	280 14.3 16.5	346 52.4 37.2	
06	121 00.5	307 59.3 N 4 24.0	285 12.7 S 5 54.9	295 16.3 S 1 16.7	1 54.8 N 20 37.2	Dubhe 194 00.1 N 61 43.4
07	136 03.0	322 59.0 22.9	300 13.7 55.6	310 18.3 16.9	16 57.2 37.2	Einath 278 21.0 N 28 36.8
08	151 05.4	337 58.6 21.8	315 14.6 56.2	325 20.3 17.1	31 59.5 37.2	Eltanin 90 49.6 N 51 29.5
09	166 07.9	352 58.3 20.7	330 15.6 56.9	340 22.3 17.3	47 01.9 37.2	Enif 33 53.7 N 9 53.9
10	181 10.4	7 58.0 19.6	345 16.5 57.5	355 24.3 17.5	62 04.3 37.2	Fomalhaut 15 31.1 S 29 35.9
11	196 12.8	22 57.6 18.6	0 17.5 58.1	10 26.2 17.7	77 06.7 37.2	
12	211 15.3	37 57.3 N 4 17.5	15 18.4 S 5 58.8	25 28.2 S 1 17.9	92 09.1 N 20 37.1	Gacrux 172 09.4 S 57 08.2
13	226 17.8	52 57.0 16.4	30 19.4 59.4	40 30.2 18.1	107 11.4 37.1	Gienah 175 59.7 S 17 33.9
14	241 20.2	67 56.7 15.3	45 20.3 60.1	55 32.2 18.3	122 13.8 37.1	Hadar 148 58.6 S 60 23.7
15	256 22.7	82 56.3 14.2	60 21.2 60.7	70 34.2 18.5	137 16.2 37.1	Hamal 328 08.2 N 23 29.2
16	271 25.1	97 56.0 13.1	75 22.2 61.4	85 36.2 18.7	152 18.6 37.1	Kaus Aust. 83 53.0 S 34 23.1
17	286 27.6	112 55.7 12.0	90 23.1 62.0	100 38.2 18.9	167 21.0 37.1	
18	301 30.1	127 55.3 N 4 10.9	105 24.1 S 6 02.6	115 40.2 S 1 19.1	182 23.4 N 20 37.1	Kochab 137 20.4 N 74 08.2
19	316 32.5	142 55.0 9.8	120 25.0 63.3	130 42.2 19.3	197 25.7 37.1	Markab 13 44.9 N 15 14.0
20	331 35.0	157 54.7 8.7	135 26.0 63.9	145 44.1 19.5	212 28.1 37.1	Menkar 314 21.9 N 4 06.7
21	346 37.5	172 54.3 7.6	150 26.9 64.6	160 46.1 19.7	227 30.5 37.0	Menkent 148 16.2 S 36 23.5
22	1 39.9	187 54.0 6.5	165 27.9 65.2	175 48.1 19.9	242 32.9 37.0	Miaplacidus 221 41.8 S 69 43.8
23	16 42.4	202 53.7 5.4	180 28.8 65.8	190 50.1 20.1	257 35.3 37.0	
23 00	31 44.9	217 53.3 N 4 04.3	195 29.8 S 6 06.5	205 52.1 S 1 20.3	272 37.7 N 20 37.0	Mirafak 308 49.8 N 49 52.7
01	46 47.3	232 53.0 03.2	210 30.7 07.1	220 54.1 20.5	287 40.0 37.0	Nunki 76 06.8 S 26 17.6
02	61 49.8	247 52.7 02.1	225 31.7 07.8	235 56.1 20.7	302 42.4 37.0	Peacock 53 29.7 S 56 43.5
03	76 52.3	262 52.4 01.0	240 32.6 08.4	250 58.1 20.9	317 44.8 37.0	Pollux 243 36.0 N 28 01.0
04	91 54.7	277 52.0 0 59.9	255 33.6 09.1	266 00.0 21.1	332 47.2 37.0	Procyon 245 06.8 N 5 13.0
05	106 57.2	292 51.7 58.8	270 34.5 09.7	281 02.0 21.3	347 49.6 37.0	
06	121 59.6	307 51.4 N 3 57.7	285 35.4 S 6 10.3	296 04.0 S 1 21.5	2 52.0 N 20 36.9	Rasalhague 96 13.0 N 12 33.5
07	137 02.1	322 51.0 56.6	300 36.4 11.0	311 06.0 21.7	17 54.4 36.9	Regulus 207 50.9 N 11 56.8
08	152 04.6	337 50.7 55.5	315 37.3 11.6	326 08.0 21.9	32 56.7 36.9	Rigel 281 18.4 S 8 11.5
09	167 07.0	352 50.4 54.4	330 38.3 12.3	341 10.0 22.1	47 59.1 36.9	Rigel Kent. 140 02.1 S 60 51.3
10	182 09.5	7 50.0 53.3	345 39.2 12.9	356 12.0 22.3	63 01.5 36.9	Sabik 102 20.6 S 15 43.9
11	197 12.0	22 49.7 52.2	0 40.2 13.5	11 14.0 22.5	78 03.9 36.9	
12	212 14.4	37 49.4 N 3 51.1	15 41.1 S 6 14.2	26 16.0 S 1 22.7	93 06.3 N 20 36.9	Schedar 349 48.1 N 56 33.9
13	227 16.9	52 49.0 50.0	30 42.1 14.8	41 17.9 22.9	108 08.7 36.9	Shaula 96 31.4 S 37 06.6
14	242 19.4	67 48.7 48.9	45 43.0 15.5	56 19.9 23.1	123 11.1 36.9	Sirius 258 39.6 S 16 43.0
15	257 21.8	82 48.4 47.8	60 44.0 16.1	71 21.9 23.3	138 13.5 36.8	Spica 158 38.8 S 11 11.0
16	272 24.3	97 48.1 46.7	75 44.9 16.7	86 23.9 23.5	153 15.8 36.8	Suhail 222 57.7 S 43 26.7
17	287 26.8	112 47.7 45.6	90 45.8 17.4	101 25.9 23.7	168 18.2 36.8	
18	302 29.2	127 47.4 N 3 44.5	105 46.8 S 6 18.0	116 27.9 S 1 23.9	183 20.6 N 20 36.8	Vega 80 43.8 N 38 47.4
19	317 31.7	142 47.1 43.4	120 47.7 18.7	131 29.9 24.1	198 23.0 36.8	Zuben'ubi 137 13.3 S 16 03.6
20	332 34.1	157 46.7 42.3	135 48.7 19.3	146 31.9 24.3	213 25.4 36.8	
21	347 36.6	172 46.4 41.2	150 49.6 19.9	161 33.9 24.5	228 27.8 36.8	SHA Mer. Pass.
22	2 39.1	187 46.1 40.1	165 50.6 20.6	176 35.9 24.7	243 30.2 36.8	Venus 187 15.6 9 28
23	17 41.5	202 45.7 39.0	180 51.5 21.2	191 37.8 24.9	258 32.6 36.8	Mars 164 21.3 10 59
						Jupiter 174 18.7 10 18
						Saturn 240 54.8 5 52



## OCTOBER 27, 28, 29 (WED., THURS., FRI.)

UT	ARIES	VENUS -4.0	MARS +1.7	JUPITER -1.7	SATURN +0.1	STARS
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name SHA Dec
27 00	35 41.4	217 21.6 N 2 17.7	197 00.2 S 7 07.7	209 03.3 S 1 39.4	276 27.5 N20 36.1	Acamar 315 22.9 S40 17.0
01	50 43.9	232 21.2 16.6	212 01.1 08.4	224 05.3 39.6	291 29.9 36.1	Achernar 335 30.9 S57 12.8
02	65 46.3	247 20.9 15.5	227 02.0 09.0	239 07.3 39.8	306 32.3 36.1	Acrux 173 18.0 S63 07.3
03	80 48.8	262 20.6 14.3	242 03.0 09.6	254 09.3 40.0	321 34.7 36.1	Adhara 255 17.8 S28 58.3
04	95 51.3	277 20.2 13.2	257 03.9 10.3	269 11.3 40.2	336 37.1 36.1	Aldebaran 290 56.9 N16 31.3
05	110 53.7	292 19.9 12.1	272 04.8 10.9	284 13.3 40.4	351 39.5 36.1	
06	125 56.2	307 19.6 N 2 11.0	287 05.8 S 7 11.6	299 15.3 S 1 40.6	6 41.9 N20 36.1	Alioth 166 26.9 N55 56.0
07	140 58.7	322 19.2 09.8	302 06.7 12.2	314 17.3 40.8	21 44.3 36.1	Alkaid 153 04.5 N49 17.4
08	156 01.1	337 18.9 08.7	317 07.6 12.8	329 19.3 41.0	36 46.7 36.0	Al Na'ir 27 51.8 S46 56.5
09	171 03.6	352 18.6 07.6	332 08.6 13.5	344 21.2 41.2	51 49.1 36.0	Alnilam 275 53.1 S 1 11.7
10	186 06.1	7 18.2 06.5	347 09.5 14.1	359 23.2 41.4	66 51.5 36.0	Alphard 218 02.9 S 8 40.5
11	201 08.5	22 17.9 05.3	2 10.4 14.7	14 25.2 41.6	81 53.9 36.0	
12	216 11.0	37 17.6 N 2 04.2	17 11.4 S 7 15.4	29 27.2 S 1 41.8	96 56.3 N20 36.0	Alphecca 126 17.1 N26 42.0
13	231 13.4	52 17.2 03.1	32 12.3 16.0	44 29.2 42.0	111 58.7 36.0	Alpheratz 357 50.4 N29 07.2
14	246 15.9	67 16.9 02.0	47 13.3 16.6	59 31.2 42.2	127 01.1 36.0	Altair 62 14.9 N 8 52.9
15	261 18.4	82 16.6 2 00.8	62 14.2 17.3	74 33.2 42.4	142 03.5 36.0	Ankaa 353 21.8 S42 16.9
16	276 20.8	97 16.2 1 59.7	77 15.1 17.9	89 35.2 42.6	157 06.0 36.0	Antares 112 35.0 S26 26.6
17	291 23.3	112 15.9 58.6	92 16.1 18.5	104 37.2 42.8	172 08.4 36.0	
18	306 25.8	127 15.6 N 1 57.5	107 17.0 S 7 19.2	119 39.2 S 1 43.0	187 10.8 N20 36.0	Arcturus 146 02.2 N19 09.5
19	321 28.2	142 15.3 56.3	122 17.9 19.8	134 41.2 43.2	202 13.2 36.0	Atria 107 43.5 S69 02.4
20	336 30.7	157 14.9 55.2	137 18.9 20.4	149 43.2 43.4	217 15.6 36.0	Avior 234 21.0 S59 31.0
21	351 33.2	172 14.6 54.1	152 19.8 21.1	164 45.2 43.6	232 18.0 36.0	Bellatrix 278 39.1 N 6 21.4
22	6 35.6	187 14.3 52.9	167 20.7 21.7	179 47.2 43.8	247 20.4 35.9	Betelgeuse 271 08.5 N 7 24.7
23	21 38.1	202 13.9 51.8	182 21.7 22.3	194 49.2 44.0	262 22.8 35.9	
28 00	36 40.5	217 13.6 N 1 50.7	197 22.6 S 7 23.0	209 51.2 S 1 44.2	277 25.2 N20 35.9	Canopus 263 58.9 S52 41.5
01	51 43.0	232 13.3 49.6	212 23.5 23.6	224 53.2 44.4	292 27.6 35.9	Capella 280 44.2 N46 00.2
02	66 45.5	247 12.9 48.4	227 24.5 24.2	239 55.2 44.6	307 30.0 35.9	Deneb 49 36.2 N45 18.0
03	81 47.9	262 12.6 47.3	242 25.4 24.9	254 57.2 44.8	322 32.4 35.9	Denebola 182 40.8 N14 32.8
04	96 50.4	277 12.3 46.2	257 26.3 25.5	269 59.2 45.0	337 34.8 35.9	Diphda 349 02.3 S17 57.6
05	111 52.9	292 11.9 45.0	272 27.3 26.1	285 01.2 45.1	352 37.3 35.9	
06	126 55.3	307 11.6 N 1 43.9	287 28.2 S 7 26.8	300 03.2 S 1 45.3	7 39.7 N20 35.9	Dubhe 194 00.0 N61 43.4
07	141 57.8	322 11.3 42.8	302 29.1 27.4	315 05.2 45.5	22 42.1 35.9	Elnath 278 21.0 N28 36.8
08	157 00.3	337 10.9 41.7	317 30.1 28.0	330 07.2 45.7	37 44.5 35.9	Eltanin 90 49.6 N51 29.4
09	172 02.7	352 10.6 40.5	332 31.0 28.7	345 09.2 45.9	52 46.9 35.9	Enif 33 53.7 N 9 53.9
10	187 05.2	7 10.3 39.4	347 31.9 29.3	0 11.2 46.1	67 49.3 35.9	Fomalhaut 15 31.1 S29 35.9
11	202 07.7	22 09.9 38.3	2 32.9 29.9	15 13.2 46.3	82 51.7 35.9	
12	217 10.1	37 09.6 N 1 37.1	17 33.8 S 7 30.6	30 15.1 S 1 46.5	97 54.1 N20 35.9	Gacrux 172 09.4 S57 08.2
13	232 12.6	52 09.3 36.0	32 34.7 31.2	45 17.1 46.7	112 56.5 35.8	Gienah 175 59.7 S17 33.9
14	247 15.0	67 08.9 34.9	47 35.6 31.8	60 19.1 46.9	127 58.9 35.8	Hadar 148 58.6 S60 23.7
15	262 17.5	82 08.6 33.7	62 36.6 32.4	75 21.1 47.1	143 01.4 35.8	Hamal 328 08.2 N23 29.2
16	277 20.0	97 08.2 32.6	77 37.5 33.1	90 23.1 47.3	158 03.8 35.8	Kaus Aust. 83 53.0 S34 23.1
17	292 22.4	112 07.9 31.5	92 38.4 33.7	105 25.1 47.5	173 06.2 35.8	
18	307 24.9	127 07.6 N 1 30.3	107 39.4 S 7 34.3	120 27.1 S 1 47.7	188 08.6 N20 35.8	Kochab 137 20.4 N74 08.2
19	322 27.4	142 07.2 29.2	122 40.3 35.0	135 29.1 47.9	203 11.0 35.8	Markab 13 45.0 N15 14.0
20	337 29.8	157 06.9 28.1	137 41.2 35.6	150 31.1 48.1	218 13.4 35.8	Menkar 314 21.9 N 4 06.7
21	352 32.3	172 06.6 26.9	152 42.2 36.2	165 33.1 48.3	233 15.8 35.8	Menkent 148 16.2 S36 23.5
22	7 34.8	187 06.2 25.8	167 43.1 36.9	180 35.1 48.5	248 18.2 35.8	Miaplacidus 221 41.7 S69 43.7
23	22 37.2	202 05.9 24.7	182 44.0 37.5	195 37.1 48.7	263 20.7 35.8	
29 00	37 39.7	217 05.6 N 1 23.5	197 45.0 S 7 38.1	210 39.1 S 1 48.9	278 23.1 N20 35.8	Mirfak 308 49.8 N49 52.8
01	52 42.2	232 05.2 22.4	212 45.9 38.8	225 41.1 49.1	293 25.5 35.8	Nunki 76 06.9 S26 17.6
02	67 44.6	247 04.9 21.3	227 46.8 39.4	240 43.1 49.3	308 27.9 35.8	Peacock 53 29.7 S56 43.5
03	82 47.1	262 04.6 20.1	242 47.8 40.0	255 45.1 49.5	323 30.3 35.8	Pollux 243 35.9 N28 00.9
04	97 49.5	277 04.2 19.0	257 48.7 40.7	270 47.1 49.7	338 32.7 35.8	Procyon 245 06.8 N 5 13.0
05	112 52.0	292 03.9 17.9	272 49.6 41.3	285 49.1 49.9	353 35.1 35.8	
06	127 54.5	307 03.6 N 1 16.7	287 50.5 S 7 41.9	300 51.1 S 1 50.0	8 37.5 N20 35.7	Rasalhague 96 13.0 N12 33.4
07	142 56.9	322 03.2 15.6	302 51.5 42.5	315 53.1 50.2	23 40.0 35.7	Regulus 207 50.8 N11 56.8
08	157 59.4	337 02.9 14.5	317 52.4 43.2	330 55.1 50.4	38 42.4 35.7	Rigel 281 18.3 S 8 11.5
09	173 01.9	352 02.6 13.3	332 53.3 43.8	345 57.1 50.6	53 44.8 35.7	Rigel Kent. 140 02.1 S60 51.3
10	188 04.3	7 02.2 12.2	347 54.3 44.4	0 59.1 50.8	68 47.2 35.7	Sabik 102 20.6 S15 43.9
11	203 06.8	22 01.9 11.1	2 55.2 45.1	16 01.1 51.0	83 49.6 35.7	
12	218 09.3	37 01.6 N 1 09.9	17 56.1 S 7 45.7	31 03.1 S 1 51.2	98 52.0 N20 35.7	Schedar 349 48.1 N56 34.0
13	233 11.7	52 01.2 08.8	32 57.0 46.3	46 05.1 51.4	113 54.5 35.7	Shaula 96 31.5 S37 06.6
14	248 14.2	67 00.9 07.7	47 58.0 47.0	61 07.1 51.6	128 56.9 35.7	Sirius 258 39.6 S16 43.0
15	263 16.6	82 00.5 06.5	62 58.9 47.6	76 09.1 51.8	143 59.3 35.7	Spica 158 38.8 S11 11.0
16	278 19.1	97 00.2 05.4	77 59.8 48.2	91 11.1 52.0	159 01.7 35.7	Suhail 222 57.7 S43 26.7
17	293 21.6	111 59.9 04.3	93 00.8 48.9	106 13.1 52.2	174 04.1 35.7	
18	308 24.0	126 59.5 N 1 03.1	108 01.7 S 7 49.5	121 15.1 S 1 52.4	189 06.5 N20 35.7	Vega 80 43.8 N38 47.4
19	323 26.5	141 59.2 02.0	123 02.6 50.1	136 17.1 52.6	204 09.0 35.7	Zuben'ubi 137 13.3 S16 03.6
20	338 29.0	156 58.9 1 00.9	138 03.5 50.7	151 19.1 52.8	219 11.4 35.7	
21	353 31.4	171 58.5 0 59.7	153 04.5 51.4	166 21.1 53.0	234 13.8 35.7	SHA Mer.Pass.
22	8 33.9	186 58.2 58.6	168 05.4 52.0	181 23.1 53.2	249 16.2 35.7	Venus 180 33.0 9 31
23	23 36.4	201 57.9 57.4	183 06.3 52.6	196 25.1 53.4	264 18.6 35.7	Mars 160 42.0 10 50
						Jupiter 173 10.6 9 59
						Saturn 240 44.7 5 29
Mer. Pass. 21 29.8		v -0.3 d 1.1	v 0.9 d 0.6	v 2.0 d 0.2	v 2.4 d 0.0	



## NOVEMBER 8, 9, 10 (MON., TUES., WED.)

UT	ARIES	VENUS -4.0	MARS +1.7	JUPITER -1.7	SATURN +0.1	STARS
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name SHA Dec
8 00	47 31.1	215 42.3 S 3 12.0	201 24.5 S10 07.2	218 41.0 S 2 34.6	288 08.0 N20 35.5	Acamar 315 22.9 S40 17.0
01	62 33.5	230 41.9 13.1	216 25.4 07.8	233 43.0 34.8	303 10.5 35.5	Achernar 335 31.0 S57 12.8
02	77 36.0	245 41.5 14.3	231 26.3 08.4	248 45.0 35.0	318 12.9 35.5	Acruz 173 17.8 S63 07.3
03	92 38.5	260 41.2 15.4	246 27.2 09.0	263 47.0 35.2	333 15.4 35.5	Adhara 255 17.7 S28 58.4
04	107 40.9	275 40.8 16.6	261 28.1 09.6	278 49.0 35.4	348 17.9 35.5	Aldebaran 290 56.9 N16 31.3
05	122 43.4	290 40.4 17.7	276 29.0 10.2	293 51.1 35.6	3 20.3 35.5	
06	137 45.9	305 40.1 S 3 18.9	291 29.9 S10 10.8	308 53.1 S 2 35.7	18 22.8 N20 35.5	Alioth 166 26.8 N55 55.9
07	152 48.3	320 39.7 20.0	306 30.8 11.4	323 55.1 35.9	33 25.3 35.5	Alkaid 153 04.5 N49 17.3
08	167 50.8	335 39.3 21.2	321 31.7 12.0	338 57.1 36.1	48 27.7 35.5	Al Na'ir 27 51.9 S46 56.5
09	182 53.3	350 39.0 22.3	336 32.6 12.6	353 59.1 36.3	63 30.2 35.5	Alnilam 275 53.0 S 1 11.7
10	197 55.7	5 38.6 23.5	351 33.5 13.2	9 01.2 36.5	78 32.6 35.5	Alphard 218 02.8 S 8 40.5
11	212 58.2	20 38.2 24.7	6 34.4 13.8	24 03.2 36.7	93 35.1 35.5	
12	228 00.6	35 37.9 S 3 25.8	21 35.3 S10 14.5	39 05.2 S 2 36.8	108 37.6 N20 35.5	Alphecca 126 17.1 N26 41.9
13	243 03.1	50 37.5 27.0	36 36.2 15.1	54 07.2 37.0	123 40.0 35.5	Alpheratz 357 50.4 N29 07.2
14	258 05.6	65 37.1 28.1	51 37.1 15.7	69 09.2 37.2	138 42.5 35.5	Altair 62 15.0 N 8 52.9
15	273 08.0	80 36.8 29.3	66 38.0 16.3	84 11.3 37.4	153 45.0 35.5	Ankaa 353 21.9 S42 16.9
16	288 10.5	95 36.4 30.4	81 38.9 16.9	99 13.3 37.6	168 47.4 35.5	Antares 112 35.0 S26 26.6
17	303 13.0	110 36.0 31.6	96 39.8 17.5	114 15.3 37.8	183 49.9 35.5	
18	318 15.4	125 35.7 S 3 32.7	111 40.7 S10 18.1	129 17.3 S 2 38.0	198 52.4 N20 35.5	Arcturus 146 02.2 N19 09.5
19	333 17.9	140 35.3 33.9	126 41.6 18.7	144 19.3 38.1	213 54.8 35.5	Atria 107 43.6 S69 02.3
20	348 20.4	155 34.9 35.0	141 42.5 19.3	159 21.3 38.3	228 57.3 35.5	Avior 234 20.8 S59 31.0
21	3 22.8	170 34.6 36.2	156 43.4 19.9	174 23.4 38.5	243 59.8 35.6	Bellatrix 278 39.0 N 6 21.4
22	18 25.3	185 34.2 37.4	171 44.3 20.5	189 25.4 38.7	259 02.2 35.6	Betelgeuse 271 08.4 N 7 24.7
23	33 27.8	200 33.8 38.5	186 45.2 21.1	204 27.4 38.9	274 04.7 35.6	
9 00	48 30.2	215 33.5 S 3 39.7	201 46.1 S10 21.7	219 29.4 S 2 39.1	289 07.2 N20 35.6	Canopus 263 58.8 S52 41.5
01	63 32.7	230 33.1 40.8	216 47.0 22.3	234 31.5 39.2	304 09.6 35.6	Capella 280 44.1 N46 00.2
02	78 35.1	245 32.7 42.0	231 47.9 23.0	249 33.5 39.4	319 12.1 35.6	Deneb 49 36.3 N45 18.0
03	93 37.6	260 32.3 43.1	246 48.7 23.6	264 35.5 39.6	334 14.6 35.6	Denebola 182 40.7 N14 32.8
04	108 40.1	275 32.0 44.3	261 49.6 24.2	279 37.5 39.8	349 17.0 35.6	Diphda 349 02.3 S17 57.6
05	123 42.5	290 31.6 45.4	276 50.5 24.8	294 39.5 40.0	4 19.5 35.6	
06	138 45.0	305 31.2 S 3 46.6	291 51.4 S10 25.4	309 41.6 S 2 40.2	19 22.0 N20 35.6	Dubhe 193 59.9 N61 43.4
07	153 47.5	320 30.9 47.7	306 52.3 26.0	324 43.6 40.3	34 24.4 35.6	El Nath 278 20.9 N28 36.8
08	168 49.9	335 30.5 48.9	321 53.2 26.6	339 45.6 40.5	49 26.9 35.6	Eltanin 90 49.7 N51 29.4
09	183 52.4	350 30.1 50.0	336 54.1 27.2	354 47.6 40.7	64 29.4 35.6	Enif 33 53.8 N 9 53.9
10	198 54.9	5 29.7 51.2	351 55.0 27.8	9 49.6 40.9	79 31.8 35.6	Fomalhaut 15 31.2 S29 36.0
11	213 57.3	20 29.4 52.3	6 55.9 28.4	24 51.7 41.1	94 34.3 35.6	
12	228 59.8	35 29.0 S 3 53.5	21 56.8 S10 29.0	39 53.7 S 2 41.3	109 36.8 N20 35.6	Gacrux 172 09.3 S57 08.1
13	244 02.2	50 28.6 54.7	36 57.7 29.6	54 55.7 41.4	124 39.2 35.6	Gienah 175 59.6 S17 33.9
14	259 04.7	65 28.3 55.8	51 58.6 30.2	69 57.7 41.6	139 41.7 35.6	Hadar 148 58.5 S60 23.6
15	274 07.2	80 27.9 57.0	66 59.5 30.8	84 59.7 41.8	154 44.2 35.6	Hamal 328 08.2 N23 29.2
16	289 09.6	95 27.5 58.1	82 00.4 31.4	100 01.8 42.0	169 46.7 35.6	Kaus Aust. 83 53.1 S34 23.1
17	304 12.1	110 27.1 59.3	97 01.3 32.0	115 03.8 42.2	184 49.1 35.6	
18	319 14.6	125 26.8 S 4 00.4	112 02.1 S10 32.6	130 05.8 S 2 42.4	199 51.6 N20 35.6	Kochab 137 20.4 N74 08.1
19	334 17.0	140 26.4 01.6	127 03.0 33.2	145 07.8 42.5	214 54.1 35.7	Markab 13 45.0 N15 14.0
20	349 19.5	155 26.0 02.7	142 03.9 33.8	160 09.9 42.7	229 56.5 35.7	Menkar 314 21.8 N 4 06.7
21	4 22.0	170 25.6 03.9	157 04.8 34.5	175 11.9 42.9	244 59.0 35.7	Menkent 148 16.1 S36 23.5
22	19 24.4	185 25.3 05.0	172 05.7 35.1	190 13.9 43.1	260 01.5 35.7	Miaplacidus 221 41.5 S69 43.8
23	34 26.9	200 24.9 06.2	187 06.6 35.7	205 15.9 43.3	275 04.0 35.7	
10 00	49 29.4	215 24.5 S 4 07.3	202 07.5 S10 36.3	220 18.0 S 2 43.5	290 06.4 N20 35.7	Mirfak 308 49.7 N49 52.8
01	64 31.8	230 24.2 08.5	217 08.4 36.9	235 20.0 43.6	305 08.9 35.7	Nunki 76 06.9 S26 17.6
02	79 34.3	245 23.8 09.6	232 09.3 37.5	250 22.0 43.8	320 11.4 35.7	Peacock 53 29.8 S56 43.5
03	94 36.7	260 23.4 10.8	247 10.2 38.1	265 24.0 44.0	335 13.8 35.7	Pollux 243 35.8 N28 00.9
04	109 39.2	275 23.0 11.9	262 11.1 38.7	280 26.0 44.2	350 16.3 35.7	Procyon 245 06.7 N 5 12.9
05	124 41.7	290 22.7 13.1	277 11.9 39.3	295 28.1 44.4	5 18.8 35.7	
06	139 44.1	305 22.3 S 4 14.2	292 12.8 S10 39.9	310 30.1 S 2 44.5	20 21.3 N20 35.7	Rasalhague 96 13.0 N12 33.4
07	154 46.6	320 21.9 15.4	307 13.7 40.5	325 32.1 44.7	35 23.7 35.7	Regulus 207 50.8 N11 56.7
08	169 49.1	335 21.5 16.6	322 14.6 41.1	340 34.1 44.9	50 26.2 35.7	Rigel 281 18.3 S 8 11.6
09	184 51.5	350 21.1 17.7	337 15.5 41.7	355 36.2 45.1	65 28.7 35.7	Rigli Kent. 140 02.1 S60 51.2
10	199 54.0	5 20.8 18.9	352 16.4 42.3	10 38.2 45.3	80 31.2 35.7	Sabik 102 20.6 S15 43.9
11	214 56.5	20 20.4 20.0	7 17.3 42.9	25 40.2 45.5	95 33.6 35.7	
12	229 58.9	35 20.0 S 4 21.2	22 18.2 S10 43.5	40 42.2 S 2 45.6	110 36.1 N20 35.7	Schedar 349 48.1 N56 34.0
13	245 01.4	50 19.6 22.3	37 19.1 44.1	55 44.3 45.8	125 38.6 35.8	Shaula 96 31.5 S37 06.6
14	260 03.9	65 19.3 23.5	52 20.0 44.7	70 46.3 46.0	140 41.0 35.8	Sirius 258 39.5 S16 43.1
15	275 06.3	80 18.9 24.6	67 20.8 45.3	85 48.3 46.2	155 43.5 35.8	Spica 158 38.7 S11 11.1
16	290 08.8	95 18.5 25.8	82 21.7 45.9	100 50.3 46.4	170 46.0 35.8	Suhail 222 57.5 S43 26.7
17	305 11.2	110 18.1 26.9	97 22.6 46.5	115 52.4 46.5	185 48.5 35.8	
18	320 13.7	125 17.8 S 4 28.1	112 23.5 S10 47.1	130 54.4 S 2 46.7	200 50.9 N20 35.8	Vega 80 43.9 N38 47.4
19	335 16.2	140 17.4 29.2	127 24.4 47.7	145 56.4 46.9	215 53.4 35.8	Zuben'ubi 137 13.3 S16 03.6
20	350 18.6	155 17.0 30.4	142 25.3 48.3	160 58.4 47.1	230 55.9 35.8	
21	5 21.1	170 16.6 31.5	157 26.2 48.9	176 00.5 47.3	245 58.4 35.8	SHA Mer.Pass.
22	20 23.6	185 16.2 32.7	172 27.1 49.5	191 02.5 47.5	261 00.9 35.8	Venus 167 03.2 9 38
23	35 26.0	200 15.9 33.8	187 27.9 50.1	206 04.5 47.6	276 03.3 35.8	Mars 153 15.8 10 32
	n m					Jupiter 170 59.2 9 21
Mer.Pass. 20 42.6		v -0.4 d 1.2	v 0.9 d 0.6	v 2.0 d 0.2	v 2.5 d 0.0	Saturn 240 36.9 4 43



UT	ARIES	VENUS -4.0	MARS +1.7	JUPITER -1.7	SATURN +0.0	STARS			
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name	SHA	Dec
SUNDAY	14 00	53 25.9	214 47.5 S 5 57.6	203 32.3 S11 33.7	223 32.6 S 3 00.7	294 04.7 N20 36.4	Acamar	315 22.9	S40 17.1
	01	68 28.4	229 47.1 58.7	218 33.2 34.3	238 34.7 00.9	309 07.2 36.4	Achernar	335 31.0	S57 12.8
	02	83 30.8	244 46.7 5 59.8	233 34.1 34.9	253 36.7 01.1	324 09.6 36.4	Acrux	173 17.8	S63 07.3
	03	98 33.3	259 46.3 6 01.0	248 35.0 35.4	268 38.7 01.3	339 12.1 36.4	Adhara	255 17.6	S28 58.4
	04	113 35.8	274 45.9 02.1	263 35.8 36.0	283 40.8 01.4	354 14.6 36.4	Aldebaran	290 56.8	N16 31.3
	05	128 38.2	289 45.5 03.3	278 36.7 36.6	298 42.8 01.6	9 17.1 36.4			
	06	143 40.7	304 45.1 S 6 04.4	293 37.6 S11 37.2	313 44.8 S 3 01.8	24 19.6 N20 36.4	Alioth	166 26.8	N55 55.9
	07	158 43.2	319 44.7 05.6	308 38.5 37.8	328 46.9 02.0	39 22.1 36.4	Alkaid	153 04.5	N49 17.3
	08	173 45.6	334 44.3 06.7	323 39.3 38.4	343 48.9 02.2	54 24.6 36.4	Al Na'ir	27 51.9	S46 56.5
	09	188 48.1	349 43.9 07.8	338 40.2 39.0	358 50.9 02.3	69 27.1 36.4	Alnilam	275 52.9	S 1 11.7
	10	203 50.6	4 43.5 09.0	353 41.1 39.6	13 53.0 02.5	84 29.6 36.4	Alphard	218 02.7	S 8 40.5
	11	218 53.0	19 43.1 10.1	8 42.0 40.2	28 55.0 02.7	99 32.1 36.5			
	12	233 55.5	34 42.7 S 6 11.3	23 42.8 S11 40.8	43 57.0 S 3 02.9	114 34.6 N20 36.5	Alphecca	126 17.0	N26 41.9
	13	248 57.9	49 42.3 12.4	38 43.7 41.4	58 59.1 03.0	129 37.1 36.5	Alpheratz	357 50.4	N29 07.2
	14	264 00.4	64 41.9 13.5	53 44.6 41.9	74 01.1 03.2	144 39.6 36.5	Altair	62 15.0	N 8 52.9
	15	279 02.9	79 41.5 14.7	68 45.5 42.5	89 03.1 03.4	159 42.1 36.5	Antaa	353 21.9	S42 16.9
	16	294 05.3	94 41.1 15.8	83 46.3 43.1	104 05.2 03.6	174 44.6 36.5	Antares	112 35.0	S26 26.6
	17	309 07.8	109 40.7 17.0	98 47.2 43.7	119 07.2 03.7	189 47.0 36.5			
	18	324 10.3	124 40.3 S 6 18.1	113 48.1 S11 44.3	134 09.3 S 3 03.9	204 49.5 N20 36.5	Arcturus	146 02.2	N19 09.4
	19	339 12.7	139 39.9 19.2	128 49.0 44.9	149 11.3 04.1	219 52.0 36.5	Atria	107 43.6	S69 02.3
	20	354 15.2	154 39.5 20.4	143 49.8 45.5	164 13.3 04.3	234 54.5 36.5	Avior	234 20.7	S59 31.1
	21	9 17.7	169 39.1 21.5	158 50.7 46.1	179 15.4 04.4	249 57.0 36.6	Bellatrix	278 39.0	N 6 21.4
	22	24 20.1	184 38.7 22.7	173 51.6 46.7	194 17.4 04.6	264 59.5 36.6	Betelgeuse	271 08.3	N 7 24.6
	23	39 22.6	199 38.3 23.8	188 52.4 47.3	209 19.4 04.8	280 02.0 36.6			
MONDAY	15 00	54 25.1	214 37.9 S 6 24.9	203 53.3 S11 47.8	224 21.5 S 3 05.0	295 04.5 N20 36.6	Canopus	263 58.8	S52 41.6
	01	69 27.5	229 37.5 26.1	218 54.2 48.4	239 23.5 05.1	310 07.0 36.6	Capella	280 44.0	N46 00.2
	02	84 30.0	244 37.1 27.2	233 55.1 49.0	254 25.5 05.3	325 09.5 36.6	Deneb	49 36.3	N45 18.0
	03	99 32.4	259 36.7 28.3	248 55.9 49.6	269 27.6 05.5	340 12.0 36.6	Denebola	182 40.7	N14 32.8
	04	114 34.9	274 36.3 29.5	263 56.8 50.2	284 29.6 05.7	355 14.5 36.6	Diphda	349 02.4	S17 57.6
	05	129 37.4	289 35.9 30.6	278 57.7 50.8	299 31.7 05.9	10 17.0 36.6			
	06	144 39.8	304 35.5 S 6 31.8	293 58.5 S11 51.4	314 33.7 S 3 06.0	25 19.5 N20 36.6	Dubhe	193 59.8	N61 43.3
	07	159 42.3							



## DECEMBER 5, 6, 7 (SUN., MON., TUES.)

UT	ARIES	VENUS -4.0	MARS +1.7	JUPITER -1.8	SATURN -0.1	STARS
	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Name SHA Dec
<b>SUNDAY</b>						
00	74 07.8	210 42.0 \$14 54.3	210 32.3 \$16 12.3	240 54.0 \$ 4 21.9	315 25.4 N20 45.5	Acamar 315 22.9 S40 17.2
01	89 10.3	225 41.4 55.2	225 33.1 12.8	255 56.1 22.0	330 27.9 45.6	Achernar 335 31.1 S57 12.9
02	104 12.8	240 40.8 56.2	240 33.9 13.3	270 58.2 22.2	345 30.5 45.6	Acrux 173 17.5 S63 07.2
03	119 15.2	255 40.2 57.1	255 34.7 13.9	286 00.3 22.3	0 33.1 45.6	Adhara 255 17.5 S28 58.5
04	134 17.7	270 39.6 58.1	270 35.4 14.4	301 02.4 22.4	15 35.7 45.7	Aldebaran 290 56.8 N16 31.3
05	149 20.2	285 39.0 14 59.0	285 36.2 14.9	316 04.5 22.6	30 38.3 45.7	
06	164 22.6	300 38.4 \$15 00.0	300 37.0 \$16 15.4	331 06.6 \$ 4 22.7	45 40.9 N20 45.7	Alloth 166 26.5 N55 55.8
07	179 25.1	315 37.8 00.9	315 37.8 15.9	346 08.7 22.9	60 43.5 45.7	Alkaid 153 04.3 N49 17.2
08	194 27.6	330 37.2 01.8	330 38.6 16.4	1 10.8 23.0	75 46.1 45.8	Al Na'ir 27 52.0 S46 56.5
09	209 30.0	345 36.6 02.8	345 39.4 16.9	16 12.9 23.2	90 48.7 45.8	Alnilam 275 52.8 S 1 11.8
10	224 32.5	0 36.0 03.7	0 40.1 17.4	31 15.0 23.3	105 51.2 45.8	Alphard 218 02.6 S 8 40.6
11	239 34.9	15 35.4 04.7	15 40.9 17.9	46 17.1 23.4	120 53.8 45.8	
12	254 37.4	30 34.8 \$15 05.6	30 41.7 \$16 18.4	61 19.3 \$ 4 23.6	135 56.4 N20 45.9	Alphecca 126 17.0 N26 41.8
13	269 39.9	45 34.2 06.5	45 42.5 18.9	76 21.4 23.7	150 59.0 45.9	Alpheratz 357 50.5 N29 07.2
14	284 42.3	60 33.6 07.5	60 43.3 19.4	91 23.5 23.9	166 01.6 45.9	Altair 62 15.0 N 8 52.8
15	299 44.8	75 33.0 08.4	75 44.1 19.9	106 25.6 24.0	181 04.2 46.0	Ankaa 353 22.0 S42 17.0
16	314 47.3	90 32.4 09.4	90 44.9 20.4	121 27.7 24.1	196 06.8 46.0	Antares 112 34.9 S26 26.6
17	329 49.7	105 31.8 10.3	105 45.6 20.9	136 29.8 24.3	211 09.4 46.0	
18	344 52.2	120 31.2 \$15 11.2	120 46.4 \$16 21.4	151 31.9 \$ 4 24.4	226 12.0 N20 46.0	Arcturus 146 02.1 N19 09.4
19	359 54.7	135 30.6 12.2	135 47.2 21.9	166 34.0 24.6	241 14.6 46.1	Atria 107 43.5 S69 02.2
20	14 57.1	150 30.0 13.1	150 48.0 22.4	181 36.1 24.7	256 17.1 46.1	Avior 234 20.5 S59 31.2
21	29 59.6	165 29.4 14.0	165 48.8 23.0	196 38.2 24.9	271 19.7 46.1	Bellatrix 278 38.9 N 6 21.4
22	45 02.1	180 28.8 15.0	180 49.5 23.5	211 40.3 25.0	286 22.3 46.1	Betelgeuse 271 08.2 N 7 24.6
23	60 04.5	195 28.2 15.9	195 50.3 24.0	226 42.4 25.1	301 24.9 46.2	
<b>MONDAY</b>						
00	75 07.0	210 27.6 \$15 16.8	210 51.1 \$16 24.5	241 44.5 \$ 4 25.3	316 27.5 N20 46.2	Canopus 263 58.6 S52 41.7
01	90 09.4	225 26.9 17.8	225 51.9 25.0	256 46.6 25.4	331 30.1 46.2	Capella 280 43.9 N46 00.3
02	105 11.9	240 26.3 18.7	240 52.7 25.5	271 48.8 25.6	346 32.7 46.3	Deneb 49 36.5 N45 18.0
03	120 14.4	255 25.7 19.6	255 53.5 26.0	286 50.9 25.7	1 35.3 46.3	Denebola 182 40.5 N14 32.7
04	135 16.8	270 25.1 20.6	270 54.2 26.5	301 53.0 25.8	16 37.9 46.3	Diphda 349 02.4 S17 57.7
05	150 19.3	285 24.5 21.5	285 55.0 27.0	316 55.1 26.0	31 40.5 46.3	
06	165 21.8	300 23.9 \$15 22.4	300 55.8 \$16 27.5	331 57.2 \$ 4 26.1	46 43.1 N20 46.4	Dubhe 193 59.5 N61 43.3
07	180 24.2	315 23.3 23.4	315 56.6 28.0	346 59.3 26.3	61 45.7 46.4	Elnath 278 20.7 N28 36.8
08	195 26.7	330 22.7 24.3	330 57.4 28.5	2 01.4 26.4	76 48.3 46.4	Eltanin 90 49.8 N51 29.3
09	210 29.2	345 22.1 25.2	345 58.1 29.0	17 03.5 26.5	91 50.9 46.4	Enif 33 53.8 N 9 53.8
10	225 31.6	0 21.4 26.1	0 58.9 29.5	32 05.6 26.7	106 53.4 46.5	Fomalhaut 15 31.3 S29 36.0
11	240 34.1	15 20.8 27.1	15 59.7 30.0	47 07.7 26.8	121 56.0 46.5	
12	255 36.6	30 20.2 \$15 28.0	31 00.5 \$16 30.5	62 09.8 \$ 4 27.0	136 58.6 N20 46.5	Gacrux 172 09.0 S57 08.1
13	270 39.0	45 19.6 28.9	46 01.3 31.0	77 12.0 27.1	152 01.2 46.6	Glenah 175 59.4 S17 34.0
14	285 41.5	60 19.0 29.8	61 02.0 31.5	92 14.1 27.2	167 03.8 46.6	Hadar 148 58.2 S60 23.6
15	300 43.9	75 18.4 30.8	76 02.8 32.0	107 16.2 27.4	182 06.4 46.6	Hamal 328 08.1 N23 29.3
16	315 46.4	90 17.7 31.7	91 03.6 32.5	122 18.3 27.5	197 09.0 46.6	Kaus Aust. 83 53.1 S34 23.1
17	330 48.9	105 17.1 32.6	106 04.4 33.0	137 20.4 27.7	212 11.6 46.7	
18	345 51.3	120 16.5 \$15 33.5	121 05.2 \$16 33.5	152 22.5 \$ 4 27.6	227 14.2 N20 46.7	Kochab 137 20.3 N74 07.9
19	0 53.8	135 15.9 34.4	136 05.9 34.0	167 24.6 27.9	242 16.8 46.7	Markab 13 45.1 N15 13.9
20	15 56.3	150 15.3 35.4	151 06.7 34.5	182 26.7 28.1	257 19.4 46.8	Menkar 314 21.8 N 4 06.6
21	30 58.7	165 14.6 36.3	166 07.5 35.0	197 28.8 28.2	272 22.0 46.8	Menkent 148 15.9 S36 23.5
22	46 01.2	180 14.0 37.2	181 08.3 35.5	212 31.0 28.4	287 24.6 46.8	Miaplacidus 221 41.0 S69 43.8
23	61 03.7	195 13.4 38.1	196 09.0 36.0	227 33.1 28.5	302 27.2 46.8	
<b>TUESDAY</b>						
00	76 06.1	210 12.8 \$15 39.0	211 09.8 \$16 36.5	242 35.2 \$ 4 28.6	317 29.8 N20 46.9	Mirfak 308 49.7 N49 52.9
01	91 08.6	225 12.2 39.9	226 10.6 37.0	257 37.3 28.8	332 32.4 46.9	Nunki 76 06.9 S26 17.6
02	106 11.0	240 11.5 40.9	241 11.4 37.5	272 39.4 28.9	347 35.0 46.9	Peacock 53 30.0 S56 43.5
03	121 13.5	255 10.9 41.8	256 12.1 38.0	287 41.5 29.0	2 37.6 47.0	Pollux 243 35.6 N28 00.9
04	136 16.0	270 10.3 42.7	271 12.9 38.5	302 43.6 29.2	17 40.2 47.0	Procyon 245 06.5 N 5 12.9
05	151 18.4	285 09.7 43.6	286 13.7 39.0	317 45.7 29.3	32 42.8 47.0	
06	166 20.9	300 09.0 \$15 44.5	301 14.5 \$16 39.5	332 47.9 \$ 4 29.5	47 45.4 N20 47.0	Rasalhague 96 13.0 N12 33.3
07	181 23.4	315 08.4 45.4	316 15.3 40.0	347 50.0 29.6	62 48.0 47.1	Regulus 207 50.5 N11 56.7
08	196 25.8	330 07.8 46.3	331 16.0 40.4	2 52.1 29.7	77 50.6 47.1	Rigel 281 18.2 S 8 11.6
09	211 28.3	345 07.2 47.3	346 16.8 40.9	17 54.2 29.9	92 53.2 47.1	Rigel Kent. 140 01.8 S60 51.1
10	226 30.8	0 06.5 48.2	1 17.6 41.4	32 56.3 30.0	107 55.8 47.2	Sabik 102 20.6 S15 43.9
11	241 33.2	15 05.9 49.1	16 18.4 41.9	47 58.4 30.2	122 58.3 47.2	
12	256 35.7	30 05.3 \$15 50.0	31 19.1 \$16 42.4	63 00.5 \$ 4 30.3	138 00.9 N20 47.2	Schedar 349 48.2 N56 34.1
13	271 38.2	45 04.7 50.9	46 19.9 42.9	78 02.6 30.4	153 03.5 47.2	Shaula 96 31.5 S37 06.5
14	286 40.6	60 04.0 51.8	61 20.7 43.4	93 04.8 30.6	168 06.1 47.3	Sirius 258 39.4 S16 43.2
15	301 43.1	75 03.4 52.7	76 21.4 43.9	108 06.9 30.7	183 08.7 47.3	Spica 158 38.6 S11 11.1
16	316 45.5	90 02.8 53.6	91 22.2 44.4	123 09.0 30.8	198 11.3 47.3	Suhail 222 57.3 S43 26.8
17	331 48.0	105 02.2 54.5	106 23.0 44.9	138 11.1 31.0	213 13.9 47.4	
18	346 50.5	120 01.5 \$15 55.4	121 23.8 \$16 45.4	153 13.2 \$ 4 31.1	228 16.5 N20 47.4	Vega 80 43.9 N38 47.3
19	1 52.9	135 00.9 56.3	136 24.5 45.9	168 15.3 31.3	243 19.1 47.4	Zuben'ubi 137 13.2 S16 03.7
20	16 55.4	150 00.3 57.2	151 25.3 46.4	183 17.5 31.4	258 21.7 47.4	
21	31 57.9	164 59.6 58.1	166 26.1 46.9	198 19.6 31.5	273 24.3 47.5	SHA Mer.Pass.
22	47 00.3	179 59.0 59.0	181 26.9 47.4	213 21.7 31.7	288 26.9 47.5	Venus 135 20.6 h m
23	62 02.8	194 58.4 59.9	196 27.6 47.9	228 23.8 31.8	303 29.5 47.5	Mars 135 44.1 9 56
						Jupiter 166 37.6 7 52
						Saturn 241 20.5 2 54



## DECEMBER 5, 6, 7 (SUN., MON., TUES.)

UT	SUN				MOON				Lat.	Twilight		Sunrise	Moonrise						
	GHA		Dec	GHA	u	Dec	d	HP		Naut.	Civil		5	6	7	8			
	°	'																	
d h	°	'	°	'	°	'	°	'	°	'	h	m	h	m	h	m	h	m	
500	182	21.3	S22	23.0	268	30.4	15.2	N10	20.4	13.7	55.5	N 72	08 04	10 14	■	23 50	25 58	01 58	04 15
01	197	21.1		23.3	283	04.6	15.2		10 06.7	13.7	55.5	68	07 32	08 57	11 13	24 02	00 02	01 53	03 49
02	212	20.8		23.6	297	38.8	15.3		9 53.0	13.8	55.6	66	07 20	08 35	10 05	24 07	00 07	01 51	03 40
03	227	20.6		23.9	312	13.1	15.2		9 39.2	13.8	55.6	64	07 10	08 17	09 30	24 11	00 11	01 49	03 32
04	242	20.3		24.2	326	47.3	15.2		9 25.4	13.9	55.6	62	07 01	08 02	09 05	24 14	00 14	01 47	03 26
05	257	20.0		24.6	341	21.5	15.3		9 11.5	14.0	55.7	60	06 53	07 49	08 45	24 17	00 17	01 46	03 20
06	272	19.8	S22	24.9	355	55.8	15.2	N 8	57.5	14.0	55.7	N 58	06 47	07 38	08 29	24 19	00 19	01 45	03 15
07	287	19.5		25.2	10	30.0	15.3		8 43.5	14.0	55.7	56	06 40	07 29	08 15	24 22	00 22	01 44	03 11
08	302	19.3		25.5	25	04.3	15.2		8 29.5	14.1	55.8	54	06 34	07 20	08 03	24 24	00 24	01 43	03 07
09	317	19.0		25.8	39	38.5	15.3		8 15.4	14.1	55.8	52	06 29	07 12	07 53	24 25	00 25	01 42	03 03
10	332	18.7		26.1	54	12.8	15.3		8 01.3	14.2	55.8	50	06 24	07 05	07 43	24 27	00 27	01 42	03 00
11	347	18.5		26.4	68	47.1	15.2		7 47.1	14.3	55.9	45	06 13	06 50	07 24	24 31	00 31	01 40	02 53
12	2 18.2	S22	26.7		83	21.3	15.3	N 7	32.8	14.3	55.9	N 40	06 04	06 37	07 08	24 34	00 34	01 39	02 47
13	17	18.0		27.0	97	55.6	15.2		7 18.5	14.3	55.9	35	05 55	06 26	06 54	24 36	00 36	01 38	02 42
14	32	17.7		27.3	112	29.8	15.3		7 04.2	14.4	55.9	30	05 46	06 16	06 42	24 38	00 38	01 37	02 38
15	47	17.4		27.6	127	04.1	15.2		6 49.8	14.4	56.0	20	05 31	05 58	06 22	24 42	00 42	01 35	02 30
16	62	17.2		27.9	141	38.3	15.3		6 35.4	14.4	56.0	N 10	05 15	05 42	06 04	24 46	00 46	01 34	02 24
17	77	16.9		28.2	156	12.6	15.2		6 21.0	14.5	56.0	0	04 59	05 25	05 47	00 07	00 49	01 32	02 18
18	92	16.6	S22	28.5	170	46.8	15.2	N 6	06.5	14.6	56.1	S 10	04 41	05 08	05 31	00 14	00 52	01 31	02 12
19	107	16.4		28.8	185	21.0	15.2		5 51.9	14.6	56.1	20	04 19	04 48	05 12	00 22	00 56	01 30	02 05
20	122	16.1		29.2	199	55.2	15.2		5 37.3	14.6	56.1	30	03 51	04 24	04 51	00 31	01 00	01 28	01 58
21	137	15.8		29.5	214	29.4	15.2		5 22.7	14.7	56.2	35	03 33	04 10	04 39	00 37	01 02	01 27	01 54
22	152	15.6		29.8	229	03.6	15.2		5 08.0	14.7	56.2	40	03 11	03 52	04 25	00 42	01 04	01 26	01 50
23	167	15.3		30.0	243	37.8	15.2		4 53.3	14.7	56.2	45	02 43	03 31	04 07	00 49	01 07	01 25	01 44
600	182	15.1	S22	30.3	258	12.0	15.1	N 4	38.6	14.8	56.3	S 50	02 01	03 03	03 46	00 57	01 11	01 24	01 38
01	197	14.8		30.6	272	46.1	15.2		4 23.8	14.8	56.3	52	01 36	02 49	03 36	01 01	01 12	01 23	01 35
02	212	14.5		30.9	287	20.3	15.1		4 09.0	14.9	56.3	54	01 01	02 32	03 24	01 05	01 14	01 23	01 32
03	227	14.3		31.2	301	54.4	15.1		3 54.1	14.9	56.4	56	///	02 12	03 11	01 10	01 16	01 22	01 29
04	242	14.0		31.5	316	28.5	15.0		3 39.2	14.9	56.4	58	///	01 46	02 55	01 15	01 18	01 21	01 25
05	257	13.7		31.8	331	02.5	15.1		3 24.3	15.0	56.5	S 60	///	01 08	02 37	01 21	01 20	01 20	01 20
06	272	13.5	S22	32.1	345	36.6	15.0	N 3	09.3	14.9	56.5								
07	287	13.2		32.4	0	10.6	15.0		2 54.4	15.1	56.5	Lat.	Sunset						
08	302	12.9		32.7	14	44.6	15.0		2 39.3	15.0	56.6			Civil	Naut.				
09	317	12.7		33.0	29	18.6	14.9		2 24.3	15.1	56.6					5	6	7	8
10	332	12.4		33.3	43	52.5	14.9		2 09.2	15.1	56.6					h	m	h	m
11	347	12.1		33.6	58	26.4	14.9		1 54.1	15.1	56.7	N 72	■	13 28	15 37	13 58	13 25	12 51	12 11
12	2 11.9	S22	33.9		73	00.3	14.9	N 1	39.0	15.2	56.7	N 70	■	14 14	15 55	13 49	13 23	12 58	12 28
13	17	11.6		34.2	87	34.2	14.8		1 23.8	15.2	56.7	68	12 29	14 45	16 10	13 41	13 22	13 03	12 42
14	32	11.3		34.4	102	08.0	14.8		1 08.6	15.2	56.8	66	13 37	15 07	16 22	13 34	13 21	13 08	12 53
15	47	11.1		34.7	116	41.8	14.8		0 53.4	15.3	56.8	64	14 12	15 25	16 32	13 28	13 20	13 12	13 03
16	62	10.8		35.0	131	15.6	14.7		0 38.1	15.2	56.9	62	14 37	15 40	16 41	13 23	13 19	13 15	13 11
17	77	10.5		35.3	145	49.3	14.7		0 22.9	15.3	56.9	60	14 57	15 53	16 49	13 19	13 18	13 18	13 17
18	92	10.3	S22	35.6	160	23.0	14.6	N 0	07.6	15.3	56.9	N 58	15 13	16 04	16 56	13 15	13 18	13 21	13 25
19	107	10.0		35.9	174	56.6	14.6	S 0	07.7	15.4	57.0	56	15 27	16 13	17 02	13 11	13 17	13 23	13 30
20	122	09.7		36.1	189	30.2	14.6		0 23.1	15.3	57.0	54	15 39	16 22	17 08	13 08	13 17	13 25	13 35
21	137	09.5		36.4	204	03.8	14.5		0 38.4	15.4	57.0	52	15 49	16 30	17 13	13 05	13 16	13 27	13 40
22	152	09.2		36.7	218	37.3	14.4		0 53.8	15.4	57.1	50	15 59	16 37	17 18	13 03	13 16	13 29	13 44
23	167	08.9		37.0	233	10.7	14.5		1 09.2	15.4	57.1	45	16 19	16 52	17 29	12 57	13 15	13 33	13 53
700	182	08.6	S22	37.3	247	44.2	14.3	S 1	24.6	15.4	57.2	N 40	16 35	17 05	17 39	12 52	13 14	13 36	14 01
01	197	08.4		37.5	262	17.5	14.4		1 40.0	15.4	57.2	35	16 48	17 16	17 48	12 48	13 13	13 39	14 07
02	212	08.1		37.8	276	50.9	14.2		1 55.4	15.5	57.2	30	17 00	17 26	17 56	12 44	13 13	13 42	14 13
03	227	07.8		38.1	291	24.1	14.3		2 10.9	15.4	57.3	20	17 20	17 44	18 12	12 38	13 12	13 46	14 23
04	242	07.6		38.4	305	57.4	14.1		2 26.3	15.5	57.3	N 10	17 38	18 01	18 27	12 32	13 10	13 50	14 32
05	257	07.3		38.7	320	30.5	14.1		2 41.8	15.5	57.4	0	17 55	18 17	18 43	12 27	13 10	13 54	14 40
06	272	07.0	S22	38.9	335	03.6	14.1	S 2	57.3	15.5	57.4	S 10	18 12	18 35	19 02	12 21	13 09	13 57	14 49
07	287	06.8		39.2	349	36.7	14.0		3 12.8	15.5	57.4	20	18 30	18 54	19 23	12 16	13 07	14 01	14 58
08	302	06.5		39.5	4 09.7	13.9			3 28.3	15.5	57.5	30	18 51	19 18	19 51	12 09	13 06	14 05	15 08
09	317	06.2		39.8	18 42.6	13.9			3 43.8	15.5	57.5	35	19 04	19 33	20 09	12 05	13 05	14 08	15 14
10	332	05.9		40.0	33 15.5	13.8			3 59.3	15.5	57.6	40	19 18	19 51	20 32	12 00	13 05	14 11	15 21
11	347	05.7		40.3	47 48.3	13.8			4 14.8	15.5	57.6	45	19 35	20 12	21 01	11 55	13 04	14 14	15 29
12	2 05.4	S22	40.6		62	21.1	13.7	S 4	30.3	15.6	57.6	S 50	19 57	20 40	21 43	11 49	13 02	14 18	15 38
13	17	05.1		40.8	76	53.8	13.6		4 45.9	15.5	57.7	52	20 07	20 55	22 07	11 46	13 02	14 20	15 43
14	32	04.8		41.1	91														



## DECEMBER 23, 24, 25 (THURS., FRI., SAT.)

UT	SUN				MOON						Lat.	Twilight		Sunrise	Moonrise			
	GHA		Dec		GHA		u	Dec	d'	HP		Naut.	Civil		23	24	25	26
	h	m			h	m												
23 T H U R S D A Y	d	h	d	h	d	h	m											
	00	180	14.2	S23	25.9	43	09.6	12.9	N19	57.1	10.3	54.9	08 27	10 58	08 27	10 15	11 49	12 25
	01	195	13.9		25.9	57	41.5	12.9	20	07.4	10.3	54.9	08 27	09 55	09 20	10 15	11 49	12 25
	02	210	13.6		25.9	72	13.4	12.8	20	17.7	10.2	54.9	08 27	09 38	08 55	10 36	11 15	12 11
	03	225	13.3		25.8	86	45.2	12.8	20	27.9	10.1	54.9	08 27	09 35	08 53	10 33	11 12	12 08
	04	240	13.0		25.8	101	17.0	12.7	20	38.0	10.0	54.9	08 27	09 35	08 53	10 33	11 12	12 08
	05	255	12.7		25.8	115	48.7	12.6	20	48.0	9.9	54.8	08 27	09 35	08 53	10 33	11 12	12 08
	06	270	12.4	S23	25.7	130	20.3	12.6	N20	57.9	9.8	54.8	08 27	09 35	08 53	10 33	11 12	12 08
	07	285	12.1		25.7	144	51.9	12.6	21	07.7	9.7	54.8	08 27	09 35	08 53	10 33	11 12	12 08
	08	300	11.8		25.7	159	23.5	12.5	21	17.4	9.6	54.8	08 27	09 35	08 53	10 33	11 12	12 08
	09	315	11.4		25.6	173	55.0	12.4	21	27.0	9.5	54.8	08 27	09 35	08 53	10 33	11 12	12 08
	10	330	11.1		25.6	188	26.4	12.4	21	36.5	9.4	54.8	08 27	09 35	08 53	10 33	11 12	12 08
	11	345	10.8		25.6	202	57.8	12.4	21	45.9	9.3	54.7	08 27	09 35	08 53	10 33	11 12	12 08
	12	0	10.5	S23	25.5	217	29.2	12.2	N21	55.2	9.2	54.7	08 27	09 35	08 53	10 33	11 12	12 08
	13	15	10.2		25.5	232	00.4	12.3	22	04.4	9.1	54.7	08 27	09 35	08 53	10 33	11 12	12 08
	14	30	09.9		25.4	246	31.7	12.2	22	13.5	9.0	54.7	08 27	09 35	08 53	10 33	11 12	12 08
	15	45	09.6		25.4	261	02.9	12.1	22	22.5	8.8	54.7	08 27	09 35	08 53	10 33	11 12	12 08
	16	60	09.3		25.4	275	34.0	12.1	22	31.3	8.8	54.7	08 27	09 35	08 53	10 33	11 12	12 08
	17	75	09.0		25.3	290	05.1	12.0	22	40.1	8.7	54.6	08 27	09 35	08 53	10 33	11 12	12 08
	18	90	08.7	S23	25.3	304	36.1	12.0	N22	48.8	8.6	54.6	08 27	09 35	08 53	10 33	11 12	12 08
	19	105	08.3		25.2	319	07.1	11.9	22	57.4	8.4	54.6	08 27	09 35	08 53	10 33	11 12	12 08
	20	120	08.0		25.2	333	38.0	11.8	23	05.8	8.4	54.6	08 27	09 35	08 53	10 33	11 12	12 08
	21	135	07.7		25.1	348	08.8	11.9	23	14.2	8.2	54.6	08 27	09 35	08 53	10 33	11 12	12 08
	22	150	07.4		25.1	2	39.7	11.7	23	22.4	8.1	54.6	08 27	09 35	08 53	10 33	11 12	12 08
	23	165	07.1		25.0	17	10.4	11.7	23	30.5	8.0	54.6	08 27	09 35	08 53	10 33	11 12	12 08
24 F R I D A Y	00	180	06.8	S23	25.0	31	41.1	11.7	N23	38.5	8.0	54.6	08 27	09 35	08 53	10 33	11 12	12 08
	01	195	06.5		24.9	46	11.8	11.6	23	46.5	7.7	54.5	08 27	09 35	08 53	10 33	11 12	12 08
	02	210	06.2		24.9	60	42.4	11.6	23	54.2	7.7	54.5	08 27	09 35	08 53	10 33	11 12	12 08
	03	225	05.9		24.8	75	13.0	11.5	24	01.9	7.6	54.5	08 27	09 35	08 53	10 33	11 12	12 08
	04	240	05.6		24.8	89	43.5	11.4	24	09.5	7.5	54.5	08 27	09 35	08 53	10 33	11 12	12 08
	05	255	05.2		24.7	104	13.9	11.4	24	17.0	7.3	54.5	08 27	09 35	08 53	10 33	11 12	12 08
	06	270	04.9	S23	24.7	118	44.3	11.4	N24	24.3	7.2	54.5	08 27	09 35	08 53	10 33	11 12	12 08
	07	285	04.6		24.6	133	14.7	11.3	24	31.5	7.1	54.5	08 27	09 35	08 53	10 33	11 12	12 08
	08	300	04.3		24.6	147	45.0	11.3	24	38.6	7.0	54.4	08 27	09 35	08 53	10 33	11 12	12 08
	09	315	04.0		24.5	162	15.3	11.2	24	45.6	6.9	54.4	08 27	09 35	08 53	10 33	11 12	12 08
	10	330	03.7		24.5	176	45.5	11.1	24	52.5	6.7	54.4	08 27	09 35	08 53	10 33	11 12	12 08
	11	345	03.4		24.4	191	15.6	11.1	24	59.2	6.7	54.4	08 27	09 35	08 53	10 33	11 12	12 08
	12	0	03.1	S23	24.4	205	45.7	11.1	N25	05.9	6.5	54.4	08 27	09 35	08 53	10 33	11 12	12 08
	13	15	02.8		24.3	220	15.8	11.0	25	12.4	6.4	54.4	08 27	09 35	08 53	10 33	11 12	12 08
	14	30	02.5		24.2	234	45.8	11.0	25	18.8	6.2	54.4	08 27	09 35	08 53	10 33	11 12	12 08
	15	45	02.2		24.2	249	15.8	11.0	25	25.0	6.2	54.4	08 27	09 35	08 53	10 33	11 12	12 08
	16	60	01.8		24.1	263	45.8	10.8	25	31.2	6.0	54.4	08 27	09 35	08 53	10 33	11 12	12 08
	17	75	01.5		24.1	278	15.6	10.9	25	37.2	5.9	54.3	08 27	09 35	08 53	10 33	11 12	12 08
	18	90	01.2	S23	24.0	292	45.5	10.8	N25	43.1	5.8	54.3	08 27	09 35	08 53	10 33	11 12	12 08
	19	105	00.9		23.9	307	15.3	10.8	25	48.9	5.7	54.3	08 27	09 35	08 53	10 33	11 12	12 08
	20	120	00.6		23.9	321	45.1	10.7	25	54.6	5.5	54.3	08 27	09 35	08 53	10 33	11 12	12 08
	21	135	00.3		23.8	336	14.8	10.7	26	00.1	5.4	54.3	08 27	09 35	08 53	10 33	11 12	12 08
	22	150	00.0		23.7	350	44.5	10.6	26	05.5	5.3	54.3	08 27	09 35	08 53	10 33	11 12	12 08
	23	164	59.7		23.7	5	14.1	10.6	26	10.8	5.1	54.3	08 27	09 35	08 53	10 33	11 12	12 08
	25 S A T U R D A Y	00	179	59.4	S23	23.6	19	43.7	10.6	N26	15.9	5.1	54.3	08 27	09 35	08 53	10 33	11 12
01		194	59.1		23.5	34	13.3	10.5	26	21.0	4.9	54.3	08 27	09 35	08 53	10 33	11 12	12 08
02		209	58.8		23.5	48	42.8	10.5	26	25.9	4.7	54.3	08 27	09 35	08 53	10 33	11 12	12 08
03		224	58.4		23.4	63	12.3	10.4	26	30.6	4.7	54.2	08 27	09 35	08 53	10 33	11 12	12 08
04		239	58.1		23.3	77	41.7	10.5	26	35.3	4.5	54.2	08 27	09 35	08 53	10 33	11 12	12 08
05		254	57.8		23.2	92	11.2	10.4	26	39.8	4.4	54.2	08 27	09 35	08 53	10 33	11 12	12 08
06		269	57.5	S23	23.2	106	40.6	10.3	N26	44.2	4.2	54.2	08 27	09 35	08 53	10 33	11 12	12 08
07		284	57.2		23.1	121	09.9	10.3	26	48.4	4.2	54.2	08 27	09 35	08 53	10 33	11 12	12 08
08		299	56.9		23.0	135	39.2	10.3	26	52.6	4.0	54.2	08 27	09 35	08 53	10 33	11 12	12 08
09		314	56.6		23.0	150	08.5	10.3	26	56.6	3.8	54.2	08 27	09 35	08 53	10 33	11 12	12 08
10		329	56.3		22.9	164	37.8	10.2	27	00.4	3.8	54.2	08 27	09 35	08 53	10 33	11 12	12 08
11		344	56.0		22.8	179	07.0	10.2	27	04.2	3.6	54.2	08 27	09 35	08 53	10 33	11 12	12 08
12		359	55.7	S23	22.7	193	36.2	10.2	N27	07.8	3.4	54.2	08 27	09 35	08 53	10 33	11 12	12 08
13		14	55.4		22.6	208	05.4	10.2	27	11.2	3.4	54.2	08 27	09 35	08 53	10 33	11 12	12 08
14		29	55.0		22.6	222	34.6	10.1	27	14.6	3.2	54.2	08 27	09 35	08 53	10 33	11 12	12 08
15		44	54.7		22.5	237	03.7	10.1	27	17.8	3.1	54.1	08 27	09 35	08 53	10 33	11 12	12 08
16		59	54.4		22.4	251	32.8	10.1	27	20.9	2.9	54.1	08 27	09 35	08 53	10 33	11 12	12 08
17		74	54.1		22.3	266	01.9	10.1	27	23.8	2.8	54.1	08 27	09 35	08 53	10 33	11 12	12 08
18		89	53.8	S23	22.2	280	31.0	10.0	N27	26.6	2.7	54.1	08 27	09 35	08 53	10 33	11 12	12 08
19		104	53.5		22.2	295	00.0	10.0	27	29.3	2.5	54.1	08 27	09 35	08 53	10 33	11 12	12 08
20		119	53.2		22.1	309	29.0	10.0	27	31.8								



## CONVERSION OF ARC TO TIME

0°-59°		60°-119°		120°-179°		180°-239°		240°-299°		300°-359°		0°-00	0°-25	0°-50	0°-75
a	h m	c	h m	d	h m	e	h m	f	h m	g	h m	i	m s	m s	m s
0	0 00	60	4 00	120	8 00	180	12 00	240	16 00	300	20 00	0	0 00	0 01	0 02
1	0 04	61	4 04	121	8 04	181	12 04	241	16 04	301	20 04	1	0 04	0 05	0 06
2	0 08	62	4 08	122	8 08	182	12 08	242	16 08	302	20 08	2	0 08	0 09	0 10
3	0 12	63	4 12	123	8 12	183	12 12	243	16 12	303	20 12	3	0 12	0 13	0 14
4	0 16	64	4 16	124	8 16	184	12 16	244	16 16	304	20 16	4	0 16	0 17	0 18
5	0 20	65	4 20	125	8 20	185	12 20	245	16 20	305	20 20	5	0 20	0 21	0 22
6	0 24	66	4 24	126	8 24	186	12 24	246	16 24	306	20 24	6	0 24	0 25	0 26
7	0 28	67	4 28	127	8 28	187	12 28	247	16 28	307	20 28	7	0 28	0 29	0 30
8	0 32	68	4 32	128	8 32	188	12 32	248	16 32	308	20 32	8	0 32	0 33	0 34
9	0 36	69	4 36	129	8 36	189	12 36	249	16 36	309	20 36	9	0 36	0 37	0 38
10	0 40	70	4 40	130	8 40	190	12 40	250	16 40	310	20 40	10	0 40	0 41	0 42
11	0 44	71	4 44	131	8 44	191	12 44	251	16 44	311	20 44	11	0 44	0 45	0 46
12	0 48	72	4 48	132	8 48	192	12 48	252	16 48	312	20 48	12	0 48	0 49	0 50
13	0 52	73	4 52	133	8 52	193	12 52	253	16 52	313	20 52	13	0 52	0 53	0 54
14	0 56	74	4 56	134	8 56	194	12 56	254	16 56	314	20 56	14	0 56	0 57	0 58
15	1 00	75	5 00	135	9 00	195	13 00	255	17 00	315	21 00	15	1 00	1 01	1 02
16	1 04	76	5 04	136	9 04	196	13 04	256	17 04	316	21 04	16	1 04	1 05	1 06
17	1 08	77	5 08	137	9 08	197	13 08	257	17 08	317	21 08	17	1 08	1 09	1 10
18	1 12	78	5 12	138	9 12	198	13 12	258	17 12	318	21 12	18	1 12	1 13	1 14
19	1 16	79	5 16	139	9 16	199	13 16	259	17 16	319	21 16	19	1 16	1 17	1 18
20	1 20	80	5 20	140	9 20	200	13 20	260	17 20	320	21 20	20	1 20	1 21	1 22
21	1 24	81	5 24	141	9 24	201	13 24	261	17 24	321	21 24	21	1 24	1 25	1 26
22	1 28	82	5 28	142	9 28	202	13 28	262	17 28	322	21 28	22	1 28	1 29	1 30
23	1 32	83	5 32	143	9 32	203	13 32	263	17 32	323	21 32	23	1 32	1 33	1 34
24	1 36	84	5 36	144	9 36	204	13 36	264	17 36	324	21 36	24	1 36	1 37	1 38
25	1 40	85	5 40	145	9 40	205	13 40	265	17 40	325	21 40	25	1 40	1 41	1 42
26	1 44	86	5 44	146	9 44	206	13 44	266	17 44	326	21 44	26	1 44	1 45	1 46
27	1 48	87	5 48	147	9 48	207	13 48	267	17 48	327	21 48	27	1 48	1 49	1 50
28	1 52	88	5 52	148	9 52	208	13 52	268	17 52	328	21 52	28	1 52	1 53	1 54
29	1 56	89	5 56	149	9 56	209	13 56	269	17 56	329	21 56	29	1 56	1 57	1 58
30	2 00	90	6 00	150	10 00	210	14 00	270	18 00	330	22 00	30	2 00	2 01	2 02
31	2 04	91	6 04	151	10 04	211	14 04	271	18 04	331	22 04	31	2 04	2 05	2 06
32	2 08	92	6 08	152	10 08	212	14 08	272	18 08	332	22 08	32	2 08	2 09	2 10
33	2 12	93	6 12	153	10 12	213	14 12	273	18 12	333	22 12	33	2 12	2 13	2 14
34	2 16	94	6 16	154	10 16	214	14 16	274	18 16	334	22 16	34	2 16	2 17	2 18
35	2 20	95	6 20	155	10 20	215	14 20	275	18 20	335	22 20	35	2 20	2 21	2 22
36	2 24	96	6 24	156	10 24	216	14 24	276	18 24	336	22 24	36	2 24	2 25	2 26
37	2 28	97	6 28	157	10 28	217	14 28	277	18 28	337	22 28	37	2 28	2 29	2 30
38	2 32	98	6 32	158	10 32	218	14 32	278	18 32	338	22 32	38	2 32	2 33	2 34
39	2 36	99	6 36	159	10 36	219	14 36	279	18 36	339	22 36	39	2 36	2 37	2 38
40	2 40	100	6 40	160	10 40	220	14 40	280	18 40	340	22 40	40	2 40	2 41	2 42
41	2 44	101	6 44	161	10 44	221	14 44	281	18 44	341	22 44	41	2 44	2 45	2 46
42	2 48	102	6 48	162	10 48	222	14 48	282	18 48	342	22 48	42	2 48	2 49	2 50
43	2 52	103	6 52	163	10 52	223	14 52	283	18 52	343	22 52	43	2 52	2 53	2 54
44	2 56	104	6 56	164	10 56	224	14 56	284	18 56	344	22 56	44	2 56	2 57	2 58
45	3 00	105	7 00	165	11 00	225	15 00	285	19 00	345	23 00	45	3 00	3 01	3 02
46	3 04	106	7 04	166	11 04	226	15 04	286	19 04	346	23 04	46	3 04	3 05	3 06
47	3 08	107	7 08	167	11 08	227	15 08	287	19 08	347	23 08	47	3 08	3 09	3 10
48	3 12	108	7 12	168	11 12	228	15 12	288	19 12	348	23 12	48	3 12	3 13	3 14
49	3 16	109	7 16	169	11 16	229	15 16	289	19 16	349	23 16	49	3 16	3 17	3 18
50	3 20	110	7 20	170	11 20	230	15 20	290	19 20	350	23 20	50	3 20	3 21	3 22
51	3 24	111	7 24	171	11 24	231	15 24	291	19 24	351	23 24	51	3 24	3 25	3 26
52	3 28	112	7 28	172	11 28	232	15 28	292	19 28	352	23 28	52	3 28	3 29	3 30
53	3 32	113	7 32	173	11 32	233	15 32	293	19 32	353	23 32	53	3 32	3 33	3 34
54	3 36	114	7 36	174	11 36	234	15 36	294	19 36	354	23 36	54	3 36	3 37	3 38
55	3 40	115	7 40	175	11 40	235	15 40	295	19 40	355	23 40	55	3 40	3 41	3 42
56	3 44	116	7 44	176	11 44	236	15 44	296	19 44	356	23 44	56	3 44	3 45	3 46
57	3 48	117	7 48	177	11 48	237	15 48	297	19 48	357	23 48	57	3 48	3 49	3 50
58	3 52	118	7 52	178	11 52	238	15 52	298	19 52	358	23 52	58	3 52	3 53	3 54
59	3 56	119	7 56	179	11 56	239	15 56	299	19 56	359	23 56	59	3 56	3 57	3 58

The above table is for converting expressions in arc to their equivalent in time ; its main use in this Almanac is for the conversion of longitude for application to L.M.T. (added if west, subtracted if east) to give G.M.T. or vice versa, particularly in the case of sunrise, sunset, etc.



## TABLES FOR INTERPOLATING SUNRISE, MOONRISE, ETC.

TABLE I—FOR LATITUDE

Tabular Interval			Difference between the times for consecutive latitudes															
10°	5°	2°	5 <sup>m</sup>	10 <sup>m</sup>	15 <sup>m</sup>	20 <sup>m</sup>	25 <sup>m</sup>	30 <sup>m</sup>	35 <sup>m</sup>	40 <sup>m</sup>	45 <sup>m</sup>	50 <sup>m</sup>	55 <sup>m</sup>	60 <sup>m</sup>	1 <sup>h</sup> 05 <sup>m</sup>	1 <sup>h</sup> 10 <sup>m</sup>	1 <sup>h</sup> 15 <sup>m</sup>	1 <sup>h</sup> 20 <sup>m</sup>
0 30	0 15	0 06	m	m	m	m	m	m	m	m	m	m	m	m	h m	h m	h m	h m
1 00	0 30	0 12	0	0	1	1	1	1	1	2	2	2	2	2	0 02	0 02	0 02	0 02
1 30	0 45	0 18	0	1	1	2	2	3	3	3	4	4	4	5	05	05	05	05
2 00	1 00	0 24	1	1	2	3	3	4	4	5	5	6	7	7	07	07	07	07
2 30	1 15	0 30	1	2	3	4	5	5	6	7	7	8	9	10	10	10	10	10
3 00	1 30	0 36	1	2	4	5	6	7	8	9	9	10	11	12	12	13	13	13
3 30	1 45	0 42	1	3	4	6	7	8	9	10	11	12	13	14	0 15	0 15	0 16	0 16
4 00	2 00	0 48	2	3	5	7	8	10	11	12	13	14	16	17	18	18	19	19
4 30	2 15	0 54	2	4	6	8	9	11	13	14	15	16	18	19	20	21	22	22
5 00	2 30	1 00	2	4	7	9	11	13	15	16	18	19	21	22	23	24	25	26
5 30	2 45	1 06	2	5	7	10	12	14	16	18	20	22	23	25	26	27	28	29
6 00	3 00	1 12	3	5	8	11	13	16	18	20	22	24	26	28	0 29	0 30	0 31	0 32
6 30	3 15	1 18	3	6	9	12	14	17	20	22	24	26	29	31	32	33	34	36
7 00	3 30	1 24	3	6	10	13	16	19	22	24	26	29	31	34	36	37	38	40
7 30	3 45	1 30	3	7	10	14	17	20	23	26	29	31	34	37	39	41	42	44
8 00	4 00	1 36	4	7	11	15	18	22	25	28	31	34	37	40	43	44	46	48
8 30	4 15	1 42	4	8	12	16	20	23	27	30	34	37	41	44	0 47	0 48	0 51	0 53
9 00	4 30	1 48	4	8	13	17	21	25	29	33	36	40	44	48	0 51	0 53	0 56	0 58
9 30	4 45	1 54	4	9	13	18	22	27	31	35	39	43	47	52	0 55	0 58	1 01	1 04
10 00	5 00	2 00	5	9	14	19	24	28	33	38	42	47	51	56	1 00	1 04	1 08	1 12
			5	10	15	20	25	30	35	40	45	50	55	60	1 05	1 10	1 15	1 20

Table I is for interpolating the L.M.T. of sunrise, twilight, moonrise, etc., for latitude. It is to be entered, in the appropriate column on the left, with the difference between true latitude and the nearest tabular latitude which is *less* than the true latitude; and with the argument at the top which is the nearest value of the difference between the times for the tabular latitude and the next higher one; the correction so obtained is applied to the time for the tabular latitude; the sign of the correction can be seen by inspection. It is to be noted that the interpolation is not linear, so that when using this table it is essential to take out the tabular phenomenon for the latitude *less* than the true latitude.

TABLE II—FOR LONGITUDE

Long. East or West	Difference between the times for given date and preceding date (for east longitude) or for given date and following date (for west longitude)													
	10 <sup>m</sup> 20 <sup>m</sup> 30 <sup>m</sup>	40 <sup>m</sup> 50 <sup>m</sup> 60 <sup>m</sup>	1 <sup>h</sup> + 10 <sup>m</sup> 20 <sup>m</sup> 30 <sup>m</sup>	1 <sup>h</sup> + 40 <sup>m</sup> 50 <sup>m</sup> 60 <sup>m</sup>	2 <sup>h</sup> 10 <sup>m</sup>	2 <sup>h</sup> 20 <sup>m</sup>	2 <sup>h</sup> 30 <sup>m</sup>	2 <sup>h</sup> 40 <sup>m</sup>	2 <sup>h</sup> 50 <sup>m</sup>	3 <sup>h</sup> 00 <sup>m</sup>				
0	m m m	m m m	m m m	m m m	h m	h m	h m	h m	h m	h m				
10	0 0 0	0 0 0	0 0 0	0 0 0	0 00	0 00	0 00	0 00	0 00	0 00				
20	0 1 1	1 1 2	2 2 2	3 3 3	04	04	04	04	05	05				
30	1 1 2	2 3 3	4 4 5	6 6 7	07	08	08	09	09	10				
40	1 2 3	3 4 5	6 7 7	8 9 10	11	12	12	13	14	15				
50	1 3 4	4 6 7	8 9 10	11 12 13	14	16	17	18	19	20				
60	1 4 5	5 7 8	10 11 12	14 15 17	0 18	0 19	0 21	0 22	0 24	0 25				
70	2 3 5	7 8 10	12 13 15	17 18 20	22	23	25	27	28	30				
80	2 4 6	8 10 12	14 16 17	19 21 23	25	27	29	31	33	35				
90	2 5 7	9 11 13	16 18 20	22 24 27	29	31	33	36	38	40				
100	2 6 8	10 12 15	17 20 22	25 27 30	32	35	37	40	42	45				
110	3 6 8	11 14 17	19 22 25	28 31 33	0 36	0 39	0 42	0 44	0 47	0 50				
120	3 6 9	12 15 18	21 24 27	31 34 37	40	43	46	49	0 52	0 55				
130	3 7 10	13 17 20	23 27 30	33 37 40	43	47	50	53	0 57	1 00				
140	4 7 11	14 18 22	25 29 32	36 40 43	47	51	54	0 58	1 01	1 05				
150	4 8 12	16 19 23	27 31 35	39 43 47	51	54	0 58	1 02	1 06	1 10				
160	4 8 13	17 21 25	29 33 38	42 46 50	0 54	0 58	1 03	1 07	1 11	1 15				
170	4 9 13	18 22 27	31 36 40	44 49 53	0 58	1 02	1 07	1 11	1 16	1 20				
180	5 9 14	19 24 28	33 38 42	47 52 57	1 01	1 06	1 11	1 16	1 20	1 25				
190	5 10 15	20 25 30	35 40 45	50 55 60	1 05	1 10	1 15	1 20	1 25	1 30				

Table II is for interpolating the L.M.T. of moonrise, moonset and the Moon's meridian passage for longitude. It is entered with longitude and with the difference between the times for the given date and for the preceding date (in east longitudes) or following date (in west longitudes). The correction is normally *added* for west longitudes and *subtracted* for east longitudes, but if, as occasionally happens, the times become earlier each day instead of later, the signs of the corrections must be reversed.



## ALTITUDE CORRECTION TABLES 0°–35°—MOON

App. Alt.	0°–4°	5°–9°	10°–14°	15°–19°	20°–24°	25°–29°	30°–34°	App. Alt.
00	34.5	58.2	62.1	62.8	62.2	60.8	58.9	00
10	36.5	58.5	62.2	62.8	62.2	60.8	58.8	10
20	38.3	58.7	62.2	62.8	62.1	60.7	58.8	20
30	40.0	58.9	62.3	62.8	62.1	60.7	58.7	30
40	41.5	59.1	62.3	62.8	62.0	60.6	58.6	40
50	42.9	59.3	62.4	62.7	62.0	60.6	58.5	50
00	44.2	59.5	62.4	62.7	61.9	60.5	58.5	00
10	45.4	59.7	62.4	62.7	61.9	60.4	58.4	10
20	46.5	59.9	62.5	62.7	61.9	60.4	58.3	20
30	47.5	60.0	62.5	62.7	61.9	60.3	58.2	30
40	48.4	60.2	62.5	62.7	61.8	60.3	58.2	40
50	49.3	60.3	62.6	62.7	61.8	60.2	58.1	50
00	50.1	60.5	62.6	62.7	61.7	60.1	58.0	00
10	50.8	60.6	62.6	62.6	61.7	60.1	57.9	10
20	51.5	60.7	62.6	62.6	61.6	60.0	57.8	20
30	52.2	60.9	62.7	62.6	61.6	59.9	57.8	30
40	52.8	61.0	62.7	62.6	61.6	59.9	57.7	40
50	53.4	61.1	62.7	62.6	61.5	59.8	57.6	50
00	53.9	61.2	62.7	62.5	61.5	59.7	57.5	00
10	54.4	61.3	62.7	62.5	61.4	59.7	57.4	10
20	54.9	61.4	62.7	62.5	61.4	59.6	57.4	20
30	55.3	61.5	62.8	62.5	61.3	59.5	57.3	30
40	55.7	61.6	62.8	62.4	61.3	59.5	57.2	40
50	56.1	61.6	62.8	62.4	61.2	59.4	57.1	50
00	56.4	61.7	62.8	62.4	61.2	59.3	57.0	00
10	56.8	61.8	62.8	62.4	61.1	59.3	56.9	10
20	57.1	61.9	62.8	62.3	61.1	59.2	56.9	20
30	57.4	61.9	62.8	62.3	61.0	59.1	56.8	30
40	57.7	62.0	62.8	62.3	61.0	59.1	56.7	40
50	58.0	62.1	62.8	62.2	60.9	59.0	56.6	50
HP	L U	L U	L U	L U	L U	L U	L U	HP
54.0	0.3 0.9	0.3 0.9	0.4 1.0	0.5 1.1	0.6 1.2	0.7 1.3	0.9 1.5	54.0
54.3	0.7 1.1	0.7 1.2	0.8 1.2	0.8 1.3	0.9 1.4	1.1 1.5	1.2 1.7	54.3
54.6	1.1 1.4	1.1 1.4	1.1 1.4	1.2 1.5	1.3 1.6	1.4 1.7	1.5 1.8	54.6
54.9	1.4 1.6	1.5 1.6	1.5 1.6	1.6 1.7	1.6 1.8	1.8 1.9	1.9 2.0	54.9
55.2	1.8 1.8	1.8 1.8	1.9 1.8	1.9 1.9	2.0 2.0	2.1 2.1	2.2 2.2	55.2
55.5	2.2 2.0	2.2 2.0	2.3 2.1	2.3 2.1	2.4 2.2	2.4 2.3	2.5 2.4	55.5
55.8	2.6 2.2	2.6 2.2	2.6 2.3	2.7 2.3	2.7 2.4	2.8 2.4	2.9 2.5	55.8
56.1	3.0 2.4	3.0 2.5	3.0 2.5	3.0 2.5	3.1 2.6	3.1 2.6	3.2 2.7	56.1
56.4	3.3 2.7	3.4 2.7	3.4 2.7	3.4 2.7	3.4 2.8	3.5 2.8	3.5 2.9	56.4
56.7	3.7 2.9	3.7 2.9	3.8 2.9	3.8 2.9	3.8 3.0	3.8 3.0	3.9 3.0	56.7
57.0	4.1 3.1	4.1 3.1	4.1 3.1	4.1 3.1	4.2 3.2	4.2 3.2	4.2 3.2	57.0
57.3	4.5 3.3	4.5 3.3	4.5 3.3	4.5 3.3	4.5 3.3	4.5 3.4	4.6 3.4	57.3
57.6	4.9 3.5	4.9 3.5	4.9 3.5	4.9 3.5	4.9 3.5	4.9 3.5	4.9 3.6	57.6
57.9	5.3 3.8	5.3 3.8	5.2 3.8	5.2 3.7	5.2 3.7	5.2 3.7	5.2 3.7	57.9
58.2	5.6 4.0	5.6 4.0	5.6 4.0	5.6 4.0	5.6 3.9	5.6 3.9	5.6 3.9	58.2
58.5	6.0 4.2	6.0 4.2	6.0 4.2	6.0 4.2	6.0 4.1	5.9 4.1	5.9 4.1	58.5
58.8	6.4 4.4	6.4 4.4	6.4 4.4	6.3 4.4	6.3 4.3	6.3 4.3	6.2 4.2	58.8
59.1	6.8 4.6	6.8 4.6	6.7 4.6	6.7 4.6	6.7 4.5	6.6 4.5	6.6 4.4	59.1
59.4	7.2 4.8	7.1 4.8	7.1 4.8	7.1 4.8	7.0 4.7	7.0 4.7	6.9 4.6	59.4
59.7	7.5 5.1	7.5 5.0	7.5 5.0	7.5 5.0	7.4 4.9	7.3 4.8	7.2 4.8	59.7
60.0	7.9 5.3	7.9 5.3	7.9 5.2	7.8 5.2	7.8 5.1	7.7 5.0	7.6 4.9	60.0
60.3	8.3 5.5	8.3 5.5	8.2 5.4	8.2 5.4	8.1 5.3	8.0 5.2	7.9 5.1	60.3
60.6	8.7 5.7	8.7 5.7	8.6 5.7	8.6 5.6	8.5 5.5	8.4 5.4	8.2 5.3	60.6
60.9	9.1 5.9	9.0 5.9	9.0 5.9	8.9 5.8	8.8 5.7	8.7 5.6	8.6 5.4	60.9
61.2	9.5 6.2	9.4 6.1	9.4 6.1	9.3 6.0	9.2 5.9	9.1 5.8	8.9 5.6	61.2
61.5	9.8 6.4	9.8 6.3	9.7 6.3	9.7 6.2	9.5 6.1	9.4 5.9	9.2 5.8	61.5

DIP			
Ht. of Eye	Corr <sup>n</sup>	Ht. of Eye	Corr <sup>n</sup>
m	ft.	m	ft.
2.4	—2.8	8.0	9.5
2.6	—2.9	8.6	9.9
2.8	—3.0	9.2	10.3
3.0	—3.1	9.8	10.6
3.2	—3.2	10.5	11.0
3.4	—3.3	11.2	11.4
3.6	—3.4	11.9	11.8
3.8	—3.5	12.6	12.2
4.0	—3.6	13.3	12.6
4.3	—3.7	14.1	13.0
4.5	—3.8	14.9	13.4
4.7	—3.9	15.7	13.8
5.0	—4.0	16.5	14.2
5.2	—4.1	17.4	14.7
5.5	—4.2	18.3	15.1
5.8	—4.3	19.1	15.5
6.1	—4.4	20.1	16.0
6.3	—4.5	21.0	16.5
6.6	—4.6	22.0	16.9
6.9	—4.7	22.9	17.4
7.2	—4.8	23.9	17.9
7.5	—4.9	24.9	18.4
7.9	—5.0	26.0	18.8
8.2	—5.1	27.1	19.3
8.5	—5.2	28.1	19.8
8.8	—5.3	29.2	20.4
9.2	—5.4	30.4	20.9
9.5		31.5	21.4

MOON CORRECTION  
TABLE

The correction is in two parts; the first correction is taken from the upper part of the table with argument apparent altitude, and the second from the lower part, with argument HP, in the same column as that from which the first correction was taken. Separate corrections are given in the lower part for lower (L) and upper (U) limbs. All corrections are to be **added** to apparent altitude, but 30' is to be **subtracted** from the altitude of the upper limb.

For corrections for pressure and temperature see page A4.

For bubble sextant observations ignore dip, take the mean of upper and lower limb corrections and subtract 15' from the altitude.

App. Alt. = Apparent altitude  
= Sextant altitude corrected for index error and dip.



## ALTITUDE CORRECTION TABLES 35°–90°—MOON

App. Alt.	35°–39°	40°–44°	45°–49°	50°–54°	55°–59°	60°–64°	65°–69°	70°–74°	75°–79°	80°–84°	85°–89°	App. Alt.
	Corr <sup>n</sup>	Corr <sup>n</sup>	Corr <sup>n</sup>	Corr <sup>n</sup>	Corr <sup>n</sup>	Corr <sup>n</sup>	Corr <sup>n</sup>	Corr <sup>n</sup>	Corr <sup>n</sup>	Corr <sup>n</sup>	Corr <sup>n</sup>	
00	35 56.5	40 53.7	45 50.5	50 46.9	55 43.1	60 38.9	65 34.6	70 30.0	75 25.3	80 20.5	85 15.6	00
10	56.4	53.6	50.4	46.8	42.9	38.8	34.4	29.9	25.2	20.4	15.5	10
20	56.3	53.5	50.2	46.7	42.8	38.7	34.3	29.7	25.0	20.2	15.3	20
30	56.2	53.4	50.1	46.5	42.7	38.5	34.1	29.6	24.9	20.0	15.1	30
40	56.2	53.3	50.0	46.4	42.5	38.4	34.0	29.4	24.7	19.9	15.0	40
50	56.1	53.2	49.9	46.3	42.4	38.2	33.8	29.3	24.5	19.7	14.8	50
00	36 56.0	41 53.1	46 49.8	51 46.2	56 42.3	61 38.1	66 33.7	71 29.1	76 24.4	81 19.6	86 14.6	00
10	55.9	53.0	49.7	46.0	42.1	37.9	33.5	29.0	24.2	19.4	14.5	10
20	55.8	52.9	49.5	45.9	42.0	37.8	33.4	28.8	24.1	19.2	14.3	20
30	55.7	52.8	49.4	45.8	41.9	37.7	33.2	28.7	23.9	19.1	14.2	30
40	55.6	52.6	49.3	45.7	41.7	37.5	33.1	28.5	23.8	18.9	14.0	40
50	55.5	52.5	49.2	45.5	41.6	37.4	32.9	28.3	23.6	18.7	13.8	50
00	37 55.4	42 52.4	47 49.1	52 45.4	57 41.4	62 37.2	67 32.8	72 28.2	77 23.4	82 18.6	87 13.7	00
10	55.3	52.3	49.0	45.3	41.3	37.1	32.6	28.0	23.3	18.4	13.5	10
20	55.2	52.2	48.8	45.2	41.2	36.9	32.5	27.9	23.1	18.2	13.3	20
30	55.1	52.1	48.7	45.0	41.0	36.8	32.3	27.7	22.9	18.1	13.2	30
40	55.0	52.0	48.6	44.9	40.9	36.6	32.2	27.6	22.8	17.9	13.0	40
50	55.0	51.9	48.5	44.8	40.8	36.5	32.0	27.4	22.6	17.8	12.8	50
00	38 54.9	43 51.8	48 48.4	53 44.6	58 40.6	63 36.4	68 31.9	73 27.2	78 22.5	83 17.6	88 12.7	00
10	54.8	51.7	48.3	44.5	40.5	36.2	31.7	27.1	22.3	17.4	12.5	10
20	54.7	51.6	48.1	44.4	40.3	36.1	31.6	26.9	22.1	17.3	12.3	20
30	54.6	51.5	48.0	44.2	40.2	35.9	31.4	26.8	22.0	17.1	12.2	30
40	54.5	51.4	47.9	44.1	40.1	35.8	31.3	26.6	21.8	16.9	12.0	40
50	54.4	51.2	47.8	44.0	39.9	35.6	31.1	26.5	21.7	16.8	11.8	50
00	39 54.3	44 51.1	49 47.7	54 43.9	59 39.8	64 35.5	69 31.0	74 26.3	79 21.5	84 16.6	89 11.7	00
10	54.2	51.0	47.5	43.7	39.6	35.3	30.8	26.1	21.3	16.4	11.5	10
20	54.1	50.9	47.4	43.6	39.5	35.2	30.7	26.0	21.2	16.3	11.4	20
30	54.0	50.8	47.3	43.5	39.4	35.0	30.5	25.8	21.0	16.1	11.2	30
40	53.9	50.7	47.2	43.3	39.2	34.9	30.4	25.7	20.9	16.0	11.0	40
50	53.8	50.6	47.0	43.2	39.1	34.7	30.2	25.5	20.7	15.8	10.9	50
HP	L U	L U	L U	L U	L U	L U	L U	L U	L U	L U	L U	HP
54.0	1.1 1.7	1.3 1.9	1.5 2.1	1.7 2.4	2.0 2.6	2.3 2.9	2.6 3.2	2.9 3.5	3.2 3.8	3.5 4.1	3.8 4.5	54.0
54.3	1.4 1.8	1.6 2.0	1.8 2.2	2.0 2.5	2.2 2.7	2.5 3.0	2.8 3.2	3.1 3.5	3.3 3.8	3.6 4.1	3.9 4.4	54.3
54.6	1.7 2.0	1.9 2.2	2.1 2.4	2.3 2.6	2.5 2.8	2.7 3.0	3.0 3.3	3.2 3.5	3.5 3.8	3.8 4.0	4.0 4.3	54.6
54.9	2.0 2.2	2.2 2.3	2.3 2.5	2.5 2.7	2.7 2.9	2.9 3.1	3.2 3.3	3.4 3.5	3.6 3.8	3.9 4.0	4.1 4.3	54.9
55.2	2.3 2.3	2.5 2.4	2.6 2.6	2.8 2.8	3.0 2.9	3.2 3.1	3.4 3.3	3.6 3.5	3.8 3.7	4.0 4.0	4.2 4.2	55.2
55.5	2.7 2.5	2.8 2.6	2.9 2.7	3.1 2.9	3.2 3.0	3.4 3.2	3.6 3.4	3.7 3.5	3.9 3.7	4.1 3.9	4.3 4.1	55.5
55.8	3.0 2.6	3.1 2.7	3.2 2.8	3.3 3.0	3.5 3.1	3.6 3.3	3.8 3.4	3.9 3.6	4.1 3.7	4.2 3.9	4.4 4.0	55.8
56.1	3.3 2.8	3.4 2.9	3.5 3.0	3.6 3.1	3.7 3.2	3.8 3.3	4.0 3.4	4.1 3.6	4.2 3.7	4.4 3.8	4.5 4.0	56.1
56.4	3.6 2.9	3.7 3.0	3.8 3.1	3.9 3.2	3.9 3.3	4.0 3.4	4.1 3.5	4.3 3.6	4.4 3.7	4.5 3.8	4.6 3.9	56.4
56.7	3.9 3.1	4.0 3.1	4.1 3.2	4.1 3.3	4.2 3.3	4.3 3.4	4.3 3.5	4.4 3.6	4.5 3.7	4.6 3.8	4.7 3.8	56.7
57.0	4.3 3.2	4.3 3.3	4.3 3.3	4.4 3.4	4.4 3.4	4.5 3.5	4.5 3.5	4.6 3.6	4.7 3.6	4.7 3.7	4.8 3.8	57.0
57.3	4.6 3.4	4.6 3.4	4.6 3.4	4.6 3.5	4.7 3.5	4.7 3.5	4.7 3.6	4.8 3.6	4.8 3.6	4.8 3.7	4.9 3.7	57.3
57.6	4.9 3.6	4.9 3.6	4.9 3.6	4.9 3.6	4.9 3.6	4.9 3.6	4.9 3.6	4.9 3.6	5.0 3.6	5.0 3.6	5.0 3.6	57.6
57.9	5.2 3.7	5.2 3.7	5.2 3.7	5.2 3.7	5.2 3.7	5.1 3.6	5.1 3.6	5.1 3.6	5.1 3.6	5.1 3.6	5.1 3.6	57.9
58.2	5.5 3.9	5.5 3.8	5.5 3.8	5.4 3.8	5.4 3.7	5.4 3.7	5.3 3.7	5.3 3.6	5.2 3.6	5.2 3.5	5.2 3.5	58.2
58.5	5.9 4.0	5.8 4.0	5.8 3.9	5.7 3.9	5.6 3.8	5.6 3.8	5.5 3.7	5.5 3.6	5.4 3.6	5.3 3.5	5.3 3.4	58.5
58.8	6.2 4.2	6.1 4.1	6.0 4.1	6.0 4.0	5.9 3.9	5.8 3.8	5.7 3.7	5.6 3.6	5.5 3.5	5.4 3.5	5.3 3.4	58.8
59.1	6.5 4.3	6.4 4.3	6.3 4.2	6.2 4.1	6.1 4.0	6.0 3.9	5.9 3.8	5.8 3.6	5.7 3.5	5.6 3.4	5.4 3.3	59.1
59.4	6.8 4.5	6.7 4.4	6.6 4.3	6.5 4.2	6.4 4.1	6.2 3.9	6.1 3.8	6.0 3.7	5.8 3.5	5.7 3.4	5.5 3.2	59.4
59.7	7.1 4.7	7.0 4.5	6.9 4.4	6.8 4.3	6.6 4.1	6.5 4.0	6.3 3.8	6.1 3.7	6.0 3.5	5.8 3.3	5.6 3.2	59.7
60.0	7.5 4.8	7.3 4.7	7.2 4.5	7.0 4.4	6.9 4.2	6.7 4.0	6.5 3.9	6.3 3.7	6.1 3.5	5.9 3.3	5.7 3.1	60.0
60.3	7.8 5.0	7.6 4.8	7.5 4.7	7.3 4.5	7.1 4.3	6.9 4.1	6.7 3.9	6.5 3.7	6.3 3.5	6.0 3.2	5.8 3.0	60.3
60.6	8.1 5.1	7.9 5.0	7.7 4.8	7.6 4.6	7.3 4.4	7.1 4.2	6.9 3.9	6.7 3.7	6.4 3.4	6.2 3.2	5.9 2.9	60.6
60.9	8.4 5.3	8.2 5.1	8.0 4.9	7.8 4.7	7.6 4.5	7.3 4.2	7.1 4.0	6.8 3.7	6.6 3.4	6.3 3.2	6.0 2.9	60.9
61.2	8.7 5.4	8.5 5.2	8.3 5.0	8.1 4.8	7.8 4.5	7.6 4.3	7.3 4.0	7.0 3.7	6.7 3.4	6.4 3.1	6.1 2.8	61.2
61.5	9.1 5.6	8.8 5.4	8.6 5.1	8.3 4.9	8.1 4.6	7.8 4.3	7.5 4.0	7.2 3.7	6.9 3.4	6.5 3.1	6.2 2.7	61.5

XXXV