2014 JANUARY 16, 17, 18 (THURS., FRI., SAT.)

UT	ARIES	VENUS −4.2		MARS +0.6		JUPITER −2.7		SATURN +0.6	
	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
16 00	115 21.4	186 09.3	S16 11.8	278 00.6	S 4 49.7	10 01.1	N22 50.7	245 35.6	S16 01.5
01	130 23.8	201 13.3	11.6	293 02.2	50.0	25 03.9	50.7	260 37.9	01.5
02	145 26.3	216 17.3	11.4	308 03.8	50.4	40 06.7	50.8	275 40.2	01.6
03	160 28.7	231 21.2	. . 11.2	323 05.4	. . 50.7	55 09.5	. . 50.8	290 42.5	. . 01.6
04	175 31.2	246 25.2	11.0	338 07.0	51.0	70 12.3	50.9	305 44.8	01.7
05	190 33.7	261 29.2	10.8	353 08.5	51.4	85 15.1	50.9	320 47.0	01.7
06	205 36.1	276 33.2	S16 10.6	8 10.1	S 4 51.7	100 18.0	N22 50.9	335 49.3	S16 01.7
07	220 38.6	291 37.1	10.4	23 11.7	52.0	115 20.8	51.0	350 51.6	01.8
THURSDAY 08	235 41.1	306 41.1	10.2	38 13.3	52.4	130 23.6	51.0	5 53.9	01.8
09	250 43.5	321 45.1	. . 10.0	53 14.8	. . 52.7	145 26.4	. . 51.1	20 56.2	. . 01.9
10	265 46.0	336 49.0	09.8	68 16.4	53.0	160 29.2	51.1	35 58.5	01.9
11	280 48.5	351 53.0	09.6	83 18.0	53.3	175 32.0	51.1	51 00.7	01.9
12	295 50.9	6 56.9	S16 09.4	98 19.6	S 4 53.7	190 34.8	N22 51.2	66 03.0	S16 02.0
13	310 53.4	22 00.9	09.2	113 21.2	54.0	205 37.6	51.2	81 05.3	02.0
14	325 55.9	37 04.8	09.0	128 22.8	54.3	220 40.4	51.3	96 07.6	02.1
15	340 58.3	52 08.8	. . 08.8	143 24.3	. . 54.7	235 43.3	. . 51.3	111 09.9	. . 02.1
16	356 00.8	67 12.7	08.6	158 25.9	55.0	250 46.1	51.3	126 12.1	02.1
17	11 03.2	82 16.7	08.5	173 27.5	55.3	265 48.9	51.4	141 14.4	02.2
18	26 05.7	97 20.6	S16 08.3	188 29.1	S 4 55.6	280 51.7	N22 51.4	156 16.7	S16 02.2
19	41 08.2	112 24.5	08.1	203 30.7	56.0	295 54.5	51.5	171 19.0	02.3
20	56 10.6	127 28.5	07.9	218 32.3	56.3	310 57.3	51.5	186 21.3	02.3
21	71 13.1	142 32.4	. . 07.7	233 33.8	. . 56.6	326 00.1	. . 51.5	201 23.6	. . 02.3
22	86 15.6	157 36.3	07.5	248 35.4	57.0	341 02.9	51.6	216 25.8	02.4
23	101 18.0	172 40.3	07.3	263 37.0	57.3	356 05.8	51.6	231 28.1	02.4
17 00	116 20.5	187 44.2	S16 07.1	278 38.6	S 4 57.6	11 08.6	N22 51.7	246 30.4	S16 02.4
01	131 23.0	202 48.1	07.0	293 40.2	57.9	26 11.4	51.7	261 32.7	02.5
02	146 25.4	217 52.0	06.8	308 41.8	58.3	41 14.2	51.7	276 35.0	02.5
03	161 27.9	232 55.9	. . 06.6	323 43.4	. . 58.6	56 17.0	. . 51.8	291 37.3	. . 02.6
04	176 30.4	247 59.8	06.4	338 44.9	58.9	71 19.8	51.8	306 39.5	02.6
05	191 32.8	263 03.8	06.2	353 46.5	59.2	86 22.6	51.8	321 41.8	02.6
06	206 35.3	278 07.7	S16 06.0	8 48.1	S 4 59.6	101 25.4	N22 51.9	336 44.1	S16 02.7
07	221 37.7	293 11.6	05.9	23 49.7	4 59.9	116 28.2	51.9	351 46.4	02.7
08	236 40.2	308 15.5	05.7	38 51.3	5 00.2	131 31.0	52.0	6 48.7	02.8
FRIDAY 09	251 42.7	323 19.4	. . 05.5	53 52.9	. . 00.5	146 33.9	. . 52.0	21 51.0	. . 02.8
10	266 45.1	338 23.3	05.3	68 54.5	00.9	161 36.7	52.0	36 53.2	02.8
11	281 47.6	353 27.2	05.2	83 56.1	01.2	176 39.5	52.1	51 55.5	02.9
12	296 50.1	8 31.0	S16 05.0	98 57.7	S 5 01.5	191 42.3	N22 52.1	66 57.8	S16 02.9
13	311 52.5	23 34.9	04.8	113 59.3	01.8	206 45.1	52.2	82 00.1	03.0
14	326 55.0	38 38.8	04.6	129 00.9	02.2	221 47.9	52.2	97 02.4	03.0
15	341 57.5	53 42.7	. . 04.5	144 02.4	. . 02.5	236 50.7	. . 52.2	112 04.7	. . 03.0
16	356 59.9	68 46.6	04.3	159 04.0	02.8	251 53.5	52.3	127 06.9	03.1
17	12 02.4	83 50.5	04.1	174 05.6	03.1	266 56.3	52.3	142 09.2	03.1
18	27 04.8	98 54.3	S16 03.9	189 07.2	S 5 03.4	281 59.1	N22 52.3	157 11.5	S16 03.1
19	42 07.3	113 58.2	03.8	204 08.8	03.8	297 01.9	52.4	172 13.8	03.2
20	57 09.8	129 02.1	03.6	219 10.4	04.1	312 04.7	52.4	187 16.1	03.2
21	72 12.2	144 05.9	. . 03.4	234 12.0	. . 04.4	327 07.6	. . 52.5	202 18.4	. . 03.3
22	87 14.7	159 09.8	03.3	249 13.6	04.7	342 10.4	52.5	217 20.7	03.3
23	102 17.2	174 13.7	03.1	264 15.2	05.1	357 13.2	52.5	232 22.9	03.3
18 00	117 19.6	189 17.5	S16 02.9	279 16.8	S 5 05.4	12 16.0	N22 52.6	247 25.2	S16 03.4
01	132 22.1	204 21.4	02.8	294 18.4	05.7	27 18.8	52.6	262 27.5	03.4
02	147 24.6	219 25.2	02.6	309 20.0	06.0	42 21.6	52.7	277 29.8	03.4
03	162 27.0	234 29.1	. . 02.5	324 21.6	. . 06.3	57 24.4	. . 52.7	292 32.1	. . 03.5
04	177 29.5	249 32.9	02.3	339 23.2	06.7	72 27.2	52.7	307 34.4	03.5
05	192 32.0	264 36.7	02.1	354 24.8	07.0	87 30.0	52.8	322 36.7	03.6
06	207 34.4	279 40.6	S16 02.0	9 26.4	S 5 07.3	102 32.8	N22 52.8	337 39.0	S16 03.6
07	222 36.9	294 44.4	01.8	24 28.0	07.6	117 35.6	52.8	352 41.2	03.6
SATURDAY 08	237 39.3	309 48.2	01.7	39 29.6	07.9	132 38.4	52.9	7 43.5	03.7
09	252 41.8	324 52.1	. . 01.5	54 31.2	. . 08.3	147 41.2	. . 52.9	22 45.8	. . 03.7
10	267 44.3	339 55.9	01.3	69 32.8	08.6	162 44.0	53.0	37 48.1	03.8
11	282 46.7	354 59.7	01.2	84 34.4	08.9	177 46.9	53.0	52 50.4	03.8
12	297 49.2	10 03.5	S16 01.0	99 36.0	S 5 09.2	192 49.7	N22 53.0	67 52.7	S16 03.8
13	312 51.7	25 07.4	00.9	114 37.6	09.5	207 52.5	53.1	82 55.0	03.9
14	327 54.1	40 11.2	00.7	129 39.2	09.8	222 55.3	53.1	97 57.3	03.9
15	342 56.6	55 15.0	. . 00.6	144 40.8	. . 10.2	237 58.1	. . 53.2	112 59.5	. . 03.9
16	357 59.1	70 18.8	00.4	159 42.5	10.5	253 00.9	53.2	128 01.8	04.0
17	13 01.5	85 22.6	00.3	174 44.1	10.8	268 03.7	53.2	143 04.1	04.0
18	28 04.0	100 26.4	S16 00.1	189 45.7	S 5 11.1	283 06.5	N22 53.3	158 06.4	S16 04.0
19	43 06.5	115 30.2	16 00.0	204 47.3	11.4	298 09.3	53.3	173 08.7	04.1
20	58 08.9	130 34.0	15 59.8	219 48.9	11.7	313 12.1	53.3	188 11.0	04.1
21	73 11.4	145 37.8	. . 59.7	234 50.5	. . 12.1	328 14.9	. . 53.4	203 13.3	. . 04.2
22	88 13.8	160 41.5	59.5	249 52.1	12.4	343 17.7	53.4	218 15.6	04.2
23	103 16.3	175 45.3	59.4	264 53.7	12.7	358 20.5	53.5	233 17.9	04.2
	h m								
Mer. Pass.	16 12.0	v 3.9	d 0.2	v 1.6	d 0.3	v 2.8	d 0.0	v 2.3	d 0.0

STARS

Name	SHA	Dec
	° ′	° ′
Acamar	315 17.9	S40 15.2
Achernar	335 26.5	S57 10.3
Acrux	173 08.4	S63 10.4
Adhara	255 11.8	S28 59.8
Aldebaran	290 48.6	N16 32.1
Alioth	166 20.3	N55 52.7
Alkaid	152 58.6	N49 14.3
Al Na'ir	27 43.6	S46 53.6
Alnilam	275 45.6	S 1 11.8
Alphard	217 55.4	S 8 43.4
Alphecca	126 10.8	N26 40.0
Alpheratz	357 43.2	N29 10.2
Altair	62 08.2	N 8 54.5
Ankaa	353 15.5	S42 14.0
Antares	112 26.0	S26 27.6
Arcturus	145 55.4	N19 06.4
Atria	107 27.8	S69 02.8
Avior	234 17.1	S59 33.4
Bellatrix	278 31.3	N 6 21.5
Betelgeuse	271 00.5	N 7 24.3
Canopus	263 55.4	S52 42.5
Capella	280 33.4	N46 00.6
Deneb	49 31.6	N45 20.0
Denebola	182 33.1	N14 29.4
Diphda	348 55.6	S17 54.7
Dubhe	193 50.8	N61 40.1
Elnath	278 11.7	N28 37.0
Eltanin	90 46.4	N51 29.2
Enif	33 47.0	N 9 56.5
Fomalhaut	15 23.8	S29 32.9
Gacrux	172 00.1	S57 11.3
Gienah	175 51.7	S17 37.2
Hadar	148 47.2	S60 26.1
Hamal	328 00.2	N23 31.8
Kaus Aust.	83 43.6	S34 22.5
Kochab	137 20.6	N74 05.6
Markab	13 38.1	N15 17.0
Menkar	314 14.5	N 4 08.6
Menkent	148 07.1	S36 26.1
Miaplacidus	221 38.6	S69 46.6
Mirfak	308 39.4	N49 54.7
Nunki	75 58.2	S26 16.6
Peacock	53 19.2	S56 41.3
Pollux	243 26.8	N27 59.3
Procyon	244 58.9	N 5 11.1
Rasalhague	96 06.3	N12 33.1
Regulus	207 42.8	N11 53.7
Rigel	281 11.4	S 8 11.4
Rigil Kent.	139 51.2	S60 53.2
Sabik	102 12.3	S15 44.4
Schedar	349 40.1	N56 37.1
Shaula	96 21.7	S37 06.6
Sirius	258 33.0	S16 44.4
Spica	158 30.8	S11 14.1
Suhail	222 51.6	S43 29.5
Vega	80 39.1	N38 47.9
Zuben'ubi	137 05.0	S16 05.9

	SHA	Mer. Pass.
	° ′	h m
Venus	71 23.7	11 26
Mars	162 18.1	5 25
Jupiter	254 48.1	23 11
Saturn	130 09.9	7 33

UT		SUN		MOON				
		GHA	Dec	GHA	v	Dec	d	HP
d	h	° ′	° ′	° ′	′	° ′	′	′
16	00	177 36.4	S20 59.3	0 48.4	13.1	N16 32.5	5.4	53.9
	01	192 36.2	58.8	15 20.5	13.2	16 27.1	5.5	53.9
	02	207 36.0	58.3	29 52.7	13.2	16 21.6	5.6	53.9
	03	222 35.8	57.9	44 24.9	13.2	16 16.0	5.6	53.9
	04	237 35.5	57.4	58 57.1	13.2	16 10.4	5.7	53.9
	05	252 35.3	56.9	73 29.3	13.3	16 04.7	5.7	53.9
	06	267 35.1	S20 56.4	88 01.6	13.3	N15 59.0	5.8	53.9
	07	282 34.9	56.0	102 33.9	13.3	15 53.2	5.9	53.9
T	08	297 34.7	55.5	117 06.2	13.4	15 47.3	6.0	53.9
H	09	312 34.5	55.0	131 38.6	13.4	15 41.3	6.0	53.9
U	10	327 34.3	54.5	146 11.0	13.4	15 35.3	6.1	53.9
R	11	342 34.1	54.1	160 43.4	13.4	15 29.2	6.2	53.9
S	12	357 33.8	S20 53.6	175 15.8	13.5	N15 23.0	6.2	53.9
D	13	12 33.6	53.1	189 48.3	13.5	15 16.8	6.3	53.9
A	14	27 33.4	52.6	204 20.8	13.5	15 10.5	6.4	53.9
Y	15	42 33.2	52.1	218 53.3	13.6	15 04.1	6.4	54.0
	16	57 33.0	51.7	233 25.9	13.6	14 57.7	6.5	54.0
	17	72 32.8	51.2	247 58.5	13.6	14 51.2	6.6	54.0
	18	87 32.6	S20 50.7	262 31.1	13.6	N14 44.6	6.6	54.0
	19	102 32.4	50.2	277 03.7	13.7	14 38.0	6.7	54.0
	20	117 32.2	49.7	291 36.4	13.7	14 31.3	6.7	54.0
	21	132 32.0	49.2	306 09.1	13.7	14 24.6	6.8	54.0
	22	147 31.8	48.8	320 41.8	13.8	14 17.8	6.9	54.0
	23	162 31.5	48.3	335 14.6	13.7	14 10.9	7.0	54.0
17	00	177 31.3	S20 47.8	349 47.3	13.8	N14 03.9	7.0	54.0
	01	192 31.1	47.3	4 20.1	13.9	13 56.9	7.0	54.0
	02	207 30.9	46.8	18 53.0	13.8	13 49.9	7.1	54.0
	03	222 30.7	46.3	33 25.8	13.9	13 42.8	7.2	54.0
	04	237 30.5	45.8	47 58.7	13.9	13 35.6	7.2	54.0
	05	252 30.3	45.3	62 31.6	14.0	13 28.4	7.3	54.0
	06	267 30.1	S20 44.8	77 04.6	13.9	N13 21.1	7.4	54.0
	07	282 29.9	44.3	91 37.5	14.0	13 13.7	7.4	54.0
	08	297 29.7	43.9	106 10.5	14.0	13 06.3	7.4	54.0
F	09	312 29.5	43.4	120 43.5	14.1	12 58.9	7.5	54.0
R	10	327 29.3	42.9	135 16.6	14.1	12 51.4	7.6	54.0
I	11	342 29.1	42.4	149 49.7	14.0	12 43.8	7.6	54.0
D	12	357 28.9	S20 41.9	164 22.7	14.2	N12 36.2	7.7	54.0
A	13	12 28.7	41.4	178 55.9	14.1	12 28.5	7.7	54.0
Y	14	27 28.5	40.9	193 29.0	14.2	12 20.8	7.8	54.0
	15	42 28.3	40.4	208 02.2	14.2	12 13.0	7.9	54.0
	16	57 28.1	39.9	222 35.4	14.2	12 05.1	7.9	54.0
	17	72 27.9	39.4	237 08.6	14.2	11 57.2	7.9	54.1
	18	87 27.7	S20 38.9	251 41.8	14.3	N11 49.3	8.0	54.1
	19	102 27.4	38.4	266 15.1	14.3	11 41.3	8.0	54.1
	20	117 27.2	37.9	280 48.4	14.3	11 33.3	8.1	54.1
	21	132 27.0	37.4	295 21.7	14.3	11 25.2	8.2	54.1
	22	147 26.8	36.9	309 55.0	14.3	11 17.0	8.2	54.1
	23	162 26.6	36.4	324 28.3	14.4	11 08.8	8.2	54.1
18	00	177 26.4	S20 35.9	339 01.7	14.4	N11 00.6	8.3	54.1
	01	192 26.2	35.4	353 35.1	14.4	10 52.3	8.3	54.1
	02	207 26.0	34.9	8 08.5	14.5	10 44.0	8.4	54.1
	03	222 25.8	34.4	22 42.0	14.4	10 35.6	8.4	54.1
	04	237 25.6	33.9	37 15.4	14.5	10 27.2	8.5	54.1
	05	252 25.4	33.3	51 48.9	14.5	10 18.7	8.5	54.1
	06	267 25.2	S20 32.8	66 22.4	14.5	N10 10.2	8.6	54.1
	07	282 25.1	32.3	80 55.9	14.5	10 01.6	8.6	54.1
S	08	297 24.9	31.8	95 29.4	14.6	9 53.0	8.6	54.2
A	09	312 24.7	31.3	110 03.0	14.6	9 44.4	8.7	54.2
T	10	327 24.5	30.8	124 36.6	14.5	9 35.7	8.7	54.2
U	11	342 24.3	30.3	139 10.1	14.6	9 27.0	8.8	54.2
R	12	357 24.1	S20 29.8	153 43.7	14.7	N 9 18.2	8.8	54.2
D	13	12 23.9	29.3	168 17.4	14.6	9 09.4	8.8	54.2
A	14	27 23.7	28.7	182 51.0	14.6	9 00.6	8.9	54.2
Y	15	42 23.5	28.2	197 24.6	14.7	8 51.7	8.9	54.2
	16	57 23.3	27.7	211 58.3	14.7	8 42.8	9.0	54.2
	17	72 23.1	27.2	226 32.0	14.7	8 33.8	9.0	54.2
	18	87 22.9	S20 26.7	241 05.7	14.7	N 8 24.8	9.0	54.2
	19	102 22.7	26.2	255 39.4	14.7	8 15.8	9.1	54.3
	20	117 22.5	25.7	270 13.1	14.8	8 06.7	9.1	54.3
	21	132 22.3	25.1	284 46.9	14.7	7 57.6	9.2	54.3
	22	147 22.1	24.6	299 20.6	14.8	7 48.4	9.2	54.3
	23	162 21.9	24.1	313 54.4	14.7	N 7 39.2	9.2	54.3
		SD 16.3	d 0.5	SD 14.7		14.7		14.8

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

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

Day	SUN Eqn. of Time 00h	SUN Eqn. of Time 12h	SUN Mer. Pass.	MOON Mer. Pass. Upper	MOON Mer. Pass. Lower	MOON Age	MOON Phase
d	m s	m s	h m	h m	h m	d	%
16	09 34	09 44	12 10	24 42	12 20	15	100
17	09 54	10 04	12 10	00 42	13 04	16	98
18	10 14	10 23	12 10	01 26	13 48	17	95

2014 MARCH 8, 9, 10 (SAT., SUN., MON.)

UT	ARIES	VENUS −4.7		MARS −0.7		JUPITER −2.4		SATURN +0.4	
	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
8 00	165 37.4	222 24.5	S16 15.3	319 15.9	S 7 50.4	64 14.5	N23 16.2	294 05.9	S16 17.7
01	180 39.9	237 24.7	15.1	334 18.5	50.4	79 16.9	16.2	309 08.4	17.7
02	195 42.3	252 24.9	14.9	349 21.2	50.3	94 19.4	16.2	324 10.9	17.7
03	210 44.8	267 25.1	14.7	4 23.8	50.2	109 21.8	16.2	339 13.4	17.7
04	225 47.3	282 25.4	14.5	19 26.5	50.1	124 24.3	16.2	354 15.9	17.6
05	240 49.7	297 25.6	14.3	34 29.1	50.1	139 26.7	16.2	9 18.3	17.6
06	255 52.2	312 25.8	S16 14.2	49 31.8	S 7 50.0	154 29.2	N23 16.2	24 20.8	S16 17.6
07	270 54.7	327 26.0	14.0	64 34.4	49.9	169 31.6	16.2	39 23.3	17.6
S 08	285 57.1	342 26.2	13.8	79 37.1	49.8	184 34.1	16.2	54 25.8	17.6
A 09	300 59.6	357 26.4	13.6	94 39.7	49.7	199 36.5	16.2	69 28.3	17.6
T 10	316 02.1	12 26.6	13.4	109 42.4	49.6	214 38.9	16.2	84 30.8	17.6
U 11	331 04.5	27 26.8	13.2	124 45.1	49.6	229 41.4	16.2	99 33.3	17.6
R 12	346 07.0	42 27.0	S16 13.0	139 47.7	S 7 49.5	244 43.8	N23 16.2	114 35.7	S16 17.5
D 13	1 09.5	57 27.2	12.8	154 50.4	49.4	259 46.3	16.2	129 38.2	17.5
A 14	16 11.9	72 27.4	12.6	169 53.1	49.3	274 48.7	16.2	144 40.7	17.5
Y 15	31 14.4	87 27.7	12.4	184 55.7	49.2	289 51.2	16.2	159 43.2	17.5
16	46 16.8	102 27.9	12.3	199 58.4	49.2	304 53.6	16.2	174 45.7	17.5
17	61 19.3	117 28.1	12.1	215 01.1	49.1	319 56.1	16.2	189 48.2	17.5
18	76 21.8	132 28.3	S16 11.9	230 03.7	S 7 49.0	334 58.5	N23 16.2	204 50.7	S16 17.5
19	91 24.2	147 28.5	11.7	245 06.4	48.9	350 00.9	16.2	219 53.2	17.4
20	106 26.7	162 28.7	11.5	260 09.1	48.8	5 03.4	16.2	234 55.6	17.4
21	121 29.2	177 28.9	11.3	275 11.8	48.7	20 05.8	16.2	249 58.1	17.4
22	136 31.6	192 29.1	11.1	290 14.4	48.6	35 08.3	16.2	265 00.6	17.4
23	151 34.1	207 29.2	10.9	305 17.1	48.6	50 10.7	16.2	280 03.1	17.4
9 00	166 36.6	222 29.4	S16 10.7	320 19.8	S 7 48.5	65 13.2	N23 16.2	295 05.6	S16 17.4
01	181 39.0	237 29.6	10.5	335 22.5	48.4	80 15.6	16.2	310 08.1	17.4
02	196 41.5	252 29.8	10.3	350 25.2	48.3	95 18.0	16.2	325 10.6	17.3
03	211 43.9	267 30.0	10.1	5 27.8	48.2	110 20.5	16.2	340 13.1	17.3
04	226 46.4	282 30.2	09.9	20 30.5	48.1	125 22.9	16.2	355 15.6	17.3
05	241 48.9	297 30.4	09.7	35 33.2	48.0	140 25.4	16.2	10 18.0	17.3
06	256 51.3	312 30.6	S16 09.5	50 35.9	S 7 47.9	155 27.8	N23 16.2	25 20.5	S16 17.3
07	271 53.8	327 30.8	09.3	65 38.6	47.8	170 30.2	16.2	40 23.0	17.3
08	286 56.3	342 31.0	09.0	80 41.3	47.8	185 32.7	16.2	55 25.5	17.2
S 09	301 58.7	357 31.1	08.8	95 44.0	47.7	200 35.1	16.2	70 28.0	17.2
U 10	317 01.2	12 31.3	08.6	110 46.7	47.6	215 37.5	16.2	85 30.5	17.2
N 11	332 03.7	27 31.5	08.4	125 49.3	47.5	230 40.0	16.2	100 33.0	17.2
D 12	347 06.1	42 31.7	S16 08.2	140 52.0	S 7 47.4	245 42.4	N23 16.2	115 35.5	S16 17.2
A 13	2 08.6	57 31.9	08.0	155 54.7	47.3	260 44.9	16.2	130 38.0	17.2
Y 14	17 11.1	72 32.0	07.8	170 57.4	47.2	275 47.3	16.2	145 40.5	17.2
15	32 13.5	87 32.2	07.6	186 00.1	47.1	290 49.7	16.2	160 43.0	17.1
16	47 16.0	102 32.4	07.4	201 02.8	47.0	305 52.2	16.2	175 45.4	17.1
17	62 18.4	117 32.6	07.2	216 05.5	46.9	320 54.6	16.2	190 47.9	17.1
18	77 20.9	132 32.8	S16 06.9	231 08.2	S 7 46.8	335 57.0	N23 16.2	205 50.4	S16 17.1
19	92 23.4	147 32.9	06.7	246 10.9	46.7	350 59.5	16.2	220 52.9	17.1
20	107 25.8	162 33.1	06.5	261 13.6	46.6	6 01.9	16.2	235 55.4	17.1
21	122 28.3	177 33.3	06.3	276 16.3	46.5	21 04.3	16.2	250 57.9	17.1
22	137 30.8	192 33.4	06.1	291 19.0	46.4	36 06.8	16.2	266 00.4	17.0
23	152 33.2	207 33.6	05.9	306 21.8	46.3	51 09.2	16.2	281 02.9	17.0
10 00	167 35.7	222 33.8	S16 05.6	321 24.5	S 7 46.2	66 11.6	N23 16.2	296 05.4	S16 17.0
01	182 38.2	237 33.9	05.4	336 27.2	46.2	81 14.1	16.2	311 07.9	17.0
02	197 40.6	252 34.1	05.2	351 29.9	46.1	96 16.5	16.2	326 10.4	17.0
03	212 43.1	267 34.3	05.0	6 32.6	46.0	111 18.9	16.2	341 12.9	17.0
04	227 45.6	282 34.4	04.8	21 35.3	45.9	126 21.4	16.2	356 15.4	16.9
05	242 48.0	297 34.6	04.5	36 38.0	45.8	141 23.8	16.2	11 17.9	16.9
06	257 50.5	312 34.8	S16 04.3	51 40.8	S 7 45.7	156 26.2	N23 16.3	26 20.3	S16 16.9
07	272 52.9	327 34.9	04.1	66 43.5	45.6	171 28.7	16.3	41 22.8	16.9
08	287 55.4	342 35.1	03.9	81 46.2	45.5	186 31.1	16.3	56 25.3	16.9
M 09	302 57.9	357 35.3	03.6	96 48.9	45.4	201 33.5	16.3	71 27.8	16.9
O 10	318 00.3	12 35.4	03.4	111 51.6	45.3	216 35.9	16.3	86 30.3	16.8
N 11	333 02.8	27 35.6	03.2	126 54.4	45.2	231 38.4	16.3	101 32.8	16.8
D 12	348 05.3	42 35.7	S16 03.0	141 57.1	S 7 45.1	246 40.8	N23 16.3	116 35.3	S16 16.8
A 13	3 07.7	57 35.9	02.7	156 59.8	44.9	261 43.2	16.3	131 37.8	16.8
Y 14	18 10.2	72 36.0	02.5	172 02.5	44.8	276 45.6	16.3	146 40.3	16.8
15	33 12.7	87 36.2	02.3	187 05.3	44.7	291 48.1	16.3	161 42.8	16.8
16	48 15.1	102 36.3	02.0	202 08.0	44.6	306 50.5	16.3	176 45.3	16.7
17	63 17.6	117 36.5	01.8	217 10.7	44.5	321 52.9	16.3	191 47.8	16.7
18	78 20.0	132 36.6	S16 01.6	232 13.5	S 7 44.4	336 55.4	N23 16.3	206 50.3	S16 16.7
19	93 22.5	147 36.8	01.3	247 16.2	44.3	351 57.8	16.3	221 52.8	16.7
20	108 25.0	162 36.9	01.1	262 18.9	44.2	7 00.2	16.3	236 55.3	16.7
21	123 27.4	177 37.1	00.9	277 21.7	44.1	22 02.6	16.3	251 57.8	16.7
22	138 29.9	192 37.2	00.6	292 24.4	44.0	37 05.1	16.3	267 00.3	16.7
23	153 32.4	207 37.4	00.4	307 27.1	43.9	52 07.5	16.3	282 02.8	16.6
	h m								
Mer. Pass.	12 51.5	v 0.2	d 0.2	v 2.7	d 0.1	v 2.4	d 0.0	v 2.5	d 0.0

STARS

Name	SHA	Dec
	° ′	° ′
Acamar	315 18.2	S40 15.2
Achernar	335 26.9	S57 10.1
Acrux	173 07.9	S63 10.7
Adhara	255 11.9	S28 59.9
Aldebaran	290 48.8	N16 32.1
Alioth	166 19.8	N55 52.8
Alkaid	152 58.2	N49 14.3
Al Na'ir	27 43.6	S46 53.4
Alnilam	275 45.8	S 1 11.9
Alphard	217 55.3	S 8 43.5
Alphecca	126 10.4	N26 39.9
Alpheratz	357 43.3	N29 10.1
Altair	62 07.9	N 8 54.4
Ankaa	353 15.6	S42 13.9
Antares	112 25.5	S26 27.6
Arcturus	145 55.0	N19 06.4
Atria	107 26.8	S69 02.8
Avior	234 17.3	S59 33.7
Bellatrix	278 31.4	N 6 21.5
Betelgeuse	271 00.7	N 7 24.3
Canopus	263 55.7	S52 42.7
Capella	280 33.7	N46 00.7
Deneb	49 31.4	N45 19.8
Denebola	182 32.8	N14 29.4
Diphda	348 55.7	S17 54.7
Dubhe	193 50.5	N61 40.3
Elnath	278 11.9	N28 37.0
Eltanin	90 46.0	N51 29.1
Enif	33 46.9	N 9 56.4
Fomalhaut	15 23.8	S29 32.8
Gacrux	171 59.7	S57 11.6
Gienah	175 51.4	S17 37.4
Hadar	148 46.6	S60 26.3
Hamal	328 00.4	N23 31.7
Kaus Aust.	83 43.2	S34 22.4
Kochab	137 19.5	N74 05.6
Markab	13 38.1	N15 16.9
Menkar	314 14.7	N 4 08.5
Menkent	148 06.6	S36 26.3
Miaplacidus	221 38.7	S69 46.9
Mirfak	308 39.8	N49 54.7
Nunki	75 57.8	S26 16.5
Peacock	53 18.9	S56 41.1
Pollux	243 26.9	N27 59.3
Procyon	244 59.0	N 5 11.0
Rasalhague	96 06.0	N12 33.0
Regulus	207 42.7	N11 53.6
Rigel	281 11.6	S 8 11.5
Rigil Kent.	139 50.5	S60 53.4
Sabik	102 11.9	S15 44.4
Schedar	349 40.4	N56 37.0
Shaula	96 21.2	S37 06.6
Sirius	258 33.1	S16 44.5
Spica	158 30.4	S11 14.2
Suhail	222 51.6	S43 29.8
Vega	80 38.7	N38 47.7
Zuben'ubi	137 04.6	S16 06.0

	SHA	Mer. Pass.
	° ′	h m
Venus	55 52.9	9 10
Mars	153 43.2	2 38
Jupiter	258 36.6	19 36
Saturn	128 29.0	4 19

UT	SUN GHA	SUN Dec	MOON GHA	MOON v	MOON Dec	MOON d	MOON HP
d h	° ′	° ′	° ′	′	° ′	′	′
8 00	177 16.5	S 5 00.2	95 37.8	11.1	N18 40.6	2.1	55.3
01	192 16.7	4 59.2	110 07.9	11.1	18 42.7	2.0	55.3
02	207 16.8	58.2	124 38.0	11.2	18 44.7	1.9	55.2
03	222 17.0	. . 57.2	139 08.2	11.2	18 46.6	1.8	55.2
04	237 17.1	56.3	153 38.4	11.2	18 48.4	1.7	55.2
05	252 17.3	55.3	168 08.6	11.2	18 50.1	1.6	55.2
06	267 17.4	S 4 54.3	182 38.8	11.2	N18 51.7	1.5	55.1
07	282 17.6	53.3	197 09.0	11.3	18 53.2	1.5	55.1
S 08	297 17.7	52.4	211 39.3	11.3	18 54.7	1.3	55.1
A 09	312 17.9	. . 51.4	226 09.6	11.3	18 56.0	1.2	55.1
T 10	327 18.0	50.4	240 39.9	11.3	18 57.2	1.2	55.0
U 11	342 18.2	49.4	255 10.2	11.3	18 58.4	1.0	55.0
R 12	357 18.3	S 4 48.5	269 40.5	11.4	N18 59.4	1.0	55.0
D 13	12 18.5	47.5	284 10.9	11.3	19 00.4	0.9	55.0
A 14	27 18.7	46.5	298 41.2	11.4	19 01.3	0.7	54.9
Y 15	42 18.8	. . 45.5	313 11.6	11.5	19 02.0	0.7	54.9
16	57 19.0	44.6	327 42.1	11.4	19 02.7	0.6	54.9
17	72 19.1	43.6	342 12.5	11.4	19 03.3	0.5	54.9
18	87 19.3	S 4 42.6	356 42.9	11.5	N19 03.8	0.4	54.9
19	102 19.4	41.6	11 13.4	11.5	19 04.2	0.3	54.8
20	117 19.6	40.7	25 43.9	11.6	19 04.5	0.2	54.8
21	132 19.7	. . 39.7	40 14.5	11.5	19 04.7	0.2	54.8
22	147 19.9	38.7	54 45.0	11.6	19 04.9	0.0	54.8
23	162 20.0	37.7	69 15.6	11.6	19 04.9	0.1	54.8
9 00	177 20.2	S 4 36.8	83 46.2	11.6	N19 04.8	0.1	54.7
01	192 20.4	35.8	98 16.8	11.6	19 04.7	0.2	54.7
02	207 20.5	34.8	112 47.4	11.7	19 04.5	0.4	54.7
03	222 20.7	. . 33.8	127 18.1	11.6	19 04.1	0.4	54.7
04	237 20.8	32.8	141 48.7	11.7	19 03.7	0.5	54.7
05	252 21.0	31.9	156 19.4	11.8	19 03.2	0.6	54.6
06	267 21.1	S 4 30.9	170 50.2	11.7	N19 02.6	0.7	54.6
07	282 21.3	29.9	185 20.9	11.8	19 01.9	0.8	54.6
08	297 21.5	28.9	199 51.7	11.8	19 01.1	0.8	54.6
S 09	312 21.6	. . 28.0	214 22.5	11.8	19 00.3	1.0	54.6
U 10	327 21.8	27.0	228 53.3	11.9	18 59.3	1.0	54.6
N 11	342 21.9	26.0	243 24.2	11.9	18 58.3	1.2	54.5
D 12	357 22.1	S 4 25.0	257 55.1	11.8	N18 57.1	1.2	54.5
A 13	12 22.2	24.0	272 25.9	12.0	18 55.9	1.3	54.5
Y 14	27 22.4	23.1	286 56.9	11.9	18 54.6	1.4	54.5
15	42 22.6	. . 22.1	301 27.8	12.0	18 53.2	1.5	54.5
16	57 22.7	21.1	315 58.8	12.0	18 51.7	1.6	54.5
17	72 22.9	20.1	330 29.8	12.0	18 50.1	1.6	54.4
18	87 23.0	S 4 19.2	345 00.8	12.1	N18 48.5	1.8	54.4
19	102 23.2	18.2	359 31.9	12.0	18 46.7	1.8	54.4
20	117 23.4	17.2	14 02.9	12.1	18 44.9	1.9	54.4
21	132 23.5	. . 16.2	28 34.0	12.2	18 43.0	2.0	54.4
22	147 23.7	15.2	43 05.2	12.1	18 41.0	2.1	54.4
23	162 23.8	14.3	57 36.3	12.2	18 38.9	2.2	54.4
10 00	177 24.0	S 4 13.3	72 07.5	12.2	N18 36.7	2.3	54.4
01	192 24.1	12.3	86 38.7	12.2	18 34.4	2.3	54.3
02	207 24.3	11.3	101 09.9	12.3	18 32.1	2.4	54.3
03	222 24.5	. . 10.3	115 41.2	12.3	18 29.7	2.6	54.3
04	237 24.6	09.4	130 12.5	12.3	18 27.1	2.6	54.3
05	252 24.8	08.4	144 43.8	12.3	18 24.5	2.6	54.3
06	267 24.9	S 4 07.4	159 15.1	12.4	N18 21.9	2.8	54.3
07	282 25.1	06.4	173 46.5	12.4	18 19.1	2.9	54.3
08	297 25.3	05.4	188 17.9	12.4	18 16.2	2.9	54.3
M 09	312 25.4	. . 04.5	202 49.3	12.4	18 13.3	3.0	54.3
O 10	327 25.6	03.5	217 20.7	12.5	18 10.3	3.1	54.2
N 11	342 25.8	02.5	231 52.2	12.5	18 07.2	3.2	54.2
D 12	357 25.9	S 4 01.5	246 23.7	12.5	N18 04.0	3.2	54.2
A 13	12 26.1	4 00.5	260 55.2	12.6	18 00.8	3.4	54.2
Y 14	27 26.2	3 59.6	275 26.8	12.5	17 57.4	3.4	54.2
15	42 26.4	. . 58.6	289 58.3	12.6	17 54.0	3.5	54.2
16	57 26.6	57.6	304 29.9	12.7	17 50.5	3.6	54.2
17	72 26.7	56.6	319 01.6	12.6	17 46.9	3.6	54.2
18	87 26.9	S 3 55.6	333 33.2	12.7	N17 43.3	3.8	54.2
19	102 27.0	54.7	348 04.9	12.7	17 39.5	3.8	54.2
20	117 27.2	53.7	2 36.6	12.8	17 35.7	3.9	54.2
21	132 27.4	. . 52.7	17 08.4	12.7	17 31.8	4.0	54.2
22	147 27.5	51.7	31 40.1	12.8	17 27.8	4.0	54.2
23	162 27.7	50.7	46 11.9	12.8	N17 23.8	4.1	54.2
	SD 16.1	d 1.0	SD 15.0		14.9		14.8

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Moonrise 8	Moonrise 9	Moonrise 10	Moonrise 11
°	h m	h m	h m	h m	h m	h m	h m
N 72	04 29	05 49	06 56	▭	▭	▭	09 53
N 70	04 38	05 50	06 51	07 15	07 59	09 13	10 41
68	04 46	05 51	06 46	08 04	08 50	09 55	11 11
66	04 52	05 52	06 43	08 35	09 22	10 23	11 34
64	04 58	05 53	06 40	08 58	09 46	10 44	11 52
62	05 02	05 53	06 37	09 16	10 04	11 02	12 06
60	05 06	05 54	06 35	09 32	10 20	11 16	12 19
N 58	05 09	05 54	06 33	09 44	10 33	11 28	12 29
56	05 11	05 54	06 31	09 56	10 44	11 39	12 38
54	05 14	05 55	06 30	10 06	10 54	11 48	12 46
52	05 16	05 55	06 28	10 14	11 03	11 56	12 54
50	05 17	05 55	06 27	10 22	11 11	12 04	13 00
45	05 21	05 55	06 24	10 39	11 27	12 20	13 14
N 40	05 23	05 54	06 21	10 53	11 41	12 33	13 26
35	05 25	05 54	06 19	11 04	11 53	12 44	13 36
30	05 26	05 53	06 17	11 14	12 03	12 53	13 44
20	05 26	05 52	06 14	11 32	12 21	13 10	13 59
N 10	05 25	05 49	06 10	11 47	12 36	13 24	14 12
0	05 22	05 47	06 07	12 02	12 50	13 38	14 24
S 10	05 18	05 43	06 04	12 16	13 05	13 51	14 36
20	05 13	05 38	06 00	12 32	13 20	14 06	14 49
30	05 04	05 32	05 56	12 49	13 38	14 22	15 04
35	04 58	05 28	05 54	13 00	13 48	14 32	15 13
40	04 51	05 24	05 51	13 11	14 00	14 43	15 22
45	04 43	05 18	05 48	13 25	14 13	14 56	15 34
S 50	04 32	05 11	05 44	13 42	14 30	15 12	15 47
52	04 26	05 08	05 42	13 50	14 38	15 19	15 54
54	04 20	05 04	05 40	13 59	14 47	15 27	16 01
56	04 13	05 00	05 38	14 09	14 57	15 36	16 09
58	04 05	04 55	05 35	14 21	15 08	15 47	16 18
S 60	03 56	04 49	05 32	14 34	15 21	15 58	16 28

Lat.	Sunset	Twilight Civil	Twilight Naut.	Moonset 8	Moonset 9	Moonset 10	Moonset 11
°	h m	h m	h m	h m	h m	h m	h m
N 72	17 28	18 35	19 56	▭	▭	▭	06 41
N 70	17 32	18 33	19 46	04 20	05 18	05 43	05 52
68	17 36	18 32	19 38	03 32	04 27	05 01	05 21
66	17 40	18 31	19 31	03 01	03 55	04 33	04 58
64	17 42	18 30	19 25	02 38	03 31	04 11	04 40
62	17 45	18 29	19 21	02 20	03 12	03 53	04 25
60	17 47	18 29	19 17	02 05	02 57	03 39	04 12
N 58	17 49	18 28	19 14	01 52	02 44	03 27	04 01
56	17 51	18 28	19 11	01 41	02 32	03 16	03 52
54	17 52	18 28	19 09	01 31	02 22	03 06	03 43
52	17 54	18 27	19 07	01 22	02 14	02 58	03 36
50	17 55	18 27	19 05	01 14	02 06	02 50	03 29
45	17 58	18 27	19 01	00 58	01 49	02 34	03 14
N 40	18 00	18 27	18 59	00 44	01 35	02 21	03 02
35	18 02	18 28	18 57	00 33	01 23	02 09	02 52
30	18 04	18 28	18 56	00 23	01 13	02 00	02 43
20	18 08	18 30	18 55	00 05	00 55	01 42	02 27
N 10	18 11	18 32	18 56	24 40	00 40	01 27	02 13
0	18 14	18 35	18 59	24 25	00 25	01 13	02 00
S 10	18 17	18 38	19 02	24 11	00 11	00 59	01 48
20	18 20	18 42	19 08	23 55	24 44	00 44	01 34
30	18 24	18 48	19 16	23 38	24 27	00 27	01 18
35	18 27	18 52	19 22	23 27	24 17	00 17	01 09
40	18 29	18 57	19 29	23 15	24 06	00 06	00 58
45	18 32	19 02	19 37	23 01	23 52	24 45	00 45
S 50	18 36	19 09	19 48	22 44	23 35	24 30	00 30
52	18 38	19 12	19 53	22 36	23 27	24 23	00 23
54	18 40	19 16	19 59	22 27	23 19	24 15	00 15
56	18 42	19 20	20 06	22 17	23 09	24 06	00 06
58	18 45	19 25	20 14	22 06	22 58	23 56	25 00
S 60	18 47	19 30	20 23	21 52	22 45	23 45	24 50

Day	SUN Eqn. of Time 00h	SUN Eqn. of Time 12h	SUN Mer. Pass.	MOON Mer. Pass. Upper	MOON Mer. Pass. Lower	MOON Age	MOON Phase
d	m s	m s	h m	h m	h m	d	%
8	10 54	10 47	12 11	18 14	05 49	07	50
9	10 39	10 32	12 11	19 02	06 38	08	59
10	10 24	10 17	12 10	19 49	07 26	09	68

2014 MAY 10, 11, 12 (SAT., SUN., MON.)

UT	ARIES	VENUS −4.1		MARS −0.9		JUPITER −2.0		SATURN +0.1	
	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
10 00	227 43.1	219 47.6	N 1 37.1	38 20.6	S 2 43.6	119 54.5	N22 44.3	359 23.8	S15 21.9
01	242 45.6	234 47.4	38.1	53 23.4	43.6	134 56.5	44.2	14 26.4	21.8
02	257 48.0	249 47.2	39.2	68 26.2	43.5	149 58.5	44.2	29 29.1	21.8
03	272 50.5	264 47.0	40.2	83 29.0	43.5	165 00.6	44.2	44 31.7	21.7
04	287 53.0	279 46.8	41.3	98 31.8	43.5	180 02.6	44.1	59 34.4	21.7
05	302 55.4	294 46.6	42.3	113 34.6	43.4	195 04.6	44.1	74 37.0	21.6
06	317 57.9	309 46.4	N 1 43.4	128 37.4	S 2 43.4	210 06.6	N22 44.0	89 39.7	S15 21.6
07	333 00.4	324 46.2	44.4	143 40.2	43.4	225 08.6	44.0	104 42.3	21.5
SATURDAY 08	348 02.8	339 46.0	45.5	158 43.0	43.4	240 10.6	43.9	119 45.0	21.5
09	3 05.3	354 45.8	46.5	173 45.8	43.3	255 12.7	43.9	134 47.6	21.4
10	18 07.8	9 45.6	47.6	188 48.6	43.3	270 14.7	43.8	149 50.3	21.4
11	33 10.2	24 45.4	48.6	203 51.4	43.3	285 16.7	43.8	164 52.9	21.3
12	48 12.7	39 45.2	N 1 49.7	218 54.2	S 2 43.3	300 18.7	N22 43.7	179 55.6	S15 21.3
13	63 15.2	54 45.0	50.7	233 57.0	43.2	315 20.7	43.7	194 58.2	21.2
14	78 17.6	69 44.8	51.8	248 59.8	43.2	330 22.8	43.6	210 00.9	21.2
15	93 20.1	84 44.6	52.8	264 02.6	43.2	345 24.8	43.6	225 03.5	21.1
16	108 22.5	99 44.3	53.9	279 05.4	43.2	0 26.8	43.5	240 06.2	21.1
17	123 25.0	114 44.1	54.9	294 08.2	43.1	15 28.8	43.5	255 08.8	21.0
18	138 27.5	129 43.9	N 1 56.0	309 11.0	S 2 43.1	30 30.8	N22 43.4	270 11.5	S15 21.0
19	153 29.9	144 43.7	57.0	324 13.8	43.1	45 32.8	43.4	285 14.2	20.9
20	168 32.4	159 43.5	58.1	339 16.6	43.1	60 34.8	43.3	300 16.8	20.9
21	183 34.9	174 43.3	1 59.1	354 19.3	43.1	75 36.9	43.3	315 19.5	20.8
22	198 37.3	189 43.1	2 00.2	9 22.1	43.0	90 38.9	43.2	330 22.1	20.8
23	213 39.8	204 42.9	01.2	24 24.9	43.0	105 40.9	43.2	345 24.8	20.7
11 00	228 42.3	219 42.7	N 2 02.3	39 27.7	S 2 43.0	120 42.9	N22 43.1	0 27.4	S15 20.7
01	243 44.7	234 42.5	03.3	54 30.5	43.0	135 44.9	43.1	15 30.1	20.6
02	258 47.2	249 42.3	04.4	69 33.2	43.0	150 46.9	43.0	30 32.7	20.6
03	273 49.7	264 42.1	05.4	84 36.0	43.0	165 49.0	43.0	45 35.4	20.6
04	288 52.1	279 41.9	06.5	99 38.8	42.9	180 51.0	42.9	60 38.0	20.5
05	303 54.6	294 41.7	07.5	114 41.6	42.9	195 53.0	42.9	75 40.7	20.5
06	318 57.0	309 41.5	N 2 08.6	129 44.4	S 2 42.9	210 55.0	N22 42.8	90 43.3	S15 20.4
07	333 59.5	324 41.3	09.6	144 47.1	42.9	225 57.0	42.8	105 46.0	20.4
08	349 02.0	339 41.1	10.7	159 49.9	42.9	240 59.0	42.7	120 48.6	20.3
SUNDAY 09	4 04.4	354 40.9	11.7	174 52.7	42.9	256 01.0	42.7	135 51.3	20.3
10	19 06.9	9 40.7	12.8	189 55.4	42.8	271 03.1	42.6	150 53.9	20.2
11	34 09.4	24 40.4	13.8	204 58.2	42.8	286 05.1	42.6	165 56.6	20.2
12	49 11.8	39 40.2	N 2 14.9	220 01.0	S 2 42.8	301 07.1	N22 42.5	180 59.2	S15 20.1
13	64 14.3	54 40.0	15.9	235 03.7	42.8	316 09.1	42.5	196 01.9	20.1
14	79 16.8	69 39.8	17.0	250 06.5	42.8	331 11.1	42.4	211 04.5	20.0
15	94 19.2	84 39.6	18.0	265 09.3	42.8	346 13.1	42.4	226 07.2	20.0
16	109 21.7	99 39.4	19.1	280 12.0	42.8	1 15.1	42.3	241 09.8	19.9
17	124 24.1	114 39.2	20.1	295 14.8	42.8	16 17.1	42.3	256 12.5	19.9
18	139 26.6	129 39.0	N 2 21.2	310 17.5	S 2 42.8	31 19.2	N22 42.2	271 15.2	S15 19.8
19	154 29.1	144 38.8	22.2	325 20.3	42.8	46 21.2	42.2	286 17.8	19.8
20	169 31.5	159 38.6	23.3	340 23.0	42.7	61 23.2	42.1	301 20.5	19.7
21	184 34.0	174 38.4	24.3	355 25.8	42.7	76 25.2	42.1	316 23.1	19.7
22	199 36.5	189 38.2	25.4	10 28.5	42.7	91 27.2	42.0	331 25.8	19.6
23	214 38.9	204 38.0	26.4	25 31.3	42.7	106 29.2	42.0	346 28.4	19.6
12 00	229 41.4	219 37.7	N 2 27.5	40 34.1	S 2 42.7	121 31.2	N22 41.9	1 31.1	S15 19.5
01	244 43.9	234 37.5	28.6	55 36.8	42.7	136 33.2	41.9	16 33.7	19.5
02	259 46.3	249 37.3	29.6	70 39.5	42.7	151 35.2	41.8	31 36.4	19.4
03	274 48.8	264 37.1	30.7	85 42.3	42.7	166 37.2	41.8	46 39.0	19.4
04	289 51.3	279 36.9	31.7	100 45.0	42.7	181 39.3	41.7	61 41.7	19.3
05	304 53.7	294 36.7	32.8	115 47.8	42.7	196 41.3	41.7	76 44.3	19.3
06	319 56.2	309 36.5	N 2 33.8	130 50.5	S 2 42.7	211 43.3	N22 41.6	91 47.0	S15 19.2
07	334 58.6	324 36.3	34.9	145 53.3	42.7	226 45.3	41.6	106 49.6	19.2
08	350 01.1	339 36.1	35.9	160 56.0	42.7	241 47.3	41.5	121 52.3	19.2
MONDAY 09	5 03.6	354 35.9	37.0	175 58.7	42.7	256 49.3	41.5	136 54.9	19.1
10	20 06.0	9 35.6	38.0	191 01.5	42.7	271 51.3	41.4	151 57.6	19.1
11	35 08.5	24 35.4	39.1	206 04.2	42.7	286 53.3	41.4	167 00.2	19.0
12	50 11.0	39 35.2	N 2 40.1	221 07.0	S 2 42.7	301 55.3	N22 41.3	182 02.9	S15 19.0
13	65 13.4	54 35.0	41.2	236 09.7	42.7	316 57.3	41.3	197 05.5	18.9
14	80 15.9	69 34.8	42.2	251 12.4	42.7	331 59.4	41.2	212 08.2	18.9
15	95 18.4	84 34.6	43.3	266 15.1	42.7	347 01.4	41.2	227 10.8	18.8
16	110 20.8	99 34.4	44.3	281 17.9	42.7	2 03.4	41.1	242 13.5	18.8
17	125 23.3	114 34.2	45.4	296 20.6	42.7	17 05.4	41.1	257 16.2	18.7
18	140 25.8	129 34.0	N 2 46.5	311 23.3	S 2 42.7	32 07.4	N22 41.0	272 18.8	S15 18.7
19	155 28.2	144 33.7	47.5	326 26.1	42.7	47 09.4	41.0	287 21.5	18.6
20	170 30.7	159 33.5	48.6	341 28.8	42.7	62 11.4	40.9	302 24.1	18.6
21	185 33.1	174 33.3	49.6	356 31.5	42.7	77 13.4	40.9	317 26.8	18.5
22	200 35.6	189 33.1	50.7	11 34.2	42.7	92 15.4	40.8	332 29.4	18.5
23	215 38.1	204 32.9	51.7	26 36.9	42.7	107 17.4	40.8	347 32.1	18.4
	h m								
Mer. Pass.	8 43.7	v −0.2	d 1.1	v 2.8	d 0.0	v 2.0	d 0.0	v 2.7	d 0.0

STARS

Name	SHA	Dec
	° ′	° ′
Acamar	315 18.3	S40 15.0
Achernar	335 27.0	S57 09.8
Acrux	173 08.0	S63 11.0
Adhara	255 12.3	S28 59.9
Aldebaran	290 49.0	N16 32.1
Alioth	166 19.8	N55 53.0
Alkaid	152 58.0	N49 14.6
Al Na'ir	27 43.1	S46 53.2
Alnilam	275 46.0	S 1 11.8
Alphard	217 55.5	S 8 43.5
Alphecca	126 10.1	N26 40.0
Alpheratz	357 43.1	N29 10.0
Altair	62 07.5	N 8 54.4
Ankaa	353 15.5	S42 13.6
Antares	112 25.1	S26 27.7
Arcturus	145 54.9	N19 06.5
Atria	107 25.9	S69 02.9
Avior	234 17.9	S59 33.8
Bellatrix	278 31.6	N 6 21.5
Betelgeuse	271 00.9	N 7 24.3
Canopus	263 56.3	S52 42.6
Capella	280 34.0	N46 00.6
Deneb	49 30.9	N45 19.8
Denebola	182 32.9	N14 29.4
Diphda	348 55.6	S17 54.5
Dubhe	193 50.8	N61 40.5
Elnath	278 12.2	N28 37.0
Eltanin	90 45.4	N51 29.2
Enif	33 46.5	N 9 56.5
Fomalhaut	15 23.5	S29 32.6
Gacrux	171 59.7	S57 11.9
Gienah	175 51.4	S17 37.5
Hadar	148 46.3	S60 26.6
Hamal	328 00.4	N23 31.6
Kaus Aust.	83 42.7	S34 22.4
Kochab	137 19.0	N74 05.9
Markab	13 37.8	N15 16.9
Menkar	314 14.7	N 4 08.6
Menkent	148 06.4	S36 26.5
Miaplacidus	221 39.5	S69 47.0
Mirfak	308 39.9	N49 54.5
Nunki	75 57.3	S26 16.5
Peacock	53 18.2	S56 40.9
Pollux	243 27.2	N27 59.3
Procyon	244 59.3	N 5 11.0
Rasalhague	96 05.6	N12 33.0
Regulus	207 42.8	N11 53.7
Rigel	281 11.8	S 8 11.4
Rigil Kent.	139 50.1	S60 53.6
Sabik	102 11.5	S15 44.4
Schedar	349 40.2	N56 36.7
Shaula	96 20.7	S37 06.6
Sirius	258 33.4	S16 44.5
Spica	158 30.3	S11 14.3
Suhail	222 52.0	S43 29.9
Vega	80 38.2	N38 47.8
Zuben'ubi	137 04.4	S16 06.1

	SHA	Mer. Pass.
	° ′	h m
Venus	351 00.5	9 21
Mars	170 45.4	21 18
Jupiter	252 00.7	15 55
Saturn	131 45.2	23 54

UT	SUN GHA	SUN Dec	MOON GHA	MOON v	MOON Dec	MOON d	MOON HP
d h	° ′	° ′	° ′	′	° ′	′	′
10 00	180 53.8	N17 32.5	57 12.3	14.3	N 0 37.3	10.0	55.3
01	195 53.8	33.2	71 45.6	14.3	0 27.3	10.0	55.3
02	210 53.8	33.8	86 18.9	14.2	0 17.3	10.1	55.3
03	225 53.8	34.5	100 52.1	14.2	N 0 07.2	10.0	55.4
04	240 53.9	35.1	115 25.3	14.2	S 0 02.8	10.1	55.4
05	255 53.9	35.8	129 58.5	14.1	0 12.9	10.1	55.4
06	270 53.9	N17 36.4	144 31.6	14.1	S 0 23.0	10.1	55.4
07	285 53.9	37.1	159 04.7	14.1	0 33.1	10.0	55.5
08	300 54.0	37.8	173 37.8	14.0	0 43.1	10.1	55.5
09	315 54.0	38.4	188 10.8	14.1	0 53.2	10.1	55.5
10	330 54.0	39.1	202 43.9	13.9	1 03.3	10.2	55.5
11	345 54.0	39.7	217 16.8	14.0	1 13.5	10.1	55.6
12	0 54.0	N17 40.4	231 49.8	13.9	S 1 23.6	10.1	55.6
13	15 54.1	41.0	246 22.7	13.9	1 33.7	10.1	55.6
14	30 54.1	41.7	260 55.6	13.8	1 43.8	10.1	55.7
15	45 54.1	42.3	275 28.4	13.8	1 53.9	10.2	55.7
16	60 54.1	43.0	290 01.2	13.8	2 04.1	10.1	55.7
17	75 54.2	43.6	304 34.0	13.8	2 14.2	10.1	55.7
18	90 54.2	N17 44.3	319 06.8	13.6	S 2 24.3	10.1	55.8
19	105 54.2	44.9	333 39.4	13.7	2 34.4	10.2	55.8
20	120 54.2	45.6	348 12.1	13.6	2 44.6	10.1	55.8
21	135 54.2	46.2	2 44.7	13.6	2 54.7	10.1	55.8
22	150 54.3	46.9	17 17.3	13.5	3 04.8	10.1	55.9
23	165 54.3	47.5	31 49.8	13.5	3 14.9	10.2	55.9
11 00	180 54.3	N17 48.1	46 22.3	13.5	S 3 25.1	10.1	55.9
01	195 54.3	48.8	60 54.8	13.4	3 35.2	10.1	56.0
02	210 54.3	49.4	75 27.2	13.3	3 45.3	10.1	56.0
03	225 54.4	50.1	89 59.5	13.3	3 55.4	10.1	56.0
04	240 54.4	50.7	104 31.8	13.3	4 05.5	10.1	56.0
05	255 54.4	51.4	119 04.1	13.2	4 15.6	10.0	56.1
06	270 54.4	N17 52.0	133 36.3	13.2	S 4 25.6	10.1	56.1
07	285 54.4	52.6	148 08.5	13.1	4 35.7	10.1	56.1
08	300 54.5	53.3	162 40.6	13.1	4 45.8	10.0	56.2
09	315 54.5	53.9	177 12.7	13.0	4 55.8	10.1	56.2
10	330 54.5	54.6	191 44.7	13.0	5 05.9	10.0	56.2
11	345 54.5	55.2	206 16.7	12.9	5 15.9	10.0	56.2
12	0 54.5	N17 55.8	220 48.6	12.9	S 5 25.9	10.0	56.3
13	15 54.5	56.5	235 20.5	12.8	5 35.9	10.0	56.3
14	30 54.6	57.1	249 52.3	12.8	5 45.9	9.9	56.3
15	45 54.6	57.8	264 24.1	12.7	5 55.8	10.0	56.4
16	60 54.6	58.4	278 55.8	12.7	6 05.8	9.9	56.4
17	75 54.6	59.0	293 27.5	12.6	6 15.7	9.9	56.4
18	90 54.6	N17 59.7	307 59.1	12.6	S 6 25.6	9.9	56.5
19	105 54.6	18 00.3	322 30.7	12.5	6 35.5	9.9	56.5
20	120 54.6	00.9	337 02.2	12.4	6 45.4	9.9	56.5
21	135 54.7	01.6	351 33.6	12.4	6 55.3	9.8	56.5
22	150 54.7	02.2	6 05.0	12.3	7 05.1	9.8	56.6
23	165 54.7	02.8	20 36.3	12.3	7 14.9	9.8	56.6
12 00	180 54.7	N18 03.5	35 07.6	12.2	S 7 24.7	9.7	56.6
01	195 54.7	04.1	49 38.8	12.2	7 34.4	9.8	56.7
02	210 54.7	04.7	64 10.0	12.1	7 44.2	9.7	56.7
03	225 54.7	05.4	78 41.1	12.0	7 53.9	9.6	56.7
04	240 54.8	06.0	93 12.1	12.0	8 03.5	9.7	56.8
05	255 54.8	06.6	107 43.1	11.9	8 13.2	9.6	56.8
06	270 54.8	N18 07.3	122 14.0	11.8	S 8 22.8	9.6	56.8
07	285 54.8	07.9	136 44.8	11.8	8 32.4	9.6	56.8
08	300 54.8	08.5	151 15.6	11.7	8 42.0	9.5	56.9
09	315 54.8	09.2	165 46.3	11.7	8 51.5	9.5	56.9
10	330 54.8	09.8	180 17.0	11.6	9 01.0	9.4	56.9
11	345 54.8	10.4	194 47.6	11.5	9 10.4	9.4	57.0
12	0 54.8	N18 11.0	209 18.1	11.4	S 9 19.8	9.4	57.0
13	15 54.9	11.7	223 48.5	11.4	9 29.2	9.4	57.0
14	30 54.9	12.3	238 18.9	11.4	9 38.6	9.3	57.1
15	45 54.9	12.9	252 49.3	11.2	9 47.9	9.3	57.1
16	60 54.9	13.5	267 19.5	11.2	9 57.2	9.2	57.1
17	75 54.9	14.2	281 49.7	11.2	10 06.4	9.2	57.2
18	90 54.9	N18 14.8	296 19.9	11.0	S10 15.6	9.1	57.2
19	105 54.9	15.4	310 49.9	11.0	10 24.7	9.1	57.2
20	120 54.9	16.0	325 19.9	10.9	10 33.8	9.1	57.2
21	135 54.9	16.6	339 49.8	10.9	10 42.9	9.0	57.3
22	150 54.9	17.3	354 19.7	10.8	10 51.9	8.9	57.3
23	165 55.0	17.9	8 49.5	10.7	S11 00.8	8.9	57.3
	SD 15.9	d 0.6	SD 15.1		15.3		15.5

SATURDAY

SUNDAY

MONDAY

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

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

Day	SUN Eqn. of Time 00h	SUN Eqn. of Time 12h	SUN Mer. Pass.	MOON Mer. Pass. Upper	MOON Mer. Pass. Lower	MOON Age	MOON Phase
d	m s	m s	h m	h m	h m	d	%
10	03 35	03 36	11 56	20 49	08 26	11	80
11	03 37	03 38	11 56	21 35	09 12	12	88
12	03 39	03 39	11 56	22 23	09 59	13	94

2014 MAY 13, 14, 15 (TUES., WED., THURS.)

UT	ARIES	VENUS −4.1		MARS −0.9		JUPITER −1.9		SATURN +0.1	
	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
13 00	230 40.5	219 32.7	N 2 52.8	41 39.7	S 2 42.7	122 19.4	N22 40.7	2 34.7	S15 18.4
01	245 43.0	234 32.5	53.8	56 42.4	42.7	137 21.4	40.7	17 37.4	18.3
02	260 45.5	249 32.3	54.9	71 45.1	42.8	152 23.4	40.6	32 40.0	18.3
03	275 47.9	264 32.0	. . 55.9	86 47.8	. . 42.8	167 25.4	. . 40.6	47 42.7	. . 18.2
04	290 50.4	279 31.8	57.0	101 50.5	42.8	182 27.5	40.5	62 45.3	18.2
05	305 52.9	294 31.6	58.0	116 53.2	42.8	197 29.5	40.5	77 48.0	18.1
06	320 55.3	309 31.4	N 2 59.1	131 56.0	S 2 42.8	212 31.5	N22 40.4	92 50.6	S15 18.1
07	335 57.8	324 31.2	3 00.1	146 58.7	42.8	227 33.5	40.4	107 53.3	18.0
08	351 00.2	339 31.0	01.2	162 01.4	42.8	242 35.5	40.3	122 55.9	18.0
09	6 02.7	354 30.8	. . 02.3	177 04.1	. . 42.8	257 37.5	. . 40.3	137 58.6	. . 18.0
10	21 05.2	9 30.5	03.3	192 06.8	42.8	272 39.5	40.2	153 01.2	17.9
11	36 07.6	24 30.3	04.4	207 09.5	42.8	287 41.5	40.2	168 03.9	17.9
12	51 10.1	39 30.1	N 3 05.4	222 12.2	S 2 42.9	302 43.5	N22 40.1	183 06.5	S15 17.8
13	66 12.6	54 29.9	06.5	237 14.9	42.9	317 45.5	40.1	198 09.2	17.8
14	81 15.0	69 29.7	07.5	252 17.6	42.9	332 47.5	40.0	213 11.8	17.7
15	96 17.5	84 29.5	. . 08.6	267 20.3	. . 42.9	347 49.5	. . 40.0	228 14.5	. . 17.7
16	111 20.0	99 29.3	09.6	282 23.0	42.9	2 51.5	39.9	243 17.2	17.6
17	126 22.4	114 29.0	10.7	297 25.7	42.9	17 53.5	39.9	258 19.8	17.6
18	141 24.9	129 28.8	N 3 11.7	312 28.4	S 2 42.9	32 55.5	N22 39.8	273 22.5	S15 17.5
19	156 27.4	144 28.6	12.8	327 31.1	43.0	47 57.5	39.8	288 25.1	17.5
20	171 29.8	159 28.4	13.9	342 33.8	43.0	62 59.5	39.7	303 27.8	17.4
21	186 32.3	174 28.2	. . 14.9	357 36.5	. . 43.0	78 01.5	. . 39.7	318 30.4	. . 17.4
22	201 34.7	189 28.0	16.0	12 39.2	43.0	93 03.5	39.6	333 33.1	17.3
23	216 37.2	204 27.7	17.0	27 41.8	43.0	108 05.5	39.6	348 35.7	17.3
14 00	231 39.7	219 27.5	N 3 18.1	42 44.5	S 2 43.1	123 07.5	N22 39.5	3 38.4	S15 17.2
01	246 42.1	234 27.3	19.1	57 47.2	43.1	138 09.5	39.5	18 41.0	17.2
02	261 44.6	249 27.1	20.2	72 49.9	43.1	153 11.5	39.4	33 43.7	17.1
03	276 47.1	264 26.9	. . 21.2	87 52.6	. . 43.1	168 13.5	. . 39.3	48 46.3	. . 17.1
04	291 49.5	279 26.7	22.3	102 55.3	43.1	183 15.6	39.3	63 49.0	17.0
05	306 52.0	294 26.4	23.3	117 58.0	43.2	198 17.6	39.2	78 51.6	17.0
06	321 54.5	309 26.2	N 3 24.4	133 00.6	S 2 43.2	213 19.6	N22 39.2	93 54.3	S15 16.9
07	336 56.9	324 26.0	25.5	148 03.3	43.2	228 21.6	39.1	108 56.9	16.9
08	351 59.4	339 25.8	26.5	163 06.0	43.2	243 23.6	39.1	123 59.6	16.9
09	7 01.9	354 25.6	. . 27.6	178 08.7	. . 43.2	258 25.6	. . 39.0	139 02.2	. . 16.8
10	22 04.3	9 25.3	28.6	193 11.3	43.3	273 27.6	39.0	154 04.9	16.8
11	37 06.8	24 25.1	29.7	208 14.0	43.3	288 29.6	38.9	169 07.5	16.7
12	52 09.2	39 24.9	N 3 30.7	223 16.7	S 2 43.3	303 31.6	N22 38.9	184 10.2	S15 16.7
13	67 11.7	54 24.7	31.8	238 19.4	43.3	318 33.6	38.8	199 12.8	16.6
14	82 14.2	69 24.5	32.8	253 22.0	43.4	333 35.6	38.8	214 15.5	16.6
15	97 16.6	84 24.2	. . 33.9	268 24.7	. . 43.4	348 37.6	. . 38.7	229 18.1	. . 16.5
16	112 19.1	99 24.0	34.9	283 27.4	43.4	3 39.6	38.7	244 20.8	16.5
17	127 21.6	114 23.8	36.0	298 30.0	43.5	18 41.6	38.6	259 23.4	16.4
18	142 24.0	129 23.6	N 3 37.1	313 32.7	S 2 43.5	33 43.6	N22 38.6	274 26.1	S15 16.4
19	157 26.5	144 23.4	38.1	328 35.4	43.5	48 45.6	38.5	289 28.7	16.3
20	172 29.0	159 23.1	39.2	343 38.0	43.5	63 47.6	38.5	304 31.4	16.3
21	187 31.4	174 22.9	. . 40.2	358 40.7	. . 43.6	78 49.6	. . 38.4	319 34.1	. . 16.2
22	202 33.9	189 22.7	41.3	13 43.3	43.6	93 51.6	38.4	334 36.7	16.2
23	217 36.3	204 22.5	42.3	28 46.0	43.6	108 53.6	38.3	349 39.4	16.1
15 00	232 38.8	219 22.3	N 3 43.4	43 48.7	S 2 43.7	123 55.6	N22 38.2	4 42.0	S15 16.1
01	247 41.3	234 22.0	44.4	58 51.3	43.7	138 57.6	38.2	19 44.7	16.0
02	262 43.7	249 21.8	45.5	73 54.0	43.7	153 59.6	38.1	34 47.3	16.0
03	277 46.2	264 21.6	. . 46.5	88 56.6	. . 43.8	169 01.6	. . 38.1	49 50.0	. . 15.9
04	292 48.7	279 21.4	47.6	103 59.3	43.8	184 03.6	38.0	64 52.6	15.9
05	307 51.1	294 21.1	48.7	119 01.9	43.8	199 05.6	38.0	79 55.3	15.9
06	322 53.6	309 20.9	N 3 49.7	134 04.6	S 2 43.9	214 07.6	N22 37.9	94 57.9	S15 15.8
07	337 56.1	324 20.7	50.8	149 07.2	43.9	229 09.5	37.9	110 00.6	15.8
08	352 58.5	339 20.5	51.8	164 09.9	43.9	244 11.5	37.8	125 03.2	15.7
09	8 01.0	354 20.3	. . 52.9	179 12.5	. . 44.0	259 13.5	. . 37.8	140 05.9	. . 15.7
10	23 03.5	9 20.0	53.9	194 15.2	44.0	274 15.5	37.7	155 08.5	15.6
11	38 05.9	24 19.8	55.0	209 17.8	44.0	289 17.5	37.7	170 11.2	15.6
12	53 08.4	39 19.6	N 3 56.0	224 20.4	S 2 44.1	304 19.5	N22 37.6	185 13.8	S15 15.5
13	68 10.8	54 19.4	57.1	239 23.1	44.1	319 21.5	37.6	200 16.5	15.5
14	83 13.3	69 19.1	58.2	254 25.7	44.1	334 23.5	37.5	215 19.1	15.4
15	98 15.8	84 18.9	3 59.2	269 28.4	. . 44.2	349 25.5	. . 37.4	230 21.8	. . 15.4
16	113 18.2	99 18.7	4 00.3	284 31.0	44.2	4 27.5	37.4	245 24.4	15.3
17	128 20.7	114 18.5	01.3	299 33.6	44.3	19 29.5	37.3	260 27.1	15.3
18	143 23.2	129 18.2	N 4 02.4	314 36.3	S 2 44.3	34 31.5	N22 37.3	275 29.7	S15 15.2
19	158 25.6	144 18.0	03.4	329 38.9	44.3	49 33.5	37.2	290 32.4	15.2
20	173 28.1	159 17.8	04.5	344 41.5	44.4	64 35.5	37.2	305 35.0	15.1
21	188 30.6	174 17.6	. . 05.5	359 44.2	. . 44.4	79 37.5	. . 37.1	320 37.7	. . 15.1
22	203 33.0	189 17.3	06.6	14 46.8	44.5	94 39.5	37.1	335 40.3	15.0
23	218 35.5	204 17.1	07.6	29 49.4	44.5	109 41.5	37.0	350 43.0	15.0
	h m								
Mer. Pass.	8 32.0	v −0.2	d 1.1	v 2.7	d 0.0	v 2.0	d 0.1	v 2.7	d 0.0

TUESDAY

WEDNESDAY

THURSDAY

STARS

Name	SHA	Dec
	° ′	° ′
Acamar	315 18.3	S40 15.0
Achernar	335 26.9	S57 09.8
Acrux	173 08.0	S63 11.0
Adhara	255 12.3	S28 59.9
Aldebaran	290 49.0	N16 32.1
Alioth	166 19.8	N55 53.0
Alkaid	152 58.0	N49 14.6
Al Na'ir	27 43.1	S46 53.2
Alnilam	275 46.0	S 1 11.8
Alphard	217 55.5	S 8 43.5
Alphecca	126 10.1	N26 40.0
Alpheratz	357 43.0	N29 10.0
Altair	62 07.5	N 8 54.4
Ankaa	353 15.4	S42 13.5
Antares	112 25.1	S26 27.7
Arcturus	145 54.9	N19 06.5
Atria	107 25.8	S69 02.9
Avior	234 17.9	S59 33.8
Bellatrix	278 31.7	N 6 21.5
Betelgeuse	271 00.9	N 7 24.3
Canopus	263 56.3	S52 42.6
Capella	280 34.0	N46 00.6
Deneb	49 30.9	N45 19.8
Denebola	182 32.9	N14 29.4
Diphda	348 55.5	S17 54.5
Dubhe	193 50.8	N61 40.6
Elnath	278 12.2	N28 37.0
Eltanin	90 45.4	N51 29.2
Enif	33 46.5	N 9 56.5
Fomalhaut	15 23.5	S29 32.6
Gacrux	171 59.7	S57 11.9
Gienah	175 51.4	S17 37.5
Hadar	148 46.3	S60 26.6
Hamal	328 00.4	N23 31.6
Kaus Aust.	83 42.7	S34 22.4
Kochab	137 19.0	N74 05.9
Markab	13 37.8	N15 16.9
Menkar	314 14.7	N 4 08.6
Menkent	148 06.4	S36 26.5
Miaplacidus	221 39.5	S69 47.0
Mirfak	308 39.9	N49 54.5
Nunki	75 57.3	S26 16.5
Peacock	53 18.2	S56 40.9
Pollux	243 27.2	N27 59.3
Procyon	244 59.3	N 5 11.0
Rasalhague	96 05.6	N12 33.1
Regulus	207 42.8	N11 53.7
Rigel	281 11.8	S 8 11.4
Rigil Kent.	139 50.1	S60 53.7
Sabik	102 11.5	S15 44.4
Schedar	349 40.1	N56 36.7
Shaula	96 20.7	S37 06.6
Sirius	258 33.4	S16 44.5
Spica	158 30.3	S11 14.3
Suhail	222 52.0	S43 29.9
Vega	80 38.2	N38 47.8
Zuben'ubi	137 04.4	S16 06.1

	SHA	Mer. Pass.
	° ′	h m
Venus	347 47.8	9 22
Mars	171 04.9	21 05
Jupiter	251 27.9	15 45
Saturn	131 58.7	23 41

UT	SUN GHA	SUN Dec	MOON GHA	MOON v	MOON Dec	MOON d	MOON HP
d h	° ′	° ′	° ′	′	° ′	′	′
13 00	180 55.0	N18 18.5	23 19.2	10.6	S11 09.7	8.9	57.4
01	195 55.0	19.1	37 48.8	10.6	11 18.6	8.8	57.4
02	210 55.0	19.7	52 18.4	10.5	11 27.4	8.8	57.4
03	225 55.0	20.4	66 47.9	10.4	11 36.2	8.7	57.5
04	240 55.0	21.0	81 17.3	10.4	11 44.9	8.6	57.5
05	255 55.0	21.6	95 46.7	10.3	11 53.5	8.6	57.5
06	270 55.0	N18 22.2	110 16.0	10.2	S12 02.1	8.6	57.6
07	285 55.0	22.8	124 45.2	10.1	12 10.7	8.5	57.6
08	300 55.0	23.5	139 14.3	10.1	12 19.2	8.4	57.6
09	315 55.0	24.1	153 43.4	10.0	12 27.6	8.4	57.6
10	330 55.0	24.7	168 12.4	9.9	12 36.0	8.3	57.7
11	345 55.0	25.3	182 41.3	9.9	12 44.3	8.2	57.7
12	0 55.0	N18 25.9	197 10.2	9.8	S12 52.5	8.2	57.7
13	15 55.0	26.5	211 39.0	9.7	13 00.7	8.1	57.8
14	30 55.0	27.1	226 07.7	9.6	13 08.8	8.1	57.8
15	45 55.1	27.7	240 36.3	9.6	13 16.9	8.0	57.8
16	60 55.1	28.4	255 04.9	9.5	13 24.9	7.9	57.8
17	75 55.1	29.0	269 33.4	9.4	13 32.8	7.9	57.9
18	90 55.1	N18 29.6	284 01.8	9.3	S13 40.7	7.7	57.9
19	105 55.1	30.2	298 30.1	9.3	13 48.4	7.8	57.9
20	120 55.1	30.8	312 58.4	9.2	13 56.2	7.6	58.0
21	135 55.1	31.4	327 26.6	9.1	14 03.8	7.6	58.0
22	150 55.1	32.0	341 54.7	9.1	14 11.4	7.5	58.0
23	165 55.1	32.6	356 22.8	9.0	14 18.9	7.4	58.1
14 00	180 55.1	N18 33.2	10 50.8	8.9	S14 26.3	7.3	58.1
01	195 55.1	33.8	25 18.7	8.8	14 33.6	7.3	58.1
02	210 55.1	34.4	39 46.5	8.8	14 40.9	7.2	58.1
03	225 55.1	35.1	54 14.3	8.7	14 48.1	7.1	58.2
04	240 55.1	35.7	68 42.0	8.6	14 55.2	7.1	58.2
05	255 55.1	36.3	83 09.6	8.5	15 02.3	6.9	58.2
06	270 55.1	N18 36.9	97 37.1	8.5	S15 09.2	6.9	58.2
07	285 55.1	37.5	112 04.6	8.4	15 16.1	6.8	58.3
08	300 55.1	38.1	126 32.0	8.4	15 22.9	6.6	58.3
09	315 55.1	38.7	140 59.4	8.2	15 29.5	6.7	58.3
10	330 55.1	39.3	155 26.6	8.2	15 36.2	6.5	58.4
11	345 55.1	39.9	169 53.8	8.1	15 42.7	6.4	58.4
12	0 55.1	N18 40.5	184 20.9	8.1	S15 49.1	6.4	58.4
13	15 55.1	41.1	198 48.0	8.0	15 55.5	6.2	58.4
14	30 55.1	41.7	213 15.0	7.9	16 01.7	6.2	58.5
15	45 55.1	42.3	227 41.9	7.8	16 07.9	6.1	58.5
16	60 55.1	42.9	242 08.7	7.8	16 14.0	5.9	58.5
17	75 55.1	43.5	256 35.5	7.7	16 19.9	5.9	58.5
18	90 55.1	N18 44.1	271 02.2	7.7	S16 25.8	5.8	58.6
19	105 55.1	44.7	285 28.9	7.6	16 31.6	5.7	58.6
20	120 55.1	45.3	299 55.5	7.5	16 37.3	5.6	58.6
21	135 55.1	45.9	314 22.0	7.4	16 42.9	5.5	58.6
22	150 55.1	46.5	328 48.4	7.4	16 48.4	5.4	58.7
23	165 55.1	47.1	343 14.8	7.3	16 53.8	5.3	58.7
15 00	180 55.1	N18 47.6	357 41.1	7.3	S16 59.1	5.2	58.7
01	195 55.1	48.2	12 07.4	7.2	17 04.3	5.0	58.7
02	210 55.0	48.8	26 33.6	7.1	17 09.3	5.0	58.8
03	225 55.0	49.4	40 59.7	7.1	17 14.3	4.9	58.8
04	240 55.0	50.0	55 25.8	7.0	17 19.2	4.8	58.8
05	255 55.0	50.6	69 51.8	7.0	17 24.0	4.6	58.8
06	270 55.0	N18 51.2	84 17.8	6.9	S17 28.6	4.6	58.8
07	285 55.0	51.8	98 43.7	6.8	17 33.2	4.5	58.9
08	300 55.0	52.4	113 09.5	6.8	17 37.7	4.3	58.9
09	315 55.0	53.0	127 35.3	6.7	17 42.0	4.2	58.9
10	330 55.0	53.6	142 01.0	6.7	17 46.2	4.1	58.9
11	345 55.0	54.1	156 26.7	6.6	17 50.3	4.1	59.0
12	0 55.0	N18 54.7	170 52.3	6.6	S17 54.4	3.8	59.0
13	15 55.0	55.3	185 17.9	6.5	17 58.2	3.8	59.0
14	30 55.0	55.9	199 43.4	6.5	18 02.0	3.7	59.0
15	45 55.0	56.5	214 08.9	6.4	18 05.7	3.5	59.0
16	60 55.0	57.1	228 34.3	6.4	18 09.2	3.5	59.1
17	75 55.0	57.7	242 59.7	6.3	18 12.7	3.3	59.1
18	90 54.9	N18 58.2	257 25.0	6.3	S18 16.0	3.2	59.1
19	105 54.9	58.8	271 50.3	6.2	18 19.2	3.1	59.1
20	120 54.9	18 59.4	286 15.5	6.2	18 22.3	3.0	59.1
21	135 54.9	19 00.0	300 40.7	6.1	18 25.3	2.8	59.2
22	150 54.9	00.6	315 05.8	6.1	18 28.1	2.7	59.2
23	165 54.9	01.2	329 30.9	6.1	S18 30.8	2.6	59.2
	SD 15.9	d 0.6	SD 15.7		15.9		16.1

TUESDAY

WEDNESDAY

THURSDAY

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

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

Day	SUN Eqn. of Time 00h	SUN Eqn. of Time 12h	SUN Mer. Pass.	MOON Mer. Pass. Upper	MOON Mer. Pass. Lower	MOON Age	MOON Phase
d	m s	m s	h m	h m	h m	d	%
13	03 40	03 40	11 56	23 15	10 49	14	98
14	03 40	03 40	11 56	24 10	11 42	15	100
15	03 40	03 40	11 56	00 10	12 38	16	99