NAUTICAL ALMANAC

FOR USE IN

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AND

HIGHER NATIONAL DIPLOMA

EXAMINATIONS

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THE NAUTICAL ALMANAC

LIST OF CONTENTS

Pages	
A2 – A3	Altitude correction tables for Sun, stars and planets
A4	Additional refraction corrections for non-standard conditions
1	Preface
2	Phases of the Moon
2 – 3	Calendars
3 – 5	Eclipses
6 – 7	Planet notes and diagram
8 – 69	Daily pages: Ephemerides of Sun, Moon, Aries and planets; sunrise, unset, twilights, moonrise, moonset, etc
70 – 79	Explanation
80 – 83	Standard times
84 – 85	Star charts
86 – 91	Stars: S.H.A. and Dec. of 173 stars, in order of S.H.A (accuracy 0′·1)
92 – 94	*Polaris* (Pole Star) tables
i	Conversion of arc to time
ii-xxxi	Tables of increments and corrections for Sun, planets, Aries, Moon
xxxii	Tables for interpolating sunrise, sunset, twilights, moonrise, moonset, Moon's meridian passage
xxxiii	Index to selected stars
Bookmark	Same as pages A2 and xxxiii

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

SUN

OCT.—MAR. App. Alt.	Lower Limb	Upper Limb	APR.—SEPT. App. Alt.	Lower Limb	Upper Limb
° ′	′	′	° ′	′	′
9 34	+10·8	−21·5	9 39	+10·6	−21·2
9 45	+10·9	−21·4	9 51	+10·7	−21·1
9 56	+11·0	−21·3	10 03	+10·8	−21·0
10 08	+11·1	−21·2	10 15	+10·9	−20·9
10 21	+11·2	−21·1	10 27	+11·0	−20·8
10 34	+11·3	−21·0	10 40	+11·1	−20·7
10 47	+11·4	−20·9	10 54	+11·2	−20·6
11 01	+11·5	−20·8	11 08	+11·3	−20·5
11 15	+11·6	−20·7	11 23	+11·4	−20·4
11 30	+11·7	−20·6	11 38	+11·5	−20·3
11 46	+11·8	−20·5	11 54	+11·6	−20·2
12 02	+11·9	−20·4	12 10	+11·7	−20·1
12 19	+12·0	−20·3	12 28	+11·8	−20·0
12 37	+12·1	−20·2	12 46	+11·9	−19·9
12 55	+12·2	−20·1	13 05	+12·0	−19·8
13 14	+12·3	−20·0	13 24	+12·1	−19·7
13 35	+12·4	−19·9	13 45	+12·2	−19·6
13 56	+12·5	−19·8	14 07	+12·3	−19·5
14 18	+12·6	−19·7	14 30	+12·4	−19·4
14 42	+12·7	−19·6	14 54	+12·5	−19·3
15 06	+12·8	−19·5	15 19	+12·6	−19·2
15 32	+12·9	−19·4	15 46	+12·7	−19·1
15 59	+13·0	−19·3	16 14	+12·8	−19·0
16 28	+13·1	−19·2	16 44	+12·9	−18·9
16 59	+13·2	−19·1	17 15	+13·0	−18·8
17 32	+13·3	−19·0	17 48	+13·1	−18·7
18 06	+13·4	−18·9	18 24	+13·2	−18·6
18 42	+13·5	−18·8	19 01	+13·3	−18·5
19 21	+13·6	−18·7	19 42	+13·4	−18·4
20 03	+13·7	−18·6	20 25	+13·5	−18·3
20 48	+13·8	−18·5	21 11	+13·6	−18·2
21 35	+13·9	−18·4	22 00	+13·7	−18·1
22 26	+14·0	−18·3	22 54	+13·8	−18·0
23 22	+14·1	−18·2	23 51	+13·9	−17·9
24 21	+14·2	−18·1	24 53	+14·0	−17·8
25 26	+14·3	−18·0	26 00	+14·1	−17·7
26 36	+14·4	−17·9	27 13	+14·2	−17·6
27 52	+14·5	−17·8	28 33	+14·3	−17·5
29 15	+14·6	−17·7	30 00	+14·4	−17·4
30 46	+14·7	−17·6	31 35	+14·5	−17·3
32 26	+14·8	−17·5	33 20	+14·6	−17·2
34 17	+14·9	−17·4	35 17	+14·7	−17·1
36 20	+15·0	−17·3	37 26	+14·8	−17·0
38 36	+15·1	−17·2	39 50	+14·9	−16·9
41 08	+15·2	−17·1	42 31	+15·0	−16·8
43 59	+15·3	−17·0	45 31	+15·1	−16·7
47 10	+15·4	−16·9	48 55	+15·2	−16·6
50 46	+15·5	−16·8	52 44	+15·3	−16·5
54 49	+15·6	−16·7	57 02	+15·4	−16·4
59 23	+15·7	−16·6	61 51	+15·5	−16·3
64 30	+15·8	−16·5	67 17	+15·6	−16·2
70 12	+15·9	−16·4	73 16	+15·7	−16·1
76 26	+16·0	−16·3	79 43	+15·8	−16·0
83 05	+16·1	−16·2	86 32	+15·9	−15·9
90 00			90 00		

STARS AND PLANETS

App. Alt.	Corrⁿ	App. Alt.	Additional Corrⁿ
° ′	′		
9 56	−5·3		**0000**
10 08	−5·2		**VENUS**
10 20	−5·1	Jan. 1-Jan. 29	
10 33	−5·0	°	
10 46	−4·9	0	
11 00	−4·8	47	+ 0·2
11 14	−4·7	Jan. 30-Feb. 26	
11 29	−4·6	°	
11 45	−4·5	0	
12 01	−4·4	46	+ 0·3
12 18	−4·3	Feb. 27-Mar. 14	
12 35	−4·2	°	
12 54	−4·1	0	
13 13	−4·0	11	+ 0·4
13 33	−3·9	41	+ 0·5
13 54	−3·8	Mar. 15-Mar. 23	
14 16	−3·7	°	
14 40	−3·6	0	
15 04	−3·5	6	+ 0·5
15 30	−3·4	20	+ 0·6
15 57	−3·3	31	+ 0·7
16 26	−3·2	Mar. 24-Apr. 19	
16 56	−3·1	°	
17 28	−3·0	0	
18 02	−2·9	4	+ 0·6
18 38	−2·8	12	+ 0·7
19 17	−2·7	22	+ 0·8
19 58	−2·6	Apr. 20-Apr. 28	
20 42	−2·5	°	
21 28	−2·4	0	
22 19	−2·3	6	+ 0·5
23 13	−2·2	20	+ 0·6
24 11	−2·1	31	+ 0·7
25 14	−2·0	Apr. 29-May 13	
26 22	−1·9	°	
27 36	−1·8	0	
28 56	−1·7	11	+ 0·4
30 24	−1·6	41	+ 0·5
32 00	−1·5	May 14-June 8	
33 45	−1·4	°	
35 40	−1·3	0	
37 48	−1·2	46	+ 0·3
40 08	−1·1	June 9-July 23	
42 44	−1·0	°	
45 36	−0·9	0	
48 47	−0·8	47	+ 0·2
52 18	−0·7	July 24-Dec. 31	
56 11	−0·6	°	
60 28	−0·5	0	
65 08	−0·4	42	+ 0·1
70 11	−0·3	**MARS**	
75 34	−0·2	Jan. 1-Nov. 12	
81 13	−0·1	°	
87 03	0·0	0	
90 00		60	+ 0·1
		Nov. 13-Dec. 31	
		°	
		0	
		41	+ 0·2
		75	+ 0·1

DIP

Ht. of Eye	Corrⁿ	Ht. of Eye	Ht. of Eye	Corrⁿ
m		ft.	m	
2·4	−2·8	8·0	1·0	− 1·8
2·6	−2·9	8·6	1·5	− 2·2
2·8	−3·0	9·2	2·0	− 2·5
3·0	−3·1	9·8	2·5	− 2·8
3·2	−3·2	10·5	3·0	− 3·0
3·4	−3·3	11·2	See table	
3·6	−3·4	11·9	←	
3·8	−3·5	12·6	m	
4·0	−3·6	13·3	20	− 7·9
4·3	−3·7	14·1	22	− 8·3
4·5	−3·8	14·9	24	− 8·6
4·7	−3·9	15·7	26	− 9·0
5·0	−4·0	16·5	28	− 9·3
5·2	−4·1	17·4		
5·5	−4·2	18·3	30	− 9·6
5·8	−4·3	19·1	32	−10·0
6·1	−4·4	20·1	34	−10·3
6·3	−4·5	21·0	36	−10·6
6·6	−4·6	22·0	38	−10·8
6·9	−4·7	22·9		
7·2	−4·8	23·9	40	−11·1
7·5	−4·9	24·9	42	−11·4
7·9	−5·0	26·0	44	−11·7
8·2	−5·1	27·1	46	−11·9
8·5	−5·2	28·1	48	−12·2
8·8	−5·3	29·2	ft.	
9·2	−5·4	30·4	2	− 1·4
9·5	−5·5	31·5	4	− 1·9
9·9	−5·6	32·7	6	− 2·4
10·3	−5·7	33·9	8	− 2·7
10·6	−5·8	35·1	10	− 3·1
11·0	−5·9	36·3	See table	
11·4	−6·0	37·6	←	
11·8	−6·1	38·9	ft.	
12·2	−6·2	40·1	70	− 8·1
12·6	−6·3	41·5	75	− 8·4
13·0	−6·4	42·8	80	− 8·7
13·4	−6·5	44·2	85	− 8·9
13·8	−6·6	45·5	90	− 9·2
14·2	−6·7	46·9	95	− 9·5
14·7	−6·8	48·4		
15·1	−6·9	49·8	100	− 9·7
15·5	−7·0	51·3	105	− 9·9
16·0	−7·1	52·8	110	−10·2
16·5	−7·2	54·3	115	−10·4
16·9	−7·3	55·8	120	−10·6
17·4	−7·4	57·4	125	−10·8
17·9	−7·5	58·9		
18·4	−7·6	60·5	130	−11·1
18·8	−7·7	62·1	135	−11·3
19·3	−7·8	63·8	140	−11·5
19·8	−7·9	65·4	145	−11·7
20·4	−8·0	67·1	150	−11·9
20·9	−8·1	68·8	155	−12·1
21·4		70·5		

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

For daylight observations of Venus, see page 260.

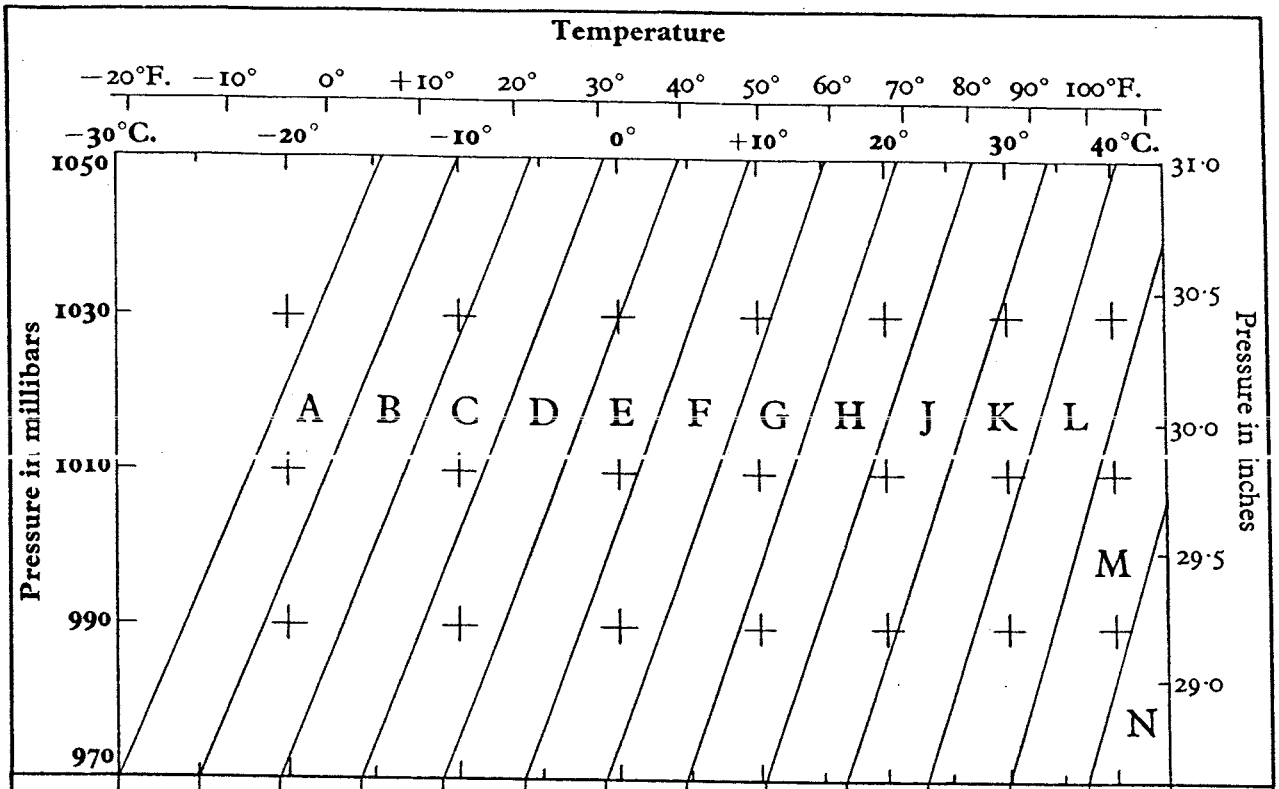
App. Alt.	SUN OCT.–MAR. Lower Limb	SUN OCT.–MAR. Upper Limb	SUN APR.–SEPT. Lower Limb	SUN APR.–SEPT. Upper Limb	STARS PLANETS
° ′	′	′	′	′	′
0 00	−18·2	−50·5	−18·4	−50·2	−34·5
03	17·5	49·8	17·8	49·6	33·8
06	16·9	49·2	17·1	48·9	33·2
09	16·3	48·6	16·5	48·3	32·6
12	15·7	48·0	15·9	47·7	32·0
15	15·1	47·4	15·3	47·1	31·4
0 18	−14·5	−46·8	−14·8	−46·6	−30·8
21	14·0	46·3	14·2	46·0	30·3
24	13·5	45·8	13·7	45·5	29·8
27	12·9	45·2	13·2	45·0	29·2
30	12·4	44·7	12·7	44·5	28·7
33	11·9	44·2	12·2	44·0	28·2
0 36	−11·5	−43·8	−11·7	−43·5	−27·8
39	11·0	43·3	11·2	43·0	27·3
42	10·5	42·8	10·8	42·6	26·8
45	10·1	42·4	10·3	42·1	26·4
48	9·6	41·9	9·9	41·7	25·9
51	9·2	41·5	9·5	41·3	25·5
0 54	− 8·8	−41·1	− 9·1	−40·9	−25·1
0 57	8·4	40·7	8·7	40·5	24·7
1 00	8·0	40·3	8·3	40·1	24·3
03	7·7	40·0	7·9	39·7	24·0
06	7·3	39·6	7·5	39·3	23·6
09	6·9	39·2	7·2	39·0	23·2
1 12	− 6·6	−38·9	− 6·8	−38·6	−22·9
15	6·2	38·5	6·5	38·3	22·5
18	5·9	38·2	6·2	38·0	22·2
21	5·6	37·9	5·8	37·6	21·9
24	5·3	37·6	5·5	37·3	21·6
27	4·9	37·2	5·2	37·0	21·2
1 30	− 4·6	−36·9	− 4·9	−36·7	−20·9
35	4·2	36·5	4·4	36·2	20·5
40	3·7	36·0	4·0	35·8	20·0
45	3·2	35·5	3·5	35·3	19·5
50	2·8	35·1	3·1	34·9	19·1
1 55	2·4	34·7	2·6	34·4	18·7
2 00	− 2·0	−34·3	− 2·2	−34·0	−18·3
05	1·6	33·9	1·8	33·6	17·9
10	1·2	33·5	1·5	33·3	17·5
15	0·9	33·2	1·1	32·9	17·2
20	0·5	32·8	0·8	32·6	16·8
25	− 0·2	32·5	0·4	32·2	16·5
2 30	+ 0·2	−32·1	− 0·1	−31·9	−16·1
35	0·5	31·8	+ 0·2	31·6	15·8
40	0·8	31·5	0·5	31·3	15·5
45	1·1	31·2	0·8	31·0	15·2
50	1·4	30·9	1·1	30·7	14·9
2 55	1·6	30·7	1·4	30·4	14·7
3 00	+ 1·9	−30·4	+ 1·7	−30·1	−14·4
05	2·2	30·1	1·9	29·9	14·1
10	2·4	29·9	2·1	29·7	13·9
15	2·6	29·7	2·4	29·4	13·7
20	2·9	29·4	2·6	29·2	13·4
25	3·1	29·2	2·9	28·9	13·2
3 30	+ 3·3	−29·0	+ 3·1	−28·7	−13·0

App. Alt.	SUN OCT.–MAR. Lower Limb	SUN OCT.–MAR. Upper Limb	SUN APR.–SEPT. Lower Limb	SUN APR.–SEPT. Upper Limb	STARS PLANETS
° ′	′	′	′	′	′
3 30	+ 3·3	−29·0	+ 3·1	−28·7	−13·0
35	3·6	28·7	3·3	28·5	12·7
40	3·8	28·5	3·5	28·3	12·5
45	4·0	28·3	3·7	28·1	12·3
50	4·2	28·1	3·9	27·9	12·1
3 55	4·4	27·9	4·1	27·7	11·9
4 00	+ 4·5	−27·8	+ 4·3	−27·5	−11·8
05	4·7	27·6	4·5	27·3	11·6
10	4·9	27·4	4·6	27·2	11·4
15	5·1	27·2	4·8	27·0	11·2
20	5·2	27·1	5·0	26·8	11·1
25	5·4	26·9	5·1	26·7	10·9
4 30	+ 5·6	−26·7	+ 5·3	−26·5	−10·7
35	5·7	26·6	5·5	26·3	10·6
40	5·9	26·4	5·6	26·2	10·4
45	6·0	26·3	5·8	26·0	10·3
50	6·2	26·1	5·9	25·9	10·1
4 55	6·3	26·0	6·0	25·8	10·0
5 00	+ 6·4	−25·9	+ 6·2	−25·6	− 9·9
05	6·6	25·7	6·3	25·5	9·7
10	6·7	25·6	6·4	25·4	9·6
15	6·8	25·5	6·6	25·2	9·5
20	6·9	25·4	6·7	25·1	9·4
25	7·1	25·2	6·8	25·0	9·2
5 30	+ 7·2	−25·1	+ 6·9	−24·9	− 9·1
35	7·3	25·0	7·0	24·8	9·0
40	7·4	24·9	7·2	24·6	8·9
45	7·5	24·8	7·3	24·5	8·8
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
10	8·0	24·3	7·8	24·0	8·3
20	8·2	24·1	8·0	23·8	8·1
30	8·4	23·9	8·1	23·7	7·9
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	+ 8·6	−23·2	− 7·4
10	9·1	23·2	8·8	23·0	7·2
20	9·2	23·1	9·0	22·8	7·1
30	9·3	23·0	9·1	22·7	7·0
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
10	9·9	22·4	9·6	22·2	6·4
20	10·0	22·3	9·7	22·1	6·3
30	10·1	22·2	9·8	22·0	6·2
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
10	10·5	21·8	10·3	21·5	5·8
20	10·6	21·7	10·4	21·4	5·7
30	10·7	21·6	10·5	21·3	5·6
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.

A4 ALTITUDE CORRECTION TABLES—ADDITIONAL CORRECTIONS

ADDITIONAL REFRACTION CORRECTIONS FOR NON-STANDARD CONDITIONS



App. Alt.	A	B	C	D	E	F	G	H	J	K	L	M	N	App. Alt.
° ′	′	′	′	′	′	′	′	′	′	′	′	′	′	° ′
0 00	−6·9	−5·7	−4·6	−3·4	−2·3	−1·1	0·0	+1·1	+2·3	+3·4	+4·6	+5·7	+6·9	0 00
0 30	5·2	4·4	3·5	2·6	1·7	0·9	0·0	0·9	1·7	2·6	3·5	4·4	5·2	0 30
1 00	4·3	3·5	2·8	2·1	1·4	0·7	0·0	0·7	1·4	2·1	2·8	3·5	4·3	1 00
1 30	3·5	2·9	2·4	1·8	1·2	0·6	0·0	0·6	1·2	1·8	2·4	2·9	3·5	1 30
2 00	3·0	2·5	2·0	1·5	1·0	0·5	0·0	0·5	1·0	1·5	2·0	2·5	3·0	2 00
2 30	−2·5	−2·1	−1·6	−1·2	−0·8	−0·4	0·0	+0·4	+0·8	+1·2	+1·6	+2·1	+2·5	2 30
3 00	2·2	1·8	1·5	1·1	0·7	0·4	0·0	0·4	0·7	1·1	1·5	1·8	2·2	3 00
3 30	2·0	1·6	1·3	1·0	0·7	0·3	0·0	0·3	0·7	1·0	1·3	1·6	2·0	3 30
4 00	1·8	1·5	1·2	0·9	0·6	0·3	0·0	0·3	0·6	0·9	1·2	1·5	1·8	4 00
4 30	1·6	1·4	1·1	0·8	0·5	0·3	0·0	0·3	0·5	0·8	1·1	1·4	1·6	4 30
5 00	−1·5	−1·3	−1·0	−0·8	−0·5	−0·2	0·0	+0·2	+0·5	+0·8	+1·0	+1·3	+1·5	5 00
6	1·3	1·1	0·9	0·6	0·4	0·2	0·0	0·2	0·4	0·6	0·9	1·1	1·3	6
7	1·1	0·9	0·7	0·6	0·4	0·2	0·0	0·2	0·4	0·6	0·7	0·9	1·1	7
8	1·0	0·8	0·7	0·5	0·3	0·2	0·0	0·2	0·3	0·5	0·7	0·8	1·0	8
9	0·9	0·7	0·6	0·4	0·3	0·1	0·0	0·1	0·3	0·4	0·6	0·7	0·9	9
10 00	−0·8	−0·7	−0·5	−0·4	−0·3	−0·1	0·0	+0·1	+0·3	+0·4	+0·5	+0·7	+0·8	10 00
12	0·7	0·6	0·5	0·3	0·2	0·1	0·0	0·1	0·2	0·3	0·5	0·6	0·7	12
14	0·6	0·5	0·4	0·3	0·2	0·1	0·0	0·1	0·2	0·3	0·4	0·5	0·6	14
16	0·5	0·4	0·3	0·3	0·2	0·1	0·0	0·1	0·2	0·3	0·3	0·4	0·5	16
18	0·4	0·4	0·3	0·2	0·2	0·1	0·0	0·1	0·2	0·2	0·3	0·4	0·4	18
20 00	−0·4	−0·3	−0·3	−0·2	−0·1	−0·1	0·0	+0·1	+0·1	+0·2	+0·3	+0·3	+0·4	20 00
25	0·3	0·3	0·2	0·2	0·1	−0·1	0·0	+0·1	0·1	0·2	0·2	0·3	0·3	25
30	0·3	0·2	0·2	0·1	0·1	0·0	0·0	0·0	0·1	0·1	0·2	0·2	0·3	30
35	0·2	0·2	0·1	0·1	0·1	0·0	0·0	0·0	0·1	0·1	0·1	0·2	0·2	35
40	0·2	0·1	0·1	0·1	−0·1	0·0	0·0	0·0	+0·1	0·1	0·1	0·1	0·2	40
50 00	−0·1	−0·1	−0·1	−0·1	0·0	0·0	0·0	0·0	0·0	+0·1	+0·1	+0·1	+0·1	50 00

The graph is entered with arguments temperature and pressure to find a zone letter; using as arguments this zone letter and apparent altitude (sextant altitude corrected for dip), a correction is taken from the table. This correction is to be applied to the sextant altitude in addition to the corrections for standard conditions (for the Sun, stars and planets from page A2 and for the Moon from pages xxxiv and xxxv).

PREFACE

The British and American editions of *The Nautical Almanac*, which are identical in content, are produced jointly by H. M. Nautical Almanac Office, Royal Greenwich Observatory, under the supervision of the Superintendent, and by the Nautical Almanac Office, United States Naval Observatory, under the supervision of R. L. Duncombe and P. M. Janiczek, to the general requirements of the Royal Navy and of the United States Navy. The Almanac is printed separately in the United Kingdom and in the United States of America.

The data in this Almanac can be made available, in a form suitable for direct photographic reproduction, to the appropriate almanac-producing agency in any country; language changes in the headings of the ephemeral pages can be introduced, if desired, during reproduction. Under this arrangement, this Almanac, with minor modifications and changes of language, has been adopted for the Brazilian, Danish, Greek, Indian, Indonesian, Korean, Mexican, Norwegian and Swedish almanacs.

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CALENDAR, 0000

RELIGIOUS CALENDARS

Epiphany	Jan. 6	Low Sunday	Apr. 17
Septuagesima Sunday	Feb. 6	Rogation Sunday	May 15
Quinquagesima Sunday	Feb. 20	Ascension Day—Holy Thursday	May 19
Ash Wednesday	Feb. 23	Whit Sunday—Pentecost	May 29
Quadragesima Sunday	Feb. 27	Trinity Sunday	June 5
Palm Sunday	Apr. 3	Corpus Christi	June 9
Good Friday	Apr. 8	First Sunday in Advent	Nov. 27
Easter Day	Apr. 10	Christmas Day	Dec. 25

Passover, First day of (Pesach)	Apr. 3	Day of Atonement (Yom Kippur)	Sept. 22
Feast of Weeks (Shebuoth)	May 23	Tabernacles, First day of (Succoth)	Sept. 27
Jewish New Year 5738 (Rosh Hashanah)	Sept. 13		

Mohammedan New Year (1398)	Dec. 12	Ramadan, First day of (tabular)	Aug. 16

CIVIL CALENDAR—BRITISH COMMONWEALTH

Australia Day	Jan. 26	St. George (England)	Apr. 23
Republic Day (India)	Jan. 26	Commonwealth Day	May 24
Independence Commemoration Day (Sri Lanka)	Feb. 4	Birthday of Prince Philip, Duke of Edinburgh	June 10
Accession of Queen Elizabeth II	Feb. 6	Dominion Day (Canada)	July 1
National Day (New Zealand)	Feb. 6	Remembrance Sunday	Nov. 13
St. David (Wales)	Mar. 1	Birthday of the Prince of Wales	Nov. 14
St. Patrick (Ireland)	Mar. 17	St. Andrew (Scotland)	Nov. 30
Birthday of Queen Elizabeth II	Apr. 21		

Bank Holidays in England and Wales—Jan. 1, Apr. 11, May 30, Aug. 29, Dec. 26, Dec. 27

Northern Ireland—Jan. 1, Mar. 17, Apr. 11, May 30, Aug. 29, Dec. 26, Dec. 27

Scotland—Jan. 1, Jan. 3, Apr. 8, May 2, Aug. 1, Dec. 26

Commonwealth Day may be observed in Great Britain on June 11

CIVIL CALENDAR—UNITED STATES OF AMERICA

New Year's Day	Jan. 1	Labor Day	Sept. 5
Lincoln's Birthday	Feb. 12	Columbus Day	Oct. 10
Washington's Birthday	Feb. 21	Veterans Day	Oct. 24
Memorial Day	May 30	Election Day (in certain States)	Nov. 8
Independence Day	July 4	Thanksgiving Day	Nov. 24

PHASES OF THE MOON

New Moon				First Quarter				Full Moon				Last Quarter			
	d	h	m		d	h	m		d	h	m		d	h	m
Jan.	19	14	11	Jan.	27	05	11	Jan.	5	12	10	Jan.	12	19	55
Feb.	18	03	37	Feb.	26	02	50	Feb.	4	03	56	Feb.	11	04	07
Mar.	19	18	33	Mar.	27	22	27	Mar.	5	17	13	Mar.	12	11	35
Apr.	18	10	35	Apr.	26	14	42	Apr.	4	04	09	Apr.	10	19	15
May	18	02	51	May	26	03	20	May	3	13	03	May	10	04	08
June	16	18	23	June	24	12	44	June	1	20	31	June	8	15	07
July	16	08	37	July	23	19	38	July	1	03	24	July	8	04	39
Aug.	14	21	31	Aug.	22	01	04	July	30	10	52	Aug.	6	20	40
Sept.	13	09	23	Sept.	20	06	18	Aug.	28	20	10	Sept.	5	14	33
Oct.	12	20	31	Oct.	19	12	46	Sept.	27	08	17	Oct.	5	09	21
Nov.	11	07	09	Nov.	17	21	52	Oct.	26	23	35	Nov.	4	03	58
Dec.	10	17	33	Dec.	17	10	37	Nov.	25	17	31	Dec.	3	21	16
								Dec.	25	12	49				

CALENDAR, 0000

DAYS OF THE WEEK AND DAYS OF THE YEAR

Day of Month	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Week	Year	Week	Year	Week	Year	Week	Year	Week	Year	Week	Year	Week	Year	Week	Year	Week	Year	Week	Year	Week	Year	Week	Year
1	S.	1	Tu.	32	Tu.	60	F.	91	♄.	121	W.	152	F.	182	M.	213	Th.	244	S.	274	Tu.	305	Th.	335
2	♄.	2	W.	33	W.	61	S.	92	M.	122	Th.	153	S.	183	Tu.	214	F.	245	♄.	275	W.	306	F.	336
3	M.	3	Th.	34	Th.	62	♄.	93	Tu.	123	F.	154	♄.	184	W.	215	S.	246	M.	276	Th.	307	S.	337
4	Tu.	4	F.	35	F.	63	M.	94	W.	124	S.	155	M.	185	Th.	216	♄.	247	Tu.	277	F.	308	♄.	338
5	W.	5	S.	36	S.	64	Tu.	95	Th.	125	♄.	156	Tu.	186	F.	217	M.	248	W.	278	S.	309	M.	339
6	Th.	6	♄.	37	♄.	65	W.	96	F.	126	M.	157	W.	187	S.	218	Tu.	249	Th.	279	♄.	310	Tu.	340
7	F.	7	M.	38	M.	66	Th.	97	S.	127	Tu.	158	Th.	188	♄.	219	W.	250	F.	280	M.	311	W.	341
8	S.	8	Tu.	39	Tu.	67	F.	98	♄.	128	W.	159	F.	189	M.	220	Th.	251	S.	281	Tu.	312	Th.	342
9	♄.	9	W.	40	W.	68	S.	99	M.	129	Th.	160	S.	190	Tu.	221	F.	252	♄.	282	W.	313	F.	343
10	M.	10	Th.	41	Th.	69	♄.	100	Tu.	130	F.	161	♄.	191	W.	222	S.	253	M.	283	Th.	314	S.	344
11	Tu.	11	F.	42	F.	70	M.	101	W.	131	S.	162	M.	192	Th.	223	♄.	254	Tu.	284	F.	315	♄.	345
12	W.	12	S.	43	S.	71	Tu.	102	Th.	132	♄.	163	Tu.	193	F.	224	M.	255	W.	285	S.	316	M.	346
13	Th.	13	♄.	44	♄.	72	W.	103	F.	133	M.	164	W.	194	S.	225	Tu.	256	Th.	286	♄.	317	Tu.	347
14	F.	14	M.	45	M.	73	Th.	104	S.	134	Tu.	165	Th.	195	♄.	226	W.	257	F.	287	M.	318	W.	348
15	S.	15	Tu.	46	Tu.	74	F.	105	♄.	135	W.	166	F.	196	M.	227	Th.	258	S.	288	Tu.	319	Th.	349
16	♄.	16	W.	47	W.	75	S.	106	M.	136	Th.	167	S.	197	Tu.	228	F.	259	♄.	289	W.	320	F.	350
17	M.	17	Th.	48	Th.	76	♄.	107	Tu.	137	F.	168	♄.	198	W.	229	S.	260	M.	290	Th.	321	S.	351
18	Tu.	18	F.	49	F.	77	M.	108	W.	138	S.	169	M.	199	Th.	230	♄.	261	Tu.	291	F.	322	♄.	352
19	W.	19	S.	50	S.	78	Tu.	109	Th.	139	♄.	170	Tu.	200	F.	231	M.	262	W.	292	S.	323	M.	353
20	Th.	20	♄.	51	♄.	79	W.	110	F.	140	M.	171	W.	201	S.	232	Tu.	263	Th.	293	♄.	324	Tu.	354
21	F.	21	M.	52	M.	80	Th.	111	S.	141	Tu.	172	Th.	202	♄.	233	W.	264	F.	294	M.	325	W.	355
22	S.	22	Tu.	53	Tu.	81	F.	112	♄.	142	W.	173	F.	203	M.	234	Th.	265	S.	295	Tu.	326	Th.	356
23	♄.	23	W.	54	W.	82	S.	113	M.	143	Th.	174	S.	204	Tu.	235	F.	266	♄.	296	W.	327	F.	357
24	M.	24	Th.	55	Th.	83	♄.	114	Tu.	144	F.	175	♄.	205	W.	236	S.	267	M.	297	Th.	328	S.	358
25	Tu.	25	F.	56	F.	84	M.	115	W.	145	S.	176	M.	206	Th.	237	♄.	268	Tu.	298	F.	329	♄.	359
26	W.	26	S.	57	S.	85	Tu.	116	Th.	146	♄.	177	Tu.	207	F.	238	M.	269	W.	299	S.	330	M.	360
27	Th.	27	♄.	58	♄.	86	W.	117	F.	147	M.	178	W.	208	S.	239	Tu.	270	Th.	300	♄.	331	Tu.	361
28	F.	28	M.	59	M.	87	Th.	118	S.	148	Tu.	179	Th.	209	♄.	240	W.	271	F.	301	M.	332	W.	362
29	S.	29			Tu.	88	F.	119	♄.	149	W.	180	F.	210	M.	241	Th.	272	S.	302	Tu.	333	Th.	363
30	♄.	30			W.	89	S.	120	M.	150	Th.	181	S.	211	Tu.	242	F.	273	♄.	303	W.	334	F.	364
31	M.	31			Th.	90			Tu.	151			♄.	212	W.	243			M.	304			S.	365

ECLIPSES

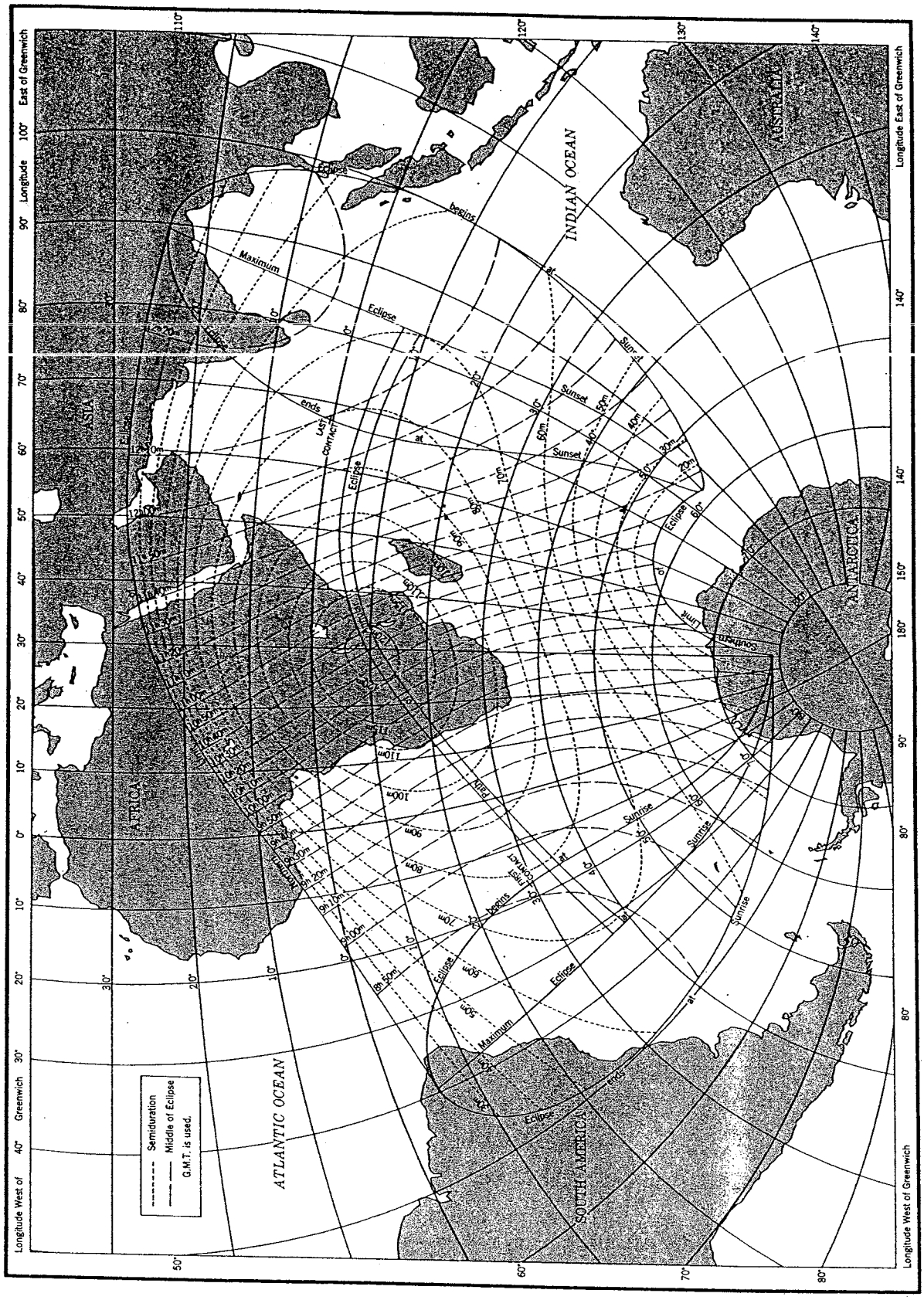
There are three eclipses, two of the Sun and one of the Moon.

1. *A Partial Eclipse of the Moon,* April 4. The eclipse begins at $03^h\ 30^m$ and ends at $05^h\ 06^m$. It is visible from western Africa, western Europe, the Atlantic Ocean, part of Antarctica, South America, North America except the north-western part, and the eastern half of the Pacific Ocean. At the time of maximum eclipse 0·20 of the Moon's diameter is obscured.

2. *An Annular Eclipse of the Sun,* April 18. See map on page 6. The eclipse begins at $07^h\ 33^m$ and ends at $13^h\ 29^m$; the annular phase begins at $08^h\ 43^m$ and ends at $12^h\ 19^m$. The maximum duration of the annular phase is $7^m\ 00^s$.

3. *A Total Eclipse of the Sun,* October 12. See map on page 7. The eclipse begins at $17^h\ 48^m$ and ends at $23^h\ 06^m$; the total phase begins at $18^h\ 49^m$ and ends at $22^h\ 05^m$. The maximum duration of the total phase is $2^m\ 37^s$.

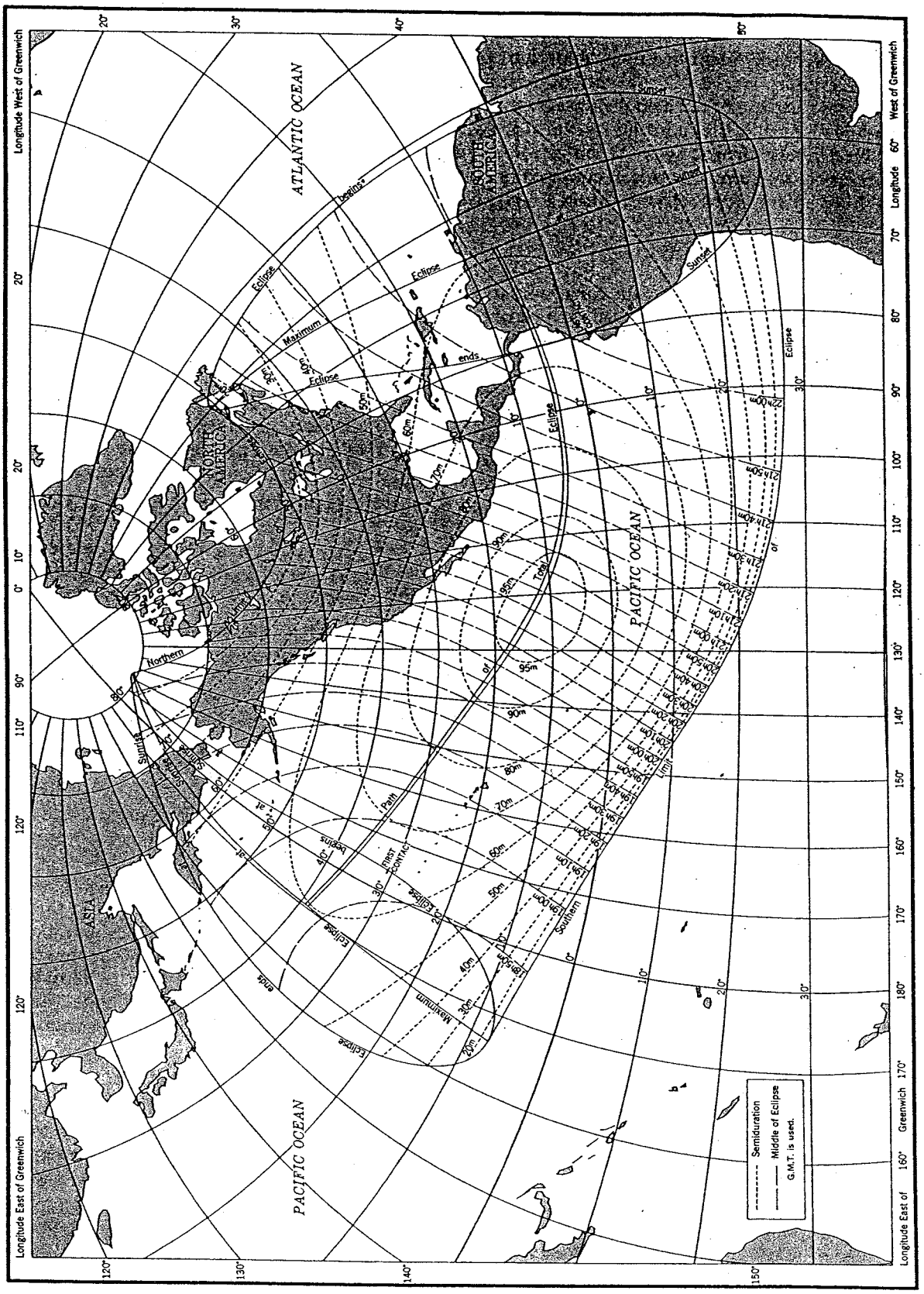
ANNULAR ECLIPSE OF 0000 APRIL 18



SOLAR ECLIPSE DIAGRAMS

The principal features shown on the diagrams are: the paths of total and annular eclipses; the northern and southern limits of partial eclipse; the sunrise and sunset curves; contour lines showing the time of middle of eclipse and the semi-duration of partial eclipse. The times of beginning and end of partial eclipse at any place can be found by applying the semi-duration to the time of middle of the eclipse, both being interpolated for that place from the contour lines.

TOTAL ECLIPSE OF 0000 OCTOBER 12



SOLAR ECLIPSE DIAGRAMS

For total and annular eclipses the mid-times of the total and annular phases are generally within 5 minutes of those given for the middle of eclipse; semi-durations, which depend on the precise position relative to the path, are not given. Further details of the paths and times of central eclipse are given in the *Astronomical Ephemeris* and in the *American Ephemeris*.

PLANET NOTES, 0000

POSITIONS OF PLANETS

VENUS is easily identified by its superior brilliance. It is an evening star until the end of March when it becomes too close to the Sun for observation. From the middle of April it is a morning star until the beginning of December, when it again becomes too close to the Sun for observation. Venus is in conjunction with Mars on May 13 and June 3, with Jupiter on July 30 and Saturn on September 18.

MARS is too close to the Sun for observation during the first half of January; it is visible as a morning star for the remainder of the year. Mars is in Sagittarius from January until mid-February, and then moves through Capricornus, Aquarius, Pisces, Aries, Taurus (passing 5° N. of *Aldebaran* on August 1), Gemini (passing 6° S. of *Pollux* on October 13) and into Cancer later in October, where it remains for the rest of the year. Mars is in conjunction with Mercury on January 12 and February 12, with Venus on May 13 and June 3, and with Jupiter on September 4.

JUPITER is an evening star from the beginning of the year until the middle of May when it becomes too close to the Sun for observation. From the second half of June it is a morning star until opposition on December 23, when it becomes an evening star for the rest of the year. Jupiter is in conjunction with Venus on July 30, and with Mars on September 4.

SATURN is a morning star until opposition on February 2, when it becomes an evening star until the end of July. It is then too close to the Sun for observation until the end of August, when it becomes visible as a morning star for the remainder of the year. Saturn is in Cancer at the beginning of the year, moving into Leo in July where it remains for the rest of the year (passing 0°.8 N. of *Regulus* on November 3). Saturn is in conjunction with Mercury on July 20 and with Venus on September 18.

MERCURY can only be seen low in the east before sunrise, or low in the west after sunset (about the time of beginning or end of civil twilight). It is visible in the mornings during the following approximate dates: January 10 (+1.9) to March 4 (- 0.7, May 7 (+2.5) to June 22 (- 1.4), September 11 (+1.6) to October 5 (- .1.1), December 26 (+2.2) to December 31 (+0.6); the planet is brighter at the end of each period. It is visible in the evenings between the following approximate dates: March 26 (-1.3) to April 24 (+2.5), July 9 (-1.0) to September 1 (+2.4), November 4 (-0.5) to December 17 (+1.7; the planet is brighter at the beginning of each period. The figures in parentheses are the magnitudes.

PLANET DIAGRAM

General Description. The diagram on the opposite page shows, in graphical form for any date during the year, the local mean time of meridian passage of the Sun, of the five planets Mercury, Venus, Mars, Jupiter, and Saturn, and of each 30° of S.H.A.; intermediate lines, corresponding to particular stars, may be drawn in by the user if he so desires. It is intended to provide a general picture of the availability of planets and stars for observation.

On each side of the line marking the time of meridian passage of the Sun a band, 45m wide, is shaded to indicate that planets and most stars crossing the meridian within 45m of the Sun are too close to the Sun for observation.

Method of use and interpretation. For any date the diagram provides immediately the local mean times of meridian passage of the Sun, planets and stars, and thus the following information:

(a) whether a planet or star is too close to the Sun for observation;
(b) whether a planet is a morning or evening star;
(c) some indication of its position during twilight;
(d) the proximity of other planets.

When the meridian passage occurs at midnight the body is in opposition to the Sun and is visible all night; planets may be observable in both morning and evening twilights. As the time of meridian passage decreases, the body ceases to be observable in the morning, but its altitude above the eastern horizon during evening twilight gradually increases; this continues until the body is on the meridian at twilight. From then onwards the body is observable above the western horizon and its altitude at evening twilight gradually decreases; eventually the body becomes too close to the Sun for observation. When the body again becomes visible it is seen as a morning star low in the east; its altitude at twilight increases until meridian passage occurs at the time of morning twilight. Then, as the time of meridian passage decreases to 0^h, the body is observable in the west in the morning twilight with a gradually decreasing altitude, until it once again reaches opposition.

DO NOT CONFUSE

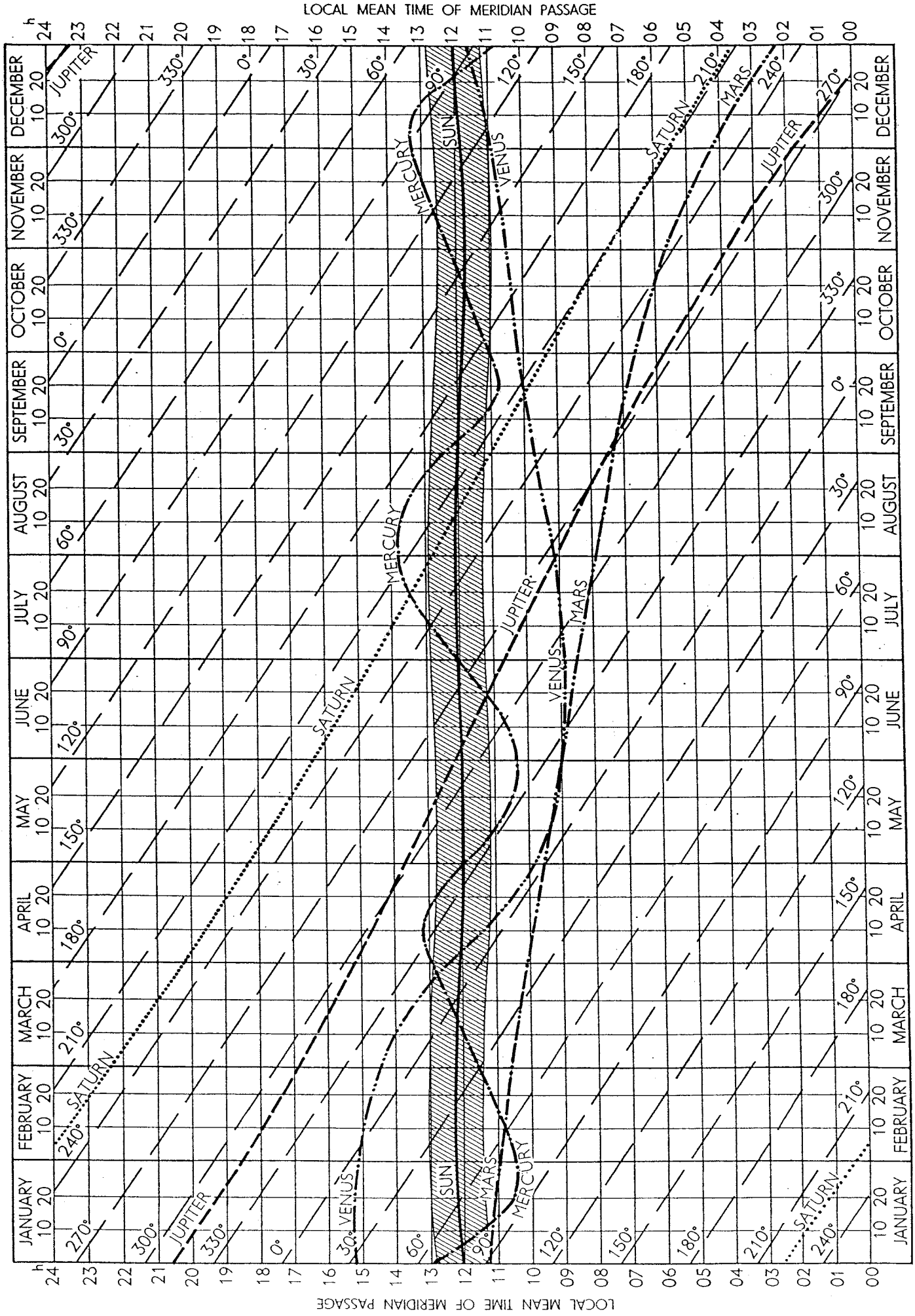
Mercury with Mars in mid-January when both planets have the same magnitude, and again in early February when Mercury is the brighter object.

Venus with Mars in the middle of May and early June, with Jupiter at the end of July, and with Saturn in the latter half of September; on all occasions Venus is the brighter object.

Mercury with Saturn in the latter half of July when Mercury is the brighter object.

Mars with Jupiter at the beginning of September when Jupiter is the brighter object.

PLANETS, 0000



G.M.T. (UT)	ARIES	VENUS −3.9		MARS +1.6		JUPITER −2.2		SATURN +0.2	
	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
4 00	103 29.3	131 27.8	S13 01.9	191 03.3	S24 04.2	54 15.1	N17 10.8	325 06.3	N16 59.6
01	118 31.8	146 27.6	13 00.8	206 03.7	04.2	69 17.7	10.8	340 08.9	59.6
02	133 34.3	161 27.5	12 59.7	221 04.1	04.1	84 20.3	10.8	355 11.5	59.7
03	148 36.7	176 27.3	·· 58.5	236 04.5	·· 04.1	99 22.8	·· 10.7	10 14.1	·· 59.7
04	163 39.2	191 27.1	57.4	251 04.9	04.1	114 25.4	10.7	25 16.7	59.8
05	178 41.7	206 27.0	56.3	266 05.3	04.1	129 28.0	10.7	40 19.4	59.8
06	193 44.1	221 26.8	S12 55.2	281 05.7	S24 04.1	144 30.5	N17 10.7	55 22.0	N16 59.9
07	208 46.6	236 26.6	54.0	296 06.2	04.1	159 33.1	10.7	70 24.6	17 00.0
08	223 49.0	251 26.5	52.9	311 06.6	04.1	174 35.6	10.7	85 27.2	00.0
09	238 51.5	266 26.3	·· 51.8	326 07.0	·· 04.1	189 38.2	·· 10.7	100 29.8	·· 00.1
10	253 54.0	281 26.1	50.7	341 07.4	04.1	204 40.8	10.6	115 32.4	00.1
11	268 56.4	296 26.0	49.5	356 07.8	04.0	219 43.3	10.6	130 35.1	00.2
12	283 58.9	311 25.8	S12 48.4	11 08.2	S24 04.0	234 45.9	N17 10.6	145 37.7	N17 00.2
13	299 01.4	326 25.7	47.3	26 08.6	04.0	249 48.5	10.6	160 40.3	00.3
14	314 03.8	341 25.5	46.2	41 09.0	04.0	264 51.0	10.6	175 42.9	00.3
15	329 06.3	356 25.3	·· 45.0	56 09.5	·· 04.0	279 53.6	·· 10.6	190 45.5	·· 00.4
16	344 08.8	11 25.2	43.9	71 09.9	04.0	294 56.1	10.6	205 48.2	00.4
17	359 11.2	26 25.0	42.8	86 10.3	03.9	309 58.7	10.5	220 50.8	00.5
18	14 13.7	41 24.9	S12 41.6	101 10.7	S24 03.9	325 01.3	N17 10.5	235 53.4	N17 00.5
19	29 16.2	56 24.7	40.5	116 11.1	03.9	340 03.8	10.5	250 56.0	00.6
20	44 18.6	71 24.6	39.4	131 11.5	03.9	355 06.4	10.5	265 58.6	00.6
21	59 21.1	86 24.4	·· 38.3	146 11.9	·· 03.9	10 08.9	·· 10.5	281 01.3	·· 00.7
22	74 23.5	101 24.2	37.1	161 12.3	03.9	25 11.5	10.5	296 03.9	00.7
23	89 26.0	116 24.1	36.0	176 12.7	03.8	40 14.1	10.5	311 06.5	00.8
5 00	104 28.5	131 23.9	S12 34.9	191 13.1	S24 03.8	55 16.6	N17 10.5	326 09.1	N17 00.9
01	119 30.9	146 23.8	33.7	206 13.6	03.8	70 19.2	10.4	341 11.7	00.9
02	134 33.4	161 23.6	32.6	221 14.0	03.8	85 21.7	10.4	356 14.4	01.0
03	149 35.9	176 23.5	·· 31.5	236 14.4	·· 03.8	100 24.3	·· 10.4	11 17.0	·· 01.0
04	164 38.3	191 23.3	30.3	251 14.8	03.7	115 26.8	10.4	26 19.6	01.1
05	179 40.8	206 23.2	29.2	266 15.2	03.7	130 29.4	10.4	41 22.2	01.1
06	194 43.3	221 23.0	S12 28.1	281 15.6	S24 03.7	145 32.0	N17 10.4	56 24.9	N17 01.2
07	209 45.7	236 22.9	26.9	296 16.0	03.7	160 34.5	10.4	71 27.5	01.2
08	224 48.2	251 22.8	25.8	311 16.4	03.7	175 37.1	10.4	86 30.1	01.3
09	239 50.7	266 22.6	·· 24.6	326 16.8	·· 03.6	190 39.6	·· 10.4	101 32.7	·· 01.3
10	254 53.1	281 22.5	23.5	341 17.3	03.6	205 42.2	10.3	116 35.3	01.4
11	269 55.6	296 22.3	22.4	356 17.7	03.6	220 44.7	10.3	131 38.0	01.4
12	284 58.0	311 22.2	S12 21.2	11 18.1	S24 03.6	235 47.3	N17 10.3	146 40.6	N17 01.5
13	300 00.5	326 22.0	20.1	26 18.5	03.5	250 49.8	10.3	161 43.2	01.6
14	315 03.0	341 21.9	19.0	41 18.9	03.5	265 52.4	10.3	176 45.8	01.6
15	330 05.4	356 21.8	·· 17.8	56 19.3	·· 03.5	280 54.9	·· 10.3	191 48.5	·· 01.7
16	345 07.9	11 21.6	16.7	71 19.7	03.5	295 57.5	10.3	206 51.1	01.7
17	0 10.4	26 21.5	15.5	86 20.1	03.4	311 00.1	10.3	221 53.7	01.8
18	15 12.8	41 21.4	S12 14.4	101 20.5	S24 03.4	326 02.6	N17 10.3	236 56.3	N17 01.8
19	30 15.3	56 21.2	13.3	116 20.9	03.4	341 05.2	10.2	251 58.9	01.9
20	45 17.8	71 21.1	12.1	131 21.3	03.3	356 07.7	10.2	267 01.6	01.9
21	60 20.2	86 20.9	·· 11.0	146 21.8	·· 03.3	11 10.3	·· 10.2	282 04.2	·· 02.0
22	75 22.7	101 20.8	09.8	161 22.2	03.3	26 12.8	10.2	297 06.8	02.0
23	90 25.2	116 20.7	08.7	176 22.6	03.3	41 15.4	10.2	312 09.4	02.1
6 00	105 27.6	131 20.5	S12 07.6	191 23.0	S24 03.2	56 17.9	N17 10.2	327 12.1	N17 02.1
01	120 30.1	146 20.4	06.4	206 23.4	03.2	71 20.5	10.2	342 14.7	02.2
02	135 32.5	161 20.3	05.3	221 23.8	03.2	86 23.0	10.2	357 17.3	02.3
03	150 35.0	176 20.2	·· 04.1	236 24.2	·· 03.1	101 25.6	·· 10.2	12 19.9	·· 02.3
04	165 37.5	191 20.0	03.0	251 24.6	03.1	116 28.1	10.2	27 22.6	02.4
05	180 39.9	206 19.9	01.8	266 25.0	03.1	131 30.7	10.1	42 25.2	02.4
06	195 42.4	221 19.8	S12 00.7	281 25.4	S24 03.0	146 33.2	N17 10.1	57 27.8	N17 02.5
07	210 44.9	236 19.6	11 59.5	296 25.8	03.0	161 35.7	10.1	72 30.4	02.5
08	225 47.3	251 19.5	58.4	311 26.3	03.0	176 38.3	10.1	87 33.1	02.6
09	240 49.8	266 19.4	·· 57.3	326 26.7	·· 02.9	191 40.8	·· 10.1	102 35.7	·· 02.6
10	255 52.3	281 19.3	56.1	341 27.1	02.9	206 43.4	10.1	117 38.3	02.7
11	270 54.7	296 19.1	55.0	356 27.5	02.9	221 45.9	10.1	132 40.9	02.7
12	285 57.2	311 19.0	S11 53.8	11 27.9	S24 02.8	236 48.5	N17 10.1	147 43.6	N17 02.8
13	300 59.6	326 18.9	52.7	26 28.3	02.8	251 51.0	10.1	162 46.2	02.9
14	316 02.1	341 18.8	51.5	41 28.7	02.8	266 53.6	10.1	177 48.8	02.9
15	331 04.6	356 18.7	·· 50.4	56 29.1	·· 02.7	281 56.1	·· 10.1	192 51.4	·· 03.0
16	346 07.0	11 18.5	49.2	71 29.5	02.7	296 58.7	10.0	207 54.1	03.0
17	1 09.5	26 18.4	48.1	86 29.9	02.6	312 01.2	10.0	222 56.7	03.1
18	16 12.0	41 18.3	S11 46.9	101 30.3	S24 02.6	327 03.7	N17 10.0	237 59.3	N17 03.1
19	31 14.4	56 18.2	45.8	116 30.7	02.6	342 06.3	10.0	253 01.9	03.2
20	46 16.9	71 18.1	44.6	131 31.2	02.5	357 08.8	10.0	268 04.6	03.2
21	61 19.4	86 18.0	·· 43.5	146 31.6	·· 02.5	12 11.4	·· 10.0	283 07.2	·· 03.3
22	76 21.8	101 17.8	42.3	161 32.0	02.5	27 13.9	10.0	298 09.8	03.3
23	91 24.3	116 17.7	41.2	176 32.4	02.4	42 16.5	10.0	313 12.4	03.4
	h m								
Mer. Pass.	16 59.3	v −0.1	d 1.1	v 0.4	d 0.0	v 2.6	d 0.0	v 2.6	d 0.1

TUESDAY

WEDNESDAY

THURSDAY

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.9	S40 24.0
Achernar	335 47.1	S57 21.5
Acrux	173 39.8	S62 58.1
Adhara	255 33.7	S28 56.6
Aldebaran	291 20.5	N16 27.8
Alioth	166 44.8	N56 04.7
Alkaid	153 20.6	N49 25.4
Al Na'ir	28 18.4	S47 04.5
Alnilam	276 13.9	S 1 13.1
Alphard	218 22.7	S 8 33.6
Alphecca	126 34.5	N26 47.4
Alpheratz	358 11.9	N29 50.0
Altair	62 35.3	N 8 48.5
Ankaa	353 42.8	S42 26.1
Antares	113 00.2	S26 22.8
Arcturus	146 20.9	N19 18.0
Atria	108 27.1	S68 59.0
Avior	234 28.5	S59 26.2
Bellatrix	279 01.1	N 6 19.6
Betelgeuse	271 30.6	N 7 24.1
Canopus	264 07.7	S52 41.2
Capella	281 14.5	N45 58.5
Deneb	49 50.5	N45 12.1
Denebola	183 01.5	N14 41.8
Diphda	349 23.4	S18 06.9
Dubhe	194 24.9	N61 52.1
Elnath	278 46.9	N28 35.3
Eltanin	90 59.4	N51 29.5
Enif	34 14.3	N 9 46.3
Fomalhaut	15 54.4	S29 44.7
Gacrux	172 31.3	S56 58.9
Gienah	176 20.4	S17 24.8
Hadar	149 27.0	S60 15.5
Hamal	328 31.6	N23 21.3
Kaus Aust.	84 20.5	S34 23.7
Kochab	137 19.6	N74 14.7
Markab	14 05.8	N15 05.0
Menkar	314 43.5	N 3 59.9
Menkent	148 40.0	S36 15.3
Miaplacidus	221 44.5	S69 37.3
Mirfak	309 19.3	N49 47.0
Nunki	76 32.6	S26 19.5
Peacock	54 02.9	S56 48.6
Pollux	244 00.8	N28 04.8
Procyon	245 28.0	N 5 16.9
Rasalhague	96 32.2	N12 34.6
Regulus	208 12.4	N12 04.6
Rigel	281 38.1	S 8 13.8
Rigil Kent.	140 29.4	S60 44.1
Sabik	102 44.3	S15 41.7
Schedar	350 11.8	N56 25.0
Shaula	96 59.5	S37 05.1
Sirius	258 57.5	S16 41.2
Spica	159 00.2	S11 02.5
Suhail	223 12.2	S43 20.4
Vega	80 57.9	N38 45.8
Zuben'ubi	137 35.9	S15 56.7

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	26 55.5	15 15
Mars	86 44.7	11 15
Jupiter	310 48.1	20 15
Saturn	221 40.7	2 15

0000 JANUARY 4, 5, 6 (TUES., WED., THURS.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
4 00	178 48.1	S22 45.2	17 23.6	11.0	N19 14.4	0.7	54.9
01	193 47.8	45.0	31 53.6	11.0	19 13.7	0.8	55.0
02	208 47.5	44.7	46 23.6	10.9	19 12.9	1.0	55.0
03	223 47.2	·· 44.4	60 53.5	11.0	19 11.9	1.0	55.0
04	238 46.9	44.2	75 23.5	10.9	19 10.9	1.1	55.0
05	253 46.6	43.9	89 53.4	10.9	19 09.8	1.2	55.0
06	268 46.4	S22 43.7	104 23.3	10.9	N19 08.6	1.3	55.0
07	283 46.1	43.4	118 53.2	10.9	19 07.3	1.4	55.1
08	298 45.8	43.1	133 23.1	10.9	19 05.9	1.5	55.1
TUESDAY 09	313 45.5	·· 42.9	147 53.0	10.9	19 04.4	1.6	55.1
10	328 45.2	42.6	162 22.9	10.9	19 02.8	1.7	55.1
11	343 45.0	42.3	176 52.8	10.8	19 01.1	1.8	55.1
12	358 44.7	S22 42.1	191 22.6	10.9	N18 59.3	1.9	55.1
13	13 44.4	41.8	205 52.5	10.8	18 57.4	2.0	55.2
14	28 44.1	41.5	220 22.3	10.8	18 55.4	2.1	55.2
15	43 43.8	·· 41.3	234 52.1	10.8	18 53.3	2.2	55.2
16	58 43.5	41.0	249 21.9	10.8	18 51.1	2.2	55.2
17	73 43.3	40.7	263 51.7	10.8	18 48.9	2.4	55.2
18	88 43.0	S22 40.5	278 21.5	10.8	N18 46.5	2.5	55.2
19	103 42.7	40.2	292 51.3	10.8	18 44.0	2.5	55.3
20	118 42.4	39.9	307 21.1	10.8	18 41.5	2.7	55.3
21	133 42.1	·· 39.6	321 50.9	10.8	18 38.8	2.7	55.3
22	148 41.9	39.4	336 20.7	10.7	18 36.1	2.9	55.3
23	163 41.6	39.1	350 50.4	10.8	18 33.2	2.9	55.3
5 00	178 41.3	S22 38.8	5 20.2	10.8	N18 30.3	3.0	55.4
01	193 41.0	38.5	19 50.0	10.7	18 27.3	3.2	55.4
02	208 40.7	38.3	34 19.7	10.8	18 24.1	3.2	55.4
03	223 40.5	·· 38.0	48 49.5	10.8	18 20.9	3.3	55.4
04	238 40.2	37.7	63 19.3	10.7	18 17.6	3.4	55.4
05	253 39.9	37.4	77 49.0	10.8	18 14.2	3.5	55.4
06	268 39.6	S22 37.2	92 18.8	10.7	N18 10.7	3.7	55.5
07	283 39.3	36.9	106 48.5	10.8	18 07.0	3.7	55.5
08	298 39.1	36.6	121 18.3	10.7	18 03.3	3.7	55.5
WEDNESDAY 09	313 38.8	·· 36.3	135 48.0	10.8	17 59.6	3.9	55.5
10	328 38.5	36.0	150 17.8	10.8	17 55.7	4.0	55.5
11	343 38.2	35.7	164 47.6	10.7	17 51.7	4.1	55.6
12	358 38.0	S22 35.5	179 17.3	10.8	N17 47.6	4.1	55.6
13	13 37.7	35.2	193 47.1	10.8	17 43.5	4.3	55.6
14	28 37.4	34.9	208 16.9	10.7	17 39.2	4.3	55.6
15	43 37.1	·· 34.6	222 46.6	10.8	17 34.9	4.5	55.6
16	58 36.9	34.3	237 16.4	10.8	17 30.4	4.5	55.7
17	73 36.6	34.0	251 46.2	10.8	17 25.9	4.7	55.7
18	88 36.3	S22 33.7	266 16.0	10.8	N17 21.2	4.7	55.7
19	103 36.0	33.4	280 45.8	10.8	17 16.5	4.8	55.7
20	118 35.7	33.2	295 15.6	10.8	17 11.7	4.9	55.7
21	133 35.5	·· 32.9	309 45.4	10.8	17 06.8	5.0	55.8
22	148 35.2	32.6	324 15.2	10.8	17 01.8	5.0	55.8
23	163 34.9	32.3	338 45.0	10.8	16 56.8	5.2	55.8
6 00	178 34.6	S22 32.0	353 14.8	10.8	N16 51.6	5.3	55.8
01	193 34.4	31.7	7 44.6	10.9	16 46.3	5.3	55.8
02	208 34.1	31.4	22 14.5	10.8	16 41.0	5.4	55.8
03	223 33.8	·· 31.1	36 44.3	10.9	16 35.6	5.6	55.9
04	238 33.5	30.8	51 14.2	10.8	16 30.0	5.6	55.9
05	253 33.3	30.5	65 44.0	10.9	16 24.4	5.7	55.9
06	268 33.0	S22 30.2	80 13.9	10.9	N16 18.7	5.7	55.9
07	283 32.7	29.9	94 43.8	10.9	16 13.0	5.9	55.9
THURSDAY 08	298 32.5	29.6	109 13.7	10.9	16 07.1	6.0	56.0
09	313 32.2	·· 29.3	123 43.6	10.9	16 01.1	6.0	56.0
10	328 31.9	29.0	138 13.5	10.9	15 55.1	6.1	56.0
11	343 31.6	28.7	152 43.4	11.0	15 49.0	6.2	56.0
12	358 31.4	S22 28.4	167 13.4	10.9	N15 42.8	6.3	56.0
13	13 31.1	28.1	181 43.3	11.0	15 36.5	6.4	56.1
14	28 30.8	27.8	196 13.3	10.9	15 30.1	6.5	56.1
15	43 30.5	·· 27.5	210 43.2	11.0	15 23.6	6.5	56.1
16	58 30.3	27.2	225 13.2	11.0	15 17.1	6.6	56.1
17	73 30.0	26.9	239 43.2	11.0	15 10.5	6.7	56.1
18	88 29.7	S22 26.6	254 13.2	11.0	N15 03.8	6.8	56.2
19	103 29.5	26.3	268 43.2	11.1	14 57.0	6.9	56.2
20	118 29.2	25.9	283 13.3	11.0	14 50.1	6.9	56.2
21	133 28.9	·· 25.6	297 43.3	11.1	14 43.2	7.1	56.2
22	148 28.6	25.3	312 13.4	11.0	14 36.1	7.1	56.2
23	163 28.4	25.0	326 43.4	11.1	14 29.0	7.2	56.3
	S.D. 16.3	d 0.3	S.D. 15.0		15.1		15.3

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Moonrise 4	Moonrise 5	Moonrise 6	Moonrise 7
°	h m	h m	h m	h m	h m	h m	h m
N 72	08 20	10 30	▬	▭	12 53	15 09	17 06
N 70	08 02	09 43	▬	12 36	14 06	15 46	17 28
68	07 47	09 12	11 30	13 27	14 43	16 11	17 44
66	07 35	08 50	10 20	13 59	15 09	16 31	17 58
64	07 25	08 32	09 45	14 22	15 30	16 47	18 09
62	07 16	08 17	09 20	14 41	15 46	17 00	18 19
60	07 08	08 04	09 00	14 56	16 00	17 11	18 27
N 58	07 01	07 53	08 44	15 09	16 11	17 20	18 34
56	06 55	07 43	08 30	15 20	16 21	17 29	18 40
54	06 49	07 35	08 18	15 30	16 30	17 36	18 46
52	06 44	07 27	08 07	15 39	16 38	17 43	18 51
50	06 39	07 20	07 58	15 47	16 45	17 49	18 55
45	06 28	07 05	07 38	16 03	17 00	18 01	19 05
N 40	06 18	06 52	07 22	16 17	17 13	18 12	19 13
35	06 09	06 41	07 09	16 29	17 24	18 21	19 20
30	06 01	06 31	06 57	16 39	17 33	18 29	19 27
20	05 45	06 12	06 36	16 56	17 49	18 43	19 37
N 10	05 30	05 56	06 19	17 12	18 03	18 55	19 46
0	05 13	05 39	06 02	17 26	18 16	19 06	19 55
S 10	04 55	05 22	05 45	17 40	18 29	19 17	20 04
20	04 33	05 02	05 27	17 55	18 43	19 29	20 13
30	04 05	04 38	05 05	18 13	18 59	19 42	20 24
35	03 47	04 23	04 53	18 23	19 08	19 50	20 30
40	03 25	04 06	04 38	18 35	19 19	19 59	20 36
45	02 56	03 44	04 21	18 48	19 31	20 09	20 44
S 50	02 14	03 16	04 00	19 05	19 46	20 22	20 54
52	01 49	03 02	03 49	19 13	19 53	20 28	20 58
54	01 12	02 45	03 38	19 21	20 01	20 34	21 03
56	////	02 25	03 24	19 31	20 09	20 41	21 08
58	////	01 58	03 09	19 42	20 19	20 49	21 14
S 60	////	01 19	02 50	19 55	20 30	20 58	21 21

Lat.	Sunset	Twilight Civil	Twilight Naut.	Moonset 4	Moonset 5	Moonset 6	Moonset 7
°	h m	h m	h m	h m	h m	h m	h m
N 72	▬	13 41	15 52	▭	11 21	10 49	10 35
N 70	▬	14 29	16 10	09 53	10 07	10 11	10 12
68	12 42	14 59	16 24	09 02	09 29	09 45	09 54
66	13 51	15 22	16 36	08 30	09 03	09 25	09 39
64	14 26	15 40	16 46	08 06	08 42	09 08	09 27
62	14 52	15 55	16 55	07 47	08 25	08 55	09 17
60	15 11	16 07	17 03	07 32	08 11	08 43	09 08
N 58	15 28	16 18	17 10	07 19	08 00	08 33	09 00
56	15 41	16 28	17 16	07 08	07 49	08 24	08 54
54	15 53	16 36	17 22	06 58	07 40	08 16	08 47
52	16 04	16 44	17 27	06 49	07 32	08 09	08 42
50	16 13	16 51	17 32	06 41	07 24	08 03	08 37
45	16 33	17 06	17 43	06 24	07 09	07 49	08 26
N 40	16 49	17 19	17 53	06 10	06 56	07 38	08 17
35	17 02	17 30	18 02	05 58	06 45	07 28	08 09
30	17 14	17 40	18 10	05 48	06 35	07 20	08 02
20	17 35	17 59	18 26	05 30	06 18	07 05	07 50
N 10	17 52	18 15	18 41	05 15	06 04	06 52	07 39
0	18 09	18 32	18 58	05 00	05 50	06 40	07 30
S 10	18 26	18 49	19 16	04 45	05 36	06 28	07 20
20	18 44	19 09	19 38	04 30	05 21	06 15	07 09
30	19 05	19 33	20 06	04 12	05 05	06 00	06 56
35	19 18	19 47	20 23	04 02	04 55	05 51	06 49
40	19 32	20 05	20 45	03 50	04 43	05 41	06 41
45	19 49	20 26	21 14	03 36	04 30	05 29	06 32
S 50	20 11	20 54	21 56	03 18	04 14	05 15	06 20
52	20 21	21 08	22 21	03 10	04 06	05 08	06 15
54	20 33	21 25	22 56	03 01	03 58	05 01	06 09
56	20 46	21 45	////	02 51	03 48	04 52	06 02
58	21 01	22 11	////	02 39	03 37	04 43	05 55
S 60	21 20	22 49	////	02 26	03 24	04 32	05 46

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
	m s	m s	h m	h m	h m	d	
4	04 47	05 01	12 05	23 38	11 13	14	○
5	05 14	05 28	12 05	24 28	12 03	15	
6	05 41	05 54	12 06	00 28	12 53	16	

G.M.T. (UT)		ARIES	VENUS −4.1		MARS +1.5		JUPITER −2.1		SATURN +0.1	
		G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d	h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
22	00	121 13.8	131 28.7	S 4 26.6	193 57.7	S23 18.2	72 10.2	N17 13.3	344 07.3	N17 24.8
	01	136 16.3	146 28.8	25.4	208 58.1	18.0	87 12.6	13.3	359 10.0	24.9
	02	151 18.8	161 29.0	24.1	223 58.5	17.8	102 15.0	13.3	14 12.7	24.9
	03	166 21.2	176 29.2	·· 22.9	238 58.9	·· 17.6	117 17.4	·· 13.3	29 15.3	·· 25.0
	04	181 23.7	191 29.4	21.7	253 59.3	17.4	132 19.8	13.4	44 18.0	25.0
	05	196 26.2	206 29.5	20.4	268 59.7	17.2	147 22.2	13.4	59 20.6	25.1
	06	211 28.6	221 29.7	S 4 19.2	284 00.1	S23 17.0	162 24.6	N17 13.4	74 23.3	N17 25.2
	07	226 31.1	236 29.9	18.0	299 00.5	16.8	177 27.0	13.4	89 26.0	25.2
S	08	241 33.5	251 30.1	16.7	314 00.9	16.6	192 29.5	13.5	104 28.6	25.3
A	09	256 36.0	266 30.3	·· 15.5	329 01.3	·· 16.4	207 31.9	·· 13.5	119 31.3	·· 25.4
T	10	271 38.5	281 30.4	14.3	344 01.7	16.2	222 34.3	13.5	134 33.9	25.4
U	11	286 40.9	296 30.6	13.0	359 02.1	15.9	237 36.7	13.5	149 36.6	25.5
R	12	301 43.4	311 30.8	S 4 11.8	14 02.5	S23 15.7	252 39.1	N17 13.6	164 39.3	N17 25.5
D	13	316 45.9	326 31.0	10.6	29 02.9	15.5	267 41.5	13.6	179 41.9	25.6
A	14	331 48.3	341 31.2	09.3	44 03.3	15.3	282 43.9	13.6	194 44.6	25.7
Y	15	346 50.8	356 31.4	·· 08.1	59 03.7	·· 15.1	297 46.3	·· 13.6	209 47.2	·· 25.7
	16	1 53.3	11 31.6	06.9	74 04.1	14.9	312 48.7	13.7	224 49.9	25.8
	17	16 55.7	26 31.7	05.6	89 04.5	14.7	327 51.1	13.7	239 52.6	25.9
	18	31 58.2	41 31.9	S 4 04.4	104 04.9	S23 14.5	342 53.5	N17 13.7	254 55.2	N17 25.9
	19	47 00.7	56 32.1	03.1	119 05.4	14.3	357 55.9	13.8	269 57.9	26.0
	20	62 03.1	71 32.3	01.9	134 05.8	14.1	12 58.3	13.8	285 00.5	26.0
	21	77 05.6	86 32.5	4 00.7	149 06.2	·· 13.8	28 00.7	·· 13.8	300 03.2	·· 26.1
	22	92 08.0	101 32.7	3 59.4	164 06.6	13.6	43 03.1	13.8	315 05.9	26.2
	23	107 10.5	116 32.9	58.2	179 07.0	13.4	58 05.5	13.9	330 08.5	26.2
23	00	122 13.0	131 33.1	S 3 57.0	194 07.4	S23 13.2	73 07.9	N17 13.9	345 11.2	N17 26.3
	01	137 15.4	146 33.3	55.7	209 07.8	13.0	88 10.3	13.9	0 13.9	26.4
	02	152 17.9	161 33.5	54.5	224 08.2	12.8	103 12.7	14.0	15 16.5	26.4
	03	167 20.4	176 33.7	·· 53.3	239 08.6	·· 12.6	118 15.1	·· 14.0	30 19.2	·· 26.5
	04	182 22.8	191 33.9	52.0	254 09.0	12.3	133 17.5	14.0	45 21.8	26.5
	05	197 25.3	206 34.1	50.8	269 09.4	12.1	148 19.9	14.0	60 24.5	26.6
	06	212 27.8	221 34.3	S 3 49.6	284 09.8	S23 11.9	163 22.3	N17 14.1	75 27.2	N17 26.7
	07	227 30.2	236 34.5	48.3	299 10.2	11.7	178 24.7	14.1	90 29.8	26.7
	08	242 32.7	251 34.7	47.1	314 10.6	11.5	193 27.1	14.1	105 32.5	26.8
S	09	257 35.1	266 34.9	·· 45.8	329 11.0	·· 11.2	208 29.5	·· 14.2	120 35.1	·· 26.9
U	10	272 37.6	281 35.1	44.6	344 11.4	11.0	223 31.9	14.2	135 37.8	26.9
N	11	287 40.1	296 35.3	43.4	359 11.8	10.8	238 34.3	14.2	150 40.5	27.0
D	12	302 42.5	311 35.5	S 3 42.1	14 12.2	S23 10.6	253 36.7	N17 14.2	165 43.1	N17 27.0
A	13	317 45.0	326 35.7	40.9	29 12.6	10.4	268 39.1	14.3	180 45.8	27.1
Y	14	332 47.5	341 35.9	39.7	44 13.0	10.1	283 41.5	14.3	195 48.5	27.2
	15	347 49.9	356 36.1	·· 38.4	59 13.4	·· 09.9	298 43.9	·· 14.3	210 51.1	·· 27.2
	16	2 52.4	11 36.3	37.2	74 13.9	09.7	313 46.3	14.4	225 53.8	27.3
	17	17 54.9	26 36.5	36.0	89 14.3	09.5	328 48.7	14.4	240 56.4	27.4
	18	32 57.3	41 36.7	S 3 34.7	104 14.7	S23 09.3	343 51.1	N17 14.4	255 59.1	N17 27.4
	19	47 59.8	56 36.9	33.5	119 15.1	09.0	358 53.5	14.4	271 01.8	27.5
	20	63 02.3	71 37.1	32.3	134 15.5	08.8	13 55.9	14.5	286 04.4	27.5
	21	78 04.7	86 37.4	·· 31.0	149 15.9	·· 08.6	28 58.3	·· 14.5	301 07.1	·· 27.6
	22	93 07.2	101 37.6	29.8	164 16.3	08.4	44 00.7	14.5	316 09.8	27.7
	23	108 09.6	116 37.8	28.5	179 16.7	08.1	59 03.1	14.6	331 12.4	27.7
24	00	123 12.1	131 38.0	S 3 27.3	194 17.1	S23 07.9	74 05.5	N17 14.6	346 15.1	N17 27.8
	01	138 14.6	146 38.2	26.1	209 17.5	07.7	89 07.9	14.6	1 17.7	27.9
	02	153 17.0	161 38.4	24.8	224 17.9	07.5	104 10.2	14.7	16 20.4	27.9
	03	168 19.5	176 38.6	·· 23.6	239 18.3	·· 07.2	119 12.6	·· 14.7	31 23.1	·· 28.0
	04	183 22.0	191 38.9	22.4	254 18.7	07.0	134 15.0	14.7	46 25.7	28.0
	05	198 24.4	206 39.1	21.1	269 19.1	06.8	149 17.4	14.7	61 28.4	28.1
	06	213 26.9	221 39.3	S 3 19.9	284 19.5	S23 06.6	164 19.8	N17 14.8	76 31.1	N17 28.2
	07	228 29.4	236 39.5	18.7	299 19.9	06.3	179 22.2	14.8	91 33.7	28.2
	08	243 31.8	251 39.7	17.4	314 20.3	06.1	194 24.6	14.8	106 36.4	28.3
M	09	258 34.3	266 40.0	·· 16.2	329 20.7	·· 05.9	209 27.0	·· 14.9	121 39.0	·· 28.4
O	10	273 36.8	281 40.2	15.0	344 21.2	05.6	224 29.4	14.9	136 41.7	28.4
N	11	288 39.2	296 40.4	13.7	359 21.6	05.4	239 31.8	14.9	151 44.4	28.5
D	12	303 41.7	311 40.6	S 3 12.5	14 22.0	S23 05.2	254 34.2	N17 15.0	166 47.0	N17 28.5
A	13	318 44.1	326 40.9	11.2	29 22.4	05.0	269 36.5	15.0	181 49.7	28.6
Y	14	333 46.6	341 41.1	10.0	44 22.8	04.7	284 38.9	15.0	196 52.4	28.7
	15	348 49.1	356 41.3	·· 08.8	59 23.2	·· 04.5	299 41.3	·· 15.1	211 55.0	·· 28.7
	16	3 51.5	11 41.5	07.5	74 23.6	04.3	314 43.7	15.1	226 57.7	28.8
	17	18 54.0	26 41.8	06.3	89 24.0	04.0	329 46.1	15.1	242 00.3	28.9
	18	33 56.5	41 42.0	S 3 05.1	104 24.4	S23 03.8	344 48.5	N17 15.2	257 03.0	N17 28.9
	19	48 58.9	56 42.2	03.8	119 24.8	03.6	359 50.9	15.2	272 05.7	29.0
	20	64 01.4	71 42.4	02.6	134 25.2	03.3	14 53.3	15.2	287 08.3	29.1
	21	79 03.9	86 42.7	·· 01.4	149 25.6	·· 03.1	29 55.6	·· 15.2	302 11.0	·· 29.1
	22	94 06.3	101 42.9	3 00.1	164 26.0	02.9	44 58.0	15.3	317 13.7	29.2
	23	109 08.8	116 43.1	2 58.9	179 26.4	02.6	60 00.4	15.3	332 16.3	29.2
Mer. Pass.		h m 15 48.5	v 0.2	d 1.2	v 0.4	d 0.2	v 2.4	d 0.0	v 2.7	d 0.1

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 39.0	S40 24.1
Achernar	335 47.2	S57 21.5
Acrux	173 39.5	S62 58.1
Adhara	255 33.6	S28 56.7
Aldebaran	291 20.6	N16 27.8
Alioth	166 44.5	N56 04.7
Alkaid	153 20.4	N49 25.3
Al Na'ir	28 18.5	S47 04.4
Alnilam	276 13.9	S 1 13.1
Alphard	218 22.6	S 8 33.7
Alphecca	126 34.3	N26 47.3
Alpheratz	358 12.0	N28 58.0
Altair	62 35.2	N 8 48.5
Ankaa	353 42.9	S42 26.0
Antares	113 00.1	S26 22.8
Arcturus	146 20.7	N19 17.9
Atria	108 26.8	S68 58.9
Avior	234 28.5	S59 26.3
Bellatrix	279 01.1	N 6 19.6
Betelgeuse	271 30.6	N 7 24.1
Canopus	264 07.8	S52 41.3
Capella	281 14.5	N45 58.6
Deneb	49 50.6	N45 12.0
Denebola	183 01.3	N14 41.8
Diphda	349 23.5	S18 06.9
Dubhe	194 24.7	N61 52.2
Elnath	278 46.9	N28 35.3
Eltanin	90 59.3	N51 29.4
Enif	34 14.3	N 9 46.2
Fomalhaut	15 54.4	S29 44.7
Gacrux	172 31.1	S56 58.9
Gienah	176 20.3	S17 24.9
Hadar	149 26.7	S60 15.5
Hamal	328 31.6	N23 21.3
Kaus Aust.	84 20.4	S34 23.7
Kochab	137 19.3	N74 14.7
Markab	14 05.8	N15 05.0
Menkar	314 43.6	N 3 59.9
Menkent	148 39.8	S36 15.3
Miaplacidus	221 44.4	S69 37.4
Mirfak	309 19.4	N49 47.0
Nunki	76 32.5	S26 19.5
Peacock	54 02.9	S56 48.5
Pollux	244 00.8	N28 04.8
Procyon	245 28.0	N 5 16.9
Rasalhague	96 32.1	N12 34.6
Regulus	208 12.3	N12 04.6
Rigel	281 38.1	S 8 13.9
Rigil Kent.	140 29.1	S60 44.1
Sabik	102 44.2	S15 41.8
Schedar	350 11.9	N56 25.0
Shaula	96 59.4	S37 05.1
Sirius	258 57.5	S16 41.3
Spica	159 00.0	S11 02.5
Suhail	223 12.1	S43 20.5
Vega	80 57.9	N38 45.7
Zuben'ubi	137 35.8	S15 56.8

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	9 20.1	15 14
Mars	71 54.4	11 03
Jupiter	310 55.0	19 04
Saturn	222 58.2	0 59

0000 JANUARY 22, 23, 24 (SAT., SUN., MON.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
22	00	177 07.2	S19 44.8	148 15.8	11.8	S 6 42.1	10.3	57.2
	01	192 07.1	44.3	162 46.6	11.8	6 31.8	10.2	57.2
	02	207 06.9	43.7	177 17.4	11.9	6 21.6	10.3	57.1
	03	222 06.7	·· 43.1	191 48.3	11.9	6 11.3	10.4	57.1
	04	237 06.6	42.6	206 19.2	12.0	6 00.9	10.3	57.1
	05	252 06.4	42.0	220 50.2	12.0	5 50.6	10.3	57.0
	06	267 06.2	S19 41.4	235 21.2	12.1	S 5 40.3	10.4	57.0
	07	282 06.1	40.8	249 52.3	12.2	5 29.9	10.4	57.0
S	08	297 05.9	40.3	264 23.5	12.2	5 19.5	10.4	57.0
A	09	312 05.7	·· 39.7	278 54.7	12.2	5 09.1	10.4	56.9
T	10	327 05.6	39.1	293 25.9	12.3	4 58.7	10.4	56.9
U	11	342 05.4	38.6	307 57.2	12.4	4 48.3	10.4	56.9
R	12	357 05.2	S19 38.0	322 28.6	12.4	S 4 37.9	10.4	56.8
D	13	12 05.1	37.4	337 00.0	12.5	4 27.5	10.5	56.8
A	14	27 04.9	36.8	351 31.5	12.5	4 17.0	10.4	56.8
Y	15	42 04.7	·· 36.3	6 03.0	12.6	4 06.6	10.5	56.7
	16	57 04.6	35.7	20 34.6	12.6	3 56.1	10.4	56.7
	17	72 04.4	35.1	35 06.2	12.7	3 45.7	10.5	56.7
	18	87 04.2	S19 34.5	49 37.9	12.7	S 3 35.2	10.5	56.6
	19	102 04.1	33.9	64 09.6	12.8	3 24.7	10.5	56.6
	20	117 03.9	33.4	78 41.4	12.8	3 14.2	10.4	56.6
	21	132 03.7	·· 32.8	93 13.2	12.8	3 03.8	10.5	56.5
	22	147 03.6	32.2	107 45.0	13.0	2 53.3	10.5	56.5
	23	162 03.4	31.6	122 17.0	12.9	2 42.8	10.5	56.5
23	00	177 03.2	S19 31.0	136 48.9	13.0	S 2 32.3	10.5	56.4
	01	192 03.1	30.5	151 20.9	13.0	2 21.8	10.4	56.4
	02	207 02.9	29.9	165 52.9	13.1	2 11.4	10.5	56.4
	03	222 02.8	·· 29.3	180 25.0	13.1	2 00.9	10.5	56.4
	04	237 02.6	28.7	194 57.1	13.2	1 50.4	10.5	56.3
	05	252 02.4	28.1	209 29.3	13.2	1 39.9	10.4	56.3
	06	267 02.3	S19 27.5	224 01.5	13.3	S 1 29.5	10.5	56.3
	07	282 02.1	26.9	238 33.8	13.3	1 19.0	10.4	56.2
	08	297 02.0	26.4	253 06.1	13.3	1 08.6	10.5	56.2
S	09	312 01.8	·· 25.8	267 38.4	13.3	0 58.1	10.4	56.2
U	10	327 01.6	25.2	282 10.7	13.4	0 47.7	10.4	56.1
N	11	342 01.5	24.6	296 43.1	13.5	0 37.3	10.5	56.1
D	12	357 01.3	S19 24.0	311 15.6	13.5	S 0 26.8	10.4	56.1
A	13	12 01.2	23.4	325 48.1	13.5	0 16.4	10.4	56.1
Y	14	27 01.0	22.8	340 20.6	13.5	S 0 06.0	10.4	56.0
	15	42 00.8	·· 22.2	354 53.1	13.6	N 0 04.4	10.3	56.0
	16	57 00.7	21.6	9 25.7	13.6	0 14.7	10.4	56.0
	17	72 00.5	21.0	23 58.3	13.6	0 25.1	10.3	55.9
	18	87 00.4	S19 20.4	38 30.9	13.7	N 0 35.4	10.4	55.9
	19	102 00.2	19.9	53 03.6	13.7	0 45.8	10.3	55.9
	20	117 00.1	19.3	67 36.3	13.7	0 56.1	10.3	55.8
	21	131 59.9	·· 18.7	82 09.0	13.8	1 06.4	10.3	55.8
	22	146 59.8	18.1	96 41.8	13.8	1 16.7	10.2	55.8
	23	161 59.6	17.5	111 14.6	13.8	1 26.9	10.3	55.8
24	00	176 59.4	S19 16.9	125 47.4	13.8	N 1 37.2	10.2	55.7
	01	191 59.3	16.3	140 20.2	13.9	1 47.4	10.2	55.7
	02	206 59.1	15.7	154 53.1	13.9	1 57.6	10.2	55.7
	03	221 59.0	·· 15.1	169 26.0	13.9	2 07.8	10.2	55.7
	04	236 58.8	14.5	183 58.9	14.0	2 18.0	10.1	55.6
	05	251 58.7	13.9	198 31.9	13.9	2 28.1	10.2	55.6
	06	266 58.5	S19 13.3	213 04.8	14.0	N 2 38.3	10.1	55.6
	07	281 58.4	12.7	227 37.8	14.0	2 48.4	10.1	55.5
	08	296 58.2	12.1	242 10.8	14.1	2 58.5	10.0	55.5
M	09	311 58.1	·· 11.5	256 43.9	14.0	3 08.5	10.1	55.5
O	10	326 57.9	10.9	271 16.9	14.1	3 18.6	10.0	55.5
N	11	341 57.8	10.3	285 50.0	14.1	3 28.6	10.0	55.4
D	12	356 57.6	S19 09.7	300 23.1	14.1	N 3 38.6	9.9	55.4
A	13	11 57.5	09.1	314 56.2	14.1	3 48.5	10.0	55.4
Y	14	26 57.3	08.5	329 29.3	14.1	3 58.5	9.9	55.4
	15	41 57.2	·· 07.8	344 02.4	14.2	4 08.4	9.8	55.3
	16	56 57.0	07.2	358 35.6	14.2	4 18.2	9.9	55.3
	17	71 56.9	06.6	13 08.8	14.2	4 28.1	9.8	55.3
	18	86 56.7	S19 06.0	27 42.0	14.2	N 4 37.9	9.8	55.3
	19	101 56.6	05.4	42 15.2	14.2	4 47.7	9.8	55.2
	20	116 56.4	04.8	56 48.4	14.2	4 57.5	9.7	55.2
	21	131 56.3	·· 04.2	71 21.6	14.3	5 07.2	9.7	55.2
	22	146 56.1	03.6	85 54.9	14.2	5 16.9	9.7	55.2
	23	161 56.0	03.0	100 28.1	14.3	5 26.6	9.6	55.2
		S.D. 16.3	d 0.6	S.D. 15.5		15.3		15.1

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

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

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
	m s	m s	h m	h m	h m	d	
22	11 31	11 39	12 12	14 35	02 11	03	
23	11 47	11 54	12 12	15 21	02 58	04	◐
24	12 02	12 09	12 12	16 06	03 44	05	

0000 MARCH 8, 9, 10 (TUES., WED., THURS.)

G.M.T. (UT)		ARIES	VENUS −4.3		MARS +1.4		JUPITER −1.8		SATURN +0.2	
d	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
8	00	165 35.1	146 19.3	N14 37.6	202 15.3	S15 41.7	112 24.0	N18 25.5	31 52.3	N18 25.6
	01	180 37.5	161 21.2	38.3	217 15.9	41.1	127 26.1	25.6	46 54.9	25.7
	02	195 40.0	176 23.1	38.9	232 16.4	40.5	142 28.2	25.7	61 57.5	25.7
	03	210 42.5	191 25.0	·· 39.5	247 17.0	·· 39.9	157 30.3	·· 25.8	77 00.1	·· 25.7
	04	225 44.9	206 26.9	40.1	262 17.5	39.3	172 32.4	25.9	92 02.7	25.8
	05	240 47.4	221 28.8	40.8	277 18.1	38.7	187 34.4	25.9	107 05.3	25.8
	06	255 49.9	236 30.7	N14 41.4	292 18.6	S15 38.1	202 36.5	N18 26.0	122 07.9	N18 25.9
	07	270 52.3	251 32.7	42.0	307 19.2	37.5	217 38.6	26.1	137 10.5	25.9
	08	285 54.8	266 34.6	42.6	322 19.7	36.8	232 40.7	26.2	152 13.1	25.9
TUESDAY	09	300 57.2	281 36.5	·· 43.2	337 20.2	·· 36.2	247 42.8	·· 26.3	167 15.7	·· 26.0
	10	315 59.7	296 38.4	43.8	352 20.8	35.6	262 44.8	26.4	182 18.3	26.0
	11	331 02.2	311 40.4	44.5	7 21.3	35.0	277 46.9	26.5	197 20.9	26.1
	12	346 04.6	326 42.3	N14 45.1	22 21.9	S15 34.4	292 49.0	N18 26.6	212 23.6	N18 26.1
	13	1 07.1	341 44.2	45.7	37 22.4	33.8	307 51.1	26.7	227 26.2	26.1
	14	16 09.6	356 46.2	46.3	52 23.0	33.2	322 53.2	26.8	242 28.8	26.2
	15	31 12.0	11 48.1	·· 46.9	67 23.5	·· 32.6	337 55.2	·· 26.9	257 31.4	·· 26.2
	16	46 14.5	26 50.0	47.5	82 24.1	31.9	352 57.3	27.0	272 34.0	26.3
	17	61 17.0	41 52.0	48.1	97 24.6	31.3	7 59.4	27.1	287 36.6	26.3
	18	76 19.4	56 53.9	N14 48.7	112 25.1	S15 30.7	23 01.5	N18 27.2	302 39.2	N18 26.3
	19	91 21.9	71 55.9	49.3	127 25.7	30.1	38 03.6	27.3	317 41.8	26.4
	20	106 24.4	86 57.9	49.9	142 26.2	29.5	53 05.6	27.4	332 44.4	26.4
	21	121 26.8	101 59.8	·· 50.5	157 26.8	·· 28.9	68 07.7	·· 27.5	347 47.0	·· 26.5
	22	136 29.3	117 01.8	51.1	172 27.3	28.2	83 09.8	27.6	2 49.6	26.5
	23	151 31.7	132 03.7	51.7	187 27.9	27.6	98 11.9	27.7	17 52.2	26.5
9	00	166 34.2	147 05.7	N14 52.3	202 28.4	S15 27.0	113 14.0	N18 27.8	32 54.8	N18 26.6
	01	181 36.7	162 07.7	52.9	217 29.0	26.4	128 16.0	27.9	47 57.4	26.6
	02	196 39.1	177 09.7	53.5	232 29.5	25.8	143 18.1	28.0	63 00.0	26.7
	03	211 41.6	192 11.6	·· 54.0	247 30.1	·· 25.2	158 20.2	·· 28.1	78 02.6	·· 26.7
	04	226 44.1	207 13.6	54.6	262 30.6	24.5	173 22.3	28.2	93 05.2	26.7
	05	241 46.5	222 15.6	55.2	277 31.2	23.9	188 24.3	28.3	108 07.8	26.8
	06	256 49.0	237 17.6	N14 55.8	292 31.7	S15 23.3	203 26.4	N18 28.4	123 10.5	N18 26.8
	07	271 51.5	252 19.6	56.4	307 32.3	22.7	218 28.5	28.5	138 13.1	26.9
WEDNESDAY	08	286 53.9	267 21.6	57.0	322 32.8	22.1	233 30.6	28.6	153 15.7	26.9
	09	301 56.4	282 23.6	·· 57.5	337 33.3	·· 21.5	248 32.6	·· 28.7	168 18.3	·· 26.9
	10	316 58.9	297 25.6	58.1	352 33.9	20.8	263 34.7	28.8	183 20.9	27.0
	11	332 01.3	312 27.6	58.7	7 34.4	20.2	278 36.8	28.9	198 23.5	27.0
	12	347 03.8	327 29.6	N14 59.3	22 35.0	S15 19.6	293 38.9	N18 29.0	213 26.1	N18 27.0
	13	2 06.2	342 31.6	14 59.8	37 35.5	19.0	308 40.9	29.1	228 28.7	27.1
	14	17 08.7	357 33.6	15 00.4	52 36.1	18.4	323 43.0	29.2	243 31.3	27.1
	15	32 11.2	12 35.7	·· 01.0	67 36.6	·· 17.7	338 45.1	·· 29.3	258 33.9	·· 27.2
	16	47 13.6	27 37.7	01.6	82 37.2	17.1	353 47.2	29.4	273 36.5	27.2
	17	62 16.1	42 39.7	02.1	97 37.7	16.5	8 49.2	29.5	288 39.1	27.2
	18	77 18.6	57 41.7	N15 02.7	112 38.3	S15 15.9	23 51.3	N18 29.6	303 41.7	N18 27.3
	19	92 21.0	72 43.8	03.2	127 38.8	15.3	38 53.4	29.7	318 44.3	27.3
	20	107 23.5	87 45.8	03.8	142 39.4	14.6	53 55.5	29.8	333 46.9	27.4
	21	122 26.0	102 47.9	·· 04.4	157 39.9	·· 14.0	68 57.5	·· 29.9	348 49.5	·· 27.4
	22	137 28.4	117 49.9	04.9	172 40.5	13.4	83 59.6	30.0	3 52.1	27.4
	23	152 30.9	132 51.9	05.5	187 41.0	12.8	99 01.7	30.1	18 54.7	27.5
10	00	167 33.3	147 54.0	N15 06.0	202 41.6	S15 12.1	114 03.7	N18 30.2	33 57.3	N18 27.5
	01	182 35.8	162 56.0	06.6	217 42.1	11.5	129 05.8	30.3	48 59.9	27.5
	02	197 38.3	177 58.1	07.1	232 42.7	10.9	144 07.9	30.4	64 02.5	27.6
	03	212 40.7	193 00.2	·· 07.7	247 43.2	·· 10.3	159 10.0	·· 30.5	79 05.1	·· 27.6
	04	227 43.2	208 02.2	08.2	262 43.8	09.7	174 12.0	30.6	94 07.7	27.7
	05	242 45.7	223 04.3	08.8	277 44.3	09.0	189 14.1	30.7	109 10.3	27.7
	06	257 48.1	238 06.4	N15 09.3	292 44.9	S15 08.4	204 16.2	N18 30.8	124 12.9	N18 27.7
	07	272 50.6	253 08.4	09.9	307 45.5	07.8	219 18.2	30.9	139 15.5	27.8
THURSDAY	08	287 53.1	268 10.5	10.4	322 46.0	07.2	234 20.3	31.0	154 18.1	27.8
	09	302 55.5	283 12.6	·· 11.0	337 46.6	·· 06.5	249 22.4	·· 31.1	169 20.7	·· 27.9
	10	317 58.0	298 14.7	11.5	352 47.1	05.9	264 24.4	31.2	184 23.3	27.9
	11	333 00.5	313 16.8	12.0	7 47.7	05.3	279 26.5	31.3	199 25.9	27.9
	12	348 02.9	328 18.9	N15 12.6	22 48.2	S15 04.6	294 28.6	N18 31.4	214 28.5	N18 28.0
	13	3 05.4	343 21.0	13.1	37 48.8	04.0	309 30.7	31.5	229 31.1	28.0
	14	18 07.8	358 23.1	13.6	52 49.3	03.4	324 32.7	31.6	244 33.7	28.0
	15	33 10.3	13 25.2	·· 14.2	67 49.9	·· 02.8	339 34.8	·· 31.7	259 36.3	·· 28.1
	16	48 12.8	28 27.3	14.7	82 50.4	02.1	354 36.9	31.8	274 38.9	28.1
	17	63 15.2	43 29.4	15.2	97 51.0	01.5	9 38.9	31.9	289 41.5	28.2
	18	78 17.7	58 31.5	N15 15.7	112 51.5	S15 00.9	24 41.0	N18 32.0	304 44.1	N18 28.2
	19	93 20.2	73 33.6	16.3	127 52.1	15 00.3	39 43.1	32.1	319 46.7	28.2
	20	108 22.6	88 35.7	16.8	142 52.6	14 59.6	54 45.1	32.2	334 49.3	28.3
	21	123 25.1	103 37.8	·· 17.3	157 53.2	·· 59.0	69 47.2	·· 32.3	349 51.9	·· 28.3
	22	138 27.6	118 40.0	17.8	172 53.7	58.4	84 49.3	32.4	4 54.5	28.3
	23	153 30.0	133 42.1	18.3	187 54.3	57.7	99 51.3	32.5	19 57.1	28.4
Mer. Pass.		h m 12 51.6	v 2.0	d 0.6	v 0.5	d 0.6	v 2.1	d 0.1	v 2.6	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 39.3	S40 24.1
Achernar	335 47.6	S57 21.4
Acrux	173 39.1	S62 58.4
Adhara	255 33.8	S28 56.8
Aldebaran	291 20.8	N16 27.7
Alioth	166 44.1	N56 04.8
Alkaid	153 20.0	N49 25.4
Al Na'ir	28 18.4	S47 04.2
Alnilam	276 14.0	S 1 13.2
Alphard	218 22.6	S 8 33.8
Alphecca	126 34.0	N26 47.3
Alpheratz	358 12.1	N28 57.8
Altair	62 35.0	N 8 49.4
Ankaa	353 43.0	S42 25.9
Antares	112 59.7	S26 22.8
Arcturus	146 20.4	N19 17.9
Atria	108 26.0	S68 58.9
Avior	234 28.7	S59 26.5
Bellatrix	279 01.3	N 6 19.6
Betelgeuse	271 30.8	N 7 24.0
Canopus	264 08.1	S52 41.4
Capella	281 14.8	N45 58.6
Deneb	49 50.4	N45 11.8
Denebola	183 01.1	N14 41.8
Diphda	349 23.6	S18 06.8
Dubhe	194 24.4	N61 52.3
Elnath	278 47.1	N28 35.3
Eltanin	90 58.9	N51 29.3
Enif	34 14.2	N 9 46.2
Fomalhaut	15 54.4	S29 44.6
Gacrux	172 30.8	S56 59.2
Gienah	176 20.1	S17 25.1
Hadar	149 26.2	S60 15.7
Hamal	328 31.8	N23 21.3
Kaus Aust.	84 20.1	S34 23.6
Kochab	137 18.3	N74 14.7
Markab	14 05.8	N15 04.9
Menkar	314 43.8	N 3 59.9
Menkent	148 39.5	S36 15.5
Miaplacidus	221 44.6	S69 37.7
Mirfak	309 19.7	N49 46.9
Nunki	76 32.3	S26 19.4
Peacock	54 02.6	S56 48.3
Pollux	244 00.8	N28 04.8
Procyon	245 28.1	N 5 16.8
Rasalhague	96 31.8	N12 34.5
Regulus	208 12.2	N12 04.5
Rigel	281 38.3	S 8 13.9
Rigil Kent.	140 28.6	S60 44.3
Sabik	102 43.8	S15 41.8
Schedar	350 12.2	N56 24.8
Shaula	96 59.0	S37 05.1
Sirius	258 57.7	S16 41.4
Spica	158 59.8	S11 02.7
Suhail	223 12.1	S43 20.7
Vega	80 57.6	N38 45.5
Zuben'ubi	137 35.5	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	340 31.5	14 10
Mars	35 54.2	10 30
Jupiter	306 39.7	16 25
Saturn	226 20.6	21 45

0000 MARCH 8, 9, 10 (TUES., WED., THURS.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
8 00	177 15.9	S 5 00.9	329 36.0	8.6	S 7 30.5	10.7	59.8
01	192 16.0	5 00.0	344 03.6	8.6	7 41.2	10.7	59.8
02	207 16.2	4 59.0	358 31.2	8.5	7 51.9	10.7	59.8
03	222 16.4	·· 58.0	12 58.7	8.5	8 02.6	10.6	59.8
04	237 16.5	57.0	27 26.2	8.5	8 13.2	10.6	59.8
05	252 16.7	56.1	41 53.7	8.4	8 23.8	10.5	59.8
06	267 16.8	S 4 55.1	56 21.1	8.4	S 8 34.3	10.5	59.8
07	282 17.0	54.1	70 48.5	8.3	8 44.8	10.4	59.8
08	297 17.1	53.1	85 15.8	8.4	8 55.2	10.3	59.8
09	312 17.3	·· 52.2	99 43.2	8.2	9 05.5	10.3	59.8
10	327 17.4	51.2	114 10.4	8.3	9 15.8	10.3	59.8
11	342 17.6	50.2	128 37.7	8.2	9 26.1	10.2	59.8
12	357 17.7	S 4 49.2	143 04.9	8.2	S 9 36.3	10.1	59.8
13	12 17.9	48.3	157 32.1	8.1	9 46.4	10.1	59.8
14	27 18.1	47.3	171 59.2	8.1	9 56.5	10.0	59.8
15	42 18.2	·· 46.3	186 26.3	8.1	10 06.5	9.9	59.8
16	57 18.4	45.3	200 53.4	8.0	10 16.4	9.9	59.8
17	72 18.5	44.4	215 20.4	8.0	10 26.3	9.8	59.8
18	87 18.7	S 4 43.4	229 47.4	7.9	S10 36.1	9.8	59.8
19	102 18.8	42.4	244 14.3	7.9	10 45.9	9.6	59.8
20	117 19.0	41.4	258 41.2	7.9	10 55.5	9.6	59.8
21	132 19.1	·· 40.5	273 08.1	7.9	11 05.1	9.6	59.8
22	147 19.3	39.5	287 35.0	7.8	11 14.7	9.5	59.8
23	162 19.5	38.5	302 01.8	7.7	11 24.2	9.3	59.8
9 00	177 19.6	S 4 37.5	316 28.5	7.7	S11 33.5	9.4	59.8
01	192 19.8	36.6	330 55.2	7.7	11 42.9	9.2	59.8
02	207 19.9	35.6	345 21.9	7.7	11 52.1	9.2	59.8
03	222 20.1	·· 34.6	359 48.6	7.6	12 01.3	9.1	59.8
04	237 20.2	33.6	14 15.2	7.6	12 10.4	9.0	59.8
05	252 20.4	32.7	28 41.8	7.5	12 19.4	8.9	59.8
06	267 20.6	S 4 31.7	43 08.3	7.5	S12 28.3	8.9	59.8
07	282 20.7	30.7	57 34.8	7.5	12 37.2	8.8	59.8
08	297 20.9	29.7	72 01.3	7.5	12 46.0	8.6	59.8
09	312 21.0	·· 28.7	86 27.8	7.4	12 54.6	8.6	59.8
10	327 21.2	27.8	100 54.2	7.3	13 03.2	8.6	59.8
11	342 21.4	26.8	115 20.5	7.4	13 11.8	8.4	59.8
12	357 21.5	S 4 25.8	129 46.9	7.3	S13 20.2	8.4	59.8
13	12 21.7	24.8	144 13.2	7.2	13 28.6	8.2	59.8
14	27 21.8	23.9	158 39.4	7.2	13 36.8	8.2	59.8
15	42 22.0	·· 22.9	173 05.6	7.2	13 45.0	8.1	59.8
16	57 22.2	21.9	187 31.8	7.2	13 53.1	7.9	59.8
17	72 22.3	20.9	201 58.0	7.1	14 01.0	7.9	59.8
18	87 22.5	S 4 19.9	216 24.1	7.1	S14 08.9	7.8	59.8
19	102 22.6	19.0	230 50.2	7.1	14 16.7	7.8	59.8
20	117 22.8	18.0	245 16.3	7.0	14 24.5	7.6	59.8
21	132 23.0	·· 17.0	259 42.3	7.0	14 32.1	7.5	59.8
22	147 23.1	16.0	274 08.3	7.0	14 39.6	7.4	59.8
23	162 23.3	15.1	288 34.3	6.9	14 47.0	7.3	59.8
10 00	177 23.4	S 4 14.1	303 00.2	6.9	S14 54.3	7.3	59.8
01	192 23.6	13.1	317 26.1	6.9	15 01.6	7.1	59.7
02	207 23.8	12.1	331 52.0	6.9	15 08.7	7.0	59.7
03	222 23.9	·· 11.1	346 17.9	6.8	15 15.7	6.9	59.7
04	237 24.1	10.2	0 43.7	6.8	15 22.6	6.8	59.7
05	252 24.2	09.2	15 09.5	6.7	15 29.4	6.8	59.7
06	267 24.4	S 4 08.2	29 35.2	6.8	S15 36.2	6.6	59.7
07	282 24.6	07.2	44 01.0	6.7	15 42.8	6.5	59.7
08	297 24.7	06.2	58 26.7	6.7	15 49.3	6.4	59.7
09	312 24.9	·· 05.3	72 52.4	6.6	15 55.7	6.3	59.7
10	327 25.0	04.3	87 18.0	6.6	16 02.0	6.2	59.7
11	342 25.2	03.3	101 43.6	6.6	16 08.2	6.0	59.7
12	357 25.4	S 4 02.3	116 09.2	6.6	S16 14.2	6.0	59.7
13	12 25.5	01.3	130 34.8	6.6	16 20.2	5.9	59.6
14	27 25.7	4 00.4	145 00.4	6.5	16 26.1	5.7	59.6
15	42 25.9	3 59.4	159 25.9	6.6	16 31.8	5.7	59.6
16	57 26.0	58.4	173 51.5	6.4	16 37.5	5.5	59.6
17	72 26.2	57.4	188 16.9	6.5	16 43.0	5.4	59.6
18	87 26.3	S 3 56.4	202 42.4	6.5	S16 48.4	5.3	59.6
19	102 26.5	55.5	217 07.9	6.4	16 53.7	5.2	59.6
20	117 26.7	54.5	231 33.3	6.4	16 58.9	5.1	59.6
21	132 26.8	·· 53.5	245 58.7	6.4	17 04.0	5.0	59.6
22	147 27.0	52.5	260 24.1	6.4	17 09.0	4.8	59.5
23	162 27.2	51.5	274 49.5	6.4	17 13.8	4.7	59.5
	S.D. 16.1	d 1.0	S.D. 16.3		16.3		16.3

TUESDAY — WEDNESDAY — THURSDAY

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

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

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
	m s	m s	h m	h m	h m	d	
8	10 57	10 49	12 11	02 06	14 33	18	◑
9	10 42	10 34	12 11	03 01	15 29	19	
10	10 27	10 19	12 10	03 57	16 26	20	

0000 MARCH 11, 12, 13 (FRI., SAT., SUN.)

G.M.T. (UT)		ARIES	VENUS −4.2		MARS +1.4		JUPITER −1.8		SATURN +0.2	
d	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
11	00	168 32.5	148 44.2	N15 18.9	202 54.9	S14 57.1	114 53.4	N18 32.6	34 59.7	N18 28.4
	01	183 35.0	163 46.4	19.4	217 55.4	56.5	129 55.5	32.7	50 02.3	28.5
	02	198 37.4	178 48.5	19.9	232 56.0	55.9	144 57.5	32.8	65 04.9	28.5
	03	213 39.9	193 50.6	·· 20.4	247 56.5	·· 55.2	159 59.6	·· 32.9	80 07.5	·· 28.5
	04	228 42.3	208 52.8	20.9	262 57.1	54.6	175 01.7	33.0	95 10.1	28.6
	05	243 44.8	223 54.9	21.4	277 57.6	54.0	190 03.7	33.1	110 12.7	28.6
	06	258 47.3	238 57.1	N15 21.9	292 58.2	S14 53.3	205 05.8	N18 33.2	125 15.3	N18 28.6
	07	273 49.7	253 59.2	22.4	307 58.7	52.7	220 07.9	33.3	140 17.9	28.7
	08	288 52.2	269 01.4	22.9	322 59.3	52.1	235 09.9	33.4	155 20.5	28.7
F	09	303 54.7	284 03.6	·· 23.4	337 59.9	·· 51.4	250 12.0	·· 33.5	170 23.1	·· 28.7
R	10	318 57.1	299 05.7	23.9	353 00.4	50.8	265 14.1	33.6	185 25.7	28.8
I	11	333 59.6	314 07.9	24.4	8 01.0	50.2	280 16.1	33.7	200 28.3	28.8
D	12	349 02.1	329 10.1	N15 24.9	23 01.5	S14 49.5	295 18.2	N18 33.8	215 30.9	N18 28.9
A	13	4 04.5	344 12.3	25.4	38 02.1	48.9	310 20.2	33.9	230 33.5	28.9
Y	14	19 07.0	359 14.4	25.9	53 02.6	48.3	325 22.3	34.0	245 36.1	28.9
	15	34 09.5	14 16.6	·· 26.4	68 03.2	47.7	340 24.4	·· 34.1	260 38.7	·· 29.0
	16	49 11.9	29 18.8	26.9	83 03.8	47.0	355 26.4	34.2	275 41.3	29.0
	17	64 14.4	44 21.0	27.4	98 04.3	46.4	10 28.5	34.3	290 43.8	29.0
	18	79 16.8	59 23.2	N15 27.8	113 04.9	S14 45.8	25 30.6	N18 34.4	305 46.4	N18 29.1
	19	94 19.3	74 25.4	28.3	128 05.4	45.1	40 32.6	34.5	320 49.0	29.1
	20	109 21.8	89 27.6	28.8	143 06.0	44.5	55 34.7	34.6	335 51.6	29.1
	21	124 24.2	104 29.8	·· 29.3	158 06.5	·· 43.8	70 36.7	·· 34.7	350 54.2	·· 29.2
	22	139 26.7	119 32.0	29.8	173 07.1	43.2	85 38.8	34.8	5 56.8	29.2
	23	154 29.2	134 34.2	30.2	188 07.7	42.6	100 40.9	34.9	20 59.4	29.3
12	00	169 31.6	149 36.5	N15 30.7	203 08.2	S14 41.9	115 42.9	N18 35.0	36 02.0	N18 29.3
	01	184 34.1	164 38.7	31.2	218 08.8	41.3	130 45.0	35.1	51 04.6	29.3
	02	199 36.6	179 40.9	31.7	233 09.3	40.7	145 47.1	35.2	66 07.2	29.4
	03	214 39.0	194 43.1	·· 32.1	248 09.9	·· 40.0	160 49.1	·· 35.3	81 09.8	·· 29.4
	04	229 41.5	209 45.4	32.6	263 10.5	39.4	175 51.2	35.4	96 12.4	29.4
	05	244 43.9	224 47.6	33.1	278 11.0	38.8	190 53.2	35.5	111 15.0	29.5
	06	259 46.4	239 49.8	N15 33.5	293 11.6	S14 38.1	205 55.3	N18 35.6	126 17.6	N18 29.5
	07	274 48.9	254 52.1	34.0	308 12.1	37.5	220 57.4	35.7	141 20.2	29.5
S	08	289 51.3	269 54.3	34.4	323 12.7	36.9	235 59.4	35.8	156 22.8	29.6
A	09	304 53.8	284 56.6	·· 34.9	338 13.3	·· 36.2	251 01.5	·· 35.9	171 25.4	·· 29.6
T	10	319 56.3	299 58.8	35.4	353 13.8	35.6	266 03.5	36.0	186 28.0	29.7
U	11	334 58.7	315 01.1	35.8	8 14.4	34.9	281 05.6	36.1	201 30.5	29.7
R	12	350 01.2	330 03.3	N15 36.3	23 14.9	S14 34.3	296 07.6	N18 36.2	216 33.1	N18 29.7
D	13	5 03.7	345 05.6	36.7	38 15.5	33.7	311 09.7	36.3	231 35.7	29.8
A	14	20 06.1	0 07.9	37.2	53 16.1	33.0	326 11.8	36.4	246 38.3	29.8
Y	15	35 08.6	15 10.1	·· 37.6	68 16.6	·· 32.4	341 13.8	·· 36.5	261 40.9	·· 29.8
	16	50 11.1	30 12.4	38.1	83 17.2	31.7	356 15.9	36.6	276 43.5	29.9
	17	65 13.5	45 14.7	38.5	98 17.7	31.1	11 17.9	36.7	291 46.1	29.9
	18	80 16.0	60 17.0	N15 38.9	113 18.3	S14 30.5	26 20.0	N18 36.8	306 48.7	N18 29.9
	19	95 18.4	75 19.3	39.4	128 18.9	29.8	41 22.0	36.9	321 51.3	30.0
	20	110 20.9	90 21.5	39.8	143 19.4	29.2	56 24.1	37.0	336 53.9	30.0
	21	125 23.4	105 23.8	·· 40.3	158 20.0	·· 28.5	71 26.2	·· 37.1	351 56.5	·· 30.0
	22	140 25.8	120 26.1	40.7	173 20.6	27.9	86 28.2	37.2	6 59.1	30.1
	23	155 28.3	135 28.4	41.1	188 21.1	27.3	101 30.3	37.3	22 01.6	30.1
13	00	170 30.8	150 30.7	N15 41.6	203 21.7	S14 26.6	116 32.3	N18 37.4	37 04.2	N18 30.1
	01	185 33.2	165 33.0	42.0	218 22.2	26.0	131 34.4	37.5	52 06.8	30.2
	02	200 35.7	180 35.4	42.4	233 22.8	25.3	146 36.4	37.6	67 09.4	30.2
	03	215 38.2	195 37.7	·· 42.8	248 23.4	·· 24.7	161 38.5	·· 37.7	82 12.0	·· 30.3
	04	230 40.6	210 40.0	43.3	263 23.9	24.1	176 40.6	37.8	97 14.6	30.3
	05	245 43.1	225 42.3	43.7	278 24.5	23.4	191 42.6	37.9	112 17.2	30.3
	06	260 45.6	240 44.6	N15 44.1	293 25.1	S14 22.8	206 44.7	N18 38.0	127 19.8	N18 30.4
	07	275 48.0	255 47.0	44.5	308 25.6	22.1	221 46.7	38.2	142 22.4	30.4
	08	290 50.5	270 49.3	44.9	323 26.2	21.5	236 48.8	38.3	157 25.0	30.4
S	09	305 52.9	285 51.6	·· 45.3	338 26.7	·· 20.8	251 50.8	·· 38.4	172 27.5	·· 30.5
U	10	320 55.4	300 54.0	45.8	353 27.3	20.2	266 52.9	38.5	187 30.1	30.5
N	11	335 57.9	315 56.3	46.2	8 27.9	19.6	281 54.9	38.6	202 32.7	30.5
D	12	351 00.3	330 58.7	N15 46.6	23 28.4	S14 18.9	296 57.0	N18 38.7	217 35.3	N18 30.6
A	13	6 02.8	346 01.0	47.0	38 29.0	18.3	311 59.0	38.8	232 37.9	30.6
Y	14	21 05.3	1 03.4	47.4	53 29.6	17.6	327 01.1	38.9	247 40.5	30.6
	15	36 07.7	16 05.7	·· 47.8	68 30.1	·· 17.0	342 03.1	·· 39.0	262 43.1	·· 30.7
	16	51 10.2	31 08.1	48.2	83 30.7	16.3	357 05.2	39.1	277 45.7	30.7
	17	66 12.7	46 10.4	48.6	98 31.3	15.7	12 07.2	39.2	292 48.3	30.7
	18	81 15.1	61 12.8	N15 49.0	113 31.8	S14 15.0	27 09.3	N18 39.3	307 50.8	N18 30.8
	19	96 17.6	76 15.2	49.4	128 32.4	14.4	42 11.3	39.4	322 53.4	30.8
	20	111 20.0	91 17.6	49.8	143 33.0	13.7	57 13.4	39.5	337 56.0	30.8
	21	126 22.5	106 19.9	·· 50.2	158 33.5	·· 13.1	72 15.5	·· 39.6	352 58.6	·· 30.9
	22	141 25.0	121 22.3	50.6	173 34.1	12.5	87 17.5	39.7	8 01.2	30.9
	23	156 27.4	136 24.7	50.9	188 34.7	11.8	102 19.6	39.8	23 03.8	30.9
Mer. Pass.		h m 12 39.8	v 2.3	d 0.5	v 0.6	d 0.6	v 2.1	d 0.1	v 2.6	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 39.3	S40 24.0
Achernar	335 47.6	S57 21.4
Acrux	173 39.1	S62 58.4
Adhara	255 33.8	S28 56.8
Aldebaran	291 20.8	N16 27.7
Alioth	166 44.1	N56 04.8
Alkaid	153 20.0	N49 25.4
Al Na'ir	28 18.4	S47 04.2
Alnilam	276 14.0	S 1 13.2
Alphard	218 22.6	S 8 33.8
Alphecca	126 34.0	N26 47.3
Alpheratz	358 12.1	N28 57.8
Altair	62 35.0	N 8 48.4
Ankaa	353 43.0	S42 25.9
Antares	112 59.7	S26 22.8
Arcturus	146 20.4	N19 17.9
Atria	108 25.9	S68 58.9
Avior	234 28.7	S59 26.5
Bellatrix	279 01.3	N 6 19.6
Betelgeuse	271 30.8	N 7 24.0
Canopus	264 08.1	S52 41.4
Capella	281 14.8	N45 58.6
Deneb	49 50.4	N45 11.8
Denebola	183 01.1	N14 41.8
Diphda	349 23.6	S18 06.8
Dubhe	194 24.4	N61 52.3
Elnath	278 47.1	N28 35.3
Eltanin	90 58.9	N51 29.3
Enif	34 14.2	N 9 46.2
Fomalhaut	15 54.4	S29 44.6
Gacrux	172 30.7	S56 59.2
Gienah	176 20.1	S17 25.1
Hadar	149 26.1	S60 15.7
Hamal	328 31.8	N23 21.3
Kaus Aust.	84 20.1	S34 23.6
Kochab	137 18.3	N74 14.7
Markab	14 05.8	N15 04.9
Menkar	314 43.8	N 3 59.9
Menkent	148 39.5	S36 15.5
Miaplacidus	221 44.6	S69 37.7
Mirfak	309 19.7	N49 46.9
Nunki	76 32.2	S26 19.4
Peacock	54 02.6	S56 48.3
Pollux	244 00.9	N28 04.8
Procyon	245 28.1	N 5 16.8
Rasalhague	96 31.8	N12 34.5
Regulus	208 12.2	N12 04.5
Rigel	281 38.3	S 8 13.9
Rigil Kent.	140 28.5	S60 44.3
Sabik	102 43.8	S15 41.8
Schedar	350 12.2	N56 24.8
Shaula	96 59.0	S37 05.1
Sirius	258 57.7	S16 41.4
Spica	158 59.7	S11 02.7
Suhail	223 12.1	S43 20.7
Vega	80 57.6	N38 45.5
Zuben'ubi	137 35.4	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	340 04.8	13 59
Mars	33 36.6	10 27
Jupiter	306 11.3	16 15
Saturn	226 30.4	21 32

0000 MARCH 11, 12, 13 (FRI., SAT., SUN.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
11	00	177 27.3	S 3 50.6	289 14.9	6.4	S17 18.5	4.7	59.5
	01	192 27.5	49.6	303 40.3	6.3	17 23.2	4.5	59.5
	02	207 27.7	48.6	318 05.6	6.3	17 27.7	4.4	59.5
	03	222 27.8	·· 47.6	332 30.9	6.3	17 32.1	4.2	59.5
	04	237 28.0	46.6	346 56.2	6.3	17 36.3	4.2	59.5
	05	252 28.2	45.7	1 21.5	6.3	17 40.5	4.0	59.5
	06	267 28.3	S 3 44.7	15 46.8	6.3	S17 44.5	3.9	59.5
	07	282 28.5	43.7	30 12.1	6.3	17 48.4	3.8	59.4
	08	297 28.6	42.7	44 37.4	6.3	17 52.2	3.7	59.4
F	09	312 28.8	·· 41.7	59 02.7	6.2	17 55.9	3.5	59.4
R	10	327 29.0	40.8	73 27.9	6.3	17 59.4	3.5	59.4
I	11	342 29.1	39.8	87 53.2	6.2	18 02.9	3.3	59.4
D	12	357 29.3	S 3 38.8	102 18.4	6.3	S18 06.2	3.2	59.4
A	13	12 29.5	37.8	116 43.7	6.2	18 09.4	3.1	59.4
Y	14	27 29.6	36.8	131 08.9	6.2	18 12.5	2.9	59.3
	15	42 29.8	·· 35.8	145 34.1	6.3	18 15.4	2.8	59.3
	16	57 30.0	34.9	159 59.4	6.2	18 18.2	2.8	59.3
	17	72 30.1	33.9	174 24.6	6.3	18 21.0	2.5	59.3
	18	87 30.3	S 3 32.9	188 49.9	6.2	S18 23.5	2.5	59.3
	19	102 30.5	31.9	203 15.1	6.2	18 26.0	2.3	59.3
	20	117 30.6	30.9	217 40.3	6.3	18 28.3	2.3	59.3
	21	132 30.8	·· 29.9	232 05.6	6.2	18 30.6	2.1	59.2
	22	147 31.0	29.0	246 30.8	6.3	18 32.7	1.9	59.2
	23	162 31.1	28.0	260 56.1	6.2	18 34.6	1.9	59.2
12	00	177 31.3	S 3 27.0	275 21.3	6.3	S18 36.5	1.7	59.2
	01	192 31.5	26.0	289 46.6	6.3	18 38.2	1.6	59.2
	02	207 31.6	25.0	304 11.9	6.2	18 39.8	1.5	59.2
	03	222 31.8	·· 24.1	318 37.1	6.3	18 41.3	1.4	59.1
	04	237 32.0	23.1	333 02.4	6.3	18 42.7	1.2	59.1
	05	252 32.1	22.1	347 27.7	6.3	18 43.9	1.1	59.1
	06	267 32.3	S 3 21.1	1 53.0	6.4	S18 45.0	1.0	59.1
	07	282 32.5	20.1	16 18.4	6.3	18 46.0	0.9	59.1
S	08	297 32.6	19.1	30 43.7	6.4	18 46.9	0.7	59.1
A	09	312 32.8	·· 18.2	45 09.1	6.3	18 47.6	0.7	59.1
T	10	327 33.0	17.2	59 34.4	6.4	18 48.3	0.5	59.0
U	11	342 33.1	16.2	73 59.8	6.4	18 48.8	0.3	59.0
R	12	357 33.3	S 3 15.2	88 25.2	6.4	S18 49.1	0.3	59.0
D	13	12 33.5	14.2	102 50.6	6.5	18 49.4	0.1	59.0
A	14	27 33.6	13.2	117 16.1	6.4	18 49.5	0.1	59.0
Y	15	42 33.8	·· 12.3	131 41.5	6.5	18 49.6	0.2	59.0
	16	57 34.0	11.3	146 07.0	6.5	18 49.4	0.2	58.9
	17	72 34.2	10.3	160 32.5	6.6	18 49.2	0.3	58.9
	18	87 34.3	S 3 09.3	174 58.1	6.5	S18 48.9	0.5	58.9
	19	102 34.5	08.3	189 23.6	6.6	18 48.4	0.6	58.9
	20	117 34.7	07.3	203 49.2	6.6	18 47.8	0.7	58.9
	21	132 34.8	·· 06.3	218 14.8	6.6	18 47.1	0.8	58.8
	22	147 35.0	05.4	232 40.4	6.7	18 46.3	1.0	58.8
	23	162 35.2	04.4	247 06.1	6.7	18 45.3	1.1	58.8
13	00	177 35.3	S 3 03.4	261 31.8	6.7	S18 44.2	1.1	58.8
	01	192 35.5	02.4	275 57.5	6.7	18 43.1	1.3	58.8
	02	207 35.7	01.4	290 23.2	6.8	18 41.8	1.5	58.8
	03	222 35.8	3 00.4	304 49.0	6.8	18 40.3	1.5	58.7
	04	237 36.0	2 59.5	319 14.8	6.9	18 38.8	1.7	58.7
	05	252 36.2	58.5	333 40.7	6.8	18 37.1	1.8	58.7
	06	267 36.4	S 2 57.5	348 06.5	7.0	S18 35.3	1.8	58.7
	07	282 36.5	56.5	2 32.5	6.9	18 33.5	2.1	58.7
	08	297 36.7	55.5	16 58.4	7.0	18 31.4	2.1	58.7
S	09	312 36.9	·· 54.5	31 24.4	7.0	18 29.3	2.2	58.6
U	10	327 37.0	53.5	45 50.4	7.1	18 27.1	2.4	58.6
N	11	342 37.2	52.6	60 16.5	7.1	18 24.7	2.4	58.6
D	12	357 37.4	S 2 51.6	74 42.6	7.1	S18 22.3	2.6	58.6
A	13	12 37.6	50.6	89 08.7	7.2	18 19.7	2.7	58.6
Y	14	27 37.7	49.6	103 34.9	7.2	18 17.0	2.8	58.5
	15	42 37.9	·· 48.6	118 01.1	7.2	18 14.2	2.9	58.5
	16	57 38.1	47.6	132 27.3	7.3	18 11.3	3.1	58.5
	17	72 38.2	46.7	146 53.6	7.4	18 08.2	3.1	58.5
	18	87 38.4	S 2 45.7	161 20.0	7.4	S18 05.1	3.3	58.5
	19	102 38.6	44.7	175 46.4	7.4	18 01.8	3.3	58.5
	20	117 38.8	43.7	190 12.8	7.5	17 58.5	3.5	58.4
	21	132 38.9	·· 42.7	204 39.3	7.5	17 55.0	3.6	58.4
	22	147 39.1	41.7	219 05.8	7.6	17 51.4	3.7	58.4
	23	162 39.3	40.7	233 32.4	7.6	17 47.7	3.7	58.4
		S.D. 16.1	d 1.0	S.D. 16.2		16.1		16.0

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

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

0000 MARCH 14, 15, 16 (MON., TUES., WED.)

G.M.T. (UT)		ARIES	VENUS −4.2		MARS +1.4		JUPITER −1.7		SATURN +0.3	
		G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d	h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
14	00	171 29.9	151 27.1	N15 51.3	203 35.2	S14 11.2	117 21.6	N18 39.9	38 06.4	N18 31.0
	01	186 32.4	166 29.5	51.7	218 35.8	10.5	132 23.7	40.0	53 09.0	31.0
	02	201 34.8	181 31.9	52.1	233 36.4	09.9	147 25.7	40.1	68 11.5	31.0
	03	216 37.3	196 34.3	·· 52.5	248 36.9	·· 09.2	162 27.8	·· 40.2	83 14.1	·· 31.1
	04	231 39.8	211 36.7	52.9	263 37.5	08.6	177 29.8	40.3	98 16.7	31.1
	05	246 42.2	226 39.1	53.2	278 38.1	07.9	192 31.9	40.4	113 19.3	31.1
	06	261 44.7	241 41.5	N15 53.6	293 38.6	S14 07.3	207 33.9	N18 40.5	128 21.9	N18 31.2
	07	276 47.2	256 43.9	54.0	308 39.2	06.6	222 36.0	40.6	143 24.5	31.2
	08	291 49.6	271 46.4	54.4	323 39.8	06.0	237 38.0	40.7	158 27.1	31.2
MONDAY	09	306 52.1	286 48.8	·· 54.7	338 40.3	·· 05.3	252 40.1	·· 40.8	173 29.6	·· 31.3
	10	321 54.5	301 51.2	55.1	353 40.9	04.7	267 42.1	40.9	188 32.2	31.3
	11	336 57.0	316 53.6	55.5	8 41.5	04.0	282 44.1	41.0	203 34.8	31.3
	12	351 59.5	331 56.1	N15 55.8	23 42.0	S14 03.4	297 46.2	N18 41.1	218 37.4	N18 31.4
	13	7 01.9	346 58.5	56.2	38 42.6	02.7	312 48.2	41.2	233 40.0	31.4
	14	22 04.4	2 01.0	56.5	53 43.2	02.1	327 50.3	41.3	248 42.6	31.4
	15	37 06.9	17 03.4	·· 56.9	68 43.7	·· 01.4	342 52.3	41.4	263 45.2	·· 31.5
	16	52 09.3	32 05.9	57.2	83 44.3	00.8	357 54.4	41.5	278 47.7	31.5
	17	67 11.8	47 08.3	57.6	98 44.9	14 00.1	12 56.4	41.6	293 50.3	31.5
	18	82 14.3	62 10.8	N15 57.9	113 45.5	S13 59.5	27 58.5	N18 41.7	308 52.9	N18 31.6
	19	97 16.7	77 13.2	58.3	128 46.0	58.8	43 00.5	41.8	323 55.5	31.6
	20	112 19.2	92 15.7	58.6	143 46.6	58.2	58 02.6	41.9	338 58.1	31.6
	21	127 21.7	107 18.2	·· 59.0	158 47.2	·· 57.5	73 04.6	·· 42.0	354 00.7	·· 31.7
	22	142 24.1	122 20.6	59.3	173 47.7	56.9	88 06.7	42.1	9 03.2	31.7
	23	157 26.6	137 23.1	15 59.7	188 48.3	56.2	103 08.7	42.3	24 05.8	31.7
15	00	172 29.0	152 25.6	N16 00.0	203 48.9	S13 55.6	118 10.8	N18 42.4	39 08.4	N18 31.8
	01	187 31.5	167 28.1	00.4	218 49.4	54.9	133 12.8	42.5	54 11.0	31.8
	02	202 34.0	182 30.6	00.7	233 50.0	54.2	148 14.8	42.6	69 13.6	31.8
	03	217 36.4	197 33.1	·· 01.0	248 50.6	·· 53.6	163 16.9	·· 42.7	84 16.2	·· 31.9
	04	232 38.9	212 35.5	01.3	263 51.2	52.9	178 18.9	42.8	99 18.7	31.9
	05	247 41.4	227 38.0	01.7	278 51.7	52.3	193 21.0	42.9	114 21.3	31.9
	06	262 43.8	242 40.5	N16 02.0	293 52.3	S13 51.6	208 23.0	N18 43.0	129 23.9	N18 32.0
	07	277 46.3	257 43.1	02.3	308 52.9	51.0	223 25.1	43.1	144 26.5	32.0
	08	292 48.8	272 45.6	02.7	323 53.4	50.3	238 27.1	43.2	159 29.1	32.0
TUESDAY	09	307 51.2	287 48.1	·· 03.0	338 54.0	·· 49.7	253 29.2	·· 43.3	174 31.7	·· 32.1
	10	322 53.7	302 50.6	03.3	353 54.6	49.0	268 31.2	43.4	189 34.2	32.1
	11	337 56.1	317 53.1	03.6	8 55.2	48.4	283 33.2	43.5	204 36.8	32.1
	12	352 58.6	332 55.6	N16 03.9	23 55.7	S13 47.7	298 35.3	N18 43.6	219 39.4	N18 32.2
	13	8 01.1	347 58.2	04.2	38 56.3	47.0	313 37.3	43.7	234 42.0	32.2
	14	23 03.5	3 00.7	04.5	53 56.9	46.4	328 39.4	43.8	249 44.6	32.2
	15	38 06.0	18 03.2	·· 04.9	68 57.4	·· 45.7	343 41.4	·· 43.9	264 47.1	·· 32.3
	16	53 08.5	33 05.8	05.2	83 58.0	45.1	358 43.5	44.0	279 49.7	32.3
	17	68 10.9	48 08.3	05.5	98 58.6	44.4	13 45.5	44.1	294 52.3	32.3
	18	83 13.4	63 10.9	N16 05.8	113 59.2	S13 43.8	28 47.5	N18 44.2	309 54.9	N18 32.4
	19	98 15.9	78 13.4	06.1	128 59.7	43.1	43 49.6	44.3	324 57.5	32.4
	20	113 18.3	93 16.0	06.4	144 00.3	42.4	58 51.6	44.4	340 00.0	32.4
	21	128 20.8	108 18.5	·· 06.7	159 00.9	·· 41.8	73 53.7	·· 44.5	355 02.6	·· 32.4
	22	143 23.3	123 21.1	07.0	174 01.5	41.1	88 55.7	44.6	10 05.2	32.5
	23	158 25.7	138 23.7	07.3	189 02.0	40.5	103 57.7	44.7	25 07.8	32.5
16	00	173 28.2	153 26.2	N16 07.5	204 02.6	S13 39.8	118 59.8	N18 44.8	40 10.4	N18 32.5
	01	188 30.6	168 28.8	07.8	219 03.2	39.2	134 01.8	44.9	55 12.9	32.6
	02	203 33.1	183 31.4	08.1	234 03.8	38.5	149 03.9	45.0	70 15.5	32.6
	03	218 35.6	198 34.0	·· 08.4	249 04.3	·· 37.8	164 05.9	·· 45.1	85 18.1	·· 32.6
	04	233 38.0	213 36.6	08.7	264 04.9	37.2	179 07.9	45.3	100 20.7	32.7
	05	248 40.5	228 39.2	09.0	279 05.5	36.5	194 10.0	45.4	115 23.3	32.7
	06	263 43.0	243 41.7	N16 09.2	294 06.1	S13 35.9	209 12.0	N18 45.5	130 25.8	N18 32.7
	07	278 45.4	258 44.3	09.5	309 06.6	35.2	224 14.1	45.6	145 28.4	32.8
	08	293 47.9	273 46.9	09.8	324 07.2	34.5	239 16.1	45.7	160 31.0	32.8
WEDNESDAY	09	308 50.4	288 49.5	·· 10.1	339 07.8	·· 33.9	254 18.1	·· 45.8	175 33.6	·· 32.8
	10	323 52.8	303 52.2	10.3	354 08.4	33.2	269 20.2	45.9	190 36.1	32.9
	11	338 55.3	318 54.8	10.6	9 08.9	32.6	284 22.2	46.0	205 38.7	32.9
	12	353 57.8	333 57.4	N16 10.9	24 09.5	S13 31.9	299 24.3	N18 46.1	220 41.3	N18 32.9
	13	9 00.2	349 00.0	11.1	39 10.1	31.2	314 26.3	46.2	235 43.9	32.9
	14	24 02.7	4 02.6	11.4	54 10.7	30.6	329 28.3	46.3	250 46.5	33.0
	15	39 05.1	19 05.3	·· 11.7	69 11.2	·· 29.9	344 30.4	·· 46.4	265 49.0	·· 33.0
	16	54 07.6	34 07.9	11.9	84 11.8	29.2	359 32.4	46.5	280 51.6	33.0
	17	69 10.1	49 10.5	12.2	99 12.4	28.6	14 34.4	46.6	295 54.2	33.1
	18	84 12.5	64 13.2	N16 12.4	114 13.0	S13 27.9	29 36.5	N18 46.7	310 56.8	N18 33.1
	19	99 15.0	79 15.8	12.7	129 13.5	27.3	44 38.5	46.8	325 59.3	33.1
	20	114 17.5	94 18.5	12.9	144 14.1	26.6	59 40.5	46.9	341 01.9	33.2
	21	129 19.9	109 21.1	·· 13.2	159 14.7	·· 25.9	74 42.6	·· 47.0	356 04.5	·· 33.2
	22	144 22.4	124 23.8	13.4	174 15.3	25.3	89 44.6	47.1	11 07.1	33.2
	23	159 24.9	139 26.4	13.6	189 15.9	24.6	104 46.7	47.2	26 09.6	33.3
Mer. Pass.		h m 12 28.0	v 2.5	d 0.3	v 0.6	d 0.7	v 2.0	d 0.1	v 2.6	d 0.0

STARS

Name	S.H.A. ° ′	Dec. ° ′
Acamar	315 39.3	S40 24.0
Achernar	335 47.6	S57 21.3
Acrux	173 39.1	S62 58.4
Adhara	255 33.8	S28 56.8
Aldebaran	291 20.8	N16 27.7
Alioth	166 44.1	N56 04.8
Alkaid	153 20.0	N49 25.4
Al Na'ir	28 18.4	S47 04.2
Alnilam	276 14.1	S 1 13.2
Alphard	218 22.6	S 8 33.8
Alphecca	126 33.9	N26 47.3
Alpheratz	358 12.1	N28 57.8
Altair	62 35.0	N 8 48.4
Ankaa	353 43.0	S42 25.9
Antares	112 59.6	S26 22.8
Arcturus	146 20.4	N19 17.9
Atria	108 25.9	S68 58.9
Avior	234 28.7	S59 26.6
Bellatrix	279 01.3	N 6 19.6
Betelgeuse	271 30.8	N 7 24.0
Canopus	264 08.1	S52 41.4
Capella	281 14.8	N45 58.6
Deneb	49 50.4	N45 11.8
Denebola	183 01.1	N14 41.8
Diphda	349 23.6	S18 06.8
Dubhe	194 24.4	N61 52.3
Elnath	278 47.1	N28 35.3
Eltanin	90 58.9	N51 29.3
Enif	34 14.2	N 9 46.2
Fomalhaut	15 54.4	S29 44.6
Gacrux	172 30.7	S56 59.2
Gienah	176 20.0	S17 25.1
Hadar	149 26.1	S60 15.7
Hamal	328 31.8	N23 21.2
Kaus Aust.	84 20.0	S34 23.6
Kochab	137 18.3	N74 14.7
Markab	14 05.8	N15 04.9
Menkar	314 43.8	N 3 59.9
Menkent	148 39.4	S36 15.5
Miaplacidus	221 44.6	S69 37.7
Mirfak	309 19.7	N49 46.9
Nunki	76 32.2	S26 19.4
Peacock	54 02.5	S56 48.3
Pollux	244 00.9	N28 04.8
Procyon	245 28.1	N 5 16.8
Rasalhague	96 31.8	N12 34.5
Regulus	208 12.2	N12 04.5
Rigel	281 38.3	S 8 13.9
Rigil Kent.	140 28.5	S60 44.3
Sabik	102 43.8	S15 41.8
Schedar	350 12.2	N56 24.8
Shaula	96 58.9	S37 05.1
Sirius	258 57.7	S16 41.4
Spica	158 59.7	S11 02.7
Suhail	223 12.1	S43 20.8
Vega	80 57.5	N38 45.5
Zuben'ubi	137 35.4	S15 56.9

	S.H.A. ° ′	Mer. Pass. h m
Venus	339 56.5	13 48
Mars	31 19.8	10 24
Jupiter	305 41.7	16 05
Saturn	226 39.4	21 20

0000 MARCH 14, 15, 16 (MON., TUES., WED.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
14	00	177 39.4	S 2 39.8	247 59.0	7.6	S17 44.0	3.9	58.4
	01	192 39.6	38.8	262 25.6	7.7	17 40.1	4.0	58.3
	02	207 39.8	37.8	276 52.3	7.8	17 36.1	4.2	58.3
	03	222 40.0	·· 36.8	291 19.1	7.8	17 31.9	4.2	58.3
	04	237 40.1	35.8	305 45.9	7.8	17 27.7	4.3	58.3
	05	252 40.3	34.8	320 12.7	7.9	17 23.4	4.4	58.3
	06	267 40.5	S 2 33.8	334 39.6	8.0	S17 19.0	4.5	58.2
	07	282 40.6	32.9	349 06.6	8.0	17 14.5	4.6	58.2
	08	297 40.8	31.9	3 33.6	8.0	17 09.9	4.7	58.2
MONDAY	09	312 41.0	·· 30.9	18 00.6	8.1	17 05.2	4.9	58.2
	10	327 41.2	29.9	32 27.7	8.2	17 00.3	4.9	58.2
	11	342 41.3	28.9	46 54.9	8.2	16 55.4	5.0	58.1
	12	357 41.5	S 2 27.9	61 22.1	8.3	S16 50.4	5.1	58.1
	13	12 41.7	26.9	75 49.4	8.3	16 45.3	5.2	58.1
	14	27 41.9	26.0	90 16.7	8.3	16 40.1	5.3	58.1
	15	42 42.0	·· 25.0	104 44.0	8.5	16 34.8	5.4	58.1
	16	57 42.2	24.0	119 11.5	8.4	16 29.4	5.5	58.1
	17	72 42.4	23.0	133 38.9	8.6	16 23.9	5.6	58.0
	18	87 42.6	S 2 22.0	148 06.5	8.5	S16 18.3	5.7	58.0
	19	102 42.7	21.0	162 34.0	8.7	16 12.6	5.7	58.0
	20	117 42.9	20.0	177 01.7	8.7	16 06.9	5.9	58.0
	21	132 43.1	·· 19.0	191 29.4	8.7	16 01.0	5.9	58.0
	22	147 43.3	18.1	205 57.1	8.8	15 55.1	6.1	57.9
	23	162 43.4	17.1	220 24.9	8.9	15 49.0	6.1	57.9
15	00	177 43.6	S 2 16.1	234 52.8	8.9	S15 42.9	6.2	57.9
	01	192 43.8	15.1	249 20.7	8.9	15 36.7	6.3	57.9
	02	207 44.0	14.1	263 48.6	9.1	15 30.4	6.4	57.9
	03	222 44.1	·· 13.1	278 16.7	9.0	15 24.0	6.4	57.8
	04	237 44.3	12.1	292 44.7	9.2	15 17.6	6.6	57.8
	05	252 44.5	11.1	307 12.9	9.2	15 11.0	6.6	57.8
	06	267 44.7	S 2 10.2	321 41.1	9.2	S15 04.4	6.7	57.8
	07	282 44.8	09.2	336 09.3	9.3	14 57.7	6.8	57.8
	08	297 45.0	08.2	350 37.6	9.4	14 50.9	6.9	57.7
TUESDAY	09	312 45.2	·· 07.2	5 06.0	9.4	14 44.0	6.9	57.7
	10	327 45.4	06.2	19 34.4	9.5	14 37.1	7.1	57.7
	11	342 45.5	05.2	34 02.9	9.5	14 30.0	7.1	57.7
	12	357 45.7	S 2 04.2	48 31.4	9.6	S14 22.9	7.2	57.7
	13	12 45.9	03.3	63 00.0	9.7	14 15.7	7.2	57.6
	14	27 46.1	02.3	77 28.7	9.7	14 08.5	7.3	57.6
	15	42 46.2	·· 01.3	91 57.4	9.7	14 01.2	7.4	57.6
	16	57 46.4	2 00.3	106 26.1	9.8	13 53.8	7.5	57.6
	17	72 46.6	1 59.3	120 54.9	9.9	13 46.3	7.6	57.6
	18	87 46.8	S 1 58.3	135 23.8	9.9	S13 38.7	7.6	57.5
	19	102 46.9	57.3	149 52.7	10.0	13 31.1	7.7	57.5
	20	117 47.1	56.3	164 21.7	10.1	13 23.4	7.7	57.5
	21	132 47.3	·· 55.4	178 50.8	10.1	13 15.7	7.8	57.5
	22	147 47.5	54.4	193 19.9	10.1	13 07.9	7.9	57.5
	23	162 47.6	53.4	207 49.0	10.2	13 00.0	8.0	57.4
16	00	177 47.8	S 1 52.4	222 18.2	10.3	S12 52.0	8.0	57.4
	01	192 48.0	51.4	236 47.5	10.3	12 44.0	8.1	57.4
	02	207 48.2	50.4	251 16.8	10.4	12 35.9	8.1	57.4
	03	222 48.4	·· 49.4	265 46.2	10.4	12 27.8	8.2	57.4
	04	237 48.5	48.4	280 15.6	10.5	12 19.6	8.3	57.3
	05	252 48.7	47.5	294 45.1	10.6	12 11.3	8.3	57.3
	06	267 48.9	S 1 46.5	309 14.7	10.5	S12 03.0	8.4	57.3
	07	282 49.1	45.5	323 44.2	10.7	11 54.6	8.5	57.3
WEDNESDAY	08	297 49.2	44.5	338 13.9	10.7	11 46.1	8.5	57.3
	09	312 49.4	·· 43.5	352 43.6	10.8	11 37.6	8.5	57.2
	10	327 49.6	42.5	7 13.4	10.8	11 29.1	8.7	57.2
	11	342 49.8	41.5	21 43.2	10.8	11 20.4	8.6	57.2
	12	357 50.0	S 1 40.5	36 13.0	10.9	S11 11.8	8.7	57.2
	13	12 50.1	39.5	50 42.9	11.0	11 03.1	8.8	57.2
	14	27 50.3	38.6	65 12.9	11.0	10 54.3	8.8	57.1
	15	42 50.5	·· 37.6	79 42.9	11.1	10 45.5	8.9	57.1
	16	57 50.7	36.6	94 13.0	11.1	10 36.6	8.9	57.1
	17	72 50.8	35.6	108 43.1	11.2	10 27.7	9.0	57.1
	18	87 51.0	S 1 34.6	123 13.3	11.2	S10 18.7	9.0	57.1
	19	102 51.2	33.6	137 43.5	11.3	10 09.7	9.1	57.0
	20	117 51.4	32.6	152 13.8	11.4	10 00.6	9.1	57.0
	21	132 51.6	·· 31.6	166 44.2	11.3	9 51.5	9.2	57.0
	22	147 51.7	30.7	181 14.5	11.5	9 42.3	9.2	57.0
	23	162 51.9	29.7	195 45.0	11.4	9 33.1	9.2	57.0
		S.D. 16.1	d 1.0	S.D. 15.8		15.7		15.6

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

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

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
	m s	m s	h m	h m	h m	d	
14	09 23	09 14	12 09	07 45	20 12	24	
15	09 06	08 58	12 09	08 39	21 05	25	
16	08 49	08 41	12 09	09 30	21 55	26	

0000 MARCH 17, 18, 19 (THURS., FRI., SAT.)

G.M.T. (UT)	ARIES	VENUS −4.1		MARS +1.4		JUPITER −1.7		SATURN +0.3	
	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
17 00	174 27.3	154 29.1	N16 13.9	204 16.4	S13 23.9	119 48.7	N18 47.3	41 12.2	N18 33.3
01	189 29.8	169 31.7	14.1	219 17.0	23.3	134 50.7	47.4	56 14.8	33.3
02	204 32.2	184 34.4	14.4	234 17.6	22.6	149 52.8	47.5	71 17.4	33.3
03	219 34.7	199 37.1	·· 14.6	249 18.2	·· 21.9	164 54.8	·· 47.6	86 19.9	·· 33.4
04	234 37.2	214 39.8	14.8	264 18.7	21.3	179 56.8	47.8	101 22.5	33.4
05	249 39.6	229 42.4	15.1	279 19.3	20.6	194 58.9	47.9	116 25.1	33.4
06	264 42.1	244 45.1	N16 15.3	294 19.9	S13 20.0	210 00.9	N18 48.0	131 27.7	N18 33.5
07	279 44.6	259 47.8	15.5	309 20.5	19.3	225 02.9	48.1	146 30.2	33.5
T 08	294 47.0	274 50.5	15.7	324 21.1	18.6	240 05.0	48.2	161 32.8	33.5
H 09	309 49.5	289 53.2	·· 15.9	339 21.6	·· 18.0	255 07.0	·· 48.3	176 35.4	·· 33.6
U 10	324 52.0	304 55.9	16.2	354 22.2	17.3	270 09.0	48.4	191 38.0	33.6
R 11	339 54.4	319 58.6	16.4	9 22.8	16.6	285 11.1	48.5	206 40.5	33.6
S 12	354 56.9	335 01.3	N16 16.6	24 23.4	S13 16.0	300 13.1	N18 48.6	221 43.1	N18 33.6
D 13	9 59.4	350 04.0	16.8	39 24.0	15.3	315 15.1	48.7	236 45.7	33.7
A 14	25 01.8	5 06.7	17.0	54 24.5	14.6	330 17.2	48.6	251 48.3	33.7
Y 15	40 04.3	20 09.5	·· 17.2	69 25.1	·· 14.0	345 19.2	·· 48.9	266 50.8	·· 33.7
16	55 06.7	35 12.2	17.4	84 25.7	13.3	0 21.2	49.0	281 53.4	33.8
17	70 09.2	50 14.9	17.6	99 26.3	12.6	15 23.3	49.1	296 56.0	33.8
18	85 11.7	65 17.6	N16 17.8	114 26.9	S13 12.0	30 25.3	N18 49.2	311 58.5	N18 33.8
19	100 14.1	80 20.4	18.0	129 27.4	11.3	45 27.3	49.3	327 01.1	33.9
20	115 16.6	95 23.1	18.2	144 28.0	10.6	60 29.4	49.4	342 03.7	33.9
21	130 19.1	110 25.9	·· 18.4	159 28.6	·· 09.9	75 31.4	·· 49.5	357 06.3	·· 33.9
22	145 21.5	125 28.6	18.6	174 29.2	09.3	90 33.4	49.6	12 08.8	33.9
23	160 24.0	140 31.4	18.8	189 29.8	08.6	105 35.4	49.7	27 11.4	34.0
18 00	175 26.5	155 34.1	N16 19.0	204 30.4	S13 07.9	120 37.5	N18 49.8	42 14.0	N18 34.0
01	190 28.9	170 36.9	19.2	219 30.9	07.3	135 39.5	49.9	57 16.6	34.0
02	205 31.4	185 39.6	19.4	234 31.5	06.6	150 41.5	50.1	72 19.1	34.1
03	220 33.9	200 42.4	·· 19.5	249 32.1	·· 05.9	165 43.6	·· 50.2	87 21.7	·· 34.1
04	235 36.3	215 45.2	19.7	264 32.7	05.3	180 45.6	50.3	102 24.3	34.1
05	250 38.8	230 47.9	19.9	279 33.3	04.6	195 47.6	50.4	117 26.8	34.1
06	265 41.2	245 50.7	N16 20.1	294 33.8	S13 03.9	210 49.7	N18 50.5	132 29.4	N18 34.2
07	280 43.7	260 53.5	20.2	309 34.4	03.2	225 51.7	50.6	147 32.0	34.2
08	295 46.2	275 56.3	20.4	324 35.0	02.6	240 53.7	50.7	162 34.5	34.2
F 09	310 48.6	290 59.1	·· 20.6	339 35.6	·· 01.9	255 55.7	·· 50.8	177 37.1	·· 34.3
R 10	325 51.1	306 01.9	20.7	354 36.2	01.2	270 57.8	50.9	192 39.7	34.3
I 11	340 53.6	321 04.7	20.9	9 36.8	13 00.6	285 59.8	51.0	207 42.3	34.3
D 12	355 56.0	336 07.5	N16 21.1	24 37.3	S12 59.9	301 01.8	N18 51.1	222 44.8	N18 34.3
A 13	10 58.5	351 10.3	21.2	39 37.9	59.2	316 03.9	51.2	237 47.4	34.4
Y 14	26 01.0	6 13.1	21.4	54 38.5	58.5	331 05.9	51.3	252 50.0	34.4
15	41 03.4	21 15.9	·· 21.5	69 39.1	·· 57.9	346 07.9	·· 51.4	267 52.5	·· 34.4
16	56 05.9	36 18.7	21.7	84 39.7	57.2	1 09.9	51.5	282 55.1	34.5
17	71 08.3	51 21.5	21.8	99 40.3	56.5	16 12.0	51.6	297 57.7	34.5
18	86 10.8	66 24.3	N16 22.0	114 40.8	S12 55.9	31 14.0	N18 51.7	313 00.2	N18 34.5
19	101 13.3	81 27.2	22.1	129 41.4	55.2	46 16.0	51.8	328 02.8	34.5
20	116 15.7	96 30.0	22.3	144 42.0	54.5	61 18.0	51.9	343 05.4	34.6
21	131 18.2	111 32.8	·· 22.4	159 42.6	·· 53.8	76 20.1	·· 52.1	358 07.9	·· 34.6
22	146 20.7	126 35.7	22.5	174 43.2	53.2	91 22.1	52.2	13 10.5	34.6
23	161 23.1	141 38.5	22.7	189 43.8	52.5	106 24.1	52.3	28 13.1	34.7
19 00	176 25.6	156 41.4	N16 22.8	204 44.4	S12 51.8	121 26.1	N18 52.4	43 15.6	N18 34.7
01	191 28.1	171 44.2	22.9	219 44.9	51.1	136 28.2	52.5	58 18.2	34.7
02	206 30.5	186 47.1	23.1	234 45.5	50.5	151 30.2	52.6	73 20.8	34.7
03	221 33.0	201 49.9	·· 23.2	249 46.1	·· 49.8	166 32.2	·· 52.7	88 23.3	·· 34.8
04	236 35.5	216 52.8	23.3	264 46.7	49.1	181 34.2	52.8	103 25.9	34.8
05	251 37.9	231 55.7	23.4	279 47.3	48.4	196 36.3	52.9	118 28.5	34.8
06	266 40.4	246 58.5	N16 23.6	294 47.9	S12 47.8	211 38.3	N18 53.0	133 31.0	N18 34.9
07	281 42.8	262 01.4	23.7	309 48.5	47.1	226 40.3	53.1	148 33.6	34.9
S 08	296 45.3	277 04.3	23.8	324 49.1	46.4	241 42.3	53.2	163 36.2	34.9
A 09	311 47.8	292 07.2	·· 23.9	339 49.6	·· 45.7	256 44.4	·· 53.3	178 38.7	·· 34.9
T 10	326 50.2	307 10.0	24.0	354 50.2	45.1	271 46.4	53.4	193 41.3	35.0
U 11	341 52.7	322 12.9	24.1	9 50.8	44.4	286 48.4	53.5	208 43.9	35.0
R 12	356 55.2	337 15.8	N16 24.2	24 51.4	S12 43.7	301 50.4	N18 53.6	223 46.4	N18 35.0
D 13	11 57.6	352 18.7	24.3	39 52.0	43.0	316 52.5	53.7	238 49.0	35.1
A 14	27 00.1	7 21.6	24.4	54 52.6	42.3	331 54.5	53.8	253 51.6	35.1
Y 15	42 02.6	22 24.5	·· 24.5	69 53.2	·· 41.7	346 56.5	·· 54.0	268 54.1	·· 35.1
16	57 05.0	37 27.4	24.6	84 53.8	41.0	1 58.5	54.1	283 56.7	35.1
17	72 07.5	52 30.3	24.7	99 54.3	40.3	17 00.6	54.2	298 59.3	35.2
18	87 10.0	67 33.3	N16 24.8	114 54.9	S12 39.6	32 02.6	N18 54.3	314 01.8	N18 35.2
19	102 12.4	82 36.2	24.9	129 55.5	39.0	47 04.6	54.4	329 04.4	35.2
20	117 14.9	97 39.1	25.0	144 56.1	38.3	62 06.6	54.5	344 07.0	35.2
21	132 17.3	112 42.0	·· 25.1	159 56.7	·· 37.6	77 08.6	·· 54.6	359 09.5	·· 35.3
22	147 19.8	127 45.0	25.1	174 57.3	36.9	92 10.7	54.7	14 12.1	35.3
23	162 22.3	142 47.9	25.2	189 57.9	36.2	107 12.7	54.8	29 14.7	35.3
	h m								
Mer. Pass.	12 16.2	v 2.8	d 0.2	v 0.6	d 0.7	v 2.0	d 0.1	v 2.6	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 39.3	S40 24.0
Achernar	335 47.6	S57 21.3
Acrux	173 39.1	S62 58.4
Adhara	255 33.8	S28 56.8
Aldebaran	291 20.8	N16 27.7
Alioth	166 44.1	N56 04.8
Alkaid	153 20.0	N49 25.4
Al Na'ir	28 18.3	S47 04.2
Alnilam	276 14.1	S 1 13.2
Alphard	218 22.6	S 8 33.8
Alphecca	126 33.9	N26 47.3
Alpheratz	358 12.1	N28 57.8
Altair	62 35.0	N 8 48.4
Ankaa	353 43.0	S42 25.9
Antares	112 59.6	S26 22.9
Arcturus	146 20.4	N19 17.9
Atria	108 25.8	S68 58.9
Avior	234 28.7	S59 26.6
Bellatrix	279 01.3	N 6 19.6
Betelgeuse	271 30.8	N 7 24.0
Canopus	264 08.2	S52 41.4
Capella	281 14.8	N45 58.6
Deneb	49 50.3	N45 11.8
Denebola	183 01.1	N14 41.8
Diphda	349 23.6	S18 06.8
Dubhe	194 24.4	N61 52.4
Elnath	278 47.1	N28 35.3
Eltanin	90 58.8	N51 29.3
Enif	34 14.2	N 9 46.2
Fomalhaut	15 54.4	S29 44.6
Gacrux	172 30.7	S56 59.2
Gienah	176 20.0	S17 25.1
Hadar	149 26.1	S60 15.7
Hamal	328 31.8	N23 21.2
Kaus Aust.	84 20.0	S34 23.6
Kochab	137 18.2	N74 14.7
Markab	14 05.8	N15 04.9
Menkar	314 43.8	N 3 59.9
Menkent	148 39.4	S36 15.5
Miaplacidus	221 44.7	S69 37.7
Mirfak	309 19.7	N49 46.9
Nunki	76 32.2	S26 19.4
Peacock	54 02.5	S56 48.3
Pollux	244 00.9	N28 04.8
Procyon	245 28.1	N 5 16.8
Rasalhague	96 31.7	N12 34.5
Regulus	208 12.2	N12 04.5
Rigel	281 38.3	S 8 13.9
Rigil Kent.	140 28.5	S60 44.3
Sabik	102 43.8	S15 41.8
Schedar	350 12.2	N56 24.8
Shaula	96 58.9	S37 05.1
Sirius	258 57.7	S16 41.4
Spica	158 59.7	S11 02.7
Suhail	223 12.1	S43 20.8
Vega	80 57.5	N38 45.5
Zuben'ubi	137 35.4	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	340 07.7	13 35
Mars	29 03.9	10 22
Jupiter	305 11.0	15 55
Saturn	226 47.5	21 07

0000 MARCH 17, 18, 19 (THURS., FRI., SAT.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	MOON v	MOON Dec.	MOON d	MOON H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
17 00	177 52.1	S 1 28.7	210 15.4	11.6	S 9 23.9	9.3	56.9
01	192 52.3	27.7	224 46.0	11.5	9 14.6	9.3	56.9
02	207 52.4	26.7	239 16.5	11.7	9 05.3	9.4	56.9
03	222 52.6	·· 25.7	253 47.2	11.6	8 55.9	9.4	56.9
04	237 52.8	24.7	268 17.8	11.8	8 46.5	9.4	56.9
05	252 53.0	23.7	282 48.6	11.7	8 37.1	9.5	56.8
06	267 53.2	S 1 22.7	297 19.3	11.8	S 8 27.6	9.5	56.8
07	282 53.3	21.8	311 50.1	11.9	8 18.1	9.6	56.8
T 08	297 53.5	20.8	326 21.0	11.9	8 08.5	9.6	56.8
H 09	312 53.7	·· 19.8	340 51.9	11.9	7 58.9	9.6	56.8
U 10	327 53.9	18.8	355 22.8	12.0	7 49.3	9.6	56.7
R 11	342 54.1	17.8	9 53.8	12.1	7 39.7	9.7	56.7
S 12	357 54.2	S 1 16.8	24 24.9	12.0	S 7 30.0	9.7	56.7
D 13	12 54.4	15.8	38 55.9	12.2	7 20.3	9.8	56.7
A 14	27 54.6	14.8	53 27.1	12.1	7 10.5	9.7	56.7
Y 15	42 54.8	·· 13.9	67 58.2	12.2	7 00.8	9.8	56.6
16	57 55.0	12.9	82 29.4	12.3	6 51.0	9.9	56.6
17	72 55.1	11.9	97 00.7	12.3	6 41.1	9.8	56.6
18	87 55.3	S 1 10.9	111 32.0	12.3	S 6 31.3	9.9	56.6
19	102 55.5	09.9	126 03.3	12.4	6 21.4	9.9	56.6
20	117 55.7	08.9	140 34.7	12.4	6 11.5	9.9	56.5
21	132 55.9	·· 07.9	155 06.1	12.4	6 01.6	10.0	56.5
22	147 56.0	06.9	169 37.5	12.5	5 51.6	9.9	56.5
23	162 56.2	05.9	184 09.0	12.6	5 41.7	10.0	56.5
18 00	177 56.4	S 1 05.0	198 40.6	12.5	S 5 31.7	10.0	56.5
01	192 56.6	04.0	213 12.1	12.6	5 21.7	10.1	56.4
02	207 56.8	03.0	227 43.7	12.7	5 11.6	10.0	56.4
03	222 57.0	·· 02.0	242 15.4	12.7	5 01.6	10.1	56.4
04	237 57.1	01.0	256 47.1	12.7	4 51.5	10.1	56.4
05	252 57.3	1 00.0	271 18.8	12.7	4 41.4	10.1	56.4
06	267 57.5	S 0 59.0	285 50.5	12.8	S 4 31.3	10.1	56.3
07	282 57.7	58.0	300 22.3	12.8	4 21.2	10.1	56.3
08	297 57.9	57.0	314 54.1	12.9	4 11.1	10.1	56.3
F 09	312 58.0	·· 56.1	329 26.0	12.9	4 01.0	10.2	56.3
R 10	327 58.2	55.1	343 57.9	12.9	3 50.8	10.1	56.2
I 11	342 58.4	54.1	358 29.8	12.9	3 40.7	10.2	56.2
D 12	357 58.6	S 0 53.1	13 01.7	13.0	S 3 30.5	10.2	56.2
A 13	12 58.8	52.1	27 33.7	13.0	3 20.3	10.2	56.2
Y 14	27 59.0	51.1	42 05.7	13.1	3 10.1	10.2	56.2
15	42 59.1	·· 50.1	56 37.8	13.0	2 59.9	10.2	56.1
16	57 59.3	49.1	71 09.8	13.1	2 49.7	10.2	56.1
17	72 59.5	48.1	85 41.9	13.2	2 39.5	10.2	56.1
18	87 59.7	S 0 47.2	100 14.1	13.1	S 2 29.3	10.2	56.1
19	102 59.9	46.2	114 46.2	13.2	2 19.1	10.2	56.1
20	118 00.0*	45.2	129 18.4	13.2	2 08.9	10.3	56.0
21	133 00.2	·· 44.2	143 50.6	13.3	1 58.6	10.2	56.0
22	148 00.4	43.2	158 22.9	13.3	1 48.4	10.2	56.0
23	163 00.6	42.2	172 55.2	13.3	1 38.2	10.2	56.0
19 00	178 00.8	S 0 41.2	187 27.5	13.3	S 1 28.0	10.3	56.0
01	193 01.0	40.2	201 59.8	13.3	1 17.7	10.2	55.9
02	208 01.1	39.2	216 32.1	13.4	1 07.5	10.2	55.9
03	223 01.3	·· 38.3	231 04.5	13.4	0 57.3	10.2	55.9
04	238 01.5	37.3	245 36.9	13.4	0 47.1	10.3	55.9
05	253 01.7	36.3	260 09.3	13.4	0 36.8	10.2	55.9
06	268 01.9	S 0 35.3	274 41.7	13.5	S 0 26.6	10.2	55.8
07	283 02.1	34.3	289 14.2	13.5	0 16.4	10.2	55.8
S 08	298 02.2	33.3	303 46.7	13.5	S 0 06.2	10.2	55.8
A 09	313 02.4	·· 32.3	318 19.2	13.5	N 0 04.0	10.2	55.8
T 10	328 02.6	31.3	332 51.7	13.6	0 14.2	10.2	55.8
U 11	343 02.8	30.3	347 24.3	13.5	0 24.4	10.1	55.7
R 12	358 03.0	S 0 29.4	1 56.8	13.6	N 0 34.5	10.2	55.7
D 13	13 03.2	28.4	16 29.4	13.6	0 44.7	10.1	55.7
A 14	28 03.3	27.4	31 02.0	13.6	0 54.8	10.2	55.7
Y 15	43 03.5	·· 26.4	45 34.6	13.7	1 05.0	10.1	55.7
16	58 03.7	25.4	60 07.3	13.6	1 15.1	10.1	55.7
17	73 03.9	24.4	74 39.9	13.7	1 25.2	10.1	55.6
18	88 04.1	S 0 23.4	89 12.6	13.7	N 1 35.3	10.1	55.6
19	103 04.3	22.4	103 45.3	13.7	1 45.4	10.1	55.6
20	118 04.4	21.5	118 18.0	13.7	1 55.5	10.0	55.6
21	133 04.6	·· 20.5	132 50.7	13.7	2 05.5	10.1	55.6
22	148 04.8	19.5	147 23.4	13.7	2 15.6	10.0	55.5
23	163 05.0	18.5	161 56.1	13.8	2 25.6	10.0	55.5
	S.D. 16.1	d 1.0	S.D. 15.4		15.3		15.2

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

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

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
	m s	m s	h m	h m	h m	d	
17	08 32	08 23	12 08	10 19	22 43	27	
18	08 15	08 06	12 08	11 06	23 29	28	●
19	07 57	07 48	12 08	11 52	24 15	29	

0000 MARCH 20, 21, 22 (SUN., MON., TUES.)

G.M.T. (UT)		ARIES	VENUS −4.0			MARS +1.4		JUPITER −1.7		SATURN +0.3	
		G.H.A.	G.H.A.	Dec.		G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d	h	° ′	° ′	° ′		° ′	° ′	° ′	° ′	° ′	° ′
20	00	177 24.7	157 50.8	N16	25.3	204 58.5	S12 35.6	122 14.7	N18 54.9	44 17.2	N18 35.4
	01	192 27.2	172 53.8		25.4	219 59.1	34.9	137 16.7	55.0	59 19.8	35.4
	02	207 29.7	187 56.7		25.4	234 59.6	34.2	152 18.7	55.1	74 22.3	35.4
	03	222 32.1	202 59.7	..	25.5	250 00.2	.. 33.5	167 20.8	.. 55.2	89 24.9	.. 35.4
	04	237 34.6	218 02.6		25.6	265 00.8	32.8	182 22.8	55.3	104 27.5	35.5
	05	252 37.1	233 05.6		25.6	280 01.4	32.2	197 24.8	55.4	119 30.0	35.5
	06	267 39.5	248 08.5	N16	25.7	295 02.0	S12 31.5	212 26.8	N18 55.5	134 32.6	N18 35.5
	07	282 42.0	263 11.5		25.8	310 02.6	30.8	227 28.8	55.6	149 35.2	35.5
	08	297 44.4	278 14.5		25.8	325 03.2	30.1	242 30.9	55.8	164 37.7	35.6
S	09	312 46.9	293 17.4	..	25.9	340 03.8	.. 29.4	257 32.9	.. 55.9	179 40.3	.. 35.6
U	10	327 49.4	308 20.4		25.9	355 04.4	28.7	272 34.9	56.0	194 42.8	35.6
N	11	342 51.8	323 23.4		26.0	10 05.0	28.1	287 36.9	56.1	209 45.4	35.6
D	12	357 54.3	338 26.4	N16	26.0	25 05.5	S12 27.4	302 38.9	N18 56.2	224 48.0	N18 35.7
A	13	12 56.8	353 29.4		26.1	40 06.1	26.7	317 41.0	56.3	239 50.5	35.7
Y	14	27 59.2	8 32.4		26.1	55 06.7	26.0	332 43.0	56.4	254 53.1	35.7
	15	43 01.7	23 35.4	..	26.2	70 07.3	.. 25.3	347 45.0	.. 56.5	269 55.6	.. 35.8
	16	58 04.2	38 38.4		26.2	85 07.9	24.6	2 47.0	56.6	284 58.2	35.8
	17	73 06.6	53 41.4		26.2	100 08.5	24.0	17 49.0	56.7	300 00.8	35.8
	18	88 09.1	68 44.4	N16	26.3	115 09.1	S12 23.3	32 51.0	N18 56.8	315 03.3	N18 35.8
	19	103 11.6	83 47.4		26.3	130 09.7	22.6	47 53.1	56.9	330 05.9	35.9
	20	118 14.0	98 50.4		26.3	145 10.3	21.9	62 55.1	57.0	345 08.4	35.9
	21	133 16.5	113 53.4	..	26.4	160 10.9	.. 21.2	77 57.1	.. 57.1	0 11.0	.. 35.9
	22	148 18.9	128 56.4		26.4	175 11.5	20.5	92 59.1	57.2	15 13.6	35.9
	23	163 21.4	143 59.5		26.4	190 12.1	19.9	108 01.1	57.3	30 16.1	36.0
21	00	178 23.9	159 02.5	N16	26.4	205 12.7	S12 19.2	123 03.1	N18 57.5	45 18.7	N18 36.0
	01	193 26.3	174 05.5		26.4	220 13.2	18.5	138 05.2	57.6	60 21.2	36.0
	02	208 28.8	189 08.6		26.5	235 13.8	17.8	153 07.2	57.7	75 23.8	36.0
	03	223 31.3	204 11.6	..	26.5	250 14.4	.. 17.1	168 09.2	.. 57.8	90 26.4	.. 36.1
	04	238 33.7	219 14.6		26.5	265 15.0	16.4	183 11.2	57.9	105 28.9	36.1
	05	253 36.2	234 17.7		26.5	280 15.6	15.8	198 13.2	58.0	120 31.5	36.1
	06	268 38.7	249 20.7	N16	26.5	295 16.2	S12 15.1	213 15.2	N18 58.1	135 34.0	N18 36.1
	07	283 41.1	264 23.8		26.5	310 16.8	14.4	228 17.2	58.2	150 36.6	36.2
	08	298 43.6	279 26.9		26.5	325 17.4	13.7	243 19.3	58.3	165 39.2	36.2
M	09	313 46.1	294 29.9	..	26.5	340 18.0	.. 13.0	258 21.3	.. 58.4	180 41.7	.. 36.2
O	10	328 48.5	309 33.0		26.5	355 18.6	12.3	273 23.3	58.5	195 44.3	36.2
N	11	343 51.0	324 36.1		26.5	10 19.2	11.6	288 25.3	58.6	210 46.8	36.3
D	12	358 53.4	339 39.1	N16	26.5	25 19.8	S12 10.9	303 27.3	N18 58.7	225 49.4	N18 36.3
A	13	13 55.9	354 42.2		26.4	40 20.4	10.3	318 29.3	58.8	240 51.9	36.3
Y	14	28 58.4	9 45.3		26.4	55 21.0	09.6	333 31.3	58.9	255 54.5	36.3
	15	44 00.8	24 48.4	..	26.4	70 21.6	.. 08.9	348 33.4	.. 59.1	270 57.1	.. 36.4
	16	59 03.3	39 51.5		26.4	85 22.2	08.2	3 35.4	59.2	285 59.6	36.4
	17	74 05.8	54 54.6		26.4	100 22.8	07.5	18 37.4	59.3	301 02.2	36.4
	18	89 08.2	69 57.7	N16	26.3	115 23.4	S12 06.8	33 39.4	N18 59.4	316 04.7	N18 36.4
	19	104 10.7	85 00.8		26.3	130 24.0	06.1	48 41.4	59.5	331 07.3	36.5
	20	119 13.2	100 03.9		26.3	145 24.6	05.4	63 43.4	59.6	346 09.8	36.5
	21	134 15.6	115 07.0	..	26.2	160 25.2	.. 04.8	78 45.4	.. 59.7	1 12.4	.. 36.5
	22	149 18.1	130 10.1		26.2	175 25.8	04.1	93 47.4	59.8	16 14.9	36.5
	23	164 20.5	145 13.2		26.2	190 26.3	03.4	108 49.5	18 59.9	31 17.5	36.6
22	00	179 23.0	160 16.3	N16	26.1	205 26.9	S12 02.7	123 51.5	N19 00.0	46 20.1	N18 36.6
	01	194 25.5	175 19.5		26.1	220 27.5	02.0	138 53.5	00.1	61 22.6	36.6
	02	209 27.9	190 22.6		26.0	235 28.1	01.3	153 55.5	00.2	76 25.2	36.6
	03	224 30.4	205 25.7	..	26.0	250 28.7	12 00.6	168 57.5	.. 00.3	91 27.7	.. 36.7
	04	239 32.9	220 28.8		25.9	265 29.3	11 59.9	183 59.5	00.4	106 30.3	36.7
	05	254 35.3	235 32.0		25.9	280 29.9	59.2	199 01.5	00.6	121 32.8	36.7
	06	269 37.8	250 35.1	N16	25.8	295 30.5	S11 58.5	214 03.5	N19 00.7	136 35.4	N18 36.7
	07	284 40.3	265 38.3		25.8	310 31.1	57.9	229 05.5	00.8	151 37.9	36.8
	08	299 42.7	280 41.4		25.7	325 31.7	57.2	244 07.5	00.9	166 40.5	36.8
T	09	314 45.2	295 44.6	..	25.7	340 32.3	.. 56.5	259 09.6	.. 01.0	181 43.0	.. 36.8
U	10	329 47.7	310 47.7		25.6	355 32.9	55.8	274 11.6	01.1	196 45.6	36.8
E	11	344 50.1	325 50.9		25.5	10 33.5	55.1	289 13.6	01.2	211 48.2	36.9
S	12	359 52.6	340 54.0	N16	25.4	25 34.1	S11 54.4	304 15.6	N19 01.3	226 50.7	N18 36.9
D	13	14 55.0	355 57.2		25.4	40 34.7	53.7	319 17.6	01.4	241 53.3	36.9
A	14	29 57.5	11 00.4		25.3	55 35.3	53.0	334 19.6	01.5	256 55.8	36.9
Y	15	45 00.0	26 03.6	..	25.2	70 35.9	.. 52.3	349 21.6	.. 01.6	271 58.4	.. 37.0
	16	60 02.4	41 06.7		25.1	85 36.5	51.6	4 23.6	01.7	287 00.9	37.0
	17	75 04.9	56 09.9		25.0	100 37.1	50.9	19 25.6	01.8	302 03.5	37.0
	18	90 07.4	71 13.1	N16	25.0	115 37.7	S11 50.2	34 27.6	N19 01.9	317 06.0	N18 37.0
	19	105 09.8	86 16.3		24.9	130 38.3	49.5	49 29.6	02.1	332 08.6	37.1
	20	120 12.3	101 19.5		24.8	145 38.9	48.9	64 31.6	02.2	347 11.1	37.1
	21	135 14.8	116 22.7	..	24.7	160 39.5	.. 48.2	79 33.7	.. 02.3	2 13.7	.. 37.1
	22	150 17.2	131 25.9		24.6	175 40.1	47.5	94 35.7	02.4	17 16.2	37.1
	23	165 19.7	146 29.1		24.5	190 40.7	46.8	109 37.7	02.5	32 18.8	37.1
Mer. Pass.		h m 12 04.4	v 3.1	d	0.0	v 0.6	d 0.7	v 2.0	d 0.1	v 2.6	d 0.0

STARS

Name	S.H.A. ° ′	Dec. ° ′
Acamar	315 39.3	S40 24.0
Achernar	335 47.6	S57 21.3
Acrux	173 39.1	S62 58.5
Adhara	255 33.9	S28 56.8
Aldebaran	291 20.8	N16 27.7
Alioth	166 44.1	N56 04.8
Alkaid	153 20.0	N49 25.4
Al Na'ir	28 18.3	S47 04.2
Alnilam	276 14.1	S 1 13.2
Alphard	218 22.6	S 8 33.8
Alphecca	126 33.9	N26 47.3
Alpheratz	358 12.1	N28 57.8
Altair	62 35.0	N 8 48.4
Ankaa	353 43.0	S42 25.9
Antares	112 59.6	S26 22.9
Arcturus	146 20.3	N19 17.9
Atria	108 25.8	S68 58.9
Avior	234 28.8	S59 26.6
Bellatrix	279 01.3	N 6 19.6
Betelgeuse	271 30.8	N 7 24.0
Canopus	264 08.2	S52 41.4
Capella	281 14.9	N45 58.6
Deneb	49 50.3	N45 11.8
Denebola	183 01.1	N14 41.8
Diphda	349 23.6	S18 06.8
Dubhe	194 24.5	N61 52.4
Elnath	278 47.2	N28 35.3
Eltanin	90 58.8	N51 29.3
Enif	34 14.1	N 9 46.1
Fomalhaut	15 54.4	S29 44.6
Gacrux	172 30.7	S56 59.2
Gienah	176 20.0	S17 25.1
Hadar	149 26.1	S60 15.7
Hamal	328 31.8	N23 21.2
Kaus Aust.	84 20.0	S34 23.6
Kochab	137 18.2	N74 14.7
Markab	14 05.8	N15 04.9
Menkar	314 43.8	N 3 59.9
Menkent	148 39.4	S36 15.5
Miaplacidus	221 44.7	S69 37.8
Mirfak	309 19.7	N49 46.9
Nunki	76 32.2	S26 19.4
Peacock	54 02.5	S56 48.3
Pollux	244 00.9	N28 04.8
Procyon	245 28.1	N 5 16.8
Rasalhague	96 31.7	N12 34.5
Regulus	208 12.2	N12 04.5
Rigel	281 38.3	S 8 13.9
Rigil Kent.	140 28.4	S60 44.3
Sabik	102 43.7	S15 41.8
Schedar	350 12.2	N56 24.8
Shaula	96 58.9	S37 05.1
Sirius	258 57.7	S16 41.4
Spica	158 59.7	S11 02.7
Suhail	223 12.2	S43 20.8
Vega	80 57.5	N38 45.5
Zuben'ubi	137 35.4	S15 56.9

	S.H.A. ° ′	Mer. Pass. h m
Venus	340 38.6	13 21
Mars	26 48.8	10 19
Jupiter	304 39.3	15 46
Saturn	226 54.8	20 55

0000 MARCH 20, 21, 22 (SUN., MON., TUES.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
20	00	178 05.2	S 0 17.5	176 28.9	13.8	N 2 35.6	10.0	55.5
	01	193 05.4	16.5	191 01.7	13.8	2 45.6	9.9	55.5
	02	208 05.5	15.5	205 34.5	13.7	2 55.5	10.0	55.5
	03	223 05.7	·· 14.5	220 07.2	13.8	3 05.5	9.9	55.4
	04	238 05.9	13.5	234 40.0	13.9	3 15.4	9.9	55.4
	05	253 06.1	12.6	249 12.9	13.8	3 25.3	9.9	55.4
	06	268 06.3	S 0 11.6	263 45.7	13.8	N 3 35.2	9.8	55.4
	07	283 06.5	10.6	278 18.5	13.9	3 45.0	9.9	55.4
	08	298 06.7	09.6	292 51.4	13.8	3 54.9	9.8	55.3
SUNDAY	09	313 06.8	·· 08.6	307 24.2	13.9	4 04.7	9.8	55.3
	10	328 07.0	07.6	321 57.1	13.9	4 14.5	9.7	55.3
	11	343 07.2	06.6	336 30.0	13.8	4 24.2	9.8	55.3
	12	358 07.4	S 0 05.6	351 02.8	13.9	N 4 34.0	9.7	55.3
	13	13 07.6	04.6	5 35.7	13.9	4 43.7	9.6	55.3
	14	28 07.8	03.7	20 08.6	13.9	4 53.3	9.7	55.2
	15	43 08.0	·· 02.7	34 41.5	13.9	5 03.0	9.6	55.2
	16	58 08.1	01.7	49 14.4	13.9	5 12.6	9.6	55.2
	17	73 08.3	S 0 00.7	63 47.3	13.9	5 22.2	9.6	55.2
	18	88 08.5	N 0 00.3	78 20.2	13.9	N 5 31.8	9.5	55.2
	19	103 08.7	01.3	92 53.1	13.9	5 41.3	9.5	55.1
	20	118 08.9	02.3	107 26.0	14.0	5 50.8	9.4	55.1
	21	133 09.1	·· 03.3	121 59.0	13.9	6 00.2	9.5	55.1
	22	148 09.3	04.2	136 31.9	13.9	6 09.7	9.4	55.1
	23	163 09.4	05.2	151 04.8	13.9	6 19.1	9.3	55.1
21	00	178 09.6	N 0 06.2	165 37.7	14.0	N 6 28.4	9.4	55.1
	01	193 09.8	07.2	180 10.7	13.9	6 37.8	9.3	55.0
	02	208 10.0	08.2	194 43.6	13.9	6 47.1	9.2	55.0
	03	223 10.2	·· 09.2	209 16.5	14.0	6 56.3	9.2	55.0
	04	238 10.4	10.2	223 49.5	13.9	7 05.5	9.2	55.0
	05	253 10.6	11.2	238 22.4	13.9	7 14.7	9.2	55.0
	06	268 10.7	N 0 12.1	252 55.3	13.9	N 7 23.9	9.1	55.0
	07	283 10.9	13.1	267 28.2	14.0	7 33.0	9.0	54.9
	08	298 11.1	14.1	282 01.2	13.9	7 42.0	9.1	54.9
MONDAY	09	313 11.3	·· 15.1	296 34.1	13.9	7 51.1	9.0	54.9
	10	328 11.5	16.1	311 07.0	13.9	8 00.1	8.9	54.9
	11	343 11.7	17.1	325 39.9	14.0	8 09.0	8.9	54.9
	12	358 11.9	N 0 18.1	340 12.9	13.9	N 8 17.9	8.9	54.9
	13	13 12.0	19.1	354 45.8	13.9	8 26.8	8.8	54.8
	14	28 12.2	20.0	9 18.7	13.9	8 35.6	8.8	54.8
	15	43 12.4	·· 21.0	23 51.6	13.9	8 44.4	8.7	54.8
	16	58 12.6	22.0	38 24.5	13.9	8 53.1	8.7	54.8
	17	73 12.8	23.0	52 57.4	13.9	9 01.8	8.6	54.8
	18	88 13.0	N 0 24.0	67 30.3	13.8	N 9 10.4	8.6	54.8
	19	103 13.2	25.0	82 03.1	13.9	9 19.0	8.6	54.8
	20	118 13.4	26.0	96 36.0	13.9	9 27.6	8.5	54.7
	21	133 13.5	·· 27.0	111 08.9	13.9	9 36.1	8.5	54.7
	22	148 13.7	27.9	125 41.8	13.8	9 44.6	8.4	54.7
	23	163 13.9	28.9	140 14.6	13.9	9 53.0	8.3	54.7
22	00	178 14.1	N 0 29.9	154 47.5	13.8	N10 01.3	8.3	54.7
	01	193 14.3	30.9	169 20.3	13.8	10 09.6	8.3	54.7
	02	208 14.5	31.9	183 53.1	13.9	10 17.9	8.2	54.7
	03	223 14.7	·· 32.9	198 26.0	13.8	10 26.1	8.2	54.6
	04	238 14.8	33.9	212 58.8	13.8	10 34.3	8.1	54.6
	05	253 15.0	34.9	227 31.6	13.8	10 42.4	8.1	54.6
	06	268 15.2	N 0 35.8	242 04.4	13.8	N10 50.5	8.0	54.6
	07	283 15.4	36.8	256 37.2	13.7	10 58.5	7.9	54.6
	08	298 15.6	37.8	271 09.9	13.8	11 06.4	7.9	54.6
TUESDAY	09	313 15.8	·· 38.8	285 42.7	13.8	11 14.3	7.9	54.6
	10	328 16.0	39.8	300 15.5	13.7	11 22.2	7.8	54.5
	11	343 16.2	40.8	314 48.2	13.7	11 30.0	7.7	54.5
	12	358 16.3	N 0 41.8	329 20.9	13.8	N11 37.7	7.7	54.5
	13	13 16.5	42.8	343 53.7	13.7	11 45.4	7.6	54.5
	14	28 16.7	43.7	358 26.4	13.7	11 53.0	7.6	54.5
	15	43 16.9	·· 44.7	12 59.1	13.7	12 00.6	7.5	54.5
	16	58 17.1	45.7	27 31.8	13.6	12 08.1	7.5	54.5
	17	73 17.3	46.7	42 04.4	13.7	12 15.6	7.4	54.5
	18	88 17.5	N 0 47.7	56 37.1	13.6	N12 23.0	7.3	54.4
	19	103 17.7	48.7	71 09.7	13.7	12 30.3	7.3	54.4
	20	118 17.8	49.7	85 42.4	13.6	12 37.6	7.3	54.4
	21	133 18.0	·· 50.6	100 15.0	13.6	12 44.9	7.1	54.4
	22	148 18.2	51.6	114 47.6	13.6	12 52.0	7.1	54.4
	23	163 18.4	52.6	129 20.2	13.6	12 59.1	7.1	54.4
		S.D. 16.1	d 1.0	S.D. 15.1		14.9		14.9

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

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

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
	m s	m s	h m	h m	h m	d	
20	07 40	07 31	12 08	12 37	00 15	01	
21	07 22	07 13	12 07	13 22	00 59	02	●
22	07 04	06 55	12 07	14 06	01 44	03	

0000 MARCH 23, 24, 25 (WED., THURS., FRI.)

G.M.T. (UT)		ARIES	VENUS −3.8		MARS +1.4		JUPITER −1.7		SATURN +0.3	
d	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
23	00	180 22.2	161 32.3	N16 24.4	205 41.3	S11 46.1	124 39.7	N19 02.6	47 21.3	N18 37.2
	01	195 24.6	176 35.5	24.3	220 41.9	45.4	139 41.7	02.7	62 23.9	37.2
	02	210 27.1	191 38.7	24.2	235 42.5	44.7	154 43.7	02.8	77 26.4	37.2
	03	225 29.5	206 41.9	·· 24.1	250 43.1	·· 44.0	169 45.7	·· 02.9	92 29.0	·· 37.2
	04	240 32.0	221 45.2	24.0	265 43.7	43.3	184 47.7	03.0	107 31.5	37.3
	05	255 34.5	236 48.4	23.8	280 44.3	42.6	199 49.7	03.1	122 34.1	37.3
	06	270 36.9	251 51.6	N16 23.7	295 44.9	S11 41.9	214 51.7	N19 03.2	137 36.6	N18 37.3
	07	285 39.4	266 54.8	23.6	310 45.5	41.2	229 53.7	03.3	152 39.2	37.3
W	08	300 41.9	281 58.1	23.5	325 46.1	40.5	244 55.7	03.4	167 41.7	37.4
E	09	315 44.3	297 01.3	·· 23.4	340 46.8	·· 39.8	259 57.7	·· 03.6	182 44.3	·· 37.4
D	10	330 46.8	312 04.6	23.2	355 47.4	39.1	274 59.7	03.7	197 46.8	37.4
N	11	345 49.3	327 07.8	23.1	10 48.0	38.4	290 01.7	03.8	212 49.4	37.4
E	12	0 51.7	342 11.1	N16 23.0	25 48.6	S11 37.7	305 03.7	N19 03.9	227 51.9	N18 37.4
S	13	15 54.2	357 14.3	22.8	40 49.2	37.0	320 05.7	04.0	242 54.5	37.5
D	14	30 56.6	12 17.6	22.7	55 49.8	36.3	335 07.7	04.1	257 57.0	37.5
A	15	45 59.1	27 20.8	·· 22.5	70 50.4	·· 35.6	350 09.8	·· 04.2	272 59.6	·· 37.5
Y	16	61 01.6	42 24.1	22.4	85 51.0	34.9	5 11.8	04.3	288 02.1	37.5
	17	76 04.0	57 27.4	22.3	100 51.6	34.2	20 13.8	04.4	303 04.7	37.6
	18	91 06.5	72 30.6	N16 22.1	115 52.2	S11 33.5	35 15.8	N19 04.5	318 07.2	N18 37.6
	19	106 09.0	87 33.9	21.9	130 52.8	32.8	50 17.8	04.6	333 09.8	37.6
	20	121 11.4	102 37.2	21.8	145 53.4	32.1	65 19.8	04.7	348 12.3	37.6
	21	136 13.9	117 40.5	·· 21.6	160 54.0	·· 31.5	80 21.8	·· 04.8	3 14.9	·· 37.7
	22	151 16.4	132 43.7	21.5	175 54.6	30.8	95 23.8	05.0	18 17.4	37.7
	23	166 18.8	147 47.0	21.3	190 55.2	30.1	110 25.8	05.1	33 20.0	37.7
24	00	181 21.3	162 50.3	N16 21.2	205 55.8	S11 29.4	125 27.8	N19 05.2	48 22.5	N18 37.7
	01	196 23.8	177 53.6	21.0	220 56.4	28.7	140 29.8	05.3	63 25.0	37.7
	02	211 26.2	192 56.9	20.8	235 57.0	28.0	155 31.8	05.4	78 27.6	37.8
	03	226 28.7	208 00.2	·· 20.6	250 57.6	·· 27.3	170 33.8	·· 05.5	93 30.1	·· 37.8
	04	241 31.1	223 03.5	20.5	265 58.2	26.6	185 35.8	05.6	108 32.7	37.8
	05	256 33.6	238 06.8	20.3	280 58.8	25.9	200 37.8	05.7	123 35.2	37.8
	06	271 36.1	253 10.2	N16 20.1	295 59.5	S11 25.2	215 39.8	N19 05.8	138 37.8	N18 37.9
	07	286 38.5	268 13.5	19.9	311 00.1	24.5	230 41.8	05.9	153 40.3	37.9
T	08	301 41.0	283 16.8	19.7	326 00.7	23.8	245 43.8	06.0	168 42.9	37.9
H	09	316 43.5	298 20.1	·· 19.5	341 01.3	·· 23.1	260 45.8	·· 06.1	183 45.4	·· 37.9
U	10	331 45.9	313 23.4	19.4	356 01.9	22.4	275 47.8	06.3	198 48.0	37.9
R	11	346 48.4	328 26.8	19.2	11 02.5	21.7	290 49.8	06.4	213 50.5	38.0
S	12	1 50.9	343 30.1	N16 19.0	26 03.1	S11 21.0	305 51.8	N19 06.5	228 53.1	N18 38.0
D	13	16 53.3	358 33.4	18.8	41 03.7	20.3	320 53.8	06.6	243 55.6	38.0
A	14	31 55.8	13 36.8	18.6	56 04.3	19.6	335 55.8	06.7	258 58.1	38.0
Y	15	46 58.3	28 40.1	·· 18.4	71 04.9	·· 18.8	350 57.8	·· 06.8	274 00.7	·· 38.1
	16	62 00.7	43 43.5	18.1	86 05.5	18.1	5 59.8	06.9	289 03.2	38.1
	17	77 03.2	58 46.8	17.9	101 06.1	17.4	21 01.8	07.0	304 05.8	38.1
	18	92 05.6	73 50.2	N16 17.7	116 06.8	S11 16.7	36 03.8	N19 07.1	319 08.3	N18 38.1
	19	107 08.1	88 53.5	17.5	131 07.4	16.0	51 05.8	07.2	334 10.9	38.1
	20	122 10.6	103 56.9	17.3	146 08.0	15.3	66 07.8	07.3	349 13.4	38.2
	21	137 13.0	119 00.2	·· 17.1	161 08.6	·· 14.6	81 09.8	·· 07.4	4 15.9	·· 38.2
	22	152 15.5	134 03.6	16.8	176 09.2	13.9	96 11.8	07.5	19 18.5	38.2
	23	167 18.0	149 07.0	16.6	191 09.8	13.2	111 13.8	07.7	34 21.0	38.2
25	00	182 20.4	164 10.4	N16 16.4	206 10.4	S11 12.5	126 15.8	N19 07.8	49 23.6	N18 38.2
	01	197 22.9	179 13.7	16.2	221 11.0	11.8	141 17.8	07.9	64 26.1	38.2
	02	212 25.4	194 17.1	15.9	236 11.6	11.1	156 19.8	08.0	79 28.6	38.3
	03	227 27.8	209 20.5	·· 15.7	251 12.2	·· 10.4	171 21.8	·· 08.1	94 31.2	·· 38.3
	04	242 30.3	224 23.9	15.5	266 12.8	09.7	186 23.8	08.2	109 33.7	38.3
	05	257 32.7	239 27.3	15.2	281 13.4	09.0	201 25.7	08.3	124 36.3	38.3
	06	272 35.2	254 30.7	N16 15.0	296 14.1	S11 08.3	216 27.7	N19 08.4	139 38.8	N18 38.3
	07	287 37.7	269 34.1	14.7	311 14.7	07.6	231 29.7	08.5	154 41.3	38.4
	08	302 40.1	284 37.4	14.5	326 15.3	06.9	246 31.7	08.6	169 43.9	38.4
F	09	317 42.6	299 40.8	·· 14.3	341 15.9	·· 06.2	261 33.7	·· 08.7	184 46.4	·· 38.4
R	10	332 45.1	314 44.3	14.0	356 16.5	05.5	276 35.7	08.8	199 49.0	38.4
I	11	347 47.5	329 47.7	13.7	11 17.1	04.8	291 37.7	09.0	214 51.5	38.4
D	12	2 50.0	344 51.1	N16 13.5	26 17.7	S11 04.1	306 39.7	N19 09.1	229 54.0	N18 38.5
A	13	17 52.5	359 54.5	13.2	41 18.3	03.4	321 41.7	09.2	244 56.6	38.5
Y	14	32 54.9	14 57.9	13.0	56 18.9	02.7	336 43.7	09.3	259 59.1	38.5
	15	47 57.4	30 01.3	·· 12.7	71 19.5	·· 02.0	351 45.7	·· 09.4	275 01.7	·· 38.5
	16	62 59.9	45 04.8	12.4	86 20.1	01.3	6 47.7	09.5	290 04.2	38.5
	17	78 02.3	60 08.2	12.2	101 20.8	11 00.6	21 49.7	09.6	305 06.7	38.6
	18	93 04.8	75 11.6	N16 11.9	116 21.4	S10 59.9	36 51.7	N19 09.7	320 09.3	N18 38.6
	19	108 07.2	90 15.0	11.6	131 22.0	59.1	51 53.7	09.8	335 11.8	38.6
	20	123 09.7	105 18.5	11.3	146 22.6	58.4	66 55.7	09.9	350 14.4	38.6
	21	138 12.2	120 21.9	·· 11.0	161 23.2	·· 57.7	81 57.7	·· 10.0	5 16.9	·· 38.6
	22	153 14.6	135 25.4	10.8	176 23.8	57.0	96 59.7	10.1	20 19.4	38.7
	23	168 17.1	150 28.8	10.5	191 24.4	56.3	112 01.7	10.3	35 22.0	38.7
Mer. Pass.		h m 11 52.6	v 3.3	d 0.2	v 0.6	d 0.7	v 2.0	d 0.1	v 2.5	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 39.4	S40 24.0
Achernar	335 47.6	S57 21.3
Acrux	173 39.1	S62 58.5
Adhara	255 33.9	S28 56.8
Aldebaran	291 20.8	N16 27.7
Alioth	166 44.1	N56 04.9
Alkaid	153 20.0	N49 25.4
Al Na'ir	28 18.3	S47 04.2
Alnilam	276 14.1	S 1 13.2
Alphard	218 22.6	S 8 33.8
Alphecca	126 33.9	N26 47.3
Alpheratz	358 12.1	N28 57.8
Altair	62 34.9	N 8 48.4
Ankaa	353 43.0	S42 25.9
Antares	112 59.6	S26 22.9
Arcturus	146 20.3	N19 17.9
Atria	108 25.7	S68 58.9
Avior	234 28.8	S59 26.6
Bellatrix	279 01.3	N 6 19.6
Betelgeuse	271 30.8	N 7 24.0
Canopus	264 08.2	S52 41.4
Capella	281 14.9	N45 58.6
Deneb	49 50.3	N45 11.8
Denebola	183 01.1	N14 41.8
Diphda	349 23.6	S18 06.8
Dubhe	194 24.5	N61 52.4
Elnath	278 47.2	N28 35.3
Eltanin	90 58.8	N51 29.3
Enif	34 14.1	N 9 46.1
Fomalhaut	15 54.4	S29 44.6
Gacrux	172 30.7	S56 59.2
Gienah	176 20.0	S17 25.1
Hadar	149 26.0	S60 15.8
Hamal	328 31.9	N23 21.2
Kaus Aust.	84 20.0	S34 23.6
Kochab	137 18.1	N74 14.7
Markab	14 05.8	N15 04.9
Menkar	314 43.8	N 3 59.9
Menkent	148 39.4	S36 15.5
Miaplacidus	221 44.7	S69 37.8
Mirfak	309 19.8	N49 46.9
Nunki	76 32.1	S26 19.4
Peacock	54 02.4	S56 48.3
Pollux	244 00.9	N28 04.8
Procyon	245 28.1	N 5 16.8
Rasalhague	96 31.7	N12 34.5
Regulus	208 12.2	N12 04.5
Rigel	281 38.4	S 8 13.9
Rigil Kent.	140 28.4	S60 44.3
Sabik	102 43.7	S15 41.8
Schedar	350 12.2	N56 24.7
Shaula	96 58.9	S37 05.1
Sirius	258 57.7	S16 41.4
Spica	158 59.7	S11 02.7
Suhail	223 12.2	S43 20.8
Vega	80 57.5	N38 45.5
Zuben'ubi	137 35.4	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	341 29.0	13 06
Mars	24 34.5	10 16
Jupiter	304 06.5	15 36
Saturn	227 01.2	20 43

0000 MARCH 23, 24, 25 (WED., THURS., FRI.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	MOON v	MOON Dec.	MOON d	MOON H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
23	00	178 18.6	N 0 53.6	143 52.8	13.5	N13 06.2	7.0	54.4
	01	193 18.8	54.6	158 25.3	13.6	13 13.2	6.9	54.4
	02	208 19.0	55.6	172 57.9	13.5	13 20.1	6.9	54.4
	03	223 19.2	·· 56.6	187 30.4	13.5	13 27.0	6.8	54.3
	04	238 19.4	57.5	202 02.9	13.5	13 33.8	6.7	54.3
	05	253 19.5	58.5	216 35.4	13.5	13 40.5	6.7	54.3
	06	268 19.7	N 0 59.5	231 07.9	13.5	N13 47.2	6.6	54.3
	07	283 19.9	1 00.5	245 40.4	13.4	13 53.8	6.6	54.3
	08	298 20.1	01.5	260 12.8	13.5	14 00.4	6.4	54.3
WEDNESDAY	09	313 20.3	·· 02.5	274 45.3	13.4	14 06.8	6.5	54.3
	10	328 20.5	03.5	289 17.7	13.4	14 13.3	6.3	54.3
	11	343 20.7	04.4	303 50.1	13.4	14 19.6	6.3	54.3
	12	358 20.9	N 1 05.4	318 22.5	13.4	N14 25.9	6.2	54.3
	13	13 21.0	06.4	332 54.9	13.3	14 32.1	6.2	54.3
	14	28 21.2	07.4	347 27.2	13.4	14 38.3	6.1	54.3
	15	43 21.4	·· 08.4	1 59.6	13.3	14 44.4	6.0	54.2
	16	58 21.6	09.4	16 31.9	13.3	14 50.4	6.0	54.2
	17	73 21.8	10.4	31 04.2	13.3	14 56.4	5.8	54.2
	18	88 22.0	N 1 11.3	45 36.5	13.3	N15 02.2	5.9	54.2
	19	103 22.2	12.3	60 08.8	13.2	15 08.1	5.7	54.2
	20	118 22.4	13.3	74 41.0	13.3	15 13.8	5.7	54.2
	21	133 22.5	·· 14.3	89 13.3	13.2	15 19.5	5.6	54.2
	22	148 22.7	15.3	103 45.5	13.2	15 25.1	5.5	54.2
	23	163 22.9	16.3	118 17.7	13.2	15 30.6	5.5	54.2
24	00	178 23.1	N 1 17.2	132 49.9	13.1	N15 36.1	5.4	54.2
	01	193 23.3	18.2	147 22.0	13.2	15 41.5	5.3	54.2
	02	208 23.5	19.2	161 54.2	13.1	15 46.8	5.3	54.2
	03	223 23.7	·· 20.2	176 26.3	13.1	15 52.1	5.2	54.2
	04	238 23.9	21.2	190 58.4	13.1	15 57.3	5.1	54.2
	05	253 24.1	22.2	205 30.5	13.1	16 02.4	5.0	54.2
	06	268 24.2	N 1 23.2	220 02.6	13.0	N16 07.4	5.0	54.2
	07	283 24.4	24.1	234 34.6	13.1	16 12.4	4.9	54.2
THURSDAY	08	298 24.6	25.1	249 06.7	13.0	16 17.3	4.8	54.2
	09	313 24.8	·· 26.1	263 38.7	13.0	16 22.1	4.8	54.2
	10	328 25.0	27.1	278 10.7	13.0	16 26.9	4.6	54.1
	11	343 25.2	28.1	292 42.7	12.9	16 31.5	4.6	54.1
	12	358 25.4	N 1 29.1	307 14.6	13.0	N16 36.1	4.5	54.1
	13	13 25.6	30.0	321 46.6	12.9	16 40.6	4.5	54.1
	14	28 25.7	31.0	336 18.5	12.9	16 45.1	4.4	54.1
	15	43 25.9	·· 32.0	350 50.4	12.9	16 49.5	4.3	54.1
	16	58 26.1	33.0	5 22.3	12.9	16 53.8	4.2	54.1
	17	73 26.3	34.0	19 54.2	12.8	16 58.0	4.1	54.1
	18	88 26.5	N 1 35.0	34 26.0	12.8	N17 02.1	4.1	54.1
	19	103 26.7	35.9	48 57.8	12.9	17 06.2	4.0	54.1
	20	118 26.9	36.9	63 29.7	12.8	17 10.2	3.9	54.1
	21	133 27.1	·· 37.9	78 01.5	12.7	17 14.1	3.8	54.1
	22	148 27.2	38.9	92 33.2	12.8	17 17.9	3.8	54.1
	23	163 27.4	39.9	107 05.0	12.7	17 21.7	3.6	54.1
25	00	178 27.6	N 1 40.9	121 36.7	12.7	N17 25.3	3.6	54.1
	01	193 27.8	41.8	136 08.4	12.7	17 28.9	3.5	54.1
	02	208 28.0	42.8	150 40.1	12.7	17 32.4	3.5	54.1
	03	223 28.2	·· 43.8	165 11.8	12.7	17 35.9	3.3	54.1
	04	238 28.4	44.8	179 43.5	12.6	17 39.2	3.3	54.1
	05	253 28.6	45.8	194 15.1	12.7	17 42.5	3.2	54.1
	06	268 28.8	N 1 46.8	208 46.8	12.6	N17 45.7	3.1	54.1
	07	283 29.0	47.7	223 18.4	12.6	17 48.8	3.1	54.1
	08	298 29.2	48.7	237 50.0	12.5	17 51.9	2.9	54.1
FRIDAY	09	313 29.3	·· 49.7	252 21.5	12.6	17 54.8	2.9	54.1
	10	328 29.5	50.7	266 53.1	12.5	17 57.7	2.8	54.1
	11	343 29.7	51.7	281 24.6	12.5	18 00.5	2.7	54.2
	12	358 29.9	N 1 52.6	295 56.1	12.6	N18 03.2	2.6	54.2
	13	13 30.1	53.6	310 27.7	12.4	18 05.8	2.6	54.2
	14	28 30.3	54.6	324 59.1	12.5	18 08.4	2.4	54.2
	15	43 30.5	·· 55.6	339 30.6	12.4	18 10.8	2.4	54.2
	16	58 30.7	56.6	354 02.0	12.5	18 13.2	2.3	54.2
	17	73 30.9	57.6	8 33.5	12.4	18 15.5	2.2	54.2
	18	88 31.0	N 1 58.5	23 04.9	12.4	N18 17.7	2.2	54.2
	19	103 31.2	1 59.5	37 36.3	12.4	18 19.9	2.0	54.2
	20	118 31.4	2 00.5	52 07.7	12.3	18 21.9	2.0	54.2
	21	133 31.6	·· 01.5	66 39.0	12.4	18 23.9	1.9	54.2
	22	148 31.8	02.5	81 10.4	12.3	18 25.8	1.8	54.2
	23	163 32.0	03.5	95 41.7	12.3	18 27.6	1.7	54.2
		S.D. 16.1	d 1.0	S.D. 14.8		14.8		14.8

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

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

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
	m s	m s	h m	h m	h m	d	
23	06 46	06 37	12 07	14 52	02 29	04	◐
24	06 28	06 19	12 06	15 38	03 15	05	
25	06 10	06 01	12 06	16 25	04 01	06	

0000 MARCH 26, 27, 28 (SAT., SUN., MON.)

G.M.T. (UT)		ARIES	VENUS −3.7		MARS +1.4		JUPITER −1.7		SATURN +0.3	
		G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d	h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
26	00	183 19.6	165 32.3	N16 10.2	206 25.0	S10 55.6	127 03.7	N19 10.4	50 24.5	N18 38.7
	01	198 22.0	180 35.7	09.9	221 25.6	54.9	142 05.6	10.5	65 27.1	38.7
	02	213 24.5	195 39.2	09.6	236 26.3	54.2	157 07.6	10.6	80 29.6	38.7
	03	228 27.0	210 42.6	·· 09.3	251 26.9	·· 53.5	172 09.6	·· 10.7	95 32.1	·· 38.8
	04	243 29.4	225 46.1	09.0	266 27.5	52.8	187 11.6	10.8	110 34.7	38.8
	05	258 31.9	240 49.6	08.7	281 28.1	52.1	202 13.6	10.9	125 37.2	38.8
	06	273 34.4	255 53.0	N16 08.4	296 28.7	S10 51.4	217 15.6	N19 11.0	140 39.7	N18 38.8
	07	288 36.8	270 56.5	08.1	311 29.3	50.7	232 17.6	11.1	155 42.3	38.8
S	08	303 39.3	286 00.0	07.8	326 29.9	50.0	247 19.6	11.2	170 44.8	38.9
A	09	318 41.7	301 03.5	·· 07.4	341 30.6	·· 49.2	262 21.6	·· 11.3	185 47.3	·· 38.9
T	10	333 44.2	316 06.9	07.1	356 31.2	48.5	277 23.6	11.4	200 49.9	38.9
U	11	348 46.7	331 10.4	06.8	11 31.8	47.8	292 25.6	11.6	215 52.4	38.9
R	12	3 49.1	346 13.9	N16 06.5	26 32.4	S10 47.1	307 27.6	N19 11.7	230 55.0	N18 38.9
D	13	18 51.6	1 17.4	06.2	41 33.0	46.4	322 29.6	11.8	245 57.5	39.0
A	14	33 54.1	16 20.9	05.8	56 33.6	45.7	337 31.5	11.9	261 00.0	39.0
Y	15	48 56.5	31 24.4	·· 05.5	71 34.2	·· 45.0	352 33.5	·· 12.0	276 02.6	·· 39.0
	16	63 59.0	46 27.9	05.2	86 34.8	44.3	7 35.5	12.1	291 05.1	39.0
	17	79 01.5	61 31.4	04.8	101 35.5	43.6	22 37.5	12.2	306 07.6	39.0
	18	94 03.9	76 34.9	N16 04.5	116 36.1	S10 42.9	37 39.5	N19 12.3	321 10.2	N18 39.1
	19	109 06.4	91 38.4	04.2	131 36.7	42.1	52 41.5	12.4	336 12.7	39.1
	20	124 08.8	106 41.9	03.8	146 37.3	41.4	67 43.5	12.5	351 15.2	39.1
	21	139 11.3	121 45.4	·· 03.5	161 37.9	·· 40.7	82 45.5	·· 12.6	6 17.8	·· 39.1
	22	154 13.8	136 49.0	03.1	176 38.5	40.0	97 47.5	12.7	21 20.3	39.1
	23	169 16.2	151 52.5	02.8	191 39.2	39.3	112 49.5	12.9	36 22.8	39.2
27	00	184 18.7	166 56.0	N16 02.4	206 39.8	S10 38.6	127 51.4	N19 13.0	51 25.4	N18 39.2
	01	199 21.2	181 59.5	02.0	221 40.4	37.9	142 53.4	13.1	66 27.9	39.2
	02	214 23.6	197 03.1	01.7	236 41.0	37.2	157 55.4	13.2	81 30.4	39.2
	03	229 26.1	212 06.6	·· 01.3	251 41.6	·· 36.5	172 57.4	·· 13.3	96 33.0	·· 39.2
	04	244 28.6	227 10.1	01.0	266 42.2	35.7	187 59.4	13.4	111 35.5	39.2
	05	259 31.0	242 13.7	00.6	281 42.9	35.0	203 01.4	13.5	126 38.0	39.3
	06	274 33.5	257 17.2	N16 00.2	296 43.5	S10 34.3	218 03.4	N19 13.6	141 40.6	N18 39.3
	07	289 36.0	272 20.7	15 59.9	311 44.1	33.6	233 05.4	13.7	156 43.1	39.3
	08	304 38.4	287 24.3	59.5	326 44.7	32.9	248 07.3	13.8	171 45.6	39.3
S	09	319 40.9	302 27.8	·· 59.1	341 45.3	·· 32.2	263 09.3	·· 13.9	186 48.2	·· 39.3
U	10	334 43.3	317 31.4	58.7	356 45.9	31.5	278 11.3	14.0	201 50.7	39.4
N	11	349 45.8	332 34.9	58.3	11 46.6	30.8	293 13.3	14.2	216 53.2	39.4
D	12	4 48.3	347 38.5	N15 57.9	26 47.2	S10 30.0	308 15.3	N19 14.3	231 55.8	N18 39.4
A	13	19 50.7	2 42.1	57.6	41 47.8	29.3	323 17.3	14.4	246 58.3	39.4
Y	14	34 53.2	17 45.6	57.2	56 48.4	28.6	338 19.3	14.5	262 00.8	39.4
	15	49 55.7	32 49.2	·· 56.8	71 49.0	·· 27.9	353 21.3	·· 14.6	277 03.4	·· 39.4
	16	64 58.1	47 52.8	56.4	86 49.6	27.2	8 23.2	14.7	292 05.9	39.5
	17	80 00.6	62 56.3	56.0	101 50.3	26.5	23 25.2	14.8	307 08.4	39.5
	18	95 03.1	77 59.9	N15 55.6	116 50.9	S10 25.8	38 27.2	N19 14.9	322 10.9	N18 39.5
	19	110 05.5	93 03.5	55.2	131 51.5	25.0	53 29.2	15.0	337 13.5	39.5
	20	125 08.0	108 07.1	54.8	146 52.1	24.3	68 31.2	15.1	352 16.0	39.5
	21	140 10.5	123 10.6	·· 54.4	161 52.7	·· 23.6	83 33.2	·· 15.2	7 18.5	·· 39.6
	22	155 12.9	138 14.2	53.9	176 53.4	22.9	98 35.2	15.4	22 21.1	39.6
	23	170 15.4	153 17.8	53.5	191 54.0	22.2	113 37.1	15.5	37 23.6	39.6
28	00	185 17.8	168 21.4	N15 53.1	206 54.6	S10 21.5	128 39.1	N19 15.6	52 26.1	N18 39.6
	01	200 20.3	183 25.0	52.7	221 55.2	20.8	143 41.1	15.7	67 28.6	39.6
	02	215 22.8	198 28.6	52.3	236 55.8	20.0	158 43.1	15.8	82 31.2	39.6
	03	230 25.2	213 32.2	·· 51.8	251 56.5	·· 19.3	173 45.1	·· 15.9	97 33.7	·· 39.7
	04	245 27.7	228 35.8	51.4	266 57.1	18.6	188 47.1	16.0	112 36.2	39.7
	05	260 30.2	243 39.4	51.0	281 57.7	17.9	203 49.1	16.1	127 38.8	39.7
	06	275 32.6	258 43.0	N15 50.5	296 58.3	S10 17.2	218 51.0	N19 16.2	142 41.3	N18 39.7
	07	290 35.1	273 46.6	50.1	311 58.9	16.5	233 53.0	16.3	157 43.8	39.7
	08	305 37.6	288 50.2	49.7	326 59.6	15.7	248 55.0	16.4	172 46.3	39.7
M	09	320 40.0	303 53.8	·· 49.2	342 00.2	·· 15.0	263 57.0	·· 16.6	187 48.9	·· 39.8
O	10	335 42.5	318 57.4	48.8	357 00.8	14.3	278 59.0	16.7	202 51.4	39.8
N	11	350 44.9	334 01.1	48.3	12 01.4	13.6	294 01.0	16.8	217 53.9	39.8
D	12	5 47.4	349 04.7	N15 47.9	27 02.0	S10 12.9	309 02.9	N19 16.9	232 56.5	N18 39.8
A	13	20 49.9	4 08.3	47.4	42 02.7	12.2	324 04.9	17.0	247 59.0	39.8
Y	14	35 52.3	19 11.9	47.0	57 03.3	11.4	339 06.9	17.1	263 01.5	39.8
	15	50 54.8	34 15.6	·· 46.5	72 03.9	·· 10.7	354 08.9	·· 17.2	278 04.0	·· 39.9
	16	65 57.3	49 19.2	46.1	87 04.5	10.0	9 10.9	17.3	293 06.6	39.9
	17	80 59.7	64 22.8	45.6	102 05.2	09.3	24 12.8	17.4	308 09.1	39.9
	18	96 02.2	79 26.5	N15 45.1	117 05.8	S10 08.6	39 14.8	N19 17.5	323 11.6	N18 39.9
	19	111 04.7	94 30.1	44.7	132 06.4	07.9	54 16.8	17.6	338 14.1	39.9
	20	126 07.1	109 33.7	44.2	147 07.0	07.1	69 18.8	17.8	353 16.7	39.9
	21	141 09.6	124 37.4	·· 43.7	162 07.6	·· 06.4	84 20.8	·· 17.9	8 19.2	·· 40.0
	22	156 12.1	139 41.0	43.3	177 08.3	05.7	99 22.8	18.0	23 21.7	40.0
	23	171 14.5	154 44.7	42.8	192 08.9	05.0	114 24.7	18.1	38 24.2	40.0
Mer. Pass.		h m 11 40.8	v 3.6	d 0.4	v 0.6	d 0.7	v 2.0	d 0.1	v 2.5	d 0.0

STARS

Name	S.H.A. ° ′	Dec. ° ′
Acamar	315 39.4	S40 24.0
Achernar	335 47.6	S57 21.3
Acrux	173 39.1	S62 58.5
Adhara	255 33.9	S28 56.8
Aldebaran	291 20.8	N16 27.7
Alioth	166 44.1	N56 04.9
Alkaid	153 19.9	N49 25.4
Al Na'ir	28 18.3	S47 04.2
Alnilam	276 14.1	S 1 13.2
Alphard	218 22.6	S 8 33.8
Alphecca	126 33.9	N26 47.3
Alpheratz	358 12.1	N28 57.8
Altair	62 34.9	N 8 48.4
Ankaa	353 43.0	S42 25.8
Antares	112 59.5	S26 22.9
Arcturus	146 20.3	N19 17.9
Atria	108 25.7	S68 59.0
Avior	234 28.8	S59 26.6
Bellatrix	279 01.3	N 6 19.6
Betelgeuse	271 30.9	N 7 24.0
Canopus	264 08.2	S52 41.4
Capella	281 14.9	N45 58.6
Deneb	49 50.3	N45 11.8
Denebola	183 01.1	N14 41.8
Diphda	349 23.6	S18 06.8
Dubhe	194 24.5	N61 52.4
Elnath	278 47.2	N28 35.3
Eltanin	90 58.7	N51 29.3
Enif	34 14.1	N 9 46.1
Fomalhaut	15 54.4	S29 44.6
Gacrux	172 30.7	S56 59.3
Gienah	176 20.0	S17 25.1
Hadar	149 26.0	S60 15.8
Hamal	328 31.9	N23 21.2
Kaus Aust.	84 19.9	S34 23.6
Kochab	137 18.1	N74 14.8
Markab	14 05.8	N15 04.9
Menkar	314 43.8	N 3 59.9
Menkent	148 39.4	S36 15.5
Miaplacidus	221 44.8	S69 37.8
Mirfak	309 19.8	N49 46.9
Nunki	76 32.1	S26 19.4
Peacock	54 02.4	S56 48.3
Pollux	244 00.9	N28 04.8
Procyon	245 28.1	N 5 16.8
Rasalhague	96 31.7	N12 34.5
Regulus	208 12.2	N12 04.5
Rigel	281 38.4	S 8 13.9
Rigil Kent.	140 28.4	S60 44.3
Sabik	102 43.7	S15 41.8
Schedar	350 12.2	N56 24.7
Shaula	96 58.8	S37 05.1
Sirius	258 57.7	S16 41.4
Spica	158 59.7	S11 02.7
Suhail	223 12.2	S43 20.8
Vega	80 57.4	N38 45.5
Zuben'ubi	137 35.4	S15 56.9

	S.H.A. ° ′	Mer. Pass. h m
Venus	342 37.3	12 49
Mars	22 21.1	10 13
Jupiter	303 32.7	15 27
Saturn	227 06.7	20 31

0000 MARCH 26, 27, 28 (SAT., SUN., MON.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	MOON v	MOON Dec.	MOON d	MOON H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
26 00	178 32.2	N 2 04.4	110 13.0	12.3	N18 29.3	1.6	54.2
01	193 32.4	05.4	124 44.3	12.3	18 30.9	1.5	54.2
02	208 32.6	06.4	139 15.6	12.3	18 32.4	1.5	54.2
03	223 32.8	·· 07.4	153 46.9	12.2	18 33.9	1.4	54.2
04	238 32.9	08.4	168 18.1	12.2	18 35.3	1.2	54.3
05	253 33.1	09.3	182 49.3	12.2	18 36.5	1.2	54.3
06	268 33.3	N 2 10.3	197 20.5	12.2	N18 37.7	1.2	54.3
07	283 33.5	11.3	211 51.7	12.2	18 38.9	1.0	54.3
S 08	298 33.7	12.3	226 22.9	12.2	18 39.9	0.9	54.3
A 09	313 33.9	·· 13.3	240 54.1	12.2	18 40.8	0.9	54.3
T 10	328 34.1	14.2	255 25.3	12.1	18 41.7	0.8	54.3
U 11	343 34.3	15.2	269 56.4	12.1	18 42.5	0.6	54.3
R 12	358 34.5	N 2 16.2	284 27.5	12.1	N18 43.1	0.6	54.3
D 13	13 34.7	17.2	298 58.6	12.1	18 43.7	0.6	54.3
A 14	28 34.8	18.2	313 29.7	12.1	18 44.3	0.4	54.4
Y 15	43 35.0	·· 19.1	328 00.8	12.1	18 44.7	0.3	54.4
16	58 35.2	20.1	342 31.9	12.0	18 45.0	0.3	54.4
17	73 35.4	21.1	357 02.9	12.1	18 45.3	0.1	54.4
18	88 35.6	N 2 22.1	11 34.0	12.0	N18 45.4	0.1	54.4
19	103 35.8	23.1	26 05.0	12.0	18 45.5	0.0	54.4
20	118 36.0	24.0	40 36.0	12.0	18 45.5	0.1	54.4
21	133 36.2	·· 25.0	55 07.0	12.0	18 45.4	0.2	54.4
22	148 36.4	26.0	69 38.0	11.9	18 45.2	0.3	54.5
23	163 36.5	27.0	84 08.9	12.0	18 44.9	0.4	54.5
27 00	178 36.7	N 2 28.0	98 39.9	11.9	N18 44.5	0.4	54.5
01	193 36.9	28.9	113 10.8	12.0	18 44.1	0.5	54.5
02	208 37.1	29.9	127 41.8	11.9	18 43.6	0.7	54.5
03	223 37.3	·· 30.9	142 12.7	11.9	18 42.9	0.7	54.5
04	238 37.5	31.9	156 43.6	11.9	18 42.2	0.8	54.5
05	253 37.7	32.9	171 14.5	11.9	18 41.4	0.9	54.6
06	268 37.9	N 2 33.8	185 45.4	11.8	N18 40.5	1.0	54.6
07	283 38.1	34.8	200 16.2	11.9	18 39.5	1.1	54.6
08	298 38.3	35.8	214 47.1	11.8	18 38.4	1.1	54.6
S 09	313 38.4	·· 36.8	229 17.9	11.9	18 37.3	1.3	54.6
U 10	328 38.6	37.8	243 48.8	11.8	18 36.0	1.3	54.6
N 11	343 38.8	38.7	258 19.6	11.8	18 34.7	1.4	54.7
D 12	358 39.0	N 2 39.7	272 50.4	11.8	N18 33.3	1.5	54.7
A 13	13 39.2	40.7	287 21.2	11.8	18 31.8	1.7	54.7
Y 14	28 39.4	41.7	301 52.0	11.8	18 30.1	1.6	54.7
15	43 39.6	·· 42.6	316 22.8	11.7	18 28.5	1.8	54.7
16	58 39.8	43.6	330 53.5	11.8	18 26.7	1.9	54.7
17	73 40.0	44.6	345 24.3	11.7	18 24.8	2.0	54.8
18	88 40.2	N 2 45.6	359 55.0	11.8	N18 22.8	2.0	54.8
19	103 40.3	46.6	14 25.8	11.7	18 20.8	2.2	54.8
20	118 40.5	47.5	28 56.5	11.7	18 18.6	2.2	54.8
21	133 40.7	·· 48.5	43 27.2	11.7	18 16.4	2.3	54.8
22	148 40.9	49.5	57 57.9	11.7	18 14.1	2.4	54.9
23	163 41.1	50.5	72 28.6	11.7	18 11.7	2.5	54.9
28 00	178 41.3	N 2 51.4	86 59.3	11.7	N18 09.2	2.6	54.9
01	193 41.5	52.4	101 30.0	11.7	18 06.6	2.7	54.9
02	208 41.7	53.4	116 00.7	11.6	18 03.9	2.7	54.9
03	223 41.9	·· 54.4	130 31.3	11.7	18 01.2	2.9	55.0
04	238 42.0	55.3	145 02.0	11.6	17 58.3	2.9	55.0
05	253 42.2	56.3	159 32.6	11.7	17 55.4	3.0	55.0
06	268 42.4	N 2 57.3	174 03.3	11.6	N17 52.4	3.2	55.0
07	283 42.6	58.3	188 33.9	11.6	17 49.2	3.2	55.1
08	298 42.8	2 59.3	203 04.5	11.6	17 46.0	3.3	55.1
M 09	313 43.0	3 00.2	217 35.1	11.6	17 42.7	3.3	55.1
O 10	328 43.2	01.2	232 05.7	11.6	17 39.4	3.5	55.1
N 11	343 43.4	02.2	246 36.3	11.6	17 35.9	3.6	55.2
D 12	358 43.6	N 3 03.2	261 06.9	11.6	N17 32.3	3.6	55.2
A 13	13 43.8	04.1	275 37.5	11.5	17 28.7	3.8	55.2
Y 14	28 43.9	05.1	290 08.0	11.6	17 24.9	3.8	55.2
15	43 44.1	·· 06.1	304 38.6	11.6	17 21.1	3.9	55.3
16	58 44.3	07.1	319 09.2	11.5	17 17.2	4.0	55.3
17	73 44.5	08.0	333 39.7	11.5	17 13.2	4.1	55.3
18	88 44.7	N 3 09.0	348 10.2	11.6	N17 09.1	4.2	55.3
19	103 44.9	10.0	2 40.8	11.5	17 04.9	4.2	55.4
20	118 45.1	11.0	17 11.3	11.5	17 00.7	4.4	55.4
21	133 45.3	·· 11.9	31 41.8	11.5	16 56.3	4.4	55.4
22	148 45.5	12.9	46 12.3	11.5	16 51.9	4.5	55.4
23	163 45.7	13.9	60 42.8	11.5	16 47.4	4.6	55.5
	S.D. 16.1	d 1.0	S.D. 14.8		14.9		15.0

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

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

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
	m s	m s	h m	h m	h m	d	
26	05 52	05 43	12 06	17 12	04 48	07	◐
27	05 33	05 24	12 05	18 00	05 36	08	
28	05 15	05 06	12 05	18 49	06 25	09	

0000 JUNE 9, 10, 11 (THURS., FRI., SAT.)

G.M.T. (UT)	ARIES	VENUS −4.0		MARS +1.3		JUPITER −1.5		SATURN +0.6	
	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
9 00	257 15.0	226 06.6	N 9 58.3	226 55.8	N11 15.3	183 46.6	N22 05.2	121 39.2	N17 53.6
01	272 17.4	241 06.9	59.0	241 56.5	15.9	198 48.4	05.3	136 41.4	53.6
02	287 19.9	256 07.1	9 59.6	256 57.2	16.6	213 50.3	05.4	151 43.6	53.5
03	302 22.3	271 07.4	10 00.3	271 57.9	·· 17.2	228 52.1	·· 05.4	166 45.9	·· 53.4
04	317 24.8	286 07.6	01.0	286 58.6	17.9	243 54.0	05.5	181 48.1	53.4
05	332 27.3	301 07.9	01.6	301 59.3	18.5	258 55.8	05.6	196 50.3	53.3
06	347 29.7	316 08.2	N10 02.3	317 00.0	N11 19.2	273 57.6	N22 05.7	211 52.6	N17 53.2
07	2 32.2	331 08.4	03.0	332 00.7	19.8	288 59.5	05.7	226 54.8	53.2
T 08	17 34.7	346 08.7	03.6	347 01.4	20.5	304 01.3	05.8	241 57.0	53.1
H 09	32 37.1	1 08.9	·· 04.3	2 02.1	·· 21.2	319 03.2	·· 05.9	256 59.3	·· 53.0
U 10	47 39.6	16 09.2	04.9	17 02.8	21.8	334 05.0	05.9	272 01.5	53.0
R 11	62 42.1	31 09.4	05.6	32 03.5	22.5	349 06.9	06.0	287 03.7	52.9
S 12	77 44.5	46 09.6	N10 06.3	47 04.2	N11 23.1	4 08.7	N22 06.1	302 06.0	N17 52.8
D 13	92 47.0	61 09.9	06.9	62 04.8	23.8	19 10.5	06.1	317 08.2	52.8
A 14	107 49.5	76 10.1	07.6	77 05.5	24.4	34 12.4	06.2	332 10.4	52.7
Y 15	122 51.9	91 10.4	·· 08.3	92 06.2	·· 25.1	49 14.2	·· 06.3	347 12.7	·· 52.6
16	137 54.4	106 10.6	08.9	107 06.9	25.7	64 16.1	06.3	2 14.9	52.6
17	152 56.8	121 10.9	09.6	122 07.6	26.4	79 17.9	06.4	17 17.1	52.5
18	167 59.3	136 11.1	N10 10.3	137 08.3	N11 27.0	94 19.7	N22 06.5	32 19.4	N17 52.4
19	183 01.8	151 11.3	10.9	152 09.0	27.7	109 21.6	06.5	47 21.6	52.4
20	198 04.2	166 11.6	11.6	167 09.7	28.3	124 23.4	06.6	62 23.8	52.3
21	213 06.7	181 11.8	·· 12.3	182 10.4	·· 29.0	139 25.3	·· 06.7	77 26.1	·· 52.3
22	228 09.2	196 12.1	12.9	197 11.1	29.6	154 27.1	06.8	92 28.3	52.2
23	243 11.6	211 12.3	13.6	212 11.8	30.3	169 29.0	06.8	107 30.5	52.1
10 00	258 14.1	226 12.5	N10 14.3	227 12.5	N11 30.9	184 30.8	N22 06.9	122 32.8	N17 52.1
01	273 16.6	241 12.8	14.9	242 13.2	31.6	199 32.6	07.0	137 35.0	52.0
02	288 19.0	256 13.0	15.6	257 13.9	32.2	214 34.5	07.0	152 37.2	51.9
03	303 21.5	271 13.2	·· 16.3	272 14.6	·· 32.9	229 36.3	·· 07.1	167 39.5	·· 51.9
04	318 24.0	286 13.5	16.9	287 15.2	33.5	244 38.2	07.2	182 41.7	51.8
05	333 26.4	301 13.7	17.6	302 15.9	34.2	259 40.0	07.2	197 43.9	51.7
06	348 28.9	316 13.9	N10 18.3	317 16.6	N11 34.8	274 41.9	N22 07.3	212 46.2	N17 51.7
07	3 31.3	331 14.2	18.9	332 17.3	35.5	289 43.7	07.4	227 48.4	51.6
08	18 33.8	346 14.4	19.6	347 18.0	36.1	304 45.5	07.4	242 50.6	51.5
F 09	33 36.3	1 14.6	·· 20.3	2 18.7	·· 36.8	319 47.4	·· 07.5	257 52.8	·· 51.5
R 10	48 38.7	16 14.9	21.0	17 19.4	37.4	334 49.2	07.6	272 55.1	51.4
I 11	63 41.2	31 15.1	21.6	32 20.1	38.0	349 51.1	07.6	287 57.3	51.3
D 12	78 43.7	46 15.3	N10 22.3	47 20.8	N11 38.7	4 52.9	N22 07.7	302 59.5	N17 51.3
A 13	93 46.1	61 15.5	23.0	62 21.5	39.3	19 54.7	07.8	318 01.8	51.2
Y 14	108 48.6	76 15.8	23.6	77 22.2	40.0	34 56.6	07.8	333 04.0	51.1
15	123 51.1	91 16.0	·· 24.3	92 22.9	·· 40.6	49 58.4	·· 07.9	348 06.2	·· 51.1
16	138 53.5	106 16.2	25.0	107 23.6	41.3	65 00.3	08.0	3 08.5	51.0
17	153 56.0	121 16.4	25.7	122 24.2	41.9	80 02.1	08.0	18 10.7	50.9
18	168 58.4	136 16.6	N10 26.3	137 24.9	N11 42.6	95 04.0	N22 08.1	33 12.9	N17 50.9
19	184 00.9	151 16.9	27.0	152 25.6	43.2	110 05.8	08.2	48 15.1	50.8
20	199 03.4	166 17.1	27.7	167 26.3	43.9	125 07.6	08.2	63 17.4	50.7
21	214 05.8	181 17.3	·· 28.4	182 27.0	·· 44.5	140 09.5	·· 08.3	78 19.6	·· 50.7
22	229 08.3	196 17.5	29.0	197 27.7	45.2	155 11.3	08.4	93 21.8	50.6
23	244 10.8	211 17.7	29.7	212 28.4	45.8	170 13.2	08.4	108 24.1	50.5
11 00	259 13.2	226 17.9	N10 30.4	227 29.1	N11 46.4	185 15.0	N22 08.5	123 26.3	N17 50.5
01	274 15.7	241 18.2	31.0	242 29.8	47.1	200 16.8	08.6	138 28.5	50.4
02	289 18.2	256 18.4	31.7	257 30.5	47.7	215 18.7	08.6	153 30.7	50.3
03	304 20.6	271 18.6	·· 32.4	272 31.2	·· 48.4	230 20.5	·· 08.7	168 33.0	·· 50.3
04	319 23.1	286 18.8	33.1	287 31.9	49.0	245 22.4	08.8	183 35.2	50.2
05	334 25.6	301 19.0	33.7	302 32.5	49.7	260 24.2	08.8	198 37.4	50.1
06	349 28.0	316 19.2	N10 34.4	317 33.2	N11 50.3	275 26.1	N22 08.9	213 39.7	N17 50.1
07	4 30.5	331 19.4	35.1	332 33.9	50.9	290 27.9	09.0	228 41.9	50.0
S 08	19 32.9	346 19.6	35.8	347 34.6	51.6	305 29.7	09.0	243 44.1	49.9
A 09	34 35.4	1 19.8	·· 36.4	2 35.3	·· 52.2	320 31.6	·· 09.1	258 46.3	·· 49.9
T 10	49 37.9	16 20.0	37.1	17 36.0	52.9	335 33.4	09.2	273 48.6	49.8
U 11	64 40.3	31 20.2	37.8	32 36.7	53.5	350 35.3	09.2	288 50.8	49.7
R 12	79 42.8	46 20.4	N10 38.5	47 37.4	N11 54.2	5 37.1	N22 09.3	303 53.0	N17 49.7
D 13	94 45.3	61 20.7	39.2	62 38.1	54.8	20 39.0	09.4	318 55.3	49.6
A 14	109 47.7	76 20.9	39.8	77 38.8	55.4	35 40.8	09.4	333 57.5	49.5
Y 15	124 50.2	91 21.1	·· 40.5	92 39.5	·· 56.1	50 42.6	·· 09.5	348 59.7	·· 49.5
16	139 52.7	106 21.3	41.2	107 40.2	56.7	65 44.5	09.6	4 01.9	49.4
17	154 55.1	121 21.5	41.9	122 40.8	57.4	80 46.3	09.6	19 04.2	49.3
18	169 57.6	136 21.7	N10 42.5	137 41.5	N11 58.0	95 48.2	N22 09.7	34 06.4	N17 49.3
19	185 00.1	151 21.9	43.2	152 42.2	58.6	110 50.0	09.8	49 08.6	49.2
20	200 02.5	166 22.1	43.9	167 42.9	59.3	125 51.8	09.8	64 10.8	49.1
21	215 05.0	181 22.2	·· 44.6	182 43.6	11 59.9	140 53.7	·· 09.9	79 13.1	·· 49.1
22	230 07.4	196 22.4	45.3	197 44.3	12 00.6	155 55.5	10.0	94 15.3	49.0
23	245 09.9	211 22.6	45.9	212 45.0	01.2	170 57.4	10.0	109 17.5	48.9
	h m								
Mer. Pass.	6 45.9	v 0.2	d 0.7	v 0.7	d 0.6	v 1.8	d 0.1	v 2.2	d 0.1

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 39.3	S40 23.6
Achernar	335 47.4	S57 20.9
Acrux	173 39.4	S62 58.8
Adhara	255 34.2	S28 56.7
Aldebaran	291 20.9	N16 27.7
Alioth	166 44.3	N56 05.2
Alkaid	153 20.0	N49 25.8
Al Na'ir	28 17.6	S47 03.9
Alnilam	276 14.2	S 1 13.1
Alphard	218 22.9	S 8 33.8
Alphecca	126 33.7	N26 47.5
Alpheratz	358 11.6	N28 57.8
Altair	62 54.4	N 8 48.6
Ankaa	353 42.6	S42 25.5
Antares	112 59.2	S26 22.9
Arcturus	146 20.3	N19 18.1
Atria	108 24.8	S68 59.2
Avior	234 29.5	S59 26.6
Bellatrix	279 01.5	N 6 19.7
Betelgeuse	271 31.0	N 7 24.1
Canopus	264 08.7	S52 41.2
Capella	281 15.0	N45 58.4
Deneb	49 49.6	N45 11.9
Denebola	183 01.3	N14 41.9
Diphda	349 23.2	S18 06.5
Dubhe	194 25.0	N61 52.6
Elnath	278 47.3	N28 35.2
Eltanin	90 58.2	N51 29.6
Enif	34 13.6	N 9 46.3
Fomalhaut	15 53.8	S29 44.3
Gacrux	172 30.9	S56 59.5
Gienah	176 20.1	S17 25.2
Hadar	149 25.9	S60 16.1
Hamal	328 31.6	N23 21.2
Kaus Aust.	84 19.4	S34 23.6
Kochab	137 18.1	N74 15.1
Markab	14 05.3	N15 05.0
Menkar	314 43.7	N 4 00.0
Menkent	148 39.3	S36 15.7
Miaplacidus	221 45.8	S69 37.9
Mirfak	309 19.7	N49 46.7
Nunki	76 31.6	S26 19.4
Peacock	54 01.5	S56 48.2
Pollux	244 01.2	N28 04.8
Procyon	245 28.4	N 5 16.9
Rasalhague	96 31.3	N12 34.6
Regulus	208 12.5	N12 04.6
Rigel	281 38.5	S 8 13.8
Rigil Kent.	140 28.2	S60 44.7
Sabik	102 43.3	S15 41.8
Schedar	350 11.6	N56 24.6
Shaula	96 58.3	S37 05.2
Sirius	258 58.0	S16 41.3
Spica	158 59.7	S11 02.7
Suhail	223 12.6	S43 20.8
Vega	80 56.9	N38 45.8
Zuben'ubi	137 35.2	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	327 58.4	8 55
Mars	328 58.4	8 51
Jupiter	286 16.7	11 41
Saturn	224 18.7	15 47

0000 JUNE 9, 10, 11 (THURS., FRI., SAT.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	MOON v	MOON Dec.	MOON d	MOON H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
9 00	180 14.4	N22 54.1	265 15.7	13.5	S 0 37.5	10.1	56.1
01	195 14.3	54.4	279 48.2	13.5	0 27.4	10.2	56.1
02	210 14.2	54.6	294 20.7	13.6	0 17.2	10.2	56.0
03	225 14.1	·· 54.8	308 53.3	13.7	S 0 07.0	10.2	56.0
04	240 13.9	55.0	323 26.0	13.6	N 0 03.2	10.1	56.0
05	255 13.8	55.2	337 58.6	13.7	0 13.3	10.2	55.9
06	270 13.7	N22 55.4	352 31.3	13.7	N 0 23.5	10.1	55.9
07	285 13.6	55.6	7 04.0	13.8	0 33.6	10.1	55.9
T 08	300 13.5	55.8	21 36.8	13.8	0 43.7	10.1	55.8
H 09	315 13.3	·· 56.0	36 09.6	13.8	0 53.8	10.1	55.8
U 10	330 13.2	56.2	50 42.4	13.8	1 03.9	10.1	55.8
R 11	345 13.1	56.4	65 15.2	13.9	1 14.0	10.0	55.8
S 12	0 13.0	N22 56.7	79 48.1	13.9	N 1 24.0	10.1	55.7
D 13	15 12.9	56.9	94 21.0	13.9	1 34.1	10.0	55.7
A 14	30 12.7	57.1	108 53.9	13.9	1 44.1	10.0	55.7
Y 15	45 12.6	·· 57.3	123 26.8	14.0	1 54.1	10.0	55.6
16	60 12.5	57.5	137 59.8	14.0	2 04.1	9.9	55.6
17	75 12.4	57.7	152 32.8	14.0	2 14.0	10.0	55.6
18	90 12.2	N22 57.9	167 05.8	14.0	N 2 24.0	9.9	55.6
19	105 12.1	58.1	181 38.8	14.0	2 33.9	9.9	55.5
20	120 12.0	58.3	196 11.8	14.1	2 43.8	9.9	55.5
21	135 11.9	·· 58.5	210 44.9	14.1	2 53.7	9.9	55.5
22	150 11.7	58.7	225 18.0	14.1	3 03.6	9.8	55.4
23	165 11.6	58.9	239 51.1	14.1	3 13.4	9.8	55.4
10 00	180 11.5	N22 59.1	254 24.2	14.2	N 3 23.2	9.8	55.4
01	195 11.4	59.3	268 57.4	14.1	3 33.0	9.8	55.4
02	210 11.2	59.5	283 30.5	14.2	3 42.8	9.7	55.3
03	225 11.1	·· 59.7	298 03.7	14.2	3 52.5	9.8	55.3
04	240 11.0	22 59.8	312 36.9	14.2	4 02.3	9.7	55.3
05	255 10.9	23 00.0	327 10.1	14.2	4 12.0	9.6	55.3
06	270 10.8	N23 00.2	341 43.3	14.2	N 4 21.6	9.7	55.2
07	285 10.6	00.4	356 16.5	14.2	4 31.3	9.6	55.2
08	300 10.5	00.6	10 49.7	14.3	4 40.9	9.6	55.2
F 09	315 10.4	·· 00.8	25 23.0	14.2	4 50.5	9.5	55.2
R 10	330 10.3	01.0	39 56.2	14.3	5 00.0	9.6	55.1
I 11	345 10.1	01.2	54 29.5	14.3	5 09.6	9.5	55.1
D 12	0 10.0	N23 01.4	69 02.8	14.2	N 5 19.1	9.4	55.1
A 13	15 09.9	01.6	83 36.0	14.3	5 28.5	9.5	55.1
Y 14	30 09.8	01.8	98 09.3	14.3	5 38.0	9.4	55.1
15	45 09.6	·· 01.9	112 42.6	14.3	5 47.4	9.4	55.0
16	60 09.5	02.1	127 15.9	14.3	5 56.8	9.3	55.0
17	75 09.4	02.3	141 49.2	14.3	6 06.1	9.3	55.0
18	90 09.3	N23 02.5	156 22.5	14.3	N 6 15.4	9.3	55.0
19	105 09.1	02.7	170 55.8	14.4	6 24.7	9.2	54.9
20	120 09.0	02.9	185 29.2	14.3	6 33.9	9.3	54.9
21	135 08.9	·· 03.0	200 02.5	14.3	6 43.2	9.1	54.9
22	150 08.8	03.2	214 35.8	14.3	6 52.3	9.2	54.9
23	165 08.6	03.4	229 09.1	14.4	7 01.5	9.1	54.9
11 00	180 08.5	N23 03.6	243 42.5	14.3	N 7 10.6	9.0	54.8
01	195 08.4	03.8	258 15.8	14.3	7 19.6	9.1	54.8
02	210 08.2	03.9	272 49.1	14.3	7 28.7	9.0	54.8
03	225 08.1	·· 04.1	287 22.4	14.3	7 37.7	8.9	54.8
04	240 08.0	04.3	301 55.7	14.4	7 46.6	8.9	54.8
05	255 07.9	04.5	316 29.1	14.3	7 55.5	8.9	54.7
06	270 07.7	N23 04.7	331 02.4	14.3	N 8 04.4	8.8	54.7
07	285 07.6	04.8	345 35.7	14.3	8 13.2	8.8	54.7
S 08	300 07.5	05.0	0 09.0	14.3	8 22.0	8.8	54.7
A 09	315 07.4	·· 05.2	14 42.3	14.3	8 30.8	8.7	54.7
T 10	330 07.2	05.4	29 15.6	14.3	8 39.5	8.7	54.6
U 11	345 07.1	05.5	43 48.9	14.3	8 48.2	8.6	54.6
R 12	0 07.0	N23 05.7	58 22.2	14.3	N 8 56.8	8.6	54.6
D 13	15 06.8	05.9	72 55.5	14.2	9 05.4	8.5	54.6
A 14	30 06.7	06.0	87 28.7	14.3	9 13.9	8.5	54.6
Y 15	45 06.6	·· 06.2	102 02.0	14.2	9 22.4	8.5	54.6
16	60 06.5	06.4	116 35.2	14.3	9 30.9	8.4	54.5
17	75 06.3	06.5	131 08.5	14.2	9 39.3	8.4	54.5
18	90 06.2	N23 06.7	145 41.7	14.3	N 9 47.7	8.3	54.5
19	105 06.1	06.9	160 15.0	14.2	9 56.0	8.3	54.5
20	120 06.0	07.0	174 48.2	14.2	10 04.3	8.2	54.5
21	135 05.8	·· 07.2	189 21.4	14.2	10 12.5	8.2	54.5
22	150 05.7	07.4	203 54.6	14.2	10 20.7	8.1	54.5
23	165 05.6	07.5	218 27.8	14.1	10 28.8	8.1	54.4
	S.D. 15.8	d 0.2	S.D. 15.2		15.0		14.9

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

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

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
	m s	m s	h m	h m	h m	d	
9	00 58	00 52	11 59	06 31	18 53	22	
10	00 46	00 40	11 59	07 15	19 37	23	●
11	00 34	00 28	12 00	07 59	20 21	24	

G.M.T. (UT)		ARIES	VENUS −4.0		MARS +1.3		JUPITER −1.5		SATURN +0.6	
		G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
	d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
	12 00	260 12.4	226 22.8	N10 46.6	227 45.7	N12 01.8	185 59.2	N22 10.1	124 19.8	N17 48.9
	01	275 14.8	241 23.0	47.3	242 46.4	02.5	201 01.1	10.2	139 22.0	48.8
	02	290 17.3	256 23.2	48.0	257 47.1	03.1	216 02.9	10.2	154 24.2	48.7
	03	305 19.8	271 23.4	48.7	272 47.7	03.7	231 04.7	10.3	169 26.4	48.7
	04	320 22.2	286 23.6	49.3	287 48.4	04.4	246 06.6	10.4	184 28.7	48.6
	05	335 24.7	301 23.8	50.0	302 49.1	05.0	261 08.4	10.4	199 30.9	48.5
	06	350 27.2	316 24.0	N10 50.7	317 49.8	N12 05.7	276 10.3	N22 10.5	214 33.1	N17 48.5
	07	5 29.6	331 24.2	51.4	332 50.5	06.3	291 12.1	10.6	229 35.3	48.4
	08	20 32.1	346 24.4	52.1	347 51.2	06.9	306 14.0	10.6	244 37.6	48.3
S	09	35 34.5	1 24.5	52.7	2 51.9	07.6	321 15.8	10.7	259 39.8	48.3
U	10	50 37.0	16 24.7	53.4	17 52.6	08.2	336 17.6	10.8	274 42.0	48.2
N	11	65 39.5	31 24.9	54.1	32 53.3	08.8	351 19.5	10.8	289 44.2	48.1
D	12	80 41.9	46 25.1	N10 54.8	47 54.0	N12 09.5	6 21.3	N22 10.9	304 46.5	N17 48.0
A	13	95 44.4	61 25.3	55.5	62 54.7	10.1	21 23.2	11.0	319 48.7	48.0
Y	14	110 46.9	76 25.5	56.1	77 55.3	10.8	36 25.0	11.0	334 50.9	47.9
	15	125 49.3	91 25.6	56.8	92 56.0	11.4	51 26.9	11.1	349 53.1	47.8
	16	140 51.8	106 25.8	57.5	107 56.7	12.0	66 28.7	11.2	4 55.4	47.8
	17	155 54.3	121 26.0	58.2	122 57.4	12.7	81 30.5	11.2	19 57.6	47.7
	18	170 56.7	136 26.2	N10 58.9	137 58.1	N12 13.3	96 32.4	N22 11.3	34 59.8	N17 47.6
	19	185 59.2	151 26.4	10 59.6	152 58.8	13.9	111 34.2	11.4	50 02.0	47.6
	20	201 01.7	166 26.5	11 00.2	167 59.5	14.6	126 36.1	11.4	65 04.3	47.5
	21	216 04.1	181 26.7	00.9	183 00.2	15.2	141 37.9	11.5	80 06.5	47.4
	22	231 06.6	196 26.9	01.6	198 00.9	15.8	156 39.8	11.6	95 08.7	47.4
	23	246 09.0	211 27.1	02.3	213 01.5	16.5	171 41.6	11.6	110 10.9	47.3
	13 00	261 11.5	226 27.2	N11 03.0	228 02.2	N12 17.1	186 43.4	N22 11.7	125 13.2	N17 47.2
	01	276 14.0	241 27.4	03.7	243 02.9	17.7	201 45.3	11.8	140 15.4	47.2
	02	291 16.4	256 27.6	04.3	258 03.6	18.4	216 47.1	11.8	155 17.6	47.1
	03	306 18.9	271 27.7	05.0	273 04.3	19.0	231 49.0	11.9	170 19.8	47.0
	04	321 21.4	286 27.9	05.7	288 05.0	19.6	246 50.8	11.9	185 22.0	47.0
	05	336 23.8	301 28.1	06.4	303 05.7	20.3	261 52.6	12.0	200 24.3	46.9
	06	351 26.3	316 28.3	N11 07.1	318 06.4	N12 20.9	276 54.5	N22 12.1	215 26.5	N17 46.8
	07	6 28.8	331 28.4	07.8	333 07.1	21.5	291 56.3	12.1	230 28.7	46.8
	08	21 31.2	346 28.6	08.5	348 07.8	22.2	306 58.2	12.2	245 30.9	46.7
M	09	36 33.7	1 28.8	09.1	3 08.4	22.8	322 00.0	12.3	260 33.2	46.6
O	10	51 36.2	16 28.9	09.8	18 09.1	23.4	337 01.9	12.3	275 35.4	46.5
N	11	66 38.6	31 29.1	10.5	33 09.8	24.1	352 03.7	12.4	290 37.6	46.5
D	12	81 41.1	46 29.3	N11 11.2	48 10.5	N12 24.7	7 05.5	N22 12.5	305 39.8	N17 46.4
A	13	96 43.5	61 29.4	11.9	63 11.2	25.3	22 07.4	12.5	320 42.1	46.3
Y	14	111 46.0	76 29.6	12.6	78 11.9	25.9	37 09.2	12.6	335 44.3	46.3
	15	126 48.5	91 29.7	13.3	93 12.6	26.6	52 11.1	12.7	350 46.5	46.2
	16	141 50.9	106 29.9	13.9	108 13.3	27.2	67 12.9	12.7	5 48.7	46.1
	17	156 53.4	121 30.1	14.6	123 14.0	27.8	82 14.8	12.8	20 50.9	46.1
	18	171 55.9	136 30.2	N11 15.3	138 14.6	N12 28.5	97 16.6	N22 12.9	35 53.2	N17 46.0
	19	186 58.3	151 30.4	16.0	153 15.3	29.1	112 18.4	12.9	50 55.4	45.9
	20	202 00.8	166 30.5	16.7	168 16.0	29.7	127 20.3	13.0	65 57.6	45.9
	21	217 03.3	181 30.7	17.4	183 16.7	30.4	142 22.1	13.0	80 59.8	45.8
	22	232 05.7	196 30.8	18.1	198 17.4	31.0	157 24.0	13.1	96 02.0	45.7
	23	247 08.2	211 31.0	18.8	213 18.1	31.6	172 25.8	13.2	111 04.3	45.7
	14 00	262 10.6	226 31.1	N11 19.4	228 18.8	N12 32.2	187 27.7	N22 13.2	126 06.5	N17 45.6
	01	277 13.1	241 31.3	20.1	243 19.5	32.9	202 29.5	13.3	141 08.7	45.5
	02	292 15.6	256 31.5	20.8	258 20.2	33.5	217 31.3	13.4	156 10.9	45.4
	03	307 18.0	271 31.6	21.5	273 20.8	34.1	232 33.2	13.4	171 13.2	45.4
	04	322 20.5	286 31.8	22.2	288 21.5	34.7	247 35.0	13.5	186 15.4	45.3
	05	337 23.0	301 31.9	22.9	303 22.2	35.4	262 36.9	13.6	201 17.6	45.2
	06	352 25.4	316 32.1	N11 23.6	318 22.9	N12 36.0	277 38.7	N22 13.6	216 19.8	N17 45.2
	07	7 27.9	331 32.2	24.3	333 23.6	36.6	292 40.6	13.7	231 22.0	45.1
	08	22 30.4	346 32.3	25.0	348 24.3	37.3	307 42.4	13.7	246 24.3	45.0
T	09	37 32.8	1 32.5	25.6	3 25.0	37.9	322 44.2	13.8	261 26.5	45.0
U	10	52 35.3	16 32.6	26.3	18 25.7	38.5	337 46.1	13.9	276 28.7	44.9
E	11	67 37.8	31 32.8	27.0	33 26.3	39.1	352 47.9	13.9	291 30.9	44.8
S	12	82 40.2	46 32.9	N11 27.7	48 27.0	N12 39.8	7 49.8	N22 14.0	306 33.1	N17 44.8
D	13	97 42.7	61 33.1	28.4	63 27.7	40.4	22 51.6	14.1	321 35.4	44.7
A	14	112 45.1	76 33.2	29.1	78 28.4	41.0	37 53.5	14.1	336 37.6	44.6
Y	15	127 47.6	91 33.4	29.8	93 29.1	41.6	52 55.3	14.2	351 39.8	44.5
	16	142 50.1	106 33.5	30.5	108 29.8	42.3	67 57.1	14.3	6 42.0	44.5
	17	157 52.5	121 33.6	31.2	123 30.5	42.9	82 59.0	14.3	21 44.2	44.4
	18	172 55.0	136 33.8	N11 31.9	138 31.2	N12 43.5	98 00.8	N22 14.4	36 46.5	N17 44.3
	19	187 57.5	151 33.9	32.5	153 31.8	44.1	113 02.7	14.4	51 48.7	44.3
	20	202 59.9	166 34.0	33.2	168 32.5	44.7	128 04.5	14.5	66 50.9	44.2
	21	218 02.4	181 34.2	33.9	183 33.2	45.4	143 06.4	14.6	81 53.1	44.1
	22	233 04.9	196 34.3	34.6	198 33.9	46.0	158 08.2	14.6	96 55.3	44.1
	23	248 07.3	211 34.5	35.3	213 34.6	46.6	173 10.0	14.7	111 57.5	44.0
		h m								
Mer. Pass.		6 34.2	v 0.2	d 0.7	v 0.7	d 0.6	v 1.8	d 0.1	v 2.2	d 0.1

STARS		
Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 39.3	S40 23.6
Achernar	335 47.3	S57 20.8
Acrux	173 39.4	S62 58.8
Adhara	255 34.2	S28 56.7
Aldebaran	291 20.9	N16 27.7
Alioth	166 44.3	N56 05.2
Alkaid	153 20.0	N49 25.8
Al Na'ir	28 17.6	S47 03.9
Alnilam	276 14.2	S 1 13.1
Alphard	218 22.9	S 8 33.8
Alphecca	126 33.7	N26 47.5
Alpheratz	358 11.6	N28 57.8
Altair	62 34.4	N 8 48.6
Ankaa	353 42.6	S42 25.5
Antares	112 59.2	S26 22.9
Arcturus	146 20.3	N19 18.1
Atria	108 24.8	S68 59.2
Avior	234 29.5	S59 26.5
Bellatrix	279 01.4	N 6 19.7
Betelgeuse	271 31.0	N 7 24.1
Canopus	264 08.7	S52 41.2
Capella	281 15.0	N45 58.4
Deneb	49 49.6	N45 11.9
Denebola	183 01.3	N14 41.9
Diphda	349 23.2	S18 06.5
Dubhe	194 25.0	N61 52.6
Elnath	278 47.3	N28 35.2
Eltanin	90 58.2	N51 29.6
Enif	34 13.6	N 9 46.3
Fomalhaut	15 53.8	S29 44.3
Gacrux	172 30.9	S56 59.5
Gienah	176 20.1	S17 25.2
Hadar	149 25.9	S60 16.1
Hamal	328 31.6	N23 21.2
Kaus Aust.	84 19.4	S34 23.6
Kochab	137 18.1	N74 15.1
Markab	14 05.3	N15 05.0
Menkar	314 43.7	N 4 00.0
Menkent	148 39.3	S36 15.7
Miaplacidus	221 45.8	S69 37.8
Mirfak	309 19.6	N49 46.7
Nunki	76 31.6	S26 19.4
Peacock	54 01.5	S56 48.2
Pollux	244 01.2	N28 04.8
Procyon	245 28.4	N 5 16.9
Rasalhague	96 31.3	N12 34.7
Regulus	208 12.5	N12 04.6
Rigel	281 38.5	S 8 13.8
Rigil Kent.	140 28.2	S60 44.7
Sabik	102 43.3	S15 41.8
Schedar	350 11.6	N56 24.6
Shaula	96 58.3	S37 05.2
Sirius	258 58.0	S16 41.3
Spica	158 59.7	S11 02.7
Suhail	223 12.6	S43 20.8
Vega	80 56.9	N38 45.8
Zuben'ubi	137 35.2	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	325 15.7	8 54
Mars	326 50.7	8 47
Jupiter	285 31.9	11 32
Saturn	224 01.6	15 37

0000 JUNE 12, 13, 14 (SUN., MON., TUES.)

G.M.T. (UT) d h	SUN G.H.A. ° ′	SUN Dec. ° ′	MOON G.H.A. ° ′	MOON v ′	MOON Dec. ° ′	MOON d ′	MOON H.P. ′
12 00	180 05.4	N23 07.7	233 00.9	14.2	N10 36.9	8.0	54.4
01	195 05.3	07.9	247 34.1	14.1	10 44.9	8.0	54.4
02	210 05.2	08.0	262 07.2	14.2	10 52.9	8.0	54.4
03	225 05.1	·· 08.2	276 40.4	14.1	11 00.9	7.9	54.4
04	240 04.9	08.4	291 13.5	14.1	11 08.8	7.8	54.4
05	255 04.8	08.5	305 46.6	14.1	11 16.6	7.8	54.4
06	270 04.7	N23 08.7	320 19.7	14.1	N11 24.4	7.7	54.3
07	285 04.5	08.8	334 52.8	14.0	11 32.1	7.7	54.3
08	300 04.4	09.0	349 25.8	14.1	11 39.8	7.6	54.3
S 09	315 04.3	·· 09.1	3 58.9	14.0	11 47.4	7.6	54.3
U 10	330 04.1	09.3	18 31.9	14.0	11 55.0	7.5	54.3
N 11	345 04.0	09.5	33 04.9	14.0	12 02.5	7.5	54.3
D 12	0 03.9	N23 09.6	47 37.9	14.0	N12 10.0	7.4	54.3
A 13	15 03.8	09.8	62 10.9	13.9	12 17.4	7.4	54.3
Y 14	30 03.6	09.9	76 43.8	14.0	12 24.8	7.3	54.2
15	45 03.5	·· 10.1	91 16.8	13.9	12 32.1	7.3	54.2
16	60 03.4	10.2	105 49.7	13.9	12 39.4	7.2	54.2
17	75 03.2	10.4	120 22.6	13.9	12 46.6	7.1	54.2
18	90 03.1	N23 10.5	134 55.5	13.8	N12 53.7	7.1	54.2
19	105 03.0	10.7	149 28.3	13.9	13 00.8	7.0	54.2
20	120 02.9	10.8	164 01.2	13.8	13 07.8	7.0	54.2
21	135 02.7	·· 11.0	178 34.0	13.8	13 14.8	6.9	54.2
22	150 02.6	11.1	193 06.8	13.8	13 21.7	6.8	54.2
23	165 02.5	11.3	207 39.6	13.7	13 28.5	6.8	54.2
13 00	180 02.3	N23 11.4	222 12.3	13.8	N13 35.3	6.7	54.1
01	195 02.2	11.6	236 45.1	13.7	13 42.0	6.7	54.1
02	210 02.1	11.7	251 17.8	13.7	13 48.7	6.6	54.1
03	225 01.9	·· 11.8	265 50.5	13.7	13 55.3	6.6	54.1
04	240 01.8	12.0	280 23.2	13.6	14 01.9	6.4	54.1
05	255 01.7	12.1	294 55.8	13.7	14 08.3	6.5	54.1
06	270 01.5	N23 12.3	309 28.5	13.6	N14 14.8	6.3	54.1
07	285 01.4	12.4	324 01.1	13.6	14 21.1	6.3	54.1
08	300 01.3	12.6	338 33.7	13.5	14 27.4	6.2	54.1
M 09	315 01.1	·· 12.7	353 06.2	13.6	14 33.6	6.2	54.1
O 10	330 01.0	12.8	7 38.8	13.5	14 39.8	6.1	54.1
N 11	345 00.9	13.0	22 11.3	13.5	14 45.9	6.1	54.1
D 12	0 00.8	N23 13.1	36 43.8	13.4	N14 52.0	5.9	54.1
A 13	15 00.6	13.3	51 16.2	13.5	14 57.9	5.9	54.1
Y 14	30 00.5	13.4	65 48.7	13.4	15 03.8	5.9	54.0
15	45 00.4	·· 13.5	80 21.1	13.4	15 09.7	5.7	54.0
16	60 00.2	13.7	94 53.5	13.4	15 15.4	5.8	54.0
17	75 00.1	13.8	109 25.9	13.4	15 21.2	5.6	54.0
18	90 00.0	N23 13.9	123 58.3	13.3	N15 26.8	5.6	54.0
19	104 59.8	14.1	138 30.6	13.3	15 32.4	5.5	54.0
20	119 59.7	14.2	153 02.9	13.3	15 37.9	5.4	54.0
21	134 59.6	·· 14.3	167 35.2	13.3	15 43.3	5.4	54.0
22	149 59.4	14.5	182 07.5	13.2	15 48.7	5.3	54.0
23	164 59.3	14.6	196 39.7	13.2	15 54.0	5.2	54.0
14 00	179 59.2	N23 14.7	211 11.9	13.2	N15 59.2	5.1	54.0
01	194 59.0	14.8	225 44.1	13.2	16 04.3	5.1	54.0
02	209 58.9	15.0	240 16.3	13.1	16 09.4	5.0	54.0
03	224 58.8	·· 15.1	254 48.4	13.1	16 14.4	5.0	54.0
04	239 58.6	15.2	269 20.5	13.1	16 19.4	4.8	54.0
05	254 58.5	15.4	283 52.6	13.1	16 24.2	4.8	54.0
06	269 58.4	N23 15.5	298 24.7	13.0	N16 29.0	4.8	54.0
07	284 58.2	15.6	312 56.7	13.0	16 33.8	4.6	54.0
08	299 58.1	15.7	327 28.7	13.0	16 38.4	4.6	54.0
T 09	314 58.0	·· 15.8	342 00.7	13.0	16 43.0	4.5	54.0
U 10	329 57.8	16.0	356 32.7	13.0	16 47.5	4.4	54.0
E 11	344 57.7	16.1	11 04.7	12.9	16 51.9	4.4	54.0
S 12	359 57.6	N23 16.2	25 36.6	12.9	N16 56.3	4.2	54.0
D 13	14 57.4	16.3	40 08.5	12.9	17 00.5	4.2	54.0
A 14	29 57.3	16.5	54 40.4	12.8	17 04.7	4.2	54.0
Y 15	44 57.2	·· 16.6	69 12.2	12.9	17 08.9	4.0	54.0
16	59 57.0	16.7	83 44.1	12.8	17 12.9	4.0	54.0
17	74 56.9	16.8	98 15.9	12.8	17 16.9	3.9	54.0
18	89 56.8	N23 16.9	112 47.7	12.7	N17 20.8	3.8	54.0
19	104 56.6	17.0	127 19.4	12.8	17 24.6	3.7	54.0
20	119 56.5	17.2	141 51.2	12.7	17 28.3	3.7	54.0
21	134 56.4	·· 17.3	156 22.9	12.7	17 32.0	3.6	54.0
22	149 56.2	17.4	170 54.6	12.7	17 35.6	3.5	54.0
23	164 56.1	17.5	185 26.3	12.6	17 39.1	3.4	54.0
	S.D. 15.8	d 0.1	S.D. 14.8		14.7		14.7

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

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

Day	SUN Eqn. of Time 00h m s	SUN Eqn. of Time 12h m s	SUN Mer. Pass. h m	MOON Mer. Pass. Upper h m	MOON Mer. Pass. Lower h m	MOON Age d	MOON Phase
12	00 22	00 16	12 00	08 44	21 06	25	
13	00 10	00 03	12 00	09 28	21 51	26	●
14	00 03	00 09	12 00	10 14	22 38	27	

G.M.T. (UT)		ARIES	VENUS −3.9		MARS +1.3		JUPITER −1.5		SATURN +0.6	
d	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
15	00	263 09.8	226 34.6	N11 36.0	228 35.3	N12 47.2	188 11.9	N22 14.8	126 59.8	N17 43.9
	01	278 12.3	241 34.7	36.7	243 36.0	47.9	203 13.7	14.8	142 02.0	43.8
	02	293 14.7	256 34.9	37.4	258 36.7	48.5	218 15.6	14.9	157 04.2	43.8
	03	308 17.2	271 35.0	·· 38.1	273 37.3	·· 49.1	233 17.4	·· 14.9	172 06.4	·· 43.7
	04	323 19.6	286 35.1	38.8	288 38.0	49.7	248 19.3	15.0	187 08.6	43.6
	05	338 22.1	301 35.2	39.5	303 38.7	50.3	263 21.1	15.1	202 10.9	43.6
	06	353 24.6	316 35.4	N11 40.1	318 39.4	N12 51.0	278 23.0	N22 15.1	217 13.1	N17 43.5
	07	8 27.0	331 35.5	40.8	333 40.1	51.6	293 24.8	15.2	232 15.3	43.4
W	08	23 29.5	346 35.6	41.5	348 40.8	52.2	308 26.6	15.3	247 17.5	43.4
E	09	38 32.0	1 35.8	·· 42.2	3 41.5	·· 52.8	323 28.5	·· 15.3	262 19.7	·· 43.3
D	10	53 34.4	16 35.9	42.9	18 42.2	53.4	338 30.3	15.4	277 21.9	43.2
N	11	68 36.9	31 36.0	43.6	33 42.8	54.1	353 32.2	15.5	292 24.2	43.1
E	12	83 39.4	46 36.1	N11 44.3	48 43.5	N12 54.7	8 34.0	N22 15.5	307 26.4	N17 43.1
S	13	98 41.8	61 36.3	45.0	63 44.2	55.3	23 35.9	15.6	322 28.6	43.0
D	14	113 44.3	76 36.4	45.7	78 44.9	55.9	38 37.7	15.6	337 30.8	42.9
A	15	128 46.7	91 36.5	·· 46.4	93 45.6	·· 56.5	53 39.5	·· 15.7	352 33.0	·· 42.9
Y	16	143 49.2	106 36.6	47.1	108 46.3	57.2	68 41.4	15.8	7 35.2	42.8
	17	158 51.7	121 36.7	47.8	123 47.0	57.8	83 43.2	15.8	22 37.5	42.7
	18	173 54.1	136 36.9	N11 48.5	138 47.6	N12 58.4	98 45.1	N22 15.9	37 39.7	N17 42.7
	19	188 56.6	151 37.0	49.1	153 48.3	59.0	113 46.9	15.9	52 41.9	42.6
	20	203 59.1	166 37.1	49.8	168 49.0	12 59.6	128 48.8	16.0	67 44.1	42.5
	21	219 01.5	181 37.2	·· 50.5	183 49.7	13 00.3	143 50.6	·· 16.1	82 46.3	·· 42.4
	22	234 04.0	196 37.3	51.2	198 50.4	00.9	158 52.4	16.1	97 48.5	42.4
	23	249 06.5	211 37.4	51.9	213 51.1	01.5	173 54.3	16.2	112 50.8	42.3
16	00	264 08.9	226 37.6	N11 52.6	228 51.8	N13 02.1	188 56.1	N22 16.3	127 53.0	N17 42.2
	01	279 11.4	241 37.7	53.3	243 52.4	02.7	203 58.0	16.3	142 55.2	42.2
	02	294 13.9	256 37.8	54.0	258 53.1	03.3	218 59.8	16.4	157 57.4	42.1
	03	309 16.3	271 37.9	·· 54.7	273 53.8	·· 04.0	234 01.7	·· 16.4	172 59.6	·· 42.0
	04	324 18.8	286 38.0	55.4	288 54.5	04.6	249 03.5	16.5	188 01.8	41.9
	05	339 21.2	301 38.1	56.1	303 55.2	05.2	264 05.4	16.6	203 04.1	41.9
	06	354 23.7	316 38.2	N11 56.8	318 55.9	N13 05.8	279 07.2	N22 16.6	218 06.3	N17 41.8
	07	9 26.2	331 38.3	57.5	333 56.6	06.4	294 09.0	16.7	233 08.5	41.7
T	08	24 28.6	346 38.5	58.2	348 57.3	07.0	309 10.9	16.8	248 10.7	41.7
H	09	39 31.1	1 38.6	·· 58.9	3 57.9	·· 07.6	324 12.7	·· 16.8	263 12.9	·· 41.6
U	10	54 33.6	16 38.7	11 59.6	18 58.6	08.3	339 14.6	16.9	278 15.1	41.5
R	11	69 36.0	31 38.8	12 00.2	33 59.3	08.9	354 16.4	16.9	293 17.4	41.5
S	12	84 38.5	46 38.9	N12 00.9	49 00.0	N13 09.5	9 18.3	N22 17.0	308 19.6	N17 41.4
D	13	99 41.0	61 39.0	01.6	64 00.7	10.1	24 20.1	17.1	323 21.8	41.3
A	14	114 43.4	76 39.1	02.3	79 01.4	10.7	39 21.9	17.1	338 24.0	41.2
Y	15	129 45.9	91 39.2	·· 03.0	94 02.1	·· 11.3	54 23.8	·· 17.2	353 26.2	·· 41.2
	16	144 48.4	106 39.3	03.7	109 02.7	11.9	69 25.6	17.2	8 28.4	41.1
	17	159 50.8	121 39.4	04.4	124 03.4	12.6	84 27.5	17.3	23 30.6	41.0
	18	174 53.3	136 39.5	N12 05.1	139 04.1	N13 13.2	99 29.3	N22 17.4	38 32.9	N17 41.0
	19	189 55.7	151 39.6	05.8	154 04.8	13.8	114 31.2	17.4	53 35.1	40.9
	20	204 58.2	166 39.7	06.5	169 05.5	14.4	129 33.0	17.5	68 37.3	40.8
	21	220 00.7	181 39.8	·· 07.2	184 06.2	·· 15.0	144 34.9	·· 17.6	83 39.5	·· 40.7
	22	235 03.1	196 39.9	07.9	199 06.8	15.6	159 36.7	17.6	98 41.7	40.7
	23	250 05.6	211 40.0	08.6	214 07.5	16.2	174 38.5	17.7	113 43.9	40.6
17	00	265 08.1	226 40.1	N12 09.3	229 08.2	N13 16.8	189 40.4	N22 17.7	128 46.1	N17 40.5
	01	280 10.5	241 40.2	10.0	244 08.9	17.4	204 42.2	17.8	143 48.4	40.5
	02	295 13.0	256 40.3	10.7	259 09.6	18.1	219 44.1	17.9	158 50.6	40.4
	03	310 15.5	271 40.4	·· 11.4	274 10.3	·· 18.7	234 45.9	·· 17.9	173 52.8	·· 40.3
	04	325 17.9	286 40.4	12.1	289 11.0	19.3	249 47.8	18.0	188 55.0	40.2
	05	340 20.4	301 40.5	12.8	304 11.6	19.9	264 49.6	18.0	203 57.2	40.2
	06	355 22.8	316 40.6	N12 13.5	319 12.3	N13 20.5	279 51.5	N22 18.1	218 59.4	N17 40.1
	07	10 25.3	331 40.7	14.2	334 13.0	21.1	294 53.3	18.2	234 01.6	40.0
	08	25 27.8	346 40.8	14.8	349 13.7	21.7	309 55.1	18.2	249 03.8	40.0
F	09	40 30.2	1 40.9	·· 15.5	4 14.4	·· 22.3	324 57.0	·· 18.3	264 06.1	·· 39.9
R	10	55 32.7	16 41.0	16.2	19 15.1	22.9	339 58.8	18.3	279 08.3	39.8
I	11	70 35.2	31 41.1	16.9	34 15.8	23.5	355 00.7	18.4	294 10.5	39.7
D	12	85 37.6	46 41.2	N12 17.6	49 16.4	N13 24.1	10 02.5	N22 18.5	309 12.7	N17 39.7
A	13	100 40.1	61 41.2	18.3	64 17.1	24.8	25 04.4	18.5	324 14.9	39.6
Y	14	115 42.6	76 41.3	19.0	79 17.8	25.4	40 06.2	18.6	339 17.1	39.5
	15	130 45.0	91 41.4	·· 19.7	94 18.5	·· 26.0	55 08.0	·· 18.6	354 19.3	·· 39.4
	16	145 47.5	106 41.5	20.4	109 19.2	26.6	70 09.9	18.7	9 21.5	39.4
	17	160 50.0	121 41.6	21.1	124 19.9	27.2	85 11.7	18.8	24 23.8	39.3
	18	175 52.4	136 41.7	N12 21.8	139 20.5	N13 27.8	100 13.6	N22 18.8	39 26.0	N17 39.2
	19	190 54.9	151 41.7	22.5	154 21.2	28.4	115 15.4	18.9	54 28.2	39.2
	20	205 57.3	166 41.8	23.2	169 21.9	29.0	130 17.3	18.9	69 30.4	39.1
	21	220 59.8	181 41.9	·· 23.9	184 22.6	·· 29.6	145 19.1	·· 19.0	84 32.6	·· 39.0
	22	236 02.3	196 42.0	24.6	199 23.3	30.2	160 21.0	19.1	99 34.8	38.9
	23	251 04.7	211 42.1	25.3	214 24.0	30.8	175 22.8	19.1	114 37.0	38.9
Mer. Pass.		h m 6 22.4	v 0.1	d 0.7	v 0.7	d 0.6	v 1.8	d 0.1	v 2.2	d 0.1

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 39.3	S40 23.6
Achernar	335 47.3	S57 20.8
Acrux	173 39.4	S62 58.8
Adhara	255 34.2	S28 56.7
Aldebaran	291 20.8	N16 27.7
Alioth	166 44.4	N56 05.2
Alkaid	153 20.0	N49 25.8
Al Na'ir	28 17.6	S47 03.9
Alnilam	276 14.2	S 1 13.1
Alphard	218 22.9	S 8 33.8
Alphecca	126 33.7	N26 47.6
Alpheratz	358 11.6	N28 57.8
Altair	62 54.4	N 8 48.6
Ankaa	353 42.6	S42 25.5
Antares	112 59.2	S26 22.9
Arcturus	146 20.3	N19 18.1
Atria	108 24.8	S68 59.2
Avior	234 29.5	S59 26.5
Bellatrix	279 01.4	N 6 19.7
Betelgeuse	271 31.0	N 7 24.1
Canopus	264 08.7	S52 41.2
Capella	281 15.0	N45 58.4
Deneb	49 49.6	N45 11.9
Denebola	183 01.3	N14 41.9
Diphda	349 23.2	S18 06.5
Dubhe	194 25.1	N61 52.6
Elnath	278 47.3	N28 35.2
Eltanin	90 58.2	N51 29.6
Enif	34 13.6	N 9 46.3
Fomalhaut	15 53.8	S29 44.3
Gacrux	172 30.9	S56 59.5
Gienah	176 20.2	S17 25.2
Hadar	149 26.0	S60 16.1
Hamal	328 31.6	N23 21.2
Kaus Aust.	84 19.4	S34 23.6
Kochab	137 18.2	N74 15.2
Markab	14 05.3	N15 05.0
Menkar	314 43.7	N 4 00.0
Menkent	148 39.3	S36 15.7
Miaplacidus	221 45.9	S69 37.8
Mirfak	309 19.6	N49 46.7
Nunki	76 31.5	S26 19.4
Peacock	54 01.4	S56 48.2
Pollux	244 01.2	N28 04.8
Procyon	245 28.4	N 5 16.9
Rasalhague	96 31.3	N12 34.7
Regulus	208 12.5	N12 04.6
Rigel	281 38.5	S 8 13.8
Rigil Kent.	140 28.2	S60 44.7
Sabik	102 43.3	S15 41.8
Schedar	350 11.5	N56 24.6
Shaula	96 58.3	S37 05.2
Sirius	258 58.0	S16 41.3
Spica	158 59.7	S11 02.7
Suhail	223 12.6	S43 20.8
Vega	80 56.9	N38 45.8
Zuben'ubi	137 35.2	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	322 28.6	8 53
Mars	324 42.8	8 44
Jupiter	284 47.2	11 23
Saturn	223 44.1	15 26

0000 JUNE 15, 16, 17 (WED., THURS., FRI.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	MOON v	MOON Dec.	MOON d	MOON H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
15 00	179 56.0	N23 17.6	199 57.9	12.7	N17 42.5	3.3	54.0
01	194 55.8	17.7	214 29.6	12.6	17 45.8	3.3	54.0
02	209 55.7	17.8	229 01.2	12.6	17 49.1	3.2	54.0
03	224 55.6	·· 17.9	243 32.8	12.5	17 52.3	3.1	54.0
04	239 55.4	18.0	258 04.3	12.6	17 55.4	3.0	54.0
05	254 55.3	18.2	272 35.9	12.5	17 58.4	3.0	54.0
06	269 55.2	N23 18.3	287 07.4	12.5	N18 01.4	2.8	54.0
07	284 55.0	18.4	301 38.9	12.5	18 04.2	2.8	54.0
W 08	299 54.9	18.5	316 10.4	12.5	18 07.0	2.7	54.0
E 09	314 54.8	·· 18.6	330 41.9	12.4	18 09.7	2.6	54.0
D 10	329 54.6	18.7	345 13.3	12.5	18 12.3	2.5	54.0
N 11	344 54.5	18.8	359 44.8	12.4	18 14.8	2.5	54.0
E 12	359 54.4	N23 18.9	14 16.2	12.4	N18 17.3	2.4	54.0
S 13	14 54.2	19.0	28 47.6	12.3	18 19.7	2.2	54.0
D 14	29 54.1	19.1	43 18.9	12.4	18 21.9	2.2	54.0
A 15	44 54.0	·· 19.2	57 50.3	12.3	18 24.1	2.2	54.0
Y 16	59 53.8	19.3	72 21.6	12.4	18 26.3	2.0	54.0
17	74 53.7	19.4	86 53.0	12.3	18 28.3	1.9	54.0
18	89 53.6	N23 19.5	101 24.3	12.3	N18 30.2	1.9	54.0
19	104 53.4	19.6	115 55.6	12.2	18 32.1	1.8	54.0
20	119 53.3	19.7	130 26.8	12.3	18 33.9	1.7	54.0
21	134 53.1	·· 19.8	144 58.1	12.2	18 35.6	1.6	54.0
22	149 53.0	19.9	159 29.3	12.3	18 37.2	1.5	54.0
23	164 52.9	20.0	174 00.6	12.2	18 38.7	1.5	54.0
16 00	179 52.7	N23 20.1	188 31.8	12.2	N18 40.2	1.3	54.0
01	194 52.6	20.2	203 03.0	12.2	18 41.5	1.3	54.0
02	209 52.5	20.3	217 34.2	12.1	18 42.8	1.2	54.0
03	224 52.3	·· 20.4	232 05.3	12.2	18 44.0	1.1	54.0
04	239 52.2	20.5	246 36.5	12.1	18 45.1	1.0	54.0
05	254 52.1	20.5	261 07.6	12.2	18 46.1	0.9	54.0
06	269 51.9	N23 20.6	275 38.8	12.1	N18 47.0	0.8	54.0
07	284 51.8	20.7	290 09.9	12.1	18 47.8	0.8	54.1
T 08	299 51.7	20.8	304 41.0	12.1	18 48.6	0.7	54.1
H 09	314 51.5	·· 20.9	319 12.1	12.1	18 49.3	0.5	54.1
U 10	329 51.4	21.0	333 43.2	12.1	18 49.8	0.5	54.1
R 11	344 51.3	21.1	348 14.3	12.0	18 50.3	0.4	54.1
S 12	359 51.1	N23 21.2	2 45.3	12.1	N18 50.7	0.4	54.1
D 13	14 51.0	21.3	17 16.4	12.0	18 51.1	0.2	54.1
A 14	29 50.8	21.3	31 47.4	12.1	18 51.3	0.1	54.1
Y 15	44 50.7	·· 21.4	46 18.5	12.0	18 51.4	0.1	54.1
16	59 50.6	21.5	60 49.5	12.0	18 51.5	0.1	54.1
17	74 50.4	21.6	75 20.5	12.0	18 51.4	0.1	54.1
18	89 50.3	N23 21.7	89 51.5	12.0	N18 51.3	0.2	54.1
19	104 50.2	21.8	104 22.5	12.0	18 51.1	0.3	54.1
20	119 50.0	21.8	118 53.5	12.0	18 50.8	0.4	54.1
21	134 49.9	·· 21.9	133 24.5	12.0	18 50.4	0.4	54.1
22	149 49.8	22.0	147 55.5	12.0	18 50.0	0.6	54.2
23	164 49.6	22.1	162 26.5	12.0	18 49.4	0.6	54.2
17 00	179 49.5	N23 22.2	176 57.5	11.9	N18 48.8	0.8	54.2
01	194 49.3	22.2	191 28.4	12.0	18 48.0	0.8	54.2
02	209 49.2	22.3	205 59.4	11.9	18 47.2	0.9	54.2
03	224 49.1	·· 22.4	220 30.3	12.0	18 46.3	1.0	54.2
04	239 48.9	22.5	235 01.3	12.0	18 45.3	1.1	54.2
05	254 48.8	22.5	249 32.3	11.9	18 44.2	1.2	54.2
06	269 48.7	N23 22.6	264 03.2	12.0	N18 43.0	1.2	54.2
07	284 48.5	22.7	278 34.2	11.9	18 41.8	1.4	54.2
08	299 48.4	22.8	293 05.1	12.0	18 40.4	1.4	54.2
F 09	314 48.3	·· 22.8	307 36.1	11.9	18 39.0	1.5	54.2
R 10	329 48.1	22.9	322 07.0	12.0	18 37.5	1.7	54.3
I 11	344 48.0	23.0	336 38.0	11.9	18 35.8	1.7	54.3
D 12	359 47.8	N23 23.0	351 08.9	11.9	N18 34.1	1.7	54.3
A 13	14 47.7	23.1	5 39.8	12.0	18 32.4	1.9	54.3
Y 14	29 47.6	23.2	20 10.8	11.9	18 30.5	2.0	54.3
15	44 47.4	·· 23.2	34 41.7	12.0	18 28.5	2.0	54.3
16	59 47.3	23.3	49 12.7	11.9	18 26.5	2.2	54.3
17	74 47.2	23.4	63 43.6	12.0	18 24.3	2.2	54.3
18	89 47.0	N23 23.4	78 14.6	11.9	N18 22.1	2.3	54.3
19	104 46.9	23.5	92 45.5	12.0	18 19.8	2.4	54.3
20	119 46.8	23.6	107 16.5	12.0	18 17.4	2.5	54.3
21	134 46.6	·· 23.6	121 47.5	11.9	18 14.9	2.6	54.4
22	149 46.5	23.7	136 18.4	12.0	18 12.3	2.6	54.4
23	164 46.3	23.7	150 49.4	12.0	18 09.7	2.8	54.4
	S.D. 15.8	d 0.1	S.D. 14.7		14.7		14.8

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

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

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
	m s	m s	h m	h m	h m	d	
15	00 16	00 22	12 00	11 01	23 25	28	
16	00 29	00 35	12 01	11 49	24 13	29	●
17	00 42	00 48	12 01	12 37	00 13	01	

0000 JUNE 18, 19, 20 (SAT., SUN., MON.)

G.M.T. (UT)		ARIES	VENUS −3.9			MARS +1.3			JUPITER −1.5			SATURN +0.6		
		G.H.A.	G.H.A.	Dec.		G.H.A.	Dec.		G.H.A.	Dec.		G.H.A.	Dec.	
d	h	° ′	° ′	° ′		° ′	° ′		° ′	° ′		° ′	° ′	
18	00	266 07.2	226 42.1	N12	26.0	229 24.7	N13	31.4	190 24.6	N22	19.2	129 39.2	N17	38.8
	01	281 09.7	241 42.2		26.7	244 25.3		32.0	205 26.5		19.2	144 41.4		38.7
	02	296 12.1	256 42.3		27.4	259 26.0		32.6	220 28.3		19.3	159 43.7		38.7
	03	311 14.6	271 42.4	··	28.1	274 26.7	··	33.2	235 30.2	··	19.4	174 45.9	··	38.6
	04	326 17.1	286 42.4		28.8	289 27.4		33.8	250 32.0		19.4	189 48.1		38.5
	05	341 19.5	301 42.5		29.5	304 28.1		34.4	265 33.9		19.5	204 50.3		38.4
	06	356 22.0	316 42.6	N12	30.2	319 28.8	N13	35.0	280 35.7	N22	19.5	219 52.5	N17	38.4
	07	11 24.5	331 42.6		30.9	334 29.4		35.6	295 37.6		19.6	234 54.7		38.3
S	08	26 26.9	346 42.7		31.6	349 30.1		36.3	310 39.4		19.7	249 56.9		38.2
A	09	41 29.4	1 42.8	··	32.2	4 30.8	··	36.9	325 41.3	··	19.7	264 59.1	··	38.1
T	10	56 31.8	16 42.9		32.9	19 31.5		37.5	340 43.1		19.8	280 01.3		38.1
U	11	71 34.3	31 42.9		33.6	34 32.2		38.1	355 44.9		19.8	295 03.6		38.0
R	12	86 36.8	46 43.0	N12	34.3	49 32.9	N13	38.7	10 46.8	N22	19.9	310 05.8	N17	37.9
D	13	101 39.2	61 43.1		35.0	64 33.5		39.3	25 48.6		20.0	325 08.0		37.9
A	14	116 41.7	76 43.1		35.7	79 34.2		39.9	40 50.5		20.0	340 10.2		37.8
Y	15	131 44.2	91 43.2	··	36.4	94 34.9	··	40.5	55 52.3	··	20.1	355 12.4	··	37.7
	16	146 46.6	106 43.3		37.1	109 35.6		41.1	70 54.2		20.1	10 14.6		37.6
	17	161 49.1	121 43.3		37.8	124 36.3		41.7	85 56.0		20.2	25 16.8		37.6
	18	176 51.6	136 43.4	N12	38.5	139 37.0	N13	42.3	100 57.9	N22	20.3	40 19.0	N17	37.5
	19	191 54.0	151 43.4		39.2	154 37.6		42.9	115 59.7		20.3	55 21.2		37.4
	20	206 56.5	166 43.5		39.9	169 38.3		43.5	131 01.5		20.4	70 23.4		37.3
	21	221 58.9	181 43.6	··	40.6	184 39.0	··	44.1	146 03.4	··	20.4	85 25.7	··	37.3
	22	237 01.4	196 43.6		41.3	199 39.7		44.7	161 05.2		20.5	100 27.9		37.2
	23	252 03.9	211 43.7		42.0	214 40.4		45.3	176 07.1		20.5	115 30.1		37.1
19	00	267 06.3	226 43.7	N12	42.7	229 41.1	N13	45.9	191 08.9	N22	20.6	130 32.3	N17	37.1
	01	282 08.8	241 43.8		43.4	244 41.7		46.5	206 10.8		20.7	145 34.5		37.0
	02	297 11.3	256 43.9		44.1	259 42.4		47.1	221 12.6		20.7	160 36.7		36.9
	03	312 13.7	271 43.9	··	44.8	274 43.1	··	47.7	236 14.5	··	20.8	175 38.9	··	36.8
	04	327 16.2	286 44.0		45.5	289 43.8		48.3	251 16.3		20.8	190 41.1		36.8
	05	342 18.7	301 44.0		46.2	304 44.5		48.9	266 18.2		20.9	205 43.3		36.7
	06	357 21.1	316 44.1	N12	46.9	319 45.2	N13	49.5	281 20.0	N22	21.0	220 45.5	N17	36.6
	07	12 23.6	331 44.1		47.6	334 45.8		50.1	296 21.8		21.0	235 47.7		36.5
	08	27 26.1	346 44.2		48.3	349 46.5		50.6	311 23.7		21.1	250 49.9		36.5
S	09	42 28.5	1 44.2	··	49.0	4 47.2	··	51.2	326 25.5	··	21.1	265 52.2	··	36.4
U	10	57 31.0	16 44.3		49.7	19 47.9		51.8	341 27.4		21.2	280 54.4		36.3
N	11	72 33.4	31 44.3		50.4	34 48.6		52.4	356 29.2		21.2	295 56.6		36.2
D	12	87 35.9	46 44.4	N12	51.1	49 49.3	N13	53.0	11 31.1	N22	21.3	310 58.8	N17	36.2
A	13	102 38.4	61 44.4		51.8	64 49.9		53.6	26 32.9		21.4	326 01.0		36.1
Y	14	117 40.8	76 44.5		52.4	79 50.6		54.2	41 34.8		21.4	341 03.2		36.0
	15	132 43.3	91 44.5	··	53.1	94 51.3	··	54.8	56 36.6	··	21.5	356 05.4	··	36.0
	16	147 45.8	106 44.6		53.8	109 52.0		55.4	71 38.5		21.5	11 07.6		35.9
	17	162 48.2	121 44.6		54.5	124 52.7		56.0	86 40.3		21.6	26 09.8		35.8
	18	177 50.7	136 44.7	N12	55.2	139 53.3	N13	56.6	101 42.1	N22	21.7	41 12.0	N17	35.7
	19	192 53.2	151 44.7		55.9	154 54.0		57.2	116 44.0		21.7	56 14.2		35.7
	20	207 55.6	166 44.7		56.6	169 54.7		57.8	131 45.8		21.8	71 16.4		35.6
	21	222 58.1	181 44.8	··	57.3	184 55.4	··	58.4	146 47.7	··	21.8	86 18.6	··	35.5
	22	238 00.6	196 44.8		58.0	199 56.1		59.0	161 49.5		21.9	101 20.8		35.4
	23	253 03.0	211 44.9		58.7	214 56.8	13	59.6	176 51.4		21.9	116 23.1		35.4
20	00	268 05.5	226 44.9	N12	59.4	229 57.4	N14	00.2	191 53.2	N22	22.0	131 25.3	N17	35.3
	01	283 07.9	241 44.9	13	00.1	244 58.1		00.8	206 55.1		22.1	146 27.5		35.2
	02	298 10.4	256 45.0		00.8	259 58.8		01.4	221 56.9		22.1	161 29.7		35.1
	03	313 12.9	271 45.0	··	01.5	274 59.5	··	01.9	236 58.8	··	22.2	176 31.9	··	35.1
	04	328 15.3	286 45.1		02.2	290 00.2		02.5	252 00.6		22.2	191 34.1		35.0
	05	343 17.8	301 45.1		02.9	305 00.8		03.1	267 02.4		22.3	206 36.3		34.9
	06	358 20.3	316 45.1	N13	03.6	320 01.5	N14	03.7	282 04.3	N22	22.3	221 38.5	N17	34.8
	07	13 22.7	331 45.2		04.3	335 02.2		04.3	297 06.1		22.4	236 40.7		34.8
	08	28 25.2	346 45.2		05.0	350 02.9		04.9	312 08.0		22.5	251 42.9		34.7
M	09	43 27.7	1 45.2	··	05.7	5 03.6	··	05.5	327 09.8	··	22.5	266 45.1	··	34.6
O	10	58 30.1	16 45.3		06.4	20 04.3		06.1	342 11.7		22.6	281 47.3		34.6
N	11	73 32.6	31 45.3		07.1	35 04.9		06.7	357 13.5		22.6	296 49.5		34.5
D	12	88 35.0	46 45.3	N13	07.8	50 05.6	N14	07.3	12 15.4	N22	22.7	311 51.7	N17	34.4
A	13	103 37.5	61 45.4		08.5	65 06.3		07.9	27 17.2		22.7	326 53.9		34.3
Y	14	118 40.0	76 45.4		09.2	80 07.0		08.4	42 19.1		22.8	341 56.1		34.3
	15	133 42.4	91 45.4	··	09.9	95 07.7	··	09.0	57 20.9	··	22.9	356 58.4	··	34.2
	16	148 44.9	106 45.4		10.6	110 08.3		09.6	72 22.8		22.9	12 00.6		34.1
	17	163 47.4	121 45.5		11.2	125 09.0		10.2	87 24.6		23.0	27 02.8		34.0
	18	178 49.8	136 45.5	N13	11.9	140 09.7	N14	10.8	102 26.4	N22	23.0	42 05.0	N17	34.0
	19	193 52.3	151 45.5		12.6	155 10.4		11.4	117 28.3		23.1	57 07.2		33.9
	20	208 54.8	166 45.5		13.3	170 11.1		12.0	132 30.1		23.1	72 09.4		33.8
	21	223 57.2	181 45.6	··	14.0	185 11.8	··	12.6	147 32.0	··	23.2	87 11.6	··	33.7
	22	238 59.7	196 45.6		14.7	200 12.4		13.1	162 33.8		23.3	102 13.8		33.7
	23	254 02.2	211 45.6		15.4	215 13.1		13.7	177 35.7		23.3	117 16.0		33.6
Mer. Pass.		h m 6 10.6	v 0.0	d	0.7	v 0.7	d	0.6	v 1.8	d	0.1	v 2.2	d	0.1

STARS

Name	S.H.A. ° ′	Dec. ° ′
Acamar	315 39.3	S40 23.6
Achernar	335 47.3	S57 20.8
Acrux	173 39.4	S62 58.8
Adhara	255 34.2	S28 56.6
Aldebaran	291 20.8	N16 27.7
Alioth	166 44.4	N56 05.2
Alkaid	153 20.0	N49 25.8
Al Na'ir	28 17.5	S47 03.9
Alnilam	276 14.2	S 1 13.1
Alphard	218 22.9	S 8 33.8
Alphecca	126 33.7	N26 47.6
Alpheratz	358 11.6	N28 57.8
Altair	62 34.4	N 8 48.6
Ankaa	353 42.5	S42 25.4
Antares	112 59.2	S26 22.9
Arcturus	146 20.3	N19 18.1
Atria	108 24.8	S68 59.3
Avior	234 29.6	S59 26.5
Bellatrix	279 01.4	N 6 19.7
Betelgeuse	271 31.0	N 7 24.1
Canopus	264 08.7	S52 41.2
Capella	281 15.0	N45 58.4
Deneb	49 49.5	N45 11.9
Denebola	183 01.3	N14 41.9
Diphda	349 23.2	S18 06.5
Dubhe	194 25.1	N61 52.6
Elnath	278 47.3	N28 35.2
Eltanin	90 58.2	N51 29.6
Enif	34 13.5	N 9 46.3
Fomalhaut	15 53.8	S29 44.3
Gacrux	172 31.0	S56 59.5
Gienah	176 20.2	S17 25.2
Hadar	149 26.0	S60 16.1
Hamal	328 31.6	N23 21.2
Kaus Aust.	84 19.3	S34 23.6
Kochab	137 18.2	N74 15.2
Markab	14 05.2	N15 05.0
Menkar	314 43.7	N 4 00.0
Menkent	148 39.3	S36 15.7
Miaplacidus	221 45.9	S69 37.8
Mirfak	309 19.6	N49 46.7
Nunki	76 31.5	S26 19.4
Peacock	54 01.4	S56 48.2
Pollux	244 01.2	N28 04.8
Procyon	245 28.4	N 5 16.9
Rasalhague	96 31.3	N12 34.7
Regulus	208 12.5	N12 04.6
Rigel	281 38.5	S 8 13.7
Rigil Kent.	140 28.2	S60 44.7
Sabik	102 43.3	S15 41.8
Schedar	350 11.5	N56 24.6
Shaula	96 58.3	S37 05.2
Sirius	258 58.0	S16 41.3
Spica	158 59.7	S11 02.7
Suhail	223 12.6	S43 20.8
Vega	80 56.9	N38 45.8
Zuben'ubi	137 35.2	S15 56.9

	S.H.A. ° ′	Mer. Pass. h m
Venus	319 37.4	8 53
Mars	322 34.7	8 41
Jupiter	284 02.6	11 14
Saturn	223 25.9	15 16

0000 JUNE 18, 19, 20 (SAT., SUN., MON.)

G.M.T. (UT) d h	SUN G.H.A. ° ′	SUN Dec. ° ′	MOON G.H.A. ° ′	MOON v ′	MOON Dec. ° ′	MOON d ′	MOON H.P. ′
18 00	179 46.2	N23 23.8	165 20.4	11.9	N18 06.9	2.8	54.4
01	194 46.1	23.9	179 51.3	12.0	18 04.1	2.9	54.4
02	209 45.9	23.9	194 22.3	12.0	18 01.2	3.0	54.4
03	224 45.8	·· 24.0	208 53.3	12.0	17 58.2	3.1	54.4
04	239 45.7	24.0	223 24.3	12.0	17 55.1	3.2	54.4
05	254 45.5	24.1	237 55.3	12.0	17 51.9	3.2	54.5
06	269 45.4	N23 24.2	252 26.3	12.0	N17 48.7	3.3	54.5
07	284 45.3	24.2	266 57.3	12.0	17 45.4	3.5	54.5
S 08	299 45.1	24.3	281 28.3	12.1	17 41.9	3.5	54.5
A 09	314 45.0	·· 24.3	295 59.4	12.0	17 38.4	3.6	54.5
T 10	329 44.8	24.4	310 30.4	12.1	17 34.8	3.6	54.5
U 11	344 44.7	24.4	325 01.5	12.0	17 31.2	3.8	54.5
R 12	359 44.6	N23 24.5	339 32.5	12.1	N17 27.4	3.9	54.5
D 13	14 44.4	24.5	354 03.6	12.0	17 23.5	3.9	54.6
A 14	29 44.3	24.6	8 34.6	12.1	17 19.6	4.0	54.6
Y 15	44 44.2	·· 24.6	23 05.7	12.1	17 15.6	4.1	54.6
16	59 44.0	24.7	37 36.8	12.1	17 11.5	4.2	54.6
17	74 43.9	24.7	52 07.9	12.1	17 07.3	4.2	54.6
18	89 43.7	N23 24.8	66 39.0	12.1	N17 03.1	4.3	54.6
19	104 43.6	24.8	81 10.1	12.1	16 58.8	4.5	54.6
20	119 43.5	24.9	95 41.2	12.2	16 54.3	4.5	54.7
21	134 43.3	·· 24.9	110 12.4	12.1	16 49.8	4.6	54.7
22	149 43.2	25.0	124 43.5	12.1	16 45.2	4.6	54.7
23	164 43.1	25.0	139 14.6	12.2	16 40.6	4.8	54.7
19 00	179 42.9	N23 25.1	153 45.8	12.2	N16 35.8	4.8	54.7
01	194 42.8	25.1	168 17.0	12.2	16 31.0	4.9	54.7
02	209 42.6	25.1	182 48.2	12.2	16 26.1	5.0	54.7
03	224 42.5	·· 25.2	197 19.4	12.2	16 21.1	5.0	54.8
04	239 42.4	25.2	211 50.6	12.2	16 16.1	5.2	54.8
05	254 42.2	25.3	226 21.8	12.2	16 10.9	5.2	54.8
06	269 42.1	N23 25.3	240 53.0	12.3	N16 05.7	5.3	54.8
07	284 42.0	25.3	255 24.3	12.2	16 00.4	5.3	54.8
08	299 41.8	25.4	269 55.5	12.3	15 55.1	5.5	54.8
S 09	314 41.7	·· 25.4	284 26.8	12.3	15 49.6	5.5	54.9
U 10	329 41.6	25.4	298 58.1	12.3	15 44.1	5.6	54.9
N 11	344 41.4	25.5	313 29.4	12.3	15 38.5	5.7	54.9
D 12	359 41.3	N23 25.5	328 00.7	12.3	N15 32.8	5.8	54.9
A 13	14 41.1	25.6	342 32.0	12.3	15 27.0	5.8	54.9
Y 14	29 41.0	25.6	357 03.3	12.4	15 21.2	5.9	54.9
15	44 40.9	·· 25.6	11 34.7	12.3	15 15.3	6.0	55.0
16	59 40.7	25.7	26 06.0	12.4	15 09.3	6.0	55.0
17	74 40.6	25.7	40 37.4	12.4	15 03.3	6.1	55.0
18	89 40.5	N23 25.7	55 08.8	12.3	N14 57.2	6.2	55.0
19	104 40.3	25.7	69 40.1	12.4	14 51.0	6.3	55.0
20	119 40.2	25.8	84 11.5	12.5	14 44.7	6.4	55.0
21	134 40.0	·· 25.8	98 43.0	12.4	14 38.3	6.4	55.1
22	149 39.9	25.8	113 14.4	12.4	14 31.9	6.5	55.1
23	164 39.8	25.9	127 45.8	12.5	14 25.4	6.5	55.1
20 00	179 39.6	N23 25.9	142 17.3	12.4	N14 18.9	6.7	55.1
01	194 39.5	25.9	156 48.7	12.5	14 12.2	6.7	55.1
02	209 39.4	25.9	171 20.2	12.5	14 05.5	6.7	55.2
03	224 39.2	·· 26.0	185 51.7	12.5	13 58.8	6.9	55.2
04	239 39.1	26.0	200 23.2	12.5	13 51.9	6.9	55.2
05	254 38.9	26.0	214 54.7	12.5	13 45.0	6.9	55.2
06	269 38.8	N23 26.0	229 26.2	12.6	N13 38.1	7.1	55.2
07	284 38.7	26.0	243 57.8	12.5	13 31.0	7.1	55.2
08	299 38.5	26.1	258 29.3	12.6	13 23.9	7.2	55.3
M 09	314 38.4	·· 26.1	273 00.9	12.5	13 16.7	7.2	55.3
O 10	329 38.3	26.1	287 32.4	12.6	13 09.5	7.3	55.3
N 11	344 38.1	26.1	302 04.0	12.6	13 02.2	7.4	55.3
D 12	359 38.0	N23 26.1	316 35.6	12.6	N12 54.8	7.4	55.3
A 13	14 37.9	26.2	331 07.2	12.6	12 47.4	7.6	55.4
Y 14	29 37.7	26.2	345 38.8	12.6	12 39.8	7.5	55.4
15	44 37.6	·· 26.2	0 10.4	12.6	12 32.3	7.7	55.4
16	59 37.4	26.2	14 42.0	12.7	12 24.6	7.6	55.4
17	74 37.3	26.2	29 13.7	12.6	12 17.0	7.8	55.4
18	89 37.2	N23 26.2	43 45.3	12.7	N12 09.2	7.8	55.5
19	104 37.0	26.2	58 17.0	12.6	12 01.4	7.9	55.5
20	119 36.9	26.3	72 48.6	12.7	11 53.5	7.9	55.5
21	134 36.8	·· 26.3	87 20.3	12.7	11 45.6	8.0	55.5
22	149 36.6	26.3	101 52.0	12.7	11 37.6	8.1	55.6
23	164 36.5	26.3	116 23.7	12.7	11 29.5	8.1	55.6
	S.D. 15.8	d 0.0	S.D. 14.9		15.0		15.1

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

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

Day	SUN Eqn. of Time 00h m s	SUN Eqn. of Time 12h m s	SUN Mer. Pass. h m	MOON Mer. Pass. Upper h m	MOON Mer. Pass. Lower h m	MOON Age d	MOON Phase
18	00 55	01 01	12 01	13 25	01 01	02	
19	01 08	01 15	12 01	14 12	01 48	03	
20	01 21	01 28	12 01	14 59	02 36	04	

0000 JUNE 21, 22, 23 (TUES., WED., THURS.)

G.M.T. (UT)		ARIES	VENUS −3.9		MARS +1.2		JUPITER −1.5		SATURN +0.6	
d.	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
21	00	269 04.6	226 45.6	N13 16.1	230 13.8	N14 14.3	192 37.5	N22 23.4	132 18.2	N17 33.5
	01	284 07.1	241 45.7	16.8	245 14.5	14.9	207 39.4	23.4	147 20.4	33.4
	02	299 09.5	256 45.7	17.5	260 15.2	15.5	222 41.2	23.5	162 22.6	33.4
	03	314 12.0	271 45.7	·· 18.2	275 15.8	·· 16.1	237 43.1	·· 23.5	177 24.8	·· 33.3
	04	329 14.5	286 45.7	18.9	290 16.5	16.7	252 44.9	23.6	192 27.0	33.2
	05	344 16.9	301 45.7	19.6	305 17.2	17.3	267 46.8	23.7	207 29.2	33.1
	06	359 19.4	316 45.8	N13 20.3	320 17.9	N14 17.8	282 48.6	N22 23.7	222 31.4	N17 33.1
	07	14 21.9	331 45.8	21.0	335 18.6	18.4	297 50.5	23.8	237 33.6	33.0
	08	29 24.3	346 45.8	21.7	350 19.2	19.0	312 52.3	23.8	252 35.8	32.9
TUESDAY	09	44 26.8	1 45.8	·· 22.4	5 19.9	·· 19.6	327 54.1	·· 23.9	267 38.0	·· 32.8
	10	59 29.3	16 45.8	23.1	20 20.6	20.2	342 56.0	23.9	282 40.2	32.8
	11	74 31.7	31 45.8	23.8	35 21.3	20.8	357 57.8	24.0	297 42.4	32.7
	12	89 34.2	46 45.8	N13 24.5	50 22.0	N14 21.3	12 59.7	N22 24.0	312 44.6	N17 32.6
	13	104 36.7	61 45.9	25.2	65 22.6	21.9	28 01.5	24.1	327 46.8	32.5
	14	119 39.1	76 45.9	25.8	80 23.3	22.5	43 03.4	24.2	342 49.0	32.5
	15	134 41.6	91 45.9	·· 26.5	95 24.0	·· 23.1	58 05.2	·· 24.2	357 51.2	·· 32.4
	16	149 44.0	106 45.9	27.2	110 24.7	23.7	73 07.1	24.3	12 53.5	32.3
	17	164 46.5	121 45.9	27.9	125 25.4	24.3	88 08.9	24.3	27 55.7	32.2
	18	179 49.0	136 45.9	N13 28.6	140 26.0	N14 24.8	103 10.8	N22 24.4	42 57.9	N17 32.2
	19	194 51.4	151 45.9	29.3	155 26.7	25.4	118 12.6	24.4	58 00.1	32.1
	20	209 53.9	166 45.9	30.0	170 27.4	26.0	133 14.5	24.5	73 02.3	32.0
	21	224 56.4	181 45.9	·· 30.7	185 28.1	·· 26.6	148 16.3	·· 24.6	88 04.5	·· 31.9
	22	239 58.8	196 45.9	31.4	200 28.8	27.2	163 18.2	24.6	103 06.7	31.9
	23	255 01.3	211 45.9	32.1	215 29.5	27.7	178 20.0	24.7	118 08.9	31.8
22	00	270 03.8	226 45.9	N13 32.8	230 30.1	N14 28.3	193 21.9	N22 24.7	133 11.1	N17 31.7
	01	285 06.2	241 45.9	33.5	245 30.8	28.9	208 23.7	24.8	148 13.3	31.6
	02	300 08.7	256 45.9	34.2	260 31.5	29.5	223 25.5	24.8	163 15.5	31.6
	03	315 11.1	271 45.9	·· 34.9	275 32.2	·· 30.1	238 27.4	·· 24.9	178 17.7	·· 31.5
	04	330 13.6	286 45.9	35.6	290 32.9	30.6	253 29.2	24.9	193 19.9	31.4
	05	345 16.1	301 45.9	36.3	305 33.5	31.2	268 31.1	25.0	208 22.1	31.3
	06	0 18.5	316 45.9	N13 36.9	320 34.2	N14 31.8	283 32.9	N22 25.1	223 24.3	N17 31.3
	07	15 21.0	331 45.9	37.6	335 34.9	32.4	298 34.8	25.1	238 26.5	31.2
	08	30 23.5	346 45.9	38.3	350 35.6	33.0	313 36.6	25.2	253 28.7	31.1
WEDNESDAY	09	45 25.9	1 45.9	·· 39.0	5 36.3	·· 33.5	328 38.5	·· 25.2	268 30.9	·· 31.0
	10	60 28.4	16 45.9	39.7	20 36.9	34.1	343 40.3	25.3	283 33.1	31.0
	11	75 30.9	31 45.9	40.4	35 37.6	34.7	358 42.2	25.3	298 35.3	30.9
	12	90 33.3	46 45.9	N13 41.1	50 38.3	N14 35.3	13 44.0	N22 25.4	313 37.5	N17 30.8
	13	105 35.8	61 45.9	41.8	65 39.0	35.9	28 45.9	25.4	328 39.7	30.7
	14	120 38.3	76 45.9	42.5	80 39.7	36.4	43 47.7	25.5	343 41.9	30.7
	15	135 40.7	91 45.9	·· 43.2	95 40.3	·· 37.0	58 49.6	·· 25.5	358 44.1	·· 30.6
	16	150 43.2	106 45.9	43.9	110 41.0	37.6	73 51.4	25.6	13 46.3	30.5
	17	165 45.6	121 45.9	44.6	125 41.7	38.2	88 53.3	25.7	28 48.5	30.4
	18	180 48.1	136 45.9	N13 45.3	140 42.4	N14 38.7	103 55.1	N22 25.7	43 50.7	N17 30.4
	19	195 50.6	151 45.9	46.0	155 43.0	39.3	118 57.0	25.8	58 52.9	30.3
	20	210 53.0	166 45.9	46.6	170 43.7	39.9	133 58.8	25.8	73 55.1	30.2
	21	225 55.5	181 45.8	·· 47.3	185 44.4	·· 40.5	149 00.7	·· 25.9	88 57.3	·· 30.1
	22	240 58.0	196 45.8	48.0	200 45.1	41.0	164 02.5	25.9	103 59.5	30.0
	23	256 00.4	211 45.8	48.7	215 45.8	41.6	179 04.4	26.0	119 01.7	30.0
23	00	271 02.9	226 45.8	N13 49.4	230 46.4	N14 42.2	194 06.2	N22 26.0	134 03.9	N17 29.9
	01	286 05.4	241 45.8	50.1	245 47.1	42.8	209 08.0	26.1	149 06.1	29.8
	02	301 07.8	256 45.8	50.8	260 47.8	43.3	224 09.9	26.1	164 08.3	29.7
	03	316 10.3	271 45.8	·· 51.5	275 48.5	·· 43.9	239 11.7	·· 26.2	179 10.5	·· 29.7
	04	331 12.8	286 45.7	52.2	290 49.2	44.5	254 13.6	26.3	194 12.7	29.6
	05	346 15.2	301 45.7	52.9	305 49.8	45.1	269 15.4	26.3	209 14.9	29.5
	06	1 17.7	316 45.7	N13 53.6	320 50.5	N14 45.6	284 17.3	N22 26.4	224 17.1	N17 29.4
	07	16 20.1	331 45.7	54.3	335 51.2	46.2	299 19.1	26.4	239 19.3	29.4
	08	31 22.6	346 45.7	54.9	350 51.9	46.8	314 21.0	26.5	254 21.5	29.3
THURSDAY	09	46 25.1	1 45.6	·· 55.6	5 52.6	·· 47.3	329 22.8	·· 26.5	269 23.7	·· 29.2
	10	61 27.5	16 45.6	56.3	20 53.2	47.9	344 24.7	26.6	284 25.9	29.1
	11	76 30.0	31 45.6	57.0	35 53.9	48.5	359 26.5	26.6	299 28.1	29.1
	12	91 32.5	46 45.6	N13 57.7	50 54.6	N14 49.1	14 28.4	N22 26.7	314 30.3	N17 29.0
	13	106 34.9	61 45.5	58.4	65 55.3	49.6	29 30.2	26.7	329 32.5	28.9
	14	121 37.4	76 45.5	59.1	80 56.0	50.2	44 32.1	26.8	344 34.7	28.8
	15	136 39.9	91 45.5	13 59.8	95 56.6	·· 50.8	59 33.9	·· 26.8	359 36.9	·· 28.8
	16	151 42.3	106 45.5	14 00.5	110 57.3	51.3	74 35.8	26.9	14 39.1	28.7
	17	166 44.8	121 45.4	01.2	125 58.0	51.9	89 37.6	27.0	29 41.3	28.6
	18	181 47.2	136 45.4	N14 01.8	140 58.7	N14 52.5	104 39.5	N22 27.0	44 43.5	N17 28.5
	19	196 49.7	151 45.4	02.5	155 59.3	53.0	119 41.3	27.1	59 45.7	28.4
	20	211 52.2	166 45.4	03.2	171 00.0	53.6	134 43.2	27.1	74 47.9	28.4
	21	226 54.6	181 45.3	·· 03.9	186 00.7	·· 54.2	149 45.0	·· 27.2	89 50.1	·· 28.3
	22	241 57.1	196 45.3	04.6	201 01.4	54.8	164 46.9	27.2	104 52.3	28.2
	23	256 59.6	211 45.3	05.3	216 02.1	55.3	179 48.7	27.3	119 54.5	28.1
Mer. Pass.		h m 5 58.8	v 0.0	d 0.7	v 0.7	d 0.6	v 1.8	d 0.1	v 2.2	d 0.1

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 39.2	S40 23.6
Achernar	335 47.2	S57 20.8
Acrux	173 39.5	S62 58.8
Adhara	255 34.2	S28 56.6
Aldebaran	291 20.8	N16 27.7
Alioth	166 44.4	N56 05.2
Alkaid	153 20.1	N49 25.8
Al Na'ir	28 17.5	S47 03.9
Alnilam	276 14.2	S 1 13.1
Alphard	218 22.9	S 8 33.8
Alphecca	126 33.7	N26 47.6
Alpheratz	358 11.5	N28 57.8
Altair	62 34.5	N 8 46.6
Ankaa	353 42.5	S42 25.4
Antares	112 59.2	S26 22.9
Arcturus	146 20.3	N19 18.1
Atria	108 24.8	S68 59.3
Avior	234 29.6	S59 26.5
Bellatrix	279 01.4	N 6 19.7
Betelgeuse	271 31.0	N 7 24.1
Canopus	264 08.7	S52 41.2
Capella	281 15.0	N45 58.4
Deneb	49 49.5	N45 12.0
Denebola	183 01.3	N14 41.9
Diphda	349 23.1	S18 06.5
Dubhe	194 25.1	N61 52.6
Elnath	278 47.3	N28 35.2
Eltanin	90 58.2	N51 29.6
Enif	34 13.5	N 9 46.3
Fomalhaut	15 53.7	S29 44.3
Gacrux	172 31.0	S56 59.5
Gienah	176 20.2	S17 25.1
Hadar	149 26.0	S60 16.1
Hamal	328 31.5	N23 21.2
Kaus Aust.	84 19.3	S34 23.6
Kochab	137 18.2	N74 15.2
Markab	14 05.2	N15 05.0
Menkar	314 43.6	N 4 00.0
Menkent	148 39.3	S36 15.7
Miaplacidus	221 45.9	S69 37.8
Mirfak	309 19.6	N49 46.7
Nunki	76 31.5	S26 19.4
Peacock	54 01.4	S56 48.2
Pollux	244 01.2	N28 04.8
Procyon	245 28.4	N 5 16.9
Rasalhague	96 31.3	N12 34.7
Regulus	208 12.5	N12 04.6
Rigel	281 38.4	S 8 13.7
Rigil Kent.	140 28.2	S60 44.7
Sabik	102 43.3	S15 41.8
Schedar	350 11.5	N56 24.6
Shaula	96 58.3	S37 05.2
Sirius	258 58.0	S16 41.3
Spica	158 59.7	S11 02.7
Suhail	223 12.7	S43 20.8
Vega	80 56.9	N38 45.8
Zuben'ubi	137 35.2	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	316 42.2	8 53
Mars	320 26.4	8 38
Jupiter	283 18.1	11 05
Saturn	223 07.3	15 05

0000 JUNE 21, 22, 23 (TUES., WED., THURS.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
21	00	179 36.3	N23 26.3	130 55.4	12.7	N11 21.4	8.2	55.6
	01	194 36.2	26.3	145 27.1	12.7	11 13.2	8.2	55.6
	02	209 36.1	26.3	159 58.8	12.7	11 05.0	8.3	55.6
	03	224 35.9	·· 26.3	174 30.5	12.7	10 56.7	8.4	55.7
	04	239 35.8	26.3	189 02.2	12.7	10 48.3	8.4	55.7
	05	254 35.7	26.3	203 33.9	12.8	10 39.9	8.5	55.7
	06	269 35.5	N23 26.3	218 05.7	12.7	N10 31.4	8.5	55.7
	07	284 35.4	26.3	232 37.4	12.8	10 22.9	8.6	55.8
	08	299 35.3	26.4	247 09.2	12.7	10 14.3	8.6	55.8
TUESDAY	09	314 35.1	·· 26.4	261 40.9	12.8	10 05.7	8.7	55.8
	10	329 35.0	26.4	276 12.7	12.7	9 57.0	8.7	55.8
	11	344 34.8	26.4	290 44.4	12.8	9 48.3	8.8	55.9
	12	359 34.7	N23 26.4	305 16.2	12.7	N 9 39.5	8.8	55.9
	13	14 34.6	26.4	319 47.9	12.8	9 30.7	8.9	55.9
	14	29 34.4	26.4	334 19.7	12.8	9 21.8	9.0	55.9
	15	44 34.3	·· 26.4	348 51.5	12.7	9 12.8	9.0	55.9
	16	59 34.2	26.4	3 23.2	12.8	9 03.8	9.0	56.0
	17	74 34.0	26.3	17 55.0	12.8	8 54.8	9.1	56.0
	18	89 33.9	N23 26.3	32 26.8	12.7	N 8 45.7	9.1	56.0
	19	104 33.8	26.3	46 58.5	12.8	8 36.6	9.2	56.0
	20	119 33.6	26.3	61 30.3	12.8	8 27.4	9.3	56.1
	21	134 33.5	·· 26.3	76 02.1	12.7	8 18.1	9.2	56.1
	22	149 33.3	26.3	90 33.8	12.8	8 08.9	9.4	56.1
	23	164 33.2	26.3	105 05.6	12.8	7 59.5	9.3	56.1
22	00	179 33.1	N23 26.3	119 37.4	12.7	N 7 50.2	9.5	56.2
	01	194 32.9	26.3	134 09.1	12.8	7 40.7	9.4	56.2
	02	209 32.8	26.3	148 40.9	12.7	7 31.3	9.5	56.2
	03	224 32.7	·· 26.3	163 12.6	12.8	7 21.8	9.6	56.3
	04	239 32.5	26.3	177 44.4	12.7	7 12.2	9.6	56.3
	05	254 32.4	26.3	192 16.1	12.8	7 02.6	9.6	56.3
	06	269 32.3	N23 26.2	206 47.9	12.7	N 6 53.0	9.7	56.3
	07	284 32.1	26.2	221 19.6	12.7	6 43.3	9.7	56.4
	08	299 32.0	26.2	235 51.3	12.7	6 33.6	9.7	56.4
WEDNESDAY	09	314 31.8	·· 26.2	250 23.0	12.7	6 23.9	9.8	56.4
	10	329 31.7	26.2	264 54.7	12.7	6 14.1	9.9	56.4
	11	344 31.6	26.2	279 26.4	12.7	6 04.2	9.8	56.5
	12	359 31.4	N23 26.2	293 58.1	12.7	N 5 54.4	9.9	56.5
	13	14 31.3	26.1	308 29.8	12.7	5 44.5	10.0	56.5
	14	29 31.2	26.1	323 01.5	12.6	5 34.5	10.0	56.5
	15	44 31.0	·· 26.1	337 33.1	12.7	5 24.5	10.0	56.6
	16	59 30.9	26.1	352 04.8	12.6	5 14.5	10.0	56.6
	17	74 30.8	26.1	6 36.4	12.6	5 04.5	10.1	56.6
	18	89 30.6	N23 26.0	21 08.0	12.6	N 4 54.4	10.1	56.7
	19	104 30.5	26.0	35 39.6	12.6	4 44.3	10.2	56.7
	20	119 30.4	26.0	50 11.2	12.6	4 34.1	10.1	56.7
	21	134 30.2	·· 26.0	64 42.8	12.5	4 24.0	10.3	56.7
	22	149 30.1	26.0	79 14.3	12.6	4 13.7	10.2	56.8
	23	164 29.9	25.9	93 45.9	12.5	4 03.5	10.3	56.8
23	00	179 29.8	N23 25.9	108 17.4	12.5	N 3 53.2	10.3	56.8
	01	194 29.7	25.9	122 48.9	12.5	3 42.9	10.3	56.9
	02	209 29.5	25.8	137 20.4	12.5	3 32.6	10.3	56.9
	03	224 29.4	·· 25.8	151 51.9	12.4	3 22.3	10.4	56.9
	04	239 29.3	25.8	166 23.3	12.5	3 11.9	10.4	57.0
	05	254 29.1	25.8	180 54.8	12.4	3 01.5	10.5	57.0
	06	269 29.0	N23 25.7	195 26.2	12.4	N 2 51.0	10.4	57.0
	07	284 28.9	25.7	209 57.6	12.3	2 40.6	10.5	57.0
THURSDAY	08	299 28.7	25.7	224 28.9	12.4	2 30.1	10.5	57.1
	09	314 28.6	·· 25.6	239 00.3	12.3	2 19.6	10.5	57.1
	10	329 28.5	25.6	253 31.6	12.3	2 09.1	10.6	57.1
	11	344 28.3	25.6	268 02.9	12.2	1 58.5	10.5	57.2
	12	359 28.2	N23 25.5	282 34.1	12.3	N 1 48.0	10.6	57.2
	13	14 28.1	25.5	297 05.4	12.2	1 37.4	10.6	57.2
	14	29 27.9	25.5	311 36.6	12.2	1 26.8	10.7	57.3
	15	44 27.8	·· 25.4	326 07.8	12.1	1 16.1	10.6	57.3
	16	59 27.7	25.4	340 38.9	12.2	1 05.5	10.7	57.3
	17	74 27.5	25.4	355 10.1	12.0	0 54.8	10.6	57.3
	18	89 27.4	N23 25.3	9 41.1	12.1	N 0 44.2	10.7	57.4
	19	104 27.3	25.3	24 12.2	12.0	0 33.5	10.7	57.4
	20	119 27.1	25.2	38 43.2	12.0	0 22.8	10.7	57.4
	21	134 27.0	·· 25.2	53 14.2	12.0	0 12.1	10.8	57.5
	22	149 26.8	25.2	67 45.2	11.9	N 0 01.3	10.7	57.5
	23	164 26.7	25.1	82 16.1	11.9	S 0 09.4	10.8	57.5
		S.D. 15.8	d 0.0	S.D. 15.2		15.4		15.6

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

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

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
	m s	m s	h m	h m	h m	d	
21	01 34	01 41	12 02	15 46	03 23	05	
22	01 47	01 54	12 02	16 33	04 09	06	●
23	02 00	02 07	12 02	17 20	04 56	07	

0000 JUNE 24, 25, 26 (FRI., SAT., SUN.)

G.M.T. (UT)		ARIES	VENUS −3.9		MARS +1.2		JUPITER −1.5		SATURN +0.6	
d	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
24	00	272 02.0	226 45.2	N14 06.0	231 02.7	N14 55.9	194 50.6	N22 27.3	134 56.7	N17 28.1
	01	287 04.5	241 45.2	06.7	246 03.4	56.5	209 52.4	27.4	149 58.9	28.0
	02	302 07.0	256 45.2	07.4	261 04.1	57.0	224 54.3	27.4	165 01.1	27.9
	03	317 09.4	271 45.1	·· 08.0	276 04.8	·· 57.6	239 56.1	·· 27.5	180 03.3	·· 27.8
	04	332 11.9	286 45.1	08.7	291 05.5	58.2	254 58.0	27.5	195 05.5	27.8
	05	347 14.4	301 45.1	09.4	306 06.1	58.7	269 59.8	27.6	210 07.7	27.7
	06	2 16.8	316 45.0	N14 10.1	321 06.8	N14 59.3	285 01.7	N22 27.7	225 09.8	N17 27.6
	07	17 19.3	331 45.0	10.8	336 07.5	14 59.9	300 03.5	27.7	240 12.0	27.5
	08	32 21.7	346 45.0	11.5	351 08.2	15 00.4	315 05.4	27.8	255 14.2	27.4
F	09	47 24.2	1 44.9	·· 12.2	6 08.8	·· 01.0	330 07.2	·· 27.8	270 16.4	·· 27.4
R	10	62 26.7	16 44.9	12.9	21 09.5	01.6	345 09.1	27.9	285 18.6	27.3
I	11	77 29.1	31 44.8	13.5	36 10.2	02.1	0 10.9	27.9	300 20.8	27.2
D	12	92 31.6	46 44.8	N14 14.2	51 10.9	N15 02.7	15 12.8	N22 28.0	315 23.0	N17 27.1
A	13	107 34.1	61 44.8	14.9	66 11.6	03.2	30 14.6	28.0	330 25.2	27.1
Y	14	122 36.5	76 44.7	15.6	81 12.2	03.8	45 16.5	28.1	345 27.4	27.0
	15	137 39.0	91 44.7	·· 16.3	96 12.9	·· 04.4	60 18.3	·· 28.1	0 29.6	·· 26.9
	16	152 41.5	106 44.6	17.0	111 13.6	04.9	75 20.2	28.2	15 31.8	26.8
	17	167 43.9	121 44.6	17.7	126 14.3	05.5	90 22.0	28.2	30 34.0	26.8
	18	182 46.4	136 44.5	N14 18.4	141 14.9	N15 06.1	105 23.9	N22 28.3	45 36.2	N17 26.7
	19	197 48.9	151 44.5	19.0	156 15.6	06.6	120 25.7	28.3	60 38.4	26.6
	20	212 51.3	166 44.4	19.7	171 16.3	07.2	135 27.6	28.4	75 40.6	26.5
	21	227 53.8	181 44.4	·· 20.4	186 17.0	·· 07.8	150 29.4	·· 28.4	90 42.8	·· 26.4
	22	242 56.2	196 44.3	21.1	201 17.7	08.3	165 31.3	28.5	105 45.0	26.4
	23	257 58.7	211 44.3	21.8	216 18.3	08.9	180 33.1	28.5	120 47.2	26.3
25	00	273 01.2	226 44.2	N14 22.5	231 19.0	N15 09.4	195 35.0	N22 28.6	135 49.4	N17 26.2
	01	288 03.6	241 44.2	23.2	246 19.7	10.0	210 36.8	28.7	150 51.6	26.1
	02	303 06.1	256 44.1	23.8	261 20.4	10.6	225 38.7	28.7	165 53.8	26.1
	03	318 08.6	271 44.1	·· 24.5	276 21.0	·· 11.1	240 40.5	·· 28.8	180 56.0	·· 26.0
	04	333 11.0	286 44.0	25.2	291 21.7	11.7	255 42.4	28.8	195 58.2	25.9
	05	348 13.5	301 44.0	25.9	306 22.4	12.2	270 44.2	28.9	211 00.4	25.8
	06	3 16.0	316 43.9	N14 26.6	321 23.1	N15 12.8	285 46.1	N22 28.9	226 02.6	N17 25.7
	07	18 18.4	331 43.9	27.3	336 23.8	13.4	300 47.9	29.0	241 04.8	25.7
S	08	33 20.9	346 43.8	27.9	351 24.4	13.9	315 49.8	29.0	256 06.9	25.6
A	09	48 23.3	1 43.8	·· 28.6	6 25.1	·· 14.5	330 51.6	·· 29.1	271 09.1	·· 25.5
T	10	63 25.8	16 43.7	29.3	21 25.8	15.0	345 53.5	29.1	286 11.3	25.4
U	11	78 28.3	31 43.7	30.0	36 26.5	15.6	0 55.3	29.2	301 13.5	25.4
R	12	93 30.7	46 43.6	N14 30.7	51 27.1	N15 16.2	15 57.2	N22 29.2	316 15.7	N17 25.3
D	13	108 33.2	61 43.5	31.4	66 27.8	16.7	30 59.0	29.3	331 17.9	25.2
A	14	123 35.7	76 43.5	32.1	81 28.5	17.3	46 00.9	29.3	346 20.1	25.1
Y	15	138 38.1	91 43.4	·· 32.7	96 29.2	·· 17.8	61 02.7	·· 29.4	1 22.3	·· 25.0
	16	153 40.6	106 43.4	33.4	111 29.8	18.4	76 04.6	29.4	16 24.5	25.0
	17	168 43.1	121 43.3	34.1	126 30.5	18.9	91 06.4	29.5	31 26.7	24.9
	18	183 45.5	136 43.2	N14 34.8	141 31.2	N15 19.5	106 08.3	N22 29.5	46 28.9	N17 24.8
	19	198 48.0	151 43.2	35.5	156 31.9	20.1	121 10.1	29.6	61 31.1	24.7
	20	213 50.5	166 43.1	36.1	171 32.6	20.6	136 12.0	29.6	76 33.3	24.7
	21	228 52.9	181 43.0	·· 36.8	186 33.2	·· 21.2	151 13.8	·· 29.7	91 35.5	·· 24.6
	22	243 55.4	196 43.0	37.5	201 33.9	21.7	166 15.7	29.7	106 37.7	24.5
	23	258 57.8	211 42.9	38.2	216 34.6	22.3	181 17.5	29.8	121 39.9	24.4
26	00	274 00.3	226 42.8	N14 38.9	231 35.3	N15 22.8	196 19.4	N22 29.8	136 42.1	N17 24.3
	01	289 02.8	241 42.8	39.6	246 35.9	23.4	211 21.2	29.9	151 44.2	24.3
	02	304 05.2	256 42.7	40.2	261 36.6	23.9	226 23.1	29.9	166 46.4	24.2
	03	319 07.7	271 42.6	·· 40.9	276 37.3	·· 24.5	241 24.9	·· 30.0	181 48.6	·· 24.1
	04	334 10.2	286 42.6	41.6	291 38.0	25.0	256 26.8	30.0	196 50.8	24.0
	05	349 12.6	301 42.5	42.3	306 38.6	25.6	271 28.6	30.1	211 53.0	24.0
	06	4 15.1	316 42.4	N14 43.0	321 39.3	N15 26.2	286 30.5	N22 30.2	226 55.2	N17 23.9
	07	19 17.6	331 42.3	43.6	336 40.0	26.7	301 32.3	30.2	241 57.4	23.8
	08	34 20.0	346 42.3	44.3	351 40.7	27.3	316 34.2	30.3	256 59.6	23.7
S	09	49 22.5	1 42.2	·· 45.0	6 41.3	·· 27.8	331 36.0	·· 30.3	272 01.8	·· 23.6
U	10	64 25.0	16 42.1	45.7	21 42.0	28.4	346 37.9	30.4	287 04.0	23.6
N	11	79 27.4	31 42.0	46.4	36 42.7	28.9	1 39.7	30.4	302 06.2	23.5
D	12	94 29.9	46 42.0	N14 47.0	51 43.4	N15 29.5	16 41.6	N22 30.5	317 08.4	N17 23.4
A	13	109 32.3	61 41.9	47.7	66 44.1	30.0	31 43.4	30.5	332 10.6	23.3
Y	14	124 34.8	76 41.8	48.4	81 44.7	30.6	46 45.3	30.6	347 12.8	23.2
	15	139 37.3	91 41.7	·· 49.1	96 45.4	·· 31.1	61 47.1	·· 30.6	2 15.0	·· 23.2
	16	154 39.7	106 41.7	49.7	111 46.1	31.7	76 49.0	30.7	17 17.1	23.1
	17	169 42.2	121 41.6	50.4	126 46.8	32.2	91 50.8	30.7	32 19.3	23.0
	18	184 44.7	136 41.5	N14 51.1	141 47.4	N15 32.8	106 52.7	N22 30.8	47 21.5	N17 22.9
	19	199 47.1	151 41.4	51.8	156 48.1	33.3	121 54.5	30.8	62 23.7	22.9
	20	214 49.6	166 41.3	52.5	171 48.8	33.9	136 56.4	30.9	77 25.9	22.8
	21	229 52.1	181 41.3	·· 53.1	186 49.5	·· 34.4	151 58.2	·· 30.9	92 28.1	·· 22.7
	22	244 54.5	196 41.2	53.8	201 50.1	35.0	167 00.1	31.0	107 30.3	22.6
	23	259 57.0	211 41.1	54.5	216 50.8	35.5	182 01.9	31.0	122 32.5	22.5
Mer. Pass.		h m 5 47.0	v −0.1	d 0.7	v 0.7	d 0.6	v 1.9	d 0.1	v 2.2	d 0.1

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 39.2	S40 23.6
Achernar	335 47.2	S57 20.8
Acrux	173 39.5	S62 58.8
Adhara	255 34.2	S28 56.6
Aldebaran	291 20.8	N16 27.7
Alioth	166 44.4	N56 05.2
Alkaid	153 20.1	N49 25.8
Al Na'ir	28 17.5	S47 03.9
Alnilam	276 14.2	S 1 13.1
Alphard	218 22.9	S 8 33.8
Alphecca	126 33.7	N26 47.6
Alpheratz	358 11.5	N28 57.9
Altair	62 34.3	N 8 48.6
Ankaa	353 42.5	S42 25.4
Antares	112 59.2	S26 22.9
Arcturus	146 20.3	N19 18.1
Atria	108 24.8	S68 59.3
Avior	234 29.6	S59 26.5
Bellatrix	279 01.4	N 6 19.7
Betelgeuse	271 31.0	N 7 24.1
Canopus	264 08.7	S52 41.1
Capella	281 15.0	N45 58.4
Deneb	49 49.5	N45 12.0
Denebola	183 01.3	N14 41.9
Diphda	349 23.1	S18 06.5
Dubhe	194 25.1	N61 52.6
Elnath	278 47.3	N28 35.2
Eltanin	90 58.2	N51 29.6
Enif	34 13.5	N 9 46.4
Fomalhaut	15 53.7	S29 44.3
Gacrux	172 31.0	S56 59.5
Gienah	176 20.2	S17 25.1
Hadar	149 26.0	S60 16.1
Hamal	328 31.5	N23 21.2
Kaus Aust.	84 19.3	S34 23.6
Kochab	137 18.3	N74 15.2
Markab	14 05.2	N15 05.0
Menkar	314 43.6	N 4 00.0
Menkent	148 39.3	S36 15.7
Miaplacidus	221 46.0	S69 37.8
Mirfak	309 19.5	N49 46.7
Nunki	76 31.5	S26 19.4
Peacock	54 01.3	S56 48.2
Pollux	244 01.2	N28 04.8
Procyon	245 28.4	N 5 16.9
Rasalhague	96 31.3	N12 34.7
Regulus	208 12.5	N12 04.6
Rigel	281 38.4	S 8 13.7
Rigil Kent.	140 28.3	S60 44.7
Sabik	102 43.3	S15 41.8
Schedar	350 11.4	N56 24.6
Shaula	96 58.3	S37 05.2
Sirius	258 58.0	S16 41.3
Spica	158 59.7	S11 02.7
Suhail	223 12.7	S43 20.8
Vega	80 56.9	N38 45.9
Zuben'ubi	137 35.2	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	313 43.1	8 53
Mars	318 17.8	8 34
Jupiter	282 33.8	10 56
Saturn	222 48.2	14 55

0000 JUNE 24, 25, 26 (FRI., SAT., SUN.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
24 00	179 26.6	N23 25.1	96 47.0	11.9	S 0 20.2	10.7	57.6
01	194 26.4	25.0	111 17.9	11.8	0 30.9	10.8	57.6
02	209 26.3	25.0	125 48.7	11.8	0 41.7	10.8	57.6
03	224 26.2	·· 25.0	140 19.5	11.8	0 52.5	10.7	57.7
04	239 26.0	24.9	154 50.3	11.7	1 03.2	10.8	57.7
05	254 25.9	24.9	169 21.0	11.7	1 14.0	10.8	57.7
06	269 25.8	N23 24.8	183 51.7	11.6	S 1 24.8	10.8	57.8
07	284 25.6	24.8	198 22.3	11.6	1 35.6	10.8	57.8
08	299 25.5	24.7	212 52.9	11.5	1 46.4	10.9	57.8
F 09	314 25.4	·· 24.7	227 23.4	11.5	1 57.3	10.8	57.9
R 10	329 25.2	24.6	241 53.9	11.5	2 08.1	10.8	57.9
I 11	344 25.1	24.6	256 24.4	11.4	2 18.9	10.8	57.9
D 12	359 25.0	N23 24.5	270 54.8	11.4	S 2 29.7	10.8	58.0
A 13	14 24.8	24.5	285 25.2	11.3	2 40.5	10.8	58.0
Y 14	29 24.7	24.4	299 55.5	11.3	2 51.3	10.8	58.0
15	44 24.6	·· 24.4	314 25.8	11.2	3 02.1	10.8	58.1
16	59 24.4	24.3	328 56.0	11.2	3 12.9	10.8	58.1
17	74 24.3	24.3	343 26.2	11.1	3 23.7	10.8	58.1
18	89 24.2	N23 24.2	357 56.3	11.1	S 3 34.5	10.8	58.2
19	104 24.0	24.1	12 26.4	11.1	3 45.3	10.8	58.2
20	119 23.9	24.1	26 56.5	11.0	3 56.1	10.8	58.2
21	134 23.8	·· 24.0	41 26.5	10.9	4 06.9	10.7	58.3
22	149 23.6	24.0	55 56.4	10.9	4 17.6	10.8	58.3
23	164 23.5	23.9	70 26.3	10.8	4 28.4	10.7	58.3
25 00	179 23.4	N23 23.9	84 56.1	10.8	S 4 39.1	10.7	58.4
01	194 23.2	23.8	99 25.9	10.7	4 49.8	10.8	58.4
02	209 23.1	23.7	113 55.6	10.6	5 00.6	10.6	58.4
03	224 23.0	·· 23.7	128 25.2	10.7	5 11.2	10.7	58.5
04	239 22.8	23.6	142 54.9	10.5	5 21.9	10.7	58.5
05	254 22.7	23.5	157 24.4	10.5	5 32.6	10.6	58.5
06	269 22.6	N23 23.5	171 53.9	10.4	S 5 43.2	10.7	58.6
07	284 22.4	23.4	186 23.3	10.4	5 53.9	10.6	58.6
S 08	299 22.3	23.3	200 52.7	10.3	6 04.5	10.6	58.6
A 09	314 22.2	·· 23.3	215 22.0	10.3	6 15.1	10.5	58.7
T 10	329 22.0	23.2	229 51.3	10.1	6 25.6	10.6	58.7
U 11	344 21.9	23.1	244 20.4	10.2	6 36.2	10.5	58.7
R 12	359 21.8	N23 23.1	258 49.6	10.0	S 6 46.7	10.5	58.8
D 13	14 21.6	23.0	273 18.6	10.0	6 57.2	10.4	58.8
A 14	29 21.5	22.9	287 47.6	10.0	7 07.6	10.5	58.8
Y 15	44 21.4	·· 22.9	302 16.6	9.8	7 18.1	10.4	58.9
16	59 21.3	22.8	316 45.4	9.9	7 28.5	10.4	58.9
17	74 21.1	22.7	331 14.3	9.7	7 38.9	10.3	58.9
18	89 21.0	N23 22.7	345 43.0	9.7	S 7 49.2	10.3	59.0
19	104 20.9	22.6	0 11.7	9.6	7 59.5	10.3	59.0
20	119 20.7	22.5	14 40.3	9.5	8 09.8	10.2	59.0
21	134 20.6	·· 22.4	29 08.8	9.5	8 20.0	10.2	59.1
22	149 20.5	22.4	43 37.3	9.4	8 30.2	10.2	59.1
23	164 20.3	22.3	58 05.7	9.3	8 40.4	10.1	59.1
26 00	179 20.2	N23 22.2	72 34.0	9.3	S 8 50.5	10.1	59.1
01	194 20.1	22.1	87 02.3	9.2	9 00.6	10.1	59.2
02	209 19.9	22.1	101 30.5	9.1	9 10.7	10.0	59.2
03	224 19.8	·· 22.0	115 58.6	9.0	9 20.7	10.0	59.2
04	239 19.7	21.9	130 26.6	9.0	9 30.7	9.9	59.3
05	254 19.5	21.8	144 54.6	8.9	9 40.6	9.9	59.3
06	269 19.4	N23 21.7	159 22.5	8.9	S 9 50.5	9.8	59.3
07	284 19.3	21.7	173 50.4	8.7	10 00.3	9.8	59.4
08	299 19.1	21.6	188 18.1	8.7	10 10.1	9.7	59.4
S 09	314 19.0	·· 21.5	202 45.8	8.6	10 19.8	9.7	59.4
U 10	329 18.9	21.4	217 13.4	8.5	10 29.5	9.6	59.5
N 11	344 18.8	21.3	231 40.9	8.5	10 39.1	9.5	59.5
D 12	359 18.6	N23 21.2	246 08.4	8.4	S10 48.6	9.6	59.5
A 13	14 18.5	21.1	260 35.8	8.3	10 58.2	9.4	59.6
Y 14	29 18.4	21.1	275 03.1	8.2	11 07.6	9.4	59.6
15	44 18.2	·· 21.0	289 30.3	8.2	11 17.0	9.4	59.6
16	59 18.1	20.9	303 57.5	8.1	11 26.4	9.2	59.7
17	74 18.0	20.8	318 24.6	8.0	11 35.6	9.3	59.7
18	89 17.8	N23 20.7	332 51.6	7.9	S11 44.9	9.1	59.7
19	104 17.7	20.6	347 18.5	7.8	11 54.0	9.1	59.7
20	119 17.6	20.5	1 45.3	7.8	12 03.1	9.0	59.8
21	134 17.4	·· 20.4	16 12.1	7.7	12 12.1	9.0	59.8
22	149 17.3	20.3	30 38.8	7.6	12 21.1	8.9	59.8
23	164 17.2	20.2	45 05.4	7.5	12 30.0	8.8	59.9
	S.D. 15.8	d 0.1	S.D. 15.8		16.0		16.2

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

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

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
	m s	m s	h m	h m	h m	d	
24	02 13	02 20	12 02	18 09	05 44	08	◐
25	02 26	02 33	12 03	18 59	06 34	09	
26	02 39	02 45	12 03	19 53	07 26	10	

0000 JUNE 27, 28, 29 (MON., TUES., WED.)

G.M.T. (UT)		ARIES	VENUS −3.8		MARS +1.2		JUPITER −1.5		SATURN +0.6	
		G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d	h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
27	00	274 59.4	226 41.0	N14 55.2	231 51.5	N15 36.1	197 03.8	N22 31.1	137 34.7	N17 22.5
	01	290 01.9	241 40.9	55.8	246 52.2	36.6	212 05.6	31.1	152 36.9	22.4
	02	305 04.4	256 40.8	56.5	261 52.8	37.2	227 07.5	31.2	167 39.1	22.3
	03	320 06.8	271 40.7	·· 57.2	276 53.5	·· 37.7	242 09.4	·· 31.2	182 41.3	·· 22.2
	04	335 09.3	286 40.7	57.9	291 54.2	38.3	257 11.2	31.3	197 43.4	22.1
	05	350 11.8	301 40.6	58.5	306 54.9	38.8	272 13.1	31.3	212 45.6	22.1
	06	5 14.2	316 40.5	N14 59.2	321 55.5	N15 39.4	287 14.9	N22 31.4	227 47.8	N17 22.0
	07	20 16.7	331 40.4	14 59.9	336 56.2	39.9	302 16.8	31.4	242 50.0	21.9
	08	35 19.2	346 40.3	15 00.6	351 56.9	40.4	317 18.6	31.5	257 52.2	21.8
MON	09	50 21.6	1 40.2	·· 01.2	6 57.6	·· 41.0	332 20.5	·· 31.5	272 54.4	·· 21.8
	10	65 24.1	16 40.1	01.9	21 58.2	41.5	347 22.3	31.6	287 56.6	21.7
	11	80 26.6	31 40.0	02.6	36 58.9	42.1	2 24.2	31.6	302 58.8	21.6
	12	95 29.0	46 39.9	N15 03.3	51 59.6	N15 42.6	17 26.0	N22 31.7	318 01.0	N17 21.5
DAY	13	110 31.5	61 39.8	03.9	67 00.3	43.2	32 27.9	31.7	333 03.2	21.4
	14	125 33.9	76 39.7	04.6	82 00.9	43.7	47 29.7	31.8	348 05.4	21.4
	15	140 36.4	91 39.7	·· 05.3	97 01.6	·· 44.3	62 31.6	·· 31.8	3 07.5	·· 21.3
	16	155 38.9	106 39.6	06.0	112 02.3	44.8	77 33.4	31.9	18 09.7	21.2
	17	170 41.3	121 39.5	06.6	127 03.0	45.3	92 35.3	31.9	33 11.9	21.1
	18	185 43.8	136 39.4	N15 07.3	142 03.6	N15 45.9	107 37.1	N22 32.0	48 14.1	N17 21.0
	19	200 46.3	151 39.3	08.0	157 04.3	46.4	122 39.0	32.0	63 16.3	21.0
	20	215 48.7	166 39.2	08.6	172 05.0	47.0	137 40.8	32.1	78 18.5	20.9
	21	230 51.2	181 39.1	·· 09.3	187 05.7	·· 47.5	152 42.7	·· 32.1	93 20.7	·· 20.8
	22	245 53.7	196 39.0	10.0	202 06.3	48.1	167 44.6	32.2	108 22.9	20.7
	23	260 56.1	211 38.9	10.7	217 07.0	48.6	182 46.4	32.2	123 25.1	20.6
28	00	275 58.6	226 38.8	N15 11.3	232 07.7	N15 49.1	197 48.3	N22 32.3	138 27.3	N17 20.6
	01	291 01.1	241 38.7	12.0	247 08.4	49.7	212 50.1	32.3	153 29.4	20.5
	02	306 03.5	256 38.6	12.7	262 09.0	50.2	227 52.0	32.4	168 31.6	20.4
	03	321 06.0	271 38.5	·· 13.3	277 09.7	·· 50.8	242 53.8	·· 32.4	183 33.8	·· 20.3
	04	336 08.4	286 38.3	14.0	292 10.4	51.3	257 55.7	32.5	198 36.0	20.2
	05	351 10.9	301 38.2	14.7	307 11.1	51.8	272 57.5	32.5	213 38.2	20.2
	06	6 13.4	316 38.1	N15 15.4	322 11.7	N15 52.4	287 59.4	N22 32.5	228 40.4	N17 20.1
	07	21 15.8	331 38.0	16.0	337 12.4	52.9	303 01.2	32.6	243 42.6	20.0
	08	36 18.3	346 37.9	16.7	352 13.1	53.5	318 03.1	32.6	258 44.8	19.9
TUE	09	51 20.8	1 37.8	·· 17.4	7 13.8	·· 54.0	333 04.9	·· 32.7	273 47.0	·· 19.8
	10	66 23.2	16 37.7	18.0	22 14.4	54.5	348 06.8	32.7	288 49.1	19.8
	11	81 25.7	31 37.6	18.7	37 15.1	55.1	3 08.6	32.8	303 51.3	19.7
	12	96 28.2	46 37.5	N15 19.4	52 15.8	N15 55.6	18 10.5	N22 32.8	318 53.5	N17 19.6
DAY	13	111 30.6	61 37.4	20.0	67 16.5	56.2	33 12.4	32.9	333 55.7	19.5
	14	126 33.1	76 37.3	20.7	82 17.1	56.7	48 14.2	32.9	348 57.9	19.4
	15	141 35.5	91 37.1	·· 21.4	97 17.8	·· 57.2	63 16.1	·· 33.0	4 00.1	·· 19.4
	16	156 38.0	106 37.0	22.0	112 18.5	57.8	78 17.9	33.0	19 02.3	19.3
	17	171 40.5	121 36.9	22.7	127 19.2	58.3	93 19.8	33.1	34 04.5	19.2
	18	186 42.9	136 36.8	N15 23.4	142 19.8	N15 58.8	108 21.6	N22 33.1	49 06.7	N17 19.1
	19	201 45.4	151 36.7	24.0	157 20.5	59.4	123 23.5	33.2	64 08.8	19.0
	20	216 47.9	166 36.6	24.7	172 21.2	15 59.9	138 25.3	33.2	79 11.0	19.0
	21	231 50.3	181 36.5	·· 25.4	187 21.9	16 00.4	153 27.2	·· 33.3	94 13.2	·· 18.9
	22	246 52.8	196 36.3	26.0	202 22.5	01.0	168 29.0	33.3	109 15.4	18.8
	23	261 55.3	211 36.2	26.7	217 23.2	01.5	183 30.9	33.4	124 17.6	18.7
29	00	276 57.7	226 36.1	N15 27.4	232 23.9	N16 02.1	198 32.7	N22 33.4	139 19.8	N17 18.6
	01	292 00.2	241 36.0	28.0	247 24.6	02.6	213 34.6	33.5	154 22.0	18.6
	02	307 02.7	256 35.9	28.7	262 25.2	03.1	228 36.5	33.5	169 24.2	18.5
	03	322 05.1	271 35.7	·· 29.4	277 25.9	·· 03.7	243 38.3	·· 33.6	184 26.3	·· 18.4
	04	337 07.6	286 35.6	30.0	292 26.6	04.2	258 40.2	33.6	199 28.5	18.3
	05	352 10.0	301 35.5	30.7	307 27.3	04.7	273 42.0	33.7	214 30.7	18.2
	06	7 12.5	316 35.4	N15 31.3	322 27.9	N16 05.3	288 43.9	N22 33.7	229 32.9	N17 18.2
	07	22 15.0	331 35.3	32.0	337 28.6	05.8	303 45.7	33.8	244 35.1	18.1
WED	08	37 17.4	346 35.1	32.7	352 29.3	06.3	318 47.6	33.8	259 37.3	18.0
	09	52 19.9	1 35.0	·· 33.3	7 29.9	·· 06.9	333 49.4	·· 33.9	274 39.5	·· 17.9
	10	67 22.4	16 34.9	34.0	22 30.6	07.4	348 51.3	33.9	289 41.7	17.8
	11	82 24.8	31 34.7	34.7	37 31.3	07.9	3 53.1	33.9	304 43.8	17.8
	12	97 27.3	46 34.6	N15 35.3	52 32.0	N16 08.4	18 55.0	N22 34.0	319 46.0	N17 17.7
NESDAY	13	112 29.8	61 34.5	36.0	67 32.6	09.0	33 56.9	34.0	334 48.2	17.6
	14	127 32.2	76 34.4	36.6	82 33.3	09.5	48 58.7	34.1	349 50.4	17.5
	15	142 34.7	91 34.2	·· 37.3	97 34.0	·· 10.0	64 00.6	·· 34.1	4 52.6	·· 17.4
	16	157 37.2	106 34.1	38.0	112 34.7	10.6	79 02.4	34.2	19 54.8	17.4
	17	172 39.6	121 34.0	38.6	127 35.3	11.1	94 04.3	34.2	34 57.0	17.3
	18	187 42.1	136 33.8	N15 39.3	142 36.0	N16 11.6	109 06.1	N22 34.3	49 59.1	N17 17.2
	19	202 44.5	151 33.7	39.9	157 36.7	12.2	124 08.0	34.3	65 01.3	17.1
	20	217 47.0	166 33.6	40.6	172 37.4	12.7	139 09.8	34.4	80 03.5	17.0
	21	232 49.5	181 33.4	·· 41.3	187 38.0	·· 13.2	154 11.7	·· 34.4	95 05.7	·· 17.0
	22	247 51.9	196 33.3	41.9	202 38.7	13.7	169 13.6	34.5	110 07.9	16.9
	23	262 54.4	211 33.2	42.6	217 39.4	14.3	184 15.4	34.5	125 10.1	16.8
Mer. Pass.		h m 5 35.2	v −0.1	d 0.7	v 0.7	d 0.5	v 1.9	d 0.0	v 2.2	d 0.1

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 39.2	S40 23.6
Achernar	335 47.2	S57 20.8
Acrux	173 39.5	S62 58.8
Adhara	255 34.2	S28 56.6
Aldebaran	291 20.8	N16 27.8
Alioth	166 44.4	N56 05.2
Alkaid	153 20.1	N49 25.8
Al Na'ir	28 17.4	S47 03.9
Alnilam	276 14.2	S 1 13.0
Alphard	218 22.9	S 8 33.8
Alphecca	126 33.7	N26 47.6
Alpheratz	358 11.5	N29 57.9
Altair	62 34.3	N 8 48.6
Ankaa	353 42.4	S42 25.4
Antares	112 59.2	S26 22.9
Arcturus	146 20.3	N19 18.1
Atria	108 24.8	S68 59.3
Avior	234 29.6	S59 26.5
Bellatrix	279 01.4	N 6 19.7
Betelgeuse	271 31.0	N 7 24.1
Canopus	264 08.7	S52 41.1
Capella	281 15.0	N45 58.4
Deneb	49 49.5	N45 12.0
Denebola	183 01.3	N14 41.9
Diphda	349 23.1	S18 06.5
Dubhe	194 25.2	N61 52.6
Elnath	278 47.2	N28 35.2
Eltanin	90 58.2	N51 29.7
Enif	34 13.5	N 9 46.4
Fomalhaut	15 53.7	S29 44.3
Gacrux	172 31.0	S56 59.5
Gienah	176 20.2	S17 25.1
Hadar	149 26.0	S60 16.1
Hamal	328 31.5	N23 21.2
Kaus Aust.	84 19.3	S34 23.6
Kochab	137 18.3	N74 15.2
Markab	14 05.2	N15 05.0
Menkar	314 43.6	N 4 00.1
Menkent	148 39.3	S36 15.7
Miaplacidus	221 46.0	S69 37.8
Mirfak	309 19.5	N49 46.7
Nunki	76 31.5	S26 19.4
Peacock	54 01.3	S56 48.2
Pollux	244 01.2	N28 04.8
Procyon	245 28.4	N 5 16.9
Rasalhague	96 31.3	N12 34.7
Regulus	208 12.5	N12 04.6
Rigel	281 38.4	S 8 13.7
Rigil Kent.	140 28.3	S60 44.7
Sabik	102 43.3	S15 41.8
Schedar	350 11.4	N56 24.6
Shaula	96 58.3	S37 05.2
Sirius	258 58.0	S16 41.2
Spica	158 59.7	S11 02.7
Suhail	223 12.7	S43 20.7
Vega	80 56.9	N38 45.9
Zuben'ubi	137 35.2	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	310 40.2	8 53
Mars	316 09.1	8 31
Jupiter	281 49.7	10 47
Saturn	222 28.7	14 44

0000 JUNE 27, 28, 29 (MON., TUES., WED.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.		MOON G.H.A.	v	MOON Dec.	d	H.P.
d	h	° ′	° ′		° ′	′	° ′	′	′
27	00	179 17.1	N23 20.2		59 31.9	7.5	S12 38.8	8.7	59.9
	01	194 16.9	20.1		73 58.4	7.4	12 47.5	8.7	59.9
	02	209 16.8	20.0		88 24.8	7.3	12 56.2	8.6	59.9
	03	224 16.7	19.9	••	102 51.1	7.2	13 04.8	8.5	60.0
	04	239 16.5	19.8		117 17.3	7.2	13 13.3	8.5	60.0
	05	254 16.4	19.7		131 43.5	7.0	13 21.8	8.4	60.0
	06	269 16.3	N23 19.6		146 09.5	7.0	S13 30.2	8.2	60.1
	07	284 16.2	19.5		160 35.5	6.9	13 38.4	8.3	60.1
	08	299 16.0	19.4		175 01.4	6.9	13 46.7	8.1	60.1
MONDAY	09	314 15.9	19.3	••	189 27.3	6.7	13 54.8	8.0	60.1
	10	329 15.8	19.2		203 53.0	6.7	14 02.8	8.0	60.2
	11	344 15.6	19.1		218 18.7	6.6	14 10.8	7.9	60.2
	12	359 15.5	N23 19.0		232 44.3	6.5	S14 18.7	7.8	60.2
	13	14 15.4	18.9		247 09.8	6.5	14 26.5	7.7	60.2
	14	29 15.2	18.8		261 35.3	6.4	14 34.2	7.6	60.3
	15	44 15.1	18.7	••	276 00.7	6.3	14 41.8	7.5	60.3
	16	59 15.0	18.6		290 26.0	6.2	14 49.3	7.4	60.3
	17	74 14.9	18.5		304 51.2	6.2	14 56.7	7.3	60.3
	18	89 14.7	N23 18.3		319 16.4	6.0	S15 04.0	7.3	60.4
	19	104 14.6	18.2		333 41.4	6.0	15 11.3	7.1	60.4
	20	119 14.5	18.1		348 06.4	6.0	15 18.4	7.0	60.4
	21	134 14.3	18.0	••	2 31.4	5.8	15 25.4	7.0	60.4
	22	149 14.2	17.9		16 56.2	5.8	15 32.4	6.8	60.5
	23	164 14.1	17.8		31 21.0	5.7	15 39.2	6.8	60.5
28	00	179 14.0	N23 17.7		45 45.7	5.6	S15 46.0	6.6	60.5
	01	194 13.8	17.6		60 10.3	5.6	15 52.6	6.5	60.5
	02	209 13.7	17.5		74 34.9	5.5	15 59.1	6.5	60.5
	03	224 13.6	17.4	••	88 59.4	5.4	16 05.6	6.3	60.6
	04	239 13.5	17.2		103 23.8	5.4	16 11.9	6.2	60.6
	05	254 13.3	17.1		117 48.2	5.3	16 18.1	6.1	60.6
	06	269 13.2	N23 17.0		132 12.5	5.2	S16 24.2	6.0	60.6
	07	284 13.1	16.9		146 36.7	5.2	16 30.2	5.9	60.6
	08	299 12.9	16.8		161 00.9	5.1	16 36.1	5.7	60.7
TUESDAY	09	314 12.8	16.7	••	175 25.0	5.0	16 41.8	5.7	60.7
	10	329 12.7	16.5		189 49.0	5.0	16 47.5	5.5	60.7
	11	344 12.6	16.4		204 13.0	4.9	16 53.0	5.5	60.7
	12	359 12.4	N23 16.3		218 36.9	4.8	S16 58.5	5.3	60.7
	13	14 12.3	16.2		233 00.7	4.8	17 03.8	5.1	60.8
	14	29 12.2	16.1		247 24.5	4.8	17 08.9	5.1	60.8
	15	44 12.1	15.9	••	261 48.3	4.6	17 14.0	5.0	60.8
	16	59 11.9	15.8		276 11.9	4.6	17 19.0	4.8	60.8
	17	74 11.8	15.7		290 35.5	4.6	17 23.8	4.7	60.8
	18	89 11.7	N23 15.6		304 59.1	4.5	S17 28.5	4.6	60.8
	19	104 11.5	15.5		319 22.6	4.5	17 33.1	4.4	60.8
	20	119 11.4	15.3		333 46.1	4.4	17 37.5	4.4	60.9
	21	134 11.3	15.2	••	348 09.5	4.3	17 41.9	4.2	60.9
	22	149 11.2	15.1		2 32.8	4.3	17 46.1	4.0	60.9
	23	164 11.0	14.9		16 56.1	4.3	17 50.1	4.0	60.9
29	00	179 10.9	N23 14.8		31 19.4	4.2	S17 54.1	3.8	60.9
	01	194 10.8	14.7		45 42.6	4.1	17 57.9	3.7	60.9
	02	209 10.7	14.6		60 05.7	4.1	18 01.6	3.6	60.9
	03	224 10.5	14.4	••	74 28.8	4.1	18 05.2	3.4	60.9
	04	239 10.4	14.3		88 51.9	4.1	18 08.6	3.3	61.0
	05	254 10.3	14.2		103 15.0	4.0	18 11.9	3.1	61.0
	06	269 10.2	N23 14.0		117 38.0	3.9	S18 15.0	3.1	61.0
	07	284 10.0	13.9		132 00.9	3.9	18 18.1	2.9	61.0
WEDNESDAY	08	299 09.9	13.8		146 23.8	3.9	18 21.0	2.7	61.0
	09	314 09.8	13.6	••	160 46.7	3.9	18 23.7	2.7	61.0
	10	329 09.7	13.5		175 09.6	3.8	18 26.4	2.4	61.0
	11	344 09.5	13.4		189 32.4	3.8	18 28.8	2.4	61.0
	12	359 09.4	N23 13.2		203 55.2	3.8	S18 31.2	2.2	61.0
	13	14 09.3	13.1		218 18.0	3.7	18 33.4	2.1	61.0
	14	29 09.2	13.0		232 40.7	3.8	18 35.5	1.9	61.0
	15	44 09.0	12.8	••	247 03.5	3.7	18 37.4	1.8	61.0
	16	59 08.9	12.7		261 26.2	3.7	18 39.2	1.7	61.0
	17	74 08.8	12.5		275 48.9	3.6	18 40.9	1.5	61.0
	18	89 08.7	N23 12.4		290 11.5	3.7	S18 42.4	1.4	61.0
	19	104 08.5	12.3		304 34.2	3.6	18 43.8	1.3	61.0
	20	119 08.4	12.1		318 56.8	3.6	18 45.1	1.1	61.0
	21	134 08.3	12.0	••	333 19.4	3.6	18 46.2	0.9	61.0
	22	149 08.2	11.8		347 42.0	3.6	18 47.1	0.9	61.0
	23	164 08.0	11.7		2 04.6	3.6	18 48.0	0.6	61.0
		S.D. 15.8	d 0.1		S.D. 16.4		16.5		16.6

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

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

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
	m s	m s	h m	h m	h m	d	
27	02 52	02 58	12 03	20 49	08 21	11	◐
28	03 04	03 10	12 03	21 49	09 19	12	
29	03 16	03 22	12 03	22 51	10 20	13	

0000 SEPTEMBER 10, 11, 12 (SAT., SUN., MON.)

G.M.T. (UT)	ARIES	VENUS −3.4		MARS +0.9		JUPITER −1.8		SATURN +0.8	
	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
10 00	348 54.8	211 36.8	N16 42.5	252 56.6	N23 31.5	255 33.6	N23 00.8	202 21.2	N14 33.6
01	3 57.3	226 36.2	41.7	267 57.4	31.5	270 35.7	00.8	217 23.3	33.5
02	18 59.8	241 35.6	41.0	282 58.3	31.5	285 37.8	00.8	232 25.5	33.4
03	34 02.2	256 35.1	·· 40.2	297 59.1	·· 31.5	300 39.9	·· 00.8	247 27.7	·· 33.3
04	49 04.7	271 34.5	39.4	312 59.9	31.5	315 42.0	00.8	262 29.8	33.2
05	64 07.2	286 33.9	38.7	328 00.8	31.5	330 44.1	00.8	277 32.0	33.1
06	79 09.6	301 33.4	N16 37.9	343 01.6	N23 31.4	345 46.3	N23 00.8	292 34.2	N14 33.0
07	94 12.1	316 32.8	37.2	358 02.4	31.4	0 48.4	00.8	307 36.3	32.9
S 08	109 14.6	331 32.2	36.4	13 03.3	31.4	15 50.5	00.8	322 38.5	32.8
A 09	124 17.0	346 31.6	·· 35.6	28 04.1	·· 31.4	30 52.6	·· 00.8	337 40.7	·· 32.7
T 10	139 19.5	1 31.1	34.9	43 04.9	31.4	45 54.7	00.7	352 42.8	32.6
U 11	154 21.9	16 30.5	34.1	58 05.8	31.4	60 56.8	00.7	7 45.0	32.5
R 12	169 24.4	31 29.9	N16 33.3	73 06.6	N23 31.3	75 58.9	N23 00.7	22 47.2	N14 32.4
D 13	184 26.9	46 29.4	32.6	88 07.4	31.3	91 01.1	00.7	37 49.3	32.3
A 14	199 29.3	61 28.8	31.8	103 08.3	31.3	106 03.2	00.7	52 51.5	32.2
Y 15	214 31.8	76 28.2	·· 31.0	118 09.1	·· 31.3	121 05.3	·· 00.7	67 53.7	·· 32.1
16	229 34.3	91 27.7	30.2	133 09.9	31.3	136 07.4	00.7	82 55.8	32.0
17	244 36.7	106 27.1	29.5	148 10.8	31.3	151 09.5	00.7	97 58.0	32.0
18	259 39.2	121 26.5	N16 28.7	163 11.6	N23 31.2	166 11.6	N23 00.7	113 00.2	N14 31.9
19	274 41.7	136 26.0	27.9	178 12.4	31.2	181 13.8	00.7	128 02.3	31.8
20	289 44.1	151 25.4	27.1	193 13.3	31.2	196 15.9	00.7	143 04.5	31.7
21	304 46.6	166 24.9	·· 26.4	208 14.1	·· 31.2	211 18.0	·· 00.7	158 06.7	·· 31.6
22	319 49.0	181 24.3	25.6	223 15.0	31.2	226 20.1	00.7	173 08.8	31.5
23	334 51.5	196 23.7	24.8	238 15.8	31.1	241 22.2	00.7	188 11.0	31.4
11 00	349 54.0	211 23.2	N16 24.0	253 16.6	N23 31.1	256 24.4	N23 00.7	203 13.2	N14 31.3
01	4 56.4	226 22.6	23.3	268 17.5	31.1	271 26.5	00.7	218 15.4	31.2
02	19 58.9	241 22.0	22.5	283 18.3	31.1	286 28.6	00.7	233 17.5	31.1
03	35 01.4	256 21.5	·· 21.7	298 19.1	·· 31.1	301 30.7	·· 00.6	248 19.7	·· 31.0
04	50 03.8	271 20.9	20.9	313 20.0	31.0	316 32.8	00.6	263 21.9	30.9
05	65 06.3	286 20.3	20.1	328 20.8	31.0	331 35.0	00.6	278 24.0	30.8
06	80 08.8	301 19.8	N16 19.4	343 21.7	N23 31.0	346 37.1	N23 00.6	293 26.2	N14 30.7
07	95 11.2	316 19.2	18.6	358 22.5	31.0	1 39.2	00.6	308 28.4	30.6
08	110 13.7	331 18.7	17.8	13 23.3	30.9	16 41.3	00.6	323 30.5	30.5
S 09	125 16.2	346 18.1	·· 17.0	28 24.2	·· 30.9	31 43.4	·· 00.6	338 32.7	·· 30.4
U 10	140 18.6	1 17.5	16.2	43 25.0	30.9	46 45.6	00.6	353 34.9	30.3
N 11	155 21.1	16 17.0	15.4	58 25.9	30.9	61 47.7	00.6	8 37.0	30.2
D 12	170 23.5	31 16.4	N16 14.7	73 26.7	N23 30.9	76 49.8	N23 00.6	23 39.2	N14 30.1
A 13	185 26.0	46 15.9	13.9	88 27.6	30.8	91 51.9	00.6	38 41.4	30.0
Y 14	200 28.5	61 15.3	13.1	103 28.4	30.8	106 54.0	00.6	53 43.5	29.9
15	215 30.9	76 14.7	·· 12.3	118 29.2	·· 30.8	121 56.2	·· 00.6	68 45.7	·· 29.9
16	230 33.4	91 14.2	11.5	133 30.1	30.8	136 58.3	00.6	83 47.9	29.8
17	245 35.9	106 13.6	10.7	148 30.9	30.7	152 00.4	00.6	98 50.1	29.7
18	260 38.3	121 13.1	N16 09.9	163 31.8	N23 30.7	167 02.5	N23 00.6	113 52.2	N14 29.6
19	275 40.8	136 12.5	09.1	178 32.6	30.7	182 04.7	00.5	128 54.4	29.5
20	290 43.3	151 11.9	08.3	193 33.5	30.7	197 06.8	00.5	143 56.6	29.4
21	305 45.7	166 11.4	·· 07.5	208 34.3	·· 30.6	212 08.9	·· 00.5	158 58.7	·· 29.3
22	320 48.2	181 10.8	06.7	223 35.1	30.6	227 11.0	00.5	174 00.9	29.2
23	335 50.7	196 10.3	05.9	238 36.0	30.6	242 13.2	00.5	189 03.1	29.1
12 00	350 53.1	211 09.7	N16 05.1	253 36.8	N23 30.6	257 15.3	N23 00.5	204 05.2	N14 29.0
01	5 55.6	226 09.2	04.3	268 37.7	30.5	272 17.4	00.5	219 07.4	28.9
02	20 58.0	241 08.6	03.5	283 38.5	30.5	287 19.5	00.5	234 09.6	28.8
03	36 00.5	256 08.0	·· 02.7	298 39.4	·· 30.5	302 21.7	·· 00.5	249 11.8	·· 28.7
04	51 03.0	271 07.5	01.9	313 40.2	30.4	317 23.8	00.5	264 13.9	28.6
05	66 05.4	286 06.9	01.1	328 41.1	30.4	332 25.9	00.5	279 16.1	28.5
06	81 07.9	301 06.4	N16 00.3	343 41.9	N23 30.4	347 28.0	N23 00.5	294 18.3	N14 28.4
07	96 10.4	316 05.8	15 59.5	358 42.8	30.4	2 30.2	00.5	309 20.4	28.3
08	111 12.8	331 05.3	58.7	13 43.6	30.3	17 32.3	00.5	324 22.6	28.2
M 09	126 15.3	346 04.7	·· 57.9	28 44.5	·· 30.3	32 34.4	·· 00.5	339 24.8	·· 28.1
O 10	141 17.8	1 04.2	57.1	43 45.3	30.3	47 36.6	00.5	354 26.9	28.0
N 11	156 20.2	16 03.6	56.3	58 46.2	30.2	62 38.7	00.4	9 29.1	27.9
D 12	171 22.7	31 03.0	N15 55.5	73 47.0	N23 30.2	77 40.8	N23 00.4	24 31.3	N14 27.9
A 13	186 25.1	46 02.5	54.7	88 47.9	30.2	92 42.9	00.4	39 33.5	27.8
Y 14	201 27.6	61 01.9	53.9	103 48.7	30.2	107 45.1	00.4	54 35.6	27.7
15	216 30.1	76 01.4	·· 53.1	118 49.6	·· 30.1	122 47.2	·· 00.4	69 37.8	·· 27.6
16	231 32.5	91 00.8	52.3	133 50.4	30.1	137 49.3	00.4	84 40.0	27.5
17	246 35.0	106 00.3	51.5	148 51.3	30.1	152 51.5	00.4	99 42.1	27.4
18	261 37.5	120 59.7	N15 50.7	163 52.1	N23 30.0	167 53.6	N23 00.4	114 44.3	N14 27.3
19	276 39.9	135 59.2	49.9	178 53.0	30.0	182 55.7	00.4	129 46.5	27.2
20	291 42.4	150 58.6	49.0	193 53.8	30.0	197 57.9	00.4	144 48.7	27.1
21	306 44.9	165 58.1	·· 48.2	208 54.7	·· 29.9	213 00.0	·· 00.4	159 50.8	·· 27.0
22	321 47.3	180 57.5	47.4	223 55.5	29.9	228 02.1	00.4	174 53.0	26.9
23	336 49.8	195 57.0	46.6	238 56.4	29.9	243 04.2	00.4	189 55.2	26.8
Mer. Pass.	h m 0 40.3	v −0.6	d 0.8	v 0.8	d 0.0	v 2.1	d 0.0	v 2.2	d 0.1

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.6	S40 23.4
Achernar	335 46.4	S57 20.8
Acrux	173 40.0	S62 58.6
Adhara	255 33.9	S28 56.3
Aldebaran	291 20.3	N16 27.9
Alioth	166 44.9	N56 05.0
Alkaid	153 20.5	N49 25.7
Al Na'ir	28 17.1	S47 04.1
Alnilam	276 13.7	S 1 12.9
Alphard	218 22.8	S 8 33.6
Alphecca	126 34.0	N26 47.7
Alpheratz	358 11.0	N28 58.2
Altair	62 34.3	N 8 48.8
Ankaa	353 41.9	S42 25.4
Antares	112 59.4	S26 22.9
Arcturus	146 20.6	N19 18.1
Atria	108 25.5	S68 59.5
Avior	234 29.4	S59 26.1
Bellatrix	279 00.9	N 6 19.8
Betelgeuse	271 30.5	N 7 24.2
Canopus	264 08.3	S52 40.8
Capella	281 14.3	N45 58.4
Deneb	49 49.5	N45 12.4
Denebola	183 01.4	N14 41.9
Diphda	349 22.6	S18 06.4
Dubhe	194 25.4	N61 52.3
Elnath	278 46.7	N28 35.2
Eltanin	90 58.6	N51 29.9
Enif	34 13.3	N 9 46.6
Fomalhaut	15 53.3	S29 44.3
Gacrux	172 31.5	S56 59.3
Gienah	176 20.4	S17 25.0
Hadar	149 26.6	S60 16.0
Hamal	328 30.9	N23 21.5
Kaus Aust.	84 19.4	S34 23.7
Kochab	137 19.7	N74 15.2
Markab	14 04.8	N15 05.3
Menkar	314 43.1	N 4 00.2
Menkent	148 39.6	S36 15.6
Miaplacidus	221 46.0	S69 37.4
Mirfak	309 18.7	N49 46.8
Nunki	76 31.5	S26 19.4
Peacock	54 01.2	S56 48.4
Pollux	244 00.9	N28 04.7
Procyon	245 28.1	N 5 17.0
Rasalhague	96 31.4	N12 34.8
Regulus	208 12.5	N12 04.6
Rigel	281 38.0	S 8 13.5
Rigil Kent.	140 28.9	S60 44.7
Sabik	102 43.5	S15 41.7
Schedar	350 10.7	N56 24.9
Shaula	96 58.5	S37 05.3
Sirius	258 57.6	S16 41.0
Spica	158 59.9	S11 02.6
Suhail	223 12.6	S43 20.4
Vega	80 57.1	N38 46.2
Zuben'ubi	137 35.5	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	221 29.2	9 55
Mars	263 22.7	7 06
Jupiter	266 30.4	6 53
Saturn	213 19.2	10 26

0000 SEPTEMBER 10, 11, 12 (SAT., SUN., MON.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
10	00	180 42.8	N 5 03.9	221 38.7	11.9	N14 00.2	6.6	55.7
	01	195 43.0	03.0	236 09.6	11.9	13 53.6	6.7	55.7
	02	210 43.2	02.0	250 40.5	11.8	13 46.9	6.8	55.7
	03	225 43.4	·· 01.1	265 11.3	11.9	13 40.1	6.9	55.7
	04	240 43.7	5 00.1	279 42.2	11.9	13 33.2	6.9	55.8
	05	255 43.9	4 59.2	294 13.1	11.9	13 26.3	7.0	55.8
	06	270 44.1	N 4 58.2	308 44.0	11.9	N13 19.3	7.1	55.8
	07	285 44.3	57.3	323 14.9	11.8	13 12.2	7.2	55.8
S	08	300 44.5	56.3	337 45.7	11.9	13 05.0	7.2	55.9
A	09	315 44.7	·· 55.4	352 16.6	11.9	12 57.8	7.3	55.9
T	10	330 45.0	54.4	6 47.5	11.9	12 50.5	7.3	55.9
U	11	345 45.2	53.5	21 18.4	11.8	12 43.2	7.5	55.9
R	12	0 45.4	N 4 52.5	35 49.2	11.9	N12 35.7	7.4	56.0
D	13	15 45.6	51.6	50 20.1	11.9	12 28.3	7.6	56.0
A	14	30 45.8	50.7	64 51.0	11.8	12 20.7	7.7	56.0
Y	15	45 46.0	·· 49.7	79 21.8	11.9	12 13.0	7.7	56.1
	16	60 46.3	48.8	93 52.7	11.9	12 05.3	7.7	56.1
	17	75 46.5	47.8	108 23.6	11.8	11 57.6	7.9	56.1
	18	90 46.7	N 4 46.9	122 54.4	11.9	N11 49.7	7.9	56.1
	19	105 46.9	45.9	137 25.3	11.8	11 41.8	7.9	56.2
	20	120 47.1	45.0	151 56.1	11.9	11 33.9	8.1	56.2
	21	135 47.3	·· 44.0	166 27.0	11.8	11 25.8	8.1	56.2
	22	150 47.6	43.1	180 57.8	11.9	11 17.7	8.1	56.2
	23	165 47.8	42.1	195 28.7	11.8	11 09.6	8.3	56.3
11	00	180 48.0	N 4 41.2	209 59.5	11.9	N11 01.3	8.3	56.3
	01	195 48.2	40.2	224 30.4	11.8	10 53.0	8.3	56.3
	02	210 48.4	39.3	239 01.2	11.8	10 44.7	8.4	56.4
	03	225 48.7	·· 38.3	253 32.0	11.8	10 36.3	8.5	56.4
	04	240 48.9	37.4	268 02.8	11.9	10 27.8	8.5	56.4
	05	255 49.1	36.4	282 33.7	11.8	10 19.3	8.6	56.4
	06	270 49.3	N 4 35.5	297 04.5	11.8	N10 10.7	8.7	56.5
	07	285 49.5	34.5	311 35.3	11.8	10 02.0	8.7	56.5
	08	300 49.7	33.6	326 06.1	11.8	9 53.3	8.8	56.5
S	09	315 50.0	·· 32.6	340 36.9	11.8	9 44.5	8.8	56.5
U	10	330 50.2	31.7	355 07.7	11.8	9 35.7	8.9	56.6
N	11	345 50.4	30.7	9 38.5	11.8	9 26.8	9.0	56.6
D	12	0 50.6	N 4 29.8	24 09.3	11.8	N 9 17.8	9.0	56.6
A	13	15 50.8	28.8	38 40.1	11.7	9 08.8	9.0	56.7
Y	14	30 51.1	27.9	53 10.8	11.8	8 59.8	9.1	56.7
	15	45 51.3	·· 26.9	67 41.6	11.8	8 50.7	9.2	56.7
	16	60 51.5	25.9	82 12.4	11.7	8 41.5	9.2	56.7
	17	75 51.7	25.0	96 43.1	11.8	8 32.3	9.3	56.8
	18	90 51.9	N 4 24.0	111 13.9	11.7	N 8 23.0	9.3	56.8
	19	105 52.2	23.1	125 44.6	11.7	8 13.7	9.4	56.8
	20	120 52.4	22.1	140 15.3	11.8	8 04.3	9.4	56.9
	21	135 52.6	·· 21.2	154 46.1	11.7	7 54.9	9.5	56.9
	22	150 52.8	20.2	169 16.8	11.7	7 45.4	9.5	56.9
	23	165 53.0	19.3	183 47.5	11.7	7 35.9	9.6	56.9
12	00	180 53.2	N 4 18.3	198 18.2	11.7	N 7 26.3	9.6	57.0
	01	195 53.5	17.4	212 48.9	11.6	7 16.7	9.6	57.0
	02	210 53.7	16.4	227 19.5	11.7	7 07.1	9.7	57.0
	03	225 53.9	·· 15.5	241 50.2	11.7	6 57.4	9.8	57.0
	04	240 54.1	14.5	256 20.9	11.6	6 47.6	9.8	57.1
	05	255 54.3	13.6	270 51.5	11.6	6 37.8	9.8	57.1
	06	270 54.6	N 4 12.6	285 22.1	11.7	N 6 28.0	9.9	57.1
	07	285 54.8	11.7	299 52.8	11.6	6 18.1	10.0	57.2
	08	300 55.0	10.7	314 23.4	11.6	6 08.1	9.9	57.2
M	09	315 55.2	·· 09.7	328 54.0	11.6	5 58.2	10.0	57.2
O	10	330 55.4	08.8	343 24.6	11.5	5 48.2	10.1	57.2
N	11	345 55.7	07.8	357 55.1	11.6	5 38.1	10.1	57.3
D	12	0 55.9	N 4 06.9	12 25.7	11.5	N 5 28.0	10.1	57.3
A	13	15 56.1	05.9	26 56.2	11.6	5 17.9	10.1	57.3
Y	14	30 56.3	05.0	41 26.8	11.5	5 07.8	10.2	57.4
	15	45 56.5	·· 04.0	55 57.3	11.5	4 57.6	10.3	57.4
	16	60 56.8	03.1	70 27.8	11.5	4 47.3	10.2	57.4
	17	75 57.0	02.1	84 58.3	11.5	4 37.1	10.3	57.4
	18	90 57.2	N 4 01.2	99 28.8	11.4	N 4 26.8	10.4	57.5
	19	105 57.4	4 00.2	113 59.2	11.5	4 16.4	10.3	57.5
	20	120 57.6	3 59.2	128 29.7	11.4	4 06.1	10.4	57.5
	21	135 57.9	·· 58.3	143 00.1	11.4	3 55.7	10.5	57.5
	22	150 58.1	57.3	157 30.5	11.4	3 45.2	10.4	57.6
	23	165 58.3	56.4	172 00.9	11.4	3 34.8	10.5	57.6
		S.D. 15.9	d 1.0	S.D. 15.3		15.4		15.6

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

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

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
	m s	m s	h m	h m	h m	d	
10	02 51	03 01	11 57	09 32	21 56	27	
11	03 12	03 22	11 57	10 20	22 44	28	●
12	03 33	03 43	11 56	11 09	23 33	29	

G.M.T. (UT)		ARIES	VENUS −3.4		MARS +0.9		JUPITER −1.8		SATURN +0.8	
d	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
13	00	351 52.3	210 56.4	N15 45.8	253 57.2	N23 29.8	258 06.4	N23 00.4	204 57.3	N14 26.7
	01	6 54.7	225 55.9	45.0	268 58.1	29.8	273 08.5	00.4	219 59.5	26.6
	02	21 57.2	240 55.3	44.1	283 58.9	29.8	288 10.6	00.4	235 01.7	26.5
	03	36 59.6	255 54.8	·· 43.3	298 59.8	·· 29.8	303 12.8	·· 00.3	250 03.9	·· 26.4
	04	52 02.1	270 54.2	42.5	314 00.6	29.7	318 14.9	00.3	265 06.0	26.3
	05	67 04.6	285 53.7	41.7	329 01.5	29.7	333 17.0	00.3	280 08.2	26.2
	06	82 07.0	300 53.1	N15 40.9	344 02.3	N23 29.7	348 19.2	N23 00.3	295 10.4	N14 26.1
	07	97 09.5	315 52.6	40.0	359 03.2	29.6	3 21.3	00.3	310 12.5	26.0
	08	112 12.0	330 52.0	39.2	14 04.0	29.6	18 23.4	00.3	325 14.7	26.0
TUESDAY	09	127 14.4	345 51.5	·· 38.4	29 04.9	·· 29.5	33 25.6	·· 00.3	340 16.9	·· 25.9
	10	142 16.9	0 50.9	37.6	44 05.8	29.5	48 27.7	00.3	355 19.1	25.8
	11	157 19.4	15 50.4	36.8	59 06.6	29.5	63 29.8	00.3	10 21.2	25.7
	12	172 21.8	30 49.9	N15 35.9	74 07.5	N23 29.4	78 32.0	N23 00.3	25 23.4	N14 25.6
	13	187 24.3	45 49.3	35.1	89 08.3	29.4	93 34.1	00.3	40 25.6	25.5
	14	202 26.8	60 48.8	34.3	104 09.2	29.4	108 36.3	00.3	55 27.7	25.4
	15	217 29.2	75 48.2	·· 33.4	119 10.0	·· 29.3	123 38.4	·· 00.3	70 29.9	·· 25.3
	16	232 31.7	90 47.7	32.6	134 10.9	29.3	138 40.5	00.3	85 32.1	25.2
	17	247 34.1	105 47.1	31.8	149 11.8	29.3	153 42.7	00.3	100 34.3	25.1
	18	262 36.6	120 46.6	N15 31.0	164 12.6	N23 29.2	168 44.8	N23 00.3	115 36.4	N14 25.0
	19	277 39.1	135 46.0	30.1	179 13.5	29.2	183 46.9	00.2	130 38.6	24.9
	20	292 41.5	150 45.5	29.3	194 14.3	29.2	198 49.1	00.2	145 40.8	24.8
	21	307 44.0	165 44.9	·· 28.5	209 15.2	·· 29.1	213 51.2	·· 00.2	160 42.9	·· 24.7
	22	322 46.5	180 44.4	27.6	224 16.1	29.1	228 53.3	00.2	175 45.1	24.6
	23	337 48.9	195 43.9	26.8	239 16.9	29.0	243 55.5	00.2	190 47.3	24.5
14	00	352 51.4	210 43.3	N15 26.0	254 17.8	N23 29.0	258 57.6	N23 00.2	205 49.5	N14 24.4
	01	7 53.9	225 42.8	25.1	269 18.6	29.0	273 59.8	00.2	220 51.6	24.3
	02	22 56.3	240 42.2	24.3	284 19.5	28.9	289 01.9	00.2	235 53.8	24.3
	03	37 58.8	255 41.7	·· 23.5	299 20.4	·· 28.9	304 04.0	·· 00.2	250 56.0	·· 24.2
	04	53 01.2	270 41.2	22.6	314 21.2	28.9	319 06.2	00.2	265 58.2	24.1
	05	68 03.7	285 40.6	21.8	329 22.1	28.8	334 08.3	00.2	281 00.3	24.0
	06	83 06.2	300 40.1	N15 20.9	344 22.9	N23 28.8	349 10.5	N23 00.2	296 02.5	N14 23.9
	07	98 08.6	315 39.5	20.1	359 23.8	28.7	4 12.6	00.2	311 04.7	23.8
	08	113 11.1	330 39.0	19.3	14 24.7	28.7	19 14.7	00.2	326 06.9	23.7
WEDNESDAY	09	128 13.6	345 38.4	·· 18.4	29 25.5	·· 28.7	34 16.9	·· 00.2	341 09.0	·· 23.6
	10	143 16.0	0 37.9	17.6	44 26.4	28.6	49 19.0	00.1	356 11.2	23.5
	11	158 18.5	15 37.4	16.7	59 27.3	28.6	64 21.2	00.1	11 13.4	23.4
	12	173 21.0	30 36.8	N15 15.9	74 28.1	N23 28.5	79 23.3	N23 00.1	26 15.5	N14 23.3
	13	188 23.4	45 36.3	15.0	89 29.0	28.5	94 25.4	00.1	41 17.7	23.2
	14	203 25.9	60 35.8	14.2	104 29.8	28.4	109 27.6	00.1	56 19.9	23.1
	15	218 28.4	75 35.2	·· 13.4	119 30.7	·· 28.4	124 29.7	·· 00.1	71 22.1	·· 23.0
	16	233 30.8	90 34.7	12.5	134 31.6	28.4	139 31.9	00.1	86 24.2	22.9
	17	248 33.3	105 34.1	11.7	149 32.4	28.3	154 34.0	00.1	101 26.4	22.8
	18	263 35.7	120 33.6	N15 10.8	164 33.3	N23 28.3	169 36.2	N23 00.1	116 28.6	N14 22.7
	19	278 38.2	135 33.1	10.0	179 34.2	28.2	184 38.3	00.1	131 30.8	22.6
	20	293 40.7	150 32.5	09.1	194 35.0	28.2	199 40.5	00.1	146 32.9	22.6
	21	308 43.1	165 32.0	·· 08.3	209 35.9	·· 28.2	214 42.6	·· 00.1	161 35.1	·· 22.5
	22	323 45.6	180 31.5	07.4	224 36.8	28.1	229 44.7	00.1	176 37.3	22.4
	23	338 48.1	195 30.9	06.6	239 37.6	28.1	244 46.9	00.1	191 39.5	22.3
15	00	353 50.5	210 30.4	N15 05.7	254 38.5	N23 28.0	259 49.0	N23 00.1	206 41.6	N14 22.2
	01	8 53.0	225 29.8	04.9	269 39.4	28.0	274 51.2	00.1	221 43.8	22.1
	02	23 55.5	240 29.3	04.0	284 40.2	27.9	289 53.3	00.0	236 46.0	22.0
	03	38 57.9	255 28.8	·· 03.1	299 41.1	·· 27.9	304 55.5	·· 00.0	251 48.2	·· 21.9
	04	54 00.4	270 28.2	02.3	314 42.0	27.8	319 57.6	00.0	266 50.3	21.8
	05	69 02.9	285 27.7	01.4	329 42.9	27.8	334 59.8	00.0	281 52.5	21.7
	06	84 05.3	300 27.2	N15 00.6	344 43.7	N23 27.8	350 01.9	N23 00.0	296 54.7	N14 21.6
	07	99 07.8	315 26.6	14 59.7	359 44.6	27.7	5 04.1	00.0	311 56.9	21.5
THURSDAY	08	114 10.2	330 26.1	58.9	14 45.5	27.7	20 06.2	00.0	326 59.0	21.4
	09	129 12.7	345 25.6	·· 58.0	29 46.3	·· 27.6	35 08.3	·· 00.0	342 01.2	·· 21.3
	10	144 15.2	0 25.0	57.1	44 47.2	27.6	50 10.5	00.0	357 03.4	21.2
	11	159 17.6	15 24.5	56.3	59 48.1	27.5	65 12.6	00.0	12 05.6	21.1
	12	174 20.1	30 24.0	N14 55.4	74 48.9	N23 27.5	80 14.8	N23 00.0	27 07.7	N14 21.1
	13	189 22.6	45 23.4	54.5	89 49.8	27.4	95 16.9	00.0	42 09.9	21.0
	14	204 25.0	60 22.9	53.7	104 50.7	27.4	110 19.1	00.0	57 12.1	20.9
	15	219 27.5	75 22.4	·· 52.8	119 51.6	·· 27.3	125 21.2	·· 00.0	72 14.3	·· 20.8
	16	234 30.0	90 21.9	52.0	134 52.4	27.3	140 23.4	23 00.0	87 16.4	20.7
	17	249 32.4	105 21.3	51.1	149 53.3	27.2	155 25.5	22 59.9	102 18.6	20.6
	18	264 34.9	120 20.8	N14 50.2	164 54.2	N23 27.2	170 27.7	N22 59.9	117 20.8	N14 20.5
	19	279 37.3	135 20.3	49.4	179 55.1	27.2	185 29.8	59.9	132 23.0	20.4
	20	294 39.8	150 19.7	48.5	194 55.9	27.1	200 32.0	59.9	147 25.1	20.3
	21	309 42.3	165 19.2	·· 47.6	209 56.8	·· 27.1	215 34.1	·· 59.9	162 27.3	·· 20.2
	22	324 44.7	180 18.7	46.8	224 57.7	27.0	230 36.3	59.9	177 29.5	20.1
	23	339 47.2	195 18.1	45.9	239 58.6	27.0	245 38.4	59.9	192 31.7	20.0
Mer. Pass.		h m 0 28.5	v −0.5	d 0.8	v 0.9	d 0.0	v 2.1	d 0.0	v 2.2	d 0.1

STARS

Name	S.H.A. ° ′	Dec. ° ′
Acamar	315 38.6	S40 23.4
Achernar	335 46.4	S57 20.8
Acrux	173 40.0	S62 58.6
Adhara	255 33.8	S28 56.3
Aldebaran	291 20.2	N16 27.9
Alioth	166 44.9	N56 05.0
Alkaid	153 20.5	N49 25.7
Al Na'ir	28 17.1	S47 04.1
Alnilam	276 13.7	S 1 12.9
Alphard	218 22.8	S 8 33.6
Alphecca	126 34.0	N26 47.7
Alpheratz	358 11.0	N28 58.2
Altair	62 34.3	N 8 48.8
Ankaa	353 41.9	S42 25.4
Antares	112 59.4	S26 22.9
Arcturus	146 20.6	N19 18.1
Atria	108 25.5	S68 59.4
Avior	234 29.4	S59 26.1
Bellatrix	279 00.9	N 6 19.8
Betelgeuse	271 30.5	N 7 24.2
Canopus	264 08.2	S52 40.8
Capella	281 14.3	N45 58.4
Deneb	49 49.5	N45 12.4
Denebola	183 01.4	N14 41.9
Diphda	349 22.6	S18 06.4
Dubhe	194 25.4	N61 52.3
Elnath	278 46.7	N28 35.2
Eltanin	90 58.6	N51 29.9
Enif	34 13.3	N 9 46.6
Fomalhaut	15 53.3	S29 44.3
Gacrux	172 31.5	S56 59.3
Gienah	176 20.4	S17 25.0
Hadar	149 26.6	S60 16.0
Hamal	328 30.9	N23 21.5
Kaus Aust.	84 19.4	S34 23.7
Kochab	137 19.8	N74 15.1
Markab	14 04.8	N15 05.3
Menkar	314 43.1	N 4 00.2
Menkent	148 39.7	S36 15.6
Miaplacidus	221 46.0	S69 37.4
Mirfak	309 18.7	N49 46.8
Nunki	76 31.6	S26 19.4
Peacock	54 01.2	S56 48.5
Pollux	244 00.9	N28 04.7
Procyon	245 28.1	N 5 17.0
Rasalhague	96 31.5	N12 34.8
Regulus	208 12.5	N12 04.6
Rigel	281 37.9	S 8 13.5
Rigil Kent.	140 28.9	S60 44.7
Sabik	102 43.5	S15 41.7
Schedar	350 10.7	N56 24.9
Shaula	96 58.5	S37 05.3
Sirius	258 57.6	S16 41.0
Spica	158 59.9	S11 02.6
Suhail	223 12.6	S43 20.4
Vega	80 57.1	N38 46.2
Zuben'ubi	137 35.5	S15 56.9

	S.H.A. ° ′	Mer. Pass. h m
Venus	217 51.9	9 57
Mars	261 26.4	7 02
Jupiter	266 06.2	6 43
Saturn	212 58.1	10 15

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
13 00	180 58.5	N 3 55.4	186 31.3	11.3	N 3 24.3	10.5	57.6
01	195 58.7	54.5	201 01.6	11.4	3 13.8	10.5	57.6
02	210 59.0	53.5	215 32.0	11.3	3 03.3	10.6	57.7
03	225 59.2	·· 52.6	230 02.3	11.3	2 52.7	10.6	57.7
04	240 59.4	51.6	244 32.6	11.3	2 42.1	10.6	57.7
05	255 59.6	50.6	259 02.9	11.2	2 31.5	10.6	57.7
06	270 59.8	N 3 49.7	273 33.1	11.3	N 2 20.9	10.7	57.8
07	286 00.1	48.7	288 03.4	11.2	2 10.2	10.7	57.8
08	301 00.3	47.8	302 33.6	11.2	1 59.5	10.7	57.8
09	316 00.5	·· 46.8	317 03.8	11.2	1 48.8	10.7	57.8
10	331 00.7	45.9	331 34.0	11.1	1 38.1	10.7	57.9
11	346 00.9	44.9	346 04.1	11.2	1 27.4	10.7	57.9
12	1 01.2	N 3 43.9	0 34.3	11.1	N 1 16.7	10.8	57.9
13	16 01.4	43.0	15 04.4	11.1	1 05.9	10.8	57.9
14	31 01.6	42.0	29 34.5	11.0	0 55.1	10.8	58.0
15	46 01.8	·· 41.1	44 04.5	11.1	0 44.3	10.8	58.0
16	61 02.0	40.1	58 34.6	11.0	0 33.5	10.8	58.0
17	76 02.3	39.2	73 04.6	11.0	0 22.7	10.8	58.0
18	91 02.5	N 3 38.2	87 34.6	10.9	N 0 11.9	10.9	58.1
19	106 02.7	37.2	102 04.5	11.0	N 0 01.0	10.8	58.1
20	121 02.9	36.3	116 34.5	10.9	S 0 09.8	10.8	58.1
21	136 03.1	·· 35.3	131 04.4	10.8	0 20.6	10.9	58.1
22	151 03.4	34.4	145 34.2	10.9	0 31.5	10.9	58.2
23	166 03.6	33.4	160 04.1	10.8	0 42.4	10.8	58.2
14 00	181 03.8	N 3 32.4	174 33.9	10.8	S 0 53.2	10.9	58.2
01	196 04.0	31.5	189 03.7	10.8	1 04.1	10.9	58.2
02	211 04.2	30.5	203 33.5	10.7	1 15.0	10.9	58.3
03	226 04.5	·· 29.6	218 03.2	10.8	1 25.9	10.8	58.3
04	241 04.7	28.6	232 33.0	10.6	1 36.7	10.9	58.3
05	256 04.9	27.6	247 02.6	10.7	1 47.6	10.9	58.3
06	271 05.1	N 3 26.7	261 32.3	10.6	S 1 58.5	10.8	58.3
07	286 05.3	25.7	276 01.9	10.6	2 09.3	10.9	58.4
08	301 05.6	24.8	290 31.5	10.6	2 20.2	10.9	58.4
09	316 05.8	·· 23.8	305 01.1	10.5	2 31.1	10.8	58.4
10	331 06.0	22.8	319 30.6	10.5	2 41.9	10.9	58.4
11	346 06.2	21.9	334 00.1	10.5	2 52.8	10.8	58.4
12	1 06.5	N 3 20.9	348 29.6	10.4	S 3 03.6	10.8	58.5
13	16 06.7	20.0	2 59.0	10.4	3 14.4	10.8	58.5
14	31 06.9	19.0	17 28.4	10.3	3 25.2	10.8	58.5
15	46 07.1	·· 18.0	31 57.7	10.4	3 36.0	10.8	58.5
16	61 07.3	17.1	46 27.1	10.3	3 46.8	10.8	58.5
17	76 07.6	16.1	60 56.4	10.2	3 57.6	10.8	58.6
18	91 07.8	N 3 15.2	75 25.6	10.2	S 4 08.4	10.7	58.6
19	106 08.0	14.2	89 54.8	10.2	4 19.1	10.7	58.6
20	121 08.2	13.2	104 24.0	10.2	4 29.8	10.7	58.6
21	136 08.4	·· 12.3	118 53.2	10.1	4 40.5	10.7	58.6
22	151 08.7	11.3	133 22.3	10.1	4 51.2	10.7	58.7
23	166 08.9	10.4	147 51.4	10.0	5 01.9	10.6	58.7
15 00	181 09.1	N 3 09.4	162 20.4	10.0	S 5 12.5	10.7	58.7
01	196 09.3	08.4	176 49.4	10.0	5 23.2	10.6	58.7
02	211 09.5	07.5	191 18.4	9.9	5 33.8	10.5	58.7
03	226 09.8	·· 06.5	205 47.3	9.9	5 44.3	10.6	58.8
04	241 10.0	05.6	220 16.2	9.8	5 54.9	10.5	58.8
05	256 10.2	04.6	234 45.0	9.9	6 05.4	10.5	58.8
06	271 10.4	N 3 03.6	249 13.9	9.7	S 6 15.9	10.4	58.8
07	286 10.7	02.7	263 42.6	9.7	6 26.3	10.4	58.8
08	301 10.9	01.7	278 11.3	9.7	6 36.7	10.4	58.8
09	316 11.1	3 00.7	292 40.0	9.7	6 47.1	10.4	58.9
10	331 11.3	2 59.8	307 08.7	9.6	6 57.5	10.3	58.9
11	346 11.5	58.8	321 37.3	9.6	7 07.8	10.3	58.9
12	1 11.8	N 2 57.9	336 05.9	9.5	S 7 18.1	10.2	58.9
13	16 12.0	56.9	350 34.4	9.5	7 28.3	10.2	58.9
14	31 12.2	55.9	5 02.9	9.4	7 38.5	10.2	58.9
15	46 12.4	·· 55.0	19 31.3	9.4	7 48.7	10.1	58.9
16	61 12.6	54.0	33 59.7	9.4	7 58.8	10.1	59.0
17	76 12.9	53.0	48 28.1	9.3	8 08.9	10.0	59.0
18	91 13.1	N 2 52.1	62 56.4	9.2	S 8 18.9	10.0	59.0
19	106 13.3	51.1	77 24.6	9.3	8 28.9	10.0	59.0
20	121 13.5	50.2	91 52.9	9.2	8 38.9	9.9	59.0
21	136 13.8	·· 49.2	106 21.1	9.1	8 48.8	9.8	59.0
22	151 14.0	48.2	120 49.2	9.1	8 58.6	9.8	59.0
23	166 14.2	47.3	135 17.3	9.0	9 08.4	9.8	59.1
	S.D. 15.9	d 1.0	S.D. 15.8		15.9		16.0

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

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

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
	m s	m s	h m	h m	h m	d	
13	03 54	04 04	11 56	11 58	24 22	00	●
14	04 15	04 25	11 56	12 48	00 22	01	
15	04 36	04 47	11 55	13 39	01 13	02	

G.M.T. (UT)		ARIES	VENUS −3.4		MARS +0.9		JUPITER −1.8		SATURN +0.8	
		G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d	h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
16	00	354 49.7	210 17.6	N14 45.0	254 59.4	N23 26.9	260 40.6	N22 59.9	207 33.8	N14 19.9
	01	9 52.1	225 17.1	44.1	270 00.3	26.9	275 42.7	59.9	222 36.0	19.8
	02	24 54.6	240 16.6	43.3	285 01.2	26.8	290 44.9	59.9	237 38.2	19.7
	03	39 57.1	255 16.0	·· 42.4	300 02.1	·· 26.8	305 47.1	·· 59.9	252 40.4	·· 19.6
	04	54 59.5	270 15.5	41.5	315 02.9	26.7	320 49.2	59.9	267 42.5	19.6
	05	70 02.0	285 15.0	40.6	330 03.8	26.7	335 51.4	59.9	282 44.7	19.5
	06	85 04.5	300 14.5	N14 39.8	345 04.7	N23 26.6	350 53.5	N22 59.9	297 46.9	N14 19.4
	07	100 06.9	315 13.9	38.9	0 05.6	26.6	5 55.7	59.9	312 49.1	19.3
	08	115 09.4	330 13.4	38.0	15 06.4	26.5	20 57.8	59.8	327 51.2	19.2
F	09	130 11.8	345 12.9	·· 37.1	30 07.3	·· 26.5	36 00.0	·· 59.8	342 53.4	·· 19.1
R	10	145 14.3	0 12.4	36.3	45 08.2	26.4	51 02.1	59.8	357 55.6	19.0
I	11	160 16.8	15 11.8	35.4	60 09.1	26.4	66 04.3	59.8	12 57.8	18.9
D	12	175 19.2	30 11.3	N14 34.5	75 10.0	N23 26.3	81 06.4	N22 59.8	27 59.9	N14 18.8
A	13	190 21.7	45 10.8	33.6	90 10.8	26.2	96 08.6	59.8	43 02.1	18.7
Y	14	205 24.2	60 10.3	32.7	105 11.7	26.2	111 10.7	59.8	58 04.3	18.6
	15	220 26.6	75 09.7	·· 31.9	120 12.6	·· 26.1	126 12.9	·· 59.8	73 06.5	·· 18.5
	16	235 29.1	90 09.2	31.0	135 13.5	26.1	141 15.1	59.8	88 08.7	18.4
	17	250 31.6	105 08.7	30.1	150 14.4	26.0	156 17.2	59.8	103 10.8	18.3
	18	265 34.0	120 08.2	N14 29.2	165 15.2	N23 26.0	171 19.4	N22 59.8	118 13.0	N14 18.2
	19	280 36.5	135 07.6	28.3	180 16.1	25.9	186 21.5	59.8	133 15.2	18.2
	20	295 39.0	150 07.1	27.4	195 17.0	25.9	201 23.7	59.8	148 17.4	18.1
	21	310 41.4	165 06.6	·· 26.6	210 17.9	·· 25.8	216 25.8	·· 59.8	163 19.5	·· 18.0
	22	325 43.9	180 06.1	25.7	225 18.8	25.8	231 28.0	59.8	178 21.7	17.9
	23	340 46.3	195 05.5	24.8	240 19.7	25.7	246 30.2	59.7	193 23.9	17.8
17	00	355 48.8	210 05.0	N14 23.9	255 20.5	N23 25.7	261 32.3	N22 59.7	208 26.1	N14 17.7
	01	10 51.3	225 04.5	23.0	270 21.4	25.6	276 34.5	59.7	223 28.2	17.6
	02	25 53.7	240 04.0	22.1	285 22.3	25.5	291 36.6	59.7	238 30.4	17.5
	03	40 56.2	255 03.5	·· 21.2	300 23.2	·· 25.5	306 38.8	·· 59.7	253 32.6	·· 17.4
	04	55 58.7	270 02.9	20.3	315 24.1	25.4	321 41.0	59.7	268 34.8	17.3
	05	71 01.1	285 02.4	19.4	330 25.0	25.4	336 43.1	59.7	283 37.0	17.2
	06	86 03.6	300 01.9	N14 18.6	345 25.8	N23 25.3	351 45.3	N22 59.7	298 39.1	N14 17.1
	07	101 06.1	315 01.4	17.7	0 26.7	25.3	6 47.4	59.7	313 41.3	17.0
S	08	116 08.5	330 00.9	16.8	15 27.6	25.2	21 49.6	59.7	328 43.5	16.9
A	09	131 11.0	345 00.4	·· 15.9	30 28.5	·· 25.2	36 51.8	·· 59.7	343 45.7	·· 16.8
T	10	146 13.4	359 59.8	15.0	45 29.4	25.1	51 53.9	59.7	358 47.8	16.8
U	11	161 15.9	14 59.3	14.1	60 30.3	25.0	66 56.1	59.7	13 50.0	16.7
R	12	176 18.4	29 58.8	N14 13.2	75 31.2	N23 25.0	81 58.2	N22 59.7	28 52.2	N14 16.6
D	13	191 20.8	44 58.3	12.3	90 32.1	24.9	97 00.4	59.7	43 54.4	16.5
A	14	206 23.3	59 57.8	11.4	105 32.9	24.9	112 02.6	59.6	58 56.6	16.4
Y	15	221 25.8	74 57.2	·· 10.5	120 33.8	·· 24.8	127 04.7	·· 59.6	73 58.7	·· 16.3
	16	236 28.2	89 56.7	09.6	135 34.7	24.8	142 06.9	59.6	89 00.9	16.2
	17	251 30.7	104 56.2	08.7	150 35.6	24.7	157 09.1	59.6	104 03.1	16.1
	18	266 33.2	119 55.7	N14 07.8	165 36.5	N23 24.6	172 11.2	N22 59.6	119 05.3	N14 16.0
	19	281 35.6	134 55.2	06.9	180 37.4	24.6	187 13.4	59.6	134 07.4	15.9
	20	296 38.1	149 54.7	06.0	195 38.3	24.5	202 15.6	59.6	149 09.6	15.8
	21	311 40.6	164 54.2	·· 05.1	210 39.2	·· 24.5	217 17.7	·· 59.6	164 11.8	·· 15.7
	22	326 43.0	179 53.6	04.2	225 40.1	24.4	232 19.9	59.6	179 14.0	15.6
	23	341 45.5	194 53.1	03.3	240 41.0	24.3	247 22.0	59.6	194 16.2	15.5
18	00	356 47.9	209 52.6	N14 02.4	255 41.8	N23 24.3	262 24.2	N22 59.6	209 18.3	N14 15.5
	01	11 50.4	224 52.1	01.5	270 42.7	24.2	277 26.4	59.6	224 20.5	15.4
	02	26 52.9	239 51.6	14 00.6	285 43.6	24.2	292 28.5	59.6	239 22.7	15.3
	03	41 55.3	254 51.1	13 59.6	300 44.5	·· 24.1	307 30.7	·· 59.6	254 24.9	·· 15.2
	04	56 57.8	269 50.6	58.7	315 45.4	24.0	322 32.9	59.5	269 27.1	15.1
	05	72 00.3	284 50.0	57.8	330 46.3	24.0	337 35.0	59.5	284 29.2	15.0
	06	87 02.7	299 49.5	N13 56.9	345 47.2	N23 23.9	352 37.2	N22 59.5	299 31.4	N14 14.9
	07	102 05.2	314 49.0	56.0	0 48.1	23.9	7 39.4	59.5	314 33.6	14.8
	08	117 07.7	329 48.5	55.1	15 49.0	23.8	22 41.5	59.5	329 35.8	14.7
S	09	132 10.1	344 48.0	·· 54.2	30 49.9	·· 23.7	37 43.7	·· 59.5	344 38.0	·· 14.6
U	10	147 12.6	359 47.5	53.3	45 50.8	23.7	52 45.9	59.5	359 40.1	14.5
N	11	162 15.1	14 47.0	52.4	60 51.7	23.6	67 48.0	59.5	14 42.3	14.4
D	12	177 17.5	29 46.5	N13 51.4	75 52.6	N23 23.5	82 50.2	N22 59.5	29 44.5	N14 14.3
A	13	192 20.0	44 46.0	50.5	90 53.5	23.5	97 52.4	59.5	44 46.7	14.3
Y	14	207 22.4	59 45.4	49.6	105 54.4	23.4	112 54.6	59.5	59 48.9	14.2
	15	222 24.9	74 44.9	·· 48.7	120 55.3	·· 23.4	127 56.7	·· 59.5	74 51.0	·· 14.1
	16	237 27.4	89 44.4	47.8	135 56.2	23.3	142 58.9	59.5	89 53.2	14.0
	17	252 29.8	104 43.9	46.9	150 57.0	23.2	158 01.1	59.5	104 55.4	13.9
	18	267 32.3	119 43.4	N13 46.0	165 57.9	N23 23.2	173 03.2	N22 59.5	119 57.6	N14 13.8
	19	282 34.8	134 42.9	45.0	180 58.8	23.1	188 05.4	59.4	134 59.8	13.7
	20	297 37.2	149 42.4	44.1	195 59.7	23.0	203 07.6	59.4	150 01.9	13.6
	21	312 39.7	164 41.9	·· 43.2	211 00.6	·· 23.0	218 09.8	·· 59.4	165 04.1	·· 13.5
	22	327 42.2	179 41.4	42.3	226 01.5	22.9	233 11.9	59.4	180 06.3	13.4
	23	342 44.6	194 40.9	41.4	241 02.4	22.8	248 14.1	59.4	195 08.5	13.3
Mer. Pass.		h m 0 16.7	v −0.5	d 0.9	v 0.9	d 0.1	v 2.2	d 0.0	v 2.2	d 0.1

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.5	S40 23.4
Achernar	335 46.3	S57 20.8
Acrux	173 40.0	S62 58.6
Adhara	255 33.8	S28 56.3
Aldebaran	291 20.2	N16 27.9
Alioth	166 44.9	N56 05.0
Alkaid	153 20.6	N49 25.7
Al Na'ir	28 17.1	S47 04.1
Alnilam	276 13.7	S 1 12.9
Alphard	218 22.8	S 8 33.6
Alphecca	126 34.0	N26 47.7
Alpheratz	358 11.0	N29 09.2
Altair	62 34.3	N 8 48.8
Ankaa	353 41.9	S42 25.5
Antares	112 59.4	S26 22.9
Arcturus	146 20.6	N19 18.1
Atria	108 25.5	S68 59.4
Avior	234 29.4	S59 26.1
Bellatrix	279 00.9	N 6 19.8
Betelgeuse	271 30.5	N 7 24.2
Canopus	264 08.2	S52 40.8
Capella	281 14.2	N45 58.4
Deneb	49 49.5	N45 12.4
Denebola	183 01.4	N14 41.9
Diphda	349 22.6	S18 06.4
Dubhe	194 25.4	N61 52.2
Elnath	278 46.7	N28 35.2
Eltanin	90 58.6	N51 29.9
Enif	34 13.3	N 9 46.6
Fomalhaut	15 53.3	S29 44.3
Gacrux	172 31.5	S56 59.3
Gienah	176 20.4	S17 25.0
Hadar	149 26.6	S60 16.0
Hamal	328 30.9	N23 21.5
Kaus Aust.	84 19.5	S34 23.7
Kochab	137 19.8	N74 15.1
Markab	14 04.8	N15 05.3
Menkar	314 43.0	N 4 00.2
Menkent	148 39.7	S36 15.6
Miaplacidus	221 46.0	S69 37.4
Mirfak	309 18.7	N49 46.8
Nunki	76 31.6	S26 19.4
Peacock	54 01.2	S56 48.5
Pollux	244 00.8	N28 04.7
Procyon	245 28.1	N 5 17.0
Rasalhague	96 31.5	N12 34.9
Regulus	208 12.5	N12 04.6
Rigel	281 37.9	S 8 13.5
Rigil Kent.	140 28.9	S60 44.6
Sabik	102 43.5	S15 41.7
Schedar	350 10.7	N56 24.9
Shaula	96 58.5	S37 05.3
Sirius	258 57.6	S16 41.0
Spica	158 59.9	S11 02.6
Suhail	223 12.6	S43 20.4
Vega	80 57.1	N38 46.2
Zuben'ubi	137 35.5	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	214 16.2	10 00
Mars	259 31.7	6 58
Jupiter	265 43.5	6 33
Saturn	212 37.3	10 05

0000 SEPTEMBER 16, 17, 18 (FRI., SAT., SUN.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
16 00	181 14.4	N 2 46.3	149 45.3	9.1	S 9 18.2	9.7	59.1
01	196 14.6	45.3	164 13.4	8.9	9 27.9	9.6	59.1
02	211 14.9	44.4	178 41.3	8.9	9 37.5	9.6	59.1
03	226 15.1	·· 43.4	193 09.2	8.9	9 47.1	9.6	59.1
04	241 15.3	42.4	207 37.1	8.8	9 56.7	9.4	59.1
05	256 15.5	41.5	222 04.9	8.8	10 06.1	9.5	59.1
06	271 15.7	N 2 40.5	236 32.7	8.8	S10 15.6	9.3	59.1
07	286 16.0	39.5	251 00.5	8.7	10 24.9	9.3	59.1
08	301 16.2	38.6	265 28.2	8.6	10 34.2	9.3	59.2
F 09	316 16.4	·· 37.6	279 55.8	8.6	10 43.5	9.2	59.2
R 10	331 16.6	36.7	294 23.4	8.6	10 52.7	9.1	59.2
I 11	346 16.9	35.7	308 51.0	8.5	11 01.8	9.0	59.2
D 12	1 17.1	N 2 34.7	323 18.5	8.5	S11 10.8	9.0	59.2
A 13	16 17.3	33.8	337 46.0	8.4	11 19.8	8.9	59.2
Y 14	31 17.5	32.8	352 13.4	8.4	11 28.7	8.9	59.2
15	46 17.7	·· 31.8	6 40.8	8.3	11 37.6	8.8	59.2
16	61 18.0	30.9	21 08.1	8.3	11 46.4	8.7	59.2
17	76 18.2	29.9	35 35.4	8.2	11 55.1	8.6	59.2
18	91 18.4	N 2 28.9	50 02.6	8.2	S12 03.7	8.6	59.2
19	106 18.6	28.0	64 29.8	8.2	12 12.3	8.5	59.3
20	121 18.9	27.0	78 57.0	8.1	12 20.8	8.4	59.3
21	136 19.1	·· 26.0	93 24.1	8.1	12 29.2	8.4	59.3
22	151 19.3	25.1	107 51.2	8.0	12 37.6	8.3	59.3
23	166 19.5	24.1	122 18.2	8.0	12 45.9	8.2	59.3
17 00	181 19.7	N 2 23.1	136 45.2	7.9	S12 54.1	8.1	59.3
01	196 20.0	22.2	151 12.1	7.9	13 02.2	8.0	59.3
02	211 20.2	21.2	165 39.0	7.8	13 10.2	8.0	59.3
03	226 20.4	·· 20.2	180 05.8	7.8	13 18.2	7.9	59.3
04	241 20.6	19.3	194 32.6	7.8	13 26.1	7.7	59.3
05	256 20.8	18.3	208 59.4	7.7	13 33.8	7.8	59.3
06	271 21.1	N 2 17.3	223 26.1	7.7	S13 41.6	7.6	59.3
07	286 21.3	16.4	237 52.8	7.6	13 49.2	7.5	59.3
S 08	301 21.5	15.4	252 19.4	7.6	13 56.7	7.5	59.3
A 09	316 21.7	·· 14.4	266 46.0	7.6	14 04.2	7.3	59.3
T 10	331 22.0	13.5	281 12.6	7.5	14 11.5	7.3	59.4
U 11	346 22.2	12.5	295 39.1	7.4	14 18.8	7.2	59.4
R 12	1 22.4	N 2 11.5	310 05.5	7.4	S14 26.0	7.1	59.4
D 13	16 22.6	10.6	324 31.9	7.4	14 33.1	7.0	59.4
A 14	31 22.8	09.6	338 58.3	7.4	14 40.1	6.9	59.4
Y 15	46 23.1	·· 08.6	353 24.7	7.2	14 47.0	6.8	59.4
16	61 23.3	07.7	7 50.9	7.3	14 53.8	6.7	59.4
17	76 23.5	06.7	22 17.2	7.2	15 00.5	6.7	59.4
18	91 23.7	N 2 05.7	36 43.4	7.2	S15 07.2	6.5	59.4
19	106 24.0	04.8	51 09.6	7.2	15 13.7	6.4	59.4
20	121 24.2	03.8	65 35.8	7.1	15 20.1	6.4	59.4
21	136 24.4	·· 02.8	80 01.9	7.0	15 26.5	6.2	59.4
22	151 24.6	01.9	94 27.9	7.1	15 32.7	6.1	59.4
23	166 24.8	2 00.9	108 54.0	6.9	15 38.8	6.1	59.4
18 00	181 25.1	N 1 59.9	123 19.9	7.0	S15 44.9	5.9	59.4
01	196 25.3	59.0	137 45.9	6.9	15 50.8	5.8	59.4
02	211 25.5	58.0	152 11.8	6.9	15 56.6	5.8	59.4
03	226 25.7	·· 57.0	166 37.7	6.9	16 02.4	5.6	59.4
04	241 25.9	56.1	181 03.6	6.8	16 08.0	5.5	59.4
05	256 26.2	55.1	195 29.4	6.8	16 13.5	5.4	59.4
06	271 26.4	N 1 54.1	209 55.2	6.7	S16 18.9	5.3	59.4
07	286 26.6	53.2	224 20.9	6.8	16 24.2	5.2	59.4
08	301 26.8	52.2	238 46.7	6.7	16 29.4	5.1	59.4
S 09	316 27.1	·· 51.2	253 12.4	6.6	16 34.5	5.0	59.4
U 10	331 27.3	50.3	267 38.0	6.7	16 39.5	4.9	59.4
N 11	346 27.5	49.3	282 03.7	6.6	16 44.4	4.8	59.4
D 12	1 27.7	N 1 48.3	296 29.3	6.5	S16 49.2	4.6	59.4
A 13	16 27.9	47.4	310 54.8	6.6	16 53.8	4.6	59.4
Y 14	31 28.2	46.4	325 20.4	6.5	16 58.4	4.4	59.4
15	46 28.4	·· 45.4	339 45.9	6.5	17 02.8	4.4	59.4
16	61 28.6	44.4	354 11.4	6.5	17 07.2	4.2	59.4
17	76 28.8	43.5	8 36.9	6.4	17 11.4	4.1	59.4
18	91 29.1	N 1 42.5	23 02.3	6.5	S17 15.5	4.0	59.4
19	106 29.3	41.5	37 27.8	6.4	17 19.5	3.8	59.4
20	121 29.5	40.6	51 53.2	6.3	17 23.3	3.8	59.4
21	136 29.7	·· 39.6	66 18.5	6.4	17 27.1	3.6	59.4
22	151 29.9	38.6	80 43.9	6.3	17 30.7	3.6	59.4
23	166 30.2	37.7	95 09.2	6.4	17 34.3	3.4	59.4
	S.D. 15.9	d 1.0	S.D. 16.1		16.2		16.2

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

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

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
	m s	m s	h m	h m	h m	d	
16	04 57	05 08	11 55	14 32	02 05	03	◐
17	05 19	05 29	11 55	15 27	03 00	04	
18	05 40	05 50	11 54	16 24	03 56	05	

G.M.T. (UT)		ARIES	VENUS −3.4		MARS +0.9		JUPITER −1.8		SATURN +0.8	
d	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
19	00	357 47.1	209 40.4	N13 40.4	256 03.3	N23 22.8	263 16.3	N22 59.4	210 10.7	N14 13.2
	01	12 49.5	224 39.9	39.5	271 04.2	22.7	278 18.4	59.4	225 12.8	13.1
	02	27 52.0	239 39.4	38.6	286 05.1	22.6	293 20.6	59.4	240 15.0	13.1
	03	42 54.5	254 38.9	·· 37.7	301 06.0	·· 22.6	308 22.8	·· 59.4	255 17.2	·· 13.0
	04	57 56.9	269 38.3	36.7	316 06.9	22.5	323 25.0	59.4	270 19.4	12.9
	05	72 59.4	284 37.8	35.8	331 07.8	22.4	338 27.1	59.4	285 21.6	12.8
	06	88 01.9	299 37.3	N13 34.9	346 08.7	N23 22.4	353 29.3	N22 59.4	300 23.7	N14 12.7
	07	103 04.3	314 36.8	34.0	1 09.6	22.3	8 31.5	59.4	315 25.9	12.6
	08	118 06.8	329 36.3	33.0	16 10.5	22.2	23 33.7	59.4	330 28.1	12.5
MONDAY	09	133 09.3	344 35.8	·· 32.1	31 11.5	·· 22.2	38 35.8	·· 59.4	345 30.3	·· 12.4
	10	148 11.7	359 35.3	31.2	46 12.4	22.1	53 38.0	59.3	0 32.5	12.3
	11	163 14.2	14 34.8	30.2	61 13.3	22.0	68 40.2	59.3	15 34.6	12.2
	12	178 16.7	29 34.3	N13 29.3	76 14.2	N23 22.0	83 42.4	N22 59.3	30 36.8	N14 12.1
	13	193 19.1	44 33.8	28.4	91 15.1	21.9	98 44.5	59.3	45 39.0	12.0
	14	208 21.6	59 33.3	27.5	106 16.0	21.8	113 46.7	59.3	60 41.2	11.9
	15	223 24.0	74 32.8	·· 26.5	121 16.9	·· 21.8	128 48.9	·· 59.3	75 43.4	·· 11.9
	16	238 26.5	89 32.3	25.6	136 17.8	21.7	143 51.1	59.3	90 45.6	11.8
	17	253 29.0	104 31.8	24.7	151 18.7	21.6	158 53.2	59.3	105 47.7	11.7
	18	268 31.4	119 31.3	N13 23.7	166 19.6	N23 21.6	173 55.4	N22 59.3	120 49.9	N14 11.6
	19	283 33.9	134 30.8	22.8	181 20.5	21.5	188 57.6	59.3	135 52.1	11.5
	20	298 36.4	149 30.3	21.8	196 21.4	21.4	203 59.8	59.3	150 54.3	11.4
	21	313 38.8	164 29.8	·· 20.9	211 22.3	·· 21.4	219 02.0	·· 59.3	165 56.5	·· 11.3
	22	328 41.3	179 29.3	20.0	226 23.2	21.3	234 04.1	59.3	180 58.6	11.2
	23	343 43.8	194 28.8	19.0	241 24.1	21.2	249 06.3	59.3	196 00.8	11.1
20	00	358 46.2	209 28.3	N13 18.1	256 25.0	N23 21.1	264 08.5	N22 59.3	211 03.0	N14 11.0
	01	13 48.7	224 27.8	17.2	271 25.9	21.1	279 10.7	59.2	226 05.2	10.9
	02	28 51.2	239 27.3	16.2	286 26.8	21.0	294 12.9	59.2	241 07.4	10.8
	03	43 53.6	254 26.8	·· 15.3	301 27.8	·· 20.9	309 15.0	·· 59.2	256 09.6	·· 10.8
	04	58 56.1	269 26.3	14.3	316 28.7	20.9	324 17.2	59.2	271 11.7	10.7
	05	73 58.5	284 25.8	13.4	331 29.6	20.8	339 19.4	59.2	286 13.9	10.6
	06	89 01.0	299 25.3	N13 12.5	346 30.5	N23 20.7	354 21.6	N22 59.2	301 16.1	N14 10.5
	07	104 03.5	314 24.8	11.5	1 31.4	20.6	9 23.8	59.2	316 18.3	10.4
	08	119 05.9	329 24.3	10.6	16 32.3	20.6	24 25.9	59.2	331 20.5	10.3
TUESDAY	09	134 08.4	344 23.8	·· 09.6	31 33.2	·· 20.5	39 28.1	·· 59.2	346 22.7	·· 10.2
	10	149 10.9	359 23.3	08.7	46 34.1	20.4	54 30.3	59.2	1 24.8	10.1
	11	164 13.3	14 22.8	07.7	61 35.0	20.4	69 32.5	59.2	16 27.0	10.0
	12	179 15.8	29 22.3	N13 06.8	76 36.0	N23 20.3	84 34.7	N22 59.2	31 29.2	N14 09.9
	13	194 18.3	44 21.8	05.8	91 36.9	20.2	99 36.9	59.2	46 31.4	09.8
	14	209 20.7	59 21.3	04.9	106 37.8	20.1	114 39.0	59.2	61 33.6	09.7
	15	224 23.2	74 20.8	·· 03.9	121 38.7	·· 20.1	129 41.2	·· 59.1	76 35.8	·· 09.7
	16	239 25.6	89 20.3	03.0	136 39.6	20.0	144 43.4	59.1	91 37.9	09.6
	17	254 28.1	104 19.9	02.1	151 40.5	19.9	159 45.6	59.1	106 40.1	09.5
	18	269 30.6	119 19.4	N13 01.1	166 41.4	N23 19.8	174 47.8	N22 59.1	121 42.3	N14 09.4
	19	284 33.0	134 18.9	13 00.1	181 42.3	19.8	189 50.0	59.1	136 44.5	09.3
	20	299 35.5	149 18.4	12 59.2	196 43.3	19.7	204 52.1	59.1	151 46.7	09.2
	21	314 38.0	164 17.9	·· 58.2	211 44.2	·· 19.6	219 54.3	·· 59.1	166 48.9	·· 09.1
	22	329 40.4	179 17.4	57.3	226 45.1	19.5	234 56.5	59.1	181 51.0	09.0
	23	344 42.9	194 16.9	56.3	241 46.0	19.5	249 58.7	59.1	196 53.2	08.9
21	00	359 45.4	209 16.4	N12 55.4	256 46.9	N23 19.4	265 00.9	N22 59.1	211 55.4	N14 08.8
	01	14 47.8	224 15.9	54.4	271 47.8	19.3	280 03.1	59.1	226 57.6	08.7
	02	29 50.3	239 15.4	53.5	286 48.8	19.2	295 05.3	59.1	241 59.8	08.7
	03	44 52.8	254 14.9	·· 52.5	301 49.7	·· 19.2	310 07.4	·· 59.1	257 02.0	·· 08.6
	04	59 55.2	269 14.4	51.6	316 50.6	19.1	325 09.6	59.1	272 04.1	08.5
	05	74 57.7	284 13.9	50.6	331 51.5	19.0	340 11.8	59.1	287 06.3	08.4
	06	90 00.1	299 13.4	N12 49.6	346 52.4	N23 18.9	355 14.0	N22 59.0	302 08.5	N14 08.3
	07	105 02.6	314 13.0	48.7	1 53.4	18.9	10 16.2	59.0	317 10.7	08.2
	08	120 05.1	329 12.5	47.7	16 54.3	18.8	25 18.4	59.0	332 12.9	08.1
WEDNESDAY	09	135 07.5	344 12.0	·· 46.8	31 55.2	·· 18.7	40 20.6	·· 59.0	347 15.1	·· 08.0
	10	150 10.0	359 11.5	45.8	46 56.1	18.6	55 22.8	59.0	2 17.3	07.9
	11	165 12.5	14 11.0	44.9	61 57.0	18.6	70 25.0	59.0	17 19.4	07.8
	12	180 14.9	29 10.5	N12 43.9	76 58.0	N23 18.5	85 27.1	N22 59.0	32 21.6	N14 07.7
	13	195 17.4	44 10.0	42.9	91 58.9	18.4	100 29.3	59.0	47 23.8	07.7
	14	210 19.9	59 09.5	42.0	106 59.8	18.3	115 31.5	59.0	62 26.0	07.6
	15	225 22.3	74 09.0	·· 41.0	122 00.7	·· 18.2	130 33.7	·· 59.0	77 28.2	·· 07.5
	16	240 24.8	89 08.6	40.0	137 01.6	18.2	145 35.9	59.0	92 30.4	07.4
	17	255 27.3	104 08.1	39.1	152 02.6	18.1	160 38.1	59.0	107 32.5	07.3
	18	270 29.7	119 07.6	N12 38.1	167 03.5	N23 18.0	175 40.3	N22 59.0	122 34.7	N14 07.2
	19	285 32.2	134 07.1	37.1	182 04.4	17.9	190 42.5	59.0	137 36.9	07.1
	20	300 34.6	149 06.6	36.2	197 05.3	17.8	205 44.7	59.0	152 39.1	07.0
	21	315 37.1	164 06.1	·· 35.2	212 06.3	·· 17.8	220 46.9	·· 58.9	167 41.3	·· 06.9
	22	330 39.6	179 05.6	34.2	227 07.2	17.7	235 49.1	58.9	182 43.5	06.8
	23	345 42.0	194 05.2	33.3	242 08.1	17.6	250 51.3	58.9	197 45.7	06.7
Mer. Pass.		h m 0 04.9	v −0.5	d 0.9	v 0.9	d 0.1	v 2.2	d 0.0	v 2.2	d 0.1

STARS		
Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.5	S40 23.4
Achernar	335 46.3	S57 20.8
Acrux	173 40.0	S62 58.5
Adhara	255 33.8	S28 56.3
Aldebaran	291 20.2	N16 27.9
Alioth	166 44.9	N56 05.0
Alkaid	153 20.6	N49 25.7
Al Na'ir	28 17.1	S47 04.1
Alnilam	276 13.7	S 1 12.9
Alphard	218 22.8	S 8 33.6
Alphecca	126 34.0	N26 47.7
Alpheratz	358 11.0	N28 58.2
Altair	62 34.3	N 8 48.8
Ankaa	353 41.9	S42 25.5
Antares	112 59.4	S26 22.9
Arcturus	146 20.6	N19 18.1
Atria	108 25.6	S68 59.4
Avior	234 29.3	S59 26.1
Bellatrix	279 00.9	N 6 19.8
Betelgeuse	271 30.5	N 7 24.2
Canopus	264 08.2	S52 40.8
Capella	281 14.2	N45 58.4
Deneb	49 49.5	N45 12.4
Denebola	183 01.4	N14 41.9
Diphda	349 22.6	S18 06.4
Dubhe	194 25.4	N61 52.2
Elnath	278 46.6	N28 35.2
Eltanin	90 58.7	N51 29.9
Enif	34 13.3	N 9 46.6
Fomalhaut	15 53.3	S29 44.3
Gacrux	172 31.5	S56 59.3
Gienah	176 20.3	S17 25.0
Hadar	149 26.6	S60 16.0
Hamal	328 30.9	N23 21.5
Kaus Aust.	84 19.5	S34 23.7
Kochab	137 19.9	N74 15.1
Markab	14 04.8	N15 05.3
Menkar	314 43.0	N 4 00.2
Menkent	148 39.7	S36 15.6
Miaplacidus	221 46.0	S69 37.4
Mirfak	309 18.6	N49 46.8
Nunki	76 31.6	S26 19.4
Peacock	54 01.3	S56 48.5
Pollux	244 00.8	N28 04.7
Procyon	245 28.0	N 5 17.0
Rasalhague	96 31.5	N12 34.9
Regulus	208 12.4	N12 04.6
Rigel	281 37.9	S 8 13.5
Rigil Kent.	140 28.9	S60 44.6
Sabik	102 43.5	S15 41.7
Schedar	350 10.7	N56 25.0
Shaula	96 58.5	S37 05.3
Sirius	258 57.6	S16 41.0
Spica	158 59.9	S11 02.6
Suhail	223 12.5	S43 20.4
Vega	80 57.1	N38 46.2
Zuben'ubi	137 35.5	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	210 42.1	10 02
Mars	257 38.8	6 54
Jupiter	265 22.3	6 23
Saturn	212 16.8	9 54

0000 SEPTEMBER 19, 20, 21 (MON., TUES., WED.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
19 00	181 30.4	N 1 36.7	109 34.6	6.3	S17 37.7	3.3	59.4
01	196 30.6	35.7	123 59.9	6.3	17 41.0	3.2	59.4
02	211 30.8	34.8	138 25.2	6.2	17 44.2	3.0	59.4
03	226 31.0	·· 33.8	152 50.4	6.3	17 47.2	3.0	59.4
04	241 31.3	32.8	167 15.7	6.2	17 50.2	2.8	59.4
05	256 31.5	31.8	181 40.9	6.2	17 53.0	2.7	59.4
06	271 31.7	N 1 30.9	196 06.1	6.2	S17 55.7	2.6	59.4
07	286 31.9	29.9	210 31.3	6.2	17 58.3	2.5	59.4
08	301 32.2	28.9	224 56.5	6.2	18 00.8	2.3	59.4
M 09	316 32.4	·· 28.0	239 21.7	6.2	18 03.1	2.3	59.4
O 10	331 32.6	27.0	253 46.9	6.2	18 05.4	2.1	59.4
N 11	346 32.8	26.0	268 12.1	6.1	18 07.5	2.0	59.3
D 12	1 33.0	N 1 25.1	282 37.2	6.2	S18 09.5	1.9	59.3
A 13	16 33.3	24.1	297 02.4	6.1	18 11.4	1.7	59.3
Y 14	31 33.5	23.1	311 27.5	6.2	18 13.1	1.6	59.3
15	46 33.7	·· 22.1	325 52.7	6.1	18 14.7	1.6	59.3
16	61 33.9	21.2	340 17.8	6.1	18 16.3	1.3	59.3
17	76 34.2	20.2	354 42.9	6.2	18 17.6	1.3	59.3
18	91 34.4	N 1 19.2	9 08.1	6.1	S18 18.9	1.2	59.3
19	106 34.6	18.3	23 33.2	6.1	18 20.1	1.0	59.3
20	121 34.8	17.3	37 58.3	6.2	18 21.1	0.9	59.3
21	136 35.0	·· 16.3	52 23.5	6.1	18 22.0	0.8	59.3
22	151 35.3	15.4	66 48.6	6.1	18 22.8	0.6	59.3
23	166 35.5	14.4	81 13.7	6.2	18 23.4	0.6	59.3
20 00	181 35.7	N 1 13.4	95 38.9	6.1	S18 24.0	0.4	59.3
01	196 35.9	12.4	110 04.0	6.2	18 24.4	0.3	59.3
02	211 36.1	11.5	124 29.2	6.1	18 24.7	0.2	59.3
03	226 36.4	·· 10.5	138 54.3	6.2	18 24.9	0.0	59.3
04	241 36.6	09.5	153 19.5	6.1	18 24.9	0.0	59.3
05	256 36.8	08.6	167 44.6	6.2	18 24.9	0.2	59.2
06	271 37.0	N 1 07.6	182 09.8	6.2	S18 24.7	0.3	59.2
07	286 37.2	06.6	196 35.0	6.2	18 24.4	0.4	59.2
08	301 37.5	05.6	211 00.2	6.2	18 24.0	0.6	59.2
T 09	316 37.7	·· 04.7	225 25.4	6.3	18 23.4	0.7	59.2
U 10	331 37.9	03.7	239 50.7	6.2	18 22.7	0.8	59.2
E 11	346 38.1	02.7	254 15.9	6.3	18 21.9	0.9	59.2
S 12	1 38.4	N 1 01.8	268 41.2	6.2	S18 21.0	1.0	59.2
D 13	16 38.6	1 00.8	283 06.4	6.3	18 20.0	1.2	59.2
A 14	31 38.8	0 59.8	297 31.7	6.3	18 18.8	1.2	59.2
Y 15	46 39.0	·· 58.8	311 57.0	6.4	18 17.6	1.4	59.2
16	61 39.2	57.9	326 22.4	6.3	18 16.2	1.5	59.2
17	76 39.5	56.9	340 47.7	6.4	18 14.7	1.6	59.2
18	91 39.7	N 0 55.9	355 13.1	6.4	S18 13.1	1.8	59.2
19	106 39.9	55.0	9 38.5	6.4	18 11.3	1.9	59.1
20	121 40.1	54.0	24 03.9	6.4	18 09.4	1.9	59.1
21	136 40.3	·· 53.0	38 29.3	6.5	18 07.5	2.1	59.1
22	151 40.6	52.0	52 54.8	6.5	18 05.4	2.2	59.1
23	166 40.8	51.1	67 20.3	6.5	18 03.2	2.4	59.1
21 00	181 41.0	N 0 50.1	81 45.8	6.5	S18 00.8	2.4	59.1
01	196 41.2	49.1	96 11.3	6.6	17 58.4	2.6	59.1
02	211 41.4	48.2	110 36.9	6.6	17 55.8	2.7	59.1
03	226 41.7	·· 47.2	125 02.5	6.6	17 53.1	2.8	59.1
04	241 41.9	46.2	139 28.1	6.7	17 50.3	2.9	59.1
05	256 42.1	45.2	153 53.8	6.7	17 47.4	3.0	59.1
06	271 42.3	N 0 44.3	168 19.5	6.7	S17 44.4	3.1	59.0
07	286 42.6	43.3	182 45.2	6.8	17 41.3	3.3	59.0
W 08	301 42.8	42.3	197 11.0	6.7	17 38.0	3.3	59.0
E 09	316 43.0	·· 41.4	211 36.7	6.9	17 34.7	3.5	59.0
D 10	331 43.2	40.4	226 02.6	6.8	17 31.2	3.6	59.0
N 11	346 43.4	39.4	240 28.4	6.9	17 27.6	3.7	59.0
E 12	1 43.7	N 0 38.4	254 54.3	6.9	S17 23.9	3.8	59.0
S 13	16 43.9	37.5	269 20.2	7.0	17 20.1	3.9	59.0
D 14	31 44.1	36.5	283 46.2	7.0	17 16.2	4.0	59.0
A 15	46 44.3	·· 35.5	298 12.2	7.1	17 12.2	4.1	58.9
Y 16	61 44.5	34.5	312 38.3	7.0	17 08.1	4.3	58.9
17	76 44.8	33.6	327 04.3	7.2	17 03.8	4.3	58.9
18	91 45.0	N 0 32.6	341 30.5	7.1	S16 59.5	4.4	58.9
19	106 45.2	31.6	355 56.6	7.2	16 55.1	4.6	58.9
20	121 45.4	30.7	10 22.8	7.3	16 50.5	4.6	58.9
21	136 45.6	·· 29.7	24 49.1	7.3	16 45.9	4.8	58.9
22	151 45.9	28.7	39 15.4	7.3	16 41.1	4.9	58.9
23	166 46.1	27.7	53 41.7	7.4	16 36.2	4.9	58.9
	S.D. 16.0	d 1.0	S.D. 16.2		16.1		16.1

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

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

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
	m s	m s	h m	h m	h m	d	
19	06 01	06 12	11 54	17 22	04 53	06	◐
20	06 22	06 33	11 53	18 20	05 51	07	
21	06 44	06 54	11 53	19 17	06 49	08	

G.M.T. (UT)		ARIES	VENUS −3.4		MARS +0.9		JUPITER −1.9		SATURN +0.8	
		G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d	h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
22	00	0 44.5	209 04.7	N12 32.3	257 09.0	N23 17.5	265 53.5	N22 58.9	212 47.8	N14 06.7
	01	15 47.0	224 04.2	31.3	272 10.0	17.4	280 55.6	58.9	227 50.0	06.6
	02	30 49.4	239 03.7	30.4	287 10.9	17.4	295 57.8	58.9	242 52.2	06.5
	03	45 51.9	254 03.2	29.4	302 11.8	17.3	311 00.0	58.9	257 54.4	06.4
	04	60 54.4	269 02.7	28.4	317 12.7	17.2	326 02.2	58.9	272 56.6	06.3
	05	75 56.8	284 02.2	27.4	332 13.7	17.1	341 04.4	58.9	287 58.8	06.2
	06	90 59.3	299 01.8	N12 26.5	347 14.6	N23 17.0	356 06.6	N22 58.9	303 01.0	N14 06.1
	07	106 01.7	314 01.3	25.5	2 15.5	17.0	11 08.8	58.9	318 03.1	06.0
T	08	121 04.2	329 00.8	24.5	17 16.4	16.9	26 11.0	58.9	333 05.3	05.9
H	09	136 06.7	344 00.3	23.5	32 17.4	16.8	41 13.2	58.9	348 07.5	05.8
U	10	151 09.1	358 59.8	22.6	47 18.3	16.7	56 15.4	58.9	3 09.7	05.7
R	11	166 11.6	13 59.3	21.6	62 19.2	16.6	71 17.6	58.8	18 11.9	05.7
S	12	181 14.1	28 58.9	N12 20.6	77 20.2	N23 16.6	86 19.8	N22 58.8	33 14.1	N14 05.6
D	13	196 16.5	43 58.4	19.6	92 21.1	16.5	101 22.0	58.8	48 16.3	05.5
A	14	211 19.0	58 57.9	18.7	107 22.0	16.4	116 24.2	58.8	63 18.5	05.4
Y	15	226 21.5	73 57.4	17.7	122 22.9	16.3	131 26.4	58.8	78 20.6	05.3
	16	241 23.9	88 56.9	16.7	137 23.9	16.2	146 28.6	58.8	93 22.8	05.2
	17	256 26.4	103 56.5	15.7	152 24.8	16.1	161 30.8	58.8	108 25.0	05.1
	18	271 28.9	118 56.0	N12 14.7	167 25.7	N23 16.1	176 33.0	N22 58.8	123 27.2	N14 05.0
	19	286 31.3	133 55.5	13.8	182 26.7	16.0	191 35.2	58.8	138 29.4	04.9
	20	301 33.8	148 55.0	12.8	197 27.6	15.9	206 37.4	58.8	153 31.6	04.8
	21	316 36.2	163 54.5	11.8	212 28.5	15.8	221 39.6	58.8	168 33.8	04.8
	22	331 38.7	178 54.1	10.8	227 29.5	15.7	236 41.8	58.8	183 36.0	04.7
	23	346 41.2	193 53.6	09.8	242 30.4	15.6	251 44.0	58.8	198 38.1	04.6
23	00	1 43.6	208 53.1	N12 08.8	257 31.3	N23 15.5	266 46.2	N22 58.8	213 40.3	N14 04.5
	01	16 46.1	223 52.6	07.9	272 32.3	15.5	281 48.4	58.8	228 42.5	04.4
	02	31 48.6	238 52.1	06.9	287 33.2	15.4	296 50.6	58.7	243 44.7	04.3
	03	46 51.0	253 51.7	05.9	302 34.1	15.3	311 52.8	58.7	258 46.9	04.2
	04	61 53.5	268 51.2	04.9	317 35.1	15.2	326 55.0	58.7	273 49.1	04.1
	05	76 56.0	283 50.7	03.9	332 36.0	15.1	341 57.2	58.7	288 51.3	04.0
	06	91 58.4	298 50.2	N12 02.9	347 36.9	N23 15.0	356 59.4	N22 58.7	303 53.5	N14 03.9
	07	107 00.9	313 49.8	01.9	2 37.9	14.9	12 01.6	58.7	318 55.6	03.9
	08	122 03.4	328 49.3	01.0	17 38.8	14.9	27 03.8	58.7	333 57.8	03.8
F	09	137 05.8	343 48.8	12 00.0	32 39.7	14.8	42 06.0	58.7	349 00.0	03.7
R	10	152 08.3	358 48.3	11 59.0	47 40.7	14.7	57 08.2	58.7	4 02.2	03.6
I	11	167 10.7	13 47.9	58.0	62 41.6	14.6	72 10.4	58.7	19 04.4	03.5
D	12	182 13.2	28 47.4	N11 57.0	77 42.6	N23 14.5	87 12.6	N22 58.7	34 06.6	N14 03.4
A	13	197 15.7	43 46.9	56.0	92 43.5	14.4	102 14.8	58.7	49 08.8	03.3
Y	14	212 18.1	58 46.4	55.0	107 44.4	14.3	117 17.0	58.7	64 11.0	03.2
	15	227 20.6	73 46.0	54.0	122 45.4	14.2	132 19.2	58.7	79 13.2	03.1
	16	242 23.1	88 45.5	53.0	137 46.3	14.2	147 21.4	58.7	94 15.3	03.0
	17	257 25.5	103 45.0	52.0	152 47.3	14.1	162 23.7	58.6	109 17.5	03.0
	18	272 28.0	118 44.5	N11 51.0	167 48.2	N23 14.0	177 25.9	N22 58.6	124 19.7	N14 02.9
	19	287 30.5	133 44.1	50.0	182 49.1	13.9	192 28.1	58.6	139 21.9	02.8
	20	302 32.9	148 43.6	49.0	197 50.1	13.8	207 30.3	58.6	154 24.1	02.7
	21	317 35.4	163 43.1	48.0	212 51.0	13.7	222 32.5	58.6	169 26.3	02.6
	22	332 37.8	178 42.6	47.0	227 52.0	13.6	237 34.7	58.6	184 28.5	02.5
	23	347 40.3	193 42.2	46.0	242 52.9	13.5	252 36.9	58.6	199 30.7	02.4
24	00	2 42.8	208 41.7	N11 45.0	257 53.8	N23 13.4	267 39.1	N22 58.6	214 32.9	N14 02.3
	01	17 45.2	223 41.2	44.0	272 54.8	13.4	282 41.3	58.6	229 35.0	02.2
	02	32 47.7	238 40.8	43.0	287 55.7	13.3	297 43.5	58.6	244 37.2	02.2
	03	47 50.2	253 40.3	42.0	302 56.7	13.2	312 45.7	58.6	259 39.4	02.1
	04	62 52.6	268 39.8	41.0	317 57.6	13.1	327 47.9	58.6	274 41.6	02.0
	05	77 55.1	283 39.3	40.0	332 58.6	13.0	342 50.2	58.6	289 43.8	01.9
	06	92 57.6	298 38.9	N11 39.0	347 59.5	N23 12.9	357 52.4	N22 58.6	304 46.0	N14 01.8
	07	108 00.0	313 38.4	38.0	3 00.5	12.8	12 54.6	58.6	319 48.2	01.7
S	08	123 02.5	328 37.9	37.0	18 01.4	12.7	27 56.8	58.5	334 50.4	01.6
A	09	138 05.0	343 37.5	36.0	33 02.3	12.6	42 59.0	58.5	349 52.6	01.5
T	10	153 07.4	358 37.0	35.0	48 03.3	12.5	58 01.2	58.5	4 54.8	01.4
U	11	168 09.9	13 36.5	34.0	63 04.2	12.5	73 03.4	58.5	19 56.9	01.3
R	12	183 12.3	28 36.1	N11 33.0	78 05.2	N23 12.4	88 05.6	N22 58.5	34 59.1	N14 01.3
D	13	198 14.8	43 35.6	32.0	93 06.1	12.3	103 07.8	58.5	50 01.3	01.2
A	14	213 17.3	58 35.1	31.0	108 07.1	12.2	118 10.1	58.5	65 03.5	01.1
Y	15	228 19.7	73 34.6	30.0	123 08.0	12.1	133 12.3	58.5	80 05.7	01.0
	16	243 22.2	88 34.2	29.0	138 09.0	12.0	148 14.5	58.5	95 07.9	00.9
	17	258 24.7	103 33.7	28.0	153 09.9	11.9	163 16.7	58.5	110 10.1	00.8
	18	273 27.1	118 33.2	N11 27.0	168 10.9	N23 11.8	178 18.9	N22 58.5	125 12.3	N14 00.7
	19	288 29.6	133 32.8	26.0	183 11.8	11.7	193 21.1	58.5	140 14.5	00.6
	20	303 32.1	148 32.3	24.9	198 12.8	11.6	208 23.3	58.5	155 16.7	00.5
	21	318 34.5	163 31.8	23.9	213 13.7	11.5	223 25.6	58.5	170 18.9	00.5
	22	333 37.0	178 31.4	22.9	228 14.7	11.4	238 27.8	58.5	185 21.0	00.4
	23	348 39.5	193 30.9	21.9	243 15.6	11.3	253 30.0	58.4	200 23.2	00.3
Mer. Pass.		h m 23 49.2	v −0.5	d 1.0	v 0.9	d 0.1	v 2.2	d 0.0	v 2.2	d 0.1

STARS		
Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.5	S40 23.4
Achernar	335 46.3	S57 20.8
Acrux	173 40.0	S62 58.5
Adhara	255 33.8	S28 56.3
Aldebaran	291 20.2	N16 27.9
Alioth	166 44.9	N56 05.0
Alkaid	153 20.6	N49 25.7
Al Na'ir	28 17.1	S47 04.1
Alnilam	276 13.7	S 1 12.9
Alphard	218 22.8	S 8 33.6
Alphecca	126 34.0	N26 47.7
Alpheratz	358 11.0	N28 58.2
Altair	62 34.5	N 8 48.8
Ankaa	353 41.8	S42 25.5
Antares	112 59.5	S26 22.9
Arcturus	146 20.6	N19 18.1
Atria	108 25.6	S68 59.4
Avior	234 29.3	S59 26.1
Bellatrix	279 00.8	N 6 19.8
Betelgeuse	271 30.4	N 7 24.2
Canopus	264 08.1	S52 40.8
Capella	281 14.2	N45 58.4
Deneb	49 49.5	N45 12.4
Denebola	183 01.4	N14 41.9
Diphda	349 22.6	S18 06.4
Dubhe	194 25.3	N61 52.2
Elnath	278 46.6	N28 35.2
Eltanin	90 58.7	N51 29.9
Enif	34 13.3	N 9 46.6
Fomalhaut	15 53.3	S29 44.3
Gacrux	172 31.5	S56 59.3
Gienah	176 20.3	S17 25.0
Hadar	149 26.7	S60 16.0
Hamal	328 30.9	N23 21.5
Kaus Aust.	84 19.5	S34 23.7
Kochab	137 19.9	N74 15.1
Markab	14 04.8	N15 05.3
Menkar	314 43.0	N 4 00.2
Menkent	148 39.7	S36 15.6
Miaplacidus	221 45.9	S69 37.4
Mirfak	309 18.6	N49 46.8
Nunki	76 31.6	S26 19.4
Peacock	54 01.3	S56 48.5
Pollux	244 00.8	N28 04.7
Procyon	245 28.0	N 5 17.0
Rasalhague	96 31.5	N12 34.9
Regulus	208 12.4	N12 04.6
Rigel	281 37.9	S 8 13.5
Rigil Kent.	140 29.0	S60 44.6
Sabik	102 43.5	S15 41.7
Schedar	350 10.7	N56 25.0
Shaula	96 58.5	S37 05.3
Sirius	258 57.5	S16 41.0
Spica	158 59.9	S11 02.6
Suhail	223 12.5	S43 20.4
Vega	80 57.1	N38 46.2
Zuben'ubi	137 35.5	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	207 09.5	10 05
Mars	255 47.7	6 49
Jupiter	265 02.6	6 12
Saturn	211 56.7	9 44

0000 SEPTEMBER 22, 23, 24 (THURS., FRI., SAT.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
22 00	181 46.3	N 0 26.8	68 08.1	7.4	S16 31.3	5.1	58.8
01	196 46.5	25.8	82 34.5	7.5	16 26.2	5.1	58.8
02	211 46.7	24.8	97 01.0	7.5	16 21.1	5.3	58.8
03	226 47.0	·· 23.8	111 27.5	7.5	16 15.8	5.4	58.8
04	241 47.2	22.9	125 54.0	7.6	16 10.4	5.4	58.8
05	256 47.4	21.9	140 20.6	7.7	16 05.0	5.6	58.8
06	271 47.6	N 0 20.9	154 47.3	7.7	S15 59.4	5.7	58.8
07	286 47.8	20.0	169 14.0	7.7	15 53.7	5.7	58.8
T 08	301 48.1	19.0	183 40.7	7.8	15 48.0	5.9	58.7
H 09	316 48.3	·· 18.0	198 07.5	7.8	15 42.1	5.9	58.7
U 10	331 48.5	17.0	212 34.3	7.9	15 36.2	6.0	58.7
R 11	346 48.7	16.1	227 01.2	7.9	15 30.2	6.2	58.7
S 12	1 48.9	N 0 15.1	241 28.1	8.0	S15 24.0	6.2	58.7
D 13	16 49.2	14.1	255 55.1	8.0	15 17.8	6.3	58.7
A 14	31 49.4	13.1	270 22.1	8.1	15 11.5	6.4	58.7
Y 15	46 49.6	·· 12.2	284 49.2	8.1	15 05.1	6.5	58.7
16	61 49.8	11.2	299 16.3	8.2	14 58.6	6.5	58.6
17	76 50.0	10.2	313 43.5	8.3	14 52.1	6.7	58.6
18	91 50.3	N 0 09.3	328 10.8	8.2	S14 45.4	6.7	58.6
19	106 50.5	08.3	342 38.0	8.4	14 38.7	6.9	58.6
20	121 50.7	07.3	357 05.4	8.3	14 31.8	6.9	58.6
21	136 50.9	·· 06.3	11 32.7	8.5	14 24.9	7.0	58.6
22	151 51.1	05.4	26 00.2	8.5	14 17.9	7.1	58.6
23	166 51.4	04.4	40 27.7	8.5	14 10.8	7.1	58.5
23 00	181 51.6	N 0 03.4	54 55.2	8.6	S14 03.7	7.3	58.5
01	196 51.8	02.4	69 22.8	8.6	13 56.4	7.3	58.5
02	211 52.0	01.5	83 50.4	8.7	13 49.1	7.4	58.5
03	226 52.2	N 0 00.5	98 18.1	8.7	13 41.7	7.5	58.5
04	241 52.4	S 0 00.5	112 45.8	8.8	13 34.2	7.5	58.5
05	256 52.7	01.5	127 13.6	8.9	13 26.7	7.7	58.5
06	271 52.9	S 0 02.4	141 41.5	8.9	S13 19.0	7.7	58.4
07	286 53.1	03.4	156 09.4	8.9	13 11.3	7.8	58.4
08	301 53.3	04.4	170 37.3	9.0	13 03.5	7.8	58.4
F 09	316 53.5	·· 05.3	185 05.3	9.1	12 55.7	7.9	58.4
R 10	331 53.8	06.3	199 33.4	9.1	12 47.8	8.0	58.4
I 11	346 54.0	07.3	214 01.5	9.1	12 39.8	8.1	58.4
D 12	1 54.2	S 0 08.3	228 29.6	9.2	S12 31.7	8.1	58.3
A 13	16 54.4	09.2	242 57.8	9.3	12 23.6	8.2	58.3
Y 14	31 54.6	10.2	257 26.1	9.3	12 15.4	8.3	58.3
15	46 54.9	·· 11.2	271 54.4	9.3	12 07.1	8.3	58.3
16	61 55.1	12.2	286 22.7	9.5	11 58.8	8.4	58.3
17	76 55.3	13.1	300 51.2	9.4	11 50.4	8.5	58.3
18	91 55.5	S 0 14.1	315 19.6	9.5	S11 41.9	8.5	58.3
19	106 55.7	15.1	329 48.1	9.6	11 33.4	8.6	58.2
20	121 55.9	16.1	344 16.7	9.6	11 24.8	8.6	58.2
21	136 56.2	·· 17.0	358 45.3	9.7	11 16.2	8.7	58.2
22	151 56.4	18.0	13 14.0	9.7	11 07.5	8.8	58.2
23	166 56.6	19.0	27 42.7	9.8	10 58.7	8.8	58.2
24 00	181 56.8	S 0 20.0	42 11.5	9.8	S10 49.9	8.9	58.1
01	196 57.0	20.9	56 40.3	9.9	10 41.0	8.9	58.1
02	211 57.3	21.9	71 09.2	9.9	10 32.1	9.0	58.1
03	226 57.5	·· 22.9	85 38.1	9.9	10 23.1	9.1	58.1
04	241 57.7	23.8	100 07.0	10.1	10 14.0	9.0	58.1
05	256 57.9	24.8	114 36.1	10.0	10 05.0	9.2	58.1
06	271 58.1	S 0 25.8	129 05.1	10.2	S 9 55.8	9.2	58.0
07	286 58.3	26.8	143 34.3	10.1	9 46.6	9.2	58.0
S 08	301 58.6	27.7	158 03.4	10.2	9 37.4	9.3	58.0
A 09	316 58.8	·· 28.7	172 32.6	10.3	9 28.1	9.3	58.0
T 10	331 59.0	29.7	187 01.9	10.3	9 18.8	9.4	58.0
U 11	346 59.2	30.7	201 31.2	10.4	9 09.4	9.4	58.0
R 12	1 59.4	S 0 31.6	216 00.6	10.4	S 9 00.0	9.5	57.9
D 13	16 59.7	32.6	230 30.0	10.4	8 50.5	9.5	57.9
A 14	31 59.9	33.6	244 59.4	10.5	8 41.0	9.6	57.9
Y 15	47 00.1	·· 34.6	259 28.9	10.6	8 31.4	9.6	57.9
16	62 00.3	35.5	273 58.5	10.6	8 21.8	9.6	57.9
17	77 00.5	36.5	288 28.1	10.6	8 12.2	9.7	57.8
18	92 00.7	S 0 37.5	302 57.7	10.7	S 8 02.5	9.7	57.8
19	107 01.0	38.5	317 27.4	10.7	7 52.8	9.7	57.8
20	122 01.2	39.4	331 57.1	10.8	7 43.1	9.8	57.8
21	137 01.4	·· 40.4	346 26.9	10.8	7 33.3	9.8	57.8
22	152 01.6	41.4	0 56.7	10.8	7 23.5	9.9	57.7
23	167 01.8	42.4	15 26.5	10.9	7 13.6	9.9	57.7
	S.D. 16.0	d 1.0	S.D. 16.0		15.9		15.8

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

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

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
	m s	m s	h m	h m	h m	d	
22	07 05	07 15	11 53	20 12	07 45	09	◐
23	07 26	07 36	11 52	21 05	08 39	10	
24	07 47	07 57	11 52	21 56	09 31	11	

0000 SEPTEMBER 25, 26, 27 (SUN., MON., TUES.)

G.M.T. (UT)		ARIES	VENUS −3.4		MARS +0.8		JUPITER −1.9		SATURN +0.8	
d	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
25	00	3 41.9	208 30.4	N11 20.9	258 16.6	N23 11.2	268 32.2	N22 58.4	215 25.4	N14 00.2
	01	18 44.4	223 30.0	19.9	273 17.5	11.1	283 34.4	58.4	230 27.6	00.1
	02	33 46.8	238 29.5	18.9	288 18.5	11.1	298 36.6	58.4	245 29.8	14 00.0
	03	48 49.3	253 29.1	·· 17.9	303 19.4	·· 11.0	313 38.8	·· 58.4	260 32.0	13 59.9
	04	63 51.8	268 28.6	16.8	318 20.4	10.9	328 41.1	58.4	275 34.2	59.8
	05	78 54.2	283 28.1	15.8	333 21.3	10.8	343 43.3	58.4	290 36.4	59.7
	06	93 56.7	298 27.7	N11 14.8	348 22.3	N23 10.7	358 45.5	N22 58.4	305 38.6	N13 59.7
	07	108 59.2	313 27.2	13.8	3 23.2	10.6	13 47.7	58.4	320 40.8	59.6
	08	124 01.6	328 26.7	12.8	18 24.2	10.5	28 49.9	58.4	335 43.0	59.5
S	09	139 04.1	343 26.3	·· 11.8	33 25.2	·· 10.4	43 52.2	·· 58.4	350 45.2	·· 59.4
U	10	154 06.6	358 25.8	10.7	48 26.1	10.3	58 54.4	58.4	5 47.3	59.3
N	11	169 09.0	13 25.3	09.7	63 27.1	10.2	73 56.6	58.4	20 49.5	59.2
D	12	184 11.5	28 24.9	N11 08.7	78 28.0	N23 10.1	88 58.8	N22 58.4	35 51.7	N13 59.1
A	13	199 13.9	43 24.4	07.7	93 29.0	10.0	104 01.0	58.4	50 53.9	59.0
Y	14	214 16.4	58 24.0	06.7	108 29.9	09.9	119 03.3	58.4	65 56.1	58.9
	15	229 18.9	73 23.5	·· 05.6	123 30.9	·· 09.8	134 05.5	·· 58.3	80 58.3	·· 58.9
	16	244 21.3	88 23.0	04.6	138 31.8	09.7	149 07.7	58.3	96 00.5	58.8
	17	259 23.8	103 22.6	03.6	153 32.8	09.6	164 09.9	58.3	111 02.7	58.7
	18	274 26.3	118 22.1	N11 02.6	168 33.8	N23 09.5	179 12.1	N22 58.3	126 04.9	N13 58.6
	19	289 28.7	133 21.7	01.5	183 34.7	09.4	194 14.4	58.3	141 07.1	58.5
	20	304 31.2	148 21.2	11 00.5	198 35.7	09.3	209 16.6	58.3	156 09.3	58.4
	21	319 33.7	163 20.7	10 59.5	213 36.6	·· 09.2	224 18.8	·· 58.3	171 11.5	·· 58.3
	22	334 36.1	178 20.3	58.5	228 37.6	09.1	239 21.0	58.3	186 13.7	58.2
	23	349 38.6	193 19.8	57.4	243 38.6	09.0	254 23.2	58.3	201 15.9	58.2
26	00	4 41.1	208 19.4	N10 56.4	258 39.5	N23 08.9	269 25.5	N22 58.3	216 18.0	N13 58.1
	01	19 43.5	223 18.9	55.4	273 40.5	08.8	284 27.7	58.3	231 20.2	58.0
	02	34 46.0	238 18.4	54.4	288 41.4	08.7	299 29.9	58.3	246 22.4	57.9
	03	49 48.4	253 18.0	·· 53.3	303 42.4	·· 08.6	314 32.1	·· 58.3	261 24.6	·· 57.8
	04	64 50.9	268 17.5	52.3	318 43.4	08.5	329 34.4	58.3	276 26.8	57.7
	05	79 53.4	283 17.1	51.3	333 44.3	08.4	344 36.6	58.3	291 29.0	57.6
	06	94 55.8	298 16.6	N10 50.3	348 45.3	N23 08.3	359 38.8	N22 58.2	306 31.2	N13 57.5
	07	109 58.3	313 16.1	49.2	3 46.2	08.2	14 41.0	58.2	321 33.4	57.4
	08	125 00.8	328 15.7	48.2	18 47.2	08.1	29 43.3	58.2	336 35.6	57.4
M	09	140 03.2	343 15.2	·· 47.2	33 48.2	·· 08.0	44 45.5	·· 58.2	351 37.8	·· 57.3
O	10	155 05.7	358 14.8	46.1	48 49.1	07.9	59 47.7	58.2	6 40.0	57.2
N	11	170 08.2	13 14.3	45.1	63 50.1	07.8	74 49.9	58.2	21 42.2	57.1
D	12	185 10.6	28 13.9	N10 44.1	78 51.1	N23 07.7	89 52.2	N22 58.2	36 44.4	N13 57.0
A	13	200 13.1	43 13.4	43.0	93 52.0	07.6	104 54.4	58.2	51 46.6	56.9
Y	14	215 15.6	58 13.0	42.0	108 53.0	07.5	119 56.6	58.2	66 48.8	56.8
	15	230 18.0	73 12.5	·· 41.0	123 54.0	·· 07.4	134 58.9	·· 58.2	81 51.0	·· 56.7
	16	245 20.5	88 12.0	39.9	138 54.9	07.3	150 01.1	58.2	96 53.1	56.7
	17	260 22.9	103 11.6	38.9	153 55.9	07.2	165 03.3	58.2	111 55.3	56.6
	18	275 25.4	118 11.1	N10 37.9	168 56.9	N23 07.1	180 05.5	N22 58.2	126 57.5	N13 56.5
	19	290 27.9	133 10.7	36.8	183 57.8	07.0	195 07.8	58.2	141 59.7	56.4
	20	305 30.3	148 10.2	35.8	198 58.8	06.9	210 10.0	58.2	157 01.9	56.3
	21	320 32.8	163 09.8	·· 34.7	213 59.8	·· 06.8	225 12.2	·· 58.2	172 04.1	·· 56.2
	22	335 35.3	178 09.3	33.7	229 00.7	06.7	240 14.5	58.1	187 06.3	56.1
	23	350 37.7	193 08.9	32.7	244 01.7	06.6	255 16.7	58.1	202 08.5	56.0
27	00	5 40.2	208 08.4	N10 31.6	259 02.7	N23 06.5	270 18.9	N22 58.1	217 10.7	N13 56.0
	01	20 42.7	223 08.0	30.6	274 03.6	06.4	285 21.2	58.1	232 12.9	55.9
	02	35 45.1	238 07.5	29.5	289 04.6	06.3	300 23.4	58.1	247 15.1	55.8
	03	50 47.6	253 07.1	·· 28.5	304 05.6	·· 06.2	315 25.6	·· 58.1	262 17.3	·· 55.7
	04	65 50.1	268 06.6	27.5	319 06.6	06.1	330 27.9	58.1	277 19.5	55.6
	05	80 52.5	283 06.1	26.4	334 07.5	06.0	345 30.1	58.1	292 21.7	55.5
	06	95 55.0	298 05.7	N10 25.4	349 08.5	N23 05.9	0 32.3	N22 58.1	307 23.9	N13 55.4
	07	110 57.4	313 05.2	24.3	4 09.5	05.8	15 34.6	58.1	322 26.1	55.3
	08	125 59.9	328 04.8	23.3	19 10.4	05.7	30 36.8	58.1	337 28.3	55.3
T	09	141 02.4	343 04.3	·· 22.2	34 11.4	·· 05.6	45 39.0	·· 58.1	352 30.5	·· 55.2
U	10	156 04.8	358 03.9	21.2	49 12.4	05.5	60 41.3	58.1	7 32.7	55.1
E	11	171 07.3	13 03.4	20.2	64 13.4	05.4	75 43.5	58.1	22 34.9	55.0
S	12	186 09.8	28 03.0	N10 19.1	79 14.3	N23 05.3	90 45.7	N22 58.1	37 37.1	N13 54.9
D	13	201 12.2	43 02.5	18.1	94 15.3	05.2	105 48.0	58.1	52 39.3	54.8
A	14	216 14.7	58 02.1	17.0	109 16.3	05.1	120 50.2	58.0	67 41.5	54.7
Y	15	231 17.2	73 01.6	·· 16.0	124 17.3	·· 05.0	135 52.4	·· 58.0	82 43.7	·· 54.6
	16	246 19.6	88 01.2	14.9	139 18.2	04.9	150 54.7	58.0	97 45.8	54.6
	17	261 22.1	103 00.7	13.9	154 19.2	04.7	165 56.9	58.0	112 48.0	54.5
	18	276 24.5	118 00.3	N10 12.8	169 20.2	N23 04.6	180 59.1	N22 58.0	127 50.2	N13 54.4
	19	291 27.0	132 59.8	11.8	184 21.2	04.5	196 01.4	58.0	142 52.4	54.3
	20	306 29.5	147 59.4	10.7	199 22.1	04.4	211 03.6	58.0	157 54.6	54.2
	21	321 31.9	162 59.0	·· 09.7	214 23.1	·· 04.3	226 05.8	·· 58.0	172 56.8	·· 54.1
	22	336 34.4	177 58.5	08.6	229 24.1	04.2	241 08.1	58.0	187 59.0	54.0
	23	351 36.9	192 58.1	07.6	244 25.1	04.1	256 10.3	58.0	203 01.2	53.9
Mer. Pass.		h m 23 37.4	v −0.5	d 1.0	v 1.0	d 0.1	v 2.2	d 0.0	v 2.2	d 0.1

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.5	S40 23.4
Achernar	335 46.3	S57 20.8
Acrux	173 40.0	S62 58.5
Adhara	255 33.7	S28 56.3
Aldebaran	291 20.2	N16 27.9
Alioth	166 44.9	N56 04.9
Alkaid	153 20.6	N49 25.7
Al Na'ir	28 17.1	S47 04.1
Alnilam	276 13.6	S 1 12.9
Alphard	218 22.8	S 8 33.6
Alphecca	126 34.1	N26 47.7
Alpheratz	358 11.0	N28 58.2
Altair	62 34.4	N 8 48.8
Ankaa	353 41.8	S42 25.5
Antares	112 59.5	S26 22.9
Arcturus	146 20.6	N19 18.1
Atria	108 25.6	S68 59.4
Avior	234 29.3	S59 26.1
Bellatrix	279 00.8	N 6 19.8
Betelgeuse	271 30.4	N 7 24.2
Canopus	264 08.1	S52 40.8
Capella	281 14.1	N45 58.4
Deneb	49 49.5	N45 12.4
Denebola	183 01.4	N14 41.9
Diphda	349 22.6	S18 06.4
Dubhe	194 25.3	N61 52.2
Elnath	278 46.6	N28 35.2
Eltanin	90 58.7	N51 29.9
Enif	34 13.3	N 9 46.6
Fomalhaut	15 53.3	S29 44.3
Gacrux	172 31.5	S56 59.3
Gienah	176 20.3	S17 25.0
Hadar	149 26.7	S60 16.0
Hamal	328 30.9	N23 21.5
Kaus Aust.	84 19.5	S34 23.7
Kochab	137 20.0	N74 15.1
Markab	14 04.8	N15 05.3
Menkar	314 43.0	N 4 00.2
Menkent	148 39.7	S36 15.6
Miaplacidus	221 45.9	S69 37.4
Mirfak	309 18.6	N49 46.8
Nunki	76 31.6	S26 19.4
Peacock	54 01.3	S56 48.5
Pollux	244 00.8	N28 04.7
Procyon	245 28.0	N 5 17.0
Rasalhague	96 31.5	N12 34.8
Regulus	208 12.4	N12 04.6
Rigel	281 37.9	S 8 13.5
Rigil Kent.	140 29.0	S60 44.6
Sabik	102 43.5	S15 41.7
Schedar	350 10.6	N56 25.0
Shaula	96 58.6	S37 05.3
Sirius	258 57.5	S16 41.0
Spica	159 00.0	S11 02.6
Suhail	223 12.5	S43 20.4
Vega	80 57.1	N38 46.2
Zuben'ubi	137 35.5	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	203 38.3	10 07
Mars	253 58.5	6 45
Jupiter	264 44.4	6 01
Saturn	211 37.0	9 33

0000 SEPTEMBER 25, 26, 27 (SUN., MON., TUES.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
25 00	182 02.0	S 0 43.3	29 56.4	11.0	S 7 03.7	9.9	57.7
01	197 02.3	44.3	44 26.4	11.0	6 53.8	9.9	57.7
02	212 02.5	45.3	58 56.4	11.0	6 43.9	10.0	57.7
03	227 02.7	·· 46.3	73 26.4	11.1	6 33.9	10.0	57.7
04	242 02.9	47.2	87 56.5	11.1	6 23.9	10.0	57.6
05	257 03.1	48.2	102 26.6	11.2	6 13.9	10.1	57.6
06	272 03.3	S 0 49.2	116 56.8	11.1	S 6 03.8	10.1	57.6
07	287 03.6	50.1	131 26.9	11.3	5 53.7	10.1	57.6
08	302 03.8	51.1	145 57.2	11.3	5 43.6	10.1	57.6
S 09	317 04.0	·· 52.1	160 27.5	11.3	5 33.5	10.2	57.5
U 10	332 04.2	53.1	174 57.8	11.3	5 23.3	10.2	57.5
N 11	347 04.4	54.0	189 28.1	11.4	5 13.1	10.1	57.5
D 12	2 04.6	S 0 55.0	203 58.5	11.4	S 5 03.0	10.3	57.5
A 13	17 04.9	56.0	218 28.9	11.5	4 52.7	10.2	57.5
Y 14	32 05.1	57.0	232 59.4	11.5	4 42.5	10.2	57.4
15	47 05.3	·· 57.9	247 29.9	11.6	4 32.3	10.3	57.4
16	62 05.5	58.9	262 00.5	11.5	4 22.0	10.3	57.4
17	77 05.7	0 59.9	276 31.0	11.6	4 11.7	10.3	57.4
18	92 05.9	S 1 00.9	291 01.6	11.7	S 4 01.4	10.3	57.3
19	107 06.2	01.8	305 32.3	11.7	3 51.1	10.3	57.3
20	122 06.4	02.8	320 03.0	11.7	3 40.8	10.4	57.3
21	137 06.6	·· 03.8	334 33.7	11.7	3 30.4	10.3	57.3
22	152 06.8	04.8	349 04.4	11.8	3 20.1	10.3	57.3
23	167 07.0	05.7	3 35.2	11.8	3 09.8	10.4	57.2
26 00	182 07.2	S 1 06.7	18 06.0	11.9	S 2 59.4	10.4	57.2
01	197 07.4	07.7	32 36.9	11.9	2 49.0	10.4	57.2
02	212 07.7	08.7	47 07.8	11.9	2 38.6	10.3	57.2
03	227 07.9	·· 09.6	61 38.7	11.9	2 28.3	10.4	57.2
04	242 08.1	10.6	76 09.6	12.0	2 17.9	10.4	57.1
05	257 08.3	11.6	90 40.6	12.0	2 07.5	10.4	57.1
06	272 08.5	S 1 12.5	105 11.6	12.0	S 1 57.1	10.4	57.1
07	287 08.7	13.5	119 42.6	12.1	1 46.7	10.4	57.1
08	302 08.9	14.5	134 13.7	12.1	1 36.3	10.4	57.0
M 09	317 09.2	·· 15.5	148 44.8	12.1	1 25.9	10.4	57.0
O 10	332 09.4	16.4	163 15.9	12.1	1 15.5	10.4	57.0
N 11	347 09.6	17.4	177 47.0	12.2	1 05.1	10.4	57.0
D 12	2 09.8	S 1 18.4	192 18.2	12.2	S 0 54.7	10.4	57.0
A 13	17 10.0	19.4	206 49.4	12.2	0 44.3	10.4	56.9
Y 14	32 10.2	20.3	221 20.6	12.3	0 33.9	10.4	56.9
15	47 10.4	·· 21.3	235 51.9	12.3	0 23.5	10.3	56.9
16	62 10.7	22.3	250 23.2	12.3	0 13.2	10.4	56.9
17	77 10.9	23.3	264 54.5	12.3	S 0 02.8	10.4	56.8
18	92 11.1	S 1 24.2	279 25.8	12.3	N 0 07.6	10.3	56.8
19	107 11.3	25.2	293 57.1	12.4	0 17.9	10.3	56.8
20	122 11.5	26.2	308 28.5	12.4	0 28.2	10.4	56.8
21	137 11.7	·· 27.2	322 59.9	12.4	0 38.6	10.3	56.8
22	152 11.9	28.1	337 31.3	12.4	0 48.9	10.3	56.7
23	167 12.2	29.1	352 02.7	12.5	0 59.2	10.3	56.7
27 00	182 12.4	S 1 30.1	6 34.2	12.5	N 1 09.5	10.3	56.7
01	197 12.6	31.1	21 05.7	12.5	1 19.8	10.2	56.7
02	212 12.8	32.0	35 37.2	12.5	1 30.0	10.3	56.6
03	227 13.0	·· 33.0	50 08.7	12.5	1 40.3	10.2	56.6
04	242 13.2	34.0	64 40.2	12.6	1 50.5	10.2	56.6
05	257 13.4	34.9	79 11.8	12.6	2 00.7	10.2	56.6
06	272 13.7	S 1 35.9	93 43.4	12.5	N 2 10.9	10.2	56.5
07	287 13.9	36.9	108 14.9	12.7	2 21.1	10.2	56.5
08	302 14.1	37.9	122 46.6	12.6	2 31.3	10.1	56.5
T 09	317 14.3	·· 38.8	137 18.2	12.6	2 41.4	10.1	56.5
U 10	332 14.5	39.8	151 49.8	12.7	2 51.5	10.1	56.5
E 11	347 14.7	40.8	166 21.5	12.7	3 01.6	10.1	56.4
S 12	2 14.9	S 1 41.8	180 53.2	12.6	N 3 11.7	10.1	56.4
D 13	17 15.1	42.7	195 24.8	12.8	3 21.8	10.0	56.4
A 14	32 15.4	43.7	209 56.6	12.7	3 31.8	10.0	56.4
Y 15	47 15.6	·· 44.7	224 28.3	12.7	3 41.8	10.0	56.3
16	62 15.8	45.7	239 00.0	12.7	3 51.8	9.9	56.3
17	77 16.0	46.6	253 31.7	12.8	4 01.7	9.9	56.3
18	92 16.2	S 1 47.6	268 03.5	12.8	N 4 11.6	9.9	56.3
19	107 16.4	48.6	282 35.3	12.8	4 21.5	9.9	56.3
20	122 16.6	49.5	297 07.1	12.8	4 31.4	9.8	56.2
21	137 16.8	·· 50.5	311 38.9	12.8	4 41.2	9.8	56.2
22	152 17.0	51.5	326 10.7	12.8	4 51.0	9.8	56.2
23	167 17.3	52.5	340 42.5	12.8	5 00.8	9.7	56.2
	S.D. 16.0	d 1.0	S.D. 15.7		15.5		15.4

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

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

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
	m s	m s	h m	h m	h m	d	
25	08 08	08 18	11 52	22 45	10 21	12	○
26	08 28	08 39	11 51	23 33	11 09	13	
27	08 49	08 59	11 51	24 20	11 56	14	

G.M.T. (UT)		ARIES	VENUS −3.4		MARS +0.8		JUPITER −1.9		SATURN +0.8	
d	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
28	00	6 39.3	207 57.6	N10 06.5	259 26.1	N23 04.0	271 12.6	N22 58.0	218 03.4	N13 53.9
	01	21 41.8	222 57.2	05.5	274 27.0	03.9	286 14.8	58.0	233 05.6	53.8
	02	36 44.3	237 56.7	04.4	289 28.0	03.8	301 17.0	58.0	248 07.8	53.7
	03	51 46.7	252 56.3	·· 03.4	304 29.0	·· 03.7	316 19.3	·· 58.0	263 10.0	·· 53.6
	04	66 49.2	267 55.8	02.3	319 30.0	03.6	331 21.5	58.0	278 12.2	53.5
	05	81 51.7	282 55.4	01.2	334 31.0	03.5	346 23.8	58.0	293 14.4	53.4
	06	96 54.1	297 54.9	N10 00.2	349 31.9	N23 03.4	1 26.0	N22 57.9	308 16.6	N13 53.3
	07	111 56.6	312 54.5	9 59.1	4 32.9	03.3	16 28.2	57.9	323 18.8	53.2
W	08	126 59.0	327 54.0	58.1	19 33.9	03.1	31 30.5	57.9	338 21.0	53.2
E	09	142 01.5	342 53.6	·· 57.0	34 34.9	·· 03.0	46 32.7	·· 57.9	353 23.2	·· 53.1
D	10	157 04.0	357 53.1	56.0	49 35.9	02.9	61 35.0	57.9	8 25.4	53.0
N	11	172 06.4	12 52.7	54.9	64 36.8	02.8	76 37.2	57.9	23 27.6	52.9
E	12	187 08.9	27 52.3	N 9 53.9	79 37.8	N23 02.7	91 39.4	N22 57.9	38 29.8	N13 52.8
S	13	202 11.4	42 51.8	52.8	94 38.8	02.6	106 41.7	57.9	53 32.0	52.7
D	14	217 13.8	57 51.4	51.7	109 39.8	02.5	121 43.9	57.9	68 34.2	52.6
A	15	232 16.3	72 50.9	·· 50.7	124 40.8	·· 02.4	136 46.2	·· 57.9	83 36.4	·· 52.6
Y	16	247 18.8	87 50.5	49.6	139 41.8	02.3	151 48.4	57.9	98 38.6	52.5
	17	262 21.2	102 50.0	48.6	154 42.8	02.2	166 50.7	57.9	113 40.8	52.4
	18	277 23.7	117 49.6	N 9 47.5	169 43.7	N23 02.1	181 52.9	N22 57.9	128 43.0	N13 52.3
	19	292 26.2	132 49.2	46.4	184 44.7	01.9	196 55.2	57.9	143 45.2	52.2
	20	307 28.6	147 48.7	45.4	199 45.7	01.8	211 57.4	57.9	158 47.4	52.1
	21	322 31.1	162 48.3	·· 44.3	214 46.7	·· 01.7	226 59.6	·· 57.9	173 49.6	·· 52.0
	22	337 33.5	177 47.8	43.2	229 47.7	01.6	242 01.9	57.9	188 51.8	51.9
	23	352 36.0	192 47.4	42.2	244 48.7	01.5	257 04.1	57.8	203 54.0	51.9
29	00	7 38.5	207 46.9	N 9 41.1	259 49.7	N23 01.4	272 06.4	N22 57.8	218 56.2	N13 51.8
	01	22 40.9	222 46.5	40.0	274 50.6	01.3	287 08.6	57.8	233 58.4	51.7
	02	37 43.4	237 46.1	39.0	289 51.6	01.2	302 10.9	57.8	249 00.6	51.6
	03	52 45.9	252 45.6	·· 37.9	304 52.6	·· 01.1	317 13.1	·· 57.8	264 02.8	·· 51.5
	04	67 48.3	267 45.2	36.8	319 53.6	01.0	332 15.4	57.8	279 05.0	51.4
	05	82 50.8	282 44.7	35.8	334 54.6	00.8	347 17.6	57.8	294 07.2	51.3
	06	97 53.3	297 44.3	N 9 34.7	349 55.6	N23 00.7	2 19.9	N22 57.8	309 09.4	N13 51.3
	07	112 55.7	312 43.9	33.6	4 56.6	00.6	17 22.1	57.8	324 11.6	51.2
T	08	127 58.2	327 43.4	32.6	19 57.6	00.5	32 24.4	57.8	339 13.8	51.1
H	09	143 00.6	342 43.0	·· 31.5	34 58.6	·· 00.4	47 26.6	·· 57.8	354 16.0	·· 51.0
U	10	158 03.1	357 42.5	30.4	49 59.6	00.3	62 28.9	57.8	9 18.2	50.9
R	11	173 05.6	12 42.1	29.4	65 00.6	00.2	77 31.1	57.8	24 20.4	50.8
S	12	188 08.0	27 41.7	N 9 28.3	80 01.5	N23 00.1	92 33.4	N22 57.8	39 22.6	N13 50.7
D	13	203 10.5	42 41.2	27.2	95 02.5	22 59.9	107 35.6	57.8	54 24.8	50.7
A	14	218 13.0	57 40.8	26.2	110 03.5	59.8	122 37.9	57.8	69 27.0	50.6
Y	15	233 15.4	72 40.3	·· 25.1	125 04.5	·· 59.7	137 40.1	·· 57.8	84 29.2	·· 50.5
	16	248 17.9	87 39.9	24.0	140 05.5	59.6	152 42.4	57.7	99 31.4	50.4
	17	263 20.4	102 39.5	22.9	155 06.5	59.5	167 44.6	57.7	114 33.6	50.3
	18	278 22.8	117 39.0	N 9 21.9	170 07.5	N22 59.4	182 46.9	N22 57.7	129 35.8	N13 50.2
	19	293 25.3	132 38.6	20.8	185 08.5	59.3	197 49.1	57.7	144 38.0	50.1
	20	308 27.8	147 38.2	19.7	200 09.5	59.1	212 51.4	57.7	159 40.2	50.1
	21	323 30.2	162 37.7	·· 18.6	215 10.5	·· 59.0	227 53.6	·· 57.7	174 42.4	·· 50.0
	22	338 32.7	177 37.3	17.6	230 11.5	58.9	242 55.9	57.7	189 44.6	49.9
	23	353 35.1	192 36.9	16.5	245 12.5	58.8	257 58.1	57.7	204 46.8	49.8
30	00	8 37.6	207 36.4	N 9 15.4	260 13.5	N22 58.7	273 00.4	N22 57.7	219 49.0	N13 49.7
	01	23 40.1	222 36.0	14.3	275 14.5	58.6	288 02.6	57.7	234 51.2	49.6
	02	38 42.5	237 35.5	13.3	290 15.5	58.5	303 04.9	57.7	249 53.4	49.5
	03	53 45.0	252 35.1	·· 12.2	305 16.5	·· 58.3	318 07.2	·· 57.7	264 55.6	·· 49.5
	04	68 47.5	267 34.7	11.1	320 17.5	58.2	333 09.4	57.7	279 57.8	49.4
	05	83 49.9	282 34.2	10.0	335 18.5	58.1	348 11.7	57.7	295 00.0	49.3
	06	98 52.4	297 33.8	N 9 08.9	350 19.5	N22 58.0	3 13.9	N22 57.7	310 02.2	N13 49.2
	07	113 54.9	312 33.4	07.9	5 20.5	57.9	18 16.2	57.7	325 04.4	49.1
	08	128 57.3	327 32.9	06.8	20 21.5	57.8	33 18.4	57.7	340 06.6	49.0
F	09	143 59.8	342 32.5	·· 05.7	35 22.5	·· 57.7	48 20.7	·· 57.6	355 08.8	·· 48.9
R	10	159 02.3	357 32.1	04.6	50 23.5	57.5	63 22.9	57.6	10 11.0	48.9
I	11	174 04.7	12 31.6	03.5	65 24.5	57.4	78 25.2	57.6	25 13.2	48.8
D	12	189 07.2	27 31.2	N 9 02.5	80 25.5	N22 57.3	93 27.5	N22 57.6	40 15.4	N13 48.7
A	13	204 09.6	42 30.8	01.4	95 26.5	57.2	108 29.7	57.6	55 17.6	48.6
Y	14	219 12.1	57 30.3	9 00.3	110 27.5	57.1	123 32.0	57.6	70 19.8	48.5
	15	234 14.6	72 29.9	8 59.2	125 28.5	·· 57.0	138 34.2	·· 57.6	85 22.0	·· 48.4
	16	249 17.0	87 29.5	58.1	140 29.5	56.8	153 36.5	57.6	100 24.2	48.3
	17	264 19.5	102 29.0	57.0	155 30.5	56.7	168 38.8	57.6	115 26.4	48.3
	18	279 22.0	117 28.6	N 8 56.0	170 31.5	N22 56.6	183 41.0	N22 57.6	130 28.6	N13 48.2
	19	294 24.4	132 28.2	54.9	185 32.5	56.5	198 43.3	57.6	145 30.8	48.1
	20	309 26.9	147 27.7	53.8	200 33.5	56.4	213 45.5	57.6	160 33.1	48.0
	21	324 29.4	162 27.3	·· 52.7	215 34.5	·· 56.3	228 47.8	·· 57.6	175 35.3	·· 47.9
	22	339 31.8	177 26.9	51.6	230 35.5	56.1	243 50.1	57.6	190 37.5	47.8
	23	354 34.3	192 26.4	50.5	245 36.5	56.0	258 52.3	57.6	205 39.7	47.8
Mer. Pass.		h m 23 25.6	v −0.4	d 1.1	v 1.0	d 0.1	v 2.3	d 0.0	v 2.2	d 0.1

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.5	S40 23.5
Achernar	335 46.3	S57 20.8
Acrux	173 40.0	S62 58.5
Adhara	255 33.7	S28 56.3
Aldebaran	291 20.1	N16 27.9
Alioth	166 44.9	N56 04.9
Alkaid	153 20.6	N49 25.6
Al Na'ir	28 17.1	S47 04.1
Alnilam	276 13.6	S 1 12.9
Alphard	218 22.8	S 8 33.6
Alphecca	126 34.1	N26 47.6
Alpheratz	358 11.0	N28 58.2
Altair	62 34.4	N 8 48.8
Ankaa	353 41.8	S42 25.5
Antares	112 59.5	S26 22.9
Arcturus	146 20.6	N19 18.1
Atria	108 25.7	S68 59.4
Avior	234 29.3	S59 26.1
Bellatrix	279 00.8	N 6 19.8
Betelgeuse	271 30.4	N 7 24.2
Canopus	264 08.1	S52 40.8
Capella	281 14.1	N45 58.4
Deneb	49 49.5	N45 12.4
Denebola	183 01.4	N14 41.9
Diphda	349 22.6	S18 06.4
Dubhe	194 25.3	N61 52.2
Elnath	278 46.6	N28 35.2
Eltanin	90 58.7	N51 29.9
Enif	34 13.3	N 9 46.6
Fomalhaut	15 53.3	S29 44.3
Gacrux	172 31.5	S56 59.3
Gienah	176 20.3	S17 25.0
Hadar	149 26.7	S60 16.0
Hamal	328 30.9	N23 21.5
Kaus Aust.	84 19.5	S34 23.7
Kochab	137 20.0	N74 15.1
Markab	14 04.8	N15 05.3
Menkar	314 43.0	N 4 00.2
Menkent	148 39.7	S36 15.6
Miaplacidus	221 45.8	S69 37.4
Mirfak	309 18.6	N49 46.8
Nunki	76 31.6	S26 19.4
Peacock	54 01.3	S56 48.5
Pollux	244 00.7	N28 04.7
Procyon	245 28.0	N 5 17.0
Rasalhague	96 31.5	N12 34.8
Regulus	208 12.4	N12 04.6
Rigel	281 37.8	S 8 13.5
Rigil Kent.	140 29.0	S60 44.6
Sabik	102 43.5	S15 41.7
Schedar	350 10.6	N56 25.0
Shaula	96 58.6	S37 05.3
Sirius	258 57.5	S16 41.0
Spica	159 00.0	S11 02.6
Suhail	223 12.5	S43 20.4
Vega	80 57.2	N38 46.2
Zuben'ubi	137 35.5	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	200 08.5	10 09
Mars	252 11.2	6 40
Jupiter	264 27.9	5 51
Saturn	211 17.7	9 23

0000 SEPTEMBER 28, 29, 30 (WED., THURS., FRI.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
28 00	182 17.5	S 1 53.4	355 14.3	12.8	N 5 10.5	9.7	56.1
01	197 17.7	54.4	9 46.1	12.9	5 20.2	9.7	56.1
02	212 17.9	55.4	24 18.0	12.8	5 29.9	9.7	56.1
03	227 18.1	·· 56.4	38 49.8	12.9	5 39.6	9.6	56.1
04	242 18.3	57.3	53 21.7	12.9	5 49.2	9.5	56.0
05	257 18.5	58.3	67 53.6	12.9	5 58.7	9.6	56.0
06	272 18.7	S 1 59.3	82 25.5	12.8	N 6 08.3	9.5	56.0
07	287 18.9	2 00.3	96 57.3	12.9	6 17.8	9.4	56.0
W 08	302 19.2	01.2	111 29.2	12.9	6 27.2	9.4	56.0
E 09	317 19.4	·· 02.2	126 01.1	13.0	6 36.6	9.4	55.9
D 10	332 19.6	03.2	140 33.1	12.9	6 46.0	9.3	55.9
N 11	347 19.8	04.1	155 05.0	12.9	6 55.3	9.3	55.9
E 12	2 20.0	S 2 05.1	169 36.9	12.9	N 7 04.6	9.3	55.9
S 13	17 20.2	06.1	184 08.8	12.9	7 13.9	9.2	55.8
D 14	32 20.4	07.1	198 40.7	13.0	7 23.1	9.2	55.8
A 15	47 20.6	·· 08.0	213 12.7	12.9	7 32.3	9.1	55.8
Y 16	62 20.8	09.0	227 44.6	13.0	7 41.4	9.1	55.8
17	77 21.0	10.0	242 16.6	12.9	7 50.5	9.1	55.8
18	92 21.3	S 2 11.0	256 48.5	12.9	N 7 59.6	9.0	55.7
19	107 21.5	11.9	271 20.4	13.0	8 08.6	8.9	55.7
20	122 21.7	12.9	285 52.4	13.0	8 17.5	8.9	55.7
21	137 21.9	·· 13.9	300 24.4	12.9	8 26.4	8.9	55.7
22	152 22.1	14.8	314 56.3	13.0	8 35.3	8.8	55.6
23	167 22.3	15.8	329 28.3	12.9	8 44.1	8.8	55.6
29 00	182 22.5	S 2 16.8	344 00.2	13.0	N 8 52.9	8.7	55.6
01	197 22.7	17.8	358 32.2	12.9	9 01.6	8.6	55.6
02	212 22.9	18.7	13 04.1	13.0	9 10.2	8.7	55.6
03	227 23.1	·· 19.7	27 36.1	13.0	9 18.9	8.5	55.5
04	242 23.3	20.7	42 08.1	12.9	9 27.4	8.5	55.5
05	257 23.6	21.6	56 40.0	13.0	9 35.9	8.5	55.5
06	272 23.8	S 2 22.6	71 12.0	13.0	N 9 44.4	8.4	55.5
07	287 24.0	23.6	85 44.0	12.9	9 52.8	8.4	55.4
T 08	302 24.2	24.6	100 15.9	13.0	10 01.2	8.3	55.4
H 09	317 24.4	·· 25.5	114 47.9	12.9	10 09.5	8.2	55.4
U 10	332 24.6	26.5	129 19.8	13.0	10 17.7	8.2	55.4
R 11	347 24.8	27.5	143 51.8	12.9	10 25.9	8.2	55.4
S 12	2 25.0	S 2 28.5	158 23.7	13.0	N10 34.1	8.1	55.3
D 13	17 25.2	29.4	172 55.7	12.9	10 42.2	8.0	55.3
A 14	32 25.4	30.4	187 27.6	13.0	10 50.2	8.0	55.3
Y 15	47 25.6	·· 31.4	201 59.6	12.9	10 58.2	7.9	55.3
16	62 25.8	32.3	216 31.5	13.0	11 06.1	7.8	55.3
17	77 26.0	33.3	231 03.5	12.9	11 13.9	7.8	55.2
18	92 26.3	S 2 34.3	245 35.4	13.0	N11 21.7	7.8	55.2
19	107 26.5	35.3	260 07.4	12.9	11 29.5	7.7	55.2
20	122 26.7	36.2	274 39.3	12.9	11 37.2	7.6	55.2
21	137 26.9	·· 37.2	289 11.2	12.9	11 44.8	7.6	55.2
22	152 27.1	38.2	303 43.1	13.0	11 52.4	7.5	55.1
23	167 27.3	39.1	318 15.1	12.9	11 59.9	7.4	55.1
30 00	182 27.5	S 2 40.1	332 47.0	12.9	N12 07.3	7.4	55.1
01	197 27.7	41.1	347 18.9	12.9	12 14.7	7.3	55.1
02	212 27.9	42.1	1 50.8	12.9	12 22.0	7.3	55.1
03	227 28.1	·· 43.0	16 22.7	12.9	12 29.3	7.2	55.0
04	242 28.3	44.0	30 54.6	12.9	12 36.5	7.1	55.0
05	257 28.5	45.0	45 26.5	12.8	12 43.6	7.0	55.0
06	272 28.7	S 2 45.9	59 58.3	12.9	N12 50.6	7.1	55.0
07	287 28.9	46.9	74 30.2	12.9	12 57.7	6.9	55.0
08	302 29.1	47.9	89 02.1	12.9	13 04.6	6.9	55.0
F 09	317 29.3	·· 48.8	103 34.0	12.8	13 11.5	6.8	54.9
R 10	332 29.6	49.8	118 05.8	12.9	13 18.3	6.7	54.9
I 11	347 29.8	50.8	132 37.7	12.8	13 25.0	6.7	54.9
D 12	2 30.0	S 2 51.8	147 09.5	12.8	N13 31.7	6.6	54.9
A 13	17 30.2	52.7	161 41.3	12.9	13 38.3	6.5	54.9
Y 14	32 30.4	53.7	176 13.2	12.8	13 44.8	6.5	54.9
15	47 30.6	·· 54.7	190 45.0	12.8	13 51.3	6.4	54.8
16	62 30.8	55.6	205 16.8	12.8	13 57.7	6.3	54.8
17	77 31.0	56.6	219 48.6	12.8	14 04.0	6.3	54.8
18	92 31.2	S 2 57.6	234 20.4	12.8	N14 10.3	6.2	54.8
19	107 31.4	58.6	248 52.2	12.8	14 16.5	6.1	54.8
20	122 31.6	2 59.5	263 24.0	12.8	14 22.6	6.1	54.8
21	137 31.8	3 00.5	277 55.8	12.8	14 28.7	6.0	54.7
22	152 32.0	01.5	292 27.6	12.8	14 34.7	5.9	54.7
23	167 32.2	02.4	306 59.4	12.7	14 40.6	5.8	54.7
	S.D. 16.0	d 1.0	S.D. 15.2		15.1		15.0

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Moonrise 28	Moonrise 29	Moonrise 30	Moonrise 1
°	h m	h m	h m	h m	h m	h m	h m
N 72	03 38	05 02	06 09	17 12	17 07	17 01	16 54
N 70	03 52	05 06	06 07	17 23	17 25	17 28	17 35
68	04 02	05 10	06 05	17 33	17 40	17 49	18 04
66	04 11	05 13	06 04	17 40	17 51	18 06	18 25
64	04 18	05 15	06 02	17 47	18 01	18 19	18 42
62	04 25	05 17	06 01	17 52	18 10	18 31	18 56
60	04 30	05 19	06 00	17 57	18 17	18 40	19 08
N 58	04 34	05 20	05 59	18 02	18 24	18 49	19 19
56	04 38	05 22	05 59	18 06	18 30	18 57	19 28
54	04 41	05 23	05 58	18 09	18 35	19 03	19 36
52	04 44	05 24	05 57	18 12	18 39	19 09	19 43
50	04 47	05 24	05 57	18 15	18 44	19 15	19 50
45	04 52	05 26	05 55	18 22	18 53	19 27	20 04
N 40	04 56	05 27	05 54	18 27	19 01	19 37	20 15
35	04 58	05 28	05 53	18 31	19 07	19 45	20 25
30	05 00	05 28	05 52	18 36	19 13	19 53	20 34
20	05 03	05 28	05 50	18 43	19 24	20 06	20 49
N 10	05 03	05 28	05 49	18 49	19 33	20 17	21 02
0	05 02	05 26	05 47	18 55	19 41	20 28	21 14
S 10	05 00	05 24	05 45	19 01	19 50	20 38	21 27
20	04 56	05 21	05 43	19 07	19 59	20 50	21 40
30	04 49	05 17	05 41	19 15	20 09	21 03	21 55
35	04 45	05 14	05 40	19 19	20 16	21 11	22 04
40	04 39	05 11	05 38	19 24	20 23	21 20	22 14
45	04 32	05 07	05 36	19 29	20 31	21 30	22 26
S 50	04 23	05 02	05 34	19 36	20 40	21 42	22 41
52	04 19	04 59	05 33	19 39	20 45	21 48	22 48
54	04 14	04 56	05 32	19 43	20 50	21 55	22 55
56	04 08	04 53	05 30	19 47	20 56	22 02	23 04
58	04 01	04 49	05 29	19 51	21 02	22 10	23 13
S 60	03 54	04 45	05 27	19 56	21 09	22 19	23 24

Lat.	Sunset	Twilight Civil	Twilight Naut.	Moonset 28	Moonset 29	Moonset 30	Moonset 1
°	h m	h m	h m	h m	h m	h m	h m
N 72	17 29	18 36	19 59	07 54	09 35	11 18	13 02
N 70	17 32	18 32	19 46	07 44	09 18	10 51	12 21
68	17 34	18 29	19 35	07 36	09 05	10 31	11 53
66	17 35	18 26	19 27	07 30	08 54	10 16	11 32
64	17 37	18 24	19 20	07 25	08 45	10 03	11 16
62	17 38	18 22	19 14	07 20	08 37	09 52	11 02
60	17 39	18 20	19 09	07 16	08 31	09 43	10 50
N 58	17 40	18 19	19 05	07 13	08 25	09 35	10 40
56	17 41	18 18	19 01	07 09	08 20	09 27	10 32
54	17 42	18 17	18 58	07 07	08 15	09 21	10 24
52	17 43	18 16	18 55	07 04	08 11	09 16	10 17
50	17 43	18 15	18 53	07 02	08 07	09 10	10 11
45	17 45	18 14	18 48	06 57	07 59	08 59	09 57
N 40	17 46	18 13	18 44	06 53	07 52	08 50	09 46
35	17 47	18 12	18 42	06 49	07 46	08 42	09 37
30	17 48	18 12	18 40	06 46	07 41	08 35	09 29
20	17 50	18 12	18 38	06 40	07 32	08 24	09 14
N 10	17 52	18 13	18 37	06 35	07 24	08 13	09 02
0	17 54	18 14	18 38	06 31	07 17	08 04	08 50
S 10	17 55	18 16	18 41	06 26	07 10	07 54	08 39
20	17 58	18 20	18 45	06 21	07 02	07 44	08 26
30	18 00	18 24	18 52	06 16	06 53	07 32	08 12
35	18 02	18 27	18 57	06 13	06 48	07 25	08 04
40	18 03	18 30	19 02	06 09	06 42	07 17	07 54
45	18 05	18 35	19 10	06 05	06 36	07 08	07 44
S 50	18 08	18 40	19 19	06 00	06 28	06 58	07 30
52	18 09	18 43	19 24	05 58	06 24	06 53	07 24
54	18 10	18 46	19 29	05 55	06 20	06 47	07 18
56	18 12	18 49	19 35	05 53	06 16	06 41	07 10
58	18 13	18 53	19 41	05 50	06 11	06 34	07 02
S 60	18 15	18 57	19 49	05 46	06 05	06 27	06 52

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
	m s	m s	h m	h m	h m	d	
28	09 09	09 20	11 51	00 20	12 43	15	○
29	09 30	09 40	11 50	01 06	13 29	16	
30	09 50	09 59	11 50	01 52	14 16	17	

0000 DECEMBER 9, 10, 11 (FRI., SAT., SUN.)

G.M.T. (UT)	ARIES	VENUS −3.4		MARS −0.3		JUPITER −2.3		SATURN +0.7	
	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
9 00	77 37.3	193 11.5	S20 44.0	302 51.4	N20 05.7	344 25.9	N23 07.1	284 31.9	N12 31.7
01	92 39.8	208 10.6	44.6	317 53.7	05.8	359 28.7	07.1	299 34.4	31.7
02	107 42.2	223 09.8	45.2	332 56.0	05.9	14 31.5	07.2	314 36.8	31.7
03	122 44.7	238 09.0	·· 45.9	347 58.3	·· 05.9	29 34.3	·· 07.2	329 39.3	·· 31.7
04	137 47.2	253 08.1	46.5	3 00.6	06.0	44 37.1	07.2	344 41.7	31.7
05	152 49.6	268 07.3	47.1	18 02.9	06.1	59 39.9	07.2	359 44.2	31.7
06	167 52.1	283 06.5	S20 47.8	33 05.2	N20 06.1	74 42.7	N23 07.2	14 46.6	N12 31.8
07	182 54.6	298 05.6	48.4	48 07.5	06.2	89 45.5	07.2	29 49.1	31.8
08	197 57.0	313 04.8	49.0	63 09.8	06.3	104 48.4	07.2	44 51.5	31.8
F 09	212 59.5	328 04.0	·· 49.6	78 12.2	·· 06.4	119 51.2	·· 07.2	59 54.0	·· 31.8
R 10	228 02.0	343 03.1	50.3	93 14.5	06.4	134 54.0	07.3	74 56.4	31.8
I 11	243 04.4	358 02.3	50.9	108 16.8	06.5	149 56.8	07.3	89 58.9	31.8
D 12	258 06.9	13 01.5	S20 51.5	123 19.1	N20 06.6	164 59.6	N23 07.3	105 01.3	N12 31.8
A 13	273 09.4	28 00.6	52.1	138 21.4	06.7	180 02.4	07.3	120 03.8	31.8
Y 14	288 11.8	42 59.8	52.7	153 23.8	06.7	195 05.2	07.3	135 06.2	31.8
15	303 14.3	57 59.0	·· 53.4	168 26.1	·· 06.8	210 08.0	·· 07.3	150 08.7	·· 31.8
16	318 16.7	72 58.1	54.0	183 28.4	06.9	225 10.8	07.3	165 11.1	31.8
17	333 19.2	87 57.3	54.6	198 30.7	07.0	240 13.6	07.3	180 13.6	31.8
18	348 21.7	102 56.4	S20 55.2	213 33.1	N20 07.0	255 16.4	N23 07.4	195 16.1	N12 31.8
19	3 24.1	117 55.6	55.8	228 35.4	07.1	270 19.3	07.4	210 18.5	31.8
20	18 26.6	132 54.8	56.4	243 37.7	07.2	285 22.1	07.4	225 21.0	31.8
21	33 29.1	147 53.9	·· 57.0	258 40.1	·· 07.3	300 24.9	·· 07.4	240 23.4	·· 31.8
22	48 31.5	162 53.1	57.6	273 42.4	07.4	315 27.7	07.4	255 25.9	31.8
23	63 34.0	177 52.2	58.3	288 44.7	07.4	330 30.5	07.4	270 28.3	31.8
10 00	78 36.5	192 51.4	S20 58.9	303 47.1	N20 07.5	345 33.3	N23 07.4	285 30.8	N12 31.9
01	93 38.9	207 50.6	20 59.5	318 49.4	07.6	0 36.1	07.4	300 33.2	31.9
02	108 41.4	222 49.7	21 00.1	333 51.7	07.7	15 38.9	07.4	315 35.7	31.9
03	123 43.9	237 48.9	·· 00.7	348 54.1	·· 07.8	30 41.7	·· 07.5	330 38.1	·· 31.9
04	138 46.3	252 48.0	01.3	3 56.4	07.8	45 44.5	07.5	345 40.6	31.9
05	153 48.8	267 47.2	01.9	18 58.8	07.9	60 47.4	07.5	0 43.0	31.9
06	168 51.2	282 46.3	S21 02.5	34 01.1	N20 08.0	75 50.2	N23 07.5	15 45.5	N12 31.9
07	183 53.7	297 45.5	03.1	49 03.5	08.1	90 53.0	07.5	30 48.0	31.9
S 08	198 56.2	312 44.6	03.7	64 05.8	08.2	105 55.8	07.5	45 50.4	31.9
A 09	213 58.6	327 43.8	·· 04.3	79 08.2	·· 08.3	120 58.6	·· 07.5	60 52.9	·· 31.9
T 10	229 01.1	342 43.0	04.9	94 10.5	08.3	136 01.4	07.5	75 55.3	31.9
U 11	244 03.6	357 42.1	05.5	109 12.9	08.4	151 04.2	07.6	90 57.8	31.9
R 12	259 06.0	12 41.3	S21 06.1	124 15.2	N20 08.5	166 07.0	N23 07.6	106 00.2	N12 31.9
D 13	274 08.5	27 40.4	06.7	139 17.6	08.6	181 09.8	07.6	121 02.7	31.9
A 14	289 11.0	42 39.6	07.3	154 19.9	08.7	196 12.7	07.6	136 05.1	32.0
Y 15	304 13.4	57 38.7	·· 07.9	169 22.3	·· 08.8	211 15.5	·· 07.6	151 07.6	·· 32.0
16	319 15.9	72 37.9	08.5	184 24.6	08.8	226 18.3	07.6	166 10.1	32.0
17	334 18.3	87 37.0	09.0	199 27.0	08.9	241 21.1	07.6	181 12.5	32.0
18	349 20.8	102 36.2	S21 09.6	214 29.4	N20 09.0	256 23.9	N23 07.6	196 15.0	N12 32.0
19	4 23.3	117 35.3	10.2	229 31.7	09.1	271 26.7	07.6	211 17.4	32.0
20	19 25.7	132 34.5	10.8	244 34.1	09.2	286 29.5	07.7	226 19.9	32.0
21	34 28.2	147 33.6	·· 11.4	259 36.4	·· 09.3	301 32.4	·· 07.7	241 22.3	·· 32.0
22	49 30.7	162 32.8	12.0	274 38.8	09.4	316 35.2	07.7	256 24.8	32.0
23	64 33.1	177 31.9	12.6	289 41.2	09.5	331 38.0	07.7	271 27.3	32.0
11 00	79 35.6	192 31.1	S21 13.2	304 43.5	N20 09.5	346 40.8	N23 07.7	286 29.7	N12 32.0
01	94 38.1	207 30.2	13.7	319 45.9	09.6	1 43.6	07.7	301 32.2	32.0
02	109 40.5	222 29.4	14.3	334 48.3	09.7	16 46.4	07.7	316 34.6	32.0
03	124 43.0	237 28.5	·· 14.9	349 50.7	·· 09.8	31 49.2	·· 07.7	331 37.1	·· 32.1
04	139 45.5	252 27.7	15.5	4 53.0	09.9	46 52.1	07.8	346 39.6	32.1
05	154 47.9	267 26.8	16.0	19 55.4	10.0	61 54.9	07.8	1 42.0	32.1
06	169 50.4	282 25.9	S21 16.6	34 57.8	N20 10.1	76 57.7	N23 07.8	16 44.5	N12 32.1
07	184 52.8	297 25.1	17.2	50 00.2	10.2	92 00.5	07.8	31 46.9	32.1
08	199 55.3	312 24.2	17.8	65 02.6	10.3	107 03.3	07.8	46 49.4	32.1
S 09	214 57.8	327 23.4	·· 18.3	80 04.9	·· 10.4	122 06.1	·· 07.8	61 51.9	·· 32.1
U 10	230 00.2	342 22.5	18.9	95 07.3	10.5	137 08.9	07.8	76 54.3	32.1
N 11	245 02.7	357 21.7	19.5	110 09.7	10.6	152 11.8	07.8	91 56.8	32.1
D 12	260 05.2	12 20.8	S21 20.1	125 12.1	N20 10.6	167 14.6	N23 07.8	106 59.2	N12 32.1
A 13	275 07.6	27 19.9	20.6	140 14.5	10.7	182 17.4	07.9	122 01.7	32.1
Y 14	290 10.1	42 19.1	21.2	155 16.9	10.8	197 20.2	07.9	137 04.2	32.1
15	305 12.6	57 18.2	·· 21.8	170 19.3	·· 10.9	212 23.0	·· 07.9	152 06.6	·· 32.2
16	320 15.0	72 17.4	22.3	185 21.6	11.0	227 25.8	07.9	167 09.1	32.2
17	335 17.5	87 16.5	22.9	200 24.0	11.1	242 28.7	07.9	182 11.5	32.2
18	350 20.0	102 15.6	S21 23.5	215 26.4	N20 11.2	257 31.5	N23 07.9	197 14.0	N12 32.2
19	5 22.4	117 14.8	24.0	230 28.8	11.3	272 34.3	07.9	212 16.5	32.2
20	20 24.9	132 13.9	24.6	245 31.2	11.4	287 37.1	07.9	227 18.9	32.2
21	35 27.3	147 13.1	·· 25.1	260 33.6	·· 11.5	302 39.9	·· 08.0	242 21.4	·· 32.2
22	50 29.8	162 12.2	25.7	275 36.0	11.6	317 42.7	08.0	257 23.9	32.2
23	65 32.3	177 11.3	26.3	290 38.4	11.7	332 45.5	08.0	272 26.3	32.2
	h m								
Mer. Pass.	18 42.5	v −0.8	d 0.6	v 2.4	d 0.1	v 2.8	d 0.0	v 2.5	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.3	S40 23.8
Achernar	335 46.4	S57 21.2
Acrux	173 39.4	S62 58.3
Adhara	255 33.2	S28 56.5
Aldebaran	291 19.8	N16 27.9
Alioth	166 44.5	N56 04.5
Alkaid	153 20.4	N49 25.2
Al Na'ir	28 17.5	S47 04.2
Alnilam	276 13.2	S 1 13.0
Alphard	218 22.2	S 8 33.8
Alphecca	126 34.1	N26 47.4
Alpheratz	358 11.1	N29 50.3
Altair	62 34.6	N 8 48.8
Ankaa	353 42.0	S42 25.7
Antares	112 59.5	S26 22.9
Arcturus	146 20.5	N19 17.8
Atria	108 26.0	S68 59.2
Avior	234 28.4	S59 26.2
Bellatrix	279 00.4	N 6 19.7
Betelgeuse	271 30.0	N 7 24.1
Canopus	264 07.5	S52 41.1
Capella	281 13.6	N45 58.5
Deneb	49 50.0	N45 12.4
Denebola	183 01.0	N14 41.6
Diphda	349 22.6	S18 06.5
Dubhe	194 24.5	N61 51.9
Elnath	278 46.1	N28 35.3
Eltanin	90 59.1	N51 29.7
Enif	34 13.6	N 9 46.6
Fomalhaut	15 53.6	S29 44.5
Gacrux	172 30.9	S56 59.1
Gienah	176 20.0	S17 25.1
Hadar	149 26.3	S60 15.7
Hamal	328 30.8	N23 21.6
Kaus Aust.	84 19.7	S34 23.7
Kochab	137 20.1	N74 14.6
Markab	14 05.0	N15 05.4
Menkar	314 42.8	N 4 00.2
Menkent	148 39.5	S36 15.5
Miaplacidus	221 44.7	S69 37.4
Mirfak	309 18.3	N49 47.1
Nunki	76 31.9	S26 19.4
Peacock	54 01.8	S56 48.5
Pollux	244 00.2	N28 04.6
Procyon	245 27.5	N 5 16.8
Rasalhague	96 31.7	N12 34.7
Regulus	208 11.9	N12 04.4
Rigel	281 37.5	S 8 13.7
Rigil Kent.	140 28.8	S60 44.3
Sabik	102 43.6	S15 41.7
Schedar	350 10.8	N56 25.3
Shaula	96 58.7	S37 05.2
Sirius	258 57.0	S16 41.2
Spica	158 59.7	S11 02.7
Suhail	223 11.9	S43 20.5
Vega	80 57.5	N38 46.0
Zuben'ubi	137 35.4	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	114 14.9	11 09
Mars	225 10.6	3 44
Jupiter	266 56.8	0 58
Saturn	206 54.3	4 57

0000 DECEMBER 9, 10, 11 (FRI., SAT., SUN.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
9 00	181 57.7	S22 47.1	206 56.2	5.3	S15 14.6	6.9	60.8
01	196 57.4	47.3	221 20.5	5.2	15 21.5	6.8	60.8
02	211 57.1	47.6	235 44.7	5.1	15 28.3	6.7	60.9
03	226 56.8	·· 47.8	250 08.8	5.1	15 35.0	6.5	60.9
04	241 56.6	48.1	264 32.9	5.0	15 41.5	6.5	60.9
05	256 56.3	48.3	278 56.9	4.9	15 48.0	6.4	60.9
06	271 56.0	S22 48.6	293 20.8	4.9	S15 54.4	6.3	61.0
07	286 55.7	48.8	307 44.7	4.8	16 00.7	6.1	61.0
08	301 55.4	49.0	322 08.5	4.7	16 06.8	6.0	61.0
F 09	316 55.2	·· 49.3	336 32.2	4.6	16 12.8	6.0	61.0
R 10	331 54.9	49.5	350 55.8	4.6	16 18.8	5.8	61.1
I 11	346 54.6	49.8	5 19.4	4.5	16 24.6	5.7	61.1
D 12	1 54.3	S22 50.0	19 42.9	4.5	S16 30.3	5.6	61.1
A 13	16 54.0	50.3	34 06.4	4.3	16 35.9	5.4	61.1
Y 14	31 53.8	50.5	48 29.7	4.4	16 41.3	5.4	61.1
15	46 53.5	·· 50.7	62 53.1	4.2	16 46.7	5.2	61.2
16	61 53.2	51.0	77 16.3	4.2	16 51.9	5.1	61.2
17	76 52.9	51.2	91 39.5	4.1	16 57.0	5.0	61.2
18	91 52.6	S22 51.4	106 02.6	4.1	S17 02.0	4.9	61.2
19	106 52.4	51.7	120 25.7	4.0	17 06.9	4.7	61.2
20	121 52.1	51.9	134 48.7	4.0	17 11.6	4.6	61.2
21	136 51.8	·· 52.2	149 11.7	3.9	17 16.2	4.5	61.3
22	151 51.5	52.4	163 34.6	3.9	17 20.7	4.4	61.3
23	166 51.2	52.6	177 57.5	3.8	17 25.1	4.2	61.3
10 00	181 50.9	S22 52.9	192 20.3	3.7	S17 29.3	4.1	61.3
01	196 50.7	53.1	206 43.0	3.7	17 33.4	4.0	61.3
02	211 50.4	53.3	221 05.7	3.7	17 37.4	3.9	61.3
03	226 50.1	·· 53.5	235 28.4	3.6	17 41.3	3.7	61.3
04	241 49.8	53.8	249 51.0	3.6	17 45.0	3.5	61.4
05	256 49.5	54.0	264 13.6	3.5	17 48.5	3.5	61.4
06	271 49.2	S22 54.2	278 36.1	3.5	S17 52.0	3.3	61.4
07	286 49.0	54.5	292 58.6	3.5	17 55.3	3.2	61.4
S 08	301 48.7	54.7	307 21.1	3.4	17 58.5	3.0	61.4
A 09	316 48.4	·· 54.9	321 43.5	3.4	18 01.5	2.9	61.4
T 10	331 48.1	55.1	336 05.9	3.4	18 04.4	2.8	61.4
U 11	346 47.8	55.3	350 28.3	3.3	18 07.2	2.6	61.4
R 12	1 47.5	S22 55.6	4 50.6	3.3	S18 09.8	2.5	61.4
D 13	16 47.3	55.8	19 12.9	3.3	18 12.3	2.4	61.4
A 14	31 47.0	56.0	33 35.2	3.2	18 14.7	2.2	61.4
Y 15	46 46.7	·· 56.2	47 57.4	3.2	18 16.9	2.1	61.5
16	61 46.4	56.5	62 19.6	3.2	18 19.0	1.9	61.5
17	76 46.1	56.7	76 41.8	3.2	18 20.9	1.8	61.5
18	91 45.8	S22 56.9	91 04.0	3.2	S18 22.7	1.7	61.5
19	106 45.5	57.1	105 26.2	3.1	18 24.4	1.5	61.5
20	121 45.3	57.3	119 48.3	3.1	18 25.9	1.4	61.5
21	136 45.0	·· 57.5	134 10.4	3.2	18 27.3	1.2	61.5
22	151 44.7	57.8	148 32.6	3.1	18 28.5	1.1	61.5
23	166 44.4	58.0	162 54.7	3.1	18 29.6	1.0	61.5
11 00	181 44.1	S22 58.2	177 16.8	3.1	S18 30.6	0.8	61.5
01	196 43.8	58.4	191 38.9	3.1	18 31.4	0.6	61.5
02	211 43.5	58.6	206 01.0	3.1	18 32.0	0.6	61.5
03	226 43.2	·· 58.8	220 23.1	3.1	18 32.6	0.4	61.5
04	241 43.0	59.0	234 45.2	3.1	18 33.0	0.2	61.5
05	256 42.7	59.2	249 07.3	3.1	18 33.2	0.1	61.5
06	271 42.4	S22 59.4	263 29.4	3.1	S18 33.3	0.1	61.5
07	286 42.1	59.6	277 51.5	3.1	18 33.2	0.1	61.5
08	301 41.8	22 59.9	292 13.6	3.1	18 33.1	0.4	61.4
S 09	316 41.5	23 00.1	306 35.7	3.1	18 32.7	0.5	61.4
U 10	331 41.2	00.3	320 57.8	3.2	18 32.2	0.6	61.4
N 11	346 40.9	00.5	335 20.0	3.1	18 31.6	0.7	61.4
D 12	1 40.6	S23 00.7	349 42.1	3.2	S18 30.9	0.9	61.4
A 13	16 40.4	00.9	4 04.3	3.2	18 30.0	1.1	61.4
Y 14	31 40.1	01.1	18 26.5	3.2	18 28.9	1.1	61.4
15	46 39.8	·· 01.3	32 48.7	3.3	18 27.8	1.4	61.4
16	61 39.5	01.5	47 11.0	3.3	18 26.4	1.4	61.4
17	76 39.2	01.7	61 33.3	3.3	18 25.0	1.6	61.4
18	91 38.9	S23 01.9	75 55.6	3.3	S18 23.4	1.8	61.4
19	106 38.6	02.1	90 17.9	3.3	18 21.6	1.8	61.4
20	121 38.3	02.3	104 40.2	3.4	18 19.8	2.1	61.3
21	136 38.0	·· 02.5	119 02.6	3.5	18 17.7	2.1	61.3
22	151 37.7	02.7	133 25.1	3.4	18 15.6	2.3	61.3
23	166 37.5	02.9	147 47.5	3.5	18 13.3	2.4	61.3
	S.D. 16.3	d 0.2	S.D. 16.6		16.7		16.7

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

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

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
	m s	m s	h m	h m	h m	d	
9	07 51	07 38	11 52	10 38	23 09	28	●
10	07 24	07 11	11 53	11 40	24 11	29	
11	06 57	06 43	11 53	12 43	00 11	01	

0000 DECEMBER 12, 13, 14 (MON., TUES., WED.)

G.M.T. (UT)	ARIES	VENUS −3.4		MARS −0.4		JUPITER −2.3		SATURN +0.7	
	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
12 00	80 34.7	192 10.5	S21 26.8	305 40.8	N20 11.8	347 48.4	N23 08.0	287 28.8	N12 32.2
01	95 37.2	207 09.6	27.4	320 43.2	11.9	2 51.2	08.0	302 31.2	32.3
02	110 39.7	222 08.8	27.9	335 45.6	12.0	17 54.0	08.0	317 33.7	32.3
03	125 42.1	237 07.9	·· 28.5	350 48.0	·· 12.1	32 56.8	·· 08.0	332 36.2	·· 32.3
04	140 44.6	252 07.0	29.0	5 50.5	12.2	47 59.6	08.0	347 38.6	32.3
05	155 47.1	267 06.2	29.6	20 52.9	12.3	63 02.5	08.0	2 41.1	32.3
06	170 49.5	282 05.3	S21 30.1	35 55.3	N20 12.4	78 05.3	N23 08.1	17 43.6	N12 32.3
07	185 52.0	297 04.4	30.7	50 57.7	12.5	93 08.1	08.1	32 46.0	32.3
08	200 54.4	312 03.6	31.2	66 00.1	12.6	108 10.9	08.1	47 48.5	32.3
M 09	215 56.9	327 02.7	·· 31.8	81 02.5	·· 12.7	123 13.7	·· 08.1	62 51.0	·· 32.3
O 10	230 59.4	342 01.8	32.3	96 04.9	12.8	138 16.5	08.1	77 53.4	32.3
N 11	246 01.8	357 01.0	32.9	111 07.4	12.9	153 19.4	08.1	92 55.9	32.4
D 12	261 04.3	12 00.1	S21 33.4	126 09.8	N20 13.0	168 22.2	N23 08.1	107 58.3	N12 32.4
A 13	276 06.8	26 59.2	34.0	141 12.2	13.1	183 25.0	08.1	123 00.8	32.4
Y 14	291 09.2	41 58.4	34.5	156 14.6	13.2	198 27.8	08.2	138 03.3	32.4
15	306 11.7	56 57.5	·· 35.0	171 17.0	·· 13.3	213 30.6	·· 08.2	153 05.7	·· 32.4
16	321 14.2	71 56.6	35.6	186 19.5	13.4	228 33.5	08.2	168 08.2	32.4
17	336 16.6	86 55.7	36.1	201 21.9	13.5	243 36.3	08.2	183 10.7	32.4
18	351 19.1	101 54.9	S21 36.7	216 24.3	N20 13.7	258 39.1	N23 08.2	198 13.1	N12 32.4
19	6 21.6	116 54.0	37.2	231 26.7	13.8	273 41.9	08.2	213 15.6	32.4
20	21 24.0	131 53.1	37.7	246 29.2	13.9	288 44.7	08.2	228 18.1	32.4
21	36 26.5	146 52.3	·· 38.3	261 31.6	·· 14.0	303 47.6	·· 08.2	243 20.5	·· 32.5
22	51 28.9	161 51.4	38.8	276 34.0	14.1	318 50.4	08.2	258 23.0	32.5
23	66 31.4	176 50.5	39.3	291 36.5	14.2	333 53.2	08.3	273 25.5	32.5
13 00	81 33.9	191 49.6	S21 39.9	306 38.9	N20 14.3	348 56.0	N23 08.3	288 27.9	N12 32.5
01	96 36.3	206 48.8	40.4	321 41.4	14.4	3 58.8	08.3	303 30.4	32.5
02	111 38.8	221 47.9	40.9	336 43.8	14.5	19 01.7	08.3	318 32.9	32.5
03	126 41.3	236 47.0	·· 41.4	351 46.2	·· 14.6	34 04.5	·· 08.3	333 35.3	·· 32.5
04	141 43.7	251 46.1	42.0	6 48.7	14.7	49 07.3	08.3	348 37.8	32.5
05	156 46.2	266 45.3	42.5	21 51.1	14.8	64 10.1	08.3	3 40.3	32.6
06	171 48.7	281 44.4	S21 43.0	36 53.6	N20 15.0	79 12.9	N23 08.3	18 42.7	N12 32.6
07	186 51.1	296 43.5	43.5	51 56.0	15.1	94 15.8	08.3	33 45.2	32.6
08	201 53.6	311 42.6	44.1	66 58.5	15.2	109 18.6	08.4	48 47.7	32.6
T 09	216 56.1	326 41.8	·· 44.6	82 00.9	·· 15.3	124 21.4	·· 08.4	63 50.2	·· 32.6
U 10	231 58.5	341 40.9	45.1	97 03.4	15.4	139 24.2	08.4	78 52.6	32.6
E 11	247 01.0	356 40.0	45.6	112 05.8	15.5	154 27.0	08.4	93 55.1	32.6
S 12	262 03.4	11 39.1	S21 46.1	127 08.3	N20 15.6	169 29.9	N23 08.4	108 57.6	N12 32.6
D 13	277 05.9	26 38.3	46.7	142 10.7	15.7	184 32.7	08.4	124 00.0	32.6
A 14	292 08.4	41 37.4	47.2	157 13.2	15.9	199 35.5	08.4	139 02.5	32.7
Y 15	307 10.8	56 36.5	·· 47.7	172 15.6	·· 16.0	214 38.3	·· 08.4	154 05.0	·· 32.7
16	322 13.3	71 35.6	48.2	187 18.1	16.1	229 41.1	08.4	169 07.4	32.7
17	337 15.8	86 34.7	48.7	202 20.6	16.2	244 44.0	08.5	184 09.9	32.7
18	352 18.2	101 33.9	S21 49.2	217 23.0	N20 16.3	259 46.8	N23 08.5	199 12.4	N12 32.7
19	7 20.7	116 33.0	49.7	232 25.5	16.4	274 49.6	08.5	214 14.9	32.7
20	22 23.2	131 32.1	50.2	247 27.9	16.5	289 52.4	08.5	229 17.3	32.7
21	37 25.6	146 31.2	·· 50.7	262 30.4	·· 16.7	304 55.3	·· 08.5	244 19.8	·· 32.7
22	52 28.1	161 30.3	51.3	277 32.9	16.8	319 58.1	08.5	259 22.3	32.8
23	67 30.5	176 29.5	51.8	292 35.3	16.9	335 00.9	08.5	274 24.7	32.8
14 00	82 33.0	191 28.6	S21 52.3	307 37.8	N20 17.0	350 03.7	N23 08.5	289 27.2	N12 32.8
01	97 35.5	206 27.7	52.8	322 40.3	17.1	5 06.5	08.5	304 29.7	32.8
02	112 37.9	221 26.8	53.3	337 42.8	17.3	20 09.4	08.6	319 32.2	32.8
03	127 40.4	236 25.9	·· 53.8	352 45.2	·· 17.4	35 12.2	·· 08.6	334 34.6	·· 32.8
04	142 42.9	251 25.0	54.3	7 47.7	17.5	50 15.0	08.6	349 37.1	32.8
05	157 45.3	266 24.1	54.8	22 50.2	17.6	65 17.8	08.6	4 39.6	32.9
06	172 47.8	281 23.3	S21 55.3	37 52.7	N20 17.7	80 20.7	N23 08.6	19 42.0	N12 32.9
07	187 50.3	296 22.4	55.8	52 55.2	17.9	95 23.5	08.6	34 44.5	32.9
W 08	202 52.7	311 21.5	56.3	67 57.6	18.0	110 26.3	08.6	49 47.0	32.9
E 09	217 55.2	326 20.6	·· 56.8	83 00.1	·· 18.1	125 29.1	·· 08.6	64 49.5	·· 32.9
D 10	232 57.7	341 19.7	57.2	98 02.6	18.2	140 32.0	08.6	79 51.9	32.9
N 11	248 00.1	356 18.8	57.7	113 05.1	18.3	155 34.8	08.7	94 54.4	32.9
E 12	263 02.6	11 17.9	S21 58.2	128 07.6	N20 18.5	170 37.6	N23 08.7	109 56.9	N12 32.9
S 13	278 05.0	26 17.1	58.7	143 10.1	18.6	185 40.4	08.7	124 59.4	33.0
D 14	293 07.5	41 16.2	59.2	158 12.6	18.7	200 43.3	08.7	140 01.8	33.0
A 15	308 10.0	56 15.3	21 59.7	173 15.0	·· 18.8	215 46.1	·· 08.7	155 04.3	·· 33.0
Y 16	323 12.4	71 14.4	22 00.2	188 17.5	19.0	230 48.9	08.7	170 06.8	33.0
17	338 14.9	86 13.5	00.7	203 20.0	19.1	245 51.7	08.7	185 09.3	33.0
18	353 17.4	101 12.6	S22 01.1	218 22.5	N20 19.2	260 54.5	N23 08.7	200 11.7	N12 33.0
19	8 19.8	116 11.7	01.6	233 25.0	19.3	275 57.4	08.7	215 14.2	33.0
20	23 22.3	131 10.8	02.1	248 27.5	19.5	291 00.2	08.8	230 16.7	33.1
21	38 24.8	146 09.9	·· 02.6	263 30.0	·· 19.6	306 03.0	·· 08.8	245 19.2	·· 33.1
22	53 27.2	161 09.0	03.1	278 32.5	19.7	321 05.8	08.8	260 21.6	33.1
23	68 29.7	176 08.2	03.5	293 35.0	19.8	336 08.7	08.8	275 24.1	33.1
	h m								
Mer. Pass.	18 30.7	v −0.9	d 0.5	v 2.5	d 0.1	v 2.8	d 0.0	v 2.5	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.3	S40 23.8
Achernar	335 46.4	S57 21.2
Acrux	173 39.3	S62 58.3
Adhara	255 33.2	S28 56.6
Aldebaran	291 19.8	N16 27.9
Alioth	166 44.5	N56 04.5
Alkaid	153 20.3	N49 25.2
Al Na'ir	28 17.5	S47 04.2
Alnilam	276 13.2	S 1 13.0
Alphard	218 22.2	S 8 33.8
Alphecca	126 34.1	N26 47.4
Alpheratz	358 11.1	N29 56.5
Altair	62 34.6	N 8 48.8
Ankaa	353 42.0	S42 25.7
Antares	112 59.5	S26 22.9
Arcturus	146 20.4	N19 17.8
Atria	108 25.9	S68 59.1
Avior	234 28.4	S59 26.2
Bellatrix	279 00.4	N 6 19.7
Betelgeuse	271 30.0	N 7 24.1
Canopus	264 07.5	S52 41.1
Capella	281 13.5	N45 58.5
Deneb	49 50.0	N45 12.4
Denebola	183 01.0	N14 41.6
Diphda	349 22.7	S18 06.5
Dubhe	194 24.5	N61 51.9
Elnath	278 46.1	N28 35.3
Eltanin	90 59.1	N51 29.7
Enif	34 13.6	N 9 46.6
Fomalhaut	15 53.6	S29 44.5
Gacrux	172 30.9	S56 59.1
Gienah	176 19.9	S17 25.1
Hadar	149 26.3	S60 15.7
Hamal	328 30.8	N23 21.6
Kaus Aust.	84 19.7	S34 23.7
Kochab	137 20.1	N74 14.6
Markab	14 05.0	N15 05.4
Menkar	314 42.8	N 4 00.2
Menkent	148 39.4	S36 15.5
Miaplacidus	221 44.6	S69 37.4
Mirfak	309 18.3	N49 47.1
Nunki	76 31.8	S26 19.4
Peacock	54 01.8	S56 48.5
Pollux	244 00.1	N28 04.6
Procyon	245 27.4	N 5 16.8
Rasalhague	96 31.7	N12 34.7
Regulus	208 11.9	N12 04.4
Rigel	281 37.5	S 8 13.7
Rigil Kent.	140 28.8	S60 44.3
Sabik	102 43.6	S15 41.7
Schedar	350 10.8	N56 25.3
Shaula	96 58.7	S37 05.2
Sirius	258 57.0	S16 41.2
Spica	158 59.7	S11 02.7
Suhail	223 11.8	S43 20.5
Vega	80 57.5	N38 46.0
Zuben'ubi	137 35.4	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	110 15.8	11 13
Mars	225 05.0	3 33
Jupiter	267 22.1	0 44
Saturn	206 54.1	4 45

0000 DECEMBER 12, 13, 14 (MON., TUES., WED.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
12	00	181 37.2	S23 03.1	162 10.0	3.6	S18 10.9	2.6	61.3
	01	196 36.9	03.2	176 32.6	3.5	18 08.3	2.7	61.3
	02	211 36.6	03.4	190 55.1	3.7	18 05.6	2.8	61.3
	03	226 36.3	·· 03.6	205 17.8	3.6	18 02.8	3.0	61.2
	04	241 36.0	03.8	219 40.4	3.7	17 59.8	3.1	61.2
	05	256 35.7	04.0	234 03.1	3.8	17 56.7	3.2	61.2
	06	271 35.4	S23 04.2	248 25.9	3.8	S17 53.5	3.4	61.2
	07	286 35.1	04.4	262 48.7	3.9	17 50.1	3.5	61.2
	08	301 34.8	04.6	277 11.6	3.9	17 46.6	3.6	61.2
MONDAY	09	316 34.5	·· 04.8	291 34.5	4.0	17 43.0	3.8	61.1
	10	331 34.2	05.0	305 57.5	4.0	17 39.2	3.9	61.1
	11	346 34.0	05.1	320 20.5	4.1	17 35.3	4.0	61.1
	12	1 33.7	S23 05.3	334 43.6	4.1	S17 31.3	4.1	61.1
	13	16 33.4	05.5	349 06.7	4.2	17 27.2	4.3	61.1
	14	31 33.1	05.7	3 29.9	4.3	17 22.9	4.4	61.0
	15	46 32.8	·· 05.9	17 53.2	4.3	17 18.5	4.5	61.0
	16	61 32.5	06.1	32 16.5	4.4	17 14.0	4.6	61.0
	17	76 32.2	06.2	46 39.9	4.5	17 09.4	4.7	61.0
	18	91 31.9	S23 06.4	61 03.4	4.5	S17 04.7	4.9	60.9
	19	106 31.6	06.6	75 26.9	4.6	16 59.8	5.0	60.9
	20	121 31.3	06.8	89 50.5	4.6	16 54.8	5.1	60.9
	21	136 31.0	·· 06.9	104 14.1	4.7	16 49.7	5.2	60.9
	22	151 30.7	07.1	118 37.8	4.8	16 44.5	5.3	60.8
	23	166 30.4	07.3	133 01.6	4.9	16 39.2	5.5	60.8
13	00	181 30.1	S23 07.5	147 25.5	4.9	S16 33.7	5.6	60.8
	01	196 29.8	07.6	161 49.4	5.1	16 28.1	5.6	60.8
	02	211 29.5	07.8	176 13.5	5.1	16 22.5	5.8	60.7
	03	226 29.3	·· 08.0	190 37.6	5.1	16 16.7	5.9	60.7
	04	241 29.0	08.2	205 01.7	5.3	16 10.8	6.0	60.7
	05	256 28.7	08.3	219 26.0	5.3	16 04.8	6.1	60.7
	06	271 28.4	S23 08.5	233 50.3	5.4	S15 58.7	6.2	60.6
	07	286 28.1	08.7	248 14.7	5.4	15 52.5	6.3	60.6
	08	301 27.8	08.8	262 39.1	5.6	15 46.2	6.5	60.6
TUESDAY	09	316 27.5	·· 09.0	277 03.7	5.6	15 39.7	6.5	60.5
	10	331 27.2	09.2	291 28.3	5.7	15 33.2	6.6	60.5
	11	346 26.9	09.3	305 53.0	5.8	15 26.6	6.7	60.5
	12	1 26.6	S23 09.5	320 17.8	5.9	S15 19.9	6.8	60.4
	13	16 26.3	09.7	334 42.7	6.0	15 13.1	6.9	60.4
	14	31 26.0	09.8	349 07.7	6.0	15 06.2	7.0	60.4
	15	46 25.7	·· 10.0	3 32.7	6.1	14 59.2	7.1	60.4
	16	61 25.4	10.2	17 57.8	6.3	14 52.1	7.2	60.3
	17	76 25.1	10.3	32 23.1	6.3	14 44.9	7.3	60.3
	18	91 24.8	S23 10.5	46 48.4	6.3	S14 37.6	7.4	60.3
	19	106 24.5	10.6	61 13.7	6.5	14 30.2	7.4	60.2
	20	121 24.2	10.8	75 39.2	6.5	14 22.8	7.6	60.2
	21	136 23.9	·· 11.0	90 04.7	6.7	14 15.2	7.6	60.2
	22	151 23.6	11.1	104 30.4	6.7	14 07.6	7.7	60.1
	23	166 23.3	11.3	118 56.1	6.8	13 59.9	7.8	60.1
14	00	181 23.0	S23 11.4	133 21.9	6.9	S13 52.1	7.9	60.1
	01	196 22.7	11.6	147 47.8	7.0	13 44.2	8.0	60.0
	02	211 22.4	11.7	162 13.8	7.0	13 36.2	8.0	60.0
	03	226 22.1	·· 11.9	176 39.8	7.2	13 28.2	8.1	59.9
	04	241 21.8	12.0	191 06.0	7.2	13 20.1	8.2	59.9
	05	256 21.5	12.2	205 32.2	7.4	13 11.9	8.2	59.9
	06	271 21.2	S23 12.4	219 58.6	7.4	S13 03.7	8.4	59.8
	07	286 20.9	12.5	234 25.0	7.5	12 55.3	8.4	59.8
	08	301 20.6	12.7	248 51.5	7.5	12 46.9	8.5	59.8
WEDNESDAY	09	316 20.3	·· 12.8	263 18.0	7.7	12 38.4	8.5	59.7
	10	331 20.0	12.9	277 44.7	7.8	12 29.9	8.6	59.7
	11	346 19.7	13.1	292 11.5	7.8	12 21.3	8.7	59.7
	12	1 19.4	S23 13.2	306 38.3	7.9	S12 12.6	8.7	59.6
	13	16 19.1	13.4	321 05.2	8.1	12 03.9	8.8	59.6
	14	31 18.8	13.5	335 32.3	8.1	11 55.1	8.9	59.5
	15	46 18.5	·· 13.7	349 59.4	8.1	11 46.2	8.9	59.5
	16	61 18.2	13.8	4 26.5	8.3	11 37.3	9.0	59.5
	17	76 17.9	14.0	18 53.8	8.4	11 28.3	9.0	59.4
	18	91 17.6	S23 14.1	33 21.2	8.4	S11 19.3	9.1	59.4
	19	106 17.3	14.2	47 48.6	8.5	11 10.2	9.2	59.4
	20	121 17.0	14.4	62 16.1	8.6	11 01.0	9.2	59.3
	21	136 16.7	·· 14.5	76 43.7	8.7	10 51.8	9.2	59.3
	22	151 16.4	14.7	91 11.4	8.8	10 42.6	9.3	59.2
	23	166 16.1	14.8	105 39.2	8.8	10 33.3	9.4	59.2
		S.D. 16.3	d 0.2	S.D. 16.6		16.5		16.2

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

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

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
	m s	m s	h m	h m	h m	d	
12	06 29	06 15	11 54	13 45	01 14	02	
13	06 01	05 47	11 54	14 45	02 16	03	●
14	05 33	05 18	11 55	15 42	03 14	04	

0000 DECEMBER 15, 16, 17 (THURS., FRI., SAT.)

G.M.T. (UT)		ARIES	VENUS −3.4		MARS −0.5		JUPITER −2.3		SATURN +0.7	
d	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
15	00	83 32.2	191 07.3	S22 04.0	308 37.5	N20 20.0	351 11.5	N23 08.8	290 26.6	N12 33.1
	01	98 34.6	206 06.4	04.5	323 40.0	20.1	6 14.3	08.8	305 29.1	33.1
	02	113 37.1	221 05.5	05.0	338 42.6	20.2	21 17.1	08.8	320 31.5	33.1
	03	128 39.5	236 04.6	·· 05.4	353 45.1	·· 20.4	36 20.0	·· 08.8	335 34.0	·· 33.2
	04	143 42.0	251 03.7	05.9	8 47.6	20.5	51 22.8	08.8	350 36.5	33.2
	05	158 44.5	266 02.8	06.4	23 50.1	20.6	66 25.6	08.9	5 39.0	33.2
	06	173 46.9	281 01.9	S22 06.9	38 52.6	N20 20.7	81 28.4	N23 08.9	20 41.4	N12 33.2
	07	188 49.4	296 01.0	07.3	53 55.1	20.9	96 31.3	08.9	35 43.9	33.2
T	08	203 51.9	311 00.1	07.8	68 57.6	21.0	111 34.1	08.9	50 46.4	33.2
H	09	218 54.3	325 59.2	·· 08.3	84 00.2	·· 21.1	126 36.9	·· 08.9	65 48.9	·· 33.3
U	10	233 56.8	340 58.3	08.7	99 02.7	21.3	141 39.8	08.9	80 51.4	33.3
R	11	248 59.3	355 57.4	09.2	114 05.2	21.4	156 42.6	08.9	95 53.8	33.3
S	12	264 01.7	10 56.5	S22 09.7	129 07.7	N20 21.5	171 45.4	N23 08.9	110 56.3	N12 33.3
D	13	279 04.2	25 55.6	10.1	144 10.2	21.7	186 48.2	08.9	125 58.8	33.3
A	14	294 06.6	40 54.7	10.6	159 12.8	21.8	201 51.1	09.0	141 01.3	33.3
Y	15	309 09.1	55 53.8	·· 11.0	174 15.3	·· 21.9	216 53.9	·· 09.0	156 03.8	·· 33.3
	16	324 11.6	70 52.9	11.5	189 17.8	22.1	231 56.7	09.0	171 06.2	33.4
	17	339 14.0	85 52.0	12.0	204 20.3	22.2	246 59.5	09.0	186 08.7	33.4
	18	354 16.5	100 51.1	S22 12.4	219 22.9	N20 22.3	262 02.4	N23 09.0	201 11.2	N12 33.4
	19	9 19.0	115 50.2	12.9	234 25.4	22.5	277 05.2	09.0	216 13.7	33.4
	20	24 21.4	130 49.3	13.3	249 27.9	22.6	292 08.0	09.0	231 16.2	33.4
	21	39 23.9	145 48.4	·· 13.8	264 30.5	·· 22.7	307 10.8	·· 09.0	246 18.6	·· 33.4
	22	54 26.4	160 47.5	14.2	279 33.0	22.9	322 13.7	09.0	261 21.1	33.5
	23	69 28.8	175 46.6	14.7	294 35.6	23.0	337 16.5	09.1	276 23.6	33.5
16	00	84 31.3	190 45.7	S22 15.1	309 38.1	N20 23.2	352 19.3	N23 09.1	291 26.1	N12 33.5
	01	99 33.8	205 44.8	15.6	324 40.6	23.3	7 22.1	09.1	306 28.6	33.5
	02	114 36.2	220 43.9	16.0	339 43.2	23.4	22 25.0	09.1	321 31.0	33.5
	03	129 38.7	235 43.0	·· 16.5	354 45.7	·· 23.6	37 27.8	·· 09.1	336 33.5	·· 33.5
	04	144 41.1	250 42.1	16.9	9 48.3	23.7	52 30.6	09.1	351 36.0	33.6
	05	159 43.6	265 41.2	17.4	24 50.8	23.8	67 33.5	09.1	6 38.5	33.6
	06	174 46.1	280 40.3	S22 17.8	39 53.4	N20 24.0	82 36.3	N23 09.1	21 41.0	N12 33.6
	07	189 48.5	295 39.4	18.2	54 55.9	24.1	97 39.1	09.1	36 43.4	33.6
	08	204 51.0	310 38.5	18.7	69 58.5	24.3	112 41.9	09.1	51 45.9	33.6
F	09	219 53.5	325 37.6	·· 19.1	85 01.0	·· 24.4	127 44.8	·· 09.2	66 48.4	·· 33.6
R	10	234 55.9	340 36.7	19.6	100 03.6	24.6	142 47.6	09.2	81 50.9	33.7
I	11	249 58.4	355 35.8	20.0	115 06.1	24.7	157 50.4	09.2	96 53.4	33.7
D	12	265 00.9	10 34.9	S22 20.4	130 08.7	N20 24.8	172 53.3	N23 09.2	111 55.9	N12 33.7
A	13	280 03.3	25 34.0	20.9	145 11.2	25.0	187 56.1	09.2	126 58.3	33.7
Y	14	295 05.8	40 33.1	21.3	160 13.8	25.1	202 58.9	09.2	142 00.8	33.7
	15	310 08.3	55 32.2	·· 21.7	175 16.4	·· 25.3	218 01.7	·· 09.2	157 03.3	·· 33.7
	16	325 10.7	70 31.3	22.2	190 18.9	25.4	233 04.6	09.2	172 05.8	33.8
	17	340 13.2	85 30.4	22.6	205 21.5	25.6	248 07.4	09.2	187 08.3	33.8
	18	355 15.6	100 29.5	S22 23.0	220 24.1	N20 25.7	263 10.2	N23 09.3	202 10.8	N12 33.8
	19	10 18.1	115 28.5	23.4	235 26.6	25.8	278 13.1	09.3	217 13.2	33.8
	20	25 20.6	130 27.6	23.9	250 29.2	26.0	293 15.9	09.3	232 15.7	33.8
	21	40 23.0	145 26.7	·· 24.3	265 31.8	·· 26.1	308 18.7	·· 09.3	247 18.2	·· 33.8
	22	55 25.5	160 25.8	24.7	280 34.3	26.3	323 21.5	09.3	262 20.7	33.9
	23	70 28.0	175 24.9	25.1	295 36.9	26.4	338 24.4	09.3	277 23.2	33.9
17	00	85 30.4	190 24.0	S22 25.6	310 39.5	N20 26.6	353 27.2	N23 09.3	292 25.7	N12 33.9
	01	100 32.9	205 23.1	26.0	325 42.1	26.7	8 30.0	09.3	307 28.1	33.9
	02	115 35.4	220 22.2	26.4	340 44.6	26.9	23 32.9	09.3	322 30.6	33.9
	03	130 37.8	235 21.3	·· 26.8	355 47.2	·· 27.0	38 35.7	·· 09.3	337 33.1	·· 34.0
	04	145 40.3	250 20.4	27.2	10 49.8	27.2	53 38.5	09.4	352 35.6	34.0
	05	160 42.8	265 19.5	27.7	25 52.4	27.3	68 41.3	09.4	7 38.1	34.0
	06	175 45.2	280 18.5	S22 28.1	40 55.0	N20 27.5	83 44.2	N23 09.4	22 40.6	N12 34.0
	07	190 47.7	295 17.6	28.5	55 57.6	27.6	98 47.0	09.4	37 43.1	34.0
S	08	205 50.1	310 16.7	28.9	71 00.1	27.8	113 49.8	09.4	52 45.6	34.0
A	09	220 52.6	325 15.8	·· 29.3	86 02.7	·· 27.9	128 52.7	·· 09.4	67 48.0	·· 34.1
T	10	235 55.1	340 14.9	29.7	101 05.3	28.1	143 55.5	09.4	82 50.5	34.1
U	11	250 57.5	355 14.0	30.1	116 07.9	28.2	158 58.3	09.4	97 53.0	34.1
R	12	266 00.0	10 13.1	S22 30.5	131 10.5	N20 28.4	174 01.1	N23 09.4	112 55.5	N12 34.1
D	13	281 02.5	25 12.1	30.9	146 13.1	28.5	189 04.0	09.5	127 58.0	34.1
A	14	296 04.9	40 11.2	31.4	161 15.7	28.7	204 06.8	09.5	143 00.5	34.2
Y	15	311 07.4	55 10.3	·· 31.8	176 18.3	·· 28.8	219 09.6	·· 09.5	158 03.0	·· 34.2
	16	326 09.9	70 09.4	32.2	191 20.9	29.0	234 12.5	09.5	173 05.5	34.2
	17	341 12.3	85 08.5	32.6	206 23.5	29.1	249 15.3	09.5	188 07.9	34.2
	18	356 14.8	100 07.6	S22 33.0	221 26.1	N20 29.3	264 18.1	N23 09.5	203 10.4	N12 34.2
	19	11 17.2	115 06.7	33.4	236 28.7	29.4	279 21.0	09.5	218 12.9	34.3
	20	26 19.7	130 05.7	33.8	251 31.3	29.6	294 23.8	09.5	233 15.4	34.3
	21	41 22.2	145 04.8	·· 34.2	266 33.9	·· 29.8	309 26.6	·· 09.5	248 17.9	·· 34.3
	22	56 24.6	160 03.9	34.6	281 36.5	29.9	324 29.4	09.5	263 20.4	34.3
	23	71 27.1	175 03.0	34.9	296 39.1	30.1	339 32.3	09.6	278 22.9	34.3
Mer. Pass.		h m 18 18.9	v −0.9	d 0.4	v 2.6	d 0.1	v 2.8	d 0.0	v 2.5	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.4	S40 23.8
Achernar	335 46.4	S57 21.2
Acrux	173 39.3	S62 58.3
Adhara	255 33.2	S28 56.6
Aldebaran	291 19.8	N16 27.9
Alioth	166 44.4	N56 04.5
Alkaid	153 20.3	N49 25.2
Al Na'ir	28 17.5	S47 04.2
Alnilam	276 13.2	S 1 13.0
Alphard	218 22.2	S 8 33.8
Alphecca	126 34.0	N26 47.3
Alpheratz	358 11.2	N28 58.3
Altair	62 34.6	N 8 48.7
Ankaa	353 42.0	S42 25.8
Antares	112 59.5	S26 22.9
Arcturus	146 20.4	N19 17.8
Atria	108 25.9	S68 59.1
Avior	234 28.4	S59 26.2
Bellatrix	279 00.4	N 6 19.7
Betelgeuse	271 29.9	N 7 24.1
Canopus	264 07.5	S52 41.1
Capella	281 13.5	N45 58.5
Deneb	49 50.0	N45 12.4
Denebola	183 01.0	N14 41.6
Diphda	349 22.7	S18 06.5
Dubhe	194 24.4	N61 51.9
Elnath	278 46.1	N28 35.3
Eltanin	90 59.1	N51 29.6
Enif	34 13.6	N 9 46.6
Fomalhaut	15 53.6	S29 44.5
Gacrux	172 30.8	S56 59.1
Gienah	176 19.9	S17 25.1
Hadar	149 26.3	S60 15.7
Hamal	328 30.8	N23 21.6
Kaus Aust.	84 19.7	S34 23.7
Kochab	137 20.0	N74 14.6
Markab	14 05.1	N15 05.3
Menkar	314 42.8	N 4 00.2
Menkent	148 39.4	S36 15.5
Miaplacidus	221 44.6	S69 37.4
Mirfak	309 18.3	N49 47.1
Nunki	76 31.8	S26 19.4
Peacock	54 01.9	S56 48.5
Pollux	244 00.1	N28 04.6
Procyon	245 27.4	N 5 16.8
Rasalhague	96 31.7	N12 34.7
Regulus	208 11.9	N12 04.4
Rigel	281 37.5	S 8 13.7
Rigil Kent.	140 28.7	S60 44.3
Sabik	102 43.6	S15 41.7
Schedar	350 10.8	N56 25.3
Shaula	96 58.7	S37 05.2
Sirius	258 57.0	S16 41.3
Spica	158 59.6	S11 02.7
Suhail	223 11.8	S43 20.5
Vega	80 57.5	N38 46.0
Zuben'ubi	137 35.3	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	106 14.4	11 18
Mars	225 06.8	3 21
Jupiter	267 48.0	0 31
Saturn	206 54.8	4 34

0000 DECEMBER 15, 16, 17 (THURS., FRI., SAT.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d h	° ′	° ′	° ′	′	° ′	′	′
15 00	181 15.8	S23 14.9	120 07.0	9.0	S10 23.9	9.4	59.2
01	196 15.5	15.1	134 35.0	9.0	10 14.5	9.5	59.1
02	211 15.2	15.2	149 03.0	9.1	10 05.0	9.5	59.1
03	226 14.9	·· 15.3	163 31.1	9.2	9 55.5	9.5	59.0
04	241 14.6	15.5	177 59.3	9.2	9 46.0	9.6	59.0
05	256 14.3	15.6	192 27.5	9.4	9 36.4	9.6	59.0
06	271 14.0	S23 15.7	206 55.9	9.4	S 9 26.8	9.7	58.9
07	286 13.7	15.9	221 24.3	9.5	9 17.1	9.7	58.9
T 08	301 13.4	16.0	235 52.8	9.6	9 07.4	9.8	58.9
H 09	316 13.1	·· 16.1	250 21.4	9.6	8 57.6	9.7	58.8
U 10	331 12.8	16.3	264 50.0	9.8	8 47.9	9.9	58.8
R 11	346 12.5	16.4	279 18.8	9.8	8 38.0	9.8	58.7
S 12	1 12.2	S23 16.5	293 47.6	9.9	S 8 28.2	9.9	58.7
D 13	16 11.9	16.6	308 16.5	9.9	8 18.3	9.9	58.7
A 14	31 11.6	16.8	322 45.4	10.1	8 08.4	10.0	58.6
Y 15	46 11.3	·· 16.9	337 14.5	10.1	7 58.4	10.0	58.6
16	61 11.0	17.0	351 43.6	10.2	7 48.4	10.0	58.5
17	76 10.7	17.1	6 12.8	10.2	7 38.4	10.1	58.5
18	91 10.4	S23 17.3	20 42.0	10.3	S 7 28.3	10.0	58.5
19	106 10.1	17.4	35 11.3	10.4	7 18.3	10.1	58.4
20	121 09.8	17.5	49 40.7	10.5	7 08.2	10.1	58.4
21	136 09.5	·· 17.6	64 10.2	10.5	6 58.1	10.2	58.3
22	151 09.2	17.7	78 39.7	10.6	6 47.9	10.2	58.3
23	166 08.9	17.9	93 09.3	10.7	6 37.7	10.1	58.3
16 00	181 08.6	S23 18.0	107 39.0	10.8	S 6 27.6	10.3	58.2
01	196 08.3	18.1	122 08.8	10.8	6 17.3	10.2	58.2
02	211 08.0	18.2	136 38.6	10.8	6 07.1	10.2	58.1
03	226 07.7	·· 18.3	151 08.4	11.0	5 56.9	10.3	58.1
04	241 07.4	18.4	165 38.4	11.0	5 46.6	10.3	58.1
05	256 07.1	18.5	180 08.4	11.1	5 36.3	10.3	58.0
06	271 06.8	S23 18.7	194 38.5	11.1	S 5 26.0	10.3	58.0
07	286 06.5	18.8	209 08.6	11.2	5 15.7	10.3	57.9
08	301 06.2	18.9	223 38.8	11.2	5 05.4	10.4	57.9
F 09	316 05.9	·· 19.0	238 09.0	11.4	4 55.0	10.3	57.9
R 10	331 05.6	19.1	252 39.4	11.3	4 44.7	10.4	57.8
I 11	346 05.3	19.2	267 09.7	11.5	4 34.3	10.3	57.8
D 12	1 05.0	S23 19.3	281 40.2	11.5	S 4 24.0	10.4	57.8
A 13	16 04.6	19.4	296 10.7	11.5	4 13.6	10.4	57.7
Y 14	31 04.3	19.5	310 41.2	11.6	4 03.2	10.4	57.7
15	46 04.0	·· 19.6	325 11.8	11.7	3 52.8	10.4	57.6
16	61 03.7	19.7	339 42.5	11.7	3 42.4	10.4	57.6
17	76 03.4	19.8	354 13.2	11.8	3 32.0	10.4	57.6
18	91 03.1	S23 19.9	8 44.0	11.8	S 3 21.6	10.4	57.5
19	106 02.8	20.0	23 14.8	11.9	3 11.2	10.4	57.5
20	121 02.5	20.1	37 45.7	11.9	3 00.8	10.4	57.5
21	136 02.2	·· 20.2	52 16.6	12.0	2 50.4	10.5	57.4
22	151 01.9	20.3	66 47.6	12.1	2 39.9	10.4	57.4
23	166 01.6	20.4	81 18.7	12.0	2 29.5	10.4	57.3
17 00	181 01.3	S23 20.5	95 49.7	12.2	S 2 19.1	10.4	57.3
01	196 01.0	20.6	110 20.9	12.2	2 08.7	10.4	57.3
02	211 00.7	20.7	124 52.1	12.2	1 58.3	10.4	57.2
03	226 00.4	·· 20.8	139 23.3	12.3	1 47.9	10.4	57.2
04	241 00.1	20.9	153 54.6	12.3	1 37.5	10.4	57.2
05	255 59.8	21.0	168 25.9	12.3	1 27.1	10.4	57.1
06	270 59.5	S23 21.1	182 57.2	12.4	S 1 16.7	10.4	57.1
07	285 59.2	21.2	197 28.6	12.5	1 06.3	10.3	57.0
S 08	300 58.9	21.3	212 00.1	12.5	0 56.0	10.4	57.0
A 09	315 58.5	·· 21.4	226 31.6	12.5	0 45.6	10.4	57.0
T 10	330 58.2	21.5	241 03.1	12.6	0 35.2	10.3	56.9
U 11	345 57.9	21.6	255 34.7	12.6	0 24.9	10.3	56.9
R 12	0 57.6	S23 21.6	270 06.3	12.7	S 0 14.6	10.4	56.9
D 13	15 57.3	21.7	284 38.0	12.6	S 0 04.2	10.3	56.8
A 14	30 57.0	21.8	299 09.6	12.8	N 0 06.1	10.3	56.8
Y 15	45 56.7	·· 21.9	313 41.4	12.7	0 16.4	10.3	56.8
16	60 56.4	22.0	328 13.1	12.8	0 26.7	10.2	56.7
17	75 56.1	22.1	342 44.9	12.9	0 36.9	10.3	56.7
18	90 55.8	S23 22.2	357 16.8	12.8	N 0 47.2	10.2	56.7
19	105 55.5	22.2	11 48.6	12.9	0 57.4	10.3	56.6
20	120 55.2	22.3	26 20.5	13.0	1 07.7	10.2	56.6
21	135 54.9	·· 22.4	40 52.5	12.9	1 17.9	10.1	56.6
22	150 54.6	22.5	55 24.4	13.0	1 28.0	10.2	56.5
23	165 54.3	22.6	69 56.4	13.0	1 38.2	10.2	56.5
	S.D. 16.3	d 0.1	S.D. 16.0		15.7		15.5

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

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

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
	m s	m s	h m	h m	h m	d	
15	05 04	04 50	11 55	16 34	04 08	05	◐
16	04 35	04 20	11 56	17 24	04 59	06	
17	04 06	03 51	11 56	18 11	05 48	07	

G.M.T. (UT)		ARIES	VENUS −3.4		MARS −0.5		JUPITER −2.3		SATURN +0.7	
d	h	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
18	00	86 29.6	190 02.1	S22 35.3	311 41.7	N20 30.2	354 35.1	N23 09.6	293 25.4	N12 34.3
	01	101 32.0	205 01.2	35.7	326 44.3	30.4	9 37.9	09.6	308 27.9	34.4
	02	116 34.5	220 00.2	36.1	341 46.9	30.5	24 40.8	09.6	323 30.3	34.4
	03	131 37.0	234 59.3	36.5	356 49.6	30.7	39 43.6	09.6	338 32.8	34.4
	04	146 39.4	249 58.4	36.9	11 52.2	30.8	54 46.4	09.6	353 35.3	34.4
	05	161 41.9	264 57.5	37.3	26 54.8	31.0	69 49.3	09.6	8 37.8	34.4
	06	176 44.4	279 56.6	S22 37.7	41 57.4	N20 31.2	84 52.1	N23 09.6	23 40.3	N12 34.5
	07	191 46.8	294 55.6	38.1	57 00.0	31.3	99 54.9	09.6	38 42.8	34.5
	08	206 49.3	309 54.7	38.4	72 02.7	31.5	114 57.8	09.6	53 45.3	34.5
S	09	221 51.7	324 53.8	38.8	87 05.3	31.6	130 00.6	09.7	68 47.8	34.5
U	10	236 54.2	339 52.9	39.2	102 07.9	31.8	145 03.4	09.7	83 50.3	34.5
N	11	251 56.7	354 52.0	39.6	117 10.5	32.0	160 06.2	09.7	98 52.8	34.6
D	12	266 59.1	9 51.0	S22 40.0	132 13.2	N20 32.1	175 09.1	N23 09.7	113 55.3	N12 34.6
A	13	282 01.6	24 50.1	40.3	147 15.8	32.3	190 11.9	09.7	128 57.7	34.6
Y	14	297 04.1	39 49.2	40.7	162 18.4	32.5	205 14.7	09.7	144 00.2	34.6
	15	312 06.5	54 48.3	41.1	177 21.1	32.6	220 17.6	09.7	159 02.7	34.7
	16	327 09.0	69 47.3	41.5	192 23.7	32.8	235 20.4	09.7	174 05.2	34.7
	17	342 11.5	84 46.4	41.8	207 26.3	32.9	250 23.2	09.7	189 07.7	34.7
	18	357 13.9	99 45.5	S22 42.2	222 29.0	N20 33.1	265 26.1	N23 09.7	204 10.2	N12 34.7
	19	12 16.4	114 44.6	42.6	237 31.6	33.3	280 28.9	09.8	219 12.7	34.7
	20	27 18.9	129 43.7	43.0	252 34.2	33.4	295 31.7	09.8	234 15.2	34.8
	21	42 21.3	144 42.7	43.3	267 36.9	33.6	310 34.6	09.8	249 17.7	34.8
	22	57 23.8	159 41.8	43.7	282 39.5	33.8	325 37.4	09.8	264 20.2	34.8
	23	72 26.2	174 40.9	44.1	297 42.2	33.9	340 40.2	09.8	279 22.7	34.8
19	00	87 28.7	189 40.0	S22 44.4	312 44.8	N20 34.1	355 43.1	N23 09.8	294 25.2	N12 34.8
	01	102 31.2	204 39.0	44.8	327 47.5	34.3	10 45.9	09.8	309 27.7	34.9
	02	117 33.6	219 38.1	45.2	342 50.1	34.4	25 48.7	09.8	324 30.2	34.9
	03	132 36.1	234 37.2	45.5	357 52.8	34.6	40 51.5	09.8	339 32.7	34.9
	04	147 38.6	249 36.2	45.9	12 55.4	34.8	55 54.4	09.8	354 35.1	34.9
	05	162 41.0	264 35.3	46.2	27 58.1	34.9	70 57.2	09.9	9 37.6	34.9
	06	177 43.5	279 34.4	S22 46.6	43 00.7	N20 35.1	86 00.0	N23 09.9	24 40.1	N12 35.0
	07	192 46.0	294 33.5	47.0	58 03.4	35.3	101 02.9	09.9	39 42.6	35.0
	08	207 48.4	309 32.5	47.3	73 06.0	35.4	116 05.7	09.9	54 45.1	35.0
M	09	222 50.9	324 31.6	47.7	88 08.7	35.6	131 08.5	09.9	69 47.6	35.0
O	10	237 53.3	339 30.7	48.0	103 11.3	35.8	146 11.4	09.9	84 50.1	35.1
N	11	252 55.8	354 29.8	48.4	118 14.0	35.9	161 14.2	09.9	99 52.6	35.1
D	12	267 58.3	9 28.8	S22 48.7	133 16.7	N20 36.1	176 17.0	N23 09.9	114 55.1	N12 35.1
A	13	283 00.7	24 27.9	49.1	148 19.3	36.3	191 19.9	09.9	129 57.6	35.1
Y	14	298 03.2	39 27.0	49.4	163 22.0	36.5	206 22.7	09.9	145 00.1	35.1
	15	313 05.7	54 26.0	49.8	178 24.7	36.6	221 25.5	10.0	160 02.6	35.2
	16	328 08.1	69 25.1	50.1	193 27.3	36.8	236 28.4	10.0	175 05.1	35.2
	17	343 10.6	84 24.2	50.5	208 30.0	37.0	251 31.2	10.0	190 07.6	35.2
	18	358 13.1	99 23.2	S22 50.8	223 32.7	N20 37.1	266 34.0	N23 10.0	205 10.1	N12 35.2
	19	13 15.5	114 22.3	51.1	238 35.4	37.3	281 36.9	10.0	220 12.6	35.3
	20	28 18.0	129 21.4	51.5	253 38.0	37.5	296 39.7	10.0	235 15.1	35.3
	21	43 20.5	144 20.5	51.8	268 40.7	37.7	311 42.5	10.0	250 17.6	35.3
	22	58 22.9	159 19.5	52.2	283 43.4	37.8	326 45.4	10.0	265 20.1	35.3
	23	73 25.4	174 18.6	52.5	298 46.1	38.0	341 48.2	10.0	280 22.6	35.3
20	00	88 27.8	189 17.7	S22 52.8	313 48.7	N20 38.2	356 51.0	N23 10.0	295 25.1	N12 35.4
	01	103 30.3	204 16.7	53.2	328 51.4	38.4	11 53.9	10.0	310 27.6	35.4
	02	118 32.8	219 15.8	53.5	343 54.1	38.5	26 56.7	10.1	325 30.1	35.4
	03	133 35.2	234 14.9	53.8	358 56.8	38.7	41 59.5	10.1	340 32.6	35.4
	04	148 37.7	249 13.9	54.2	13 59.5	38.9	57 02.4	10.1	355 35.1	35.5
	05	163 40.2	264 13.0	54.5	29 02.2	39.1	72 05.2	10.1	10 37.6	35.5
	06	178 42.6	279 12.1	S22 54.8	44 04.9	N20 39.3	87 08.0	N23 10.1	25 40.1	N12 35.5
	07	193 45.1	294 11.1	55.2	59 07.5	39.4	102 10.9	10.1	40 42.6	35.5
	08	208 47.6	309 10.2	55.5	74 10.2	39.6	117 13.7	10.1	55 45.1	35.5
T	09	223 50.0	324 09.3	55.8	89 12.9	39.8	132 16.5	10.1	70 47.6	35.6
U	10	238 52.5	339 08.3	56.1	104 15.6	40.0	147 19.3	10.1	85 50.1	35.6
E	11	253 55.0	354 07.4	56.5	119 18.3	40.1	162 22.2	10.1	100 52.6	35.6
S	12	268 57.4	9 06.5	S22 56.8	134 21.0	N20 40.3	177 25.0	N23 10.2	115 55.1	N12 35.6
D	13	283 59.9	24 05.5	57.1	149 23.7	40.5	192 27.8	10.2	130 57.6	35.7
A	14	299 02.3	39 04.6	57.4	164 26.4	40.7	207 30.7	10.2	146 00.1	35.7
Y	15	314 04.8	54 03.6	57.7	179 29.1	40.9	222 33.5	10.2	161 02.6	35.7
	16	329 07.3	69 02.7	58.1	194 31.8	41.1	237 36.3	10.2	176 05.1	35.7
	17	344 09.7	84 01.8	58.4	209 34.5	41.2	252 39.2	10.2	191 07.6	35.8
	18	359 12.2	99 00.8	S22 58.7	224 37.3	N20 41.4	267 42.0	N23 10.2	206 10.1	N12 35.8
	19	14 14.7	113 59.9	59.0	239 40.0	41.6	282 44.8	10.2	221 12.6	35.8
	20	29 17.1	128 59.0	59.3	254 42.7	41.8	297 47.7	10.2	236 15.1	35.8
	21	44 19.6	143 58.0	59.6	269 45.4	42.0	312 50.5	10.2	251 17.6	35.9
	22	59 22.1	158 57.1	22 59.9	284 48.1	42.1	327 53.3	10.2	266 20.1	35.9
	23	74 24.5	173 56.1	23 00.2	299 50.8	42.3	342 56.2	10.3	281 22.6	35.9
		h m								
Mer. Pass.		18 07.1	v −0.9	d 0.4	v 2.7	d 0.2	v 2.8	d 0.0	v 2.5	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.4	S40 23.8
Achernar	335 46.5	S57 21.2
Acrux	173 39.3	S62 58.3
Adhara	255 33.2	S28 56.6
Aldebaran	291 19.8	N16 27.9
Alioth	166 44.4	N56 04.5
Alkaid	153 20.3	N49 25.2
Al Na'ir	28 17.6	S47 04.2
Alnilam	276 13.2	S 1 13.0
Alphard	218 22.2	S 8 33.8
Alphecca	126 34.0	N26 47.3
Alpheratz	358 11.2	N28 58.3
Altair	62 34.6	N 8 49.7
Ankaa	353 42.1	S42 25.8
Antares	112 59.5	S26 22.9
Arcturus	146 20.4	N19 17.8
Atria	108 25.9	S68 59.1
Avior	234 28.3	S59 26.3
Bellatrix	279 00.4	N 6 19.7
Betelgeuse	271 29.9	N 7 24.1
Canopus	264 07.5	S52 41.1
Capella	281 13.5	N45 58.5
Deneb	49 50.0	N45 12.4
Denebola	183 00.9	N14 41.6
Diphda	349 22.7	S18 06.5
Dubhe	194 24.4	N61 51.9
Elnath	278 46.1	N28 35.3
Eltanin	90 59.1	N51 29.6
Enif	34 13.6	N 9 46.6
Fomalhaut	15 53.6	S29 44.5
Gacrux	172 30.8	S56 59.1
Gienah	176 19.9	S17 25.1
Hadar	149 26.2	S60 15.7
Hamal	328 30.8	N23 21.6
Kaus Aust.	84 19.7	S34 23.6
Kochab	137 20.0	N74 14.6
Markab	14 05.1	N15 05.3
Menkar	314 42.8	N 4 00.2
Menkent	148 39.4	S36 15.5
Miaplacidus	221 44.6	S69 37.5
Mirfak	309 18.3	N49 47.1
Nunki	76 31.8	S26 19.4
Peacock	54 01.9	S56 48.5
Pollux	244 00.1	N28 04.6
Procyon	245 27.4	N 5 16.8
Rasalhague	96 31.7	N12 34.7
Regulus	208 11.8	N12 04.4
Rigel	281 37.5	S 8 13.7
Rigil Kent.	140 28.7	S60 44.3
Sabik	102 43.6	S15 41.8
Schedar	350 10.9	N56 25.3
Shaula	96 58.7	S37 05.2
Sirius	258 57.0	S16 41.3
Spica	158 59.6	S11 02.7
Suhail	223 11.8	S43 20.5
Vega	80 57.5	N38 46.0
Zuben'ubi	137 35.3	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	102 11.2	11 22
Mars	225 16.1	3 08
Jupiter	268 14.3	0 17
Saturn	206 56.5	4 22

0000 DECEMBER 18, 19, 20 (SUN., MON., TUES.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
18	00	180 53.9	S23 22.6	84 28.4	13.1	N 1 48.4	10.1	56.5
	01	195 53.6	22.7	99 00.5	13.1	1 58.5	10.1	56.4
	02	210 53.3	22.8	113 32.6	13.1	2 08.6	10.1	56.4
	03	225 53.0	·· 22.9	128 04.7	13.1	2 18.7	10.1	56.4
	04	240 52.7	22.9	142 36.8	13.2	2 28.8	10.0	56.3
	05	255 52.4	23.0	157 09.0	13.2	2 38.8	10.0	56.3
	06	270 52.1	S23 23.1	171 41.2	13.2	N 2 48.8	10.0	56.3
	07	285 51.8	23.2	186 13.4	13.2	2 58.8	10.0	56.2
	08	300 51.5	23.2	200 45.6	13.3	3 08.8	9.9	56.2
SUNDAY	09	315 51.2	·· 23.3	215 17.9	13.2	3 18.7	9.9	56.2
	10	330 50.9	23.4	229 50.1	13.3	3 28.6	9.9	56.1
	11	345 50.6	23.5	244 22.4	13.4	3 38.5	9.9	56.1
	12	0 50.3	S23 23.5	258 54.8	13.3	N 3 48.4	9.8	56.1
	13	15 50.0	23.6	273 27.1	13.4	3 58.2	9.9	56.1
	14	30 49.6	23.7	287 59.5	13.4	4 08.1	9.7	56.0
	15	45 49.3	·· 23.7	302 31.9	13.4	4 17.8	9.8	56.0
	16	60 49.0	23.8	317 04.3	13.4	4 27.6	9.7	56.0
	17	75 48.7	23.8	331 36.7	13.4	4 37.3	9.7	55.9
	18	90 48.4	S23 23.9	346 09.1	13.4	N 4 47.0	9.7	55.9
	19	105 48.1	24.0	0 41.5	13.5	4 56.7	9.6	55.9
	20	120 47.8	24.0	15 14.0	13.5	5 06.3	9.6	55.8
	21	135 47.5	·· 24.1	29 46.5	13.5	5 15.9	9.5	55.8
	22	150 47.2	24.2	44 19.0	13.5	5 25.4	9.6	55.8
	23	165 46.9	24.2	58 51.5	13.5	5 35.0	9.5	55.8
19	00	180 46.6	S23 24.3	73 24.0	13.5	N 5 44.5	9.4	55.7
	01	195 46.3	24.3	87 56.5	13.6	5 53.9	9.4	55.7
	02	210 45.9	24.4	102 29.1	13.5	6 03.3	9.4	55.7
	03	225 45.6	·· 24.4	117 01.6	13.6	6 12.7	9.4	55.7
	04	240 45.3	24.5	131 34.2	13.5	6 22.1	9.3	55.6
	05	255 45.0	24.6	146 06.7	13.6	6 31.4	9.3	55.6
	06	270 44.7	S23 24.6	160 39.3	13.6	N 6 40.7	9.2	55.6
	07	285 44.4	24.7	175 11.9	13.6	6 49.9	9.2	55.5
	08	300 44.1	24.7	189 44.5	13.6	6 59.1	9.2	55.5
MONDAY	09	315 43.8	·· 24.8	204 17.1	13.6	7 08.3	9.1	55.5
	10	330 43.5	24.8	218 49.7	13.6	7 17.4	9.1	55.5
	11	345 43.2	24.9	233 22.3	13.6	7 26.5	9.0	55.4
	12	0 42.9	S23 24.9	247 54.9	13.6	N 7 35.5	9.0	55.4
	13	15 42.5	25.0	262 27.5	13.6	7 44.5	9.0	55.4
	14	30 42.2	25.0	277 00.1	13.6	7 53.5	8.9	55.4
	15	45 41.9	·· 25.1	291 32.7	13.7	8 02.4	8.9	55.3
	16	60 41.6	25.1	306 05.4	13.6	8 11.3	8.8	55.3
	17	75 41.3	25.2	320 38.0	13.6	8 20.1	8.8	55.3
	18	90 41.0	S23 25.2	335 10.6	13.6	N 8 28.9	8.7	55.3
	19	105 40.7	25.2	349 43.2	13.7	8 37.6	8.7	55.3
	20	120 40.4	25.3	4 15.9	13.6	8 46.3	8.7	55.2
	21	135 40.1	·· 25.3	18 48.5	13.6	8 55.0	8.6	55.2
	22	150 39.8	25.4	33 21.1	13.7	9 03.6	8.6	55.2
	23	165 39.5	25.4	47 53.8	13.6	9 12.2	8.5	55.2
20	00	180 39.1	S23 25.4	62 26.4	13.6	N 9 20.7	8.4	55.1
	01	195 38.8	25.5	76 59.0	13.6	9 29.1	8.4	55.1
	02	210 38.5	25.5	91 31.6	13.6	9 37.5	8.4	55.1
	03	225 38.2	·· 25.6	106 04.2	13.6	9 45.9	8.3	55.1
	04	240 37.9	25.6	120 36.8	13.6	9 54.2	8.3	55.1
	05	255 37.6	25.6	135 09.4	13.6	10 02.5	8.2	55.0
	06	270 37.3	S23 25.7	149 42.0	13.6	N10 10.7	8.2	55.0
	07	285 37.0	25.7	164 14.6	13.6	10 18.9	8.1	55.0
	08	300 36.7	25.7	178 47.2	13.6	10 27.0	8.1	55.0
TUESDAY	09	315 36.4	·· 25.8	193 19.8	13.6	10 35.1	8.0	54.9
	10	330 36.1	25.8	207 52.4	13.6	10 43.1	8.0	54.9
	11	345 35.7	25.8	222 25.0	13.5	10 51.1	7.9	54.9
	12	0 35.4	S23 25.9	236 57.5	13.6	N10 59.0	7.8	54.9
	13	15 35.1	25.9	251 30.1	13.5	11 06.8	7.8	54.9
	14	30 34.8	25.9	266 02.6	13.6	11 14.6	7.8	54.9
	15	45 34.5	·· 25.9	280 35.2	13.5	11 22.4	7.7	54.8
	16	60 34.2	26.0	295 07.7	13.5	11 30.1	7.6	54.8
	17	75 33.9	26.0	309 40.2	13.5	11 37.7	7.6	54.8
	18	90 33.6	S23 26.0	324 12.7	13.5	N11 45.3	7.5	54.8
	19	105 33.3	26.0	338 45.2	13.5	11 52.8	7.5	54.8
	20	120 33.0	26.1	353 17.7	13.5	12 00.3	7.4	54.7
	21	135 32.6	·· 26.1	7 50.2	13.4	12 07.7	7.4	54.7
	22	150 32.3	26.1	22 22.6	13.5	12 15.1	7.3	54.7
	23	165 32.0	26.1	36 55.1	13.4	12 22.4	7.2	54.7
		S.D. 16.3	d 0.0	S.D. 15.3		15.1		15.0

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

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

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
	m s	m s	h m	h m	h m	d	
18	03 36	03 22	11 57	18 57	06 34	08	◐
19	03 07	02 52	11 57	19 42	07 20	09	
20	02 37	02 22	11 58	20 28	08 05	10	

G.M.T. (UT)		ARIES	VENUS −3.4		MARS −0.6		JUPITER −2.3		SATURN +0.6	
		G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d	h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
21	00	89 27.0	188 55.2	S23 00.5	314 53.5	N20 42.5	357 59.0	N23 10.3	296 25.1	N12 35.9
	01	104 29.4	203 54.3	00.8	329 56.2	42.7	13 01.8	10.3	311 27.6	36.0
	02	119 31.9	218 53.3	01.2	344 59.0	42.9	28 04.7	10.3	326 30.1	36.0
	03	134 34.4	233 52.4	01.5	0 01.7	43.1	43 07.5	10.3	341 32.6	36.0
	04	149 36.8	248 51.4	01.8	15 04.4	43.3	58 10.3	10.3	356 35.1	36.0
	05	164 39.3	263 50.5	02.1	30 07.1	43.4	73 13.2	10.3	11 37.6	36.1
	06	179 41.8	278 49.6	S23 02.4	45 09.9	N20 43.6	88 16.0	N23 10.3	26 40.1	N12 36.1
W	07	194 44.2	293 48.6	02.7	60 12.6	43.8	103 18.8	10.3	41 42.6	36.1
E	08	209 46.7	308 47.7	03.0	75 15.3	44.0	118 21.7	10.3	56 45.1	36.1
D	09	224 49.2	323 46.7	03.3	90 18.0	44.2	133 24.5	10.4	71 47.6	36.2
N	10	239 51.6	338 45.8	03.6	105 20.8	44.4	148 27.3	10.4	86 50.1	36.2
E	11	254 54.1	353 44.9	03.8	120 23.5	44.6	163 30.2	10.4	101 52.6	36.2
S	12	269 56.6	8 43.9	S23 04.1	135 26.2	N20 44.8	178 33.0	N23 10.4	116 55.1	N12 36.2
D	13	284 59.0	23 43.0	04.4	150 29.0	45.0	193 35.8	10.4	131 57.6	36.3
A	14	300 01.5	38 42.0	04.7	165 31.7	45.1	208 38.7	10.4	147 00.2	36.3
Y	15	315 03.9	53 41.1	05.0	180 34.5	45.3	223 41.5	10.4	162 02.7	36.3
	16	330 06.4	68 40.2	05.3	195 37.2	45.5	238 44.3	10.4	177 05.2	36.3
	17	345 08.9	83 39.2	05.6	210 39.9	45.7	253 47.2	10.4	192 07.7	36.4
	18	0 11.3	98 38.3	S23 05.9	225 42.7	N20 45.9	268 50.0	N23 10.4	207 10.2	N12 36.4
	19	15 13.8	113 37.3	06.2	240 45.4	46.1	283 52.8	10.4	222 12.7	36.4
	20	30 16.3	128 36.4	06.4	255 48.2	46.3	298 55.7	10.5	237 15.2	36.4
	21	45 18.7	143 35.4	06.7	270 50.9	46.5	313 58.5	10.5	252 17.7	36.5
	22	60 21.2	158 34.5	07.0	285 53.7	46.7	329 01.3	10.5	267 20.2	36.5
	23	75 23.7	173 33.5	07.3	300 56.4	46.9	344 04.2	10.5	282 22.7	36.5
22	00	90 26.1	188 32.6	S23 07.6	315 59.2	N20 47.1	359 07.0	N23 10.5	297 25.2	N12 36.5
	01	105 28.6	203 31.7	07.8	331 01.9	47.3	14 09.8	10.5	312 27.7	36.6
	02	120 31.1	218 30.7	08.1	346 04.7	47.5	29 12.7	10.5	327 30.2	36.6
	03	135 33.5	233 29.8	08.4	1 07.4	47.6	44 15.5	10.5	342 32.7	36.6
	04	150 36.0	248 28.8	08.7	16 10.2	47.8	59 18.4	10.5	357 35.2	36.6
	05	165 38.4	263 27.9	08.9	31 13.0	48.0	74 21.2	10.5	12 37.8	36.7
	06	180 40.9	278 26.9	S23 09.2	46 15.7	N20 48.2	89 24.0	N23 10.5	27 40.3	N12 36.7
T	07	195 43.4	293 26.0	09.5	61 18.5	48.4	104 26.9	10.6	42 42.8	36.7
H	08	210 45.8	308 25.0	09.7	76 21.3	48.6	119 29.7	10.6	57 45.3	36.7
U	09	225 48.3	323 24.1	10.0	91 24.0	48.8	134 32.5	10.6	72 47.8	36.8
R	10	240 50.8	338 23.1	10.3	106 26.8	49.0	149 35.4	10.6	87 50.3	36.8
S	11	255 53.2	353 22.2	10.5	121 29.6	49.2	164 38.2	10.6	102 52.8	36.8
D	12	270 55.7	8 21.2	S23 10.8	136 32.3	N20 49.4	179 41.0	N23 10.6	117 55.3	N12 36.8
A	13	285 58.2	23 20.3	11.1	151 35.1	49.6	194 43.9	10.6	132 57.8	36.9
Y	14	301 00.6	38 19.4	11.3	166 37.9	49.8	209 46.7	10.6	148 00.3	36.9
	15	316 03.1	53 18.4	11.6	181 40.6	50.0	224 49.5	10.6	163 02.8	36.9
	16	331 05.5	68 17.5	11.8	196 43.4	50.2	239 52.4	10.6	178 05.4	37.0
	17	346 08.0	83 16.5	12.1	211 46.2	50.4	254 55.2	10.6	193 07.9	37.0
	18	1 10.5	98 15.6	S23 12.3	226 49.0	N20 50.6	269 58.0	N23 10.7	208 10.4	N12 37.0
	19	16 12.9	113 14.6	12.6	241 51.8	50.8	285 00.9	10.7	223 12.9	37.0
	20	31 15.4	128 13.7	12.9	256 54.5	51.0	300 03.7	10.7	238 15.4	37.1
	21	46 17.9	143 12.7	13.1	271 57.3	51.2	315 06.5	10.7	253 17.9	37.1
	22	61 20.3	158 11.8	13.4	287 00.1	51.4	330 09.4	10.7	268 20.4	37.1
	23	76 22.8	173 10.8	13.6	302 02.9	51.6	345 12.2	10.7	283 22.9	37.1
23	00	91 25.3	188 09.9	S23 13.9	317 05.7	N20 51.8	0 15.0	N23 10.7	298 25.4	N12 37.2
	01	106 27.7	203 08.9	14.1	332 08.5	52.0	15 17.9	10.7	313 28.0	37.2
	02	121 30.2	218 08.0	14.4	347 11.3	52.2	30 20.7	10.7	328 30.5	37.2
	03	136 32.7	233 07.0	14.6	2 14.1	52.4	45 23.5	10.7	343 33.0	37.3
	04	151 35.1	248 06.1	14.8	17 16.9	52.6	60 26.4	10.7	358 35.5	37.3
	05	166 37.6	263 05.1	15.1	32 19.6	52.8	75 29.2	10.7	13 38.0	37.3
	06	181 40.0	278 04.2	S23 15.3	47 22.4	N20 53.0	90 32.0	N23 10.8	28 40.5	N12 37.3
F	07	196 42.5	293 03.2	15.6	62 25.2	53.2	105 34.9	10.8	43 43.0	37.4
R	08	211 45.0	308 02.3	15.8	77 28.0	53.5	120 37.7	10.8	58 45.5	37.4
I	09	226 47.4	323 01.3	16.0	92 30.8	53.7	135 40.5	10.8	73 48.1	37.4
D	10	241 49.9	338 00.3	16.3	107 33.7	53.9	150 43.4	10.8	88 50.6	37.5
A	11	256 52.4	352 59.4	16.5	122 36.5	54.1	165 46.2	10.8	103 53.1	37.5
Y	12	271 54.8	7 58.4	S23 16.7	137 39.3	N20 54.3	180 49.0	N23 10.8	118 55.6	N12 37.5
	13	286 57.3	22 57.5	17.0	152 42.1	54.5	195 51.9	10.8	133 58.1	37.5
	14	301 59.8	37 56.5	17.2	167 44.9	54.7	210 54.7	10.8	149 00.6	37.6
	15	317 02.2	52 55.6	17.4	182 47.7	54.9	225 57.5	10.8	164 03.1	37.6
	16	332 04.7	67 54.6	17.7	197 50.5	55.1	241 00.4	10.8	179 05.7	37.6
	17	347 07.2	82 53.7	17.9	212 53.3	55.3	256 03.2	10.9	194 08.2	37.7
	18	2 09.6	97 52.7	S23 18.1	227 56.1	N20 55.5	271 06.0	N23 10.9	209 10.7	N12 37.7
	19	17 12.1	112 51.8	18.3	242 58.9	55.7	286 08.9	10.9	224 13.2	37.7
	20	32 14.5	127 50.8	18.6	258 01.8	55.9	301 11.7	10.9	239 15.7	37.7
	21	47 17.0	142 49.9	18.8	273 04.6	56.2	316 14.5	10.9	254 18.2	37.8
	22	62 19.5	157 48.9	19.0	288 07.4	56.4	331 17.4	10.9	269 20.7	37.8
	23	77 21.9	172 48.0	19.2	303 10.2	56.6	346 20.2	10.9	284 23.3	37.8
Mer. Pass.		h m 17 55.3	v −0.9	d 0.3	v 2.8	d 0.2	v 2.8	d 0.0	v 2.5	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.4	S40 23.8
Achernar	335 46.5	S57 21.2
Acrux	173 39.2	S62 58.3
Adhara	255 33.2	S28 56.6
Aldebaran	291 19.8	N16 27.9
Alioth	166 44.4	N56 04.5
Alkaid	153 20.3	N49 25.2
Al Na'ir	28 17.6	S47 04.2
Alnilam	276 13.2	S 1 13.1
Alphard	218 22.2	S 8 33.8
Alphecca	126 34.0	N26 47.3
Alpheratz	358 11.2	N28 58.3
Altair	62 34.6	N 8 48.7
Ankaa	353 42.1	S42 25.8
Antares	112 59.5	S26 22.9
Arcturus	146 20.4	N19 17.8
Atria	108 25.9	S68 59.1
Avior	234 28.3	S59 26.3
Bellatrix	279 00.4	N 6 19.7
Betelgeuse	271 29.9	N 7 24.1
Canopus	264 07.5	S52 41.1
Capella	281 13.5	N45 58.5
Deneb	49 50.0	N45 12.4
Denebola	183 00.9	N14 41.6
Diphda	349 22.7	S18 06.6
Dubhe	194 24.4	N61 51.9
Elnath	278 46.1	N28 35.3
Eltanin	90 59.1	N51 29.6
Enif	34 13.6	N 9 46.6
Fomalhaut	15 53.6	S29 44.5
Gacrux	172 30.8	S56 59.1
Gienah	176 19.9	S17 25.1
Hadar	149 26.2	S60 15.7
Hamal	328 30.8	N23 21.6
Kaus Aust.	84 19.7	S34 23.6
Kochab	137 20.0	N74 14.6
Markab	14 05.1	N15 05.3
Menkar	314 42.8	N 4 00.2
Menkent	148 39.4	S36 15.5
Miaplacidus	221 44.5	S69 37.5
Mirfak	309 18.3	N49 47.1
Nunki	76 31.8	S26 19.4
Peacock	54 01.9	S56 48.4
Pollux	244 00.1	N28 04.6
Procyon	245 27.4	N 5 16.8
Rasalhague	96 31.7	N12 34.7
Regulus	208 11.8	N12 04.4
Rigel	281 37.5	S 8 13.7
Rigil Kent.	140 28.7	S60 44.3
Sabik	102 43.6	S15 41.8
Schedar	350 10.9	N56 25.3
Shaula	96 58.7	S37 05.2
Sirius	258 57.0	S16 41.3
Spica	158 59.6	S11 02.7
Suhail	223 11.8	S43 20.5
Vega	80 57.5	N38 45.9
Zuben'ubi	137 35.3	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	98 06.5	11 27
Mars	225 33.1	2 56
Jupiter	268 40.9	0 04
Saturn	206 59.1	4 10

0000 DECEMBER 21, 22, 23 (WED., THURS., FRI.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	MOON v	MOON Dec.	MOON d	MOON H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
21	00	180 31.7	S23 26.1	51 27.5	13.5	N12 29.6	7.2	54.7
	01	195 31.4	26.2	66 00.0	13.4	12 36.8	7.1	54.7
	02	210 31.1	26.2	80 32.4	13.4	12 43.9	7.1	54.6
	03	225 30.8	·· 26.2	95 04.8	13.4	12 51.0	7.0	54.6
	04	240 30.5	26.2	109 37.2	13.4	12 58.0	6.9	54.6
	05	255 30.2	26.2	124 09.6	13.3	13 04.9	6.9	54.6
	06	270 29.9	S23 26.2	138 41.9	13.4	N13 11.8	6.8	54.6
	07	285 29.5	26.3	153 14.3	13.3	13 18.6	6.8	54.6
W	08	300 29.2	26.3	167 46.6	13.3	13 25.4	6.6	54.5
E	09	315 28.9	·· 26.3	182 18.9	13.4	13 32.0	6.7	54.5
D	10	330 28.6	26.3	196 51.3	13.2	13 38.7	6.5	54.5
N	11	345 28.3	26.3	211 23.5	13.3	13 45.2	6.5	54.5
E	12	0 28.0	S23 26.3	225 55.8	13.3	N13 51.7	6.5	54.5
S	13	15 27.7	26.3	240 28.1	13.2	13 58.2	6.4	54.5
D	14	30 27.4	26.3	255 00.3	13.3	14 04.6	6.3	54.5
A	15	45 27.1	·· 26.3	269 32.6	13.2	14 10.9	6.2	54.4
Y	16	60 26.8	26.3	284 04.8	13.2	14 17.1	6.2	54.4
	17	75 26.4	26.3	298 37.0	13.2	14 23.3	6.1	54.4
	18	90 26.1	S23 26.4	313 09.2	13.2	N14 29.4	6.1	54.4
	19	105 25.8	26.4	327 41.4	13.1	14 35.5	5.9	54.4
	20	120 25.5	26.4	342 13.5	13.2	14 41.4	5.9	54.4
	21	135 25.2	·· 26.4	356 45.7	13.1	14 47.3	5.9	54.4
	22	150 24.9	26.4	11 17.8	13.1	14 53.2	5.8	54.4
	23	165 24.6	26.4	25 49.9	13.1	14 59.0	5.7	54.3
22	00	180 24.3	S23 26.4	40 22.0	13.1	N15 04.7	5.6	54.3
	01	195 24.0	26.4	54 54.1	13.0	15 10.3	5.6	54.3
	02	210 23.6	26.4	69 26.1	13.1	15 15.9	5.5	54.3
	03	225 23.3	·· 26.4	83 58.2	13.0	15 21.4	5.4	54.3
	04	240 23.0	26.4	98 30.2	13.0	15 26.8	5.4	54.3
	05	255 22.7	26.4	113 02.2	13.0	15 32.2	5.2	54.3
	06	270 22.4	S23 26.3	127 34.2	13.0	N15 37.4	5.3	54.3
	07	285 22.1	26.3	142 06.2	12.9	15 42.7	5.1	54.3
T	08	300 21.8	26.3	156 38.1	13.0	15 47.8	5.1	54.2
H	09	315 21.5	·· 26.3	171 10.1	12.9	15 52.9	5.0	54.2
U	10	330 21.2	26.3	185 42.0	12.9	15 57.9	4.9	54.2
R	11	345 20.9	26.3	200 13.9	12.9	16 02.8	4.9	54.2
S	12	0 20.5	S23 26.3	214 45.8	12.9	N16 07.7	4.7	54.2
D	13	15 20.2	26.3	229 17.7	12.8	16 12.4	4.7	54.2
A	14	30 19.9	26.3	243 49.5	12.9	16 17.1	4.7	54.2
Y	15	45 19.6	·· 26.3	258 21.4	12.8	16 21.8	4.5	54.2
	16	60 19.3	26.3	272 53.2	12.8	16 26.3	4.5	54.2
	17	75 19.0	26.2	287 25.0	12.8	16 30.8	4.4	54.2
	18	90 18.7	S23 26.2	301 56.8	12.8	N16 35.2	4.4	54.1
	19	105 18.4	26.2	316 28.6	12.7	16 39.6	4.2	54.1
	20	120 18.1	26.2	331 00.3	12.8	16 43.8	4.2	54.1
	21	135 17.8	·· 26.2	345 32.1	12.7	16 48.0	4.1	54.1
	22	150 17.4	26.2	0 03.8	12.7	16 52.1	4.0	54.1
	23	165 17.1	26.1	14 35.5	12.7	16 56.1	4.0	54.1
23	00	180 16.8	S23 26.1	29 07.2	12.7	N17 00.1	3.8	54.1
	01	195 16.5	26.1	43 38.9	12.7	17 03.9	3.8	54.1
	02	210 16.2	26.1	58 10.6	12.6	17 07.7	3.8	54.1
	03	225 15.9	·· 26.1	72 42.2	12.6	17 11.5	3.6	54.1
	04	240 15.6	26.0	87 13.8	12.7	17 15.1	3.6	54.1
	05	255 15.3	26.0	101 45.5	12.6	17 18.7	3.4	54.1
	06	270 15.0	S23 26.0	116 17.1	12.6	N17 22.1	3.4	54.1
	07	285 14.6	26.0	130 48.7	12.5	17 25.5	3.4	54.1
	08	300 14.3	25.9	145 20.2	12.6	17 28.9	3.2	54.0
F	09	315 14.0	·· 25.9	159 51.8	12.6	17 32.1	3.2	54.0
R	10	330 13.7	25.9	174 23.4	12.5	17 35.3	3.1	54.0
I	11	345 13.4	25.9	188 54.9	12.5	17 38.4	3.0	54.0
D	12	0 13.1	S23 25.8	203 26.4	12.5	N17 41.4	2.9	54.0
A	13	15 12.8	25.8	217 57.9	12.5	17 44.3	2.8	54.0
Y	14	30 12.5	25.8	232 29.4	12.5	17 47.1	2.8	54.0
	15	45 12.2	·· 25.7	247 00.9	12.5	17 49.9	2.7	54.0
	16	60 11.9	25.7	261 32.4	12.5	17 52.6	2.6	54.0
	17	75 11.5	25.7	276 03.9	12.4	17 55.2	2.5	54.0
	18	90 11.2	S23 25.6	290 35.3	12.5	N17 57.7	2.4	54.0
	19	105 10.9	25.6	305 06.8	12.4	18 00.1	2.4	54.0
	20	120 10.6	25.6	319 38.2	12.4	18 02.5	2.2	54.0
	21	135 10.3	·· 25.5	334 09.6	12.4	18 04.7	2.2	54.0
	22	150 10.0	25.5	348 41.0	12.4	18 06.9	2.1	54.0
	23	165 09.7	25.4	3 12.4	12.4	18 09.0	2.0	54.0
		S.D. 16.3	d 0.0	S.D. 14.8		14.8		14.7

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

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

0000 DECEMBER 24, 25, 26 (SAT., SUN., MON.)

G.M.T. (UT)		ARIES	VENUS −3.4		MARS −0.7		JUPITER −2.3		SATURN +0.6	
		G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d	h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
24	00	92 24.4	187 47.0	S23 19.5	318 13.1	N20 56.8	1 23.0	N23 10.9	299 25.8	N12 37.9
	01	107 26.9	202 46.0	19.7	333 15.9	57.0	16 25.9	10.9	314 28.3	37.9
	02	122 29.3	217 45.1	19.9	348 18.7	57.2	31 28.7	10.9	329 30.8	37.9
	03	137 31.8	232 44.1	·· 20.1	3 21.5	·· 57.4	46 31.5	·· 10.9	344 33.3	·· 37.9
	04	152 34.3	247 43.2	20.3	18 24.4	57.6	61 34.4	10.9	359 35.8	38.0
	05	167 36.7	262 42.2	20.5	33 27.2	57.9	76 37.2	11.0	14 38.4	38.0
	06	182 39.2	277 41.3	S23 20.7	48 30.0	N20 58.1	91 40.0	N23 11.0	29 40.9	N12 38.0
	07	197 41.7	292 40.3	21.0	63 32.9	58.3	106 42.9	11.0	44 43.4	38.1
S	08	212 44.1	307 39.4	21.2	78 35.7	58.5	121 45.7	11.0	59 45.9	38.1
A	09	227 46.6	322 38.4	·· 21.4	93 38.5	·· 58.7	136 48.5	·· 11.0	74 48.4	·· 38.1
T	10	242 49.0	337 37.4	21.6	108 41.4	58.9	151 51.4	11.0	89 50.9	38.1
U	11	257 51.5	352 36.5	21.8	123 44.2	59.1	166 54.2	11.0	104 53.5	38.2
R	12	272 54.0	7 35.5	S23 22.0	138 47.1	N20 59.4	181 57.0	N23 11.0	119 56.0	N12 38.2
D	13	287 56.4	22 34.6	22.2	153 49.9	59.6	196 59.9	11.0	134 58.5	38.2
A	14	302 58.9	37 33.6	22.4	168 52.7	20 59.8	212 02.7	11.0	150 01.0	38.3
Y	15	318 01.4	52 32.7	·· 22.6	183 55.6	21 00.0	227 05.5	·· 11.0	165 03.5	·· 38.3
	16	333 03.8	67 31.7	22.8	198 58.4	00.2	242 08.4	11.0	180 06.1	38.3
	17	348 06.3	82 30.7	23.0	214 01.3	00.4	257 11.2	11.1	195 08.6	38.4
	18	3 08.8	97 29.8	S23 23.2	229 04.1	N21 00.7	272 14.0	N23 11.1	210 11.1	N12 38.4
	19	18 11.2	112 28.8	23.4	244 07.0	00.9	287 16.9	11.1	225 13.6	38.4
	20	33 13.7	127 27.9	23.6	259 09.8	01.1	302 19.7	11.1	240 16.1	38.4
	21	48 16.1	142 26.9	·· 23.8	274 12.7	·· 01.3	317 22.5	·· 11.1	255 18.6	·· 38.5
	22	63 18.6	157 25.9	24.0	289 15.6	01.5	332 25.4	11.1	270 21.2	38.5
	23	78 21.1	172 25.0	24.1	304 18.4	01.7	347 28.2	11.1	285 23.7	38.5
25	00	93 23.5	187 24.0	S23 24.3	319 21.3	N21 02.0	2 31.0	N23 11.1	300 26.2	N12 38.6
	01	108 26.0	202 23.1	24.5	334 24.1	02.2	17 33.9	11.1	315 28.7	38.6
	02	123 28.5	217 22.1	24.7	349 27.0	02.4	32 36.7	11.1	330 31.2	38.6
	03	138 30.9	232 21.2	·· 24.9	4 29.9	·· 02.6	47 39.5	·· 11.1	345 33.8	·· 38.7
	04	153 33.4	247 20.2	25.1	19 32.7	02.8	62 42.4	11.1	0 36.3	38.7
	05	168 35.9	262 19.2	25.3	34 35.6	03.1	77 45.2	11.2	15 38.8	38.7
	06	183 38.3	277 18.3	S23 25.4	49 38.5	N21 03.3	92 48.0	N23 11.2	30 41.3	N12 38.8
	07	198 40.8	292 17.3	25.6	64 41.3	03.5	107 50.9	11.2	45 43.9	38.8
	08	213 43.3	307 16.4	25.8	79 44.2	03.7	122 53.7	11.2	60 46.4	38.8
S	09	228 45.7	322 15.4	·· 26.0	94 47.1	·· 04.0	137 56.5	·· 11.2	75 48.9	·· 38.9
U	10	243 48.2	337 14.4	26.2	109 50.0	04.2	152 59.4	11.2	90 51.4	38.9
N	11	258 50.6	352 13.5	26.3	124 52.8	04.4	168 02.2	11.2	105 53.9	38.9
D	12	273 53.1	7 12.5	S23 26.5	139 55.7	N21 04.6	183 05.0	N23 11.2	120 56.5	N12 38.9
A	13	288 55.6	22 11.5	26.7	154 58.6	04.8	198 07.9	11.2	135 59.0	39.0
Y	14	303 58.0	37 10.6	26.8	170 01.5	05.1	213 10.7	11.2	151 01.5	39.0
	15	319 00.5	52 09.6	·· 27.0	185 04.4	·· 05.3	228 13.5	·· 11.2	166 04.0	·· 39.0
	16	334 03.0	67 08.7	27.2	200 07.2	05.5	243 16.4	11.2	181 06.6	39.1
	17	349 05.4	82 07.7	27.4	215 10.1	05.7	258 19.2	11.2	196 09.1	39.1
	18	4 07.9	97 06.7	S23 27.5	230 13.0	N21 06.0	273 22.0	N23 11.3	211 11.6	N12 39.1
	19	19 10.4	112 05.8	27.7	245 15.9	06.2	288 24.9	11.3	226 14.1	39.2
	20	34 12.8	127 04.8	27.8	260 18.8	06.4	303 27.7	11.3	241 16.6	39.2
	21	49 15.3	142 03.9	·· 28.0	275 21.7	·· 06.7	318 30.5	·· 11.3	256 19.2	·· 39.2
	22	64 17.8	157 02.9	28.2	290 24.6	06.9	333 33.3	11.3	271 21.7	39.3
	23	79 20.2	172 01.9	28.3	305 27.5	07.1	348 36.2	11.3	286 24.2	39.3
26	00	94 22.7	187 01.0	S23 28.5	320 30.4	N21 07.3	3 39.0	N23 11.3	301 26.7	N12 39.3
	01	109 25.1	202 00.0	28.7	335 33.3	07.6	18 41.8	11.3	316 29.3	39.4
	02	124 27.6	216 59.0	28.8	350 36.2	07.8	33 44.7	11.3	331 31.8	39.4
	03	139 30.1	231 58.1	·· 29.0	5 39.1	·· 08.0	48 47.5	·· 11.3	346 34.3	·· 39.4
	04	154 32.5	246 57.1	29.1	20 42.0	08.3	63 50.3	11.3	1 36.8	39.5
	05	169 35.0	261 56.2	29.3	35 44.9	08.5	78 53.2	11.3	16 39.4	39.5
	06	184 37.5	276 55.2	S23 29.4	50 47.8	N21 08.7	93 56.0	N23 11.3	31 41.9	N12 39.5
	07	199 39.9	291 54.2	29.6	65 50.7	08.9	108 58.8	11.4	46 44.4	39.6
	08	214 42.4	306 53.3	29.7	80 53.6	09.2	124 01.7	11.4	61 46.9	39.6
M	09	229 44.9	321 52.3	·· 29.9	95 56.5	·· 09.4	139 04.5	·· 11.4	76 49.5	·· 39.6
O	10	244 47.3	336 51.3	30.0	110 59.4	09.6	154 07.3	11.4	91 52.0	39.7
N	11	259 49.8	351 50.4	30.2	126 02.3	09.9	169 10.2	11.4	106 54.5	39.7
D	12	274 52.2	6 49.4	S23 30.3	141 05.2	N21 10.1	184 13.0	N23 11.4	121 57.1	N12 39.7
A	13	289 54.7	21 48.4	30.4	156 08.1	10.3	199 15.8	11.4	136 59.6	39.7
Y	14	304 57.2	36 47.5	30.6	171 11.1	10.6	214 18.7	11.4	152 02.1	39.8
	15	319 59.6	51 46.5	·· 30.7	186 14.0	·· 10.8	229 21.5	·· 11.4	167 04.6	·· 39.8
	16	335 02.1	66 45.5	30.9	201 16.9	11.0	244 24.3	11.4	182 07.2	39.8
	17	350 04.6	81 44.6	31.0	216 19.8	11.3	259 27.2	11.4	197 09.7	39.9
	18	5 07.0	96 43.6	S23 31.1	231 22.7	N21 11.5	274 30.0	N23 11.4	212 12.2	N12 39.9
	19	20 09.5	111 42.7	31.3	246 25.7	11.7	289 32.8	11.4	227 14.7	39.9
	20	35 12.0	126 41.7	31.4	261 28.6	12.0	304 35.6	11.5	242 17.3	40.0
	21	50 14.4	141 40.7	·· 31.5	276 31.5	·· 12.2	319 38.5	·· 11.5	257 19.8	·· 40.0
	22	65 16.9	156 39.8	31.7	291 34.4	12.4	334 41.3	11.5	272 22.3	40.0
	23	80 19.4	171 38.8	31.8	306 37.4	12.7	349 44.1	11.5	287 24.9	40.1
Mer. Pass.		h m 17 43.5	v −1.0	d 0.2	v 2.9	d 0.2	v 2.8	d 0.0	v 2.5	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.4	S40 23.8
Achernar	335 46.5	S57 21.2
Acrux	173 39.2	S62 58.3
Adhara	255 33.2	S28 56.6
Aldebaran	291 19.8	N16 27.9
Alioth	166 44.3	N56 04.5
Alkaid	153 20.2	N49 25.2
Al Na'ir	28 17.6	S47 04.2
Alnilam	276 13.2	S 1 13.1
Alphard	218 22.1	S 8 33.8
Alphecca	126 34.0	N26 47.3
Alpheratz	358 11.2	N28 58.3
Altair	62 34.6	N 8 48.7
Ankaa	353 42.1	S42 25.8
Antares	112 59.4	S26 22.9
Arcturus	146 20.3	N19 17.8
Atria	108 25.8	S68 59.1
Avior	234 28.3	S59 26.3
Bellatrix	279 00.4	N 6 19.7
Betelgeuse	271 29.9	N 7 24.1
Canopus	264 07.4	S52 41.1
Capella	281 13.5	N45 58.5
Deneb	49 50.1	N45 12.3
Denebola	183 00.9	N14 41.6
Diphda	349 22.7	S18 06.6
Dubhe	194 24.3	N61 51.8
Elnath	278 46.1	N28 35.3
Eltanin	90 59.1	N51 29.6
Enif	34 13.6	N 9 46.6
Fomalhaut	15 53.6	S29 44.5
Gacrux	172 30.7	S56 59.1
Gienah	176 19.8	S17 25.1
Hadar	149 26.1	S60 15.7
Hamal	328 30.8	N23 21.6
Kaus Aust.	84 19.7	S34 23.6
Kochab	137 19.9	N74 14.6
Markab	14 05.1	N15 05.3
Menkar	314 42.8	N 4 00.2
Menkent	148 39.3	S36 15.5
Miaplacidus	221 44.5	S69 37.5
Mirfak	309 18.3	N49 47.1
Nunki	76 31.8	S26 19.4
Peacock	54 01.9	S56 48.4
Pollux	244 00.1	N28 04.6
Procyon	245 27.4	N 5 16.8
Rasalhague	96 31.6	N12 34.6
Regulus	208 11.8	N12 04.4
Rigel	281 37.4	S 8 13.7
Rigil Kent.	140 28.6	S60 44.3
Sabik	102 43.6	S15 41.8
Schedar	350 10.9	N56 25.3
Shaula	96 58.7	S37 05.2
Sirius	258 57.0	S16 41.3
Spica	158 59.6	S11 02.7
Suhail	223 11.7	S43 20.6
Vega	80 57.5	N38 45.9
Zuben'ubi	137 35.3	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	94 00.5	11 31
Mars	225 57.7	2 42
Jupiter	269 07.5	23 45
Saturn	207 02.7	3 58

0000 DECEMBER 24, 25, 26 (SAT., SUN., MON.)

G.M.T. (UT)	SUN G.H.A.	SUN Dec.	MOON G.H.A.	MOON v	MOON Dec.	MOON d	MOON H.P.
	° ′	° ′	° ′	′	° ′	′	′
24 00	180 09.4	S23 25.4	17 43.8	12.4	N18 11.0	2.0	54.0
01	195 09.1	25.4	32 15.2	12.3	18 13.0	1.8	54.0
02	210 08.8	25.3	46 46.5	12.4	18 14.8	1.8	54.0
03	225 08.4	·· 25.3	61 17.9	12.4	18 16.6	1.7	54.0
04	240 08.1	25.2	75 49.3	12.3	18 18.3	1.6	54.0
05	255 07.8	25.2	90 20.6	12.3	18 19.9	1.5	54.0
06	270 07.5	S23 25.2	104 51.9	12.4	N18 21.4	1.5	54.0
07	285 07.2	25.1	119 23.3	12.3	18 22.9	1.3	54.0
S 08	300 06.9	25.1	133 54.6	12.3	18 24.2	1.3	54.0
A 09	315 06.6	·· 25.0	148 25.9	12.3	18 25.5	1.2	54.0
T 10	330 06.3	25.0	162 57.2	12.3	18 26.7	1.1	54.0
U 11	345 06.0	24.9	177 28.5	12.3	18 27.8	1.0	53.9
R 12	0 05.7	S23 24.9	191 59.8	12.3	N18 28.8	0.9	53.9
D 13	15 05.3	24.8	206 31.1	12.3	18 29.7	0.9	53.9
A 14	30 05.0	24.8	221 02.4	12.3	18 30.6	0.7	53.9
Y 15	45 04.7	·· 24.7	235 33.7	12.2	18 31.3	0.7	53.9
16	60 04.4	24.7	250 04.9	12.3	18 32.0	0.6	53.9
17	75 04.1	24.6	264 36.2	12.3	18 32.6	0.5	53.9
18	90 03.8	S23 24.6	279 07.5	12.2	N18 33.1	0.4	53.9
19	105 03.5	24.5	293 38.7	12.3	18 33.5	0.4	53.9
20	120 03.2	24.4	308 10.0	12.3	18 33.9	0.2	53.9
21	135 02.9	·· 24.4	322 41.3	12.2	18 34.1	0.2	53.9
22	150 02.6	24.3	337 12.5	12.3	18 34.3	0.1	53.9
23	165 02.2	24.3	351 43.8	12.2	18 34.4	0.0	53.9
25 00	180 01.9	S23 24.2	6 15.0	12.3	N18 34.4	0.1	53.9
01	195 01.6	24.2	20 46.3	12.2	18 34.3	0.2	53.9
02	210 01.3	24.1	35 17.5	12.3	18 34.1	0.2	53.9
03	225 01.0	·· 24.0	49 48.8	12.3	18 33.9	0.4	53.9
04	240 00.7	24.0	64 20.1	12.2	18 33.5	0.4	53.9
05	255 00.4	23.9	78 51.3	12.3	18 33.1	0.5	53.9
06	270 00.1	S23 23.8	93 22.6	12.2	N18 32.6	0.6	53.9
07	284 59.8	23.8	107 53.8	12.3	18 32.0	0.7	53.9
08	299 59.5	23.7	122 25.1	12.3	18 31.3	0.8	53.9
S 09	314 59.2	·· 23.7	136 56.4	12.2	18 30.5	0.8	54.0
U 10	329 58.8	23.6	151 27.6	12.3	18 29.7	1.0	54.0
N 11	344 58.5	23.5	165 58.9	12.3	18 28.7	1.0	54.0
D 12	359 58.2	S23 23.4	180 30.2	12.2	N18 27.7	1.1	54.0
A 13	14 57.9	23.4	195 01.4	12.3	18 26.6	1.2	54.0
Y 14	29 57.6	23.3	209 32.7	12.3	18 25.4	1.2	54.0
15	44 57.3	·· 23.2	224 04.0	12.3	18 24.2	1.4	54.0
16	59 57.0	23.2	238 35.3	12.3	18 22.8	1.5	54.0
17	74 56.7	23.1	253 06.6	12.3	18 21.3	1.5	54.0
18	89 56.4	S23 23.0	267 37.9	12.3	N18 19.8	1.6	54.0
19	104 56.1	22.9	282 09.2	12.3	18 18.2	1.7	54.0
20	119 55.8	22.9	296 40.5	12.3	18 16.5	1.8	54.0
21	134 55.4	·· 22.8	311 11.8	12.4	18 14.7	1.8	54.0
22	149 55.1	22.7	325 43.2	12.3	18 12.9	2.0	54.0
23	164 54.8	22.6	340 14.5	12.3	18 10.9	2.0	54.0
26 00	179 54.5	S23 22.6	354 45.8	12.4	N18 08.9	2.1	54.0
01	194 54.2	22.5	9 17.2	12.3	18 06.8	2.2	54.0
02	209 53.9	22.4	23 48.5	12.4	18 04.6	2.3	54.0
03	224 53.6	·· 22.3	38 19.9	12.4	18 02.3	2.3	54.0
04	239 53.3	22.2	52 51.3	12.4	18 00.0	2.5	54.0
05	254 53.0	22.2	67 22.7	12.4	17 57.5	2.5	54.0
06	269 52.7	S23 22.1	81 54.1	12.4	N17 55.0	2.6	54.0
07	284 52.4	22.0	96 25.5	12.4	17 52.4	2.7	54.0
08	299 52.1	21.9	110 56.9	12.4	17 49.7	2.8	54.0
M 09	314 51.7	·· 21.8	125 28.3	12.5	17 46.9	2.8	54.0
O 10	329 51.4	21.7	139 59.8	12.4	17 44.1	3.0	54.0
N 11	344 51.1	21.6	154 31.2	12.5	17 41.1	3.0	54.0
D 12	359 50.8	S23 21.6	169 02.7	12.5	N17 38.1	3.1	54.1
A 13	14 50.5	21.5	183 34.2	12.5	17 35.0	3.2	54.1
Y 14	29 50.2	21.4	198 05.7	12.5	17 31.8	3.2	54.1
15	44 49.9	·· 21.3	212 37.2	12.5	17 28.6	3.4	54.1
16	59 49.6	21.2	227 08.7	12.5	17 25.2	3.4	54.1
17	74 49.3	21.1	241 40.2	12.5	17 21.8	3.5	54.1
18	89 49.0	S23 21.0	256 11.7	12.6	N17 18.3	3.5	54.1
19	104 48.7	20.9	270 43.3	12.6	17 14.8	3.7	54.1
20	119 48.4	20.8	285 14.9	12.5	17 11.1	3.7	54.1
21	134 48.1	·· 20.7	299 46.4	12.6	17 07.4	3.8	54.1
22	149 47.7	20.6	314 18.0	12.6	17 03.6	3.9	54.1
23	164 47.4	20.5	328 49.6	12.7	16 59.7	4.0	54.1
	S.D. 16.3	d 0.1	S.D. 14.7		14.7		14.7

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

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

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
	m s	m s	h m	h m	h m	d	
24	00 38	00 23	12 00	23 34	11 10	14	○
25	00 08	00 06	12 00	24 22	11 58	15	
26	00 21	00 36	12 01	00 22	12 45	16	

0000 DECEMBER 27, 28, 29 (TUES., WED., THURS.)

G.M.T. (UT)		ARIES	VENUS −3.4		MARS −0.7		JUPITER −2.3		SATURN +0.6	
		G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d	h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
27	00	95 21.8	186 37.8	S23 31.9	321 40.3	N21 12.9	4 47.0	N23 11.5	302 27.4	N12 40.1
	01	110 24.3	201 36.9	32.1	336 43.2	13.1	19 49.8	11.5	317 29.9	40.2
	02	125 26.7	216 35.9	32.2	351 46.2	13.4	34 52.6	11.5	332 32.4	40.2
	03	140 29.2	231 34.9	·· 32.3	6 49.1	·· 13.6	49 55.5	·· 11.5	347 35.0	·· 40.2
	04	155 31.7	246 34.0	32.4	21 52.0	13.8	64 58.3	11.5	2 37.5	40.3
	05	170 34.1	261 33.0	32.6	36 55.0	14.1	80 01.1	11.5	17 40.0	40.3
	06	185 36.6	276 32.0	S23 32.7	51 57.9	N21 14.3	95 04.0	N23 11.5	32 42.6	N12 40.3
	07	200 39.1	291 31.1	32.8	67 00.9	14.6	110 06.8	11.5	47 45.1	40.4
	08	215 41.5	306 30.1	32.9	82 03.8	14.8	125 09.6	11.5	62 47.6	40.4
TUESDAY	09	230 44.0	321 29.1	·· 33.0	97 06.7	·· 15.0	140 12.5	·· 11.6	77 50.2	·· 40.4
	10	245 46.5	336 28.2	33.1	112 09.7	15.3	155 15.3	11.6	92 52.7	40.5
	11	260 48.9	351 27.2	33.3	127 12.6	15.5	170 18.1	11.6	107 55.2	40.5
	12	275 51.4	6 26.2	S23 33.4	142 15.6	N21 15.8	185 20.9	N23 11.6	122 57.7	N12 40.5
	13	290 53.9	21 25.3	33.5	157 18.5	16.0	200 23.8	11.6	138 00.3	40.6
	14	305 56.3	36 24.3	33.6	172 21.5	16.2	215 26.6	11.6	153 02.8	40.6
	15	320 58.8	51 23.3	·· 33.7	187 24.4	·· 16.5	230 29.4	·· 11.6	168 05.3	·· 40.6
	16	336 01.2	66 22.4	33.8	202 27.4	16.7	245 32.3	11.6	183 07.9	40.7
	17	351 03.7	81 21.4	33.9	217 30.4	17.0	260 35.1	11.6	198 10.4	40.7
	18	6 06.2	96 20.4	S23 34.0	232 33.3	N21 17.2	275 37.9	N23 11.6	213 12.9	N12 40.7
	19	21 08.6	111 19.5	34.1	247 36.3	17.4	290 40.8	11.6	228 15.5	40.8
	20	36 11.1	126 18.5	34.2	262 39.2	17.7	305 43.6	11.6	243 18.0	40.8
	21	51 13.6	141 17.5	·· 34.3	277 42.2	·· 17.9	320 46.4	·· 11.6	258 20.5	·· 40.8
	22	66 16.0	156 16.6	34.4	292 45.2	18.2	335 49.2	11.6	273 23.1	40.9
	23	81 18.5	171 15.6	34.5	307 48.1	18.4	350 52.1	11.7	288 25.6	40.9
28	00	96 21.0	186 14.6	S23 34.6	322 51.1	N21 18.6	5 54.9	N23 11.7	303 28.1	N12 40.9
	01	111 23.4	201 13.7	34.7	337 54.1	18.9	20 57.7	11.7	318 30.7	41.0
	02	126 25.9	216 12.7	34.8	352 57.0	19.1	36 00.6	11.7	333 33.2	41.0
	03	141 28.3	231 11.7	·· 34.9	8 00.0	·· 19.4	51 03.4	·· 11.7	348 35.7	·· 41.0
	04	156 30.8	246 10.7	35.0	23 03.0	19.6	66 06.2	11.7	3 38.3	41.1
	05	171 33.3	261 09.8	35.1	38 05.9	19.9	81 09.1	11.7	18 40.8	41.1
	06	186 35.7	276 08.8	S23 35.2	53 08.9	N21 20.1	96 11.9	N23 11.7	33 43.3	N12 41.2
	07	201 38.2	291 07.8	35.3	68 11.9	20.4	111 14.7	11.7	48 45.9	41.2
	08	216 40.7	306 06.9	35.4	83 14.9	20.6	126 17.5	11.7	63 48.4	41.2
WEDNESDAY	09	231 43.1	321 05.9	·· 35.5	98 17.9	·· 20.8	141 20.4	·· 11.7	78 50.9	·· 41.3
	10	246 45.6	336 04.9	35.6	113 20.8	21.1	156 23.2	11.7	93 53.5	41.3
	11	261 48.1	351 04.0	35.6	128 23.8	21.3	171 26.0	11.7	108 56.0	41.3
	12	276 50.5	6 03.0	S23 35.7	143 26.8	N21 21.6	186 28.9	N23 11.7	123 58.5	N12 41.4
	13	291 53.0	21 02.0	35.8	158 29.8	21.8	201 31.7	11.8	139 01.1	41.4
	14	306 55.5	36 01.1	35.9	173 32.8	22.1	216 34.5	11.8	154 03.6	41.4
	15	321 57.9	51 00.1	·· 36.0	188 35.8	·· 22.3	231 37.3	·· 11.8	169 06.1	·· 41.5
	16	337 00.4	65 59.1	36.0	203 38.8	22.6	246 40.2	11.8	184 08.7	41.5
	17	352 02.8	80 58.2	36.1	218 41.7	22.8	261 43.0	11.8	199 11.2	41.6
	18	7 05.3	95 57.2	S23 36.2	233 44.7	N21 23.1	276 45.8	N23 11.8	214 13.8	N12 41.6
	19	22 07.8	110 56.2	36.3	248 47.7	23.3	291 48.7	11.8	229 16.3	41.6
	20	37 10.2	125 55.2	36.3	263 50.7	23.6	306 51.5	11.8	244 18.8	41.7
	21	52 12.7	140 54.3	·· 36.4	278 53.7	·· 23.8	321 54.3	·· 11.8	259 21.4	·· 41.7
	22	67 15.2	155 53.3	36.5	293 56.7	24.1	336 57.1	11.8	274 23.9	41.7
	23	82 17.6	170 52.3	36.5	308 59.7	24.3	352 00.0	11.8	289 26.4	41.8
29	00	97 20.1	185 51.4	S23 36.6	324 02.7	N21 24.6	7 02.8	N23 11.8	304 29.0	N12 41.8
	01	112 22.6	200 50.4	36.7	339 05.7	24.8	22 05.6	11.8	319 31.5	41.8
	02	127 25.0	215 49.4	36.7	354 08.7	25.1	37 08.5	11.8	334 34.0	41.9
	03	142 27.5	230 48.5	·· 36.8	9 11.7	·· 25.3	52 11.3	·· 11.9	349 36.6	·· 41.9
	04	157 30.0	245 47.5	36.9	24 14.7	25.6	67 14.1	11.9	4 39.1	42.0
	05	172 32.4	260 46.5	36.9	39 17.8	25.8	82 16.9	11.9	19 41.7	42.0
	06	187 34.9	275 45.5	S23 37.0	54 20.8	N21 26.1	97 19.8	N23 11.9	34 44.2	N12 42.0
	07	202 37.3	290 44.6	37.1	69 23.8	26.3	112 22.6	11.9	49 46.7	42.1
THURSDAY	08	217 39.8	305 43.6	37.1	84 26.8	26.6	127 25.4	11.9	64 49.3	42.1
	09	232 42.3	320 42.6	·· 37.2	99 29.8	·· 26.8	142 28.3	·· 11.9	79 51.8	·· 42.1
	10	247 44.7	335 41.7	37.2	114 32.8	27.1	157 31.1	11.9	94 54.4	42.2
	11	262 47.2	350 40.7	37.3	129 35.8	27.3	172 33.9	11.9	109 56.9	42.2
	12	277 49.7	5 39.7	S23 37.3	144 38.9	N21 27.6	187 36.7	N23 11.9	124 59.4	N12 42.3
	13	292 52.1	20 38.8	37.4	159 41.9	27.8	202 39.6	11.9	140 02.0	42.3
	14	307 54.6	35 37.8	37.4	174 44.9	28.1	217 42.4	11.9	155 04.5	42.3
	15	322 57.1	50 36.8	·· 37.5	189 47.9	·· 28.4	232 45.2	·· 11.9	170 07.0	·· 42.4
	16	337 59.5	65 35.8	37.5	204 51.0	28.6	247 48.0	11.9	185 09.6	42.4
	17	353 02.0	80 34.9	37.6	219 54.0	28.9	262 50.9	11.9	200 12.1	42.4
	18	8 04.5	95 33.9	S23 37.6	234 57.0	N21 29.1	277 53.7	N23 12.0	215 14.7	N12 42.5
	19	23 06.9	110 32.9	37.7	250 00.0	29.4	292 56.5	12.0	230 17.2	42.5
	20	38 09.4	125 32.0	37.7	265 03.1	29.6	307 59.4	12.0	245 19.8	42.6
	21	53 11.8	140 31.0	·· 37.7	280 06.1	·· 29.9	323 02.2	·· 12.0	260 22.3	·· 42.6
	22	68 14.3	155 30.0	37.8	295 09.1	30.1	338 05.0	12.0	275 24.8	42.6
	23	83 16.8	170 29.0	37.8	310 12.2	30.4	353 07.8	12.0	290 27.4	42.7
Mer. Pass.		h m 17 31.7	v −1.0	d 0.1	v 3.0	d 0.2	v 2.8	d 0.0	v 2.5	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.4	S40 23.8
Achernar	335 46.5	S57 21.2
Acrux	173 39.1	S62 58.3
Adhara	255 33.1	S28 56.6
Aldebaran	291 19.8	N16 27.9
Alioth	166 44.3	N56 04.5
Alkaid	153 20.2	N49 25.2
Al Na'ir	28 17.6	S47 04.2
Alnilam	276 13.2	S 1 13.1
Alphard	218 22.1	S 8 33.9
Alphecca	126 34.0	N26 47.3
Alpheratz	358 11.2	N28 58.3
Altair	62 34.6	N 8 48.7
Ankaa	353 42.1	S42 25.8
Antares	112 59.4	S26 22.9
Arcturus	146 20.3	N19 17.7
Atria	108 25.8	S68 59.1
Avior	234 28.3	S59 26.3
Bellatrix	279 00.4	N 6 19.7
Betelgeuse	271 29.9	N 7 24.1
Canopus	264 07.4	S52 41.2
Capella	281 13.5	N45 58.5
Deneb	49 50.1	N45 12.3
Denebola	183 00.9	N14 41.6
Diphda	349 22.7	S18 06.6
Dubhe	194 24.3	N61 51.8
Elnath	278 46.1	N28 35.3
Eltanin	90 59.1	N51 29.6
Enif	34 13.6	N 9 46.6
Fomalhaut	15 53.6	S29 44.5
Gacrux	172 30.7	S56 59.1
Gienah	176 19.8	S17 25.1
Hadar	149 26.1	S60 15.7
Hamal	328 30.8	N23 21.6
Kaus Aust.	84 19.7	S34 23.6
Kochab	137 19.9	N74 14.6
Markab	14 05.1	N15 05.3
Menkar	314 42.8	N 4 00.2
Menkent	148 39.3	S36 15.5
Miaplacidus	221 44.4	S69 37.5
Mirfak	309 18.3	N49 47.1
Nunki	76 31.8	S26 19.4
Peacock	54 01.9	S56 48.4
Pollux	244 00.1	N28 04.6
Procyon	245 27.4	N 5 16.8
Rasalhague	96 31.6	N12 34.6
Regulus	208 11.8	N12 04.3
Rigel	281 37.4	S 8 13.8
Rigil Kent.	140 28.6	S60 44.3
Sabik	102 43.6	S15 41.8
Schedar	350 10.9	N56 25.3
Shaula	96 58.7	S37 05.2
Sirius	258 57.0	S16 41.3
Spica	158 59.5	S11 02.7
Suhail	223 11.7	S43 20.6
Vega	80 57.5	N38 45.9
Zuben'ubi	137 35.3	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	89 53.7	11 36
Mars	226 30.1	2 28
Jupiter	269 33.9	23 32
Saturn	207 07.2	3 45

0000 DECEMBER 27, 28, 29 (TUES., WED., THURS.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	MOON v	MOON Dec.	MOON d	MOON H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
27	00	179 47.1	S23 20.4	343 21.3	12.6	N16 55.7	4.0	54.1
	01	194 46.8	20.3	357 52.9	12.7	16 51.7	4.2	54.1
	02	209 46.5	20.2	12 24.6	12.6	16 47.5	4.2	54.1
	03	224 46.2	20.1	26 56.2	12.7	16 43.3	4.2	54.2
	04	239 45.9	20.0	41 27.9	12.7	16 39.1	4.4	54.2
	05	254 45.6	19.9	55 59.6	12.7	16 34.7	4.4	54.2
	06	269 45.3	S23 19.8	70 31.3	12.8	N16 30.3	4.5	54.2
	07	284 45.0	19.7	85 03.1	12.7	16 25.8	4.6	54.2
	08	299 44.7	19.6	99 34.8	12.8	16 21.2	4.6	54.2
TUESDAY	09	314 44.4	19.5	114 06.6	12.8	16 16.6	4.8	54.2
	10	329 44.1	19.4	128 38.4	12.7	16 11.8	4.8	54.2
	11	344 43.8	19.3	143 10.1	12.9	16 07.0	4.8	54.2
	12	359 43.5	S23 19.2	157 42.0	12.8	N16 02.2	5.0	54.2
	13	14 43.1	19.1	172 13.8	12.8	15 57.2	5.0	54.2
	14	29 42.8	19.0	186 45.6	12.9	15 52.2	5.1	54.2
	15	44 42.5	18.9	201 17.5	12.9	15 47.1	5.2	54.3
	16	59 42.2	18.8	215 49.4	12.9	15 41.9	5.2	54.3
	17	74 41.9	18.6	230 21.3	12.9	15 36.7	5.3	54.3
	18	89 41.6	S23 18.5	244 53.2	12.9	N15 31.4	5.4	54.3
	19	104 41.3	18.4	259 25.1	13.0	15 26.0	5.5	54.3
	20	119 41.0	18.3	273 57.1	12.9	15 20.5	5.5	54.3
	21	134 40.7	18.2	288 29.0	13.0	15 15.0	5.6	54.3
	22	149 40.4	18.1	303 01.0	13.0	15 09.4	5.6	54.3
	23	164 40.1	18.0	317 33.0	13.0	15 03.8	5.8	54.3
28	00	179 39.8	S23 17.8	332 05.0	13.0	N14 58.0	5.8	54.4
	01	194 39.5	17.7	346 37.0	13.1	14 52.2	5.8	54.4
	02	209 39.2	17.6	1 09.1	13.1	14 46.4	6.0	54.4
	03	224 38.9	17.5	15 41.2	13.0	14 40.4	6.0	54.4
	04	239 38.6	17.4	30 13.2	13.1	14 34.4	6.1	54.4
	05	254 38.3	17.2	44 45.3	13.2	14 28.3	6.1	54.4
	06	269 37.9	S23 17.1	59 17.5	13.1	N14 22.2	6.2	54.4
	07	284 37.6	17.0	73 49.6	13.1	14 16.0	6.3	54.4
	08	299 37.3	16.9	88 21.7	13.2	14 09.7	6.3	54.4
WEDNESDAY	09	314 37.0	16.7	102 53.9	13.2	14 03.4	6.4	54.5
	10	329 36.7	16.6	117 26.1	13.2	13 57.0	6.5	54.5
	11	344 36.4	16.5	131 58.3	13.2	13 50.5	6.5	54.5
	12	359 36.1	S23 16.4	146 30.5	13.2	N13 44.0	6.6	54.5
	13	14 35.8	16.2	161 02.7	13.3	13 37.4	6.6	54.5
	14	29 35.5	16.1	175 35.0	13.2	13 30.8	6.8	54.5
	15	44 35.2	16.0	190 07.2	13.3	13 24.0	6.7	54.5
	16	59 34.9	15.8	204 39.5	13.3	13 17.3	6.9	54.6
	17	74 34.6	15.7	219 11.8	13.3	13 10.4	6.9	54.6
	18	89 34.3	S23 15.6	233 44.1	13.3	N13 03.5	7.0	54.6
	19	104 34.0	15.4	248 16.4	13.4	12 56.5	7.0	54.6
	20	119 33.7	15.3	262 48.8	13.3	12 49.5	7.1	54.6
	21	134 33.4	15.2	277 21.1	13.4	12 42.4	7.1	54.6
	22	149 33.1	15.0	291 53.5	13.3	12 35.3	7.2	54.6
	23	164 32.8	14.9	306 25.8	13.4	12 28.1	7.3	54.7
29	00	179 32.5	S23 14.8	320 58.2	13.4	N12 20.8	7.3	54.7
	01	194 32.2	14.6	335 30.6	13.5	12 13.5	7.4	54.7
	02	209 31.9	14.5	350 03.1	13.4	12 06.1	7.4	54.7
	03	224 31.6	14.4	4 35.5	13.4	11 58.7	7.5	54.7
	04	239 31.3	14.2	19 07.9	13.5	11 51.2	7.5	54.7
	05	254 30.9	14.1	33 40.4	13.5	11 43.7	7.6	54.7
	06	269 30.6	S23 13.9	48 12.9	13.5	N11 36.1	7.7	54.8
	07	284 30.3	13.8	62 45.4	13.5	11 28.4	7.7	54.8
THURSDAY	08	299 30.0	13.6	77 17.9	13.5	11 20.7	7.8	54.8
	09	314 29.7	13.5	91 50.4	13.5	11 12.9	7.8	54.8
	10	329 29.4	13.4	106 22.9	13.5	11 05.1	7.9	54.8
	11	344 29.1	13.2	120 55.4	13.5	10 57.2	7.9	54.9
	12	359 28.8	S23 13.1	135 27.9	13.6	N10 49.3	8.0	54.9
	13	14 28.5	12.9	150 00.5	13.5	10 41.3	8.0	54.9
	14	29 28.2	12.8	164 33.0	13.6	10 33.3	8.1	54.9
	15	44 27.9	12.6	179 05.6	13.6	10 25.2	8.1	54.9
	16	59 27.6	12.5	193 38.2	13.6	10 17.1	8.2	54.9
	17	74 27.3	12.3	208 10.8	13.6	10 08.9	8.2	55.0
	18	89 27.0	S23 12.2	222 43.4	13.6	N10 00.7	8.3	55.0
	19	104 26.7	12.0	237 16.0	13.6	9 52.4	8.3	55.0
	20	119 26.4	11.9	251 48.6	13.6	9 44.1	8.4	55.0
	21	134 26.1	11.7	266 21.2	13.6	9 35.7	8.4	55.0
	22	149 25.8	11.6	280 53.8	13.6	9 27.3	8.5	55.1
	23	164 25.5	11.4	295 26.4	13.7	9 18.8	8.5	55.1
		S.D. 16.3	d 0.1	S.D. 14.8		14.8		14.9

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

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

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
	m s	m s	h m	h m	h m	d	
27	00 51	01 06	12 01	01 09	13 32	17	◐
28	01 20	01 35	12 02	01 55	14 18	18	
29	01 50	02 04	12 02	02 41	15 04	19	

0000 DEC. 30, 31, 1978 JAN. 1 (FRI., SAT., SUN.)

G.M.T. (UT)	ARIES	VENUS −3.5		MARS −0.8		JUPITER −2.3		SATURN +0.6	
	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
30 00	98 19.2	185 28.1	S23 37.9	325 15.2	N21 30.7	8 10.7	N23 12.0	305 29.9	N12 42.7
01	113 21.7	200 27.1	37.9	340 18.2	30.9	23 13.5	12.0	320 32.5	42.7
02	128 24.2	215 26.1	37.9	355 21.3	31.2	38 16.3	12.0	335 35.0	42.8
03	143 26.6	230 25.2	·· 38.0	10 24.3	·· 31.4	53 19.1	·· 12.0	350 37.5	·· 42.8
04	158 29.1	245 24.2	38.0	25 27.4	31.7	68 22.0	12.0	5 40.1	42.9
05	173 31.6	260 23.2	38.0	40 30.4	31.9	83 24.8	12.0	20 42.6	42.9
06	188 34.0	275 22.2	S23 38.1	55 33.5	N21 32.2	98 27.6	N23 12.0	35 45.2	N12 42.9
07	203 36.5	290 21.3	38.1	70 36.5	32.5	113 30.4	12.0	50 47.7	43.0
08	218 38.9	305 20.3	38.1	85 39.5	32.7	128 33.3	12.0	65 50.3	43.0
F 09	233 41.4	320 19.3	·· 38.1	100 42.6	·· 33.0	143 36.1	·· 12.1	80 52.8	·· 43.1
R 10	248 43.9	335 18.4	38.2	115 45.6	33.2	158 38.9	12.1	95 55.3	43.1
I 11	263 46.3	350 17.4	38.2	130 48.7	33.5	173 41.7	12.1	110 57.9	43.1
D 12	278 48.8	5 16.4	S23 38.2	145 51.8	N21 33.8	188 44.6	N23 12.1	126 00.4	N12 43.2
A 13	293 51.3	20 15.4	38.2	160 54.8	34.0	203 47.4	12.1	141 03.0	43.2
Y 14	308 53.7	35 14.5	38.3	175 57.9	34.3	218 50.2	12.1	156 05.5	43.2
15	323 56.2	50 13.5	·· 38.3	191 00.9	·· 34.5	233 53.0	·· 12.1	171 08.1	·· 43.3
16	338 58.7	65 12.5	38.3	206 04.0	34.8	248 55.9	12.1	186 10.6	43.3
17	354 01.1	80 11.6	38.3	221 07.0	35.1	263 58.7	12.1	201 13.1	43.4
18	9 03.6	95 10.6	S23 38.3	236 10.1	N21 35.3	279 01.5	N23 12.1	216 15.7	N12 43.4
19	24 06.1	110 09.6	38.3	251 13.2	35.6	294 04.3	12.1	231 18.2	43.4
20	39 08.5	125 08.7	38.3	266 16.2	35.9	309 07.2	12.1	246 20.8	43.5
21	54 11.0	140 07.7	·· 38.4	281 19.3	·· 36.1	324 10.0	·· 12.1	261 23.3	·· 43.5
22	69 13.4	155 06.7	38.4	296 22.4	36.4	339 12.8	12.1	276 25.9	43.6
23	84 15.9	170 05.7	38.4	311 25.4	36.6	354 15.6	12.1	291 28.4	43.6
31 00	99 18.4	185 04.8	S23 38.4	326 28.5	N21 36.9	9 18.5	N23 12.1	306 31.0	N12 43.6
01	114 20.8	200 03.8	38.4	341 31.6	37.2	24 21.3	12.2	321 33.5	43.7
02	129 23.3	215 02.8	38.4	356 34.7	37.4	39 24.1	12.2	336 36.0	43.7
03	144 25.8	230 01.9	·· 38.4	11 37.7	·· 37.7	54 26.9	·· 12.2	351 38.6	·· 43.8
04	159 28.2	245 00.9	38.4	26 40.8	38.0	69 29.8	12.2	6 41.1	43.8
05	174 30.7	259 59.9	38.4	41 43.9	38.2	84 32.6	12.2	21 43.7	43.8
06	189 33.2	274 58.9	S23 38.4	56 47.0	N21 38.5	99 35.4	N23 12.2	36 46.2	N12 43.9
07	204 35.6	289 58.0	38.4	71 50.0	38.8	114 38.2	12.2	51 48.8	43.9
S 08	219 38.1	304 57.0	38.4	86 53.1	39.0	129 41.1	12.2	66 51.3	44.0
A 09	234 40.6	319 56.0	·· 38.4	101 56.2	·· 39.3	144 43.9	·· 12.2	81 53.9	·· 44.0
T 10	249 43.0	334 55.1	38.4	116 59.3	39.5	159 46.7	12.2	96 56.4	44.0
U 11	264 45.5	349 54.1	38.4	132 02.4	39.8	174 49.5	12.2	111 59.0	44.1
R 12	279 47.9	4 53.1	S23 38.4	147 05.5	N21 40.1	189 52.3	N23 12.2	127 01.5	N12 44.1
D 13	294 50.4	19 52.1	38.4	162 08.6	40.3	204 55.2	12.2	142 04.1	44.2
A 14	309 52.9	34 51.2	38.3	177 11.7	40.6	219 58.0	12.2	157 06.6	44.2
Y 15	324 55.3	49 50.2	·· 38.3	192 14.7	·· 40.9	235 00.8	·· 12.2	172 09.2	·· 44.2
16	339 57.8	64 49.2	38.3	207 17.8	41.1	250 03.6	12.2	187 11.7	44.3
17	355 00.3	79 48.3	38.3	222 20.9	41.4	265 06.5	12.3	202 14.3	44.3
18	10 02.7	94 47.3	S23 38.3	237 24.0	N21 41.7	280 09.3	N23 12.3	217 16.8	N12 44.4
19	25 05.2	109 46.3	38.3	252 27.1	41.9	295 12.1	12.3	232 19.4	44.4
20	40 07.7	124 45.3	38.2	267 30.2	42.2	310 14.9	12.3	247 21.9	44.4
21	55 10.1	139 44.4	·· 38.2	282 33.3	·· 42.5	325 17.7	·· 12.3	262 24.5	·· 44.5
22	70 12.6	154 43.4	38.2	297 36.4	42.8	340 20.6	12.3	277 27.0	44.5
23	85 15.0	169 42.4	38.2	312 39.5	43.0	355 23.4	12.3	292 29.5	44.6
1 00	100 17.5	184 41.5	S23 38.2	327 42.6	N21 43.3	10 26.2	N23 12.3	307 32.1	N12 44.6
01	115 20.0	199 40.5	38.1	342 45.7	43.6	25 29.0	12.3	322 34.6	44.6
02	130 22.4	214 39.5	38.1	357 48.9	43.8	40 31.9	12.3	337 37.2	44.7
03	145 24.9	229 38.5	·· 38.1	12 52.0	·· 44.1	55 34.7	·· 12.3	352 39.7	·· 44.7
04	160 27.4	244 37.6	38.1	27 55.1	44.4	70 37.5	12.3	7 42.3	44.8
05	175 29.8	259 36.6	38.0	42 58.2	44.6	85 40.3	12.3	22 44.8	44.8
06	190 32.3	274 35.6	S23 38.0	58 01.3	N21 44.9	100 43.1	N23 12.3	37 47.4	N12 44.9
07	205 34.8	289 34.7	38.0	73 04.4	45.2	115 46.0	12.3	52 49.9	44.9
08	220 37.2	304 33.7	37.9	88 07.5	45.5	130 48.8	12.3	67 52.5	44.9
S 09	235 39.7	319 32.7	·· 37.9	103 10.6	·· 45.7	145 51.6	·· 12.3	82 55.1	·· 45.0
U 10	250 42.2	334 31.7	37.9	118 13.8	46.0	160 54.4	12.4	97 57.6	45.0
N 11	265 44.6	349 30.8	37.8	133 16.9	46.3	175 57.2	12.4	113 00.2	45.1
D 12	280 47.1	4 29.8	S23 37.8	148 20.0	N21 46.5	191 00.1	N23 12.4	128 02.7	N12 45.1
A 13	295 49.5	19 28.8	37.7	163 23.1	46.8	206 02.9	12.4	143 05.3	45.1
Y 14	310 52.0	34 27.9	37.7	178 26.3	47.1	221 05.7	12.4	158 07.8	45.2
15	325 54.5	49 26.9	·· 37.7	193 29.4	·· 47.4	236 08.5	·· 12.4	173 10.4	·· 45.2
16	340 56.9	64 25.9	37.6	208 32.5	47.6	251 11.3	12.4	188 12.9	45.3
17	355 59.4	79 24.9	37.6	223 35.6	47.9	266 14.2	12.4	203 15.5	45.3
18	11 01.9	94 24.0	S23 37.5	238 38.8	N21 48.2	281 17.0	N23 12.4	218 18.0	N12 45.4
19	26 04.3	109 23.0	37.5	253 41.9	48.4	296 19.8	12.4	233 20.6	45.4
20	41 06.8	124 22.0	37.4	268 45.0	48.7	311 22.6	12.4	248 23.1	45.4
21	56 09.3	139 21.1	·· 37.4	283 48.2	·· 49.0	326 25.4	·· 12.4	263 25.7	·· 45.5
22	71 11.7	154 20.1	37.3	298 51.3	49.3	341 28.3	12.4	278 28.2	45.5
23	86 14.2	169 19.1	37.3	313 54.4	49.5	356 31.1	12.4	293 30.8	45.6
	h m								
Mer. Pass.	17 19.9	v −1.0	d 0.0	v 3.1	d 0.3	v 2.8	d 0.0	v 2.5	d 0.0

STARS

Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 38.4	S40 23.8
Achernar	335 46.6	S57 21.2
Acrux	173 39.1	S62 58.4
Adhara	255 33.1	S28 56.6
Aldebaran	291 19.8	N16 27.9
Alioth	166 44.3	N56 04.5
Alkaid	153 20.2	N49 25.2
Al Na'ir	28 17.6	S47 04.2
Alnilam	276 13.2	S 1 13.1
Alphard	218 22.1	S 8 33.9
Alphecca	126 33.9	N26 47.3
Alpheratz	358 11.2	N28 58.3
Altair	62 34.6	N 8 48.7
Ankaa	353 42.1	S42 25.8
Antares	112 59.4	S26 22.9
Arcturus	146 20.3	N19 17.7
Atria	108 25.8	S68 59.1
Avior	234 28.3	S59 26.3
Bellatrix	279 00.4	N 6 19.7
Betelgeuse	271 29.9	N 7 24.1
Canopus	264 07.4	S52 41.2
Capella	281 13.5	N45 58.5
Deneb	49 50.1	N45 12.3
Denebola	183 00.8	N14 41.6
Diphda	349 22.7	S18 06.6
Dubhe	194 24.2	N61 51.8
Elnath	278 46.1	N28 35.3
Eltanin	90 59.1	N51 29.6
Enif	34 13.6	N 9 46.5
Fomalhaut	15 53.6	S29 44.5
Gacrux	172 30.6	S56 59.1
Gienah	176 19.8	S17 25.1
Hadar	149 26.1	S60 15.7
Hamal	328 30.8	N23 21.6
Kaus Aust.	84 19.7	S34 23.6
Kochab	137 19.8	N74 14.5
Markab	14 05.1	N15 05.3
Menkar	314 42.8	N 4 00.2
Menkent	148 39.3	S36 15.5
Miaplacidus	221 44.4	S69 37.5
Mirfak	309 18.3	N49 47.1
Nunki	76 31.8	S26 19.4
Peacock	54 01.9	S56 48.4
Pollux	244 00.0	N28 04.6
Procyon	245 27.4	N 5 16.8
Rasalhague	96 31.6	N12 34.6
Regulus	208 11.7	N12 04.3
Rigel	281 37.4	S 8 13.8
Rigil Kent.	140 28.5	S60 44.3
Sabik	102 43.5	S15 41.8
Schedar	350 11.0	N56 25.3
Shaula	96 58.6	S37 05.2
Sirius	258 57.0	S16 41.3
Spica	158 59.5	S11 02.7
Suhail	223 11.7	S43 20.6
Vega	80 57.5	N38 45.9
Zuben'ubi	137 35.2	S15 56.9

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	85 46.4	11 40
Mars	227 10.1	2 14
Jupiter	270 00.1	23 18
Saturn	207 12.6	3 33

0000 DEC. 30, 31, 1978 JAN. 1 (FRI., SAT., SUN.)

G.M.T. (UT)		SUN G.H.A.	SUN Dec.	MOON G.H.A.	v	MOON Dec.	d	H.P.
d	h	° ′	° ′	° ′	′	° ′	′	′
30	00	179 25.2	S23 11.2	309 59.1	13.6	N 9 10.3	8.6	55.1
	01	194 24.9	11.1	324 31.7	13.6	9 01.7	8.6	55.1
	02	209 24.6	10.9	339 04.3	13.7	8 53.1	8.6	55.1
	03	224 24.3	·· 10.8	353 37.0	13.6	8 44.5	8.7	55.2
	04	239 24.0	10.6	8 09.6	13.7	8 35.8	8.8	55.2
	05	254 23.7	10.4	22 42.3	13.7	8 27.0	8.7	55.2
	06	269 23.4	S23 10.3	37 15.0	13.6	N 8 18.3	8.9	55.2
	07	284 23.1	10.1	51 47.6	13.7	8 09.4	8.8	55.2
	08	299 22.8	10.0	66 20.3	13.6	8 00.6	8.9	55.3
F	09	314 22.5	·· 09.8	80 52.9	13.7	7 51.7	9.0	55.3
R	10	329 22.2	09.6	95 25.6	13.7	7 42.7	9.0	55.3
I	11	344 21.9	09.5	109 58.3	13.6	7 33.7	9.0	55.3
D	12	359 21.6	S23 09.3	124 30.9	13.7	N 7 24.7	9.1	55.3
A	13	14 21.3	09.1	139 03.6	13.6	7 15.6	9.1	55.4
Y	14	29 21.0	09.0	153 36.2	13.7	7 06.5	9.1	55.4
	15	44 20.7	·· 08.8	168 08.9	13.6	6 57.4	9.2	55.4
	16	59 20.4	08.6	182 41.5	13.7	6 48.2	9.2	55.4
	17	74 20.1	08.5	197 14.2	13.6	6 39.0	9.3	55.5
	18	89 19.8	S23 08.3	211 46.8	13.7	N 6 29.7	9.3	55.5
	19	104 19.5	08.1	226 19.5	13.6	6 20.4	9.3	55.5
	20	119 19.2	07.9	240 52.1	13.6	6 11.1	9.4	55.5
	21	134 18.9	·· 07.8	255 24.7	13.7	6 01.7	9.4	55.5
	22	149 18.6	07.6	269 57.4	13.6	5 52.3	9.4	55.6
	23	164 18.3	07.4	284 30.0	13.6	5 42.9	9.5	55.6
31	00	179 18.0	S23 07.2	299 02.6	13.6	N 5 33.4	9.5	55.6
	01	194 17.7	07.1	313 35.2	13.6	5 23.9	9.5	55.6
	02	209 17.4	06.9	328 07.8	13.6	5 14.4	9.5	55.7
	03	224 17.1	·· 06.7	342 40.4	13.6	5 04.9	9.6	55.7
	04	239 16.8	06.5	357 13.0	13.5	4 55.3	9.7	55.7
	05	254 16.5	06.4	11 45.5	13.6	4 45.6	9.6	55.7
	06	269 16.2	S23 06.2	26 18.1	13.5	N 4 36.0	9.7	55.8
	07	284 15.9	06.0	40 50.6	13.5	4 26.3	9.7	55.8
S	08	299 15.6	05.8	55 23.1	13.6	4 16.6	9.7	55.8
A	09	314 15.3	·· 05.6	69 55.7	13.5	4 06.9	9.8	55.9
T	10	329 15.0	05.4	84 28.2	13.5	3 57.1	9.8	55.9
U	11	344 14.7	05.3	99 00.7	13.4	3 47.3	9.8	55.9
R	12	359 14.4	S23 05.1	113 33.1	13.5	N 3 37.5	9.8	55.9
D	13	14 14.1	04.9	128 05.6	13.4	3 27.7	9.9	56.0
A	14	29 13.8	04.7	142 38.0	13.4	3 17.8	9.9	56.0
Y	15	44 13.5	·· 04.5	157 10.4	13.4	3 07.9	9.9	56.0
	16	59 13.2	04.3	171 42.8	13.4	2 58.0	9.9	56.0
	17	74 12.9	04.1	186 15.2	13.4	2 48.1	10.0	56.1
	18	89 12.6	S23 03.9	200 47.6	13.3	N 2 38.1	9.9	56.1
	19	104 12.3	03.8	215 19.9	13.4	2 28.2	10.0	56.1
	20	119 12.0	03.6	229 52.3	13.3	2 18.2	10.0	56.2
	21	134 11.7	·· 03.4	244 24.6	13.2	2 08.2	10.1	56.2
	22	149 11.4	03.2	258 56.8	13.3	1 58.1	10.0	56.2
	23	164 11.1	03.0	273 29.1	13.2	1 48.1	10.1	56.2
1	00	179 10.8	S23 02.8	288 01.3	13.2	N 1 38.0	10.1	56.3
	01	194 10.5	02.6	302 33.5	13.2	1 27.9	10.1	56.3
	02	209 10.2	02.4	317 05.7	13.2	1 17.8	10.1	56.3
	03	224 10.0	·· 02.2	331 37.9	13.1	1 07.7	10.2	56.4
	04	239 09.7	02.0	346 10.0	13.1	0 57.5	10.1	56.4
	05	254 09.4	01.8	0 42.1	13.1	0 47.4	10.2	56.4
	06	269 09.1	S23 01.6	15 14.2	13.0	N 0 37.2	10.2	56.4
	07	284 08.8	01.4	29 46.2	13.0	0 27.0	10.1	56.5
	08	299 08.5	01.2	44 18.2	13.0	0 16.9	10.2	56.5
S	09	314 08.2	·· 01.0	58 50.2	12.9	N 0 06.7	10.3	56.5
U	10	329 07.9	00.8	73 22.1	13.0	S 0 03.6	10.2	56.6
N	11	344 07.6	00.6	87 54.1	12.8	0 13.8	10.2	56.6
D	12	359 07.3	S23 00.4	102 25.9	12.9	S 0 24.0	10.3	56.6
A	13	14 07.0	00.2	116 57.8	12.8	0 34.3	10.2	56.7
Y	14	29 06.7	23 00.0	131 29.6	12.8	0 44.5	10.3	56.7
	15	44 06.4	22 59.8	146 01.4	12.7	0 54.8	10.2	56.7
	16	59 06.1	59.6	160 33.1	12.7	1 05.0	10.3	56.8
	17	74 05.8	59.4	175 04.8	12.7	1 15.3	10.3	56.8
	18	89 05.5	S22 59.1	189 36.5	12.6	S 1 25.6	10.3	56.8
	19	104 05.2	58.9	204 08.1	12.6	1 35.9	10.3	56.9
	20	119 04.9	58.7	218 39.7	12.6	1 46.2	10.2	56.9
	21	134 04.6	·· 58.5	233 11.3	12.5	1 56.4	10.3	56.9
	22	149 04.3	58.3	247 42.8	12.4	2 06.7	10.3	57.0
	23	164 04.1	58.1	262 14.2	12.5	2 17.0	10.3	57.0
		S.D. 16.3	d 0.2	S.D. 15.1		15.2		15.4

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Moonrise 30	Moonrise 31	Moonrise 1	Moonrise 2
°	h m	h m	h m	h m	h m	h m	h m
N 72	08 25	10 46	▬	20 43	22 23	24 05	00 05
N 70	08 06	09 51	▬	20 52	22 25	24 02	00 02
68	07 50	09 18	▬	20 59	22 28	23 59	25 33
66	07 38	08 54	10 30	21 05	22 29	23 56	25 26
64	07 27	08 35	09 51	21 10	22 31	23 54	25 20
62	07 18	08 19	09 24	21 14	22 32	23 52	25 15
60	07 10	08 06	09 03	21 18	22 33	23 51	25 10
N 58	07 02	07 55	08 46	21 21	22 34	23 49	25 06
56	06 56	07 45	08 32	21 24	22 35	23 48	25 03
54	06 50	07 36	08 19	21 27	22 36	23 47	25 00
52	06 44	07 28	08 08	21 29	22 37	23 46	24 57
50	06 39	07 20	07 59	21 31	22 37	23 45	24 54
45	06 27	07 05	07 38	21 36	22 39	23 43	24 49
N 40	06 17	06 51	07 22	21 40	22 40	23 41	24 44
35	06 08	06 40	07 08	21 44	22 41	23 40	24 40
30	06 00	06 29	06 56	21 47	22 42	23 38	24 37
20	05 43	06 11	06 35	21 52	22 43	23 36	24 31
N 10	05 27	05 54	06 16	21 56	22 45	23 34	24 26
0	05 11	05 37	05 59	22 01	22 46	23 33	24 21
S 10	04 52	05 19	05 42	22 05	22 47	23 31	24 16
20	04 30	04 59	05 23	22 09	22 49	23 29	24 11
30	04 01	04 34	05 02	22 15	22 51	23 27	24 05
35	03 43	04 19	04 49	22 18	22 51	23 26	24 02
40	03 20	04 01	04 34	22 21	22 53	23 25	23 58
45	02 50	03 39	04 16	22 25	22 54	23 23	23 54
S 50	02 05	03 10	03 54	22 30	22 55	23 21	23 49
52	01 39	02 55	03 43	22 32	22 56	23 21	23 47
54	00 57	02 38	03 31	22 34	22 57	23 20	23 44
56	////	02 16	03 17	22 37	22 58	23 19	23 41
58	////	01 47	03 01	22 39	22 58	23 18	23 38
S 60	////	01 02	02 41	22 43	22 59	23 16	23 35

Lat.	Sunset	Twilight Civil	Twilight Naut.	Moonset 30	Moonset 31	Moonset 1	Moonset 2
°	h m	h m	h m	h m	h m	h m	h m
N 72	▬	13 20	15 41	11 15	11 09	11 04	10 58
N 70	▬	14 15	16 01	11 04	11 05	11 04	11 04
68	▬	14 48	16 16	10 56	11 00	11 05	11 09
66	13 36	15 12	16 29	10 48	10 57	11 05	11 14
64	14 16	15 32	16 39	10 42	10 54	11 05	11 17
62	14 43	15 47	16 49	10 37	10 52	11 06	11 20
60	15 03	16 00	16 57	10 32	10 49	11 06	11 23
N 58	15 20	16 12	17 04	10 28	10 47	11 06	11 26
56	15 35	16 22	17 11	10 24	10 45	11 06	11 28
54	15 47	16 31	17 17	10 21	10 44	11 06	11 30
52	15 58	16 39	17 22	10 18	10 42	11 07	11 32
50	16 08	16 46	17 27	10 15	10 41	11 07	11 33
45	16 28	17 02	17 39	10 09	10 38	11 07	11 37
N 40	16 44	17 15	17 49	10 04	10 36	11 07	11 40
35	16 58	17 26	17 58	10 00	10 33	11 07	11 42
30	17 11	17 37	18 07	09 56	10 32	11 07	11 45
20	17 31	17 55	18 23	09 49	10 28	11 08	11 49
N 10	17 50	18 12	18 39	09 43	10 25	11 08	11 52
0	18 07	18 29	18 55	09 37	10 22	11 08	11 55
S 10	18 24	18 47	19 14	09 31	10 20	11 08	11 59
20	18 43	19 07	19 36	09 25	10 16	11 09	12 02
30	19 04	19 32	20 05	09 18	10 13	11 09	12 06
35	19 17	19 47	20 23	09 14	10 11	11 09	12 08
40	19 32	20 05	20 46	09 10	10 09	11 09	12 11
45	19 50	20 27	21 16	09 04	10 06	11 09	12 14
S 50	20 12	20 56	22 00	08 58	10 03	11 09	12 18
52	20 22	21 11	22 26	08 55	10 01	11 09	12 19
54	20 34	21 28	23 07	08 52	10 00	11 09	12 21
56	20 48	21 49	////	08 48	09 58	11 09	12 23
58	21 04	22 17	////	08 44	09 56	11 09	12 25
S 60	21 24	23 02	////	08 39	09 53	11 10	12 28

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
	m s	m s	h m	h m	h m	d	
30	02 19	02 33	12 03	03 26	15 49	20	
31	02 47	03 02	12 03	04 11	16 34	21	◑
1	03 16	03 30	12 04	04 57	17 20	22	

EXPLANATION

PRINCIPLE AND ARRANGEMENT

1. *Object.* The object of this Almanac is to provide, in a convenient form, the data required for the practice of astronomical navigation at sea.

2. *Principle.* The main contents of the Almanac consist of data from which the *Greenwich Hour Angle* (G.H.A.) and the *Declination* (Dec.) of all the bodies used for navigation can be obtained for any instant of *Greenwich Mean Time* (G.M.T.(U.T.)). The *Local Hour Angle* (L.H.A.) can then be obtained by means of the formula:

$$\text{L.H.A} = \text{G.H.A} \begin{matrix} -\text{west} \\ +\text{east} \end{matrix} \text{ longitude}$$

The remaining data consist of: times of rising and setting of the Sun and Moon, and times of twilight; miscellaneous calendarial and planning data and auxiliary tables, including a list of Standard Times; corrections to be applied to observed altitude.

For the Sun, Moon, and planets the G.H.A. and Dec. are tabulated directly for each hour of G.M.T.(U.T.) throughout the year. For the stars the *Sidereal Hour Angle* (S.H.A.) is given, and the G.H.A. is obtained from:

G.H.A. Star = G.H.A. Aries + S.H.A. Star

The S.H.A. and Dec. of the stars change slowly and may be regarded as constant over periods of several days. G.H.A. Aries, or the Greenwich Hour Angle of the first point of Aries (the Vernal Equinox), is tabulated for each hour. Permanent tables give the appropriate increments and corrections to the tabulated hourly values of G.H.A. and Dec. for the minutes and seconds of G.M.T.(U.T.)

The tabular accuracy is 0'.1 throughout. The time argument on the daily pages of this Almanac is 12^h+ the Greenwich Hour Angle of the mean sun and is denoted by G.M.T.(U.T.) This scale*may differ from the broadcast time signals by an amount which, if ignored, will introduce an error of up to 0'·2 in longitude determined from astronomical observations. (The difference arises because the time argument depends on the variable rate of rotation of the Earth while the broadcast time signals are now based on an atomic time-scale.) Step adjustments of exactly one second are made to the time signals as required (normally at 24^h on December 31 and June 30) so that the difference between the time signals and G.M.T.(U.T.), as used in this Almanac, may not exceed 0^s·7. Those who require to reduce observations to a precision of better than 1^s must therefore obtain the correction to the time signals from coding in the signal, or from other sources. The correction may be applied to each of the times of observation: alternatively, the longitude, when determined from astronomical observations, may be corrected by the corresponding amount shown in the following table:

Correction to time signals	Correction to longitude
-0^s·7	0′·2 to east
-0^s·6 to -0^s·3	0′·1 to east
-0^s·2 to $+0^s$·2	no correction
$+0^s$·3 to $+0^s$′6	0′·1 to west
$+0^s$·7	0′·2 to west

*The name universal time (UT) is now often used instead of the name Greenwich Mean Time.
The time-scale used in this almanac is denoted by UT1, while the scale of the time signals is denoted by UTC.

EXPLANATION

3. *Lay-out.* The ephemeral data for three days are presented on an opening of two pages: the left-hand page contains the data for the planets and stars; the right-hand page contains the data for the Sun and Moon, together with times of twilight, sunrise, sunset, moonrise and moonset.

The remaining contents are arranged as follows: for ease of reference the altitude-correction tables are given on pages A_2, A_3, A_4, xxxiv and xxxv; calendar, Moon's phases, eclipses, and planet notes (i.e. data of general interest) precede the main tabulations; the other data follow the main tabulations and are arranged, as far as possible, in order of importance or frequency of use backwards from page xxxv.

MAIN DATA

4. *Daily pages.* The daily pages give the G.H.A. of Aries, the G.H.A. and Dec. of the Sun, Moon, and the four navigational planets, for each hour of G.M.T.(U.T) For the Moon, values of v and d are also tabulated for each hour to facilitate the correction of G.H.A. and Dec. to intermediate times; v and d for the Sun and planets change so slowly that they are given, at the foot of the appropriate columns, once only on the page; v is zero for Aries and negligible for the Sun, and is omitted. The S.H.A. and Dec. of the 57 selected stars, arranged in alphabetical order of proper name, are also given.

5. *Stars.* The S.H.A. and Dec. of 173 stars, including the 57 selected stars, are tabulated for each month on pages 86-91; no interpolation is required and the data can be used in precisely the same way as those for the selected stars on the daily pages. The stars are arranged in order of S.H.A.

The list of 173 includes all stars down to magnitude 3·0, together with a few fainter ones to fill the larger gaps. The 57 selected stars have been chosen from amongst these on account of brightness and distribution in the sky; they will suffice for the majority of observations.

The 57 selected stars are known by their proper names, but they are also numbered in descending order of S.H.A. In the list of 173 stars, the constellation names are always given on the left-hand page; on the facing page proper names are given where well-known names exist. Numbers for the selected stars are given in both columns.

Stars which, owing to their declinations, are unsuitable for use with the *Tables of Computed Altitude and Azimuth* (H.O. 214 or H.D. 486) are specially indicated.

An index to the selected stars, containing lists in both alphabetical and numerical order, is given on page xxxiii and is also reprinted on the bookmark.

6. *Increments and corrections.* These tables, printed on tinted paper (pages ii-xxxi) at the back of the Almanac, provide the increments and corrections for minutes and seconds to be applied to the hourly values of G.H.A. and Dec. They consist of sixty tables, one for each minute, separated into two parts: increments to G.H.A. for Sun and planets, Aries, and Moon for every minute and second; and, for each minute, corrections to be applied to G.H.A. and Dec. corresponding to the values of v and d given on the daily pages.

The increments are based on the following adopted hourly rates of increase of the G.H.A.: Sun and planets, 15° precisely; Aries, 15° 02′·46; Moon, 14° 19′·0. The values of v on the daily pages are the excesses of the actual hourly motions over the adopted values; they are generally positive, except for Venus. The tabulated hourly values of the Sun's G.H.A. have been adjusted to reduce to a minimum the error caused by treating v as negligible. The values of d on the daily pages are the hourly differences of the Dec. For the Moon, the true values of v and d are given for each hour; otherwise mean values are given for the three days on the page.

EXPLANATION

7. *Method of entry.* The G.M.T.(U.T.) of an observation is expressed as a day and hour, followed by a number of minutes and seconds. The tabular values of G.H.A. and Dec., and, where necessary, the corresponding values of *v* and *d*, are taken directly from the daily pages for the day and hour of G.M.T.(U.T.); this hour is always *before* the time of observation. S.H.A. and Dec. of the selected stars are also taken from the daily pages.

The table of Increments and Corrections for the minute of G.M.T.(U.T.) is then selected. For the G.H.A., the increment for minutes and seconds is taken from the appropriate column opposite the seconds of G.M.T.(U.T.); the *v*-correction is taken from the second part of the same table opposite the value of *v* as given on the daily pages. Both increment and *v*-correction are to be added to the G.H.A., except for Venus when *v* is prefixed by a minus sign and the *v*-correction is to be subtracted. For the Dec. there is no increment, but a *d*-correction is applied in the same way as the *v*-correction; *d* is given without sign on the daily pages and the sign of the correction is to be supplied by inspection of the Dec. column. In many cases the correction may be applied mentally.

8. *Examples.* (a) Sun and Moon. Required the G.H.A. and Dec. of the Sun and Moon on 0000 January 22 at G.M.T.(U.T.) $15^h\ 47^m\ 13^s$.

		SUN			MOON			
		G.H.A.	Dec.	*d*	G.H.A.	*v*	Dec.	*d*
		° ′	° ′	′	° ′	′	° ′	′
Daily page, Jan. $22^d\ 15^h$		42 04·7	S.19 36·3	0·6	6 03·0	12·6	S.4 06·6	10·5
Increments for	$47^m\ 13^s$	11 48·3			11 16·0			
v or *d* corrections for	47^m		−0·5		+10·0		−8·3	
Sum for Jan. $22^d\ 15^h\ 47^m\ 13^s$		53 53·0	S.19 35·8		17 29·0		S.3 58·3	

(b) Planets. Required the L.H.A. and Dec. of (i) Venus on 0000 January 6 at G.M.T.(U.T.) $10^h\ 57^m\ 13^s$ in longitude E. 150° 55′; (ii) Jupiter on 0000 January 6 at G.M.T.(U.T.) $23^h\ 25^m\ 12^s$ in longitude W. 55° 12′.

		VENUS					JUPITER			
		G.H.A.	*v*	Dec.	*d*		G.H.A.	*v*	Dec.	*d*
		° ′	′	° ′	′		° ′	′	° ′	′
Daily page, January 6^d (10^h)		281 19·3	−0·1	S.11 56·1	1·1	(23^h)	42 16·5	2·6	N.17 10·0	0·0
Increments (planets)	($57^m\ 28^s$)	14 22·0				($25^m\ 12^s$)	6 18·0			
v or *d* corrections	(57^m)	−0·1		−1·1		(25^m)	+1·1		0·0	
Sum = G.H.A. and Dec.		295 41·2		S.11 55·0			48 35·6		N.17 10·0	
Longitude	(east)	+150 55·0				(west)	− 55 12·0			
Multiples of 360°		−360					+360			
L.H.A. planet		86 36·2					353 23·6			

(c) Stars. Required the G.H.A. and Dec. of (i) *Aldebaran* on 0000 January 22 at G.M.T.(U.T.) $15^h\ 55^m\ 13^s$; (ii) *Vega* on 0000 January 22 at G.M.T.(U.T.) $16^h\ 02^m\ 45^s$.

		Aldebaran			*Vega*	
		G.H.A.	Dec.		G.H.A.	Dec.
		° ′	° ′		° ′	° ′
Daily page (S.H.A. and Dec.)		291 20·6	N.16 27·8		80 57·9	N.38 45·7
Daily page (G.H.A. Aries)	(15^h)	346 50·8		(16^h)	1 53·3	
Increments (Aries)	($55^m\ 13^s$)	13 50·5		($02^m\ 45^s$)	0 41·4	
Sum = G.H.A. star		652 01·9			83 32·6	
Multiples of 360°		−360				
G.H.A. star		292 01·9			83 32·6	

9. *Polaris (Pole Star) tables.* The tables on pages 92-94 provide means by which the latitude can be deduced from an observed altitude of *Polaris,* and they also give its azimuth; their use is explained and illustrated on those pages. They are based on the following formula:

$$\text{Latitude - corrected sextant altitude} = -\,p \cos h + \tfrac{1}{2}p \sin p \sin^2 h \tan(\text{latitude})$$

where p = polar distance of *Polaris* = 90° - Dec.
h = local hour angle of *Polaris* = L.H.A. Aries + S.H.A.

a_0, which is a function of L.H.A. Aries only, is the value of both terms of the above formula calculated for mean values of the S.H.A. (327° 26′) and Dec. (N. 89° 09′·7) of *Polaris,* for a mean latitude of 50°, and adjusted by the addition of a constant (58′·8). a_1 which is a function of L.H.A. Aries and latitude, is the excess of the value of the second term over its mean value for latitude 50°, increased by a constant (0′·6) to make it always positive. a_2, which is a function of L.H.A. Aries and date, is the correction to the first term for the variation of *Polaris* from its adopted mean position; it is increased by a constant (0′·6) to make it positive. The sum of the added constants is 1°, so that:

$$\text{Latitude} = \text{corrected sextant altitude} - 1° + a_0 + a_1 + a_2$$

RISING AND SETTING PHENOMENA

10. *General.* On the right-hand daily pages are given the times of sunrise and sunset, of the beginning and end of civil and nautical twilights, and of moonrise and moonset for a range of latitudes from N. 72° to S. 60°. These times, which are given to the nearest minute, are strictly the G.M.T.(U.T.) of the phenomena on the Greenwich meridian; they are given for every day for moonrise and moonset, but only for the middle day of the three on each page for the solar phenomena.

They are approximately the Local Mean Times (L.M.T.) of the corresponding phenomena on other meridians; they can be formally interpolated if desired. The G.M.T.(U.T.) of a phenomenon is obtained from the L.M. T. by:

$$\text{G.M.T.(U.T.)} = \text{L.M.T.}\,{}^{+\,\text{west}}_{-\,\text{east}}\ \text{longitude}$$

in which the longitude must first be converted to time by the table on page i or otherwise.

Interpolation for latitude can be done mentally or with the aid of Table I on page xxxii.

The following symbols are used to indicate the conditions under which, in high latitudes, some of the phenomena do not occur:

- ☐ Sun or Moon remains continuously above the horizon;
- ■ Sun or Moon remains continuously below the horizon;
- ▨ twilight lasts all night.

Basis of the tabulations. At sunrise and sunset 16′ is allowed for semi-diameter and 34′ for horizontal refraction, so that at the times given the Sun's upper limb is on the visible horizon; all times refer to phenomena as seen from sea level with a clear horizon.

At the times given for the beginning and end of twilight, the Sun's zenith distance is 96° for civil, and 102° for nautical twilight. The degree of illumination at the times given for civil twilight (in good conditions and in the absence of other illumination) is such that the brightest stars are visible and the horizon is clearly defined. At the times given for nautical twilight the horizon is in general not visible, and it is too dark for observation with a marine sextant.

EXPLANATION

Times corresponding to other depressions of the Sun may be obtained by interpolation or, for depressions of more than 12°, less reliably, by extrapolation; times so obtained will be subject to considerable uncertainty near extreme conditions.

At moonrise and moonset allowance is made for semi-diameter, parallax, and refraction (34′), so that at the times given the Moon's upper limb is on the visible horizon as seen from sea level.

11. *Sunrise, sunset, twilight.* The tabulated times may be regarded, without serious error, as the L.M.T. of the phenomena on any of the three days on the page and in any longitude. Precise times may normally be obtained by interpolating the tabular values for latitude and to the correct day and longitude, the latter being expressed as a fraction of a day by dividing it by 360°, positive for west and negative for east longitudes. In the extreme conditions near ☐, ▬ or ▨ interpolation may not be possible in one direction, but accurate times are of little value in these circumstances.

Examples. Required the G.M.T.(U.T.) of (a) the beginning of morning twilights and sunrise on 0000 January 22 for latitude S. 48° 55′, longitude E. 75° 18′; (b) sunset and the end of evening twilights on 0000 January 24 for latitude N. 67° 10′, longitude W. 168° 05′.

	(a)	Twilight Nautical	Twilight Civil	Sunrise	(b)	Sunset	Twilight Civil	Twilight Nautical
		d h m	d h m	d h m		d h m	d h m	d h m
From p. 25 L.M.T. for Lat.	S.45°	22 03 25	22 04 09	22 04 44	N. 66°	24 14 57	24 16 07	24 17 15
Corr. to (p. xxxii)	S.48° 55′	−27	−20	−16	N. 67° 10′	−17	−9	−6
Long. (p. i)	E.75° 18′	−5 01	−5 01	−5 01	W.168° 05′	+11 12	+11 12	+11 12
G.M.T.		21 21 57	21 22 48	21 23 27		25 01 52	25 03 10	25 04 21

The L.M.T. are strictly for January 23 (middle date on page) and 0° longitude; for precise times it is necessary to interpolate:

(a) to January 22^d - 75°/360° = Jan. 21^d 8, i.e. ⅓ (1.2) = 0·4 backwards towards the data for the same latitude interpolated from the previous page; the corrections are -2^m to nautical twilight, -2^m to civil twilight and -2^m to sunrise.

(b) to January 24^d + 168°/360° = Jan. 24^d·5, i.e. ⅓ (1.5) = 0.5 forwards towards the data for the same latitude interpolated from the following page; the corrections are + 8^m to sunset, + 5^m to civil twilight, and + 4^m to nautical twilight.

12. *Moonrise, moonset.* Precise times of moonrise and moonset are rarely needed; a glance at the tables will generally give sufficient indication of whether the Moon is available for observation and of the hours of rising and setting. If needed, precise times may be obtained as follows. Interpolate for latitude, using Table I on page xxxii, on the day wanted and also on the preceding day in east longitudes or the following day in west longitudes; take the difference between these times and interpolate for longitude by applying to the time for the day wanted the correction from Table II on page xxxii, so that the resulting time is between the two times used. In extreme conditions near ☐ or ▬ interpolation for latitude or longitude may be possible only in one direction; accurate times are of little value in these circumstances.

To facilitate this interpolation the times of moonrise and moonset are given for four days on each page; where no phenomenon occurs during a particular day (as happens once a month) the time of the phenomenon on the following day, increased by 24^h, is given; extra care must be taken when interpolating between two values, when one of those values exceeds 24^h. In practice it suffices to use the daily difference between the times for the nearest tabular latitude, and generally, to enter Table II with the nearest tabular arguments as in the examples below.

EXPLANATION

Examples. Required the G.M.T.(U.T.) of moonrise and moonset in latitude S. 47° 10′, longitudes E. 124° 00′ and W. 76° 31′ on 0000 January 22.

	Longitude E. 124° 00′		Longitude W. 76° 31′	
	Moonrise	Moonset	Moonrise	Moonset
	d h m	d h m	d h m	d h m
L.M.T. for Lat. S. 45°	22 08 02	22 20 59	22 08 02	22 20 59
Lat. correction (p. xxxii, Table I)	−02	00	−02	00
Long. correction (p. xxxii, Table II)	−23	−10	+16	+07
Correct L.M.T.	22 07 37	22 20 49	22 08 16	22 21 06
Longitude (p. i)	−8 16	−8 16	+5 06	+5 06
G.M.T.	21 23 21	22 12 33	22 13 22	23 02 12

ALTITUDE CORRECTION TABLES

13. *General.* In general two corrections are given for application to altitudes observed with a marine sextant; additional corrections are required for Venus and Mars and also for very low altitudes.

Tables of the correction for dip of the horizon, due to height of eye above sea level, are given on pages A2 and xxxiv. Strictly this correction should be applied first and subtracted from the sextant altitude to give apparent altitude, which is the correct argument for the other tables.

Separate tables are given of the second correction for the Sun, for stars and planets (on pages A2 and A3), and for the Moon (on pages xxxiv and xxxv). For the Sun, values are given for both lower and upper limbs, for two periods of the year. The star tables are used for the planets, but additional corrections (page A2) are required for Venus and Mars. The Moon tables are in two parts: the main correction is a function of apparent altitude only and is tabulated for the lower limb (30′ must be subtracted to obtain the correction for the upper limb); the other, which is given for both lower and upper limbs, depends also on the horizontal parallax, which has to be taken from the daily pages.

An additional correction, given on page A4, is required for the change in the refraction, due to variations of pressure and temperature from the adopted standard conditions; it may generally be ignored for altitudes greater than 10°, except possibly in extreme conditions. The correction tables for the Sun, stars, and planets are in two parts; only those for altitudes greater than 10° are reprinted on the bookmark.

14. *Critical tables.* Some of the altitude correction tables are arranged as critical tables. In these an interval of apparent altitude (or height of eye) corresponds to a single value of the correction; no interpolation is required. At a "critical" entry the upper of the two possible values of the correction is to be taken. For example, in the table of dip, a correction of −4′·1 corresponds to all values of the height of eye from 5.3 to 5.5 metres (17·5 to 18·3 feet) inclusive.

15. *Examples.* The following examples illustrate the use of the altitude correction tables; the sextant altitudes given are assumed to be taken on 0000 January 22 with a marine sextant at height 5·4 metres (18 feet),/temperature −3°C. and pressure 982 mb., the Moon sights being taken at about 10^h G.M.T.(U.T.)

EXPLANATION

	SUN lower limb	SUN upper limb	MOON lower limb	MOON upper limb	VENUS	*Polaris*
	° ′	° ′	° ′	° ′	° ′	° ′
Sextant altitude	21 19·7	3 20·2	33 27·6	26 06·7	4 32·6	49 36·5
Dip, height 5·4 metres (18 feet)	−4·1	−4·1	−4·1	−4·1	−4·1	−4·1
Main correction	+13·8	−29·6	+57·4	+60·5	−10·8	−0·8
−30′ for upper limb (Moon)	—	—	—	−30·0	—	—
L, U correction for Moon	—	—	+4·1	+3·1	—	—
Additional correction for Venus	—	—	—	—	+0·2	—
Additional refraction correction	−0·1	−0·3	0·0	−0·1	−0·3	0·0
Corrected sextant altitude	21 29·3	2 46·2	34 25·0	26 36·1	4 17·6	49 31·6

The main corrections have been taken out with apparent altitude (sextant altitude corrected for dip) as argument, interpolating where possible. These refinements are rarely necessary.

16. *Basis of the corrections.* The table for the dip of the sea horizon is based on the formula:

$$\text{Correction for dip} = -\,1'76\,\sqrt{(\text{height of eye in metres})} = 0'97\,\sqrt{(\text{height of eye in feet})}$$

The mean refraction, given explicitly in the correction table for the stars and planets and incorporated into those for the Sun and Moon, is based on Garfinkel's theory and is for a temperature of 10°C. (50°F.) and a pressure of 1010 mb. (29·83 inches). The additional corrections for variations of temperature and pressure from these adopted means are also based on Garfinkel's theory; there is no significant difference between the various theories to the accuracy given.

The correction table for the Sun includes the effects of semi-diameter and parallax, as well as the mean refraction; no correction for irradiation is included.

The additional corrections for Venus and Mars allow for parallax and phase, and are given by $p \cos H - k \cos \theta$, where H is the altitude, θ the angle at the planet between the vertical and the Sun: p and k are, for Venus, for 0000:

	Jan. 1	Feb. 7	Mar. 3	Mar. 19	Apr. 24	May 10	June 1	July 21	Dec. 31
p	0·2	0·3	0·4	0·5	0·4	0·3	0·2	0·1	
k	0·1	0·2	0·3	0·4	0·3	0·2	0·1	0·0	

The corrections given on page A2, and on the bookmark, are mean values applicable, in the case of Venus, only when the Sun is below the horizon. For daylight observations of Venus the observed values of H and θ should be used to calculate the correction directly; the term $-k \cos \theta$ is positive when the Sun is lower than Venus, zero when they have the same altitude, and negative when the Sun is higher.

In the case of the Moon the correction table includes the effects of semi-diameter, parallax and augmentation as well as the mean refraction; no correction for irradiation is included.

17. *Bubble sextant observations.* When observing with a bubble sextant no correction is necessary for dip, semi-diameter, or augmentation. For the stars and planets the corrections given may be used unchanged, and they should also be used for the Sun; for the Moon it is easiest to take the mean of the corrections for lower and upper limbs and subtract 15′ from the altitude; the correction for dip must not be applied.

EXPLANATION
AUXILIARY AND PLANNING DATA

18. *Sun and Moon.* On the daily pages are given: the semi-diameters and the times of meridian passage of both Sun and Moon over the Greenwich meridian; the equation of time; the horizontal parallax and the age of the Moon, together with a symbol indicating the phase. For the Moon, the semi-diameters for each of the three days are given, in order, at the foot of the column; for the Sun a single value is sufficient. The equation of time is given, without sign, for 00^h and 12^h G.M.T.(U.T.) on each day. To obtain apparent time, apply the equation of time to meantime with a *positive* sign when G.H.A. Sun at 00^h G.M.T.(U.T.) *exceeds* 180°, or at 12h *exceeds* 0°, corresponding to a meridian passage of the Sun *before* 12^h G.M.T.(U.T.); *otherwise* apply with a *negative* sign.

The times of the phases of the Moon are given in G.M.T.(U.T.) on page 2.

19. *Planets.* The magnitudes of the planets are given immediately following their names in the headings on the daily pages; also given, for the middle day of the three on the page, are their S.H.A. at 00^h G.M.T.(U.T.) and their times of meridian passage.

The planet notes and diagram on pages 6 and 7 provide descriptive information as to the suitability of the planets for observation during the year, and of their positions and movements.

20. *Stars.* The time of meridian passage of the first point of Aries over the Greenwich meridian is given on the daily pages, for the middle day of the three on the page, to $0^m.1$. The interval between successive meridian passages is $23^h\ 56^m{\cdot}1$ (24h less $3^m{\cdot}9$) so that times for intermediate days and other meridians can readily be derived. If a precise time is required it may be obtained by finding the G.M.T.(U.T.) at which L.H.A. Aries is zero.

The meridian passage of a star occurs when its L.H.A. is zero, that is when L.H.A. Aries + S.H.A. = 360°. An approximate time can be obtained from the planet diagram on page 7.

The star charts on pages 84 and 85 are intended to assist identification. They show the relative positions of the stars in the sky as seen from the Earth and include all 173 stars used in the Almanac, together with a few others to complete the main constellation configurations. The local meridian at any time may be located on the chart by means of its S.H.A. which is 360° - L.H.A. Aries, or west longitude - G.H.A. Aries.

21. *Star globe.* To set a star globe on which is printed a scale of L.H.A. Aries, first set the globe for latitude and then rotate about the polar axis until the scale under the edge of the meridian circle reads L.H.A. Aries.

To mark the positions of the Sun, Moon, and planets on the star globe, take the difference G.H.A. Aries - G.H.A. body and use this along the L.H.A. Aries scale, in conjunction with the declination, to plot the position. G.H.A. Aries - G.H.A. body is most conveniently found by taking the difference when the G.H.A. of the body is small (less than 15°), which happens once a day.

22. *Calendar.* On page 2 are given lists of ecclesiastical festivals, and of the principal anniversaries and holidays in the British Commonwealth and the United States of America. The calendar on page 3 includes the day of the year as well as the day of the week.

Brief particulars are given, at the foot of page 5, of the solar and lunar eclipses occurring during the year; the times given are in G.M.T.(U.T.) The principal features of the more important solar eclipses are shown on the maps on pages 4 and 5.

23. *Standard times.* The lists on pages 80-83 give the standard times used in most countries. In general no attempt is made to give details of the beginning and end of summer time, since they are liable to frequent changes at short notice.

EXPLANATION

The Date or Calendar Line is an arbitrary line, on either side of which the date differs by one day; when crossing this line on a westerly course, the date must be advanced one day; when crossing it on an easterly course, the date must be put back one day. The line is a modification of the line of the 180th meridian, and is drawn so as to include, as far as possible, islands of any one group, etc., on the same side of the line. It may be traced by starting at the South Pole and joining up to the following positions:

Lat.	S. 51°·0	S. 45°·0	S. 15°·0	S. 5°·0	N. 48°·0	N. 53°·0	N. 65°·5
Long.	180·0	W. 172·5	W. 172·5	180·0	180·0	E. 170·0	W. 169·0

thence through the middle of the Diomede Islands to Lat. N.68°·0, Long. W.169°·0, passing east of Ostrov Vrangelya (Wrangel Island) to Lat. N.75°·0, Long. 180°·0, and thence to the North Pole.

ACCURACY

24. *Main data.* The quantities tabulated in this Almanac are generally correct to the nearest 0′·1; the exception is the Sun's G.H.A. which is deliberately adjusted by up to 0′·15 to reduce the error due to ignoring the *v*-correction. The G.H.A. and Dec. at intermediate times cannot be obtained to this precision, since at least two quantities must be added; moreover, the *v*- and *d*-corrections are based on mean values of *v* and *d* and are taken from tables for the whole minute only. The largest error that can occur in the G.H.A. or Dec. of any body other than the Sun or Moon is less than 0′·2; it may reach 0′·25 for the G.H.A. of the Sun and 0′·3 for that of the Moon.

In practice it may be expected that only one third of the values of G.H.A. and Dec. taken out will have errors larger than 0′·05 and less than one-tenth will have errors larger than 0′·1.

25. *Altitude corrections.* The errors in the altitude corrections are nominally of the same order as those in G.H.A. and Dec., as they result from the addition of several quantities each correctly rounded off to 0′·1. But the actual values of the dip and of the refraction at low altitudes may, in extreme atmospheric conditions, differ considerably from the mean values used in the tables.

STANDARD TIMES

LIST I — PLACES FAST ON UTC (mainly those EAST OF GREENWICH)

The times given below should be *added* to UTC to give Standard Time / *subtracted* from Standard Time to give UTC.

	h	m
Admiralty Islands	10	
Afghanistan	04	30
Albania*	01	
Algeria	01	
Amirante Islands	04	
Andaman Islands	05	30
Angola	01	
Armenia*	04	
Australia		
Australian Capital Territory*	10	
New South Wales[1]*	10	
Northern Territory	09	30
Queensland	10	
South Australia*	09	30
Tasmania*	10	
Victoria*	10	
Western Australia	08	
Whitsunday Islands	10	
Austria*†	01	
Azerbaijan*	04	
Bahrain	03	
Balearic Islands*	01	
Bangladesh	06	
Belarus*	02	
Belgium*†	01	
Benin	01	
Bosnia and Herzegovina*	01	
Botswana, Republic of	02	
Brunei	08	
Bulgaria*	02	
Burma (Myanmar)	06	30
Burundi	02	
Cambodia	07	
Cameroon Republic	01	
Caroline Islands[2]	10	
Central African Republic	01	
Chad	01	
Chagos Archipelago	05	
Chatham Islands*	12	45
China, People's Republic of	08	
Christmas Island, Indian Ocean	07	
Cocos (Keeling) Islands	06	30
Comoro Islands (Comoros)	03	
Congo, Democratic Republic		
Kinshasa, Mbandaka	01	
Haut-Zaire, Kasai, Kivu, Shaba	02	
Congo Republic	01	
Corsica*	01	
Crete*	02	
Croatia*	01	
Cyprus: Ercan*, Larnaca*	02	
Czech Republic*	01	
Denmark*†	01	
Djibouti	03	
East Timor	09	
Egypt, Arab Republic of*	02	
Equatorial Guinea, Republic of	01	
Eritrea	03	
Estonia	02	
Ethiopia	03	
Fiji	12	
Finland*†	02	
France*†	01	
Gabon	01	
Georgia*	04	
Germany*†	01	
Gibraltar*	01	
Greece*†	02	
Guam	10	
Hong Kong	08	
Hungary*	01	
India	05	30
Indonesia, Republic of		
Bangka, Billiton, Java, West and Central Kalimantan, Madura, Sumatra	07	
Bali, Flores, South and East Kalimantan, Lombok, Sulawesi, Sumba, Sumbawa, West Timor	08	
Aru, Irian Jaya, Kai, Moluccas, Tanimbar	09	
Iran*	03	30
Iraq*	03	
Israel*	02	
Italy*†	01	
Jan Mayen Island*	01	
Japan	09	
Jordan*	02	
Kazakhstan*		
Western, Aktau, Uralsk, Atyrau	04	
Central, Aktyubinsk, Kzyl-Orda	05	
Eastern	06	
Kenya	03	
Kiribati Republic		
Gilbert Islands	12	
Phoenix Islands	13	
Line Islands[3]	14	
Korea, North,	09	
Republic of (South)	09	
Kuril Islands	11	
Kuwait	03	
Kyrgyzstan*	05	
Laccadive Islands	05	30
Laos	07	
Latvia	02	

* Daylight-saving time may be kept in these places. † For Summer time dates see List II footnotes.

1 Except Broken Hill Area which keeps $09^h\ 30^m$.

2 Except Pohnpei, Pingelap and Kosrae which keep 11^h.

3 The Line Islands that are not part of the Kiribati Republic keep 10^h slow on UTC.

LIST I — (*continued*)

	h	m
Lebanon*	02	
Lesotho	02	
Libya	02	
Liechtenstein*	01	
Lithuania	02	
Lord Howe Island*	10	30
Luxembourg*†	01	
Macau	08	
Macedonia*, former Yugoslav Republic	01	
Macias Nguema (Fernando Póo)	01	
Madagascar, Democratic Republic of	03	
Malawi	02	
Malaysia, Malaya, Sabah, Sarawak	08	
Maldives, Republic of The	05	
Malta*	01	
Mariana Islands	10	
Marshall Islands[1]	12	
Mauritius	04	
Moldova*	02	
Monaco*	01	
Mongolia	08	
Mozambique	02	
Namibia*	01	
Nauru	12	
Nepal	05	45
Netherlands, The*†	01	
New Caledonia	11	
New Zealand*	12	
Nicobar Islands	05	30
Niger	01	
Nigeria, Republic of	01	
Norfolk Island	11	30
Norway*	01	
Novaya Zemlya	03	
Okinawa	09	
Oman	04	
Pagalu (Annobon Islands)	01	
Pakistan	05	
Palau Islands	09	
Papua New Guinea	10	
Pescadores Islands	08	
Philippine Republic	08	
Poland*	01	
Qatar	03	
Reunion	04	
Romania*	02	
Russia[2]*		
Zone 1 Kaliningrad	02	
Zone 2 Moscow, St Petersburg, Arkhangelsk, Astrakhan	03	
Zone 3 Samara, Izhevsk	04	
Zone 4 Perm, Amderna, Novyy Port	05	
Zone 5 Omsk, Novosibirsk	06	
Zone 6 Norilsk, Kyzyl, Dikson	07	
Russia (*continued*)		
Zone 7 Bratsk, Irkutsk, Ulan-Ude	08	
Zone 8 Yakutsk, Chita, Tiksi	09	
Zone 9 Vladivostok, Khabarovsk, Okhotsk	10	
Zone 10 Magadan, Yuzhno	11	
Zone 11 Petropavlovsk, Pevek	12	
Rwanda	02	
Ryukyu Islands	09	
Sakhalin Island*	10	
Santa Cruz Islands	11	
Sardinia*	01	
Saudi Arabia	03	
Schouten Islands	10	
Serbia*	01	
Seychelles	04	
Sicily*	01	
Singapore	08	
Slovakia*	01	
Slovenia*	01	
Socotra	03	
Solomon Islands	11	
Somalia Republic	03	
South Africa, Republic of	02	
Spain*†	01	
Spanish Possessions in North Africa*	01	
Spitsbergen (Svalbard)*	01	
Sri Lanka	06	
Sudan, Republic of	03	
Swaziland	02	
Sweden*†	01	
Switzerland*	01	
Syria (Syrian Arab Republic)*	02	
Taiwan	08	
Tajikistan	05	
Tanzania	03	
Thailand	07	
Tonga*	13	
Tunisia	01	
Turkey*	02	
Turkmenistan	05	
Tuvalu	12	
Uganda	03	
Ukraine*	02	
United Arab Emirates	04	
Uzbekistan	05	
Vanuatu, Republic of	11	
Vietnam, Socialist Republic of	07	
Yemen	03	
Yugoslavia*, Federal Republic of	01	
Zambia, Republic of	02	
Zimbabwe	02	

* Daylight-saving time may be kept in these places. † For Summer time dates see List II footnotes.
1 Except the Ebon Atol which keeps time 24h slow on that of the rest of the islands.
2 The boundaries between the zones are irregular; listed are chief towns in each zone.

LIST II — PLACES NORMALLY KEEPING UTC

Ascension Island	Ghana	Irish Republic*†	Morocco	Sierra Leone
Burkina-Faso	Great Britain†	Ivory Coast	Portugal*†	Togo Republic
Canary Islands*	Guinea-Bissau	Liberia	Principe	Tristan da Cunha
Channel Islands†	Guinea Republic	Madeira*	St. Helena	
Faeroes*, The	Iceland	Mali	São Tomé	
Gambia, The	Ireland, Northern†	Mauritania	Senegal	

* Daylight-saving time may be kept in these places.

† Summer time (daylight-saving time), one hour in advance of UTC, may be kept from 2002 March 31^d 01^h to October 27^d 01^h UTC. Definitive dates are subject to the Ninth Summer Time Directive of the European Union, and subsequent ratification by member countries.

LIST III — PLACES SLOW ON UTC (WEST OF GREENWICH)

The times given below should be *subtracted* from UTC to give Standard Time / *added* to Standard Time to give UTC.

	h	m
Argentina	03	
Austral (Tubuai) Islands[1]	10	
Azores*	01	
Bahamas*	05	
Barbados	04	
Belize	06	
Bermuda*	04	
Bolivia	04	
Brazil		
S and E coastal states, Bahia, Goiás, Tocantins, Brasilia*	03	
N and NE coastal states, Eastern Para	03	
Mato Grosso, Mato Grosso do Sul*	04	
Central states, western Para, E and Central Amazonas	04	
Acre, western Amazonas	05	
British Antarctic Territory[2]	03	
Canada		
Alberta*	07	
British Columbia[3]*	08	
Labrador[3]*	04	
Manitoba*	06	
New Brunswick*	04	
Newfoundland*	03	30
Northwest Territories[3]*		
east of long. W. 85°	05	
long. W. 85° to W. 102°	06	
west of long. W. 102°	07	
Nova Scotia*	04	
Ontario, east of long. W. 90°*	05	
west of long. W. 90°	05	
Prince Edward Island*	04	
Canada (*continued*)		
Quebec, east of long. W. 63°[3]	04	
west of long. W. 63°*	05	
Saskatchewan[3]	06	
Yukon*	08	
Cape Verde Islands	01	
Cayman Islands	05	
Chile*	04	
Colombia	05	
Cook Islands	10	
Costa Rica	06	
Cuba*	05	
Curaçao Island	04	
Dominican Republic	05	
Easter Island (I. de Pascua)*	06	
Ecuador	05	
El Salvador	06	
Falkland Islands*	04	
Fanning Island	10	
Fernando de Noronha Island	02	
French Guiana	03	
Galápagos Islands	06	
Greenland[4]		
General*	03	
Scoresby Sound*	01	
Thule area*	04	
Grenada	04	
Guadeloupe	04	
Guatemala	06	
Guyana, Republic of	04	
Haiti	05	
Honduras	06	

* Daylight-saving time may be kept in these places.

1 This is the legal standard time, but local mean time is generally used.

2 Most stations use UTC.

3 Some areas may keep another time zone.

4 Mesters Vig and Danmarkshavn keep UTC.

LIST III — (*continued*)

	h m
Jamaica	05
Johnston Island	10
Juan Fernandez Islands*	04
Leeward Islands	04
Marquesas Islands	09 30
Martinique	04
Mexico*[1]	06
Midway Islands	11
Nicaragua	06
Niue	11
Panama, Republic of	05
Paraguay*	04
Peru	05
Pitcairn Island	08
Puerto Rico	04
St. Pierre and Miquelon*	03
Samoa	11
Society Islands	10
South Georgia	02
Suriname	03
Trindade Island, South Atlantic	02
Trinidad and Tobago	04
Tuamotu Archipelago	10
Tubuai (Austral) Islands	10
Turks and Caicos Islands*	05
United States of America[2]	
Alabama	06
Alaska	09
Aleutian Islands, east of W. 169° 30′	09
Aleutian Islands, west of W. 169° 30′	10
Arizona[3]	07
Arkansas	06
California	08
Colorado	07
Connecticut	05
Delaware	05
District of Columbia	05
Florida[4]	05
Georgia	05
Hawaii[3]	10
Idaho[4]	07
Illinois	06
Indiana[3,4]	05
United States of America[2] (*continued*)	
Iowa	06
Kansas[4]	06
Kentucky, eastern part	05
western part	06
Louisiana	06
Maine	05
Maryland	05
Massachusetts	05
Michigan[4]	05
Minnesota	06
Mississippi	06
Missouri	06
Montana	07
Nebraska, eastern part	06
western part	07
Nevada	08
New Hampshire	05
New Jersey	05
New Mexico	07
New York	05
North Carolina	05
North Dakota[4]	06
Ohio	05
Oklahoma	06
Oregon[4]	08
Pennsylvania	05
Rhode Island	05
South Carolina	05
South Dakota, eastern part	06
western part	07
Tennessee, eastern part	05
western part	06
Texas[4]	06
Utah	07
Vermont	05
Virginia	05
Washington D.C.	05
Washington	08
West Virginia	05
Wisconsin	06
Wyoming	07
Uruguay	03
Venezuela	04
Virgin Islands	04
Windward Islands	04

* Daylight-saving time may be kept in these places.

1 Except the states of Sonora, Sinaloa*, Nayarit*, Chihuahua* and the Southern District of Lower California* which keep 07^h, and the Northern District of Lower California* which keeps 08^h.

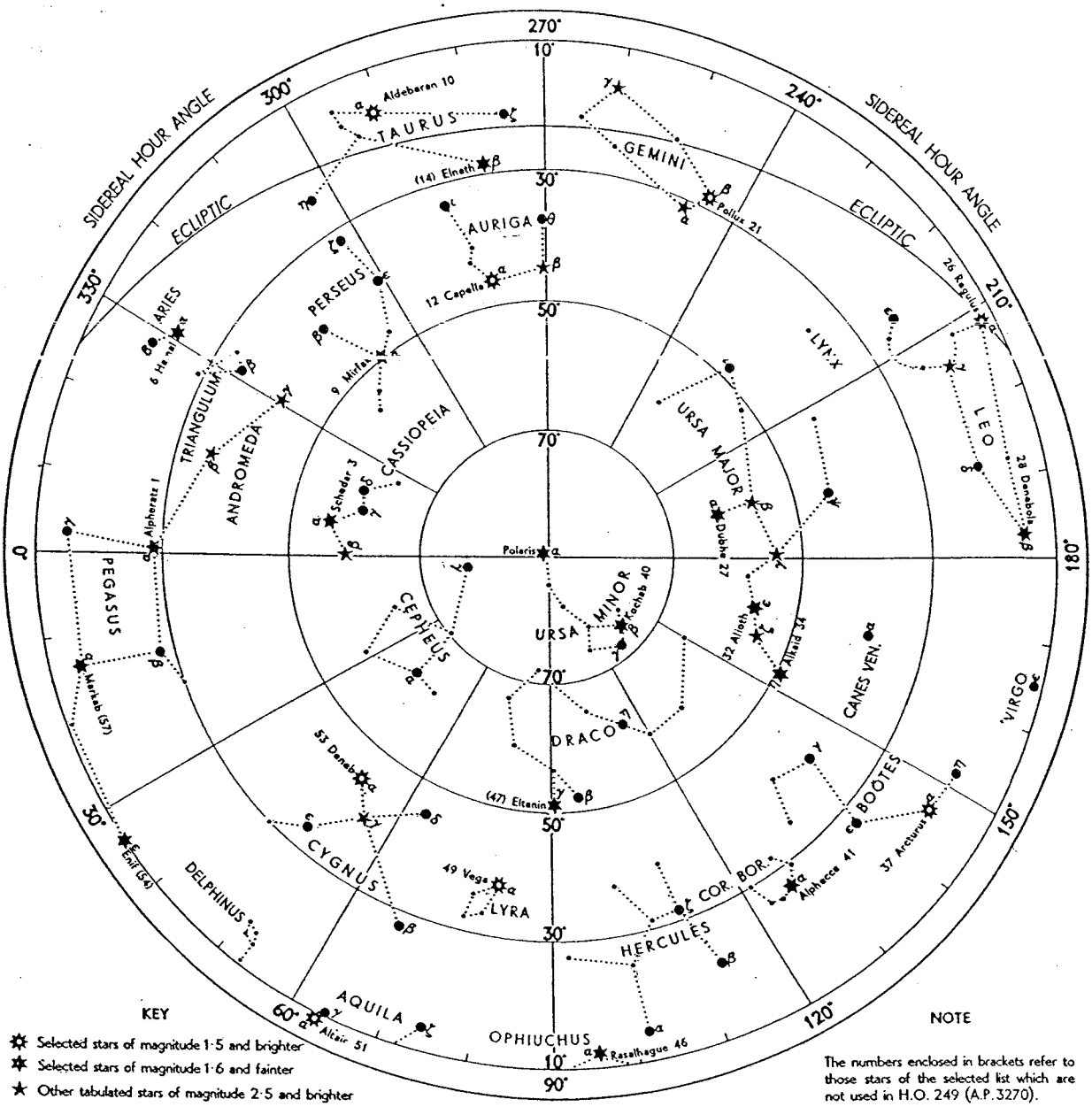
2 Daylight-saving (Summer) time, one hour fast on the time given, is kept from the first Sunday in April to the last Sunday in October, changing at $02^h\ 00^m$ local clock time.

3 Exempt from keeping daylight-saving time.

4 A small portion of the state is in another time zone.

STAR CHARTS

NORTHERN STARS



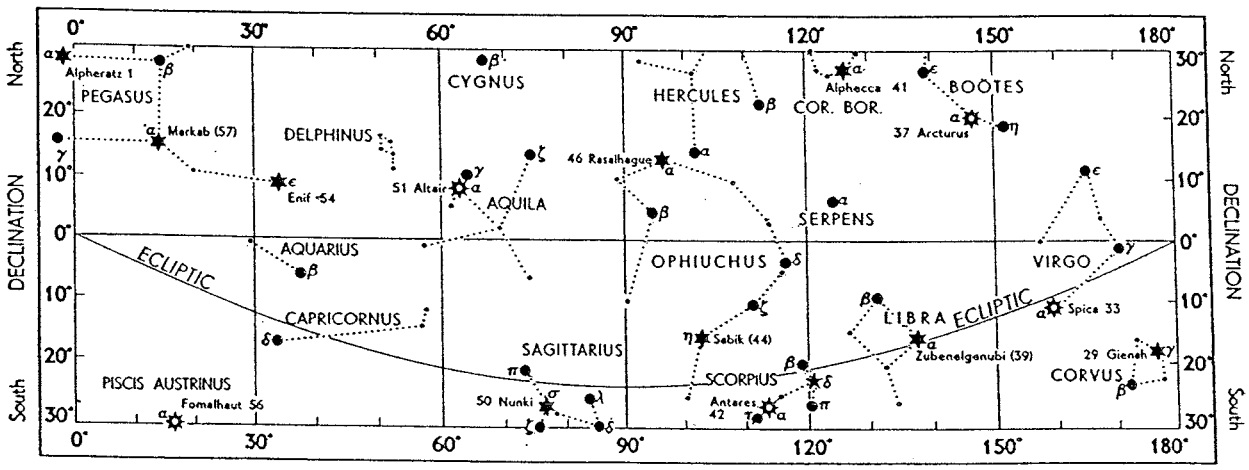
KEY

- Selected stars of magnitude 1·5 and brighter
- Selected stars of magnitude 1·6 and fainter
- ★ Other tabulated stars of magnitude 2·5 and brighter
- ● Other tabulated stars of magnitude 2·6 and fainter
- • Untabulated stars

NOTE

The numbers enclosed in brackets refer to those stars of the selected list which are not used in H.O. 249 (A.P.3270).

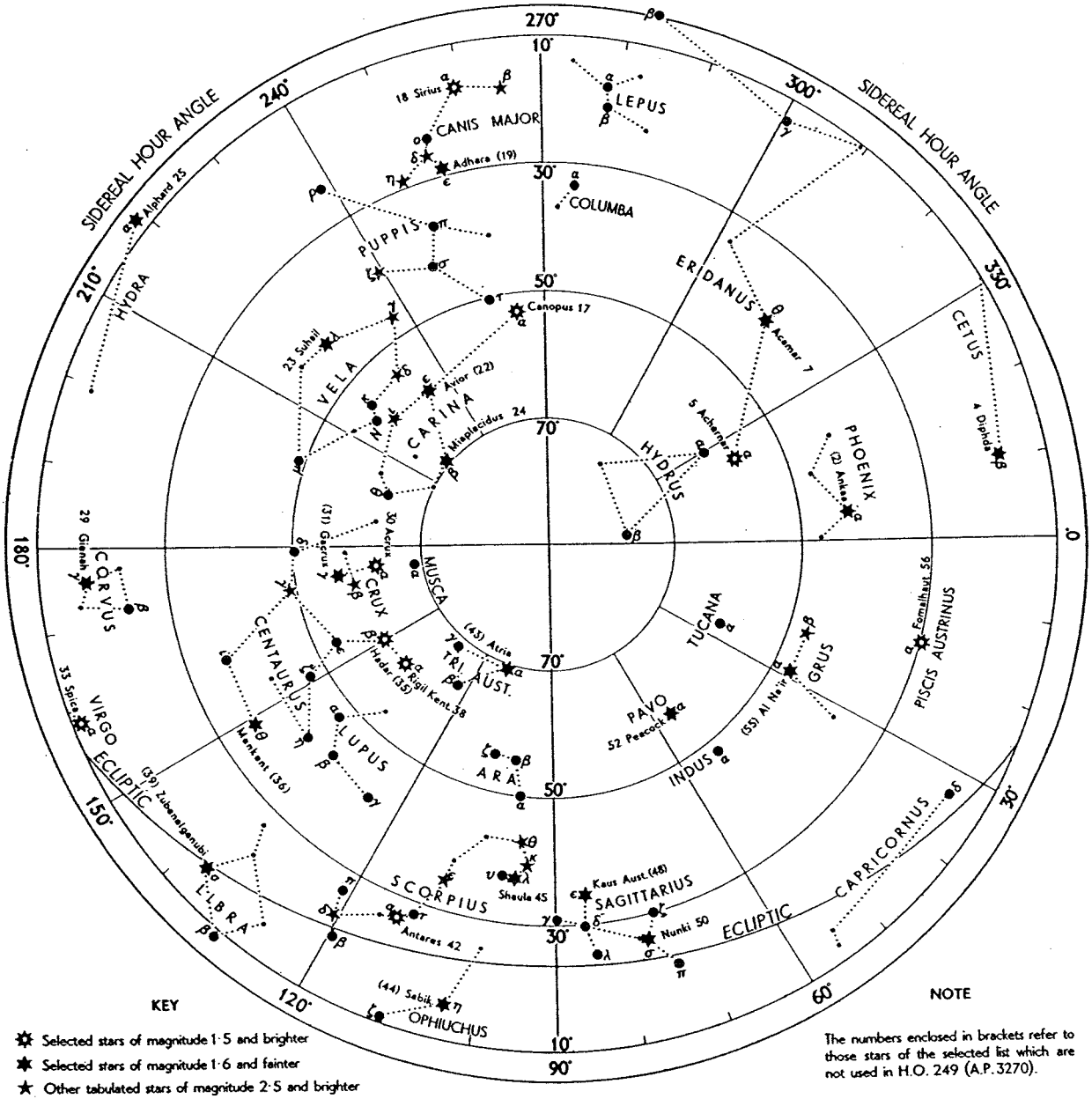
EQUATORIAL STARS (S.H.A. 0° to 180°)



E.1663/2

STAR CHARTS

SOUTHERN STARS



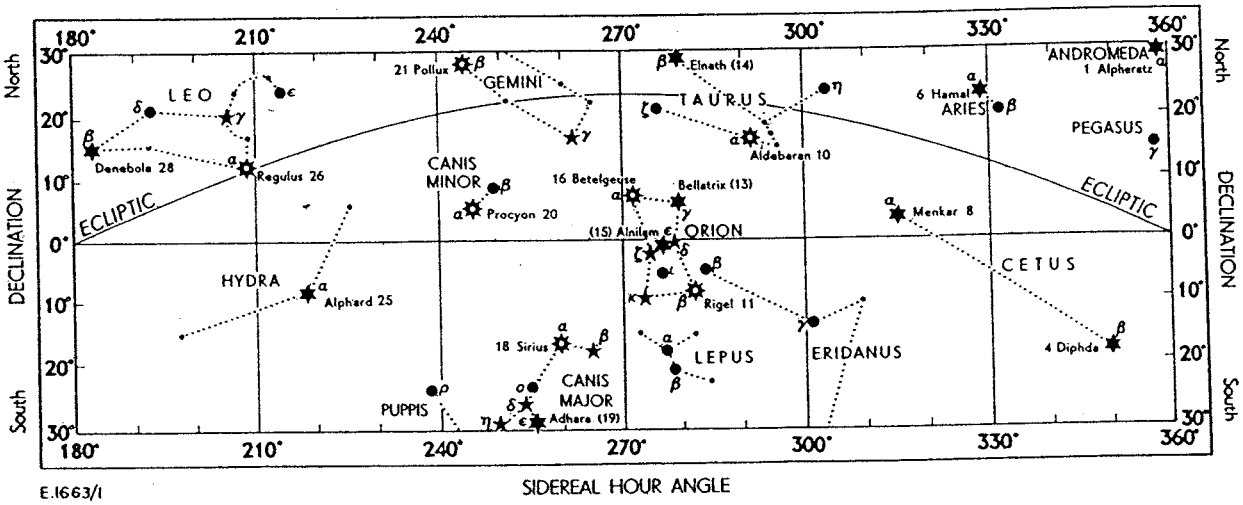
KEY

- ✡ Selected stars of magnitude 1·5 and brighter
- ✱ Selected stars of magnitude 1·6 and fainter
- ★ Other tabulated stars of magnitude 2·5 and brighter
- ● Other tabulated stars of magnitude 2·6 and fainter
- • Untabulated stars

NOTE

The numbers enclosed in brackets refer to those stars of the selected list which are not used in H.O. 249 (A.P. 3270).

EQUATORIAL STARS (S.H.A. 180° to 360°)



E.1663/1

STARS, 0000 JANUARY—JUNE

Mag.	Name and Number		S.H.A.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	Dec.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
			°	′	′	′	′	′	′	°	′	′	′	′	′	′
3·4	γ Cephei †		5	24·1	24·6	24·8	24·5	23·9	23·1	N. 77	30·6	30·5	30·4	30·2	30·1	30·1
2·6	α Pegasi	57	14	05·8	05·8	05·8	05·7	05·5	05·3	N. 15	05·0	04·9	04·9	04·9	04·9	05·0
2·6	β Pegasi		14	20·2	20·2	20·2	20·1	19·9	19·6	N. 27	57·7	57·6	57·5	57·4	57·4	57·5
1·3	α Piscis Aust.	56	15	54·4	54·4	54·4	54·3	54·1	53·8	S. 29	44·7	44·7	44·6	44·5	44·4	44·3
2·2	β Gruis		19	40·8	40·8	40·8	40·6	40·3	40·0	S. 46	60·4	60·3	60·2	60·1	59·9	59·9
2·9	α Tucanæ		25	46·4	46·4	46·3	46·1	45·7	45·3	S. 60	22·6	22·5	22·3	22·2	22·0	22·0
2·2	α Gruis	55	28	18·5	18·5	18·4	18·2	17·9	17·6	S. 47	04·4	04·3	04·2	04·1	04·0	03·9
3·0	δ Capricorni		33	33·6	33·5	33·4	33·3	33·1	32·8	S. 16	13·9	13·9	13·9	13·8	13·7	13·6
2·5	ε Pegasi	54	34	14·3	14·3	14·2	14·0	13·8	13·6	N. 9	46·3	46·2	46·2	46·2	46·2	46·3
3·1	β Aquarii		37	24·9	24·9	24·8	24·6	24·4	24·2	S. 5	40·3	40·3	40·3	40·3	40·2	40·1
2·6	α Cephei		40	29·9	29·9	29·8	29·5	29·1	28·7	N. 62	29·5	29·4	29·2	29·1	29·2	29·3
2·6	ε Cygni		48	41·0	41·0	40·8	40·6	40·4	40·1	N. 33	53·2	53·0	53·0	52·9	53·0	53·1
1·3	α Cygni	53	49	50·6	50·5	50·4	50·1	49·8	49·6	N. 45	12·0	11·9	11·8	11·7	11·8	11·9
3·2	α Indi		50	61·0	60·9	60·7	60·4	60·1	59·8	S. 47	22·3	22·2	22·1	22·0	22·0	22·0
2·1	α Pavonis	52	54	02·9	02·8	02·5	02·2	01·8	01·4	S. 56	48·5	48·4	48·3	48·2	48·2	48·2
2·3	γ Cygni		54	39·2	39·2	39·0	38·8	38·5	38·3	N. 40	11·1	11·0	10·9	10·8	10·9	11·0
0·9	α Aquilæ	51	62	35·3	35·2	35·0	34·8	34·6	34·4	N. 8	48·5	48·4	48·4	48·4	48·5	48·6
2·8	γ Aquilæ		63	42·7	42·6	42·4	42·2	42·0	41·8	N. 10	33·5	33·4	33·4	33·4	33·4	33·6
3·0	δ Cygni		63	56·5	56·4	56·2	55·9	55·6	55·4	N. 45	04·6	04·4	04·3	04·3	04·4	04·5
3·2	β Cygni		67	33·3	33·2	33·0	32·8	32·6	32·4	N. 27	54·7	54·6	54·5	54·5	54·6	54·8
3·0	π Sagittarii		72	54·2	54·1	53·9	53·7	53·4	53·2	S. 21	03·6	03·6	03·5	03·5	03·5	03·4
3·0	ζ Aquilæ		73	54·9	54·8	54·6	54·4	54·2	54·0	N. 13	49·8	49·7	49·7	49·7	49·7	49·9
2·7	ζ Sagittarii		74	43·0	42·8	42·6	42·3	42·1	41·9	S. 29	54·7	54·7	54·7	54·7	54·6	54·6
2·1	σ Sagittarii	50	76	32·6	32·4	32·2	32·0	31·7	31·5	S. 26	19·5	19·4	19·4	19·4	19·4	19·4
0·1	α Lyræ	49	80	57·9	57·7	57·5	57·3	57·0	56·9	N. 38	45·7	45·6	45·5	45·6	45·7	45·8
2·9	λ Sagittarii		83	21·9	21·7	21·5	21·2	21·0	20·9	S. 25	26·0	26·0	26·0	26·0	26·0	26·0
2·0	ε Sagittarii	48	84	20·5	20·3	20·0	19·8	19·5	19·4	S. 34	23·7	23·6	23·6	23·6	23·6	23·6
2·8	δ Sagittarii		85	07·3	07·1	06·9	06·7	06·4	06·3	S. 29	50·2	50·2	50·2	50·2	50·2	50·2
3·1	γ Sagittarii		88	55·2	55·0	54·8	54·5	54·3	54·1	S. 30	25·4	25·4	25·4	25·4	25·4	25·4
2·4	γ Draconis	47	90	59·4	59·2	58·9	58·6	58·3	58·2	N. 51	29·5	29·3	29·3	29·3	29·4	29·6
2·9	β Ophiuchi		94	25·1	24·9	24·7	24·5	24·3	24·2	N. 4	34·6	34·5	34·5	34·5	34·6	34·7
2·5	κ Scorpii		94	46·7	46·5	46·2	45·9	45·7	45·5	S. 39	01·0	01·0	01·0	01·0	01·0	01·1
2·0	θ Scorpii		96	05·2	04·9	04·6	04·3	04·1	03·9	S. 42	58·9	58·8	58·8	58·9	58·9	59·0
2·1	α Ophiuchi	46	96	32·2	32·0	31·8	31·6	31·4	31·3	N. 12	34·6	34·5	34·5	34·5	34·6	34·7
1·7	λ Scorpii	45	96	59·5	59·2	58·9	58·7	58·5	58·3	S. 37	05·1	05·1	05·1	05·1	05·2	05·2
3·0	α Aræ		97	29·3	29·0	28·6	28·3	28·0	27·9	S. 49	51·4	51·3	51·3	51·3	51·4	51·5
3·0	β Draconis		97	31·8	31·5	31·2	30·9	30·7	30·6	N. 52	19·0	18·9	18·9	18·9	19·0	19·2
2·8	υ Scorpii		97	42·2	41·9	41·6	41·4	41·2	41·0	S. 37	16·5	16·5	16·5	16·6	16·6	16·6
2·8	β Aræ		99	09·4	09·1	08·7	08·4	08·1	07·9	S. 55	30·3	30·3	30·3	30·3	30·4	30·5
Var.‡	α Herculis		101	36·2	36·0	35·8	35·6	35·4	35·3	N. 14	25·0	24·9	24·8	24·9	24·9	25·0
2·6	η Ophiuchi	44	102	44·2	44·0	43·8	43·6	43·4	43·3	S. 15	41·7	41·8	41·8	41·8	41·8	41·8
3·1	ζ Aræ		105	49·5	49·1	48·7	48·4	48·1	48·0	S. 55	57·1	57·0	57·1	57·1	57·2	57·3
2·4	ε Scorpii		107	50·0	49·7	49·5	49·2	49·1	49·0	S. 34	15·0	15·0	15·0	15·1	15·1	15·1
1·9	α Triang. Aust.	43	108	27·0	26·4	25·9	25·4	25·0	24·8	S. 68	59·0	58·9	58·9	59·0	59·1	59·2
3·0	ζ Herculis		109	53·9	53·7	53·5	53·3	53·1	53·1	N. 31	38·6	38·5	38·4	38·5	38·6	38·7
2·7	ζ Ophiuchi		111	01·7	01·5	01·3	01·1	00·9	00·8	S. 10	31·2	31·3	31·3	31·3	31·3	31·3
2·9	τ Scorpii		111	23·3	23·1	22·8	22·6	22·5	22·4	S. 28	10·0	10·0	10·1	10·1	10·1	10·2
2·8	β Herculis		112	41·7	41·5	41·2	41·1	40·9	40·9	N. 21	32·3	32·2	32·2	32·2	32·3	32·4
1·2	α Scorpii	42	112	60·1	59·9	59·6	59·4	59·3	59·2	S. 26	22·8	22·8	22·8	22·9	22·9	22·9
2·9	η Draconis		114	05·4	05·1	04·7	04·4	04·2	04·2	N. 61	33·8	33·7	33·7	33·8	33·9	34·1
3·0	δ Ophiuchi		116	43·0	42·7	42·5	42·3	42·2	42·2	S. 3	38·1	38·2	38·2	38·2	38·2	38·1
2·8	β Scorpii		118	58·6	58·3	58·1	57·9	57·8	57·7	S. 19	44·5	44·5	44·6	44·6	44·6	44·6
2·5	δ Scorpii		120	15·4	15·2	15·0	14·8	14·6	14·6	S. 22	33·3	33·4	33·4	33·4	33·5	33·5
3·0	π Scorpii		120	38·1	37·9	37·6	37·4	37·3	37·3	S. 26	02·8	02·8	02·9	02·9	03·0	03·0
3·0	β Trianguli Aust.		121	43·5	43·0	42·6	42·2	41·9	41·9	S. 63	21·4	21·4	21·4	21·5	21·7	21·8
2·8	α Serpentis		124	13·0	12·8	12·6	12·4	12·3	12·3	N. 6	29·8	29·7	29·7	29·7	29·8	29·9
2·3	α Coronæ Bor.	41	126	34·4	34·2	33·9	33·8	33·7	33·7	N. 26	47·4	47·3	47·3	47·3	47·4	47·6
3·0	γ Lupi †		126	35·9	35·6	35·3	35·1	35·0	34·9	S. 41	05·2	05·3	05·3	05·4	05·5	05·6

‡ 3·0—3·7 † Not suitable for use with H.O. 214 (H.D. 486)

STARS, 0000 JULY—DECEMBER

Mag.	Name and Number		S.H.A.							Dec.						
				JULY	AUG.	SEPT.	OCT.	NOV.	DEC.		JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
			°	′	′	′	′	′	′	°	′	′	′	′	′	′
3·4	γ Cephei †		5	22·4	21·8	21·6	21·7	22·1	22·8	N. 77	30·2	30·4	30·5	30·7	30·9	30·9
2·6	*Markab*	57	14	05·1	04·9	04·8	04·9	04·9	05·0	N. 15	05·1	05·2	05·3	05·4	05·4	05·3
2·6	*Scheat*		14	19·4	19·2	19·1	19·2	19·3	19·4	N. 27	57·6	57·8	57·9	58·0	58·0	58·0
1·3	*Fomalhaut*	56	15	53·6	53·4	53·3	53·4	53·5	53·6	S. 29	44·2	44·2	44·3	44·4	44·4	44·5
2·2	β Gruis		19	39·7	39·5	39·5	39·5	39·7	39·9	S. 46	59·8	59·9	60·0	60·1	60·2	60·2
2·9	α Tucanæ		25	45·0	44·7	44·7	44·9	45·1	45·4	S. 60	22·0	22·1	22·2	22·3	22·4	22·4
2·2	*Al Na'ir*	55	28	17·3	17·1	17·1	17·2	17·4	17·5	S. 47	03·9	04·0	04·1	04·2	04·2	04·2
3·0	δ Capricorni		33	32·6	32·5	32·5	32·6	32·7	32·8	S. 16	13·6	13·5	13·6	13·6	13·6	13·6
2·5	*Enif*	54	34	13·4	13·3	13·3	13·4	13·5	13·6	N. 9	46·4	46·5	46·6	46·6	46·6	46·6
3·1	β Aquarii		37	24·0	23·9	23·9	24·0	24·1	24·2	S. 5	40·0	40·0	40·0	40·0	40·0	40·0
2·6	*Alderamin*		40	28·4	28·4	28·5	28·7	29·1	29·4	N. 62	29·4	29·6	29·8	29·9	29·9	29·9
2·6	ε Cygni		48	40·0	39·9	40·0	40·1	40·3	40·4	N. 33	53·2	53·4	53·5	53·6	53·6	53·5
1·3	*Deneb*	53	49	49·4	49·4	49·5	49·6	49·9	50·0	N. 45	12·1	12·2	12·4	12·5	12·5	12·4
3·2	α Indi		50	59·6	59·5	59·6	59·8	59·9	60·1	S. 47	22·0	22·1	22·2	22·2	22·2	22·2
2·1	*Peacock*	52	54	01·2	01·1	01·2	01·4	01·7	01·8	S. 56	48·3	48·4	48·5	48·5	48·5	48·5
2·3	γ Cygni		54	38·1	38·1	38·2	38·4	38·6	38·7	N. 40	11·2	11·3	11·5	11·5	11·5	11·4
0·9	*Altair*	51	62	34·3	34·2	34·3	34·4	34·6	34·6	N. 8	48·7	48·8	48·8	48·8	48·8	48·7
2·8	γ Aquilæ		63	41·7	41·7	41·8	41·9	42·0	42·1	N. 10	33·7	33·7	33·8	33·8	33·8	33·7
3·0	δ Cygni		63	55·3	55·3	55·5	55·7	55·9	56·0	N. 45	04·7	04·8	05·0	05·0	05·0	04·9
3·2	*Albireo*		67	32·3	32·3	32·4	32·6	32·7	32·8	N. 27	54·9	55·0	55·1	55·1	55·1	55·0
3·0	π Sagittarii		72	53·1	53·1	53·2	53·4	53·5	53·5	S. 21	03·4	03·4	03·5	03·5	03·5	03·5
3·0	ζ Aquilæ		73	53·9	53·9	54·0	54·2	54·3	54·3	N. 13	50·0	50·1	50·1	50·1	50·1	50·0
2·7	ζ Sagittarii		74	41·8	41·8	41·9	42·0	42·2	42·2	S. 29	54·6	54·7	54·7	54·7	54·7	54·7
2·1	*Nunki*	50	76	31·4	31·4	31·6	31·7	31·8	31·8	S. 26	19·4	19·4	19·4	19·4	19·4	19·4
0·1	*Vega*	49	80	56·8	56·9	57·1	57·3	57·4	57·5	N. 38	46·0	46·1	46·2	46·2	46·1	46·0
2·9	λ Sagittarii		83	20·8	20·8	20·9	21·1	21·2	21·2	S. 25	26·0	26·0	26·0	26·0	26·0	26·0
2·0	*Kaus Australis*	48	84	19·3	19·3	19·4	19·6	19·7	19·7	S. 34	23·7	23·7	23·7	23·7	23·7	23·7
2·8	δ Sagittarii		85	06·2	06·2	06·3	06·5	06·6	06·6	S. 29	50·2	50·2	50·2	50·2	50·2	50·2
3·1	γ Sagittarii		88	54·1	54·1	54·2	54·4	54·5	54·5	S. 30	25·4	25·4	25·4	25·4	25·4	25·4
2·4	*Eltanin*	47	90	58·2	58·4	58·6	58·9	59·1	59·1	N. 51	29·7	29·9	29·9	29·9	29·8	29·7
2·9	β Ophiuchi		94	24·2	24·2	24·4	24·5	24·6	24·6	N. 4	34·7	34·8	34·8	34·8	34·8	34·7
2·5	κ Scorpii		94	45·5	45·6	45·7	45·9	46·0	46·0	S. 39	01·1	01·1	01·2	01·1	01·1	01·0
2·0	θ Scorpii		96	03·9	04·0	04·1	04·3	04·4	04·4	S. 42	59·0	59·1	59·1	59·1	59·0	58·9
2·1	*Rasalhague*	46	96	31·3	31·3	31·5	31·6	31·7	31·7	N. 12	34·8	34·8	34·8	34·8	34·8	34·7
1·7	*Shaula*	45	96	58·3	58·3	58·5	58·7	58·7	58·7	S. 37	05·2	05·3	05·3	05·3	05·2	05·2
3·0	α Aræ		97	27·8	27·9	28·1	28·3	28·4	28·4	S. 49	51·5	51·6	51·6	51·6	51·5	51·4
3·0	β Draconis		97	30·7	30·8	31·1	31·3	31·5	31·6	N. 52	19·4	19·5	19·5	19·5	19·4	19·2
2·8	υ Scorpii		97	41·0	41·0	41·2	41·4	41·4	41·4	S. 37	16·7	16·7	16·7	16·7	16·7	16·6
2·8	β Aræ		99	07·9	08·0	08·2	08·4	08·6	08·5	S. 55	30·6	30·7	30·7	30·6	30·6	30·5
Var.‡	α Herculis		101	35·3	35·4	35·5	35·7	35·7	35·7	N. 14	25·1	25·2	25·2	25·2	25·1	25·0
2·6	*Sabik*	44	102	43·3	43·3	43·5	43·6	43·7	43·6	S. 15	41·8	41·7	41·7	41·7	41·7	41·7
3·1	ζ Aræ		105	48·0	48·1	48·4	48·6	48·7	48·6	S. 55	57·4	57·4	57·5	57·4	57·3	57·2
2·4	ε Scorpii		107	48·9	49·0	49·2	49·3	49·4	49·3	S. 34	15·2	15·2	15·2	15·2	15·1	15·1
1·9	*Atria*	43	108	24·8	25·1	25·5	25·9	26·0	25·9	S. 68	59·4	59·4	59·4	59·4	59·3	59·1
3·0	ζ Herculis		109	53·1	53·2	53·4	53·5	53·6	53·6	N. 31	38·9	38·9	38·9	38·9	38·8	38·6
2·7	ζ Ophiuchi		111	00·8	00·9	01·1	01·2	01·2	01·1	S. 10	31·2	31·2	31·2	31·2	31·2	31·2
2·9	τ Scorpii		111	22·4	22·4	22·6	22·7	22·8	22·7	S. 28	10·2	10·2	10·2	10·1	10·1	10·1
2·8	β Herculis		112	40·9	41·0	41·1	41·3	41·3	41·3	N. 21	32·5	32·6	32·6	32·5	32·5	32·3
1·2	*Antares*	42	112	59·2	59·3	59·4	59·5	59·6	59·5	S. 26	22·9	22·9	22·9	22·9	22·9	22·9
2·9	η Draconis		114	04·4	04·6	05·0	05·3	05·5	05·5	N. 61	34·2	34·3	34·3	34·2	34·1	33·9
3·0	δ Ophiuchi		116	42·2	42·3	42·4	42·5	42·5	42·4	S. 3	38·1	38·1	38·1	38·1	38·1	38·2
2·8	β Scorpii		118	57·7	57·8	57·9	58·1	58·1	58·0	S. 19	44·6	44·6	44·6	44·6	44·6	44·6
2·5	*Dschubba*		120	14·6	14·7	14·8	14·9	15·0	14·9	S. 22	33·5	33·5	33·4	33·4	33·4	33·4
3·0	π Scorpii		120	37·3	37·4	37·5	37·6	37·6	37·5	S. 26	03·0	03·0	03·0	02·9	02·9	02·9
3·0	β Trianguli Aust.		121	42·0	42·2	42·5	42·8	42·8	42·6	S. 63	21·9	21·9	21·9	21·8	21·7	21·6
2·8	α Serpentis		124	12·3	12·4	12·6	12·7	12·7	12·6	N. 6	29·9	29·9	30·0	29·9	29·9	29·8
2·3	*Alphecca*	41	126	33·7	33·9	34·0	34·1	34·1	34·0	N. 26	47·6	47·7	47·7	47·6	47·5	47·3
3·0	γ Lupi †		126	35·0	35·1	35·3	35·4	35·4	35·3	S. 41	05·6	05·6	05·6	05·5	05·4	05·4

‡ 3·0—3·7

†Not suitable for use with H.O. 214 (H.D. 486)

Mag.	Name and Number		S.H.A.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	Dec.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
			°	′	′	′	′	′	′	°	′	′	′	′	′	′
3·1	γ Ursæ Minoris †		129	49·5	48·9	48·4	48·1	48·0	48·1	N. 71	54·7	54·6	54·7	54·8	55·0	55·1
3·1	γ Trianguli Aust.		130	48·7	48·2	47·7	47·3	47·1	47·1	S. 68	35·4	35·5	35·6	35·7	35·8	36·0
2·7	β Libræ		131	03·5	03·2	03·0	02·9	02·8	02·7	S. 9	17·9	18·0	18·0	18·0	18·0	18·0
2·8	β Lupi		135	44·6	44·3	44·0	43·8	43·7	43·7	S. 43	02·3	02·4	02·5	02·6	02·7	02·7
2·2	β Ursæ Minoris	40	137	19·5	18·8	18·3	17·9	17·9	18·1	N. 74	14·7	14·6	14·7	14·8	15·0	15·1
2·9	α Libræ	39	137	35·9	35·6	35·4	35·3	35·2	35·2	S. 15	56·7	56·8	56·9	56·9	56·9	56·9
2·6	ε Bootis		138	60·3	60·1	59·9	59·7	59·7	59·7	N. 27	10·1	10·0	10·0	10·1	10·2	10·3
2·9	α Lupi		139	53·9	53·6	53·3	53·1	53·1	53·1	S. 47	17·2	17·3	17·4	17·5	17·6	17·7
0·1	α Centauri	38	140	29·2	28·8	28·5	28·2	28·2	28·2	S. 60	44·1	44·2	44·3	44·4	44·6	44·7
2·6	η Centauri		141	29·2	28·9	28·7	28·5	28·4	28·4	S. 42	03·3	03·3	03·4	03·5	03·6	03·7
3·0	γ Bootis		142	12·8	12·5	12·3	12·2	12·1	12·2	N. 38	24·3	24·2	24·2	24·3	24·5	24·6
0·2	α Bootis	37	146	20·8	20·5	20·4	20·3	20·2	20·3	N. 19	17·9	17·9	17·9	17·9	18·0	18·1
2·3	θ Centauri	36	148	39·9	39·7	39·4	39·3	39·3	39·3	S. 36	15·3	15·4	15·5	15·6	15·7	15·7
0·9	β Centauri	35	149	26·8	26·4	26·1	25·9	25·9	25·9	S. 60	15·5	15·6	15·7	15·9	16·0	16·1
3·1	ζ Centauri		151	28·3	27·9	27·7	27·6	27·5	27·6	S. 47	10·3	10·4	10·5	10·7	10·8	10·9
2·8	η Bootis		151	36·1	35·9	35·7	35·6	35·6	35·6	N. 18	30·6	30·5	30·5	30·6	30·6	30·7
1·9	η Ursæ Majoris	34	153	20·5	20·2	20·0	19·9	19·9	20·0	N. 49	25·4	25·3	25·4	25·5	25·7	25·8
2·6	ε Centauri †		155	23·3	23·0	22·7	22·6	22·6	22·7	S. 53	20·8	20·9	21·0	21·1	21·3	21·3
1·2	α Virginis	33	158	60·1	59·9	59·7	59·7	59·6	59·7	S. 11	02·5	02·6	02·7	02·7	02·7	02·7
2·2	ζ Ursæ Majoris		159	15·0	14·7	14·5	14·4	14·4	14·6	N. 55	02·4	02·4	02·4	02·6	02·7	02·8
2·9	ι Centauri		160	10·2	10·0	09·8	09·7	09·7	09·8	S. 36	35·4	35·5	35·6	35·7	35·8	35·8
3·0	ε Virginis		164	44·4	44·1	44·0	43·9	44·0	44·0	N. 11	04·8	04·7	04·7	04·7	04·8	04·9
2·9	α Canum Venat.		166	15·6	15·3	15·2	15·1	15·2	15·3	N. 38	26·2	26·2	26·3	26·4	26·5	26·6
1·7	ε Ursæ Majoris	32	166	44·6	44·3	44·1	44·1	44·2	44·3	N. 56	04·7	04·7	04·8	05·0	05·1	05·2
1·5	β Crucis		168	23·9	23·6	23·4	23·3	23·4	23·5	S. 59	33·6	33·7	33·9	34·0	34·2	34·2
2·9	γ Virginis		169	52·4	52·2	52·0	52·0	52·0	52·1	S. 1	19·5	19·6	19·6	19·6	19·6	19·6
2·4	γ Centauri		169	55·9	55·7	55·5	55·4	55·5	55·6	S. 48	49·9	50·0	50·1	50·3	50·4	50·4
2·9	α Muscæ		171	02·3	01·8	01·6	01·5	01·6	01·9	S. 69	00·3	00·4	00·6	00·8	00·9	01·0
2·8	β Corvi		171	42·0	41·8	41·7	41·7	41·7	41·8	S. 23	16·2	16·3	16·4	16·5	16·5	16·5
1·6	γ Crucis	31	172	31·2	30·9	30·7	30·7	30·8	30·9	S. 56	58·9	59·0	59·2	59·3	59·5	59·5
1·1	α Crucis	30	173	39·6	39·3	39·1	39·1	39·2	39·4	S. 62	58·1	58·3	58·4	58·6	58·7	58·8
2·8	γ Corvi	29	176	20·4	20·2	20·1	20·0	20·1	20·2	S. 17	24·9	25·0	25·1	25·1	25·2	25·2
2·9	δ Centauri		178	12·1	11·8	11·7	11·7	11·8	11·9	S. 50	35·5	35·7	35·8	36·0	36·1	36·1
2·5	γ Ursæ Majoris		181	50·4	50·1	50·0	50·0	50·1	50·3	N. 53	49·0	49·0	49·1	49·3	49·4	49·4
2·2	β Leonis	28	183	01·4	01·2	01·1	01·1	01·2	01·3	N. 14	41·8	41·8	41·8	41·8	41·9	41·9
2·6	δ Leonis		191	46·4	46·2	46·1	46·2	46·2	46·3	N. 20	38·7	38·7	38·7	38·8	38·8	38·9
3·2	ψ Ursæ Majoris		192	54·0	53·8	53·8	53·8	53·9	54·1	N. 44	37·1	37·1	37·2	37·3	37·4	37·4
2·0	α Ursæ Majoris	27	194	24·8	24·5	24·4	24·6	24·8	25·1	N. 61	52·2	52·2	52·3	52·5	52·6	52·6
2·4	β Ursæ Majoris		194	52·7	52·4	52·4	52·5	52·7	52·9	N. 56	30·0	30·1	30·2	30·3	30·4	30·4
2·8	μ Velorum		198	32·7	32·5	32·5	32·6	32·8	32·9	S. 49	17·9	18·0	18·2	18·3	18·4	18·4
3·0	θ Carinæ †		199	27·1	26·9	26·9	27·0	27·3	27·6	S. 64	16·3	16·5	16·7	16·9	16·9	17·0
2·3	γ Leonis		205	19·0	18·9	18·8	18·9	19·0	19·1	N. 19	57·2	57·2	57·2	57·3	57·3	57·4
1·3	α Leonis	26	208	12·4	12·2	12·2	12·3	12·4	12·5	N. 12	04·6	04·5	04·5	04·6	04·6	04·6
3·1	ε Leonis		213	51·3	51·2	51·2	51·3	51·4	51·5	N. 23	52·6	52·6	52·6	52·7	52·7	52·7
3·0	N Velorum		217	21·4	21·3	21·4	21·6	21·8	22·1	S. 56	56·0	56·2	56·3	56·5	56·5	56·4
2·2	α Hydræ	25	218	22·7	22·6	22·6	22·7	22·8	22·9	S. 8	33·7	33·8	33·8	33·9	33·8	33·8
2·6	κ Velorum		219	38·2	38·1	38·2	38·4	38·7	38·9	S. 54	54·8	55·0	55·1	55·2	55·2	55·2
2·2	ι Carinæ		220	52·0	52·0	52·1	52·3	52·6	52·8	S. 59	10·8	10·9	11·1	11·2	11·2	11·2
1·8	β Carinæ	24	221	44·5	44·4	44·6	45·0	45·4	45·8	S. 69	37·4	37·6	37·7	37·9	37·9	37·8
2·2	λ Velorum	23	223	12·1	12·1	12·1	12·3	12·5	12·6	S. 43	20·4	20·6	20·8	20·8	20·8	20·8
3·1	ι Ursæ Majoris		225	34·8	34·7	34·8	35·0	35·1	35·3	N. 48	07·7	07·8	07·9	07·9	07·9	07·9
2·0	δ Velorum		228	58·2	58·2	58·3	58·5	58·8	59·0	S. 54	37·5	37·7	37·8	37·9	37·9	37·9
1·7	ε Carinæ	22	234	28·5	28·5	28·7	29·0	29·3	29·5	S. 59	26·2	26·4	26·6	26·6	26·6	26·5
1·9	γ Velorum		237	47·0	47·0	47·1	47·3	47·5	47·7	S. 47	16·3	16·4	16·5	16·6	16·6	16·5
2·9	ρ Puppis		238	21·0	21·0	21·1	21·2	21·4	21·4	S. 24	14·4	14·5	14·6	14·7	14·6	14·6
2·3	ζ Puppis		239	17·8	17·8	17·9	18·1	18·2	18·4	S. 39	56·4	56·6	56·7	56·7	56·7	56·6
1·2	β Geminorum	21	244	00·8	00·8	00·9	01·0	01·1	01·2	N. 28	04·8	04·8	04·8	04·8	04·8	04·8
0·5	α Canis Minoris	20	245	28·0	28·0	28·1	28·2	28·3	28·4	N. 5	16·9	16·8	16·8	16·8	16·8	16·9

† Not suitable for use with H.O. 214 (H.D. 486)

STARS, 0000 JULY—DECEMBER

Mag.	Name and Number		S.H.A.	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	Dec.	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
			°	′	′	′	′	′	′	°	′	′	′	′	′	′
3·1	γ Ursæ Minoris †		129	48·5	49·0	49·5	49·9	50·1	50·0	N. 71	55·2	55·2	55·2	55·1	54·9	54·7
3·1	γ Trianguli Aust.		130	47·3	47·6	48·0	48·2	48·2	48·0	S. 68	36·0	36·1	36·0	35·9	35·8	35·7
2·7	β Libræ		131	02·8	02·9	03·0	03·1	03·1	03·0	S. 9	18·0	17·9	17·9	17·9	17·9	18·0
2·8	β Lupi		135	43·8	43·9	44·1	44·2	44·2	44·0	S. 43	02·8	02·8	02·7	02·6	02·6	02·5
2·2	*Kochab*	40	137	18·6	19·2	19·8	20·2	20·3	20·1	N. 74	15·2	15·2	15·1	15·0	14·8	14·6
2·9	*Zubenelgenubi*	39	137	35·2	35·4	35·5	35·5	35·5	35·4	S. 15	56·9	56·9	56·9	56·8	56·8	56·9
2·6	ε Bootis		138	59·8	59·9	60·0	60·1	60·1	60·0	N. 27	10·4	10·4	10·3	10·3	10·1	10·0
2·9	α Lupi		139	53·2	53·3	53·5	53·6	53·5	53·3	S. 47	17·7	17·7	17·6	17·5	17·4	17·4
0·1	*Rigil Kent.*	38	140	28·4	28·7	28·9	29·1	29·0	28·7	S. 60	44·7	44·7	44·6	44·5	44·4	44·3
2·6	η Centauri		141	28·5	28·7	28·8	28·9	28·8	28·7	S. 42	03·7	03·7	03·6	03·6	03·5	03·5
3·0	γ Bootis		142	12·3	12·5	12·6	12·7	12·7	12·5	N. 38	24·7	24·7	24·6	24·5	24·4	24·2
0·2	*Arcturus*	37	146	20·3	20·5	20·6	20·6	20·6	20·4	N. 19	18·1	18·1	18·1	18·0	17·9	17·8
2·3	*Menkent*	36	148	39·4	39·5	39·7	39·7	39·6	39·4	S. 36	15·7	15·7	15·6	15·5	15·5	15·5
0·9	*Hadar*	35	149	26·1	26·4	26·6	26·7	26·6	26·3	S. 60	16·1	16·1	16·0	15·9	15·8	15·7
3·1	ζ Centauri		151	27·7	27·9	28·0	28·1	28·0	27·7	S. 47	10·9	10·8	10·8	10·7	10·6	10·5
2·8	η Bootis		151	35·7	35·8	35·9	35·9	35·9	35·7	N. 18	30·8	30·8	30·8	30·7	30·6	30·4
1·9	*Alkaid*	34	153	20·2	20·4	20·5	20·6	20·5	20·3	N. 49	25·8	25·8	25·7	25·6	25·4	25·2
2·6	ε Centauri †		155	22·8	23·0	23·2	23·2	23·1	22·8	S. 53	21·4	21·3	21·2	21·1	21·0	21·0
1·2	*Spica*	33	158	59·8	59·9	59·9	59·9	59·8	59·6	S. 11	02·7	02·6	02·6	02·6	02·6	02·7
2·2	*Mizar*		159	14·8	15·0	15·2	15·2	15·1	14·9	N. 55	02·9	02·8	02·7	02·6	02·4	02·2
2·9	ι Centauri		160	09·9	10·0	10·1	10·1	10·0	09·7	S. 36	35·8	35·8	35·7	35·6	35·5	35·6
3·0	ε Virginis		164	44·1	44·2	44·3	44·3	44·1	43·9	N. 11	04·9	04·9	04·9	04·8	04·7	04·6
2·9	*Cor Caroli*		166	15·4	15·5	15·6	15·6	15·5	15·3	N. 38	26·6	26·6	26·5	26·4	26·2	26·1
1·7	*Alioth*	32	166	44·6	44·8	44·9	44·9	44·8	44·5	N. 56	05·2	05·1	05·0	04·8	04·7	04·5
1·5	*Mimosa*		168	23·8	24·0	24·1	24·1	23·9	23·5	S. 59	34·2	34·2	34·1	33·9	33·8	33·8
2·9	γ Virginis		169	52·2	52·2	52·3	52·3	52·1	51·9	S. 1	19·6	19·5	19·5	19·5	19·6	19·7
2·4	*Muhlifain*		169	55·8	55·9	56·0	56·0	55·8	55·5	S. 48	50·4	50·4	50·2	50·1	50·1	50·1
2·9	α Muscæ		171	02·3	02·6	02·8	02·8	02·5	02·0	S. 69	01·0	01·0	00·8	00·7	00·6	00·5
2·8	β Corvi		171	41·9	41·9	42·0	42·0	41·8	41·6	S. 23	16·5	16·4	16·3	16·3	16·3	16·4
1·6	*Gacrux*	31	172	31·1	31·3	31·5	31·4	31·2	30·8	S. 56	59·5	59·4	59·3	59·2	59·1	59·1
1·1	*Acrux*	30	173	39·6	39·9	40·0	40·0	39·7	39·3	S. 62	58·8	58·7	58·6	58·4	58·3	58·3
2·8	*Gienah*	29	176	20·2	20·3	20·4	20·3	20·2	19·9	S. 17	25·1	25·1	25·0	25·0	25·0	25·1
2·9	δ Centauri		178	12·1	12·2	12·3	12·2	12·0	11·7	S. 50	36·1	36·0	35·9	35·8	35·7	35·7
2·5	*Phecda*		181	50·5	50·6	50·7	50·6	50·4	50·1	N. 53	49·4	49·3	49·2	49·0	48·9	48·7
2·2	*Denebola*	28	183	01·4	01·4	01·4	01·4	01·2	01·0	N. 14	41·9	41·9	41·9	41·8	41·7	41·6
2·6	δ Leonis		191	46·4	46·5	46·5	46·4	46·2	45·9	N. 20	38·9	38·9	38·8	38·7	38·6	38·5
3·2	ψ Ursæ Majoris		192	54·2	54·3	54·3	54·2	53·9	53·6	N. 44	37·4	37·3	37·2	37·1	36·9	36·8
2·0	*Dubhe*	27	194	25·3	25·4	25·4	25·2	24·9	24·5	N. 61	52·5	52·4	52·3	52·1	51·9	51·9
2·4	*Merak*		194	53·0	53·1	53·1	53·0	52·7	52·3	N. 56	30·4	30·3	30·1	30·0	29·8	29·7
2·8	μ Velorum		198	33·1	33·2	33·2	33·0	32·7	32·4	S. 49	18·3	18·2	18·1	18·0	17·9	18·0
3·0	θ Carinæ †		199	27·9	28·0	28·0	27·8	27·4	27·0	S. 64	16·9	16·8	16·6	16·5	16·4	16·5
2·3	*Algeiba*		205	19·2	19·2	19·1	19·0	18·8	18·5	N. 19	57·4	57·3	57·3	57·2	57·1	57·0
1·3	*Regulus*	26	208	12·5	12·5	12·5	12·3	12·1	11·9	N. 12	04·6	04·6	04·6	04·6	04·5	04·4
3·1	ε Leonis		213	51·6	51·5	51·5	51·3	51·1	50·8	N. 23	52·7	52·7	52·6	52·5	52·4	52·4
3·0	N Velorum		217	22·2	22·2	22·1	21·9	21·5	21·2	S. 56	56·3	56·2	56·0	56·0	56·0	56·1
2·2	*Alphard*	25	218	22·9	22·9	22·8	22·7	22·4	22·2	S. 8	33·7	33·7	33·6	33·6	33·7	33·8
2·6	κ Velorum		219	39·0	39·0	38·9	38·7	38·3	38·0	S. 54	55·1	54·9	54·8	54·7	54·7	54·8
2·2	ι Carinæ		220	53·0	53·0	52·9	52·6	52·2	51·9	S. 59	11·1	10·9	10·8	10·7	10·7	10·8
1·8	*Miaplacidus*	24	221	46·1	46·2	46·0	45·6	45·1	44·6	S. 69	37·7	37·6	37·4	37·3	37·3	37·4
2·2	*Suhail*	23	223	12·7	12·7	12·6	12·4	12·1	11·8	S. 43	20·7	20·5	20·4	20·4	20·4	20·5
3·1	ι Ursæ Majoris		225	35·3	35·2	35·1	34·8	34·5	34·2	N. 48	07·8	07·7	07·6	07·5	07·5	07·4
2·0	δ Velorum		228	59·1	59·1	58·9	58·7	58·3	58·0	S. 54	37·7	37·6	37·5	37·4	37·4	37·5
1·7	*Avior*	22	234	29·6	29·6	29·4	29·1	28·7	28·4	S. 59	26·4	26·2	26·1	26·1	26·1	26·2
1·9	γ Velorum		237	47·7	47·7	47·5	47·2	46·9	46·7	S. 47	16·4	16·2	16·1	16·1	16·1	16·2
2·9	ρ Puppis		238	21·4	21·4	21·2	21·0	20·8	20·6	S. 24	14·5	14·3	14·3	14·3	14·3	14·4
2·3	ζ Puppis		239	18·4	18·3	18·2	17·9	17·6	17·4	S. 39	56·5	56·4	56·3	56·2	56·3	56·4
1·2	*Pollux*	21	244	01·2	01·0	00·8	00·6	00·4	00·1	N. 28	04·8	04·8	04·7	04·7	04·6	04·6
0·5	*Procyon*	20	245	28·3	28·2	28·1	27·9	27·6	27·4	N. 5	16·9	16·9	17·0	16·9	16·9	16·8

† Not suitable for use with H.O. 214 (H.D. 486)

STARS, 0000 JANUARY—JUNE

Mag.	Name and Number		S.H.A.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	Dec.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
			°	′	′	′	′	′	′	°	′	′	′	′	′	′
1·6	α Geminorum		246	42·4	42·4	42·5	42·7	42·8	42·8	N. 31	56·2	56·2	56·3	56·3	56·3	56·3
3·3	σ Puppis		247	51·9	51·9	52·1	52·3	52·5	52·6	S. 43	15·5	15·6	15·7	15·7	15·7	15·6
3·1	β Canis Minoris		248	30·9	30·9	31·0	31·2	31·3	31·3	N. 8	20·0	20·0	19·9	20·0	20·0	20·0
2·4	η Canis Majoris		249	11·7	11·7	11·8	12·0	12·1	12·2	S. 29	15·7	15·8	15·9	15·9	15·8	15·7
2·7	π Puppis		250	54·5	54·5	54·7	54·9	55·0	55·1	S. 37	03·5	03·7	03·8	03·8	03·7	03·6
2·0	δ Canis Majoris		253	07·6	07·7	07·8	08·0	08·1	08·2	S. 26	21·6	21·7	21·8	21·8	21·7	21·6
3·1	ο Canis Majoris		254	28·5	28·6	28·7	28·8	29·0	29·0	S. 23	48·2	48·3	48·3	48·3	48·3	48·2
1·6	ε Canis Majoris	19	255	33·7	33·7	33·8	34·0	34·1	34·2	S. 28	56·6	56·7	56·8	56·8	56·8	56·7
2·8	τ Puppis		257	38·9	39·0	39·2	39·5	39·7	39·8	S. 50	35·4	35·6	35·7	35·7	35·6	35·5
−1·6	α Canis Majoris	18	258	57·5	57·6	57·7	57·8	58·0	58·0	S. 16	41·3	41·4	41·4	41·4	41·4	41·3
1·9	γ Geminorum		260	53·7	53·8	53·9	54·0	54·1	54·1	N. 16	25·0	25·0	25·0	25·0	25·0	25·0
−0·9	α Carinæ	17	264	07·8	07·9	08·1	08·4	08·6	08·7	S. 52	41·2	41·4	41·4	41·4	41·3	41·2
2·0	β Canis Majoris		264	34·2	34·3	34·4	34·6	34·7	34·7	S. 17	56·9	56·9	57·0	57·0	56·9	56·8
2·7	θ Aurigæ		270	27·1	27·2	27·3	27·5	27·6	27·6	N. 37	12·6	12·7	12·7	12·7	12·6	12·6
2·1	β Aurigæ		270	31·7	31·8	31·9	32·1	32·3	32·2	N. 44	56·7	56·8	56·8	56·8	56·7	56·7
Var.‡	α Orionis	16	271	30·6	30·7	30·8	30·9	31·0	31·0	N. 7	24·1	24·0	24·0	24·0	24·0	24·1
2·2	κ Orionis		273	19·6	19·6	19·8	19·9	20·0	20·0	S. 9	40·8	40·9	40·9	40·9	40·9	40·8
1·9	ζ Orionis		275	05·6	05·6	05·8	05·9	06·0	06·0	S. 1	57·4	57·5	57·5	57·5	57·4	57·4
2·8	α Columbæ		275	17·3	17·4	17·6	17·8	17·9	17·9	S. 34	05·4	05·5	05·5	05·5	05·4	05·3
3·0	ζ Tauri		275	55·4	55·5	55·6	55·8	55·9	55·8	N. 21	07·7	07·7	07·7	07·7	07·6	07·6
1·8	ε Orionis	15	276	13·9	13·9	14·0	14·2	14·3	14·2	S. 1	13·1	13·2	13·2	13·2	13·1	13·1
2·9	ι Orionis		276	24·9	25·0	25·1	25·3	25·4	25·3	S. 5	55·6	55·7	55·7	55·7	55·7	55·6
2·7	α Leporis		277	03·8	03·9	04·1	04·2	04·3	04·3	S. 17	50·5	50·6	50·6	50·6	50·5	50·4
2·5	δ Orionis		277	17·1	17·2	17·3	17·4	17·5	17·5	S. 0	19·1	19·1	19·2	19·1	19·1	19·0
3·0	β Leporis		278	10·7	10·8	10·9	11·1	11·1	11·1	S. 20	46·9	46·9	47·0	46·9	46·9	46·8
1·8	β Tauri	14	278	46·9	47·0	47·1	47·3	47·3	47·3	N. 28	35·3	35·3	35·3	35·3	35·2	35·2
1·7	γ Orionis	13	279	01·1	01·2	01·3	01·4	01·5	01·4	N. 6	19·6	19·6	19·6	19·6	19·6	19·7
0·2	α Aurigæ	12	281	14·5	14·6	14·8	15·0	15·1	15·0	N. 45	58·5	58·6	58·6	58·6	58·5	58·4
0·3	β Orionis	11	281	38·1	38·2	38·3	38·4	38·5	38·5	S. 8	13·8	13·9	13·9	13·9	13·8	13·8
2·9	β Eridani		283	18·8	18·9	19·0	19·1	19·2	19·2	S. 5	07·1	07·2	07·2	07·2	07·1	07·0
2·9	ι Aurigæ †		286	07·1	07·1	07·3	07·4	07·5	07·4	N. 33	07·8	07·8	07·8	07·8	07·8	07·7
1·1	α Tauri	10	291	20·6	20·7	20·8	20·9	20·9	20·9	N. 16	27·8	27·7	27·7	27·7	27·7	27·7
3·2	γ Eridani		300	45·3	45·4	45·6	45·7	45·7	45·6	S. 13	34·6	34·6	34·6	34·6	34·5	34·4
3·0	ε Persei		300	54·9	55·0	55·2	55·3	55·3	55·2	N. 39	56·7	56·8	56·7	56·7	56·6	56·6
2·9	ζ Persei		301	49·3	49·4	49·5	49·7	49·7	49·5	N. 31	49·0	49·0	49·0	48·9	48·9	48·9
3·0	η Tauri		303	27·9	28·0	28·1	28·2	28·2	28·1	N. 24	02·1	02·1	02·1	02·0	02·0	02·0
1·9	α Persei	9	309	19·3	19·5	19·7	19·8	19·8	19·6	N. 49	47·0	47·0	46·9	46·8	46·7	46·7
Var.§	β Persei †		313	19·5	19·7	19·8	19·9	19·9	19·7	N. 40	52·2	52·2	52·1	52·1	52·0	52·0
2·8	α Ceti	8	314	43·6	43·7	43·8	43·9	43·8	43·7	N. 3	59·9	59·9	59·9	59·9	59·9	60·0
3·1	θ Eridani	7	315	39·0	39·1	39·3	39·4	39·4	39·3	S. 40	24·1	24·1	24·0	23·9	23·8	23·6
2·1	α Ursæ Minoris †		327	27·8	38·6	47·2	51·2	48·8	40·7	N. 89	09·9	09·9	09·8	09·6	09·5	09·4
3·1	β Trianguli		327	57·1	57·3	57·4	57·4	57·3	57·1	N. 34	52·9	52·9	52·8	52·7	52·7	52·7
2·2	α Arietis	6	328	31·6	31·7	31·8	31·9	31·8	31·6	N. 23	21·3	21·3	21·2	21·2	21·2	21·2
2·2	γ Andromedæ		329	22·4	22·6	22·7	22·7	22·6	22·4	N. 42	13·4	13·3	13·3	13·2	13·1	13·1
3·0	α Hydri		330	29·4	29·7	29·9	30·0	29·9	29·7	S. 61	41·2	41·2	41·1	40·9	40·7	40·6
2·7	β Arietis		331	39·3	39·4	39·4	39·5	39·4	39·2	N. 20	41·8	41·8	41·8	41·7	41·7	41·8
0·6	α Eridani	5	335	47·2	47·4	47·6	47·6	47·6	47·3	S. 57	21·5	21·5	21·3	21·2	21·0	20·8
2·8	δ Cassiopeiæ		338	55·1	55·4	55·5	55·5	55·4	55·0	N. 60	07·3	07·2	07·1	07·0	06·9	06·8
2·4	β Andromedæ		342	53·2	53·3	53·4	53·4	53·2	53·0	N. 35	30·1	30·1	30·0	29·9	29·9	29·9
Var.‖	γ Cassiopeiæ		346	10·1	10·3	10·4	10·4	10·2	09·8	N. 60	35·9	35·8	35·7	35·5	35·4	35·4
2·2	β Ceti	4	349	23·4	23·5	23·6	23·5	23·4	23·2	S. 18	06·9	06·9	06·8	06·7	06·6	06·5
2·5	α Cassiopeiæ	3	350	11·9	12·1	12·2	12·1	11·9	11·6	N. 56	25·0	24·9	24·8	24·7	24·6	24·6
2·4	α Phœnicis	2	353	42·8	43·0	43·0	43·0	42·8	42·6	S. 42	26·1	26·0	25·9	25·7	25·6	25·5
2·9	β Hydri †		353	52·4	53·0	53·2	53·2	52·8	52·1	S. 77	23·3	23·2	23·0	22·8	22·6	22·5
2·9	γ Pegasi		356	59·2	59·2	59·3	59·2	59·1	58·8	N. 15	03·4	03·4	03·3	03·3	03·4	03·4
2·4	β Cassiopeiæ		358	00·7	00·9	01·0	00·9	00·6	00·3	N. 59	01·7	01·6	01·5	01·3	01·3	01·3
2·2	α Andromedæ	1	358	12·0	12·1	12·1	12·0	11·8	11·6	N. 28	58·0	57·9	57·8	57·8	57·8	57·8

‡ 0·1—1·2 §2·3—3·5 ‖ Irregular variable; 1974 mag. 2·5 † Not suitable for use with H.O. 214 (H.D. 486)

STARS, 0000 JULY—DECEMBER

Mag.	Name and Number		S.H.A.	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	Dec.	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
			°	′	′	′	′	′	′	°	′	′	′	′	′	′
1·6	*Castor*		246	42·8	42·7	42·5	42·2	41·9	41·7	N. 31	56·2	56·2	56·1	56·1	56·1	56·0
3·3	σ Puppis		247	52·6	52·5	52·3	52·0	51·8	51·5	S. 43	15·4	15·3	15·2	15·2	15·3	15·4
3·1	β Canis Minoris		248	31·3	31·1	31·0	30·8	30·5	30·3	N. 8	20·0	20·1	20·1	20·0	20·0	19·9
2·4	η Canis Majoris		249	12·2	12·1	11·9	11·7	11·4	11·3	S. 29	15·6	15·5	15·4	15·4	15·5	15·6
2·7	π Puppis		250	55·1	55·0	54·8	54·5	54·3	54·1	S. 37	03·5	03·4	03·3	03·3	03·3	03·5
2·0	*Wezen*		253	08·1	08·0	07·8	07·6	07·4	07·2	S. 26	21·5	21·4	21·3	21·3	21·4	21·5
3·1	ο Canis Majoris		254	29·0	28·9	28·7	28·5	28·2	28·0	S. 23	48·1	48·0	47·9	47·9	48·0	48·1
1·6	*Adhara*	19	255	34·2	34·0	33·8	33·6	33·4	33·2	S. 28	56·5	56·4	56·3	56·3	56·4	56·6
2·8	τ Puppis		257	39·8	39·6	39·4	39·1	38·8	38·6	S. 50	35·3	35·2	35·1	35·1	35·2	35·3
−1·6	*Sirius*	18	258	57·9	57·8	57·6	57·4	57·2	57·0	S. 16	41·2	41·1	41·0	41·1	41·1	41·3
1·9	*Alhena*		260	54·0	53·9	53·7	53·4	53·2	53·0	N. 16	25·1	25·1	25·1	25·1	25·0	25·0
−0·9	*Canopus*	17	264	08·7	08·5	08·2	07·9	07·6	07·5	S. 52	41·0	40·9	40·8	40·8	40·9	41·1
2·0	*Mirzam*		264	34·6	34·5	34·3	34·0	33·8	33·7	S. 17	56·7	56·6	56·6	56·6	56·7	56·8
2·7	θ Aurigæ		270	27·4	27·2	27·0	26·7	26·4	26·3	N. 37	12·6	12·5	12·5	12·5	12·5	12·6
2·1	*Menkalinan*		270	32·1	31·9	31·6	31·3	31·0	30·8	N. 44	56·6	56·6	56·5	56·5	56·6	56·6
Var.‡	*Betelgeuse*	16	271	30·9	30·7	30·5	30·3	30·1	29·9	N. 7	24·1	24·2	24·2	24·2	24·1	24·1
2·2	κ Orionis		273	19·9	19·7	19·5	19·3	19·1	19·0	S. 9	40·7	40·6	40·5	40·6	40·6	40·7
1·9	*Alnitak*		275	05·8	05·7	05·5	05·3	05·1	04·9	S. 1	57·3	57·2	57·2	57·2	57·3	57·3
2·8	*Phact*		275	17·8	17·6	17·4	17·1	16·9	16·8	S. 34	05·1	05·0	05·0	05·0	05·1	05·3
3·0	ζ Tauri		275	55·7	55·5	55·3	55·0	54·8	54·7	N. 21	07·7	07·7	07·7	07·7	07·7	07·7
1·8	*Alnilam*	15	276	14·1	13·9	13·7	13·5	13·3	13·2	S. 1	13·0	12·9	12·9	12·9	13·0	13·0
2·9	ι Orionis		276	25·2	25·0	24·8	24·6	24·4	24·3	S. 5	55·5	55·4	55·4	55·4	55·5	55·5
2·7	α Leporis		277	04·2	04·0	03·8	03·6	03·4	03·3	S. 17	50·3	50·2	50·1	50·2	50·3	50·4
2·5	δ Orionis		277	17·3	17·2	16·9	16·7	16·5	16·4	S. 0	19·0	18·9	18·9	18·9	18·9	19·0
3·0	β Leporis		278	11·0	10·8	10·6	10·4	10·2	10·1	S. 20	46·6	46·5	46·5	46·5	46·6	46·7
1·8	*Elnath*	14	278	47·1	46·9	46·7	46·4	46·2	46·1	N. 28	35·2	35·2	35·2	35·2	35·3	35·3
1·7	*Bellatrix*	13	279	01·3	01·1	00·9	00·7	00·5	00·4	N. 6	19·7	19·8	19·8	19·8	19·8	19·7
0·2	*Capella*	12	281	14·8	14·6	14·3	14·0	13·7	13·5	N. 45	58·4	58·3	58·4	58·4	58·4	58·5
0·3	*Rigel*	11	281	38·3	38·2	37·9	37·7	37·6	37·5	S. 8	13·7	13·6	13·5	13·6	13·6	13·7
2·9	β Eridani		283	19·0	18·8	18·6	18·4	18·3	18·2	S. 5	06·9	06·9	06·8	06·8	06·9	07·0
2·9	ι Aurigæ †		286	07·3	07·0	06·8	06·5	06·3	06·2	N. 33	07·7	07·7	07·7	07·8	07·8	07·8
1·1	*Aldebaran*	10	291	20·7	20·5	20·2	20·0	19·9	19·8	N. 16	27·8	27·8	27·9	27·9	27·9	27·9
3·2	γ Eridani		300	45·4	45·2	45·0	44·8	44·7	44·7	S. 13	34·3	34·2	34·2	34·2	34·3	34·4
3·0	ε Persei		300	55·0	54·7	54·4	54·2	54·0	53·9	N. 39	56·5	56·6	56·6	56·7	56·8	56·8
2·9	ζ Persei		301	49·3	49·1	48·8	48·6	48·5	48·4	N. 31	48·9	48·9	49·0	49·0	49·1	49·1
3·0	*Alcyone*		303	27·9	27·6	27·4	27·2	27·1	27·0	N. 24	02·0	02·1	02·1	02·2	02·2	02·2
1·9	*Mirfak*	9	309	19·3	19·0	18·7	18·5	18·3	18·3	N. 49	46·7	46·7	46·8	46·9	47·0	47·1
Var.§	*Algol* †		313	19·5	19·2	18·9	18·7	18·6	18·6	N. 40	52·0	52·0	52·1	52·2	52·3	52·4
2·8	*Menkar*	8	314	43·5	43·3	43·1	42·9	42·8	42·8	N. 4	00·1	00·2	00·2	00·2	00·2	00·2
3·1	*Acamar*	7	315	39·1	38·8	38·6	38·4	38·3	38·3	S. 40	23·5	23·4	23·4	23·5	23·6	23·8
2·1	*Polaris* †		327	29·8	18·1	08·1	01·9	00·7	05·3	N. 89	09·3	09·4	09·5	09·7	09·9	10·0
3·1	β Trianguli		327	56·9	56·6	56·4	56·2	56·2	56·2	N. 34	52·7	52·8	52·9	53·0	53·1	53·1
2·2	*Hamal*	6	328	31·4	31·1	30·9	30·8	30·7	30·8	N. 23	21·3	21·4	21·5	21·5	21·6	21·6
2·2	*Almak*		329	22·1	21·8	21·6	21·5	21·4	21·5	N. 42	13·1	13·2	13·3	13·4	13·5	13·6
3·0	α Hydri		330	29·4	29·0	28·6	28·5	28·5	28·7	S. 61	40·4	40·4	40·5	40·6	40·8	40·9
2·7	*Sheratan*		331	39·0	38·7	38·5	38·4	38·4	38·4	N. 20	41·8	41·9	42·0	42·1	42·1	42·1
0·6	*Achernar*	5	335	47·0	46·6	46·4	46·2	46·3	46·4	S. 57	20·7	20·7	20·8	20·9	21·1	21·2
2·8	*Ruchbah*		338	54·6	54·2	54·0	53·8	53·8	54·0	N. 60	06·9	07·0	07·1	07·3	07·4	07·5
2·4	*Mirach*		342	52·7	52·5	52·3	52·2	52·2	52·3	N. 35	30·0	30·1	30·2	30·3	30·4	30·4
Var.‖	γ Cassiopeiæ		346	09·4	09·1	08·8	08·7	08·8	08·9	N. 60	35·5	35·6	35·7	35·9	36·0	36·1
2·2	*Diphda*	4	349	23·0	22·7	22·6	22·6	22·6	22·7	S. 18	06·4	06·4	06·4	06·4	06·5	06·5
2·5	*Schedar*	3	350	11·2	10·9	10·7	10·6	10·7	10·8	N. 56	24·6	24·8	24·9	25·1	25·2	25·3
2·4	*Ankaa*	2	353	42·3	42·0	41·9	41·8	41·9	42·0	S. 42	25·4	25·4	25·4	25·6	25·7	25·7
2·9	β Hydri †		353	51·3	50·6	50·1	50·1	50·5	51·1	S. 77	22·5	22·5	22·7	22·8	23·0	23·0
2·9	*Algenib*		356	58·6	58·4	58·3	58·3	58·3	58·4	N. 15	03·5	03·6	03·7	03·8	03·8	03·8
2·4	*Caph*		357	59·9	59·6	59·4	59·4	59·5	59·7	N. 59	01·4	01·5	01·7	01·8	02·0	02·0
2·2	*Alpheratz*	1	358	11·4	11·1	11·0	11·0	11·0	11·1	N. 28	57·9	58·0	58·2	58·3	58·3	58·3

‡ 0·1—1·2 § 2·3—3·5 ‖ Irregular variable; 1974 mag. 2·5 † Not suitable for use with H.O. 214 (H.D. 486)

POLARIS (POLE STAR) TABLES, 0000

FOR DETERMINING LATITUDE FROM SEXTANT ALTITUDE AND FOR AZIMUTH

L.H.A. ARIES	0°– 9°	10°– 19°	20°– 29°	30°– 39°	40°– 49°	50°– 59°	60°– 69°	70°– 79°	80°– 89°	90°– 99°	100°– 109°	110°– 119°
	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0
°	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
0	0 16·5	0 12·4	0 09·7	0 08·6	0 08·9	0 10·8	0 14·2	0 19·0	0 25·0	0 32·0	0 39·9	0 48·3
1	16·1	12·1	09·5	08·5	09·1	11·1	14·7	19·6	25·7	32·8	40·7	49·1
2	15·6	11·8	09·4	08·5	09·2	11·4	15·1	20·1	26·3	33·5	41·5	50·0
3	15·2	11·5	09·2	08·5	09·3	11·7	15·5	20·7	27·0	34·3	42·3	50·9
4	14·7	11·2	09·1	08·5	09·5	12·0	16·0	21·3	27·7	35·1	43·2	51·7
5	0 14·3	0 10·9	0 08·9	0 08·5	0 09·7	0 12·4	0 16·5	0 21·9	0 28·4	0 35·9	0 44·0	0 52·6
6	13·9	10·6	08·8	08·6	09·9	12·7	17·0	22·5	29·1	36·7	44·9	53·5
7	13·5	10·4	08·7	08·7	10·1	13·1	17·5	23·1	29·8	37·4	45·7	54·4
8	13·1	10·1	08·7	08·7	10·3	13·5	18·0	23·7	30·6	38·3	46·6	55·2
9	12·8	09·9	08·6	08·8	10·6	13·8	18·5	24·4	31·3	39·1	47·4	56·1
10	0 12·4	0 09·7	0 08·6	0 08·9	0 10·8	0 14·2	0 19·0	0 25·0	0 32·0	0 39·9	0 48·3	0 57·0
Lat.	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1
°	′	′	′	′	′	′	′	′	′	′	′	′
0	0·5	0·6	0·6	0·6	0·6	0·5	0·5	0·4	0·3	0·3	0·2	0·2
10	·5	·6	·6	·6	·6	·5	·5	·4	·4	·3	·3	·2
20	·5	·6	·6	·6	·6	·6	·5	·5	·4	·4	·3	·3
30	·6	·6	·6	·6	·6	·6	·5	·5	·5	·4	·4	·4
40	0·6	0·6	0·6	0·6	0·6	0·6	0·6	0·5	0·5	0·5	0·5	0·5
45	·6	·6	·6	·6	·6	·6	·6	·6	·6	·5	·5	·5
50	·6	·6	·6	·6	·6	·6	·6	·6	·6	·6	·6	·6
55	·6	·6	·6	·6	·6	·6	·6	·6	·7	·7	·7	·7
60	·6	·6	·6	·6	·6	·6	·7	·7	·7	·8	·8	·8
62	0·7	0·6	0·6	0·6	0·6	0·6	0·7	0·7	0·8	0·8	0·8	0·8
64	·7	·6	·6	·6	·6	·6	·7	·7	·8	·8	0·9	0·9
66	·7	·6	·6	·6	·6	·7	·7	·8	·8	0·9	1·0	1·0
68	0·7	0·6	0·6	0·6	0·6	0·7	0·7	0·8	0·9	1·0	1·0	1·1
Month	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2
	′	′	′	′	′	′	′	′	′	′	′	′
Jan.	0·7	0·8	0·8	0·8	0·8	0·8	0·8	0·7	0·7	0·7	0·7	0·7
Feb.	·7	·7	·7	·8	·8	·8	·8	·8	·8	·8	·8	·8
Mar.	·5	·6	·6	·7	·7	·8	·8	·9	·9	·9	·9	·9
Apr.	0·4	0·4	0·5	0·5	0·6	0·7	0·7	0·8	0·8	0·9	0·9	0·9
May	·3	·3	·3	·4	·5	·5	·6	·7	·7	·8	·8	·9
June	·2	·2	·3	·3	·3	·4	·4	·5	·6	·6	·7	·8
July	0·3	0·3	0·3	0·3	0·3	0·3	0·3	0·4	0·4	0·5	0·5	0·6
Aug.	·4	·4	·3	·3	·3	·3	·3	·3	·3	·4	·4	·4
Sept.	·6	·5	·5	·4	·4	·3	·3	·3	·3	·3	·3	·3
Oct.	0·7	0·7	0·6	0·6	0·5	0·5	0·4	0·4	0·3	0·3	0·3	0·3
Nov.	0·9	0·9	0·8	·8	·7	·6	·6	·5	·4	·4	·3	·3
Dec.	1·0	1·0	1·0	0·9	0·9	0·8	0·7	0·6	0·6	0·5	0·4	0·4
Lat.	AZIMUTH											
°	°	°	°	°	°	°	°	°	°	°	°	°
0	0·4	0·3	0·1	0·0	359·8	359·7	359·6	359·4	359·3	359·3	359·2	359·2
20	0·4	0·3	0·1	0·0	359·8	359·7	359·5	359·4	359·3	359·2	359·1	359·1
40	0·5	0·3	0·1	0·0	359·8	359·6	359·4	359·3	359·1	359·0	359·0	358·9
50	0·6	0·4	0·2	359·9	359·7	359·5	359·3	359·1	359·0	358·8	358·8	358·7
55	0·7	0·4	0·2	359·9	359·7	359·4	359·2	359·0	358·8	358·7	358·6	358·5
60	0·8	0·5	0·2	359·9	359·6	359·3	359·1	358·8	358·7	358·5	358·4	358·3
65	0·9	0·6	0·3	359·9	359·6	359·2	358·9	358·6	358·4	358·2	358·1	358·0

Latitude = Apparent altitude (corrected for refraction) $- 1° + a_0 + a_1 + a_2$

The table is entered with L.H.A. Aries to determine the column to be used; each column refers to a range of 10°. a_0 is taken, with mental interpolation, from the upper table with the units of L.H.A. Aries in degrees as argument; a_1, a_2 are taken, without interpolation, from the second and third tables with arguments latitude and month respectively. a_0, a_1, a_2 are always positive. The final table gives the azimuth of *Polaris*.

POLARIS (POLE STAR) TABLES, 0000

FOR DETERMINING LATITUDE FROM SEXTANT ALTITUDE AND FOR AZIMUTH

L.H.A. ARIES	120°– 129°	130°– 139°	140°– 149°	150°– 159°	160°– 169°	170°– 179°	180°– 189°	190°– 199°	200°– 209°	210°– 219°	220°– 229°	230°– 239°
	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0
°	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
0	0 57·0	1 05·7	1 14·3	1 22·3	1 29·7	1 36·0	1 41·3	1 45·3	1 47·9	1 49·1	1 48·7	1 46·8
1	57·9	06·6	15·1	23·1	30·3	36·6	41·8	45·6	48·1	49·1	48·6	46·6
2	58·7	07·5	15·9	23·9	31·0	37·2	42·2	45·9	48·3	49·1	48·4	46·3
3	0 59·6	08·3	16·7	24·6	31·7	37·8	42·7	46·2	48·4	49·1	48·3	46·0
4	1 00·5	09·2	17·6	25·4	32·3	38·3	43·1	46·5	48·5	49·1	48·1	45·7
5	1 01·4	1 10·0	1 18·4	1 26·1	1 33·0	1 38·8	1 43·5	1 46·8	1 48·7	1 49·1	1 47·9	1 45·4
6	02·2	10·9	19·2	26·8	33·6	39·4	43·9	47·0	48·8	49·0	47·7	45·0
7	03·1	11·7	20·0	27·5	34·2	39·9	44·3	47·3	48·9	49·0	47·5	44·7
8	04·0	12·6	20·8	28·3	34·9	40·4	44·6	47·5	48·9	48·9	47·3	44·3
9	04·9	13·4	21·5	29·0	35·5	40·8	45·0	47·7	49·0	48·8	47·1	43·9
10	1 05·7	1 14·3	1 22·3	1 29·7	1 36·0	1 41·3	1 45·3	1 47·9	1 49·1	1 48·7	1 46·8	1 43·5
Lat.	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1
°	′	′	′	′	′	′	′	′	′	′	′	′
0	0·2	0·2	0·2	0·3	0·4	0·4	0·5	0·6	0·6	0·6	0·6	0·5
10	·2	·2	·3	·3	·4	·5	·5	·6	·6	·6	·6	·5
20	·3	·3	·3	·4	·4	·5	·5	·6	·6	·6	·6	·6
30	·4	·4	·4	·4	·5	·5	·6	·6	·6	·6	·6	·6
40	0·5	0·5	0·5	0·5	0·5	0·6	0·6	0·6	0·6	0·6	0·6	0·6
45	·5	·5	·5	·5	·6	·6	·6	·6	·6	·6	·6	·6
50	·6	·6	·6	·6	·6	·6	·6	·6	·6	·6	·6	·6
55	·7	·7	·7	·7	·6	·6	·6	·6	·6	·6	·6	·6
60	·8	·8	·8	·7	·7	·7	·6	·6	·6	·6	·6	·6
62	0·9	0·8	0·8	0·8	0·7	0·7	0·7	0·6	0·6	0·6	0·6	0·6
64	0·9	0·9	·9	·8	·8	·7	·7	·6	·6	·6	·6	·6
66	1·0	1·0	0·9	·9	·8	·7	·7	·6	·6	·6	·6	·7
68	1·1	1·1	1·0	0·9	0·9	0·8	0·7	0·6	0·6	0·6	0·6	0·7
Month	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2
	′	′	′	′	′	′	′	′	′	′	′	′
Jan.	0·6	0·6	0·6	0·5	0·5	0·5	0·5	0·4	0·4	0·4	0·4	0·4
Feb.	·8	·7	·7	·7	·6	·6	·5	·5	·5	·4	·4	·4
Mar.	0·9	0·9	0·9	·8	·8	·7	·7	·6	·6	·5	·5	·4
Apr.	1·0	1·0	1·0	0·9	0·9	0·9	0·8	0·8	0·7	0·7	0·6	0·5
May	0·9	1·0	1·0	1·0	1·0	1·0	0·9	0·9	·9	·8	·7	·7
June	·8	0·9	0·9	0·9	1·0	1·0	1·0	1·0	·9	·9	·9	·8
July	0·7	0·7	0·8	0·8	0·9	0·9	0·9	0·9	0·9	0·9	0·9	0·9
Aug.	·5	·5	·6	·7	·7	·8	·8	·8	·9	·9	·9	·9
Sept.	·3	·4	·4	·5	·5	·6	·6	·7	·7	·8	·8	·9
Oct.	0·3	0·3	0·3	0·3	0·4	0·4	0·5	0·5	0·6	0·6	0·7	0·7
Nov.	·2	·2	·2	·2	·2	·2	·3	·3	·4	·4	·5	·6
Dec.	0·3	0·2	0·2	0·2	0·2	0·2	0·2	0·2	0·2	0·3	0·3	0·4
Lat.	AZIMUTH											
°	°	°	°	°	°	°	°	°	°	°	°	°
0	359·2	359·2	359·2	359·3	359·4	359·5	359·6	359·7	359·9	0·0	0·2	0·3
20	359·1	359·1	359·2	359·2	359·3	359·5	359·6	359·7	359·9	0·0	0·2	0·3
40	358·9	358·9	359·0	359·1	359·2	359·3	359·5	359·7	359·9	0·0	0·2	0·4
50	358·7	358·7	358·8	358·9	359·0	359·2	359·4	359·6	359·8	0·1	0·3	0·5
55	358·5	358·6	358·7	358·8	358·9	359·1	359·3	359·6	359·8	0·1	0·3	0·5
60	358·3	358·4	358·5	358·6	358·8	359·0	359·2	359·5	359·8	0·1	0·4	0·6
65	358·0	358·1	358·2	358·4	358·6	358·8	359·1	359·4	359·7	0·1	0·4	0·7

ILLUSTRATION

On 1977 May 22 at G.M.T. $23^h\ 18^m\ 56^s$ in longitude W. 37° 14′ the corrected sextant altitude of *Polaris* was 49° 31′·6.

From the daily pages:	° ′
G.H.A. Aries (23^h)	225 27·1
Increment ($18^m\ 56^s$)	4 44·8
Longitude (west)	−37 14
L.H.A. Aries	192 58

	° ′
Corr. Sext. Alt.	49 31·6
a_0 (argument 192° 58′)	1 46·2
a_1 (lat. 50° approx.)	0·6
a_2 (May)	0·9
Sum −1° = Lat. =	50 19·3

POLARIS (POLE STAR) TABLES, 0000

FOR DETERMINING LATITUDE FROM SEXTANT ALTITUDE AND FOR AZIMUTH

L.H.A. ARIES	240°– 249°	250°– 259°	260°– 269°	270°– 279°	280°– 289°	290°– 299°	300°– 309°	310°– 319°	320°– 329°	330°– 339°	340°– 349°	350°– 359°
	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0	a_0
°	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
0	1 43·5	1 38·9	1 33·1	1 26·2	1 18·5	1 10·2	1 01·5	0 52·7	0 44·1	0 36·0	0 28·5	0 22·0
1	43·1	38·4	32·4	25·5	17·7	09·3	1 00·6	51·9	43·3	35·2	27·8	21·4
2	42·7	37·8	31·8	24·7	16·9	08·4	0 59·7	51·0	42·5	34·4	27·1	20·8
3	42·3	37·3	31·1	24·0	16·0	07·6	58·9	50·1	41·6	33·6	26·4	20·2
4	41·8	36·7	30·4	23·2	15·2	06·7	58·0	49·3	40·8	32·9	25·8	19·6
5	1 41·4	1 36·1	1 29·7	1 22·4	1 14·4	1 05·9	0 57·1	0 48·4	0 40·0	0 32·1	0 25·1	0 19·1
6	40·9	35·5	29·0	21·6	13·5	05·0	56·2	47·5	39·2	31·4	24·4	18·6
7	40·4	34·9	28·3	20·9	12·7	04·1	55·3	46·7	38·4	30·7	23·8	18·0
8	39·9	34·3	27·6	20·1	11·9	03·2	54·5	45·8	37·6	29·9	23·2	17·5
9	39·4	33·7	26·9	19·3	11·0	02·4	53·6	45·0	36·8	29·2	22·6	17·0
10	1 38·9	1 33·1	1 26·2	1 18·5	1 10·2	1 01·5	0 52·7	0 44·1	0 36·0	0 28·5	0 22·0	0 16·5
Lat.	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1	a_1
°	′	′	′	′	′	′	′	′	′	′	′	′
0	0·5	0·4	0·3	0·3	0·2	0·2	0·2	0·2	0·2	0·3	0·4	0·4
10	·5	·4	·4	·3	·3	·2	·2	·2	·3	·3	·4	·5
20	·5	·5	·4	·4	·3	·3	·3	·3	·3	·4	·4	·5
30	·5	·5	·5	·4	·4	·4	·4	·4	·4	·4	·5	·5
40	0·6	0·5	0·5	0·5	0·5	0·5	0·5	0·5	0·5	0·5	0·5	0·6
45	·6	·6	·6	·5	·5	·5	·5	·5	·5	·5	·6	·6
50	·6	·6	·6	·6	·6	·6	·6	·6	·6	·6	·6	·6
55	·6	·6	·7	·7	·7	·7	·7	·7	·7	·7	·6	·6
60	·7	·7	·7	·8	·8	·8	·8	·8	·8	·7	·7	·7
62	0·7	0·7	0·8	0·8	0·8	0·8	0·9	0·8	0·8	0·8	0·7	0·7
64	·7	·7	·8	·8	0·9	0·9	0·9	0·9	·9	·8	·8	·7
66	·7	·8	·8	0·9	1·0	1·0	1·0	1·0	0·9	·9	·8	·7
68	0·7	0·8	0·9	1·0	1·0	1·1	1·1	1·1	1·0	0·9	0·9	0·8
Month	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2	a_2
	′	′	′	′	′	′	′	′	′	′	′	′
Jan.	0·4	0·5	0·5	0·5	0·5	0·5	0·6	0·6	0·6	0·7	0·7	0·7
Feb.	·4	·4	·4	·4	·4	·4	·4	·5	·5	·5	·6	·6
Mar.	·4	·3	·3	·3	·3	·3	·3	·3	·3	·4	·4	·5
Apr.	0·5	0·4	0·4	0·3	0·3	0·3	0·2	0·2	0·2	0·3	0·3	0·3
May	·6	·5	·5	·4	·4	·3	·3	·2	·2	·2	·2	·2
June	·8	·7	·6	·6	·5	·4	·4	·3	·3	·3	·2	·2
July	0·9	0·8	0·8	0·7	0·7	0·6	0·5	0·5	0·4	0·4	0·3	0·3
Aug.	·9	·9	·9	·8	·8	·8	·7	·7	·6	·5	·5	·4
Sept.	·9	·9	·9	·9	·9	·9	·9	·8	·8	·7	·7	·6
Oct.	0·8	0·8	0·9	0·9	0·9	0·9	0·9	0·9	0·9	0·9	0·8	0·8
Nov.	·6	·7	·8	·8	·9	·9	1·0	1·0	1·0	1·0	1·0	1·0
Dec.	0·5	0·6	0·6	0·7	0·8	0·8	0·9	1·0	1·0	1·0	1·0	1·0
Lat.	AZIMUTH											
°	°	°	°	°	°	°	°	°	°	°	°	°
0	0·4	0·6	0·7	0·7	0·8	0·8	0·8	0·8	0·8	0·7	0·6	0·5
20	0·5	0·6	0·7	0·8	0·8	0·9	0·9	0·9	0·8	0·8	0·7	0·5
40	0·6	0·7	0·9	1·0	1·0	1·1	1·1	1·1	1·0	0·9	0·8	0·7
50	0·7	0·9	1·0	1·1	1·2	1·3	1·3	1·3	1·2	1·1	1·0	0·8
55	0·8	1·0	1·1	1·3	1·4	1·4	1·5	1·4	1·4	1·2	1·1	0·9
60	0·9	1·1	1·3	1·5	1·6	1·7	1·7	1·6	1·6	1·4	1·3	1·0
65	1·0	1·3	1·5	1·7	1·9	2·0	2·0	2·0	1·9	1·7	1·5	1·2

Latitude = Apparent altitude (corrected for refraction) $-1° + a_0 + a_1 + a_2$

The table is entered with L.H.A. Aries to determine the column to be used; each column refers to a range of 10°. a_0 is taken, with mental interpolation, from the upper table with the units of L.H.A. Aries in degrees as argument; a_1, a_2 are taken, without interpolation, from the second and third tables with arguments latitude and month respectively. a_0, a_1, a_2 are always positive. The final table gives the azimuth of *Polaris*.

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
°	h m	°	h m	°	h m	°	h m	°	h m	°	h m	′	m s	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	0 03
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	0 07
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	0 11
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	0 15
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	0 19
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	0 23
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	0 27
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	0 31
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	0 35
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	0 39
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	0 43
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	0 47
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	0 51
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	0 55
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	0 59
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	1 03
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	1 07
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	1 11
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	1 15
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	1 19
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	1 23
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	1 27
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	1 31
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	1 35
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	1 39
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	1 43
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	1 47
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	1 51
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	1 55
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	1 59
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	2 03
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	2 07
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	2 11
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	2 15
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	2 19
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	2 23
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	2 27
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	2 31
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	2 35
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	2 39
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	2 43
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	2 47
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	2 51
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	2 55
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	2 59
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	3 03
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	3 07
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	3 11
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	3 15
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	3 19
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	3 23
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	3 27
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	3 31
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	3 35
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	3 39
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	3 43
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	3 47
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	3 51
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	3 55
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	3 59

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.(UT) or vice versa, particularly in the case of sunrise, sunset, etc.

m 0	SUN PLANETS	ARIES	MOON	v or d	Corrn	v or d	Corrn	v or d	Corrn
s	° ′	° ′	° ′	′	′	′	′	′	′
00	0 00·0	0 00·0	0 00·0	0·0	0·0	6·0	0·1	12·0	0·1
01	0 00·3	0 00·3	0 00·2	0·1	0·0	6·1	0·1	12·1	0·1
02	0 00·5	0 00·5	0 00·5	0·2	0·0	6·2	0·1	12·2	0·1
03	0 00·8	0 00·8	0 00·7	0·3	0·0	6·3	0·1	12·3	0·1
04	0 01·0	0 01·0	0 01·0	0·4	0·0	6·4	0·1	12·4	0·1
05	0 01·3	0 01·3	0 01·2	0·5	0·0	6·5	0·1	12·5	0·1
06	0 01·5	0 01·5	0 01·4	0·6	0·0	6·6	0·1	12·6	0·1
07	0 01·8	0 01·8	0 01·7	0·7	0·0	6·7	0·1	12·7	0·1
08	0 02·0	0 02·0	0 01·9	0·8	0·0	6·8	0·1	12·8	0·1
09	0 02·3	0 02·3	0 02·1	0·9	0·0	6·9	0·1	12·9	0·1
10	0 02·5	0 02·5	0 02·4	1·0	0·0	7·0	0·1	13·0	0·1
11	0 02·8	0 02·8	0 02·6	1·1	0·0	7·1	0·1	13·1	0·1
12	0 03·0	0 03·0	0 02·9	1·2	0·0	7·2	0·1	13·2	0·1
13	0 03·3	0 03·3	0 03·1	1·3	0·0	7·3	0·1	13·3	0·1
14	0 03·5	0 03·5	0 03·3	1·4	0·0	7·4	0·1	13·4	0·1
15	0 03·8	0 03·8	0 03·6	1·5	0·0	7·5	0·1	13·5	0·1
16	0 04·0	0 04·0	0 03·8	1·6	0·0	7·6	0·1	13·6	0·1
17	0 04·3	0 04·3	0 04·1	1·7	0·0	7·7	0·1	13·7	0·1
18	0 04·5	0 04·5	0 04·3	1·8	0·0	7·8	0·1	13·8	0·1
19	0 04·8	0 04·8	0 04·5	1·9	0·0	7·9	0·1	13·9	0·1
20	0 05·0	0 05·0	0 04·8	2·0	0·0	8·0	0·1	14·0	0·1
21	0 05·3	0 05·3	0 05·0	2·1	0·0	8·1	0·1	14·1	0·1
22	0 05·5	0 05·5	0 05·2	2·2	0·0	8·2	0·1	14·2	0·1
23	0 05·8	0 05·8	0 05·5	2·3	0·0	8·3	0·1	14·3	0·1
24	0 06·0	0 06·0	0 05·7	2·4	0·0	8·4	0·1	14·4	0·1
25	0 06·3	0 06·3	0 06·0	2·5	0·0	8·5	0·1	14·5	0·1
26	0 06·5	0 06·5	0 06·2	2·6	0·0	8·6	0·1	14·6	0·1
27	0 06·8	0 06·8	0 06·4	2·7	0·0	8·7	0·1	14·7	0·1
28	0 07·0	0 07·0	0 06·7	2·8	0·0	8·8	0·1	14·8	0·1
29	0 07·3	0 07·3	0 06·9	2·9	0·0	8·9	0·1	14·9	0·1
30	0 07·5	0 07·5	0 07·2	3·0	0·0	9·0	0·1	15·0	0·1
31	0 07·8	0 07·8	0 07·4	3·1	0·0	9·1	0·1	15·1	0·1
32	0 08·0	0 08·0	0 07·6	3·2	0·0	9·2	0·1	15·2	0·1
33	0 08·3	0 08·3	0 07·9	3·3	0·0	9·3	0·1	15·3	0·1
34	0 08·5	0 08·5	0 08·1	3·4	0·0	9·4	0·1	15·4	0·1
35	0 08·8	0 08·8	0 08·4	3·5	0·0	9·5	0·1	15·5	0·1
36	0 09·0	0 09·0	0 08·6	3·6	0·0	9·6	0·1	15·6	0·1
37	0 09·3	0 09·3	0 08·8	3·7	0·0	9·7	0·1	15·7	0·1
38	0 09·5	0 09·5	0 09·1	3·8	0·0	9·8	0·1	15·8	0·1
39	0 09·8	0 09·8	0 09·3	3·9	0·0	9·9	0·1	15·9	0·1
40	0 10·0	0 10·0	0 09·5	4·0	0·0	10·0	0·1	16·0	0·1
41	0 10·3	0 10·3	0 09·8	4·1	0·0	10·1	0·1	16·1	0·1
42	0 10·5	0 10·5	0 10·0	4·2	0·0	10·2	0·1	16·2	0·1
43	0 10·8	0 10·8	0 10·3	4·3	0·0	10·3	0·1	16·3	0·1
44	0 11·0	0 11·0	0 10·5	4·4	0·0	10·4	0·1	16·4	0·1
45	0 11·3	0 11·3	0 10·7	4·5	0·0	10·5	0·1	16·5	0·1
46	0 11·5	0 11·5	0 11·0	4·6	0·0	10·6	0·1	16·6	0·1
47	0 11·8	0 11·8	0 11·2	4·7	0·0	10·7	0·1	16·7	0·1
48	0 12·0	0 12·0	0 11·5	4·8	0·0	10·8	0·1	16·8	0·1
49	0 12·3	0 12·3	0 11·7	4·9	0·0	10·9	0·1	16·9	0·1
50	0 12·5	0 12·5	0 11·9	5·0	0·0	11·0	0·1	17·0	0·1
51	0 12·8	0 12·8	0 12·2	5·1	0·0	11·1	0·1	17·1	0·1
52	0 13·0	0 13·0	0 12·4	5·2	0·0	11·2	0·1	17·2	0·1
53	0 13·3	0 13·3	0 12·6	5·3	0·0	11·3	0·1	17·3	0·1
54	0 13·5	0 13·5	0 12·9	5·4	0·0	11·4	0·1	17·4	0·1
55	0 13·8	0 13·8	0 13·1	5·5	0·0	11·5	0·1	17·5	0·1
56	0 14·0	0 14·0	0 13·4	5·6	0·0	11·6	0·1	17·6	0·1
57	0 14·3	0 14·3	0 13·6	5·7	0·0	11·7	0·1	17·7	0·1
58	0 14·5	0 14·5	0 13·8	5·8	0·0	11·8	0·1	17·8	0·1
59	0 14·8	0 14·8	0 14·1	5·9	0·0	11·9	0·1	17·9	0·1
60	0 15·0	0 15·0	0 14·3	6·0	0·1	12·0	0·1	18·0	0·2

m 1	SUN PLANETS	ARIES	MOON	v or d	Corrn	v or d	Corrn	v or d	Corrn
s	° ′	° ′	° ′	′	′	′	′	′	′
00	0 15·0	0 15·0	0 14·3	0·0	0·0	6·0	0·2	12·0	0·3
01	0 15·3	0 15·3	0 14·6	0·1	0·0	6·1	0·2	12·1	0·3
02	0 15·5	0 15·5	0 14·8	0·2	0·0	6·2	0·2	12·2	0·3
03	0 15·8	0 15·8	0 15·0	0·3	0·0	6·3	0·2	12·3	0·3
04	0 16·0	0 16·0	0 15·3	0·4	0·0	6·4	0·2	12·4	0·3
05	0 16·3	0 16·3	0 15·5	0·5	0·0	6·5	0·2	12·5	0·3
06	0 16·5	0 16·5	0 15·7	0·6	0·0	6·6	0·2	12·6	0·3
07	0 16·8	0 16·8	0 16·0	0·7	0·0	6·7	0·2	12·7	0·3
08	0 17·0	0 17·0	0 16·2	0·8	0·0	6·8	0·2	12·8	0·3
09	0 17·3	0 17·3	0 16·5	0·9	0·0	6·9	0·2	12·9	0·3
10	0 17·5	0 17·5	0 16·7	1·0	0·0	7·0	0·2	13·0	0·3
11	0 17·8	0 17·8	0 16·9	1·1	0·0	7·1	0·2	13·1	0·3
12	0 18·0	0 18·0	0 17·2	1·2	0·0	7·2	0·2	13·2	0·3
13	0 18·3	0 18·3	0 17·4	1·3	0·0	7·3	0·2	13·3	0·3
14	0 18·5	0 18·6	0 17·7	1·4	0·0	7·4	0·2	13·4	0·3
15	0 18·8	0 18·8	0 17·9	1·5	0·0	7·5	0·2	13·5	0·3
16	0 19·0	0 19·1	0 18·1	1·6	0·0	7·6	0·2	13·6	0·3
17	0 19·3	0 19·3	0 18·4	1·7	0·0	7·7	0·2	13·7	0·3
18	0 19·5	0 19·6	0 18·6	1·8	0·0	7·8	0·2	13·8	0·3
19	0 19·8	0 19·8	0 18·9	1·9	0·0	7·9	0·2	13·9	0·3
20	0 20·0	0 20·1	0 19·1	2·0	0·1	8·0	0·2	14·0	0·4
21	0 20·3	0 20·3	0 19·3	2·1	0·1	8·1	0·2	14·1	0·4
22	0 20·5	0 20·6	0 19·6	2·2	0·1	8·2	0·2	14·2	0·4
23	0 20·8	0 20·8	0 19·8	2·3	0·1	8·3	0·2	14·3	0·4
24	0 21·0	0 21·1	0 20·0	2·4	0·1	8·4	0·2	14·4	0·4
25	0 21·3	0 21·3	0 20·3	2·5	0·1	8·5	0·2	14·5	0·4
26	0 21·5	0 21·6	0 20·5	2·6	0·1	8·6	0·2	14·6	0·4
27	0 21·8	0 21·8	0 20·8	2·7	0·1	8·7	0·2	14·7	0·4
28	0 22·0	0 22·1	0 21·0	2·8	0·1	8·8	0·2	14·8	0·4
29	0 22·3	0 22·3	0 21·2	2·9	0·1	8·9	0·2	14·9	0·4
30	0 22·5	0 22·6	0 21·5	3·0	0·1	9·0	0·2	15·0	0·4
31	0 22·8	0 22·8	0 21·7	3·1	0·1	9·1	0·2	15·1	0·4
32	0 23·0	0 23·1	0 22·0	3·2	0·1	9·2	0·2	15·2	0·4
33	0 23·3	0 23·3	0 22·2	3·3	0·1	9·3	0·2	15·3	0·4
34	0 23·5	0 23·6	0 22·4	3·4	0·1	9·4	0·2	15·4	0·4
35	0 23·8	0 23·8	0 22·7	3·5	0·1	9·5	0·2	15·5	0·4
36	0 24·0	0 24·1	0 22·9	3·6	0·1	9·6	0·2	15·6	0·4
37	0 24·3	0 24·3	0 23·1	3·7	0·1	9·7	0·2	15·7	0·4
38	0 24·5	0 24·6	0 23·4	3·8	0·1	9·8	0·2	15·8	0·4
39	0 24·8	0 24·8	0 23·6	3·9	0·1	9·9	0·2	15·9	0·4
40	0 25·0	0 25·1	0 23·9	4·0	0·1	10·0	0·3	16·0	0·4
41	0 25·3	0 25·3	0 24·1	4·1	0·1	10·1	0·3	16·1	0·4
42	0 25·5	0 25·6	0 24·3	4·2	0·1	10·2	0·3	16·2	0·4
43	0 25·8	0 25·8	0 24·6	4·3	0·1	10·3	0·3	16·3	0·4
44	0 26·0	0 26·1	0 24·8	4·4	0·1	10·4	0·3	16·4	0·4
45	0 26·3	0 26·3	0 25·1	4·5	0·1	10·5	0·3	16·5	0·4
46	0 26·5	0 26·6	0 25·3	4·6	0·1	10·6	0·3	16·6	0·4
47	0 26·8	0 26·8	0 25·5	4·7	0·1	10·7	0·3	16·7	0·4
48	0 27·0	0 27·1	0 25·8	4·8	0·1	10·8	0·3	16·8	0·4
49	0 27·3	0 27·3	0 26·0	4·9	0·1	10·9	0·3	16·9	0·4
50	0 27·5	0 27·6	0 26·2	5·0	0·1	11·0	0·3	17·0	0·4
51	0 27·8	0 27·8	0 26·5	5·1	0·1	11·1	0·3	17·1	0·4
52	0 28·0	0 28·1	0 26·7	5·2	0·1	11·2	0·3	17·2	0·4
53	0 28·3	0 28·3	0 27·0	5·3	0·1	11·3	0·3	17·3	0·4
54	0 28·5	0 28·6	0 27·2	5·4	0·1	11·4	0·3	17·4	0·4
55	0 28·8	0 28·8	0 27·4	5·5	0·1	11·5	0·3	17·5	0·4
56	0 29·0	0 29·1	0 27·7	5·6	0·1	11·6	0·3	17·6	0·4
57	0 29·3	0 29·3	0 27·9	5·7	0·1	11·7	0·3	17·7	0·4
58	0 29·5	0 29·6	0 28·2	5·8	0·1	11·8	0·3	17·8	0·4
59	0 29·8	0 29·8	0 28·4	5·9	0·1	11·9	0·3	17·9	0·4
60	0 30·0	0 30·1	0 28·6	6·0	0·2	12·0	0·3	18·0	0·5

2m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	0 30·0	0 30·1	0 28·6	0·0	0·0	6·0	0·3	12·0	0·5
01	0 30·3	0 30·3	0 28·9	0·1	0·0	6·1	0·3	12·1	0·5
02	0 30·5	0 30·6	0 29·1	0·2	0·0	6·2	0·3	12·2	0·5
03	0 30·8	0 30·8	0 29·3	0·3	0·0	6·3	0·3	12·3	0·5
04	0 31·0	0 31·1	0 29·6	0·4	0·0	6·4	0·3	12·4	0·5
05	0 31·3	0 31·3	0 29·8	0·5	0·0	6·5	0·3	12·5	0·5
06	0 31·5	0 31·6	0 30·1	0·6	0·0	6·6	0·3	12·6	0·5
07	0 31·8	0 31·8	0 30·3	0·7	0·0	6·7	0·3	12·7	0·5
08	0 32·0	0 32·1	0 30·5	0·8	0·0	6·8	0·3	12·8	0·5
09	0 32·3	0 32·3	0 30·8	0·9	0·0	6·9	0·3	12·9	0·5
10	0 32·5	0 32·6	0 31·0	1·0	0·0	7·0	0·3	13·0	0·5
11	0 32·8	0 32·8	0 31·3	1·1	0·0	7·1	0·3	13·1	0·5
12	0 33·0	0 33·1	0 31·5	1·2	0·1	7·2	0·3	13·2	0·6
13	0 33·3	0 33·3	0 31·7	1·3	0·1	7·3	0·3	13·3	0·6
14	0 33·5	0 33·6	0 32·0	1·4	0·1	7·4	0·3	13·4	0·6
15	0 33·8	0 33·8	0 32·2	1·5	0·1	7·5	0·3	13·5	0·6
16	0 34·0	0 34·1	0 32·5	1·6	0·1	7·6	0·3	13·6	0·6
17	0 34·3	0 34·3	0 32·7	1·7	0·1	7·7	0·3	13·7	0·6
18	0 34·5	0 34·6	0 32·9	1·8	0·1	7·8	0·3	13·8	0·6
19	0 34·8	0 34·8	0 33·2	1·9	0·1	7·9	0·3	13·9	0·6
20	0 35·0	0 35·1	0 33·4	2·0	0·1	8·0	0·3	14·0	0·6
21	0 35·3	0 35·3	0 33·6	2·1	0·1	8·1	0·3	14·1	0·6
22	0 35·5	0 35·6	0 33·9	2·2	0·1	8·2	0·3	14·2	0·6
23	0 35·8	0 35·8	0 34·1	2·3	0·1	8·3	0·3	14·3	0·6
24	0 36·0	0 36·1	0 34·4	2·4	0·1	8·4	0·4	14·4	0·6
25	0 36·3	0 36·3	0 34·6	2·5	0·1	8·5	0·4	14·5	0·6
26	0 36·5	0 36·6	0 34·8	2·6	0·1	8·6	0·4	14·6	0·6
27	0 36·8	0 36·9	0 35·1	2·7	0·1	8·7	0·4	14·7	0·6
28	0 37·0	0 37·1	0 35·3	2·8	0·1	8·8	0·4	14·8	0·6
29	0 37·3	0 37·4	0 35·6	2·9	0·1	8·9	0·4	14·9	0·6
30	0 37·5	0 37·6	0 35·8	3·0	0·1	9·0	0·4	15·0	0·6
31	0 37·8	0 37·9	0 36·0	3·1	0·1	9·1	0·4	15·1	0·6
32	0 38·0	0 38·1	0 36·3	3·2	0·1	9·2	0·4	15·2	0·6
33	0 38·3	0 38·4	0 36·5	3·3	0·1	9·3	0·4	15·3	0·6
34	0 38·5	0 38·6	0 36·7	3·4	0·1	9·4	0·4	15·4	0·6
35	0 38·8	0 38·9	0 37·0	3·5	0·1	9·5	0·4	15·5	0·6
36	0 39·0	0 39·1	0 37·2	3·6	0·2	9·6	0·4	15·6	0·7
37	0 39·3	0 39·4	0 37·5	3·7	0·2	9·7	0·4	15·7	0·7
38	0 39·5	0 39·6	0 37·7	3·8	0·2	9·8	0·4	15·8	0·7
39	0 39·8	0 39·9	0 37·9	3·9	0·2	9·9	0·4	15·9	0·7
40	0 40·0	0 40·1	0 38·2	4·0	0·2	10·0	0·4	16·0	0·7
41	0 40·3	0 40·4	0 38·4	4·1	0·2	10·1	0·4	16·1	0·7
42	0 40·5	0 40·6	0 38·7	4·2	0·2	10·2	0·4	16·2	0·7
43	0 40·8	0 40·9	0 38·9	4·3	0·2	10·3	0·4	16·3	0·7
44	0 41·0	0 41·1	0 39·1	4·4	0·2	10·4	0·4	16·4	0·7
45	0 41·3	0 41·4	0 39·4	4·5	0·2	10·5	0·4	16·5	0·7
46	0 41·5	0 41·6	0 39·6	4·6	0·2	10·6	0·4	16·6	0·7
47	0 41·8	0 41·9	0 39·8	4·7	0·2	10·7	0·4	16·7	0·7
48	0 42·0	0 42·1	0 40·1	4·8	0·2	10·8	0·5	16·8	0·7
49	0 42·3	0 42·4	0 40·3	4·9	0·2	10·9	0·5	16·9	0·7
50	0 42·5	0 42·6	0 40·6	5·0	0·2	11·0	0·5	17·0	0·7
51	0 42·8	0 42·9	0 40·8	5·1	0·2	11·1	0·5	17·1	0·7
52	0 43·0	0 43·1	0 41·0	5·2	0·2	11·2	0·5	17·2	0·7
53	0 43·3	0 43·4	0 41·3	5·3	0·2	11·3	0·5	17·3	0·7
54	0 43·5	0 43·6	0 41·5	5·4	0·2	11·4	0·5	17·4	0·7
55	0 43·8	0 43·9	0 41·8	5·5	0·2	11·5	0·5	17·5	0·7
56	0 44·0	0 44·1	0 42·0	5·6	0·2	11·6	0·5	17·6	0·7
57	0 44·3	0 44·4	0 42·2	5·7	0·2	11·7	0·5	17·7	0·7
58	0 44·5	0 44·6	0 42·5	5·8	0·2	11·8	0·5	17·8	0·7
59	0 44·8	0 44·9	0 42·7	5·9	0·2	11·9	0·5	17·9	0·7
60	0 45·0	0 45·1	0 43·0	6·0	0·3	12·0	0·5	18·0	0·8

3m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	0 45·0	0 45·1	0 43·0	0·0	0·0	6·0	0·4	12·0	0·7
01	0 45·3	0 45·4	0 43·2	0·1	0·0	6·1	0·4	12·1	0·7
02	0 45·5	0 45·6	0 43·4	0·2	0·0	6·2	0·4	12·2	0·7
03	0 45·8	0 45·9	0 43·7	0·3	0·0	6·3	0·4	12·3	0·7
04	0 46·0	0 46·1	0 43·9	0·4	0·0	6·4	0·4	12·4	0·7
05	0 46·3	0 46·4	0 44·1	0·5	0·0	6·5	0·4	12·5	0·7
06	0 46·5	0 46·6	0 44·4	0·6	0·0	6·6	0·4	12·6	0·7
07	0 46·8	0 46·9	0 44·6	0·7	0·0	6·7	0·4	12·7	0·7
08	0 47·0	0 47·1	0 44·9	0·8	0·0	6·8	0·4	12·8	0·7
09	0 47·3	0 47·4	0 45·1	0·9	0·1	6·9	0·4	12·9	0·8
10	0 47·5	0 47·6	0 45·3	1·0	0·1	7·0	0·4	13·0	0·8
11	0 47·8	0 47·9	0 45·6	1·1	0·1	7·1	0·4	13·1	0·8
12	0 48·0	0 48·1	0 45·8	1·2	0·1	7·2	0·4	13·2	0·8
13	0 48·3	0 48·4	0 46·1	1·3	0·1	7·3	0·4	13·3	0·8
14	0 48·5	0 48·6	0 46·3	1·4	0·1	7·4	0·4	13·4	0·8
15	0 48·8	0 48·9	0 46·5	1·5	0·1	7·5	0·4	13·5	0·8
16	0 49·0	0 49·1	0 46·8	1·6	0·1	7·6	0·4	13·6	0·8
17	0 49·3	0 49·4	0 47·0	1·7	0·1	7·7	0·4	13·7	0·8
18	0 49·5	0 49·6	0 47·2	1·8	0·1	7·8	0·5	13·8	0·8
19	0 49·8	0 49·9	0 47·5	1·9	0·1	7·9	0·5	13·9	0·8
20	0 50·0	0 50·1	0 47·7	2·0	0·1	8·0	0·5	14·0	0·8
21	0 50·3	0 50·4	0 48·0	2·1	0·1	8·1	0·5	14·1	0·8
22	0 50·5	0 50·6	0 48·2	2·2	0·1	8·2	0·5	14·2	0·8
23	0 50·8	0 50·9	0 48·4	2·3	0·1	8·3	0·5	14·3	0·8
24	0 51·0	0 51·1	0 48·7	2·4	0·1	8·4	0·5	14·4	0·8
25	0 51·3	0 51·4	0 48·9	2·5	0·1	8·5	0·5	14·5	0·8
26	0 51·5	0 51·6	0 49·2	2·6	0·2	8·6	0·5	14·6	0·9
27	0 51·8	0 51·9	0 49·4	2·7	0·2	8·7	0·5	14·7	0·9
28	0 52·0	0 52·1	0 49·6	2·8	0·2	8·8	0·5	14·8	0·9
29	0 52·3	0 52·4	0 49·9	2·9	0·2	8·9	0·5	14·9	0·9
30	0 52·5	0 52·6	0 50·1	3·0	0·2	9·0	0·5	15·0	0·9
31	0 52·8	0 52·9	0 50·3	3·1	0·2	9·1	0·5	15·1	0·9
32	0 53·0	0 53·1	0 50·6	3·2	0·2	9·2	0·5	15·2	0·9
33	0 53·3	0 53·4	0 50·8	3·3	0·2	9·3	0·5	15·3	0·9
34	0 53·5	0 53·6	0 51·1	3·4	0·2	9·4	0·5	15·4	0·9
35	0 53·8	0 53·9	0 51·3	3·5	0·2	9·5	0·6	15·5	0·9
36	0 54·0	0 54·1	0 51·5	3·6	0·2	9·6	0·6	15·6	0·9
37	0 54·3	0 54·4	0 51·8	3·7	0·2	9·7	0·6	15·7	0·9
38	0 54·5	0 54·6	0 52·0	3·8	0·2	9·8	0·6	15·8	0·9
39	0 54·8	0 54·9	0 52·3	3·9	0·2	9·9	0·6	15·9	0·9
40	0 55·0	0 55·2	0 52·5	4·0	0·2	10·0	0·6	16·0	0·9
41	0 55·3	0 55·4	0 52·7	4·1	0·2	10·1	0·6	16·1	0·9
42	0 55·5	0 55·7	0 53·0	4·2	0·2	10·2	0·6	16·2	0·9
43	0 55·8	0 55·9	0 53·2	4·3	0·3	10·3	0·6	16·3	1·0
44	0 56·0	0 56·2	0 53·4	4·4	0·3	10·4	0·6	16·4	1·0
45	0 56·3	0 56·4	0 53·7	4·5	0·3	10·5	0·6	16·5	1·0
46	0 56·5	0 56·7	0 53·9	4·6	0·3	10·6	0·6	16·6	1·0
47	0 56·8	0 56·9	0 54·2	4·7	0·3	10·7	0·6	16·7	1·0
48	0 57·0	0 57·2	0 54·4	4·8	0·3	10·8	0·6	16·8	1·0
49	0 57·3	0 57·4	0 54·6	4·9	0·3	10·9	0·6	16·9	1·0
50	0 57·5	0 57·7	0 54·9	5·0	0·3	11·0	0·6	17·0	1·0
51	0 57·8	0 57·9	0 55·1	5·1	0·3	11·1	0·6	17·1	1·0
52	0 58·0	0 58·2	0 55·4	5·2	0·3	11·2	0·7	17·2	1·0
53	0 58·3	0 58·4	0 55·6	5·3	0·3	11·3	0·7	17·3	1·0
54	0 58·5	0 58·7	0 55·8	5·4	0·3	11·4	0·7	17·4	1·0
55	0 58·8	0 58·9	0 56·1	5·5	0·3	11·5	0·7	17·5	1·0
56	0 59·0	0 59·2	0 56·3	5·6	0·3	11·6	0·7	17·6	1·0
57	0 59·3	0 59·4	0 56·6	5·7	0·3	11·7	0·7	17·7	1·0
58	0 59·5	0 59·7	0 56·8	5·8	0·3	11·8	0·7	17·8	1·0
59	0 59·8	0 59·9	0 57·0	5·9	0·3	11·9	0·7	17·9	1·0
60	1 00·0	1 00·2	0 57·3	6·0	0·4	12·0	0·7	18·0	1·1

m 4	SUN PLANETS	ARIES	MOON	v or Corrn d		v or Corrn d		v or Corrn d	
s	° ′	° ′	° ′	′	′	′	′	′	′
00	1 00·0	1 00·2	0 57·3	0·0	0·0	6·0	0·5	12·0	0·9
01	1 00·3	1 00·4	0 57·5	0·1	0·0	6·1	0·5	12·1	0·9
02	1 00·5	1 00·7	0 57·7	0·2	0·0	6·2	0·5	12·2	0·9
03	1 00·8	1 00·9	0 58·0	0·3	0·0	6·3	0·5	12·3	0·9
04	1 01·0	1 01·2	0 58·2	0·4	0·0	6·4	0·5	12·4	0·9
05	1 01·3	1 01·4	0 58·5	0·5	0·0	6·5	0·5	12·5	0·9
06	1 01·5	1 01·7	0 58·7	0·6	0·0	6·6	0·5	12·6	0·9
07	1 01·8	1 01·9	0 58·9	0·7	0·1	6·7	0·5	12·7	1·0
08	1 02·0	1 02·2	0 59·2	0·8	0·1	6·8	0·5	12·8	1·0
09	1 02·3	1 02·4	0 59·4	0·9	0·1	6·9	0·5	12·9	1·0
10	1 02·5	1 02·7	0 59·7	1·0	0·1	7·0	0·5	13·0	1·0
11	1 02·8	1 02·9	0 59·9	1·1	0·1	7·1	0·5	13·1	1·0
12	1 03·0	1 03·2	1 00·1	1·2	0·1	7·2	0·5	13·2	1·0
13	1 03·3	1 03·4	1 00·4	1·3	0·1	7·3	0·5	13·3	1·0
14	1 03·5	1 03·7	1 00·6	1·4	0·1	7·4	0·6	13·4	1·0
15	1 03·8	1 03·9	1 00·8	1·5	0·1	7·5	0·6	13·5	1·0
16	1 04·0	1 04·2	1 01·1	1·6	0·1	7·6	0·6	13·6	1·0
17	1 04·3	1 04·4	1 01·3	1·7	0·1	7·7	0·6	13·7	1·0
18	1 04·5	1 04·7	1 01·6	1·8	0·1	7·8	0·6	13·8	1·0
19	1 04·8	1 04·9	1 01·8	1·9	0·1	7·9	0·6	13·9	1·0
20	1 05·0	1 05·2	1 02·0	2·0	0·2	8·0	0·6	14·0	1·1
21	1 05·3	1 05·4	1 02·3	2·1	0·2	8·1	0·6	14·1	1·1
22	1 05·5	1 05·7	1 02·5	2·2	0·2	8·2	0·6	14·2	1·1
23	1 05·8	1 05·9	1 02·8	2·3	0·2	8·3	0·6	14·3	1·1
24	1 06·0	1 06·2	1 03·0	2·4	0·2	8·4	0·6	14·4	1·1
25	1 06·3	1 06·4	1 03·2	2·5	0·2	8·5	0·6	14·5	1·1
26	1 06·5	1 06·7	1 03·5	2·6	0·2	8·6	0·6	14·6	1·1
27	1 06·8	1 06·9	1 03·7	2·7	0·2	8·7	0·7	14·7	1·1
28	1 07·0	1 07·2	1 03·9	2·8	0·2	8·8	0·7	14·8	1·1
29	1 07·3	1 07·4	1 04·2	2·9	0·2	8·9	0·7	14·9	1·1
30	1 07·5	1 07·7	1 04·4	3·0	0·2	9·0	0·7	15·0	1·1
31	1 07·8	1 07·9	1 04·7	3·1	0·2	9·1	0·7	15·1	1·1
32	1 08·0	1 08·2	1 04·9	3·2	0·2	9·2	0·7	15·2	1·1
33	1 08·3	1 08·4	1 05·1	3·3	0·2	9·3	0·7	15·3	1·1
34	1 08·5	1 08·7	1 05·4	3·4	0·3	9·4	0·7	15·4	1·2
35	1 08·8	1 08·9	1 05·6	3·5	0·3	9·5	0·7	15·5	1·2
36	1 09·0	1 09·2	1 05·9	3·6	0·3	9·6	0·7	15·6	1·2
37	1 09·3	1 09·4	1 06·1	3·7	0·3	9·7	0·7	15·7	1·2
38	1 09·5	1 09·7	1 06·3	3·8	0·3	9·8	0·7	15·8	1·2
39	1 09·8	1 09·9	1 06·6	3·9	0·3	9·9	0·7	15·9	1·2
40	1 10·0	1 10·2	1 06·8	4·0	0·3	10·0	0·8	16·0	1·2
41	1 10·3	1 10·4	1 07·0	4·1	0·3	10·1	0·8	16·1	1·2
42	1 10·5	1 10·7	1 07·3	4·2	0·3	10·2	0·8	16·2	1·2
43	1 10·8	1 10·9	1 07·5	4·3	0·3	10·3	0·8	16·3	1·2
44	1 11·0	1 11·2	1 07·8	4·4	0·3	10·4	0·8	16·4	1·2
45	1 11·3	1 11·4	1 08·0	4·5	0·3	10·5	0·8	16·5	1·2
46	1 11·5	1 11·7	1 08·2	4·6	0·3	10·6	0·8	16·6	1·2
47	1 11·8	1 11·9	1 08·5	4·7	0·4	10·7	0·8	16·7	1·3
48	1 12·0	1 12·2	1 08·7	4·8	0·4	10·8	0·8	16·8	1·3
49	1 12·3	1 12·4	1 09·0	4·9	0·4	10·9	0·8	16·9	1·3
50	1 12·5	1 12·7	1 09·2	5·0	0·4	11·0	0·8	17·0	1·3
51	1 12·8	1 12·9	1 09·4	5·1	0·4	11·1	0·8	17·1	1·3
52	1 13·0	1 13·2	1 09·7	5·2	0·4	11·2	0·8	17·2	1·3
53	1 13·3	1 13·5	1 09·9	5·3	0·4	11·3	0·8	17·3	1·3
54	1 13·5	1 13·7	1 10·2	5·4	0·4	11·4	0·9	17·4	1·3
55	1 13·8	1 14·0	1 10·4	5·5	0·4	11·5	0·9	17·5	1·3
56	1 14·0	1 14·2	1 10·6	5·6	0·4	11·6	0·9	17·6	1·3
57	1 14·3	1 14·5	1 10·9	5·7	0·4	11·7	0·9	17·7	1·3
58	1 14·5	1 14·7	1 11·1	5·8	0·4	11·8	0·9	17·8	1·3
59	1 14·8	1 15·0	1 11·3	5·9	0·4	11·9	0·9	17·9	1·3
60	1 15·0	1 15·2	1 11·6	6·0	0·5	12·0	0·9	18·0	1·4

m 5	SUN PLANETS	ARIES	MOON	v or Corrn d		v or Corrn d		v or Corrn d	
s	° ′	° ′	° ′	′	′	′	′	′	′
00	1 15·0	1 15·2	1 11·6	0·0	0·0	6·0	0·6	12·0	1·1
01	1 15·3	1 15·5	1 11·8	0·1	0·0	6·1	0·6	12·1	1·1
02	1 15·5	1 15·7	1 12·1	0·2	0·0	6·2	0·6	12·2	1·1
03	1 15·8	1 16·0	1 12·3	0·3	0·0	6·3	0·6	12·3	1·1
04	1 16·0	1 16·2	1 12·5	0·4	0·0	6·4	0·6	12·4	1·1
05	1 16·3	1 16·5	1 12·8	0·5	0·0	6·5	0·6	12·5	1·1
06	1 16·5	1 16·7	1 13·0	0·6	0·1	6·6	0·6	12·6	1·2
07	1 16·8	1 17·0	1 13·3	0·7	0·1	6·7	0·6	12·7	1·2
08	1 17·0	1 17·2	1 13·5	0·8	0·1	6·8	0·6	12·8	1·2
09	1 17·3	1 17·5	1 13·7	0·9	0·1	6·9	0·6	12·9	1·2
10	1 17·5	1 17·7	1 14·0	1·0	0·1	7·0	0·6	13·0	1·2
11	1 17·8	1 18·0	1 14·2	1·1	0·1	7·1	0·7	13·1	1·2
12	1 18·0	1 18·2	1 14·4	1·2	0·1	7·2	0·7	13·2	1·2
13	1 18·3	1 18·5	1 14·7	1·3	0·1	7·3	0·7	13·3	1·2
14	1 18·5	1 18·7	1 14·9	1·4	0·1	7·4	0·7	13·4	1·2
15	1 18·8	1 19·0	1 15·2	1·5	0·1	7·5	0·7	13·5	1·2
16	1 19·0	1 19·2	1 15·4	1·6	0·1	7·6	0·7	13·6	1·2
17	1 19·3	1 19·5	1 15·6	1·7	0·2	7·7	0·7	13·7	1·3
18	1 19·5	1 19·7	1 15·9	1·8	0·2	7·8	0·7	13·8	1·3
19	1 19·8	1 20·0	1 16·1	1·9	0·2	7·9	0·7	13·9	1·3
20	1 20·0	1 20·2	1 16·4	2·0	0·2	8·0	0·7	14·0	1·3
21	1 20·3	1 20·5	1 16·6	2·1	0·2	8·1	0·7	14·1	1·3
22	1 20·5	1 20·7	1 16·8	2·2	0·2	8·2	0·8	14·2	1·3
23	1 20·8	1 21·0	1 17·1	2·3	0·2	8·3	0·8	14·3	1·3
24	1 21·0	1 21·2	1 17·3	2·4	0·2	8·4	0·8	14·4	1·3
25	1 21·3	1 21·5	1 17·5	2·5	0·2	8·5	0·8	14·5	1·3
26	1 21·5	1 21·7	1 17·8	2·6	0·2	8·6	0·8	14·6	1·3
27	1 21·8	1 22·0	1 18·0	2·7	0·2	8·7	0·8	14·7	1·3
28	1 22·0	1 22·2	1 18·3	2·8	0·3	8·8	0·8	14·8	1·4
29	1 22·3	1 22·5	1 18·5	2·9	0·3	8·9	0·8	14·9	1·4
30	1 22·5	1 22·7	1 18·7	3·0	0·3	9·0	0·8	15·0	1·4
31	1 22·8	1 23·0	1 19·0	3·1	0·3	9·1	0·8	15·1	1·4
32	1 23·0	1 23·2	1 19·2	3·2	0·3	9·2	0·8	15·2	1·4
33	1 23·3	1 23·5	1 19·5	3·3	0·3	9·3	0·9	15·3	1·4
34	1 23·5	1 23·7	1 19·7	3·4	0·3	9·4	0·9	15·4	1·4
35	1 23·8	1 24·0	1 19·9	3·5	0·3	9·5	0·9	15·5	1·4
36	1 24·0	1 24·2	1 20·2	3·6	0·3	9·6	0·9	15·6	1·4
37	1 24·3	1 24·5	1 20·4	3·7	0·3	9·7	0·9	15·7	1·4
38	1 24·5	1 24·7	1 20·7	3·8	0·3	9·8	0·9	15·8	1·4
39	1 24·8	1 25·0	1 20·9	3·9	0·4	9·9	0·9	15·9	1·5
40	1 25·0	1 25·2	1 21·1	4·0	0·4	10·0	0·9	16·0	1·5
41	1 25·3	1 25·5	1 21·4	4·1	0·4	10·1	0·9	16·1	1·5
42	1 25·5	1 25·7	1 21·6	4·2	0·4	10·2	0·9	16·2	1·5
43	1 25·8	1 26·0	1 21·8	4·3	0·4	10·3	0·9	16·3	1·5
44	1 26·0	1 26·2	1 22·1	4·4	0·4	10·4	1·0	16·4	1·5
45	1 26·3	1 26·5	1 22·3	4·5	0·4	10·5	1·0	16·5	1·5
46	1 26·5	1 26·7	1 22·6	4·6	0·4	10·6	1·0	16·6	1·5
47	1 26·8	1 27·0	1 22·8	4·7	0·4	10·7	1·0	16·7	1·5
48	1 27·0	1 27·2	1 23·0	4·8	0·4	10·8	1·0	16·8	1·5
49	1 27·3	1 27·5	1 23·3	4·9	0·4	10·9	1·0	16·9	1·5
50	1 27·5	1 27·7	1 23·5	5·0	0·5	11·0	1·0	17·0	1·6
51	1 27·8	1 28·0	1 23·8	5·1	0·5	11·1	1·0	17·1	1·6
52	1 28·0	1 28·2	1 24·0	5·2	0·5	11·2	1·0	17·2	1·6
53	1 28·3	1 28·5	1 24·2	5·3	0·5	11·3	1·0	17·3	1·6
54	1 28·5	1 28·7	1 24·5	5·4	0·5	11·4	1·0	17·4	1·6
55	1 28·8	1 29·0	1 24·7	5·5	0·5	11·5	1·1	17·5	1·6
56	1 29·0	1 29·2	1 24·9	5·6	0·5	11·6	1·1	17·6	1·6
57	1 29·3	1 29·5	1 25·2	5·7	0·5	11·7	1·1	17·7	1·6
58	1 29·5	1 29·7	1 25·4	5·8	0·5	11·8	1·1	17·8	1·6
59	1 29·8	1 30·0	1 25·7	5·9	0·5	11·9	1·1	17·9	1·6
60	1 30·0	1 30·2	1 25·9	6·0	0·6	12·0	1·1	18·0	1·7

m 6	SUN PLANETS	ARIES	MOON	v or d	Corrn	v or d	Corrn	v or d	Corrn
s	° ′	° ′	° ′	′	′	′	′	′	′
00	1 30·0	1 30·2	1 25·9	0·0	0·0	6·0	0·7	12·0	1·3
01	1 30·3	1 30·5	1 26·1	0·1	0·0	6·1	0·7	12·1	1·3
02	1 30·5	1 30·7	1 26·4	0·2	0·0	6·2	0·7	12·2	1·3
03	1 30·8	1 31·0	1 26·6	0·3	0·0	6·3	0·7	12·3	1·3
04	1 31·0	1 31·2	1 26·9	0·4	0·0	6·4	0·7	12·4	1·3
05	1 31·3	1 31·5	1 27·1	0·5	0·1	6·5	0·7	12·5	1·4
06	1 31·5	1 31·8	1 27·3	0·6	0·1	6·6	0·7	12·6	1·4
07	1 31·8	1 32·0	1 27·6	0·7	0·1	6·7	0·7	12·7	1·4
08	1 32·0	1 32·3	1 27·8	0·8	0·1	6·8	0·7	12·8	1·4
09	1 32·3	1 32·5	1 28·0	0·9	0·1	6·9	0·7	12·9	1·4
10	1 32·5	1 32·8	1 28·3	1·0	0·1	7·0	0·8	13·0	1·4
11	1 32·8	1 33·0	1 28·5	1·1	0·1	7·1	0·8	13·1	1·4
12	1 33·0	1 33·3	1 28·8	1·2	0·1	7·2	0·8	13·2	1·4
13	1 33·3	1 33·5	1 29·0	1·3	0·1	7·3	0·8	13·3	1·4
14	1 33·5	1 33·8	1 29·2	1·4	0·2	7·4	0·8	13·4	1·5
15	1 33·8	1 34·0	1 29·5	1·5	0·2	7·5	0·8	13·5	1·5
16	1 34·0	1 34·3	1 29·7	1·6	0·2	7·6	0·8	13·6	1·5
17	1 34·3	1 34·5	1 30·0	1·7	0·2	7·7	0·8	13·7	1·5
18	1 34·5	1 34·8	1 30·2	1·8	0·2	7·8	0·8	13·8	1·5
19	1 34·8	1 35·0	1 30·4	1·9	0·2	7·9	0·9	13·9	1·5
20	1 35·0	1 35·3	1 30·7	2·0	0·2	8·0	0·9	14·0	1·5
21	1 35·3	1 35·5	1 30·9	2·1	0·2	8·1	0·9	14·1	1·5
22	1 35·5	1 35·8	1 31·1	2·2	0·2	8·2	0·9	14·2	1·5
23	1 35·8	1 36·0	1 31·4	2·3	0·2	8·3	0·9	14·3	1·5
24	1 36·0	1 36·3	1 31·6	2·4	0·3	8·4	0·9	14·4	1·6
25	1 36·3	1 36·5	1 31·9	2·5	0·3	8·5	0·9	14·5	1·6
26	1 36·5	1 36·8	1 32·1	2·6	0·3	8·6	0·9	14·6	1·6
27	1 36·8	1 37·0	1 32·3	2·7	0·3	8·7	0·9	14·7	1·6
28	1 37·0	1 37·3	1 32·6	2·8	0·3	8·8	1·0	14·8	1·6
29	1 37·3	1 37·5	1 32·8	2·9	0·3	8·9	1·0	14·9	1·6
30	1 37·5	1 37·8	1 33·1	3·0	0·3	9·0	1·0	15·0	1·6
31	1 37·8	1 38·0	1 33·3	3·1	0·3	9·1	1·0	15·1	1·6
32	1 38·0	1 38·3	1 33·5	3·2	0·3	9·2	1·0	15·2	1·6
33	1 38·3	1 38·5	1 33·8	3·3	0·4	9·3	1·0	15·3	1·7
34	1 38·5	1 38·8	1 34·0	3·4	0·4	9·4	1·0	15·4	1·7
35	1 38·8	1 39·0	1 34·3	3·5	0·4	9·5	1·0	15·5	1·7
36	1 39·0	1 39·3	1 34·5	3·6	0·4	9·6	1·0	15·6	1·7
37	1 39·3	1 39·5	1 34·7	3·7	0·4	9·7	1·1	15·7	1·7
38	1 39·5	1 39·8	1 35·0	3·8	0·4	9·8	1·1	15·8	1·7
39	1 39·8	1 40·0	1 35·2	3·9	0·4	9·9	1·1	15·9	1·7
40	1 40·0	1 40·3	1 35·4	4·0	0·4	10·0	1·1	16·0	1·7
41	1 40·3	1 40·5	1 35·7	4·1	0·4	10·1	1·1	16·1	1·7
42	1 40·5	1 40·8	1 35·9	4·2	0·5	10·2	1·1	16·2	1·8
43	1 40·8	1 41·0	1 36·2	4·3	0·5	10·3	1·1	16·3	1·8
44	1 41·0	1 41·3	1 36·4	4·4	0·5	10·4	1·1	16·4	1·8
45	1 41·3	1 41·5	1 36·6	4·5	0·5	10·5	1·1	16·5	1·8
46	1 41·5	1 41·8	1 36·9	4·6	0·5	10·6	1·1	16·6	1·8
47	1 41·8	1 42·0	1 37·1	4·7	0·5	10·7	1·2	16·7	1·8
48	1 42·0	1 42·3	1 37·4	4·8	0·5	10·8	1·2	16·8	1·8
49	1 42·3	1 42·5	1 37·6	4·9	0·5	10·9	1·2	16·9	1·8
50	1 42·5	1 42·8	1 37·8	5·0	0·5	11·0	1·2	17·0	1·8
51	1 42·8	1 43·0	1 38·1	5·1	0·6	11·1	1·2	17·1	1·9
52	1 43·0	1 43·3	1 38·3	5·2	0·6	11·2	1·2	17·2	1·9
53	1 43·3	1 43·5	1 38·5	5·3	0·6	11·3	1·2	17·3	1·9
54	1 43·5	1 43·8	1 38·8	5·4	0·6	11·4	1·2	17·4	1·9
55	1 43·8	1 44·0	1 39·0	5·5	0·6	11·5	1·2	17·5	1·9
56	1 44·0	1 44·3	1 39·3	5·6	0·6	11·6	1·3	17·6	1·9
57	1 44·3	1 44·5	1 39·5	5·7	0·6	11·7	1·3	17·7	1·9
58	1 44·5	1 44·8	1 39·7	5·8	0·6	11·8	1·3	17·8	1·9
59	1 44·8	1 45·0	1 40·0	5·9	0·6	11·9	1·3	17·9	1·9
60	1 45·0	1 45·3	1 40·2	6·0	0·7	12·0	1·3	18·0	2·0

m 7	SUN PLANETS	ARIES	MOON	v or d	Corrn	v or d	Corrn	v or d	Corrn
s	° ′	° ′	° ′	′	′	′	′	′	′
00	1 45·0	1 45·3	1 40·2	0·0	0·0	6·0	0·8	12·0	1·5
01	1 45·3	1 45·5	1 40·5	0·1	0·0	6·1	0·8	12·1	1·5
02	1 45·5	1 45·8	1 40·7	0·2	0·0	6·2	0·8	12·2	1·5
03	1 45·8	1 46·0	1 40·9	0·3	0·0	6·3	0·8	12·3	1·5
04	1 46·0	1 46·3	1 41·2	0·4	0·1	6·4	0·8	12·4	1·6
05	1 46·3	1 46·5	1 41·4	0·5	0·1	6·5	0·8	12·5	1·6
06	1 46·5	1 46·8	1 41·6	0·6	0·1	6·6	0·8	12·6	1·6
07	1 46·8	1 47·0	1 41·9	0·7	0·1	6·7	0·8	12·7	1·6
08	1 47·0	1 47·3	1 42·1	0·8	0·1	6·8	0·9	12·8	1·6
09	1 47·3	1 47·5	1 42·4	0·9	0·1	6·9	0·9	12·9	1·6
10	1 47·5	1 47·8	1 42·6	1·0	0·1	7·0	0·9	13·0	1·6
11	1 47·8	1 48·0	1 42·8	1·1	0·1	7·1	0·9	13·1	1·6
12	1 48·0	1 48·3	1 43·1	1·2	0·2	7·2	0·9	13·2	1·7
13	1 48·3	1 48·5	1 43·3	1·3	0·2	7·3	0·9	13·3	1·7
14	1 48·5	1 48·8	1 43·6	1·4	0·2	7·4	0·9	13·4	1·7
15	1 48·8	1 49·0	1 43·8	1·5	0·2	7·5	0·9	13·5	1·7
16	1 49·0	1 49·3	1 44·0	1·6	0·2	7·6	1·0	13·6	1·7
17	1 49·3	1 49·5	1 44·3	1·7	0·2	7·7	1·0	13·7	1·7
18	1 49·5	1 49·8	1 44·5	1·8	0·2	7·8	1·0	13·8	1·7
19	1 49·8	1 50·1	1 44·8	1·9	0·2	7·9	1·0	13·9	1·7
20	1 50·0	1 50·3	1 45·0	2·0	0·3	8·0	1·0	14·0	1·8
21	1 50·3	1 50·6	1 45·2	2·1	0·3	8·1	1·0	14·1	1·8
22	1 50·5	1 50·8	1 45·5	2·2	0·3	8·2	1·0	14·2	1·8
23	1 50·8	1 51·1	1 45·7	2·3	0·3	8·3	1·0	14·3	1·8
24	1 51·0	1 51·3	1 45·9	2·4	0·3	8·4	1·1	14·4	1·8
25	1 51·3	1 51·6	1 46·2	2·5	0·3	8·5	1·1	14·5	1·8
26	1 51·5	1 51·8	1 46·4	2·6	0·3	8·6	1·1	14·6	1·8
27	1 51·8	1 52·1	1 46·7	2·7	0·3	8·7	1·1	14·7	1·8
28	1 52·0	1 52·3	1 46·9	2·8	0·4	8·8	1·1	14·8	1·9
29	1 52·3	1 52·6	1 47·1	2·9	0·4	8·9	1·1	14·9	1·9
30	1 52·5	1 52·8	1 47·4	3·0	0·4	9·0	1·1	15·0	1·9
31	1 52·8	1 53·1	1 47·6	3·1	0·4	9·1	1·1	15·1	1·9
32	1 53·0	1 53·3	1 47·9	3·2	0·4	9·2	1·2	15·2	1·9
33	1 53·3	1 53·6	1 48·1	3·3	0·4	9·3	1·2	15·3	1·9
34	1 53·5	1 53·8	1 48·3	3·4	0·4	9·4	1·2	15·4	1·9
35	1 53·8	1 54·1	1 48·6	3·5	0·4	9·5	1·2	15·5	1·9
36	1 54·0	1 54·3	1 48·8	3·6	0·5	9·6	1·2	15·6	2·0
37	1 54·3	1 54·6	1 49·0	3·7	0·5	9·7	1·2	15·7	2·0
38	1 54·5	1 54·8	1 49·3	3·8	0·5	9·8	1·2	15·8	2·0
39	1 54·8	1 55·1	1 49·5	3·9	0·5	9·9	1·2	15·9	2·0
40	1 55·0	1 55·3	1 49·8	4·0	0·5	10·0	1·3	16·0	2·0
41	1 55·3	1 55·6	1 50·0	4·1	0·5	10·1	1·3	16·1	2·0
42	1 55·5	1 55·8	1 50·2	4·2	0·5	10·2	1·3	16·2	2·0
43	1 55·8	1 56·1	1 50·5	4·3	0·5	10·3	1·3	16·3	2·0
44	1 56·0	1 56·3	1 50·7	4·4	0·6	10·4	1·3	16·4	2·1
45	1 56·3	1 56·6	1 51·0	4·5	0·6	10·5	1·3	16·5	2·1
46	1 56·5	1 56·8	1 51·2	4·6	0·6	10·6	1·3	16·6	2·1
47	1 56·8	1 57·1	1 51·4	4·7	0·6	10·7	1·3	16·7	2·1
48	1 57·0	1 57·3	1 51·7	4·8	0·6	10·8	1·4	16·8	2·1
49	1 57·3	1 57·6	1 51·9	4·9	0·6	10·9	1·4	16·9	2·1
50	1 57·5	1 57·8	1 52·1	5·0	0·6	11·0	1·4	17·0	2·1
51	1 57·8	1 58·1	1 52·4	5·1	0·6	11·1	1·4	17·1	2·1
52	1 58·0	1 58·3	1 52·6	5·2	0·7	11·2	1·4	17·2	2·2
53	1 58·3	1 58·6	1 52·9	5·3	0·7	11·3	1·4	17·3	2·2
54	1 58·5	1 58·8	1 53·1	5·4	0·7	11·4	1·4	17·4	2·2
55	1 58·8	1 59·1	1 53·3	5·5	0·7	11·5	1·4	17·5	2·2
56	1 59·0	1 59·3	1 53·6	5·6	0·7	11·6	1·5	17·6	2·2
57	1 59·3	1 59·6	1 53·8	5·7	0·7	11·7	1·5	17·7	2·2
58	1 59·5	1 59·8	1 54·1	5·8	0·7	11·8	1·5	17·8	2·2
59	1 59·8	2 00·1	1 54·3	5·9	0·7	11·9	1·5	17·9	2·2
60	2 00·0	2 00·3	1 54·5	6·0	0·8	12·0	1·5	18·0	2·3

m 8	SUN PLANETS	ARIES	MOON	v or Corrn d		v or Corrn d		v or Corrn d	
s	° ′	° ′	° ′	′	′	′	′	′	′
00	2 00·0	2 00·3	1 54·5	0·0	0·0	6·0	0·9	12·0	1·7
01	2 00·3	2 00·6	1 54·8	0·1	0·0	6·1	0·9	12·1	1·7
02	2 00·5	2 00·8	1 55·0	0·2	0·0	6·2	0·9	12·2	1·7
03	2 00·8	2 01·1	1 55·2	0·3	0·0	6·3	0·9	12·3	1·7
04	2 01·0	2 01·3	1 55·5	0·4	0·1	6·4	0·9	12·4	1·8
05	2 01·3	2 01·6	1 55·7	0·5	0·1	6·5	0·9	12·5	1·8
06	2 01·5	2 01·8	1 56·0	0·6	0·1	6·6	0·9	12·6	1·8
07	2 01·8	2 02·1	1 56·2	0·7	0·1	6·7	0·9	12·7	1·8
08	2 02·0	2 02·3	1 56·4	0·8	0·1	6·8	1·0	12·8	1·8
09	2 02·3	2 02·6	1 56·7	0·9	0·1	6·9	1·0	12·9	1·8
10	2 02·5	2 02·8	1 56·9	1·0	0·1	7·0	1·0	13·0	1·8
11	2 02·8	2 03·1	1 57·2	1·1	0·2	7·1	1·0	13·1	1·9
12	2 03·0	2 03·3	1 57·4	1·2	0·2	7·2	1·0	13·2	1·9
13	2 03·3	2 03·6	1 57·6	1·3	0·2	7·3	1·0	13·3	1·9
14	2 03·5	2 03·8	1 57·9	1·4	0·2	7·4	1·0	13·4	1·9
15	2 03·8	2 04·1	1 58·1	1·5	0·2	7·5	1·1	13·5	1·9
16	2 04·0	2 04·3	1 58·4	1·6	0·2	7·6	1·1	13·6	1·9
17	2 04·3	2 04·6	1 58·6	1·7	0·2	7·7	1·1	13·7	1·9
18	2 04·5	2 04·8	1 58·8	1·8	0·3	7·8	1·1	13·8	2·0
19	2 04·8	2 05·1	1 59·1	1·9	0·3	7·9	1·1	13·9	2·0
20	2 05·0	2 05·3	1 59·3	2·0	0·3	8·0	1·1	14·0	2·0
21	2 05·3	2 05·6	1 59·5	2·1	0·3	8·1	1·1	14·1	2·0
22	2 05·5	2 05·8	1 59·8	2·2	0·3	8·2	1·2	14·2	2·0
23	2 05·8	2 06·1	2 00·0	2·3	0·3	8·3	1·2	14·3	2·0
24	2 06·0	2 06·3	2 00·3	2·4	0·3	8·4	1·2	14·4	2·0
25	2 06·3	2 06·6	2 00·5	2·5	0·4	8·5	1·2	14·5	2·1
26	2 06·5	2 06·8	2 00·7	2·6	0·4	8·6	1·2	14·6	2·1
27	2 06·8	2 07·1	2 01·0	2·7	0·4	8·7	1·2	14·7	2·1
28	2 07·0	2 07·3	2 01·2	2·8	0·4	8·8	1·2	14·8	2·1
29	2 07·3	2 07·6	2 01·5	2·9	0·4	8·9	1·3	14·9	2·1
30	2 07·5	2 07·8	2 01·7	3·0	0·4	9·0	1·3	15·0	2·1
31	2 07·8	2 08·1	2 01·9	3·1	0·4	9·1	1·3	15·1	2·1
32	2 08·0	2 08·4	2 02·2	3·2	0·5	9·2	1·3	15·2	2·2
33	2 08·3	2 08·6	2 02·4	3·3	0·5	9·3	1·3	15·3	2·2
34	2 08·5	2 08·9	2 02·6	3·4	0·5	9·4	1·3	15·4	2·2
35	2 08·8	2 09·1	2 02·9	3·5	0·5	9·5	1·3	15·5	2·2
36	2 09·0	2 09·4	2 03·1	3·6	0·5	9·6	1·4	15·6	2·2
37	2 09·3	2 09·6	2 03·4	3·7	0·5	9·7	1·4	15·7	2·2
38	2 09·5	2 09·9	2 03·6	3·8	0·5	9·8	1·4	15·8	2·2
39	2 09·8	2 10·1	2 03·8	3·9	0·6	9·9	1·4	15·9	2·3
40	2 10·0	2 10·4	2 04·1	4·0	0·6	10·0	1·4	16·0	2·3
41	2 10·3	2 10·6	2 04·3	4·1	0·6	10·1	1·4	16·1	2·3
42	2 10·5	2 10·9	2 04·6	4·2	0·6	10·2	1·4	16·2	2·3
43	2 10·8	2 11·1	2 04·8	4·3	0·6	10·3	1·5	16·3	2·3
44	2 11·0	2 11·4	2 05·0	4·4	0·6	10·4	1·5	16·4	2·3
45	2 11·3	2 11·6	2 05·3	4·5	0·6	10·5	1·5	16·5	2·3
46	2 11·5	2 11·9	2 05·5	4·6	0·7	10·6	1·5	16·6	2·4
47	2 11·8	2 12·1	2 05·7	4·7	0·7	10·7	1·5	16·7	2·4
48	2 12·0	2 12·4	2 06·0	4·8	0·7	10·8	1·5	16·8	2·4
49	2 12·3	2 12·6	2 06·2	4·9	0·7	10·9	1·5	16·9	2·4
50	2 12·5	2 12·9	2 06·5	5·0	0·7	11·0	1·6	17·0	2·4
51	2 12·8	2 13·1	2 06·7	5·1	0·7	11·1	1·6	17·1	2·4
52	2 13·0	2 13·4	2 06·9	5·2	0·7	11·2	1·6	17·2	2·4
53	2 13·3	2 13·6	2 07·2	5·3	0·8	11·3	1·6	17·3	2·5
54	2 13·5	2 13·9	2 07·4	5·4	0·8	11·4	1·6	17·4	2·5
55	2 13·8	2 14·1	2 07·7	5·5	0·8	11·5	1·6	17·5	2·5
56	2 14·0	2 14·4	2 07·9	5·6	0·8	11·6	1·6	17·6	2·5
57	2 14·3	2 14·6	2 08·1	5·7	0·8	11·7	1·7	17·7	2·5
58	2 14·5	2 14·9	2 08·4	5·8	0·8	11·8	1·7	17·8	2·5
59	2 14·8	2 15·1	2 08·6	5·9	0·8	11·9	1·7	17·9	2·5
60	2 15·0	2 15·4	2 08·9	6·0	0·9	12·0	1·7	18·0	2·6

m 9	SUN PLANETS	ARIES	MOON	v or Corrn d		v or Corrn d		v or Corrn d	
s	° ′	° ′	° ′	′	′	′	′	′	′
00	2 15·0	2 15·4	2 08·9	0·0	0·0	6·0	1·0	12·0	1·9
01	2 15·3	2 15·6	2 09·1	0·1	0·0	6·1	1·0	12·1	1·9
02	2 15·5	2 15·9	2 09·3	0·2	0·0	6·2	1·0	12·2	1·9
03	2 15·8	2 16·1	2 09·6	0·3	0·0	6·3	1·0	12·3	1·9
04	2 16·0	2 16·4	2 09·8	0·4	0·1	6·4	1·0	12·4	2·0
05	2 16·3	2 16·6	2 10·0	0·5	0·1	6·5	1·0	12·5	2·0
06	2 16·5	2 16·9	2 10·3	0·6	0·1	6·6	1·0	12·6	2·0
07	2 16·8	2 17·1	2 10·5	0·7	0·1	6·7	1·1	12·7	2·0
08	2 17·0	2 17·4	2 10·8	0·8	0·1	6·8	1·1	12·8	2·0
09	2 17·3	2 17·6	2 11·0	0·9	0·1	6·9	1·1	12·9	2·0
10	2 17·5	2 17·9	2 11·2	1·0	0·2	7·0	1·1	13·0	2·1
11	2 17·8	2 18·1	2 11·5	1·1	0·2	7·1	1·1	13·1	2·1
12	2 18·0	2 18·4	2 11·7	1·2	0·2	7·2	1·1	13·2	2·1
13	2 18·3	2 18·6	2 12·0	1·3	0·2	7·3	1·2	13·3	2·1
14	2 18·5	2 18·9	2 12·2	1·4	0·2	7·4	1·2	13·4	2·1
15	2 18·8	2 19·1	2 12·4	1·5	0·2	7·5	1·2	13·5	2·1
16	2 19·0	2 19·4	2 12·7	1·6	0·3	7·6	1·2	13·6	2·2
17	2 19·3	2 19·6	2 12·9	1·7	0·3	7·7	1·2	13·7	2·2
18	2 19·5	2 19·9	2 13·1	1·8	0·3	7·8	1·2	13·8	2·2
19	2 19·8	2 20·1	2 13·4	1·9	0·3	7·9	1·3	13·9	2·2
20	2 20·0	2 20·4	2 13·6	2·0	0·3	8·0	1·3	14·0	2·2
21	2 20·3	2 20·6	2 13·9	2·1	0·3	8·1	1·3	14·1	2·2
22	2 20·5	2 20·9	2 14·1	2·2	0·3	8·2	1·3	14·2	2·2
23	2 20·8	2 21·1	2 14·3	2·3	0·4	8·3	1·3	14·3	2·3
24	2 21·0	2 21·4	2 14·6	2·4	0·4	8·4	1·3	14·4	2·3
25	2 21·3	2 21·6	2 14·8	2·5	0·4	8·5	1·3	14·5	2·3
26	2 21·5	2 21·9	2 15·1	2·6	0·4	8·6	1·4	14·6	2·3
27	2 21·8	2 22·1	2 15·3	2·7	0·4	8·7	1·4	14·7	2·3
28	2 22·0	2 22·4	2 15·5	2·8	0·4	8·8	1·4	14·8	2·3
29	2 22·3	2 22·6	2 15·8	2·9	0·5	8·9	1·4	14·9	2·4
30	2 22·5	2 22·9	2 16·0	3·0	0·5	9·0	1·4	15·0	2·4
31	2 22·8	2 23·1	2 16·2	3·1	0·5	9·1	1·4	15·1	2·4
32	2 23·0	2 23·4	2 16·5	3·2	0·5	9·2	1·5	15·2	2·4
33	2 23·3	2 23·6	2 16·7	3·3	0·5	9·3	1·5	15·3	2·4
34	2 23·5	2 23·9	2 17·0	3·4	0·5	9·4	1·5	15·4	2·4
35	2 23·8	2 24·1	2 17·2	3·5	0·6	9·5	1·5	15·5	2·5
36	2 24·0	2 24·4	2 17·4	3·6	0·6	9·6	1·5	15·6	2·5
37	2 24·3	2 24·6	2 17·7	3·7	0·6	9·7	1·5	15·7	2·5
38	2 24·5	2 24·9	2 17·9	3·8	0·6	9·8	1·6	15·8	2·5
39	2 24·8	2 25·1	2 18·2	3·9	0·6	9·9	1·6	15·9	2·5
40	2 25·0	2 25·4	2 18·4	4·0	0·6	10·0	1·6	16·0	2·5
41	2 25·3	2 25·6	2 18·6	4·1	0·6	10·1	1·6	16·1	2·5
42	2 25·5	2 25·9	2 18·9	4·2	0·7	10·2	1·6	16·2	2·6
43	2 25·8	2 26·1	2 19·1	4·3	0·7	10·3	1·6	16·3	2·6
44	2 26·0	2 26·4	2 19·3	4·4	0·7	10·4	1·6	16·4	2·6
45	2 26·3	2 26·7	2 19·6	4·5	0·7	10·5	1·7	16·5	2·6
46	2 26·5	2 26·9	2 19·8	4·6	0·7	10·6	1·7	16·6	2·6
47	2 26·8	2 27·2	2 20·1	4·7	0·7	10·7	1·7	16·7	2·6
48	2 27·0	2 27·4	2 20·3	4·8	0·8	10·8	1·7	16·8	2·7
49	2 27·3	2 27·7	2 20·5	4·9	0·8	10·9	1·7	16·9	2·7
50	2 27·5	2 27·9	2 20·8	5·0	0·8	11·0	1·7	17·0	2·7
51	2 27·8	2 28·2	2 21·0	5·1	0·8	11·1	1·8	17·1	2·7
52	2 28·0	2 28·4	2 21·3	5·2	0·8	11·2	1·8	17·2	2·7
53	2 28·3	2 28·7	2 21·5	5·3	0·8	11·3	1·8	17·3	2·7
54	2 28·5	2 28·9	2 21·7	5·4	0·9	11·4	1·8	17·4	2·8
55	2 28·8	2 29·2	2 22·0	5·5	0·9	11·5	1·8	17·5	2·8
56	2 29·0	2 29·4	2 22·2	5·6	0·9	11·6	1·8	17·6	2·8
57	2 29·3	2 29·7	2 22·5	5·7	0·9	11·7	1·9	17·7	2·8
58	2 29·5	2 29·9	2 22·7	5·8	0·9	11·8	1·9	17·8	2·8
59	2 29·8	2 30·2	2 22·9	5·9	0·9	11·9	1·9	17·9	2·8
60	2 30·0	2 30·4	2 23·2	6·0	1·0	12·0	1·9	18·0	2·9

10m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	2 30·0	2 30·4	2 23·2	0·0	0·0	6·0	1·1	12·0	2·1
01	2 30·3	2 30·7	2 23·4	0·1	0·0	6·1	1·1	12·1	2·1
02	2 30·5	2 30·9	2 23·6	0·2	0·0	6·2	1·1	12·2	2·1
03	2 30·8	2 31·2	2 23·9	0·3	0·1	6·3	1·1	12·3	2·2
04	2 31·0	2 31·4	2 24·1	0·4	0·1	6·4	1·1	12·4	2·2
05	2 31·3	2 31·7	2 24·4	0·5	0·1	6·5	1·1	12·5	2·2
06	2 31·5	2 31·9	2 24·6	0·6	0·1	6·6	1·2	12·6	2·2
07	2 31·8	2 32·2	2 24·8	0·7	0·1	6·7	1·2	12·7	2·2
08	2 32·0	2 32·4	2 25·1	0·8	0·1	6·8	1·2	12·8	2·2
09	2 32·3	2 32·7	2 25·3	0·9	0·2	6·9	1·2	12·9	2·3
10	2 32·5	2 32·9	2 25·6	1·0	0·2	7·0	1·2	13·0	2·3
11	2 32·8	2 33·2	2 25·8	1·1	0·2	7·1	1·2	13·1	2·3
12	2 33·0	2 33·4	2 26·0	1·2	0·2	7·2	1·3	13·2	2·3
13	2 33·3	2 33·7	2 26·3	1·3	0·2	7·3	1·3	13·3	2·3
14	2 33·5	2 33·9	2 26·5	1·4	0·2	7·4	1·3	13·4	2·3
15	2 33·8	2 34·2	2 26·7	1·5	0·3	7·5	1·3	13·5	2·4
16	2 34·0	2 34·4	2 27·0	1·6	0·3	7·6	1·3	13·6	2·4
17	2 34·3	2 34·7	2 27·2	1·7	0·3	7·7	1·3	13·7	2·4
18	2 34·5	2 34·9	2 27·5	1·8	0·3	7·8	1·4	13·8	2·4
19	2 34·8	2 35·2	2 27·7	1·9	0·3	7·9	1·4	13·9	2·4
20	2 35·0	2 35·4	2 27·9	2·0	0·4	8·0	1·4	14·0	2·5
21	2 35·3	2 35·7	2 28·2	2·1	0·4	8·1	1·4	14·1	2·5
22	2 35·5	2 35·9	2 28·4	2·2	0·4	8·2	1·4	14·2	2·5
23	2 35·8	2 36·2	2 28·7	2·3	0·4	8·3	1·5	14·3	2·5
24	2 36·0	2 36·4	2 28·9	2·4	0·4	8·4	1·5	14·4	2·5
25	2 36·3	2 36·7	2 29·1	2·5	0·4	8·5	1·5	14·5	2·5
26	2 36·5	2 36·9	2 29·4	2·6	0·5	8·6	1·5	14·6	2·6
27	2 36·8	2 37·2	2 29·6	2·7	0·5	8·7	1·5	14·7	2·6
28	2 37·0	2 37·4	2 29·8	2·8	0·5	8·8	1·5	14·8	2·6
29	2 37·3	2 37·7	2 30·1	2·9	0·5	8·9	1·6	14·9	2·6
30	2 37·5	2 37·9	2 30·3	3·0	0·5	9·0	1·6	15·0	2·6
31	2 37·8	2 38·2	2 30·6	3·1	0·5	9·1	1·6	15·1	2·6
32	2 38·0	2 38·4	2 30·8	3·2	0·6	9·2	1·6	15·2	2·7
33	2 38·3	2 38·7	2 31·0	3·3	0·6	9·3	1·6	15·3	2·7
34	2 38·5	2 38·9	2 31·3	3·4	0·6	9·4	1·6	15·4	2·7
35	2 38·8	2 39·2	2 31·5	3·5	0·6	9·5	1·7	15·5	2·7
36	2 39·0	2 39·4	2 31·8	3·6	0·6	9·6	1·7	15·6	2·7
37	2 39·3	2 39·7	2 32·0	3·7	0·6	9·7	1·7	15·7	2·7
38	2 39·5	2 39·9	2 32·2	3·8	0·7	9·8	1·7	15·8	2·8
39	2 39·8	2 40·2	2 32·5	3·9	0·7	9·9	1·7	15·9	2·8
40	2 40·0	2 40·4	2 32·7	4·0	0·7	10·0	1·8	16·0	2·8
41	2 40·3	2 40·7	2 32·9	4·1	0·7	10·1	1·8	16·1	2·8
42	2 40·5	2 40·9	2 33·2	4·2	0·7	10·2	1·8	16·2	2·8
43	2 40·8	2 41·2	2 33·4	4·3	0·8	10·3	1·8	16·3	2·9
44	2 41·0	2 41·4	2 33·7	4·4	0·8	10·4	1·8	16·4	2·9
45	2 41·3	2 41·7	2 33·9	4·5	0·8	10·5	1·8	16·5	2·9
46	2 41·5	2 41·9	2 34·1	4·6	0·8	10·6	1·9	16·6	2·9
47	2 41·8	2 42·2	2 34·4	4·7	0·8	10·7	1·9	16·7	2·9
48	2 42·0	2 42·4	2 34·6	4·8	0·8	10·8	1·9	16·8	2·9
49	2 42·3	2 42·7	2 34·9	4·9	0·9	10·9	1·9	16·9	3·0
50	2 42·5	2 42·9	2 35·1	5·0	0·9	11·0	1·9	17·0	3·0
51	2 42·8	2 43·2	2 35·3	5·1	0·9	11·1	1·9	17·1	3·0
52	2 43·0	2 43·4	2 35·6	5·2	0·9	11·2	2·0	17·2	3·0
53	2 43·3	2 43·7	2 35·8	5·3	0·9	11·3	2·0	17·3	3·0
54	2 43·5	2 43·9	2 36·1	5·4	0·9	11·4	2·0	17·4	3·0
55	2 43·8	2 44·2	2 36·3	5·5	1·0	11·5	2·0	17·5	3·1
56	2 44·0	2 44·4	2 36·5	5·6	1·0	11·6	2·0	17·6	3·1
57	2 44·3	2 44·7	2 36·8	5·7	1·0	11·7	2·0	17·7	3·1
58	2 44·5	2 45·0	2 37·0	5·8	1·0	11·8	2·1	17·8	3·1
59	2 44·8	2 45·2	2 37·2	5·9	1·0	11·9	2·1	17·9	3·1
60	2 45·0	2 45·5	2 37·5	6·0	1·1	12·0	2·1	18·0	3·2

11m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	2 45·0	2 45·5	2 37·5	0·0	0·0	6·0	1·2	12·0	2·3
01	2 45·3	2 45·7	2 37·7	0·1	0·0	6·1	1·2	12·1	2·3
02	2 45·5	2 46·0	2 38·0	0·2	0·0	6·2	1·2	12·2	2·3
03	2 45·8	2 46·2	2 38·2	0·3	0·1	6·3	1·2	12·3	2·4
04	2 46·0	2 46·5	2 38·4	0·4	0·1	6·4	1·2	12·4	2·4
05	2 46·3	2 46·7	2 38·7	0·5	0·1	6·5	1·2	12·5	2·4
06	2 46·5	2 47·0	2 38·9	0·6	0·1	6·6	1·3	12·6	2·4
07	2 46·8	2 47·2	2 39·2	0·7	0·1	6·7	1·3	12·7	2·4
08	2 47·0	2 47·5	2 39·4	0·8	0·2	6·8	1·3	12·8	2·5
09	2 47·3	2 47·7	2 39·6	0·9	0·2	6·9	1·3	12·9	2·5
10	2 47·5	2 48·0	2 39·9	1·0	0·2	7·0	1·3	13·0	2·5
11	2 47·8	2 48·2	2 40·1	1·1	0·2	7·1	1·4	13·1	2·5
12	2 48·0	2 48·5	2 40·3	1·2	0·2	7·2	1·4	13·2	2·5
13	2 48·3	2 48·7	2 40·6	1·3	0·2	7·3	1·4	13·3	2·5
14	2 48·5	2 49·0	2 40·8	1·4	0·3	7·4	1·4	13·4	2·6
15	2 48·8	2 49·2	2 41·1	1·5	0·3	7·5	1·4	13·5	2·6
16	2 49·0	2 49·5	2 41·3	1·6	0·3	7·6	1·5	13·6	2·6
17	2 49·3	2 49·7	2 41·5	1·7	0·3	7·7	1·5	13·7	2·6
18	2 49·5	2 50·0	2 41·8	1·8	0·3	7·8	1·5	13·8	2·6
19	2 49·8	2 50·2	2 42·0	1·9	0·4	7·9	1·5	13·9	2·7
20	2 50·0	2 50·5	2 42·3	2·0	0·4	8·0	1·5	14·0	2·7
21	2 50·3	2 50·7	2 42·5	2·1	0·4	8·1	1·6	14·1	2·7
22	2 50·5	2 51·0	2 42·7	2·2	0·4	8·2	1·6	14·2	2·7
23	2 50·8	2 51·2	2 43·0	2·3	0·4	8·3	1·6	14·3	2·7
24	2 51·0	2 51·5	2 43·2	2·4	0·5	8·4	1·6	14·4	2·8
25	2 51·3	2 51·7	2 43·4	2·5	0·5	8·5	1·6	14·5	2·8
26	2 51·5	2 52·0	2 43·7	2·6	0·5	8·6	1·6	14·6	2·8
27	2 51·8	2 52·2	2 43·9	2·7	0·5	8·7	1·7	14·7	2·8
28	2 52·0	2 52·5	2 44·2	2·8	0·5	8·8	1·7	14·8	2·8
29	2 52·3	2 52·7	2 44·4	2·9	0·6	8·9	1·7	14·9	2·9
30	2 52·5	2 53·0	2 44·6	3·0	0·6	9·0	1·7	15·0	2·9
31	2 52·8	2 53·2	2 44·9	3·1	0·6	9·1	1·7	15·1	2·9
32	2 53·0	2 53·5	2 45·1	3·2	0·6	9·2	1·8	15·2	2·9
33	2 53·3	2 53·7	2 45·4	3·3	0·6	9·3	1·8	15·3	2·9
34	2 53·5	2 54·0	2 45·6	3·4	0·7	9·4	1·8	15·4	3·0
35	2 53·8	2 54·2	2 45·8	3·5	0·7	9·5	1·8	15·5	3·0
36	2 54·0	2 54·5	2 46·1	3·6	0·7	9·6	1·8	15·6	3·0
37	2 54·3	2 54·7	2 46·3	3·7	0·7	9·7	1·9	15·7	3·0
38	2 54·5	2 55·0	2 46·6	3·8	0·7	9·8	1·9	15·8	3·0
39	2 54·8	2 55·2	2 46·8	3·9	0·7	9·9	1·9	15·9	3·0
40	2 55·0	2 55·5	2 47·0	4·0	0·8	10·0	1·9	16·0	3·1
41	2 55·3	2 55·7	2 47·3	4·1	0·8	10·1	1·9	16·1	3·1
42	2 55·5	2 56·0	2 47·5	4·2	0·8	10·2	2·0	16·2	3·1
43	2 55·8	2 56·2	2 47·7	4·3	0·8	10·3	2·0	16·3	3·1
44	2 56·0	2 56·5	2 48·0	4·4	0·8	10·4	2·0	16·4	3·1
45	2 56·3	2 56·7	2 48·2	4·5	0·9	10·5	2·0	16·5	3·2
46	2 56·5	2 57·0	2 48·5	4·6	0·9	10·6	2·0	16·6	3·2
47	2 56·8	2 57·2	2 48·7	4·7	0·9	10·7	2·1	16·7	3·2
48	2 57·0	2 57·5	2 48·9	4·8	0·9	10·8	2·1	16·8	3·2
49	2 57·3	2 57·7	2 49·2	4·9	0·9	10·9	2·1	16·9	3·2
50	2 57·5	2 58·0	2 49·4	5·0	1·0	11·0	2·1	17·0	3·3
51	2 57·8	2 58·2	2 49·7	5·1	1·0	11·1	2·1	17·1	3·3
52	2 58·0	2 58·5	2 49·9	5·2	1·0	11·2	2·1	17·2	3·3
53	2 58·3	2 58·7	2 50·1	5·3	1·0	11·3	2·2	17·3	3·3
54	2 58·5	2 59·0	2 50·4	5·4	1·0	11·4	2·2	17·4	3·3
55	2 58·8	2 59·2	2 50·6	5·5	1·1	11·5	2·2	17·5	3·4
56	2 59·0	2 59·5	2 50·8	5·6	1·1	11·6	2·2	17·6	3·4
57	2 59·3	2 59·7	2 51·1	5·7	1·1	11·7	2·2	17·7	3·4
58	2 59·5	3 00·0	2 51·3	5·8	1·1	11·8	2·3	17·8	3·4
59	2 59·8	3 00·2	2 51·6	5·9	1·1	11·9	2·3	17·9	3·4
60	3 00·0	3 00·5	2 51·8	6·0	1·2	12·0	2·3	18·0	3·5

12m	SUN PLANETS	ARIES	MOON	v or d	Corrn	v or d	Corrn	v or d	Corrn
s	° ′	° ′	° ′	′	′	′	′	′	′
00	3 00·0	3 00·5	2 51·8	0·0	0·0	6·0	1·3	12·0	2·5
01	3 00·3	3 00·7	2 52·0	0·1	0·0	6·1	1·3	12·1	2·5
02	3 00·5	3 01·0	2 52·3	0·2	0·0	6·2	1·3	12·2	2·5
03	3 00·8	3 01·2	2 52·5	0·3	0·1	6·3	1·3	12·3	2·6
04	3 01·0	3 01·5	2 52·8	0·4	0·1	6·4	1·3	12·4	2·6
05	3 01·3	3 01·7	2 53·0	0·5	0·1	6·5	1·4	12·5	2·6
06	3 01·5	3 02·0	2 53·2	0·6	0·1	6·6	1·4	12·6	2·6
07	3 01·8	3 02·2	2 53·5	0·7	0·1	6·7	1·4	12·7	2·6
08	3 02·0	3 02·5	2 53·7	0·8	0·2	6·8	1·4	12·8	2·7
09	3 02·3	3 02·7	2 53·9	0·9	0·2	6·9	1·4	12·9	2·7
10	3 02·5	3 03·0	2 54·2	1·0	0·2	7·0	1·5	13·0	2·7
11	3 02·8	3 03·3	2 54·4	1·1	0·2	7·1	1·5	13·1	2·7
12	3 03·0	3 03·5	2 54·7	1·2	0·3	7·2	1·5	13·2	2·8
13	3 03·3	3 03·8	2 54·9	1·3	0·3	7·3	1·5	13·3	2·8
14	3 03·5	3 04·0	2 55·1	1·4	0·3	7·4	1·5	13·4	2·8
15	3 03·8	3 04·3	2 55·4	1·5	0·3	7·5	1·6	13·5	2·8
16	3 04·0	3 04·5	2 55·6	1·6	0·3	7·6	1·6	13·6	2·8
17	3 04·3	3 04·8	2 55·9	1·7	0·4	7·7	1·6	13·7	2·9
18	3 04·5	3 05·0	2 56·1	1·8	0·4	7·8	1·6	13·8	2·9
19	3 04·8	3 05·3	2 56·3	1·9	0·4	7·9	1·6	13·9	2·9
20	3 05·0	3 05·5	2 56·6	2·0	0·4	8·0	1·7	14·0	2·9
21	3 05·3	3 05·8	2 56·8	2·1	0·4	8·1	1·7	14·1	2·9
22	3 05·5	3 06·0	2 57·0	2·2	0·5	8·2	1·7	14·2	3·0
23	3 05·8	3 06·3	2 57·3	2·3	0·5	8·3	1·7	14·3	3·0
24	3 06·0	3 06·5	2 57·5	2·4	0·5	8·4	1·8	14·4	3·0
25	3 06·3	3 06·8	2 57·8	2·5	0·5	8·5	1·8	14·5	3·0
26	3 06·5	3 07·0	2 58·0	2·6	0·5	8·6	1·8	14·6	3·0
27	3 06·8	3 07·3	2 58·2	2·7	0·6	8·7	1·8	14·7	3·1
28	3 07·0	3 07·5	2 58·5	2·8	0·6	8·8	1·8	14·8	3·1
29	3 07·3	3 07·8	2 58·7	2·9	0·6	8·9	1·9	14·9	3·1
30	3 07·5	3 08·0	2 59·0	3·0	0·6	9·0	1·9	15·0	3·1
31	3 07·8	3 08·3	2 59·2	3·1	0·6	9·1	1·9	15·1	3·1
32	3 08·0	3 08·5	2 59·4	3·2	0·7	9·2	1·9	15·2	3·2
33	3 08·3	3 08·8	2 59·7	3·3	0·7	9·3	1·9	15·3	3·2
34	3 08·5	3 09·0	2 59·9	3·4	0·7	9·4	2·0	15·4	3·2
35	3 08·8	3 09·3	3 00·2	3·5	0·7	9·5	2·0	15·5	3·2
36	3 09·0	3 09·5	3 00·4	3·6	0·8	9·6	2·0	15·6	3·3
37	3 09·3	3 09·8	3 00·6	3·7	0·8	9·7	2·0	15·7	3·3
38	3 09·5	3 10·0	3 00·9	3·8	0·8	9·8	2·0	15·8	3·3
39	3 09·8	3 10·3	3 01·1	3·9	0·8	9·9	2·1	15·9	3·3
40	3 10·0	3 10·5	3 01·3	4·0	0·8	10·0	2·1	16·0	3·3
41	3 10·3	3 10·8	3 01·6	4·1	0·9	10·1	2·1	16·1	3·4
42	3 10·5	3 11·0	3 01·8	4·2	0·9	10·2	2·1	16·2	3·4
43	3 10·8	3 11·3	3 02·1	4·3	0·9	10·3	2·1	16·3	3·4
44	3 11·0	3 11·5	3 02·3	4·4	0·9	10·4	2·2	16·4	3·4
45	3 11·3	3 11·8	3 02·5	4·5	0·9	10·5	2·2	16·5	3·4
46	3 11·5	3 12·0	3 02·8	4·6	1·0	10·6	2·2	16·6	3·5
47	3 11·8	3 12·3	3 03·0	4·7	1·0	10·7	2·2	16·7	3·5
48	3 12·0	3 12·5	3 03·3	4·8	1·0	10·8	2·3	16·8	3·5
49	3 12·3	3 12·8	3 03·5	4·9	1·0	10·9	2·3	16·9	3·5
50	3 12·5	3 13·0	3 03·7	5·0	1·0	11·0	2·3	17·0	3·5
51	3 12·8	3 13·3	3 04·0	5·1	1·1	11·1	2·3	17·1	3·6
52	3 13·0	3 13·5	3 04·2	5·2	1·1	11·2	2·3	17·2	3·6
53	3 13·3	3 13·8	3 04·4	5·3	1·1	11·3	2·4	17·3	3·6
54	3 13·5	3 14·0	3 04·7	5·4	1·1	11·4	2·4	17·4	3·6
55	3 13·8	3 14·3	3 04·9	5·5	1·1	11·5	2·4	17·5	3·6
56	3 14·0	3 14·5	3 05·2	5·6	1·2	11·6	2·4	17·6	3·7
57	3 14·3	3 14·8	3 05·4	5·7	1·2	11·7	2·4	17·7	3·7
58	3 14·5	3 15·0	3 05·6	5·8	1·2	11·8	2·5	17·8	3·7
59	3 14·8	3 15·3	3 05·9	5·9	1·2	11·9	2·5	17·9	3·7
60	3 15·0	3 15·5	3 06·1	6·0	1·3	12·0	2·5	18·0	3·8

13m	SUN PLANETS	ARIES	MOON	v or d	Corrn	v or d	Corrn	v or d	Corrn
s	° ′	° ′	° ′	′	′	′	′	′	′
00	3 15·0	3 15·5	3 06·1	0·0	0·0	6·0	1·4	12·0	2·7
01	3 15·3	3 15·8	3 06·4	0·1	0·0	6·1	1·4	12·1	2·7
02	3 15·5	3 16·0	3 06·6	0·2	0·0	6·2	1·4	12·2	2·7
03	3 15·8	3 16·3	3 06·8	0·3	0·1	6·3	1·4	12·3	2·8
04	3 16·0	3 16·5	3 07·1	0·4	0·1	6·4	1·4	12·4	2·8
05	3 16·3	3 16·8	3 07·3	0·5	0·1	6·5	1·5	12·5	2·8
06	3 16·5	3 17·0	3 07·5	0·6	0·1	6·6	1·5	12·6	2·8
07	3 16·8	3 17·3	3 07·8	0·7	0·2	6·7	1·5	12·7	2·9
08	3 17·0	3 17·5	3 08·0	0·8	0·2	6·8	1·5	12·8	2·9
09	3 17·3	3 17·8	3 08·3	0·9	0·2	6·9	1·6	12·9	2·9
10	3 17·5	3 18·0	3 08·5	1·0	0·2	7·0	1·6	13·0	2·9
11	3 17·8	3 18·3	3 08·7	1·1	0·2	7·1	1·6	13·1	2·9
12	3 18·0	3 18·5	3 09·0	1·2	0·3	7·2	1·6	13·2	3·0
13	3 18·3	3 18·8	3 09·2	1·3	0·3	7·3	1·6	13·3	3·0
14	3 18·5	3 19·0	3 09·5	1·4	0·3	7·4	1·7	13·4	3·0
15	3 18·8	3 19·3	3 09·7	1·5	0·3	7·5	1·7	13·5	3·0
16	3 19·0	3 19·5	3 09·9	1·6	0·4	7·6	1·7	13·6	3·1
17	3 19·3	3 19·8	3 10·2	1·7	0·4	7·7	1·7	13·7	3·1
18	3 19·5	3 20·0	3 10·4	1·8	0·4	7·8	1·8	13·8	3·1
19	3 19·8	3 20·3	3 10·7	1·9	0·4	7·9	1·8	13·9	3·1
20	3 20·0	3 20·5	3 10·9	2·0	0·5	8·0	1·8	14·0	3·2
21	3 20·3	3 20·8	3 11·1	2·1	0·5	8·1	1·8	14·1	3·2
22	3 20·5	3 21·0	3 11·4	2·2	0·5	8·2	1·8	14·2	3·2
23	3 20·8	3 21·3	3 11·6	2·3	0·5	8·3	1·9	14·3	3·2
24	3 21·0	3 21·6	3 11·8	2·4	0·5	8·4	1·9	14·4	3·2
25	3 21·3	3 21·8	3 12·1	2·5	0·6	8·5	1·9	14·5	3·3
26	3 21·5	3 22·1	3 12·3	2·6	0·6	8·6	1·9	14·6	3·3
27	3 21·8	3 22·3	3 12·6	2·7	0·6	8·7	2·0	14·7	3·3
28	3 22·0	3 22·6	3 12·8	2·8	0·6	8·8	2·0	14·8	3·3
29	3 22·3	3 22·8	3 13·0	2·9	0·7	8·9	2·0	14·9	3·4
30	3 22·5	3 23·1	3 13·3	3·0	0·7	9·0	2·0	15·0	3·4
31	3 22·8	3 23·3	3 13·5	3·1	0·7	9·1	2·0	15·1	3·4
32	3 23·0	3 23·6	3 13·8	3·2	0·7	9·2	2·1	15·2	3·4
33	3 23·3	3 23·8	3 14·0	3·3	0·7	9·3	2·1	15·3	3·4
34	3 23·5	3 24·1	3 14·2	3·4	0·8	9·4	2·1	15·4	3·5
35	3 23·8	3 24·3	3 14·5	3·5	0·8	9·5	2·1	15·5	3·5
36	3 24·0	3 24·6	3 14·7	3·6	0·8	9·6	2·2	15·6	3·5
37	3 24·3	3 24·8	3 14·9	3·7	0·8	9·7	2·2	15·7	3·5
38	3 24·5	3 25·1	3 15·2	3·8	0·9	9·8	2·2	15·8	3·6
39	3 24·8	3 25·3	3 15·4	3·9	0·9	9·9	2·2	15·9	3·6
40	3 25·0	3 25·6	3 15·7	4·0	0·9	10·0	2·3	16·0	3·6
41	3 25·3	3 25·8	3 15·9	4·1	0·9	10·1	2·3	16·1	3·6
42	3 25·5	3 26·1	3 16·1	4·2	0·9	10·2	2·3	16·2	3·6
43	3 25·8	3 26·3	3 16·4	4·3	1·0	10·3	2·3	16·3	3·7
44	3 26·0	3 26·6	3 16·6	4·4	1·0	10·4	2·3	16·4	3·7
45	3 26·3	3 26·8	3 16·9	4·5	1·0	10·5	2·4	16·5	3·7
46	3 26·5	3 27·1	3 17·1	4·6	1·0	10·6	2·4	16·6	3·7
47	3 26·8	3 27·3	3 17·3	4·7	1·1	10·7	2·4	16·7	3·8
48	3 27·0	3 27·6	3 17·6	4·8	1·1	10·8	2·4	16·8	3·8
49	3 27·3	3 27·8	3 17·8	4·9	1·1	10·9	2·5	16·9	3·8
50	3 27·5	3 28·1	3 18·0	5·0	1·1	11·0	2·5	17·0	3·8
51	3 27·8	3 28·3	3 18·3	5·1	1·1	11·1	2·5	17·1	3·8
52	3 28·0	3 28·6	3 18·5	5·2	1·2	11·2	2·5	17·2	3·9
53	3 28·3	3 28·8	3 18·8	5·3	1·2	11·3	2·5	17·3	3·9
54	3 28·5	3 29·1	3 19·0	5·4	1·2	11·4	2·6	17·4	3·9
55	3 28·8	3 29·3	3 19·2	5·5	1·2	11·5	2·6	17·5	3·9
56	3 29·0	3 29·6	3 19·5	5·6	1·3	11·6	2·6	17·6	4·0
57	3 29·3	3 29·8	3 19·7	5·7	1·3	11·7	2·6	17·7	4·0
58	3 29·5	3 30·1	3 20·0	5·8	1·3	11·8	2·7	17·8	4·0
59	3 29·8	3 30·3	3 20·2	5·9	1·3	11·9	2·7	17·9	4·0
60	3 30·0	3 30·6	3 20·4	6·0	1·4	12·0	2·7	18·0	4·1

14m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	3 30·0	3 30·6	3 20·4	0·0	0·0	6·0	1·5	12·0	2·9
01	3 30·3	3 30·8	3 20·7	0·1	0·0	6·1	1·5	12·1	2·9
02	3 30·5	3 31·1	3 20·9	0·2	0·0	6·2	1·5	12·2	2·9
03	3 30·8	3 31·3	3 21·1	0·3	0·1	6·3	1·5	12·3	3·0
04	3 31·0	3 31·6	3 21·4	0·4	0·1	6·4	1·5	12·4	3·0
05	3 31·3	3 31·8	3 21·6	0·5	0·1	6·5	1·6	12·5	3·0
06	3 31·5	3 32·1	3 21·9	0·6	0·1	6·6	1·6	12·6	3·0
07	3 31·8	3 32·3	3 22·1	0·7	0·2	6·7	1·6	12·7	3·1
08	3 32·0	3 32·6	3 22·3	0·8	0·2	6·8	1·6	12·8	3·1
09	3 32·3	3 32·8	3 22·6	0·9	0·2	6·9	1·7	12·9	3·1
10	3 32·5	3 33·1	3 22·8	1·0	0·2	7·0	1·7	13·0	3·1
11	3 32·8	3 33·3	3 23·1	1·1	0·3	7·1	1·7	13·1	3·2
12	3 33·0	3 33·6	3 23·3	1·2	0·3	7·2	1·7	13·2	3·2
13	3 33·3	3 33·8	3 23·5	1·3	0·3	7·3	1·8	13·3	3·2
14	3 33·5	3 34·1	3 23·8	1·4	0·3	7·4	1·8	13·4	3·2
15	3 33·8	3 34·3	3 24·0	1·5	0·4	7·5	1·8	13·5	3·3
16	3 34·0	3 34·6	3 24·3	1·6	0·4	7·6	1·8	13·6	3·3
17	3 34·3	3 34·8	3 24·5	1·7	0·4	7·7	1·9	13·7	3·3
18	3 34·5	3 35·1	3 24·7	1·8	0·4	7·8	1·9	13·8	3·3
19	3 34·8	3 35·3	3 25·0	1·9	0·5	7·9	1·9	13·9	3·4
20	3 35·0	3 35·6	3 25·2	2·0	0·5	8·0	1·9	14·0	3·4
21	3 35·3	3 35·8	3 25·4	2·1	0·5	8·1	2·0	14·1	3·4
22	3 35·5	3 36·1	3 25·7	2·2	0·5	8·2	2·0	14·2	3·4
23	3 35·8	3 36·3	3 25·9	2·3	0·6	8·3	2·0	14·3	3·5
24	3 36·0	3 36·6	3 26·2	2·4	0·6	8·4	2·0	14·4	3·5
25	3 36·3	3 36·8	3 26·4	2·5	0·6	8·5	2·1	14·5	3·5
26	3 36·5	3 37·1	3 26·6	2·6	0·6	8·6	2·1	14·6	3·5
27	3 36·8	3 37·3	3 26·9	2·7	0·7	8·7	2·1	14·7	3·6
28	3 37·0	3 37·6	3 27·1	2·8	0·7	8·8	2·1	14·8	3·6
29	3 37·3	3 37·8	3 27·4	2·9	0·7	8·9	2·2	14·9	3·6
30	3 37·5	3 38·1	3 27·6	3·0	0·7	9·0	2·2	15·0	3·6
31	3 37·8	3 38·3	3 27·8	3·1	0·7	9·1	2·2	15·1	3·6
32	3 38·0	3 38·6	3 28·1	3·2	0·8	9·2	2·2	15·2	3·7
33	3 38·3	3 38·8	3 28·3	3·3	0·8	9·3	2·2	15·3	3·7
34	3 38·5	3 39·1	3 28·5	3·4	0·8	9·4	2·3	15·4	3·7
35	3 38·8	3 39·3	3 28·8	3·5	0·8	9·5	2·3	15·5	3·7
36	3 39·0	3 39·6	3 29·0	3·6	0·9	9·6	2·3	15·6	3·8
37	3 39·3	3 39·9	3 29·3	3·7	0·9	9·7	2·3	15·7	3·8
38	3 39·5	3 40·1	3 29·5	3·8	0·9	9·8	2·4	15·8	3·8
39	3 39·8	3 40·4	3 29·7	3·9	0·9	9·9	2·4	15·9	3·8
40	3 40·0	3 40·6	3 30·0	4·0	1·0	10·0	2·4	16·0	3·9
41	3 40·3	3 40·9	3 30·2	4·1	1·0	10·1	2·4	16·1	3·9
42	3 40·5	3 41·1	3 30·5	4·2	1·0	10·2	2·5	16·2	3·9
43	3 40·8	3 41·4	3 30·7	4·3	1·0	10·3	2·5	16·3	3·9
44	3 41·0	3 41·6	3 30·9	4·4	1·1	10·4	2·5	16·4	4·0
45	3 41·3	3 41·9	3 31·2	4·5	1·1	10·5	2·5	16·5	4·0
46	3 41·5	3 42·1	3 31·4	4·6	1·1	10·6	2·6	16·6	4·0
47	3 41·8	3 42·4	3 31·6	4·7	1·1	10·7	2·6	16·7	4·0
48	3 42·0	3 42·6	3 31·9	4·8	1·2	10·8	2·6	16·8	4·1
49	3 42·3	3 42·9	3 32·1	4·9	1·2	10·9	2·6	16·9	4·1
50	3 42·5	3 43·1	3 32·4	5·0	1·2	11·0	2·7	17·0	4·1
51	3 42·8	3 43·4	3 32·6	5·1	1·2	11·1	2·7	17·1	4·1
52	3 43·0	3 43·6	3 32·8	5·2	1·3	11·2	2·7	17·2	4·2
53	3 43·3	3 43·9	3 33·1	5·3	1·3	11·3	2·7	17·3	4·2
54	3 43·5	3 44·1	3 33·3	5·4	1·3	11·4	2·8	17·4	4·2
55	3 43·8	3 44·4	3 33·6	5·5	1·3	11·5	2·8	17·5	4·2
56	3 44·0	3 44·6	3 33·8	5·6	1·4	11·6	2·8	17·6	4·3
57	3 44·3	3 44·9	3 34·0	5·7	1·4	11·7	2·8	17·7	4·3
58	3 44·5	3 45·1	3 34·3	5·8	1·4	11·8	2·9	17·8	4·3
59	3 44·8	3 45·4	3 34·5	5·9	1·4	11·9	2·9	17·9	4·3
60	3 45·0	3 45·6	3 34·8	6·0	1·5	12·0	2·9	18·0	4·4

15m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	3 45·0	3 45·6	3 34·8	0·0	0·0	6·0	1·6	12·0	3·1
01	3 45·3	3 45·9	3 35·0	0·1	0·0	6·1	1·6	12·1	3·1
02	3 45·5	3 46·1	3 35·2	0·2	0·1	6·2	1·6	12·2	3·2
03	3 45·8	3 46·4	3 35·5	0·3	0·1	6·3	1·6	12·3	3·2
04	3 46·0	3 46·6	3 35·7	0·4	0·1	6·4	1·7	12·4	3·2
05	3 46·3	3 46·9	3 35·9	0·5	0·1	6·5	1·7	12·5	3·2
06	3 46·5	3 47·1	3 36·2	0·6	0·2	6·6	1·7	12·6	3·3
07	3 46·8	3 47·4	3 36·4	0·7	0·2	6·7	1·7	12·7	3·3
08	3 47·0	3 47·6	3 36·7	0·8	0·2	6·8	1·8	12·8	3·3
09	3 47·3	3 47·9	3 36·9	0·9	0·2	6·9	1·8	12·9	3·3
10	3 47·5	3 48·1	3 37·1	1·0	0·3	7·0	1·8	13·0	3·4
11	3 47·8	3 48·4	3 37·4	1·1	0·3	7·1	1·8	13·1	3·4
12	3 48·0	3 48·6	3 37·6	1·2	0·3	7·2	1·9	13·2	3·4
13	3 48·3	3 48·9	3 37·9	1·3	0·3	7·3	1·9	13·3	3·4
14	3 48·5	3 49·1	3 38·1	1·4	0·4	7·4	1·9	13·4	3·5
15	3 48·8	3 49·4	3 38·3	1·5	0·4	7·5	1·9	13·5	3·5
16	3 49·0	3 49·6	3 38·6	1·6	0·4	7·6	2·0	13·6	3·5
17	3 49·3	3 49·9	3 38·8	1·7	0·4	7·7	2·0	13·7	3·5
18	3 49·5	3 50·1	3 39·0	1·8	0·5	7·8	2·0	13·8	3·6
19	3 49·8	3 50·4	3 39·3	1·9	0·5	7·9	2·0	13·9	3·6
20	3 50·0	3 50·6	3 39·5	2·0	0·5	8·0	2·1	14·0	3·6
21	3 50·3	3 50·9	3 39·8	2·1	0·5	8·1	2·1	14·1	3·6
22	3 50·5	3 51·1	3 40·0	2·2	0·6	8·2	2·1	14·2	3·7
23	3 50·8	3 51·4	3 40·2	2·3	0·6	8·3	2·1	14·3	3·7
24	3 51·0	3 51·6	3 40·5	2·4	0·6	8·4	2·2	14·4	3·7
25	3 51·3	3 51·9	3 40·7	2·5	0·6	8·5	2·2	14·5	3·7
26	3 51·5	3 52·1	3 41·0	2·6	0·7	8·6	2·2	14·6	3·8
27	3 51·8	3 52·4	3 41·2	2·7	0·7	8·7	2·2	14·7	3·8
28	3 52·0	3 52·6	3 41·4	2·8	0·7	8·8	2·3	14·8	3·8
29	3 52·3	3 52·9	3 41·7	2·9	0·7	8·9	2·3	14·9	3·8
30	3 52·5	3 53·1	3 41·9	3·0	0·8	9·0	2·3	15·0	3·9
31	3 52·8	3 53·4	3 42·1	3·1	0·8	9·1	2·4	15·1	3·9
32	3 53·0	3 53·6	3 42·4	3·2	0·8	9·2	2·4	15·2	3·9
33	3 53·3	3 53·9	3 42·6	3·3	0·9	9·3	2·4	15·3	4·0
34	3 53·5	3 54·1	3 42·9	3·4	0·9	9·4	2·4	15·4	4·0
35	3 53·8	3 54·4	3 43·1	3·5	0·9	9·5	2·5	15·5	4·0
36	3 54·0	3 54·6	3 43·3	3·6	0·9	9·6	2·5	15·6	4·0
37	3 54·3	3 54·9	3 43·6	3·7	1·0	9·7	2·5	15·7	4·1
38	3 54·5	3 55·1	3 43·8	3·8	1·0	9·8	2·5	15·8	4·1
39	3 54·8	3 55·4	3 44·1	3·9	1·0	9·9	2·6	15·9	4·1
40	3 55·0	3 55·6	3 44·3	4·0	1·0	10·0	2·6	16·0	4·1
41	3 55·3	3 55·9	3 44·5	4·1	1·1	10·1	2·6	16·1	4·2
42	3 55·5	3 56·1	3 44·8	4·2	1·1	10·2	2·6	16·2	4·2
43	3 55·8	3 56·4	3 45·0	4·3	1·1	10·3	2·7	16·3	4·2
44	3 56·0	3 56·6	3 45·2	4·4	1·1	10·4	2·7	16·4	4·2
45	3 56·3	3 56·9	3 45·5	4·5	1·2	10·5	2·7	16·5	4·3
46	3 56·5	3 57·1	3 45·7	4·6	1·2	10·6	2·7	16·6	4·3
47	3 56·8	3 57·4	3 46·0	4·7	1·2	10·7	2·8	16·7	4·3
48	3 57·0	3 57·6	3 46·2	4·8	1·2	10·8	2·8	16·8	4·3
49	3 57·3	3 57·9	3 46·4	4·9	1·3	10·9	2·8	16·9	4·4
50	3 57·5	3 58·2	3 46·7	5·0	1·3	11·0	2·8	17·0	4·4
51	3 57·8	3 58·4	3 46·9	5·1	1·3	11·1	2·9	17·1	4·4
52	3 58·0	3 58·7	3 47·2	5·2	1·3	11·2	2·9	17·2	4·4
53	3 58·3	3 58·9	3 47·4	5·3	1·4	11·3	2·9	17·3	4·5
54	3 58·5	3 59·2	3 47·6	5·4	1·4	11·4	2·9	17·4	4·5
55	3 58·8	3 59·4	3 47·9	5·5	1·4	11·5	3·0	17·5	4·5
56	3 59·0	3 59·7	3 48·1	5·6	1·4	11·6	3·0	17·6	4·5
57	3 59·3	3 59·9	3 48·4	5·7	1·5	11·7	3·0	17·7	4·6
58	3 59·5	4 00·2	3 48·6	5·8	1·5	11·8	3·0	17·8	4·6
59	3 59·8	4 00·4	3 48·8	5·9	1·5	11·9	3·1	17·9	4·6
60	4 00·0	4 00·7	3 49·1	6·0	1·6	12·0	3·1	18·0	4·7

16m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	4 00·0	4 00·7	3 49·1	0·0	0·0	6·0	1·7	12·0	3·3
01	4 00·3	4 00·9	3 49·3	0·1	0·0	6·1	1·7	12·1	3·3
02	4 00·5	4 01·2	3 49·5	0·2	0·1	6·2	1·7	12·2	3·4
03	4 00·8	4 01·4	3 49·8	0·3	0·1	6·3	1·7	12·3	3·4
04	4 01·0	4 01·7	3 50·0	0·4	0·1	6·4	1·8	12·4	3·4
05	4 01·3	4 01·9	3 50·3	0·5	0·1	6·5	1·8	12·5	3·4
06	4 01·5	4 02·2	3 50·5	0·6	0·2	6·6	1·8	12·6	3·5
07	4 01·8	4 02·4	3 50·7	0·7	0·2	6·7	1·8	12·7	3·5
08	4 02·0	4 02·7	3 51·0	0·8	0·2	6·8	1·9	12·8	3·5
09	4 02·3	4 02·9	3 51·2	0·9	0·2	6·9	1·9	12·9	3·5
10	4 02·5	4 03·2	3 51·5	1·0	0·3	7·0	1·9	13·0	3·6
11	4 02·8	4 03·4	3 51·7	1·1	0·3	7·1	2·0	13·1	3·6
12	4 03·0	4 03·7	3 51·9	1·2	0·3	7·2	2·0	13·2	3·6
13	4 03·3	4 03·9	3 52·2	1·3	0·4	7·3	2·0	13·3	3·7
14	4 03·5	4 04·2	3 52·4	1·4	0·4	7·4	2·0	13·4	3·7
15	4 03·8	4 04·4	3 52·6	1·5	0·4	7·5	2·1	13·5	3·7
16	4 04·0	4 04·7	3 52·9	1·6	0·4	7·6	2·1	13·6	3·7
17	4 04·3	4 04·9	3 53·1	1·7	0·5	7·7	2·1	13·7	3·8
18	4 04·5	4 05·2	3 53·4	1·8	0·5	7·8	2·1	13·8	3·8
19	4 04·8	4 05·4	3 53·6	1·9	0·5	7·9	2·2	13·9	3·8
20	4 05·0	4 05·7	3 53·8	2·0	0·6	8·0	2·2	14·0	3·9
21	4 05·3	4 05·9	3 54·1	2·1	0·6	8·1	2·2	14·1	3·9
22	4 05·5	4 06·2	3 54·3	2·2	0·6	8·2	2·3	14·2	3·9
23	4 05·8	4 06·4	3 54·6	2·3	0·6	8·3	2·3	14·3	3·9
24	4 06·0	4 06·7	3 54·8	2·4	0·7	8·4	2·3	14·4	4·0
25	4 06·3	4 06·9	3 55·0	2·5	0·7	8·5	2·3	14·5	4·0
26	4 06·5	4 07·2	3 55·3	2·6	0·7	8·6	2·4	14·6	4·0
27	4 06·8	4 07·4	3 55·5	2·7	0·7	8·7	2·4	14·7	4·0
28	4 07·0	4 07·7	3 55·7	2·8	0·8	8·8	2·4	14·8	4·1
29	4 07·3	4 07·9	3 56·0	2·9	0·8	8·9	2·4	14·9	4·1
30	4 07·5	4 08·2	3 56·2	3·0	0·8	9·0	2·5	15·0	4·1
31	4 07·8	4 08·4	3 56·5	3·1	0·9	9·1	2·5	15·1	4·2
32	4 08·0	4 08·7	3 56·7	3·2	0·9	9·2	2·5	15·2	4·2
33	4 08·3	4 08·9	3 56·9	3·3	0·9	9·3	2·6	15·3	4·2
34	4 08·5	4 09·2	3 57·2	3·4	0·9	9·4	2·6	15·4	4·2
35	4 08·8	4 09·4	3 57·4	3·5	1·0	9·5	2·6	15·5	4·3
36	4 09·0	4 09·7	3 57·7	3·6	1·0	9·6	2·6	15·6	4·3
37	4 09·3	4 09·9	3 57·9	3·7	1·0	9·7	2·7	15·7	4·3
38	4 09·5	4 10·2	3 58·1	3·8	1·0	9·8	2·7	15·8	4·3
39	4 09·8	4 10·4	3 58·4	3·9	1·1	9·9	2·7	15·9	4·4
40	4 10·0	4 10·7	3 58·6	4·0	1·1	10·0	2·8	16·0	4·4
41	4 10·3	4 10·9	3 58·8	4·1	1·1	10·1	2·8	16·1	4·4
42	4 10·5	4 11·2	3 59·1	4·2	1·2	10·2	2·8	16·2	4·5
43	4 10·8	4 11·4	3 59·3	4·3	1·2	10·3	2·8	16·3	4·5
44	4 11·0	4 11·7	3 59·6	4·4	1·2	10·4	2·9	16·4	4·5
45	4 11·3	4 11·9	3 59·8	4·5	1·2	10·5	2·9	16·5	4·5
46	4 11·5	4 12·2	4 00·0	4·6	1·3	10·6	2·9	16·6	4·6
47	4 11·8	4 12·4	4 00·3	4·7	1·3	10·7	2·9	16·7	4·6
48	4 12·0	4 12·7	4 00·5	4·8	1·3	10·8	3·0	16·8	4·6
49	4 12·3	4 12·9	4 00·8	4·9	1·3	10·9	3·0	16·9	4·6
50	4 12·5	4 13·2	4 01·0	5·0	1·4	11·0	3·0	17·0	4·7
51	4 12·8	4 13·4	4 01·2	5·1	1·4	11·1	3·1	17·1	4·7
52	4 13·0	4 13·7	4 01·5	5·2	1·4	11·2	3·1	17·2	4·7
53	4 13·3	4 13·9	4 01·7	5·3	1·5	11·3	3·1	17·3	4·8
54	4 13·5	4 14·2	4 02·0	5·4	1·5	11·4	3·1	17·4	4·8
55	4 13·8	4 14·4	4 02·2	5·5	1·5	11·5	3·2	17·5	4·8
56	4 14·0	4 14·7	4 02·4	5·6	1·5	11·6	3·2	17·6	4·8
57	4 14·3	4 14·9	4 02·7	5·7	1·6	11·7	3·2	17·7	4·9
58	4 14·5	4 15·2	4 02·9	5·8	1·6	11·8	3·2	17·8	4·9
59	4 14·8	4 15·4	4 03·1	5·9	1·6	11·9	3·3	17·9	4·9
60	4 15·0	4 15·7	4 03·4	6·0	1·7	12·0	3·3	18·0	5·0

17m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	4 15·0	4 15·7	4 03·4	0·0	0·0	6·0	1·8	12·0	3·5
01	4 15·3	4 15·9	4 03·6	0·1	0·0	6·1	1·8	12·1	3·5
02	4 15·5	4 16·2	4 03·9	0·2	0·1	6·2	1·8	12·2	3·6
03	4 15·8	4 16·5	4 04·1	0·3	0·1	6·3	1·8	12·3	3·6
04	4 16·0	4 16·7	4 04·3	0·4	0·1	6·4	1·9	12·4	3·6
05	4 16·3	4 17·0	4 04·6	0·5	0·1	6·5	1·9	12·5	3·6
06	4 16·5	4 17·2	4 04·8	0·6	0·2	6·6	1·9	12·6	3·7
07	4 16·8	4 17·5	4 05·1	0·7	0·2	6·7	2·0	12·7	3·7
08	4 17·0	4 17·7	4 05·3	0·8	0·2	6·8	2·0	12·8	3·7
09	4 17·3	4 18·0	4 05·5	0·9	0·3	6·9	2·0	12·9	3·8
10	4 17·5	4 18·2	4 05·8	1·0	0·3	7·0	2·0	13·0	3·8
11	4 17·8	4 18·5	4 06·0	1·1	0·3	7·1	2·1	13·1	3·8
12	4 18·0	4 18·7	4 06·2	1·2	0·4	7·2	2·1	13·2	3·9
13	4 18·3	4 19·0	4 06·5	1·3	0·4	7·3	2·1	13·3	3·9
14	4 18·5	4 19·2	4 06·7	1·4	0·4	7·4	2·2	13·4	3·9
15	4 18·8	4 19·5	4 07·0	1·5	0·4	7·5	2·2	13·5	3·9
16	4 19·0	4 19·7	4 07·2	1·6	0·5	7·6	2·2	13·6	4·0
17	4 19·3	4 20·0	4 07·4	1·7	0·5	7·7	2·2	13·7	4·0
18	4 19·5	4 20·2	4 07·7	1·8	0·5	7·8	2·3	13·8	4·0
19	4 19·8	4 20·5	4 07·9	1·9	0·6	7·9	2·3	13·9	4·1
20	4 20·0	4 20·7	4 08·2	2·0	0·6	8·0	2·3	14·0	4·1
21	4 20·3	4 21·0	4 08·4	2·1	0·6	8·1	2·4	14·1	4·1
22	4 20·5	4 21·2	4 08·6	2·2	0·6	8·2	2·4	14·2	4·1
23	4 20·8	4 21·5	4 08·9	2·3	0·7	8·3	2·4	14·3	4·2
24	4 21·0	4 21·7	4 09·1	2·4	0·7	8·4	2·5	14·4	4·2
25	4 21·3	4 22·0	4 09·3	2·5	0·7	8·5	2·5	14·5	4·2
26	4 21·5	4 22·2	4 09·6	2·6	0·8	8·6	2·5	14·6	4·3
27	4 21·8	4 22·5	4 09·8	2·7	0·8	8·7	2·5	14·7	4·3
28	4 22·0	4 22·7	4 10·1	2·8	0·8	8·8	2·6	14·8	4·3
29	4 22·3	4 23·0	4 10·3	2·9	0·8	8·9	2·6	14·9	4·3
30	4 22·5	4 23·2	4 10·5	3·0	0·9	9·0	2·6	15·0	4·4
31	4 22·8	4 23·5	4 10·8	3·1	0·9	9·1	2·7	15·1	4·4
32	4 23·0	4 23·7	4 11·0	3·2	0·9	9·2	2·7	15·2	4·4
33	4 23·3	4 24·0	4 11·3	3·3	1·0	9·3	2·7	15·3	4·5
34	4 23·5	4 24·2	4 11·5	3·4	1·0	9·4	2·7	15·4	4·5
35	4 23·8	4 24·5	4 11·7	3·5	1·0	9·5	2·8	15·5	4·5
36	4 24·0	4 24·7	4 12·0	3·6	1·1	9·6	2·8	15·6	4·6
37	4 24·3	4 25·0	4 12·2	3·7	1·1	9·7	2·8	15·7	4·6
38	4 24·5	4 25·2	4 12·5	3·8	1·1	9·8	2·9	15·8	4·6
39	4 24·8	4 25·5	4 12·7	3·9	1·1	9·9	2·9	15·9	4·6
40	4 25·0	4 25·7	4 12·9	4·0	1·2	10·0	2·9	16·0	4·7
41	4 25·3	4 26·0	4 13·2	4·1	1·2	10·1	2·9	16·1	4·7
42	4 25·5	4 26·2	4 13·4	4·2	1·2	10·2	3·0	16·2	4·7
43	4 25·8	4 26·5	4 13·6	4·3	1·3	10·3	3·0	16·3	4·8
44	4 26·0	4 26·7	4 13·9	4·4	1·3	10·4	3·0	16·4	4·8
45	4 26·3	4 27·0	4 14·1	4·5	1·3	10·5	3·1	16·5	4·8
46	4 26·5	4 27·2	4 14·4	4·6	1·3	10·6	3·1	16·6	4·8
47	4 26·8	4 27·5	4 14·6	4·7	1·4	10·7	3·1	16·7	4·9
48	4 27·0	4 27·7	4 14·8	4·8	1·4	10·8	3·2	16·8	4·9
49	4 27·3	4 28·0	4 15·1	4·9	1·4	10·9	3·2	16·9	4·9
50	4 27·5	4 28·2	4 15·3	5·0	1·5	11·0	3·2	17·0	5·0
51	4 27·8	4 28·5	4 15·6	5·1	1·5	11·1	3·2	17·1	5·0
52	4 28·0	4 28·7	4 15·8	5·2	1·5	11·2	3·3	17·2	5·0
53	4 28·3	4 29·0	4 16·0	5·3	1·5	11·3	3·3	17·3	5·0
54	4 28·5	4 29·2	4 16·3	5·4	1·6	11·4	3·3	17·4	5·1
55	4 28·8	4 29·5	4 16·5	5·5	1·6	11·5	3·4	17·5	5·1
56	4 29·0	4 29·7	4 16·7	5·6	1·6	11·6	3·4	17·6	5·1
57	4 29·3	4 30·0	4 17·0	5·7	1·7	11·7	3·4	17·7	5·2
58	4 29·5	4 30·2	4 17·2	5·8	1·7	11·8	3·4	17·8	5·2
59	4 29·8	4 30·5	4 17·5	5·9	1·7	11·9	3·5	17·9	5·2
60	4 30·0	4 30·7	4 17·7	6·0	1·8	12·0	3·5	18·0	5·3

18m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	4 30·0	4 30·7	4 17·7	0·0	0·0	6·0	1·9	12·0	3·7
01	4 30·3	4 31·0	4 17·9	0·1	0·0	6·1	1·9	12·1	3·7
02	4 30·5	4 31·2	4 18·2	0·2	0·1	6·2	1·9	12·2	3·8
03	4 30·8	4 31·5	4 18·4	0·3	0·1	6·3	1·9	12·3	3·8
04	4 31·0	4 31·7	4 18·7	0·4	0·1	6·4	2·0	12·4	3·8
05	4 31·3	4 32·0	4 18·9	0·5	0·2	6·5	2·0	12·5	3·9
06	4 31·5	4 32·2	4 19·1	0·6	0·2	6·6	2·0	12·6	3·9
07	4 31·8	4 32·5	4 19·4	0·7	0·2	6·7	2·1	12·7	3·9
08	4 32·0	4 32·7	4 19·6	0·8	0·2	6·8	2·1	12·8	3·9
09	4 32·3	4 33·0	4 19·8	0·9	0·3	6·9	2·1	12·9	4·0
10	4 32·5	4 33·2	4 20·1	1·0	0·3	7·0	2·2	13·0	4·0
11	4 32·8	4 33·5	4 20·3	1·1	0·3	7·1	2·2	13·1	4·0
12	4 33·0	4 33·7	4 20·6	1·2	0·4	7·2	2·2	13·2	4·1
13	4 33·3	4 34·0	4 20·8	1·3	0·4	7·3	2·3	13·3	4·1
14	4 33·5	4 34·2	4 21·0	1·4	0·4	7·4	2·3	13·4	4·1
15	4 33·8	4 34·5	4 21·3	1·5	0·5	7·5	2·3	13·5	4·2
16	4 34·0	4 34·8	4 21·5	1·6	0·5	7·6	2·3	13·6	4·2
17	4 34·3	4 35·0	4 21·8	1·7	0·5	7·7	2·4	13·7	4·2
18	4 34·5	4 35·3	4 22·0	1·8	0·6	7·8	2·4	13·8	4·3
19	4 34·8	4 35·5	4 22·2	1·9	0·6	7·9	2·4	13·9	4·3
20	4 35·0	4 35·8	4 22·5	2·0	0·6	8·0	2·5	14·0	4·3
21	4 35·3	4 36·0	4 22·7	2·1	0·6	8·1	2·5	14·1	4·3
22	4 35·5	4 36·3	4 22·9	2·2	0·7	8·2	2·5	14·2	4·4
23	4 35·8	4 36·5	4 23·2	2·3	0·7	8·3	2·6	14·3	4·4
24	4 36·0	4 36·8	4 23·4	2·4	0·7	8·4	2·6	14·4	4·4
25	4 36·3	4 37·0	4 23·7	2·5	0·8	8·5	2·6	14·5	4·5
26	4 36·5	4 37·3	4 23·9	2·6	0·8	8·6	2·7	14·6	4·5
27	4 36·8	4 37·5	4 24·1	2·7	0·8	8·7	2·7	14·7	4·5
28	4 37·0	4 37·8	4 24·4	2·8	0·9	8·8	2·7	14·8	4·6
29	4 37·3	4 38·0	4 24·6	2·9	0·9	8·9	2·7	14·9	4·6
30	4 37·5	4 38·3	4 24·9	3·0	0·9	9·0	2·8	15·0	4·6
31	4 37·8	4 38·5	4 25·1	3·1	1·0	9·1	2·8	15·1	4·7
32	4 38·0	4 38·8	4 25·3	3·2	1·0	9·2	2·8	15·2	4·7
33	4 38·3	4 39·0	4 25·6	3·3	1·0	9·3	2·9	15·3	4·7
34	4 38·5	4 39·3	4 25·8	3·4	1·0	9·4	2·9	15·4	4·7
35	4 38·8	4 39·5	4 26·1	3·5	1·1	9·5	2·9	15·5	4·8
36	4 39·0	4 39·8	4 26·3	3·6	1·1	9·6	3·0	15·6	4·8
37	4 39·3	4 40·0	4 26·5	3·7	1·1	9·7	3·0	15·7	4·8
38	4 39·5	4 40·3	4 26·8	3·8	1·2	9·8	3·0	15·8	4·9
39	4 39·8	4 40·5	4 27·0	3·9	1·2	9·9	3·1	15·9	4·9
40	4 40·0	4 40·8	4 27·2	4·0	1·2	10·0	3·1	16·0	4·9
41	4 40·3	4 41·0	4 27·5	4·1	1·3	10·1	3·1	16·1	5·0
42	4 40·5	4 41·3	4 27·7	4·2	1·3	10·2	3·1	16·2	5·0
43	4 40·8	4 41·5	4 28·0	4·3	1·3	10·3	3·2	16·3	5·0
44	4 41·0	4 41·8	4 28·2	4·4	1·4	10·4	3·2	16·4	5·1
45	4 41·3	4 42·0	4 28·4	4·5	1·4	10·5	3·2	16·5	5·1
46	4 41·5	4 42·3	4 28·7	4·6	1·4	10·6	3·3	16·6	5·1
47	4 41·8	4 42·5	4 28·9	4·7	1·4	10·7	3·3	16·7	5·1
48	4 42·0	4 42·8	4 29·2	4·8	1·5	10·8	3·3	16·8	5·2
49	4 42·3	4 43·0	4 29·4	4·9	1·5	10·9	3·4	16·9	5·2
50	4 42·5	4 43·3	4 29·6	5·0	1·5	11·0	3·4	17·0	5·2
51	4 42·8	4 43·5	4 29·9	5·1	1·6	11·1	3·4	17·1	5·3
52	4 43·0	4 43·8	4 30·1	5·2	1·6	11·2	3·5	17·2	5·3
53	4 43·3	4 44·0	4 30·3	5·3	1·6	11·3	3·5	17·3	5·3
54	4 43·5	4 44·3	4 30·6	5·4	1·7	11·4	3·5	17·4	5·4
55	4 43·8	4 44·5	4 30·8	5·5	1·7	11·5	3·5	17·5	5·4
56	4 44·0	4 44·8	4 31·1	5·6	1·7	11·6	3·6	17·6	5·4
57	4 44·3	4 45·0	4 31·3	5·7	1·8	11·7	3·6	17·7	5·5
58	4 44·5	4 45·3	4 31·5	5·8	1·8	11·8	3·6	17·8	5·5
59	4 44·8	4 45·5	4 31·8	5·9	1·8	11·9	3·7	17·9	5·5
60	4 45·0	4 45·8	4 32·0	6·0	1·9	12·0	3·7	18·0	5·6

19m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	4 45·0	4 45·8	4 32·0	0·0	0·0	6·0	2·0	12·0	3·9
01	4 45·3	4 46·0	4 32·3	0·1	0·0	6·1	2·0	12·1	3·9
02	4 45·5	4 46·3	4 32·5	0·2	0·1	6·2	2·0	12·2	4·0
03	4 45·8	4 46·5	4 32·7	0·3	0·1	6·3	2·0	12·3	4·0
04	4 46·0	4 46·8	4 33·0	0·4	0·1	6·4	2·1	12·4	4·0
05	4 46·3	4 47·0	4 33·2	0·5	0·2	6·5	2·1	12·5	4·1
06	4 46·5	4 47·3	4 33·4	0·6	0·2	6·6	2·1	12·6	4·1
07	4 46·8	4 47·5	4 33·7	0·7	0·2	6·7	2·2	12·7	4·1
08	4 47·0	4 47·8	4 33·9	0·8	0·3	6·8	2·2	12·8	4·2
09	4 47·3	4 48·0	4 34·2	0·9	0·3	6·9	2·2	12·9	4·2
10	4 47·5	4 48·3	4 34·4	1·0	0·3	7·0	2·3	13·0	4·2
11	4 47·8	4 48·5	4 34·6	1·1	0·4	7·1	2·3	13·1	4·3
12	4 48·0	4 48·8	4 34·9	1·2	0·4	7·2	2·3	13·2	4·3
13	4 48·3	4 49·0	4 35·1	1·3	0·4	7·3	2·4	13·3	4·3
14	4 48·5	4 49·3	4 35·4	1·4	0·5	7·4	2·4	13·4	4·4
15	4 48·8	4 49·5	4 35·6	1·5	0·5	7·5	2·4	13·5	4·4
16	4 49·0	4 49·8	4 35·8	1·6	0·5	7·6	2·5	13·6	4·4
17	4 49·3	4 50·0	4 36·1	1·7	0·6	7·7	2·5	13·7	4·5
18	4 49·5	4 50·3	4 36·3	1·8	0·6	7·8	2·5	13·8	4·5
19	4 49·8	4 50·5	4 36·6	1·9	0·6	7·9	2·6	13·9	4·5
20	4 50·0	4 50·8	4 36·8	2·0	0·7	8·0	2·6	14·0	4·6
21	4 50·3	4 51·0	4 37·0	2·1	0·7	8·1	2·6	14·1	4·6
22	4 50·5	4 51·3	4 37·3	2·2	0·7	8·2	2·7	14·2	4·6
23	4 50·8	4 51·5	4 37·5	2·3	0·7	8·3	2·7	14·3	4·6
24	4 51·0	4 51·8	4 37·7	2·4	0·8	8·4	2·7	14·4	4·7
25	4 51·3	4 52·0	4 38·0	2·5	0·8	8·5	2·8	14·5	4·7
26	4 51·5	4 52·3	4 38·2	2·6	0·8	8·6	2·8	14·6	4·7
27	4 51·8	4 52·5	4 38·5	2·7	0·9	8·7	2·8	14·7	4·8
28	4 52·0	4 52·8	4 38·7	2·8	0·9	8·8	2·9	14·8	4·8
29	4 52·3	4 53·1	4 38·9	2·9	0·9	8·9	2·9	14·9	4·8
30	4 52·5	4 53·3	4 39·2	3·0	1·0	9·0	2·9	15·0	4·9
31	4 52·8	4 53·6	4 39·4	3·1	1·0	9·1	3·0	15·1	4·9
32	4 53·0	4 53·8	4 39·7	3·2	1·0	9·2	3·0	15·2	4·9
33	4 53·3	4 54·1	4 39·9	3·3	1·1	9·3	3·0	15·3	5·0
34	4 53·5	4 54·3	4 40·1	3·4	1·1	9·4	3·1	15·4	5·0
35	4 53·8	4 54·6	4 40·4	3·5	1·1	9·5	3·1	15·5	5·0
36	4 54·0	4 54·8	4 40·6	3·6	1·2	9·6	3·1	15·6	5·1
37	4 54·3	4 55·1	4 40·8	3·7	1·2	9·7	3·2	15·7	5·1
38	4 54·5	4 55·3	4 41·1	3·8	1·2	9·8	3·2	15·8	5·1
39	4 54·8	4 55·6	4 41·3	3·9	1·3	9·9	3·2	15·9	5·2
40	4 55·0	4 55·8	4 41·6	4·0	1·3	10·0	3·3	16·0	5·2
41	4 55·3	4 56·1	4 41·8	4·1	1·3	10·1	3·3	16·1	5·2
42	4 55·5	4 56·3	4 42·0	4·2	1·4	10·2	3·3	16·2	5·3
43	4 55·8	4 56·6	4 42·3	4·3	1·4	10·3	3·3	16·3	5·3
44	4 56·0	4 56·8	4 42·5	4·4	1·4	10·4	3·4	16·4	5·3
45	4 56·3	4 57·1	4 42·8	4·5	1·5	10·5	3·4	16·5	5·4
46	4 56·5	4 57·3	4 43·0	4·6	1·5	10·6	3·4	16·6	5·4
47	4 56·8	4 57·6	4 43·2	4·7	1·5	10·7	3·5	16·7	5·4
48	4 57·0	4 57·8	4 43·5	4·8	1·6	10·8	3·5	16·8	5·5
49	4 57·3	4 58·1	4 43·7	4·9	1·6	10·9	3·5	16·9	5·5
50	4 57·5	4 58·3	4 43·9	5·0	1·6	11·0	3·6	17·0	5·5
51	4 57·8	4 58·6	4 44·2	5·1	1·7	11·1	3·6	17·1	5·6
52	4 58·0	4 58·8	4 44·4	5·2	1·7	11·2	3·6	17·2	5·6
53	4 58·3	4 59·1	4 44·7	5·3	1·7	11·3	3·7	17·3	5·6
54	4 58·5	4 59·3	4 44·9	5·4	1·8	11·4	3·7	17·4	5·7
55	4 58·8	4 59·6	4 45·1	5·5	1·8	11·5	3·7	17·5	5·7
56	4 59·0	4 59·8	4 45·4	5·6	1·8	11·6	3·8	17·6	5·7
57	4 59·3	5 00·1	4 45·6	5·7	1·9	11·7	3·8	17·7	5·8
58	4 59·5	5 00·3	4 45·9	5·8	1·9	11·8	3·8	17·8	5·8
59	4 59·8	5 00·6	4 46·1	5·9	1·9	11·9	3·9	17·9	5·8
60	5 00·0	5 00·8	4 46·3	6·0	2·0	12·0	3·9	18·0	5·9

20m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or Corrn d ′	′	v or Corrn d ′	′	v or Corrn d ′	′
00	5 00·0	5 00·8	4 46·3	0·0	0·0	6·0	2·1	12·0	4·1
01	5 00·3	5 01·1	4 46·6	0·1	0·0	6·1	2·1	12·1	4·1
02	5 00·5	5 01·3	4 46·8	0·2	0·1	6·2	2·1	12·2	4·2
03	5 00·8	5 01·6	4 47·0	0·3	0·1	6·3	2·2	12·3	4·2
04	5 01·0	5 01·8	4 47·3	0·4	0·1	6·4	2·2	12·4	4·2
05	5 01·3	5 02·1	4 47·5	0·5	0·2	6·5	2·2	12·5	4·3
06	5 01·5	5 02·3	4 47·8	0·6	0·2	6·6	2·3	12·6	4·3
07	5 01·8	5 02·6	4 48·0	0·7	0·2	6·7	2·3	12·7	4·3
08	5 02·0	5 02·8	4 48·2	0·8	0·3	6·8	2·3	12·8	4·4
09	5 02·3	5 03·1	4 48·5	0·9	0·3	6·9	2·4	12·9	4·4
10	5 02·5	5 03·3	4 48·7	1·0	0·3	7·0	2·4	13·0	4·4
11	5 02·8	5 03·6	4 49·0	1·1	0·4	7·1	2·4	13·1	4·5
12	5 03·0	5 03·8	4 49·2	1·2	0·4	7·2	2·5	13·2	4·5
13	5 03·3	5 04·1	4 49·4	1·3	0·4	7·3	2·5	13·3	4·5
14	5 03·5	5 04·3	4 49·7	1·4	0·5	7·4	2·5	13·4	4·6
15	5 03·8	5 04·6	4 49·9	1·5	0·5	7·5	2·6	13·5	4·6
16	5 04·0	5 04·8	4 50·2	1·6	0·5	7·6	2·6	13·6	4·6
17	5 04·3	5 05·1	4 50·4	1·7	0·6	7·7	2·6	13·7	4·7
18	5 04·5	5 05·3	4 50·6	1·8	0·6	7·8	2·7	13·8	4·7
19	5 04·8	5 05·6	4 50·9	1·9	0·6	7·9	2·7	13·9	4·7
20	5 05·0	5 05·8	4 51·1	2·0	0·7	8·0	2·7	14·0	4·8
21	5 05·3	5 06·1	4 51·3	2·1	0·7	8·1	2·8	14·1	4·8
22	5 05·5	5 06·3	4 51·6	2·2	0·8	8·2	2·8	14·2	4·9
23	5 05·8	5 06·6	4 51·8	2·3	0·8	8·3	2·8	14·3	4·9
24	5 06·0	5 06·8	4 52·1	2·4	0·8	8·4	2·9	14·4	4·9
25	5 06·3	5 07·1	4 52·3	2·5	0·9	8·5	2·9	14·5	5·0
26	5 06·5	5 07·3	4 52·5	2·6	0·9	8·6	2·9	14·6	5·0
27	5 06·8	5 07·6	4 52·8	2·7	0·9	8·7	3·0	14·7	5·0
28	5 07·0	5 07·8	4 53·0	2·8	1·0	8·8	3·0	14·8	5·1
29	5 07·3	5 08·1	4 53·3	2·9	1·0	8·9	3·0	14·9	5·1
30	5 07·5	5 08·3	4 53·5	3·0	1·0	9·0	3·1	15·0	5·1
31	5 07·8	5 08·6	4 53·7	3·1	1·1	9·1	3·1	15·1	5·2
32	5 08·0	5 08·8	4 54·0	3·2	1·1	9·2	3·1	15·2	5·2
33	5 08·3	5 09·1	4 54·2	3·3	1·1	9·3	3·2	15·3	5·2
34	5 08·5	5 09·3	4 54·4	3·4	1·2	9·4	3·2	15·4	5·3
35	5 08·8	5 09·6	4 54·7	3·5	1·2	9·5	3·2	15·5	5·3
36	5 09·0	5 09·8	4 54·9	3·6	1·2	9·6	3·3	15·6	5·3
37	5 09·3	5 10·1	4 55·2	3·7	1·3	9·7	3·3	15·7	5·4
38	5 09·5	5 10·3	4 55·4	3·8	1·3	9·8	3·3	15·8	5·4
39	5 09·8	5 10·6	4 55·6	3·9	1·3	9·9	3·4	15·9	5·4
40	5 10·0	5 10·8	4 55·9	4·0	1·4	10·0	3·4	16·0	5·5
41	5 10·3	5 11·1	4 56·1	4·1	1·4	10·1	3·5	16·1	5·5
42	5 10·5	5 11·4	4 56·4	4·2	1·4	10·2	3·5	16·2	5·5
43	5 10·8	5 11·6	4 56·6	4·3	1·5	10·3	3·5	16·3	5·6
44	5 11·0	5 11·9	4 56·8	4·4	1·5	10·4	3·6	16·4	5·6
45	5 11·3	5 12·1	4 57·1	4·5	1·5	10·5	3·6	16·5	5·6
46	5 11·5	5 12·4	4 57·3	4·6	1·6	10·6	3·6	16·6	5·7
47	5 11·8	5 12·6	4 57·5	4·7	1·6	10·7	3·7	16·7	5·7
48	5 12·0	5 12·9	4 57·8	4·8	1·6	10·8	3·7	16·8	5·7
49	5 12·3	5 13·1	4 58·0	4·9	1·7	10·9	3·7	16·9	5·8
50	5 12·5	5 13·4	4 58·3	5·0	1·7	11·0	3·8	17·0	5·8
51	5 12·8	5 13·6	4 58·5	5·1	1·7	11·1	3·8	17·1	5·8
52	5 13·0	5 13·9	4 58·7	5·2	1·8	11·2	3·8	17·2	5·9
53	5 13·3	5 14·1	4 59·0	5·3	1·8	11·3	3·9	17·3	5·9
54	5 13·5	5 14·4	4 59·2	5·4	1·8	11·4	3·9	17·4	5·9
55	5 13·8	5 14·6	4 59·5	5·5	1·9	11·5	3·9	17·5	6·0
56	5 14·0	5 14·9	4 59·7	5·6	1·9	11·6	4·0	17·6	6·0
57	5 14·3	5 15·1	4 59·9	5·7	1·9	11·7	4·0	17·7	6·0
58	5 14·5	5 15·4	5 00·2	5·8	2·0	11·8	4·0	17·8	6·1
59	5 14·8	5 15·6	5 00·4	5·9	2·0	11·9	4·1	17·9	6·1
60	5 15·0	5 15·9	5 00·7	6·0	2·1	12·0	4·1	18·0	6·2

21m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or Corrn d ′	′	v or Corrn d ′	′	v or Corrn d ′	′
00	5 15·0	5 15·9	5 00·7	0·0	0·0	6·0	2·2	12·0	4·3
01	5 15·3	5 16·1	5 00·9	0·1	0·0	6·1	2·2	12·1	4·3
02	5 15·5	5 16·4	5 01·1	0·2	0·1	6·2	2·2	12·2	4·4
03	5 15·8	5 16·6	5 01·4	0·3	0·1	6·3	2·3	12·3	4·4
04	5 16·0	5 16·9	5 01·6	0·4	0·1	6·4	2·3	12·4	4·4
05	5 16·3	5 17·1	5 01·8	0·5	0·2	6·5	2·3	12·5	4·5
06	5 16·5	5 17·4	5 02·1	0·6	0·2	6·6	2·4	12·6	4·5
07	5 16·8	5 17·6	5 02·3	0·7	0·3	6·7	2·4	12·7	4·6
08	5 17·0	5 17·9	5 02·6	0·8	0·3	6·8	2·4	12·8	4·6
09	5 17·3	5 18·1	5 02·8	0·9	0·3	6·9	2·5	12·9	4·6
10	5 17·5	5 18·4	5 03·0	1·0	0·4	7·0	2·5	13·0	4·7
11	5 17·8	5 18·6	5 03·3	1·1	0·4	7·1	2·5	13·1	4·7
12	5 18·0	5 18·9	5 03·5	1·2	0·4	7·2	2·6	13·2	4·7
13	5 18·3	5 19·1	5 03·8	1·3	0·5	7·3	2·6	13·3	4·8
14	5 18·5	5 19·4	5 04·0	1·4	0·5	7·4	2·7	13·4	4·8
15	5 18·8	5 19·6	5 04·2	1·5	0·5	7·5	2·7	13·5	4·8
16	5 19·0	5 19·9	5 04·5	1·6	0·6	7·6	2·7	13·6	4·9
17	5 19·3	5 20·1	5 04·7	1·7	0·6	7·7	2·8	13·7	4·9
18	5 19·5	5 20·4	5 04·9	1·8	0·6	7·8	2·8	13·8	4·9
19	5 19·8	5 20·6	5 05·2	1·9	0·7	7·9	2·8	13·9	5·0
20	5 20·0	5 20·9	5 05·4	2·0	0·7	8·0	2·9	14·0	5·0
21	5 20·3	5 21·1	5 05·7	2·1	0·8	8·1	2·9	14·1	5·1
22	5 20·5	5 21·4	5 05·9	2·2	0·8	8·2	2·9	14·2	5·1
23	5 20·8	5 21·6	5 06·1	2·3	0·8	8·3	3·0	14·3	5·1
24	5 21·0	5 21·9	5 06·4	2·4	0·9	8·4	3·0	14·4	5·2
25	5 21·3	5 22·1	5 06·6	2·5	0·9	8·5	3·0	14·5	5·2
26	5 21·5	5 22·4	5 06·9	2·6	0·9	8·6	3·1	14·6	5·2
27	5 21·8	5 22·6	5 07·1	2·7	1·0	8·7	3·1	14·7	5·3
28	5 22·0	5 22·9	5 07·3	2·8	1·0	8·8	3·2	14·8	5·3
29	5 22·3	5 23·1	5 07·6	2·9	1·0	8·9	3·2	14·9	5·3
30	5 22·5	5 23·4	5 07·8	3·0	1·1	9·0	3·2	15·0	5·4
31	5 22·8	5 23·6	5 08·0	3·1	1·1	9·1	3·3	15·1	5·4
32	5 23·0	5 23·9	5 08·3	3·2	1·1	9·2	3·3	15·2	5·4
33	5 23·3	5 24·1	5 08·5	3·3	1·2	9·3	3·3	15·3	5·5
34	5 23·5	5 24·4	5 08·8	3·4	1·2	9·4	3·4	15·4	5·5
35	5 23·8	5 24·6	5 09·0	3·5	1·3	9·5	3·4	15·5	5·6
36	5 24·0	5 24·9	5 09·2	3·6	1·3	9·6	3·4	15·6	5·6
37	5 24·3	5 25·1	5 09·5	3·7	1·3	9·7	3·5	15·7	5·6
38	5 24·5	5 25·4	5 09·7	3·8	1·4	9·8	3·5	15·8	5·7
39	5 24·8	5 25·6	5 10·0	3·9	1·4	9·9	3·5	15·9	5·7
40	5 25·0	5 25·9	5 10·2	4·0	1·4	10·0	3·6	16·0	5·7
41	5 25·3	5 26·1	5 10·4	4·1	1·5	10·1	3·6	16·1	5·8
42	5 25·5	5 26·4	5 10·7	4·2	1·5	10·2	3·7	16·2	5·8
43	5 25·8	5 26·6	5 10·9	4·3	1·5	10·3	3·7	16·3	5·8
44	5 26·0	5 26·9	5 11·1	4·4	1·6	10·4	3·7	16·4	5·9
45	5 26·3	5 27·1	5 11·4	4·5	1·6	10·5	3·8	16·5	5·9
46	5 26·5	5 27·4	5 11·6	4·6	1·6	10·6	3·8	16·6	5·9
47	5 26·8	5 27·6	5 11·9	4·7	1·7	10·7	3·8	16·7	6·0
48	5 27·0	5 27·9	5 12·1	4·8	1·7	10·8	3·9	16·8	6·0
49	5 27·3	5 28·1	5 12·3	4·9	1·8	10·9	3·9	16·9	6·1
50	5 27·5	5 28·4	5 12·6	5·0	1·8	11·0	3·9	17·0	6·1
51	5 27·8	5 28·6	5 12·8	5·1	1·8	11·1	4·0	17·1	6·1
52	5 28·0	5 28·9	5 13·1	5·2	1·9	11·2	4·0	17·2	6·2
53	5 28·3	5 29·1	5 13·3	5·3	1·9	11·3	4·0	17·3	6·2
54	5 28·5	5 29·4	5 13·5	5·4	1·9	11·4	4·1	17·4	6·2
55	5 28·8	5 29·7	5 13·8	5·5	2·0	11·5	4·1	17·5	6·3
56	5 29·0	5 29·9	5 14·0	5·6	2·0	11·6	4·2	17·6	6·3
57	5 29·3	5 30·2	5 14·3	5·7	2·0	11·7	4·2	17·7	6·3
58	5 29·5	5 30·4	5 14·5	5·8	2·1	11·8	4·2	17·8	6·4
59	5 29·8	5 30·7	5 14·7	5·9	2·1	11·9	4·3	17·9	6·4
60	5 30·0	5 30·9	5 15·0	6·0	2·2	12·0	4·3	18·0	6·5

22m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	5 30·0	5 30·9	5 15·0	0·0	0·0	6·0	2·3	12·0	4·5
01	5 30·3	5 31·2	5 15·2	0·1	0·0	6·1	2·3	12·1	4·5
02	5 30·5	5 31·4	5 15·4	0·2	0·1	6·2	2·3	12·2	4·6
03	5 30·8	5 31·7	5 15·7	0·3	0·1	6·3	2·4	12·3	4·6
04	5 31·0	5 31·9	5 15·9	0·4	0·2	6·4	2·4	12·4	4·7
05	5 31·3	5 32·2	5 16·2	0·5	0·2	6·5	2·4	12·5	4·7
06	5 31·5	5 32·4	5 16·4	0·6	0·2	6·6	2·5	12·6	4·7
07	5 31·8	5 32·7	5 16·6	0·7	0·3	6·7	2·5	12·7	4·8
08	5 32·0	5 32·9	5 16·9	0·8	0·3	6·8	2·6	12·8	4·8
09	5 32·3	5 33·2	5 17·1	0·9	0·3	6·9	2·6	12·9	4·8
10	5 32·5	5 33·4	5 17·4	1·0	0·4	7·0	2·6	13·0	4·9
11	5 32·8	5 33·7	5 17·6	1·1	0·4	7·1	2·7	13·1	4·9
12	5 33·0	5 33·9	5 17·8	1·2	0·5	7·2	2·7	13·2	5·0
13	5 33·3	5 34·2	5 18·1	1·3	0·5	7·3	2·7	13·3	5·0
14	5 33·5	5 34·4	5 18·3	1·4	0·5	7·4	2·8	13·4	5·0
15	5 33·8	5 34·7	5 18·5	1·5	0·6	7·5	2·8	13·5	5·1
16	5 34·0	5 34·9	5 18·8	1·6	0·6	7·6	2·9	13·6	5·1
17	5 34·3	5 35·2	5 19·0	1·7	0·6	7·7	2·9	13·7	5·1
18	5 34·5	5 35·4	5 19·3	1·8	0·7	7·8	2·9	13·8	5·2
19	5 34·8	5 35·7	5 19·5	1·9	0·7	7·9	3·0	13·9	5·2
20	5 35·0	5 35·9	5 19·7	2·0	0·8	8·0	3·0	14·0	5·3
21	5 35·3	5 36·2	5 20·0	2·1	0·8	8·1	3·0	14·1	5·3
22	5 35·5	5 36·4	5 20·2	2·2	0·8	8·2	3·1	14·2	5·3
23	5 35·8	5 36·7	5 20·5	2·3	0·9	8·3	3·1	14·3	5·4
24	5 36·0	5 36·9	5 20·7	2·4	0·9	8·4	3·2	14·4	5·4
25	5 36·3	5 37·2	5 20·9	2·5	0·9	8·5	3·2	14·5	5·4
26	5 36·5	5 37·4	5 21·2	2·6	1·0	8·6	3·2	14·6	5·5
27	5 36·8	5 37·7	5 21·4	2·7	1·0	8·7	3·3	14·7	5·5
28	5 37·0	5 37·9	5 21·6	2·8	1·1	8·8	3·3	14·8	5·6
29	5 37·3	5 38·2	5 21·9	2·9	1·1	8·9	3·3	14·9	5·6
30	5 37·5	5 38·4	5 22·1	3·0	1·1	9·0	3·4	15·0	5·6
31	5 37·8	5 38·7	5 22·4	3·1	1·2	9·1	3·4	15·1	5·7
32	5 38·0	5 38·9	5 22·6	3·2	1·2	9·2	3·5	15·2	5·7
33	5 38·3	5 39·2	5 22·8	3·3	1·2	9·3	3·5	15·3	5·7
34	5 38·5	5 39·4	5 23·1	3·4	1·3	9·4	3·5	15·4	5·8
35	5 38·8	5 39·7	5 23·3	3·5	1·3	9·5	3·6	15·5	5·8
36	5 39·0	5 39·9	5 23·6	3·6	1·4	9·6	3·6	15·6	5·9
37	5 39·3	5 40·2	5 23·8	3·7	1·4	9·7	3·6	15·7	5·9
38	5 39·5	5 40·4	5 24·0	3·8	1·4	9·8	3·7	15·8	5·9
39	5 39·8	5 40·7	5 24·3	3·9	1·5	9·9	3·7	15·9	6·0
40	5 40·0	5 40·9	5 24·5	4·0	1·5	10·0	3·8	16·0	6·0
41	5 40·3	5 41·2	5 24·7	4·1	1·5	10·1	3·8	16·1	6·0
42	5 40·5	5 41·4	5 25·0	4·2	1·6	10·2	3·8	16·2	6·1
43	5 40·8	5 41·7	5 25·2	4·3	1·6	10·3	3·9	16·3	6·1
44	5 41·0	5 41·9	5 25·5	4·4	1·7	10·4	3·9	16·4	6·2
45	5 41·3	5 42·2	5 25·7	4·5	1·7	10·5	3·9	16·5	6·2
46	5 41·5	5 42·4	5 25·9	4·6	1·7	10·6	4·0	16·6	6·2
47	5 41·8	5 42·7	5 26·2	4·7	1·8	10·7	4·0	16·7	6·3
48	5 42·0	5 42·9	5 26·4	4·8	1·8	10·8	4·1	16·8	6·3
49	5 42·3	5 43·2	5 26·7	4·9	1·8	10·9	4·1	16·9	6·3
50	5 42·5	5 43·4	5 26·9	5·0	1·9	11·0	4·1	17·0	6·4
51	5 42·8	5 43·7	5 27·1	5·1	1·9	11·1	4·2	17·1	6·4
52	5 43·0	5 43·9	5 27·4	5·2	2·0	11·2	4·2	17·2	6·5
53	5 43·3	5 44·2	5 27·6	5·3	2·0	11·3	4·2	17·3	6·5
54	5 43·5	5 44·4	5 27·9	5·4	2·0	11·4	4·3	17·4	6·5
55	5 43·8	5 44·7	5 28·1	5·5	2·1	11·5	4·3	17·5	6·6
56	5 44·0	5 44·9	5 28·3	5·6	2·1	11·6	4·4	17·6	6·6
57	5 44·3	5 45·2	5 28·6	5·7	2·1	11·7	4·4	17·7	6·6
58	5 44·5	5 45·4	5 28·8	5·8	2·2	11·8	4·4	17·8	6·7
59	5 44·8	5 45·7	5 29·0	5·9	2·2	11·9	4·5	17·9	6·7
60	5 45·0	5 45·9	5 29·3	6·0	2·3	12·0	4·5	18·0	6·8

23m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	5 45·0	5 45·9	5 29·3	0·0	0·0	6·0	2·4	12·0	4·7
01	5 45·3	5 46·2	5 29·5	0·1	0·0	6·1	2·4	12·1	4·7
02	5 45·5	5 46·4	5 29·8	0·2	0·1	6·2	2·4	12·2	4·8
03	5 45·8	5 46·7	5 30·0	0·3	0·1	6·3	2·5	12·3	4·8
04	5 46·0	5 46·9	5 30·2	0·4	0·2	6·4	2·5	12·4	4·9
05	5 46·3	5 47·2	5 30·5	0·5	0·2	6·5	2·5	12·5	4·9
06	5 46·5	5 47·4	5 30·7	0·6	0·2	6·6	2·6	12·6	4·9
07	5 46·8	5 47·7	5 31·0	0·7	0·3	6·7	2·6	12·7	5·0
08	5 47·0	5 48·0	5 31·2	0·8	0·3	6·8	2·7	12·8	5·0
09	5 47·3	5 48·2	5 31·4	0·9	0·4	6·9	2·7	12·9	5·1
10	5 47·5	5 48·5	5 31·7	1·0	0·4	7·0	2·7	13·0	5·1
11	5 47·8	5 48·7	5 31·9	1·1	0·4	7·1	2·8	13·1	5·1
12	5 48·0	5 49·0	5 32·1	1·2	0·5	7·2	2·8	13·2	5·2
13	5 48·3	5 49·2	5 32·4	1·3	0·5	7·3	2·9	13·3	5·2
14	5 48·5	5 49·5	5 32·6	1·4	0·5	7·4	2·9	13·4	5·2
15	5 48·8	5 49·7	5 32·9	1·5	0·6	7·5	2·9	13·5	5·3
16	5 49·0	5 50·0	5 33·1	1·6	0·6	7·6	3·0	13·6	5·3
17	5 49·3	5 50·2	5 33·3	1·7	0·7	7·7	3·0	13·7	5·4
18	5 49·5	5 50·5	5 33·6	1·8	0·7	7·8	3·1	13·8	5·4
19	5 49·8	5 50·7	5 33·8	1·9	0·7	7·9	3·1	13·9	5·4
20	5 50·0	5 51·0	5 34·1	2·0	0·8	8·0	3·1	14·0	5·5
21	5 50·3	5 51·2	5 34·3	2·1	0·8	8·1	3·2	14·1	5·5
22	5 50·5	5 51·5	5 34·5	2·2	0·9	8·2	3·2	14·2	5·6
23	5 50·8	5 51·7	5 34·8	2·3	0·9	8·3	3·3	14·3	5·6
24	5 51·0	5 52·0	5 35·0	2·4	0·9	8·4	3·3	14·4	5·6
25	5 51·3	5 52·2	5 35·2	2·5	1·0	8·5	3·3	14·5	5·7
26	5 51·5	5 52·5	5 35·5	2·6	1·0	8·6	3·4	14·6	5·7
27	5 51·8	5 52·7	5 35·7	2·7	1·1	8·7	3·4	14·7	5·8
28	5 52·0	5 53·0	5 36·0	2·8	1·1	8·8	3·4	14·8	5·8
29	5 52·3	5 53·2	5 36·2	2·9	1·1	8·9	3·5	14·9	5·8
30	5 52·5	5 53·5	5 36·4	3·0	1·2	9·0	3·5	15·0	5·9
31	5 52·8	5 53·7	5 36·7	3·1	1·2	9·1	3·6	15·1	5·9
32	5 53·0	5 54·0	5 36·9	3·2	1·3	9·2	3·6	15·2	6·0
33	5 53·3	5 54·2	5 37·2	3·3	1·3	9·3	3·6	15·3	6·0
34	5 53·5	5 54·5	5 37·4	3·4	1·3	9·4	3·7	15·4	6·0
35	5 53·8	5 54·7	5 37·6	3·5	1·4	9·5	3·7	15·5	6·1
36	5 54·0	5 55·0	5 37·9	3·6	1·4	9·6	3·8	15·6	6·1
37	5 54·3	5 55·2	5 38·1	3·7	1·4	9·7	3·8	15·7	6·1
38	5 54·5	5 55·5	5 38·4	3·8	1·5	9·8	3·8	15·8	6·2
39	5 54·8	5 55·7	5 38·6	3·9	1·5	9·9	3·9	15·9	6·2
40	5 55·0	5 56·0	5 38·8	4·0	1·6	10·0	3·9	16·0	6·3
41	5 55·3	5 56·2	5 39·1	4·1	1·6	10·1	4·0	16·1	6·3
42	5 55·5	5 56·5	5 39·3	4·2	1·6	10·2	4·0	16·2	6·3
43	5 55·8	5 56·7	5 39·5	4·3	1·7	10·3	4·0	16·3	6·4
44	5 56·0	5 57·0	5 39·8	4·4	1·7	10·4	4·1	16·4	6·4
45	5 56·3	5 57·2	5 40·0	4·5	1·8	10·5	4·1	16·5	6·5
46	5 56·5	5 57·5	5 40·3	4·6	1·8	10·6	4·2	16·6	6·5
47	5 56·8	5 57·7	5 40·5	4·7	1·8	10·7	4·2	16·7	6·5
48	5 57·0	5 58·0	5 40·7	4·8	1·9	10·8	4·2	16·8	6·6
49	5 57·3	5 58·2	5 41·0	4·9	1·9	10·9	4·3	16·9	6·6
50	5 57·5	5 58·5	5 41·2	5·0	2·0	11·0	4·3	17·0	6·7
51	5 57·8	5 58·7	5 41·5	5·1	2·0	11·1	4·3	17·1	6·7
52	5 58·0	5 59·0	5 41·7	5·2	2·0	11·2	4·4	17·2	6·7
53	5 58·3	5 59·2	5 41·9	5·3	2·1	11·3	4·4	17·3	6·8
54	5 58·5	5 59·5	5 42·2	5·4	2·1	11·4	4·5	17·4	6·8
55	5 58·8	5 59·7	5 42·4	5·5	2·2	11·5	4·5	17·5	6·9
56	5 59·0	6 00·0	5 42·6	5·6	2·2	11·6	4·5	17·6	6·9
57	5 59·3	6 00·2	5 42·9	5·7	2·2	11·7	4·6	17·7	6·9
58	5 59·5	6 00·5	5 43·1	5·8	2·3	11·8	4·6	17·8	7·0
59	5 59·8	6 00·7	5 43·4	5·9	2·3	11·9	4·7	17·9	7·0
60	6 00·0	6 01·0	5 43·6	6·0	2·4	12·0	4·7	18·0	7·1

24m	SUN PLANETS	ARIES	MOON	v or Corrn d		v or Corrn d		v or Corrn d	
s	° ′	° ′	° ′	′	′	′	′	′	′
00	6 00·0	6 01·0	5 43·6	0·0	0·0	6·0	2·5	12·0	4·9
01	6 00·3	6 01·2	5 43·8	0·1	0·0	6·1	2·5	12·1	4·9
02	6 00·5	6 01·5	5 44·1	0·2	0·1	6·2	2·5	12·2	5·0
03	6 00·8	6 01·7	5 44·3	0·3	0·1	6·3	2·6	12·3	5·0
04	6 01·0	6 02·0	5 44·6	0·4	0·2	6·4	2·6	12·4	5·1
05	6 01·3	6 02·2	5 44·8	0·5	0·2	6·5	2·7	12·5	5·1
06	6 01·5	6 02·5	5 45·0	0·6	0·2	6·6	2·7	12·6	5·1
07	6 01·8	6 02·7	5 45·3	0·7	0·3	6·7	2·7	12·7	5·2
08	6 02·0	6 03·0	5 45·5	0·8	0·3	6·8	2·8	12·8	5·2
09	6 02·3	6 03·2	5 45·7	0·9	0·4	6·9	2·8	12·9	5·3
10	6 02·5	6 03·5	5 46·0	1·0	0·4	7·0	2·9	13·0	5·3
11	6 02·8	6 03·7	5 46·2	1·1	0·4	7·1	2·9	13·1	5·3
12	6 03·0	6 04·0	5 46·5	1·2	0·5	7·2	2·9	13·2	5·4
13	6 03·3	6 04·2	5 46·7	1·3	0·5	7·3	3·0	13·3	5·4
14	6 03·5	6 04·5	5 46·9	1·4	0·6	7·4	3·0	13·4	5·5
15	6 03·8	6 04·7	5 47·2	1·5	0·6	7·5	3·1	13·5	5·5
16	6 04·0	6 05·0	5 47·4	1·6	0·7	7·6	3·1	13·6	5·6
17	6 04·3	6 05·2	5 47·7	1·7	0·7	7·7	3·1	13·7	5·6
18	6 04·5	6 05·5	5 47·9	1·8	0·7	7·8	3·2	13·8	5·6
19	6 04·8	6 05·7	5 48·1	1·9	0·8	7·9	3·2	13·9	5·7
20	6 05·0	6 06·0	5 48·4	2·0	0·8	8·0	3·3	14·0	5·7
21	6 05·3	6 06·3	5 48·6	2·1	0·9	8·1	3·3	14·1	5·8
22	6 05·5	6 06·5	5 48·8	2·2	0·9	8·2	3·3	14·2	5·8
23	6 05·8	6 06·8	5 49·1	2·3	0·9	8·3	3·4	14·3	5·8
24	6 06·0	6 07·0	5 49·3	2·4	1·0	8·4	3·4	14·4	5·9
25	6 06·3	6 07·3	5 49·6	2·5	1·0	8·5	3·5	14·5	5·9
26	6 06·5	6 07·5	5 49·8	2·6	1·1	8·6	3·5	14·6	6·0
27	6 06·8	6 07·8	5 50·0	2·7	1·1	8·7	3·6	14·7	6·0
28	6 07·0	6 08·0	5 50·3	2·8	1·1	8·8	3·6	14·8	6·0
29	6 07·3	6 08·3	5 50·5	2·9	1·2	8·9	3·6	14·9	6·1
30	6 07·5	6 08·5	5 50·8	3·0	1·2	9·0	3·7	15·0	6·1
31	6 07·8	6 08·8	5 51·0	3·1	1·3	9·1	3·7	15·1	6·2
32	6 08·0	6 09·0	5 51·2	3·2	1·3	9·2	3·8	15·2	6·2
33	6 08·3	6 09·3	5 51·5	3·3	1·3	9·3	3·8	15·3	6·2
34	6 08·5	6 09·5	5 51·7	3·4	1·4	9·4	3·8	15·4	6·3
35	6 08·8	6 09·8	5 52·0	3·5	1·4	9·5	3·9	15·5	6·3
36	6 09·0	6 10·0	5 52·2	3·6	1·5	9·6	3·9	15·6	6·4
37	6 09·3	6 10·3	5 52·4	3·7	1·5	9·7	4·0	15·7	6·4
38	6 09·5	6 10·5	5 52·7	3·8	1·6	9·8	4·0	15·8	6·5
39	6 09·8	6 10·8	5 52·9	3·9	1·6	9·9	4·0	15·9	6·5
40	6 10·0	6 11·0	5 53·1	4·0	1·6	10·0	4·1	16·0	6·5
41	6 10·3	6 11·3	5 53·4	4·1	1·7	10·1	4·1	16·1	6·6
42	6 10·5	6 11·5	5 53·6	4·2	1·7	10·2	4·2	16·2	6·6
43	6 10·8	6 11·8	5 53·9	4·3	1·8	10·3	4·2	16·3	6·7
44	6 11·0	6 12·0	5 54·1	4·4	1·8	10·4	4·2	16·4	6·7
45	6 11·3	6 12·3	5 54·3	4·5	1·8	10·5	4·3	16·5	6·7
46	6 11·5	6 12·5	5 54·6	4·6	1·9	10·6	4·3	16·6	6·8
47	6 11·8	6 12·8	5 54·8	4·7	1·9	10·7	4·4	16·7	6·8
48	6 12·0	6 13·0	5 55·1	4·8	2·0	10·8	4·4	16·8	6·9
49	6 12·3	6 13·3	5 55·3	4·9	2·0	10·9	4·5	16·9	6·9
50	6 12·5	6 13·5	5 55·5	5·0	2·0	11·0	4·5	17·0	6·9
51	6 12·8	6 13·8	5 55·8	5·1	2·1	11·1	4·5	17·1	7·0
52	6 13·0	6 14·0	5 56·0	5·2	2·1	11·2	4·6	17·2	7·0
53	6 13·3	6 14·3	5 56·2	5·3	2·2	11·3	4·6	17·3	7·1
54	6 13·5	6 14·5	5 56·5	5·4	2·2	11·4	4·7	17·4	7·1
55	6 13·8	6 14·8	5 56·7	5·5	2·2	11·5	4·7	17·5	7·1
56	6 14·0	6 15·0	5 57·0	5·6	2·3	11·6	4·7	17·6	7·2
57	6 14·3	6 15·3	5 57·2	5·7	2·3	11·7	4·8	17·7	7·2
58	6 14·5	6 15·5	5 57·4	5·8	2·4	11·8	4·8	17·8	7·3
59	6 14·8	6 15·8	5 57·7	5·9	2·4	11·9	4·9	17·9	7·3
60	6 15·0	6 16·0	5 57·9	6·0	2·5	12·0	4·9	18·0	7·4

25m	SUN PLANETS	ARIES	MOON	v or Corrn d		v or Corrn d		v or Corrn d	
s	° ′	° ′	° ′	′	′	′	′	′	′
00	6 15·0	6 16·0	5 57·9	0·0	0·0	6·0	2·6	12·0	5·1
01	6 15·3	6 16·3	5 58·2	0·1	0·0	6·1	2·6	12·1	5·1
02	6 15·5	6 16·5	5 58·4	0·2	0·1	6·2	2·6	12·2	5·2
03	6 15·8	6 16·8	5 58·6	0·3	0·1	6·3	2·7	12·3	5·2
04	6 16·0	6 17·0	5 58·9	0·4	0·2	6·4	2·7	12·4	5·3
05	6 16·3	6 17·3	5 59·1	0·5	0·2	6·5	2·8	12·5	5·3
06	6 16·5	6 17·5	5 59·3	0·6	0·3	6·6	2·8	12·6	5·4
07	6 16·8	6 17·8	5 59·6	0·7	0·3	6·7	2·8	12·7	5·4
08	6 17·0	6 18·0	5 59·8	0·8	0·3	6·8	2·9	12·8	5·4
09	6 17·3	6 18·3	6 00·1	0·9	0·4	6·9	2·9	12·9	5·5
10	6 17·5	6 18·5	6 00·3	1·0	0·4	7·0	3·0	13·0	5·5
11	6 17·8	6 18·8	6 00·5	1·1	0·5	7·1	3·0	13·1	5·6
12	6 18·0	6 19·0	6 00·8	1·2	0·5	7·2	3·1	13·2	5·6
13	6 18·3	6 19·3	6 01·0	1·3	0·6	7·3	3·1	13·3	5·7
14	6 18·5	6 19·5	6 01·3	1·4	0·6	7·4	3·1	13·4	5·7
15	6 18·8	6 19·8	6 01·5	1·5	0·6	7·5	3·2	13·5	5·7
16	6 19·0	6 20·0	6 01·7	1·6	0·7	7·6	3·2	13·6	5·8
17	6 19·3	6 20·3	6 02·0	1·7	0·7	7·7	3·3	13·7	5·8
18	6 19·5	6 20·5	6 02·2	1·8	0·8	7·8	3·3	13·8	5·9
19	6 19·8	6 20·8	6 02·5	1·9	0·8	7·9	3·4	13·9	5·9
20	6 20·0	6 21·0	6 02·7	2·0	0·9	8·0	3·4	14·0	6·0
21	6 20·3	6 21·3	6 02·9	2·1	0·9	8·1	3·4	14·1	6·0
22	6 20·5	6 21·5	6 03·2	2·2	0·9	8·2	3·5	14·2	6·0
23	6 20·8	6 21·8	6 03·4	2·3	1·0	8·3	3·5	14·3	6·1
24	6 21·0	6 22·0	6 03·6	2·4	1·0	8·4	3·6	14·4	6·1
25	6 21·3	6 22·3	6 03·9	2·5	1·1	8·5	3·6	14·5	6·2
26	6 21·5	6 22·5	6 04·1	2·6	1·1	8·6	3·7	14·6	6·2
27	6 21·8	6 22·8	6 04·4	2·7	1·1	8·7	3·7	14·7	6·2
28	6 22·0	6 23·0	6 04·6	2·8	1·2	8·8	3·7	14·8	6·3
29	6 22·3	6 23·3	6 04·8	2·9	1·2	8·9	3·8	14·9	6·3
30	6 22·5	6 23·5	6 05·1	3·0	1·3	9·0	3·8	15·0	6·4
31	6 22·8	6 23·8	6 05·3	3·1	1·3	9·1	3·9	15·1	6·4
32	6 23·0	6 24·0	6 05·6	3·2	1·4	9·2	3·9	15·2	6·5
33	6 23·3	6 24·3	6 05·8	3·3	1·4	9·3	4·0	15·3	6·5
34	6 23·5	6 24·5	6 06·0	3·4	1·4	9·4	4·0	15·4	6·5
35	6 23·8	6 24·8	6 06·3	3·5	1·5	9·5	4·0	15·5	6·6
36	6 24·0	6 25·1	6 06·5	3·6	1·5	9·6	4·1	15·6	6·6
37	6 24·3	6 25·3	6 06·7	3·7	1·6	9·7	4·1	15·7	6·7
38	6 24·5	6 25·6	6 07·0	3·8	1·6	9·8	4·2	15·8	6·7
39	6 24·8	6 25·8	6 07·2	3·9	1·7	9·9	4·2	15·9	6·8
40	6 25·0	6 26·1	6 07·5	4·0	1·7	10·0	4·3	16·0	6·8
41	6 25·3	6 26·3	6 07·7	4·1	1·7	10·1	4·3	16·1	6·8
42	6 25·5	6 26·6	6 07·9	4·2	1·8	10·2	4·3	16·2	6·9
43	6 25·8	6 26·8	6 08·2	4·3	1·8	10·3	4·4	16·3	6·9
44	6 26·0	6 27·1	6 08·4	4·4	1·9	10·4	4·4	16·4	7·0
45	6 26·3	6 27·3	6 08·7	4·5	1·9	10·5	4·5	16·5	7·0
46	6 26·5	6 27·6	6 08·9	4·6	2·0	10·6	4·5	16·6	7·1
47	6 26·8	6 27·8	6 09·1	4·7	2·0	10·7	4·5	16·7	7·1
48	6 27·0	6 28·1	6 09·4	4·8	2·0	10·8	4·6	16·8	7·1
49	6 27·3	6 28·3	6 09·6	4·9	2·1	10·9	4·6	16·9	7·2
50	6 27·5	6 28·6	6 09·8	5·0	2·1	11·0	4·7	17·0	7·2
51	6 27·8	6 28·8	6 10·1	5·1	2·2	11·1	4·7	17·1	7·3
52	6 28·0	6 29·1	6 10·3	5·2	2·2	11·2	4·8	17·2	7·3
53	6 28·3	6 29·3	6 10·6	5·3	2·3	11·3	4·8	17·3	7·4
54	6 28·5	6 29·6	6 10·8	5·4	2·3	11·4	4·8	17·4	7·4
55	6 28·8	6 29·8	6 11·0	5·5	2·3	11·5	4·9	17·5	7·4
56	6 29·0	6 30·1	6 11·3	5·6	2·4	11·6	4·9	17·6	7·5
57	6 29·3	6 30·3	6 11·5	5·7	2·4	11·7	5·0	17·7	7·5
58	6 29·5	6 30·6	6 11·8	5·8	2·5	11·8	5·0	17·8	7·6
59	6 29·8	6 30·8	6 12·0	5·9	2·5	11·9	5·1	17·9	7·6
60	6 30·0	6 31·1	6 12·2	6·0	2·6	12·0	5·1	18·0	7·7

26m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	6 30·0	6 31·1	6 12·2	0·0	0·0	6·0	2·7	12·0	5·3
01	6 30·3	6 31·3	6 12·5	0·1	0·0	6·1	2·7	12·1	5·3
02	6 30·5	6 31·6	6 12·7	0·2	0·1	6·2	2·7	12·2	5·4
03	6 30·8	6 31·8	6 12·9	0·3	0·1	6·3	2·8	12·3	5·4
04	6 31·0	6 32·1	6 13·2	0·4	0·2	6·4	2·8	12·4	5·5
05	6 31·3	6 32·3	6 13·4	0·5	0·2	6·5	2·9	12·5	5·5
06	6 31·5	6 32·6	6 13·7	0·6	0·3	6·6	2·9	12·6	5·6
07	6 31·8	6 32·8	6 13·9	0·7	0·3	6·7	3·0	12·7	5·6
08	6 32·0	6 33·1	6 14·1	0·8	0·4	6·8	3·0	12·8	5·7
09	6 32·3	6 33·3	6 14·4	0·9	0·4	6·9	3·0	12·9	5·7
10	6 32·5	6 33·6	6 14·6	1·0	0·4	7·0	3·1	13·0	5·7
11	6 32·8	6 33·8	6 14·9	1·1	0·5	7·1	3·1	13·1	5·8
12	6 33·0	6 34·1	6 15·1	1·2	0·5	7·2	3·2	13·2	5·8
13	6 33·3	6 34·3	6 15·3	1·3	0·6	7·3	3·2	13·3	5·9
14	6 33·5	6 34·6	6 15·6	1·4	0·6	7·4	3·3	13·4	5·9
15	6 33·8	6 34·8	6 15·8	1·5	0·7	7·5	3·3	13·5	6·0
16	6 34·0	6 35·1	6 16·1	1·6	0·7	7·6	3·4	13·6	6·0
17	6 34·3	6 35·3	6 16·3	1·7	0·8	7·7	3·4	13·7	6·1
18	6 34·5	6 35·6	6 16·5	1·8	0·8	7·8	3·4	13·8	6·1
19	6 34·8	6 35·8	6 16·8	1·9	0·8	7·9	3·5	13·9	6·1
20	6 35·0	6 36·1	6 17·0	2·0	0·9	8·0	3·5	14·0	6·2
21	6 35·3	6 36·3	6 17·2	2·1	0·9	8·1	3·6	14·1	6·2
22	6 35·5	6 36·6	6 17·5	2·2	1·0	8·2	3·6	14·2	6·3
23	6 35·8	6 36·8	6 17·7	2·3	1·0	8·3	3·7	14·3	6·3
24	6 36·0	6 37·1	6 18·0	2·4	1·1	8·4	3·7	14·4	6·4
25	6 36·3	6 37·3	6 18·2	2·5	1·1	8·5	3·8	14·5	6·4
26	6 36·5	6 37·6	6 18·4	2·6	1·1	8·6	3·8	14·6	6·4
27	6 36·8	6 37·8	6 18·7	2·7	1·2	8·7	3·8	14·7	6·5
28	6 37·0	6 38·1	6 18·9	2·8	1·2	8·8	3·9	14·8	6·5
29	6 37·3	6 38·3	6 19·2	2·9	1·3	8·9	3·9	14·9	6·6
30	6 37·5	6 38·6	6 19·4	3·0	1·3	9·0	4·0	15·0	6·6
31	6 37·8	6 38·8	6 19·6	3·1	1·4	9·1	4·0	15·1	6·7
32	6 38·0	6 39·1	6 19·9	3·2	1·4	9·2	4·1	15·2	6·7
33	6 38·3	6 39·3	6 20·1	3·3	1·5	9·3	4·1	15·3	6·8
34	6 38·5	6 39·6	6 20·3	3·4	1·5	9·4	4·2	15·4	6·8
35	6 38·8	6 39·8	6 20·6	3·5	1·5	9·5	4·2	15·5	6·8
36	6 39·0	6 40·1	6 20·8	3·6	1·6	9·6	4·2	15·6	6·9
37	6 39·3	6 40·3	6 21·1	3·7	1·6	9·7	4·3	15·7	6·9
38	6 39·5	6 40·6	6 21·3	3·8	1·7	9·8	4·3	15·8	7·0
39	6 39·8	6 40·8	6 21·5	3·9	1·7	9·9	4·4	15·9	7·0
40	6 40·0	6 41·1	6 21·8	4·0	1·8	10·0	4·4	16·0	7·1
41	6 40·3	6 41·3	6 22·0	4·1	1·8	10·1	4·5	16·1	7·1
42	6 40·5	6 41·6	6 22·3	4·2	1·9	10·2	4·5	16·2	7·2
43	6 40·8	6 41·8	6 22·5	4·3	1·9	10·3	4·5	16·3	7·2
44	6 41·0	6 42·1	6 22·7	4·4	1·9	10·4	4·6	16·4	7·2
45	6 41·3	6 42·3	6 23·0	4·5	2·0	10·5	4·6	16·5	7·3
46	6 41·5	6 42·6	6 23·2	4·6	2·0	10·6	4·7	16·6	7·3
47	6 41·8	6 42·8	6 23·4	4·7	2·1	10·7	4·7	16·7	7·4
48	6 42·0	6 43·1	6 23·7	4·8	2·1	10·8	4·8	16·8	7·4
49	6 42·3	6 43·4	6 23·9	4·9	2·2	10·9	4·8	16·9	7·5
50	6 42·5	6 43·6	6 24·2	5·0	2·2	11·0	4·9	17·0	7·5
51	6 42·8	6 43·9	6 24·4	5·1	2·3	11·1	4·9	17·1	7·6
52	6 43·0	6 44·1	6 24·6	5·2	2·3	11·2	4·9	17·2	7·6
53	6 43·3	6 44·4	6 24·9	5·3	2·3	11·3	5·0	17·3	7·6
54	6 43·5	6 44·6	6 25·1	5·4	2·4	11·4	5·0	17·4	7·7
55	6 43·8	6 44·9	6 25·4	5·5	2·4	11·5	5·1	17·5	7·7
56	6 44·0	6 45·1	6 25·6	5·6	2·5	11·6	5·1	17·6	7·8
57	6 44·3	6 45·4	6 25·8	5·7	2·5	11·7	5·2	17·7	7·8
58	6 44·5	6 45·6	6 26·1	5·8	2·6	11·8	5·2	17·8	7·9
59	6 44·8	6 45·9	6 26·3	5·9	2·6	11·9	5·3	17·9	7·9
60	6 45·0	6 46·1	6 26·6	6·0	2·7	12·0	5·3	18·0	8·0

27m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	6 45·0	6 46·1	6 26·6	0·0	0·0	6·0	2·8	12·0	5·5
01	6 45·3	6 46·4	6 26·8	0·1	0·0	6·1	2·8	12·1	5·5
02	6 45·5	6 46·6	6 27·0	0·2	0·1	6·2	2·8	12·2	5·6
03	6 45·8	6 46·9	6 27·3	0·3	0·1	6·3	2·9	12·3	5·6
04	6 46·0	6 47·1	6 27·5	0·4	0·2	6·4	2·9	12·4	5·7
05	6 46·3	6 47·4	6 27·7	0·5	0·2	6·5	3·0	12·5	5·7
06	6 46·5	6 47·6	6 28·0	0·6	0·3	6·6	3·0	12·6	5·8
07	6 46·8	6 47·9	6 28·2	0·7	0·3	6·7	3·1	12·7	5·8
08	6 47·0	6 48·1	6 28·5	0·8	0·4	6·8	3·1	12·8	5·9
09	6 47·3	6 48·4	6 28·7	0·9	0·4	6·9	3·2	12·9	5·9
10	6 47·5	6 48·6	6 28·9	1·0	0·5	7·0	3·2	13·0	6·0
11	6 47·8	6 48·9	6 29·2	1·1	0·5	7·1	3·3	13·1	6·0
12	6 48·0	6 49·1	6 29·4	1·2	0·6	7·2	3·3	13·2	6·1
13	6 48·3	6 49·4	6 29·7	1·3	0·6	7·3	3·3	13·3	6·1
14	6 48·5	6 49·6	6 29·9	1·4	0·6	7·4	3·4	13·4	6·1
15	6 48·8	6 49·9	6 30·1	1·5	0·7	7·5	3·4	13·5	6·2
16	6 49·0	6 50·1	6 30·4	1·6	0·7	7·6	3·5	13·6	6·2
17	6 49·3	6 50·4	6 30·6	1·7	0·8	7·7	3·5	13·7	6·3
18	6 49·5	6 50·6	6 30·8	1·8	0·8	7·8	3·6	13·8	6·3
19	6 49·8	6 50·9	6 31·1	1·9	0·9	7·9	3·6	13·9	6·4
20	6 50·0	6 51·1	6 31·3	2·0	0·9	8·0	3·7	14·0	6·4
21	6 50·3	6 51·4	6 31·6	2·1	1·0	8·1	3·7	14·1	6·5
22	6 50·5	6 51·6	6 31·8	2·2	1·0	8·2	3·8	14·2	6·5
23	6 50·8	6 51·9	6 32·0	2·3	1·1	8·3	3·8	14·3	6·6
24	6 51·0	6 52·1	6 32·3	2·4	1·1	8·4	3·9	14·4	6·6
25	6 51·3	6 52·4	6 32·5	2·5	1·1	8·5	3·9	14·5	6·6
26	6 51·5	6 52·6	6 32·8	2·6	1·2	8·6	3·9	14·6	6·7
27	6 51·8	6 52·9	6 33·0	2·7	1·2	8·7	4·0	14·7	6·7
28	6 52·0	6 53·1	6 33·2	2·8	1·3	8·8	4·0	14·8	6·8
29	6 52·3	6 53·4	6 33·5	2·9	1·3	8·9	4·1	14·9	6·8
30	6 52·5	6 53·6	6 33·7	3·0	1·4	9·0	4·1	15·0	6·9
31	6 52·8	6 53·9	6 33·9	3·1	1·4	9·1	4·2	15·1	6·9
32	6 53·0	6 54·1	6 34·2	3·2	1·5	9·2	4·2	15·2	7·0
33	6 53·3	6 54·4	6 34·4	3·3	1·5	9·3	4·3	15·3	7·0
34	6 53·5	6 54·6	6 34·7	3·4	1·6	9·4	4·3	15·4	7·1
35	6 53·8	6 54·9	6 34·9	3·5	1·6	9·5	4·4	15·5	7·1
36	6 54·0	6 55·1	6 35·1	3·6	1·7	9·6	4·4	15·6	7·2
37	6 54·3	6 55·4	6 35·4	3·7	1·7	9·7	4·4	15·7	7·2
38	6 54·5	6 55·6	6 35·6	3·8	1·7	9·8	4·5	15·8	7·2
39	6 54·8	6 55·9	6 35·9	3·9	1·8	9·9	4·5	15·9	7·3
40	6 55·0	6 56·1	6 36·1	4·0	1·8	10·0	4·6	16·0	7·3
41	6 55·3	6 56·4	6 36·3	4·1	1·9	10·1	4·6	16·1	7·4
42	6 55·5	6 56·6	6 36·6	4·2	1·9	10·2	4·7	16·2	7·4
43	6 55·8	6 56·9	6 36·8	4·3	2·0	10·3	4·7	16·3	7·5
44	6 56·0	6 57·1	6 37·0	4·4	2·0	10·4	4·8	16·4	7·5
45	6 56·3	6 57·4	6 37·3	4·5	2·1	10·5	4·8	16·5	7·6
46	6 56·5	6 57·6	6 37·5	4·6	2·1	10·6	4·9	16·6	7·6
47	6 56·8	6 57·9	6 37·8	4·7	2·2	10·7	4·9	16·7	7·7
48	6 57·0	6 58·1	6 38·0	4·8	2·2	10·8	5·0	16·8	7·7
49	6 57·3	6 58·4	6 38·2	4·9	2·2	10·9	5·0	16·9	7·7
50	6 57·5	6 58·6	6 38·5	5·0	2·3	11·0	5·0	17·0	7·8
51	6 57·8	6 58·9	6 38·7	5·1	2·3	11·1	5·1	17·1	7·8
52	6 58·0	6 59·1	6 39·0	5·2	2·4	11·2	5·1	17·2	7·9
53	6 58·3	6 59·4	6 39·2	5·3	2·4	11·3	5·2	17·3	7·9
54	6 58·5	6 59·6	6 39·4	5·4	2·5	11·4	5·2	17·4	8·0
55	6 58·8	6 59·9	6 39·7	5·5	2·5	11·5	5·3	17·5	8·0
56	6 59·0	7 00·1	6 39·9	5·6	2·6	11·6	5·3	17·6	8·1
57	6 59·3	7 00·4	6 40·2	5·7	2·6	11·7	5·4	17·7	8·1
58	6 59·5	7 00·6	6 40·4	5·8	2·7	11·8	5·4	17·8	8·2
59	6 59·8	7 00·9	6 40·6	5·9	2·7	11·9	5·5	17·9	8·2
60	7 00·0	7 01·1	6 40·9	6·0	2·8	12·0	5·5	18·0	8·3

28m	SUN PLANETS	ARIES	MOON	v or d	Corrn	v or d	Corrn	v or d	Corrn
s	° ′	° ′	° ′	′	′	′	′	′	′
00	7 00·0	7 01·1	6 40·9	0·0	0·0	6·0	2·9	12·0	5·7
01	7 00·3	7 01·4	6 41·1	0·1	0·0	6·1	2·9	12·1	5·7
02	7 00·5	7 01·7	6 41·3	0·2	0·1	6·2	2·9	12·2	5·8
03	7 00·8	7 01·9	6 41·6	0·3	0·1	6·3	3·0	12·3	5·8
04	7 01·0	7 02·2	6 41·8	0·4	0·2	6·4	3·0	12·4	5·9
05	7 01·3	7 02·4	6 42·1	0·5	0·2	6·5	3·1	12·5	5·9
06	7 01·5	7 02·7	6 42·3	0·6	0·3	6·6	3·1	12·6	6·0
07	7 01·8	7 02·9	6 42·5	0·7	0·3	6·7	3·2	12·7	6·0
08	7 02·0	7 03·2	6 42·8	0·8	0·4	6·8	3·2	12·8	6·1
09	7 02·3	7 03·4	6 43·0	0·9	0·4	6·9	3·3	12·9	6·1
10	7 02·5	7 03·7	6 43·3	1·0	0·5	7·0	3·3	13·0	6·2
11	7 02·8	7 03·9	6 43·5	1·1	0·5	7·1	3·4	13·1	6·2
12	7 03·0	7 04·2	6 43·7	1·2	0·6	7·2	3·4	13·2	6·3
13	7 03·3	7 04·4	6 44·0	1·3	0·6	7·3	3·5	13·3	6·3
14	7 03·5	7 04·7	6 44·2	1·4	0·7	7·4	3·5	13·4	6·4
15	7 03·8	7 04·9	6 44·4	1·5	0·7	7·5	3·6	13·5	6·4
16	7 04·0	7 05·2	6 44·7	1·6	0·8	7·6	3·6	13·6	6·5
17	7 04·3	7 05·4	6 44·9	1·7	0·8	7·7	3·7	13·7	6·5
18	7 04·5	7 05·7	6 45·2	1·8	0·9	7·8	3·7	13·8	6·6
19	7 04·8	7 05·9	6 45·4	1·9	0·9	7·9	3·8	13·9	6·6
20	7 05·0	7 06·2	6 45·6	2·0	1·0	8·0	3·8	14·0	6·7
21	7 05·3	7 06·4	6 45·9	2·1	1·0	8·1	3·8	14·1	6·7
22	7 05·5	7 06·7	6 46·1	2·2	1·0	8·2	3·9	14·2	6·7
23	7 05·8	7 06·9	6 46·4	2·3	1·1	8·3	3·9	14·3	6·8
24	7 06·0	7 07·2	6 46·6	2·4	1·1	8·4	4·0	14·4	6·8
25	7 06·3	7 07·4	6 46·8	2·5	1·2	8·5	4·0	14·5	6·9
26	7 06·5	7 07·7	6 47·1	2·6	1·2	8·6	4·1	14·6	6·9
27	7 06·8	7 07·9	6 47·3	2·7	1·3	8·7	4·1	14·7	7·0
28	7 07·0	7 08·2	6 47·5	2·8	1·3	8·8	4·2	14·8	7·0
29	7 07·3	7 08·4	6 47·8	2·9	1·4	8·9	4·2	14·9	7·1
30	7 07·5	7 08·7	6 48·0	3·0	1·4	9·0	4·3	15·0	7·1
31	7 07·8	7 08·9	6 48·3	3·1	1·5	9·1	4·3	15·1	7·2
32	7 08·0	7 09·2	6 48·5	3·2	1·5	9·2	4·4	15·2	7·2
33	7 08·3	7 09·4	6 48·7	3·3	1·6	9·3	4·4	15·3	7·3
34	7 08·5	7 09·7	6 49·0	3·4	1·6	9·4	4·5	15·4	7·3
35	7 08·8	7 09·9	6 49·2	3·5	1·7	9·5	4·5	15·5	7·4
36	7 09·0	7 10·2	6 49·5	3·6	1·7	9·6	4·6	15·6	7·4
37	7 09·3	7 10·4	6 49·7	3·7	1·8	9·7	4·6	15·7	7·5
38	7 09·5	7 10·7	6 49·9	3·8	1·8	9·8	4·7	15·8	7·5
39	7 09·8	7 10·9	6 50·2	3·9	1·9	9·9	4·7	15·9	7·6
40	7 10·0	7 11·2	6 50·4	4·0	1·9	10·0	4·8	16·0	7·6
41	7 10·3	7 11·4	6 50·6	4·1	1·9	10·1	4·8	16·1	7·6
42	7 10·5	7 11·7	6 50·9	4·2	2·0	10·2	4·8	16·2	7·7
43	7 10·8	7 11·9	6 51·1	4·3	2·0	10·3	4·9	16·3	7·7
44	7 11·0	7 12·2	6 51·4	4·4	2·1	10·4	4·9	16·4	7·8
45	7 11·3	7 12·4	6 51·6	4·5	2·1	10·5	5·0	16·5	7·8
46	7 11·5	7 12·7	6 51·8	4·6	2·2	10·6	5·0	16·6	7·9
47	7 11·8	7 12·9	6 52·1	4·7	2·2	10·7	5·1	16·7	7·9
48	7 12·0	7 13·2	6 52·3	4·8	2·3	10·8	5·1	16·8	8·0
49	7 12·3	7 13·4	6 52·6	4·9	2·3	10·9	5·2	16·9	8·0
50	7 12·5	7 13·7	6 52·8	5·0	2·4	11·0	5·2	17·0	8·1
51	7 12·8	7 13·9	6 53·0	5·1	2·4	11·1	5·3	17·1	8·1
52	7 13·0	7 14·2	6 53·3	5·2	2·5	11·2	5·3	17·2	8·2
53	7 13·3	7 14·4	6 53·5	5·3	2·5	11·3	5·4	17·3	8·2
54	7 13·5	7 14·7	6 53·8	5·4	2·6	11·4	5·4	17·4	8·3
55	7 13·8	7 14·9	6 54·0	5·5	2·6	11·5	5·5	17·5	8·3
56	7 14·0	7 15·2	6 54·2	5·6	2·7	11·6	5·5	17·6	8·4
57	7 14·3	7 15·4	6 54·5	5·7	2·7	11·7	5·6	17·7	8·4
58	7 14·5	7 15·7	6 54·7	5·8	2·8	11·8	5·6	17·8	8·5
59	7 14·8	7 15·9	6 54·9	5·9	2·8	11·9	5·7	17·9	8·5
60	7 15·0	7 16·2	6 55·2	6·0	2·9	12·0	5·7	18·0	8·6

29m	SUN PLANETS	ARIES	MOON	v or d	Corrn	v or d	Corrn	v or d	Corrn
s	° ′	° ′	° ′	′	′	′	′	′	′
00	7 15·0	7 16·2	6 55·2	0·0	0·0	6·0	3·0	12·0	5·9
01	7 15·3	7 16·4	6 55·4	0·1	0·0	6·1	3·0	12·1	5·9
02	7 15·5	7 16·7	6 55·7	0·2	0·1	6·2	3·0	12·2	6·0
03	7 15·8	7 16·9	6 55·9	0·3	0·1	6·3	3·1	12·3	6·0
04	7 16·0	7 17·2	6 56·1	0·4	0·2	6·4	3·1	12·4	6·1
05	7 16·3	7 17·4	6 56·4	0·5	0·2	6·5	3·2	12·5	6·1
06	7 16·5	7 17·7	6 56·6	0·6	0·3	6·6	3·2	12·6	6·2
07	7 16·8	7 17·9	6 56·9	0·7	0·3	6·7	3·3	12·7	6·2
08	7 17·0	7 18·2	6 57·1	0·8	0·4	6·8	3·3	12·8	6·3
09	7 17·3	7 18·4	6 57·3	0·9	0·4	6·9	3·4	12·9	6·3
10	7 17·5	7 18·7	6 57·6	1·0	0·5	7·0	3·4	13·0	6·4
11	7 17·8	7 18·9	6 57·8	1·1	0·5	7·1	3·5	13·1	6·4
12	7 18·0	7 19·2	6 58·0	1·2	0·6	7·2	3·5	13·2	6·5
13	7 18·3	7 19·4	6 58·3	1·3	0·6	7·3	3·6	13·3	6·5
14	7 18·5	7 19·7	6 58·5	1·4	0·7	7·4	3·6	13·4	6·6
15	7 18·8	7 20·0	6 58·8	1·5	0·7	7·5	3·7	13·5	6·6
16	7 19·0	7 20·2	6 59·0	1·6	0·8	7·6	3·7	13·6	6·7
17	7 19·3	7 20·5	6 59·2	1·7	0·8	7·7	3·8	13·7	6·7
18	7 19·5	7 20·7	6 59·5	1·8	0·9	7·8	3·8	13·8	6·8
19	7 19·8	7 21·0	6 59·7	1·9	0·9	7·9	3·9	13·9	6·8
20	7 20·0	7 21·2	7 00·0	2·0	1·0	8·0	3·9	14·0	6·9
21	7 20·3	7 21·5	7 00·2	2·1	1·0	8·1	4·0	14·1	6·9
22	7 20·5	7 21·7	7 00·4	2·2	1·1	8·2	4·0	14·2	7·0
23	7 20·8	7 22·0	7 00·7	2·3	1·1	8·3	4·1	14·3	7·0
24	7 21·0	7 22·2	7 00·9	2·4	1·2	8·4	4·1	14·4	7·1
25	7 21·3	7 22·5	7 01·1	2·5	1·2	8·5	4·2	14·5	7·1
26	7 21·5	7 22·7	7 01·4	2·6	1·3	8·6	4·2	14·6	7·2
27	7 21·8	7 23·0	7 01·6	2·7	1·3	8·7	4·3	14·7	7·2
28	7 22·0	7 23·2	7 01·9	2·8	1·4	8·8	4·3	14·8	7·3
29	7 22·3	7 23·5	7 02·1	2·9	1·4	8·9	4·4	14·9	7·3
30	7 22·5	7 23·7	7 02·3	3·0	1·5	9·0	4·4	15·0	7·4
31	7 22·8	7 24·0	7 02·6	3·1	1·5	9·1	4·5	15·1	7·4
32	7 23·0	7 24·2	7 02·8	3·2	1·6	9·2	4·5	15·2	7·5
33	7 23·3	7 24·5	7 03·1	3·3	1·6	9·3	4·6	15·3	7·5
34	7 23·5	7 24·7	7 03·3	3·4	1·7	9·4	4·6	15·4	7·6
35	7 23·8	7 25·0	7 03·5	3·5	1·7	9·5	4·7	15·5	7·6
36	7 24·0	7 25·2	7 03·8	3·6	1·8	9·6	4·7	15·6	7·7
37	7 24·3	7 25·5	7 04·0	3·7	1·8	9·7	4·8	15·7	7·7
38	7 24·5	7 25·7	7 04·3	3·8	1·9	9·8	4·8	15·8	7·8
39	7 24·8	7 26·0	7 04·5	3·9	1·9	9·9	4·9	15·9	7·8
40	7 25·0	7 26·2	7 04·7	4·0	2·0	10·0	4·9	16·0	7·9
41	7 25·3	7 26·5	7 05·0	4·1	2·0	10·1	5·0	16·1	7·9
42	7 25·5	7 26·7	7 05·2	4·2	2·1	10·2	5·0	16·2	8·0
43	7 25·8	7 27·0	7 05·4	4·3	2·1	10·3	5·1	16·3	8·0
44	7 26·0	7 27·2	7 05·7	4·4	2·2	10·4	5·1	16·4	8·1
45	7 26·3	7 27·5	7 05·9	4·5	2·2	10·5	5·2	16·5	8·1
46	7 26·5	7 27·7	7 06·2	4·6	2·3	10·6	5·2	16·6	8·2
47	7 26·8	7 28·0	7 06·4	4·7	2·3	10·7	5·3	16·7	8·2
48	7 27·0	7 28·2	7 06·6	4·8	2·4	10·8	5·3	16·8	8·3
49	7 27·3	7 28·5	7 06·9	4·9	2·4	10·9	5·4	16·9	8·3
50	7 27·5	7 28·7	7 07·1	5·0	2·5	11·0	5·4	17·0	8·4
51	7 27·8	7 29·0	7 07·4	5·1	2·5	11·1	5·5	17·1	8·4
52	7 28·0	7 29·2	7 07·6	5·2	2·6	11·2	5·5	17·2	8·5
53	7 28·3	7 29·5	7 07·8	5·3	2·6	11·3	5·6	17·3	8·5
54	7 28·5	7 29·7	7 08·1	5·4	2·7	11·4	5·6	17·4	8·6
55	7 28·8	7 30·0	7 08·3	5·5	2·7	11·5	5·7	17·5	8·6
56	7 29·0	7 30·2	7 08·5	5·6	2·8	11·6	5·7	17·6	8·7
57	7 29·3	7 30·5	7 08·8	5·7	2·8	11·7	5·8	17·7	8·7
58	7 29·5	7 30·7	7 09·0	5·8	2·9	11·8	5·8	17·8	8·8
59	7 29·8	7 31·0	7 09·3	5·9	2·9	11·9	5·9	17·9	8·8
60	7 30·0	7 31·2	7 09·5	6·0	3·0	12·0	5·9	18·0	8·9

30m	SUN PLANETS	ARIES	MOON	v or d	Corrn	v or d	Corrn	v or d	Corrn
s	° ′	° ′	° ′	′	′	′	′	′	′
00	7 30·0	7 31·2	7 09·5	0·0	0·0	6·0	3·1	12·0	6·1
01	7 30·3	7 31·5	7 09·7	0·1	0·1	6·1	3·1	12·1	6·2
02	7 30·5	7 31·7	7 10·0	0·2	0·1	6·2	3·2	12·2	6·2
03	7 30·8	7 32·0	7 10·2	0·3	0·2	6·3	3·2	12·3	6·3
04	7 31·0	7 32·2	7 10·5	0·4	0·2	6·4	3·3	12·4	6·3
05	7 31·3	7 32·5	7 10·7	0·5	0·3	6·5	3·3	12·5	6·4
06	7 31·5	7 32·7	7 10·9	0·6	0·3	6·6	3·4	12·6	6·4
07	7 31·8	7 33·0	7 11·2	0·7	0·4	6·7	3·4	12·7	6·5
08	7 32·0	7 33·2	7 11·4	0·8	0·4	6·8	3·5	12·8	6·5
09	7 32·3	7 33·5	7 11·6	0·9	0·5	6·9	3·5	12·9	6·6
10	7 32·5	7 33·7	7 11·9	1·0	0·5	7·0	3·6	13·0	6·6
11	7 32·8	7 34·0	7 12·1	1·1	0·6	7·1	3·6	13·1	6·7
12	7 33·0	7 34·2	7 12·4	1·2	0·6	7·2	3·7	13·2	6·7
13	7 33·3	7 34·5	7 12·6	1·3	0·7	7·3	3·7	13·3	6·8
14	7 33·5	7 34·7	7 12·8	1·4	0·7	7·4	3·8	13·4	6·8
15	7 33·8	7 35·0	7 13·1	1·5	0·8	7·5	3·8	13·5	6·9
16	7 34·0	7 35·2	7 13·3	1·6	0·8	7·6	3·9	13·6	6·9
17	7 34·3	7 35·5	7 13·6	1·7	0·9	7·7	3·9	13·7	7·0
18	7 34·5	7 35·7	7 13·8	1·8	0·9	7·8	4·0	13·8	7·0
19	7 34·8	7 36·0	7 14·0	1·9	1·0	7·9	4·0	13·9	7·1
20	7 35·0	7 36·2	7 14·3	2·0	1·0	8·0	4·1	14·0	7·1
21	7 35·3	7 36·5	7 14·5	2·1	1·1	8·1	4·1	14·1	7·2
22	7 35·5	7 36·7	7 14·7	2·2	1·1	8·2	4·2	14·2	7·2
23	7 35·8	7 37·0	7 15·0	2·3	1·2	8·3	4·2	14·3	7·3
24	7 36·0	7 37·2	7 15·2	2·4	1·2	8·4	4·3	14·4	7·3
25	7 36·3	7 37·5	7 15·5	2·5	1·3	8·5	4·3	14·5	7·4
26	7 36·5	7 37·7	7 15·7	2·6	1·3	8·6	4·4	14·6	7·4
27	7 36·8	7 38·0	7 15·9	2·7	1·4	8·7	4·4	14·7	7·5
28	7 37·0	7 38·3	7 16·2	2·8	1·4	8·8	4·5	14·8	7·5
29	7 37·3	7 38·5	7 16·4	2·9	1·5	8·9	4·5	14·9	7·6
30	7 37·5	7 38·8	7 16·7	3·0	1·5	9·0	4·6	15·0	7·6
31	7 37·8	7 39·0	7 16·9	3·1	1·6	9·1	4·6	15·1	7·7
32	7 38·0	7 39·3	7 17·1	3·2	1·6	9·2	4·7	15·2	7·7
33	7 38·3	7 39·5	7 17·4	3·3	1·7	9·3	4·7	15·3	7·8
34	7 38·5	7 39·8	7 17·6	3·4	1·7	9·4	4·8	15·4	7·8
35	7 38·8	7 40·0	7 17·9	3·5	1·8	9·5	4·8	15·5	7·9
36	7 39·0	7 40·3	7 18·1	3·6	1·8	9·6	4·9	15·6	7·9
37	7 39·3	7 40·5	7 18·3	3·7	1·9	9·7	4·9	15·7	8·0
38	7 39·5	7 40·8	7 18·6	3·8	1·9	9·8	5·0	15·8	8·0
39	7 39·8	7 41·0	7 18·8	3·9	2·0	9·9	5·0	15·9	8·1
40	7 40·0	7 41·3	7 19·0	4·0	2·0	10·0	5·1	16·0	8·1
41	7 40·3	7 41·5	7 19·3	4·1	2·1	10·1	5·1	16·1	8·2
42	7 40·5	7 41·8	7 19·5	4·2	2·1	10·2	5·2	16·2	8·2
43	7 40·8	7 42·0	7 19·8	4·3	2·2	10·3	5·2	16·3	8·3
44	7 41·0	7 42·3	7 20·0	4·4	2·2	10·4	5·3	16·4	8·3
45	7 41·3	7 42·5	7 20·2	4·5	2·3	10·5	5·3	16·5	8·4
46	7 41·5	7 42·8	7 20·5	4·6	2·3	10·6	5·4	16·6	8·4
47	7 41·8	7 43·0	7 20·7	4·7	2·4	10·7	5·4	16·7	8·5
48	7 42·0	7 43·3	7 21·0	4·8	2·4	10·8	5·5	16·8	8·5
49	7 42·3	7 43·5	7 21·2	4·9	2·5	10·9	5·5	16·9	8·6
50	7 42·5	7 43·8	7 21·4	5·0	2·5	11·0	5·6	17·0	8·6
51	7 42·8	7 44·0	7 21·7	5·1	2·6	11·1	5·6	17·1	8·7
52	7 43·0	7 44·3	7 21·9	5·2	2·6	11·2	5·7	17·2	8·7
53	7 43·3	7 44·5	7 22·1	5·3	2·7	11·3	5·7	17·3	8·8
54	7 43·5	7 44·8	7 22·4	5·4	2·7	11·4	5·8	17·4	8·8
55	7 43·8	7 45·0	7 22·6	5·5	2·8	11·5	5·8	17·5	8·9
56	7 44·0	7 45·3	7 22·9	5·6	2·8	11·6	5·9	17·6	8·9
57	7 44·3	7 45·5	7 23·1	5·7	2·9	11·7	5·9	17·7	9·0
58	7 44·5	7 45·8	7 23·3	5·8	2·9	11·8	6·0	17·8	9·0
59	7 44·8	7 46·0	7 23·6	5·9	3·0	11·9	6·0	17·9	9·1
60	7 45·0	7 46·3	7 23·8	6·0	3·1	12·0	6·1	18·0	9·2

31m	SUN PLANETS	ARIES	MOON	v or d	Corrn	v or d	Corrn	v or d	Corrn
s	° ′	° ′	° ′	′	′	′	′	′	′
00	7 45·0	7 46·3	7 23·8	0·0	0·0	6·0	3·2	12·0	6·3
01	7 45·3	7 46·5	7 24·1	0·1	0·1	6·1	3·2	12·1	6·4
02	7 45·5	7 46·8	7 24·3	0·2	0·1	6·2	3·3	12·2	6·4
03	7 45·8	7 47·0	7 24·5	0·3	0·2	6·3	3·3	12·3	6·5
04	7 46·0	7 47·3	7 24·8	0·4	0·2	6·4	3·4	12·4	6·5
05	7 46·3	7 47·5	7 25·0	0·5	0·3	6·5	3·4	12·5	6·6
06	7 46·5	7 47·8	7 25·2	0·6	0·3	6·6	3·5	12·6	6·6
07	7 46·8	7 48·0	7 25·5	0·7	0·4	6·7	3·5	12·7	6·7
08	7 47·0	7 48·3	7 25·7	0·8	0·4	6·8	3·6	12·8	6·7
09	7 47·3	7 48·5	7 26·0	0·9	0·5	6·9	3·6	12·9	6·8
10	7 47·5	7 48·8	7 26·2	1·0	0·5	7·0	3·7	13·0	6·8
11	7 47·8	7 49·0	7 26·4	1·1	0·6	7·1	3·7	13·1	6·9
12	7 48·0	7 49·3	7 26·7	1·2	0·6	7·2	3·8	13·2	6·9
13	7 48·3	7 49·5	7 26·9	1·3	0·7	7·3	3·8	13·3	7·0
14	7 48·5	7 49·8	7 27·2	1·4	0·7	7·4	3·9	13·4	7·0
15	7 48·8	7 50·0	7 27·4	1·5	0·8	7·5	3·9	13·5	7·1
16	7 49·0	7 50·3	7 27·6	1·6	0·8	7·6	4·0	13·6	7·1
17	7 49·3	7 50·5	7 27·9	1·7	0·9	7·7	4·0	13·7	7·2
18	7 49·5	7 50·8	7 28·1	1·8	0·9	7·8	4·1	13·8	7·2
19	7 49·8	7 51·0	7 28·4	1·9	1·0	7·9	4·1	13·9	7·3
20	7 50·0	7 51·3	7 28·6	2·0	1·1	8·0	4·2	14·0	7·4
21	7 50·3	7 51·5	7 28·8	2·1	1·1	8·1	4·3	14·1	7·4
22	7 50·5	7 51·8	7 29·1	2·2	1·2	8·2	4·3	14·2	7·5
23	7 50·8	7 52·0	7 29·3	2·3	1·2	8·3	4·4	14·3	7·5
24	7 51·0	7 52·3	7 29·5	2·4	1·3	8·4	4·4	14·4	7·6
25	7 51·3	7 52·5	7 29·8	2·5	1·3	8·5	4·5	14·5	7·6
26	7 51·5	7 52·8	7 30·0	2·6	1·4	8·6	4·5	14·6	7·7
27	7 51·8	7 53·0	7 30·3	2·7	1·4	8·7	4·6	14·7	7·7
28	7 52·0	7 53·3	7 30·5	2·8	1·5	8·8	4·6	14·8	7·8
29	7 52·3	7 53·5	7 30·7	2·9	1·5	8·9	4·7	14·9	7·8
30	7 52·5	7 53·8	7 31·0	3·0	1·6	9·0	4·7	15·0	7·9
31	7 52·8	7 54·0	7 31·2	3·1	1·6	9·1	4·8	15·1	7·9
32	7 53·0	7 54·3	7 31·5	3·2	1·7	9·2	4·8	15·2	8·0
33	7 53·3	7 54·5	7 31·7	3·3	1·7	9·3	4·9	15·3	8·0
34	7 53·5	7 54·8	7 31·9	3·4	1·8	9·4	4·9	15·4	8·1
35	7 53·8	7 55·0	7 32·2	3·5	1·8	9·5	5·0	15·5	8·1
36	7 54·0	7 55·3	7 32·4	3·6	1·9	9·6	5·0	15·6	8·2
37	7 54·3	7 55·5	7 32·6	3·7	1·9	9·7	5·1	15·7	8·2
38	7 54·5	7 55·8	7 32·9	3·8	2·0	9·8	5·1	15·8	8·3
39	7 54·8	7 56·0	7 33·1	3·9	2·0	9·9	5·2	15·9	8·3
40	7 55·0	7 56·3	7 33·4	4·0	2·1	10·0	5·3	16·0	8·4
41	7 55·3	7 56·6	7 33·6	4·1	2·2	10·1	5·3	16·1	8·5
42	7 55·5	7 56·8	7 33·8	4·2	2·2	10·2	5·4	16·2	8·5
43	7 55·8	7 57·1	7 34·1	4·3	2·3	10·3	5·4	16·3	8·6
44	7 56·0	7 57·3	7 34·3	4·4	2·3	10·4	5·5	16·4	8·6
45	7 56·3	7 57·6	7 34·6	4·5	2·4	10·5	5·5	16·5	8·7
46	7 56·5	7 57·8	7 34·8	4·6	2·4	10·6	5·6	16·6	8·7
47	7 56·8	7 58·1	7 35·0	4·7	2·5	10·7	5·6	16·7	8·8
48	7 57·0	7 58·3	7 35·3	4·8	2·5	10·8	5·7	16·8	8·8
49	7 57·3	7 58·6	7 35·5	4·9	2·6	10·9	5·7	16·9	8·9
50	7 57·5	7 58·8	7 35·7	5·0	2·6	11·0	5·8	17·0	8·9
51	7 57·8	7 59·1	7 36·0	5·1	2·7	11·1	5·8	17·1	9·0
52	7 58·0	7 59·3	7 36·2	5·2	2·7	11·2	5·9	17·2	9·0
53	7 58·3	7 59·6	7 36·5	5·3	2·8	11·3	5·9	17·3	9·1
54	7 58·5	7 59·8	7 36·7	5·4	2·8	11·4	6·0	17·4	9·1
55	7 58·8	8 00·1	7 36·9	5·5	2·9	11·5	6·0	17·5	9·2
56	7 59·0	8 00·3	7 37·2	5·6	2·9	11·6	6·1	17·6	9·2
57	7 59·3	8 00·6	7 37·4	5·7	3·0	11·7	6·1	17·7	9·3
58	7 59·5	8 00·8	7 37·7	5·8	3·0	11·8	6·2	17·8	9·3
59	7 59·8	8 01·1	7 37·9	5·9	3·1	11·9	6·2	17·9	9·4
60	8 00·0	8 01·3	7 38·1	6·0	3·2	12·0	6·3	18·0	9·5

32m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	8 00·0	8 01·3	7 38·1	0·0	0·0	6·0	3·3	12·0	6·5
01	8 00·3	8 01·6	7 38·4	0·1	0·1	6·1	3·3	12·1	6·6
02	8 00·5	8 01·8	7 38·6	0·2	0·1	6·2	3·4	12·2	6·6
03	8 00·8	8 02·1	7 38·8	0·3	0·2	6·3	3·4	12·3	6·7
04	8 01·0	8 02·3	7 39·1	0·4	0·2	6·4	3·5	12·4	6·7
05	8 01·3	8 02·6	7 39·3	0·5	0·3	6·5	3·5	12·5	6·8
06	8 01·5	8 02·8	7 39·6	0·6	0·3	6·6	3·6	12·6	6·8
07	8 01·8	8 03·1	7 39·8	0·7	0·4	6·7	3·6	12·7	6·9
08	8 02·0	8 03·3	7 40·0	0·8	0·4	6·8	3·7	12·8	6·9
09	8 02·3	8 03·6	7 40·3	0·9	0·5	6·9	3·7	12·9	7·0
10	8 02·5	8 03·8	7 40·5	1·0	0·5	7·0	3·8	13·0	7·0
11	8 02·8	8 04·1	7 40·8	1·1	0·6	7·1	3·8	13·1	7·1
12	8 03·0	8 04·3	7 41·0	1·2	0·7	7·2	3·9	13·2	7·2
13	8 03·3	8 04·6	7 41·2	1·3	0·7	7·3	4·0	13·3	7·2
14	8 03·5	8 04·8	7 41·5	1·4	0·8	7·4	4·0	13·4	7·3
15	8 03·8	8 05·1	7 41·7	1·5	0·8	7·5	4·1	13·5	7·3
16	8 04·0	8 05·3	7 42·0	1·6	0·9	7·6	4·1	13·6	7·4
17	8 04·3	8 05·6	7 42·2	1·7	0·9	7·7	4·2	13·7	7·4
18	8 04·5	8 05·8	7 42·4	1·8	1·0	7·8	4·2	13·8	7·5
19	8 04·8	8 06·1	7 42·7	1·9	1·0	7·9	4·3	13·9	7·5
20	8 05·0	8 06·3	7 42·9	2·0	1·1	8·0	4·3	14·0	7·6
21	8 05·3	8 06·6	7 43·1	2·1	1·1	8·1	4·4	14·1	7·6
22	8 05·5	8 06·8	7 43·4	2·2	1·2	8·2	4·4	14·2	7·7
23	8 05·8	8 07·1	7 43·6	2·3	1·2	8·3	4·5	14·3	7·7
24	8 06·0	8 07·3	7 43·9	2·4	1·3	8·4	4·6	14·4	7·8
25	8 06·3	8 07·6	7 44·1	2·5	1·4	8·5	4·6	14·5	7·9
26	8 06·5	8 07·8	7 44·3	2·6	1·4	8·6	4·7	14·6	7·9
27	8 06·8	8 08·1	7 44·6	2·7	1·5	8·7	4·7	14·7	8·0
28	8 07·0	8 08·3	7 44·8	2·8	1·5	8·8	4·8	14·8	8·0
29	8 07·3	8 08·6	7 45·1	2·9	1·6	8·9	4·8	14·9	8·1
30	8 07·5	8 08·8	7 45·3	3·0	1·6	9·0	4·9	15·0	8·1
31	8 07·8	8 09·1	7 45·5	3·1	1·7	9·1	4·9	15·1	8·2
32	8 08·0	8 09·3	7 45·8	3·2	1·7	9·2	5·0	15·2	8·2
33	8 08·3	8 09·6	7 46·0	3·3	1·8	9·3	5·0	15·3	8·3
34	8 08·5	8 09·8	7 46·2	3·4	1·8	9·4	5·1	15·4	8·3
35	8 08·8	8 10·1	7 46·5	3·5	1·9	9·5	5·1	15·5	8·4
36	8 09·0	8 10·3	7 46·7	3·6	2·0	9·6	5·2	15·6	8·5
37	8 09·3	8 10·6	7 47·0	3·7	2·0	9·7	5·3	15·7	8·5
38	8 09·5	8 10·8	7 47·2	3·8	2·1	9·8	5·3	15·8	8·6
39	8 09·8	8 11·1	7 47·4	3·9	2·1	9·9	5·4	15·9	8·6
40	8 10·0	8 11·3	7 47·7	4·0	2·2	10·0	5·4	16·0	8·7
41	8 10·3	8 11·6	7 47·9	4·1	2·2	10·1	5·5	16·1	8·7
42	8 10·5	8 11·8	7 48·2	4·2	2·3	10·2	5·5	16·2	8·8
43	8 10·8	8 12·1	7 48·4	4·3	2·3	10·3	5·6	16·3	8·8
44	8 11·0	8 12·3	7 48·6	4·4	2·4	10·4	5·6	16·4	8·9
45	8 11·3	8 12·6	7 48·9	4·5	2·4	10·5	5·7	16·5	8·9
46	8 11·5	8 12·8	7 49·1	4·6	2·5	10·6	5·7	16·6	9·0
47	8 11·8	8 13·1	7 49·3	4·7	2·5	10·7	5·8	16·7	9·0
48	8 12·0	8 13·3	7 49·6	4·8	2·6	10·8	5·9	16·8	9·1
49	8 12·3	8 13·6	7 49·8	4·9	2·7	10·9	5·9	16·9	9·2
50	8 12·5	8 13·8	7 50·1	5·0	2·7	11·0	6·0	17·0	9·2
51	8 12·8	8 14·1	7 50·3	5·1	2·8	11·1	6·0	17·1	9·3
52	8 13·0	8 14·3	7 50·5	5·2	2·8	11·2	6·1	17·2	9·3
53	8 13·3	8 14·6	7 50·8	5·3	2·9	11·3	6·1	17·3	9·4
54	8 13·5	8 14·9	7 51·0	5·4	2·9	11·4	6·2	17·4	9·4
55	8 13·8	8 15·1	7 51·3	5·5	3·0	11·5	6·2	17·5	9·5
56	8 14·0	8 15·4	7 51·5	5·6	3·0	11·6	6·3	17·6	9·5
57	8 14·3	8 15·6	7 51·7	5·7	3·1	11·7	6·3	17·7	9·6
58	8 14·5	8 15·9	7 52·0	5·8	3·1	11·8	6·4	17·8	9·6
59	8 14·8	8 16·1	7 52·2	5·9	3·2	11·9	6·4	17·9	9·7
60	8 15·0	8 16·4	7 52·5	6·0	3·3	12·0	6·5	18·0	9·8

33m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	8 15·0	8 16·4	7 52·5	0·0	0·0	6·0	3·4	12·0	6·7
01	8 15·3	8 16·6	7 52·7	0·1	0·1	6·1	3·4	12·1	6·8
02	8 15·5	8 16·9	7 52·9	0·2	0·1	6·2	3·5	12·2	6·8
03	8 15·8	8 17·1	7 53·2	0·3	0·2	6·3	3·5	12·3	6·9
04	8 16·0	8 17·4	7 53·4	0·4	0·2	6·4	3·6	12·4	6·9
05	8 16·3	8 17·6	7 53·6	0·5	0·3	6·5	3·6	12·5	7·0
06	8 16·5	8 17·9	7 53·9	0·6	0·3	6·6	3·7	12·6	7·0
07	8 16·8	8 18·1	7 54·1	0·7	0·4	6·7	3·7	12·7	7·1
08	8 17·0	8 18·4	7 54·4	0·8	0·4	6·8	3·8	12·8	7·1
09	8 17·3	8 18·6	7 54·6	0·9	0·5	6·9	3·9	12·9	7·2
10	8 17·5	8 18·9	7 54·8	1·0	0·6	7·0	3·9	13·0	7·3
11	8 17·8	8 19·1	7 55·1	1·1	0·6	7·1	4·0	13·1	7·3
12	8 18·0	8 19·4	7 55·3	1·2	0·7	7·2	4·0	13·2	7·4
13	8 18·3	8 19·6	7 55·6	1·3	0·7	7·3	4·1	13·3	7·4
14	8 18·5	8 19·9	7 55·8	1·4	0·8	7·4	4·1	13·4	7·5
15	8 18·8	8 20·1	7 56·0	1·5	0·8	7·5	4·2	13·5	7·5
16	8 19·0	8 20·4	7 56·3	1·6	0·9	7·6	4·2	13·6	7·6
17	8 19·3	8 20·6	7 56·5	1·7	0·9	7·7	4·3	13·7	7·6
18	8 19·5	8 20·9	7 56·7	1·8	1·0	7·8	4·4	13·8	7·7
19	8 19·8	8 21·1	7 57·0	1·9	1·1	7·9	4·4	13·9	7·8
20	8 20·0	8 21·4	7 57·2	2·0	1·1	8·0	4·5	14·0	7·8
21	8 20·3	8 21·6	7 57·5	2·1	1·2	8·1	4·5	14·1	7·9
22	8 20·5	8 21·9	7 57·7	2·2	1·2	8·2	4·6	14·2	7·9
23	8 20·8	8 22·1	7 57·9	2·3	1·3	8·3	4·6	14·3	8·0
24	8 21·0	8 22·4	7 58·2	2·4	1·3	8·4	4·7	14·4	8·0
25	8 21·3	8 22·6	7 58·4	2·5	1·4	8·5	4·7	14·5	8·1
26	8 21·5	8 22·9	7 58·7	2·6	1·5	8·6	4·8	14·6	8·2
27	8 21·8	8 23·1	7 58·9	2·7	1·5	8·7	4·9	14·7	8·2
28	8 22·0	8 23·4	7 59·1	2·8	1·6	8·8	4·9	14·8	8·3
29	8 22·3	8 23·6	7 59·4	2·9	1·6	8·9	5·0	14·9	8·3
30	8 22·5	8 23·9	7 59·6	3·0	1·7	9·0	5·0	15·0	8·4
31	8 22·8	8 24·1	7 59·8	3·1	1·7	9·1	5·1	15·1	8·4
32	8 23·0	8 24·4	8 00·1	3·2	1·8	9·2	5·1	15·2	8·5
33	8 23·3	8 24·6	8 00·3	3·3	1·8	9·3	5·2	15·3	8·5
34	8 23·5	8 24·9	8 00·6	3·4	1·9	9·4	5·2	15·4	8·6
35	8 23·8	8 25·1	8 00·8	3·5	2·0	9·5	5·3	15·5	8·7
36	8 24·0	8 25·4	8 01·0	3·6	2·0	9·6	5·4	15·6	8·7
37	8 24·3	8 25·6	8 01·3	3·7	2·1	9·7	5·4	15·7	8·8
38	8 24·5	8 25·9	8 01·5	3·8	2·1	9·8	5·5	15·8	8·8
39	8 24·8	8 26·1	8 01·8	3·9	2·2	9·9	5·5	15·9	8·9
40	8 25·0	8 26·4	8 02·0	4·0	2·2	10·0	5·6	16·0	8·9
41	8 25·3	8 26·6	8 02·2	4·1	2·3	10·1	5·6	16·1	9·0
42	8 25·5	8 26·9	8 02·5	4·2	2·3	10·2	5·7	16·2	9·0
43	8 25·8	8 27·1	8 02·7	4·3	2·4	10·3	5·8	16·3	9·1
44	8 26·0	8 27·4	8 02·9	4·4	2·5	10·4	5·8	16·4	9·2
45	8 26·3	8 27·6	8 03·2	4·5	2·5	10·5	5·9	16·5	9·2
46	8 26·5	8 27·9	8 03·4	4·6	2·6	10·6	5·9	16·6	9·3
47	8 26·8	8 28·1	8 03·7	4·7	2·6	10·7	6·0	16·7	9·3
48	8 27·0	8 28·4	8 03·9	4·8	2·7	10·8	6·0	16·8	9·4
49	8 27·3	8 28·6	8 04·1	4·9	2·7	10·9	6·1	16·9	9·4
50	8 27·5	8 28·9	8 04·4	5·0	2·8	11·0	6·1	17·0	9·5
51	8 27·8	8 29·1	8 04·6	5·1	2·8	11·1	6·2	17·1	9·5
52	8 28·0	8 29·4	8 04·9	5·2	2·9	11·2	6·3	17·2	9·6
53	8 28·3	8 29·6	8 05·1	5·3	3·0	11·3	6·3	17·3	9·7
54	8 28·5	8 29·9	8 05·3	5·4	3·0	11·4	6·4	17·4	9·7
55	8 28·8	8 30·1	8 05·6	5·5	3·1	11·5	6·4	17·5	9·8
56	8 29·0	8 30·4	8 05·8	5·6	3·1	11·6	6·5	17·6	9·8
57	8 29·3	8 30·6	8 06·1	5·7	3·2	11·7	6·5	17·7	9·9
58	8 29·5	8 30·9	8 06·3	5·8	3·2	11·8	6·6	17·8	9·9
59	8 29·8	8 31·1	8 06·5	5·9	3·3	11·9	6·6	17·9	10·0
60	8 30·0	8 31·4	8 06·8	6·0	3·4	12·0	6·7	18·0	10·1

34m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or Corrn d ′	′	v or Corrn d ′	′	v or Corrn d ′	′
00	8 30·0	8 31·4	8 06·8	0·0	0·0	6·0	3·5	12·0	6·9
01	8 30·3	8 31·6	8 07·0	0·1	0·1	6·1	3·5	12·1	7·0
02	8 30·5	8 31·9	8 07·2	0·2	0·1	6·2	3·6	12·2	7·0
03	8 30·8	8 32·1	8 07·5	0·3	0·2	6·3	3·6	12·3	7·1
04	8 31·0	8 32·4	8 07·7	0·4	0·2	6·4	3·7	12·4	7·1
05	8 31·3	8 32·6	8 08·0	0·5	0·3	6·5	3·7	12·5	7·2
06	8 31·5	8 32·9	8 08·2	0·6	0·3	6·6	3·8	12·6	7·2
07	8 31·8	8 33·2	8 08·4	0·7	0·4	6·7	3·9	12·7	7·3
08	8 32·0	8 33·4	8 08·7	0·8	0·5	6·8	3·9	12·8	7·4
09	8 32·3	8 33·7	8 08·9	0·9	0·5	6·9	4·0	12·9	7·4
10	8 32·5	8 33·9	8 09·2	1·0	0·6	7·0	4·0	13·0	7·5
11	8 32·8	8 34·2	8 09·4	1·1	0·6	7·1	4·1	13·1	7·5
12	8 33·0	8 34·4	8 09·6	1·2	0·7	7·2	4·1	13·2	7·6
13	8 33·3	8 34·7	8 09·9	1·3	0·7	7·3	4·2	13·3	7·6
14	8 33·5	8 34·9	8 10·1	1·4	0·8	7·4	4·3	13·4	7·7
15	8 33·8	8 35·2	8 10·3	1·5	0·9	7·5	4·3	13·5	7·8
16	8 34·0	8 35·4	8 10·6	1·6	0·9	7·6	4·4	13·6	7·8
17	8 34·3	8 35·7	8 10·8	1·7	1·0	7·7	4·4	13·7	7·9
18	8 34·5	8 35·9	8 11·1	1·8	1·0	7·8	4·5	13·8	7·9
19	8 34·8	8 36·2	8 11·3	1·9	1·1	7·9	4·5	13·9	8·0
20	8 35·0	8 36·4	8 11·5	2·0	1·2	8·0	4·6	14·0	8·1
21	8 35·3	8 36·7	8 11·8	2·1	1·2	8·1	4·7	14·1	8·1
22	8 35·5	8 36·9	8 12·0	2·2	1·3	8·2	4·7	14·2	8·2
23	8 35·8	8 37·2	8 12·3	2·3	1·3	8·3	4·8	14·3	8·2
24	8 36·0	8 37·4	8 12·5	2·4	1·4	8·4	4·8	14·4	8·3
25	8 36·3	8 37·7	8 12·7	2·5	1·4	8·5	4·9	14·5	8·3
26	8 36·5	8 37·9	8 13·0	2·6	1·5	8·6	4·9	14·6	8·4
27	8 36·8	8 38·2	8 13·2	2·7	1·6	8·7	5·0	14·7	8·5
28	8 37·0	8 38·4	8 13·4	2·8	1·6	8·8	5·1	14·8	8·5
29	8 37·3	8 38·7	8 13·7	2·9	1·7	8·9	5·1	14·9	8·6
30	8 37·5	8 38·9	8 13·9	3·0	1·7	9·0	5·2	15·0	8·6
31	8 37·8	8 39·2	8 14·2	3·1	1·8	9·1	5·2	15·1	8·7
32	8 38·0	8 39·4	8 14·4	3·2	1·8	9·2	5·3	15·2	8·7
33	8 38·3	8 39·7	8 14·6	3·3	1·9	9·3	5·3	15·3	8·8
34	8 38·5	8 39·9	8 14·9	3·4	2·0	9·4	5·4	15·4	8·9
35	8 38·8	8 40·2	8 15·1	3·5	2·0	9·5	5·5	15·5	8·9
36	8 39·0	8 40·4	8 15·4	3·6	2·1	9·6	5·5	15·6	9·0
37	8 39·3	8 40·7	8 15·6	3·7	2·1	9·7	5·6	15·7	9·0
38	8 39·5	8 40·9	8 15·8	3·8	2·2	9·8	5·6	15·8	9·1
39	8 39·8	8 41·2	8 16·1	3·9	2·2	9·9	5·7	15·9	9·1
40	8 40·0	8 41·4	8 16·3	4·0	2·3	10·0	5·8	16·0	9·2
41	8 40·3	8 41·7	8 16·5	4·1	2·4	10·1	5·8	16·1	9·3
42	8 40·5	8 41·9	8 16·8	4·2	2·4	10·2	5·9	16·2	9·3
43	8 40·8	8 42·2	8 17·0	4·3	2·5	10·3	5·9	16·3	9·4
44	8 41·0	8 42·4	8 17·3	4·4	2·5	10·4	6·0	16·4	9·4
45	8 41·3	8 42·7	8 17·5	4·5	2·6	10·5	6·0	16·5	9·5
46	8 41·5	8 42·9	8 17·7	4·6	2·6	10·6	6·1	16·6	9·5
47	8 41·8	8 43·2	8 18·0	4·7	2·7	10·7	6·2	16·7	9·6
48	8 42·0	8 43·4	8 18·2	4·8	2·8	10·8	6·2	16·8	9·7
49	8 42·3	8 43·7	8 18·5	4·9	2·8	10·9	6·3	16·9	9·7
50	8 42·5	8 43·9	8 18·7	5·0	2·9	11·0	6·3	17·0	9·8
51	8 42·8	8 44·2	8 18·9	5·1	2·9	11·1	6·4	17·1	9·8
52	8 43·0	8 44·4	8 19·2	5·2	3·0	11·2	6·4	17·2	9·9
53	8 43·3	8 44·7	8 19·4	5·3	3·0	11·3	6·5	17·3	9·9
54	8 43·5	8 44·9	8 19·7	5·4	3·1	11·4	6·6	17·4	10·0
55	8 43·8	8 45·2	8 19·9	5·5	3·2	11·5	6·6	17·5	10·1
56	8 44·0	8 45·4	8 20·1	5·6	3·2	11·6	6·7	17·6	10·1
57	8 44·3	8 45·7	8 20·4	5·7	3·3	11·7	6·7	17·7	10·2
58	8 44·5	8 45·9	8 20·6	5·8	3·3	11·8	6·8	17·8	10·2
59	8 44·8	8 46·2	8 20·8	5·9	3·4	11·9	6·8	17·9	10·3
60	8 45·0	8 46·4	8 21·1	6·0	3·5	12·0	6·9	18·0	10·4

35m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or Corrn d ′	′	v or Corrn d ′	′	v or Corrn d ′	′
00	8 45·0	8 46·4	8 21·1	0·0	0·0	6·0	3·6	12·0	7·1
01	8 45·3	8 46·7	8 21·3	0·1	0·1	6·1	3·6	12·1	7·2
02	8 45·5	8 46·9	8 21·6	0·2	0·1	6·2	3·7	12·2	7·2
03	8 45·8	8 47·2	8 21·8	0·3	0·2	6·3	3·7	12·3	7·3
04	8 46·0	8 47·4	8 22·0	0·4	0·2	6·4	3·8	12·4	7·3
05	8 46·3	8 47·7	8 22·3	0·5	0·3	6·5	3·8	12·5	7·4
06	8 46·5	8 47·9	8 22·5	0·6	0·4	6·6	3·9	12·6	7·5
07	8 46·8	8 48·2	8 22·8	0·7	0·4	6·7	4·0	12·7	7·5
08	8 47·0	8 48·4	8 23·0	0·8	0·5	6·8	4·0	12·8	7·6
09	8 47·3	8 48·7	8 23·2	0·9	0·5	6·9	4·1	12·9	7·6
10	8 47·5	8 48·9	8 23·5	1·0	0·6	7·0	4·1	13·0	7·7
11	8 47·8	8 49·2	8 23·7	1·1	0·7	7·1	4·2	13·1	7·8
12	8 48·0	8 49·4	8 23·9	1·2	0·7	7·2	4·3	13·2	7·8
13	8 48·3	8 49·7	8 24·2	1·3	0·8	7·3	4·3	13·3	7·9
14	8 48·5	8 49·9	8 24·4	1·4	0·8	7·4	4·4	13·4	7·9
15	8 48·8	8 50·2	8 24·7	1·5	0·9	7·5	4·4	13·5	8·0
16	8 49·0	8 50·4	8 24·9	1·6	0·9	7·6	4·5	13·6	8·0
17	8 49·3	8 50·7	8 25·1	1·7	1·0	7·7	4·6	13·7	8·1
18	8 49·5	8 50·9	8 25·4	1·8	1·1	7·8	4·6	13·8	8·2
19	8 49·8	8 51·2	8 25·6	1·9	1·1	7·9	4·7	13·9	8·2
20	8 50·0	8 51·5	8 25·9	2·0	1·2	8·0	4·7	14·0	8·3
21	8 50·3	8 51·7	8 26·1	2·1	1·2	8·1	4·8	14·1	8·3
22	8 50·5	8 52·0	8 26·3	2·2	1·3	8·2	4·9	14·2	8·4
23	8 50·8	8 52·2	8 26·6	2·3	1·4	8·3	4·9	14·3	8·5
24	8 51·0	8 52·5	8 26·8	2·4	1·4	8·4	5·0	14·4	8·5
25	8 51·3	8 52·7	8 27·0	2·5	1·5	8·5	5·0	14·5	8·6
26	8 51·5	8 53·0	8 27·3	2·6	1·5	8·6	5·1	14·6	8·6
27	8 51·8	8 53·2	8 27·5	2·7	1·6	8·7	5·1	14·7	8·7
28	8 52·0	8 53·5	8 27·8	2·8	1·7	8·8	5·2	14·8	8·8
29	8 52·3	8 53·7	8 28·0	2·9	1·7	8·9	5·3	14·9	8·8
30	8 52·5	8 54·0	8 28·2	3·0	1·8	9·0	5·3	15·0	8·9
31	8 52·8	8 54·2	8 28·5	3·1	1·8	9·1	5·4	15·1	8·9
32	8 53·0	8 54·5	8 28·7	3·2	1·9	9·2	5·4	15·2	9·0
33	8 53·3	8 54·7	8 29·0	3·3	2·0	9·3	5·5	15·3	9·1
34	8 53·5	8 55·0	8 29·2	3·4	2·0	9·4	5·6	15·4	9·1
35	8 53·8	8 55·2	8 29·4	3·5	2·1	9·5	5·6	15·5	9·2
36	8 54·0	8 55·5	8 29·7	3·6	2·1	9·6	5·7	15·6	9·2
37	8 54·3	8 55·7	8 29·9	3·7	2·2	9·7	5·7	15·7	9·3
38	8 54·5	8 56·0	8 30·2	3·8	2·2	9·8	5·8	15·8	9·3
39	8 54·8	8 56·2	8 30·4	3·9	2·3	9·9	5·9	15·9	9·4
40	8 55·0	8 56·5	8 30·6	4·0	2·4	10·0	5·9	16·0	9·5
41	8 55·3	8 56·7	8 30·9	4·1	2·4	10·1	6·0	16·1	9·5
42	8 55·5	8 57·0	8 31·1	4·2	2·5	10·2	6·0	16·2	9·6
43	8 55·8	8 57·2	8 31·3	4·3	2·5	10·3	6·1	16·3	9·6
44	8 56·0	8 57·5	8 31·6	4·4	2·6	10·4	6·2	16·4	9·7
45	8 56·3	8 57·7	8 31·8	4·5	2·7	10·5	6·2	16·5	9·8
46	8 56·5	8 58·0	8 32·1	4·6	2·7	10·6	6·3	16·6	9·8
47	8 56·8	8 58·2	8 32·3	4·7	2·8	10·7	6·3	16·7	9·9
48	8 57·0	8 58·5	8 32·5	4·8	2·8	10·8	6·4	16·8	9·9
49	8 57·3	8 58·7	8 32·8	4·9	2·9	10·9	6·4	16·9	10·0
50	8 57·5	8 59·0	8 33·0	5·0	3·0	11·0	6·5	17·0	10·1
51	8 57·8	8 59·2	8 33·3	5·1	3·0	11·1	6·6	17·1	10·1
52	8 58·0	8 59·5	8 33·5	5·2	3·1	11·2	6·6	17·2	10·2
53	8 58·3	8 59·7	8 33·7	5·3	3·1	11·3	6·7	17·3	10·2
54	8 58·5	9 00·0	8 34·0	5·4	3·2	11·4	6·7	17·4	10·3
55	8 58·8	9 00·2	8 34·2	5·5	3·3	11·5	6·8	17·5	10·4
56	8 59·0	9 00·5	8 34·4	5·6	3·3	11·6	6·9	17·6	10·4
57	8 59·3	9 00·7	8 34·7	5·7	3·4	11·7	6·9	17·7	10·5
58	8 59·5	9 01·0	8 34·9	5·8	3·4	11·8	7·0	17·8	10·5
59	8 59·8	9 01·2	8 35·2	5·9	3·5	11·9	7·0	17·9	10·6
60	9 00·0	9 01·5	8 35·4	6·0	3·6	12·0	7·1	18·0	10·7

36m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	9 00·0	9 01·5	8 35·4	0·0	0·0	6·0	3·7	12·0	7·3
01	9 00·3	9 01·7	8 35·6	0·1	0·1	6·1	3·7	12·1	7·4
02	9 00·5	9 02·0	8 35·9	0·2	0·1	6·2	3·8	12·2	7·4
03	9 00·8	9 02·2	8 36·1	0·3	0·2	6·3	3·8	12·3	7·5
04	9 01·0	9 02·5	8 36·4	0·4	0·2	6·4	3·9	12·4	7·5
05	9 01·3	9 02·7	8 36·6	0·5	0·3	6·5	4·0	12·5	7·6
06	9 01·5	9 03·0	8 36·8	0·6	0·4	6·6	4·0	12·6	7·7
07	9 01·8	9 03·2	8 37·1	0·7	0·4	6·7	4·1	12·7	7·7
08	9 02·0	9 03·5	8 37·3	0·8	0·5	6·8	4·1	12·8	7·8
09	9 02·3	9 03·7	8 37·5	0·9	0·5	6·9	4·2	12·9	7·8
10	9 02·5	9 04·0	8 37·8	1·0	0·6	7·0	4·3	13·0	7·9
11	9 02·8	9 04·2	8 38·0	1·1	0·7	7·1	4·3	13·1	8·0
12	9 03·0	9 04·5	8 38·3	1·2	0·7	7·2	4·4	13·2	8·0
13	9 03·3	9 04·7	8 38·5	1·3	0·8	7·3	4·4	13·3	8·1
14	9 03·5	9 05·0	8 38·7	1·4	0·9	7·4	4·5	13·4	8·2
15	9 03·8	9 05·2	8 39·0	1·5	0·9	7·5	4·6	13·5	8·2
16	9 04·0	9 05·5	8 39·2	1·6	1·0	7·6	4·6	13·6	8·3
17	9 04·3	9 05·7	8 39·5	1·7	1·0	7·7	4·7	13·7	8·3
18	9 04·5	9 06·0	8 39·7	1·8	1·1	7·8	4·7	13·8	8·4
19	9 04·8	9 06·2	8 39·9	1·9	1·2	7·9	4·8	13·9	8·5
20	9 05·0	9 06·5	8 40·2	2·0	1·2	8·0	4·9	14·0	8·5
21	9 05·3	9 06·7	8 40·4	2·1	1·3	8·1	4·9	14·1	8·6
22	9 05·5	9 07·0	8 40·6	2·2	1·3	8·2	5·0	14·2	8·6
23	9 05·8	9 07·2	8 40·9	2·3	1·4	8·3	5·0	14·3	8·7
24	9 06·0	9 07·5	8 41·1	2·4	1·5	8·4	5·1	14·4	8·8
25	9 06·3	9 07·7	8 41·4	2·5	1·5	8·5	5·2	14·5	8·8
26	9 06·5	9 08·0	8 41·6	2·6	1·6	8·6	5·2	14·6	8·9
27	9 06·8	9 08·2	8 41·8	2·7	1·6	8·7	5·3	14·7	8·9
28	9 07·0	9 08·5	8 42·1	2·8	1·7	8·8	5·4	14·8	9·0
29	9 07·3	9 08·7	8 42·3	2·9	1·8	8·9	5·4	14·9	9·1
30	9 07·5	9 09·0	8 42·6	3·0	1·8	9·0	5·5	15·0	9·1
31	9 07·8	9 09·2	8 42·8	3·1	1·9	9·1	5·5	15·1	9·2
32	9 08·0	9 09·5	8 43·0	3·2	1·9	9·2	5·6	15·2	9·2
33	9 08·3	9 09·8	8 43·3	3·3	2·0	9·3	5·7	15·3	9·3
34	9 08·5	9 10·0	8 43·5	3·4	2·1	9·4	5·7	15·4	9·4
35	9 08·8	9 10·3	8 43·8	3·5	2·1	9·5	5·8	15·5	9·4
36	9 09·0	9 10·5	8 44·0	3·6	2·2	9·6	5·8	15·6	9·5
37	9 09·3	9 10·8	8 44·2	3·7	2·3	9·7	5·9	15·7	9·6
38	9 09·5	9 11·0	8 44·5	3·8	2·3	9·8	6·0	15·8	9·6
39	9 09·8	9 11·3	8 44·7	3·9	2·4	9·9	6·0	15·9	9·7
40	9 10·0	9 11·5	8 44·9	4·0	2·4	10·0	6·1	16·0	9·7
41	9 10·3	9 11·8	8 45·2	4·1	2·5	10·1	6·1	16·1	9·8
42	9 10·5	9 12·0	8 45·4	4·2	2·6	10·2	6·2	16·2	9·9
43	9 10·8	9 12·3	8 45·7	4·3	2·6	10·3	6·3	16·3	9·9
44	9 11·0	9 12·5	8 45·9	4·4	2·7	10·4	6·3	16·4	10·0
45	9 11·3	9 12·8	8 46·1	4·5	2·7	10·5	6·4	16·5	10·0
46	9 11·5	9 13·0	8 46·4	4·6	2·8	10·6	6·4	16·6	10·1
47	9 11·8	9 13·3	8 46·6	4·7	2·9	10·7	6·5	16·7	10·2
48	9 12·0	9 13·5	8 46·9	4·8	2·9	10·8	6·6	16·8	10·2
49	9 12·3	9 13·8	8 47·1	4·9	3·0	10·9	6·6	16·9	10·3
50	9 12·5	9 14·0	8 47·3	5·0	3·0	11·0	6·7	17·0	10·3
51	9 12·8	9 14·3	8 47·6	5·1	3·1	11·1	6·8	17·1	10·4
52	9 13·0	9 14·5	8 47·8	5·2	3·2	11·2	6·8	17·2	10·5
53	9 13·3	9 14·8	8 48·0	5·3	3·2	11·3	6·9	17·3	10·5
54	9 13·5	9 15·0	8 48·3	5·4	3·3	11·4	6·9	17·4	10·6
55	9 13·8	9 15·3	8 48·5	5·5	3·3	11·5	7·0	17·5	10·6
56	9 14·0	9 15·5	8 48·8	5·6	3·4	11·6	7·1	17·6	10·7
57	9 14·3	9 15·8	8 49·0	5·7	3·5	11·7	7·1	17·7	10·8
58	9 14·5	9 16·0	8 49·2	5·8	3·5	11·8	7·2	17·8	10·8
59	9 14·8	9 16·3	8 49·5	5·9	3·6	11·9	7·2	17·9	10·9
60	9 15·0	9 16·5	8 49·7	6·0	3·7	12·0	7·3	18·0	11·0

37m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	9 15·0	9 16·5	8 49·7	0·0	0·0	6·0	3·8	12·0	7·5
01	9 15·3	9 16·8	8 50·0	0·1	0·1	6·1	3·8	12·1	7·6
02	9 15·5	9 17·0	8 50·2	0·2	0·1	6·2	3·9	12·2	7·6
03	9 15·8	9 17·3	8 50·4	0·3	0·2	6·3	3·9	12·3	7·7
04	9 16·0	9 17·5	8 50·7	0·4	0·3	6·4	4·0	12·4	7·8
05	9 16·3	9 17·8	8 50·9	0·5	0·3	6·5	4·1	12·5	7·8
06	9 16·5	9 18·0	8 51·1	0·6	0·4	6·6	4·1	12·6	7·9
07	9 16·8	9 18·3	8 51·4	0·7	0·4	6·7	4·2	12·7	7·9
08	9 17·0	9 18·5	8 51·6	0·8	0·5	6·8	4·3	12·8	8·0
09	9 17·3	9 18·8	8 51·9	0·9	0·6	6·9	4·3	12·9	8·1
10	9 17·5	9 19·0	8 52·1	1·0	0·6	7·0	4·4	13·0	8·1
11	9 17·8	9 19·3	8 52·3	1·1	0·7	7·1	4·4	13·1	8·2
12	9 18·0	9 19·5	8 52·6	1·2	0·8	7·2	4·5	13·2	8·3
13	9 18·3	9 19·8	8 52·8	1·3	0·8	7·3	4·6	13·3	8·3
14	9 18·5	9 20·0	8 53·1	1·4	0·9	7·4	4·6	13·4	8·4
15	9 18·8	9 20·3	8 53·3	1·5	0·9	7·5	4·7	13·5	8·4
16	9 19·0	9 20·5	8 53·5	1·6	1·0	7·6	4·8	13·6	8·5
17	9 19·3	9 20·8	8 53·8	1·7	1·1	7·7	4·8	13·7	8·6
18	9 19·5	9 21·0	8 54·0	1·8	1·1	7·8	4·9	13·8	8·6
19	9 19·8	9 21·3	8 54·3	1·9	1·2	7·9	4·9	13·9	8·7
20	9 20·0	9 21·5	8 54·5	2·0	1·3	8·0	5·0	14·0	8·8
21	9 20·3	9 21·8	8 54·7	2·1	1·3	8·1	5·1	14·1	8·8
22	9 20·5	9 22·0	8 55·0	2·2	1·4	8·2	5·1	14·2	8·9
23	9 20·8	9 22·3	8 55·2	2·3	1·4	8·3	5·2	14·3	8·9
24	9 21·0	9 22·5	8 55·4	2·4	1·5	8·4	5·3	14·4	9·0
25	9 21·3	9 22·8	8 55·7	2·5	1·6	8·5	5·3	14·5	9·1
26	9 21·5	9 23·0	8 55·9	2·6	1·6	8·6	5·4	14·6	9·1
27	9 21·8	9 23·3	8 56·2	2·7	1·7	8·7	5·4	14·7	9·2
28	9 22·0	9 23·5	8 56·4	2·8	1·8	8·8	5·5	14·8	9·3
29	9 22·3	9 23·8	8 56·6	2·9	1·8	8·9	5·6	14·9	9·3
30	9 22·5	9 24·0	8 56·9	3·0	1·9	9·0	5·6	15·0	9·4
31	9 22·8	9 24·3	8 57·1	3·1	1·9	9·1	5·7	15·1	9·4
32	9 23·0	9 24·5	8 57·4	3·2	2·0	9·2	5·8	15·2	9·5
33	9 23·3	9 24·8	8 57·6	3·3	2·1	9·3	5·8	15·3	9·6
34	9 23·5	9 25·0	8 57·8	3·4	2·1	9·4	5·9	15·4	9·6
35	9 23·8	9 25·3	8 58·1	3·5	2·2	9·5	5·9	15·5	9·7
36	9 24·0	9 25·5	8 58·3	3·6	2·3	9·6	6·0	15·6	9·8
37	9 24·3	9 25·8	8 58·5	3·7	2·3	9·7	6·1	15·7	9·8
38	9 24·5	9 26·0	8 58·8	3·8	2·4	9·8	6·1	15·8	9·9
39	9 24·8	9 26·3	8 59·0	3·9	2·4	9·9	6·2	15·9	9·9
40	9 25·0	9 26·5	8 59·3	4·0	2·5	10·0	6·3	16·0	10·0
41	9 25·3	9 26·8	8 59·5	4·1	2·6	10·1	6·3	16·1	10·1
42	9 25·5	9 27·0	8 59·7	4·2	2·6	10·2	6·4	16·2	10·1
43	9 25·8	9 27·3	9 00·0	4·3	2·7	10·3	6·4	16·3	10·2
44	9 26·0	9 27·5	9 00·2	4·4	2·8	10·4	6·5	16·4	10·3
45	9 26·3	9 27·8	9 00·5	4·5	2·8	10·5	6·6	16·5	10·3
46	9 26·5	9 28·1	9 00·7	4·6	2·9	10·6	6·6	16·6	10·4
47	9 26·8	9 28·3	9 00·9	4·7	2·9	10·7	6·7	16·7	10·4
48	9 27·0	9 28·6	9 01·2	4·8	3·0	10·8	6·8	16·8	10·5
49	9 27·3	9 28·8	9 01·4	4·9	3·1	10·9	6·8	16·9	10·6
50	9 27·5	9 29·1	9 01·6	5·0	3·1	11·0	6·9	17·0	10·6
51	9 27·8	9 29·3	9 01·9	5·1	3·2	11·1	6·9	17·1	10·7
52	9 28·0	9 29·6	9 02·1	5·2	3·3	11·2	7·0	17·2	10·8
53	9 28·3	9 29·8	9 02·4	5·3	3·3	11·3	7·1	17·3	10·8
54	9 28·5	9 30·1	9 02·6	5·4	3·4	11·4	7·1	17·4	10·9
55	9 28·8	9 30·3	9 02·8	5·5	3·4	11·5	7·2	17·5	10·9
56	9 29·0	9 30·6	9 03·1	5·6	3·5	11·6	7·3	17·6	11·0
57	9 29·3	9 30·8	9 03·3	5·7	3·6	11·7	7·3	17·7	11·1
58	9 29·5	9 31·1	9 03·6	5·8	3·6	11·8	7·4	17·8	11·1
59	9 29·8	9 31·3	9 03·8	5·9	3·7	11·9	7·4	17·9	11·2
60	9 30·0	9 31·6	9 04·0	6·0	3·8	12·0	7·5	18·0	11·3

38m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	9 30·0	9 31·6	9 04·0	0·0	0·0	6·0	3·9	12·0	7·7
01	9 30·3	9 31·8	9 04·3	0·1	0·1	6·1	3·9	12·1	7·8
02	9 30·5	9 32·1	9 04·5	0·2	0·1	6·2	4·0	12·2	7·8
03	9 30·8	9 32·3	9 04·7	0·3	0·2	6·3	4·0	12·3	7·9
04	9 31·0	9 32·6	9 05·0	0·4	0·3	6·4	4·1	12·4	8·0
05	9 31·3	9 32·8	9 05·2	0·5	0·3	6·5	4·2	12·5	8·0
06	9 31·5	9 33·1	9 05·5	0·6	0·4	6·6	4·2	12·6	8·1
07	9 31·8	9 33·3	9 05·7	0·7	0·4	6·7	4·3	12·7	8·1
08	9 32·0	9 33·6	9 05·9	0·8	0·5	6·8	4·4	12·8	8·2
09	9 32·3	9 33·8	9 06·2	0·9	0·6	6·9	4·4	12·9	8·3
10	9 32·5	9 34·1	9 06·4	1·0	0·6	7·0	4·5	13·0	8·3
11	9 32·8	9 34·3	9 06·7	1·1	0·7	7·1	4·6	13·1	8·4
12	9 33·0	9 34·6	9 06·9	1·2	0·8	7·2	4·6	13·2	8·5
13	9 33·3	9 34·8	9 07·1	1·3	0·8	7·3	4·7	13·3	8·5
14	9 33·5	9 35·1	9 07·4	1·4	0·9	7·4	4·7	13·4	8·6
15	9 33·8	9 35·3	9 07·6	1·5	1·0	7·5	4·8	13·5	8·7
16	9 34·0	9 35·6	9 07·9	1·6	1·0	7·6	4·9	13·6	8·7
17	9 34·3	9 35·8	9 08·1	1·7	1·1	7·7	4·9	13·7	8·8
18	9 34·5	9 36·1	9 08·3	1·8	1·2	7·8	5·0	13·8	8·9
19	9 34·8	9 36·3	9 08·6	1·9	1·2	7·9	5·1	13·9	8·9
20	9 35·0	9 36·6	9 08·8	2·0	1·3	8·0	5·1	14·0	9·0
21	9 35·3	9 36·8	9 09·0	2·1	1·3	8·1	5·2	14·1	9·0
22	9 35·5	9 37·1	9 09·3	2·2	1·4	8·2	5·3	14·2	9·1
23	9 35·8	9 37·3	9 09·5	2·3	1·5	8·3	5·3	14·3	9·2
24	9 36·0	9 37·6	9 09·8	2·4	1·5	8·4	5·4	14·4	9·2
25	9 36·3	9 37·8	9 10·0	2·5	1·6	8·5	5·5	14·5	9·3
26	9 36·5	9 38·1	9 10·2	2·6	1·7	8·6	5·5	14·6	9·4
27	9 36·8	9 38·3	9 10·5	2·7	1·7	8·7	5·6	14·7	9·4
28	9 37·0	9 38·6	9 10·7	2·8	1·8	8·8	5·6	14·8	9·5
29	9 37·3	9 38·8	9 11·0	2·9	1·9	8·9	5·7	14·9	9·6
30	9 37·5	9 39·1	9 11·2	3·0	1·9	9·0	5·8	15·0	9·6
31	9 37·8	9 39·3	9 11·4	3·1	2·0	9·1	5·8	15·1	9·7
32	9 38·0	9 39·6	9 11·7	3·2	2·1	9·2	5·9	15·2	9·8
33	9 38·3	9 39·8	9 11·9	3·3	2·1	9·3	6·0	15·3	9·8
34	9 38·5	9 40·1	9 12·1	3·4	2·2	9·4	6·0	15·4	9·9
35	9 38·8	9 40·3	9 12·4	3·5	2·2	9·5	6·1	15·5	9·9
36	9 39·0	9 40·6	9 12·6	3·6	2·3	9·6	6·2	15·6	10·0
37	9 39·3	9 40·8	9 12·9	3·7	2·4	9·7	6·2	15·7	10·1
38	9 39·5	9 41·1	9 13·1	3·8	2·4	9·8	6·3	15·8	10·1
39	9 39·8	9 41·3	9 13·3	3·9	2·5	9·9	6·4	15·9	10·2
40	9 40·0	9 41·6	9 13·6	4·0	2·6	10·0	6·4	16·0	10·3
41	9 40·3	9 41·8	9 13·8	4·1	2·6	10·1	6·5	16·1	10·3
42	9 40·5	9 42·1	9 14·1	4·2	2·7	10·2	6·5	16·2	10·4
43	9 40·8	9 42·3	9 14·3	4·3	2·8	10·3	6·6	16·3	10·5
44	9 41·0	9 42·6	9 14·5	4·4	2·8	10·4	6·7	16·4	10·5
45	9 41·3	9 42·8	9 14·8	4·5	2·9	10·5	6·7	16·5	10·6
46	9 41·5	9 43·1	9 15·0	4·6	3·0	10·6	6·8	16·6	10·7
47	9 41·8	9 43·3	9 15·2	4·7	3·0	10·7	6·9	16·7	10·7
48	9 42·0	9 43·6	9 15·5	4·8	3·1	10·8	6·9	16·8	10·8
49	9 42·3	9 43·8	9 15·7	4·9	3·1	10·9	7·0	16·9	10·8
50	9 42·5	9 44·1	9 16·0	5·0	3·2	11·0	7·1	17·0	10·9
51	9 42·8	9 44·3	9 16·2	5·1	3·3	11·1	7·1	17·1	11·0
52	9 43·0	9 44·6	9 16·4	5·2	3·3	11·2	7·2	17·2	11·0
53	9 43·3	9 44·8	9 16·7	5·3	3·4	11·3	7·3	17·3	11·1
54	9 43·5	9 45·1	9 16·9	5·4	3·5	11·4	7·3	17·4	11·2
55	9 43·8	9 45·3	9 17·2	5·5	3·5	11·5	7·4	17·5	11·2
56	9 44·0	9 45·6	9 17·4	5·6	3·6	11·6	7·4	17·6	11·3
57	9 44·3	9 45·8	9 17·6	5·7	3·7	11·7	7·5	17·7	11·4
58	9 44·5	9 46·1	9 17·9	5·8	3·7	11·8	7·6	17·8	11·4
59	9 44·8	9 46·4	9 18·1	5·9	3·8	11·9	7·6	17·9	11·5
60	9 45·0	9 46·6	9 18·4	6·0	3·9	12·0	7·7	18·0	11·6

39m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	9 45·0	9 46·6	9 18·4	0·0	0·0	6·0	4·0	12·0	7·9
01	9 45·3	9 46·9	9 18·6	0·1	0·1	6·1	4·0	12·1	8·0
02	9 45·5	9 47·1	9 18·8	0·2	0·1	6·2	4·1	12·2	8·0
03	9 45·8	9 47·4	9 19·1	0·3	0·2	6·3	4·1	12·3	8·1
04	9 46·0	9 47·6	9 19·3	0·4	0·3	6·4	4·2	12·4	8·2
05	9 46·3	9 47·9	9 19·5	0·5	0·3	6·5	4·3	12·5	8·2
06	9 46·5	9 48·1	9 19·8	0·6	0·4	6·6	4·3	12·6	8·3
07	9 46·8	9 48·4	9 20·0	0·7	0·5	6·7	4·4	12·7	8·4
08	9 47·0	9 48·6	9 20·3	0·8	0·5	6·8	4·5	12·8	8·4
09	9 47·3	9 48·9	9 20·5	0·9	0·6	6·9	4·5	12·9	8·5
10	9 47·5	9 49·1	9 20·7	1·0	0·7	7·0	4·6	13·0	8·6
11	9 47·8	9 49·4	9 21·0	1·1	0·7	7·1	4·7	13·1	8·6
12	9 48·0	9 49·6	9 21·2	1·2	0·8	7·2	4·7	13·2	8·7
13	9 48·3	9 49·9	9 21·5	1·3	0·9	7·3	4·8	13·3	8·8
14	9 48·5	9 50·1	9 21·7	1·4	0·9	7·4	4·9	13·4	8·8
15	9 48·8	9 50·4	9 21·9	1·5	1·0	7·5	4·9	13·5	8·9
16	9 49·0	9 50·6	9 22·2	1·6	1·1	7·6	5·0	13·6	9·0
17	9 49·3	9 50·9	9 22·4	1·7	1·1	7·7	5·1	13·7	9·0
18	9 49·5	9 51·1	9 22·6	1·8	1·2	7·8	5·1	13·8	9·1
19	9 49·8	9 51·4	9 22·9	1·9	1·3	7·9	5·2	13·9	9·2
20	9 50·0	9 51·6	9 23·1	2·0	1·3	8·0	5·3	14·0	9·2
21	9 50·3	9 51·9	9 23·4	2·1	1·4	8·1	5·3	14·1	9·3
22	9 50·5	9 52·1	9 23·6	2·2	1·4	8·2	5·4	14·2	9·3
23	9 50·8	9 52·4	9 23·8	2·3	1·5	8·3	5·5	14·3	9·4
24	9 51·0	9 52·6	9 24·1	2·4	1·6	8·4	5·5	14·4	9·5
25	9 51·3	9 52·9	9 24·3	2·5	1·6	8·5	5·6	14·5	9·5
26	9 51·5	9 53·1	9 24·6	2·6	1·7	8·6	5·7	14·6	9·6
27	9 51·8	9 53·4	9 24·8	2·7	1·8	8·7	5·7	14·7	9·7
28	9 52·0	9 53·6	9 25·0	2·8	1·8	8·8	5·8	14·8	9·7
29	9 52·3	9 53·9	9 25·3	2·9	1·9	8·9	5·9	14·9	9·8
30	9 52·5	9 54·1	9 25·5	3·0	2·0	9·0	5·9	15·0	9·9
31	9 52·8	9 54·4	9 25·7	3·1	2·0	9·1	6·0	15·1	9·9
32	9 53·0	9 54·6	9 26·0	3·2	2·1	9·2	6·1	15·2	10·0
33	9 53·3	9 54·9	9 26·2	3·3	2·2	9·3	6·1	15·3	10·1
34	9 53·5	9 55·1	9 26·5	3·4	2·2	9·4	6·2	15·4	10·1
35	9 53·8	9 55·4	9 26·7	3·5	2·3	9·5	6·3	15·5	10·2
36	9 54·0	9 55·6	9 26·9	3·6	2·4	9·6	6·3	15·6	10·3
37	9 54·3	9 55·9	9 27·2	3·7	2·4	9·7	6·4	15·7	10·3
38	9 54·5	9 56·1	9 27·4	3·8	2·5	9·8	6·5	15·8	10·4
39	9 54·8	9 56·4	9 27·7	3·9	2·6	9·9	6·5	15·9	10·5
40	9 55·0	9 56·6	9 27·9	4·0	2·6	10·0	6·6	16·0	10·5
41	9 55·3	9 56·9	9 28·1	4·1	2·7	10·1	6·6	16·1	10·6
42	9 55·5	9 57·1	9 28·4	4·2	2·8	10·2	6·7	16·2	10·7
43	9 55·8	9 57·4	9 28·6	4·3	2·8	10·3	6·8	16·3	10·7
44	9 56·0	9 57·6	9 28·8	4·4	2·9	10·4	6·8	16·4	10·8
45	9 56·3	9 57·9	9 29·1	4·5	3·0	10·5	6·9	16·5	10·9
46	9 56·5	9 58·1	9 29·3	4·6	3·0	10·6	7·0	16·6	10·9
47	9 56·8	9 58·4	9 29·6	4·7	3·1	10·7	7·0	16·7	11·0
48	9 57·0	9 58·6	9 29·8	4·8	3·2	10·8	7·1	16·8	11·1
49	9 57·3	9 58·9	9 30·0	4·9	3·2	10·9	7·2	16·9	11·1
50	9 57·5	9 59·1	9 30·3	5·0	3·3	11·0	7·2	17·0	11·2
51	9 57·8	9 59·4	9 30·5	5·1	3·4	11·1	7·3	17·1	11·3
52	9 58·0	9 59·6	9 30·8	5·2	3·4	11·2	7·4	17·2	11·3
53	9 58·3	9 59·9	9 31·0	5·3	3·5	11·3	7·4	17·3	11·4
54	9 58·5	10 00·1	9 31·2	5·4	3·6	11·4	7·5	17·4	11·5
55	9 58·8	10 00·4	9 31·5	5·5	3·6	11·5	7·6	17·5	11·5
56	9 59·0	10 00·6	9 31·7	5·6	3·7	11·6	7·6	17·6	11·6
57	9 59·3	10 00·9	9 32·0	5·7	3·8	11·7	7·7	17·7	11·7
58	9 59·5	10 01·1	9 32·2	5·8	3·8	11·8	7·8	17·8	11·7
59	9 59·8	10 01·4	9 32·4	5·9	3·9	11·9	7·8	17·9	11·8
60	10 00·0	10 01·6	9 32·7	6·0	4·0	12·0	7·9	18·0	11·9

40m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	10 00·0	10 01·6	9 32·7	0·0	0·0	6·0	4·1	12·0	8·1
01	10 00·3	10 01·9	9 32·9	0·1	0·1	6·1	4·1	12·1	8·2
02	10 00·5	10 02·1	9 33·1	0·2	0·1	6·2	4·2	12·2	8·2
03	10 00·8	10 02·4	9 33·4	0·3	0·2	6·3	4·3	12·3	8·3
04	10 01·0	10 02·6	9 33·6	0·4	0·3	6·4	4·3	12·4	8·4
05	10 01·3	10 02·9	9 33·9	0·5	0·3	6·5	4·4	12·5	8·4
06	10 01·5	10 03·1	9 34·1	0·6	0·4	6·6	4·5	12·6	8·5
07	10 01·8	10 03·4	9 34·3	0·7	0·5	6·7	4·5	12·7	8·6
08	10 02·0	10 03·6	9 34·6	0·8	0·5	6·8	4·6	12·8	8·6
09	10 02·3	10 03·9	9 34·8	0·9	0·6	6·9	4·7	12·9	8·7
10	10 02·5	10 04·1	9 35·1	1·0	0·7	7·0	4·7	13·0	8·8
11	10 02·8	10 04·4	9 35·3	1·1	0·7	7·1	4·8	13·1	8·8
12	10 03·0	10 04·7	9 35·5	1·2	0·8	7·2	4·9	13·2	8·9
13	10 03·3	10 04·9	9 35·8	1·3	0·9	7·3	4·9	13·3	9·0
14	10 03·5	10 05·2	9 36·0	1·4	0·9	7·4	5·0	13·4	9·0
15	10 03·8	10 05·4	9 36·2	1·5	1·0	7·5	5·1	13·5	9·1
16	10 04·0	10 05·7	9 36·5	1·6	1·1	7·6	5·1	13·6	9·2
17	10 04·3	10 05·9	9 36·7	1·7	1·1	7·7	5·2	13·7	9·2
18	10 04·5	10 06·2	9 37·0	1·8	1·2	7·8	5·3	13·8	9·3
19	10 04·8	10 06·4	9 37·2	1·9	1·3	7·9	5·3	13·9	9·4
20	10 05·0	10 06·7	9 37·4	2·0	1·4	8·0	5·4	14·0	9·5
21	10 05·3	10 06·9	9 37·7	2·1	1·4	8·1	5·5	14·1	9·5
22	10 05·5	10 07·2	9 37·9	2·2	1·5	8·2	5·5	14·2	9·6
23	10 05·8	10 07·4	9 38·2	2·3	1·6	8·3	5·6	14·3	9·7
24	10 06·0	10 07·7	9 38·4	2·4	1·6	8·4	5·7	14·4	9·7
25	10 06·3	10 07·9	9 38·6	2·5	1·7	8·5	5·7	14·5	9·8
26	10 06·5	10 08·2	9 38·9	2·6	1·8	8·6	5·8	14·6	9·9
27	10 06·8	10 08·4	9 39·1	2·7	1·8	8·7	5·9	14·7	9·9
28	10 07·0	10 08·7	9 39·3	2·8	1·9	8·8	5·9	14·8	10·0
29	10 07·3	10 08·9	9 39·6	2·9	2·0	8·9	6·0	14·9	10·1
30	10 07·5	10 09·2	9 39·8	3·0	2·0	9·0	6·1	15·0	10·1
31	10 07·8	10 09·4	9 40·1	3·1	2·1	9·1	6·1	15·1	10·2
32	10 08·0	10 09·7	9 40·3	3·2	2·2	9·2	6·2	15·2	10·3
33	10 08·3	10 09·9	9 40·5	3·3	2·2	9·3	6·3	15·3	10·3
34	10 08·5	10 10·2	9 40·8	3·4	2·3	9·4	6·3	15·4	10·4
35	10 08·8	10 10·4	9 41·0	3·5	2·4	9·5	6·4	15·5	10·5
36	10 09·0	10 10·7	9 41·3	3·6	2·4	9·6	6·5	15·6	10·5
37	10 09·3	10 10·9	9 41·5	3·7	2·5	9·7	6·5	15·7	10·6
38	10 09·5	10 11·2	9 41·7	3·8	2·6	9·8	6·6	15·8	10·7
39	10 09·8	10 11·4	9 42·0	3·9	2·6	9·9	6·7	15·9	10·7
40	10 10·0	10 11·7	9 42·2	4·0	2·7	10·0	6·8	16·0	10·8
41	10 10·3	10 11·9	9 42·4	4·1	2·8	10·1	6·8	16·1	10·9
42	10 10·5	10 12·2	9 42·7	4·2	2·8	10·2	6·9	16·2	10·9
43	10 10·8	10 12·4	9 42·9	4·3	2·9	10·3	7·0	16·3	11·0
44	10 11·0	10 12·7	9 43·2	4·4	3·0	10·4	7·0	16·4	11·1
45	10 11·3	10 12·9	9 43·4	4·5	3·0	10·5	7·1	16·5	11·1
46	10 11·5	10 13·2	9 43·6	4·6	3·1	10·6	7·2	16·6	11·2
47	10 11·8	10 13·4	9 43·9	4·7	3·2	10·7	7·2	16·7	11·3
48	10 12·0	10 13·7	9 44·1	4·8	3·2	10·8	7·3	16·8	11·3
49	10 12·3	10 13·9	9 44·4	4·9	3·3	10·9	7·4	16·9	11·4
50	10 12·5	10 14·2	9 44·6	5·0	3·4	11·0	7·4	17·0	11·5
51	10 12·8	10 14·4	9 44·8	5·1	3·4	11·1	7·5	17·1	11·5
52	10 13·0	10 14·7	9 45·1	5·2	3·5	11·2	7·6	17·2	11·6
53	10 13·3	10 14·9	9 45·3	5·3	3·6	11·3	7·6	17·3	11·7
54	10 13·5	10 15·2	9 45·6	5·4	3·6	11·4	7·7	17·4	11·7
55	10 13·8	10 15·4	9 45·8	5·5	3·7	11·5	7·8	17·5	11·8
56	10 14·0	10 15·7	9 46·0	5·6	3·8	11·6	7·8	17·6	11·9
57	10 14·3	10 15·9	9 46·3	5·7	3·8	11·7	7·9	17·7	11·9
58	10 14·5	10 16·2	9 46·5	5·8	3·9	11·8	8·0	17·8	12·0
59	10 14·8	10 16·4	9 46·7	5·9	4·0	11·9	8·0	17·9	12·1
60	10 15·0	10 16·7	9 47·0	6·0	4·1	12·0	8·1	18·0	12·2

41m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	10 15·0	10 16·7	9 47·0	0·0	0·0	6·0	4·2	12·0	8·3
01	10 15·3	10 16·9	9 47·2	0·1	0·1	6·1	4·2	12·1	8·4
02	10 15·5	10 17·2	9 47·5	0·2	0·1	6·2	4·3	12·2	8·4
03	10 15·8	10 17·4	9 47·7	0·3	0·2	6·3	4·4	12·3	8·5
04	10 16·0	10 17·7	9 47·9	0·4	0·3	6·4	4·4	12·4	8·6
05	10 16·3	10 17·9	9 48·2	0·5	0·3	6·5	4·5	12·5	8·6
06	10 16·5	10 18·2	9 48·4	0·6	0·4	6·6	4·6	12·6	8·7
07	10 16·8	10 18·4	9 48·7	0·7	0·5	6·7	4·6	12·7	8·8
08	10 17·0	10 18·7	9 48·9	0·8	0·6	6·8	4·7	12·8	8·9
09	10 17·3	10 18·9	9 49·1	0·9	0·6	6·9	4·8	12·9	8·9
10	10 17·5	10 19·2	9 49·4	1·0	0·7	7·0	4·8	13·0	9·0
11	10 17·8	10 19·4	9 49·6	1·1	0·8	7·1	4·9	13·1	9·1
12	10 18·0	10 19·7	9 49·8	1·2	0·8	7·2	5·0	13·2	9·1
13	10 18·3	10 19·9	9 50·1	1·3	0·9	7·3	5·0	13·3	9·2
14	10 18·5	10 20·2	9 50·3	1·4	1·0	7·4	5·1	13·4	9·3
15	10 18·8	10 20·4	9 50·6	1·5	1·0	7·5	5·2	13·5	9·3
16	10 19·0	10 20·7	9 50·8	1·6	1·1	7·6	5·3	13·6	9·4
17	10 19·3	10 20·9	9 51·0	1·7	1·2	7·7	5·3	13·7	9·5
18	10 19·5	10 21·2	9 51·3	1·8	1·2	7·8	5·4	13·8	9·5
19	10 19·8	10 21·4	9 51·5	1·9	1·3	7·9	5·5	13·9	9·6
20	10 20·0	10 21·7	9 51·8	2·0	1·4	8·0	5·5	14·0	9·7
21	10 20·3	10 21·9	9 52·0	2·1	1·5	8·1	5·6	14·1	9·8
22	10 20·5	10 22·2	9 52·2	2·2	1·5	8·2	5·7	14·2	9·8
23	10 20·8	10 22·4	9 52·5	2·3	1·6	8·3	5·7	14·3	9·9
24	10 21·0	10 22·7	9 52·7	2·4	1·7	8·4	5·8	14·4	10·0
25	10 21·3	10 23·0	9 52·9	2·5	1·7	8·5	5·9	14·5	10·0
26	10 21·5	10 23·2	9 53·2	2·6	1·8	8·6	5·9	14·6	10·1
27	10 21·8	10 23·5	9 53·4	2·7	1·9	8·7	6·0	14·7	10·2
28	10 22·0	10 23·7	9 53·7	2·8	1·9	8·8	6·1	14·8	10·2
29	10 22·3	10 24·0	9 53·9	2·9	2·0	8·9	6·2	14·9	10·3
30	10 22·5	10 24·2	9 54·1	3·0	2·1	9·0	6·2	15·0	10·4
31	10 22·8	10 24·5	9 54·4	3·1	2·1	9·1	6·3	15·1	10·4
32	10 23·0	10 24·7	9 54·6	3·2	2·2	9·2	6·4	15·2	10·5
33	10 23·3	10 25·0	9 54·9	3·3	2·3	9·3	6·4	15·3	10·6
34	10 23·5	10 25·2	9 55·1	3·4	2·4	9·4	6·5	15·4	10·7
35	10 23·8	10 25·5	9 55·3	3·5	2·4	9·5	6·6	15·5	10·7
36	10 24·0	10 25·7	9 55·6	3·6	2·5	9·6	6·6	15·6	10·8
37	10 24·3	10 26·0	9 55·8	3·7	2·6	9·7	6·7	15·7	10·9
38	10 24·5	10 26·2	9 56·1	3·8	2·6	9·8	6·8	15·8	10·9
39	10 24·8	10 26·5	9 56·3	3·9	2·7	9·9	6·8	15·9	11·0
40	10 25·0	10 26·7	9 56·5	4·0	2·8	10·0	6·9	16·0	11·1
41	10 25·3	10 27·0	9 56·8	4·1	2·8	10·1	7·0	16·1	11·1
42	10 25·5	10 27·2	9 57·0	4·2	2·9	10·2	7·1	16·2	11·2
43	10 25·8	10 27·5	9 57·2	4·3	3·0	10·3	7·1	16·3	11·3
44	10 26·0	10 27·7	9 57·5	4·4	3·0	10·4	7·2	16·4	11·3
45	10 26·3	10 28·0	9 57·7	4·5	3·1	10·5	7·3	16·5	11·4
46	10 26·5	10 28·2	9 58·0	4·6	3·2	10·6	7·3	16·6	11·5
47	10 26·8	10 28·5	9 58·2	4·7	3·3	10·7	7·4	16·7	11·6
48	10 27·0	10 28·7	9 58·4	4·8	3·3	10·8	7·5	16·8	11·6
49	10 27·3	10 29·0	9 58·7	4·9	3·4	10·9	7·5	16·9	11·7
50	10 27·5	10 29·2	9 58·9	5·0	3·5	11·0	7·6	17·0	11·8
51	10 27·8	10 29·5	9 59·2	5·1	3·5	11·1	7·7	17·1	11·8
52	10 28·0	10 29·7	9 59·4	5·2	3·6	11·2	7·7	17·2	11·9
53	10 28·3	10 30·0	9 59·6	5·3	3·7	11·3	7·8	17·3	12·0
54	10 28·5	10 30·2	9 59·9	5·4	3·7	11·4	7·9	17·4	12·0
55	10 28·8	10 30·5	10 00·1	5·5	3·8	11·5	8·0	17·5	12·1
56	10 29·0	10 30·7	10 00·3	5·6	3·9	11·6	8·0	17·6	12·2
57	10 29·3	10 31·0	10 00·6	5·7	3·9	11·7	8·1	17·7	12·2
58	10 29·5	10 31·2	10 00·8	5·8	4·0	11·8	8·2	17·8	12·3
59	10 29·8	10 31·5	10 01·1	5·9	4·1	11·9	8·2	17·9	12·4
60	10 30·0	10 31·7	10 01·3	6·0	4·2	12·0	8·3	18·0	12·5

42m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or Corrn d ′ ′	v or Corrn d ′ ′	v or Corrn d ′ ′
00	10 30·0	10 31·7	10 01·3	0·0 0·0	6·0 4·3	12·0 8·5
01	10 30·3	10 32·0	10 01·5	0·1 0·1	6·1 4·3	12·1 8·6
02	10 30·5	10 32·2	10 01·8	0·2 0·1	6·2 4·4	12·2 8·6
03	10 30·8	10 32·5	10 02·0	0·3 0·2	6·3 4·5	12·3 8·7
04	10 31·0	10 32·7	10 02·3	0·4 0·3	6·4 4·5	12·4 8·8
05	10 31·3	10 33·0	10 02·5	0·5 0·4	6·5 4·6	12·5 8·9
06	10 31·5	10 33·2	10 02·7	0·6 0·4	6·6 4·7	12·6 8·9
07	10 31·8	10 33·5	10 03·0	0·7 0·5	6·7 4·7	12·7 9·0
08	10 32·0	10 33·7	10 03·2	0·8 0·6	6·8 4·8	12·8 9·1
09	10 32·3	10 34·0	10 03·4	0·9 0·6	6·9 4·9	12·9 9·1
10	10 32·5	10 34·2	10 03·7	1·0 0·7	7·0 5·0	13·0 9·2
11	10 32·8	10 34·5	10 03·9	1·1 0·8	7·1 5·0	13·1 9·3
12	10 33·0	10 34·7	10 04·2	1·2 0·9	7·2 5·1	13·2 9·4
13	10 33·3	10 35·0	10 04·4	1·3 0·9	7·3 5·2	13·3 9·4
14	10 33·5	10 35·2	10 04·6	1·4 1·0	7·4 5·2	13·4 9·5
15	10 33·8	10 35·5	10 04·9	1·5 1·1	7·5 5·3	13·5 9·6
16	10 34·0	10 35·7	10 05·1	1·6 1·1	7·6 5·4	13·6 9·6
17	10 34·3	10 36·0	10 05·4	1·7 1·2	7·7 5·5	13·7 9·7
18	10 34·5	10 36·2	10 05·6	1·8 1·3	7·8 5·5	13·8 9·8
19	10 34·8	10 36·5	10 05·8	1·9 1·3	7·9 5·6	13·9 9·8
20	10 35·0	10 36·7	10 06·1	2·0 1·4	8·0 5·7	14·0 9·9
21	10 35·3	10 37·0	10 06·3	2·1 1·5	8·1 5·7	14·1 10·0
22	10 35·5	10 37·2	10 06·5	2·2 1·6	8·2 5·8	14·2 10·1
23	10 35·8	10 37·5	10 06·8	2·3 1·6	8·3 5·9	14·3 10·1
24	10 36·0	10 37·7	10 07·0	2·4 1·7	8·4 6·0	14·4 10·2
25	10 36·3	10 38·0	10 07·3	2·5 1·8	8·5 6·0	14·5 10·3
26	10 36·5	10 38·2	10 07·5	2·6 1·8	8·6 6·1	14·6 10·3
27	10 36·8	10 38·5	10 07·7	2·7 1·9	8·7 6·2	14·7 10·4
28	10 37·0	10 38·7	10 08·0	2·8 2·0	8·8 6·2	14·8 10·5
29	10 37·3	10 39·0	10 08·2	2·9 2·1	8·9 6·3	14·9 10·6
30	10 37·5	10 39·2	10 08·5	3·0 2·1	9·0 6·4	15·0 10·6
31	10 37·8	10 39·5	10 08·7	3·1 2·2	9·1 6·4	15·1 10·7
32	10 38·0	10 39·7	10 08·9	3·2 2·3	9·2 6·5	15·2 10·8
33	10 38·3	10 40·0	10 09·2	3·3 2·3	9·3 6·6	15·3 10·8
34	10 38·5	10 40·2	10 09·4	3·4 2·4	9·4 6·7	15·4 10·9
35	10 38·8	10 40·5	10 09·7	3·5 2·5	9·5 6·7	15·5 11·0
36	10 39·0	10 40·7	10 09·9	3·6 2·6	9·6 6·8	15·6 11·1
37	10 39·3	10 41·0	10 10·1	3·7 2·6	9·7 6·9	15·7 11·1
38	10 39·5	10 41·3	10 10·4	3·8 2·7	9·8 6·9	15·8 11·2
39	10 39·8	10 41·5	10 10·6	3·9 2·8	9·9 7·0	15·9 11·3
40	10 40·0	10 41·8	10 10·8	4·0 2·8	10·0 7·1	16·0 11·3
41	10 40·3	10 42·0	10 11·1	4·1 2·9	10·1 7·2	16·1 11·4
42	10 40·5	10 42·3	10 11·3	4·2 3·0	10·2 7·2	16·2 11·5
43	10 40·8	10 42·5	10 11·6	4·3 3·0	10·3 7·3	16·3 11·5
44	10 41·0	10 42·8	10 11·8	4·4 3·1	10·4 7·4	16·4 11·6
45	10 41·3	10 43·0	10 12·0	4·5 3·2	10·5 7·4	16·5 11·7
46	10 41·5	10 43·3	10 12·3	4·6 3·3	10·6 7·5	16·6 11·8
47	10 41·8	10 43·5	10 12·5	4·7 3·3	10·7 7·6	16·7 11·8
48	10 42·0	10 43·8	10 12·8	4·8 3·4	10·8 7·7	16·8 11·9
49	10 42·3	10 44·0	10 13·0	4·9 3·5	10·9 7·7	16·9 12·0
50	10 42·5	10 44·3	10 13·2	5·0 3·5	11·0 7·8	17·0 12·0
51	10 42·8	10 44·5	10 13·5	5·1 3·6	11·1 7·9	17·1 12·1
52	10 43·0	10 44·8	10 13·7	5·2 3·7	11·2 7·9	17·2 12·2
53	10 43·3	10 45·0	10 13·9	5·3 3·8	11·3 8·0	17·3 12·3
54	10 43·5	10 45·3	10 14·2	5·4 3·8	11·4 8·1	17·4 12·3
55	10 43·8	10 45·5	10 14·4	5·5 3·9	11·5 8·1	17·5 12·4
56	10 44·0	10 45·8	10 14·7	5·6 4·0	11·6 8·2	17·6 12·5
57	10 44·3	10 46·0	10 14·9	5·7 4·0	11·7 8·3	17·7 12·5
58	10 44·5	10 46·3	10 15·1	5·8 4·1	11·8 8·4	17·8 12·6
59	10 44·8	10 46·5	10 15·4	5·9 4·2	11·9 8·4	17·9 12·7
60	10 45·0	10 46·8	10 15·6	6·0 4·3	12·0 8·5	18·0 12·8

43m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or Corrn d ′ ′	v or Corrn d ′ ′	v or Corrn d ′ ′
00	10 45·0	10 46·8	10 15·6	0·0 0·0	6·0 4·4	12·0 8·7
01	10 45·3	10 47·0	10 15·9	0·1 0·1	6·1 4·4	12·1 8·8
02	10 45·5	10 47·3	10 16·1	0·2 0·1	6·2 4·5	12·2 8·8
03	10 45·8	10 47·5	10 16·3	0·3 0·2	6·3 4·6	12·3 8·9
04	10 46·0	10 47·8	10 16·6	0·4 0·3	6·4 4·6	12·4 9·0
05	10 46·3	10 48·0	10 16·8	0·5 0·4	6·5 4·7	12·5 9·1
06	10 46·5	10 48·3	10 17·0	0·6 0·4	6·6 4·8	12·6 9·1
07	10 46·8	10 48·5	10 17·3	0·7 0·5	6·7 4·9	12·7 9·2
08	10 47·0	10 48·8	10 17·5	0·8 0·6	6·8 4·9	12·8 9·3
09	10 47·3	10 49·0	10 17·8	0·9 0·7	6·9 5·0	12·9 9·4
10	10 47·5	10 49·3	10 18·0	1·0 0·7	7·0 5·1	13·0 9·4
11	10 47·8	10 49·5	10 18·2	1·1 0·8	7·1 5·1	13·1 9·5
12	10 48·0	10 49·8	10 18·5	1·2 0·9	7·2 5·2	13·2 9·6
13	10 48·3	10 50·0	10 18·7	1·3 0·9	7·3 5·3	13·3 9·6
14	10 48·5	10 50·3	10 19·0	1·4 1·0	7·4 5·4	13·4 9·7
15	10 48·8	10 50·5	10 19·2	1·5 1·1	7·5 5·4	13·5 9·8
16	10 49·0	10 50·8	10 19·4	1·6 1·2	7·6 5·5	13·6 9·9
17	10 49·3	10 51·0	10 19·7	1·7 1·2	7·7 5·6	13·7 9·9
18	10 49·5	10 51·3	10 19·9	1·8 1·3	7·8 5·7	13·8 10·0
19	10 49·8	10 51·5	10 20·2	1·9 1·4	7·9 5·7	13·9 10·1
20	10 50·0	10 51·8	10 20·4	2·0 1·5	8·0 5·8	14·0 10·2
21	10 50·3	10 52·0	10 20·6	2·1 1·5	8·1 5·9	14·1 10·2
22	10 50·5	10 52·3	10 20·9	2·2 1·6	8·2 5·9	14·2 10·3
23	10 50·8	10 52·5	10 21·1	2·3 1·7	8·3 6·0	14·3 10·4
24	10 51·0	10 52·8	10 21·3	2·4 1·7	8·4 6·1	14·4 10·4
25	10 51·3	10 53·0	10 21·6	2·5 1·8	8·5 6·2	14·5 10·5
26	10 51·5	10 53·3	10 21·8	2·6 1·9	8·6 6·2	14·6 10·6
27	10 51·8	10 53·5	10 22·1	2·7 2·0	8·7 6·3	14·7 10·7
28	10 52·0	10 53·8	10 22·3	2·8 2·0	8·8 6·4	14·8 10·7
29	10 52·3	10 54·0	10 22·5	2·9 2·1	8·9 6·5	14·9 10·8
30	10 52·5	10 54·3	10 22·8	3·0 2·2	9·0 6·5	15·0 10·9
31	10 52·8	10 54·5	10 23·0	3·1 2·2	9·1 6·6	15·1 10·9
32	10 53·0	10 54·8	10 23·3	3·2 2·3	9·2 6·7	15·2 11·0
33	10 53·3	10 55·0	10 23·5	3·3 2·4	9·3 6·7	15·3 11·1
34	10 53·5	10 55·3	10 23·7	3·4 2·5	9·4 6·8	15·4 11·2
35	10 53·8	10 55·5	10 24·0	3·5 2·5	9·5 6·9	15·5 11·2
36	10 54·0	10 55·8	10 24·2	3·6 2·6	9·6 7·0	15·6 11·3
37	10 54·3	10 56·0	10 24·4	3·7 2·7	9·7 7·0	15·7 11·4
38	10 54·5	10 56·3	10 24·7	3·8 2·8	9·8 7·1	15·8 11·5
39	10 54·8	10 56·5	10 24·9	3·9 2·8	9·9 7·2	15·9 11·5
40	10 55·0	10 56·8	10 25·2	4·0 2·9	10·0 7·3	16·0 11·6
41	10 55·3	10 57·0	10 25·4	4·1 3·0	10·1 7·3	16·1 11·7
42	10 55·5	10 57·3	10 25·6	4·2 3·0	10·2 7·4	16·2 11·7
43	10 55·8	10 57·5	10 25·9	4·3 3·1	10·3 7·5	16·3 11·8
44	10 56·0	10 57·8	10 26·1	4·4 3·2	10·4 7·5	16·4 11·9
45	10 56·3	10 58·0	10 26·4	4·5 3·3	10·5 7·6	16·5 12·0
46	10 56·5	10 58·3	10 26·6	4·6 3·3	10·6 7·7	16·6 12·0
47	10 56·8	10 58·5	10 26·8	4·7 3·4	10·7 7·8	16·7 12·1
48	10 57·0	10 58·8	10 27·1	4·8 3·5	10·8 7·8	16·8 12·2
49	10 57·3	10 59·0	10 27·3	4·9 3·6	10·9 7·9	16·9 12·3
50	10 57·5	10 59·3	10 27·5	5·0 3·6	11·0 8·0	17·0 12·3
51	10 57·8	10 59·6	10 27·8	5·1 3·7	11·1 8·0	17·1 12·4
52	10 58·0	10 59·8	10 28·0	5·2 3·8	11·2 8·1	17·2 12·5
53	10 58·3	11 00·1	10 28·3	5·3 3·8	11·3 8·2	17·3 12·5
54	10 58·5	11 00·3	10 28·5	5·4 3·9	11·4 8·3	17·4 12·6
55	10 58·8	11 00·6	10 28·7	5·5 4·0	11·5 8·3	17·5 12·7
56	10 59·0	11 00·8	10 29·0	5·6 4·1	11·6 8·4	17·6 12·8
57	10 59·3	11 01·1	10 29·2	5·7 4·1	11·7 8·5	17·7 12·8
58	10 59·5	11 01·3	10 29·5	5·8 4·2	11·8 8·6	17·8 12·9
59	10 59·8	11 01·6	10 29·7	5·9 4·3	11·9 8·6	17·9 13·0
60	11 00·0	11 01·8	10 29·9	6·0 4·4	12·0 8·7	18·0 13·1

44m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	11 00·0	11 01·8	10 29·9	0·0	0·0	6·0	4·5	12·0	8·9
01	11 00·3	11 02·1	10 30·2	0·1	0·1	6·1	4·5	12·1	9·0
02	11 00·5	11 02·3	10 30·4	0·2	0·1	6·2	4·6	12·2	9·0
03	11 00·8	11 02·6	10 30·6	0·3	0·2	6·3	4·7	12·3	9·1
04	11 01·0	11 02·8	10 30·9	0·4	0·3	6·4	4·7	12·4	9·2
05	11 01·3	11 03·1	10 31·1	0·5	0·4	6·5	4·8	12·5	9·3
06	11 01·5	11 03·3	10 31·4	0·6	0·4	6·6	4·9	12·6	9·3
07	11 01·8	11 03·6	10 31·6	0·7	0·5	6·7	5·0	12·7	9·4
08	11 02·0	11 03·8	10 31·8	0·8	0·6	6·8	5·0	12·8	9·5
09	11 02·3	11 04·1	10 32·1	0·9	0·7	6·9	5·1	12·9	9·6
10	11 02·5	11 04·3	10 32·3	1·0	0·7	7·0	5·2	13·0	9·6
11	11 02·8	11 04·6	10 32·6	1·1	0·8	7·1	5·3	13·1	9·7
12	11 03·0	11 04·8	10 32·8	1·2	0·9	7·2	5·3	13·2	9·8
13	11 03·3	11 05·1	10 33·0	1·3	1·0	7·3	5·4	13·3	9·9
14	11 03·5	11 05·3	10 33·3	1·4	1·0	7·4	5·5	13·4	9·9
15	11 03·8	11 05·6	10 33·5	1·5	1·1	7·5	5·6	13·5	10·0
16	11 04·0	11 05·8	10 33·8	1·6	1·2	7·6	5·6	13·6	10·1
17	11 04·3	11 06·1	10 34·0	1·7	1·3	7·7	5·7	13·7	10·2
18	11 04·5	11 06·3	10 34·2	1·8	1·3	7·8	5·8	13·8	10·2
19	11 04·8	11 06·6	10 34·5	1·9	1·4	7·9	5·9	13·9	10·3
20	11 05·0	11 06·8	10 34·7	2·0	1·5	8·0	5·9	14·0	10·4
21	11 05·3	11 07·1	10 34·9	2·1	1·6	8·1	6·0	14·1	10·5
22	11 05·5	11 07·3	10 35·2	2·2	1·6	8·2	6·1	14·2	10·5
23	11 05·8	11 07·6	10 35·4	2·3	1·7	8·3	6·2	14·3	10·6
24	11 06·0	11 07·8	10 35·7	2·4	1·8	8·4	6·2	14·4	10·7
25	11 06·3	11 08·1	10 35·9	2·5	1·9	8·5	6·3	14·5	10·8
26	11 06·5	11 08·3	10 36·1	2·6	1·9	8·6	6·4	14·6	10·8
27	11 06·8	11 08·6	10 36·4	2·7	2·0	8·7	6·5	14·7	10·9
28	11 07·0	11 08·8	10 36·6	2·8	2·1	8·8	6·5	14·8	11·0
29	11 07·3	11 09·1	10 36·9	2·9	2·2	8·9	6·6	14·9	11·1
30	11 07·5	11 09·3	10 37·1	3·0	2·2	9·0	6·7	15·0	11·1
31	11 07·8	11 09·6	10 37·3	3·1	2·3	9·1	6·7	15·1	11·2
32	11 08·0	11 09·8	10 37·6	3·2	2·4	9·2	6·8	15·2	11·3
33	11 08·3	11 10·1	10 37·8	3·3	2·4	9·3	6·9	15·3	11·3
34	11 08·5	11 10·3	10 38·0	3·4	2·5	9·4	7·0	15·4	11·4
35	11 08·8	11 10·6	10 38·3	3·5	2·6	9·5	7·0	15·5	11·5
36	11 09·0	11 10·8	10 38·5	3·6	2·7	9·6	7·1	15·6	11·6
37	11 09·3	11 11·1	10 38·8	3·7	2·7	9·7	7·2	15·7	11·6
38	11 09·5	11 11·3	10 39·0	3·8	2·8	9·8	7·3	15·8	11·7
39	11 09·8	11 11·6	10 39·2	3·9	2·9	9·9	7·3	15·9	11·8
40	11 10·0	11 11·8	10 39·5	4·0	3·0	10·0	7·4	16·0	11·9
41	11 10·3	11 12·1	10 39·7	4·1	3·0	10·1	7·5	16·1	11·9
42	11 10·5	11 12·3	10 40·0	4·2	3·1	10·2	7·6	16·2	12·0
43	11 10·8	11 12·6	10 40·2	4·3	3·2	10·3	7·6	16·3	12·1
44	11 11·0	11 12·8	10 40·4	4·4	3·3	10·4	7·7	16·4	12·2
45	11 11·3	11 13·1	10 40·7	4·5	3·3	10·5	7·8	16·5	12·2
46	11 11·5	11 13·3	10 40·9	4·6	3·4	10·6	7·9	16·6	12·3
47	11 11·8	11 13·6	10 41·1	4·7	3·5	10·7	7·9	16·7	12·4
48	11 12·0	11 13·8	10 41·4	4·8	3·6	10·8	8·0	16·8	12·5
49	11 12·3	11 14·1	10 41·6	4·9	3·6	10·9	8·1	16·9	12·5
50	11 12·5	11 14·3	10 41·9	5·0	3·7	11·0	8·2	17·0	12·6
51	11 12·8	11 14·6	10 42·1	5·1	3·8	11·1	8·2	17·1	12·7
52	11 13·0	11 14·8	10 42·3	5·2	3·9	11·2	8·3	17·2	12·8
53	11 13·3	11 15·1	10 42·6	5·3	3·9	11·3	8·4	17·3	12·8
54	11 13·5	11 15·3	10 42·8	5·4	4·0	11·4	8·5	17·4	12·9
55	11 13·8	11 15·6	10 43·1	5·5	4·1	11·5	8·5	17·5	13·0
56	11 14·0	11 15·8	10 43·3	5·6	4·2	11·6	8·6	17·6	13·1
57	11 14·3	11 16·1	10 43·5	5·7	4·2	11·7	8·7	17·7	13·1
58	11 14·5	11 16·3	10 43·8	5·8	4·3	11·8	8·8	17·8	13·2
59	11 14·8	11 16·6	10 44·0	5·9	4·4	11·9	8·8	17·9	13·3
60	11 15·0	11 16·8	10 44·3	6·0	4·5	12·0	8·9	18·0	13·4

45m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	11 15·0	11 16·8	10 44·3	0·0	0·0	6·0	4·6	12·0	9·1
01	11 15·3	11 17·1	10 44·5	0·1	0·1	6·1	4·6	12·1	9·2
02	11 15·5	11 17·3	10 44·7	0·2	0·2	6·2	4·7	12·2	9·3
03	11 15·8	11 17·6	10 45·0	0·3	0·2	6·3	4·8	12·3	9·3
04	11 16·0	11 17·9	10 45·2	0·4	0·3	6·4	4·9	12·4	9·4
05	11 16·3	11 18·1	10 45·4	0·5	0·4	6·5	4·9	12·5	9·5
06	11 16·5	11 18·4	10 45·7	0·6	0·5	6·6	5·0	12·6	9·6
07	11 16·8	11 18·6	10 45·9	0·7	0·5	6·7	5·1	12·7	9·6
08	11 17·0	11 18·9	10 46·2	0·8	0·6	6·8	5·2	12·8	9·7
09	11 17·3	11 19·1	10 46·4	0·9	0·7	6·9	5·2	12·9	9·8
10	11 17·5	11 19·4	10 46·6	1·0	0·8	7·0	5·3	13·0	9·9
11	11 17·8	11 19·6	10 46·9	1·1	0·8	7·1	5·4	13·1	9·9
12	11 18·0	11 19·9	10 47·1	1·2	0·9	7·2	5·5	13·2	10·0
13	11 18·3	11 20·1	10 47·4	1·3	1·0	7·3	5·5	13·3	10·1
14	11 18·5	11 20·4	10 47·6	1·4	1·1	7·4	5·6	13·4	10·2
15	11 18·8	11 20·6	10 47·8	1·5	1·1	7·5	5·7	13·5	10·2
16	11 19·0	11 20·9	10 48·1	1·6	1·2	7·6	5·8	13·6	10·3
17	11 19·3	11 21·1	10 48·3	1·7	1·3	7·7	5·8	13·7	10·4
18	11 19·5	11 21·4	10 48·5	1·8	1·4	7·8	5·9	13·8	10·5
19	11 19·8	11 21·6	10 48·8	1·9	1·4	7·9	6·0	13·9	10·5
20	11 20·0	11 21·9	10 49·0	2·0	1·5	8·0	6·1	14·0	10·6
21	11 20·3	11 22·1	10 49·3	2·1	1·6	8·1	6·1	14·1	10·7
22	11 20·5	11 22·4	10 49·5	2·2	1·7	8·2	6·2	14·2	10·8
23	11 20·8	11 22·6	10 49·7	2·3	1·7	8·3	6·3	14·3	10·8
24	11 21·0	11 22·9	10 50·0	2·4	1·8	8·4	6·4	14·4	10·9
25	11 21·3	11 23·1	10 50·2	2·5	1·9	8·5	6·4	14·5	11·0
26	11 21·5	11 23·4	10 50·5	2·6	2·0	8·6	6·5	14·6	11·1
27	11 21·8	11 23·6	10 50·7	2·7	2·0	8·7	6·6	14·7	11·1
28	11 22·0	11 23·9	10 50·9	2·8	2·1	8·8	6·7	14·8	11·2
29	11 22·3	11 24·1	10 51·2	2·9	2·2	8·9	6·7	14·9	11·3
30	11 22·5	11 24·4	10 51·4	3·0	2·3	9·0	6·8	15·0	11·4
31	11 22·8	11 24·6	10 51·6	3·1	2·4	9·1	6·9	15·1	11·5
32	11 23·0	11 24·9	10 51·9	3·2	2·4	9·2	7·0	15·2	11·5
33	11 23·3	11 25·1	10 52·1	3·3	2·5	9·3	7·1	15·3	11·6
34	11 23·5	11 25·4	10 52·4	3·4	2·6	9·4	7·1	15·4	11·7
35	11 23·8	11 25·6	10 52·6	3·5	2·7	9·5	7·2	15·5	11·8
36	11 24·0	11 25·9	10 52·8	3·6	2·7	9·6	7·3	15·6	11·8
37	11 24·3	11 26·1	10 53·1	3·7	2·8	9·7	7·4	15·7	11·9
38	11 24·5	11 26·4	10 53·3	3·8	2·9	9·8	7·4	15·8	12·0
39	11 24·8	11 26·6	10 53·6	3·9	3·0	9·9	7·5	15·9	12·1
40	11 25·0	11 26·9	10 53·8	4·0	3·0	10·0	7·6	16·0	12·1
41	11 25·3	11 27·1	10 54·0	4·1	3·1	10·1	7·7	16·1	12·2
42	11 25·5	11 27·4	10 54·3	4·2	3·2	10·2	7·7	16·2	12·3
43	11 25·8	11 27·6	10 54·5	4·3	3·3	10·3	7·8	16·3	12·4
44	11 26·0	11 27·9	10 54·7	4·4	3·3	10·4	7·9	16·4	12·4
45	11 26·3	11 28·1	10 55·0	4·5	3·4	10·5	8·0	16·5	12·5
46	11 26·5	11 28·4	10 55·2	4·6	3·5	10·6	8·0	16·6	12·6
47	11 26·8	11 28·6	10 55·5	4·7	3·6	10·7	8·1	16·7	12·7
48	11 27·0	11 28·9	10 55·7	4·8	3·6	10·8	8·2	16·8	12·7
49	11 27·3	11 29·1	10 55·9	4·9	3·7	10·9	8·3	16·9	12·8
50	11 27·5	11 29·4	10 56·2	5·0	3·8	11·0	8·3	17·0	12·9
51	11 27·8	11 29·6	10 56·4	5·1	3·9	11·1	8·4	17·1	13·0
52	11 28·0	11 29·9	10 56·7	5·2	3·9	11·2	8·5	17·2	13·0
53	11 28·3	11 30·1	10 56·9	5·3	4·0	11·3	8·6	17·3	13·1
54	11 28·5	11 30·4	10 57·1	5·4	4·1	11·4	8·6	17·4	13·2
55	11 28·8	11 30·6	10 57·4	5·5	4·2	11·5	8·7	17·5	13·3
56	11 29·0	11 30·9	10 57·6	5·6	4·2	11·6	8·8	17·6	13·3
57	11 29·3	11 31·1	10 57·9	5·7	4·3	11·7	8·9	17·7	13·4
58	11 29·5	11 31·4	10 58·1	5·8	4·4	11·8	8·9	17·8	13·5
59	11 29·8	11 31·6	10 58·3	5·9	4·5	11·9	9·0	17·9	13·6
60	11 30·0	11 31·9	10 58·6	6·0	4·6	12·0	9·1	18·0	13·7

46m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	11 30·0	11 31·9	10 58·6	0·0	0·0	6·0	4·7	12·0	9·3
01	11 30·3	11 32·1	10 58·8	0·1	0·1	6·1	4·7	12·1	9·4
02	11 30·5	11 32·4	10 59·0	0·2	0·2	6·2	4·8	12·2	9·5
03	11 30·8	11 32·6	10 59·3	0·3	0·2	6·3	4·9	12·3	9·5
04	11 31·0	11 32·9	10 59·5	0·4	0·3	6·4	5·0	12·4	9·6
05	11 31·3	11 33·1	10 59·8	0·5	0·4	6·5	5·0	12·5	9·7
06	11 31·5	11 33·4	11 00·0	0·6	0·5	6·6	5·1	12·6	9·8
07	11 31·8	11 33·6	11 00·2	0·7	0·5	6·7	5·2	12·7	9·8
08	11 32·0	11 33·9	11 00·5	0·8	0·6	6·8	5·3	12·8	9·9
09	11 32·3	11 34·1	11 00·7	0·9	0·7	6·9	5·3	12·9	10·0
10	11 32·5	11 34·4	11 01·0	1·0	0·8	7·0	5·4	13·0	10·1
11	11 32·8	11 34·6	11 01·2	1·1	0·9	7·1	5·5	13·1	10·2
12	11 33·0	11 34·9	11 01·4	1·2	0·9	7·2	5·6	13·2	10·2
13	11 33·3	11 35·1	11 01·7	1·3	1·0	7·3	5·7	13·3	10·3
14	11 33·5	11 35·4	11 01·9	1·4	1·1	7·4	5·7	13·4	10·4
15	11 33·8	11 35·6	11 02·1	1·5	1·2	7·5	5·8	13·5	10·5
16	11 34·0	11 35·9	11 02·4	1·6	1·2	7·6	5·9	13·6	10·5
17	11 34·3	11 36·2	11 02·6	1·7	1·3	7·7	6·0	13·7	10·6
18	11 34·5	11 36·4	11 02·9	1·8	1·4	7·8	6·0	13·8	10·7
19	11 34·8	11 36·7	11 03·1	1·9	1·5	7·9	6·1	13·9	10·8
20	11 35·0	11 36·9	11 03·3	2·0	1·6	8·0	6·2	14·0	10·9
21	11 35·3	11 37·2	11 03·6	2·1	1·6	8·1	6·3	14·1	10·9
22	11 35·5	11 37·4	11 03·8	2·2	1·7	8·2	6·4	14·2	11·0
23	11 35·8	11 37·7	11 04·1	2·3	1·8	8·3	6·4	14·3	11·1
24	11 36·0	11 37·9	11 04·3	2·4	1·9	8·4	6·5	14·4	11·2
25	11 36·3	11 38·2	11 04·5	2·5	1·9	8·5	6·6	14·5	11·2
26	11 36·5	11 38·4	11 04·8	2·6	2·0	8·6	6·7	14·6	11·3
27	11 36·8	11 38·7	11 05·0	2·7	2·1	8·7	6·7	14·7	11·4
28	11 37·0	11 38·9	11 05·2	2·8	2·2	8·8	6·8	14·8	11·5
29	11 37·3	11 39·2	11 05·5	2·9	2·2	8·9	6·9	14·9	11·5
30	11 37·5	11 39·4	11 05·7	3·0	2·3	9·0	7·0	15·0	11·6
31	11 37·8	11 39·7	11 06·0	3·1	2·4	9·1	7·1	15·1	11·7
32	11 38·0	11 39·9	11 06·2	3·2	2·5	9·2	7·1	15·2	11·8
33	11 38·3	11 40·2	11 06·4	3·3	2·6	9·3	7·2	15·3	11·9
34	11 38·5	11 40·4	11 06·7	3·4	2·6	9·4	7·3	15·4	11·9
35	11 38·8	11 40·7	11 06·9	3·5	2·7	9·5	7·4	15·5	12·0
36	11 39·0	11 40·9	11 07·2	3·6	2·8	9·6	7·4	15·6	12·1
37	11 39·3	11 41·2	11 07·4	3·7	2·9	9·7	7·5	15·7	12·2
38	11 39·5	11 41·4	11 07·6	3·8	2·9	9·8	7·6	15·8	12·2
39	11 39·8	11 41·7	11 07·9	3·9	3·0	9·9	7·7	15·9	12·3
40	11 40·0	11 41·9	11 08·1	4·0	3·1	10·0	7·8	16·0	12·4
41	11 40·3	11 42·2	11 08·3	4·1	3·2	10·1	7·8	16·1	12·5
42	11 40·5	11 42·4	11 08·6	4·2	3·3	10·2	7·9	16·2	12·6
43	11 40·8	11 42·7	11 08·8	4·3	3·3	10·3	8·0	16·3	12·6
44	11 41·0	11 42·9	11 09·1	4·4	3·4	10·4	8·1	16·4	12·7
45	11 41·3	11 43·2	11 09·3	4·5	3·5	10·5	8·1	16·5	12·8
46	11 41·5	11 43·4	11 09·5	4·6	3·6	10·6	8·2	16·6	12·9
47	11 41·8	11 43·7	11 09·8	4·7	3·6	10·7	8·3	16·7	12·9
48	11 42·0	11 43·9	11 10·0	4·8	3·7	10·8	8·4	16·8	13·0
49	11 42·3	11 44·2	11 10·3	4·9	3·8	10·9	8·4	16·9	13·1
50	11 42·5	11 44·4	11 10·5	5·0	3·9	11·0	8·5	17·0	13·2
51	11 42·8	11 44·7	11 10·7	5·1	4·0	11·1	8·6	17·1	13·3
52	11 43·0	11 44·9	11 11·0	5·2	4·0	11·2	8·7	17·2	13·3
53	11 43·3	11 45·2	11 11·2	5·3	4·1	11·3	8·8	17·3	13·4
54	11 43·5	11 45·4	11 11·5	5·4	4·2	11·4	8·8	17·4	13·5
55	11 43·8	11 45·7	11 11·7	5·5	4·3	11·5	8·9	17·5	13·6
56	11 44·0	11 45·9	11 11·9	5·6	4·3	11·6	9·0	17·6	13·6
57	11 44·3	11 46·2	11 12·2	5·7	4·4	11·7	9·1	17·7	13·7
58	11 44·5	11 46·4	11 12·4	5·8	4·5	11·8	9·1	17·8	13·8
59	11 44·8	11 46·7	11 12·6	5·9	4·6	11·9	9·2	17·9	13·9
60	11 45·0	11 46·9	11 12·9	6·0	4·7	12·0	9·3	18·0	14·0

47m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	11 45·0	11 46·9	11 12·9	0·0	0·0	6·0	4·8	12·0	9·5
01	11 45·3	11 47·2	11 13·1	0·1	0·1	6·1	4·8	12·1	9·6
02	11 45·5	11 47·4	11 13·4	0·2	0·2	6·2	4·9	12·2	9·7
03	11 45·8	11 47·7	11 13·6	0·3	0·2	6·3	5·0	12·3	9·7
04	11 46·0	11 47·9	11 13·8	0·4	0·3	6·4	5·1	12·4	9·8
05	11 46·3	11 48·2	11 14·1	0·5	0·4	6·5	5·1	12·5	9·9
06	11 46·5	11 48·4	11 14·3	0·6	0·5	6·6	5·2	12·6	10·0
07	11 46·8	11 48·7	11 14·6	0·7	0·6	6·7	5·3	12·7	10·1
08	11 47·0	11 48·9	11 14·8	0·8	0·6	6·8	5·4	12·8	10·1
09	11 47·3	11 49·2	11 15·0	0·9	0·7	6·9	5·5	12·9	10·2
10	11 47·5	11 49·4	11 15·3	1·0	0·8	7·0	5·5	13·0	10·3
11	11 47·8	11 49·7	11 15·5	1·1	0·9	7·1	5·6	13·1	10·4
12	11 48·0	11 49·9	11 15·7	1·2	1·0	7·2	5·7	13·2	10·5
13	11 48·3	11 50·2	11 16·0	1·3	1·0	7·3	5·8	13·3	10·5
14	11 48·5	11 50·4	11 16·2	1·4	1·1	7·4	5·9	13·4	10·6
15	11 48·8	11 50·7	11 16·5	1·5	1·2	7·5	5·9	13·5	10·7
16	11 49·0	11 50·9	11 16·7	1·6	1·3	7·6	6·0	13·6	10·8
17	11 49·3	11 51·2	11 16·9	1·7	1·3	7·7	6·1	13·7	10·8
18	11 49·5	11 51·4	11 17·2	1·8	1·4	7·8	6·2	13·8	10·9
19	11 49·8	11 51·7	11 17·4	1·9	1·5	7·9	6·3	13·9	11·0
20	11 50·0	11 51·9	11 17·7	2·0	1·6	8·0	6·3	14·0	11·1
21	11 50·3	11 52·2	11 17·9	2·1	1·7	8·1	6·4	14·1	11·2
22	11 50·5	11 52·4	11 18·1	2·2	1·7	8·2	6·5	14·2	11·2
23	11 50·8	11 52·7	11 18·4	2·3	1·8	8·3	6·6	14·3	11·3
24	11 51·0	11 52·9	11 18·6	2·4	1·9	8·4	6·7	14·4	11·4
25	11 51·3	11 53·2	11 18·8	2·5	2·0	8·5	6·7	14·5	11·5
26	11 51·5	11 53·4	11 19·1	2·6	2·1	8·6	6·8	14·6	11·6
27	11 51·8	11 53·7	11 19·3	2·7	2·1	8·7	6·9	14·7	11·6
28	11 52·0	11 53·9	11 19·6	2·8	2·2	8·8	7·0	14·8	11·7
29	11 52·3	11 54·2	11 19·8	2·9	2·3	8·9	7·0	14·9	11·8
30	11 52·5	11 54·5	11 20·0	3·0	2·4	9·0	7·1	15·0	11·9
31	11 52·8	11 54·7	11 20·3	3·1	2·5	9·1	7·2	15·1	12·0
32	11 53·0	11 55·0	11 20·5	3·2	2·5	9·2	7·3	15·2	12·0
33	11 53·3	11 55·2	11 20·8	3·3	2·6	9·3	7·4	15·3	12·1
34	11 53·5	11 55·5	11 21·0	3·4	2·7	9·4	7·4	15·4	12·2
35	11 53·8	11 55·7	11 21·2	3·5	2·8	9·5	7·5	15·5	12·3
36	11 54·0	11 56·0	11 21·5	3·6	2·9	9·6	7·6	15·6	12·4
37	11 54·3	11 56·2	11 21·7	3·7	2·9	9·7	7·7	15·7	12·4
38	11 54·5	11 56·5	11 22·0	3·8	3·0	9·8	7·8	15·8	12·5
39	11 54·8	11 56·7	11 22·2	3·9	3·1	9·9	7·8	15·9	12·6
40	11 55·0	11 57·0	11 22·4	4·0	3·2	10·0	7·9	16·0	12·7
41	11 55·3	11 57·2	11 22·7	4·1	3·2	10·1	8·0	16·1	12·7
42	11 55·5	11 57·5	11 22·9	4·2	3·3	10·2	8·1	16·2	12·8
43	11 55·8	11 57·7	11 23·1	4·3	3·4	10·3	8·2	16·3	12·9
44	11 56·0	11 58·0	11 23·4	4·4	3·5	10·4	8·2	16·4	13·0
45	11 56·3	11 58·2	11 23·6	4·5	3·6	10·5	8·3	16·5	13·1
46	11 56·5	11 58·5	11 23·9	4·6	3·6	10·6	8·4	16·6	13·1
47	11 56·8	11 58·7	11 24·1	4·7	3·7	10·7	8·5	16·7	13·2
48	11 57·0	11 59·0	11 24·3	4·8	3·8	10·8	8·6	16·8	13·3
49	11 57·3	11 59·2	11 24·6	4·9	3·9	10·9	8·6	16·9	13·4
50	11 57·5	11 59·5	11 24·8	5·0	4·0	11·0	8·7	17·0	13·5
51	11 57·8	11 59·7	11 25·1	5·1	4·0	11·1	8·8	17·1	13·5
52	11 58·0	12 00·0	11 25·3	5·2	4·1	11·2	8·9	17·2	13·6
53	11 58·3	12 00·2	11 25·5	5·3	4·2	11·3	8·9	17·3	13·7
54	11 58·5	12 00·5	11 25·8	5·4	4·3	11·4	9·0	17·4	13·8
55	11 58·8	12 00·7	11 26·0	5·5	4·4	11·5	9·1	17·5	13·9
56	11 59·0	12 01·0	11 26·2	5·6	4·4	11·6	9·2	17·6	13·9
57	11 59·3	12 01·2	11 26·5	5·7	4·5	11·7	9·3	17·7	14·0
58	11 59·5	12 01·5	11 26·7	5·8	4·6	11·8	9·3	17·8	14·1
59	11 59·8	12 01·7	11 27·0	5·9	4·7	11·9	9·4	17·9	14·2
60	12 00·0	12 02·0	11 27·2	6·0	4·8	12·0	9·5	18·0	14·3

48m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	12 00·0	12 02·0	11 27·2	0·0	0·0	6·0	4·9	12·0	9·7
01	12 00·3	12 02·2	11 27·4	0·1	0·1	6·1	4·9	12·1	9·8
02	12 00·5	12 02·5	11 27·7	0·2	0·2	6·2	5·0	12·2	9·9
03	12 00·8	12 02·7	11 27·9	0·3	0·2	6·3	5·1	12·3	9·9
04	12 01·0	12 03·0	11 28·2	0·4	0·3	6·4	5·2	12·4	10·0
05	12 01·3	12 03·2	11 28·4	0·5	0·4	6·5	5·3	12·5	10·1
06	12 01·5	12 03·5	11 28·6	0·6	0·5	6·6	5·3	12·6	10·2
07	12 01·8	12 03·7	11 28·9	0·7	0·6	6·7	5·4	12·7	10·3
08	12 02·0	12 04·0	11 29·1	0·8	0·6	6·8	5·5	12·8	10·3
09	12 02·3	12 04·2	11 29·3	0·9	0·7	6·9	5·6	12·9	10·4
10	12 02·5	12 04·5	11 29·6	1·0	0·8	7·0	5·7	13·0	10·5
11	12 02·8	12 04·7	11 29·8	1·1	0·9	7·1	5·7	13·1	10·6
12	12 03·0	12 05·0	11 30·1	1·2	1·0	7·2	5·8	13·2	10·7
13	12 03·3	12 05·2	11 30·3	1·3	1·1	7·3	5·9	13·3	10·8
14	12 03·5	12 05·5	11 30·5	1·4	1·1	7·4	6·0	13·4	10·8
15	12 03·8	12 05·7	11 30·8	1·5	1·2	7·5	6·1	13·5	10·9
16	12 04·0	12 06·0	11 31·0	1·6	1·3	7·6	6·1	13·6	11·0
17	12 04·3	12 06·2	11 31·3	1·7	1·4	7·7	6·2	13·7	11·1
18	12 04·5	12 06·5	11 31·5	1·8	1·5	7·8	6·3	13·8	11·2
19	12 04·8	12 06·7	11 31·7	1·9	1·5	7·9	6·4	13·9	11·2
20	12 05·0	12 07·0	11 32·0	2·0	1·6	8·0	6·5	14·0	11·3
21	12 05·3	12 07·2	11 32·2	2·1	1·7	8·1	6·5	14·1	11·4
22	12 05·5	12 07·5	11 32·4	2·2	1·8	8·2	6·6	14·2	11·5
23	12 05·8	12 07·7	11 32·7	2·3	1·9	8·3	6·7	14·3	11·6
24	12 06·0	12 08·0	11 32·9	2·4	1·9	8·4	6·8	14·4	11·6
25	12 06·3	12 08·2	11 33·2	2·5	2·0	8·5	6·9	14·5	11·7
26	12 06·5	12 08·5	11 33·4	2·6	2·1	8·6	7·0	14·6	11·8
27	12 06·8	12 08·7	11 33·6	2·7	2·2	8·7	7·0	14·7	11·9
28	12 07·0	12 09·0	11 33·9	2·8	2·3	8·8	7·1	14·8	12·0
29	12 07·3	12 09·2	11 34·1	2·9	2·3	8·9	7·2	14·9	12·0
30	12 07·5	12 09·5	11 34·4	3·0	2·4	9·0	7·3	15·0	12·1
31	12 07·8	12 09·7	11 34·6	3·1	2·5	9·1	7·4	15·1	12·2
32	12 08·0	12 10·0	11 34·8	3·2	2·6	9·2	7·4	15·2	12·3
33	12 08·3	12 10·2	11 35·1	3·3	2·7	9·3	7·5	15·3	12·4
34	12 08·5	12 10·5	11 35·3	3·4	2·7	9·4	7·6	15·4	12·4
35	12 08·8	12 10·7	11 35·6	3·5	2·8	9·5	7·7	15·5	12·5
36	12 09·0	12 11·0	11 35·8	3·6	2·9	9·6	7·8	15·6	12·6
37	12 09·3	12 11·2	11 36·0	3·7	3·0	9·7	7·8	15·7	12·7
38	12 09·5	12 11·5	11 36·3	3·8	3·1	9·8	7·9	15·8	12·8
39	12 09·8	12 11·7	11 36·5	3·9	3·2	9·9	8·0	15·9	12·9
40	12 10·0	12 12·0	11 36·7	4·0	3·2	10·0	8·1	16·0	12·9
41	12 10·3	12 12·2	11 37·0	4·1	3·3	10·1	8·2	16·1	13·0
42	12 10·5	12 12·5	11 37·2	4·2	3·4	10·2	8·2	16·2	13·1
43	12 10·8	12 12·8	11 37·5	4·3	3·5	10·3	8·3	16·3	13·2
44	12 11·0	12 13·0	11 37·7	4·4	3·6	10·4	8·4	16·4	13·3
45	12 11·3	12 13·3	11 37·9	4·5	3·6	10·5	8·5	16·5	13·3
46	12 11·5	12 13·5	11 38·2	4·6	3·7	10·6	8·6	16·6	13·4
47	12 11·8	12 13·8	11 38·4	4·7	3·8	10·7	8·6	16·7	13·5
48	12 12·0	12 14·0	11 38·7	4·8	3·9	10·8	8·7	16·8	13·6
49	12 12·3	12 14·3	11 38·9	4·9	4·0	10·9	8·8	16·9	13·7
50	12 12·5	12 14·5	11 39·1	5·0	4·0	11·0	8·9	17·0	13·7
51	12 12·8	12 14·8	11 39·4	5·1	4·1	11·1	9·0	17·1	13·8
52	12 13·0	12 15·0	11 39·6	5·2	4·2	11·2	9·1	17·2	13·9
53	12 13·3	12 15·3	11 39·8	5·3	4·3	11·3	9·1	17·3	14·0
54	12 13·5	12 15·5	11 40·1	5·4	4·4	11·4	9·2	17·4	14·1
55	12 13·8	12 15·8	11 40·3	5·5	4·4	11·5	9·3	17·5	14·1
56	12 14·0	12 16·0	11 40·6	5·6	4·5	11·6	9·4	17·6	14·2
57	12 14·3	12 16·3	11 40·8	5·7	4·6	11·7	9·5	17·7	14·3
58	12 14·5	12 16·5	11 41·0	5·8	4·7	11·8	9·5	17·8	14·4
59	12 14·8	12 16·8	11 41·3	5·9	4·8	11·9	9·6	17·9	14·5
60	12 15·0	12 17·0	11 41·5	6·0	4·9	12·0	9·7	18·0	14·6

49m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	12 15·0	12 17·0	11 41·5	0·0	0·0	6·0	5·0	12·0	9·9
01	12 15·3	12 17·3	11 41·8	0·1	0·1	6·1	5·0	12·1	10·0
02	12 15·5	12 17·5	11 42·0	0·2	0·2	6·2	5·1	12·2	10·1
03	12 15·8	12 17·8	11 42·2	0·3	0·2	6·3	5·2	12·3	10·1
04	12 16·0	12 18·0	11 42·5	0·4	0·3	6·4	5·3	12·4	10·2
05	12 16·3	12 18·3	11 42·7	0·5	0·4	6·5	5·4	12·5	10·3
06	12 16·5	12 18·5	11 42·9	0·6	0·5	6·6	5·4	12·6	10·4
07	12 16·8	12 18·8	11 43·2	0·7	0·6	6·7	5·5	12·7	10·5
08	12 17·0	12 19·0	11 43·4	0·8	0·7	6·8	5·6	12·8	10·6
09	12 17·3	12 19·3	11 43·7	0·9	0·7	6·9	5·7	12·9	10·6
10	12 17·5	12 19·5	11 43·9	1·0	0·8	7·0	5·8	13·0	10·7
11	12 17·8	12 19·8	11 44·1	1·1	0·9	7·1	5·9	13·1	10·8
12	12 18·0	12 20·0	11 44·4	1·2	1·0	7·2	5·9	13·2	10·9
13	12 18·3	12 20·3	11 44·6	1·3	1·1	7·3	6·0	13·3	11·0
14	12 18·5	12 20·5	11 44·9	1·4	1·2	7·4	6·1	13·4	11·1
15	12 18·8	12 20·8	11 45·1	1·5	1·2	7·5	6·2	13·5	11·1
16	12 19·0	12 21·0	11 45·3	1·6	1·3	7·6	6·3	13·6	11·2
17	12 19·3	12 21·3	11 45·6	1·7	1·4	7·7	6·4	13·7	11·3
18	12 19·5	12 21·5	11 45·8	1·8	1·5	7·8	6·4	13·8	11·4
19	12 19·8	12 21·8	11 46·1	1·9	1·6	7·9	6·5	13·9	11·5
20	12 20·0	12 22·0	11 46·3	2·0	1·7	8·0	6·6	14·0	11·6
21	12 20·3	12 22·3	11 46·5	2·1	1·7	8·1	6·7	14·1	11·6
22	12 20·5	12 22·5	11 46·8	2·2	1·8	8·2	6·8	14·2	11·7
23	12 20·8	12 22·8	11 47·0	2·3	1·9	8·3	6·8	14·3	11·8
24	12 21·0	12 23·0	11 47·2	2·4	2·0	8·4	6·9	14·4	11·9
25	12 21·3	12 23·3	11 47·5	2·5	2·1	8·5	7·0	14·5	12·0
26	12 21·5	12 23·5	11 47·7	2·6	2·1	8·6	7·1	14·6	12·0
27	12 21·8	12 23·8	11 48·0	2·7	2·2	8·7	7·2	14·7	12·1
28	12 22·0	12 24·0	11 48·2	2·8	2·3	8·8	7·3	14·8	12·2
29	12 22·3	12 24·3	11 48·4	2·9	2·4	8·9	7·3	14·9	12·3
30	12 22·5	12 24·5	11 48·7	3·0	2·5	9·0	7·4	15·0	12·4
31	12 22·8	12 24·8	11 48·9	3·1	2·6	9·1	7·5	15·1	12·5
32	12 23·0	12 25·0	11 49·2	3·2	2·6	9·2	7·6	15·2	12·5
33	12 23·3	12 25·3	11 49·4	3·3	2·7	9·3	7·7	15·3	12·6
34	12 23·5	12 25·5	11 49·6	3·4	2·8	9·4	7·8	15·4	12·7
35	12 23·8	12 25·8	11 49·9	3·5	2·9	9·5	7·8	15·5	12·8
36	12 24·0	12 26·0	11 50·1	3·6	3·0	9·6	7·9	15·6	12·9
37	12 24·3	12 26·3	11 50·3	3·7	3·1	9·7	8·0	15·7	13·0
38	12 24·5	12 26·5	11 50·6	3·8	3·1	9·8	8·1	15·8	13·0
39	12 24·8	12 26·8	11 50·8	3·9	3·2	9·9	8·2	15·9	13·1
40	12 25·0	12 27·0	11 51·1	4·0	3·3	10·0	8·3	16·0	13·2
41	12 25·3	12 27·3	11 51·3	4·1	3·4	10·1	8·3	16·1	13·3
42	12 25·5	12 27·5	11 51·5	4·2	3·5	10·2	8·4	16·2	13·4
43	12 25·8	12 27·8	11 51·8	4·3	3·5	10·3	8·5	16·3	13·4
44	12 26·0	12 28·0	11 52·0	4·4	3·6	10·4	8·6	16·4	13·5
45	12 26·3	12 28·3	11 52·3	4·5	3·7	10·5	8·7	16·5	13·6
46	12 26·5	12 28·5	11 52·5	4·6	3·8	10·6	8·7	16·6	13·7
47	12 26·8	12 28·8	11 52·7	4·7	3·9	10·7	8·8	16·7	13·8
48	12 27·0	12 29·0	11 53·0	4·8	4·0	10·8	8·9	16·8	13·9
49	12 27·3	12 29·3	11 53·2	4·9	4·0	10·9	9·0	16·9	13·9
50	12 27·5	12 29·5	11 53·4	5·0	4·1	11·0	9·1	17·0	14·0
51	12 27·8	12 29·8	11 53·7	5·1	4·2	11·1	9·2	17·1	14·1
52	12 28·0	12 30·0	11 53·9	5·2	4·3	11·2	9·2	17·2	14·2
53	12 28·3	12 30·3	11 54·2	5·3	4·4	11·3	9·3	17·3	14·3
54	12 28·5	12 30·5	11 54·4	5·4	4·5	11·4	9·4	17·4	14·4
55	12 28·8	12 30·8	11 54·6	5·5	4·5	11·5	9·5	17·5	14·4
56	12 29·0	12 31·1	11 54·9	5·6	4·6	11·6	9·6	17·6	14·5
57	12 29·3	12 31·3	11 55·1	5·7	4·7	11·7	9·7	17·7	14·6
58	12 29·5	12 31·6	11 55·4	5·8	4·8	11·8	9·7	17·8	14·7
59	12 29·8	12 31·8	11 55·6	5·9	4·9	11·9	9·8	17·9	14·8
60	12 30·0	12 32·1	11 55·8	6·0	5·0	12·0	9·9	18·0	14·9

50m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or Corrn d ′ ′	v or Corrn d ′ ′	v or Corrn d ′ ′
00	12 30·0	12 32·1	11 55·8	0·0 0·0	6·0 5·1	12·0 10·1
01	12 30·3	12 32·3	11 56·1	0·1 0·1	6·1 5·1	12·1 10·2
02	12 30·5	12 32·6	11 56·3	0·2 0·2	6·2 5·2	12·2 10·3
03	12 30·8	12 32·8	11 56·5	0·3 0·3	6·3 5·3	12·3 10·4
04	12 31·0	12 33·1	11 56·8	0·4 0·3	6·4 5·4	12·4 10·4
05	12 31·3	12 33·3	11 57·0	0·5 0·4	6·5 5·5	12·5 10·5
06	12 31·5	12 33·6	11 57·3	0·6 0·5	6·6 5·6	12·6 10·6
07	12 31·8	12 33·8	11 57·5	0·7 0·6	6·7 5·6	12·7 10·7
08	12 32·0	12 34·1	11 57·7	0·8 0·7	6·8 5·7	12·8 10·8
09	12 32·3	12 34·3	11 58·0	0·9 0·8	6·9 5·8	12·9 10·9
10	12 32·5	12 34·6	11 58·2	1·0 0·8	7·0 5·9	13·0 10·9
11	12 32·8	12 34·8	11 58·5	1·1 0·9	7·1 6·0	13·1 11·0
12	12 33·0	12 35·1	11 58·7	1·2 1·0	7·2 6·1	13·2 11·1
13	12 33·3	12 35·3	11 58·9	1·3 1·1	7·3 6·1	13·3 11·2
14	12 33·5	12 35·6	11 59·2	1·4 1·2	7·4 6·2	13·4 11·3
15	12 33·8	12 35·8	11 59·4	1·5 1·3	7·5 6·3	13·5 11·4
16	12 34·0	12 36·1	11 59·7	1·6 1·3	7·6 6·4	13·6 11·4
17	12 34·3	12 36·3	11 59·9	1·7 1·4	7·7 6·5	13·7 11·5
18	12 34·5	12 36·6	12 00·1	1·8 1·5	7·8 6·6	13·8 11·6
19	12 34·8	12 36·8	12 00·4	1·9 1·6	7·9 6·6	13·9 11·7
20	12 35·0	12 37·1	12 00·6	2·0 1·7	8·0 6·7	14·0 11·8
21	12 35·3	12 37·3	12 00·8	2·1 1·8	8·1 6·8	14·1 11·9
22	12 35·5	12 37·6	12 01·1	2·2 1·9	8·2 6·9	14·2 12·0
23	12 35·8	12 37·8	12 01·3	2·3 1·9	8·3 7·0	14·3 12·0
24	12 36·0	12 38·1	12 01·6	2·4 2·0	8·4 7·1	14·4 12·1
25	12 36·3	12 38·3	12 01·8	2·5 2·1	8·5 7·2	14·5 12·2
26	12 36·5	12 38·6	12 02·0	2·6 2·2	8·6 7·2	14·6 12·3
27	12 36·8	12 38·8	12 02·3	2·7 2·3	8·7 7·3	14·7 12·4
28	12 37·0	12 39·1	12 02·5	2·8 2·4	8·8 7·4	14·8 12·5
29	12 37·3	12 39·3	12 02·8	2·9 2·4	8·9 7·5	14·9 12·5
30	12 37·5	12 39·6	12 03·0	3·0 2·5	9·0 7·6	15·0 12·6
31	12 37·8	12 39·8	12 03·2	3·1 2·6	9·1 7·7	15·1 12·7
32	12 38·0	12 40·1	12 03·5	3·2 2·7	9·2 7·7	15·2 12·8
33	12 38·3	12 40·3	12 03·7	3·3 2·8	9·3 7·8	15·3 12·9
34	12 38·5	12 40·6	12 03·9	3·4 2·9	9·4 7·9	15·4 13·0
35	12 38·8	12 40·8	12 04·2	3·5 2·9	9·5 8·0	15·5 13·0
36	12 39·0	12 41·1	12 04·4	3·6 3·0	9·6 8·1	15·6 13·1
37	12 39·3	12 41·3	12 04·7	3·7 3·1	9·7 8·2	15·7 13·2
38	12 39·5	12 41·6	12 04·9	3·8 3·2	9·8 8·2	15·8 13·3
39	12 39·8	12 41·8	12 05·1	3·9 3·3	9·9 8·3	15·9 13·4
40	12 40·0	12 42·1	12 05·4	4·0 3·4	10·0 8·4	16·0 13·5
41	12 40·3	12 42·3	12 05·6	4·1 3·5	10·1 8·5	16·1 13·6
42	12 40·5	12 42·6	12 05·9	4·2 3·5	10·2 8·6	16·2 13·6
43	12 40·8	12 42·8	12 06·1	4·3 3·6	10·3 8·7	16·3 13·7
44	12 41·0	12 43·1	12 06·3	4·4 3·7	10·4 8·8	16·4 13·8
45	12 41·3	12 43·3	12 06·6	4·5 3·8	10·5 8·8	16·5 13·9
46	12 41·5	12 43·6	12 06·8	4·6 3·9	10·6 8·9	16·6 14·0
47	12 41·8	12 43·8	12 07·0	4·7 4·0	10·7 9·0	16·7 14·1
48	12 42·0	12 44·1	12 07·3	4·8 4·0	10·8 9·1	16·8 14·1
49	12 42·3	12 44·3	12 07·5	4·9 4·1	10·9 9·2	16·9 14·2
50	12 42·5	12 44·6	12 07·8	5·0 4·2	11·0 9·3	17·0 14·3
51	12 42·8	12 44·8	12 08·0	5·1 4·3	11·1 9·3	17·1 14·4
52	12 43·0	12 45·1	12 08·2	5·2 4·4	11·2 9·4	17·2 14·5
53	12 43·3	12 45·3	12 08·5	5·3 4·5	11·3 9·5	17·3 14·6
54	12 43·5	12 45·6	12 08·7	5·4 4·5	11·4 9·6	17·4 14·6
55	12 43·8	12 45·8	12 09·0	5·5 4·6	11·5 9·7	17·5 14·7
56	12 44·0	12 46·1	12 09·2	5·6 4·7	11·6 9·8	17·6 14·8
57	12 44·3	12 46·3	12 09·4	5·7 4·8	11·7 9·8	17·7 14·9
58	12 44·5	12 46·6	12 09·7	5·8 4·9	11·8 9·9	17·8 15·0
59	12 44·8	12 46·8	12 09·9	5·9 5·0	11·9 10·0	17·9 15·1
60	12 45·0	12 47·1	12 10·2	6·0 5·1	12·0 10·1	18·0 15·2

51m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or Corrn d ′ ′	v or Corrn d ′ ′	v or Corrn d ′ ′
00	12 45·0	12 47·1	12 10·2	0·0 0·0	6·0 5·2	12·0 10·3
01	12 45·3	12 47·3	12 10·4	0·1 0·1	6·1 5·2	12·1 10·4
02	12 45·5	12 47·6	12 10·6	0·2 0·2	6·2 5·3	12·2 10·5
03	12 45·8	12 47·8	12 10·9	0·3 0·3	6·3 5·4	12·3 10·6
04	12 46·0	12 48·1	12 11·1	0·4 0·3	6·4 5·5	12·4 10·6
05	12 46·3	12 48·3	12 11·3	0·5 0·4	6·5 5·6	12·5 10·7
06	12 46·5	12 48·6	12 11·6	0·6 0·5	6·6 5·7	12·6 10·8
07	12 46·8	12 48·8	12 11·8	0·7 0·6	6·7 5·8	12·7 10·9
08	12 47·0	12 49·1	12 12·1	0·8 0·7	6·8 5·8	12·8 11·0
09	12 47·3	12 49·4	12 12·3	0·9 0·8	6·9 5·9	12·9 11·1
10	12 47·5	12 49·6	12 12·5	1·0 0·9	7·0 6·0	13·0 11·2
11	12 47·8	12 49·9	12 12·8	1·1 0·9	7·1 6·1	13·1 11·2
12	12 48·0	12 50·1	12 13·0	1·2 1·0	7·2 6·2	13·2 11·3
13	12 48·3	12 50·4	12 13·3	1·3 1·1	7·3 6·3	13·3 11·4
14	12 48·5	12 50·6	12 13·5	1·4 1·2	7·4 6·4	13·4 11·5
15	12 48·8	12 50·9	12 13·7	1·5 1·3	7·5 6·4	13·5 11·6
16	12 49·0	12 51·1	12 14·0	1·6 1·4	7·6 6·5	13·6 11·7
17	12 49·3	12 51·4	12 14·2	1·7 1·5	7·7 6·6	13·7 11·8
18	12 49·5	12 51·6	12 14·4	1·8 1·5	7·8 6·7	13·8 11·8
19	12 49·8	12 51·9	12 14·7	1·9 1·6	7·9 6·8	13·9 11·9
20	12 50·0	12 52·1	12 14·9	2·0 1·7	8·0 6·9	14·0 12·0
21	12 50·3	12 52·4	12 15·2	2·1 1·8	8·1 7·0	14·1 12·1
22	12 50·5	12 52·6	12 15·4	2·2 1·9	8·2 7·0	14·2 12·2
23	12 50·8	12 52·9	12 15·6	2·3 2·0	8·3 7·1	14·3 12·3
24	12 51·0	12 53·1	12 15·9	2·4 2·1	8·4 7·2	14·4 12·4
25	12 51·3	12 53·4	12 16·1	2·5 2·1	8·5 7·3	14·5 12·4
26	12 51·5	12 53·6	12 16·4	2·6 2·2	8·6 7·4	14·6 12·5
27	12 51·8	12 53·9	12 16·6	2·7 2·3	8·7 7·5	14·7 12·6
28	12 52·0	12 54·1	12 16·8	2·8 2·4	8·8 7·6	14·8 12·7
29	12 52·3	12 54·4	12 17·1	2·9 2·5	8·9 7·6	14·9 12·8
30	12 52·5	12 54·6	12 17·3	3·0 2·6	9·0 7·7	15·0 12·9
31	12 52·8	12 54·9	12 17·5	3·1 2·7	9·1 7·8	15·1 13·0
32	12 53·0	12 55·1	12 17·8	3·2 2·7	9·2 7·9	15·2 13·0
33	12 53·3	12 55·4	12 18·0	3·3 2·8	9·3 8·0	15·3 13·1
34	12 53·5	12 55·6	12 18·3	3·4 2·9	9·4 8·1	15·4 13·2
35	12 53·8	12 55·9	12 18·5	3·5 3·0	9·5 8·2	15·5 13·3
36	12 54·0	12 56·1	12 18·7	3·6 3·1	9·6 8·2	15·6 13·4
37	12 54·3	12 56·4	12 19·0	3·7 3·2	9·7 8·3	15·7 13·5
38	12 54·5	12 56·6	12 19·2	3·8 3·3	9·8 8·4	15·8 13·6
39	12 54·8	12 56·9	12 19·5	3·9 3·3	9·9 8·5	15·9 13·6
40	12 55·0	12 57·1	12 19·7	4·0 3·4	10·0 8·6	16·0 13·7
41	12 55·3	12 57·4	12 19·9	4·1 3·5	10·1 8·7	16·1 13·8
42	12 55·5	12 57·6	12 20·2	4·2 3·6	10·2 8·8	16·2 13·9
43	12 55·8	12 57·9	12 20·4	4·3 3·7	10·3 8·8	16·3 14·0
44	12 56·0	12 58·1	12 20·6	4·4 3·8	10·4 8·9	16·4 14·1
45	12 56·3	12 58·4	12 20·9	4·5 3·9	10·5 9·0	16·5 14·2
46	12 56·5	12 58·6	12 21·1	4·6 3·9	10·6 9·1	16·6 14·2
47	12 56·8	12 58·9	12 21·4	4·7 4·0	10·7 9·2	16·7 14·3
48	12 57·0	12 59·1	12 21·6	4·8 4·1	10·8 9·3	16·8 14·4
49	12 57·3	12 59·4	12 21·8	4·9 4·2	10·9 9·4	16·9 14·5
50	12 57·5	12 59·6	12 22·1	5·0 4·3	11·0 9·4	17·0 14·6
51	12 57·8	12 59·9	12 22·3	5·1 4·4	11·1 9·5	17·1 14·7
52	12 58·0	13 00·1	12 22·6	5·2 4·5	11·2 9·6	17·2 14·8
53	12 58·3	13 00·4	12 22·8	5·3 4·5	11·3 9·7	17·3 14·8
54	12 58·5	13 00·6	12 23·0	5·4 4·6	11·4 9·8	17·4 14·9
55	12 58·8	13 00·9	12 23·3	5·5 4·7	11·5 9·9	17·5 15·0
56	12 59·0	13 01·1	12 23·5	5·6 4·8	11·6 10·0	17·6 15·1
57	12 59·3	13 01·4	12 23·8	5·7 4·9	11·7 10·0	17·7 15·2
58	12 59·5	13 01·6	12 24·0	5·8 5·0	11·8 10·1	17·8 15·3
59	12 59·8	13 01·9	12 24·2	5·9 5·1	11·9 10·2	17·9 15·4
60	13 00·0	13 02·1	12 24·5	6·0 5·2	12·0 10·3	18·0 15·5

52m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	13 00·0	13 02·1	12 24·5	0·0	0·0	6·0	5·3	12·0	10·5
01	13 00·3	13 02·4	12 24·7	0·1	0·1	6·1	5·3	12·1	10·6
02	13 00·5	13 02·6	12 24·9	0·2	0·2	6·2	5·4	12·2	10·7
03	13 00·8	13 02·9	12 25·2	0·3	0·3	6·3	5·5	12·3	10·8
04	13 01·0	13 03·1	12 25·4	0·4	0·4	6·4	5·6	12·4	10·9
05	13 01·3	13 03·4	12 25·7	0·5	0·4	6·5	5·7	12·5	10·9
06	13 01·5	13 03·6	12 25·9	0·6	0·5	6·6	5·8	12·6	11·0
07	13 01·8	13 03·9	12 26·1	0·7	0·6	6·7	5·9	12·7	11·1
08	13 02·0	13 04·1	12 26·4	0·8	0·7	6·8	6·0	12·8	11·2
09	13 02·3	13 04·4	12 26·6	0·9	0·8	6·9	6·0	12·9	11·3
10	13 02·5	13 04·6	12 26·9	1·0	0·9	7·0	6·1	13·0	11·4
11	13 02·8	13 04·9	12 27·1	1·1	1·0	7·1	6·2	13·1	11·5
12	13 03·0	13 05·1	12 27·3	1·2	1·1	7·2	6·3	13·2	11·6
13	13 03·3	13 05·4	12 27·6	1·3	1·1	7·3	6·4	13·3	11·6
14	13 03·5	13 05·6	12 27·8	1·4	1·2	7·4	6·5	13·4	11·7
15	13 03·8	13 05·9	12 28·0	1·5	1·3	7·5	6·6	13·5	11·8
16	13 04·0	13 06·1	12 28·3	1·6	1·4	7·6	6·7	13·6	11·9
17	13 04·3	13 06·4	12 28·5	1·7	1·5	7·7	6·7	13·7	12·0
18	13 04·5	13 06·6	12 28·8	1·8	1·6	7·8	6·8	13·8	12·1
19	13 04·8	13 06·9	12 29·0	1·9	1·7	7·9	6·9	13·9	12·2
20	13 05·0	13 07·1	12 29·2	2·0	1·8	8·0	7·0	14·0	12·3
21	13 05·3	13 07·4	12 29·5	2·1	1·8	8·1	7·1	14·1	12·3
22	13 05·5	13 07·7	12 29·7	2·2	1·9	8·2	7·2	14·2	12·4
23	13 05·8	13 07·9	12 30·0	2·3	2·0	8·3	7·3	14·3	12·5
24	13 06·0	13 08·2	12 30·2	2·4	2·1	8·4	7·4	14·4	12·6
25	13 06·3	13 08·4	12 30·4	2·5	2·2	8·5	7·4	14·5	12·7
26	13 06·5	13 08·7	12 30·7	2·6	2·3	8·6	7·5	14·6	12·8
27	13 06·8	13 08·9	12 30·9	2·7	2·4	8·7	7·6	14·7	12·9
28	13 07·0	13 09·2	12 31·1	2·8	2·5	8·8	7·7	14·8	13·0
29	13 07·3	13 09·4	12 31·4	2·9	2·5	8·9	7·8	14·9	13·0
30	13 07·5	13 09·7	12 31·6	3·0	2·6	9·0	7·9	15·0	13·1
31	13 07·8	13 09·9	12 31·9	3·1	2·7	9·1	8·0	15·1	13·2
32	13 08·0	13 10·2	12 32·1	3·2	2·8	9·2	8·1	15·2	13·3
33	13 08·3	13 10·4	12 32·3	3·3	2·9	9·3	8·1	15·3	13·4
34	13 08·5	13 10·7	12 32·6	3·4	3·0	9·4	8·2	15·4	13·5
35	13 08·8	13 10·9	12 32·8	3·5	3·1	9·5	8·3	15·5	13·6
36	13 09·0	13 11·2	12 33·1	3·6	3·2	9·6	8·4	15·6	13·7
37	13 09·3	13 11·4	12 33·3	3·7	3·2	9·7	8·5	15·7	13·7
38	13 09·5	13 11·7	12 33·5	3·8	3·3	9·8	8·6	15·8	13·8
39	13 09·8	13 11·9	12 33·8	3·9	3·4	9·9	8·7	15·9	13·9
40	13 10·0	13 12·2	12 34·0	4·0	3·5	10·0	8·8	16·0	14·0
41	13 10·3	13 12·4	12 34·2	4·1	3·6	10·1	8·8	16·1	14·1
42	13 10·5	13 12·7	12 34·5	4·2	3·7	10·2	8·9	16·2	14·2
43	13 10·8	13 12·9	12 34·7	4·3	3·8	10·3	9·0	16·3	14·3
44	13 11·0	13 13·2	12 35·0	4·4	3·9	10·4	9·1	16·4	14·4
45	13 11·3	13 13·4	12 35·2	4·5	3·9	10·5	9·2	16·5	14·4
46	13 11·5	13 13·7	12 35·4	4·6	4·0	10·6	9·3	16·6	14·5
47	13 11·8	13 13·9	12 35·7	4·7	4·1	10·7	9·4	16·7	14·6
48	13 12·0	13 14·2	12 35·9	4·8	4·2	10·8	9·5	16·8	14·7
49	13 12·3	13 14·4	12 36·2	4·9	4·3	10·9	9·5	16·9	14·8
50	13 12·5	13 14·7	12 36·4	5·0	4·4	11·0	9·6	17·0	14·9
51	13 12·8	13 14·9	12 36·6	5·1	4·5	11·1	9·7	17·1	15·0
52	13 13·0	13 15·2	12 36·9	5·2	4·6	11·2	9·8	17·2	15·1
53	13 13·3	13 15·4	12 37·1	5·3	4·6	11·3	9·9	17·3	15·1
54	13 13·5	13 15·7	12 37·4	5·4	4·7	11·4	10·0	17·4	15·2
55	13 13·8	13 15·9	12 37·6	5·5	4·8	11·5	10·1	17·5	15·3
56	13 14·0	13 16·2	12 37·8	5·6	4·9	11·6	10·2	17·6	15·4
57	13 14·3	13 16·4	12 38·1	5·7	5·0	11·7	10·2	17·7	15·5
58	13 14·5	13 16·7	12 38·3	5·8	5·1	11·8	10·3	17·8	15·6
59	13 14·8	13 16·9	12 38·5	5·9	5·2	11·9	10·4	17·9	15·7
60	13 15·0	13 17·2	12 38·8	6·0	5·3	12·0	10·5	18·0	15·8

53m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	13 15·0	13 17·2	12 38·8	0·0	0·0	6·0	5·4	12·0	10·7
01	13 15·3	13 17·4	12 39·0	0·1	0·1	6·1	5·4	12·1	10·8
02	13 15·5	13 17·7	12 39·3	0·2	0·2	6·2	5·5	12·2	10·9
03	13 15·8	13 17·9	12 39·5	0·3	0·3	6·3	5·6	12·3	11·0
04	13 16·0	13 18·2	12 39·7	0·4	0·4	6·4	5·7	12·4	11·1
05	13 16·3	13 18·4	12 40·0	0·5	0·4	6·5	5·8	12·5	11·1
06	13 16·5	13 18·7	12 40·2	0·6	0·5	6·6	5·9	12·6	11·2
07	13 16·8	13 18·9	12 40·5	0·7	0·6	6·7	6·0	12·7	11·3
08	13 17·0	13 19·2	12 40·7	0·8	0·7	6·8	6·1	12·8	11·4
09	13 17·3	13 19·4	12 40·9	0·9	0·8	6·9	6·2	12·9	11·5
10	13 17·5	13 19·7	12 41·2	1·0	0·9	7·0	6·2	13·0	11·6
11	13 17·8	13 19·9	12 41·4	1·1	1·0	7·1	6·3	13·1	11·7
12	13 18·0	13 20·2	12 41·6	1·2	1·1	7·2	6·4	13·2	11·8
13	13 18·3	13 20·4	12 41·9	1·3	1·2	7·3	6·5	13·3	11·9
14	13 18·5	13 20·7	12 42·1	1·4	1·2	7·4	6·6	13·4	11·9
15	13 18·8	13 20·9	12 42·4	1·5	1·3	7·5	6·7	13·5	12·0
16	13 19·0	13 21·2	12 42·6	1·6	1·4	7·6	6·8	13·6	12·1
17	13 19·3	13 21·4	12 42·8	1·7	1·5	7·7	6·9	13·7	12·2
18	13 19·5	13 21·7	12 43·1	1·8	1·6	7·8	7·0	13·8	12·3
19	13 19·8	13 21·9	12 43·3	1·9	1·7	7·9	7·0	13·9	12·4
20	13 20·0	13 22·2	12 43·6	2·0	1·8	8·0	7·1	14·0	12·5
21	13 20·3	13 22·4	12 43·8	2·1	1·9	8·1	7·2	14·1	12·6
22	13 20·5	13 22·7	12 44·0	2·2	2·0	8·2	7·3	14·2	12·7
23	13 20·8	13 22·9	12 44·3	2·3	2·1	8·3	7·4	14·3	12·8
24	13 21·0	13 23·2	12 44·5	2·4	2·1	8·4	7·5	14·4	12·8
25	13 21·3	13 23·4	12 44·7	2·5	2·2	8·5	7·6	14·5	12·9
26	13 21·5	13 23·7	12 45·0	2·6	2·3	8·6	7·7	14·6	13·0
27	13 21·8	13 23·9	12 45·2	2·7	2·4	8·7	7·8	14·7	13·1
28	13 22·0	13 24·2	12 45·5	2·8	2·5	8·8	7·8	14·8	13·2
29	13 22·3	13 24·4	12 45·7	2·9	2·6	8·9	7·9	14·9	13·3
30	13 22·5	13 24·7	12 45·9	3·0	2·7	9·0	8·0	15·0	13·4
31	13 22·8	13 24·9	12 46·2	3·1	2·8	9·1	8·1	15·1	13·5
32	13 23·0	13 25·2	12 46·4	3·2	2·9	9·2	8·2	15·2	13·6
33	13 23·3	13 25·4	12 46·7	3·3	2·9	9·3	8·3	15·3	13·6
34	13 23·5	13 25·7	12 46·9	3·4	3·0	9·4	8·4	15·4	13·7
35	13 23·8	13 26·0	12 47·1	3·5	3·1	9·5	8·5	15·5	13·8
36	13 24·0	13 26·2	12 47·4	3·6	3·2	9·6	8·6	15·6	13·9
37	13 24·3	13 26·5	12 47·6	3·7	3·3	9·7	8·6	15·7	14·0
38	13 24·5	13 26·7	12 47·9	3·8	3·4	9·8	8·7	15·8	14·1
39	13 24·8	13 27·0	12 48·1	3·9	3·5	9·9	8·8	15·9	14·2
40	13 25·0	13 27·2	12 48·3	4·0	3·6	10·0	8·9	16·0	14·3
41	13 25·3	13 27·5	12 48·6	4·1	3·7	10·1	9·0	16·1	14·4
42	13 25·5	13 27·7	12 48·8	4·2	3·7	10·2	9·1	16·2	14·4
43	13 25·8	13 28·0	12 49·0	4·3	3·8	10·3	9·2	16·3	14·5
44	13 26·0	13 28·2	12 49·3	4·4	3·9	10·4	9·3	16·4	14·6
45	13 26·3	13 28·5	12 49·5	4·5	4·0	10·5	9·4	16·5	14·7
46	13 26·5	13 28·7	12 49·8	4·6	4·1	10·6	9·5	16·6	14·8
47	13 26·8	13 29·0	12 50·0	4·7	4·2	10·7	9·5	16·7	14·9
48	13 27·0	13 29·2	12 50·2	4·8	4·3	10·8	9·6	16·8	15·0
49	13 27·3	13 29·5	12 50·5	4·9	4·4	10·9	9·7	16·9	15·1
50	13 27·5	13 29·7	12 50·7	5·0	4·5	11·0	9·8	17·0	15·2
51	13 27·8	13 30·0	12 51·0	5·1	4·5	11·1	9·9	17·1	15·2
52	13 28·0	13 30·2	12 51·2	5·2	4·6	11·2	10·0	17·2	15·3
53	13 28·3	13 30·5	12 51·4	5·3	4·7	11·3	10·1	17·3	15·4
54	13 28·5	13 30·7	12 51·7	5·4	4·8	11·4	10·2	17·4	15·5
55	13 28·8	13 31·0	12 51·9	5·5	4·9	11·5	10·3	17·5	15·6
56	13 29·0	13 31·2	12 52·1	5·6	5·0	11·6	10·3	17·6	15·7
57	13 29·3	13 31·5	12 52·4	5·7	5·1	11·7	10·4	17·7	15·8
58	13 29·5	13 31·7	12 52·6	5·8	5·2	11·8	10·5	17·8	15·9
59	13 29·8	13 32·0	12 52·9	5·9	5·3	11·9	10·6	17·9	16·0
60	13 30·0	13 32·2	12 53·1	6·0	5·4	12·0	10·7	18·0	16·1

54m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	13 30·0	13 32·2	12 53·1	0·0	0·0	6·0	5·5	12·0	10·9
01	13 30·3	13 32·5	12 53·3	0·1	0·1	6·1	5·5	12·1	11·0
02	13 30·5	13 32·7	12 53·6	0·2	0·2	6·2	5·6	12·2	11·1
03	13 30·8	13 33·0	12 53·8	0·3	0·3	6·3	5·7	12·3	11·2
04	13 31·0	13 33·2	12 54·1	0·4	0·4	6·4	5·8	12·4	11·3
05	13 31·3	13 33·5	12 54·3	0·5	0·5	6·5	5·9	12·5	11·4
06	13 31·5	13 33·7	12 54·5	0·6	0·5	6·6	6·0	12·6	11·4
07	13 31·8	13 34·0	12 54·8	0·7	0·6	6·7	6·1	12·7	11·5
08	13 32·0	13 34·2	12 55·0	0·8	0·7	6·8	6·2	12·8	11·6
09	13 32·3	13 34·5	12 55·2	0·9	0·8	6·9	6·3	12·9	11·7
10	13 32·5	13 34·7	12 55·5	1·0	0·9	7·0	6·4	13·0	11·8
11	13 32·8	13 35·0	12 55·7	1·1	1·0	7·1	6·4	13·1	11·9
12	13 33·0	13 35·2	12 56·0	1·2	1·1	7·2	6·5	13·2	12·0
13	13 33·3	13 35·5	12 56·2	1·3	1·2	7·3	6·6	13·3	12·1
14	13 33·5	13 35·7	12 56·4	1·4	1·3	7·4	6·7	13·4	12·2
15	13 33·8	13 36·0	12 56·7	1·5	1·4	7·5	6·8	13·5	12·3
16	13 34·0	13 36·2	12 56·9	1·6	1·5	7·6	6·9	13·6	12·4
17	13 34·3	13 36·5	12 57·2	1·7	1·5	7·7	7·0	13·7	12·4
18	13 34·5	13 36·7	12 57·4	1·8	1·6	7·8	7·1	13·8	12·5
19	13 34·8	13 37·0	12 57·6	1·9	1·7	7·9	7·2	13·9	12·6
20	13 35·0	13 37·2	12 57·9	2·0	1·8	8·0	7·3	14·0	12·7
21	13 35·3	13 37·5	12 58·1	2·1	1·9	8·1	7·4	14·1	12·8
22	13 35·5	13 37·7	12 58·3	2·2	2·0	8·2	7·4	14·2	12·9
23	13 35·8	13 38·0	12 58·6	2·3	2·1	8·3	7·5	14·3	13·0
24	13 36·0	13 38·2	12 58·8	2·4	2·2	8·4	7·6	14·4	13·1
25	13 36·3	13 38·5	12 59·1	2·5	2·3	8·5	7·7	14·5	13·2
26	13 36·5	13 38·7	12 59·3	2·6	2·4	8·6	7·8	14·6	13·3
27	13 36·8	13 39·0	12 59·5	2·7	2·5	8·7	7·9	14·7	13·4
28	13 37·0	13 39·2	12 59·8	2·8	2·5	8·8	8·0	14·8	13·4
29	13 37·3	13 39·5	13 00·0	2·9	2·6	8·9	8·1	14·9	13·5
30	13 37·5	13 39·7	13 00·3	3·0	2·7	9·0	8·2	15·0	13·6
31	13 37·8	13 40·0	13 00·5	3·1	2·8	9·1	8·3	15·1	13·7
32	13 38·0	13 40·2	13 00·7	3·2	2·9	9·2	8·4	15·2	13·8
33	13 38·3	13 40·5	13 01·0	3·3	3·0	9·3	8·4	15·3	13·9
34	13 38·5	13 40·7	13 01·2	3·4	3·1	9·4	8·5	15·4	14·0
35	13 38·8	13 41·0	13 01·5	3·5	3·2	9·5	8·6	15·5	14·1
36	13 39·0	13 41·2	13 01·7	3·6	3·3	9·6	8·7	15·6	14·2
37	13 39·3	13 41·5	13 01·9	3·7	3·4	9·7	8·8	15·7	14·3
38	13 39·5	13 41·7	13 02·2	3·8	3·5	9·8	8·9	15·8	14·4
39	13 39·8	13 42·0	13 02·4	3·9	3·5	9·9	9·0	15·9	14·4
40	13 40·0	13 42·2	13 02·6	4·0	3·6	10·0	9·1	16·0	14·5
41	13 40·3	13 42·5	13 02·9	4·1	3·7	10·1	9·2	16·1	14·6
42	13 40·5	13 42·7	13 03·1	4·2	3·8	10·2	9·3	16·2	14·7
43	13 40·8	13 43·0	13 03·4	4·3	3·9	10·3	9·4	16·3	14·8
44	13 41·0	13 43·2	13 03·6	4·4	4·0	10·4	9·4	16·4	14·9
45	13 41·3	13 43·5	13 03·8	4·5	4·1	10·5	9·5	16·5	15·0
46	13 41·5	13 43·7	13 04·1	4·6	4·2	10·6	9·6	16·6	15·1
47	13 41·8	13 44·0	13 04·3	4·7	4·3	10·7	9·7	16·7	15·2
48	13 42·0	13 44·3	13 04·6	4·8	4·4	10·8	9·8	16·8	15·3
49	13 42·3	13 44·5	13 04·8	4·9	4·5	10·9	9·9	16·9	15·4
50	13 42·5	13 44·8	13 05·0	5·0	4·5	11·0	10·0	17·0	15·4
51	13 42·8	13 45·0	13 05·3	5·1	4·6	11·1	10·1	17·1	15·5
52	13 43·0	13 45·3	13 05·5	5·2	4·7	11·2	10·2	17·2	15·6
53	13 43·3	13 45·5	13 05·7	5·3	4·8	11·3	10·3	17·3	15·7
54	13 43·5	13 45·8	13 06·0	5·4	4·9	11·4	10·4	17·4	15·8
55	13 43·8	13 46·0	13 06·2	5·5	5·0	11·5	10·4	17·5	15·9
56	13 44·0	13 46·3	13 06·5	5·6	5·1	11·6	10·5	17·6	16·0
57	13 44·3	13 46·5	13 06·7	5·7	5·2	11·7	10·6	17·7	16·1
58	13 44·5	13 46·8	13 06·9	5·8	5·3	11·8	10·7	17·8	16·2
59	13 44·8	13 47·0	13 07·2	5·9	5·4	11·9	10·8	17·9	16·3
60	13 45·0	13 47·3	13 07·4	6·0	5·5	12·0	10·9	18·0	16·4

55m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	13 45·0	13 47·3	13 07·4	0·0	0·0	6·0	5·6	12·0	11·1
01	13 45·3	13 47·5	13 07·7	0·1	0·1	6·1	5·6	12·1	11·2
02	13 45·5	13 47·8	13 07·9	0·2	0·2	6·2	5·7	12·2	11·3
03	13 45·8	13 48·0	13 08·1	0·3	0·3	6·3	5·8	12·3	11·4
04	13 46·0	13 48·3	13 08·4	0·4	0·4	6·4	5·9	12·4	11·5
05	13 46·3	13 48·5	13 08·6	0·5	0·5	6·5	6·0	12·5	11·6
06	13 46·5	13 48·8	13 08·8	0·6	0·6	6·6	6·1	12·6	11·7
07	13 46·8	13 49·0	13 09·1	0·7	0·6	6·7	6·2	12·7	11·7
08	13 47·0	13 49·3	13 09·3	0·8	0·7	6·8	6·3	12·8	11·8
09	13 47·3	13 49·5	13 09·6	0·9	0·8	6·9	6·4	12·9	11·9
10	13 47·5	13 49·8	13 09·8	1·0	0·9	7·0	6·5	13·0	12·0
11	13 47·8	13 50·0	13 10·0	1·1	1·0	7·1	6·6	13·1	12·1
12	13 48·0	13 50·3	13 10·3	1·2	1·1	7·2	6·7	13·2	12·2
13	13 48·3	13 50·5	13 10·5	1·3	1·2	7·3	6·8	13·3	12·3
14	13 48·5	13 50·8	13 10·8	1·4	1·3	7·4	6·8	13·4	12·4
15	13 48·8	13 51·0	13 11·0	1·5	1·4	7·5	6·9	13·5	12·5
16	13 49·0	13 51·3	13 11·2	1·6	1·5	7·6	7·0	13·6	12·6
17	13 49·3	13 51·5	13 11·5	1·7	1·6	7·7	7·1	13·7	12·7
18	13 49·5	13 51·8	13 11·7	1·8	1·7	7·8	7·2	13·8	12·8
19	13 49·8	13 52·0	13 12·0	1·9	1·8	7·9	7·3	13·9	12·9
20	13 50·0	13 52·3	13 12·2	2·0	1·9	8·0	7·4	14·0	13·0
21	13 50·3	13 52·5	13 12·4	2·1	1·9	8·1	7·5	14·1	13·0
22	13 50·5	13 52·8	13 12·7	2·2	2·0	8·2	7·6	14·2	13·1
23	13 50·8	13 53·0	13 12·9	2·3	2·1	8·3	7·7	14·3	13·2
24	13 51·0	13 53·3	13 13·1	2·4	2·2	8·4	7·8	14·4	13·3
25	13 51·3	13 53·5	13 13·4	2·5	2·3	8·5	7·9	14·5	13·4
26	13 51·5	13 53·8	13 13·6	2·6	2·4	8·6	8·0	14·6	13·5
27	13 51·8	13 54·0	13 13·9	2·7	2·5	8·7	8·0	14·7	13·6
28	13 52·0	13 54·3	13 14·1	2·8	2·6	8·8	8·1	14·8	13·7
29	13 52·3	13 54·5	13 14·3	2·9	2·7	8·9	8·2	14·9	13·8
30	13 52·5	13 54·8	13 14·6	3·0	2·8	9·0	8·3	15·0	13·9
31	13 52·8	13 55·0	13 14·8	3·1	2·9	9·1	8·4	15·1	14·0
32	13 53·0	13 55·3	13 15·1	3·2	3·0	9·2	8·5	15·2	14·1
33	13 53·3	13 55·5	13 15·3	3·3	3·1	9·3	8·6	15·3	14·2
34	13 53·5	13 55·8	13 15·5	3·4	3·1	9·4	8·7	15·4	14·2
35	13 53·8	13 56·0	13 15·8	3·5	3·2	9·5	8·8	15·5	14·3
36	13 54·0	13 56·3	13 16·0	3·6	3·3	9·6	8·9	15·6	14·4
37	13 54·3	13 56·5	13 16·2	3·7	3·4	9·7	9·0	15·7	14·5
38	13 54·5	13 56·8	13 16·5	3·8	3·5	9·8	9·1	15·8	14·6
39	13 54·8	13 57·0	13 16·7	3·9	3·6	9·9	9·2	15·9	14·7
40	13 55·0	13 57·3	13 17·0	4·0	3·7	10·0	9·3	16·0	14·8
41	13 55·3	13 57·5	13 17·2	4·1	3·8	10·1	9·3	16·1	14·9
42	13 55·5	13 57·8	13 17·4	4·2	3·9	10·2	9·4	16·2	15·0
43	13 55·8	13 58·0	13 17·7	4·3	4·0	10·3	9·5	16·3	15·1
44	13 56·0	13 58·3	13 17·9	4·4	4·1	10·4	9·6	16·4	15·2
45	13 56·3	13 58·5	13 18·2	4·5	4·2	10·5	9·7	16·5	15·3
46	13 56·5	13 58·8	13 18·4	4·6	4·3	10·6	9·8	16·6	15·4
47	13 56·8	13 59·0	13 18·6	4·7	4·3	10·7	9·9	16·7	15·4
48	13 57·0	13 59·3	13 18·9	4·8	4·4	10·8	10·0	16·8	15·5
49	13 57·3	13 59·5	13 19·1	4·9	4·5	10·9	10·1	16·9	15·6
50	13 57·5	13 59·8	13 19·3	5·0	4·6	11·0	10·2	17·0	15·7
51	13 57·8	14 00·0	13 19·6	5·1	4·7	11·1	10·3	17·1	15·8
52	13 58·0	14 00·3	13 19·8	5·2	4·8	11·2	10·4	17·2	15·9
53	13 58·3	14 00·5	13 20·1	5·3	4·9	11·3	10·5	17·3	16·0
54	13 58·5	14 00·8	13 20·3	5·4	5·0	11·4	10·5	17·4	16·1
55	13 58·8	14 01·0	13 20·5	5·5	5·1	11·5	10·6	17·5	16·2
56	13 59·0	14 01·3	13 20·8	5·6	5·2	11·6	10·7	17·6	16·3
57	13 59·3	14 01·5	13 21·0	5·7	5·3	11·7	10·8	17·7	16·4
58	13 59·5	14 01·8	13 21·3	5·8	5·4	11·8	10·9	17·8	16·5
59	13 59·8	14 02·0	13 21·5	5·9	5·5	11·9	11·0	17·9	16·6
60	14 00·0	14 02·3	13 21·7	6·0	5·6	12·0	11·1	18·0	16·7

56m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	14 00·0	14 02·3	13 21·7	0·0	0·0	6·0	5·7	12·0	11·3
01	14 00·3	14 02·6	13 22·0	0·1	0·1	6·1	5·7	12·1	11·4
02	14 00·5	14 02·8	13 22·2	0·2	0·2	6·2	5·8	12·2	11·5
03	14 00·8	14 03·1	13 22·4	0·3	0·3	6·3	5·9	12·3	11·6
04	14 01·0	14 03·3	13 22·7	0·4	0·4	6·4	6·0	12·4	11·7
05	14 01·3	14 03·6	13 22·9	0·5	0·5	6·5	6·1	12·5	11·8
06	14 01·5	14 03·8	13 23·2	0·6	0·6	6·6	6·2	12·6	11·9
07	14 01·8	14 04·1	13 23·4	0·7	0·7	6·7	6·3	12·7	12·0
08	14 02·0	14 04·3	13 23·6	0·8	0·8	6·8	6·4	12·8	12·1
09	14 02·3	14 04·6	13 23·9	0·9	0·8	6·9	6·5	12·9	12·1
10	14 02·5	14 04·8	13 24·1	1·0	0·9	7·0	6·6	13·0	12·2
11	14 02·8	14 05·1	13 24·4	1·1	1·0	7·1	6·7	13·1	12·3
12	14 03·0	14 05·3	13 24·6	1·2	1·1	7·2	6·8	13·2	12·4
13	14 03·3	14 05·6	13 24·9	1·3	1·2	7·3	6·9	13·3	12·5
14	14 03·5	14 05·8	13 25·1	1·4	1·3	7·4	7·0	13·4	12·6
15	14 03·8	14 06·1	13 25·3	1·5	1·4	7·5	7·1	13·5	12·7
16	14 04·0	14 06·3	13 25·6	1·6	1·5	7·6	7·2	13·6	12·8
17	14 04·3	14 06·6	13 25·8	1·7	1·6	7·7	7·3	13·7	12·9
18	14 04·5	14 06·8	13 26·0	1·8	1·7	7·8	7·3	13·8	13·0
19	14 04·8	14 07·1	13 26·3	1·9	1·8	7·9	7·4	13·9	13·1
20	14 05·0	14 07·3	13 26·5	2·0	1·9	8·0	7·5	14·0	13·2
21	14 05·3	14 07·6	13 26·7	2·1	2·0	8·1	7·6	14·1	13·3
22	14 05·5	14 07·8	13 27·0	2·2	2·1	8·2	7·7	14·2	13·4
23	14 05·8	14 08·1	13 27·2	2·3	2·2	8·3	7·8	14·3	13·5
24	14 06·0	14 08·3	13 27·5	2·4	2·3	8·4	7·9	14·4	13·6
25	14 06·3	14 08·6	13 27·7	2·5	2·4	8·5	8·0	14·5	13·7
26	14 06·5	14 08·8	13 27·9	2·6	2·4	8·6	8·1	14·6	13·7
27	14 06·8	14 09·1	13 28·2	2·7	2·5	8·7	8·2	14·7	13·8
28	14 07·0	14 09·3	13 28·4	2·8	2·6	8·8	8·3	14·8	13·9
29	14 07·3	14 09·6	13 28·7	2·9	2·7	8·9	8·4	14·9	14·0
30	14 07·5	14 09·8	13 28·9	3·0	2·8	9·0	8·5	15·0	14·1
31	14 07·8	14 10·1	13 29·1	3·1	2·9	9·1	8·6	15·1	14·2
32	14 08·0	14 10·3	13 29·4	3·2	3·0	9·2	8·7	15·2	14·3
33	14 08·3	14 10·6	13 29·6	3·3	3·1	9·3	8·8	15·3	14·4
34	14 08·5	14 10·8	13 29·8	3·4	3·2	9·4	8·9	15·4	14·5
35	14 08·8	14 11·1	13 30·1	3·5	3·3	9·5	8·9	15·5	14·6
36	14 09·0	14 11·3	13 30·3	3·6	3·4	9·6	9·0	15·6	14·7
37	14 09·3	14 11·6	13 30·6	3·7	3·5	9·7	9·1	15·7	14·8
38	14 09·5	14 11·8	13 30·8	3·8	3·6	9·8	9·2	15·8	14·9
39	14 09·8	14 12·1	13 31·0	3·9	3·7	9·9	9·3	15·9	15·0
40	14 10·0	14 12·3	13 31·3	4·0	3·8	10·0	9·4	16·0	15·1
41	14 10·3	14 12·6	13 31·5	4·1	3·9	10·1	9·5	16·1	15·2
42	14 10·5	14 12·8	13 31·8	4·2	4·0	10·2	9·6	16·2	15·3
43	14 10·8	14 13·1	13 32·0	4·3	4·0	10·3	9·7	16·3	15·3
44	14 11·0	14 13·3	13 32·2	4·4	4·1	10·4	9·8	16·4	15·4
45	14 11·3	14 13·6	13 32·5	4·5	4·2	10·5	9·9	16·5	15·5
46	14 11·5	14 13·8	13 32·7	4·6	4·3	10·6	10·0	16·6	15·6
47	14 11·8	14 14·1	13 32·9	4·7	4·4	10·7	10·1	16·7	15·7
48	14 12·0	14 14·3	13 33·2	4·8	4·5	10·8	10·2	16·8	15·8
49	14 12·3	14 14·6	13 33·4	4·9	4·6	10·9	10·3	16·9	15·9
50	14 12·5	14 14·8	13 33·7	5·0	4·7	11·0	10·4	17·0	16·0
51	14 12·8	14 15·1	13 33·9	5·1	4·8	11·1	10·5	17·1	16·1
52	14 13·0	14 15·3	13 34·1	5·2	4·9	11·2	10·5	17·2	16·2
53	14 13·3	14 15·6	13 34·4	5·3	5·0	11·3	10·6	17·3	16·3
54	14 13·5	14 15·8	13 34·6	5·4	5·1	11·4	10·7	17·4	16·4
55	14 13·8	14 16·1	13 34·9	5·5	5·2	11·5	10·8	17·5	16·5
56	14 14·0	14 16·3	13 35·1	5·6	5·3	11·6	10·9	17·6	16·6
57	14 14·3	14 16·6	13 35·3	5·7	5·4	11·7	11·0	17·7	16·7
58	14 14·5	14 16·8	13 35·6	5·8	5·5	11·8	11·1	17·8	16·8
59	14 14·8	14 17·1	13 35·8	5·9	5·6	11·9	11·2	17·9	16·9
60	14 15·0	14 17·3	13 36·1	6·0	5·7	12·0	11·3	18·0	17·0

57m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	14 15·0	14 17·3	13 36·1	0·0	0·0	6·0	5·8	12·0	11·5
01	14 15·3	14 17·6	13 36·3	0·1	0·1	6·1	5·8	12·1	11·6
02	14 15·5	14 17·8	13 36·5	0·2	0·2	6·2	5·9	12·2	11·7
03	14 15·8	14 18·1	13 36·8	0·3	0·3	6·3	6·0	12·3	11·8
04	14 16·0	14 18·3	13 37·0	0·4	0·4	6·4	6·1	12·4	11·9
05	14 16·3	14 18·6	13 37·2	0·5	0·5	6·5	6·2	12·5	12·0
06	14 16·5	14 18·8	13 37·5	0·6	0·6	6·6	6·3	12·6	12·1
07	14 16·8	14 19·1	13 37·7	0·7	0·7	6·7	6·4	12·7	12·2
08	14 17·0	14 19·3	13 38·0	0·8	0·8	6·8	6·5	12·8	12·3
09	14 17·3	14 19·6	13 38·2	0·9	0·9	6·9	6·6	12·9	12·4
10	14 17·5	14 19·8	13 38·4	1·0	1·0	7·0	6·7	13·0	12·5
11	14 17·8	14 20·1	13 38·7	1·1	1·1	7·1	6·8	13·1	12·6
12	14 18·0	14 20·3	13 38·9	1·2	1·2	7·2	6·9	13·2	12·7
13	14 18·3	14 20·6	13 39·2	1·3	1·2	7·3	7·0	13·3	12·7
14	14 18·5	14 20·9	13 39·4	1·4	1·3	7·4	7·1	13·4	12·8
15	14 18·8	14 21·1	13 39·6	1·5	1·4	7·5	7·2	13·5	12·9
16	14 19·0	14 21·4	13 39·9	1·6	1·5	7·6	7·3	13·6	13·0
17	14 19·3	14 21·6	13 40·1	1·7	1·6	7·7	7·4	13·7	13·1
18	14 19·5	14 21·9	13 40·3	1·8	1·7	7·8	7·5	13·8	13·2
19	14 19·8	14 22·1	13 40·6	1·9	1·8	7·9	7·6	13·9	13·3
20	14 20·0	14 22·4	13 40·8	2·0	1·9	8·0	7·7	14·0	13·4
21	14 20·3	14 22·6	13 41·1	2·1	2·0	8·1	7·8	14·1	13·5
22	14 20·5	14 22·9	13 41·3	2·2	2·1	8·2	7·9	14·2	13·6
23	14 20·8	14 23·1	13 41·5	2·3	2·2	8·3	8·0	14·3	13·7
24	14 21·0	14 23·4	13 41·8	2·4	2·3	8·4	8·1	14·4	13·8
25	14 21·3	14 23·6	13 42·0	2·5	2·4	8·5	8·1	14·5	13·9
26	14 21·5	14 23·9	13 42·3	2·6	2·5	8·6	8·2	14·6	14·0
27	14 21·8	14 24·1	13 42·5	2·7	2·6	8·7	8·3	14·7	14·1
28	14 22·0	14 24·4	13 42·7	2·8	2·7	8·8	8·4	14·8	14·2
29	14 22·3	14 24·6	13 43·0	2·9	2·8	8·9	8·5	14·9	14·3
30	14 22·5	14 24·9	13 43·2	3·0	2·9	9·0	8·6	15·0	14·4
31	14 22·8	14 25·1	13 43·4	3·1	3·0	9·1	8·7	15·1	14·5
32	14 23·0	14 25·4	13 43·7	3·2	3·1	9·2	8·8	15·2	14·6
33	14 23·3	14 25·6	13 43·9	3·3	3·2	9·3	8·9	15·3	14·7
34	14 23·5	14 25·9	13 44·2	3·4	3·3	9·4	9·0	15·4	14·8
35	14 23·8	14 26·1	13 44·4	3·5	3·4	9·5	9·1	15·5	14·9
36	14 24·0	14 26·4	13 44·6	3·6	3·5	9·6	9·2	15·6	15·0
37	14 24·3	14 26·6	13 44·9	3·7	3·5	9·7	9·3	15·7	15·0
38	14 24·5	14 26·9	13 45·1	3·8	3·6	9·8	9·4	15·8	15·1
39	14 24·8	14 27·1	13 45·4	3·9	3·7	9·9	9·5	15·9	15·2
40	14 25·0	14 27·4	13 45·6	4·0	3·8	10·0	9·6	16·0	15·3
41	14 25·3	14 27·6	13 45·8	4·1	3·9	10·1	9·7	16·1	15·4
42	14 25·5	14 27·9	13 46·1	4·2	4·0	10·2	9·8	16·2	15·5
43	14 25·8	14 28·1	13 46·3	4·3	4·1	10·3	9·9	16·3	15·6
44	14 26·0	14 28·4	13 46·5	4·4	4·2	10·4	10·0	16·4	15·7
45	14 26·3	14 28·6	13 46·8	4·5	4·3	10·5	10·1	16·5	15·8
46	14 26·5	14 28·9	13 47·0	4·6	4·4	10·6	10·2	16·6	15·9
47	14 26·8	14 29·1	13 47·3	4·7	4·5	10·7	10·3	16·7	16·0
48	14 27·0	14 29·4	13 47·5	4·8	4·6	10·8	10·4	16·8	16·1
49	14 27·3	14 29·6	13 47·7	4·9	4·7	10·9	10·4	16·9	16·2
50	14 27·5	14 29·9	13 48·0	5·0	4·8	11·0	10·5	17·0	16·3
51	14 27·8	14 30·1	13 48·2	5·1	4·9	11·1	10·6	17·1	16·4
52	14 28·0	14 30·4	13 48·5	5·2	5·0	11·2	10·7	17·2	16·5
53	14 28·3	14 30·6	13 48·7	5·3	5·1	11·3	10·8	17·3	16·6
54	14 28·5	14 30·9	13 48·9	5·4	5·2	11·4	10·9	17·4	16·7
55	14 28·8	14 31·1	13 49·2	5·5	5·3	11·5	11·0	17·5	16·8
56	14 29·0	14 31·4	13 49·4	5·6	5·4	11·6	11·1	17·6	16·9
57	14 29·3	14 31·6	13 49·7	5·7	5·5	11·7	11·2	17·7	17·0
58	14 29·5	14 31·9	13 49·9	5·8	5·6	11·8	11·3	17·8	17·1
59	14 29·8	14 32·1	13 50·1	5·9	5·7	11·9	11·4	17·9	17·2
60	14 30·0	14 32·4	13 50·4	6·0	5·8	12·0	11·5	18·0	17·3

58m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	14 30·0	14 32·4	13 50·4	0·0	0·0	6·0	5·9	12·0	11·7
01	14 30·3	14 32·6	13 50·6	0·1	0·1	6·1	5·9	12·1	11·8
02	14 30·5	14 32·9	13 50·8	0·2	0·2	6·2	6·0	12·2	11·9
03	14 30·8	14 33·1	13 51·1	0·3	0·3	6·3	6·1	12·3	12·0
04	14 31·0	14 33·4	13 51·3	0·4	0·4	6·4	6·2	12·4	12·1
05	14 31·3	14 33·6	13 51·6	0·5	0·5	6·5	6·3	12·5	12·2
06	14 31·5	14 33·9	13 51·8	0·6	0·6	6·6	6·4	12·6	12·3
07	14 31·8	14 34·1	13 52·0	0·7	0·7	6·7	6·5	12·7	12·4
08	14 32·0	14 34·4	13 52·3	0·8	0·8	6·8	6·6	12·8	12·5
09	14 32·3	14 34·6	13 52·5	0·9	0·9	6·9	6·7	12·9	12·6
10	14 32·5	14 34·9	13 52·8	1·0	1·0	7·0	6·8	13·0	12·7
11	14 32·8	14 35·1	13 53·0	1·1	1·1	7·1	6·9	13·1	12·8
12	14 33·0	14 35·4	13 53·2	1·2	1·2	7·2	7·0	13·2	12·9
13	14 33·3	14 35·6	13 53·5	1·3	1·3	7·3	7·1	13·3	13·0
14	14 33·5	14 35·9	13 53·7	1·4	1·4	7·4	7·2	13·4	13·1
15	14 33·8	14 36·1	13 53·9	1·5	1·5	7·5	7·3	13·5	13·2
16	14 34·0	14 36·4	13 54·2	1·6	1·6	7·6	7·4	13·6	13·3
17	14 34·3	14 36·6	13 54·4	1·7	1·7	7·7	7·5	13·7	13·4
18	14 34·5	14 36·9	13 54·7	1·8	1·8	7·8	7·6	13·8	13·5
19	14 34·8	14 37·1	13 54·9	1·9	1·9	7·9	7·7	13·9	13·6
20	14 35·0	14 37·4	13 55·1	2·0	2·0	8·0	7·8	14·0	13·7
21	14 35·3	14 37·6	13 55·4	2·1	2·0	8·1	7·9	14·1	13·7
22	14 35·5	14 37·9	13 55·6	2·2	2·1	8·2	8·0	14·2	13·8
23	14 35·8	14 38·1	13 55·9	2·3	2·2	8·3	8·1	14·3	13·9
24	14 36·0	14 38·4	13 56·1	2·4	2·3	8·4	8·2	14·4	14·0
25	14 36·3	14 38·6	13 56·3	2·5	2·4	8·5	8·3	14·5	14·1
26	14 36·5	14 38·9	13 56·6	2·6	2·5	8·6	8·4	14·6	14·2
27	14 36·8	14 39·2	13 56·8	2·7	2·6	8·7	8·5	14·7	14·3
28	14 37·0	14 39·4	13 57·0	2·8	2·7	8·8	8·6	14·8	14·4
29	14 37·3	14 39·7	13 57·3	2·9	2·8	8·9	8·7	14·9	14·5
30	14 37·5	14 39·9	13 57·5	3·0	2·9	9·0	8·8	15·0	14·6
31	14 37·8	14 40·2	13 57·8	3·1	3·0	9·1	8·9	15·1	14·7
32	14 38·0	14 40·4	13 58·0	3·2	3·1	9·2	9·0	15·2	14·8
33	14 38·3	14 40·7	13 58·2	3·3	3·2	9·3	9·1	15·3	14·9
34	14 38·5	14 40·9	13 58·5	3·4	3·3	9·4	9·2	15·4	15·0
35	14 38·8	14 41·2	13 58·7	3·5	3·4	9·5	9·3	15·5	15·1
36	14 39·0	14 41·4	13 59·0	3·6	3·5	9·6	9·4	15·6	15·2
37	14 39·3	14 41·7	13 59·2	3·7	3·6	9·7	9·5	15·7	15·3
38	14 39·5	14 41·9	13 59·4	3·8	3·7	9·8	9·6	15·8	15·4
39	14 39·8	14 42·2	13 59·7	3·9	3·8	9·9	9·7	15·9	15·5
40	14 40·0	14 42·4	13 59·9	4·0	3·9	10·0	9·8	16·0	15·6
41	14 40·3	14 42·7	14 00·1	4·1	4·0	10·1	9·8	16·1	15·7
42	14 40·5	14 42·9	14 00·4	4·2	4·1	10·2	9·9	16·2	15·8
43	14 40·8	14 43·2	14 00·6	4·3	4·2	10·3	10·0	16·3	15·9
44	14 41·0	14 43·4	14 00·9	4·4	4·3	10·4	10·1	16·4	16·0
45	14 41·3	14 43·7	14 01·1	4·5	4·4	10·5	10·2	16·5	16·1
46	14 41·5	14 43·9	14 01·3	4·6	4·5	10·6	10·3	16·6	16·2
47	14 41·8	14 44·2	14 01·6	4·7	4·6	10·7	10·4	16·7	16·3
48	14 42·0	14 44·4	14 01·8	4·8	4·7	10·8	10·5	16·8	16·4
49	14 42·3	14 44·7	14 02·1	4·9	4·8	10·9	10·6	16·9	16·5
50	14 42·5	14 44·9	14 02·3	5·0	4·9	11·0	10·7	17·0	16·6
51	14 42·8	14 45·2	14 02·5	5·1	5·0	11·1	10·8	17·1	16·7
52	14 43·0	14 45·4	14 02·8	5·2	5·1	11·2	10·9	17·2	16·8
53	14 43·3	14 45·7	14 03·0	5·3	5·2	11·3	11·0	17·3	16·9
54	14 43·5	14 45·9	14 03·3	5·4	5·3	11·4	11·1	17·4	17·0
55	14 43·8	14 46·2	14 03·5	5·5	5·4	11·5	11·2	17·5	17·1
56	14 44·0	14 46·4	14 03·7	5·6	5·5	11·6	11·3	17·6	17·2
57	14 44·3	14 46·7	14 04·0	5·7	5·6	11·7	11·4	17·7	17·3
58	14 44·5	14 46·9	14 04·2	5·8	5·7	11·8	11·5	17·8	17·4
59	14 44·8	14 47·2	14 04·4	5·9	5·8	11·9	11·6	17·9	17·5
60	14 45·0	14 47·4	14 04·7	6·0	5·9	12·0	11·7	18·0	17·6

59m s	SUN PLANETS ° ′	ARIES ° ′	MOON ° ′	v or d ′	Corrn ′	v or d ′	Corrn ′	v or d ′	Corrn ′
00	14 45·0	14 47·4	14 04·7	0·0	0·0	6·0	6·0	12·0	11·9
01	14 45·3	14 47·7	14 04·9	0·1	0·1	6·1	6·0	12·1	12·0
02	14 45·5	14 47·9	14 05·2	0·2	0·2	6·2	6·1	12·2	12·1
03	14 45·8	14 48·2	14 05·4	0·3	0·3	6·3	6·2	12·3	12·2
04	14 46·0	14 48·4	14 05·6	0·4	0·4	6·4	6·3	12·4	12·3
05	14 46·3	14 48·7	14 05·9	0·5	0·5	6·5	6·4	12·5	12·4
06	14 46·5	14 48·9	14 06·1	0·6	0·6	6·6	6·5	12·6	12·5
07	14 46·8	14 49·2	14 06·4	0·7	0·7	6·7	6·6	12·7	12·6
08	14 47·0	14 49·4	14 06·6	0·8	0·8	6·8	6·7	12·8	12·7
09	14 47·3	14 49·7	14 06·8	0·9	0·9	6·9	6·8	12·9	12·8
10	14 47·5	14 49·9	14 07·1	1·0	1·0	7·0	6·9	13·0	12·9
11	14 47·8	14 50·2	14 07·3	1·1	1·1	7·1	7·0	13·1	13·0
12	14 48·0	14 50·4	14 07·5	1·2	1·2	7·2	7·1	13·2	13·1
13	14 48·3	14 50·7	14 07·8	1·3	1·3	7·3	7·2	13·3	13·2
14	14 48·5	14 50·9	14 08·0	1·4	1·4	7·4	7·3	13·4	13·3
15	14 48·8	14 51·2	14 08·3	1·5	1·5	7·5	7·4	13·5	13·4
16	14 49·0	14 51·4	14 08·5	1·6	1·6	7·6	7·5	13·6	13·5
17	14 49·3	14 51·7	14 08·7	1·7	1·7	7·7	7·6	13·7	13·6
18	14 49·5	14 51·9	14 09·0	1·8	1·8	7·8	7·7	13·8	13·7
19	14 49·8	14 52·2	14 09·2	1·9	1·9	7·9	7·8	13·9	13·8
20	14 50·0	14 52·4	14 09·5	2·0	2·0	8·0	7·9	14·0	13·9
21	14 50·3	14 52·7	14 09·7	2·1	2·1	8·1	8·0	14·1	14·0
22	14 50·5	14 52·9	14 09·9	2·2	2·2	8·2	8·1	14·2	14·1
23	14 50·8	14 53·2	14 10·2	2·3	2·3	8·3	8·2	14·3	14·2
24	14 51·0	14 53·4	14 10·4	2·4	2·4	8·4	8·3	14·4	14·3
25	14 51·3	14 53·7	14 10·6	2·5	2·5	8·5	8·4	14·5	14·4
26	14 51·5	14 53·9	14 10·9	2·6	2·6	8·6	8·5	14·6	14·5
27	14 51·8	14 54·2	14 11·1	2·7	2·7	8·7	8·6	14·7	14·6
28	14 52·0	14 54·4	14 11·4	2·8	2·8	8·8	8·7	14·8	14·7
29	14 52·3	14 54·7	14 11·6	2·9	2·9	8·9	8·8	14·9	14·8
30	14 52·5	14 54·9	14 11·8	3·0	3·0	9·0	8·9	15·0	14·9
31	14 52·8	14 55·2	14 12·1	3·1	3·1	9·1	9·0	15·1	15·0
32	14 53·0	14 55·4	14 12·3	3·2	3·2	9·2	9·1	15·2	15·1
33	14 53·3	14 55·7	14 12·6	3·3	3·3	9·3	9·2	15·3	15·2
34	14 53·5	14 55·9	14 12·8	3·4	3·4	9·4	9·3	15·4	15·3
35	14 53·8	14 56·2	14 13·0	3·5	3·5	9·5	9·4	15·5	15·4
36	14 54·0	14 56·4	14 13·3	3·6	3·6	9·6	9·5	15·6	15·5
37	14 54·3	14 56·7	14 13·5	3·7	3·7	9·7	9·6	15·7	15·6
38	14 54·5	14 56·9	14 13·8	3·8	3·8	9·8	9·7	15·8	15·7
39	14 54·8	14 57·2	14 14·0	3·9	3·9	9·9	9·8	15·9	15·8
40	14 55·0	14 57·5	14 14·2	4·0	4·0	10·0	9·9	16·0	15·9
41	14 55·3	14 57·7	14 14·5	4·1	4·1	10·1	10·0	16·1	16·0
42	14 55·5	14 58·0	14 14·7	4·2	4·2	10·2	10·1	16·2	16·1
43	14 55·8	14 58·2	14 14·9	4·3	4·3	10·3	10·2	16·3	16·2
44	14 56·0	14 58·5	14 15·2	4·4	4·4	10·4	10·3	16·4	16·3
45	14 56·3	14 58·7	14 15·4	4·5	4·5	10·5	10·4	16·5	16·4
46	14 56·5	14 59·0	14 15·7	4·6	4·6	10·6	10·5	16·6	16·5
47	14 56·8	14 59·2	14 15·9	4·7	4·7	10·7	10·6	16·7	16·6
48	14 57·0	14 59·5	14 16·1	4·8	4·8	10·8	10·7	16·8	16·7
49	14 57·3	14 59·7	14 16·4	4·9	4·9	10·9	10·8	16·9	16·8
50	14 57·5	15 00·0	14 16·6	5·0	5·0	11·0	10·9	17·0	16·9
51	14 57·8	15 00·2	14 16·9	5·1	5·1	11·1	11·0	17·1	17·0
52	14 58·0	15 00·5	14 17·1	5·2	5·2	11·2	11·1	17·2	17·1
53	14 58·3	15 00·7	14 17·3	5·3	5·3	11·3	11·2	17·3	17·2
54	14 58·5	15 01·0	14 17·6	5·4	5·4	11·4	11·3	17·4	17·3
55	14 58·8	15 01·2	14 17·8	5·5	5·5	11·5	11·4	17·5	17·4
56	14 59·0	15 01·5	14 18·0	5·6	5·6	11·6	11·5	17·6	17·5
57	14 59·3	15 01·7	14 18·3	5·7	5·7	11·7	11·6	17·7	17·6
58	14 59·5	15 02·0	14 18·5	5·8	5·8	11·8	11·7	17·8	17·7
59	14 59·8	15 02·2	14 18·8	5·9	5·9	11·9	11·8	17·9	17·8
60	15 00·0	15 02·5	14 19·0	6·0	6·0	12·0	11·9	18·0	17·9

TABLES FOR INTERPOLATING SUNRISE, MOONRISE, ETC.

TABLE I—FOR LATITUDE

Tabular Interval			Difference between the times for consecutive latitudes															
10°	5°	2°	5m	10m	15m	20m	25m	30m	35m	40m	45m	50m	55m	60m	1h 05m	1h 10m	1h 15m	1h 20m
° ′	° ′	° ′	m	m	m	m	m	m	m	m	m	m	m	m	h m	h m	h m	h m
0 30	0 15	0 06	0	0	1	1	1	1	1	2	2	2	2	2	0 02	0 02	0 02	0 02
1 00	0 30	0 12	0	1	1	2	2	3	3	3	4	4	4	5	05	05	05	05
1 30	0 45	0 18	1	1	2	3	3	4	4	5	5	6	7	7	07	07	07	07
2 00	1 00	0 24	1	2	3	4	5	5	6	7	7	8	9	10	10	10	10	10
2 30	1 15	0 30	1	2	4	5	6	7	8	9	9	10	11	12	12	13	13	13
3 00	1 30	0 36	1	3	4	6	7	8	9	10	11	12	13	14	0 15	0 15	0 16	0 16
3 30	1 45	0 42	2	3	5	7	8	10	11	12	13	14	16	17	18	18	19	19
4 00	2 00	0 48	2	4	6	8	9	11	13	14	15	16	18	19	20	21	22	22
4 30	2 15	0 54	2	4	7	9	11	13	15	16	18	19	21	22	23	24	25	26
5 00	2 30	1 00	2	5	7	10	12	14	16	18	20	22	23	25	26	27	28	29
5 30	2 45	1 06	3	5	8	11	13	16	18	20	22	24	26	28	0 29	0 30	0 31	0 32
6 00	3 00	1 12	3	6	9	12	14	17	20	22	24	26	29	31	32	33	34	36
6 30	3 15	1 18	3	6	10	13	16	19	22	24	26	29	31	34	36	37	38	40
7 00	3 30	1 24	3	7	10	14	17	20	23	26	29	31	34	37	39	41	42	44
7 30	3 45	1 30	4	7	11	15	18	22	25	28	31	34	37	40	43	44	46	48
8 00	4 00	1 36	4	8	12	16	20	23	27	30	34	37	41	44	0 47	0 48	0 51	0 53
8 30	4 15	1 42	4	8	13	17	21	25	29	33	36	40	44	48	0 51	0 53	0 56	0 58
9 00	4 30	1 48	4	9	13	18	22	27	31	35	39	43	47	52	0 55	0 58	1 01	1 04
9 30	4 45	1 54	5	9	14	19	24	28	33	38	42	47	51	56	1 00	1 04	1 08	1 12
10 00	5 00	2 00	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)																	
	10m	20m	30m	40m	50m	60m	1h + 10m	20m	30m	1h + 40m	50m	60m	2h 10m	2h 20m	2h 30m	2h 40m	2h 50m	3h 00m
°	m	m	m	m	m	m	m	m	m	m	m	m	h m	h m	h m	h m	h m	h m
0	0	0	0	0	0	0	0	0	0	0	0	0	0 00	0 00	0 00	0 00	0 00	0 00
10	0	1	1	1	1	2	2	2	2	3	3	3	04	04	04	04	05	05
20	1	1	2	2	3	3	4	4	5	6	6	7	07	08	08	09	09	10
30	1	2	2	3	4	5	6	7	7	8	9	10	11	12	12	13	14	15
40	1	2	3	4	6	7	8	9	10	11	12	13	14	16	17	18	19	20
50	1	3	4	6	7	8	10	11	12	14	15	17	0 18	0 19	0 21	0 22	0 24	0 25
60	2	3	5	7	8	10	12	13	15	17	18	20	22	23	25	27	28	30
70	2	4	6	8	10	12	14	16	17	19	21	23	25	27	29	31	33	35
80	2	4	7	9	11	13	16	18	20	22	24	27	29	31	33	36	38	40
90	2	5	7	10	12	15	17	20	22	25	27	30	32	35	37	40	42	45
100	3	6	8	11	14	17	19	22	25	28	31	33	0 36	0 39	0 42	0 44	0 47	0 50
110	3	6	9	12	15	18	21	24	27	31	34	37	40	43	46	49	0 52	0 55
120	3	7	10	13	17	20	23	27	30	33	37	40	43	47	50	53	0 57	1 00
130	4	7	11	14	18	22	25	29	32	36	40	43	47	51	54	0 58	1 01	1 05
140	4	8	12	16	19	23	27	31	35	39	43	47	51	54	0 58	1 02	1 06	1 10
150	4	8	13	17	21	25	29	33	38	42	46	50	0 54	0 58	1 03	1 07	1 11	1 15
160	4	9	13	18	22	27	31	36	40	44	49	53	0 58	1 02	1 07	1 11	1 16	1 20
170	5	9	14	19	24	28	33	38	42	47	52	57	1 01	1 06	1 11	1 16	1 20	1 25
180	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.

INDEX TO SELECTED STARS, 0000

Name	No.	Mag.	S.H.A.	Dec.
			°	°
Acamar	7	3·1	316	S. 40
Achernar	5	0·6	336	S. 57
Acrux	30	1·1	174	S. 63
Adhara	19	1·6	256	S. 29
Aldebaran	10	1·1	291	N. 16
Alioth	32	1·7	167	N. 56
Alkaid	34	1·9	153	N. 49
Al Na'ir	55	2·2	28	S. 47
Alnilam	15	1·8	276	S. 1
Alphard	25	2·2	218	S. 9
Alphecca	41	2·3	127	N. 27
Alpheratz	1	2·2	358	N. 29
Altair	51	0·9	63	N. 9
Ankaa	2	2·4	354	S. 42
Antares	42	1·2	113	S. 26
Arcturus	37	0·2	146	N. 19
Atria	43	1·9	108	S. 69
Avior	22	1·7	234	S. 59
Bellatrix	13	1·7	279	N. 6
Betelgeuse	16	Var.*	272	N. 7
Canopus	17	−0·9	264	S. 53
Capella	12	0·2	281	N. 46
Deneb	53	1·3	50	N. 45
Denebola	28	2·2	183	N. 15
Diphda	4	2·2	349	S. 18
Dubhe	27	2·0	194	N. 62
Elnath	14	1·8	279	N. 29
Eltanin	47	2·4	91	N. 51
Enif	54	2·5	34	N. 10
Fomalhaut	56	1·3	16	S. 30
Gacrux	31	1·6	173	S. 57
Gienah	29	2·8	176	S. 17
Hadar	35	0·9	149	S. 60
Hamal	6	2·2	329	N. 23
Kaus Australis	48	2·0	84	S. 34
Kochab	40	2·2	137	N. 74
Markab	57	2·6	14	N. 15
Menkar	8	2·8	315	N. 4
Menkent	36	2·3	149	S. 36
Miaplacidus	24	1·8	222	S. 70
Mirfak	9	1·9	309	N. 50
Nunki	50	2·1	77	S. 26
Peacock	52	2·1	54	S. 57
Pollux	21	1·2	244	N. 28
Procyon	20	0·5	245	N. 5
Rasalhague	46	2·1	97	N. 13
Regulus	26	1·3	208	N. 12
Rigel	11	0·3	282	S. 8
Rigil Kentaurus	38	0·1	140	S. 61
Sabik	44	2·6	103	S. 16
Schedar	3	2·5	350	N. 56
Shaula	45	1·7	97	S. 37
Sirius	18	−1·6	259	S. 17
Spica	33	1·2	159	S. 11
Suhail	23	2·2	223	S. 43
Vega	49	0·1	81	N. 39
Zubenelgenubi	39	2·9	138	S. 16

* 0·1—1·2

No.	Name	Mag.	S.H.A.	Dec.
			°	°
1	*Alpheratz*	2·2	358	N. 29
2	*Ankaa*	2·4	354	S. 42
3	*Schedar*	2·5	350	N. 56
4	*Diphda*	2·2	349	S. 18
5	*Achernar*	0·6	336	S. 57
6	*Hamal*	2·2	329	N. 23
7	*Acamar*	3·1	316	S. 40
8	*Menkar*	2·8	315	N. 4
9	*Mirfak*	1·9	309	N. 50
10	*Aldebaran*	1·1	291	N. 16
11	*Rigel*	0·3	282	S. 8
12	*Capella*	0·2	281	N. 46
13	*Bellatrix*	1·7	279	N. 6
14	*Elnath*	1·8	279	N. 29
15	*Alnilam*	1·8	276	S. 1
16	*Betelgeuse*	Var.*	272	N. 7
17	*Canopus*	−0·9	264	S. 53
18	*Sirius*	−1·6	259	S. 17
19	*Adhara*	1·6	256	S. 29
20	*Procyon*	0·5	245	N. 5
21	*Pollux*	1·2	244	N. 28
22	*Avior*	1·7	234	S. 59
23	*Suhail*	2·2	223	S. 43
24	*Miaplacidus*	1·8	222	S. 70
25	*Alphard*	2·2	218	S. 9
26	*Regulus*	1·3	208	N. 12
27	*Dubhe*	2·0	194	N. 62
28	*Denebola*	2·2	183	N. 15
29	*Gienah*	2·8	176	S. 17
30	*Acrux*	1·1	174	S. 63
31	*Gacrux*	1·6	173	S. 57
32	*Alioth*	1·7	167	N. 56
33	*Spica*	1·2	159	S. 11
34	*Alkaid*	1·9	153	N. 49
35	*Hadar*	0·9	149	S. 60
36	*Menkent*	2·3	149	S. 36
37	*Arcturus*	0·2	146	N. 19
38	*Rigil Kentaurus*	0·1	140	S. 61
39	*Zubenelgenubi*	2·9	138	S. 16
40	*Kochab*	2·2	137	N. 74
41	*Alphecca*	2·3	127	N. 27
42	*Antares*	1·2	113	S. 26
43	*Atria*	1·9	108	S. 69
44	*Sabik*	2·6	103	S. 16
45	*Shaula*	1·7	97	S. 37
46	*Rasalhague*	2·1	97	N. 13
47	*Eltanin*	2·4	91	N. 51
48	*Kaus Australis*	2·0	84	S. 34
49	*Vega*	0·1	81	N. 39
50	*Nunki*	2·1	77	S. 26
51	*Altair*	0·9	63	N. 9
52	*Peacock*	2·1	54	S. 57
53	*Deneb*	1·3	50	N. 45
54	*Enif*	2·5	34	N. 10
55	*Al Na'ir*	2·2	28	S. 47
56	*Fomalhaut*	1·3	16	S. 30
57	*Markab*	2·6	14	N. 15

ALTITUDE CORRECTION TABLES 0°–35°—MOON

App. Alt.	0°–4° Corrn	5°–9° Corrn	10°–14° Corrn	15°–19° Corrn	20°–24° Corrn	25°–29° Corrn	30°–34° Corrn	App. Alt.
′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	′
00	0 33·8	5 58·2	10 62·1	15 62·8	20 62·2	25 60·8	30 58·9	00
10	35·9	58·5	62·2	62·8	62·1	60·8	58·8	10
20	37·8	58·7	62·2	62·8	62·1	60·7	58·8	20
30	39·6	58·9	62·3	62·8	62·1	60·7	58·7	30
40	41·2	59·1	62·3	62·8	62·0	60·6	58·6	40
50	42·6	59·3	62·4	62·7	62·0	60·6	58·5	50
00	1 44·0	6 59·5	11 62·4	16 62·7	21 62·0	26 60·5	31 58·5	00
10	45·2	59·7	62·4	62·7	61·9	60·4	58·4	10
20	46·3	59·9	62·5	62·7	61·9	60·4	58·3	20
30	47·3	60·0	62·5	62·7	61·9	60·3	58·2	30
40	48·3	60·2	62·5	62·7	61·8	60·3	58·2	40
50	49·2	60·3	62·6	62·7	61·8	60·2	58·1	50
00	2 50·0	7 60·5	12 62·6	17 62·7	22 61·7	27 60·1	32 58·0	00
10	50·8	60·6	62·6	62·6	61·7	60·1	57·9	10
20	51·4	60·7	62·6	62·6	61·6	60·0	57·8	20
30	52·1	60·9	62·7	62·6	61·6	59·9	57·8	30
40	52·7	61·0	62·7	62·6	61·5	59·9	57·7	40
50	53·3	61·1	62·7	62·6	61·5	59·8	57·6	50
00	3 53·8	8 61·2	13 62·7	18 62·5	23 61·5	28 59·7	33 57·5	00
10	54·3	61·3	62·7	62·5	61·4	59·7	57·4	10
20	54·8	61·4	62·7	62·5	61·4	59·6	57·4	20
30	55·2	61·5	62·8	62·5	61·3	59·6	57·3	30
40	55·6	61·6	62·8	62·4	61·3	59·5	57·2	40
50	56·0	61·6	62·8	62·4	61·2	59·4	57·1	50
00	4 56·4	9 61·7	14 62·8	19 62·4	24 61·2	29 59·3	34 57·0	00
10	56·7	61·8	62·8	62·3	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	62·2	60·9	59·1	56·7	40
50	57·9	62·1	62·8	62·2	60·9	59·0	56·6	50

H.P.	L	U	L	U	L	U	L	U	L	U	L	U	L	U	H.P.
′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′
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	0·7	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	1·9	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	3·4	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	3·1	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	4·7	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	Corrn	Ht. of Eye	Ht. of Eye	Corrn	Ht. of Eye
m	′	ft.	m	′	ft.
2·4	−2·8	8·0	9·5	−5·5	31·5
2·6	−2·9	8·6	9·9	−5·6	32·7
2·8	−3·0	9·2	10·3	−5·7	33·9
3·0	−3·1	9·8	10·6	−5·8	35·1
3·2	−3·2	10·5	11·0	−5·9	36·3
3·4	−3·3	11·2	11·4	−6·0	37·6
3·6	−3·4	11·9	11·8	−6·1	38·9
3·8	−3·5	12·6	12·2	−6·2	40·1
4·0	−3·6	13·3	12·6	−6·3	41·5
4·3	−3·7	14·1	13·0	−6·4	42·8
4·5	−3·8	14·9	13·4	−6·5	44·2
4·7	−3·9	15·7	13·8	−6·6	45·5
5·0	−4·0	16·5	14·2	−6·7	46·9
5·2	−4·1	17·4	14·7	−6·8	48·4
5·5	−4·2	18·3	15·1	−6·9	49·8
5·8	−4·3	19·1	15·5	−7·0	51·3
6·1	−4·4	20·1	16·0	−7·1	52·8
6·3	−4·5	21·0	16·5	−7·2	54·3
6·6	−4·6	22·0	16·9	−7·3	55·8
6·9	−4·7	22·9	17·4	−7·4	57·4
7·2	−4·8	23·9	17·9	−7·5	58·9
7·5	−4·9	24·9	18·4	−7·6	60·5
7·9	−5·0	26·0	18·8	−7·7	62·1
8·2	−5·1	27·1	19·3	−7·8	63·8
8·5	−5·2	28·1	19·8	−7·9	65·4
8·8	−5·3	29·2	20·4	−8·0	67·1
9·2	−5·4	30·4	20·9	−8·1	68·8
9·5		31·5	21·4		70·5

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 H.P., 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.
	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	Corrⁿ	
′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	′
00	35 56·5	40 53·7	45 50·5	50 46·9	55 43·1	60 38·9	65 34·6	70 30·1	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	52·8	49·5	45·9	42·0	37·8	33·4	28·8	24·1	19·2	14·3	20
30	55·7	52·7	49·4	45·8	41·8	37·7	33·2	28·7	23·9	19·1	14·1	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	48·2	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 47·6	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	16·5	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
H.P.	L U	L U	L U	L U	L U	L U	L U	L U	L U	L U	L U	H.P.
′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′ ′	′
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	2·3 2·7	2·5 3·0	2·8 3·2	3·0 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	3·7 4·1	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 4·6	7·0 4·5	6·9 4·4	6·8 4·3	6·6 4·1	6·5 4·0	6·3 3·8	6·2 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