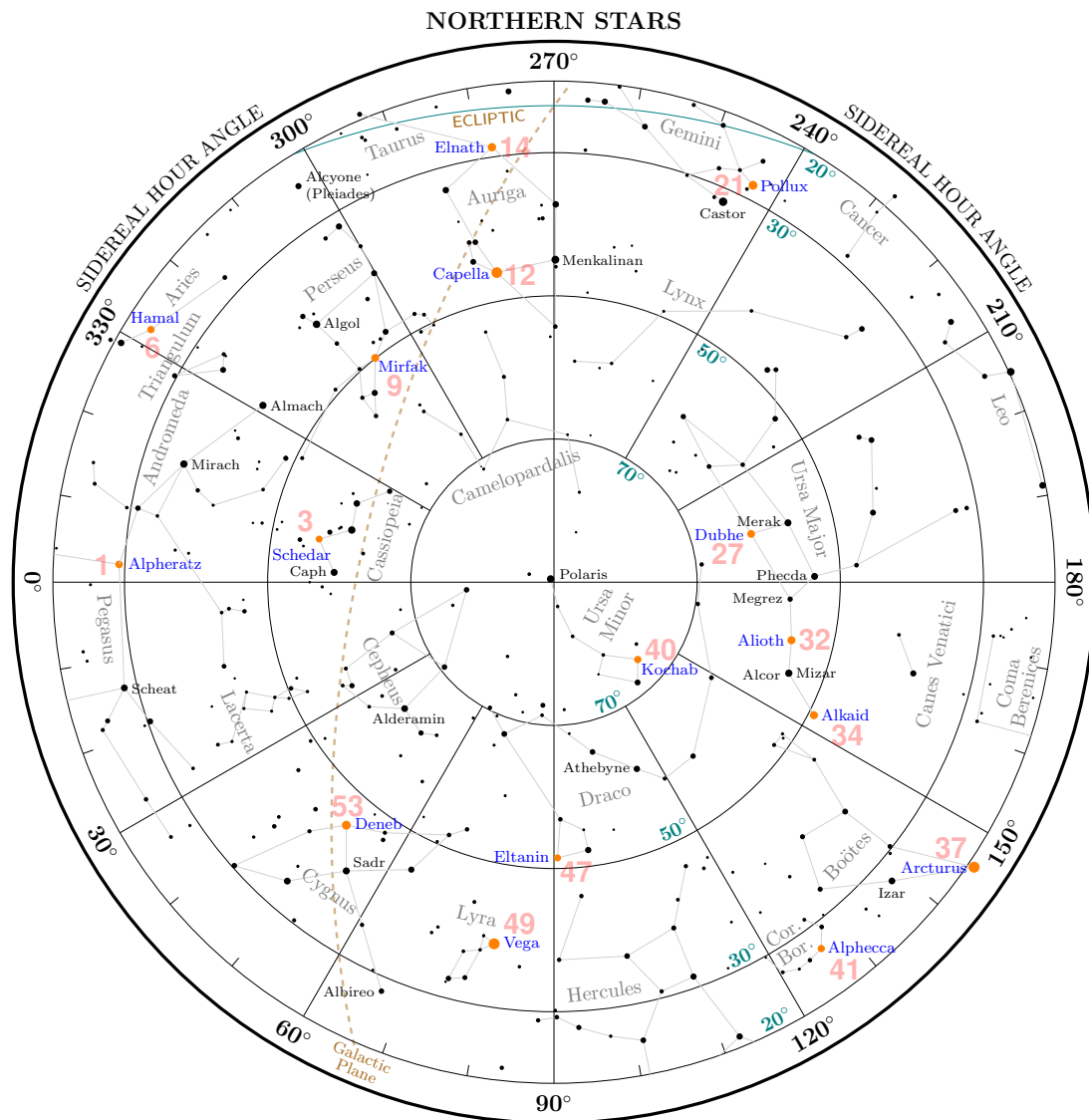


GENERATED USING EPHEM



THE NAUTICAL ALMANAC

12.02.2008

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October 20, 2023

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

Aries		Venus		Mars		Jupiter		Saturn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec
0	141°25.7	206°39.0	S21°17.9	57°03.9	N26°30.7	218°11.3	S22°46.4	342°49.6	N10°57.0	Alpheratz	357°48.1 29°08.2
1	156°28.2	221°38.2	17.5	72°06.0	30.6	233°13.2	46.4	357°52.3	57.0	Ankaa	353°19.8 -42°15.9
2	171°30.7	236°37.4	17.1	87°08.1	30.6	248°15.1	46.3	12°54.9	57.1	Schedar	349°45.8 56°35.1
3	186°33.1	251°36.5	•• 16.7	102°10.1	•• 30.6	263°17.1	•• 46.3	27°57.6	•• 57.2	Diphda	349°00.1 -17°56.6
4	201°35.6	266°35.7	16.3	117°12.2	30.5	278°19.0	46.2	43°00.2	57.3	Achernar	335°29.7 -57°11.9
5	216°38.1	281°34.9	15.9	132°14.3	30.5	293°20.9	46.2	58°02.9	57.3	Hamal	328°05.5 23°30.2
6	231°40.5	296°34.1	S21°15.5	147°16.3	N26°30.5	308°22.8	S22°46.2	73°05.5	N10°57.4	Polaris	319°48.6 89°18.4
7	246°43.0	311°33.2	15.1	162°18.4	30.4	323°24.7	46.1	88°08.1	57.5	Acamar	315°21.3 -40°16.5
8	261°45.5	326°32.4	14.7	177°20.4	30.4	338°26.7	46.1	103°10.8	57.6	Menkar	314°19.3 4°07.3
9	276°47.9	341°31.6	•• 14.3	192°22.5	•• 30.4	353°28.6	•• 46.0	118°13.4	•• 57.6	Mirfak	308°46.3 49°53.7
10	291°50.4	356°30.8	13.9	207°24.6	30.3	8°30.5	46.0	133°16.1	57.7	Aldebaran	290°53.9 16°31.6
11	306°52.9	11°30.0	13.5	222°26.6	30.3	23°32.4	45.9	148°18.7	57.8	Rigel	281°15.8 -8°11.6
12	321°55.3	26°29.1	S21°13.1	237°28.7	N26°30.3	38°34.4	S22°45.9	163°21.4	N10°57.9	Capella	280°40.2 46°00.6
13	336°57.8	41°28.3	12.7	252°30.7	30.2	53°36.3	45.9	178°24.0	58.0	Bellatrix	278°36.2 6°21.5
14	352°00.2	56°27.5	12.3	267°32.8	30.2	68°38.2	45.8	193°26.7	58.0	Elnath	278°17.5 28°37.0
15	7°02.7	71°26.7	•• 11.9	282°34.8	•• 30.2	83°40.1	•• 45.8	208°29.3	•• 58.1	Alnilam	275°50.3 -1°11.8
16	22°05.2	86°25.9	11.4	297°36.9	30.1	98°42.0	45.7	223°31.9	58.2	Betelgeuse	271°05.5 7°24.5
17	37°07.6	101°25.1	11.0	312°39.0	30.1	113°44.0	45.7	238°34.6	58.3	Canopus	263°57.6 -52°42.1
18	52°10.1	116°24.2	S21°10.6	327°41.0	N26°30.1	128°45.9	S22°45.6	253°37.2	N10°58.3	Sirius	258°37.0 -16°43.7
19	67°12.6	131°23.4	10.2	342°43.0	30.0	143°47.8	45.6	268°39.9	58.4	Adhara	255°15.4 -28°59.1
20	82°15.0	146°22.6	09.8	357°45.1	30.0	158°49.7	45.6	283°42.5	58.5	Procyon	245°03.6 5°12.2
21	97°17.5	161°21.8	•• 09.4	12°47.1	•• 30.0	173°51.7	•• 45.5	298°45.2	•• 58.6	Pollux	243°32.3 28°00.4
22	112°20.0	176°21.0	09.0	27°49.2	29.9	188°53.6	45.5	313°47.8	58.6	Avior	234°19.3 -59°32.2
23	127°22.4	191°20.1	08.5	42°51.2	29.9	203°55.5	45.4	328°50.5	58.7	Suhail	222°55.1 -43°28.0
Mer.pass. 14:31		ν -0.8' d 0.4' m -3.8		ν 2.1' d -0.0' m -0.3		ν 1.9' d 0.0' m -1.8		ν 2.6' d 0.1' m 0.3			

Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	142°24.9	206°19.3	S21°08.1	57°53.3	N26°29.9	218°57.4	S22°45.4	343°53.1	N10°58.8
1	157°27.4	221°18.5	07.7	72°55.3	29.8	233°59.4	45.3	358°55.8	58.9
2	172°29.8	236°17.7	07.3	87°57.4	29.8	249°01.3	45.3	13°58.4	59.0
3	187°32.3	251°16.9	•• 06.9	102°59.4	•• 29.8	264°03.2	•• 45.3	29°01.1	•• 59.0
4	202°34.7	266°16.1	06.4	118°01.4	29.7	279°05.1	45.2	44°03.7	59.1
5	217°37.2	281°15.3	06.0	133°03.5	29.7	294°07.1	45.2	59°06.3	59.2
6	232°39.7	296°14.4	S21°05.6	148°05.5	N26°29.7	309°09.0	S22°45.1	74°09.0	N10°59.3
7	247°42.1	311°13.6	05.2	163°07.5	29.6	324°10.9	45.1	89°11.6	59.3
8	262°44.6	326°12.8	04.7	178°09.6	29.6	339°12.8	45.0	104°14.3	59.4
9	277°47.1	341°12.0	•• 04.3	193°11.6	•• 29.6	354°14.8	•• 45.0	119°16.9	•• 59.5
10	292°49.5	356°11.2	03.9	208°13.6	29.5	9°16.7	45.0	134°19.6	59.6
11	307°52.0	11°10.4	03.5	223°15.7	29.5	24°18.6	44.9	149°22.2	59.6
12	322°54.5	26°09.6	S21°03.0	238°17.7	N26°29.5	39°20.5	S22°44.9	164°24.9	N10°59.7
13	337°56.9	41°08.7	02.6	253°19.7	29.4	54°22.5	44.8	179°27.5	59.8
14	352°59.4	56°07.9	02.2	268°21.7	29.4	69°24.4	44.8	194°30.2	10°59.9
15	8°01.8	71°07.1	•• 01.7	283°23.8	•• 29.4	84°26.3	•• 44.7	209°32.8	11°00.0
16	23°04.3	86°06.3	01.3	298°25.8	29.3	99°28.2	44.7	224°35.5	00.0
17	38°06.8	101°05.5	00.9	313°27.8	29.3	114°30.2	44.7	239°38.1	00.1
18	53°09.2	116°04.7	S21°00.4	328°29.8	N26°29.3	129°32.1	S22°44.6	254°40.7	N11°00.2
19	68°11.7	131°03.9	21°00.0	343°31.9	29.2	144°34.0	44.6	269°43.4	00.3
20	83°14.2	146°03.1	20°59.5	358°33.9	29.2	159°35.9	44.5	284°46.0	00.3
21	98°16.6	161°02.3	•• 59.1	13°35.9	•• 29.2	174°37.9	•• 44.5	299°48.7	•• 00.4
22	113°19.1	176°01.5	58.7	28°37.9	29.1	189°39.8	44.4	314°51.3	00.5
23	128°21.6	191°00.6	58.2	43°39.9	29.1	204°41.7	44.4	329°54.0	00.6
Mer.pass. 14:27		ν -0.8' d 0.4' m -3.8		ν 2.0' d -0.0' m -0.2		ν 1.9' d 0.0' m -1.8		ν 2.6' d 0.1' m 0.3	

Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	143°24.0	205°59.8	S20°57.8	58°41.9	N26°29.1	219°43.7	S22°44.4	344°56.6	N11°00.6
1	158°26.5	220°59.0	57.3	73°44.0	29.0	234°45.6	44.3	359°59.3	00.7
2	173°29.0	235°58.2	56.9	88°46.0	29.0	249°47.5	44.3	15°01.9	00.8
3	188°31.4	250°57.4	•• 56.4	103°48.0	•• 29.0	264°49.4	•• 44.2	30°04.6	•• 00.9
4	203°33.9	265°56.6	56.0	118°50.0	28.9	279°51.4	44.2	45°07.2	01.0
5	218°36.3	280°55.8	55.5	133°52.0	28.9	294°53.3	44.1	60°09.9	01.0
6	233°38.8	295°55.0	S20°55.1	148°54.0	N26°28.9	309°55.2	S22°44.1	75°12.5	N11°01.1
7	248°41.3	310°54.2	54.6	163°56.0	28.8	324°57.1	44.1	90°15.2	01.2
8	263°43.7	325°53.4	54.2	178°58.0	28.8	339°59.1	44.0	105°17.8	01.3
9	278°46.2	340°52.6	•• 53.7	194°00.0	•• 28.8	355°01.0	•• 44.0	120°20.5	•• 01.3
10	293°48.7	355°51.8	53.3	209°02.0	28.7	10°02.9	43.9	135°23.1	01.4
11	308°51.1	10°51.0	52.8	224°04.0	28.7	25°04.9	43.9	150°25.7	01.5
12	323°53.6	25°50.2	S20°52.4	239°06.0	N26°28.7	40°06.8	S22°43.8	165°28.4	N11°01.6
13	338°56.1	40°49.3	51.9	254°08.0	28.6	55°08.7	43.8	180°31.0	01.6
14	353°58.5	55°48.5	51.4	269°10.0	28.6	70°10.7	43.8	195°33.7	01.7
15	9°01.0	70°47.7	•• 51.0	284°12.0	•• 28.6	85°12.6	•• 43.7	210°36.3	•• 01.8
16	24°03.5	85°46.9	50.5	299°14.0	28.5	100°14.5	43.7	225°39.0	01.9
17	39°05.9	100°46.1	50.1	314°16.0	28.5	115°16.4	43.6	240°41.6	02.0
18	54°08.4	115°45.3	S20°49.6	329°18.0	N26°28.5	130°18.4	S22°43.6	255°44.3	N11°02.0
19	69°10.8	130°44.5	49.1	344°20.0	28.5	145°20.3	43.5	270°46.9	02.1
20	84°13.3	145°43.7	48.7	359°22.0	28.4	160°22.2	43.5	285°49.6	02.2
21	99°15.8	160°42.9	•• 48.2	14°24.0	•• 28.4	175°24.2	•• 43.4	300°52.2	•• 02.3
22	114°18.2	175°42.1	47.7	29°26.0	28.4	190°26.1	43.4	315°54.9	02.3
23	129°20.7	190°41.3	47.3	44°28.0	28.3	205°28.0	43.4	330°57.5	02.4
Mer.pass. 14:24		ν -0.8' d 0.4' m -3.8		ν 2.0' d -0.0' m -0.2		ν 1.9' d 0.0' m -1.8		ν 2.6' d 0.1' m 0.3	

Feb 12 Tue	SHA	Mer.pass
Venus	65°13.3	10:14
Mars	275°38.2	20:09
Jupiter	76°45.5	09:26
Saturn	201°23.9	01:08

Feb 13 Wed	SHA	Mer.pass
Venus	63°54.4	10:15
Mars	275°28.4	20:06
Jupiter	76°32.5	09:23
Saturn	201°28.2	01:04

Feb 14 Thu	SHA	Mer.pass
Venus	62°35.8	10:17
Mars	275°17.9	20:03
Jupiter	76°19.6	09:20
Saturn	201°32.6	01:00

Horizontal parallax	
Venus:	0.1
Mars:	0.2

h		Sun		Moon			
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°26.2	S13°58.1	120°31.7	10.5'	N13°33.0	14.7'	59.1'
1	191°26.2	57.2	135°01.2	10.5'	13°47.7	14.7'	59.1'
2	206°26.2	56.4	149°30.7	10.4'	14°02.4	14.6'	59.1'
3	221°26.2	· · 55.6	164°00.0	10.3'	14°17.0	14.5'	59.1'
4	236°26.2	54.8	178°29.3	10.2'	14°31.5	14.4'	59.1'
5	251°26.2	53.9	192°58.6	10.1'	14°45.9	14.4'	59.1'
6	266°26.2	S13°53.1	207°27.7	10.1'	N15°00.3	14.3'	59.1'
7	281°26.2	52.3	221°56.8	10.0'	15°14.6	14.2'	59.1'
8	296°26.2	51.5	236°25.8	9.9'	15°28.8	14.1'	59.1'
9	311°26.2	· · 50.6	250°54.7	9.8'	15°42.9	14.0'	59.1'
10	326°26.2	49.8	265°23.5	9.7'	15°56.9	14.0'	59.1'
11	341°26.2	49.0	279°52.3	9.7'	16°10.9	13.9'	59.1'
12	356°26.2	S13°48.2	294°20.9	9.6'	N16°24.8	13.8'	59.1'
13	11°26.2	47.3	308°49.5	9.5'	16°38.5	13.7'	59.1'
14	26°26.2	46.5	323°18.0	9.4'	16°52.2	13.6'	59.1'
15	41°26.2	· · 45.7	337°46.4	9.3'	17°05.8	13.5'	59.2'
16	56°26.2	44.8	352°14.7	9.2'	17°19.3	13.4'	59.2'
17	71°26.2	44.0	6°43.0	9.1'	17°32.7	13.3'	59.2'
18	86°26.2	S13°43.2	21°11.1	9.1'	N17°46.0	13.2'	59.2'
19	101°26.2	42.3	35°39.2	9.0'	17°59.2	13.1'	59.2'
20	116°26.3	41.5	50°07.2	8.9'	18°12.3	13.0'	59.2'
21	131°26.3	· · 40.7	64°35.0	8.8'	18°25.3	12.9'	59.2'
22	146°26.3	39.8	79°02.8	8.7'	18°38.2	12.8'	59.2'
23	161°26.3	39.0	93°30.5	8.6'	18°51.0	12.7'	59.2'
SD = 16.2'		$d = 0.8'$	SD = 16.1'				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	176°26.3	S13°38.2	107°58.1	8.5'	N19°03.7	12.6'	59.2'
1	191°26.3	37.3	122°25.7	8.4'	19°16.3	12.5'	59.2'
2	206°26.3	36.5	136°53.1	8.3'	19°28.8	12.4'	59.2'
3	221°26.3	· · 35.7	151°20.4	8.2'	19°41.2	12.2'	59.2'
4	236°26.3	34.8	165°47.7	8.2'	19°53.4	12.1'	59.2'
5	251°26.3	34.0	180°14.8	8.1'	20°05.5	12.0'	59.2'
6	266°26.3	S13°33.2	194°41.9	8.0'	N20°17.5	11.9'	59.2'
7	281°26.3	32.3	209°08.9	7.9'	20°29.4	11.8'	59.2'
8	296°26.4	31.5	223°35.7	7.8'	20°41.2	11.7'	59.2'
9	311°26.4	· · 30.7	238°02.5	7.7'	20°52.9	11.5'	59.2'
10	326°26.4	29.8	252°29.2	7.6'	21°04.4	11.4'	59.2'
11	341°26.4	29.0	266°55.8	7.5'	21°15.8	11.3'	59.2'
12	356°26.4	S13°28.1	281°22.3	7.4'	N21°27.1	11.2'	59.2'
13	11°26.4	27.3	295°48.7	7.3'	21°38.2	11.0'	59.2'
14	26°26.4	26.5	310°15.0	7.2'	21°49.3	10.9'	59.2'
15	41°26.4	· · 25.6	324°41.2	7.1'	22°00.2	10.8'	59.2'
16	56°26.4	24.8	339°07.4	7.0'	22°10.9	10.6'	59.2'
17	71°26.5	24.0	353°33.4	6.9'	22°21.5	10.5'	59.2'
18	86°26.5	S13°23.1	7°59.3	6.8'	N22°32.0	10.4'	59.2'
19	101°26.5	22.3	22°25.2	6.8'	22°42.4	10.2'	59.2'
20	116°26.5	21.4	36°50.9	6.7'	22°52.6	10.1'	59.2'
21	131°26.5	· · 20.6	51°16.6	6.6'	23°02.7	9.9'	59.2'
22	146°26.5	19.7	65°42.2	6.5'	23°12.6	9.8'	59.2'
23	161°26.5	18.9	80°07.7	6.4'	23°22.4	9.6'	59.2'
SD = 16.2'		$d = 0.8'$	SD = 16.1'				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	176°26.6	S13°18.1	94°33.0	6.3'	N23°32.0	9.5'	59.2'
1	191°26.6	17.2	108°58.3	6.2'	23°41.5	9.3'	59.2'
2	206°26.6	16.4	123°23.6	6.1'	23°50.9	9.2'	59.2'
3	221°26.6	· · 15.5	137°48.7	6.0'	24°00.1	9.0'	59.2'
4	236°26.6	14.7	152°13.7	5.9'	24°09.1	8.9'	59.2'
5	251°26.6	13.8	166°38.7	5.9'	24°18.0	8.7'	59.2'
6	266°26.7	S13°13.0	181°03.5	5.8'	N24°26.7	8.6'	59.2'
7	281°26.7	12.2	195°28.3	5.7'	24°35.3	8.4'	59.2'
8	296°26.7	11.3	209°53.0	5.6'	24°43.7	8.3'	59.2'
9	311°26.7	· · 10.5	224°17.6	5.5'	24°52.0	8.1'	59.2'
10	326°26.7	09.6	238°42.1	5.4'	25°00.1	7.9'	59.2'
11	341°26.8	08.8	253°06.6	5.4'	25°08.1	7.8'	59.2'
12	356°26.8	S13°07.9	267°30.9	5.3'	N25°15.9	7.6'	59.2'
13	11°26.8	07.1	281°55.2	5.2'	25°23.5	7.5'	59.2'
14	26°26.8	06.2	296°19.4	5.1'	25°30.9	7.3'	59.2'
15	41°26.8	· · 05.4	310°43.5	5.1'	25°38.2	7.1'	59.2'
16	56°26.9	04.5	325°07.6	5.0'	25°45.3	7.0'	59.2'
17	71°26.9	03.7	339°31.6	4.9'	25°52.3	6.8'	59.2'
18	86°26.9	S13°02.8	353°55.5	4.8'	N25°59.1	6.6'	59.2'
19	101°26.9	02.0	8°19.3	4.8'	26°05.7	6.4'	59.2'
20	116°26.9	01.1	22°43.1	4.7'	26°12.1	6.3'	59.2'
21	131°27.0	13°00.3	37°06.8	4.6'	26°18.4	6.1'	59.2'
22	146°27.0	12°59.4	51°30.4	4.6'	26°24.5	5.9'	59.2'
23	161°27.0	58.6	65°54.0	4.5'	26°30.4	5.7'	59.2'
SD = 16.2'		$d = 0.8'$	SD = 16.2'				

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

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

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 ^h mm:ss	Time 12 ^h mm:ss		Upper hh:mm	Lower hh:mm	
12	14:15	14:15	12:14	16:32	04:06	5(26%)
13	14:15	14:14	12:14	17:27	04:59	6(37%)
14	14:14	14:13	12:14	18:25	05:56	7(48%)