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U. S. DEPARTMENT OF AGRICULTURE,

WEATHER BUREAU.

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TABLES FOR COMPUTING THE TIME OF MOONRISE AND MOONSET.

(ADAPTED FROM MANUSCRIPT TABLES FURNISHED BY THE UNITED STATES NAUTICAL ALMANAC OFFICE, AND PUBLISHED WITH THE PERMISSION OF THE SUPERINTENDENT OF THE UNITED STATES NAVAL OBSERVATORY)

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The same rule applies to determinations of the time of moonrise or moonset at latitude 50° N. Hour angles west of the ninetieth meridian are considered plus, because the local time of rising, transit, or setting of the moon will be later the farther west we go, and the corrections to be applied to the data of Table 1 are therefore plus. Hour angles east of the ninetieth meridian are considered minus, because the local time of rising, transit, or setting of the moon will be earlier the farther east we go, and the corrections to be applied to the data of Table 1 are therefore minus.

To facilitate the computation of these corrections, Table 2 has been prepared,[1] which gives the products of the hour angle of the station from the ninetieth meridian into the variations per hour of longitude given in Table 1.

At the end of the data for each month in Table 1 is given the seventy-fifth meridian time of the occurrence of the principal phases of the moon, to assist in determining whether the time of moonrise or of moonset should be computed on a given date. In general, from new moon to full moon the public is interested only in the time the moon sets, as the moon rises during hours of daylight. For the same reason, between full moon and new moon the public is interested in the time the moon rises.

The astronomical time of the moon's transit, as derived from Table 1, also gives a clue to the moon's phases. Thus, in January, 1916, the new moon occurred on the 4th, and the moon's transit on that day occurred near the noon hour. The moon reached its first quarter on the 11th, and its transit on that day occurred about 6 p. m. Full moon occurred on the 20th, and the moon's transit on the night of January 19–20 occurred about midnight. Finally, the moon reached its last quarter on the 27th, and the moon's transit on the night of January 27–28 occurred about 6 a. m. In general, therefore, new moon falls on a date when the moon transits about noon, full moon on a date when it transits about midnight, the first quarter on a date when it transits about 6 p. m., and the last quarter on a date when it transits about 6 a. m.

On days when the moon is near its full, and especially in winter when the nights are long, both moonrise and moonset may occur on the same night between sunset and sunrise.

It is convenient to remember that the civil date of either moonrise or moonset will be the same as the astronomical date, or else one day later. Thus, from Table 1, moonrise on the astronomical day January 3, 1916, occurred after midnight on the night of January 3–4, civil time; and moonset on the astronomical day January 16, 1916, occurred after midnight on the night of January 16–17, civil

[1] Tables 2 and 3 differ for each station. They are therefore printed on a separate sheet, which accompanies this pamphlet.

time. If, therefore, we wish to compute the time of moonrise on the morning of January 3, 1916, civil time, we must compute for the astronomical day January 2; and if we wish to compute the time of moonset on the morning of January 16, 1916, civil time, we must compute for the astronomical day January 15.

Having computed for latitude 50° N. and the longitude of the station the time of the moon's transit, and of its rising or setting, as the case may require, the difference gives t of Table 3. The correction corresponding to the value of t thus determined, if added to the computed time of moonrise at latitude 50° N. and the longitude of the station, gives the astronomical time of moonrise at the station. Similarly, if the corresponding correction for moonset is subtracted from the computed time of moonset at latitude 50° N. and the longitude of the station, the result is the astronomical time of moonset at the station. Hence, the rules that follow Table 3.

The above processes are made clearer by examples that follow these rules.

MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.		Variation per hour of longitude.	Day of month.	Transit.		Variation per hour of longitude.	Day of month.	Setting.		Variation per hour of longitude.
	h.	m.	m.		h.	m.	m.		h.	m.	m.
Jan. 1	17	32	3.4	1	21	24	2.7	2	1	10	2.1
2	18	49	2.9	2	22	30	2.8	3	2	10	2.8
3	19	52	2.2	3	23	37	2.7	4	3	25	3.4
4	20	38	1.6	5	0	41	2.6	5	4	53	3.7
5	21	10	1.1	6	1	41	2.4	6	6	23	3.7
6	21	33	0.8	7	2	35	2.2	7	7	50	3.6
7	21	52	0.7	8	3	25	2.0	8	9	12	3.4
8	22	8	0.6	9	4	11	1.9	9	10	30	3.2
9	22	23	0.6	10	4	56	1.8	10	11	45	3.1
10	22	38	0.6	11	5	40	1.8	11	12	59	3.1
11	22	54	0.8	12	6	25	1.9	12	14	11	3.0
12	23	15	1.0	13	7	11	2.0	13	15	21	2.9
13	23	40	1.2	14	7	58	2.0	14	16	30	2.7
15	0	12	1.5	15	8	48	2.1	15	17	32	2.4
16	0	53	1.9	16	9	38	2.1	16	18	24	2.0
17	1	44	2.3	17	10	29	2.1	17	19	7	1.6
18	2	45	2.7	18	11	19	2.0	18	19	41	1.2
19	3	52	2.9	19	12	7	2.0	19	20	7	1.0
20	5	4	3.0	20	12	53	1.9	20	20	27	0.8
21	6	15	3.0	21	13	38	1.8	21	20	43	0.7
22	7	27	3.0	22	14	21	1.8	22	20	59	0.6
23	8	39	3.0	23	15	3	1.8	23	21	13	0.6
24	9	52	3.1	24	15	46	1.8	24	21	27	0.6
25	11	7	3.2	25	16	31	1.9	25	21	43	0.7
26	12	25	3.3	26	17	19	2.1	26	22	2	0.9
27	13	46	3.4	27	18	11	2.3	27	22	27	1.2
28	15	9	3.4	28	19	9	2.5	28	23	2	1.8
29	16	28	3.1	29	20	11	2.6	29	23	51	2.4
30	17	36	2.5	30	21	15	2.7	31	0	57	3.0
31	18	28	1.9	31	22	20	2.6	32	2	17	3.6

PHASES OF THE MOON.

New moon.... 4th 11.45 p. m., 75th meridian time.
First quarter..11th 10.38 p. m., 75th meridian time.
Full moon.....20th 3.29 a. m., 75th meridian time.
Last quarter..27th 7.35 p. m., 75th meridian time.

MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Feb. 1	19 6	1.4	1	23 21	2.5	2	3 47	3.8
2	19 33	1.0	3	0 18	2.3	3	5 16	3.6
3	19 55	0.8	4	1 11	2.1	4	6 41	3.5
4	20 12	0.7	5	2 0	2.0	5	8 3	3.4
5	20 28	0.6	6	2 47	1.9	6	9 23	3.3
6	20 43	0.6	7	3 32	1.9	7	10 39	3.2
7	20 59	0.7	8	4 18	1.9	8	11 54	3.1
8	21 18	0.8	9	5 4	1.9	9	13 6	3.0
9	21 41	1.1	10	5 52	2.0	10	14 16	2.8
10	22 11	1.4	11	6 41	2.0	11	15 21	2.5
11	22 48	1.8	12	7 32	2.1	12	16 18	2.2
12	23 37	2.2	13	8 23	2.1	13	17 4	1.7
14	0 33	2.6	14	9 13	2.1	14	17 41	1.3
15	1 39	2.8	15	10 2	2.0	15	18 9	1.0
16	2 48	2.9	16	10 49	1.9	16	18 32	0.8
17	4 1	3.0	17	11 34	1.9	17	18 50	0.7
18	5 14	3.0	18	12 18	1.8	18	19 6	0.6
19	6 27	3.0	19	13 1	1.8	19	19 21	0.6
20	7 41	3.1	20	13 45	1.8	20	19 35	0.6
21	8 56	3.2	21	14 30	1.9	21	19 50	0.7
22	10 14	3.3	22	15 17	2.0	22	20 9	0.8
23	11 33	3.4	23	16 8	2.2	23	20 32	1.1
24	12 55	3.4	24	17 3	2.4	24	21 3	1.5
25	14 14	3.1	25	18 2	2.5	25	21 45	2.1
26	15 24	2.6	26	19 3	2.6	26	22 43	2.8
27	16 21	2.0	27	20 6	2.6	27	23 55	3.3
28	17 2	1.5	28	21 7	2.5	29	1 18	3.6
29	17 33	1.1	29	22 4	2.3	30	2 46	3.7

PHASES OF THE MOON.

New moon.... 3d 11.06 a. m., 75th meridian time.
First quarter..10th 5.20 p. m., 75th meridian time.
Full moon....18th 9.29 p. m., 75th meridian time.
Last quarter..26th 4.24 a. m., 75th meridian time.

MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W., and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Mar. 1	17 56	0.9	1	22 57	2.2	2	4 12	3.6
2	18 16	0.8	2	23 47	2.0	3	5 34	3.4
3	18 32	0.7	4	0 35	2.0	4	6 54	3.3
4	18 48	0.7	5	1 22	1.9	5	8 13	3.3
5	19 4	0.7	6	2 8	1.9	6	9 30	3.2
6	19 22	0.8	7	2 55	2.0	7	10 46	3.1
7	19 44	1.0	8	3 43	2.0	8	11 59	3.0
8	20 11	1.3	9	4 33	2.1	9	13 7	2.7
9	20 45	1.6	10	5 23	2.1	10	14 8	2.3
10	21 29	2.0	11	6 14	2.1	11	14 59	1.9
11	22 22	2.4	12	7 5	2.1	12	15 39	1.5
12	23 25	2.8	13	7 54	2.0	13	16 10	1.2
14	0 33	2.9	14	8 42	2.0	14	16 35	1.0
15	1 44	3.0	15	9 28	1.9	15	16 55	0.8
16	2 56	3.0	16	10 12	1.8	16	17 12	0.7
17	4 10	3.1	17	10 56	1.8	17	17 27	0.6
18	5 24	3.2	18	11 40	1.9	18	17 42	0.6
19	6 39	3.2	19	12 25	1.9	19	17 58	0.7
20	7 58	3.3	20	13 13	2.0	20	18 16	0.8
21	9 18	3.4	21	14 3	2.2	21	18 37	1.1
22	10 42	3.4	22	14 58	2.4	22	19 6	1.4
23	12 3	3.2	23	15 56	2.5	23	19 45	2.0
24	13 16	2.8	24	16 58	2.6	24	20 38	2.6
25	14 17	2.2	25	17 59	2.5	25	21 45	3.1
26	15 2	1.7	26	19 0	2.4	26	23 5	3.4
27	15 36	1.2	27	19 57	2.3	28	0 29	3.6
28	16 0	1.0	28	20 50	2.1	29	1 52	3.5
29	16 20	0.8	29	21 40	2.0	30	3 13	3.4
30	16 37	0.7	30	22 27	2.0	31	4 33	3.3
31	16 53	0.7	31	23 13	1.9	32	5 50	3.2

PHASES OF THE MOON.

New moon.... 3d 10.58 p. m., 75th meridian time.
First quarter..11th 1.33 p. m., 75th meridian time.
Full moon.....19th 12.27 p. m., 75th meridian time.
Last quarter..26th 11.22 a. m., 75th meridian time.

MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W., and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Apr. 1	17 9	0.7	1	23 59	1.9	2	7 7	3.2
2	17 26	0.8	3	0 46	2.0	3	8 23	3.1
3	17 47	1.0	4	1 34	2.0	4	9 37	3.0
4	18 11	1.2	5	2 23	2.1	5	10 49	2.8
5	18 43	1.5	6	3 14	2.1	6	11 54	2.5
6	19 23	1.9	7	4 5	2.1	7	12 50	2.1
7	20 13	2.3	8	4 56	2.1	8	13 34	1.6
8	21 12	2.6	9	5 46	2.0	9	14 9	1.3
9	22 18	2.8	10	6 34	2.0	10	14 36	1.0
10	23 27	2.9	11	7 20	1.9	11	14 58	0.8
12	0 38	3.0	12	8 5	1.8	12	15 16	0.7
13	1 50	3.0	13	8 48	1.8	13	15 32	0.6
14	3 2	3.0	14	9 32	1.8	14	15 47	0.6
15	4 17	3.2	15	10 17	1.9	15	16 2	0.7
16	5 35	3.3	16	11 4	2.0	16	16 19	0.8
17	6 55	3.4	17	11 54	2.2	17	16 40	1.0
18	8 19	3.5	18	12 48	2.4	18	17 7	1.3
19	9 44	3.4	19	13 47	2.5	19	17 43	1.8
20	11 3	3.0	20	14 49	2.6	20	18 33	2.4
21	12 9	2.4	21	15 52	2.6	21	19 37	2.9
22	13 1	1.8	22	16 54	2.5	22	20 54	3.4
23	13 37	1.3	23	17 52	2.3	23	22 17	3.5
24	14 4	1.0	24	18 47	2.2	24	23 40	3.4
25	14 25	0.8	25	19 37	2.0	26	1 1	3.3
26	14 42	0.7	26	20 24	1.9	27	2 19	3.2
27	14 59	0.7	27	21 10	1.9	28	3 36	3.2
28	15 15	0.7	28	21 55	1.9	29	4 51	3.1
29	15 31	0.7	29	22 40	1.9	30	6 6	3.1
30	15 50	0.8	30	23 27	2.0	31	7 21	3.1

PHASES OF THE MOON.

New moon..... 2d 11.21 a. m., 75th meridian time.
First quarter...10th 9.36 a. m., 75th meridian time.
Full moon.....18th 12.08 a. m., 75th meridian time.
Last quarter...24th 5.38 p. m., 75th meridian time.

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MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W., and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
May 1	16 13	1.1	2	0 16	2.1	2	8 33	3.0
2	16 42	1.4	3	1 6	2.1	3	9 40	2.7
3	17 19	1.7	4	1 57	2.1	4	10 40	2.3
4	18 5	2.1	5	2 49	2.1	5	11 28	1.8
5	19 2	2.5	6	3 39	2.1	6	12 7	1.4
6	20 5	2.7	7	4 27	2.0	7	12 35	1.0
7	21 13	2.8	8	5 14	1.9	8	12 59	0.9
8	22 22	2.9	9	5 58	1.8	9	13 19	0.8
9	23 32	2.9	10	6 41	1.8	10	13 35	0.7
11	0 42	2.9	11	7 24	1.8	11	13 51	0.6
12	1 54	3.0	12	8 7	1.8	12	14 6	0.6
13	3 9	3.2	13	8 52	1.9	13	14 22	0.7
14	4 28	3.4	14	9 40	2.1	14	14 41	0.8
15	5 51	3.5	15	10 33	2.3	15	15 4	1.1
16	7 16	3.5	16	11 30	2.5	16	15 37	1.6
17	8 39	3.3	17	12 33	2.7	17	16 22	2.2
18	9 54	2.8	18	13 38	2.7	18	17 22	2.8
19	10 53	2.1	19	14 43	2.6	19	18 37	3.4
20	11 35	1.5	20	15 44	2.5	20	20 2	3.6
21	12 7	1.1	21	16 41	2.3	21	21 27	3.6
22	12 30	0.9	22	17 34	2.1	22	22 50	3.4
23	12 50	0.8	23	18 22	2.0	24	0 10	3.3
24	13 6	0.7	24	19 8	1.9	25	1 26	3.2
25	13 22	0.7	25	19 53	1.9	26	2 41	3.1
26	13 38	0.7	26	20 38	1.9	27	3 55	3.1
27	13 56	0.8	27	21 24	1.9	28	5 9	3.1
28	14 18	1.0	28	22 11	2.0	29	6 21	3.0
29	14 44	1.3	29	23 1	2.1	30	7 30	2.7
30	15 18	1.6	30	23 51	2.1	31	8 31	2.4
31	16 2	2.0	32	0 43	2.1	32	9 23	2.0

PHASES OF THE MOON.

New moon.... 2d 12.29 a. m., 75th meridian time.
First quarter..10th 3.47 a. m., 75th meridian time.
Full moon....17th 9.11 a. m., 75th meridian time.
Last quarter..24th 12.16 a. m., 75th meridian time.
New moon....31st 2.37 p. m., 75th meridian time.

MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W., and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
June 1	16 55	2.4	2	1 33	2.1	2	10 6	1.6
2	17 56	2.6	3	2 23	2.0	3	10 39	1.2
3	19 2	2.8	4	3 10	1.9	4	11 3	1.0
4	20 10	2.9	5	3 54	1.8	5	11 23	0.8
5	21 19	2.9	6	4 37	1.8	6	11 40	0.7
6	22 28	2.9	7	5 19	1.7	7	11 56	0.6
7	23 37	2.9	8	6 1	1.8	8	12 11	0.6
9	0 49	3.0	9	6 44	1.8	9	12 26	0.6
10	2 4	3.2	10	7 29	2.0	10	12 42	0.8
11	3 22	3.4	11	8 18	2.1	11	13 4	1.0
12	4 45	3.5	12	9 12	2.4	12	13 31	1.3
13	6 10	3.4	13	10 12	2.6	13	14 8	1.9
14	7 30	3.0	14	11 16	2.7	14	15 1	2.6
15	8 37	2.4	15	12 23	2.8	15	16 11	3.2
16	9 29	1.8	16	13 28	2.6	16	17 35	3.6
17	10 5	1.3	17	14 29	2.4	17	19 3	3.7
18	10 33	1.0	18	15 26	2.2	18	20 30	3.6
19	10 54	0.8	19	16 17	2.1	19	21 54	3.4
20	11 11	0.7	20	17 5	2.0	20	23 14	3.3
21	11 28	0.7	21	17 51	1.9	22	0 30	3.2
22	11 44	0.7	22	18 37	1.9	23	1 46	3.1
23	12 2	0.8	23	19 22	1.9	24	3 0	3.1
24	12 23	1.0	24	20 9	2.0	25	4 12	3.0
25	12 47	1.2	25	20 57	2.1	26	5 21	2.8
26	13 19	1.5	26	21 47	2.1	27	6 24	2.5
27	13 59	1.9	27	22 38	2.1	28	7 20	2.1
28	14 48	2.3	28	23 29	2.1	29	8 5	1.7
29	15 46	2.6	30	0 19	2.0	30	8 40	1.3
30	16 52	2.8	31	1 7	1.9	31	9 7	1.0

PHASES OF THE MOON.

First quarter.. 8th 6.59 p. m., 75th meridian time.
Full moon....15th 4.42 p. m., 75th meridian time.
Last quarter..22d 8.16 a. m., 75th meridian time.
New moon....30th 5.43 a. m., 75th meridian time.

MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moo for longitude 90° W. and latitude 50° N.*

Date.	Rising.		Variation per hour of longitude.	Day of month.	Transit.		Variation per hour of longitude.	Day of month.	Setting.		Variation per hour of longitude.
	h.	m.	m.		h.	m.	m.		h.	m.	m.
July 1	18	0	2.9	2	1	52	1.8	2	9	29	0.
2	19	9	2.9	3	2	36	1.8	3	9	46	0.
3	20	18	2.8	4	3	18	1.7	4	10	2	0.
4	21	26	2.8	5	3	59	1.7	5	10	17	0.
5	22	35	2.9	6	4	40	1.8	6	10	32	0.
6	23	47	3.0	7	5	23	1.9	7	10	47	0.
8	1	2	3.2	8	6	9	2.0	8	11	5	0.
9	2	21	3.3	9	7	0	2.2	9	11	27	1.
10	3	42	3.4	10	7	55	2.4	10	11	59	1.
11	5	3	3.2	11	8	55	2.6	11	12	44	2.
12	6	16	2.8	12	10	0	2.7	12	13	44	2.
13	7	15	2.2	13	11	6	2.7	13	15	2	3.
14	8	0	1.6	14	12	10	2.6	14	16	29	3.
15	8	31	1.2	15	13	10	2.4	15	18	1	3.
16	8	56	1.0	16	14	5	2.2	16	19	29	3.
17	9	16	0.8	17	14	56	2.1	17	20	53	3.
18	9	33	0.7	18	15	45	2.0	18	22	13	3.
19	9	50	0.7	19	16	32	1.9	19	23	30	3.
20	10	7	0.7	20	17	18	2.0	21	0	47	3.
21	10	27	0.8	21	18	6	2.0	22	2	1	3.
22	10	50	1.1	22	18	54	2.0	23	3	12	2.
23	11	20	1.4	23	19	44	2.1	24	4	18	2.
24	11	57	1.7	24	20	35	2.1	25	5	16	2.
25	12	43	2.1	25	21	25	2.1	26	6	4	1.
26	13	40	2.5	26	22	16	2.1	27	6	43	1.
27	14	43	2.7	27	23	4	2.0	28	7	12	1.
28	15	50	2.8	28	23	50	1.9	29	7	35	0.
29	16	59	2.9	30	0	34	1.8	30	7	54	0.
30	18	8	2.9	31	1	17	1.8	31	8	10	0.
31	19	17	2.9	32	1	58	1.7	32	8	25	0.

PHASES OF THE MOON.

First quarter.. 8th 6.55 a. m., 75th meridian time.
Full moon..... 14th 11.40 p. m., 75th meridian time.
Last quarter.. 21st 6.33 p. m., 75th meridian time.
New moon.... 29th 9.15 p. m., 75th meridian time.

MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Aug. 1	20 26	2.9	2	2 40	1.7	2	8 39	0.6
2	21 37	3.0	3	3 22	1.8	3	8 54	0.7
3	22 50	3.1	4	4 6	1.9	4	9 11	0.8
5	0 5	3.2	5	4 54	2.1	5	9 32	1.0
6	1 24	3.3	6	5 45	2.2	6	9 59	1.3
7	2 43	3.2	7	6 42	2.4	7	10 36	1.8
8	3 57	2.9	8	7 42	2.6	8	11 26	2.5
9	5 1	2.4	9	8 46	2.6	9	12 34	3.1
10	5 51	1.8	10	9 50	2.6	10	13 56	3.6
11	6 28	1.3	11	10 51	2.5	11	15 24	3.7
12	6 55	1.0	12	11 49	2.3	12	16 54	3.7
13	7 17	0.9	13	12 42	2.2	13	18 22	3.6
14	7 37	0.8	14	13 33	2.1	14	19 46	3.5
15	7 54	0.7	15	14 22	2.0	15	21 7	3.4
16	8 11	0.7	16	15 10	2.0	16	22 27	3.3
17	8 31	0.8	17	15 59	2.0	17	23 44	3.2
18	8 53	1.0	18	16 48	2.1	19	0 58	3.0
19	9 20	1.3	19	17 38	2.1	20	2 7	2.7
20	9 55	1.6	20	18 29	2.1	21	3 9	2.4
21	10 39	2.0	21	19 20	2.1	22	4 1	2.0
22	11 32	2.4	22	20 11	2.1	23	4 42	1.5
23	12 33	2.6	23	21 0	2.0	24	5 14	1.2
24	13 39	2.8	24	21 47	1.9	25	5 39	1.0
25	14 48	2.9	25	22 32	1.8	26	6 0	0.8
26	15 57	2.9	26	23 15	1.8	27	6 18	0.7
27	17 7	2.9	27	23 58	1.7	28	6 34	0.6
28	18 17	2.9	29	0 39	1.7	29	6 48	0.6
29	19 27	2.9	30	1 22	1.8	30	7 3	0.6
30	20 39	3.0	31	2 5	1.9	31	7 19	0.7
31	21 54	3.2	32	2 52	2.0	32	7 38	0.9

PHASES OF THE MOON.

First quarter.. 6th 4.06 p. m., 75th meridian time.
Full moon....13th 7.00 a. m., 75th meridian time.
Last quarter..20th 7.53 a. m., 75th meridian time.
New moon....28th 12.25 p. m., 75th meridian time.

MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W., and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Sept. 1	23 11	3.2	2	3 42	2.2	2	8 3	1.2
3	0 29	3.2	3	4 36	2.3	3	8 36	1.6
4	1 44	2.9	4	5 33	2.5	4	9 20	2.2
5	2 49	2.5	5	6 34	2.6	5	10 19	2.8
6	3 43	2.0	6	7 36	2.5	6	11 32	3.3
7	4 24	1.5	7	8 36	2.5	7	12 56	3.6
8	4 55	1.2	8	9 34	2.3	8	14 24	3.7
9	5 20	1.0	9	10 28	2.2	9	15 51	3.6
10	5 40	0.8	10	11 20	2.1	10	17 15	3.5
11	5 57	0.7	11	12 10	2.1	11	18 37	3.4
12	6 14	0.7	12	12 59	2.0	12	19 59	3.4
13	6 34	0.8	13	13 48	2.1	13	21 19	3.3
14	6 56	1.0	14	14 38	2.1	14	22 36	3.2
15	7 21	1.2	15	15 29	2.1	15	23 50	2.9
16	7 54	1.6	16	16 21	2.2	17	0 57	2.6
17	8 35	1.9	17	17 13	2.2	18	1 53	2.1
18	9 24	2.2	18	18 4	2.1	19	2 38	1.7
19	10 22	2.6	19	18 54	2.0	20	3 14	1.3
20	11 27	2.7	20	19 42	1.9	21	3 42	1.0
21	12 35	2.8	21	20 27	1.9	22	4 5	0.8
22	13 44	2.9	22	21 11	1.8	23	4 23	0.7
23	14 53	2.9	23	21 54	1.8	24	4 40	0.7
24	16 3	2.9	24	22 36	1.8	25	4 55	0.6
25	17 13	2.9	25	23 19	1.8	26	5 10	0.6
26	18 26	3.0	27	0 3	1.9	27	5 26	0.7
27	19 41	3.2	28	0 49	2.0	28	5 45	0.8
28	20 59	3.3	29	1 38	2.1	29	6 8	1.1
29	22 18	3.2	30	2 32	2.3	30	6 38	1.4
30	23 33	3.0	31	3 29	2.4	31	7 19	2.0

PHASES OF THE MOON.

First quarter.. 4th 11.26 p. m., 75th meridian time.
Full moon....11th 3.31 p. m., 75th meridian time.
Last quarter..19th 12.35 a. m., 75th meridian time.
New moon....27th 2.34 a. m., 75th meridian time.

MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W., and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Oct. 2	0 42	2.6	2	4 28	2.5	2	8 14	2.6
3	1 39	2.1	3	5 29	2.5	3	9 22	3.1
4	2 23	1.6	4	6 28	2.4	4	10 41	3.4
5	2 57	1.2	5	7 25	2.3	5	12 4	3.5
6	3 22	1.0	6	8 19	2.2	6	13 28	3.5
7	3 43	0.8	7	9 10	2.1	7	14 52	3.5
8	4 1	0.7	8	9 59	2.0	8	16 13	3.4
9	4 18	0.7	9	10 48	2.0	9	17 33	3.3
10	4 37	0.8	10	11 36	2.0	10	18 53	3.3
11	4 57	0.9	11	12 26	2.1	11	20 12	3.2
12	5 21	1.1	12	13 17	2.2	12	21 27	3.0
13	5 51	1.4	13	14 9	2.2	13	22 39	2.8
14	6 29	1.8	14	15 2	2.2	14	23 41	2.4
15	7 15	2.1	15	15 55	2.2	16	0 32	1.9
16	8 12	2.5	16	16 46	2.1	17	1 12	1.4
17	9 14	2.7	17	17 35	2.0	18	1 42	1.2
18	10 21	2.8	18	18 21	1.9	19	2 6	1.0
19	11 29	2.8	19	19 5	1.8	20	2 27	0.8
20	12 37	2.9	20	19 48	1.8	21	2 44	0.7
21	13 46	2.9	21	20 30	1.7	22	3 0	0.6
22	14 56	2.9	22	21 12	1.8	23	3 15	0.6
23	16 8	3.0	23	21 56	1.9	24	3 31	0.7
24	17 22	3.2	24	22 41	2.0	25	3 49	0.8
25	18 40	3.3	25	23 31	2.1	26	4 11	1.1
26	20 0	3.3	27	0 24	2.3	27	4 40	1.4
27	21 18	3.1	28	1 21	2.4	28	5 18	1.8
28	22 31	2.8	29	2 21	2.5	29	6 9	2.4
29	23 33	2.3	30	3 23	2.6	30	7 15	3.0
31	0 22	1.8	31	4 23	2.5	31	8 31	3.4

PHASES OF THE MOON.

First quarter.. 4th 6.00 a. m., 75th meridian time.
Full moon.....11th 2.01 a. m., 75th meridian time.
Last quarter ..18th 8.09 p. m., 75th meridian time.
New moon....26th 3.37 p. m., 75th meridian time.

MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Nov. 1	0 58	1.3	1	5 21	2.3	1	9 54	3.5
2	1 25	1.0	2	6 15	2.2	2	11 16	3.4
3	1 47	0.9	3	7 6	2.1	3	12 37	3.4
4	2 7	0.8	4	7 54	2.0	4	13 57	3.3
5	2 24	0.7	5	8 42	2.0	5	15 16	3.3
6	2 41	0.7	6	9 29	2.0	6	16 33	3.2
7	3 0	0.8	7	10 17	2.0	7	17 50	3.2
8	3 23	1.0	8	11 7	2.1	8	19 7	3.2
9	3 50	1.3	9	11 59	2.2	9	20 20	2.9
10	4 24	1.6	10	12 51	2.2	10	21 26	2.6
11	5 8	2.0	11	13 44	2.2	11	22 22	2.1
12	6 1	2.4	12	14 37	2.1	12	23 6	1.6
13	7 2	2.6	13	15 27	2.0	13	23 41	1.3
14	8 6	2.7	14	16 14	1.9	15	0 8	1.0
15	9 14	2.8	15	16 59	1.8	16	0 30	0.8
16	10 22	2.8	16	17 42	1.8	17	0 48	0.7
17	11 30	2.8	17	18 24	1.7	18	1 4	0.6
18	12 38	2.8	18	19 5	1.7	19	1 19	0.6
19	13 47	2.9	19	19 47	1.8	20	1 34	0.7
20	14 59	3.0	20	20 31	1.9	21	1 51	0.8
21	16 14	3.2	21	21 18	2.0	22	2 12	1.0
22	17 33	3.3	22	22 10	2.2	23	2 37	1.2
23	18 54	3.3	23	23 6	2.4	24	3 10	1.6
24	20 12	3.1	25	0 7	2.6	25	3 58	2.2
25	21 21	2.6	26	1 10	2.6	26	5 0	2.8
26	22 16	2.0	27	2 13	2.6	27	6 15	3.3
27	22 57	1.5	28	3 14	2.4	28	7 39	3.5
28	23 28	1.1	29	4 10	2.3	29	9 4	3.5
29	23 52	0.9	30	5 3	2.1	30	10 26	3.4

PHASES OF THE MOON.

First quarter....2d 12.51 p. m., 75th meridian time.
Full moon.... 9th 3.18 p. m., 75th meridian time.
Last quarter..17th 5.00 p. m., 75th meridian time.
New moon....25th 3.50 a. m., 75th meridian time.

MOON, 1916.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Dec. 1	0 12	0.8	1	5 52	2.0	1	11 47	3.3
2	0 29	0.7	2	6 40	2.0	2	13 5	3.2
3	0 47	0.7	3	7 26	1.9	3	14 22	3.2
4	1 6	0.8	4	8 13	2.0	4	15 38	3.1
5	1 27	1.0	5	9 2	2.0	5	16 53	3.1
6	1 52	1.2	6	9 52	2.1	6	18 6	2.9
7	2 23	1.5	7	10 43	2.2	7	19 14	2.6
8	3 2	1.8	8	11 36	2.2	8	20 13	2.2
9	3 51	2.3	9	12 29	2.1	9	21 1	1.8
10	4 49	2.6	10	13 19	2.1	10	21 40	1.4
11	5 53	2.7	11	14 8	2.0	11	22 10	1.1
12	7 1	2.8	12	14 54	1.9	12	22 32	0.9
13	8 9	2.8	13	15 38	1.8	13	22 52	0.8
14	9 17	2.8	14	16 19	1.7	14	23 8	0.7
15	10 24	2.8	15	17 0	1.7	15	23 24	0.6
16	11 31	2.8	16	17 41	1.7	16	23 39	0.6
17	12 39	2.9	17	18 23	1.8	17	23 54	0.7
18	13 51	3.0	18	19 7	1.9	19	0 12	0.8
19	15 6	3.2	19	19 55	2.1	20	0 34	1.1
20	16 25	3.3	20	20 48	2.3	21	1 3	1.4
21	17 45	3.2	21	21 46	2.5	22	1 43	2.0
22	18 59	2.9	22	22 49	2.7	23	2 38	2.6
23	20 2	2.4	23	23 53	2.7	24	3 49	3.2
24	20 51	1.8	25	0 57	2.6	25	5 11	3.6
25	21 27	1.3	26	1 58	2.4	26	6 39	3.7
26	21 54	1.0	27	2 54	2.3	27	8 7	3.6
27	22 16	0.9	28	3 47	2.1	28	9 31	3.5
28	22 36	0.8	29	4 36	2.0	29	10 52	3.4
29	22 53	0.7	30	5 24	2.0	30	12 12	3.3
30	23 11	0.7	31	6 11	2.0	31	13 28	3.2
31	23 31	0.8	32	6 59	2.0	32	14 44	3.1

PHASES OF THE MOON.

First quarter.. 1st 8.56 p. m., 75th meridian time.
Full moon.... 9th 7.44 a. m., 75th meridian time.
Last quarter..17th 1.06 p. m., 75th meridian time.
New moon....24th 3.31 p. m., 75th meridian time.
First quarter..31st 7.07 a. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Jan. 1	23 55	1.0	2	7 49	2.1	2	15 57	3.0
3	0 24	1.3	3	8 39	2.1	3	17 5	2.7
4	1 0	1.7	4	9 31	2.2	4	18 6	2.3
5	1 46	2.1	5	10 23	2.2	5	18 58	1.9
6	2 42	2.4	6	11 14	2.1	6	19 39	1.5
7	3 43	2.6	7	12 4	2.0	7	20 13	1.2
8	4 49	2.8	8	12 51	1.9	8	20 38	1.0
9	5 57	2.8	9	13 35	1.8	9	20 58	0.8
10	7 5	2.8	10	14 17	1.7	10	21 15	0.7
11	8 12	2.8	11	14 58	1.7	11	21 31	0.6
12	9 19	2.8	12	15 38	1.7	12	21 45	0.6
13	10 26	2.8	13	16 19	1.7	13	22 0	0.6
14	11 35	2.9	14	17 2	1.8	14	22 16	0.8
15	12 47	3.0	15	17 47	1.9	15	22 37	1.0
16	14 1	3.1	16	18 35	2.1	16	23 1	1.2
17	15 18	3.2	17	19 29	2.3	17	23 33	1.6
18	16 33	3.0	18	20 27	2.5	19	0 19	2.2
19	17 41	2.6	19	21 30	2.6	20	1 20	2.8
20	18 37	2.1	20	22 34	2.7	21	2 35	3.4
21	19 20	1.6	21	23 37	2.6	22	4 2	3.7
22	19 53	1.2	23	0 37	2.4	23	5 33	3.8
23	20 18	1.0	24	1 33	2.3	24	7 2	3.6
24	20 39	0.8	25	2 26	2.1	25	8 28	3.5
25	20 58	0.8	26	3 16	2.1	26	9 50	3.4
26	21 17	0.8	27	4 6	2.1	27	11 11	3.3
27	21 36	0.8	28	4 55	2.1	28	12 30	3.2
28	21 59	1.0	29	5 45	2.1	29	13 45	3.0
29	22 26	1.3	30	6 36	2.1	30	14 57	2.8
30	23 1	1.6	31	7 27	2.2	31	16 1	2.5
31	23 43	1.9	32	8 19	2.2	32	16 56	2.1

PHASES OF THE MOON.

Full moon..... 8th 2.42 a. m., 75th meridian time.
Last quarter..16th 6.42 a. m., 75th meridian time.
New moon....23d 2.40 a. m., 75th meridian time.
First quarter..29th 8.02 p. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Feb. 2	0 35	2.3	2	9 11	2.1	2	17 40	1.6
3	1 35	2.6	3	10 0	2.0	3	18 15	1.3
4	2 39	2.7	4	10 48	1.9	4	18 42	1.0
5	3 47	2.8	5	11 33	1.8	5	19 4	0.8
6	4 55	2.8	6	12 16	1.8	6	19 22	0.7
7	6 3	2.8	7	12 58	1.7	7	19 38	0.6
8	7 10	2.8	8	13 38	1.7	8	19 53	0.6
9	8 17	2.8	9	14 19	1.7	9	20 8	0.6
10	9 25	2.8	10	15 0	1.8	10	20 24	0.7
11	10 34	2.9	11	15 44	1.9	11	20 42	0.8
12	11 46	3.0	12	16 30	2.0	12	21 4	1.1
13	13 1	3.1	13	17 20	2.2	13	21 33	1.4
14	14 14	3.0	14	18 15	2.4	14	22 12	1.8
15	15 23	2.7	15	19 13	2.5	15	23 2	2.4
16	16 23	2.3	16	20 14	2.6	17	0 9	3.0
17	17 11	1.8	17	21 16	2.5	18	1 28	3.5
18	17 47	1.3	18	22 16	2.5	19	2 55	3.7
19	18 15	1.0	19	23 14	2.3	20	4 24	3.7
20	18 39	0.9	21	0 9	2.2	21	5 53	3.7
21	19 0	0.8	22	1 1	2.2	22	7 20	3.6
22	19 20	0.8	23	1 53	2.1	23	8 43	3.5
23	19 39	0.8	24	2 44	2.1	24	10 5	3.4
24	20 2	1.0	25	3 35	2.2	25	11 26	3.2
25	20 28	1.2	26	4 28	2.2	26	12 41	3.0
26	21 1	1.5	27	5 21	2.2	27	13 50	2.7
27	21 41	1.9	28	6 14	2.2	28	14 50	2.3
28	22 30	2.2	29	7 6	2.1	29	15 38	1.8

PHASES OF THE MOON.

Full moon.... 6th 10.28 p. m., 75th meridian time.
Last quarter..14th 8.53 p. m., 75th meridian time.
New moon....21st 1.09 p. m., 75th meridian time.
First quarter..28th 11.44 a. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.		Variation per hour of longitude.	Day of month.	Transit.		Variation per hour of longitude.	Day of month.	Setting.		Variation per hour of longitude.
	h.	m.	m.		h.	m.	m.		h.	m.	m.
Mar. 1	23	27	2.5	2	7	56	2.1	2	16	16	1.4
3	0	30	2.7	3	8	44	2.0	3	16	46	1.1
4	1	37	2.8	4	9	30	1.9	4	17	9	0.9
5	2	45	2.8	5	10	14	1.8	5	17	29	0.8
6	3	52	2.8	6	10	56	1.7	6	17	45	0.7
7	4	59	2.8	7	11	37	1.7	7	18	1	0.6
8	6	7	2.8	8	12	18	1.7	8	18	16	0.6
9	7	15	2.8	9	13	0	1.8	9	18	32	0.7
10	8	24	2.9	10	13	43	1.8	10	18	50	0.8
11	9	36	3.0	11	14	28	2.0	11	19	11	1.0
12	10	50	3.1	12	15	17	2.1	12	19	37	1.3
13	12	2	3.0	13	16	10	2.3	13	20	12	1.7
14	13	12	2.7	14	17	6	2.4	14	20	57	2.2
15	14	14	2.4	15	18	4	2.5	15	21	56	2.7
16	15	5	1.9	16	19	4	2.5	16	23	8	3.2
17	15	44	1.4	17	20	2	2.4	18	0	29	3.4
18	16	15	1.2	18	20	59	2.3	19	1	55	3.6
19	16	40	1.0	19	21	53	2.2	20	3	21	3.6
20	17	1	0.9	20	22	46	2.2	21	4	46	3.5
21	17	21	0.8	21	23	37	2.2	22	6	10	3.5
22	17	41	0.8	23	0	29	2.2	23	7	34	3.5
23	18	3	1.0	24	1	21	2.2	24	8	56	3.4
24	18	28	1.2	25	2	14	2.2	25	10	17	3.2
25	18	58	1.4	26	3	9	2.3	26	11	31	2.9
26	19	36	1.8	27	4	3	2.3	27	12	36	2.5
27	20	23	2.1	28	4	57	2.2	28	13	31	2.1
28	21	19	2.4	29	5	49	2.1	29	14	14	1.6
29	22	20	2.6	30	6	39	2.0	30	14	47	1.2
30	23	26	2.8	31	7	26	1.9	31	15	12	1.0

PHASES OF THE MOON.

Full moon.... 8th 4.58 p. m., 75th meridian time.
Last quarter..16th 7.33 a. m., 75th meridian time.
New moon....22d 11.05 p. m., 75th meridian time.
First quarter..30th 5.36 a. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Apr. 1	0 33	2.8	1	8 10	1.8	1	15 33	0.8
2	1 41	2.8	2	8 53	1.7	2	15 51	0.7
3	2 48	2.8	3	9 34	1.7	3	16 7	0.7
4	3 55	2.8	4	10 15	1.7	4	16 23	0.7
5	5 2	2.8	5	10 57	1.8	5	16 39	0.7
6	6 11	2.9	6	11 40	1.8	6	16 56	0.8
7	7 24	3.0	7	12 25	2.0	7	17 17	1.0
8	8 38	3.1	8	13 14	2.1	8	17 42	1.2
9	9 51	3.0	9	14 6	2.2	9	18 14	1.5
10	11 3	2.8	10	15 1	2.4	10	18 57	2.0
11	12 7	2.5	11	15 59	2.4	11	19 52	2.5
12	13 0	2.0	12	16 58	2.4	12	20 59	3.0
13	13 43	1.6	13	17 56	2.4	13	22 16	3.3
14	14 16	1.2	14	18 51	2.3	14	23 37	3.4
15	14 42	1.0	15	19 45	2.2	16	0 59	3.4
16	15 4	0.9	16	20 36	2.1	17	2 23	3.5
17	15 24	0.8	17	21 27	2.1	18	3 45	3.4
18	15 43	0.8	18	22 17	2.1	19	5 7	3.4
19	16 3	0.9	19	23 8	2.2	20	6 29	3.4
20	16 27	1.0	21	0 0	2.2	21	7 50	3.4
21	16 55	1.3	22	0 54	2.3	22	9 8	3.1
22	17 30	1.6	23	1 50	2.3	23	10 17	2.7
23	18 14	2.0	24	2 45	2.3	24	11 18	2.3
24	19 6	2.4	25	3 39	2.2	25	12 6	1.8
25	20 7	2.6	26	4 30	2.1	26	12 44	1.4
26	21 13	2.8	27	5 19	2.0	27	13 13	1.1
27	22 20	2.8	28	6 5	1.9	28	13 36	0.9
28	23 27	2.8	29	6 48	1.8	29	13 56	0.8
30	0 34	2.8	30	7 30	1.7	30	14 12	0.7

PHASES OF THE MOON.

Full Moon..... 7th 8.49 a. m., 75th meridian time.
Last quarter..14th 3.12 p. m., 75th meridian time.
New moon....21st 9.01 a. m., 75th meridian time.
First quarter..29th 12.22 a. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W., and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
May 1	1 41	2.8	1	8 11	1.7	1	14 28	0.6
2	2 48	2.8	2	8 52	1.7	2	14 43	0.7
3	3 56	2.9	3	9 34	1.8	3	15 0	0.7
4	5 7	3.0	4	10 19	1.9	4	15 20	0.8
5	6 21	3.1	5	11 7	2.1	5	15 43	1.1
6	7 36	3.1	6	11 58	2.2	6	16 13	1.4
7	8 50	3.0	7	12 54	2.4	7	16 53	1.9
8	9 58	2.7	8	13 52	2.5	8	17 45	2.4
9	10 56	2.2	9	14 52	2.5	9	18 50	2.9
10	11 42	1.7	10	15 51	2.4	10	20 5	3.2
11	12 18	1.3	11	16 48	2.3	11	21 26	3.4
12	12 45	1.0	12	17 41	2.2	12	22 48	3.4
13	13 8	0.9	13	18 33	2.1	14	0 9	3.4
14	13 29	0.8	14	19 22	2.0	15	1 30	3.4
15	13 48	0.8	15	20 11	2.0	16	2 50	3.3
16	14 8	0.9	16	21 0	2.1	17	4 10	3.3
17	14 30	1.0	17	21 51	2.1	18	5 29	3.3
18	14 55	1.2	18	22 43	2.2	19	6 46	3.2
19	15 26	1.5	19	23 37	2.3	20	8 0	2.9
20	16 6	1.9	21	0 32	2.3	21	9 4	2.5
21	16 55	2.3	22	1 27	2.2	22	9 57	2.0
22	17 53	2.6	23	2 20	2.2	23	10 40	1.6
23	18 57	2.7	24	3 11	2.0	24	11 13	1.2
24	20 5	2.8	25	3 58	1.9	25	11 38	1.0
25	21 12	2.8	26	4 43	1.8	26	11 59	0.8
26	22 19	2.8	27	5 25	1.7	27	12 16	0.7
27	23 26	2.8	28	6 6	1.7	28	12 32	0.7
29	0 32	2.8	29	6 46	1.7	29	12 48	0.7
30	1 39	2.8	30	7 28	1.8	30	13 4	0.7
31	2 48	2.9	31	8 11	1.9	31	13 23	0.8

PHASES OF THE MOON.

Full moon.... 6th 9.43 p. m., 75th meridian time.
Last quarter..13th 8.48 p. m., 75th meridian time.
New moon....20th 7.47 p. m., 75th meridian time.
First quarter..28th 6.34 p. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W., and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
June 1	4 0	3.0	1	8 57	2.0	1	13 44	1.0
2	5 14	3.1	2	9 47	2.2	2	14 11	1.3
3	6 28	3.0	3	10 41	2.3	3	14 46	1.7
4	7 41	2.8	4	11 39	2.5	4	15 34	2.2
5	8 45	2.4	5	12 40	2.5	5	16 36	2.8
6	9 37	2.0	6	13 41	2.5	6	17 49	3.2
7	10 18	1.5	7	14 40	2.4	7	19 10	3.4
8	10 49	1.2	8	15 36	2.3	8	20 35	3.5
9	11 14	1.0	9	16 29	2.2	9	21 58	3.4
10	11 35	0.8	10	17 20	2.1	10	23 19	3.3
11	11 54	0.8	11	18 9	2.0	12	0 39	3.3
12	12 13	0.8	12	18 57	2.0	13	1 58	3.3
13	12 34	1.0	13	19 47	2.1	14	3 16	3.3
14	12 58	1.2	14	20 37	2.2	15	4 33	3.2
15	13 27	1.4	15	21 30	2.2	16	5 47	2.9
16	14 3	1.7	16	22 24	2.3	17	6 54	2.6
17	14 47	2.1	17	23 18	2.3	18	7 50	2.1
18	15 42	2.4	19	0 12	2.2	19	8 35	1.7
19	16 44	2.6	20	1 3	2.1	20	9 12	1.3
20	17 50	2.8	21	1 52	2.0	21	9 40	1.0
21	18 58	2.8	22	2 38	1.8	22	10 2	0.9
22	20 6	2.8	23	3 21	1.8	23	10 22	0.8
23	21 13	2.8	24	4 2	1.7	24	10 38	0.7
24	22 18	2.7	25	4 42	1.7	25	10 54	0.6
25	23 24	2.7	26	5 23	1.7	26	11 9	0.6
27	0 31	2.8	27	6 4	1.8	27	11 25	0.8
28	1 40	2.9	28	6 48	1.9	28	11 46	1.0
29	2 52	3.0	29	7 35	2.0	29	12 10	1.2
30	4 7	3.1	30	8 26	2.2	30	12 41	1.5

PHASES OF THE MOON.

Full moon.... 5th 8.07 a. m., 75th meridian time.
Last quarter..12th 1.38 a. m., 75th meridian time.
New moon....19th 8.02 a. m., 75th meridian time.
First quarter..27th 11.08 a. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
July 1	5 20	3.0	1	9 22	2.4	1	13 21	2.0
2	6 28	2.7	2	10 22	2.5	2	14 16	2.6
3	7 26	2.2	3	11 24	2.6	3	15 25	3.1
4	8 12	1.7	4	12 25	2.5	4	16 46	3.4
5	8 48	1.3	5	13 25	2.4	5	18 13	3.6
6	9 16	1.0	6	14 21	2.3	6	19 39	3.6
7	9 39	0.9	7	15 14	2.2	7	21 3	3.5
8	10 0	0.8	8	16 5	2.1	8	22 25	3.4
9	10 19	0.8	9	16 55	2.1	9	23 46	3.4
10	10 39	0.9	10	17 44	2.1	11	1 6	3.3
11	11 2	1.0	11	18 35	2.1	12	2 23	3.2
12	11 29	1.3	12	19 26	2.2	13	3 37	3.0
13	12 3	1.6	13	20 19	2.2	14	4 45	2.7
14	12 44	1.9	14	21 13	2.2	15	5 45	2.3
15	13 34	2.3	15	22 6	2.2	16	6 34	1.8
16	14 33	2.6	16	22 58	2.1	17	7 13	1.4
17	15 38	2.7	17	23 47	2.0	18	7 43	1.2
18	16 46	2.8	19	0 34	1.9	19	8 8	1.0
19	17 54	2.8	20	1 18	1.8	20	8 28	0.8
20	19 1	2.8	21	2 0	1.7	21	8 44	0.7
21	20 6	2.7	22	2 40	1.7	22	9 0	0.7
22	21 12	2.7	23	3 20	1.7	23	9 16	0.7
23	22 19	2.8	24	4 1	1.7	24	9 32	0.7
24	23 26	2.8	25	4 43	1.8	25	9 50	0.8
26	0 34	2.9	26	5 28	1.9	26	10 11	1.0
27	1 46	3.0	27	6 16	2.1	27	10 38	1.3
28	2 58	3.0	28	7 8	2.3	28	11 13	1.7
29	4 8	2.8	29	8 5	2.4	29	12 0	2.2
30	5 11	2.4	30	9 5	2.5	30	13 1	2.8
31	6 2	1.9	31	10 6	2.6	31	14 15	3.3

PHASES OF THE MOON.

Full moon..... 4th 4.40 p. m., 75th meridian time.
Last quarter..11th 7.12 a. m., 75th meridian time.
New moon....18th 10.00 p. m., 75th meridian time.
First quarter..27th 1.40 a. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Aug. 1	6 42	1.5	1	11 7	2.5	1	15 39	3.6
2	7 15	1.2	2	12 5	2.4	2	17 7	3.7
3	7 41	1.0	3	13 1	2.3	3	18 35	3.7
4	8 3	0.9	4	13 55	2.2	4	20 2	3.6
5	8 24	0.8	5	14 47	2.1	5	21 26	3.5
6	8 44	0.9	6	15 38	2.1	6	22 48	3.4
7	9 7	1.0	7	16 30	2.2	8	0 9	3.3
8	9 33	1.2	8	17 22	2.2	9	1 26	3.1
9	10 5	1.5	9	18 16	2.2	10	2 37	2.8
10	10 43	1.8	10	19 9	2.2	11	3 40	2.4
11	11 32	2.2	11	20 3	2.2	12	4 32	2.0
12	12 28	2.5	12	20 55	2.1	13	5 13	1.5
13	13 30	2.7	13	21 44	2.0	14	5 47	1.2
14	14 37	2.8	14	22 32	1.9	15	6 13	1.0
15	15 44	2.8	15	23 16	1.8	16	6 34	0.8
16	16 51	2.8	16	23 59	1.7	17	6 52	0.7
17	17 58	2.8	18	0 39	1.7	18	7 8	0.7
18	19 3	2.7	19	1 20	1.7	19	7 24	0.7
19	20 8	2.7	20	2 0	1.7	20	7 40	0.7
20	21 16	2.8	21	2 41	1.8	21	7 57	0.7
21	22 23	2.8	22	3 25	1.9	22	8 17	0.8
22	23 32	2.9	23	4 11	2.0	23	8 40	1.1
24	0 42	2.9	24	5 0	2.1	24	9 12	1.5
25	1 52	2.8	25	5 53	2.3	25	9 52	1.9
26	2 55	2.5	26	6 50	2.4	26	10 44	2.4
27	3 50	2.1	27	7 49	2.5	27	11 51	3.0
28	4 35	1.7	28	8 48	2.5	28	13 8	3.3
29	5 11	1.3	29	9 47	2.4	29	14 33	3.5
30	5 40	1.1	30	10 44	2.3	30	16 1	3.7
31	6 4	1.0	31	11 39	2.3	31	17 29	3.7

PHASES OF THE MOON.

Full moon.... 3d 12.11 a. m., 75th meridian time.
Last quarter.. 9th 2.56 p. m., 75th meridian time.
New moon....17th 1.21 p. m., 75th meridian time.
First quarter..25th 2.08 p. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moo for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation pe hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m
Sept. 1	6 25	0.9	1	12 32	2.2	1	18 56	3.
2	6 47	0.9	2	13 25	2.2	2	20 22	3.
3	7 10	1.0	3	14 19	2.2	3	21 46	3.
4	7 35	1.2	4	15 13	2.3	4	23 7	3.
5	8 [illegible]	1.4	5	16 8	2.3	6	0 23	3.
6	8 42	1.7	6	17 3	2.3	7	1 31	2.
7	9 28	2.1	7	17 58	2.2	8	2 28	2.
8	10 22	2.4	8	18 51	2.2	9	3 13	1.
9	11 24	2.6	9	19 41	2.1	10	3 48	1.
10	12 28	2.7	10	20 29	1.9	11	4 16	1.
11	13 36	2.8	11	21 14	1.8	12	4 39	0.
12	14 42	2.7	12	21 57	1.8	13	4 59	0.
13	15 48	2.7	13	22 39	1.7	14	5 15	0.
14	16 54	2.7	14	23 19	1.7	15	5 31	0.
15	18 0	2.7	16	0 0	1.7	16	5 47	0.
16	19 7	2.8	17	0 41	1.8	17	6 4	0.
17	20 14	2.8	18	1 24	1.8	18	6 24	0.
18	21 22	2.9	19	2 9	1.9	19	6 47	1.
19	22 32	2.9	20	2 57	2.1	20	7 16	1.
20	23 41	2.8	21	3 48	2.2	21	7 52	1.
22	0 44	2.5	22	4 43	2.3	22	8 39	2.
23	1 42	2.2	23	5 39	2.4	23	9 38	2.
24	2 29	1.8	24	6 36	2.4	24	10 48	3.
25	3 7	1.4	25	7 33	2.4	25	12 7	3.
26	3 37	1.2	26	8 28	2.3	26	13 30	3.
27	4 3	1.0	27	9 23	2.2	27	14 56	3.
28	4 25	0.9	28	10 16	2.2	28	16 22	3.
29	4 47	0.9	29	11 9	2.2	29	17 48	3.
30	5 9	0.9	30	12 3	2.3	30	19 14	3.

PHASES OF THE MOON.

Full moon.... 1st 7.28 a. m., 75th meridian time.
Last quarter.. 8th 2.05 a. m., 75th meridian time.
New moon....16th 5.28 a. m., 75th meridian time.
First quarter..24th 12.41 a. m., 75th meridian time.
Full moon....30th 3.31 p. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	*m.*		*h. m.*	*m.*		*h. m.*	*m.*
Oct. 1	5 34	1.0	1	12 57	2.3	1	20 38	3.4
2	6 3	1.3	2	13 53	2.4	2	21 59	3.2
3	6 38	1.7	3	14 50	2.4	3	23 13	2.9
4	7 22	2.0	4	15 47	2.3	5	0 16	2.4
5	8 14	2.4	5	16 42	2.3	6	1 7	1.9
6	9 14	2.6	6	17 35	2.1	7	1 47	1.5
7	10 18	2.7	7	18 25	2.0	8	2 18	1.2
8	11 26	2.8	8	19 11	1.9	9	2 43	1.0
9	12 33	2.8	9	19 55	1.8	10	3 4	0.8
10	13 38	2.7	10	20 37	1.7	11	3 21	0.7
11	14 45	2.8	11	21 18	1.7	12	3 38	0.7
12	15 50	2.7	12	21 58	1.7	13	3 54	0.7
13	16 55	2.7	13	22 39	1.7	14	4 11	0.7
14	18 3	2.8	14	23 22	1.8	15	4 30	0.8
15	19 12	2.9	16	0 7	1.9	16	4 52	1.0
16	20 22	2.9	17	0 54	2.1	17	5 19	1.3
17	21 31	2.8	18	1 45	2.2	18	5 53	1.6
18	22 37	2.6	19	2 39	2.3	19	6 38	2.1
19	23 36	2.3	20	3 34	2.3	20	7 34	2.5
21	0 26	1.9	21	4 31	2.3	21	8 40	2.9
22	1 5	1.5	22	5 26	2.3	22	9 54	3.1
23	1 38	1.2	23	6 20	2.2	23	11 12	3.2
24	2 4	1.0	24	7 13	2.2	24	12 34	3.4
25	2 27	0.9	25	8 5	2.1	25	13 56	3.4
26	2 48	0.9	26	8 56	2.1	26	15 18	3.4
27	3 9	0.9	27	9 48	2.2	27	16 42	3.5
28	3 33	1.0	28	10 41	2.3	28	18 6	3.5
29	4 0	1.2	29	11 36	2.3	29	19 29	3.4
30	4 32	1.5	30	12 33	2.4	30	20 48	3.1
31	5 12	1.9	31	13 31	2.4	31	21 57	2.7

PHASES OF THE MOON.

Last quarter.. 7th 5.14 p. m., 75th meridian time.
New moon....15th 9.41 p. m., 75th meridian time.
First quarter..23d 9.38 a. m., 75th meridian time.
Full moon.....30th 1.19 a. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moo for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Varia tion pe hour c longi- tude.
	h. m.	m.		h. m.	m.		h. m.	m
Nov. 1	6 1	2.2	1	14 29	2.4	1	22 55	2
2	6 59	2.6	2	15 24	2.2	2	23 41	1
3	8 4	2.7	3	16 16	2.1	4	0 17	1
4	9 12	2.8	4	17 5	2.0	5	0 44	1
5	10 20	2.8	5	17 50	1.8	6	1 7	0
6	11 27	2.8	6	18 33	1.7	7	1 27	0
7	12 32	2.7	7	19 14	1.7	8	1 43	0
8	13 37	2.7	8	19 55	1.7	9	1 59	0
9	14 43	2.7	9	20 35	1.7	10	2 16	0
10	15 50	2.8	10	21 17	1.8	11	2 35	0
11	16 58	2.9	11	22 2	1.9	12	2 56	1.
12	18 8	2.9	12	22 49	2.0	13	3 21	1.
13	19 18	2.9	13	23 39	2.2	14	3 53	1.
14	20 27	2.7	15	0 33	2.3	15	4 34	1.
15	21 30	2.4	16	1 29	2.4	16	5 27	2.
16	22 23	2.0	17	2 26	2.4	17	6 32	2.
17	23 6	1.6	18	3 22	2.3	18	7 45	3.
18	23 40	1.3	19	4 17	2.2	19	9 3	3.
20	0 8	1.0	20	5 10	2.2	20	10 22	3.
21	0 31	0.9	21	6 0	2.1	21	11 42	3.
22	0 52	0.9	22	6 50	2.1	22	13 2	3.
23	1 13	0.9	23	7 40	2.1	23	14 22	3.
24	1 34	0.9	24	8 31	2.2	24	15 43	3.
25	1 58	1.1	25	9 23	2.2	25	17 4	3.
26	2 28	1.4	26	10 18	2.3	26	18 24	3.
27	3 4	1.7	27	11 15	2.4	27	19 37	2.
28	3 48	2.1	28	12 13	2.4	28	20 41	2.
29	4 43	2.5	29	13 10	2.3	29	21 33	1.
30	5 45	2.8	30	14 4	2.2	30	22 13	1.

PHASES OF THE MOON.

Last quarter.. 6th 12.04 p. m., 75th meridian time.
New moon....14th 1.28 p. m., 75th meridian time.
First quarter..21st 5.29 p. m., 75th meridian time.
Full moon....28th 1.41 p. m., 75th meridian time.

MOON, 1917.

TABLE 1.—*Local mean astronomical time of rising, setting, and transit of the moon for longitude 90° W. and latitude 50° N.*

Date.	Rising.	Variation per hour of longitude.	Day of month.	Transit.	Variation per hour of longitude.	Day of month.	Setting.	Variation per hour of longitude.
	h. m.	m.		h. m.	m.		h. m.	m.
Dec. 1	6 53	2.9	1	14 55	2.1	1	22 44	1.2
2	8 2	2.9	2	15 43	1.9	2	23 9	1.0
3	9 11	2.8	3	16 27	1.8	3	23 29	0.8
4	10 18	2.8	4	17 9	1.7	4	23 47	0.7
5	11 23	2.7	5	17 50	1.7	6	0 4	0.7
6	12 28	2.7	6	18 30	1.7	7	0 20	0.7
7	13 34	2.7	7	19 11	1.7	8	0 37	0.7
8	14 41	2.8	8	19 54	1.8	9	0 57	0.8
9	15 50	2.9	9	20 40	2.0	10	1 20	1.1
10	17 0	2.9	10	21 29	2.1	11	1 50	1.4
11	18 10	2.8	11	22 21	2.3	12	2 28	1.8
12	19 16	2.6	12	23 17	2.4	13	3 17	2.3
13	20 15	2.2	14	0 15	2.4	14	4 17	2.8
14	21 3	1.8	15	1 14	2.4	15	5 30	3.2
15	21 41	1.4	16	2 11	2.3	16	6 49	3.3
16	22 11	1.2	17	3 5	2.2	17	8 10	3.4
17	22 37	1.0	18	3 57	2.1	18	9 31	3.4
18	22 58	0.9	19	4 48	2.1	19	10 51	3.3
19	23 19	0.9	20	5 37	2.1	20	12 11	3.3
20	23 40	0.9	21	6 27	2.1	21	13 30	3.3
22	0 3	1.0	22	7 18	2.2	22	14 49	3.3
23	0 29	1.2	23	8 11	2.2	23	16 7	3.2
24	1 1	1.5	24	9 5	2.3	24	17 21	2.9
25	1 41	1.9	25	10 1	2.3	25	18 28	2.6
26	2 31	2.3	26	10 58	2.3	26	19 24	2.1
27	3 30	2.6	27	11 53	2.2	27	20 8	1.6
28	4 36	2.8	28	12 45	2.1	28	20 43	1.3
29	5 44	2.9	29	13 34	2.0	29	21 10	1.0
30	6 54	2.9	30	14 20	1.9	30	21 33	0.8
31	8 2	2.8	31	15 4	1.8	31	21 52	0.7

PHASES OF THE MOON.

Last quarter.. 6th 9.14 a. m., 75th meridian time.
New moon....14th 4.17 a. m., 75th meridian time.
First quarter..21st 1.07 a. m., 75th meridian time.
Full moon....28th 4.52 a. m., 75th meridian time.

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