Perigee Table
Finding Moon's Age
Draper's drawing re Lunar meridian

```
25.421
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               261 29960544
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                 1830148576 0

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13.064980272 ) 243.412300000
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               104519842176
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                78389881632
                40366694080
                39194940816
                 1171753264 0

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13.064980272 ) 154.694500000
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                52773279040
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                  513357952 0

5.81
13.064980272 ) 75.976700000
               65 324901360
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               1045198 42176
                199814422 40

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                10634373472 0
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                  182389254 40

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                  306455104 00

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                13064980272
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                26129960544
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               52 259921088
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               39 194940816
               110093591840
               104519842176
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23.59
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               129446360800

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22.99
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91454861904
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ASTRONOMIC AND CALENDRIC LAWS GOVERNING THE LUNI-SOLAR YEAR

Chapter III

1. Lunar Observation and Paschal Reckoning.
2. Translation Period and Waxing Period
3. The Ancient Jewish Phasis
4.

360
3
10,80

360
16
2160
360
5760

360
30
10800

360
43
1080
1440
15480

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56
2160
1800
20160

360
70
25200

360
83
1080
2880
29880

360
96
2160
3240
34560

109
360
6540
327
39240

123
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7380
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44280

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8160
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48960

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447
53640

162
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58320

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63360

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77400

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82440

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96480

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101520

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1599
191880

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196920

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173137.1185~~64544~~

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104519842176
78389881632
52259921088
6114.410767296

13.064980272
103
39194940816
13064980272
1345.692968016

"As Jesus still sat at the well-side, He looked upon the fields of grain that

Long ☾ + lunations in century + no. degrees over × No. of cycl., Foundation of all almanacs today;

Jan 0.5 G.C.T 1900

mean motion 27.554 13.77 366.2…

Brown

Mean ☾ = 270° 26′ 11.″71 + 1336^r 307° 53′ 26.″06 t_c + 7.″14 t_c^2 + 0.″0068 t_c^3

Long. ω = 334 19 46.40 + 11 109 02′ .0252 ″ −37.17 ″ − 0.04500 t_c^3

Foundation of Brown's work on the moon page

Mean anomaly ☾ − ω (moon, per.) = 296° 6′ 25.″31 + 1325^r (lunations) 198° 51′ 23.″54 t_c + 44.″31 t_c^2 + .″052 t_c^3 +

$t_c = -1$; + 361.

$\frac{r}{V}$ = Δ days to be added to date gives date of perigee

360° − x = r

r = (360° − x)

(1) t_c	(5) °	′	″	(3)		(3b) ′	″	(3a)		(4)		(2) J.D.N.	(6) °
$t_c = 0$	296°	6′	25.31″	Jan 0.5	1900							2415020	296.107031
−1	97	15	46.03	Dec 30.5	1799	50	39.282	44.258	−198	50	39.28	2378495	97.262786
−2	258	26	35.05	Dec 29.5	1699	49	55.128	44.206	−37	39	50.26	2341970	258.443069
−3	59	38	52.08	Dec 29.5	1599	49	11.078	44.154	−236	27	33.23	2305445	59.647800
−4	220	52	36.78	Dec 19.5	1499	48	27.132	44.102	−75	13	48.53	2268920	220.876883
−5	22	7	48.86	19.5	1399	47	43.290	44.050	−273	58	36.45	2232395	22.130239
−6	183	24	28.00	19.5	1299	46	59.552	43.998	−112	41	57.31	2195870	183.407778
−7	344	42	33.88	19.5	1199	46	15.918	43.946	−311	23	51.43	2159345	344.709411
−8	146	2	6.21		1099	45	32.388	43.894	−150	4	19.10	2122820	146.035058
−9	307	23	4.65		999	44	48.962	43.842	−348	43	20.66	2086295	307.384625
−10	108	45	28.91		899	44	5.640	43.790	−187	20	56.40	2049770	108.758031
−11	270	9	18.67		799	43	22.422	43.738	−25	57	6.64	2013245	270.155186
−12	71	34	33.61		699	42	39.308	43.686	−224	31	51.70	1976720	71.576003
−13	233	1	13.53		599	41	56.298	43.634	−63	5	11.78	1940195	233.020425
−14	34	29	17.82		499	41	.13392	43.582	−261	37	7.49	1903670	34.488283
−15	195	58	46.46		399	40	30.590	43.530	−100	7	38.85	1867145	195.979572
−16	357	29	39.04		299	39	47.892	43.478	−298	36	46.27	1830620	357.494178
−17	159	1	55.24		199	39	5.298	43.426	−137	4	30.07	1794095	159.032011
−18	320	35	34.77	Dec 19.5	99	38	22.808	43.374	−335	30	50.54	1757570	320.592992
−19	122	10	37.29	2 B.C.	1	37	40.422	43.322	−173	55	48.02	1721045	122.177025
−20	283	47	2.51	102 B.C.	−101	36	58.140	43.270	−12	19	22.80	1684520	283.784031
−21	85	24	50.11		−201	36	15.962	43.218	−210	41	35.20	1647995	85.413919
−22	247	3	59.77		−301	35	33.888	43.166	−49	2	25.54	1611470	247.066603
−23	48	44	31.20		−401	34	51.918	43.114	−247	21	54.11	1574945	48.742000
−24	210	26	24.06		−501	34	10.052	43.062	−85	40	1.25	1538420	210.440017
−25	12	9	38.06	Dec 19.5	−601	33	28.290	43.010	−283	56	47.25	1501895	12.160572

diff 161.155755

checked

$2\left(\frac{1}{4} \cdot \frac{1}{4}\right) + \frac{1}{2} \quad \frac{1}{8} - \frac{1}{8} - \frac{1}{2} - \frac{1}{8} - \frac{1}{8} = N$

$x = 8N + 7$

4	3	7
2	1	15
1	0	28
		31
		39
		45

April 8 = ☉
7
6
5
4
3
2
1
31
30
29
28
27
26

Δ days + date = date of Perigee

29 AD = 31 × 13.25 = no. of periods

397.5

410.

(integer no. of P) × 27.55457 ... d

~~411.~~

413.

Page 28 Tables of the Moon

Sect. I, Chapter I

Ernest W. Brown

Yale, 1919.

$\mathbb{C} - \Gamma'$

V° var per day

Period

1900	13°.064992650	$\frac{360}{V}$ = 27.^{d}55455052
1800	.064991977	
1700	91307	
1600	90639	
1500	89973	
1400	89310	
1300	88649	
1200	87990	
1100	87334	
1000	86680	
900	86029	
800	85380	
700	84733	
600	84089	
500	83447	
400	82807	
300	82170	
200	81535	27.55457395
100	80902	27.55457530
0 = 1 B.C.	80272	27.55457663
−100	13.0649[illegible]9645	27.55457796

(7)

multiply

413.

$f_n = f_0 + n\Delta' + \frac{n(n-1)}{2}\Delta''$

6:30 $2^h 21'$

solve the equation for (t)

$\cos t_{☾} = \cos(90°50' - \pi_{☾}) \sec\delta \sec\phi - \tan\delta \tan\phi$

add $\alpha_{☾} + t_{☾}$ = Sidereal time at the time of moonset.

find the Local civil time when the local sidereal time equals $\alpha_{☾} + t_{☾}$ by the following procedure.

Find from newcomb's tables the sid. time for the corresponding G.C.T. then add $2^h 20.^m9$ for the local Jerusalem sid. Time call this J.

Then $J - \alpha_{☾} - t_{☾} = \Delta(1.032) = $ approx civil time interval is the sidereal interval from the local assumed time to the true local time of phenomena.

~~Repeat all the above for the sun and the local civil times of sunset and moonset gives the interval between them.~~ take from almanac.

A lot of work which may be shortened a little by using the approximate formula for $t_{☾}$ or $t_{\odot}$ as follows:

$\cos(t+q) = -\tan\phi \tan\delta$

where q is $+0.^m3$ for the moon and $-3.^m5$ for the sunset.

Glen H. Draper

Computed by Glenn Draper, Associate Astronomer, U.S. Naval Observatory

Moonset occurs when the sidereal time equals $H_☾ + \alpha_☾$ where $\cos H_☾ = -\tan\phi \tan\delta + \sin(\pi - sd - 34') \sec\phi \sec\delta$.

For Jerusalem $\phi = +31°46'$; $\log\tan\phi = 9.79185$; $\log\sec\phi = 0.0705$.

$\lambda = -2^h 20^m.9$ st. corr. $= -23^s.15$

S.T. for Jerusalem Mean Noon from ~~page~~ B.N.A. 201 for year 1844.

Oct 12 $= 13^h 24^m 37^s.83 - 23^s.15 = 13^h 24^m.24$

Oct 13 $= 13 \; 28 \; 34.38 - 23.15 = 13 \; 28.19$

From page 211 we have as a first approx. (from phase.) for moonset

5:20.9 P.M. Jer. Time or 3 P.M. G.C.T. which gives

$\alpha_☾ = 13^h 40^m.59$

$\delta = -13° 48'.2$

$\log\tan\delta = 9.39038_n$

$\therefore \log\cos H_☾ = 9.18243$

$H_☾ = 5^h \; 24^m.98$

$\alpha_☾ = 13 \; 40.59$

$\Sigma = 19^h \; 5.57$

S.T. = { $13^h \; 24^m.24$; $5 \; 20.90$; 0.88 ; $18 \; 46.02$ }

$\Sigma - ST = +0^h \; 19^m.55$

Second Approximation: — $5^h \; 40^m.9$ P.M. J.T. = $3^h 20^m$ P.M. G.C.T.

$\alpha_☾ = 13^s \; 41^m.40$

$\delta = -13° \; 51'.8$

$\log\tan\delta$ = 9.79185 / 9.39234$_n$ / (10) 9.18419

$\log\sin(\pi - sd - 34) = 7.4637$

$\log\sec\delta$ = 0.0705 / 0.0128 / 7.5470

S.T. { $13 \; 24.24$; $5 \; 40.90$; $.93$; $19 \; 5.07$ }

$H_☾ = 5^h \; 24^m.02$

$\alpha_☾ = 13 \; 41.40$

$\Sigma = \alpha_☾ + H_☾ = 19^h \; 5^m.42$

.15283 / 352 / .15635 = cos H

$\Sigma - S.T. = +0^m.35$ ∴ Moonset at Jer. Oct 12, 1844 at 5:41 P.M.

Moonset Jerusalem October 13
Moonset Greenwich October 12 & 13.

Oct. 12 = 13' 17" = Equation of time

Oct. 13 = 13' 32" = equation of time

12^h N. Nov. 16, 1925 - $15^h\ 40^m\ 27^s$ = Oct. 12 - 10^h P.M. - 1844 - $13^h\ 57^m\ 41^s$

Nov. 16

9 3 6
5- 5 8
1.1 45 / 4 8

6 19
5 36 / 49

$$f_n = f_0 + n\Delta' + \frac{n(n-1)}{2}\Delta''$$

$$= 1.44 + 94.24 + \quad 1.44 \quad = 96.18$$

Moon sunset date

If moonset is given in J.C.T. subtract L and get G.C.T. for phenomenon = time for moon table.

If you do not have moonset time, take 6:00 p.m. Greenwich, and use it, which is same + L at Jerusalem.

Sun

Sun is moving so slowly—but should

$2\frac{1}{2}$ 30 A.D. at equator | $2^h\ 27^m$ |

March 25 | 6:15 | $2\frac{1}{2}$

6:22 6:

1844	Apr 18		Apr 19	
ϕ	+ 31° 46′	+ 51° 28′	+ 31° 46′	+ 51° 28′
λ	− 2^h 20.9^m	0 0	− 2^h 20.9^m	0 0
Local Time	6 44.9	7 40.	7 50.9	8 54
GMT	4 24.0		5 30.0	
$\delta_{☾}$	+ 17 29.3	+ 17 52.6	+ 20 10.6	+ 20 28.3
d	5.3	5.3	5.3	5.3
D	8	12	9	.1.3
table A	+ 45.2	+ 95.4	+ 52.7	+ 111.9
Sid T.	− 1 46.8	− 1 46.8	− 1 50.7	− 1 50.7
table III	− 7	− 1.3	− 9	− 1.5
Σ	− 1 2.3	− 0 12.7	− 0 58.9	− 0 0.3
dD	− 4	− 6	− 5	− 7
$\alpha_{☾} + 6^h$	8 24.7	8 31.3	9 15.8	9 22.8
Moonset	7 22.0	8 18.0	8 16.4	9 21.8

G.M.T.	5 00	8 18.0	5 54.0	9 20.0
$\delta_{☾}$	+ 17 33.7	+ 17 57.8	+ 20 12.3	+ 20 30.4
table A	+ 45.3	+ 1 36.2	+ 52.8	+ 1 52.1
Sid T.	− 1 46.8	− 1 46.8	− 1 50.7	− 1 50.7
table III	− 8	− 1.4	− 1.0	− 1.5
Σ	− 1 2.3	− 12.0	− 58.9	− 1
dD	− 4	− 6	− 5	− 7
$\alpha_{☾} + 6^h$	8 25.9	8 32.5	9 16.6	9 23.7
Moonset.	7 23.2	8 19.9	8 17.2	9 22.9

Moonset T. defined as the instant moon's upper limb is on the apparent Horizon

1844	Oct 12		Oct 13	
φ	+ 31° 46′	+ 51° 28′	+ 31° 46′	+ 51° 28′
λ	− 2h 20.9m	0 0	− 2h 20.9	0 0
Local Time	5 40.9	5 0	6 30.9	6 0
G.M.T.	3 20.0	5 0	4 10.0	6 0
$\delta_☾$	− 13 55.4	− 14° 9.7′	− 17 50.0	− 18° 4.9′
d	10.0	10.0	10.1	10.1
D	.08	.12	.08	.13
Table A	− 35.4	− 74.0	− 46.1	− 99.7
Sid Time	− 13 24.6	− 13 24.6	− 13 28.6	− 13 28.6
Table III	− .5	− .8	− .7	− .9
Σ	− 14 0.5	− 14 39.4	− 14 15.4	− 15 9.2
dD	− .8	− 1.2	− .8	− 1.3
$\alpha_☾ + 6^h$	19 41.4	19 45.5	20 43.1	20 47.8
Moonset	5 40.1	5 4.9	6 26.9	5 37.3

G.M.T.	3 19.2	5 4.8	4 6	5 40.0
$\delta_☾$	− 13 51.6	− 14 10.6	− 17 49.5	− 18 2.2
table A	− 35.3	− 74.1	− 46.1	− 96.6
Sid Time	− 13 24.6	− 13 24.6	− 13 28.6	− 13 28.6
table III	− .6	− .8	− .7	− .9
Σ	− 14 0.5	− 14 39.5	− 14 15.4	− 15 6.1
dD	− .8	− 1.2	− 8	− 1.3
$\alpha_☾ + 6^h$	19 41.4	19 45.6	20 42.9	20 46.9
Moonset	5 40.1	5 4.9	6 26.7	5 39.5

PM Local Mean Time

A.D.	1 = B.C.	2 g_0	3 Interval from Dec. 19.5–IV 0.5 and on		4 "3" ÷ by 27.55457663 Lunations	5 "4" × 360°	6 "3" × V°	7 Subtract "5" from "6"	8 = g Add "7" to "2"	9 Subtract "8" from 360	10 "9" ÷ by V°	11 Add "10" to IV 0.5			
−1	Apr 0.5														
−1	Dec. 19.5	122.177025	−263		−9	−3240°	−3436.0898								
0	= (1 B.C.)		= 103	13	3	1080	1345.6929	265.6929	27.8699	332.1301	25.421	IV 25.92		P	
1	Apr. 0.5		468	14	16	5760	6114.4107	354.4107	116.5877	243.4123	18.630	IV 19.13	Apr 14		
2	"	"	833	13	30	10800	10883.1285	83.1285	205.3055	154.6945	11.843	IV 12.34	Apr 4		
3	"	"	1198	13	43	15480	15651.8463	171.8463	294.0233	75.9767	5.81	IV 6.31	Apr 23		
4	"	"	1564	13	56	20160	20433.6291	273.6291	35.8061	324.1939	24.81	IV 25.31	Apr 11		A
5	"	"	1929	14	70	25200	25202.3469	2.3469	124.5239	235.4761	18.02	IV 18.52	Apr 1		
6	"	"	2294	13	83	29880	29971.0647	91.0647	213.2417	146.7583	11.23	IV 11.73	Apr 20		
7	"	"	2659	13	96	34560	34739.7825	179.7825	301.9595	58.0405	4.44	IV 4.94	Apr 9		
8	"	"	3025	13	109	39240	39521.5653	281.5653	43.7423	316.2577	24.26	IV 24.76	Mar 28		
9	"	"	3390	14	123	44280	44290.2831	10.2831	132.4601	227.5399	17.41	IV 17.91	Apr 16	P	
10	"	"	3755	13	136	48960	49059.0000	99.0000	221.1770	138.8230	10.62	IV 11.12	Apr 5		
11	"	"	4120	13	149	53640	53827.7187	187.7187	309.8957	50.1043	3.84	IV 4.34	Mar 26		
12	"	"	4486	14	162	58320	58609.5015	289.5015	51.6785	308.3215	23.59	IV 24.09	Apr 13		A
13	"	"	4851	13	176	63360	63378.2192	18.2192	140.3962	219.6038	16.80	IV 17.30	Apr 2		A
14	"	"	5216	13	189	68040	68146.9370	106.9370	229.1140	130.8860	10.01	IV 10.51	Apr 21		
15	"	"	5581	13	202	72720	72915.6548	195.6548	317.8318	42.1682	3.22	IV 3.72	Apr 11		
16	"	"	5947	14	215	77400	77697.4376	297.4376	59.6146	300.3854	22.99	IV 23.49	Mar 30		
17	"	"	6312	13	229	82440	82466.1554	26.1554	148.3324	211.6676	16.20	IV 16.70	Apr 18	P	
18	"	"	6677	13	242	87120	87234.8732	114.8732	237.0502	122.9498	9.41	IV 9.91	Apr 7	P	
19	"	"	7042	13	255	91800	92003.5910	203.5910	325.7680	34.2320	26.20	IV 26.70	Mar 27		
20	"	"	7408	14	268	96480	96785.3738	305.3738	67.5508	292.4492	22.38	IV 22.88	Apr 14		
21	"	"	7773	13	282	101520	101554.0916	34.0916	156.2686	203.7314	15.59	IV 16.09	Apr 4		A
22	"	"	8138	13	295	106200	106322.8094	122.8094	244.9864	115.0136	8.80	IV 9.30	Apr 23		A
23	"	"	8503	13	308	110880	111145.5272	265.5272	387.7042	27.7042	25.43	IV 25.93	Apr 12		A
24	"	"	8869	14	321	115560	115873.3100	313.3100	75.4870	284.5130	21.77	IV 22.27	Apr 1		
25	"	"	9234	13	335	120600	120642.0278	42.0278	164.2048	195.7952	14.98	IV 15.48	Apr 19		
26	"	"	9599	13	348 ×	125280	125410.7456	130.7456	252.9226	107.0774	8.19 ×	IV 8.69	Apr 8	P	
27	"	"	9964	13	361 ×	129960	130179.4634	219.4634	341.6404	18.3596	1.45	IV 1.95	Mar 29	P	
28	"	"	10330	14	374 ×	134640	134961.2462	321.2462	83.4232	276.5768	21.16	IV 21.66	Apr 15		
29	"	"	10695	13	388 ×	139680	139729.9640	49.9640	172.1410	187.8590	14.37	IV 14.87	Apr 5		
30	"	"	11060	13	401 ×	144360	144498.6818	138.6818	260.8588	99.1412	7.58	IV 8.08	Mar 26		A
31	"	"	11425	13	414 ×	149040	149267.3996	227.3996	349.5766	10.4234	.72	IV 1.22	Apr 14		A
32	"	"	11791	14	427	153720	154049.1823	329.1823	91.3593	268.6407	20.56	IV 21.06	Apr 2		
33	"	"	12156	13	441	158760	158817.9001	57.9001	180.0771	179.9229	13.7[illegible]	IV 14.27	Apr 21		
34	"	"	12521	13	454	163440	163586.6179	146.6179	268.7949	91.2051	6.98	IV 7.48	Apr 10	P	
35	"	"	12886	13	467	168120	168355.3357	235.3357	357.5127	2.4873	.19 ×	IV .69	Mar 30	P	
36	"	"	13252	14	480	172800	173137.1185	337.1185	99.2955	260.7045	19.95	IV 20.45	Apr 17		
37	"	"	13617	13	494	177840	177905.8363	65.8363	188.0133	171.9867	13.16	IV 13.66	Apr 6		
38	"	"	13982	13	507	182520	182674.5541	154.5541	276.7311	83.2689	6.37	IV 6.87	Mar 27		
39	"	"	14347	13	520	187200	187443.2719	243.2719	365.4489	5.4489		IV	Apr 15		
40	"	"	14713	14	533	191880	192225.0547	345.0547	107.2317	252.7683	19.34	IV 19.84	Apr 4		A
41	"	"	15078	13	547	196920	196993.7725	73.7725	195.9495	164.0505	12.55	IV 13.05	Apr 23		
42	"	"	15443	13	560	201600	201762.4903	162.4903	284.6673	75.3327			Apr 12	P	
43	"	"	15808	13	573	206280	206531.2081	251.2081	13.3851	346.6149			Apr 1	P	
44	"	"	16174	14	586	210960	211312.9909	352.9909	115.1679	244.8321			Apr 19		
45	"	"	16539	13	600	216000	216081.7087	81.7087	203.8857	156.1143			Apr 8		
46	"	"	16904	13	613	220680	220850.4265	170.4265	292.6035	67.3965			Mar 28		
47	"	"	17269	14	626	225360	225579.9493	219.9493	342.1263	17.8737	1.363	IV 1.86	Apr 16		A
48	"	"	17635	13	640	230400							Apr 5		
49	"	"	18000	13	653	235080							Mar 26		
50	"	"	18365		666	239760							Apr 14	P	

		(ω)		Julian D.N.			360 x 13	348x360 =	27.554 Lunations
Dec 19.5	-1 A.D. g =	122.°177025	J.D.N.	1728045.					
Apr 0.5	26	252.9175		1730644.	9599	Δg =	125410.°7405	- 125280°	348
"	27	341.6352		1009	9964		130179.4582	- 129960	361
"	28	83.4177	Subtract	375	10330	Periods	134961.2407	- 134640	374
"	29	172.1353	from 360°	740	10695	in days	139729.9583	- 139680	388
"	30	260.8529		2105	11060	Divide by	144498.6759	- 144360	401
"	31	349.5705		470	11425	27.554	149267.3935	- 149040	414

360°

8.196	107.°0825	Divide by moon's average daily motion in degrees	130.°7405
1.406	18.3648		219.4582
21.170	276.5823		321.2407
14.379	187.8647		49.9583
7.589	99.1471	add to	138.6759
0.798	10.4295		227.3935

	Apr 8.696	AD 25 26 ω	Civil Time	26	Conj. = Apr. 6.28	Tr. Per. 1.49
	1.906	27 ω	Perigee Dates	27	conj. = Mar. 26.83	1.93
15 to 28	21.670	28 ω	midway	28	conj. = Apr. 13	1.09
5 to 18	14.879	29 ω	sec. half	29	conj. = Apr. 2.82	1.95
26 to 8	8.089	30 ap at conj.		30	conj. = Mar. 22.84	2.93
	1.298	31 ap at new moon		31	conj. = Apr. 10.58	3.19
		32 ap				
Apr.	14.27	33 ap	sec. half			

Mar 22

44
27

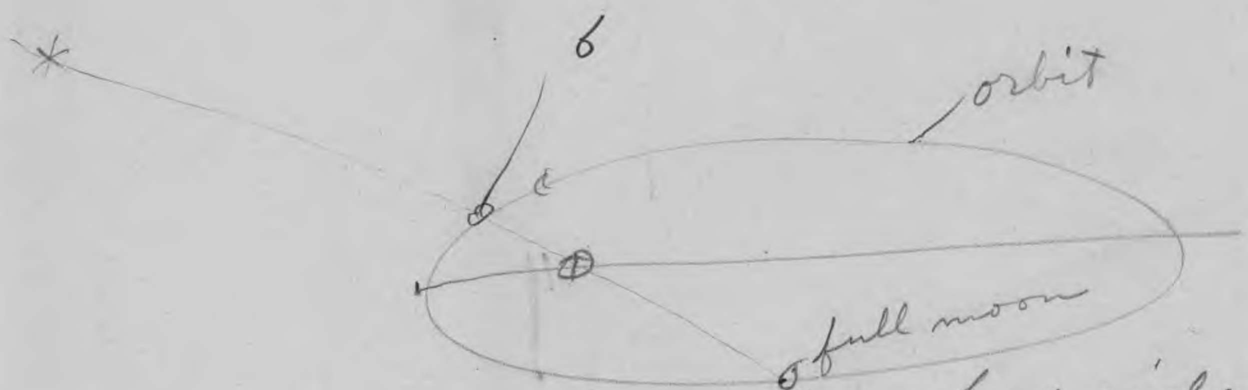
36	76
37	77
38	78
39	79
40	80

draw an ellipse

draw line of apsides (thru longest. diameter

that is thru point of perigee

to apogee).

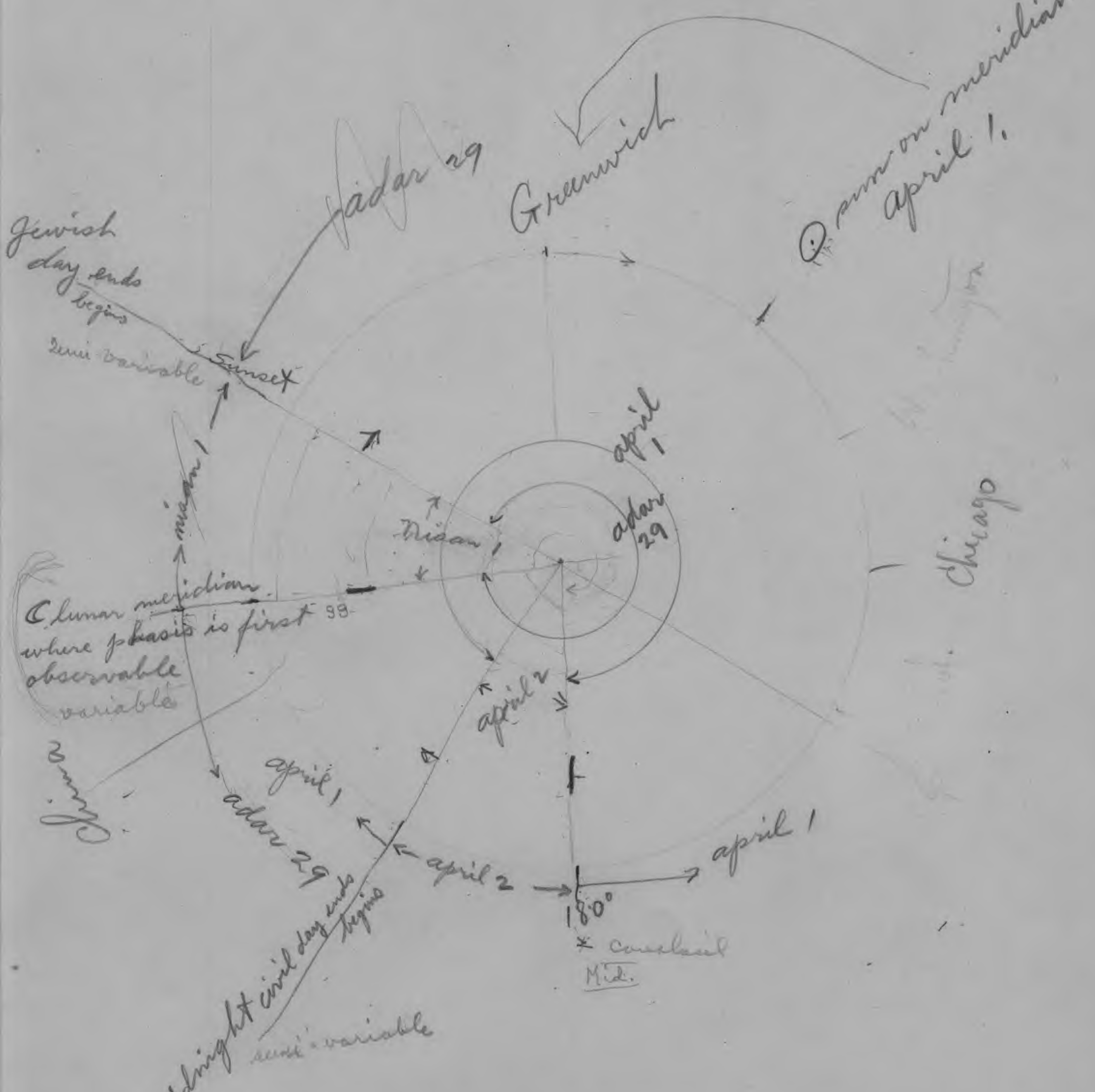


place earth on line of apsides

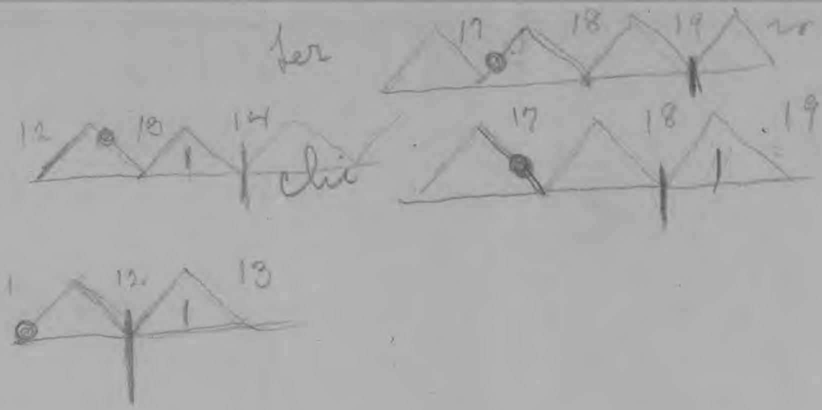
Place sun

draw line three centers

Draper's drawing to illustrate perigee and apogee



Greenwich
sun on meridian
april 1.
adar 29
Jewish
day ends
begins
semi-variable
Sunset
nisan 1
april
1
adar
29
Nisan
lunar meridian
where phasis is first
observable
variable
99
Chicago
april 2
april 1
adar 29
april 2
april 1
180°
constant
Mid.
midnight civil day ends
begins
semi-variable



17,44 12,[illegible]

24

1.02

56
77
1.33

27.55457663 | 15443.00000000 | 560
13777288315
1665711 6850
1653274 5978
12437087 20

569
547
22

| 15808.00000000 | 573
13777288315
2030711 6850
1928820 3641
1018913 2090
826637 2989

| 16174.00000000 | 586
13777288315
2396711 6850
2204365 1304
192346 55460

| 16539.00000000 | 600
16532745978
625402200

| 16904.00000000 | 613
16532745978
371254 0220
275545 7663
957082 5570

| 17269.00000000 | 626
16532745978
736254 0220
551091 5326
185162 48940

27.55457663 | 17635.00000000 | 640
16532745978
1102254 0220
1102183 0652
7095680

13.06480272 | 17.87370000 | 1.36
13 06480272
48 8897280
39 19440816
8894564640
898881632

13.064980272 | 17.873700000 | 1.368
13 064980272
48087197280
39194940816
88922564640
78389881632
105326830080

560
360
33600
1680
201600

573
360
34380
1719
206280

586
360
35160
1758
210960

360
600
216000

613
360
36780
1839
220680

626
360
37560
1878
225360

640
360
38400
1920
230400

653
360
39180
1959
235080

666
360
39960
1998
239760

27.55457530
103
8266372590
2755457530

13.0680902
103
392042706
130680902
1346.0132906

13.0680272
103
392040816
130680272
1346.0068016

13.064979645
103
391949389 35
1306497964 5
1345.6929.03435

13.064980272
468
104519842176
78388981632
52259921088
6114.410767296

13.064980272
15443
39194940816
52259921088
52259921088
65324901360
1306498027 2
201762.49034 0496

13.064980272
15808
104519842176
104519842176
65324901360
130649802 72
206531.208139776

13.064980272
16174
52259921088
91454861904
1306498027 2
78388981632
130649802 72
211312.99091 9328

13.064980272
16539
117584822448
39194940816
65324901360
78388981632
130649802 72
216081.70871 8608

13.064980272
16904
52259921088
117584822448
78388981632
1306498027 2
220850.4265 17888

13.064980272
17269
78388981632
78388981632
26129960544
91454861904
1306498027 2
225579.9493763 52

225579
225360
219.

201762
201600
162.

206531
206280
251.

211312.
210960
352.

219609.
216000
3609

162.4903
122.1770
284.6673

251.2081
122.1770
373.3851
360
13.3851

352.9909
122.1770
475.1679
360
115.1679

81.7087
122.1770
203.8857

170.4265
122.1770
292.6035

219.9493
122.1770
342.1263

360
284.6673
75.3327

360
.13.3851
346.6149

360
115.1679
244.8321

360
203.8857
156.1143

360
342.1263
17.8737

360.
292.6035
67.3965

337.1185
122.1770
459.2955

Finding the Moon's Age

The following pencilled note in a second-hand book on Astronomy may be of interest:

"Divide given year by 19;
Multiply remainder by 11;
Reject multiples of 30;
To this remainder add one-third plus one-quarter of the century (Excluding fractions);
Add the constant 8;
Add day of month;
Add number of month (commencing with March 1, January and February being put with previous year);
From the sum deduct the century, and the remainder will be the Moon's age (reject multiples of 30) within an error of one day."

No clue is given as to the source of this rule, but I can testify to its accuracy. I have checked it against a selection of past eclipses taken from Ferguson's <u>Astronomy</u>, and by taking those which happened in the middle of the day the age comes correct every time for as many centuries past as I have tried it, allowing for Old Style. The following example is for 1941 June 11:

1900

$\frac{1941}{19}$ leaves remainder of 3. Multiply by 11, giving 33. Subtract 30. To remainder 3 add 10 ($\frac{1}{3}$ plus $\frac{1}{4}$ of 19), 8, 11 and 4, totalling 36. Subtract 19, giving 17 days for age of moon on this day.

For any current year, the rule amounts to deriving a constant for that year, adding the day and number of the month when the information is requiredd, and subtracting multiples of 30. This constant is easily memorized and the operation can then be performed mentally as required. (Constant for 1941 = 2. Add 11 and 4 for June 11. Age 17 days.)

I should be very interested to know the derivation of the various processes set out above, for which I cannot at present see any reason. Perhaps someone will know the source of the rule.

Having obtained the age of the Moon from the above, its time of Southing on that day for any longitude is easily found by multiplying its age by four-fifths and subtracting a constant (12 for Greenwich). The remainder is the approximate time in hours. (Example for 1941, June 11. Age 19 days. 4/5-ths = 13.6, Subtract 12 = 01.6, i.e. 01^h 36^m. N.A. gives 01^h 29^m.) — P. Harvey.

Apr

epact = 28.04
13.77
14.27

Apr 28 16.36
1.64

It has ~~again~~ been proposed to locate 14 Nisan in 30 A.D. on the Jewish day of full moon, Friday, April 7, and the calendar dates for a 14-Nisan passover ~~&~~ covering the crucifixion period — 29 to 30 A.D. — have been presented in table form.[72] In diagram H (page 30),

Formal

Formerly ~~some time~~ the death passover was limited to a whole decade, but ~~two years~~ ~~the problem is narrower~~ astronomy has narrowed ~~the problem to~~ down the limits of the problem

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[72] Olmstead, A.T., "The Chronology

In conjunction, It has been proposed to locate 14 Nisan in 30 A.D. on the Jewish day of full moon, Friday, April 7, and in 31 A.D., to ~~follow~~ begin 14 Nisan over ~~a day~~ 24 hours before the full moon of April 25.[72] The passover dates for ~~a hypothetical~~ crucifixion period of ~~from~~ 29 to 36 A.D. ~~are~~ also presented in tables form, ~~which~~ diagram H (p. 30) analyzes and compares with ~~the~~ a true passover graph one based on the passover - full moon relation.

Demonstration 6 (Diagram H, p. 30):

● Conjunction = 1st day of each month.

San Francisco
The Peerless 100-year Chinese-English Calendar 1849 to 1948. Compiled by J. Endicott Gardner. San Francisco, 1924.
105° Szechuan;
Chinese) mid to mid.

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[72] Olmstead, A.T., "The Chronology of Jesus' Life," p. 4. Anglican Theological Review, January, 1942. Vol. XXIV.