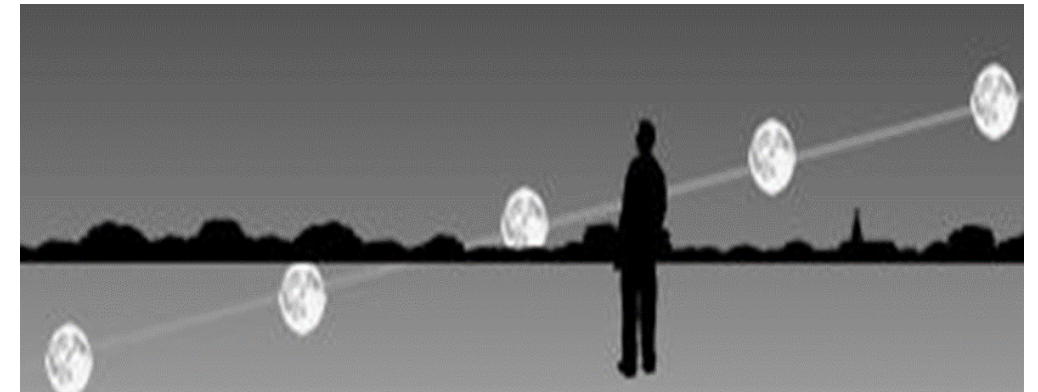
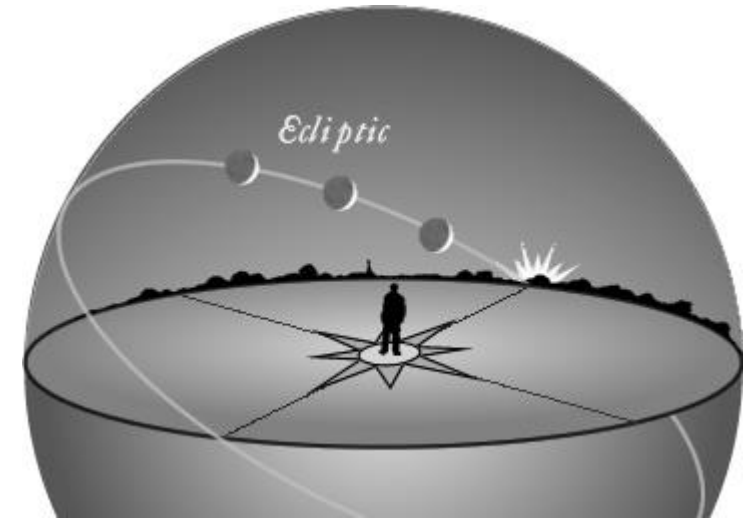


Anatomy of an Eclipse



Harvest Moon

- Full moon closest to the autumnal equinox, and can come anywhere from two weeks before to two weeks after the autumnal equinox.
- Northern Hemisphere: 2015 autumnal equinox comes on September 23, so the September 28 full moon counts as the Northern Hemisphere's Harvest Moon.
- This year's Harvest Moon is the closest and largest full moon of the year.
- In autumn, the *ecliptic* – or path of the sun, moon and planets – makes a narrow angle with the evening horizon, causing the location of the moonrise on the horizon to be farther north along the eastern horizon for several nights in succession.



The narrow angle of the ecliptic means the moon rises noticeably farther north on the horizon, from one night to the next. So there is no long period of darkness between sunset and moonrise.

Eclipse pairs -- solar and lunar eclipses, in a family of signs on the same axis.

2015

- Pisces-Virgo: solar new moon eclipse on March 20, 2015 in Pisces at 29 degrees, and a solar eclipse Sep 12 in Virgo at 20 degrees.
- Aries-Libra family: lunar eclipse in Libra on April 4, at 14 degrees, and lunar eclipse full moon Sep 27 in Aries 5 degrees.

2016

- Lunar full moon eclipse in Libra, on Mar 23 at 3 degrees, which concludes two years of the Libra-Aries family.
- Total number of eclipses 6 per family : Pisces-Virgo family ends Feb 26, 2017
- Eclipse move retrograde
- Consider the eclipses forming aspects with planets, the sun, moon or ascendant in the natal chart.
- The range of the degree for any eclipse in the family insures a wide number of people will feel them in their natal chart.

The years with eclipses in your Sun or ASC will trigger turning points, so if you are a Pisces, Virgo, Aries or Libra, 2015 and 2016 will be a landmark years for you.

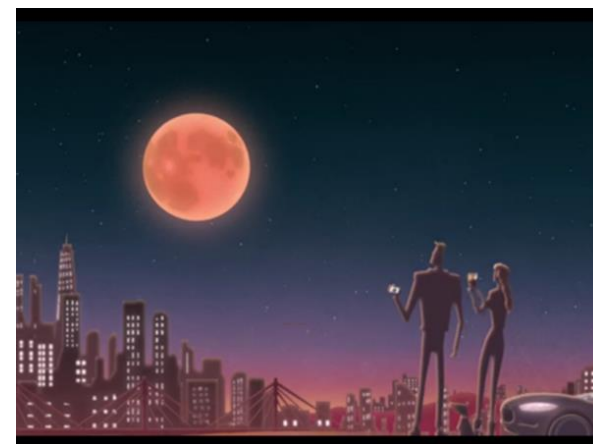


A lunar tetrad

- 4 total lunar eclipses spaced 6 lunar months apart
- No partial eclipse between them
- Full moon appears coppery red during a total lunar eclipse -- light from the sun refracts around Earth's atmosphere into the planet's shadow, casting a reddish hue over the moon

Tetrad #	1st Eclipse	2nd Eclipse	3rd Eclipse	4th Eclipse
1	2003 May 16	2003 Nov 09	2004 May 04	2004 Oct 28
2	2014 Apr 15	2014 Oct 08	2015 Apr 04	2015 Sep 28
3	2032 Apr 25	2032 Oct 18	2033 Apr 14	2033 Oct 08
4	2043 Mar 25	2043 Sep 19	2044 Mar 13	2044 Sep 07
5	2050 May 06	2050 Oct 30	2051 Apr 26	2051 Oct 19
6	2061 Apr 04	2061 Sep 29	2062 Mar 25	2062 Sep 18
7	2072 Mar 04	2072 Aug 28	2073 Feb 22	2073 Aug 17
8	2090 Mar 15	2090 Sep 08	2091 Mar 05	2091 Aug 29

"Eclipses During 2014," F. Espenak, **Observers Handbook: 2014**,
Royal Astronomical Society of Canada.



Lunation (or New Moon and Full Moon) charts have been used by Mundane Astrologers for many centuries. In later times, people began to compare them to their natal charts.



The Full Moon is a turning point--

- The Opposition, is the time when you would try to accomplish the things that were started on a New Moon. The Full Moon is when you look to external events or things get beyond your control.
- After the Sun/Moon opposition, comes the Full Moon period's inconjunct. The waxing inconjunct at the Gibbous phase asks us to make last minute adjustments and refinements.

Things to look at when comparing the Lunation charts to your own

- Houses that the Sun and Moon are transiting in your natal chart.
- What aspects do the Sun and Moon make to your natal planets?
- Look at the previous Lunation chart in this family.



An **eclipse** is a far more potent lunation.

- Look to the house the eclipse falls in your natal chart. The affairs of that house will be activated.
- Does the eclipse can activate a planet in your natal chart.
- The sign of the eclipse plays a role in the events that the eclipse will trigger.
- Many people tend to fear eclipses, simply because they often bring about a crisis of sorts that leads to a significant event or change. However, this event or change can be very positive.
- Eclipses are tied to changing circumstances. However, we are usually the ones to precipitate or to attract changes because our "inner guides" know that we need it--we know that change is necessary for growth.

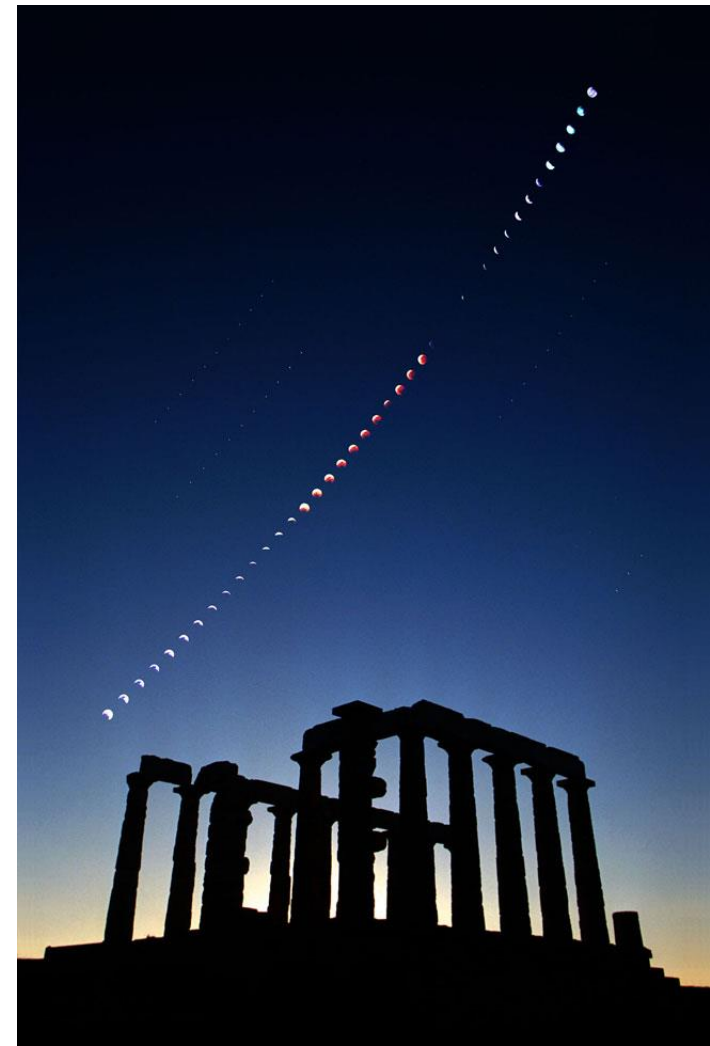
- 1st house -- change your image or redefine your personality in some manner. Finding a **balance between autonomy and dependence**. Put your needs first, but do so with respect for others. Leadership ability is "tested" right now. There may be some drama involving a significant other.
- 2nd house -- make necessary **financial changes** in your life. Sharing and power issues surface--what's yours and what's mine. A financial settlement, the beginning or end of a particular debt, and other such scenarios can be part of the picture now.
- 3rd house -- **daily activities can change** dramatically. There may be a major event in the life of a sibling, a publishing offer or you might be in a position to promote yourself. Travel or education plans surface.
- 4th house -- house repairs, family dramas--The demands of your **personal life** are now paramount. Attention to your public and personal lives is a priority. A major career project can come to fruition.
- 5th house -- demands of your larger goals in life may have been eclipsing your **pleasure-seeking activities**. Also possible, your children may be going through their own changes and "stages", and need more attention now, or a child could be experiencing a major new beginning. Some might have a child.
- 6th house -- there could be changes necessary in your **job or health** routines. You can use this surge of emotional eclipse power to make positive changes. Do something to improve your or get going on your exercise or nutrition program. A work project or a job itself can begin or end now. A physical or mental health issue might come to light.



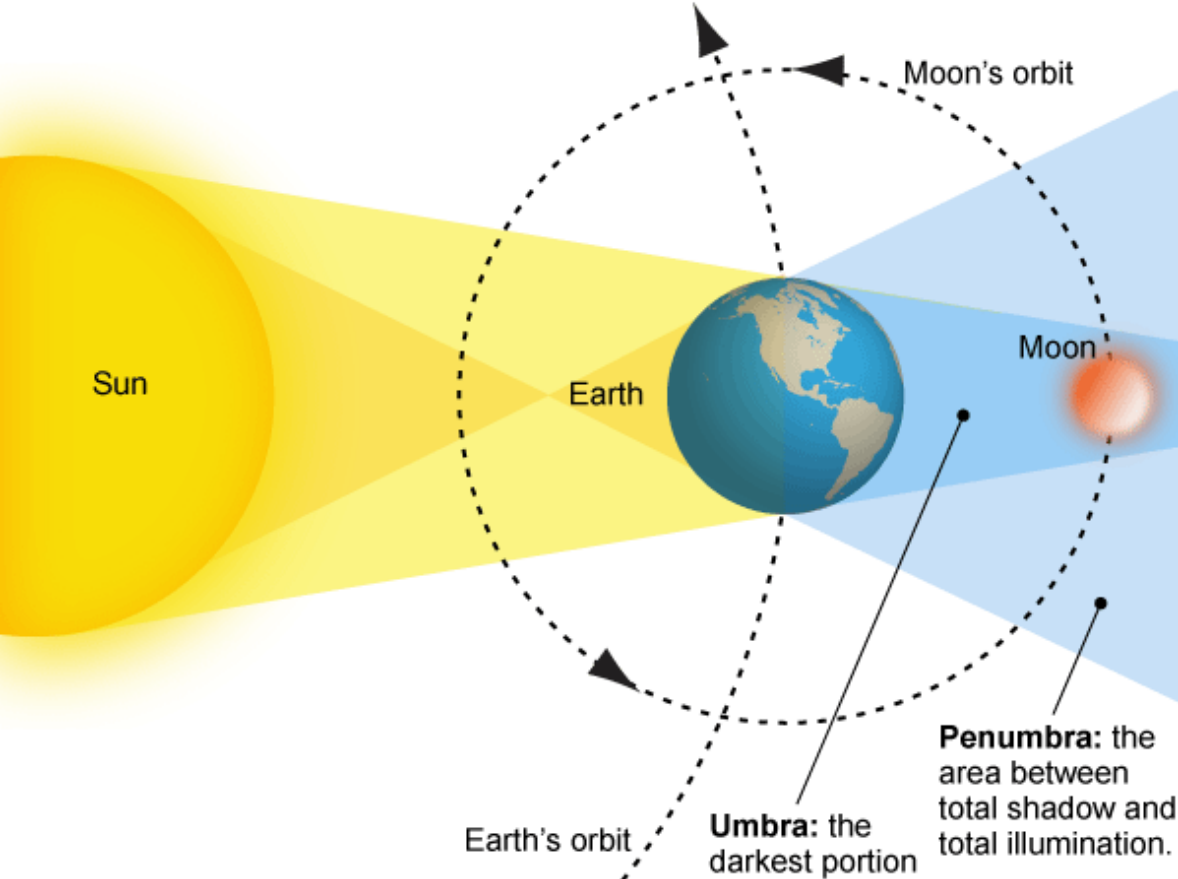
- 7th house -- partnerships may be tested (an **important one-to-one relationship**--a marriage partner, significant other, business partner, or an adversary). Strike a balance between your needs and those of another. Compromise and negotiate. You might have more social opportunities, or you might acquire many new clients.
- 8th house -- settle some of your **debts, financial or karmic**. What makes you feel comfortable and secure needs to be balanced with attention to other people's needs and comfort levels. There can be new money coming into your life.
- 9th house -- take a **leap of faith now**. There may be an important beginning or culmination in education. If you are in business, a writer, or the like, you might reach a wider audience.
- 10th house -- you may need to review your career goals. **Career matters** come to a head, but so might a personal, domestic, family, or house and home matter. You're called to perform, possibly on a moment's notice, and it's best to maintain reserve and show your competence.
- 11th house -- friendships may be tested, or your relationship to groups or organizations. You're looking for validation from **friends and group activities** now. There can be a major event involving a child or a romantic partner, or a culmination of a creative project can occur at this time.
- 12th house -- take time for rest and **spiritual renewal**. Balance business at work with some retreat and renewal. There can be exposure of a clandestine matter or secrets. A work project can come to fruition.



- Eclipses almost always bring up all kinds of unexpected changes of direction, assuming your Sun, moon, or a planet is involved through conjunction, opposition or square.
- Eclipses bring news of life's big events—often changing timetables!
- Take notice of all news and signals you get near an eclipse, and take them seriously— accepting them as non-negotiable and firm.
- The job of an eclipse is to shine a glaring ray of truth to part of your life in a startling way. A full moon lunar eclipse, will help you to see the true character of someone close. Occasionally, an important person to you will be "eclipsed out" of your life.
- With all eclipses, something ends and something else begins – it is an emotional time. Guard your health if it occurs on your birthday.
- Each eclipse in an 18 month to 2 year series is united in theme like a necklace. Once a family of signs is finished, it will not be back for seven or eight years.
- Eclipses repeat in nearly exact degree and sign every 19 years.



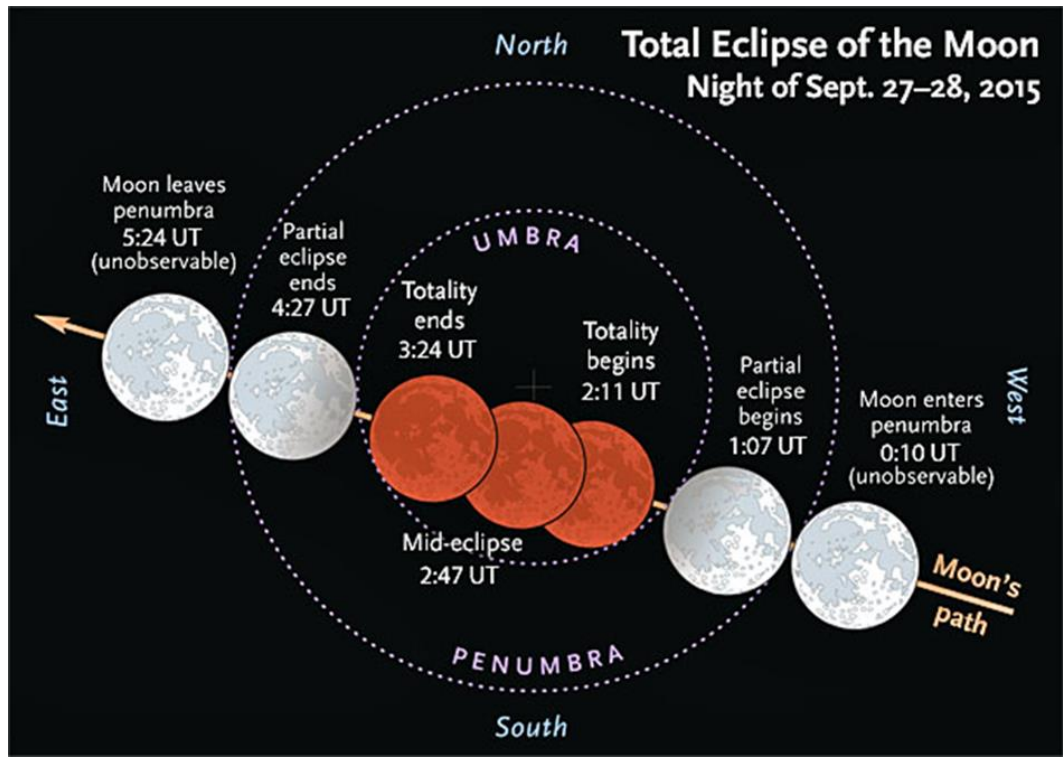
Path of Eclipse



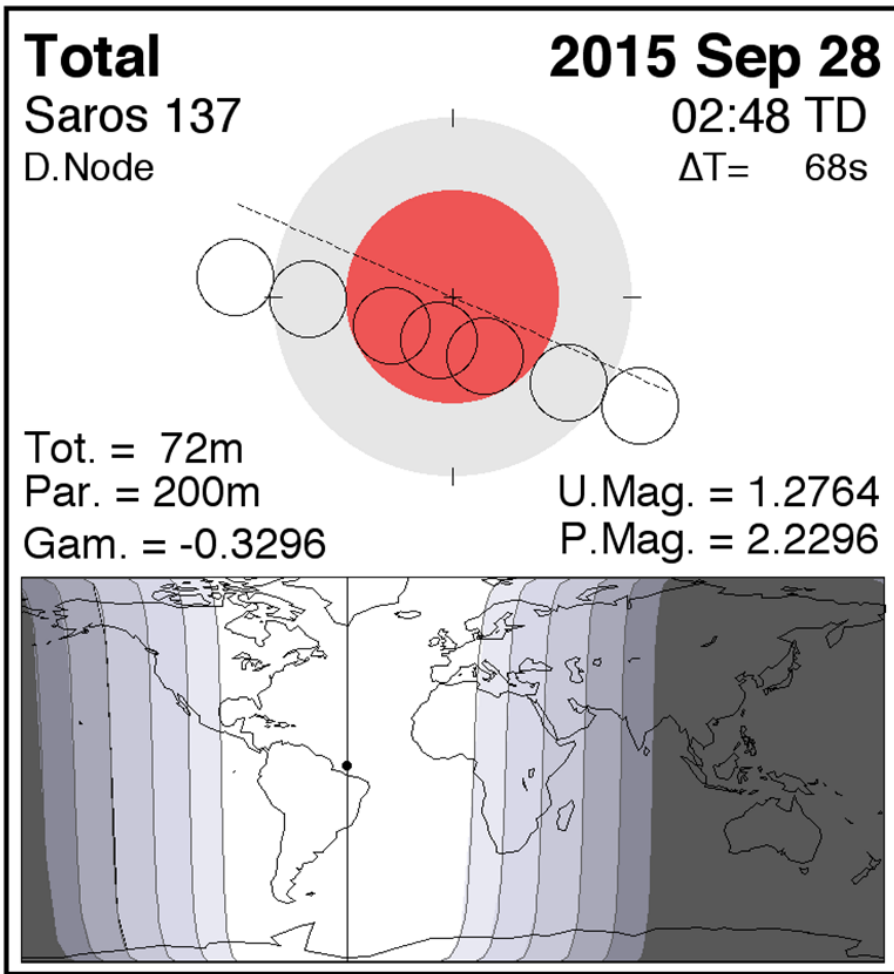
Umbra: the darkest portion of the Earth's shadow.

Penumbra: the area between total shadow and total illumination.

Note: Distances not to scale.
Source: NATIONAL WEATHER SERVICE



- The Moon's Westward Motion Across the Sky
- Earth is turning to the east – faster than the moon
 - Moon is moving to the east, but the much faster westward motion of *our* sky is carrying it to the west
 - It rises in the east and sets in the west.

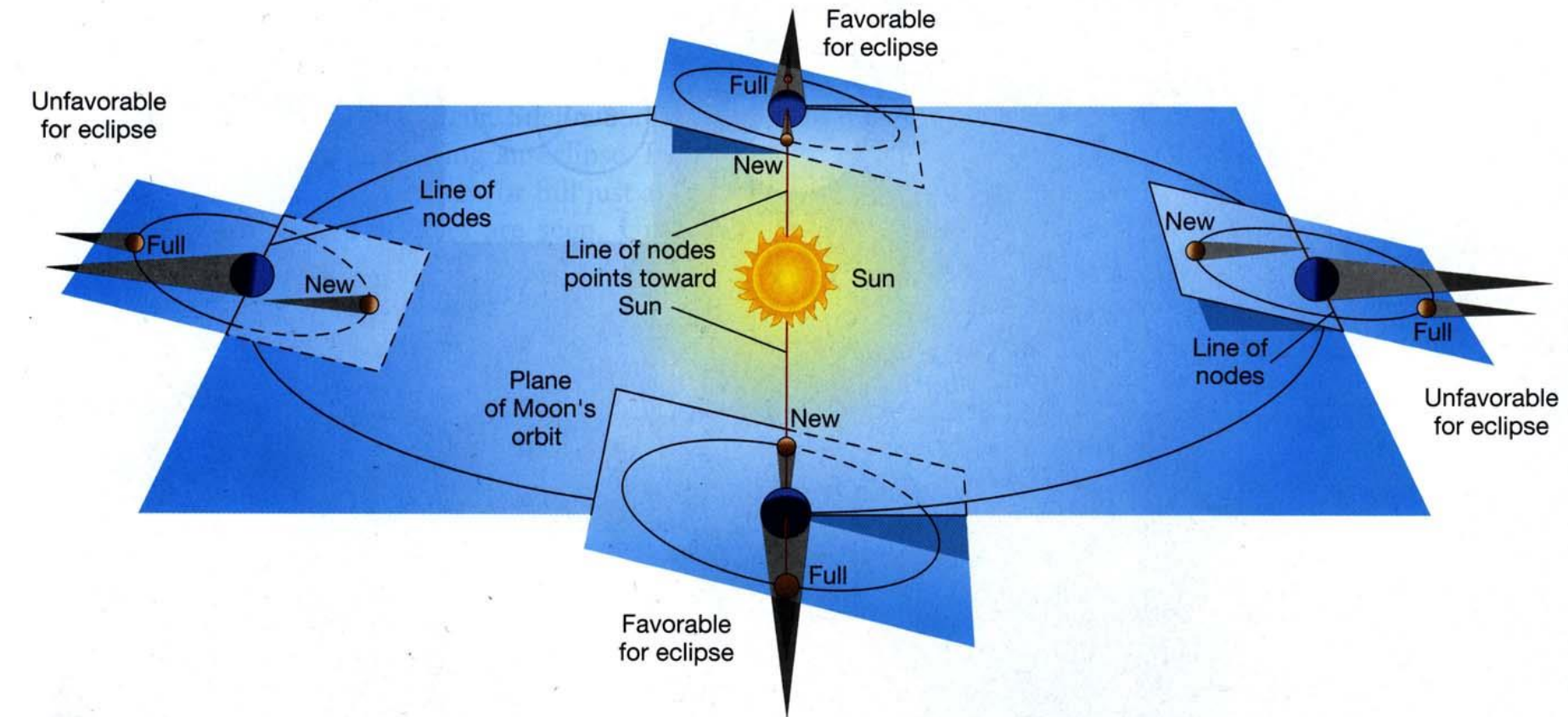


Thousand Year Canon of Lunar Eclipses
 ©2014 by Fred Espenak

Event	UTC Time	Time in Woodland*	Visible in Woodland
Penumbral Eclipse begins	Sep 28 at 12:11 AM	Sep 27 at 5:11 PM	No, below horizon
Partial Eclipse begins	Sep 28 at 1:07 AM	Sep 27 at 6:07 PM	No, below horizon
Full Eclipse begins	Sep 28 at 2:11 AM	Sep 27 at 7:11 PM	Yes
Maximum Eclipse	Sep 28 at 2:47 AM	Sep 27 at 7:47 PM	Yes
Full Eclipse ends	Sep 28 at 3:23 AM	Sep 27 at 8:23 PM	Yes
Partial Eclipse ends	Sep 28 at 4:27 AM	Sep 27 at 9:27 PM	Yes
Penumbral Eclipse ends	Sep 28 at 5:22 AM	Sep 27 at 10:22 PM	Yes

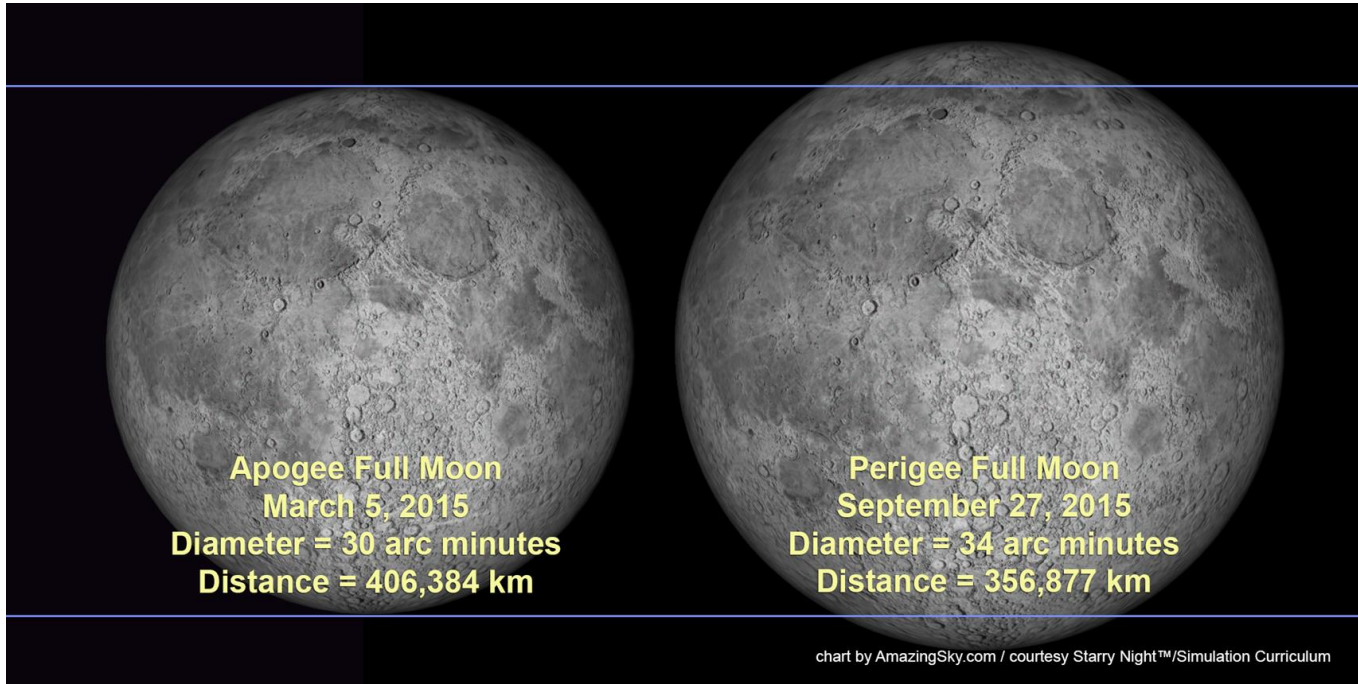
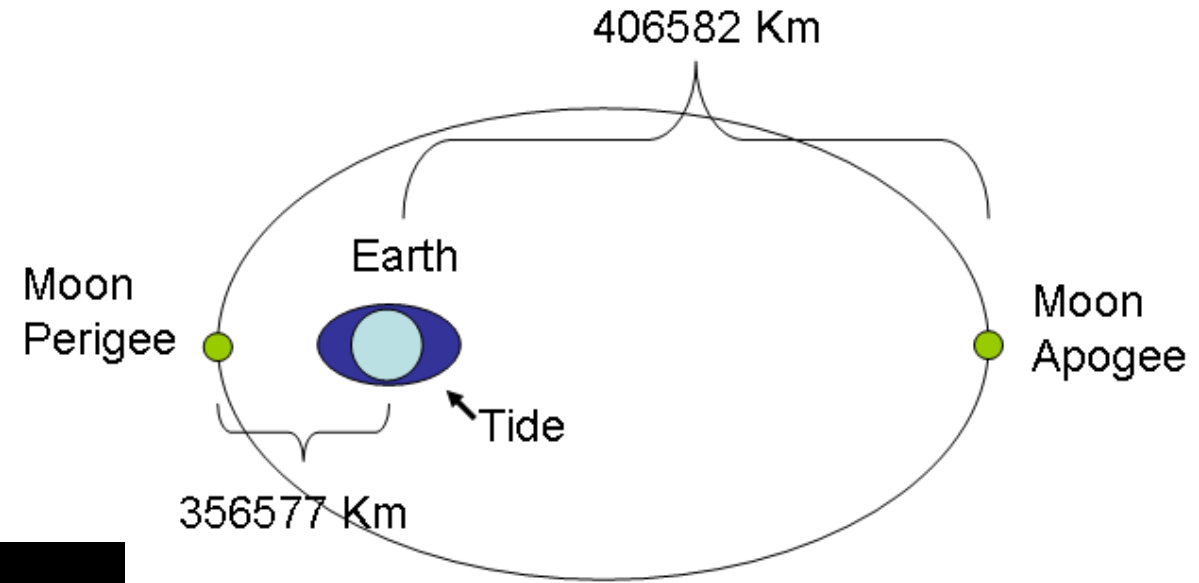
- Total duration: 5 hr, 11 min
- Full eclipse: 1 hr, 12 min

Eclipse occurs at New or Full Moon when the Moon crosses a Node



Supermoon--

A new or full moon closely coinciding with perigee – the Moon's closest point to Earth in its orbit.



2015 has six supermoons:

- New moons of January, February and March
- Full moons of August, September and October (Hunter Moon)



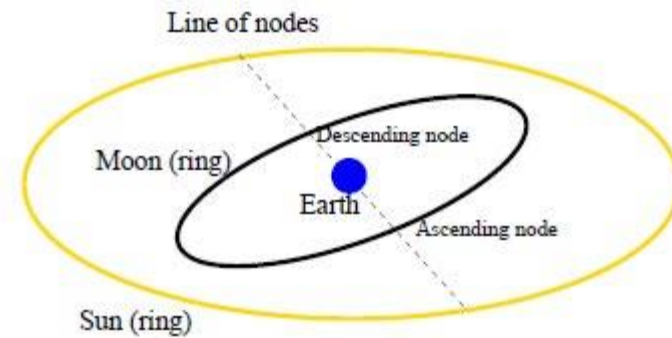
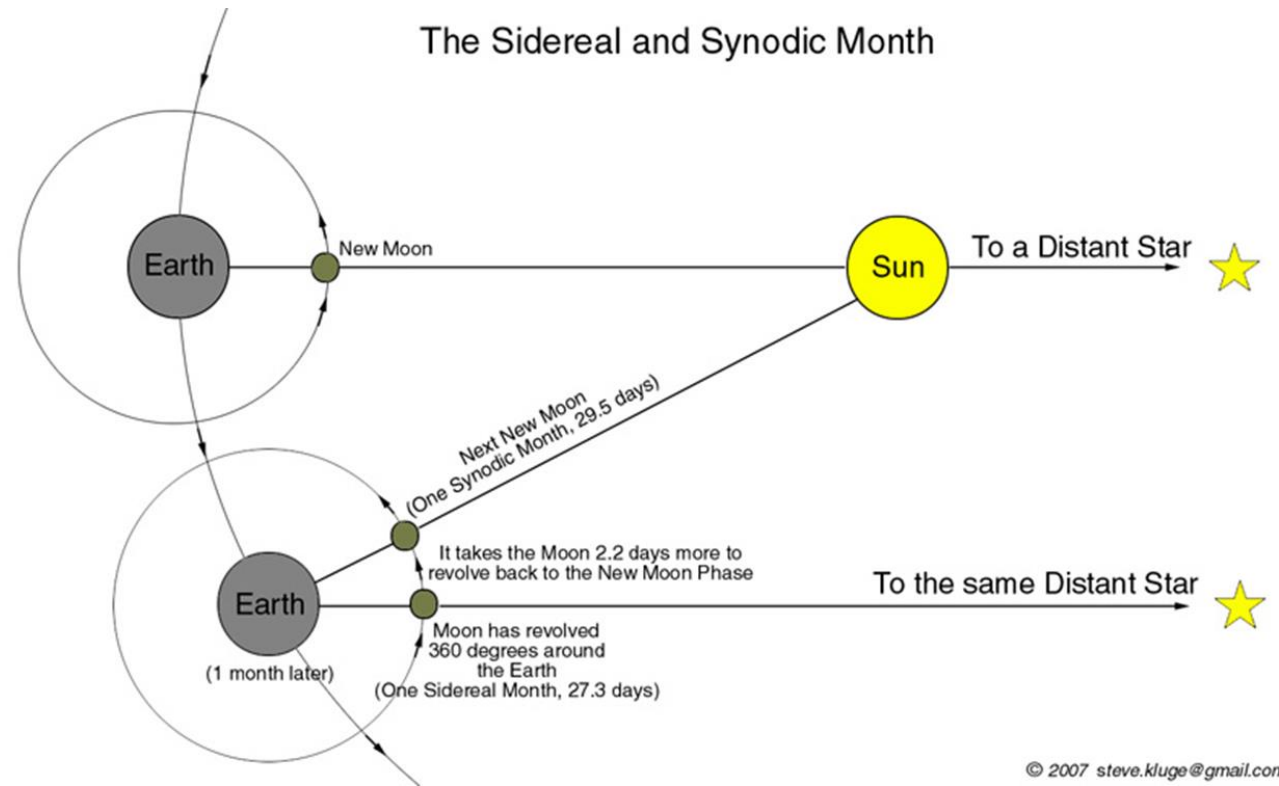
- Ancient cultures recognized the vagaries of the lunar and solar cycles as they attempted to reconcile early calendars.
- The Gregorian calendar strikes a balance between the solar mean and tropical year.
- The Muslim calendar uses strictly lunar periods, and thus falls 11 days short of a 365 day year.
- The Jewish and Chinese calendars incorporate a hybrid luni-solar system, so a 'leap month' is needed every few years.
- 6th century BCE -- Chaldeans noticed a pattern when lunar eclipses occurred which has been developed since as the **Saros Cycle**.
 - About every 18 years the Sun, Earth and Moon are in a similar alignment and will produce an eclipse very similar to its predecessor -- except 120 degrees westward.
 - The eclipse seasons repeat with a period of 346.62 days



Antikythera Mechanism an ancient Greek clock/lunar calendar

Saros Calculation: based on 3 key lunar cycles which are crucial to predicting eclipses:

- 223 Synodic months - time it takes for the Moon to return to a like phase (29.5 days).
- 239 Anomalistic month - time it takes for the Moon to return to perigee (27.6 days).
- 242 sDraconic months - time it takes for the Moon to return to a similar intersecting node (ascending or descending) along the ecliptic (27.2 days). (Crucial)
- Meton (Athens, 500 BCE) -- 235 synodic periods very nearly equals 19 solar years to within a few hours. The phases of the Moon repeat every 19-year Metonic cycle.



Saros Cycle

A saros cycle is just eight hours shy of 18 years and 11 days, which in turn is equal to 223 synodic, 242 anomalistic or 239 draconic months.

- One Saros = 6585.32 days or 18 years, 11.33 days or 223 synodic months.
- This number arises because that is the number of whole months required for even multiple of all lunar cycles.

The name saros was first described by Edmond Halley in 1691, who took it from a translation of an 11th century Byzantine dictionary. The plural of saros is saroses.

This also means that solar and lunar eclipses one saros period apart share nearly the same geometry, shifted 120 degrees in longitude westward.

Figure 1 — Eclipses from Saros 136: 1901 to 2045

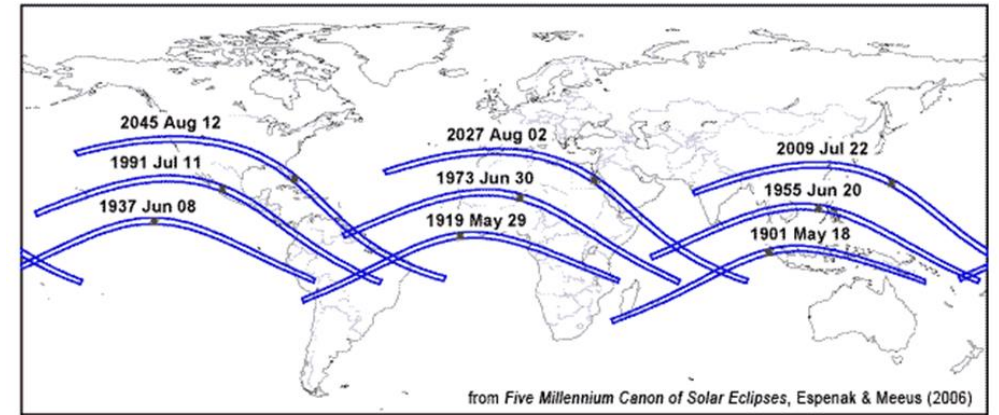
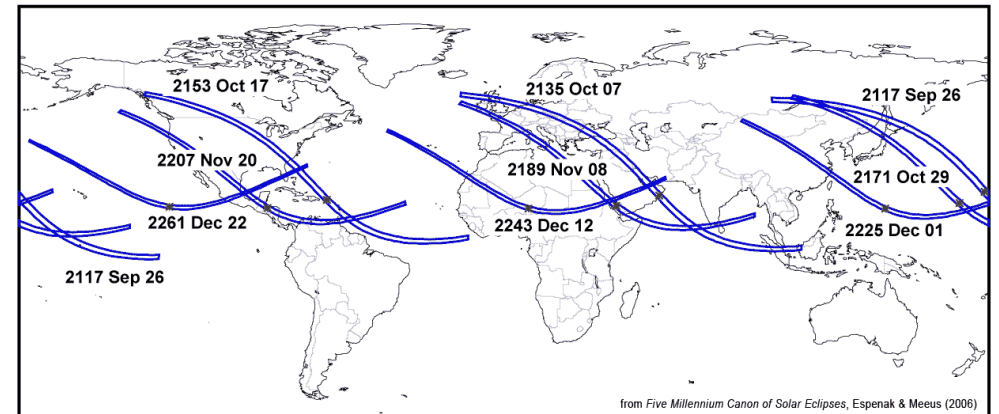
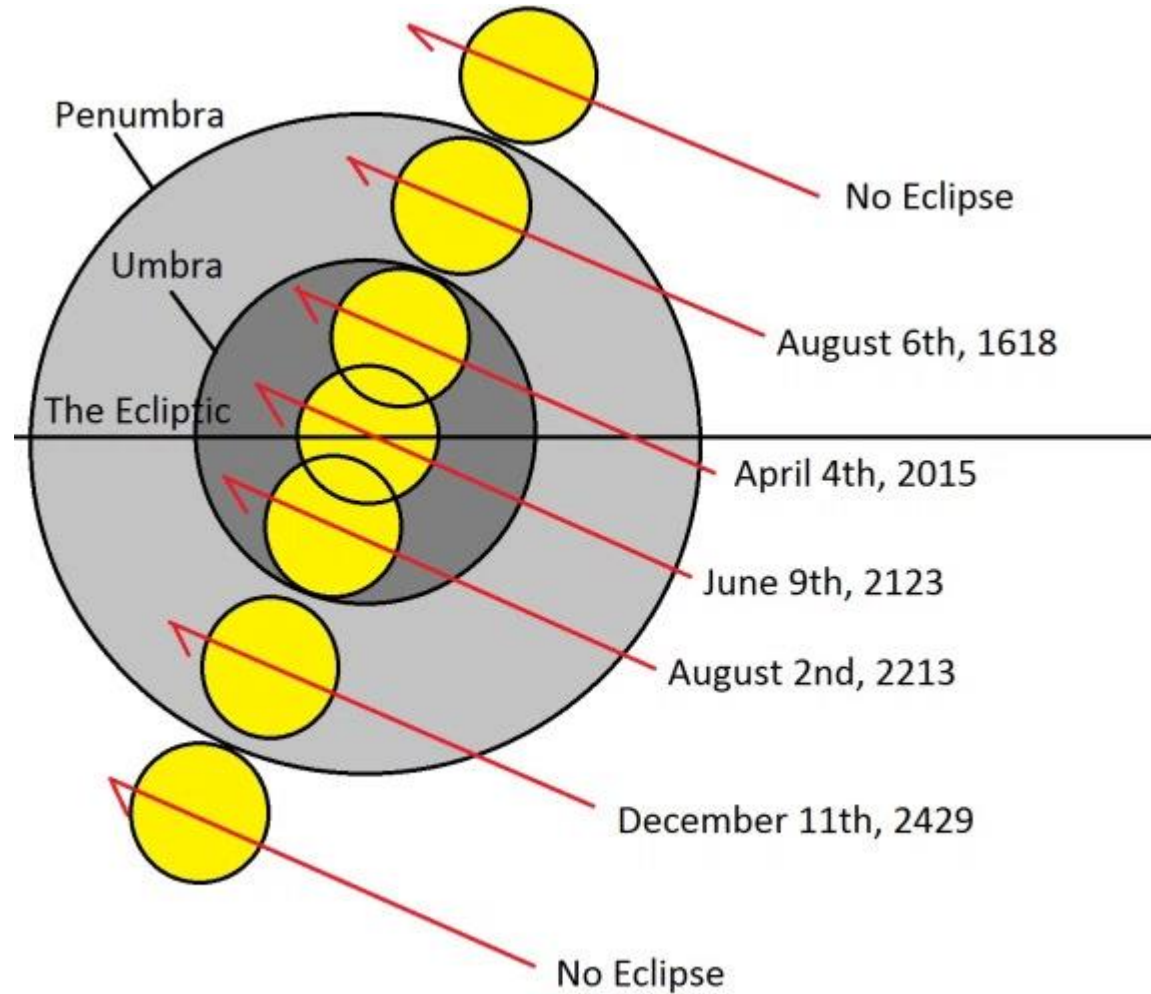


Figure 2 — Eclipses from Saros 136: 2117 to 2261



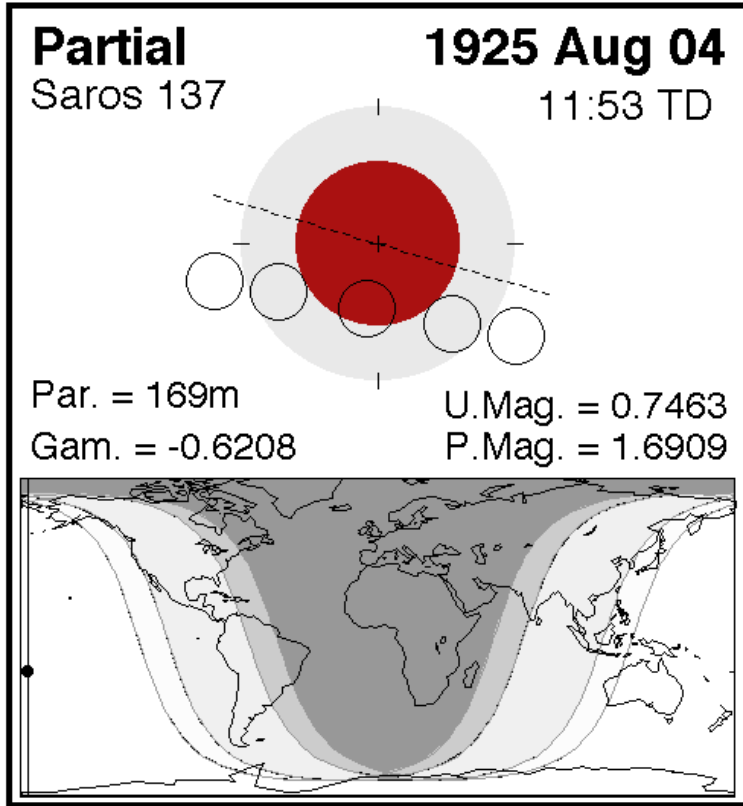


Saros Series 132

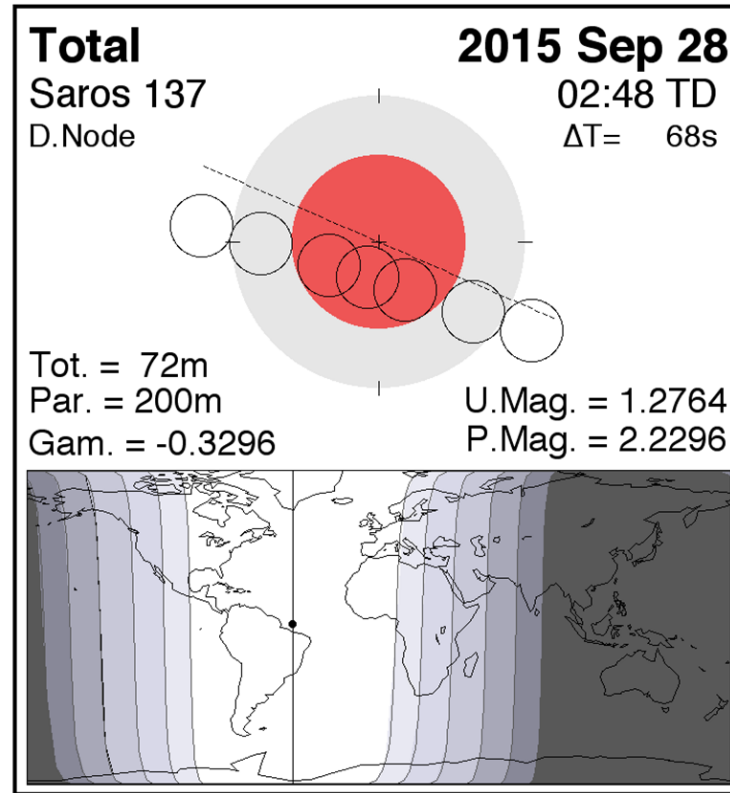
- Started with barely a penumbral eclipse on May 12, 1492.
- Apr 4, 2015 eclipse features the very first total lunar eclipse of the series, duration of totality was 4 minutes and 43 seconds, a far below the maximum duration of 107 minutes that can occur during a central eclipse.
- Saros series—12 to 13 centuries and over 70 eclipses

Sep 27 Eclipse – Saros Series 137

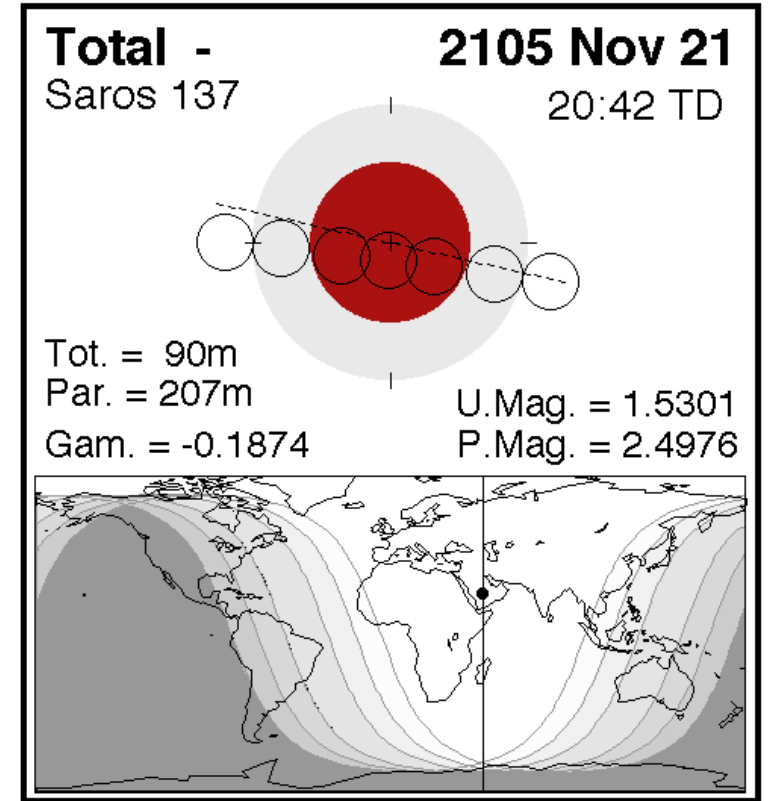
<http://eclipse.gsfc.nasa.gov/eclipse.html>



www.EclipseWise.com/eclipse.html



<http://eclipse.gsfc.nasa.gov/eclipse.html>



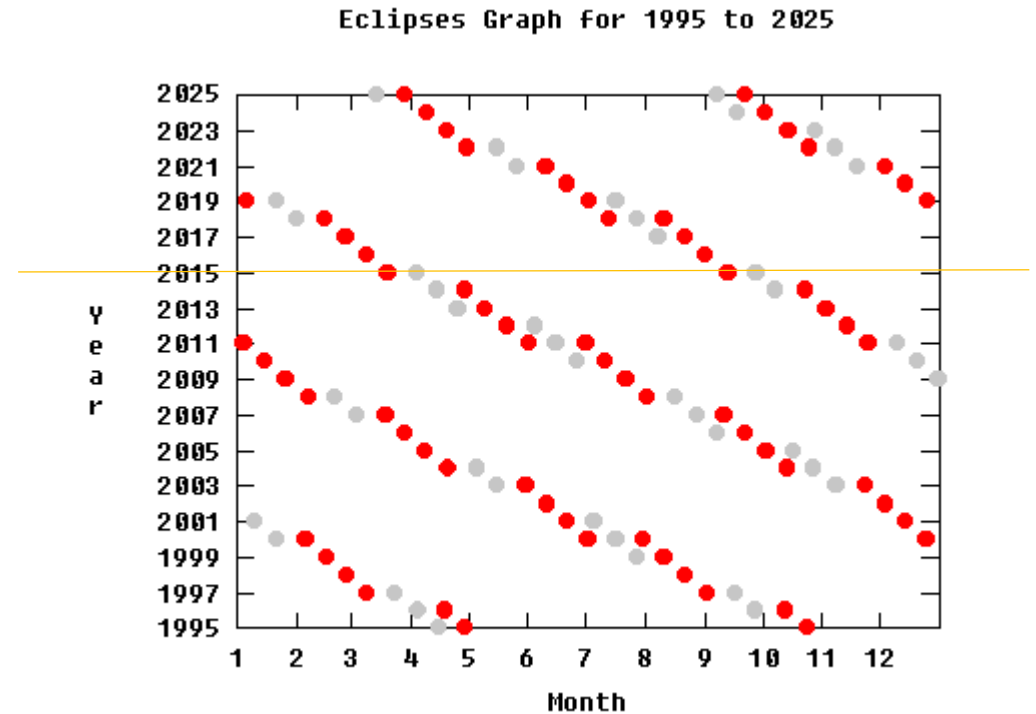
Five Millennium Canon of Lunar Eclipses (Espenak & Meeus)
 NASA TP-2009-214172

Thousand Year Canon of Lunar Eclipses
 ©2014 by Fred Espenak

Five Millennium Canon of Lunar Eclipses (Espenak & Meeus)
 NASA TP-2009-214172

Pattern of the Saros Series

- The **red** circles indicate solar eclipses while the **gray** circles are lunar eclipses.
- A complete eclipse cycle is 18 years 11 and 1/3 days. Thus, if an eclipse occurs today it will take another 18 years, 11 and 1/3 days before this particular node and Moon-Sun orientation reoccurs.
- Another eclipse occurs but 1/3 the way around the world (west of the previous eclipse of that cycle).



Catalog of Lunar Eclipses in Saros 137

Seq. Num.	Rel. Num.	Calendar Date	TD of Greatest Eclipse	ΔT s	Luna Num	Ecl. Type	QSE	Gamma	Pen. Mag.	Um. Mag.	Phase Durations		
											Pen. m	Par. m	Total m
01	-43	1564 Dec 17	21:16:37	139	-5381	N	a-	-1.5587	0.0066	-1.0109	23.0	-	-
02	-42	1583 Jan 08	05:55:04	127	-5158	N	a-	-1.5513	0.0186	-0.9958	38.4	-	-
03	-41	1601 Jan 18	14:32:25	117	-4935	N	a-	-1.5425	0.0329	-0.9777	50.9	-	-
04	-40	1619 Jan 29	23:07:09	95	-4712	N	a-	-1.5311	0.0518	-0.9547	63.5	-	-
05	-39	1637 Feb 09	07:38:45	68	-4489	N	a-	-1.5164	0.0763	-0.9256	76.7	-	-
06	-38	1655 Feb 20	16:03:56	42	-4266	N	a-	-1.4962	0.1109	-0.8860	91.8	-	-
07	-37	1673 Mar 03	00:24:02	20	-4043	N	a-	-1.4715	0.1536	-0.8381	107.2	-	-
08	-36	1691 Mar 14	08:36:44	9	-3820	N	a-	-1.4403	0.2083	-0.7780	123.8	-	-
09	-35	1709 Mar 25	16:43:34	9	-3597	N	a-	-1.4038	0.2725	-0.7084	140.3	-	-
10	-34	1727 Apr 06	00:41:54	10	-3374	N	a-	-1.3596	0.3508	-0.6247	157.4	-	-
11	-33	1745 Apr 16	08:34:55	12	-3151	N	a-	-1.3106	0.4382	-0.5321	173.9	-	-
12	-32	1763 Apr 27	16:20:38	15	-2928	N	a-	-1.2552	0.5374	-0.4281	190.1	-	-
13	-31	1781 May 08	00:01:08	17	-2705	N	a-	-1.1949	0.6457	-0.3152	205.6	-	-
14	-30	1799 May 19	07:36:00	14	-2482	N	a-	-1.1294	0.7639	-0.1930	220.3	-	-
15	-29	1817 May 30	15:07:30	12	-2259	N	a-	-1.0607	0.8880	-0.0652	233.9	-	-
16	-28	1835 Jun 10	22:35:53	6	-2036	P	a-	-0.9888	1.0184	0.0681	246.4	56.8	-
17	-27	1853 Jun 21	06:01:48	7	-1813	P	a-	-0.9146	1.1535	0.2056	257.8	96.7	-
18	-26	1871 Jul 02	13:27:48	-1	-1590	P	a-	-0.8401	1.2893	0.3432	267.9	122.4	-
19	-25	1889 Jul 12	20:53:52	-6	-1367	P	a-	-0.7654	1.4257	0.4807	276.8	141.7	-
20	-24	1907 Jul 25	04:22:27	7	-1144	P	a-	-0.6924	1.5595	0.6149	284.5	156.8	-
21	-23	1925 Aug 04	11:52:57	24	-921	P	a-	-0.6208	1.6909	0.7463	291.2	168.9	-
22	-22	1943 Aug 15	19:28:46	26	-698	P	a-	-0.5533	1.8152	0.8697	296.7	178.4	-
23	-21	1961 Aug 26	03:08:51	34	-475	P	a-	-0.4894	1.9330	0.9863	301.4	186.0	-
24	-20	1979 Sep 06	10:55:02	50	-252	T	a-	-0.4305	2.0421	1.0936	305.1	191.9	44.4
25	-19	1997 Sep 16	18:47:42	63	-29	T	p-	-0.3768	2.1417	1.1909	308.2	196.4	61.5
26	-18	2015 Sep 28	02:48:17	69	194	T	p-	-0.3296	2.2296	1.2764	310.7	199.9	71.9
27	-17	2033 Oct 08	10:56:23	80	417	T	p-	-0.2889	2.3057	1.3497	312.6	202.4	78.8
28	-16	2051 Oct 19	19:11:50	97	640	T	p-	-0.2542	2.3708	1.4118	314.2	204.3	83.6
29	-15	2069 Oct 30	03:35:06	134	863	T	p-	-0.2263	2.4235	1.4616	315.4	205.6	86.8
30	-14	2087 Nov 10	12:05:33	174	1086	T	p-	-0.2043	2.4654	1.5006	316.4	206.6	88.9
31	-13	2105 Nov 21	20:42:00	216	1309	T	p-	-0.1874	2.4976	1.5301	317.3	207.3	90.4
32	-12	2123 Dec 03	05:24:09	261	1532	T	p-	-0.1755	2.5208	1.5507	318.0	207.7	91.4
33	-11	2141 Dec 13	14:10:16	307	1755	T	p-	-0.1671	2.5374	1.5652	318.7	208.1	92.0
34	-10	2159 Dec 24	23:00:09	349	1978	T	p-	-0.1619	2.5478	1.5737	319.2	208.4	92.4
35	-09	2178 Jan 04	07:50:14	390	2201	T	p-	-0.1570	2.5574	1.5820	319.8	208.8	92.8
36	-08	2196 Jan 15	16:41:55	432	2424	T	p-	-0.1537	2.5641	1.5877	320.3	209.1	93.1
37	-07	2214 Jan 27	01:30:46	476	2647	T	p-	-0.1480	2.5748	1.5979	320.9	209.5	93.6
38	-06	2232 Feb 07	10:17:44	522	2870	T	p-	-0.1410	2.5876	1.6106	321.5	210.0	94.1
39	-05	2250 Feb 17	18:58:32	571	3093	T	p-	-0.1291	2.6094	1.6326	322.2	210.7	95.0
40	-04	2268 Feb 29	03:35:27	621	3316	T	p-	-0.1142	2.6365	1.6602	322.9	211.4	96.0

Catalog of Lunar Eclipses in Saros 137

Seq. Num.	Rel. Num.	Calendar Date	TD of Greatest Eclipse	ΔT s	Luna Num	Ecl. Type	QSE	Gamma	Pen. Mag.	Um. Mag.	Phase Durations		
											Pen. m	Par. m	Total m
41	-03	2286 Mar 11	12:04:37	674	3539	T-	pp	-0.0929	2.6753	1.6996	323.7	212.3	97.2
42	-02	2304 Mar 22	20:26:42	729	3762	T-	pp	-0.0661	2.7240	1.7491	324.6	213.1	98.4
43	-01	2322 Apr 03	04:39:45	785	3985	T-	pp	-0.0323	2.7857	1.8116	325.4	213.9	99.4
44	00	2340 Apr 13	12:45:17	844	4208	T+	pp	0.0074	2.8310	1.8576	326.1	214.5	99.9
45	01	2358 Apr 24	20:41:46	905	4431	T+	pp	0.0542	2.7449	1.7720	326.7	214.8	99.5
46	02	2376 May 05	04:29:55	968	4654	T+	-p	0.1074	2.6471	1.6744	326.9	214.4	97.8
47	03	2394 May 16	12:10:00	1033	4877	T+	-p	0.1667	2.5384	1.5656	326.6	213.3	94.3
48	04	2412 May 26	19:43:25	1100	5100	T+	-p	0.2306	2.4214	1.4479	325.8	211.1	88.2
49	05	2430 Jun 07	03:09:30	1169	5323	T	-p	0.3000	2.2946	1.3201	324.3	207.7	78.4
50	06	2448 Jun 17	10:30:31	1241	5546	T	-a	0.3730	2.1615	1.1854	322.0	202.8	62.6
51	07	2466 Jun 28	17:46:38	1314	5769	T	-a	0.4490	2.0231	1.0448	318.7	196.2	32.2
52	08	2484 Jul 09	01:00:42	1389	5992	P	-a	0.5260	1.8831	0.9021	314.5	187.6	-
53	09	2502 Jul 21	08:11:07	1467	6215	P	-a	0.6051	1.7398	0.7554	309.2	176.6	-
54	10	2520 Jul 31	15:22:37	1546	6438	P	-a	0.6822	1.6002	0.6120	303.0	163.3	-
55	11	2538 Aug 11	22:33:32	1628	6661	P	-a	0.7588	1.4620	0.4693	295.7	146.7	-
56	12	2556 Aug 22	05:48:05	1712	6884	P	-a	0.8315	1.3309	0.3334	287.8	126.6	-
57	13	2574 Sep 02	13:03:42	1798	7107	P	-a	0.9023	1.2037	0.2008	278.9	100.5	-
58	14	2592 Sep 12	20:25:19	1885	7330	P	-a	0.9671	1.0876	0.0791	269.7	64.3	-
59	15	2610 Sep 25	03:50:47	1975	7553	N	-a	1.0277	0.9796	-0.0350	260.2	-	-
60	16	2628 Oct 05	11:22:30	2067	7776	N	-a	1.0821	0.8828	-0.1379	250.7	-	-
61	17	2646 Oct 16	19:00:12	2161	7999	N	-a	1.1308	0.7967	-0.2304	241.4	-	-
62	18	2664 Oct 27	02:45:20	2257	8222	N	-a	1.1726	0.7231	-0.3102	232.7	-	-
63	19	2682 Nov 07	10:37:27	2356	8445	N	-a	1.2077	0.6619	-0.3776	225.0	-	-
64	20	2700 Nov 18	18:35:06	2456	8668	N	-a	1.2375	0.6101	-0.4352	218.0	-	-
65	21	2718 Nov 30	02:39:40	2558	8891	N	-a	1.2608	0.5701	-0.4808	212.5	-	-
66	22	2736 Dec 10	10:49:08	2663	9114	N	-a	1.2799	0.5376	-0.5183	207.8	-	-
67	23	2754 Dec 21	19:03:15	2769	9337	N	-a	1.2944	0.5134	-0.5472	204.3	-	-
68	24	2773 Jan 01	03:19:29	2878	9560	N	-a	1.3067	0.4928	-0.5717	201.3	-	-
69	25	2791 Jan 12	11:38:09	2988	9783	N	-a	1.3165	0.4765	-0.5914	198.9	-	-
70	26	2809 Jan 22	19:56:13	3101	10006	N	-h	1.3263	0.4598	-0.6107	196.3	-	-
71	27	2827 Feb 03	04:12:29	3216	10229	N	-h	1.3371	0.4410	-0.6314	193.2	-	-
72	28	2845 Feb 13	12:25:13	3333	10452	N	-h	1.3502	0.4177	-0.6561	188.9	-	-
73	29	2863 Feb 24	20:33:14	3451	10675	N	-h	1.3665	0.3882	-0.6864	183.1	-	-
74	30	2881 Mar 07	04:34:07	3572	10898	N	-t	1.3878	0.3491	-0.7256	174.7	-	-
75	31	2899 Mar 18	12:27:24	3695	11121	N	-t	1.4146	0.2998	-0.7748	163.0	-	-
76	32	2917 Mar 29	20:11:52	3821	11344	N	-t	1.4477	0.2389	-0.8350	146.6	-	-
77	33	2935 Apr 10	03:47:50	3948	11567	N	-t	1.4869	0.1665	-0.9066	123.4	-	-
78	34	2953 Apr 20	11:12:26	4077	11790	N	-t	1.5341	0.0792	-0.9928	86.0	-	-

Quiz:

On Aug 21, 2017 a total solar eclipse will occur in the US, from the west to the Carolinas. This is a remarkable eclipse because the previous eclipse in the same cycle (Saros) also passed through a very populated area. Which eclipse is in the same cycle as the August 21, 2017 eclipse?

Solution:

The Saros is 18 years, 11.33 days. This means that the previous eclipse was in 2017 - 18 = 1999. It occurred 11.33 days earlier which puts the date as Aug 11, 1999. The eclipse occurs 1/3 of a day earlier or 1/3 of the way around the world in an easterly direction. The previous eclipse in the same Saros is the famous Aug 11, 1999 eclipse that passed through central Europe and was seen by millions

Appendix: Antikythera Mechanism

- On the front face: fixed ring dial representing the [ecliptic](#), the twelve [zodiacal](#) signs marked off with equal 30 degree sectors.
- Outside of that dial is another ring which is rotatable, marked off with the months and days of the Sothic [Egyptian calendar](#), twelve months of 30 days plus five [intercalary days](#).
- The first task is to rotate the Egyptian calendar ring to match the current zodiac points. The Egyptian calendar ignored leap days, so it advanced through a full zodiac sign in about 120 years.
- The mechanism was operated by turning a small hand crank which moved the date pointer on the front dial, which would be set to the correct Egyptian calendar day. The year is not selectable, so it is necessary to know the year currently set, or by looking up the cycles in the Babylonian [ephemeris](#) tables for the day of the year currently set, since most of the calendar cycles are not synchronous with the year.



- The crank moves the date pointer about 78 days per full rotation, so hitting a particular day on the dial would be easily possible if the mechanism was in good working condition. The action of turning the hand crank would also cause all interlocked gears within the mechanism to rotate, resulting in the simultaneous calculation of the position of the Sun and Moon, the moon phase, eclipse, and calendar cycles, and perhaps the locations of planets.
- The operator also had to be aware of the position of the spiral dial pointers on the two large dials on the back. The pointer had a "follower" that tracked the spiral incisions in the metal as the dials incorporated four and five full rotations of the pointers. When a pointer reached the terminal month location at either end of the spiral, the pointer's follower had to be manually moved to the other end of the spiral before proceeding further.

