



## Get ready for an early morning Lunar Eclipse

By Bob Moler



Three views of the total lunar eclipse of March 3, 2026. From left to right: Just after the beginning of the partial phase, when the Moon begins to enter the Earth's umbra. Center is a few minutes before totality, when the Moon is almost completely immersed into the Earth's umbra. On the right, the Moon at mid eclipse, with the brightening twilight sky. This is Stellarium's rendition. I'm willing to bet that the Moon will actually be invisible at this point.

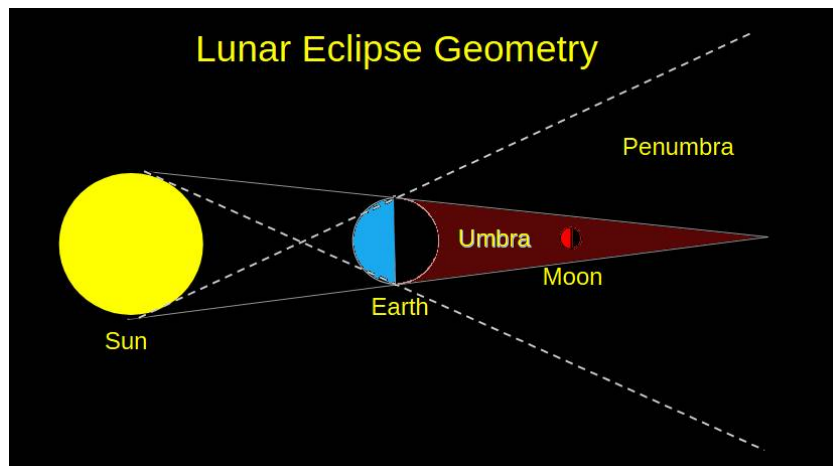
The first of three eclipses of the year, which will be visible from Northern Michigan, will occur in the morning hours before sunrise on Tuesday March 3<sup>rd</sup>. This is a total lunar eclipse. An eclipse, to get up early for, rather than stay up late for. We will not see it in its entirety, since the

to display phases to begin with, but that was his explanation of a lunar eclipse.

There's a cool word that describes when three bodies like solar system bodies line up. It's "syzygy", a high scoring Scrabble word. Ptolemy uses it all the time in his Almagest, which I

researched for a program, I gave a couple of months ago. In the lunar eclipse example the Earth is in the middle, providing the shadow for the Moon to pass through to create a lunar eclipse.

Because the sun is not a point source shadows cast by objects illuminated by it are fuzzy. The fuzzy part of the shadow is

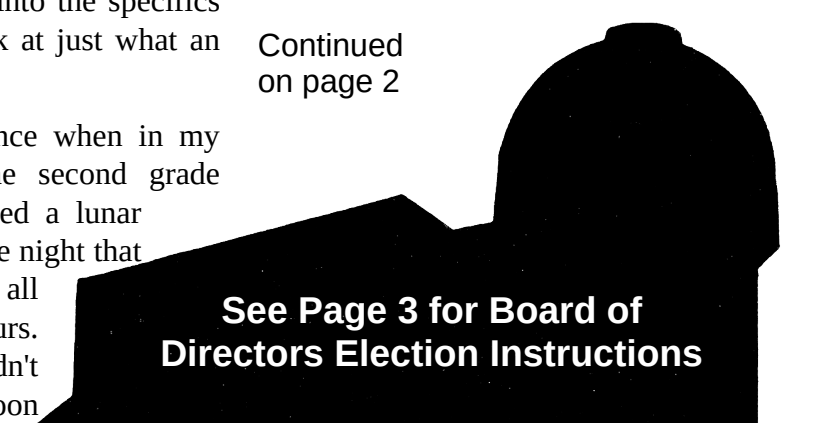


dim totally eclipsed Moon will probably succumb to the increasing morning twilight. Before getting into the specifics of this eclipse, let's look at just what an eclipse is.

I remember an instance when in my early years. Like in the second grade maybe, my dad explained a lunar eclipse to me as being the night that the moon went through all its phases in a few hours. I'm pretty sure he didn't know what causes the moon

Continued on page 2

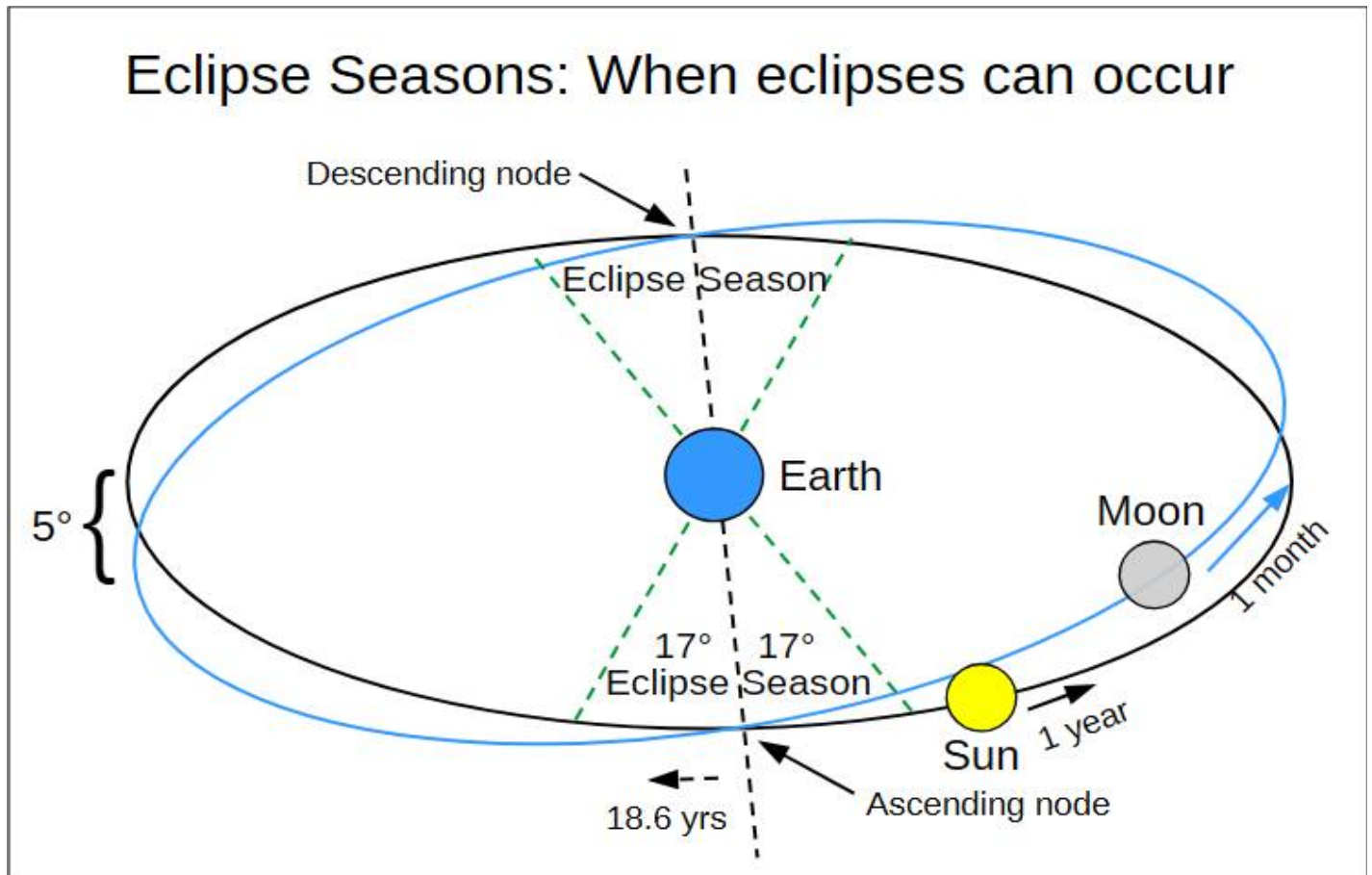
See Page 3 for Board of Directors Election Instructions



## Lunar Eclipse (Continued from page 1).

called the penumbra, where the sun is only partially blocked. It gets increasingly deep as the closer it gets to the inner part of the shadow where the Sun is completely blocked, called the umbra. In some lunar

There is a pattern to when eclipses occur, other than that solar eclipses occur at new moon and lunar eclipses occur at full moon. There are two times of the year when eclipses occur. These are within an



eclipses the moon only penetrates the penumbra. These penumbral eclipses are generally unnoticed unless the moon approaches near the umbra, in which case the part of the moon closest to the umbra will be noticeably dimmer than the rest of the moon. In the total or partial lunar eclipse the penumbral darkening is generally noticeable about a half hour before the partial phase begins, and lingers for a similar period after the final partial phase ends.

approximate 35 day period, called an eclipse season, about six months apart. Currently these would be in February and March for the first one and in August for the second one. The moon's orbit is inclined to the earth's own orbit of the sun by 5°, so in only one in six full moons will there ever be a lunar eclipse, because most of the time the moon passes north or south of the earth's shadow. The same logic is true for solar

Continued on page 4

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### Grand Traverse Astronomical Society - Est. June 1982 – 43 years of service

-----Officers-----		-----Directors-----	-----Patrons-----
President	Jerry Dobek	Charles Bell	Charles Bell, Robert Carroll & Terri Mills, Daniel Dall'Olmo, Jessica DeWitt, Don and Kathy Flegel, Bill Hathaway, Richard Kuschell, Mark Leugers, Judy Moler, Ronald & Jan Uthe
Vice President	Kim Dobek	Don Flegel	
Secretary	Joe Brooks	Bill Hathaway	
Treasurer	Gary Carlisle		
Editor	Bob Moler, transitioning to Mary Gribbin		

## Upcoming Society Events

Events not held at the Joseph H. Rogers Observatory depend on the weather.

**Friday, March 6 – Monthly meeting and star party** at NMC Rogers Observatory. Also available via **Zoom**. See our website <http://www.gtastro.org> for instructions and a link to click.

7 PM – Board of Directors Meeting

8 PM – General Meeting: Jerry Dobek presents his new book collaboration: *The Barnard Album*.

9 PM – Star Party, if it is clear.

### Zoom Meeting Link:

<https://us02web.zoom.us/j/8388913229?omn=88435646093>

## Board of Directors Election

Members of the Grand Traverse Astronomical Society in good standing will find enclosed in the mailed Stellar Sentinel one or two postcards with which to cast their vote for Board of Directors. This year's election is for five (5) board members. All of the terms will be for two years.

The Grand Traverse Astronomical Society is governed by a nine member Board of Directors. The normal term of a board member is two years beginning in May. At the May Board of Directors meeting officers are elected for a term of one year.

Officers are: President, Vice President, Secretary, Treasurer, and Newsletter Editor. The President and Newsletter Editor must have had prior service on the board to be elected. The Vice President is also the Program Chairman. Of the nine board members five are officers. Should a vacancy occur on the board the President shall appoint a board member to serve until the next election.

All members in good standing, other than honorary and patron only members, are eligible to serve on the board. In case of family memberships, two members of the family, if names are provided to the society, are eligible. Family members also receive two ballots.

Postcards with a list of the names of eligible members will be enclosed in an envelope mailed to each member. The list contains all such members, other than board members whose terms do not expire

this year, and those ineligible. Board members, whose terms expire next year and do not have to run this year are Charles Bell, Kim Dobek, Don Flegel, and Bill Hathaway. A current list of Board members and officers is posted on the bottom of page 2. The members eligible to be elected to the board are members in good standing as of February 2026, whose addresses are within 50 miles of Traverse City or who have demonstrated that they can attend meetings regularly via Zoom, if they live farther away.

### Instructions for voting:

Members in good standing will receive a mailed envelope with postcard ballots. On the post card circle no more than five (5) names. Mail the card postmarked no later than March 31st to the, election chairman, Don Flegel, whose name and address is on the front of the card. Top vote recipients will be contacted in order of number of votes they received in early April for their acceptance. ★



**VOTE**

# Lunar Eclipse (Continued from page 2)

eclipses, where one in six new moons provides someone on the earth a solar eclipse of some kind. Here's the timeline to this eclipse:

## Total Lunar Eclipse March 3, 2026 Events for the Grand Traverse area

Time	Event
03:44 AM	Begin Penumbral phase. This is the theoretical start of the eclipse. Nothing will appear to happen until about half an hour before the partial phase starts. Then the upper left part of the Moon will appear to darken.
04:50 AM	Begin Partial phase. The umbra will encroach onto the Moon from upper left to lower right. The dull red of the umbral shadow may be discerned near the beginning of totality.
05:40 AM	Astronomical Twilight begins. The Sun is 18° below the horizon.
06:04 AM	Begin Totality. The expected dull red of the Moon will be brighter on the edge nearest the edge of the umbral shadow. How long will the totally eclipsed Moon be visible?
06:14 AM	Nautical Twilight begins. The Sun is 12° below the horizon.
06:34 AM	Mid Eclipse
07:03 AM	End Totality. Will a tiny slice of the Moon become visible in brightening sky before it sets?
07:18 AM	Sunrise
07:19 AM	Moonset

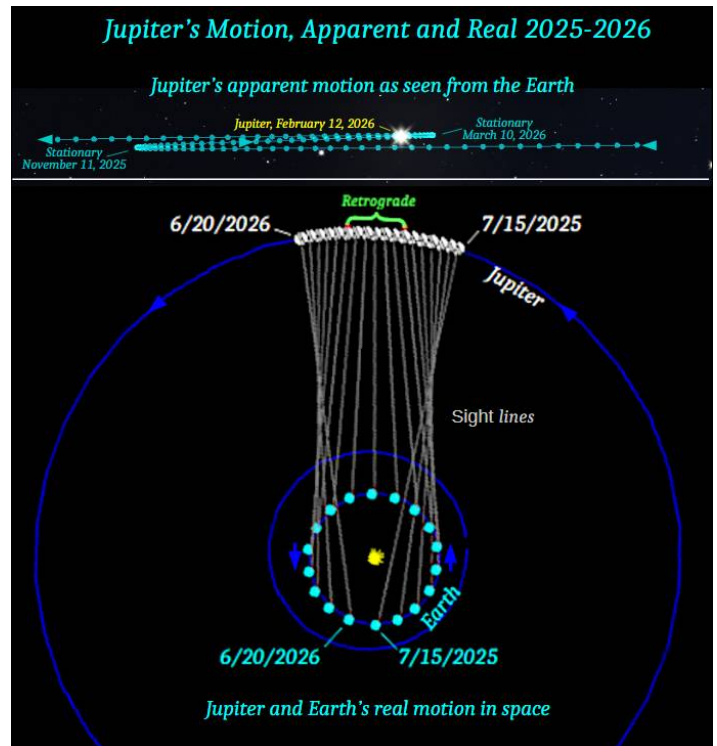
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## Tidbits from Bob Moler's Ephemeris

### The real cause of a planet's retrograde motion (From February 13, 2026)

What is the real reason that Jupiter is currently moving westward for a while in retrograde motion? Retrograde motion occurs in outer planets because the

Earth is actually passing them. A simple analogy would be, if you were in a car that was passing another, the car you are passing would seem to move backwards compared to you. And that is exactly what's happening. The Earth moves faster than the outer planets. Since the solar system is like a racetrack, and we get to lap these outer planets repeatedly when they are closest to us. For the inner planet it's opposite. They go retrograde or backwards when they are passing us. This is a much simpler answer than all these circles upon circles the ancients invented.



A diagram showing the Earth and Jupiter and above, the appearance of Jupiter in our sky and the retrograde motion as the Earth in essence passes Jupiter in our orbital motions around the Sun. When the sight lines from earth to Jupiter are trending counterclockwise, moving to the left, the planet appears to be moving eastward in its normal motion. As we pass Jupiter, at our closest point to it, the sight lines tend to rotate in the clockwise direction, which causes the appearance of retrograde motion of Jupiter in our sky. The plotting intervals on the top diagram is 10 days, 20 days on the bottom one. The diagram on the bottom was created using my LookingUp app, the upper diagram was created using Stellarium. Annotations added in LibreOffice Draw, all put together with GIMP.

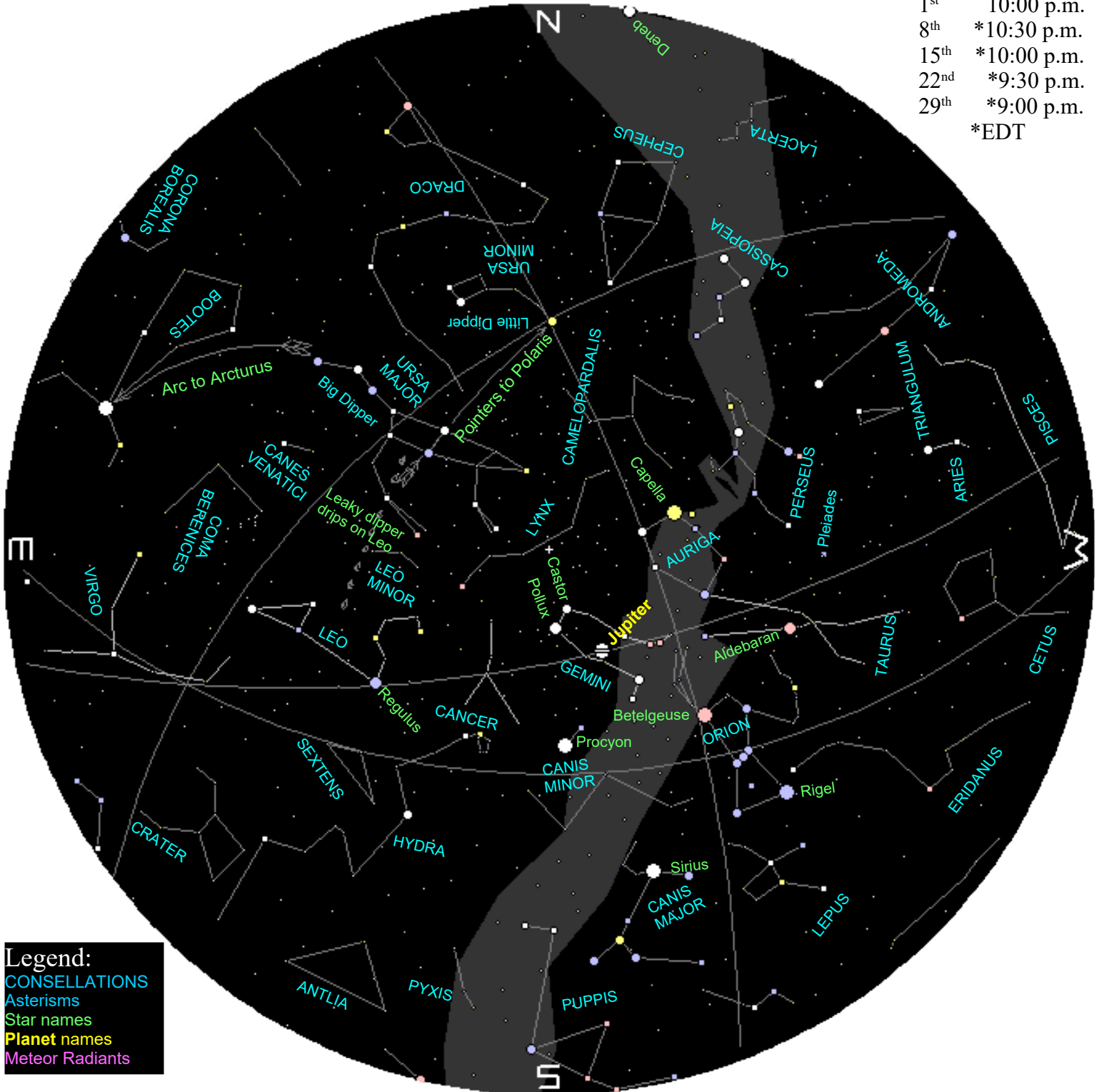
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# The Stars and Planets for March 2026

By Bob Moler

Planets are plotted for mid month. The star positions are correct for:

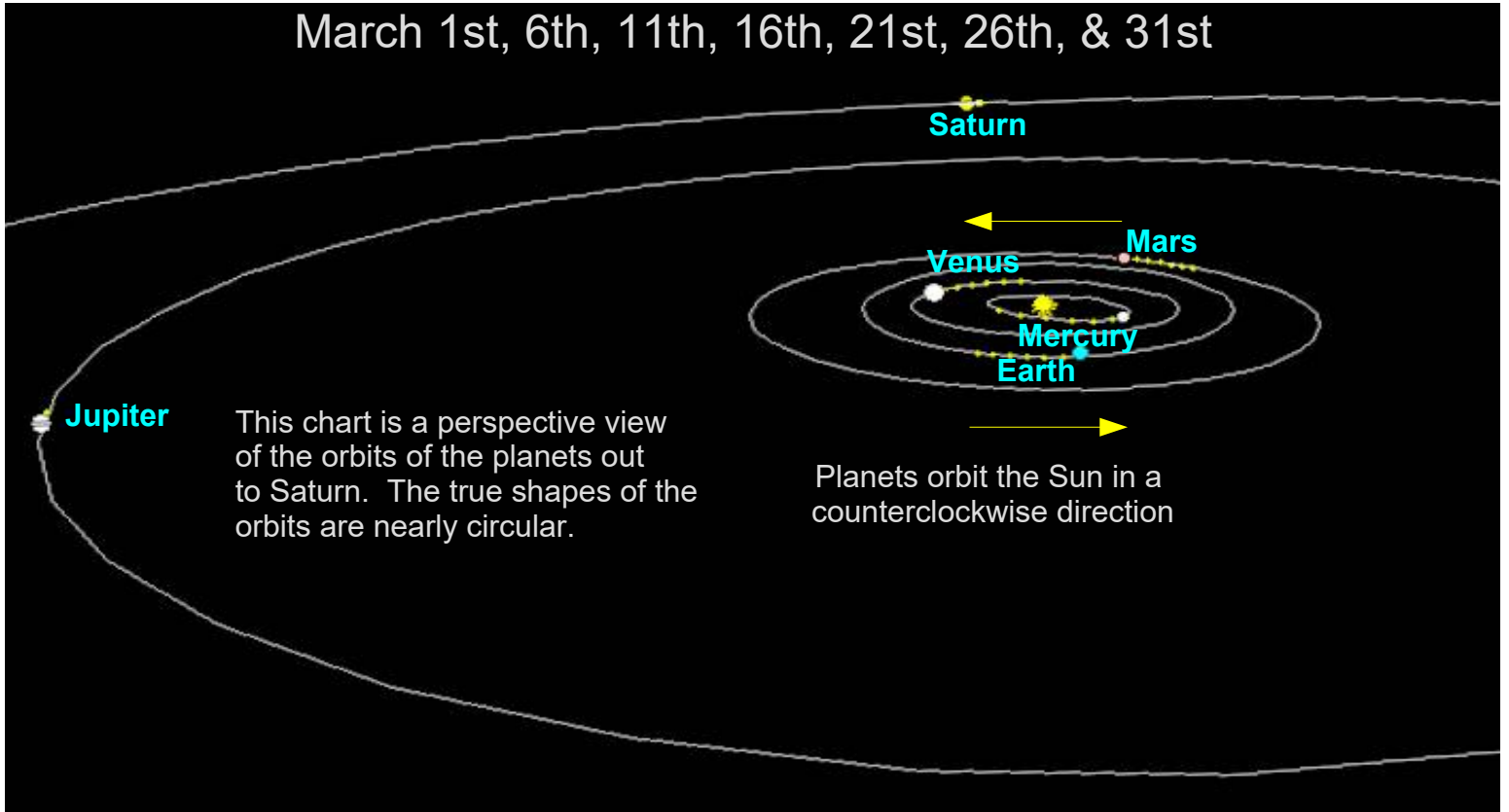
1 <sup>st</sup>	10:00 p.m.
8 <sup>th</sup>	*10:30 p.m.
15 <sup>th</sup>	*10:00 p.m.
22 <sup>nd</sup>	*9:30 p.m.
29 <sup>th</sup>	*9:00 p.m.
	*EDT



Orion the hunter the central constellation of the winter skies is moving to the southwest in our evening sky now, as the spring stars rise higher in the east. Jupiter is visible at chart time. Earlier in the evening Saturn and Venus can be seen. At chart time the last of the autumn stars are setting in the west. Daylight Saving Time starts on the 8<sup>th</sup> this year, and spring starts on the 20<sup>th</sup>. Enjoy the winter stars while you can this month because they will disappear rapidly as the sunset times increase by about a minute and a half a day, even ignoring the daylight time jump. Stars set 4 minutes earlier each night, so adding those together the stars will lose 5 ½ minutes to the Sun each night.

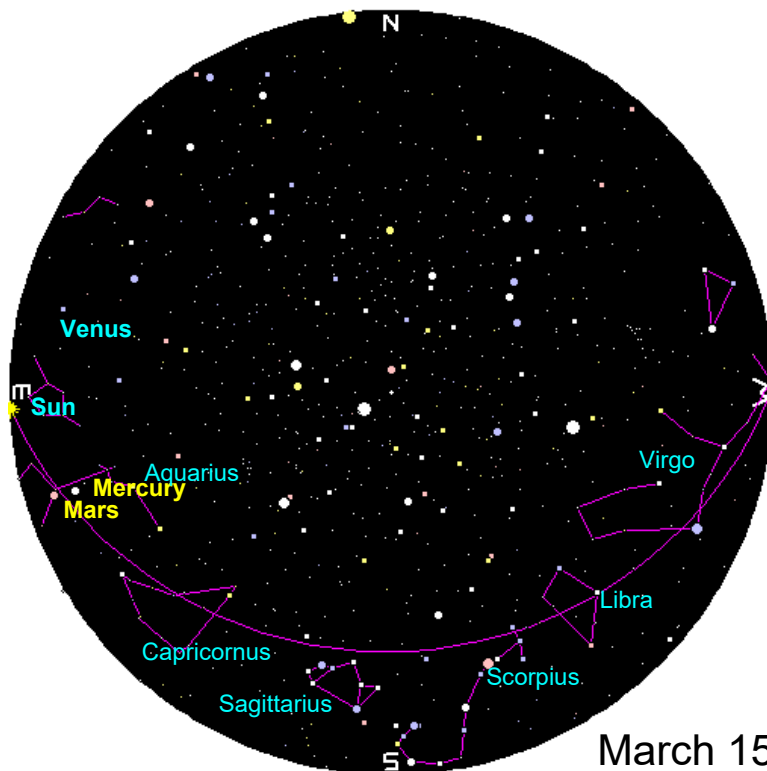
# The Naked Eye Planets

March 1st, 6th, 11th, 16th, 21st, 26th, & 31st

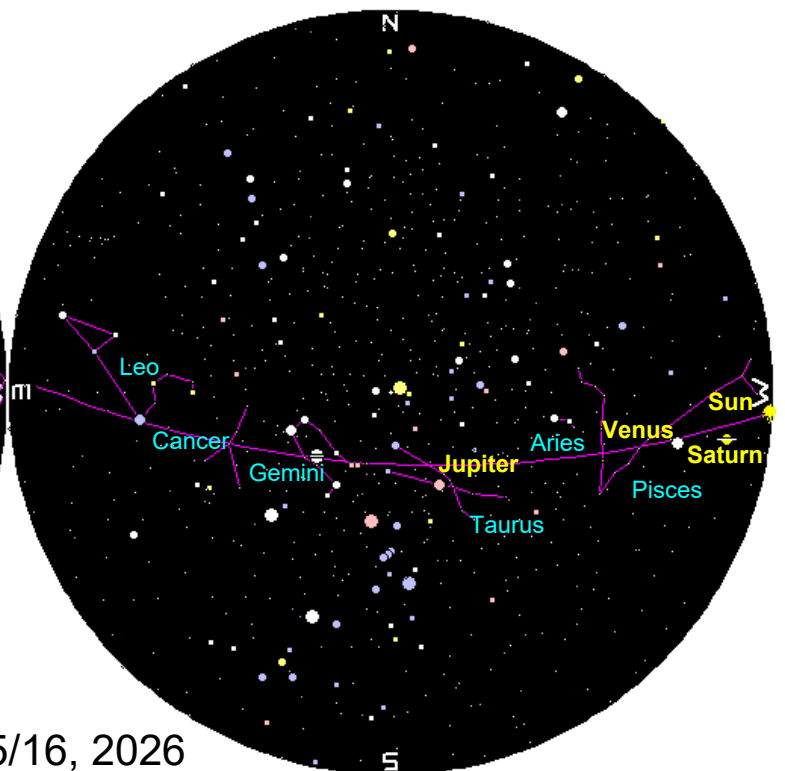


## The Planets as Seen From Northern Michigan

Sunrise



Sunset



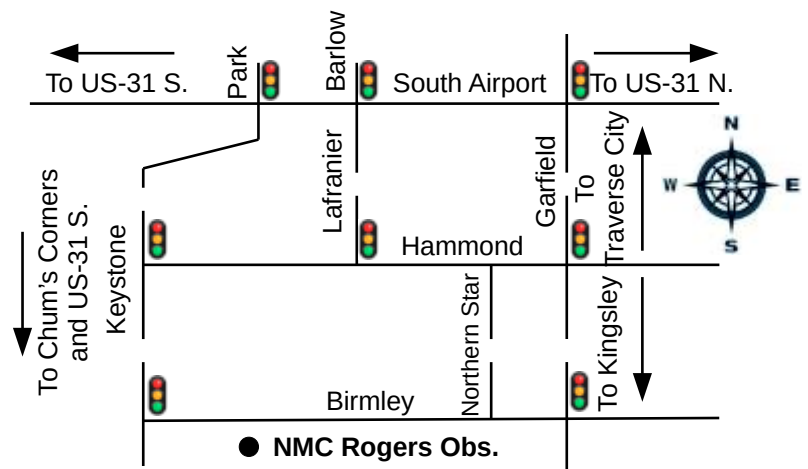
March 15/16, 2026

# CELESTIAL CALENDAR

	Date	Time	Event
Mar	1 Su		Venus: 13° E
	2 Mo	7:00 AM	Moon-Regulus: 0.4° S
	2 Mo	11:35 PM	Moon Descending Node
	<b>3 Tu</b>	<b>6:35 AM</b>	<b>Total Lunar Eclipse</b>
	3 Tu	6:38 AM	Full Moon
	6 Fr	12:24 PM	Moon-Spica: 2° N
	7 Sa	6:01 AM	Mercury Inferior Conj.
	10 Tu	7:32 AM	Moon-Antares: 0.8° N
	10 Tu	9:43 AM	Moon Apogee: 404400 km
	11 We	5:39 AM	Last Quarter
	11 We	5:12 PM	Moon South Dec.: 28.4° S
	15 Su	3:13 PM	Mercury-Mars: 3.4° N
	17 Tu	11:22 AM	Moon Ascending Node
	18 We	9:23 PM	New Moon
	20 Fr	8:39 AM	Moon-Venus: 4.7° S
	<b>20 Fr</b>	<b>10:46 AM</b>	<b>Vernal Equinox</b>
	22 Su	6:16 AM	Neptune Conjunction
	22 Su	7:40 AM	Moon Perigee: 366900 km
	23 Mo	4:32 AM	Moon-Pleiades: 1.1° S
	25 We	12:46 AM	Moon North Dec.: 28.4° N
	25 We	4:27 AM	Saturn Conjunction
	25 We	3:18 PM	First Quarter
	26 Th	8:13 AM	Moon-Jupiter: 4° S
	27 Fr	10:15 PM	Moon-Beehive: 1.3° S
	29 Su	3:00 PM	Moon-Regulus: 0.4° S
	30 Mo	7:34 AM	Moon Descending Node
Apr	1 We		Venus: 20.5° E

Sky Events Calendar by Fred Espenak and Sumit Dutta (NASA's GSFC), <http://eclipse.gsfc.nasa.gov/SKYCAL/SKYCAL.html> to make your own for any year. Some additions and clarifications were made by the editor.

The Grand Traverse Astronomical Society meets on the 1st Friday of each month except August at the Northwestern Michigan College Rogers Observatory. The public is invited to all society functions as our guests. We are a non-profit group dedicated to the study of astronomy. If you'd like more information about us, our meeting and outreach schedule, see our website: [www.gtastro.org](http://www.gtastro.org).



Map is not to scale

# Ephemeris of Sky Events for NMC Observatory

March, 2026 Local time zone: EST

DATE	SUN RISE	SUN SET	DAYLIGHT HOURS	TWILIGHT*		MOON PHASE	RISE OR SET**	OR TIME	ILLUM FRACTN
				END	START				
Sun 1	07:19a	06:30p	11:10	07:33p	06:16a		Set	06:58a	97%
Mon 2	07:18a	06:31p	11:13	07:34p	06:15a		Set	07:18a	100%
Tue 3	07:16a	06:33p	11:16	07:36p	06:13a	Full	Rise	07:04p	100%
Wed 4	07:14a	06:34p	11:19	07:37p	06:11a		Rise	08:14p	97%
Thu 5	07:12a	06:35p	11:23	07:38p	06:09a		Rise	09:22p	93%
Fri 6	07:10a	06:37p	11:26	07:39p	06:08a		Rise	10:30p	87%
Sat 7	07:09a	06:38p	11:29	07:41p	06:06a		Rise	11:38p	80%
-----									
EDT	Time Change								
Sun 8	08:07a	07:39p	11:32	08:42p	07:04a		Rise	01:45a	72%
Mon 9	08:05a	07:40p	11:35	08:43p	07:02a		Rise	02:49a	63%
Tue 10	08:03a	07:42p	11:38	08:45p	07:01a		Rise	03:49a	54%
Wed 11	08:01a	07:43p	11:41	08:46p	06:59a	L Qtr	Rise	04:41a	44%
Thu 12	08:00a	07:44p	11:44	08:47p	06:57a		Rise	05:24a	35%
Fri 13	07:58a	07:46p	11:47	08:49p	06:55a		Rise	06:00a	26%
Sat 14	07:56a	07:47p	11:50	08:50p	06:53a		Rise	06:29a	18%
-----									
Sun 15	07:54a	07:48p	11:54	08:51p	06:51a		Rise	06:52a	11%
Mon 16	07:52a	07:49p	11:57	08:53p	06:49a		Rise	07:13a	5%
Tue 17	07:50a	07:51p	12:00	08:54p	06:48a		Rise	07:33a	1%
Wed 18	07:49a	07:52p	12:03	08:55p	06:46a	New	Set	07:45p	0%
Thu 19	07:47a	07:53p	12:06	08:57p	06:44a		Set	09:02p	1%
Fri 20	07:45a	07:55p	12:09	08:58p	06:42a		Set	10:21p	5%
Sat 21	07:43a	07:56p	12:12	08:59p	06:40a		Set	11:42p	11%
-----									
Sun 22	07:41a	07:57p	12:15	09:01p	06:38a		Set	01:04a	20%
Mon 23	07:39a	07:58p	12:18	09:02p	06:36a		Set	02:22a	30%
Tue 24	07:38a	08:00p	12:22	09:03p	06:34a		Set	03:30a	41%
Wed 25	07:36a	08:01p	12:25	09:05p	06:32a	F Qtr	Set	04:25a	52%
Thu 26	07:34a	08:02p	12:28	09:06p	06:30a		Set	05:06a	63%
Fri 27	07:32a	08:03p	12:31	09:07p	06:28a		Set	05:38a	74%
Sat 28	07:30a	08:05p	12:34	09:09p	06:26a		Set	06:03a	83%
-----									
Sun 29	07:28a	08:06p	12:37	09:10p	06:24a		Set	06:23a	90%
Mon 30	07:26a	08:07p	12:40	09:11p	06:22a		Set	06:42a	95%
Tue 31	07:25a	08:08p	12:43	09:13p	06:20a		Set	06:59a	99%

\* Nautical Twilight

\*\* Moonrise or moonset, whichever occurs between sunset and sunrise



**For renewing members, all we need is your name and email or street address to identify you, plus any information that has changed.**

## Grand Traverse Astronomical Society – Membership Application / Renewal for 2026

I am interested, please send me more information about the next GTAS meeting. (Also see [www.gtastro.org](http://www.gtastro.org))

I'll join, payment enclosed

Email Address: \_\_\_\_\_

Membership renewal

**Newsletter Delivery:**  **Email**  **Mail** (Postcard only)

Membership term runs from January to December

Interests: \_\_\_\_\_

Name(s): \_\_\_\_\_ Home Phone: \_\_\_\_\_ Cell: \_\_\_\_\_

Address: \_\_\_\_\_

(Street, City, State ZIP)

Dues:  Single Membership .....\$25.00/yr **Mail check to:** G.T.A.S.

Family.....\$30.00/yr Gary Carlisle, Treasurer

Student (up to 18 years age)....\$15.00/yr 1473 Birmley Road

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For new members just joining mid-year, pro rate the dues thus:  
**Annual Dues X months remaining in the year / 12.**  
 Example: Single Joining in June:  
 \$25.00 X 6 (Jul-Dec) / 12 = \$12.50

# Total Lunar Eclipse of 2026 Mar 03

## Sun at Greatest Eclipse (Geocentric Coordinates)

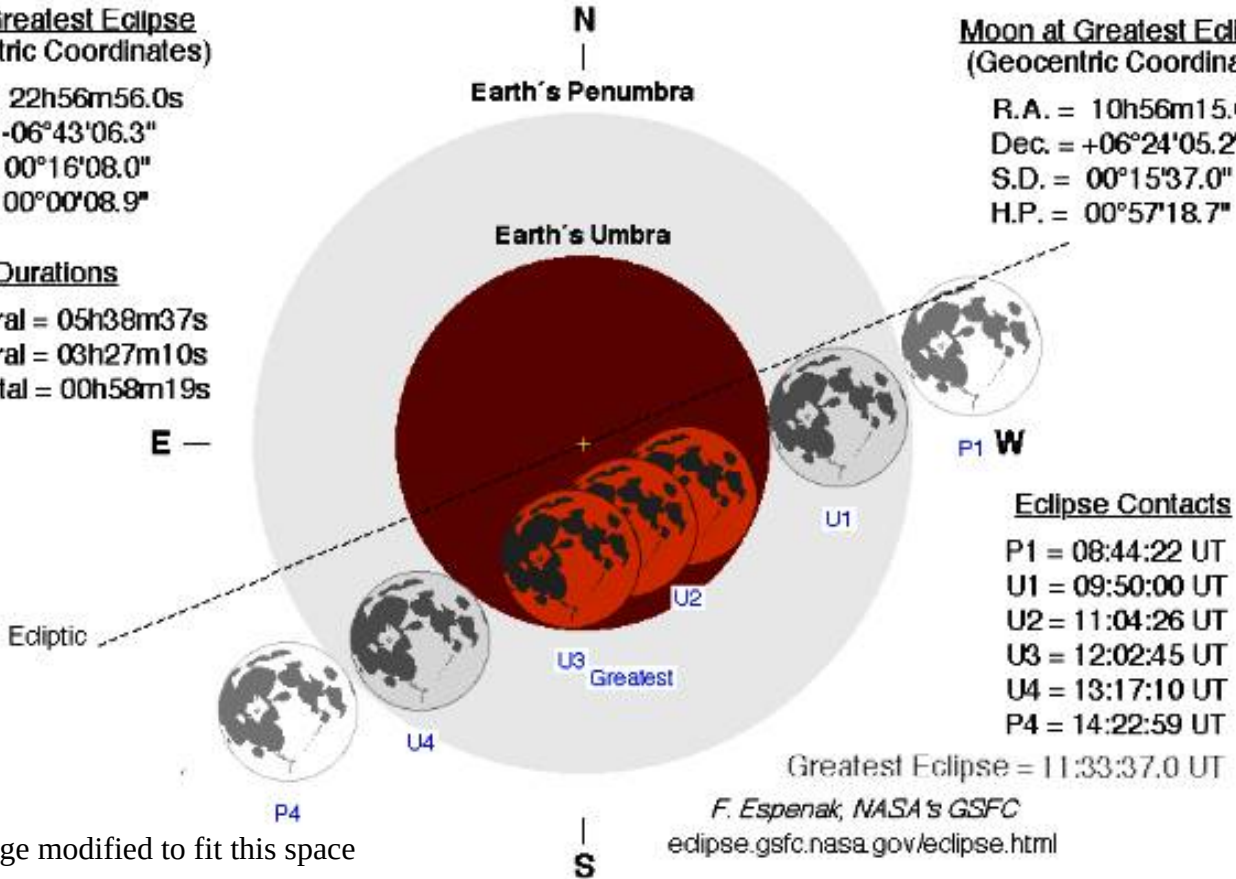
R.A. = 22h56m56.0s  
 Dec. = -06°43'06.3"  
 S.D. = 00°16'08.0"  
 H.P. = 00°00'08.9"

## Moon at Greatest Eclipse (Geocentric Coordinates)

R.A. = 10h56m15.0s  
 Dec. = +06°24'05.2"  
 S.D. = 00°15'37.0"  
 H.P. = 00°57'18.7"

## Eclipse Durations

Penumbral = 05h38m37s  
 Umbral = 03h27m10s  
 Total = 00h58m19s



## Eclipse Contacts

P1 = 08:44:22 UT  
 U1 = 09:50:00 UT  
 U2 = 11:04:26 UT  
 U3 = 12:02:45 UT  
 U4 = 13:17:10 UT  
 P4 = 14:22:59 UT

Greatest Eclipse = 11:33:37.0 UT

F. Espenak, NASA's GSFC  
[eclipse.gsfc.nasa.gov/eclipse.html](http://eclipse.gsfc.nasa.gov/eclipse.html)

Image modified to fit this space

## Eileen Carlisle

Avon Representative

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Traverse City, MI 49696-8808

Phone: 946-8123 Fax: 929-0859

E-Mail: [EileenAvonRep@charter.net](mailto:EileenAvonRep@charter.net)

**WANTED: Astronomers interested in working with Project ASTRO POLARIS.** Willingness to work with K-12 students and teachers. Visiting classrooms and conducting experiments, discussing astronomy interests and events. Sharing your love of astronomy with others. Will provide; training, materials, instructions and support. Please contact: Jerry Dobeck Site Coordinator Project ASTRO POLARIS NMC Science & Math 1701 East Front Street Traverse City, MI 49686 email [jdobek@nmc.edu](mailto:jdobek@nmc.edu) phone 946-1787 obsv. 223-4545 home

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