
The Moon

Standards & elements

- **S6E2. Students will understand the effects of the relative positions of the earth, moon and sun.**
- a. Demonstrate the phases of the moon by showing the alignment of the earth, moon, and sun.
- b. Explain the alignment of the earth, moon, and sun during solar and lunar eclipses.

The Moon and You

Think about these questions…

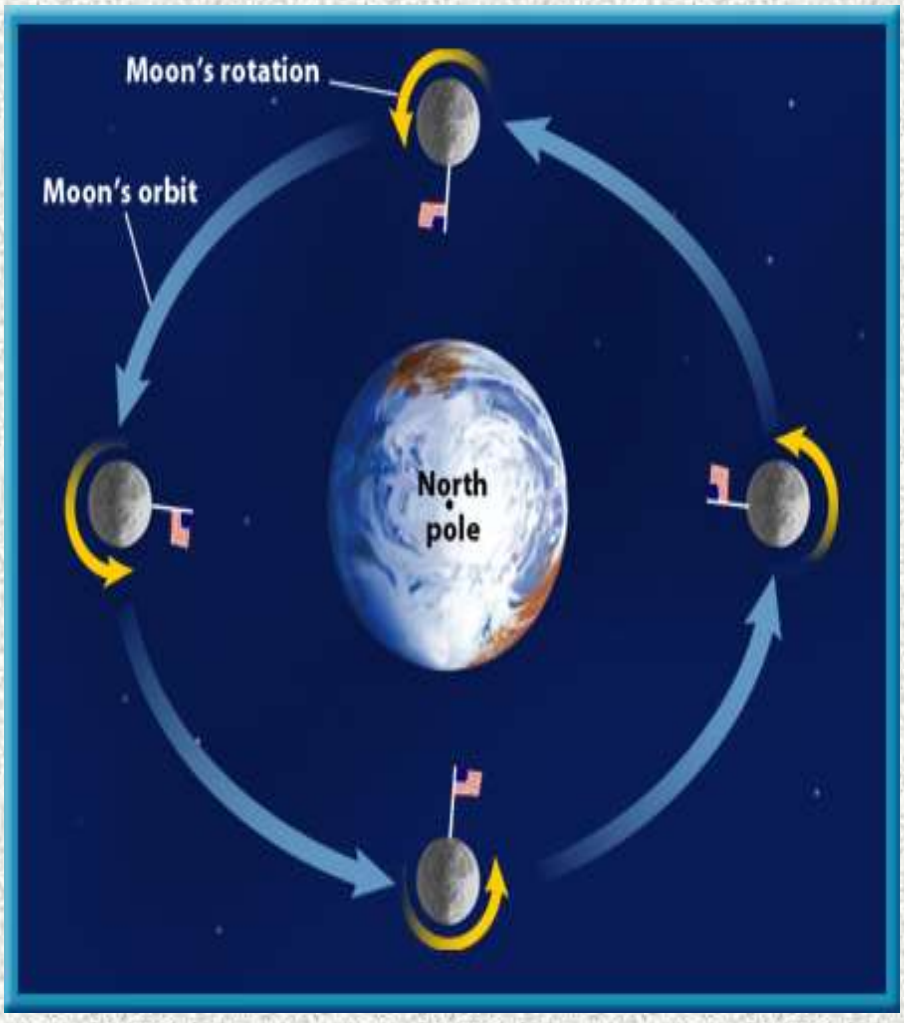
- Meet your moon.
- Why can we see these phases?
- What if you traveled to the moon?
- How is the moon's motion around the Earth observed?

Check what you know: Does the Moon orbit the Earth?

The Earth takes a year to orbit around the Sun. What about the Moon? Does it orbit the Earth? Circle the answer you think best describes the motion of the Moon.

A. The Moon orbits the Earth about once a day.
B. The Moon orbits the Earth about once a week.
C. The Moon orbits the Earth about once a month.
D. The Moon orbits the Earth about once a year.

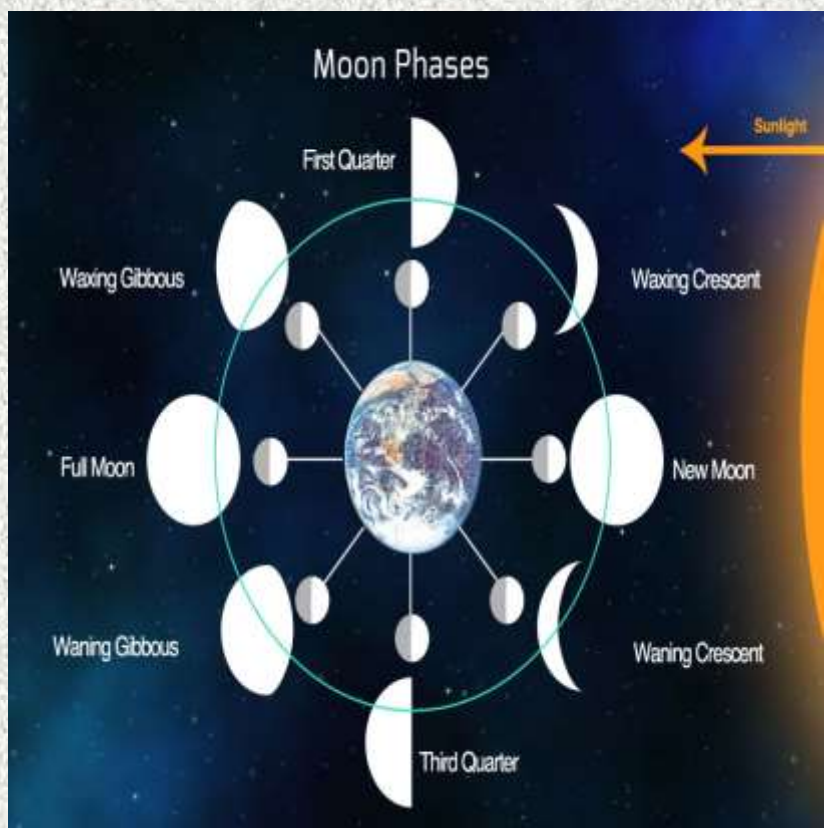
INTRODUCTION



It takes **29.5 days** for the moon to **revolve** around the Earth and we always see that **same** side of the moon. (We never see the back side)

Why do we have MOON PHASES?

Different amounts of sunlight light up the moon and, from Earth, makes the moon **appear** to have “different shapes” or phases.

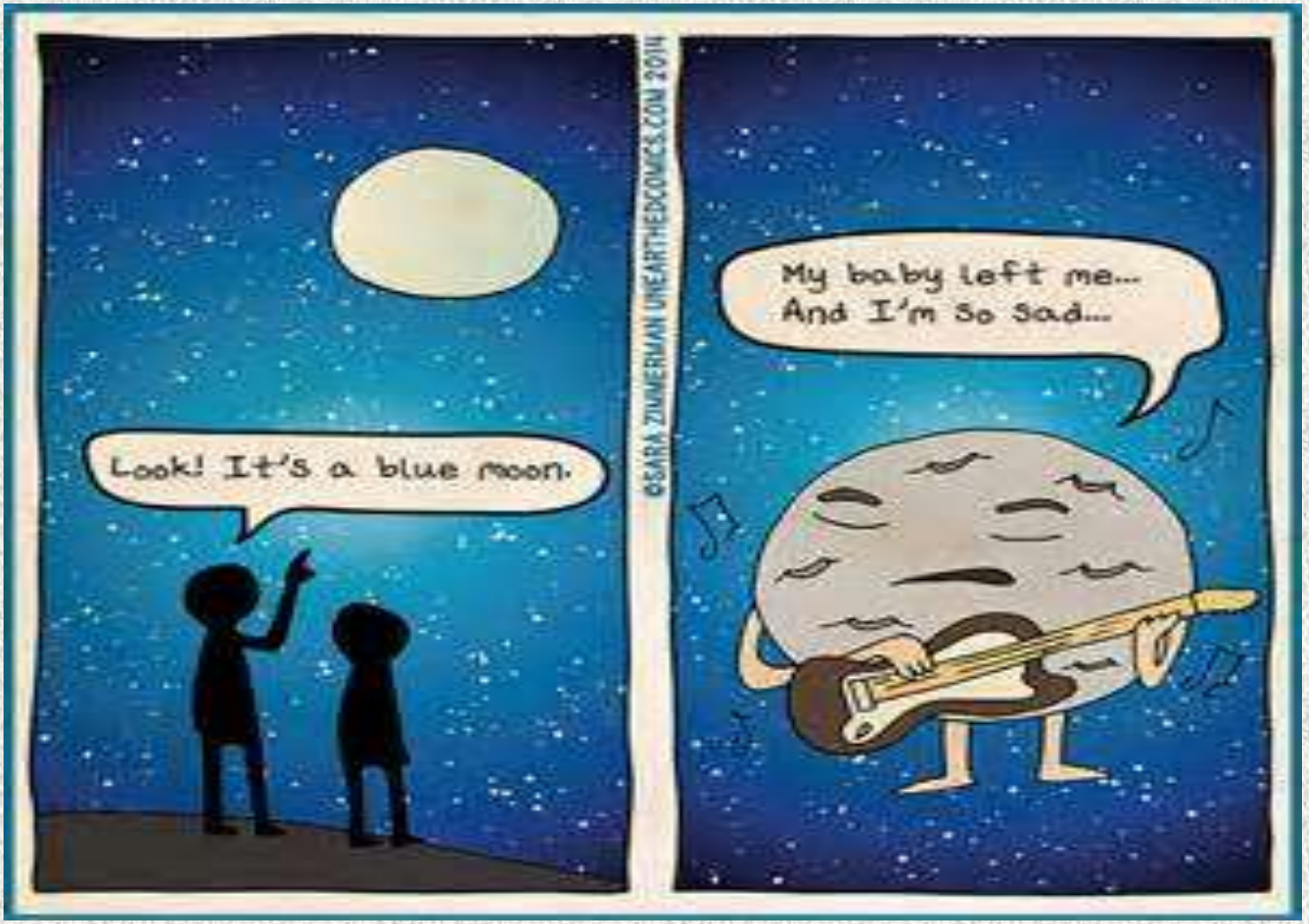


How big is the Moon?

- Wall-e Learns about Proportions

Summary from the Clip

How big is the moon? If Earth were a **basketball**, the Moon would be a **baseball**.


Look! It's a blue moon.
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My baby left me...
And I'm so sad...

Check what you know: Seeing the Moon

How often have you looked up into the sky and seen the Moon? Put an X next to all the times when you think you can go outside and see the Moon.

_____ in the morning

_____ at noon

_____ in the middle of the afternoon

_____ in the evening before sunset

_____ in the evening after sunset

_____ at midnight

What do we see?

The Phases of the Moon

- **New moon:** (0% **None** **reflected light)**

Draw it

- **Crescent:** (1-49% partly but less than one-half illuminated by direct sunlight.)

Draw it!

- **Quarter:** (50% half)

Draw it!

The Phases of the Moon

- **Gibbous:** (51-99% more than one-half but **not** fully illuminated by direct sunlight.)

- **Full moon:** (100% **ALL** illuminated by **direct** sunlight.)

B. Phases of the Moon (Draw what the phase looks like in the boxes provided)

1. New Moon - earth cannot see any part of the moon (lasts one day)

2. Waxing Crescent - waxing means moon's face is growing (lasts several days)

3. First quarter - right half of moon's face is visible (lasts for only one day)

4. Waxing gibbous - more than 1/2 of moon's face is visible (lasts several days)

5. Full moon – all of the moon's face is visible (last for one day)

6. Waning gibbous - (last for several days)

7. Last quarter or Third quarter - left half of face is visible (lasts for only one day)

8. Waning crescent - waxing means moon's face is shrinking (last for several days)

Why all the crazy words for the moon phases? (Moon phase vocabulary)

Most of these words are based in Latin or Greek (those dudes way back when that started doing science and observing space!)

CRESCENT- **Arc** shape: a **curved** shape **like a "C".**

- **GIBBOUS**- think **bulging outward or swollen**

for those two "b"s in the middle of the word. This shape is **bigger than half, but less than full.**

WAXING- Think "Wax On" from Karate Kid. It means getting **bigger**. Light is being "**added**" and the moon is looking bigger each day.

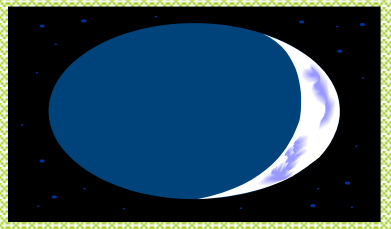
WANING- It means getting **smaller**. Since we say "Way-ning"…. I think of it as "going AWAY". Moon appears to be "**shrinking**" **each day.**

Why do we see "phases" of the moon?

VIDEO= SEE END FOR DIRECTIONS!

- Lunar Phase Simulator
- Moon Phases BrainPoP
- Animated picture of Moon phases

Check what you know: Crescent Moon



When there is a crescent Moon in the night sky, how much of the *entire* Moon's spherical surface is actually lit by the Sun? Circle the answer that best matches your thinking.

A. Quarter or less of the entire Moon
B. Half of the entire Moon
C. Three quarters of the entire Moon
D. The entire Moon

Uncovering Student Ideas in Astronomy pg 127

Check what you know: Moon Phase and Solar Eclipse

During a solar eclipse the Moon appears to completely cover the Sun. What phase is the Moon in just before and after a solar eclipse? Circle the answer that best matches your thinking.

A. Full Moon
B. New Moon
C. First quarter Moon
D. Last quarter Moon
E. It can be any phase.

Now, draw a diagram of where the Earth, Moon and Sun will be during a SOLAR eclipse.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"Don't worry, it's just a phase."

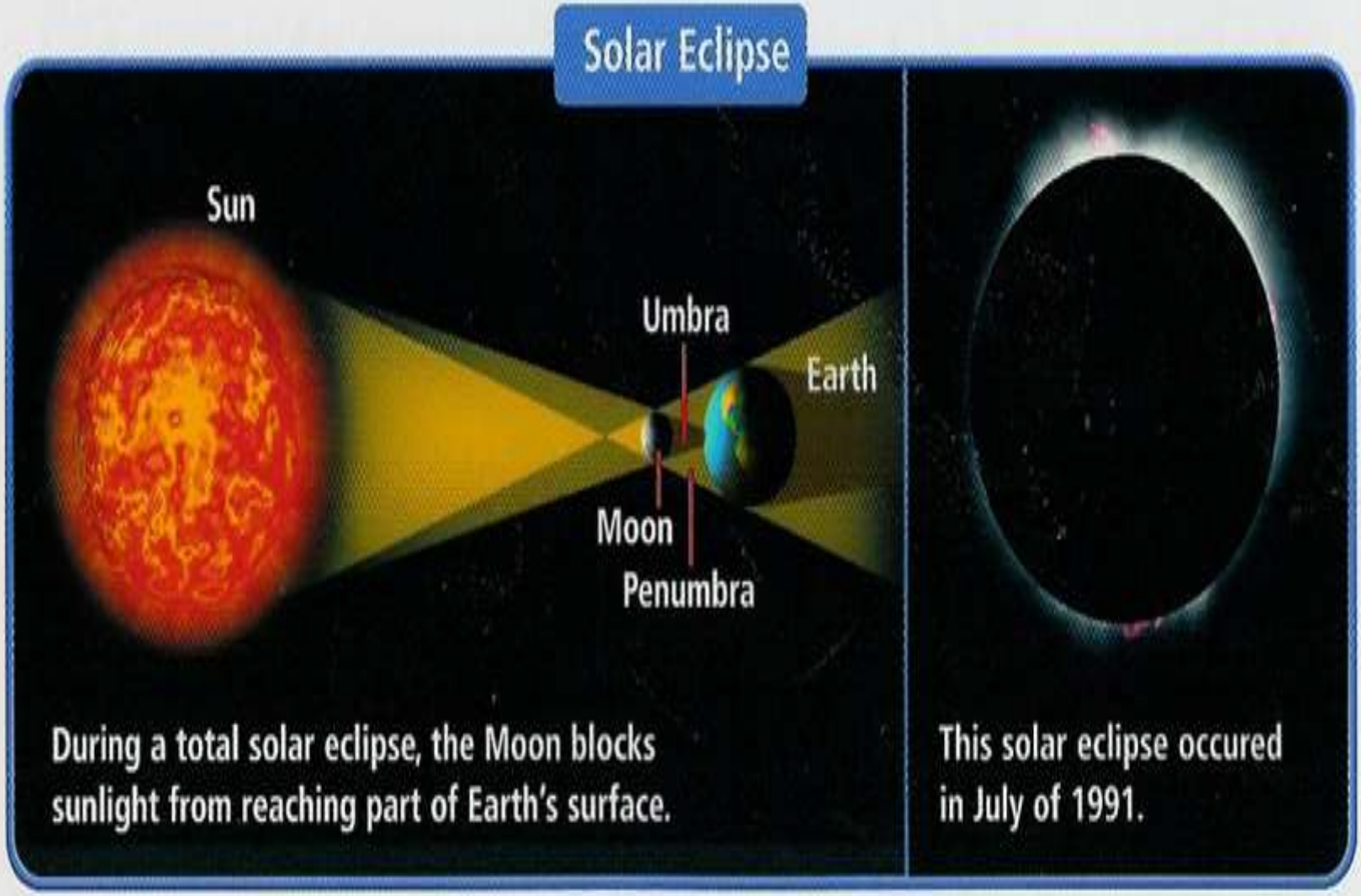
Solar Eclipse

Cause: **The moon passes between the sun and the Earth.**

Effect: **The moon blocks out the sun.**

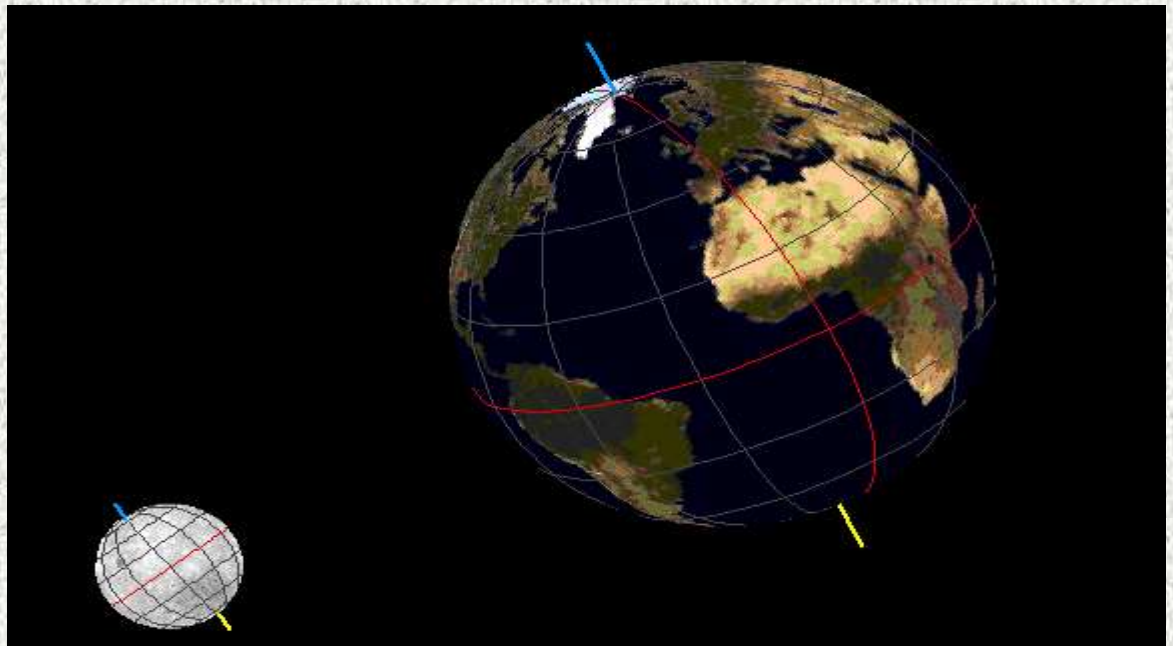
Does a large area of the Earth see a total solar eclipse? How do you know?

Solar Eclipse



Solar Eclipses

- Sun – the shadow of the moon on the earth



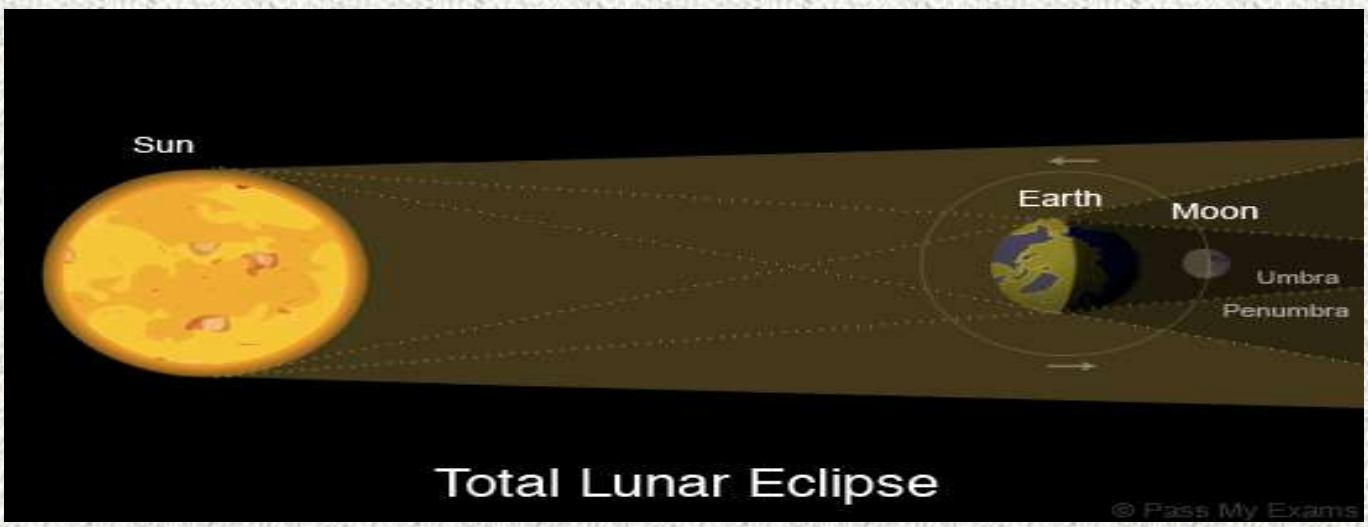
Lunar Eclipse

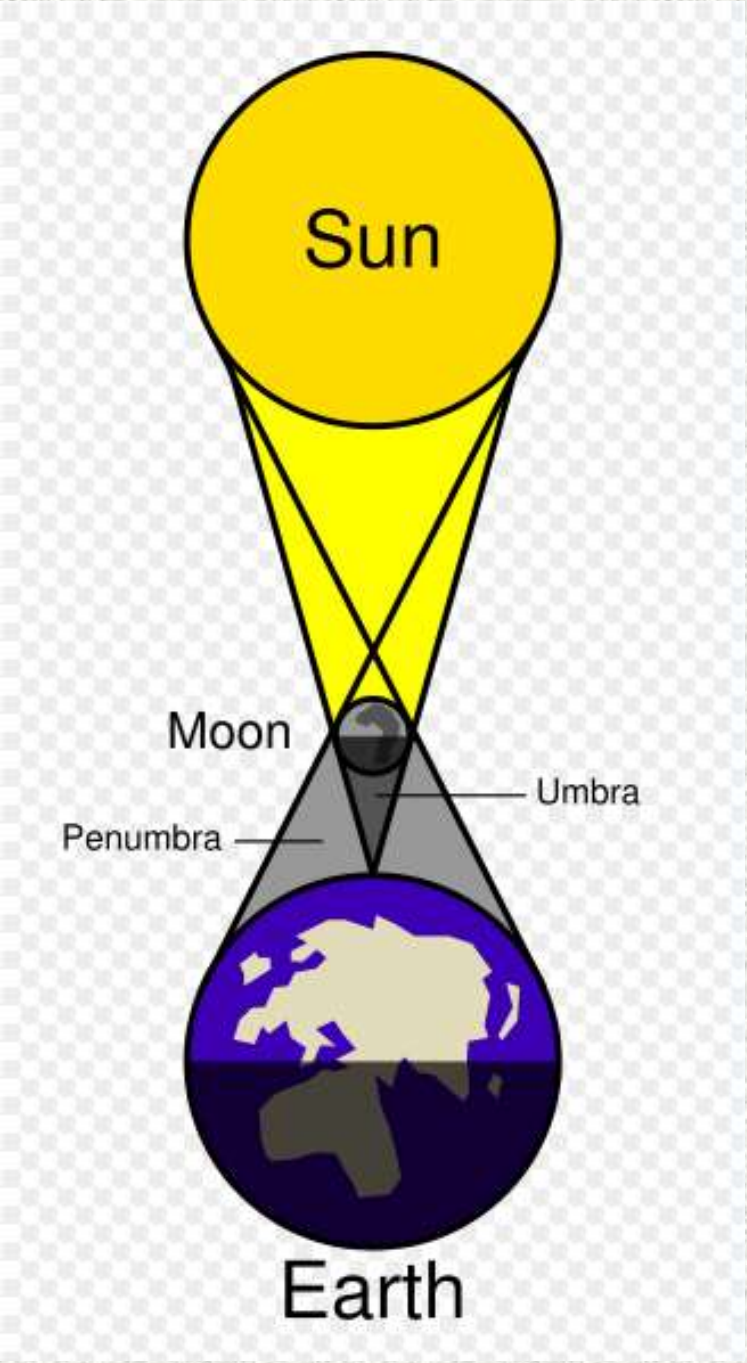
Cause: **Earth passes between the sun and the moon**

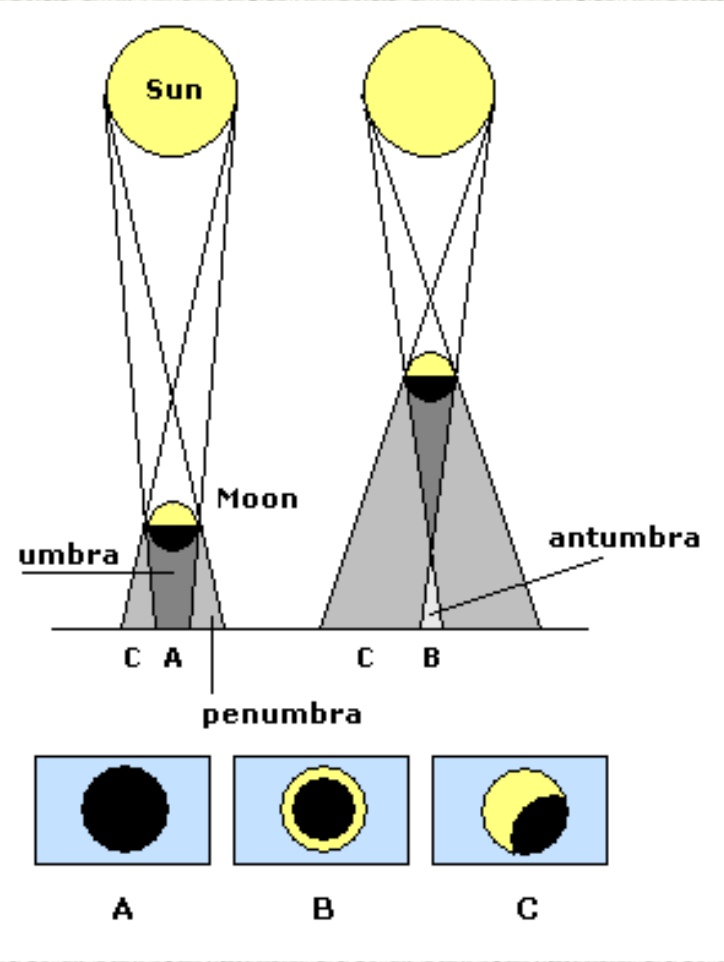
Effect: **Earth's shadow falls on the moon.**

What is a lunar eclipse?

- Now imagine what happens when you have **the sun, the Earth, and the moon all lined up in a row**. **When the moon is all the way in the umbra shadow, it is a total lunar eclipse.** Total lunar eclipses last around 20 minutes to an hour and 40 minutes







A – total eclipse
B – annular eclipse
C – partial eclipse

Eclipses

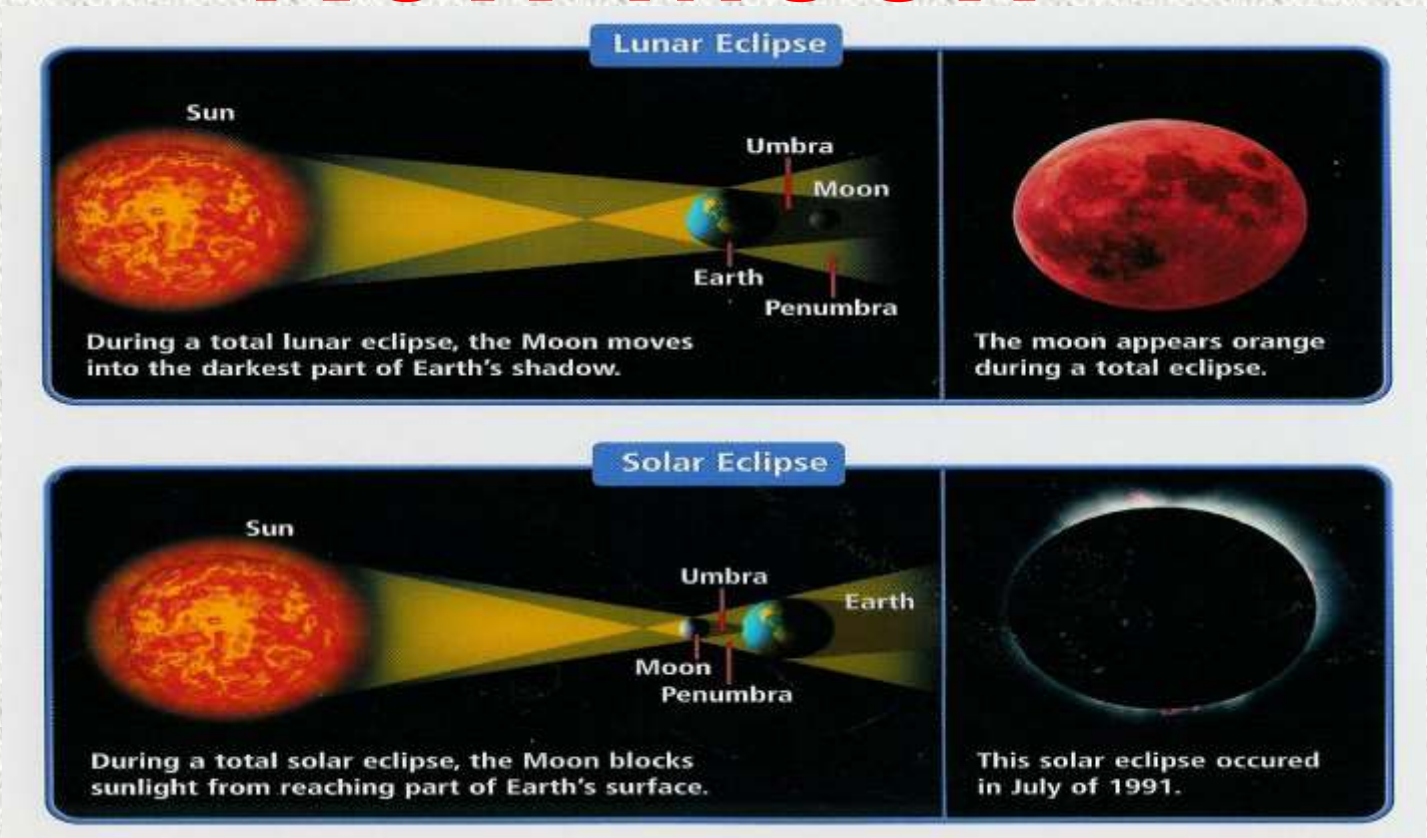
- Have you seen eclipses?
- What are eclipses in nature?
  - One celestial object casts its shadow on the other one
- **Umbra**: Inner core of total darkness the disc of the Sun is completely blocked.
- **Penumbra**: Outer, partial shadow Sun's disc is only partly blocked, with a bit peeking over the edge.

What's the <u>moon phase</u> when a lunar eclipse occurs?

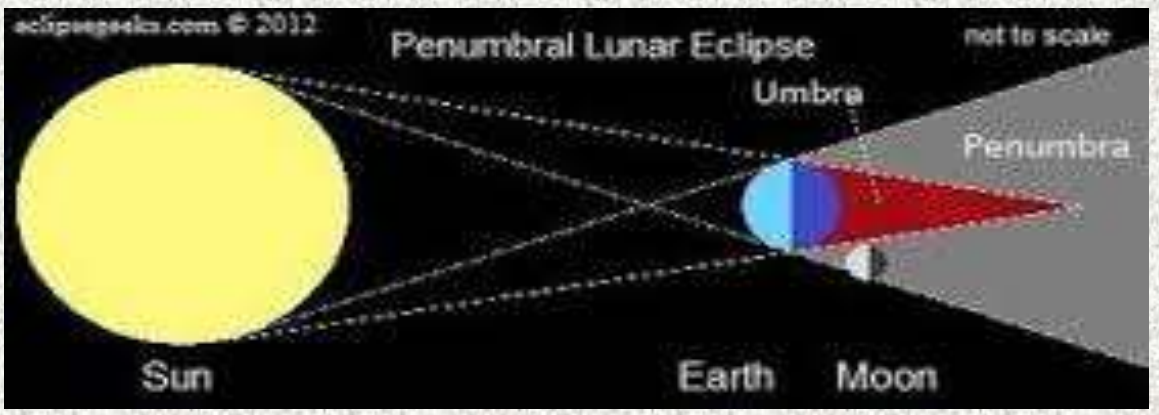
Full Moon

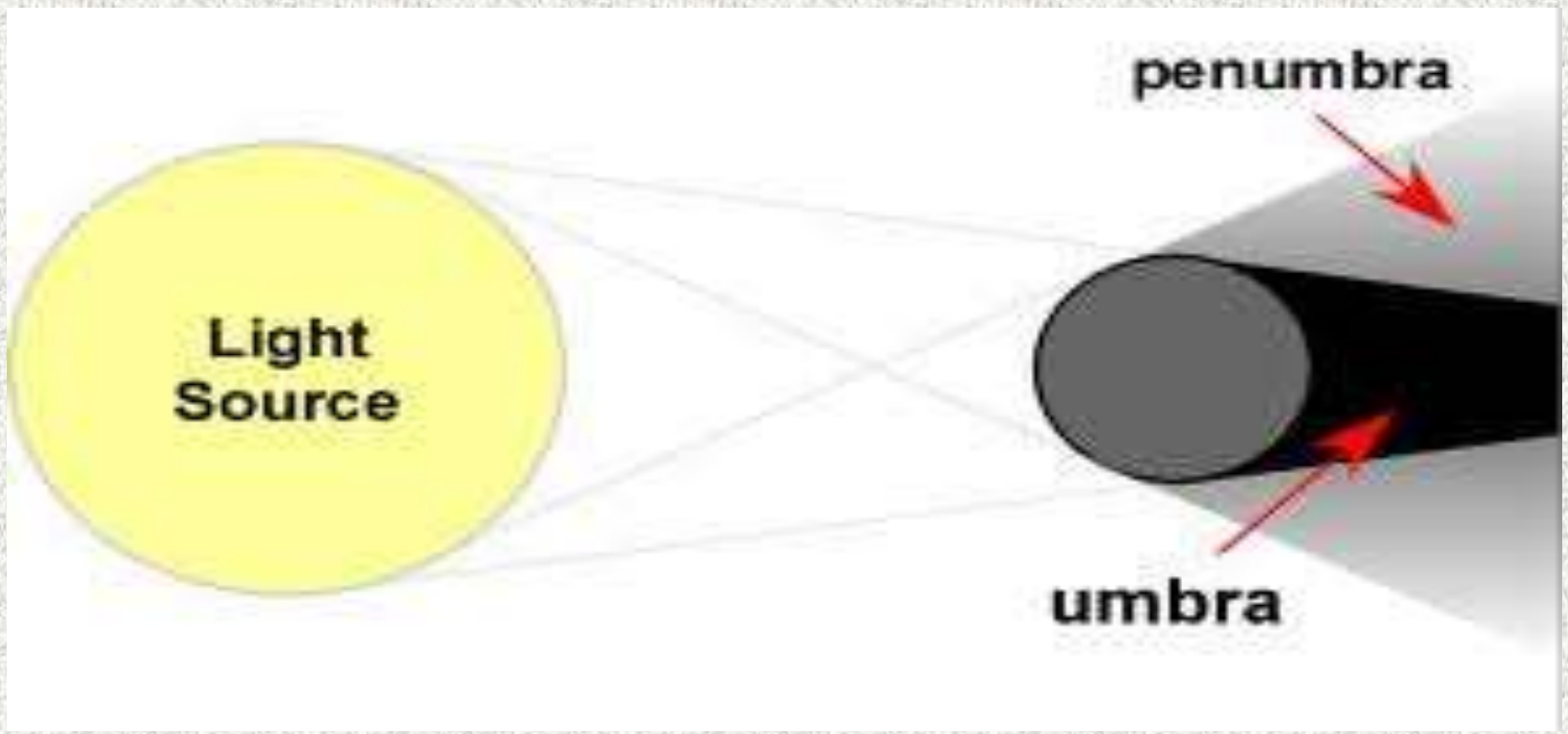
What's the <u>moon phase</u> when a solar eclipse occurs?

New Moon

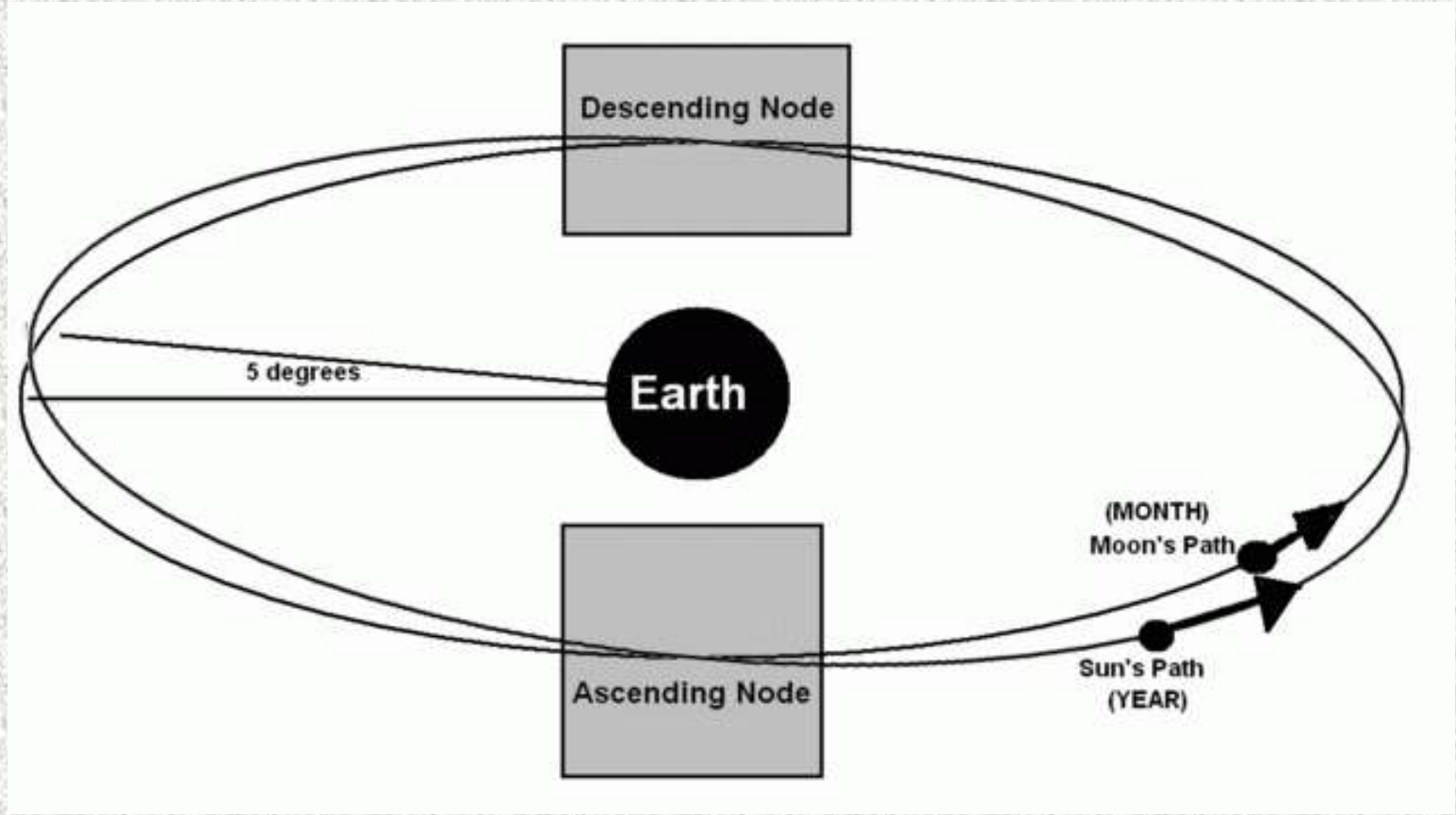


Penumbra & Umbra illustration



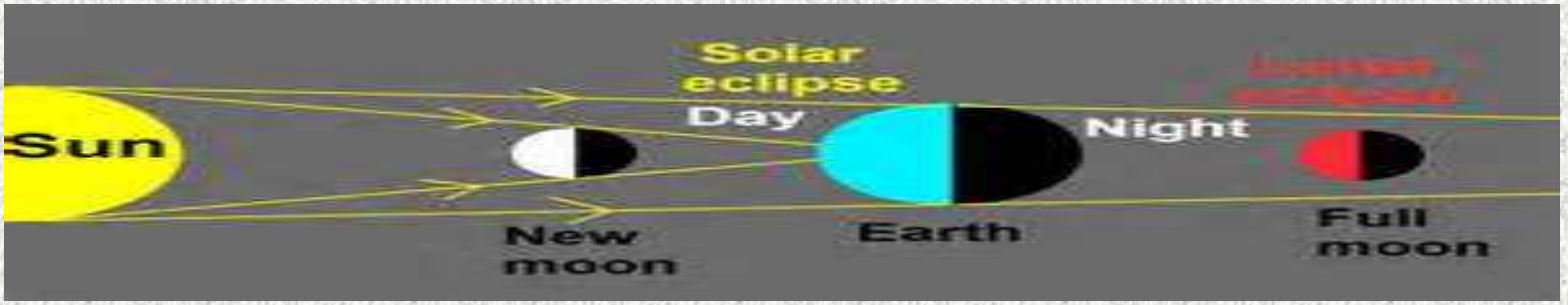


Why aren’t there solar eclipses and lunar eclipses on EVERY new moon and full moon?



Two conditions must be satisfied <u>for an eclipse</u> to occur

1. The nodes of the moon's orbit must be nearly **<u>aligned</u>** with the Sun and the Earth
2. The phase of the <u>moon must be **new or full**</u>



Check What You Know: Phases of Earth

Name the phase of the Earth in this picture.

Finished? Watch video go back to the Blog use buttons to view video

You may…

1. Finish any assignments
2. Go to USA Test Prep (Has Videos0
3. New Path Learning (Has videos)