

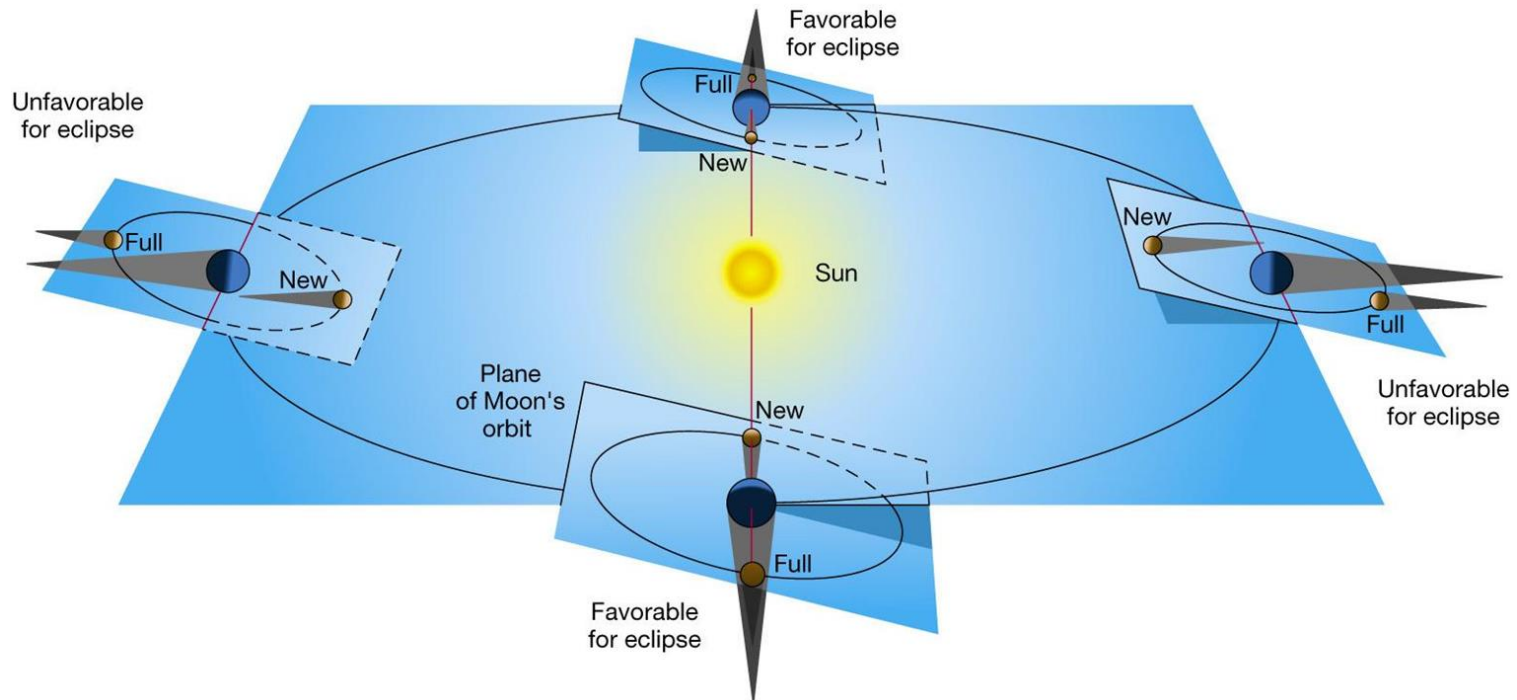
Eclipses and Tides



6.E.1.1 Explain how the relative motion and relative position of the sun, Earth and moon affect the seasons, **tides**, phases of the moon, and **eclipses**.

Eclipses

- The moon's orbit around Earth is slightly tilted with respect to Earth's orbit around the sun.



The moon's orbit is tilted about 5 degrees relative to Earth's orbit around the sun.

Eclipses

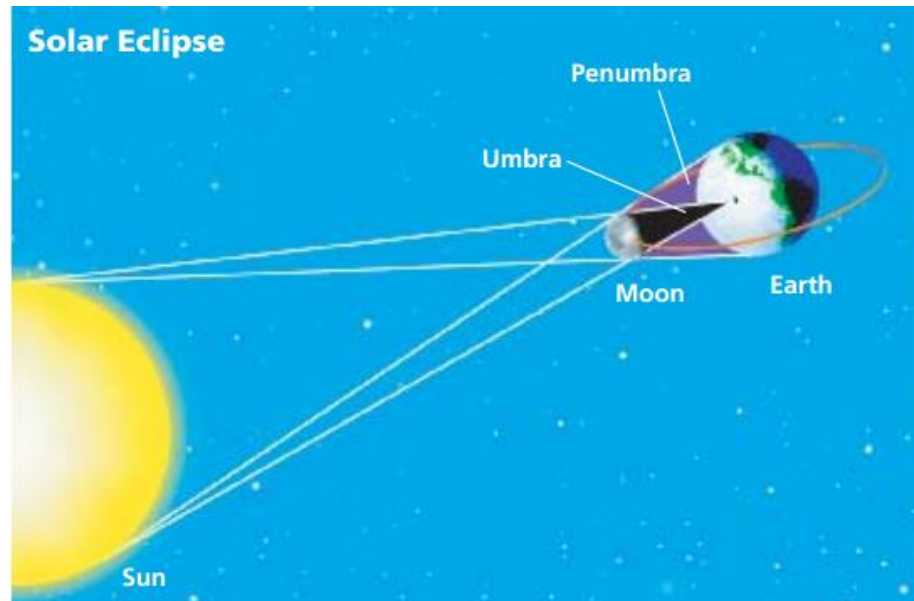
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- As a result, in most months the moon revolves around Earth without moving into Earth's shadow or the moon's shadow hitting Earth.
- When the moon's shadow hits Earth or Earth's shadow hits the moon, an eclipse occurs. When an object in space comes between the sun and a third object, it casts a shadow on that object, causing an eclipse to take place. There are two types of eclipses: solar eclipses and lunar eclipses.
- The words solar and lunar come from the Latin words for "sun" and "moon."

Solar Eclipses

- During a new moon, the moon lies between Earth and the sun. A solar eclipse occurs when the moon passes directly between Earth and the sun, blocking sunlight from Earth. The moon's shadow then hits Earth. So a solar eclipse occurs when a new moon blocks your view of the sun.



Total Solar Eclipses



- The very darkest part of the moon's shadow, the umbra, is cone-shaped. From any point in the umbra, light from the sun is completely blocked by the moon. The moon's umbra happens to be long enough so that the point of the cone can just reach a small part of Earth's surface. Only the people within the umbra experience a total solar eclipse.

Total Solar Eclipses

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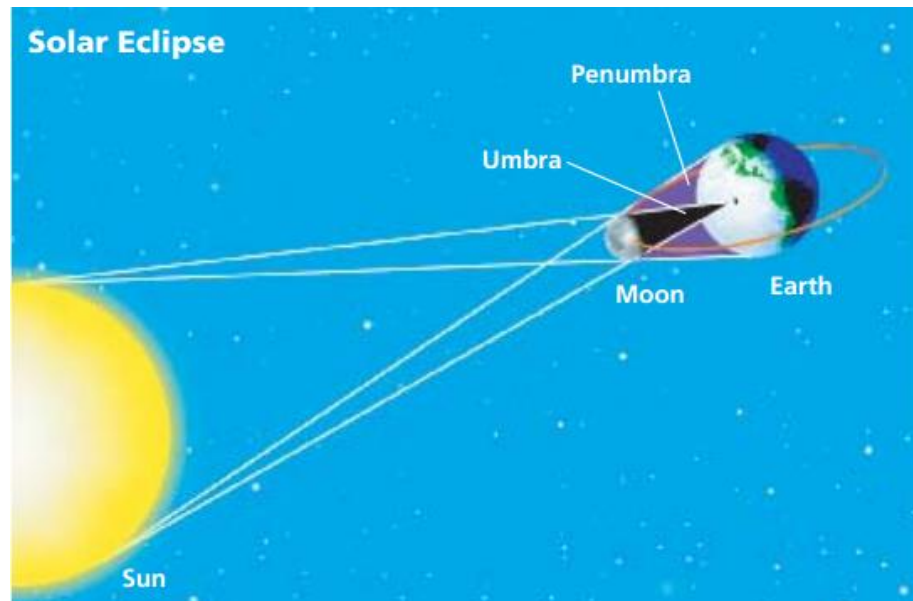


- During the short period of a total solar eclipse, the sky grows as dark as night, even in the middle of a clear day. The air gets cool and the sky becomes an eerie color. You can see the stars and the solar corona, which is the faint outer atmosphere of the sun.



Partial Solar Eclipses

- During a solar eclipse, you should see that the moon casts another part of its shadow that is less dark than the umbra. This larger part of the shadow is called the penumbra. In the penumbra, part of the sun is visible from Earth.

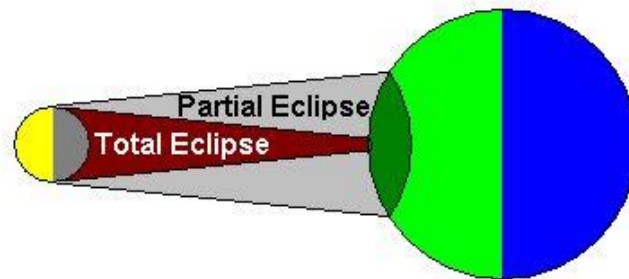


Partial Solar Eclipses

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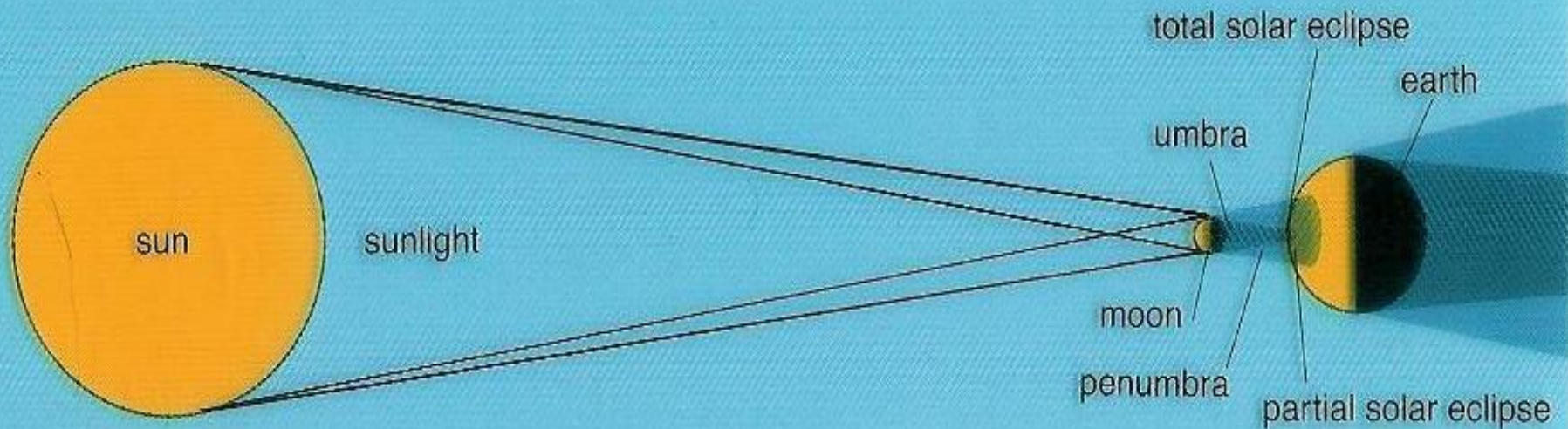
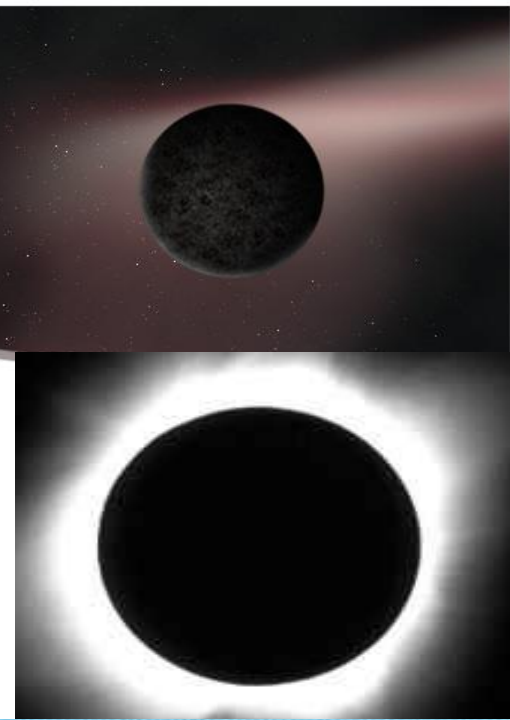


- During a solar eclipse, people in the penumbra see only a partial eclipse. Since an extremely bright part of the sun still remains visible, it is not safe to look directly at the sun during a partial solar eclipse (just as you wouldn't look directly at the sun during a normal day).



Solar Eclipse

- Blocks the view of the sun
- Occur during New Moon
- Occur every year, only seen in specific areas



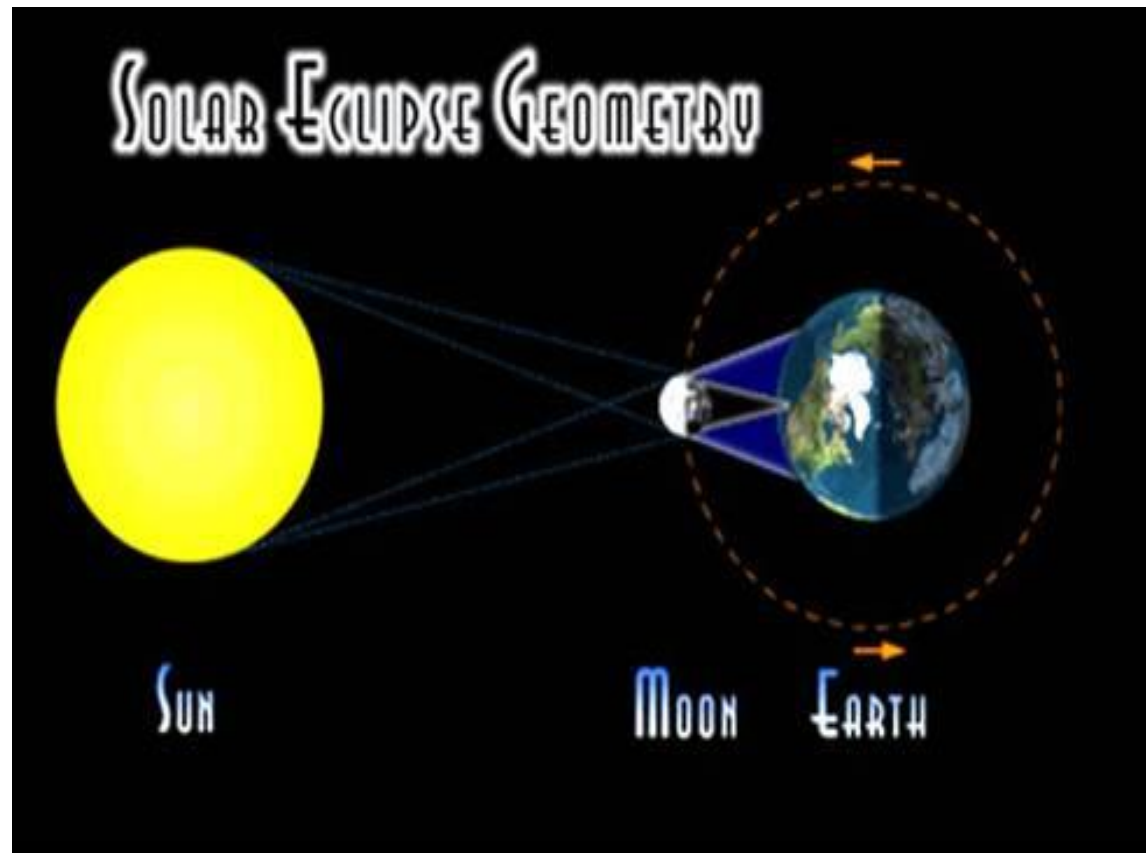
A SOLAR ECLIPSE

Images of Solar Eclipse

Total Solar Eclipse



Partial Solar Eclipse



Lunar Eclipses

- During most months, the moon moves near Earth's shadow but not quite into it. A lunar eclipse occurs at a full moon when Earth is directly between the moon and the sun.



Lunar Eclipses

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- During a lunar eclipse, Earth blocks sunlight from reaching the moon. The moon is then in Earth's shadow and looks dim from Earth. Lunar eclipses occur only when there is a full moon because the moon is closest to Earth's shadow at that time.



Total Lunar Eclipses

- Like the moon's shadow in a solar eclipse, Earth's shadow has an umbra and a penumbra. When the moon is in Earth's umbra, you see a total lunar eclipse. You can see the edge of Earth's shadow on the moon before and after a total lunar eclipse.



Total Lunar Eclipses

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- Unlike a total solar eclipse, a total lunar eclipse can be seen anywhere on Earth that the moon is visible. So you are more likely to see a total lunar eclipse than a total solar eclipse.

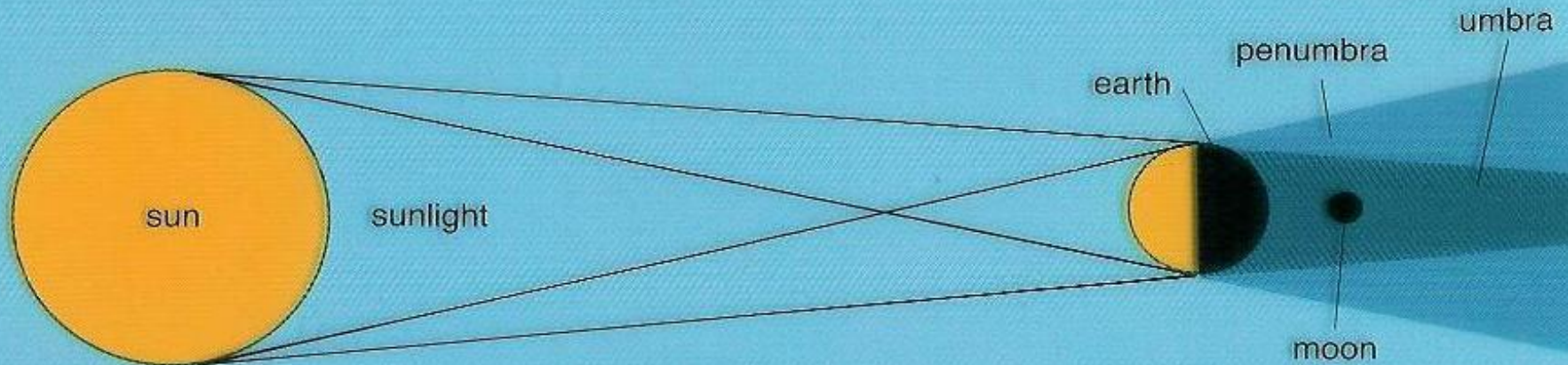


Images of a Lunar Eclipse



www.MrEclipse.com

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B LUNAR ECLIPSE

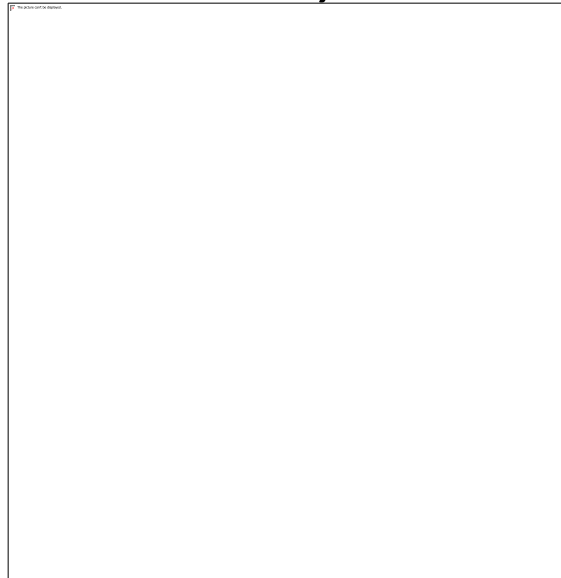
Partial Lunar Eclipses

- For most lunar eclipses, Earth, the moon, and the sun are not quite in line, and only a partial lunar eclipse results. A partial lunar eclipse occurs when the moon passes partly into the umbra of Earth's shadow. The edge of the umbra appears blurry, and you can watch it pass across the moon for two or three hours.



Tides

- A sand castle being washed away is an example of an ocean tide. The rise and fall of ocean water that occurs every 12.5 hours or so. The water rises for about six hours, then falls for about six hours, in a regular cycle.

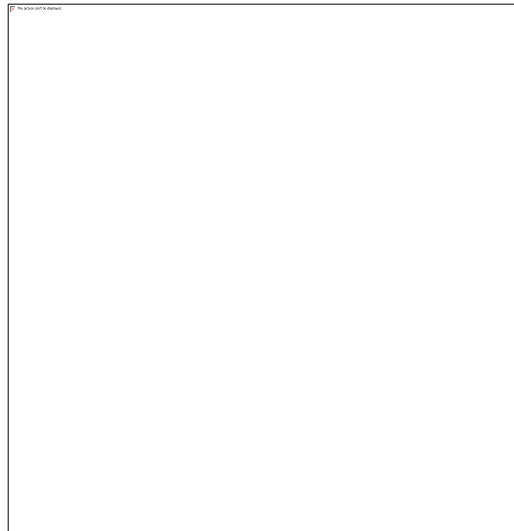


Tides

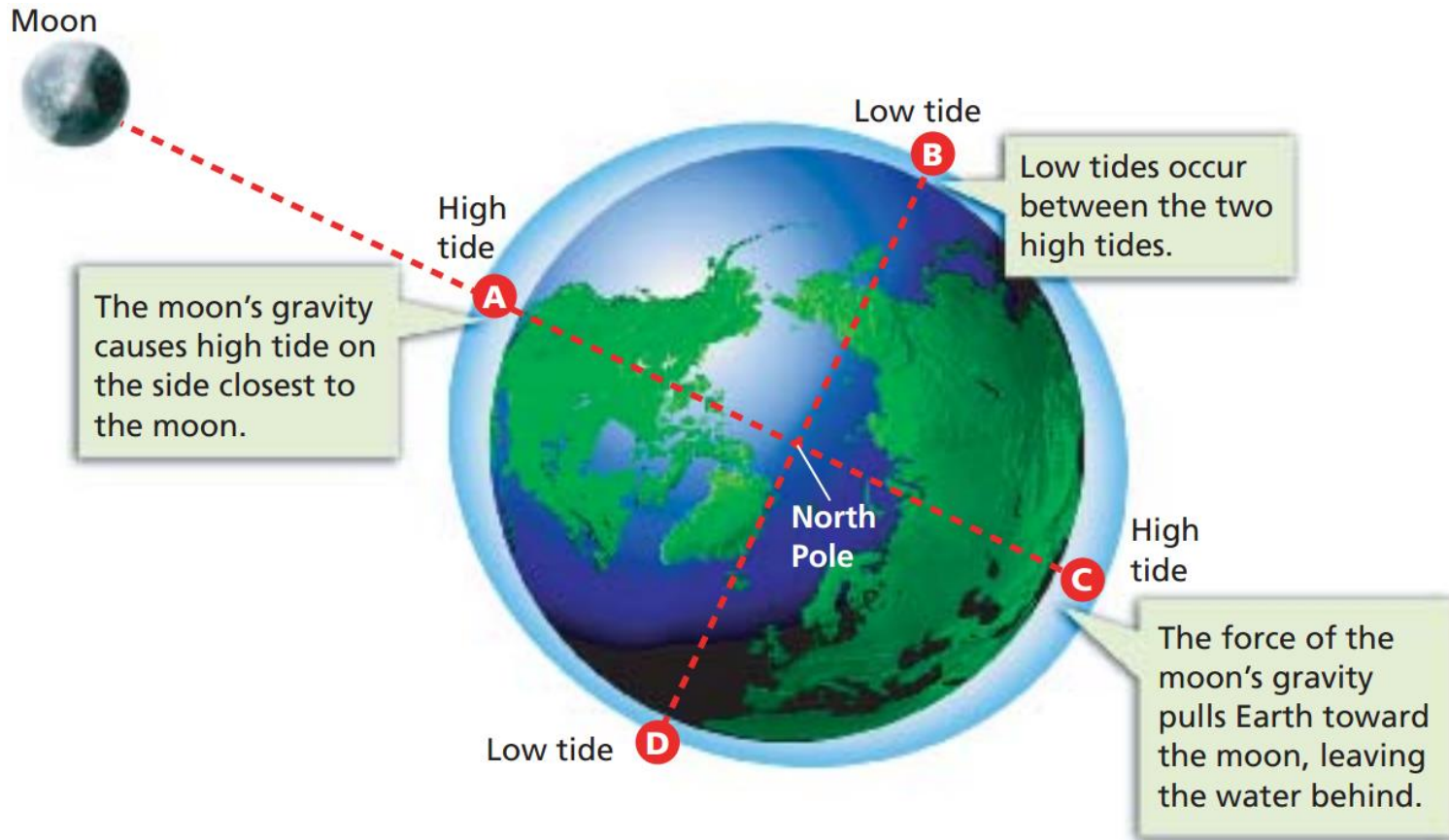
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- The force of gravity pulls the moon and Earth (including the water on Earth's surface) toward each other. Tides are caused mainly by differences in how much the moon's gravity pulls on different parts of Earth.



The Tide Cycle



The Tide Cycle

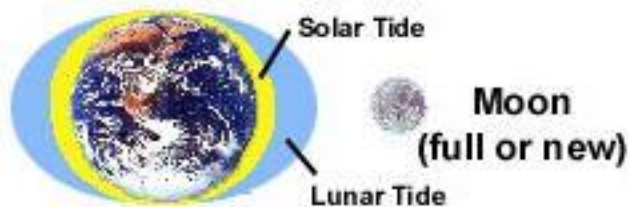
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- At any one time there are two places with high tides and two places with low tides on Earth. As Earth rotates, one high tide stays on the side of Earth facing the moon. The second high tide stays on the opposite side of Earth. Each location on Earth sweeps through those two high tides and two low tides every 25 hours or so.

Spring Tide

- The sun's gravity pulls on Earth's waters. The gravity of the sun and the moon pull in the same direction. Their combined forces produce a tide with the greatest difference between consecutive low and high tides, called a spring tide.



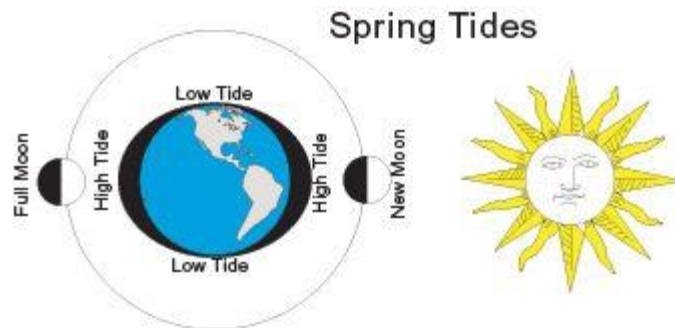
Spring Tides



Spring Tide

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- At full moon, the moon and the sun are on opposite sides of Earth. Since there are high tides on both sides of Earth, a spring tide is also produced. It doesn't matter in which order the sun, Earth, and moon line up. Spring tides occur twice a month, at new moon and at full moon.



Neap Tide

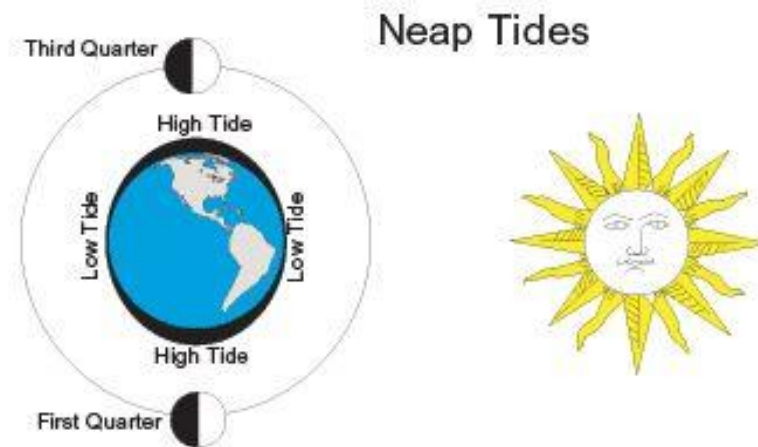
- During the moon's first-quarter and third-quarter phases, the line between Earth and the sun is at right angles to the line between Earth and the moon. The sun's pull is at right angles to the moon's pull. This arrangement produces a neap tide, a tide with the least difference between consecutive low and high tides.



Neap Tide

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- Neap tides occur twice a month.



Questions

Which best explains how a lunar eclipse occurs?

- A. Earth orbits the Sun.
- B. The Moon orbits Earth.
- C. Earth passes between the Moon and the Sun.
- D. The Moon passes between Earth and the Sun.

Which best explains why Earth has tides?

A. Earth orbits the Sun.

B. Earth rotates on its axis.

C. The Sun has a gravitational pull on Earth.

D. The Moon has a gravitational pull on Earth.

When does a solar eclipse occur?

- A. when the Moon's light is on Earth's surface
- B. when the Sun's shadow is on Earth's surface
- C. when Earth passes in a direct line between the Sun and the Moon
- D. when the Moon passes in a direct line between Earth and the Sun

The End!!!

