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Warm-Up | The Earth-Sun-Moon System

Lesson Question

How do the movements of Earth and the moon affect each other?

Lesson Goals

- **Describe** how Earth moves in space.
- **Explain** what causes the phases of the moon.
- **Describe** lunar and solar eclipses.
- **Explain** what causes tides.

Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

astronomy	the study of the universe beyond Earth
eclipse	an event that occurs when one body in space gets between another body in space and the Sun
lunar cycle	the phases the moon goes through during its revolution around Earth
neap tide	a tide that occurs when the Sun and moon are at right angles, making high tides lower than normal and low tides higher than normal
orbit	the oval path a body in space takes around another body in space
revolution	the movement of one body in space around another

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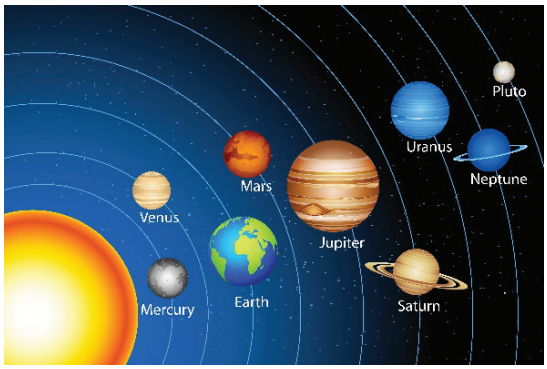
Words to Know

rotation	the movement of a body in space on its [axis]
spring tide	a tide that occurs when the Sun, the moon, and Earth are [aligned], making tides higher

The Solar System

The solar system contains many objects.

- Sun: star at the [center] of system
- [Planets]: large bodies in space that do not give off light
- [Moons]: natural objects that revolve around planets
- [Dwarf] planet: Pluto



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Astronomy

Astronomy is the study of the [universe] beyond Earth.

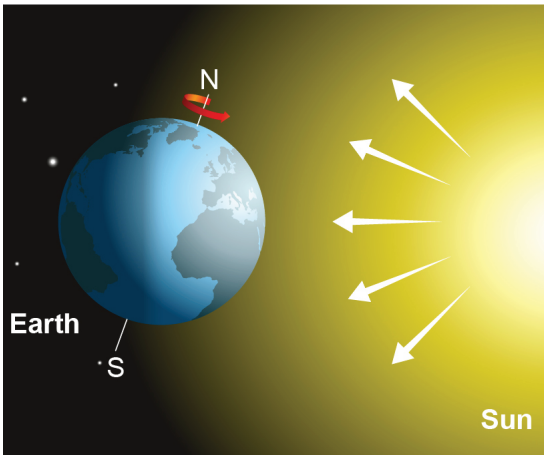
Astronomers are scientists who study:

- [planets].
- [solar] systems.
- [stars].
- galaxies.

Earth's Rotation

Earth rotates, or spins, on its [axis].

- Earth's **rotation** causes [day] and night.
- Earth rotates [eastward]; the Sun appears to move [westward].
- Earth completes a rotation every [24] hours.



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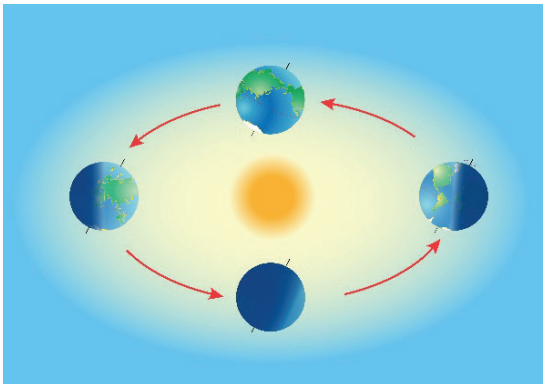
Earth's Revolution

Earth revolves around the [Sun].

- It takes [one] year for Earth to make a complete **revolution**.
- The path Earth follows is called its [orbit].
  - Earth's orbit is an oval called an [ellipse].



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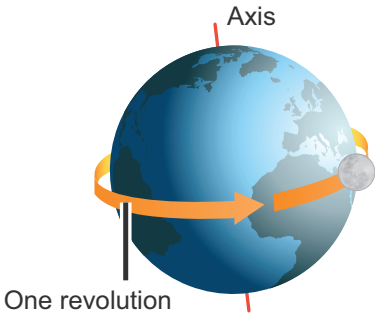
The Moon's Movements

The moon [rotates] on its axis and [revolves] around Earth.



Rotation

[27.3] days to complete

Revolution

27.3 days to complete

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The Lunar Cycle

The moon goes through different [phases], called the **lunar cycle**.

- The lunar cycle is caused by the relative positions of the [moon], [Earth], and the [Sun].
- The part of the lunar cycle observed depends on how much of the [sunlit] side faces Earth.
  - The moon reflects [light] from the Sun.

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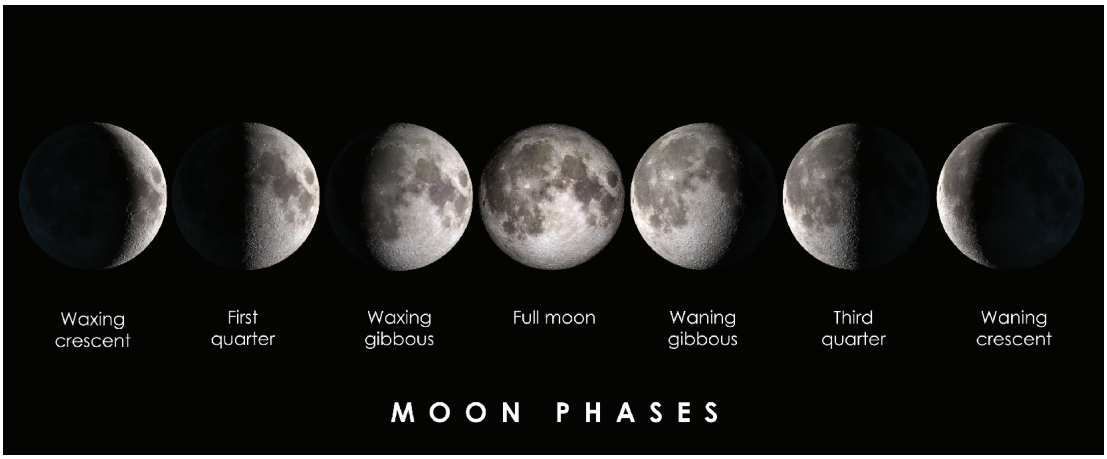
Phases of the Moon



- The [lunar] cycle begins with the new moon.
- A [waxing] crescent occurs when we can see about one-quarter of the moon. The word “wax” means “to [increase].”
- The waxing gibbous is about three-quarters of the moon.
- The full moon is when we see the entire surface of the moon reflecting sunlight.
- The [waning] gibbous is next. The word “wane” means “to [decrease].”

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Slide 5

Moon Phases

- The moon rotates around [Earth].
- The moon tilts on its [axis].

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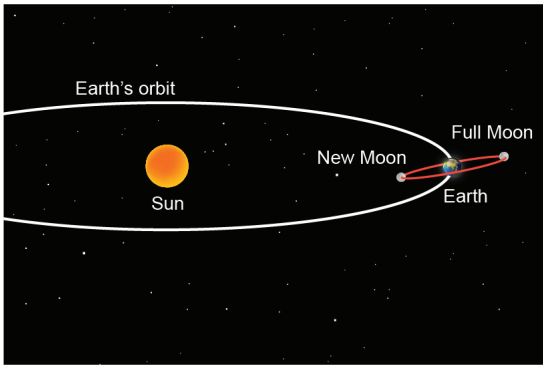
Orbits of Earth and the Moon

The moon's orbit around Earth is slightly tilted.

- Due to this [tilt], the moon does not often get in Earth's shadow.
- The moon's shadow does not often cover Earth.
- An [eclipse] occurs when the moon's shadow covers part of Earth or when Earth's shadow covers part of the moon.



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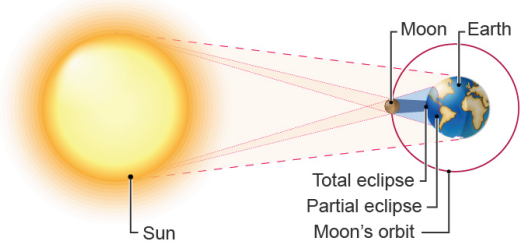
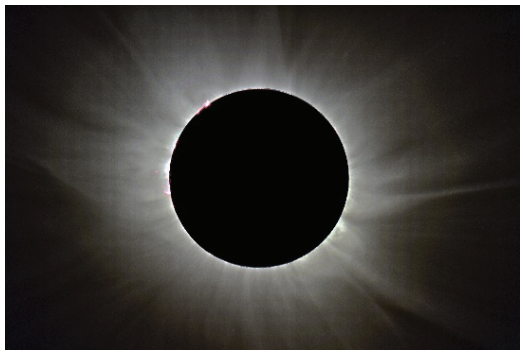
Solar Eclipses

A solar eclipse happens when a new [moon] blocks the view of the [Sun].



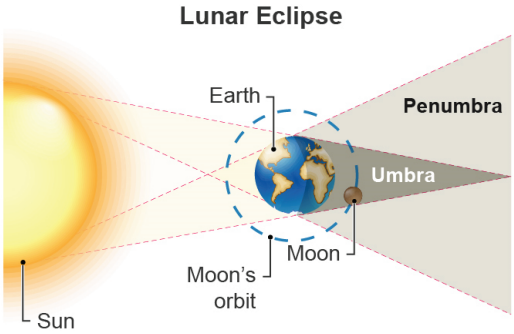
How a Solar Eclipse Happens



Total Solar Eclipse

Lunar Eclipses

A lunar eclipse occurs during a [full] moon when Earth is [directly] between the moon and the Sun.



How a Lunar Eclipse Happens



Total Lunar Eclipse

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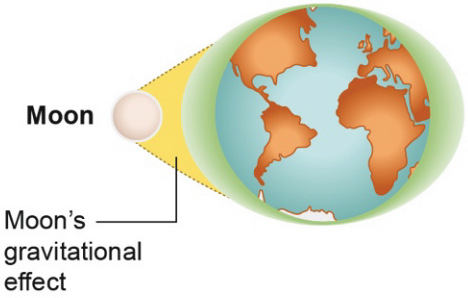
Gravity and the Tides

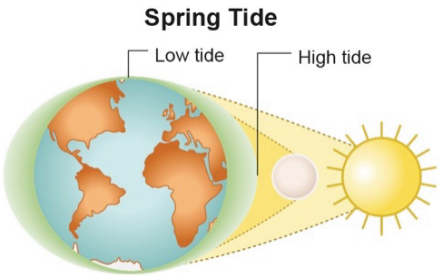
Earth's tides are caused by the gravity of the moon and the Sun.

- Both bodies pull on Earth, causing the crust and water to bulge slightly.
- High tides occur in areas with more pull.

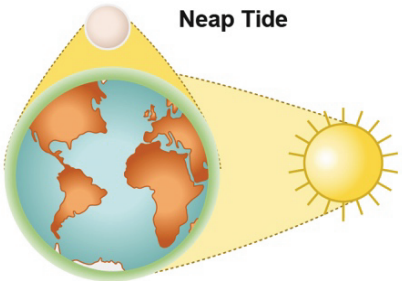


Spring and Neap Tides

Each of these special tides occurs twice a month. They are caused by the gravity of the Sun and the gravity of the moon working together.



Spring tides are extra high tides that occur during new and full moons.



Neap tides occur during the first and third quarters of the moon's phases.

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Summary | The Earth-Sun-Moon System

Lesson Question

How do the movements of Earth and the moon affect each other?

Answer

(Sample answer) The Earth's rotation causes day and night, whereas revolution results in season changes. The moon rotates on its axis and revolves around Earth, resulting in the lunar cycle.

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Review: Key Concepts

Earth moves through [space] in two ways.

Rotation	Revolution
• Around its axis	• Around the Sun
• Takes about 24 hours	• Takes about one year
• Causes day and night	• Path is called orbit

Review: Key Concepts

The [lunar] cycle occurs each time the moon revolves around Earth.

- The moon reflects the light of the Sun.
- The phases are new moon, waxing crescent, first quarter, waxing gibbous, full moon, waning gibbous, third quarter, and waning crescent.

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Review: Key Concepts

Two main kinds of eclipses occur.

Solar Eclipse

- New moon blocks the view of the Sun.
- Total solar eclipse is when the moon completely covers the Sun.
- Partial solar eclipse is when the moon covers only part of the Sun's disk.

Lunar Eclipse

- Earth blocks sunlight from reaching full moon.
- Total lunar eclipse is when Earth's shadow completely covers the moon.
- Partial lunar eclipse is when only a portion of the moon enters Earth's shadow.

Review: Key Concepts

Earth's tides are caused by the gravity of the moon and the Sun.

Sun and moon pull on Earth. → **Earth's crust bulges.** → **Water levels change.**

The Sun and the moon have gravitational pulls that affect Earth.

Where the Sun and the moon are closest to Earth, the crust and oceans rise a bit.

High tides occur in areas with more gravitational pull; low tides occur in areas with less gravitational pull.

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Use this space to write any questions or thoughts about this lesson.

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