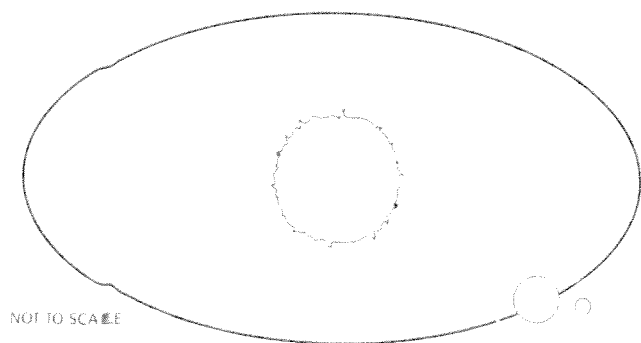


Our Solar System



The **sun** is the center and largest body of our **solar system**. Nine planets and their moons **revolve**, or travel around, the sun. Smaller bodies—icy **comets** and chunks of rock called **asteroids**—also revolve around the sun. Everything travels in the same direction and in its

own **orbit**, or path. Beyond our solar system are the stars that make up the rest of the universe.

The pull of **gravity** holds the bodies of the solar system together. Gravity between the sun and the planets keeps the planets in their orbits. Gravity between each planet and its moons keeps the moons in orbit around the planet.

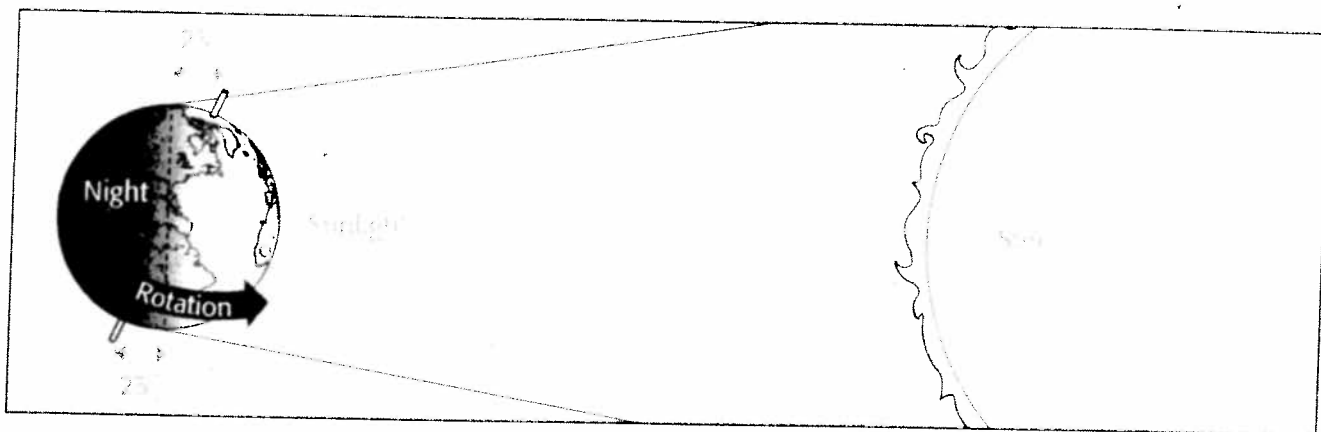
The orbit of a planet is a kind of oval path called an **ellipse**. It takes each planet a fixed length of time to complete one revolution around the sun. Because a planet's movements are predictable, space scientists know where it will be at any time. They need this information when planning space flights and doing research.

Name five objects that make up our solar system.

What prevents the planets from flying off into space? What prevents a planet's moons from flying off into space?

Rotation

What causes day and night on Earth?



As Earth rotates on its axis, half of the globe experiences daytime.

In addition to orbiting the sun, Earth **rotates** on its axis like a spinning top. Imagine a line drawn between the North and South Poles and through Earth's center. This line is Earth's **axis**. Earth rotates from west to east. Because of this motion, the sun, moon, and stars appear to be moving from east to west. As seen from Earth, these bodies rise in the east and set in the west.

Earth's **rotation** causes daytime and nighttime. When a location on Earth faces the sun, it has daylight. When that location faces away from the sun, it is in darkness and has nighttime. One complete rotation is called a **day** and

takes 24 hours. We tell time based on Earth's rotation. Earth is divided into 24 time zones. Each time zone represents one hour in a day. When it is noon at one location, it is noon at all locations within that time zone.

Earth's moon also rotates, but it turns much more slowly than Earth does. It takes the moon the same amount of time to rotate as it takes to revolve around Earth—about 28 days. Because of this, the same side of the moon always faces Earth. Humans had never seen the opposite side of the moon until spacecraft flew around the moon.

Explain how you know that Earth rotates.

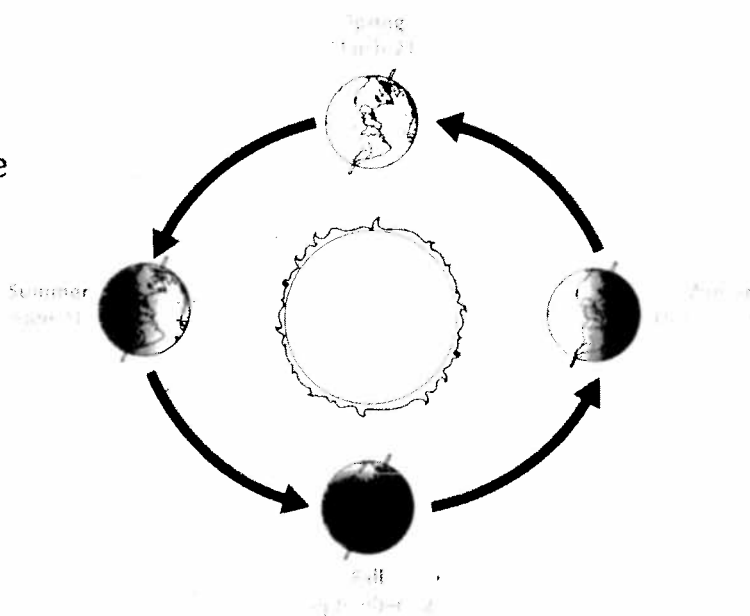
Earth's Revolution

Earth's axis is tilted $23\frac{1}{2}$ degrees. This tilt causes the axis to be pointed toward the sun during some parts of its orbit and away from the sun during other parts. The time it takes Earth to orbit once around the sun is a **year**, or $365\frac{1}{4}$ days. During a year, the Northern and Southern Hemispheres experience **seasons**—changes in the number of daylight hours and average daily temperatures.

When Earth's axis is pointed away from the sun, the Northern Hemisphere has the fewest hours of daylight. This happens on December 21, the first day of winter on the calendar. From December to June, the number of daylight hours in the Northern Hemisphere increases. The Northern Hemisphere has the most hours of daylight on June 21. This is the first day of summer.

Sunlight strikes the side of Earth that is pointed toward the sun more directly than it strikes the side of Earth that is pointed away from it. More direct

sunlight means more energy is received. Thus the Northern Hemisphere receives more solar energy during summer than winter. The Southern Hemisphere experiences seasons opposite those experienced in the Northern Hemisphere.



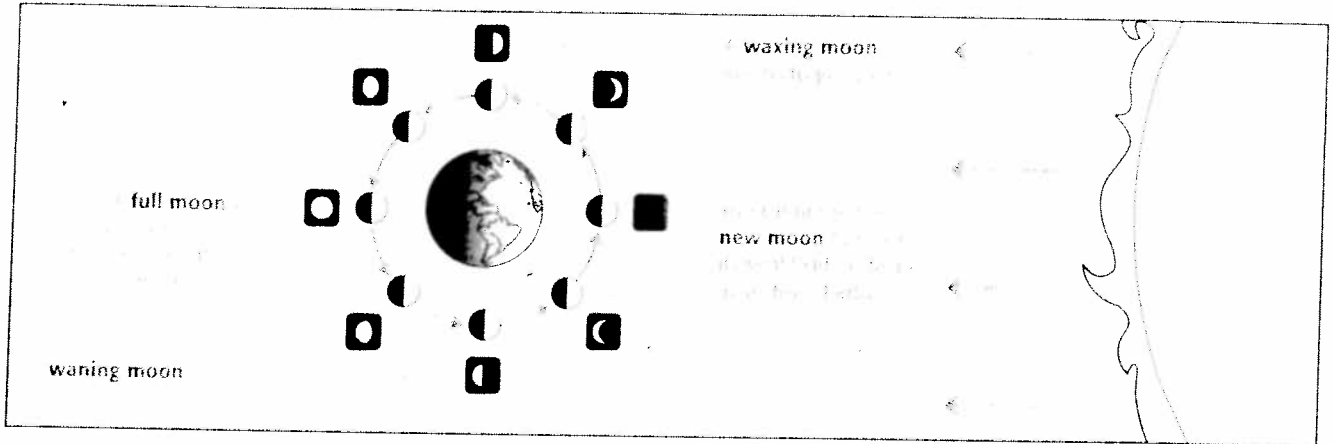
The Northern Hemisphere is cold in winter because the sun's rays strike it less directly. The opposite is true in the Southern Hemisphere.

What You Know

Why does the Southern Hemisphere experience winter in June?

Moon's Revolution

What are the phases of the moon?



Earth's **moon** is the brightest object in the sky, but it gives off no light of its own. The light we see is light from the sun that hits the moon's surface and is reflected to Earth. To people on Earth, the moon appears to change its shape during the month. These changes are the moon's **phases**.

As Earth revolves around the sun, its moon revolves around Earth. As the moon moves through its orbit, its position in the sky changes relative to the positions of the sun and Earth.

Although one full side of the moon is always lighted, the portion of the sunlit side that you see changes during the month.

Sometimes, one body in space blocks the view of another body. This is called an **eclipse**. During a solar eclipse, the moon passes between the sun and Earth and blocks your view of the sun. During a lunar eclipse, Earth comes between the moon and the sun and casts a shadow on the moon.

Use these terms to complete the sentences.

new moon full moon waxing moon waning moon

When Earth is between the moon and the sun, you see a _____.

You cannot see a _____.

A _____ occurs after a new moon and before a full moon.

A _____ occurs after a full moon and before a new moon.