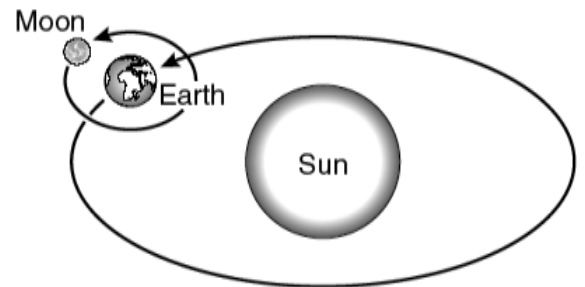


Key Concepts

Earth/Space Systems and Cycles (SOL 4.8)

Space

- The Earth completes one **revolution** around the sun every 365 days. The moon revolves around the Earth about once every month.
- Due to the tilt of the Earth, it experiences seasons during its revolution around the sun.
- The **phases of the moon** are caused by its position relative to the Earth and the sun. The phases of the moon include the **new, waxing crescent, first quarter, waxing gibbous, full, waning gibbous, last quarter, and waning crescent**.
- The **sun** is an average-sized yellow star, about 110 times the diameter of the Earth. The sun is approximately 4.6 billion years old.
- Our **moon** is a small rocky satellite, having about one-quarter the diameter of the Earth and one-eightieth its mass. It has extremes of temperature, virtually no atmosphere, no water, and no life.
- The **Earth** is one of nine planets that revolve around the sun and comprise the solar system. The Earth, the third planet from the sun, is one of the four rocky inner planets. It is about 150 million kilometers from the sun. (The emphasis is placed on the Earth, rather than the other planets.)
- The Earth is a geologically active planet with a surface that is constantly changing. Unlike the other three inner planets, it has large amounts of life-supporting water and an oxygen-rich atmosphere. The Earth's protective atmosphere blocks out most of the sun's damaging rays.
- Our understanding of the solar system has changed from an Earth-centered model of **Aristotle** and **Ptolemy** to the sun-centered model of **Copernicus** and **Galileo**.
- The NASA Apollo missions added greatly to our understanding of the moon.



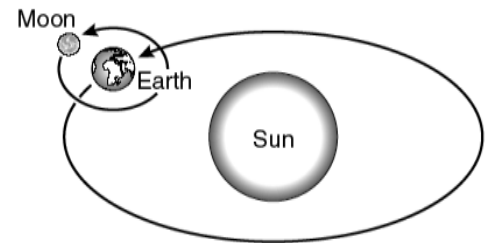
- Our understanding of the sun, moon, and the solar system continues to change with new scientific discoveries.

Rotation and Revolution

Earth is going around and around the sun just as a runner goes around and around a track. The path Earth takes as it moves around the sun is called its **orbit**. Earth's orbit looks like a slightly flattened circle, called an **ellipse**. Earth takes one year (365 days) to make a **revolution** around the sun. One full orbit around another object is called a revolution.

Revolving around the sun is not the only way the Earth is moving. Earth is also spinning. The Earth **rotates** around its axis (an imaginary line that starts at the North Pole, passes through the center of the earth, and stops at the South Pole). The amount of time for one rotation is called a day. On Earth, one rotation takes 24 hours.

The moon is smaller than the Earth and it orbits the Earth. Month after month, the moon keeps orbiting the Earth, even as the Earth is orbiting the sun. Why does the moon orbit the Earth? Why does Earth orbit the sun? The answer to both questions is **gravity**.

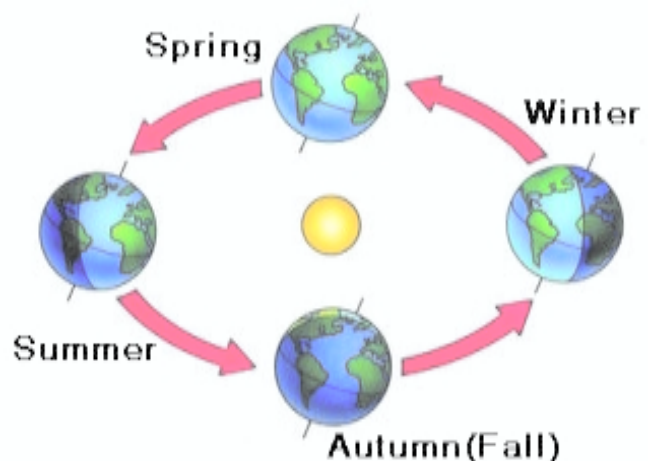
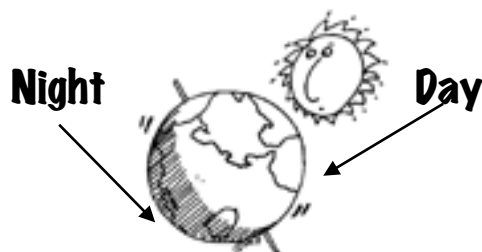


SEASONS

Earth gets light and heat from the sun. However, not all parts of Earth get the same amount of sunlight. Earth's **axis** is tilted in relation to the sun.

The North Pole is tilted toward the sun in the month of June. During this time, the Northern Hemisphere experiences summer and the Southern Hemisphere experiences winter.

Beginning in the month of December, the Southern Hemisphere experiences summer and the Northern Hemisphere experiences winter. The movement of the Earth around the sun and the tilt of Earth are the two reasons why we have seasons.



Earth, Moon, and Sun

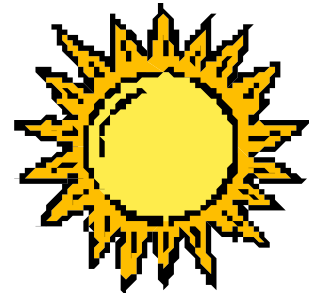
Earth

- The 3rd planet from the sun.
- One of the 4 rocky (terrestrial) inner planets.
- It has large amounts of life-supporting water and an oxygen-rich atmosphere.
- It is a geologically active planet with a surface that is constantly changing.
- The Earth's protective atmosphere blocks out most of the sun's damaging rays.



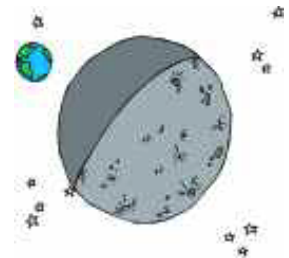
The Sun

- The sun is 1.4 million kilometers (870,000 miles) in diameter. It is about 110 times the diameter of the Earth.
- The sun is a large sphere of hot gas with a surface temperature of 10,000 degrees Fahrenheit.
- The distance between the Earth and the sun is 150 million kilometers (93 million miles).
- The sun is made mostly of hydrogen. It has enough hydrogen to stay shining for about 4 billion years.
- The sun is an average-sized star. It is just like the others in the sky, except the sun is much closer to us.
- The sun is approximately 4.6 billion years old.



The Moon

- The moon is a small rocky satellite, having about one-quarter the diameter of the Earth and one-eightieth of its mass.
- The moon is approximately 4.6 billion years old.
- The moon has little or no atmosphere and no oxygen.
- The moon has no water, wind, clouds, weather, or life.
- You would weigh one-sixth of your Earth weight on the moon.
- The moon is pitted with large craters.
- The moon's surface is very hot during its days and freezing during its nights.
- The distance from the moon to the Earth is 240,000 miles.
- The NASA Apollo missions added greatly to our understanding of the moon.

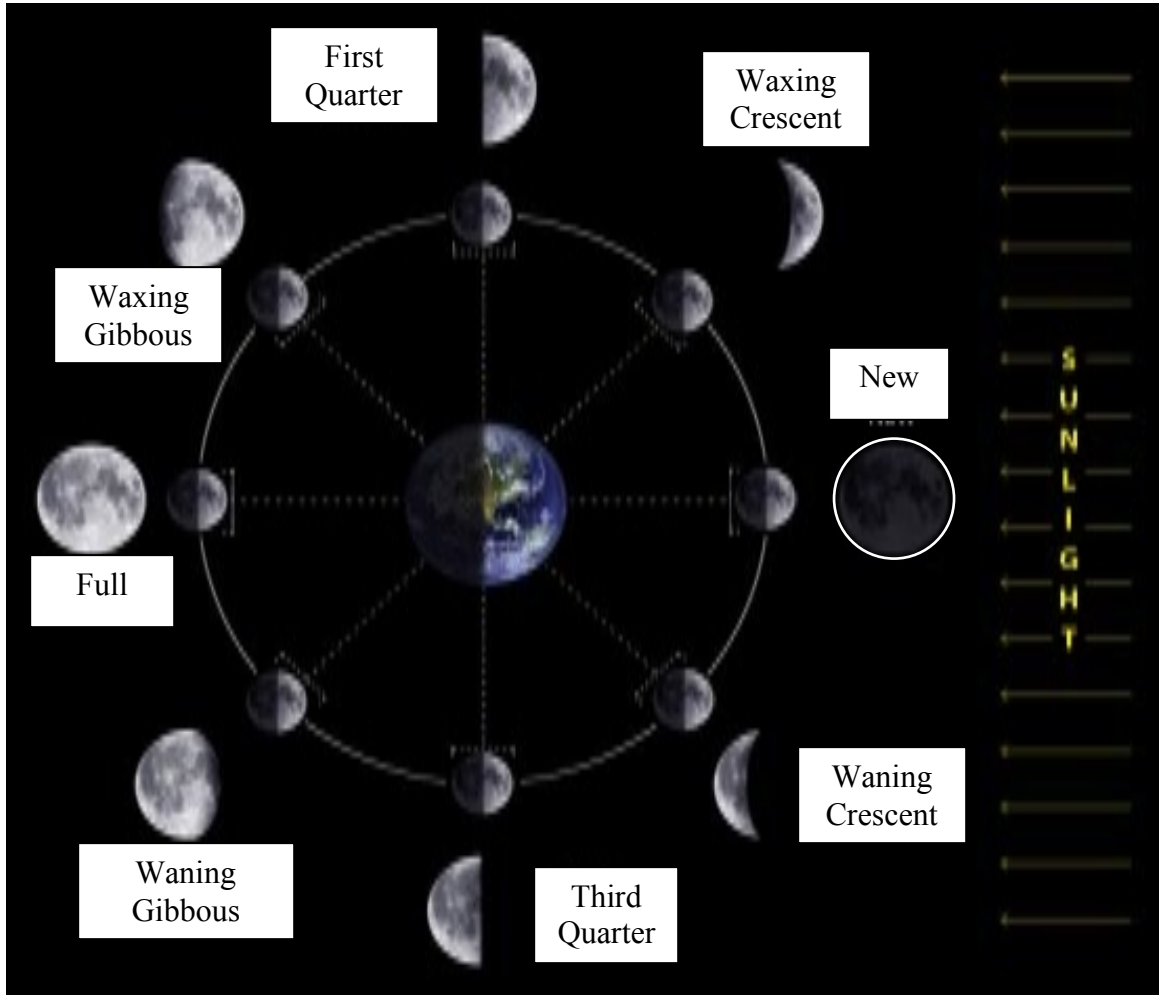


Phases of the Moon

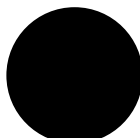
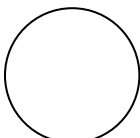
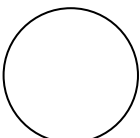
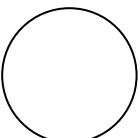
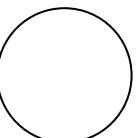
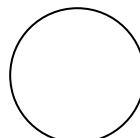
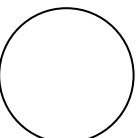
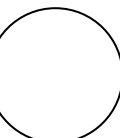
The moon, our closest neighbor in space, is shaped like a ball. Yet, from day to day, its shape seems to change. Sometimes the moon appears as a round circle. At other times, only thin slivers can be seen.

These changes are called **phases of the moon**. The phases appear in a pattern that repeats itself every $29 \frac{1}{3}$ days. This period is the time it takes the moon to orbit the Earth.

Nevertheless, the moon only seems to change shape. The shape of the moon that we see depends on how much of the sunlit half of the moon is facing Earth. The amount of sunlit moon facing the Earth depends on the position of the moon in its orbit around the Earth.



Directions: Illustrate the 8 Phases of the Moon. The new moon has been done for you.

							
New Moon	Waxing Crescent	First Quarter	Waxing Gibbous	Full Moon	Waning Gibbous	Last Quarter	Waning Crescent



Directions: Use S (Sun), M (Moon), and E (Earth) to identify the following descriptions.

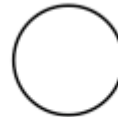
- _____ 1. Has no oxygen, water, wind, clouds, weather, or life
- _____ 2. Small, rocky satellite
- _____ 3. Average-sized star that is closer to us than the other stars in the sky
- _____ 4. Its protective atmosphere blocks out most of the sun's damaging rays.
- _____ 5. Large glob of hot gas with a surface temperature of 10,000 degrees Fahrenheit
- _____ 6. Third planet from the Sun
- _____ 7. One of the four rocky (terrestrial) inner planets
- _____ 8. Pitted with small craters
- _____ 9. 1.4 million kilometers (870,000 miles) in diameter
- _____ 10. Smallest of the three celestial bodies



Directions: Name the phase of the moon you see below.



1. _____



2. _____



3. _____



4. _____

Important Astronomers



Aristotle

Aristotle was born in Greece. He believed that the Earth was a sphere and that the universe was spherical.



Claudius Ptolemy

Ptolemy was an Egyptian geographer, astronomer, and mathematician who believed that the planets and sun orbited the earth. He agreed with Aristotle that the solar system was an Earth-centered model.



Nicolaus Copernicus

Copernicus was a Polish astronomer who theorized that the planets revolved around the sun. He determined the size of the sun and moon and the distances of the sun and moon from the Earth.



Galileo Galilei

Galileo was an Italian scientist who was the first to use a telescope for astronomy. He discovered the rings of Saturn and the mountains and craters of the moon. He supported Copernicus' theory that everything revolved around the sun (sun-centered model).