Standards: S6E1.c, S6E1.d, S6E1.f, S6CS5.a, S6CS7.b

The Solar System

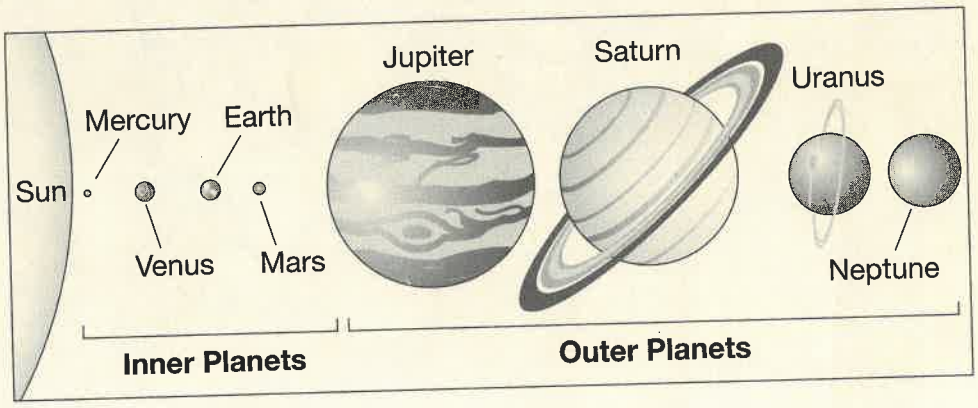
Key Words • solar system • planet • inner planets • outer planets • astronomer • moon • asteroid • comet • meteoroid • meteor • meteorite • revolution • orbit • rotation • axis

Getting the Idea

Our planet, Earth, is one of the eight planets in our solar system. A **solar system** includes all of the planets, moons, and other objects that revolve around a star. A **planet** is a large space object that moves in a curved path around a star, such as our sun. Our solar system includes the sun, eight planets, their moons, and various comets, asteroids, and other small bodies. The solar system also contains large clouds of dust and gas.

The Planets

In order of distance from closest to the sun to farthest from it, the planets are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Mercury, Venus, Earth, and Mars are called the **inner planets** because they are closest to the sun. Jupiter, Saturn, Uranus, and Neptune are called the **outer planets** because they are farther from the sun.



NOTE: Distances not to scale

The inner planets are relatively small. They are made up mainly of rock and metal, and have few or no moons. The outer planets are large, and made up mainly of light gases and ices. The outer planets have rings and many moons. The diagram on page 12 does not show the rings of Jupiter and Neptune because they are hard to detect.

Until recently, a small, rocky body beyond Neptune called Pluto was considered a planet. In 2006, a group of **astronomers**, scientists who study the universe, voted to redefine what makes a space object a planet. As a result, they reclassified Pluto as a dwarf planet. Astronomers have also classified two other small bodies, Ceres and Eris, as dwarf planets. However, not all scientists agree with the new definitions.

Moons and Other Bodies

A **moon** is a natural object that revolves around a planet. Earth has one moon. The outer planets each have many moons. Only two planets, Mercury and Venus, have no moons. Most moons are solid or partly solid. Earth's moon and the two moons of Mars are made of rocky material. Astronomers also refer to moons as *satellites*. These natural objects are different from the satellites launched into space from Earth.

The only object in the solar system that humans have visited is Earth's moon. Two American astronauts walked on the moon for the first time in 1969.

Asteroids are large pieces of space rock with irregular shapes. Most are found in the asteroid belt between Mars and Jupiter. They can collide with objects such as Earth's moon, creating huge craters on the surface.

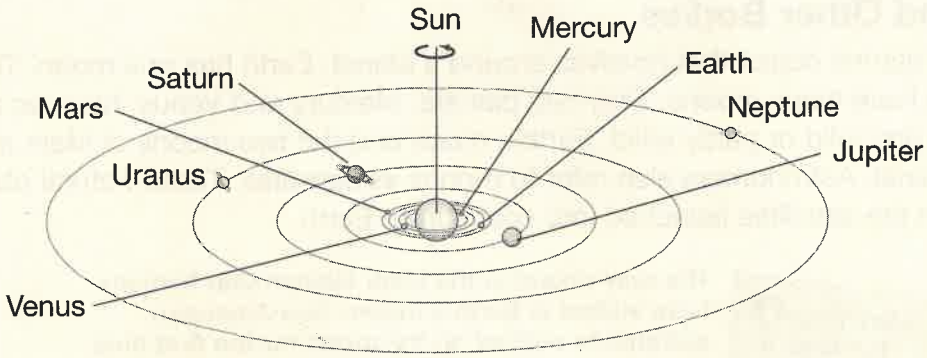
Comets are bodies made up of ice, dust, and small, gritty particles. As they approach the sun, the ice turns to gas, producing a spectacular streak that is often referred to as a tail. Comets come from faraway regions of the solar system beyond the planets. One of them, the Oort cloud, is very far away. Some people consider it the edge of our solar system. The Oort cloud may be filled with billions, even trillions, of comets.

Meteoroids are pieces of rock or dust that are smaller than asteroids. When meteoroids enter Earth's atmosphere, they usually burn up and produce streaks of light called **meteors**. We also refer to meteors as shooting stars. Those that land on Earth are called **meteorites**.

Planetary Movements

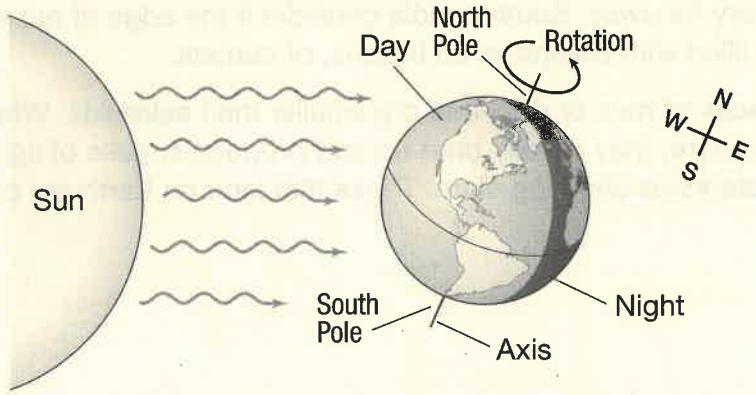
If you could travel far above the plane of our solar system and look down on it, you would see all of the planets moving around the sun in a counterclockwise direction. The movement of a body in space around another body is called **revolution**. The path that a revolving body takes is called its **orbit**. One revolution is one complete path, or orbit.

Earth travels in an orbit that is nearly circular. Most of the other planets have orbits that are close to circular also, although Mercury and Mars have orbits that are shaped more like an oval. If you could look at the solar system from the side, it would appear mostly flat, like a pancake, because most of the planets orbit on roughly the same plane.



NOTE: Diagram not to scale

In addition to revolving around the sun, all of the planets rotate, or spin, on their axes. The movement of a space object turning on its own axis is called **rotation**. An **axis** is an imaginary line that runs through the center of a planet or another body. One rotation is one complete turn on an axis. All of the planets except Venus and Uranus rotate in the same, counterclockwise direction in which they revolve around the sun.



NOTE: Not to scale

Earth's rotation is why we have day and night.

Movement of Planets in the Night Sky

If you watch the planets in the night sky, you will notice that their positions change in relation to the stars. Stars do move in space, but they are so far away from Earth that we cannot detect their movement. When you look at the stars from Earth, you see the same star patterns. The Big Dipper always looks like the Big Dipper even though its position may change over the horizon.

However, the position of the planets does change compared to the background of stars. The planets are much, much closer to Earth than any star except the sun, so we see the movement of the planets as they revolve around the sun.

Discussion Question

Why can you see Mercury, Venus, Mars, Jupiter, and Saturn with your eyes alone but not Uranus or Neptune?

The Solar System

1. Which statement describes how the sun and the planets of our solar system are related?

   A. Planets revolve around the sun.
   B. The sun revolves around planets.
   C. Planets rotate on their axes.
   D. The sun rotates on its axis.

2. Which characteristic do all the inner planets share?

   A. They all have moons.
   B. They are all gaseous.
   C. They are all solid and rocky.
   D. They are all larger than Earth.

3. Which list gives the correct order of the outer planets, starting with the planet closest to the sun?

   A. Jupiter, Saturn, Neptune, Uranus
   B. Saturn, Jupiter, Uranus, Neptune
   C. Jupiter, Saturn, Uranus, Neptune
   D. Saturn, Jupiter, Neptune, Uranus

4. Which of these is NOT a planet?

   A. Mercury
   B. Earth
   C. Neptune
   D. Pluto