Comparing the Planets

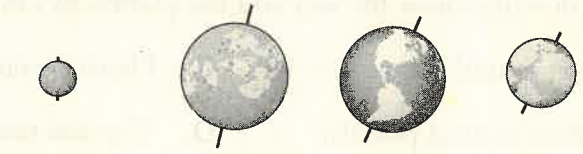
Key Word • atmosphere

Getting the Idea

Recall from Lesson 1 that our planet, Earth, is one of eight planets in our solar system. The inner planets are small, rocky, and closer to the sun. The outer planets are large, gaseous, and farther from the sun. Although the planets are divided into these two groups, they are also very different from one another.

The Inner Planets

Remember that planets orbit the sun at different distances. 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. The inner planets are Mercury, Venus, Earth, and Mars.



Mercury Venus Earth Mars

Mercury is the closest planet to the sun and the smallest. There is no water on Mercury, and the planet has a very thin atmosphere. An **atmosphere** is a blanket of gases that surrounds a planet. Many craters and smooth plains can be found on Mercury's surface. The planet is scorching hot on the side facing the sun and freezing cold on the side that faces away. These extremes make it impossible for life as we know it to survive on Mercury.

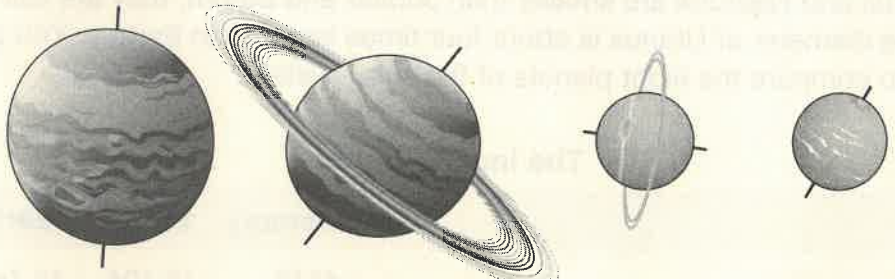
Venus is about the same size as Earth. It has a rocky surface with plateaus, mountains, and plains. Venus has no water and is much hotter than Earth, so no living things from Earth could survive there. Venus has a thick atmosphere that is mostly carbon dioxide. This gas traps the sun's heat, and makes the average surface temperature on Venus the hottest in the solar system—about 465°C (or 870°F).

Earth is the only planet in the solar system that can support life. Earth's surface is rocky and covered with plains, mountains, and valleys. Earth is the only planet in the solar system three-quarters covered by liquid water. Our planet's atmosphere contains nitrogen, oxygen, and several other gases. The conditions on Earth support a rich mix of plant and animal life.

Mars is smaller than Earth, with a diameter about half that of Earth. Mars is called the "Red Planet" because of its red soil and rocks. The color comes from iron oxide, or rust. The surface is rocky and dusty, with huge craters, mountains, and rocky plains. The largest volcano in the solar system is on Mars and is so big it would cover the state of Washington. Mars's atmosphere is thin and contains mostly carbon dioxide. At times, its surface temperature can be below –100°C. At other times, it can be close to 0°C, the freezing point of water. Space probes have found evidence that there may have once been liquid water on Mars. If so, there might have been life in the Martian soil at one time as well.

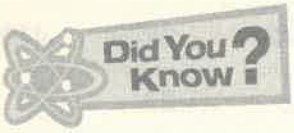
The Outer Planets

Recall from Lesson 1 that the asteroid belt lies between Mars and Jupiter. The four planets beyond the asteroid belt are Jupiter, Saturn, Uranus, and Neptune. They are called the outer planets. They are much larger than the inner planets and made mostly of gases, so they are also called "gas giants." Their larger size keeps many more moons in orbit around them. However, none of these planets can support life as we know it. The planets' temperatures are too cold, and their surfaces and atmospheres are much different from Earth's.



Jupiter Saturn Uranus Neptune

Jupiter is the largest planet in the solar system. Its mass is more than 300 times the mass of Earth. Most of this mass is hydrogen and helium. Unlike the inner planets, Jupiter does not really have a solid surface. It is best described as a fluid planet with an outer layer made of hydrogen and helium gases and inner layers of liquid hydrogen. Jupiter spins very quickly, completing one rotation in about ten hours. This helps make Jupiter's atmosphere a stormy place. Bands of colored clouds that look like stripes mark Jupiter's outer layers. Jupiter also has a thin set of rings and at least 62 moons. One of these moons is larger than Mercury. Another has volcanoes that may be more active than those on Earth.



The large, red spot on Jupiter is a huge storm in its atmosphere. This storm is so large it could surround the entire planet Earth.

Saturn, the sixth planet from the sun, is the second-largest planet after Jupiter. Like Jupiter, Saturn is a fluid planet made of liquids and gases, mostly hydrogen. It has super-high winds that can reach speeds that are five times greater than those of the worst hurricanes on Earth. Saturn has 62 known moons and the solar system's largest system of rings. The rings are made of tiny bits of ice, rock, and dust.

Uranus is the seventh planet from the sun and is the third largest planet in diameter. Because of its distance from the sun, it is very cold and takes 84 years to orbit the sun. Like Jupiter and Saturn, it has an atmosphere made mostly of hydrogen, but also frozen materials such as water, ammonia, and methane. As a result, Uranus is sometimes described as an "ice giant." Frozen methane gives the planet its blue-green color. Uranus has rings and 27 known moons. The planet's axis is tipped much more than that of any of the other planets. As a result, Uranus seems to roll on its side as it rotates.

Neptune is the most distant planet from the sun—so far away that it takes 165 years to orbit the sun. It is slightly smaller than Uranus in diameter. Like Uranus, Neptune is a very cold, giant ball of gases, liquid, and ice. Neptune has 13 moons and a system of rings.

Although Uranus and Neptune are smaller than Jupiter and Saturn, they are still much larger than Earth. The diameter of Uranus is about four times larger than Earth's. You can use the tables below to compare the eight planets of the solar system.

The Inner Planets

	Mercury	Venus	Earth	Mars
Diameter (kilometers)	4879	12,104	12,756	6794
Average distance from the sun (millions of kilometers)	58	108	150	228
Number of moons	0	0	1	2

The Outer Planets

	Jupiter	Saturn	Uranus	Neptune
Diameter (kilometers)	142,984	120,536	51,118	49,528
Average distance from the sun (millions of kilometers)	778	1427	2870	4498
Number of moons	62	62	27	13

Source: *www.nasa.gov*

Discussion Question

What are three reasons why the outer planets cannot support life as we know it?

Comparing the Planets

1. Which of these is **not** one of the inner planets?

   A. Earth
   B. Venus
   C. Uranus
   D. Mercury

2. How are Jupiter, Saturn, and Uranus similar?

   A. They are all fluid planets of liquids and gases.
   B. They are all the same size.
   C. They are all the same distance from the sun.
   D. They all have the same surface temperature.

3. Why is the surface of Venus so hot?

   A. It is the closest planet to the sun.
   B. Huge volcanoes warm its atmosphere.
   C. It has no atmosphere to shield it from the sun's heat.
   D. Carbon dioxide in the atmosphere traps the sun's heat.

4. Which of the following statements about Earth is true?

   A. It is the only planet in the solar system with an atmosphere.
   B. It is the only planet in the solar system known to support life.
   C. It is the only planet in the solar system with a moon.
   D. It is the only planet in the solar system that rotates on an axis.