

INVESTIGATE

Seeing Mars in 3-D HANDS-ON ACTIVITY

1. Make a viewer by cutting out two eyeholes from a rectangle of stiff paper. The holes should match your eye positions.
2. Tape a piece of red filter over one hole. Tape a piece of blue filter over the other hole.
3. Hold the viewer in front of your eyes so that your right eye looks through the blue filter and your left eye looks through the red filter. Examine pictures of Mars's surface taken by the *Pathfinder* mission supplied by your teacher.

THINK ABOUT IT: Why might scientists find 3-D pictures useful for studying Mars?



Objective

Describe features on the planet Mars.

Key Term

rift: valley caused by a crack in the crust of a planet

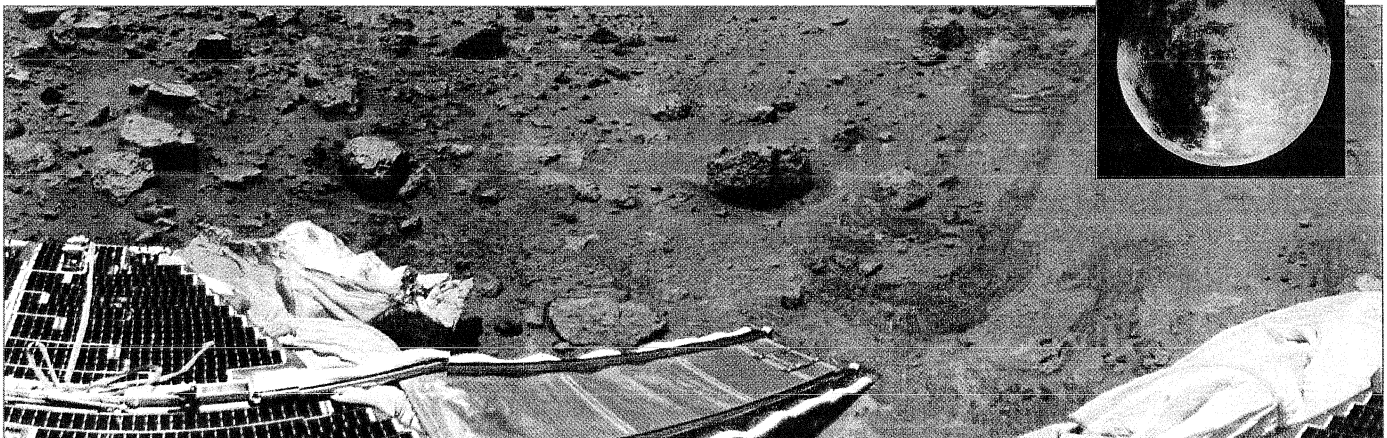
The Red Planet Mars is the fourth planet from the Sun. Its orbit period is 687 days. Its rate of rotation is 24 hours and 37 minutes. Therefore, the lengths of a day on Mars and on Earth are almost the same. Mars has seasons similar to Earth's seasons because of the similar tilt of its axis. However, Mars is half the diameter of Earth. Its surface is reddish in color. Mars has volcanoes, valleys, polar ice caps, craters, and river channels. It has a thin carbon dioxide atmosphere.

The air pressure on Mars is about the same as the air pressure on Earth at an altitude of 35 km. Except for some icy spots at the poles, no water is visible on the Martian surface. Mars is a dry world. It can be colder than Antarctica in winter and as warm as a spring day in the American Midwest.

1 CONTRAST: How do Mars and Earth differ?

The Martian Surface Many space probes, including two *Viking* landers, have studied Mars. Photographs show that the surface has many craters and is covered with loose rocks. Winds of up to 100 km/h raise giant dust storms that cover the planet. Scientists think that Mars probably once had rivers or lakes on its surface.

2 IDENTIFY: What spacecraft visited Mars?



▲ Figure 17-19 The surface of Mars was photographed by the *Viking* lander. It showed a landscape with rocks scattered all around.

Giant Volcanoes and Canyons The largest known volcano in the solar system is called Olympus Mons. Olympus Mons is found on Mars. It is 27 km high. Had Olympus Mons formed on Earth, it would not have been nearly as high. This is because Earth's gravity is stronger. At the summit of the volcano is a large crater. Mars has many other large volcanoes. Mars also has a large **rift**, or crack, in its crust that forms a complex canyon system. The canyon, called Vallis Marineris, stretches 4,000 km. On Earth, this canyon would reach across the United States.

3 EXPLAIN: Why are volcanoes on Mars much larger than volcanoes on Earth?

Water on Mars Scientists have used robot spacecraft to search for water on Mars. Finding water could mean that Mars has life. There is some water ice at the Martian south pole. There are also many dry channels on Mars that look like they were carved by running water. Where is the water today? It may be frozen beneath the surface or have boiled away in the thin atmosphere.

4 INFER: Where might water be on Mars?

✓ CHECKING CONCEPTS

1. What causes the huge dust storms on Mars?
2. How are Mars and Earth similar?



Integrating Life Science

TOPICS: bacteria, fossils

FOSSILS FROM MARS?

In 1984, a meteorite was found in Antarctica that scientists think came from Mars. Like other planets, Mars has been struck by asteroids often in its past. Mars was struck by one such asteroid about 16 million years ago. Pieces of the surface broke off and went flying into space. Eventually, a meteorite from this asteroid strike fell to Earth.

Some scientists studying the rock found unusual, rodlike structures in it. They suggested that these tiny structures might be bacteria fossils. If the rodlike structures are from Mars, it could mean that life existed on Mars many years ago. However, these structures might have become part of the meteorite as it fell through the atmosphere to Earth.

Thinking Critically What evidence of possible life was in the meteorite?

3. How do the Vallis Marineris on Mars and the Grand Canyon on Earth compare in size?
4. Why do we think water might exist on Mars?



THINKING CRITICALLY

5. **INFER:** If Mars once had water, what might have happened to it?
6. **APPLY:** Could humans live on Mars? How?

Web InfoSearch

Martian Canals In 1877, an Italian astronomer said that he had seen "channels" on Mars. This word became "canals" when the report was translated into English. Some people, including the astronomer Percival Lowell, assumed that the canals must have been built by Martians.

SEARCH: Use the Internet to find out more about the "canals" on Mars. Do they exist? Start your search for information at www.conceptsandchallenges.com. Use the key search words **Martian canals**, **Mars canals** **Lowell**, and **Percival Lowell**.



▲ **Figure 17-20** Possible bacteria fossils (right) were found on an Antarctic ice sheet similar to the one shown above.