

Curiosity on Mars

A Reading A-Z Level W Leveled Book

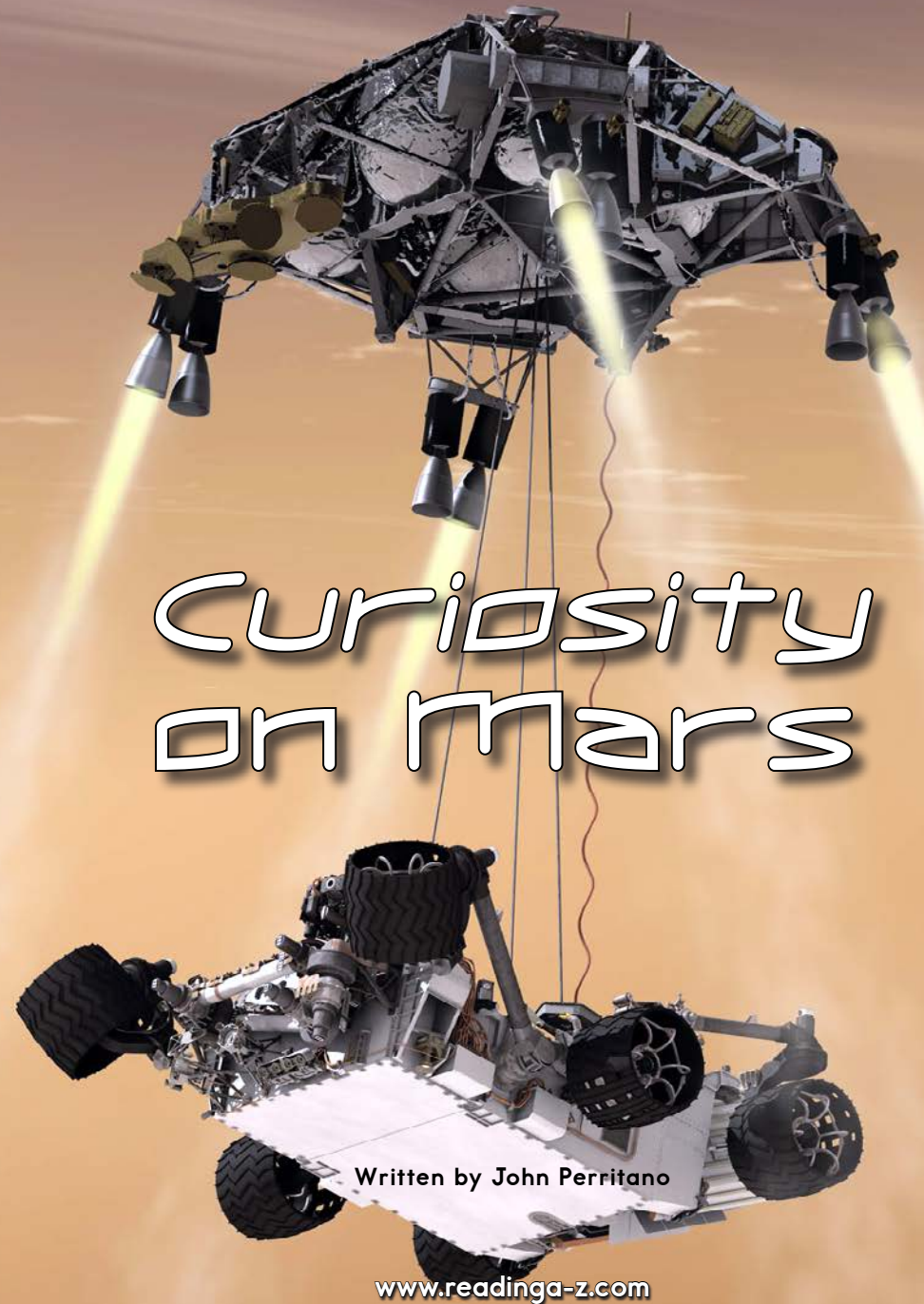
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Curiosity
on Mars

Written by John Perritano

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Glossary

elements (<i>n.</i>)	substances made of one type of atom and that cannot be broken down into simpler substances (p. 11)
evidence (<i>n.</i>)	something that supports a theory or claim (p. 4)
extraterrestrial (<i>adj.</i>)	existing or coming from outside Earth or its atmosphere (p. 8)
laser (<i>n.</i>)	a device that projects intense, focused light of similar wavelengths (p. 11)
Martian (<i>adj.</i>)	of or relating to the planet Mars (p. 5)
microbes (<i>n.</i>)	microscopic organisms (p. 13)
mission (<i>n.</i>)	a set purpose for doing something; a special task or assignment (p. 7)
relay (<i>v.</i>)	to pass along something, such as information or a signal (p. 15)
robotic (<i>adj.</i>)	of or related to a device that is programmed to perform tasks for humans (p. 4)
rover (<i>n.</i>)	a vehicle used to explore the surface of an object in space, such as a planet or moon (p. 4)
satellites (<i>n.</i>)	a natural or human-made object that orbits Earth or another object in space (p. 15)
simulates (<i>v.</i>)	models or imitates the appearance or condition of something (p. 14)



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Cover: The Sky Crane fires rockets to slow its descent while lowering *Curiosity* carefully to the surface of Mars in this computer rendering.

Back cover: A self-portrait by *Curiosity*, shortly after landing on Mars.

Title page: On November 26, 2011, an Atlas V rocket, carrying the *Curiosity* rover, lifted off from Cape Canaveral in Florida.

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Correlation

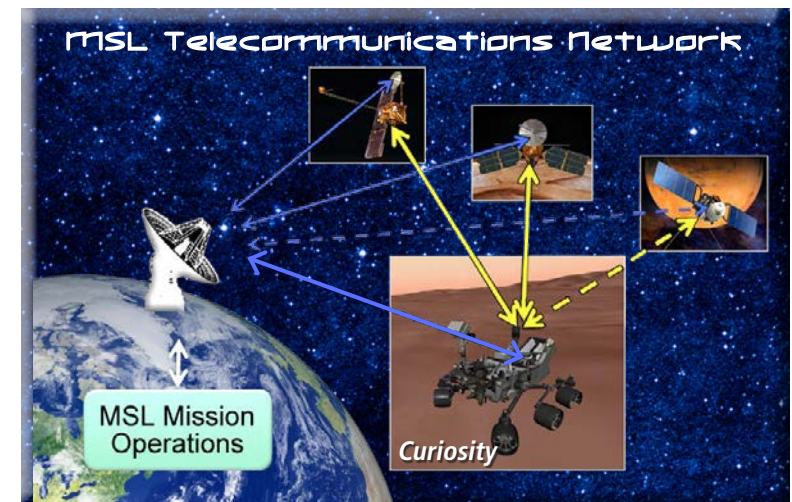
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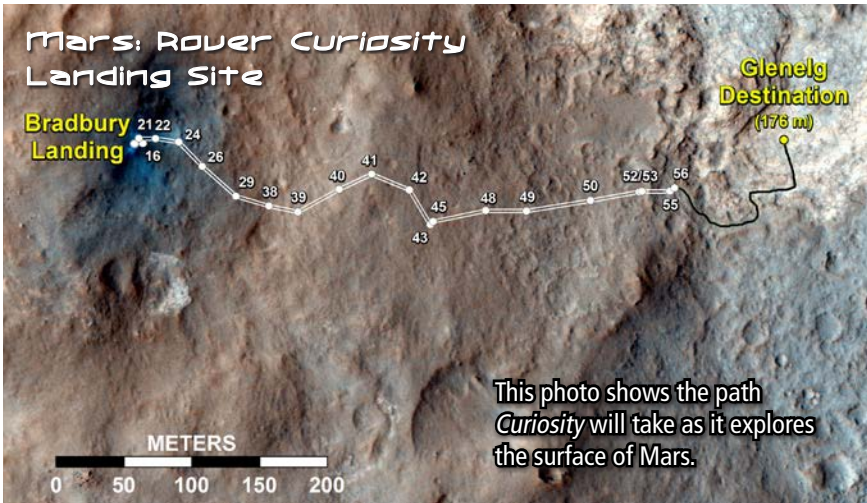
Listening In

Talking to *Curiosity* is more complicated than picking up a smartphone and calling a friend. The rover can send messages directly to Earth. It can also **relay** signals by using three **satellites** orbiting Mars.

Scientists send and receive the signals using a system of giant antenna dishes (see diagram). The system is called the Deep Space Network. The huge dishes are located near Madrid, Spain; Canberra, Australia; and the Mojave Desert in California.

Scientists will be listening—at least for the next two years—as *Curiosity* drives along the Martian landscape, hoping to see if anyone else is out there.





Driving *Curiosity* is a hard job; one bad turn could doom the mission. That’s why Heverly meets with scientists to talk about where the rover should go before he gets behind the wheel or, in this case, the computer.

Once in the driver’s seat, Heverly must put on special glasses to study the 3-D images that *Curiosity* sends back. He then uses a computer program that **simulates** the route. Heverly enters hundreds of computer commands that steer the craft. *Curiosity* crawled only thirty feet a day when it first landed.

CURIOUS FACTS

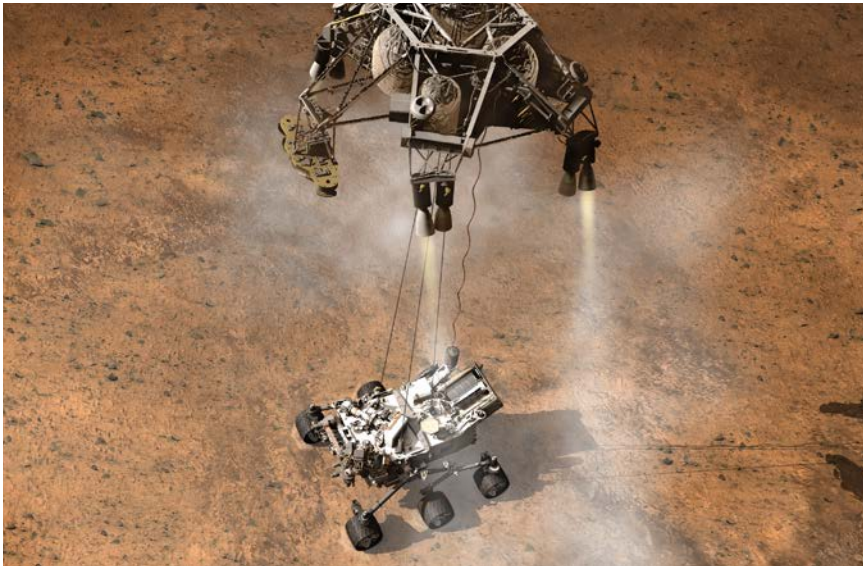
The temperature on Mars can dip below -81 degrees Fahrenheit (-62.78°C). Heated liquids pump through *Curiosity* to keep the rover warm.



Scientists watch *Curiosity* test its robotic arm at NASA’s Jet Propulsion Laboratory in 2010.

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Touchdown! In a move never before attempted by NASA, *Curiosity* is lowered gently to the surface of Mars by a Sky Crane (computer rendering).

Landing on Mars

Jet Propulsion Laboratory
Cupertino, California
September 20, 2012, 7:20 PM

It will be over in the time it takes to hard-boil an egg. That's the only thing scientists know for sure. Some hold their breath. Others bite their fingernails. All hope the strange-looking spacecraft lands safely on Mars.

The spacecraft's name is *Curiosity*. Its job is to look for **evidence** of past or current life on Mars. *Curiosity* is a mechanical **rover** larger than a golf cart. In fact, it's the largest **robotic** vehicle that NASA, the United States' space agency, has ever built.

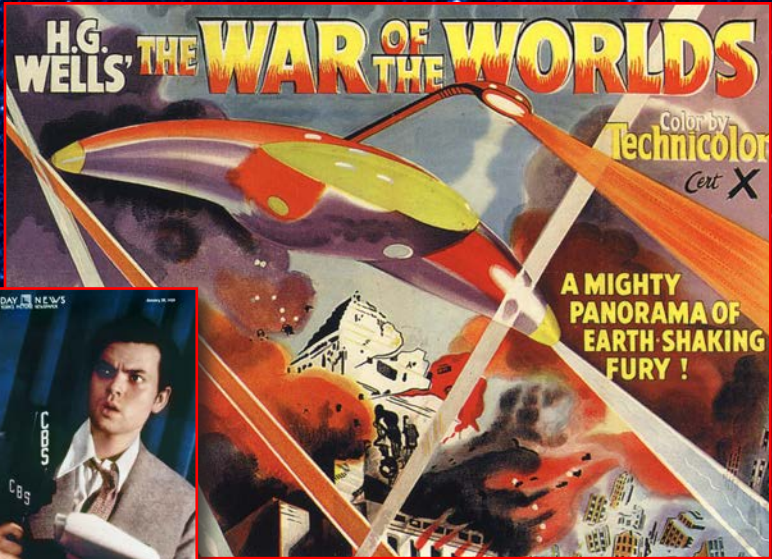
Driving *Curiosity*

Some people drive buses for a living. Others drive taxicabs. Still others drive delivery vans. When Matt Heverly is on the job, he drives *Curiosity*.


Scientists think they have the best opportunity to find evidence of life inside Gale Crater

Mars is about twice the size of Earth's moon. Yet, the rover is motoring only in one neighborhood, called Gale Crater. A meteor created the crater about three billion years ago. The hole is the size of Connecticut and Rhode Island combined. Inside the crater is a mountain taller than Mount Rainier, which towers over Seattle, Washington.

Scientists think they have the best opportunity to find evidence of life inside this crater. That's because scientists believe Gale Crater was once flooded with water. As a result, the crater is packed with clays and sulfates—types of minerals. These minerals are byproducts of water. *Curiosity* will study the soil to see if any **microbes** are hiding inside.



H.G. WELLS' THE WAR OF THE WORLDS
Color by Technicolor
Cert X
A MIGHTY PANORAMA OF EARTH SHAKING FURY!



Mars Attacks

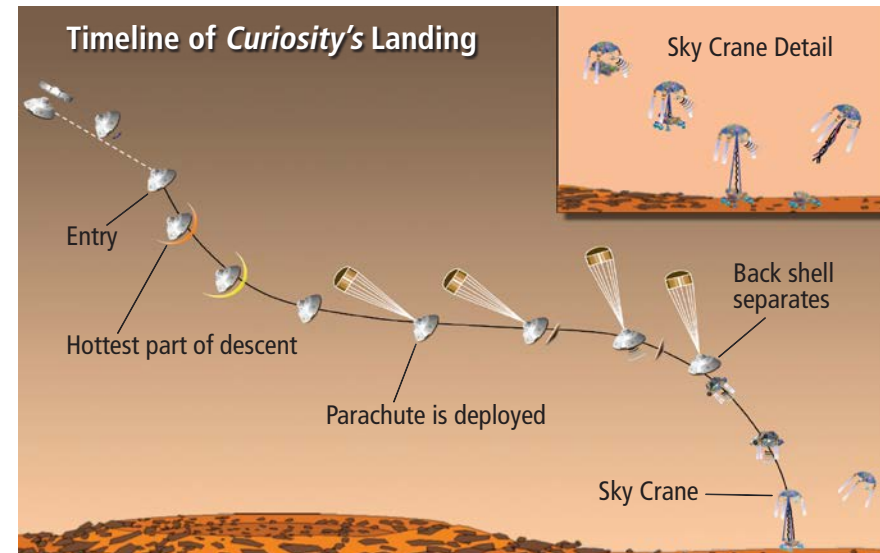
On the night of October 30, 1938, many Americans gathered in their living rooms and listened to the radio. On that night, they heard something shocking. "A huge flaming object" had smashed into a New Jersey farm. The Martians were invading! People in and around New York City panicked. They called the police. They called newspapers. They called radio stations. Should they get out of town? How should they protect themselves?

People didn't really have to worry. The broadcast was a radio play called "The War of the Worlds." The play was based on a novel by H. G. Wells. At the beginning of the broadcast, an actor named Orson Welles (above) told listeners that the "invasion" was not real. Many people did not hear the introduction, however. They really thought Mars was attacking Earth.

Curiosity hurtles through space at 13,000 miles (20,921 km) per hour as it breaks through the planet's atmosphere. What happens next is a 7-minute plunge to the surface—and the longest 420 seconds in the lives of NASA scientists on the Mars rover team.

Although the **Martian** atmosphere is thin, it produces enough drag to slow *Curiosity* to 1,000 miles (1,609 km) per hour. Still, at this speed, the craft is moving far too fast to land.

But scientists have planned for this moment. A 100-pound parachute blossoms from the top of the craft. The chute slows *Curiosity* to 200 miles (321 km) per hour, the speed of a Formula 1 race car.





August 5, 2012. Scientists at the Jet Propulsion Laboratory react to the *Curiosity* rover landing safely on Mars.

Seconds later, the parachute releases. With seconds to go and the surface of Mars fast approaching, the Sky Crane holding *Curiosity* beneath it fires its rocket engines. They slow the craft even more.

About 66 feet (20 m) above the planet's surface, the Sky Crane gently lowers *Curiosity* to the ground on cables. Scientists have never before tried to land a spacecraft using this method. Will it work? No one knows. The control room is silent.

Finally, the seven minutes are up. "Touchdown confirmed!" someone shouts. Cheers fill the room. People hug. A few cry. *Curiosity* has landed.

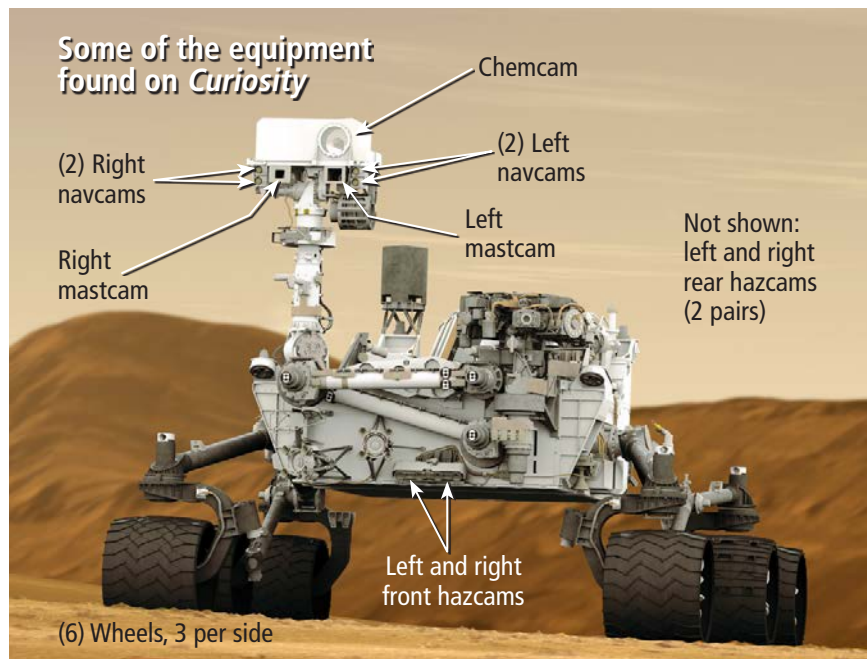
Curiosity also has a rock-blasting **laser**. Once the laser zaps a rock, special instruments examine the gases that spew into the air. The rover also has a drill that can grind bits of boulders into dust. *Curiosity* can look at the dust and determine the makeup of the minerals and chemicals. The rover can also scoop up and study bits of Martian dirt.

What exactly are *Curiosity* and the NASA scientists looking for? The rover's mission is to search for the building blocks of life. These include carbon, hydrogen, nitrogen, oxygen, and other **elements**. If *Curiosity* finds these elements, it means life may now exist, or in the past have existed, on the Red Planet.

Curiosity at a Glance

Mission name: Mars Science Laboratory	Landed: 10:32 p.m. (Pacific Time), August 5, 2012
Size: 10 feet long, 9 feet wide, and 7 feet tall	1:32 a.m. (Eastern Standard Time), August 6, 2012
Weight: 2,000 pounds (900 kg)—about the weight of a small car	Length of mission on Mars: One Mars year (about 23 Earth months)
Launched: November 26, 2011	

Curious Facts
Curiosity's power comes from electricity produced by plutonium, a fuel used in nuclear power plants.



Mobile Science Lab

If there is life on Mars, *Curiosity* has a good chance of finding it. It is the brainiest Mars rover ever—a science lab on wheels. On August 5, 2012, the rover wasted no time in getting to work after landing. *Curiosity* popped the protective dust covers off its cameras and turned on its weather station. It took its first images and beamed them back to Earth.

Curiosity is outfitted with many newly designed pieces of equipment, including 3-D cameras. Scientists can now view the Martian landscape as if they were walking on the planet themselves.

Searching for E.T.

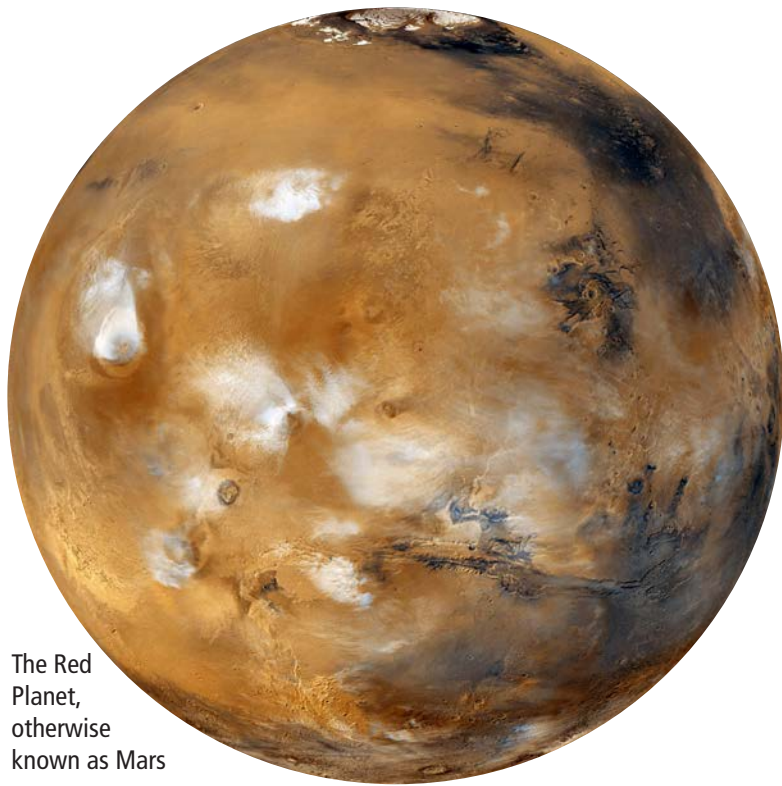
Mars has fascinated people for centuries. The ancient Romans and Greeks named the planet for their gods of war. In 1877, an Italian astronomer wrongly thought he saw canals on the Martian surface. His mistake gave rise to the idea that someone was living there.

As time passed, people soon realized that Mars and Earth had a lot in common. Mars is just as old as Earth. As on Earth, the seasons on Mars change. The planet has volcanoes, mountains, and valleys. Yet, Earth has one thing that has yet to be found on Mars—life.



Ancient Greeks named their god of war Ares. Ancient Romans named their god of war Mars.

As far as we know, Earth is the only planet in our solar system that has ever been home to living things. Scientists hope that will all change by the time *Curiosity's* **mission** ends in two years. They hope the Red Planet has, or once supported, life.



The Red Planet,
otherwise
known as Mars

Although NASA sent the spacecraft to Mars to search for aliens, the rover won't be looking for little green men. Instead, it will search for tiny **extraterrestrial** life-forms hiding beneath rocks or buried under the soil. Such creatures might be smaller than a one-celled animal or as tiny as a virus.

Where might these critters have come from? Long ago, water flowed on Mars. Water is vital for life. If Mars was wet, perhaps life flowered on its rust-red surface. If life did bloom on Mars, it might have left behind some proof.

Spirit or Opportunity
2004

Sojourner
1996

Curiosity
2012

Scientists standing with test models of the three rovers that have been sent to Mars.

ROVING AROUND MARS

Besides Earth, Mars is the most studied planet in our solar system. Humans have sent many space probes to Mars to look for life and study its geology.

The most famous missions involve robotic rovers. In 1996, the United States launched the *Pathfinder* probe. The probe landed on Mars on July 4, 1997. Two days later, a six-wheeled rover named *Sojourner* began roaming the Martian surface. *Sojourner's* findings showed scientists that Mars was more Earthlike than originally thought.

In 2004, two other rovers—*Spirit* and *Opportunity*—arrived. They landed on opposite sides of the planet. These robots were more complex than *Sojourner*. Their mission was supposed to last ninety days. *Spirit* went silent in 2010, but *Opportunity* is still on the job.