

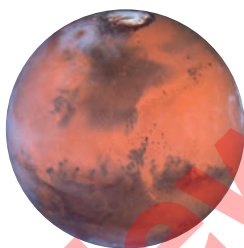
7 Ways to Survive on Mars

Jill Bryant



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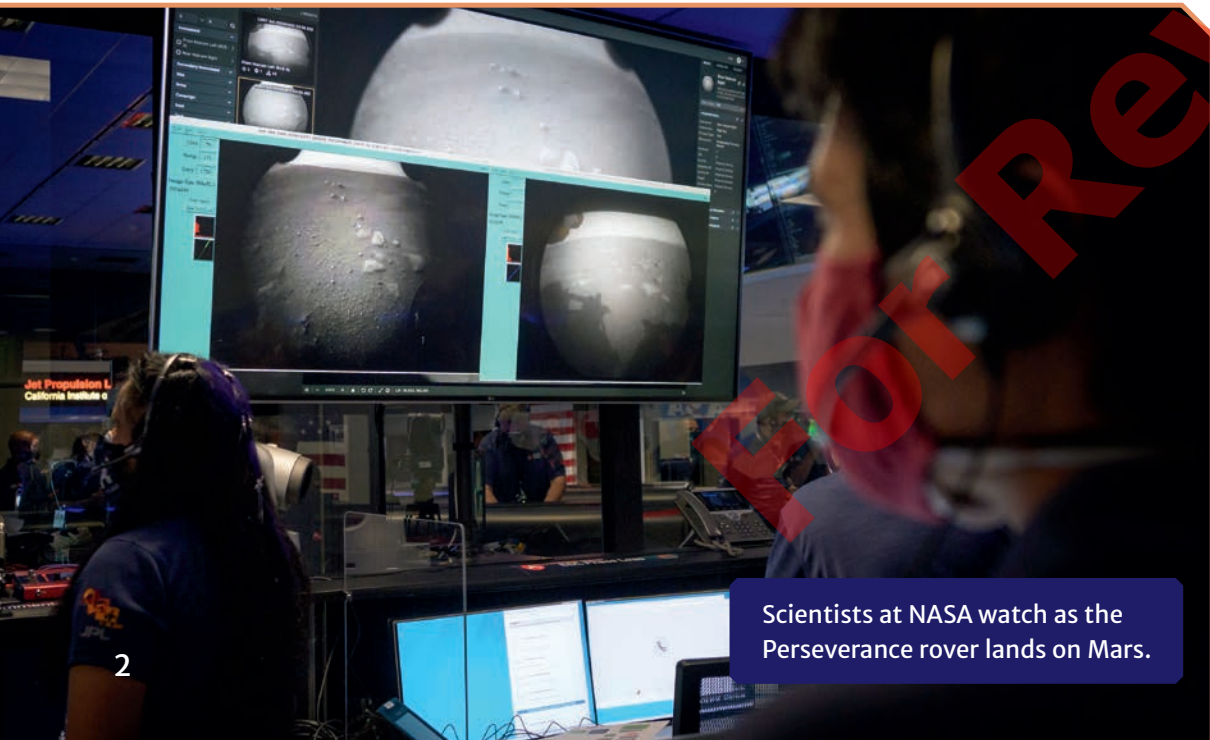
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Choose Adventure

Mars is the closest planet to Earth, but unlike Earth, it has an environment that is extreme and hostile for humans. The landscape is rocky, the soil is **toxic** and oxygen levels are very low. Yet, as far back as 1960, space agencies such as the USA's National Aeronautics and Space Administration (NASA) began sending devices to Mars, taking photos and collecting information. As we strive to learn more about Mars, some scientists and citizens are investigating the possibility of living on Mars one day.

Let's consider how humans could choose adventure and successfully live on another planet. What is required to survive on Mars?



Three and a half billion years ago, Earth and Mars weren't so different. But since then, Earth has become a planet that supports vibrant life, while Mars is cold and bare.

Earth and Mars: Then and Now

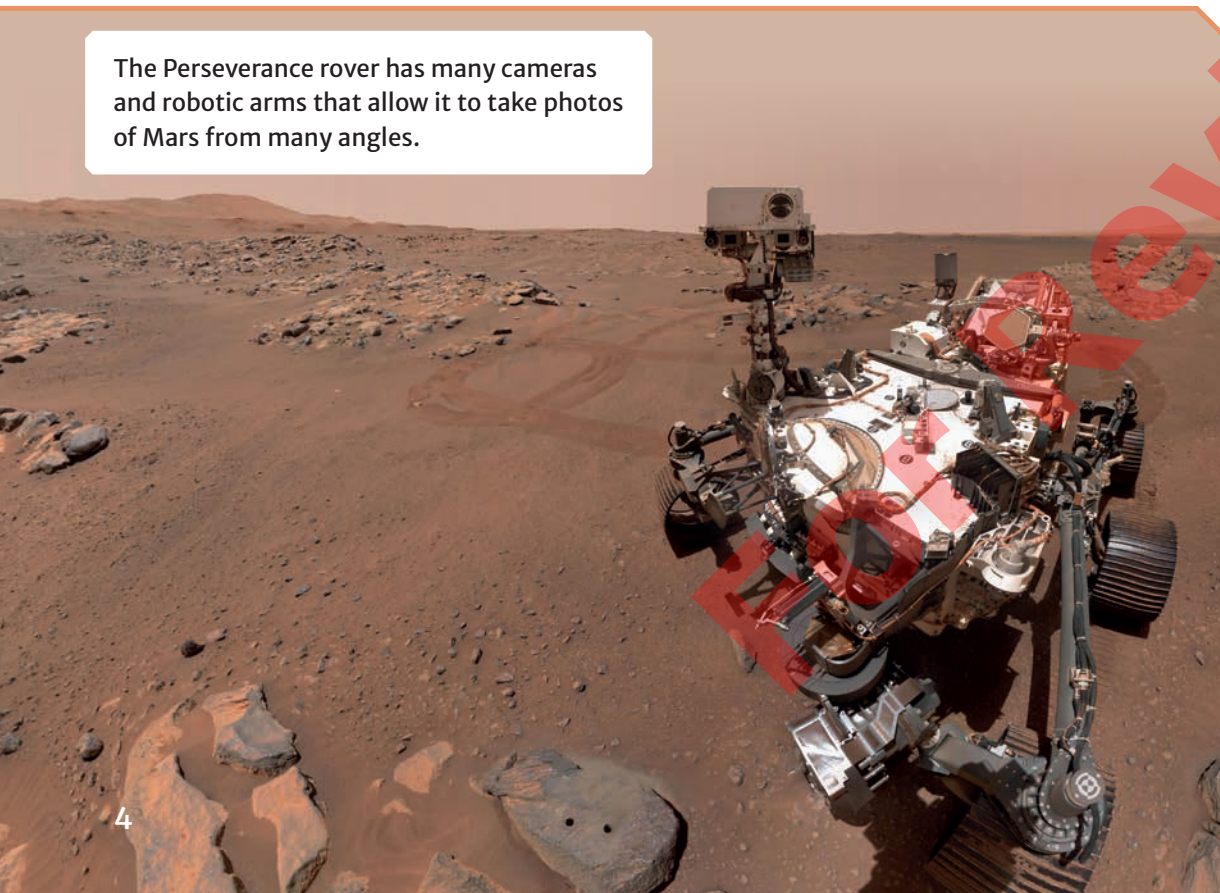
Earth – The Blue Planet		Mars – The Red Planet	
Then (3.5 Billion Years Ago)	Now (Present Day)	Then (3.5 Billion Years Ago)	Now (Present Day)
extreme heat	temperate climate	mostly cold, sometimes temperate	extreme cold
no oxygen	plenty of oxygen	no oxygen	trace amounts of oxygen
may have been covered in water	water (oceans, rivers, lakes) and ice	water (oceans, rivers, lakes)	may be some water; ice below surface
lots of active volcanoes releasing water vapour	hurricanes, tornadoes, volcanic eruptions, thunderstorms, snowstorms, droughts, floods	active volcanoes, floods, acid rain, dust storms, strong winds, superstorms, snow	dust storms
no living things	living things (flora and fauna)	possibility of living things	no confirmed living things

Ready, Set, Research!

To even consider living on Mars, you will first need to do lots of research.

Robotic devices called rovers have already collected lots of information for scientists on Earth. Space agencies such as NASA send rovers from Earth to Mars, a journey through space that takes seven to ten months. Then, the rovers travel over the Martian landscape, taking photographs. The rovers are “uncrewed”, meaning there are no humans on board to operate the controls. Instead, commands are often sent from Earth.

The Perseverance rover has many cameras and robotic arms that allow it to take photos of Mars from many angles.

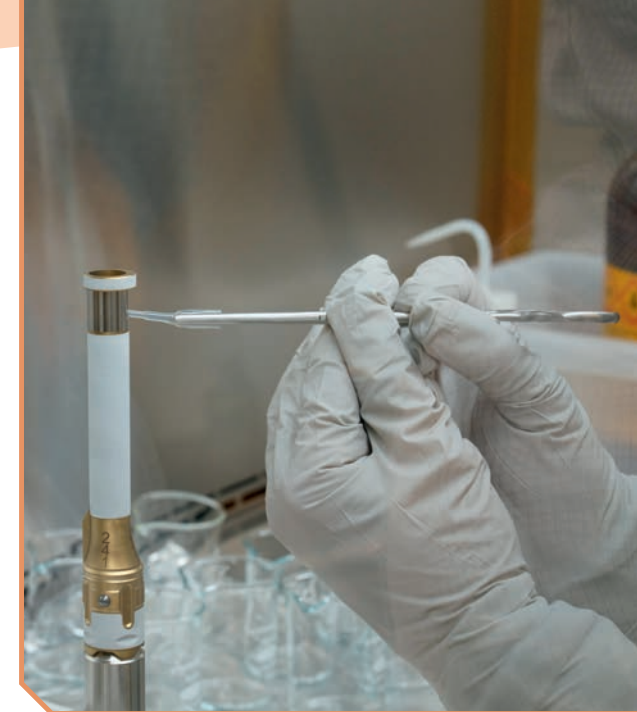


Rovers also take temperature readings, extract samples of rocks and soil, and search for tiny **organisms**. In the future, scientists hope to bring the sample tubes of rock and soil collected by each rover back to Earth to study. This process will be complicated and expensive but will allow scientists to gather even more detailed information about Mars.

When you have learned as much as possible about Mars, you and your team will be ready to start building a city.

NASA space engineers have sent five rovers to Mars.

- July 1997: Sojourner, a robot on wheels, hits the ground on Mars.
- January 2004: A rover called Spirit lands on Mars. Three weeks later its twin, Opportunity, arrives.
- August 2012: The Curiosity rover touches down for a long visit.
- February 2021: The Perseverance rover lands inside a Martian crater.

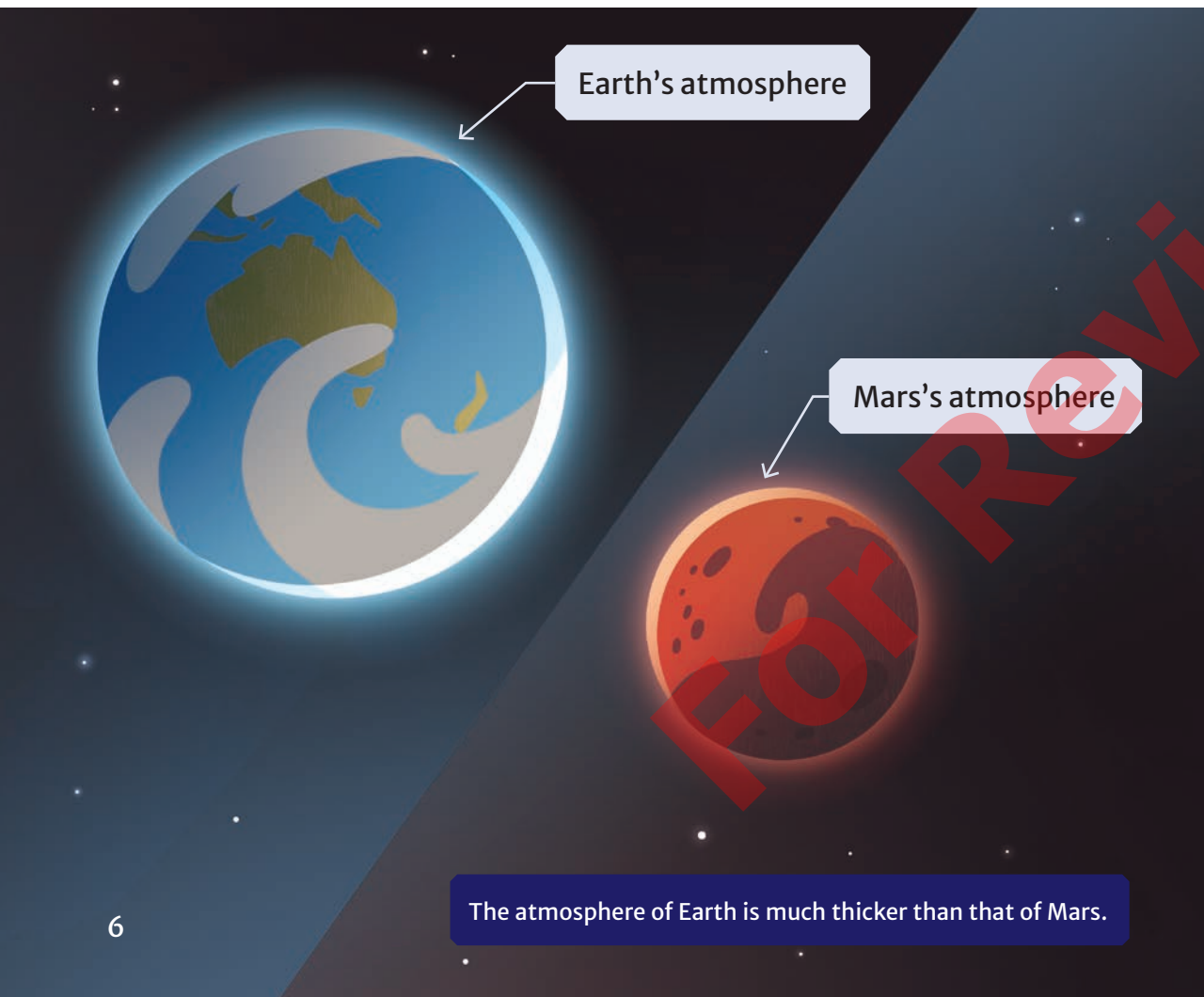


Samples of Martian rock and soil collected by rovers are stored in tubes like this.

1 Make Your Own Oxygen

Humans need oxygen to survive. Unfortunately, the **atmosphere** on Mars has only small amounts of this gas. Mars's thin atmosphere is mostly made up of carbon dioxide, which is deadly to humans in large amounts.

To live on Mars, you will need a steady supply of oxygen.



The atmosphere of Earth is much thicker than that of Mars.

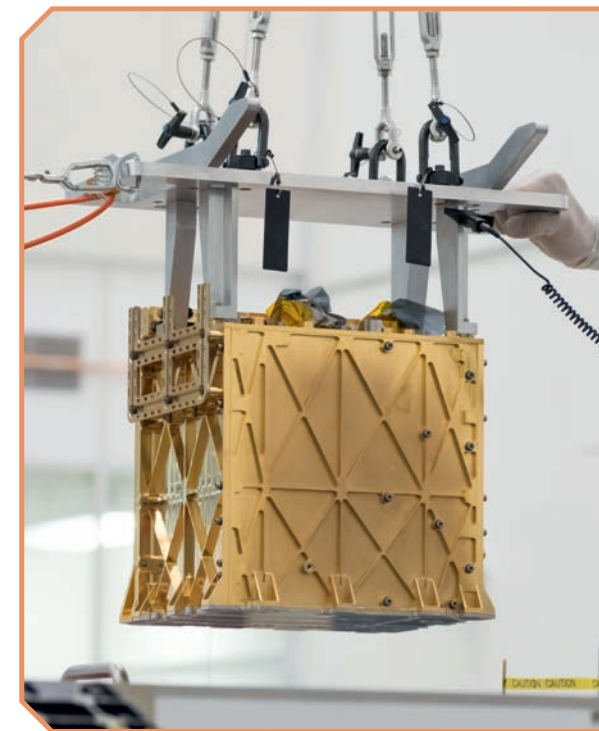
Oxygen Factory

Rather than bringing tanks of oxygen from Earth, you could make oxygen on Mars. It is possible to extract oxygen from the atmosphere on Mars with an oxygen generator.

In 2021, NASA used its Perseverance rover to launch a major experiment to produce a small amount of oxygen on Mars. It was successful! The experiment was named the **Mars Oxygen In-Situ Resource Utilization Experiment**, or MOXIE.

MOXIE super-heats the small amounts of oxygen found in the atmosphere on Mars. Then, oxygen is extracted from the carbon dioxide in the atmosphere. Clean, pure oxygen is collected. Using this technology, scientists can attempt to create a stable supply of oxygen on Mars.

Astronauts need to breathe in about 30 grams of oxygen per hour of regular activity. However, MOXIE produces just 5 grams of oxygen per hour. Oxygen generators will need to become much more effective to support a city on Mars.



MOXIE was placed into the Perseverance rover in a lab in 2019.