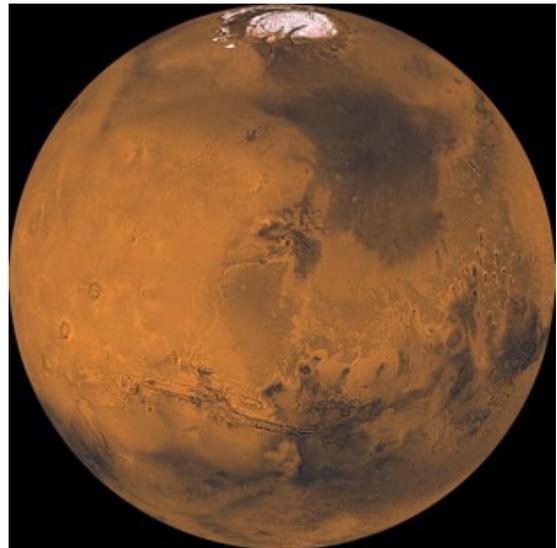


## What Mars Reveals about Life in Our Universe

### *Companion Q&A Fact Sheet*

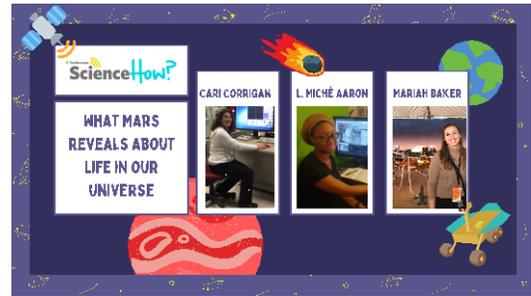
Educators from the Smithsonian’s Air and Space and Natural History Museums assembled this collection of commonly asked questions about Mars to complement the Smithsonian Science How webinar broadcast on March 3, 2021, “What Mars Reveals about Life in our Universe.”

Continue to explore Mars and your own curiosities with these facts and additional resources:



- [NASA: Mars Overview](#)
- [NASA: Mars Robotic Missions](#)
- [National Air and Space Museum on the Smithsonian Learning Lab: “Wondering About Astronomy Together” Guide](#)
- [National Museum of Natural History: A collection of resources for teaching about Antarctic Meteorites and Mars](#)

- [Smithsonian Science How: “What Mars Reveals about Life in our Universe” with experts Cari Corrigan, L. Miché Aaron, and Mariah Baker](#)  
(aired March 3, 2021)



## Mars Overview

### How long is Mars' day?

Mars takes 24 hours and 38 minutes to spin around once, so its day is very similar to Earth's.

### How long is Mars' year?

Mars takes 687 days, almost two Earth years, to complete one orbit around the Sun.

### How far is Mars from Earth?

The distance between Earth and Mars changes as both planets move around the Sun in their orbits. At its closest, Mars is just 34 million miles from the Earth; that's about one third of Earth's distance from the Sun. On the day of this program, March 3, 2021, Mars was about 135 million miles away, or four times its closest distance.

### How far is Mars from the Sun?

Mars orbits an average of 141 million miles from the Sun, which is about one-and-a-half times as far as the Earth is from the Sun.

### What's the temperature on Mars?

Like Earth, Mars has areas that are hotter or colder. The average surface temperature on Mars is minus 80 degrees Fahrenheit (°F), very cold! But it can be as warm as 86 °F at the equator and as cold as minus 284 °F at the poles. However, the heat stays close to the ground; if you were standing on the

warmest part of Mars, your feet might feel 86 degrees °F, but up by your head it would be below 0 °F.

### **How big is Mars (compared to Earth)?**

Mars is 4,221 miles wide, just about half the size of the Earth.

### **Is there oxygen on Mars/What is the Mars atmosphere made of?**

Mars' atmosphere has a tiny amount of oxygen, just 1%, which is not enough for people to breathe. 95% of the Mars atmosphere is carbon dioxide, which gives the sky its pinkish color. The atmosphere of Mars is very thin, 100 times less dense than Earth's.

### **Is there water on Mars?**

There is water on Mars, but the surface is too cold for it to stay liquid. There is evidence of frozen water ice on the surface and some water underground where it is warmer.

### **Is there ice on Mars?**

There is ice on Mars in many different places. A lot of it is located at the poles, similar to Earth's ice cap in the Arctic, but there is also ice trapped in rocks on Mars and in craters across the planet.

### **Does it rain on Mars?**

No, Mars does not have a water cycle with liquid precipitation like Earth does. However, the poles on Mars get cold enough in the winter that some of the carbon dioxide from the atmosphere freezes and becomes ice on the surface.

### **Why is Mars red/orange?**

The rocks on Mars contain a lot of iron, which reacts with the atmosphere and forms rust like we see on Earth. So, the red color we see is the rusty rocks and dust that cover the surface of Mars.

### **What are the dark patches on Mars?**

Different parts of Mars appear lighter or darker depending on how they reflect light. The dark areas are where there is little or no dust, so we're seeing the exposed lava rock, which doesn't reflect as much light.

### **What is the surface of Mars made of?**

Mars is made of rock, and we see a lot of the same minerals there that we find on Earth. The volcanic areas on Mars are made of basalt, the same lava rock we find in Hawaii and Iceland on Earth. Other places on Mars are made of sedimentary rock, like sandstone or mudstone, that we find in river valleys or plains on Earth.

### **How old is Mars?**

Mars formed about the same time Earth did, approximately 4.6 billion years ago. However, the rocks on Mars' surface are much older than what we find on the surface of the Earth, because on Mars there is no plate tectonics replacing the old rocks with new crust.

### **Is there life/aliens on Mars?**

No one has found life anywhere besides the Earth yet. However, we know that Mars used to be a more warm and wet environment, and so scientists are looking for signs of any past life on Mars. That's what the new Perseverance rover is designed to do.

### **Does life/aliens exist in space?**

No one has found life anywhere besides the Earth yet. But the Universe is a big place, and we know that there are at least 4,000 planets orbiting other stars in our Milky Way galaxy. So the chances are good that Earth is not the only place where life could form.

In our solar system, there are several other worlds where the conditions could be right for life, like the underground oceans on Jupiter's moon Europa and Saturn's moons Titan and Enceladus. Future robotic missions are planning to study the environments on those moons to see if life could form there.

### **Does Mars have moons?**

Mars has two moons, named Phobos and Deimos. They are much smaller than Earth's Moon, only about the size of a city. Phobos and Deimos are not round like a ball but shaped like lumpy space potatoes.

### **Does Mars have volcanoes?**

There are lots of volcanoes on Mars, but none of them are active. The largest volcano in the solar system, named Olympus Mons, is on Mars. It is big enough to cover the entire state of South Dakota, and is nearly three times as tall as Mount Everest.

### **Does Mars have valleys or canyons?**

Yes, there are a lot of valleys on Mars. Some are old stream beds where water used to flow and carve out the river shape. Then there is the huge canyon called Valles Marineris, which is 2,500 miles long and five times as deep as the Grand Canyon. It is a big crack in Mars' crust from when the planet was cooling down, like how the top of a cake sometimes cracks after it comes out of the oven.

### **Does Mars have craters?**

The surface of Mars is covered with impact craters, the round holes left behind where meteorites have crashed into the planet. The craters can be as small as a few dozen feet wide, or as large as hundreds of miles across. The biggest crater on Mars is the Hellas Impact Crater, which is a huge basin 1,400 miles wide (about twice the size of Texas).

### **Will Mars ever crash into Earth?**

No, Mars and the Earth are far apart in their separate orbits and will not crash into each other.

### **How long does it take to travel to Mars?**

Mars and the Earth are both moving through space in their orbits, so the distance between them changes. When we send spacecraft to Mars, we launch them when the two planets will be closest together so the journey is as short as possible, about 7 months.

The Earth and Mars reach the point where they are closest together once every 26 months. That is why several countries (the USA, United Arab Emirates, and China) all launched missions around the same time last July, and the spacecraft all arrived at Mars this February.

### **How can I become an astronaut and go to Mars?**

Astronauts come from a wide variety of jobs, including scientists, pilots, doctors, and teachers. The most important skills that astronauts need to have are working together on a team, solving problems, persisting through frustrating or scary situations, and learning new things every day.

Thousands of people apply to be astronauts, yet only a few are selected each time. That doesn't mean you shouldn't follow that dream; real astronauts say it's most important to find something you love to do and focus on getting better at doing it. That way, even if you don't end up being an astronaut, you will be happy in your job and know that you are adding your unique contribution to the world.

### **Can I see Mars in the sky?**

Yes, Mars is visible in the sky from Earth right now. After the Sun has set and the sky is getting dark, stand facing south so that the fading glow of sunset is on your right. Look straight up for a bright dot that is not twinkling and has a slightly orange color. In 2021, the Moon will be close to Mars in the sky on March 18, 19, and 20, which can help you find it.

### **How many robots have visited Mars?**

There have been 28 spacecraft that visited Mars and collected data. A total of 46 spacecraft have attempted to study Mars, but almost half of those missions failed at launch or had problems once they reached Mars and did not send back any data.

### **How many robots are currently working on Mars?**

There are currently 11 spacecraft actively studying Mars: 8 orbiters, 2 rovers, and 1 lander. The orbiters include spacecraft sent by the European Space Agency, China, India, and the United Arab Emirates; all the other active missions were sent by the United States. Tianwen-1, the orbiter from China, is carrying a lander and rover that has plans to touch down on the surface of Mars sometime in spring-summer 2021.

### **Is Mars the only planet inhabited solely by robots?**

Yes, Mars is the only planet with currently active spacecraft on its surface. A few robots have landed on Venus, but they are no longer working. There is currently a Chinese-built rover, Chang'e 4, studying the surface of the Moon, but that's not a planet.

### **Have humans ever visited Mars?**

No humans have visited Mars yet. The only world besides the Earth where humans have landed is the Moon.

### **Will humans ever visit Mars? When?**

There are many organizations working to send humans on a mission to Mars, possibly by the 2030s. However, scientists still need to learn more about Mars' environment and develop new technologies to make sure the astronauts will be safe. So a human mission to Mars will not happen until we have solved all the necessary challenges.

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*The fact sheet's content was assembled by the Smithsonian's National Museum of Natural History and National Air and Space Museum*

