

The Red Planet

Teacher Sheet(s)

Objective: To learn why Mars is called the Red Planet.

Level: K-4

Subjects(s): Science

Prep Time: 10-30 minutes

Duration: Extended

Materials Category: Special Requirements

National Education Standards

Science: 3a, 5a

Math:

Technology (ISTE):

Technology (ITEA):

NGS Geography Standards:

Materials:

- Student Sheets
- Light-colored sand
- Steel wool
- Scissors
- Magnifying lens
- Water
- Journal

Related Links:

Based on a lesson from:

[NASA Langley Research Center—The NASA SciFiles: The Case Of The Inhabitable Habitat](#)

Supporting NASAexplores Article(s):

[Next Stop: Mars](#)

Pre-Lesson Instructions:

- Duplicate the Student Sheets.
- Assign students into groups of two to four.

Background Information:

Mars is the fourth planet from the Sun. Mars is the only planet whose surface

can be seen in detail from the Earth. It is much smaller than Earth. It has two moons, Phobos and Deimos.

Mars is called the Red Planet because it is covered in reddish-brown rocks and soil. Most of the surface is flat, but there are several massive, extinct volcanoes. The tallest volcano, Olympus Mons, is the tallest volcano in our solar system. It's three times taller than Mt. Everest. Mars also has a gigantic canyon, Vallis Marineris. This canyon is as long as the distance from New York to San Francisco.

You'd think Mars would be easier to understand. Like Earth, Mars has polar ice caps and clouds in its atmosphere, seasonal weather patterns, volcanoes, canyons and other recognizable features. However, conditions on Mars vary wildly from what we know on our own planet.

Over the past three decades, spacecraft have shown us that Mars is rocky, cold, and sterile beneath its hazy, pink sky. We've discovered that today's Martian wasteland hints at a formerly volatile world where volcanoes once raged, meteors plowed deep craters, and flash floods rushed over the land. And, Mars continues to throw out new enticements with each landing or orbital pass made by our spacecraft.

Guidelines:

1. Read the NASAexplores K-4 article, "Next Stop: Mars."
2. Discuss how we have learned things about Mars.
3. Ask students if they know the nickname for Mars.
4. Explain that Mars is called the Red Planet because it is covered with reddish-brown rocks and soil.
5. Ask students if they know why the soil on Mars is red.
6. Distribute the Student Sheets and materials.
7. Have students set up experiments and answer questions as directed.
8. Place samples in a safe place. Have students check the samples every day and record what is happening to the soil.

Discussion/Wrap-up:

- After 1 week, discuss the changes in the soil. Martian sand contains iron and oxygen. Those are the ingredients you added to your sand. When iron comes into mixes with water and oxygen, it rusts and turns a reddish-brown. Scientists think there was once enough water on Mars that the whole planet rusted and turned red. We can see the rust all the way from Earth.

Extensions:

- Find examples of rust on Earth.
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The Red Planet

Student Sheet(s)

Materials

- Pie pan
- Sand
- Steel wool
- Scissors
- Magnifying lens
- Water

Procedure

1. Fill the pan half full of sand.
2. Cut the steel wool into tiny squares.
3. Mix the pieces of wool with the sand.
4. Cover with water.
5. Look at the sand with your team. Talk about how the sand looks.
6. Draw and color a picture of your pan. Be sure to put the date on the picture.
7. Check your sand every day. Be sure to keep it covered in water. Write any changes you see in your sample.
8. At the end of the week, draw and color a picture of your soil sample.



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Next Stop: Mars



What will the next ship that goes to Mars look like? You might think of something from Star Wars. The first Mars airplane was just tested. It's not a regular airplane. It won't take off from an airport runway. The Mars

airplane takes off into space on a rocket. It is kept in a special case called an aeroshell. When it gets close to the surface of the planet, it is let loose. Then, it goes closer to the planet. The first plane won't carry people. But, people might get to ride in one someday.

The plane will not land on Mars. It will fly more than a mile above the surface. It will collect facts about the **geology** and the **atmosphere** of Mars. That information will be sent to Earth. Scientists will study what is found.

We have been to Mars. A **rover** called Sojourner was sent in 1997. It landed on Mars. But, it didn't go far from where it landed. It collected a lot of information for researchers. Other missions have flown by the planet. Some have orbited it. They have taken pictures of Mars. The Mars airplane does something



different. It doesn't get information by landing on the planet. It just gets close enough to get facts about the surface and crust of Mars. It can gather more information than the other crafts that have gone to Mars. It will measure how much water and other gases are in the atmosphere. It will send better pictures than the others that have been sent.

The plane is called the Eagle. It went on its first flight in 2002. How did it do that and not leave Earth? The Eagle was taken very high. That is because our atmosphere does not have as much push as you go higher. To get that high, a balloon lifted the Eagle. One of the hardest things to do was to get a balloon big enough. To make the plane smaller, the wings and tail





were folded underneath the plane. Then, the plane was packed into its case. The Eagle was let out. The wings unfolded. The tail straightened. The engine started. The Eagle began its trip. When it landed, the mission was called a full success.

The next steps are to get the plane ready for a full trip to Mars. This trip is planned for about 2007. The important basics have been solved. The Mars airplane can be released from its case. It can unfold its wings and tail sections. It can follow its path. It can get new information. Next stop: Mars.

Published by NASAexplores: April 10, 2003



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Next Stop: Mars



What will the next Mars exploration vehicle look like? You're probably thinking of a futuristic nuclear-powered craft. Actually, it may look more like an airplane! It's quite a bit different from any airplane you've ever seen. For example, it won't take off from an airport runway. The Mars

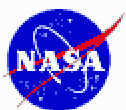
airplane is also known as the Aerial Regional-scale Environmental Survey of Mars, or ARES for short. It is launched into space by a rocket and stored in a protective case called an aeroshell. When it approaches the surface of the planet, it's released for its **descent**. The first planes won't carry people, but future plans do include human passengers.

ARES is being designed for a Mars Scout mission. When it is released from its rocket, it will fly 2.5 kilometers (1.55 miles) above the surface. It won't actually land on the surface. During its flight, it will gather data about the geology and the atmosphere of Mars. That information will be relayed back to Earth, where scientists will be able to study it.

Previous missions to Mars have analyzed the planet's characteristics. The most memorable mission used the 1997 Sojourner rover. Its purpose was different, though. It traveled about 6 meters (20 feet) in each direction from its landing site and collected a great deal of information for researchers. Other missions have flown by the planet, orbited it, and recorded images



of the planet. ARES does something in between. It doesn't collect data by landing on the planet, but it gets close enough to gather detailed information about the surface and crust of Mars. It records information covering hundreds of kilometers, rather than several dozen, in a region called the planet's Ancient Southern Highlands. The pictures returned will be much clearer than any captured by orbiting satellites. The plane will also take direct measurement of water vapor and gas concentrations in the Mars atmosphere.





The ARES **prototype** plane is called the Eagle. In 2002, it completed its first flight in conditions similar to the atmosphere of Mars. How can it do that while on Earth? The Eagle was taken to a height of approximately 31,550 meters (103,500 feet). At this height, the atmospheric pressure is lower, and the atmosphere is less dense. To reach those heights, a high-altitude research balloon lifted the Eagle. To make the Eagle more compact and ready for its flight, the wings and tail sections were folded

underneath the **fuselage**. The entire craft was then packed into the aeroshell protective case. As the Eagle was released from the shell, the wings unfolded, the tail straightened, and the engine started. The Eagle was off on its first flight. When it landed, the mission was declared a full success.

The next steps involve preparing ARES for a full trip to Mars. This trip is planned for about 2007. The important basics have been solved. The Mars airplane can be released from its aeroshell, can unfold its wings and tail sections, and can follow a preplanned route to recover information. Next stop: Mars.

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