

Mars Habitation

Discovering Information About Mars



Students gain background knowledge about environmental factors on Mars through taking notes while viewing a PowerPoint presentation. They then clarify the challenges of living on Mars by generating a list of potential environmental problems.

Supporting Video: <https://mars.nasa.gov/msl/multimedia/videos/index.cfm?v=29>

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Overview

In this lesson plan students will:

- Gain background knowledge about environmental factors on Mars.
- Take notes while viewing a PowerPoint presentation.
- Create a list of potential environmental problems on Mars.

Process/Skills

Time: 5 minute prep time
1 hour lesson time (not counting writing)

Materials:

- Computer and projection system (or print out the powerpoint slides)
- "Discover" Powerpoint presentation
- Student Handouts
- Teacher Guide
- 3-2-1 Template
- Templates for Creative Writing (Map, Postcard, Cinquain/Free Verse, Important/Sensory Poem)
- Writing journals
- Pens/Pencils

Objectives:

1. Students will get their first glimpse into what Mars is really like.
2. Students will consider that if they want to build a community on Mars:
 - a. What would you need to know about its environment?
 - b. How are natural resources different there?
 - c. How is it different from Earth?

Activity (step by step):

STEP 1: ENGAGE (~10 minutes) Identify need for more information about Mars.

1. Ask students to jot down responses to the question "How do humans depend on Earth's resources?"

- a. Remind them to consider the needed resources for the communities they created in the REFLECT stage (Activity 1 in this lesson collection).
2. Allow students to share answers.
3. Ask students how they think the need for planetary resources would change if they moved to Mars.

STEP 2: EXPLORE (~40 minutes) Gain information.

1. Ask students to complete the first two columns on Handout #1 (KWL Chart)
2. Discuss what students already know and what they want to know about Mars.
3. Give students Handouts #2 & #3
4. Have students read Handout #3 and take notes on Handout #2.
5. Go through the “Discover” PowerPoint and have student complete notes
6. Give students the “Discover Rubric” and have them check notes for accuracy and completeness.
7. Collect student work and assess using the “Discover Rubric” in the Teacher Guide.

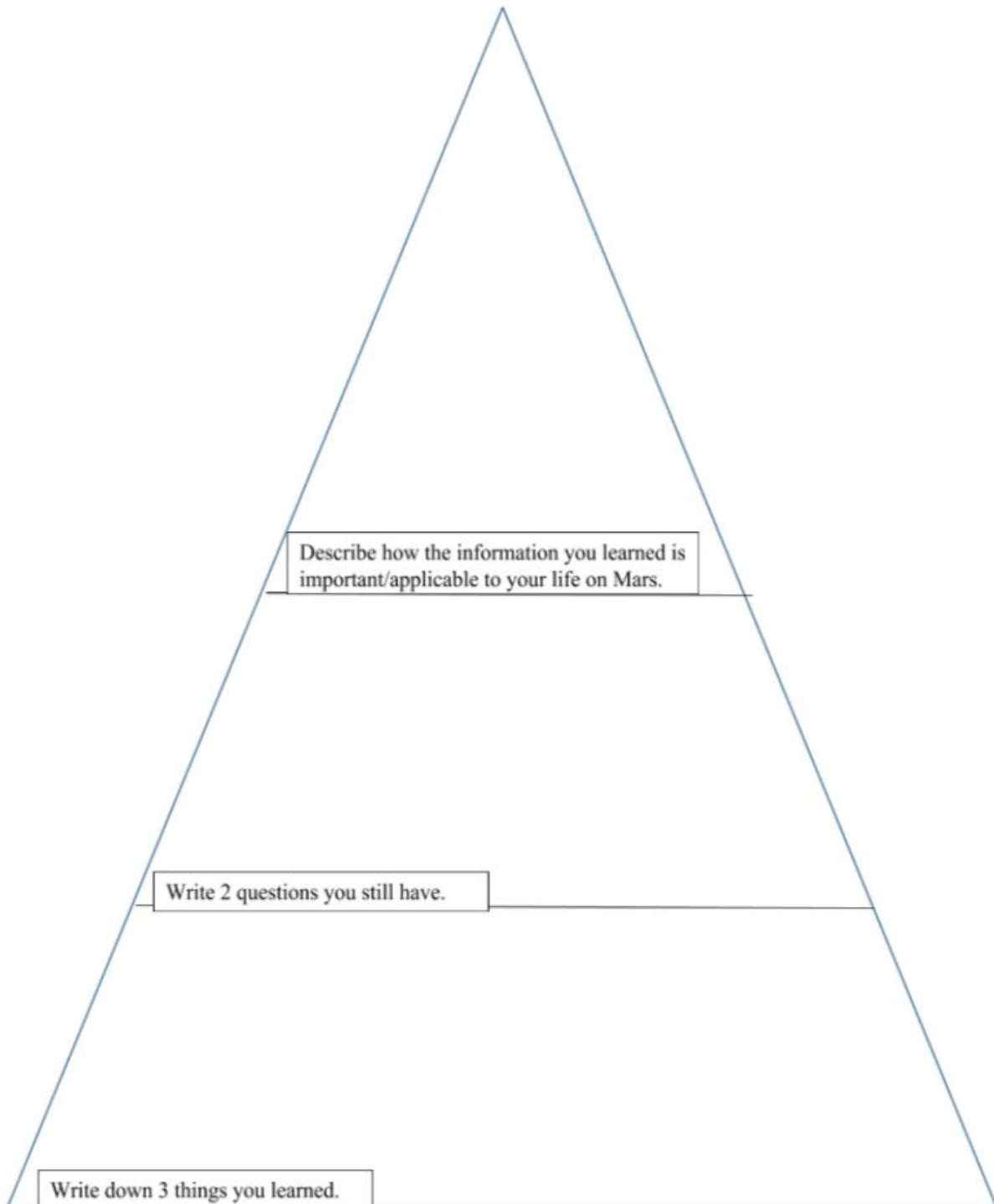
STEP 3: Evaluate (~10 minutes)

1. Have students record what they learned about Mars by completing the final column on Handout #1.
2. Encourage students to discuss how what they learned about Mars could be added to their habitat booklets for the project.

STEP 4: Writing

1. Writing to Learn – Use the 3-2-1 Pyramid Model (See Template) to reflect on today’s activities.

3-2-1 Pyramid Model for Learning



Mars

What I KNOW about Mars	What I WONDER about Mars	What I LEARNED about Mars

Student Handout #2 - Note-taking Sheets (1 of 2)

Directions: Paraphrase (write in your own words) information about Mars.

Topic	Notes
Sun	
Temperature	
Seasons	
Radiation	
Atmosphere & Oxygen	
Atmospheric Pressure	

Student Handout #2 - Note-taking Sheets (2 of 2)

Topic	Notes
Water	
Soil	
Wind & Dust	
Gravity	
Landforms on Mars	

What Is Mars?

Mars is the fourth planet from the sun and the next planet beyond Earth. It is, on average, more than 142 million miles from the sun. Mars is about one-sixth the size of Earth. Mars is known as the Red Planet. It gets its red color from the iron in its soil.

Mars is named for the ancient Roman god of war. The Greeks called the planet Ares. The Romans and Greeks associated the planet with war because its color resembles the color of blood.

Mars has two small moons. Their names are Phobos and Deimos. They are named for the sons of Ares, the Greek god of war. Phobos means "fear," and Deimos means "panic."

What Is Mars Like?

Mars is very cold. The average temperature on Mars is minus 80 degrees Fahrenheit -- way below freezing! Its surface is rocky, with canyons, volcanoes and craters all over it. Red dust covers most of its surface. Mars has clouds and wind, just as Earth does. Sometimes the wind blows the red dust into a dust storm. The dust storms can look like tornados and can be seen from Earth. Mars has about one-third the gravity of Earth. A rock dropped on Mars would fall more slowly than a rock falls on Earth. A person who weighs 100 pounds on Earth would only weigh about 37 pounds on Mars because of the reduced gravity. Mars' atmosphere has much less oxygen than the atmosphere of Earth. Its atmosphere is mostly carbon dioxide.

What Has NASA Learned About Mars?

NASA has used both spacecraft and robots to learn more about Mars. In 1965, Mariner 4 flew past Mars and became the first NASA spacecraft to take close-up images of another planet. In 1976, Viking 1 and Viking 2 were the first NASA spacecraft to land on Mars. Both spacecraft took images and collected science data on the Martian surface.

Since then, several spacecraft have flown near or landed on Mars. Scientists are particularly interested in searching for clues of water on Mars. Living things need water to survive. So, finding evidence that water exists or used to exist on Mars would mean that there could be or could have been life on the planet.

How Is NASA Exploring Mars Today?

Today, three spacecraft are orbiting Mars. The spacecraft are using scientific tools to collect information like temperature and the kinds of minerals on Mars. They are also taking images and searching for water.

Two rovers named Spirit and Opportunity are on the surface of Mars taking images and studying the planet's soil and rocks. Rovers are robots that drive around. NASA uses the images and information gathered by the spacecraft and rovers to learn more about Mars.

How Will NASA Explore Mars in the Future?

NASA plans to send more robots to Mars. It wants robots to one day collect Martian soil and rocks and bring them back to Earth to be studied. A robot named Phoenix landed on Mars in May 2008. Phoenix is digging holes in Mars' surface and examining what it finds in the holes. Phoenix is sending this information back to scientists on Earth to study.

NASA also wants to send astronauts to the Red Planet someday. To prepare to send humans to Mars, NASA is researching new kinds of homes where astronauts can live. Scientists are studying how people living in space can grow plants for food. To find out how living in space affects humans, NASA is studying what happens to astronauts on the International Space Station.

Topic	Notes
Sun	<ul style="list-style-type: none"> ● ¼ amount of power from solar energy ● Mars is 1½ times farther away from sun than Earth ● This makes Mars colder too
Temperature	<ul style="list-style-type: none"> ● Mars is colder than Earth ● -190 to 75 degrees F ● Farther from sun ● Atmosphere doesn't trap warmth from sun
Seasons	<ul style="list-style-type: none"> ● Martian seasons last 2 times as long as Earth ● Martian year = 687 Earth days ● Martian year = 669 sols ● Sol = Martian day
Radiation	<ul style="list-style-type: none"> ● Mars has thin atmosphere ● Mars doesn't have a magnetic field ● Radiation levels are twice as high on Mars ● Metal conducts radiation ● Hydrogen protects from radiation
Atmosphere & Oxygen	<ul style="list-style-type: none"> ● The air of Mars is mainly carbon dioxide (95%). Only 0.1% is oxygen. ● No oxygen to breathe ● Earth's atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor ● The atmosphere changes at different elevations
Atmospheric Pressure	<ul style="list-style-type: none"> ● Atmosphere is thin ● Only 1/100 of Earth's surface pressure ● 15 lbs of pressure on Earth ● 0.15 lbs of pressure on Mars

Topic	Notes
Water	<ul style="list-style-type: none"> ● Little, if any, liquid water on surface now ● There was probably water long ago ● There is water ice below the surface of the planet
Soil	<ul style="list-style-type: none"> ● Toxic ● Hard to grow plants in Martian soil
Wind & Dust	<ul style="list-style-type: none"> ● Mars has reddish-brown dust ● Winds blow dust around ● Wind speed increases to 50-100 meters per second during dust storms ● Sometimes almost the whole planet is covered in dust storms
Gravity	<ul style="list-style-type: none"> ● Mars has 1/3 the gravity of Earth ● You could jump 3 times as high ● Astronauts lose muscle and bone mass at 0 gravity ● They exercise 2 hours a day ● Gravity is a force that causes two objects to pull toward each other. ● It keeps planets in orbit around the sun and governs the rest of the motion in the solar system. ● It holds us to the earth's surface
Landforms on Mars	<ul style="list-style-type: none"> ● Volcanoes ● Olympus Mons is 3 X taller than 3 Everest & flat ● Plains <ul style="list-style-type: none"> ○ Nothing grows there ○ Low and flat ○ Opportunity saw its heat shield at Meridiani Planum ● Craters <ul style="list-style-type: none"> ○ Gusev Crater was possibly a water source ● Canyons <ul style="list-style-type: none"> ○ Valles Marineris is bigger than the Grand ○ 2,000 miles long