

Red Planet:

Read, Write,
Explore!

Lesson 1: A Quick Trip to Mars

Description of Lesson: The purpose of this lesson is to introduce students to Mars as we know it today. Using Google Earth/Mars and the recommended reading, students will compare and contrast Earth and Mars using graphic organizers.

Background:

Mars is a dry, desolate place without flowing water or vegetation. The surface is covered by fine, dusty sand, similar to a desert on Earth. The diameter of Mars is 6,800 kilometers across—about half the diameter of Earth. It has only ten percent the mass of Earth. Because of the small diameter and low mass, the surface gravity on Mars is only about 1/3 the gravity on Earth (0.38 to be exact) and the atmospheric pressure is 1/100 of Earth's. If you weighed 45 kilograms (100 pounds) on Earth, you would weigh 17 kilograms (38 pounds) on Mars. The thin atmosphere of Mars has very little oxygen, and has a weak greenhouse atmosphere. Since it's farther from the Sun than Earth—about 78 million kilometers (48.5 million miles) farther out—it's also very cold at the surface. Average temperatures hover around -50 degrees Celsius (-58 degrees Fahrenheit). Now imagine what it would be like to go for a visit! Scientists and engineers are considering what it would take for humans to explore Mars. It's important to consider what a human would need to take with them just to step out onto the surface and take a quick glance around.

The Mars Atmospheric and Volatile Evolution (MAVEN) mission to Mars has instruments onboard to explore why Mars and Earth evolved in such different ways. One of the goals of the MAVEN mission is to get very accurate measurements of Mars' atmosphere. These measurements will enable scientists to determine what happened to Mars' atmosphere throughout history since Mars is thought to have been warmer and wetter in the past.

Recommended additional activities (any below complement this activity):

American Museum of Natural History, *Mars and Earth*, "What Do Satellites Images Tell Us About Mars?," Activity 3:

http://www.nasa.gov/pdf/145913main_Mars.and.Earth.Guide.pdf

Exploratorium, *Imagine Yourself on Mars*, "The Cold Boiling Water:"

<http://www.exploratorium.edu/mars/teachers/onmars.html>

Phoenix Mission, "Mars Match Game," Lesson 6:

http://phoenix.lpl.arizona.edu/pdf/lesson_6.pdf

Jet Propulsion Laboratory, *Earth and Mars: As Different as they are Alike:*

<http://muse.jpl.nasa.gov/library/Earth.and.Mars.pdf>

Benchmarks for Science Literacy, Project 2061 (3-5)

The Physical Setting

- *The Universe: The earth is one of several planets that orbit the sun, and the moon orbits around the earth. 4A/E4*
- *The Earth: Air is a material that surrounds us and takes up space and whose movement we feel as wind. 4B/E4*
- *Forces of Nature: The earth's gravity pulls any object on or near the earth toward it without touching it. 4G/E1*

Habits of Mind

Communication and Observation: Find locations on maps and globes, interpret information displayed on maps, and use maps to navigate. 12D/E5

Common Core for English Language Arts

Reading: Information Text

- *RI.3.7. Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).*
- *RI.4.9. Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.*
- *RI.5.9. Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.*

Writing

- *W.3.2., 4.2, 5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.*
- *W.3.7, 4.7, 5.7 Conduct short research projects that build knowledge about a topic.*

Speaking and Listening

- *SL.3.2. Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.*

Lesson Time: Two 45-minute periods

Choose one or more of the following books to read aloud:

- Bennett, Jeffrey. 2006. *Max Goes to Mars*. Boulder, Colo.: Big Kid Science. (Grades 2 and up)
- Landau, Elaine. 2008. *Mars*. Canada: Scholastic. (Grades 2 and up)
- Loewen, Nancy. 2008. *Seeing Red, The Planet Mars*. Minneapolis: Picture Window Books. (Grades K and up)
- Ride, Sally and Tam O'Shaughnessy. 2006. *The Mystery of Mars*. San Diego: Sally Ride Science. (Grades 3 and up) pp 10-17, 24-29

Choose one or more of the following books as a classroom resource:

- Asimov, Isaac. 2007. *Mars*. New York: Prometheus Books. (Grades 4 and up)

- Kobasa, Paul ed., *Solar System and Space Exploration Library: Mars*, Chicago, 2007. (Grades 3 and up)
- Murray, Stuart. 2004. *Eyewitness Mars*. London: DK Publishing, Inc. (Grades 3 and up) pp 16, 24-25, 34-45
- Ride, Sally and Tam O'Shaughnessy. 2006. *The Mystery of Mars*. San Diego: Sally Ride Science. (Grades 2 and up)

Materials:

- One or more of the books listed to read aloud
- One or more of the classroom resource books
- Google Earth 5 or above
- Computer with internet
- Projector
- "Know-Wonder" worksheets

Notes on Materials: Google Earth 5 is available for free here:
<http://www.google.com/earth/>

Procedure:

- Read one or more of the books listed to the class.
- Have available one or more of the classroom resource books.
- Find your longitude and latitude on Google Earth.
- Explore your area of Earth with students. Type your city and state into the search bar. Discuss what the area looks like with the students. Make a note of major geologic features including lakes, oceans, and streams. Also, facilitate discussion about features in the city or surrounding area.
- Record your longitude and latitude from the bottom of the screen.
- On the top bar, click on the symbol that looks like Saturn and select Mars from the drop-down menu.
- Find the same latitude and longitude using Google Mars. Input "Latitude, Longitude" into the search bar (example: 40N, 104W). Discuss the major differences visible on the "same part" of the Martian surface.
- Choose another latitude and longitude of Earth, selecting an area different from yours (for example, if you live in a rural area, choose an urban one) and explore Earth and Mars for that latitude as well.
- Distribute the "Know-Wonder" graphic organizer.
- Organize the class into small groups of three. Distribute the graphic organizer worksheets to each group. Each student should have his/her own worksheet.
 - The students will discuss what they know about Mars and compare it to Earth.
 - Direct students to fill in the graphic organizer.
 - Allow 15-20 minutes for this.
- On Day 2, ask students to share their work with the class.

Dispelling Preconceptions: Students may believe Mars is hot because the surface is red. This preconception might be from student knowledge that Mars had active volcanoes, or that meteorite impacts may have created a molten

surface in its history. In reality, Mars has iron oxide (rust) mixed in the soil that causes the red color. Consider helping students understand that a color does not necessarily indicate a temperature by laying out different colored rocks and asking students which rock is hottest.

Extension Activity (Grades 3-5): Complete the activity, “Atmospheric Pressure on Mars,” in the Red Planet lesson series. This can be done either before or after students complete the “Know-Wonder” graphic organizer.

Extension Activity (Grades 3-5): Complete the activity, “The Gravity on Mars,” in the Red Planet lesson series. This can be done either before or after students complete the “Know-Wonder” graphic organizer.

References used to create lesson:

Riddle, Bob. 2012. Welcome to Mars. *NSTA’s Science Scope* (January): 84-87.



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Know-Wonder about Mars _____

Name: _____

What I know about Mars	What I wonder about Mars