Getting a Closer Look

Suggested Grade Level: 3–9

Summary

Students will observe rocks using a magnifying instrument as an analogy to the Microscopic Imager tool on the Mars Exploration Rover mission (MER) rovers

Standards

- NM State Science Content Standards: Strand I, Scientific Thinking and Practice; Strand II, Standard III, Earth and Space Science
- National Science Education Standards: Standard A, Scientific Inquiry; Standard E, Science and Technology

Background Information

The Mars Exploration Rover mission included a unique scientific instrument on each of the two rovers. This instrument was called the Microsopic Imager (MI) and it was a combination of a microscope and a camera. The MI was part of the geologist's toolkit of instruments at the end of the rover's robotic arm (also called the Instrument Deployment Device or IDD). The toolkit at the end of the arm could swivel four different instruments into place against a rock. The MI was used to zoom in on a fresh rock surface produced by the RAT (rock abrasion tool) and could send extreme close-up views of the rock's minerals, layers, or other small-scale features back to the scientists on Earth. The MI was also used to send close-up views of the shape and size of the dust and sand particles making up the Martian surface.

Materials

- Getting a Closer Look Data Sheet, included in this activity
- Basic rock types: 4 samples each of basalt, granite, limestone, sandstone, shale; numbered or labeled
- Magnifying glasses of various magnification
- Microscope(s) (if available, use a digital microscope attached to a desktop or laptop computer)

Preparation

1. Collect or borrow small rock samples listed above.

2. Print and photocopy Getting a Closer Look data sheet, included in this activity, for each team of students.

3. Set up four scientific research stations in your classroom. If you have enough equipment, place a magnifying glass and a microscope at each station and divide the students into four research teams, one for each station. If you do not have enough equipment, have the student teams rotate through each of four stations with one station for observation by eye, one or two stations for observation with magnifying glasses of different magnification, and one station for observation with a microscope.

Introduction for Students

The Mars Exploration Rovers are robotic field geologists. They were designed to help scientists here on Earth study the rocks of Mars by sending close-up pictures of the rocks back to Earth. Why do you think that it was important to see close-up pictures of rocks?

Procedure

1. Students work in teams and examine the rock samples, first using only their eyes and then using the magnifying instruments.

2. Students record (or draw and color for younger students) their observations on the data sheet, using first their unaided eyes, then magnifying glass(es), and finally a microscope.

Process/Closure

Compare the observations of the rocks using eyes, glass, and microscope. Which instrument provided the most information? If you were designing a rover, which instrument(s) would you include and why?

Extension/Enrichment

The teacher can provide the basic rock types and a mystery rock that the teams observe and compare with the known rocks. Students can collect their own rocks to bring in by doing a sampling technique similar to a rover traverse and collecting rocks at specific intervals as they walk through their neighborhood or at specific stopping places as they are driven across their city or local area.

Credits

This activity was created by Kathy Jones, Albuquerque Public Schools.

Data Sheet

Name(s) _____

_____

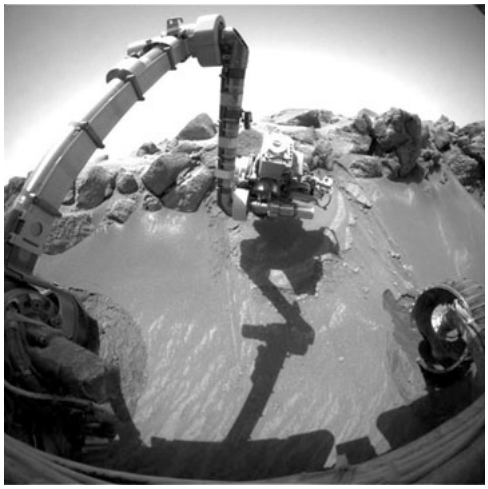
Date _____

Getting a Closer Look

The Mars Exploration Rovers are robotic field geologists. They help scientists study the rocks on Mars by sending close-up pictures of the rocks back to Earth.

Observe the rock samples. Record your observations using your own eyes, a magnifying glass, and a microscope.

Sample	Unaided Eyes	Magnifying Glass	Microscope



The Instrument Deployment Device (IDD) provides a closer look at Larry's Lookout (Hazcam image from Spirit)