

MER Coloring Sheet

Suggested Grade Level: 2–5

Summary

Students will focus their attention on the rover from the Mars Exploration Rover mission (MER) and its components.

Standards

- NM Science Content Standards: Strand III, Science and Society
- National Science Standards: Standard E, Technological Design

Background Information

Rovers are difficult to design. They need to move across the surface of the planet easily but they also need a full set of scientific instruments (known as the science payload). To the engineers who designed the rover, the most important parts were the rover body, wheels, suspension, and solar panels, because without these components the rover would not be able to move around on the surface of Mars. To the scientists the most important parts were the cameras and the scientific instruments; and actually the cameras are also used as scientific instruments. The most important instruments on the MER rovers were those called the Athena Instruments (also known as the geologist's toolkit) on the end of the arm. These were geological instruments that had never been sent to Mars prior to this mission that enabled the scientists to see and analyze the interior of Martian rocks.

Materials for Each Student

- Coloring sheet(s) (Version 1 with labels and/or Version 2 without labels) and Parts Sheet included in this activity.
- Coloring pencils, crayons, markers

Preparation

1. Print and photocopy the MER rover coloring sheet for each student. For younger students use Version 1. For older students use Version 2 and also print the parts of the Mars Exploration Rover.
2. Prior to the lesson, the teacher should review the component parts of the Mars Exploration Rover; see the activity in this Guide entitled Rover Components and the information in this Guide about the MER rovers in Chapter III, section E, entitled The MER Rovers.

Introduction for Students

The Mars Exploration Rovers are robotic field geologists. They help scientists here on Earth study the rocks and dust of Mars by sending images and data back to Earth. Take a look at the MER rover and all of the different parts that make the rover work. Your task will be to color this rover. Choose how you are going to color your rover. You can color it to look as though it is on Mars or you can color it to look as though this sheet is a plan for building the rover.

Procedure

1. Each student should receive his/her own MER rover sheet but the work can be done individually or in pairs.
2. The teacher should discuss the MER mission and the observations that the rovers have sent back to Earth (see the MER Rovers and MER Results sections in Chapter III in this Guide).
3. For older students, the teacher can discuss the component parts of the rover and lead the students to categorize them. For example, the component parts shown here could be put into four (or more) possible categories:
 - cameras (pancam, navcam, front hazcams, and rear hazcams)
 - instruments (mini-TES, magnets, and Athena Instruments)
 - antennas (omni antenna and DTE antenna)
 - vehicle (PMA, Instrument Deployment Device (IDD), solar panels and the body, wheels and suspension)
4. These four categories could be color-coded using four different colors (to make the sheet look like a plan for building the rover) or the students can color the rover to make it look as it would look while exploring Mars.

Process/Closure

Ask your students which parts on the rover they consider to be the most important and why. Some of the components could be placed in more than one category. Ask your students to explain why they colored their rover in a certain way.

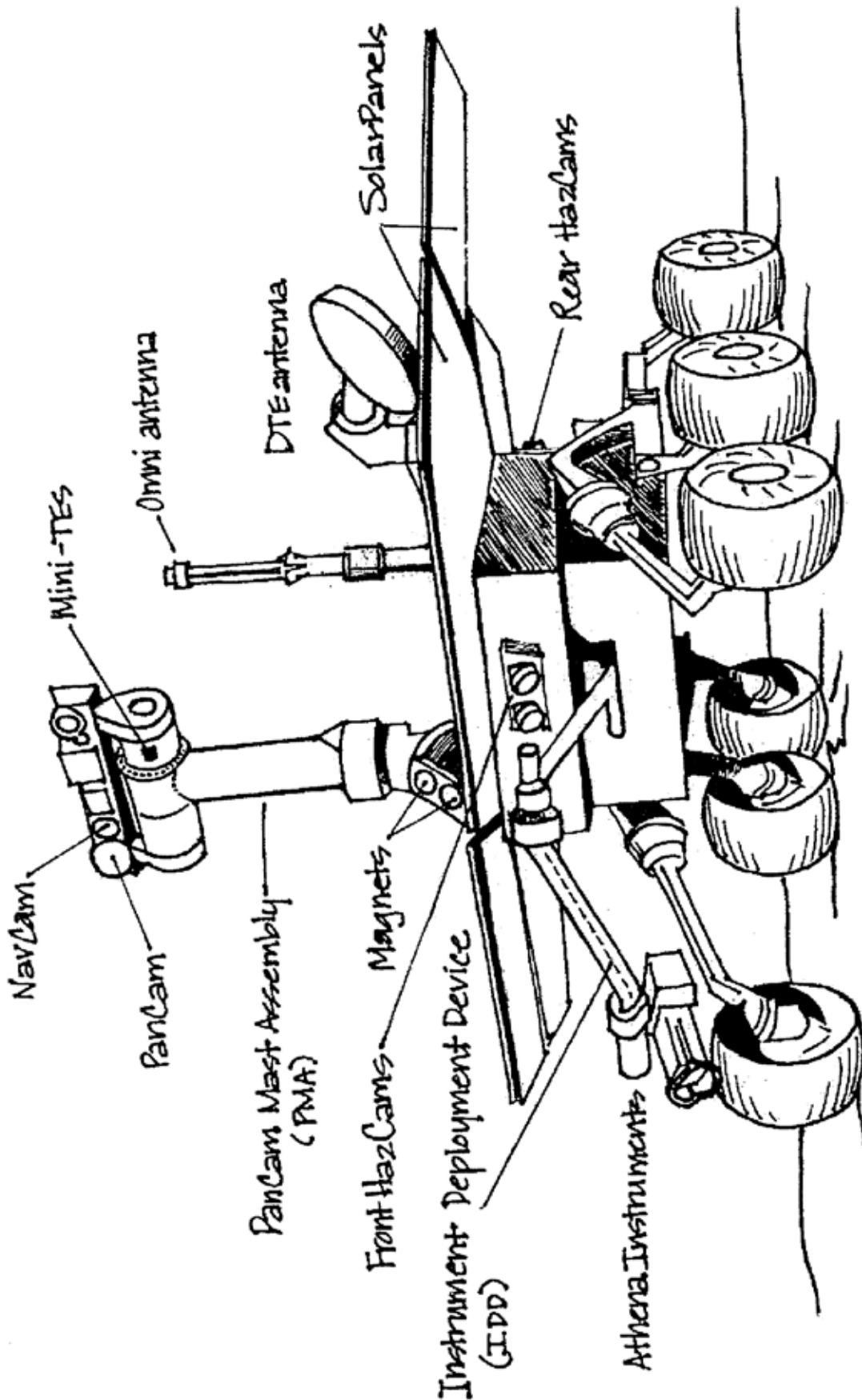
Extension/Enrichment

This activity can be used alone, but it is also useful as a component of the Edible Rover activity for younger students or associated with (without actually coloring the sheet) the Rover Components activity for older students.

The rover coloring sheet can be used with labels or without labels. When used without labels, the Martian terrain and sky can also be colored.

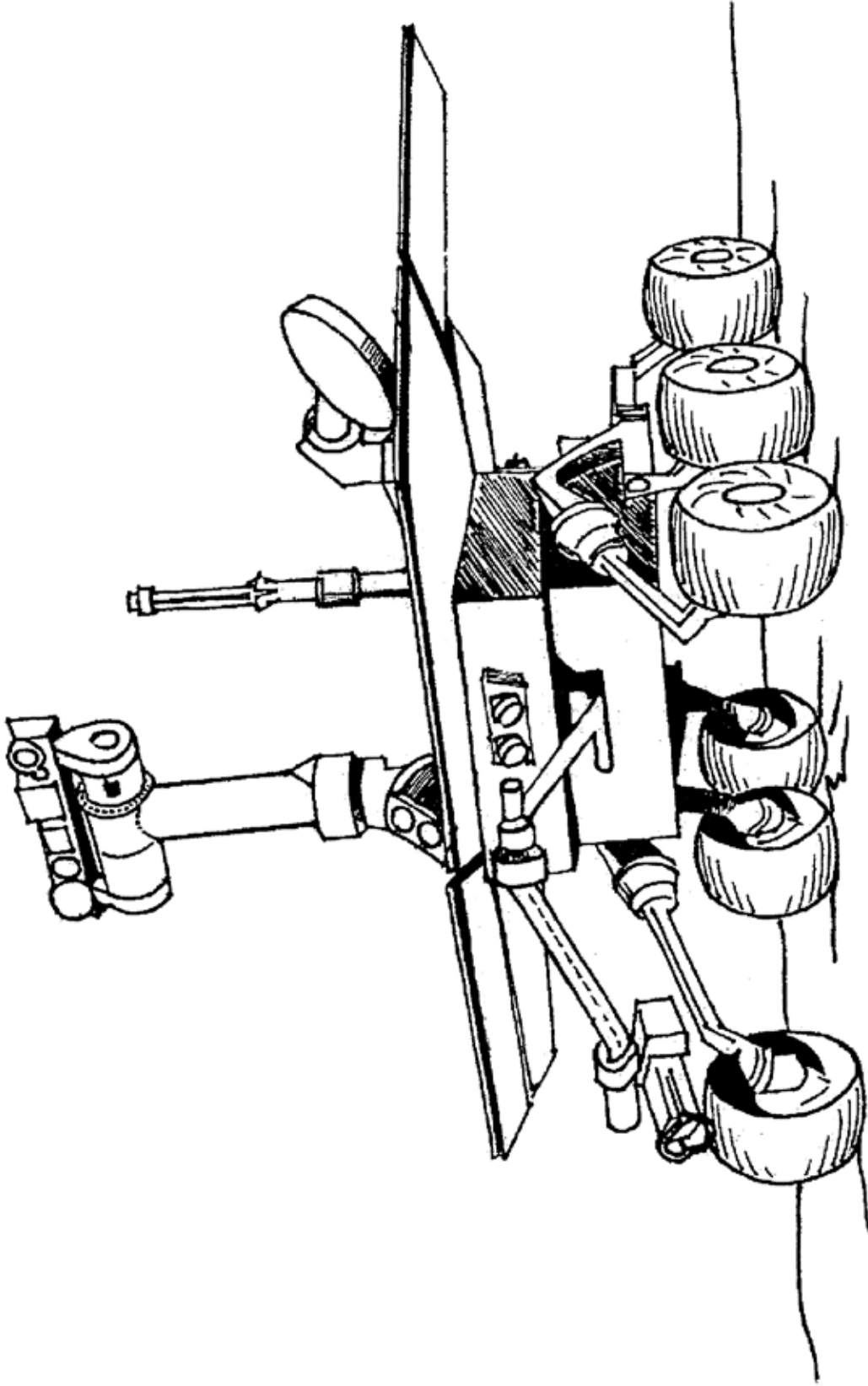
Credits

This activity was created by Jayne Aubele, New Mexico Museum of Natural History & Science; coloring sheet artwork by Tiffany Yazzie, LodeStar Astronomy Center.



The Mars Exploration Rover

Names(s) _____
Date _____



The Mars Exploration Rover

The Parts of the Mars Exploration Rover

- Athena Instruments are a set of scientific instruments on the Instrument Deployment Device (IDD) that can observe and study the geology of the surface of Mars. These instruments are also called “the geologist’s toolkit.”
- The DTE Antenna sends and receives messages directly from the rover to Earth.
- HazCams (front and rear) are small cameras that help the rover navigate the terrain of Mars.
- The Instrument Deployment Device (IDD) is the robotic arm that can move scientific instruments to the rocks and soils of Mars for a close look.
- Magnets separate magnetic soil particles from non-magnetic ones in the dust of Mars.
- The Mini-TES shows the composition of the rocks and soils of Mars.
- The NavCam is a stereo black and white camera that is used by mission scientists to decide where the rover should go.
- The OMNI Antenna sends and receives messages from spacecraft orbiting Mars.
- The PanCam is a stereo color camera that takes 360-degree pictures of the rover’s surroundings.
- The PMA is a mast assembly that holds the PanCam, the NavCam, and the mini-TES.
- Solar Panels generate energy from the sun.



Rover model at the New Mexico Museum of Natural History & Science in Albuquerque, NM.