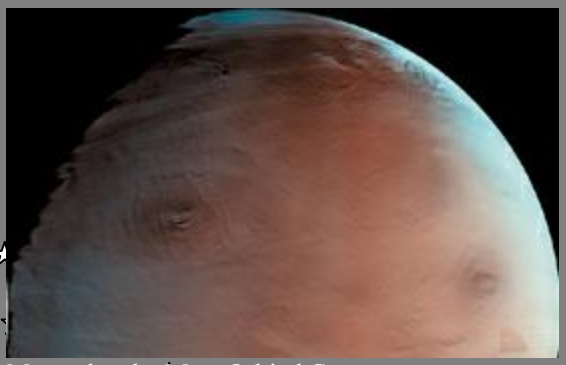
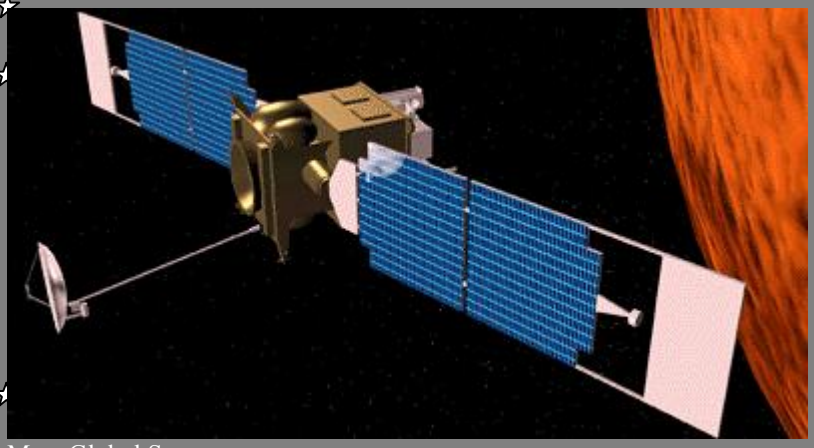
Mars and Beyond!



Mars taken by Mars Orbital Camera

Family Portrait of Jupiter's Great Red Spot and the Galilean Satellites



Mars Global Surveyor

By Nancy Wilkinson

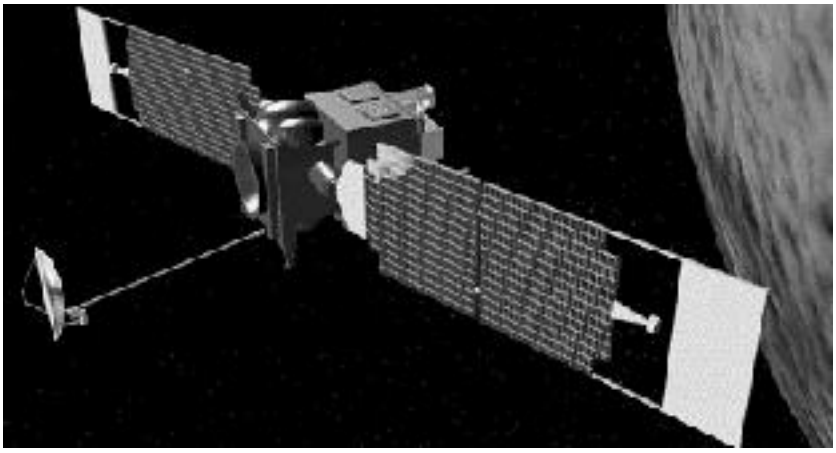
Mars and Beyond
Lesson 11
How Far Away Is Mars Global Surveyor from Mars?

Objective:

Students will discover proportion and size.

Materials Needed:

Pictures on pages 58 - 59 for each student.



Mars Global Surveyor – Courtesy of NASA/JPL

Opening Activity:

Look at the map on the page 58. It is a map of Colorado at approximately 350 kilometers above the Earth. List all of the landmarks that you can see on the map.

Activity:

1) Read the following excerpt to your students:

The Mars Global Surveyor made an 11.6-hour elliptical orbit. This means that the spacecraft made an oval orbit around the planet instead of a circle as planned. On the spacecraft is a camera called M.O.C (Mars Orbital Camera). The Mars Orbital Camera took high-resolution images, on the order of a meter or so, of surface features. It also took lower resolution images of the entire planet over time to enable research into the temporal changes in the atmosphere and on the surface. Most pictures of the planet were taken at a range from 378 kilometers to 800 kilometers above the planet.

2) Show the picture on page 59. They were taken with M.O.C. Notice the two volcanoes in the picture. Ask the students how tall they think the volcano, Olympus Mons is? (*Olympus Mons is about 550 kilometers (340 miles) wide. It would cover the State of Arizona.*

3) Using the information from the map showing a portion of Colorado and the M.O.C. image, have the students list some Earth items that might be able to be seen from a distance of 378 kilometers. Would you be able to spot the World Trade Center, the Statue of Liberty, a car on a street? *(Because of the resolution, The MOC should be able to depict the Word Trade Center and The Statue of Liberty. There would not be great detail to these items.)*

4) Show the middle pictures of three hills on page 59. The left image was taken from the Viking Orbiter over 20 years ago. Many people think that it is a face

from an ancient civilization. The two pictures on the right are taken from MOC. The pictures are described as follows:

> "In the comparison, the best Viking image has been enlarged to 3.3 times its original resolution, and the MOC image has been decreased by a similar 3.3 times, creating images of roughly the same size."

Looking at the three pictures, what is your opinion of the "face"?

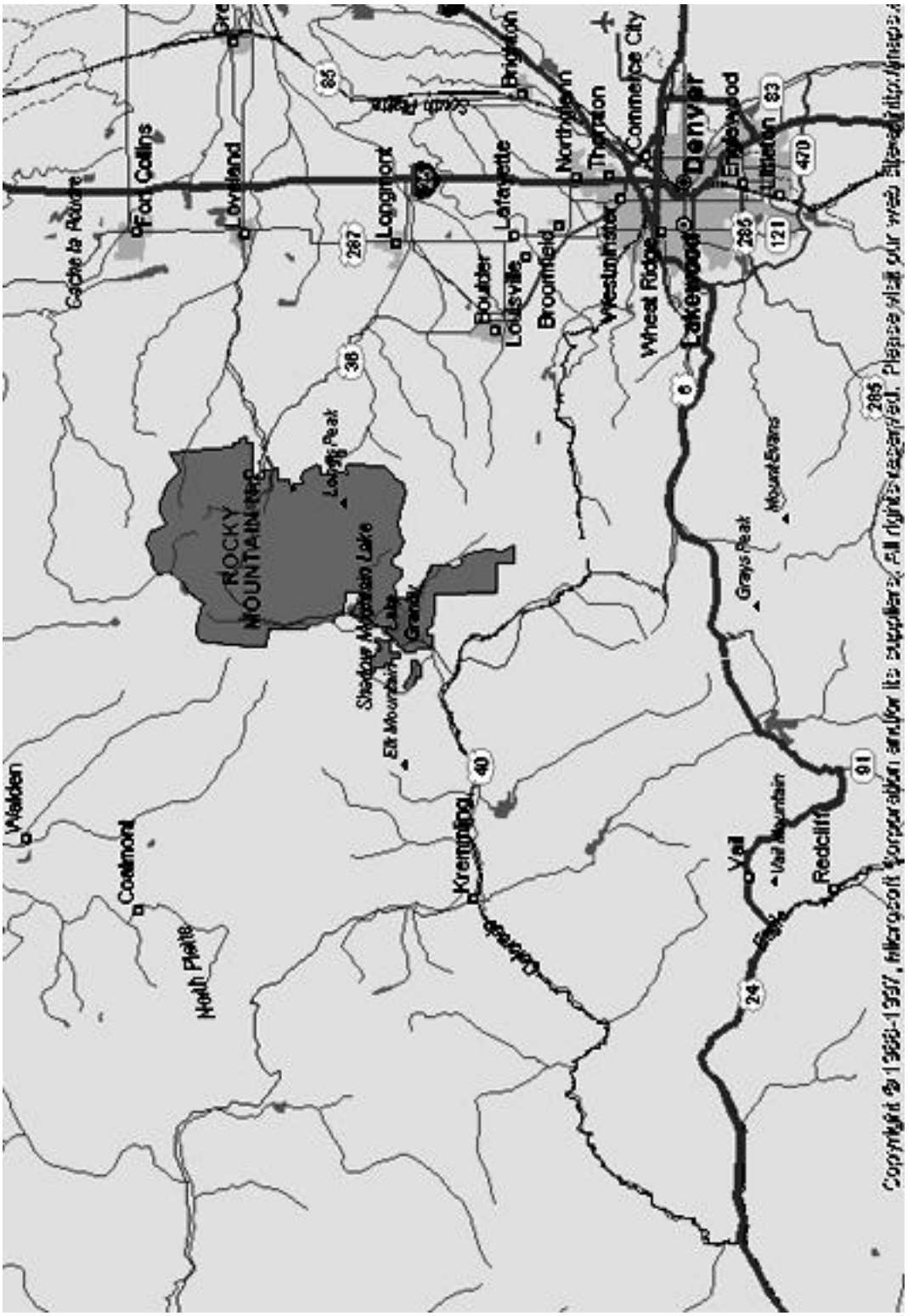
Closure

If someone from another planet took a picture of the Earth from 1,000 kilometers away, what things on Earth do you think might show that there is civilization? You might want to discuss the Seven greatest wonders of the world.

Sojourner Rover

The rock "Mini-Matterhorn"

Lander image of the rock "Wedge"


Fort Collins
Loveland
Longmont
Boulder
Louisville
Lafayette
Broomfield
Brighton
Northglenn
Thornton
Commerce City
Denver
Englewood
Littleton
Westminster
Wheat Ridge
Lakewood
Mount Evans
Grays Peak
ROCKY MOUNTAIN
Longs Peak
Shadow Mountain Lake
Grand
Elk Mountain
Kremmling
Walden
Steamboat
Hahn Peak
Vail
Vail Mountain
Redcliff
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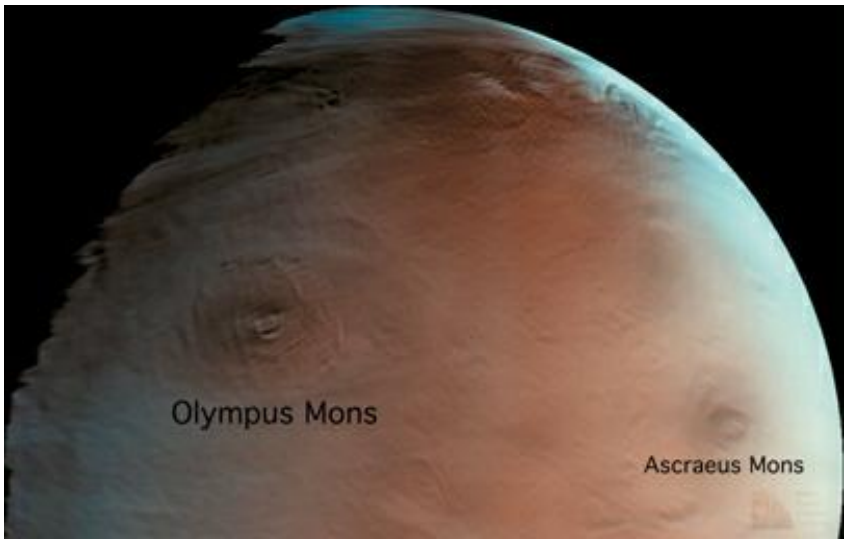
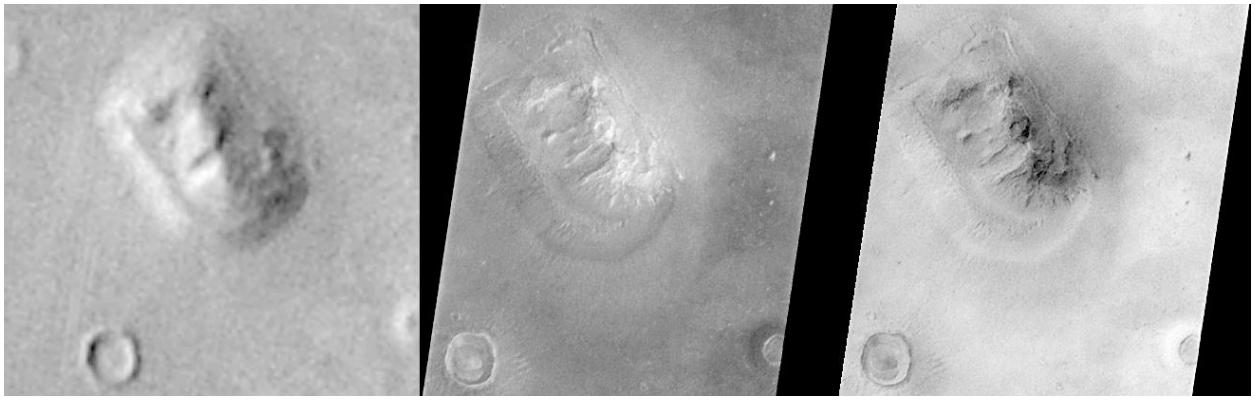
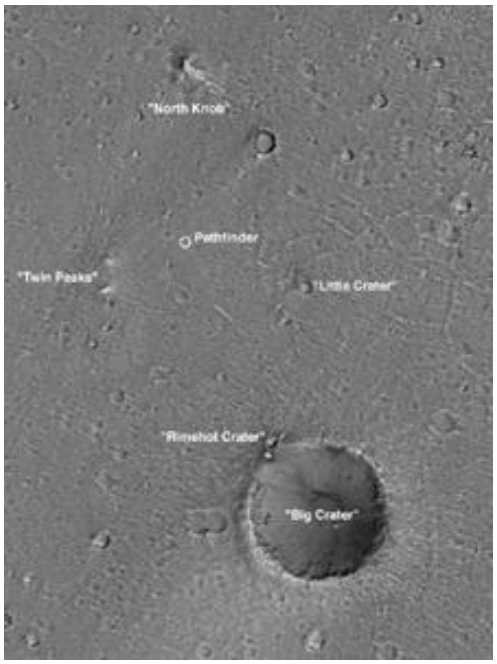


Malin Space Science Systems/NASA



Malin Space Science Systems/NASA



MOC showing Pathfinder site at roughly 6.6 m (21.5 feet wide)
Malin Space Science Systems/NASA