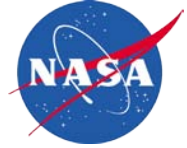


National Aeronautics and Space Administration



Guide Lites

Crater Maps

www.youtube.com/nasaclips

www.nasa.gov/education/nasaclips

www.nasa.gov



Crater Maps

The first step in NASA's plan to one day return to the moon began with an uncrewed mission to our nearest neighbor. The Lunar Reconnaissance Orbiter, or LRO, is creating a comprehensive atlas of the moon's features and resources. Building on information obtained from previous missions to the moon, LRO focuses on the selection of safe landing sites, the identification of lunar resources and studies of how the lunar radiation environment will affect humans. The LRO payload, composed of six unique instruments and one technology demonstration, will provide key data sets to help deepen our understanding of the moon and clear the way for future exploration.

Like Earth, the moon has certain physical features that have been given special names. The major features of the moon's surface can be seen by just looking up at it. Lighter and darker areas are distinctive terrains. The bright areas are lunar highlands, while the darker plains are called *lunar maria*, Latin for seas. The circular features so obvious on the moon are impact craters formed when meteorites smashed into the surface. By recording the number, size and extent of erosion of craters, lunar geologists can determine the ages of different surfaces on the moon and piece together a geologic history. The comprehensive data provided by LRO will provide even more information about crater slopes and surface roughness, allowing geologists to understand the moon and how it continues to evolve.

Objective:

In this activity participants will make a crater map and compare the geologic features of the moon to those on Earth.

Materials:

- medium size disposable foam bowls (one for each station to be set up)
- liquid washable tempura paint (black or blue)
- white cardstock
- liquid dishwashing detergent (choose one that makes good bubbles)
- newspapers
- water
- craft sticks for stirring paint mixtures in bowls
- map of the moon (interactive and 3-D maps may be found online at: <http://moon.google.com>)

Engage:

Preparation: Cover tables with newspaper or plastic tablecloths. In each bowl, mix approximately 60 mL (5 Tablespoons) of liquid dishwashing detergent, 60 mL of tempera paint, and 120 mL (1/2 cup) of water. If mixture is not dark enough or does not make good bubbles, add additional paint or dishwashing liquid. Stir mixture thoroughly with a craft stick.

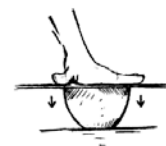
Give each participant a clean straw. Ask them to use the straw to gently blow bubbles in the bowl. The bubbles should form a mound above the rim of the bowl.



Note: be sure participants understand to blow into the straw rather than suck on the straw.

Have the student carefully remove the straw from the bowl. Take the cardstock and lay it carefully on top of the mass of bubbles.

Push lightly on the paper tracing the rim of the bowl through the paper with fingers. The pressure of the paper will pop the bubbles and produce crater-like surface.



Lay crater maps flat to allow the paint to dry. Allow the paper to set for a few moments before picking it up. Maps are dry to touch in just a few minutes. Participants may want to put their names on their papers because the crater maps will be similar.

Explain:

Compare the crater maps created by the participants to an actual map of the moon. Look for lighter and darker areas. Label the light areas as highlands and the dark areas as *maria* or seas. Name at least two craters on the map.

Locate the Apollo landing sites. Notice the terrain around these sites. Based on what they observe about the Apollo sites, ask participants to choose a landing site for the next mission to the moon. (*Sites selected should be flat areas with no craters.*)

To learn more about the Lunar Reconnaissance Orbiter, watch the NASA eClips™ video segment, *Real World: NASA's Lunar Reconnaissance Orbiter Mission*, which can be viewed or downloaded at: www.nasa.gov/education/nasaclips.

This segment can be viewed in high definition using the following direct link to YouTube/NASA eClips™: <http://www.youtube.com/nasaclips#p/c/887C1C3BAAD53F17/13/CEUMzyGBx54> .

To learn more about the tools on board LRO and the data collected, watch the NASA eClips™ video segment, *Our World: Instruments on the Lunar Reconnaissance Orbiter*, which can be viewed or downloaded at: www.nasa.gov/education/nasaclips.

This segment can be viewed in high definition using the following direct link to YouTube/NASA eClips™: <http://www.youtube.com/nasaclips#p/c/31002AD70975DC1B/25/dIM5aUPs5H8> .

Extend:

To learn more about NASA's return to the moon, watch the NASA eClips™ video segment, *Our World: Lunar Habitat - Structure*, which can be viewed or downloaded at: www.nasa.gov/education/nasaclips.

This segment can be viewed in high definition at the following direct link to YouTube/NASA eClips™: <http://www.youtube.com/watch?v=RTHKoeO5jWc&feature=PlayList&p=31002AD70975DC1B> .

To learn more about regolith, or dirt on the moon's surface, watch the NASA eClips™ video segment, *Real World: Moon Dirt*, which can be viewed or downloaded at: www.nasa.gov/education/nasaclips

This segment can be viewed in high definition at the following direct link to YouTube/NASA eClips™: <http://www.youtube.com/watch?v=BEF2qVvMrJI> .

