



STEM Challenge: Moon Craters

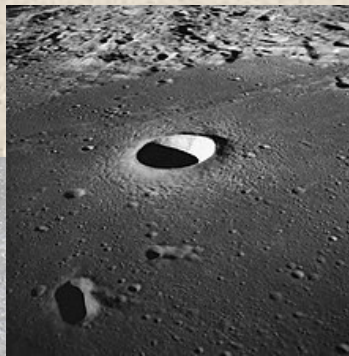
The Moon is covered in circular features, called impact craters. Impact craters are formed when space rocks smash into the surfaces of the Moon, Mars, and even Earth. Impact craters have different features based on the space rock's size (mass), speed, and the angle at which it struck the surface.



Tycho Crater



Ejecta spreading out from Tycho



Raised rim

Most craters have deep central depressions, raised rims, and a blanket of ejected material, ejecta, surrounding them. You can see this on the moon with just a pair of binoculars!

Using the directions on the next page, explore what happens when a meteorite, asteroid, or other object hits the Moon. You can also explore what features the impacts create by dropping balls of different sizes and weights from different heights.

How did you do making your own craters? Take a photo and send it to us at eplyouthservices@gmail.com!



What you need:

- One large tub or box, such as a large dishpan
- A large bag of flour (enough to fill the box 1-2 inches deep)
- Fine cocoa powder or sand
- Sieve
- Two same-size balls of different weights, such as a marble, gumball, or mothball
- Two same-weight balls of different sizes, such as a rubber ball and golf ball
- Yard stick
- Small rulers
- Tooth picks
- 3x5 index card to smooth the surface of the powder
- Newspaper or something else to put under the tub to protect your floors

How to set it up:

1. Fill the pan with flour to a depth of 1-2 inches (2.5-5 centimeters). Tap the pan to settle the flour and smooth the surface.
2. Using the sieve sprinkle a fine layer of cocoa or sand evenly and completely over the flour.
3. Sprinkle another layer of white flour on top of the cocoa or sand.
4. Spread newspaper on the floor and place the pan on top of the newspaper.

Run the experiment:

Gather around the box, standing several feet away from it. Begin with the balls that are similar in size, but different weights. Use the yardstick to measure an equal height. Try it again, but this time drop one ball from three different heights. Measure the diameter of each crater, its depth (using a toothpick), and the distance the ejecta traveled after the impact (from the edge of the crater). Repeat the test using the other ball that is similar in size. If necessary, smooth out the top layer and sprinkle more cocoa or sand and then flour. Then repeat the above procedure with the balls that are similar in weight, but different sizes.

- How did crater size change when balls of different mass (i.e., weight) were dropped from the same height?
- How would you state the general relationship between a ball's mass and the crater size?
- How did the size of the balls affect the crater sizes?
- How would you state the general relationship between a ball's size and the crater size?
- How did the different speeds of the balls affect the crater sizes?
- How would you state the general relationship between a ball's speed and the crater size?