

# Out of This World! - Week 7

## Grades K-2

### Day 2: Making an Impact

#### Teacher/Parent Background:

The circular features so obvious on the Moon's surface are impact craters formed when impactors smashed into the surface. The explosion and excavation of materials at the impacted site created piles of rock (called ejecta) around the circular hole as well as bright streaks of target material (called rays) thrown for great distances.

Two basic methods forming craters in nature are:

- 1) impact of a projectile on the surface
- 2) collapse of the top of a volcano creating a crater termed caldera

By studying all types of craters on Earth and by creating impact craters in experimental laboratories geologists concluded that the Moon's craters are impact in origin.

The factors affecting the appearance of impact craters and ejecta are the size and velocity of the impactor, and the geology of the target 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 can piece together the geologic history. This technique works because older surfaces are exposed to impacting meteorites for a longer period of time than are younger surfaces.

#### Overview:

In this activity, learners will explore how craters formed on the surface of the Moon.

#### Related Standards:

- **Observe and ask questions** about patterns of the motion of the sun, moon and stars in the sky.

#### Key Terms:

- moon - a natural satellite of a planet
- satellite - an object that stays in an orbit around a planet

- crater - dish-shaped pits formed when objects from space struck the moon's surface

### Materials List:

- *Making an Impact* handout
- marbles or other objects such as golf balls, tennis balls, baseballs, etc.
- 1 high-walled tub (plastic, aluminum or cardboard - at least 15 cm deep)
- damp, not wet, sand or dry baking soda, enough for a depth of 10 cm
- safety goggles
- tongue depressor or small piece of cardboard
- ruler or measuring tape
- newspaper or other covering to protect floors

### Activity Description:

1. Review the student's Moon observations on the *Making an Impact* handout from Day 1, focusing specifically on observations of craters on the Moon's surface.
  - What do you notice about the surface of the Moon?
    - There are holes/circles (craters) located across the surface of the Moon.
  - Are all the craters on the Moon the same? Why or why not?
    - The craters on the Moon are various sizes and in different locations.
  - How do you think the craters formed?
    - The craters formed when objects (asteroids, meteors, comets, etc.) crashed into the Moon.
  - What do you think the craters look different?
    - The size and speed of the objects hitting the Moon would impact the appearance and size of the craters. Larger objects would create larger craters. Objects traveling at high speeds might make deeper craters or through more dirt farther from the center of the crater.
2. Guide the student to confirm or refute his/her predictions about what affects the appearance and size of craters by conducting a simulation:
  - Spread newspaper under the tub to catch spills or consider doing the activity outside.
  - Fill the tub with your chosen material (damp sand or dry baking soda) to about 10 cm and smooth the surface so it settles evenly.
  - Ask the student:
    - What way can we make craters in this material?
    - What could we do to make big craters and small craters?
    - How can we protect our eyes from any sand/baking soda that gets thrown into the air?

- Have the student handle the balls and predict what kind of impact crater each one might make (big/small). Record their predictions on the *Exploring the Moon* handout.
- Have the student stand and drop a ball from shoulder height into the tub.
  - Emphasize the importance of simply dropping the balls from the same height without throwing or pushing them down.
- Measure the sizes and depths of the craters as appropriate.
- After each impact, have the student remove the ball and smooth the sand/baking soda with a tongue depressor or piece of cardboard.
- Continue dropping the various balls and measuring the resulting craters.

### Closure:

Encourage the student to use the collected data to develop and support an explanation (claim) about what causes differences in the appearances of craters. This can be accomplished by sequencing the balls by sizes and/or weights and comparing with the size of the crater formed.

### Extension:

Challenge the student to use the provided materials to make a smaller/larger or deeper/more shallow crater.

- Experiment with different drop heights.
- Allow gentle throwing of the balls.
- Toss the balls from an angle.

