Activity Name: **Lunar Craters**

Activity Description: **Given pictures, after a discussion, the students will use objects to drop from a distance into a pan of flour to create a crater to demonstrate how impact craters are formed after impact with a planet and how this can give scientists an insight to the age and geology of a planet, this will be done at least 5 times per child.**

Suggested Grade Level / Age Range: **Elementary School Aged**

Science Content Covered (just provide keywords – *example – heat, light, energy*): **Lunar craters**

Time needed to complete the activity: **6 to 10 minutes**

Materials Required (per student):

-A large pan or box
-Enough flour to make a 1"- to 2"-deep layer
-1 heaping cup of powdered cocoa
-A sifter
-A large trash bag or piece of cloth or plastic to place under the crater box
-Several objects that can be used as impactors, such as large and small marbles, golf balls, rocks, bouncy balls, and ball bearings.
-Ruler
-Paper and pencil
-Safety glasses
-Pictures of lunar craters (optional)

Directions as well as Activity Success Tips for Parents and Teachers:

1. **Show the images of lunar craters to the children and invite them to describe what they see. ASK**

~What shape are they? ~How can they use the light and shadow to determine the shape and features of the craters?

~Can they find some craters on top of each other? Which were formed first? Which were formed later? Do the edges of the more recent craters look different than those of the older ones?

2. Invite them to begin experimenting by having them each select one impactor to drop and determining from what heights they will drop them (encourage them to not throw their impactors). What do they think will happen when an impactor — a heavy object — is dropped into one of the boxes? Have each team drop their impactors one at a time.

~What do they observe?

~Does the feature that was created look like any of the features they observed on the surface of the Moon? *They look like craters — roughly circular depressions on the surface of a planet or moon.*

~How are they similar? Different? *Some similarities include the circular shape and depression, and the material that is excavated from the crater and forms a rim — the ejecta. Long bright streaks — rays — probably extend out from the crater they created. Some differences include the fact that the impactor is still present in the model.*

3. Now, taking turns let the children experiment with creating craters! Have each group conduct an experiment by changing one variable to see how it affects impact crater size. Experiments could explore different impactor sizes, weights, distances dropped, or angles of impact. For example, one group could drop the same impactor from different heights (modeling different velocities of the incoming impactors), and another group could experiment by dropping different-sized impactors from the same height. If the children want to experiment with angles of impact they will need to throw the impactors at the box; caution should be used to make sure no one is standing on the opposite side of the box in case the impactors miss. Invite the children to predict what will happen in their experiments. Have the children measure and note the width and depth of each impact crater formed in their experiments.

~What did the groups observe?

~How did the weight of objects affect the size and depth of the crater you created?

~How did the size of the object affect the size and depth of the crater?

~How did dropping or throwing the impactors from different heights affect the sizes and depths of the craters they formed?

Conclusion

Have the children reflect on what they observed and the images of lunar craters.

What features did the children create in their models? *Impact craters.*

How do the children think the craters on the Moon formed? *By large impactors — asteroids or comets — striking its surface.*

Scientists have not actually seen any large asteroids or comets hit the

Moon, but they think the large craters on the Moon — and on other planets and moons — were created by them. Scientists have observed very small asteroids hitting the Moon and Earth, and they observed several pieces of Comet Shoemaker-Levy striking Jupiter. NASA's Lunar Crater Observation and Sensing Satellite mission will intentionally impact the Moon's south pole with a used rocket and the spacecraft itself in fall 2009. Scientists will study the debris plume that is thrown up from the impact.

When the children see "shooting stars" — more accurately called "meteors" they are seeing tiny dust- to sand-sized "asteroids" that are streaking toward Earth's surface. They are too small to make craters or leave any meteorites to collect.

What evidence might scientists have to make them think impactors created the craters in the lunar crater images? *Scientists experiment with models — like the children did — to determine what type of feature an impactor might leave behind. They also have other evidence from some craters on Earth: fragments of the asteroids (meteorites) and alterations to the rocks and minerals at the impact sites caused by the impactors striking the ground at high speed.*

Insert Any Images / Photos / Drawings needed to help describe or explain the activity:

Any images from google.com, or images on lunar craters from an accredited book or magazine will work fine with this experiment/demonstration.

Possible follow-up, extension activities or ideas for children and parents to explore (with references or urls):

NONE

Safety comments / considerations:

Wear safety goggles when dropping objects into the pan to avoid injury to ones eyes.

If your activity should be credited to any specific source or citation – indicate that here:

http://www.lpi.usra.edu/education/explore/LRO/activities/craterCreations/

So we can make sure your organization gets credit for your participation and we refer people accurately to your organization:

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