Environmental Science Institute
UNIVERSITY OF TEXAS AT AUSTIN

Impact Craters in the Classroom

Subject: Science (Earth Science)

Grade Level: 8th

Rationale or Purpose: This activity gives students a chance to view impact craters as well as see first-hand how they occur and what influence they have on the Earth.

Materials:

- 1-2 boxes with at least four-inch sides
- Trash bags to line the boxes
- Flour to fill the boxes up to about three inches
- Dry tempra paint (red or blue)
- Several glass marbles

Lesson Duration: 50 minutes

TEKS: 1(A-B); 2(B-D); 3(C); 14(B)

Background Information:
Impact cratering is a process found everywhere in the solar system except on the giant gaseous planets. Earth has been heavily impacted, but erosion has removed most of the craters.

Perhaps the finest surviving impact crater on Earth is the Barringer Meteor Crater near Winslow, Arizona. It is 1.2 kilometers (0.75 miles) across and 200 meters (650 feet) deep. It was formed about 49,000 years ago when a 50 meter (150 foot) nickel/iron meteorite struck the desert at a speed of 11 kilometers per second (25,000 miles per hour).

An examination of actual craters, almost any image of the Moon will do, will prepare the students for this activity. Just about all craters have deep central depressions, raised rims, and a blanket of ejected material surrounding them.

Activity:

Students will be able to create their own impact craters, and observe the changes in land surfaces caused by meteors.

Procedure:

Take the students outside and let them observe the Moon directly during daylight. Check the newspaper for the phases of the Moon and observe it in the afternoon during "first quarter" or in the morning during "third quarter". The Moon will be separated from the Sun by 90 degrees to the east (left) at first quarter and 90 degrees to the west (right) during third quarter. Discuss with the students how the large dark regions are the remains of very great impacts and many retain their circular boundaries. Binoculars on a tripod would provide a spectacular view if they are available.

You can create craters in the classroom with a box, lined with a trash bag, with sides at least 4 inches high (the lid to photocopier paper boxes is perfect); flour (3 to 4 inches deep with at least an inch of clearance to the box rim), some dry (powdered) tempra paint (red or blue), and some marbles.

Place the flour in the box and smooth and firmly pack it (experiment with different firmnesses). Place a dusting of the paint powder over the flour (colored water in a spray bottle works, but not as well). Use the marbles to bombard the surface (one at a time). Look for classical cratering features: basin, raised rim, ejecta blanket (material excavated from the crater and dumped around it, visible as white flour on the colored powder), and rays (material shot out at high velocity forming lines pointing directly away from the impact site).

Students should keep careful records and can do top and profile drawings of the craters and compare craters formed by different size projectiles, different velocities, and different angles of impact. Different size projectiles can be dropped from measured heights so that they will have common velocities. They should also remember that the quality of their tests is more important than quantity.

After several craters, the flour and tempra can be mixed and re-smoothed without changing the white of the flour too much. Then a new layer of tempra can be applied and additional experiments conducted. In real impacts the impacting object is destroyed or broken up into small chunks. Of course the marble will not do this and will remain whole in the crater.

After students have completed their trials, have them do the post-assessment worksheet provided.

Required Documents:

- Post-Assessment Worksheet

Name _____

Date _____

Craters in the Classroom

Use colored pencils in the space below to draw an impact crater. Then use the vocabulary at the bottom of the page to label your crater.

Vocabulary

- **Central Peak** - A mountain found in the center of large craters. It is formed by a "rebound" of the rock at the impact site (the marble will be sitting there in this activity).
- **Crater** - A (usually) circular depression in a surface caused by an impact.
- **Ejecta** - Material tossed out of the crater.
- **Ejecta Blanket** - Ejecta tossed out at low speed. The material lies like a blanket around the crater.
- **Floor** - The interior of the crater. It is flat in large craters (the marble will be there in this activity).
- **Rays** - Ejecta tossed out of the crater at high speed. The material forms long lines pointing directly away from the crater.
- **Rim** - The raised edge of the crater. It is formed by the outwards and upwards compression of the crater walls, not ejecta.