

Meteorites and Their Impact

Teacher Information Sheet

Objective:

- Students will simulate the impact of a meteorite on the earth's surface.

Materials Needed:

1. Three different-sized steel bearings (small, medium, and large) for each student group
2. Clay
3. Toothpicks
4. Metric rulers
5. Pieces of cardboard (for protective covering).

Procedure:

1. Review and discuss background information on meteorites.
2. Divide students into groups of 2 or 3.
3. Copy and distribute Student Information Sheet to each student or group.
4. Review and demonstrate procedures for conducting lab.

Meteorites and Their Impact

Student Information Sheet

Objective:

- To simulate the impact of a meteorite

Materials Needed:

1. Three different-sized steel bearings (small, medium, and large)
2. Clay
3. Toothpaste
4. Metric ruler
5. Cardboard (for protective covering).

Background Information:

A **meteor** is a flash in the sky or a shooting star.

A **meteorite** is a rock from space that hits the earth.

A recovered meteorite is called either a **fall** or a **find**. It is called a fall when someone actually witnesses the event and recovers the meteorite, but this is rare. On average, there is one meteor fall per year in North America. A find is a meteorite that is discovered long after it hits the earth with no witnesses. A study in 2001 estimated that a recoverable meteorite hits the earth at a rate of one per million square kilometers per year.

It is estimated that 1,000 to 10,000 tons of meteors enter the earth's atmosphere every day. Most of these burn up and never make it to the surface as a recoverable meteorite.

Some scientists believe that meteorites are fragments from the “missing planet”, a planet which may have once roamed between Mars and Jupiter. Other scientists believe that meteorites come from the tails of comets. When meteorites approach the earth, the gravitational field which is similar to a powerful magnet, pulls them closer. The friction builds up in the atmosphere and creates intense heat.

A meteorite strikes the earth, scatters, and then sends shock waves racing in every direction. The depth of penetration and the crater size depend on where the meteorite hits the earth (soft or hard terrain), its speed, and the size of the meteorite at impact. The crater that is formed is usually larger than the meteorite itself.

Name _____

Date _____

Procedure:

- 1) Create a clay pad, 5 inches long, 3 inches wide, and 1 inch thick. The pad will represent the Earth's crust.
- 2) Your teacher will give you three steel bearings - small, medium, and large. Each bearing will represent a meteorite.
- 3) Place the clay pad in the center of the table or on the floor.
- 4) Stand over the clay pad and hold the bearing at shoulder level between your thumb and index finger. Center the bearing over the pad, and release it.
- 5) Drop each bearing, one at a time, on the clay pad.
- 6) After the first bearing hits the clay, carefully remove it. Then measure in millimeters and record the depth and diameter of the crater on the Data Table.
- 7) Use a toothpick to measure the depth of the crater in the following manner: Hold the toothpick in a vertical position directly over the center of the crater. Lower the toothpick until it touches the bottom of the crater. Use a pen or pencil to mark the toothpick where it is level with the surface of the clay pad. Then measure in millimeters the distance between the mark and the end of the toothpick that touched the bottom of the crater.
- 8) Repeat this procedure for the remaining bearings. Record all measurements on the Data Table.
- 9) Cover the table or floor with cardboard for protection. Set the clay pad on the cardboard. Smooth out all previous crater marks.
- 10) Now forcefully toss the bearings into the clay pad by flipping them with a sharp downward snap of the wrist. This action, of course, will increase the speed of the falling bearings.
- 11) Measure and record the depth and diameter of the crater on the Data Table.

Name _____

Date _____

Data Table <i>Impact of Meteorites</i>		
Soft Drop METEORITE	Diameter of Impact (mm)	Depth of Crater (mm)
Small		
Medium		
Large		
Fast Drop METEORITE	Diameter of Impact (mm)	Depth of Crater (mm)
Small		
Medium		
Large		

Name _____

Date _____

Questions:

1. Which bearing made the largest crater?
2. Which bearing traveled the fastest? The slowest?
3. Do the crater and the “meteorite” have the same diameter? Explain your answer.
4. What factors determine the speed of a meteorite?
5. Why do you think more meteorite craters haven't been discovered?

Name _____

Date _____

Answers:

- 1) The heaviest.
- 2) They travel at the same speed.
- 3) No, the impact forms a crater that is larger than the meteorite.
- 4) Air friction, size and density of meteorite.
- 5) Many meteorites land in isolated areas or oceans, or their craters erode away.