

Name: _____ Date: _____ Class: _____

Impact Crater Lab

Background:

Impact craters are not unique to the Moon. They are found on all the terrestrial planets and on many moons of the outer planets. On Earth, impact craters are not easily recognized because of weathering and erosion. Famous impact craters on Earth are Meteor Crater in Arizona, Ries crater in Germany, and Chicxulub on the Yucatan coast in Mexico. Chicxulub is considered by most scientists to be the crater left behind from the catastrophe that led to the extinction of the dinosaurs. A meteoroid does not have to reach the ground to cause damage. A small meteoroid can easily damage man-made satellites orbiting around the Earth. Even the space shuttle experiences minor damage from micrometeoroids during every mission. Most meteors that come at the Earth burn up from atmospheric friction and never reach the ground. Only a few larger and denser meteors reach the Earth's surface and make an impact.

Materials:

"Moon Box" - Small ruler - Calculator
2 meter sticks - Scale - *separate piece of paper*
Projectiles (2) - Pencil

Procedure:

In this activity, you will drop projectiles from a fixed height (60cm and 90cm) into the "moon" box one at a time. The diameter and depth of the crater will be measured and the data recorded for further analysis.

Determine the mass (g), volume (cm³) and density of your projectiles and record that information here. Volume of a Sphere = $\frac{4}{3} \pi r^3$ Density = M/V

Projectile #1- M = _____ V = _____ D = _____

Projectile #2 - M = _____ V = _____ D = _____

Show YOUR WORK!

Gather all your materials and find a suitable spot for this activity. Place your "moon" box on soft ground, not concrete. Smooth the "moon" box so that the surface is as flat and even as possible, but not packed.

1. Hold the projectile at the first determined height (60 cm) and carefully drop the projectile into the "moon" box.
2. **VERY** carefully, remove the projectile from the crater it created. If you cannot remove the projectile without damaging the crater, leave it in.
 - a. Measure the crater diameter in cm. Record the diameter into Data Table #1.
 - b. Measure the depth of your crater in cm. Record the depth into Data Table #1.

Smooth the surface of your "moon box" and repeat steps 3-5 for a total of 3 trials at the first height (60cm) with the first projectile.

Smooth the surface of your "moon box" and repeat steps 3-6 for a second height of 90 cm. Record your results into Data Table #1

When you have filled in your Data Table for projectile #1, repeat steps 3-7 for Projectile #2. Enter all your information for projectile #2 into Data Table #2.

Clean up and put away all materials.

Create two **BAR GRAPHS**. The first graph will compare Crater Diameter (y-axis) and drop height (x-axis). The second graph will compare Crater Depth (y-axis) and drop height (x-axis). You should have 2 bars for each projectile on one graph. Make sure you use a different color for each projectile.

Complete the following questions regarding this impact crater lab on a separate sheet of paper.

Which projectile had the largest average crater diameter? At which height?

Which projectile had the largest average crater depth? At which height?

Is there any relationship between drop height and crater diameter?

Is there any relationship between mass of the projectile and crater diameter?

What evidence was there that the energy of a falling projectile was transferred to the ground?

In this experiment, we used projectiles that were still intact after impact. What do you think happens to real meteors after impact?

How would this change the crater that is formed?

Why do you think scientists are interested in studying meteors and the impact craters they produce?

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Complete the following table by explaining the difference between the following orbital debris. Use your book for help.

Comet	
Meteoroid	
Meteor	
Meteorite	
Asteroid	

Data Table #1 - Use for Projectile #1 only

Projectile #1	Trial #1	Trial #2	Trial #3	Total	Average
Crater Diameter @ 60 cm					
Crater Depth @ 60 cm					
Crater Diameter @ 90 cm					
Crater Depth @ 90 cm					

Data Table #2 - Use for Projectile #2 only

Projectile #2	Trial #1	Trial #2	Trial #3	Total	Average
Crater Diameter @ 60 cm					
Crater Depth @ 60 cm					
Crater Diameter @ 90 cm					
Crater Depth @ 90 cm					