4. Investigating Craters

1 hour

Children carry out and evaluate practical tasks to mimic crater formation and consider what information can be gained about meteorites by studying the craters they make.

OBJECTIVES

- Identifying scientific evidence that has been used to support or refute ideas or arguments
- To know that science is about thinking creatively to try to explain how living and non-living things work, and to establish links between causes and effects.
- To know that comparing Mars' key landscape features with similar features on Earth can help us to understand their formation."

RESOURCES

(Per group of 4 children unless otherwise stated)

- Activity sheet 8 cut into cards
- Tray 1/2 filled with sand
- A variety of 'meteorites' (e.g. marbles, rubber balls, stones)
- Tube for safely directing dropping/rolling 'meteorites'
- Measuring device (see diagram on Activity sheet 8)
- Ruler
- Metre stick

ACTIVITY

The children begin by investigating the effects of dropping various masseses , such as marbles, into a tray of sand. The children should be alerted to the safety issues when dropping objects. Using a tube through which to drop the objects would direct them safely to the tray.

Trays could be placed on the floor to allow the height of drop to be increased safely. Encourage discussion about fair testing, how the speed, density, size of the projectile is important, and how and why this affects the size of the crater produced.

PLENARY

The communication manager from each group shares their results with the class. The results can be collated and displayed on the whiteboard for comparison. Interesting patterns or unusual figures could be highlighted. The importance of replication of results is emphasised. This is also an opportunity for graphs to be constructed and suitable graphing software to be employed. The children compare their craters with the images from Mars:

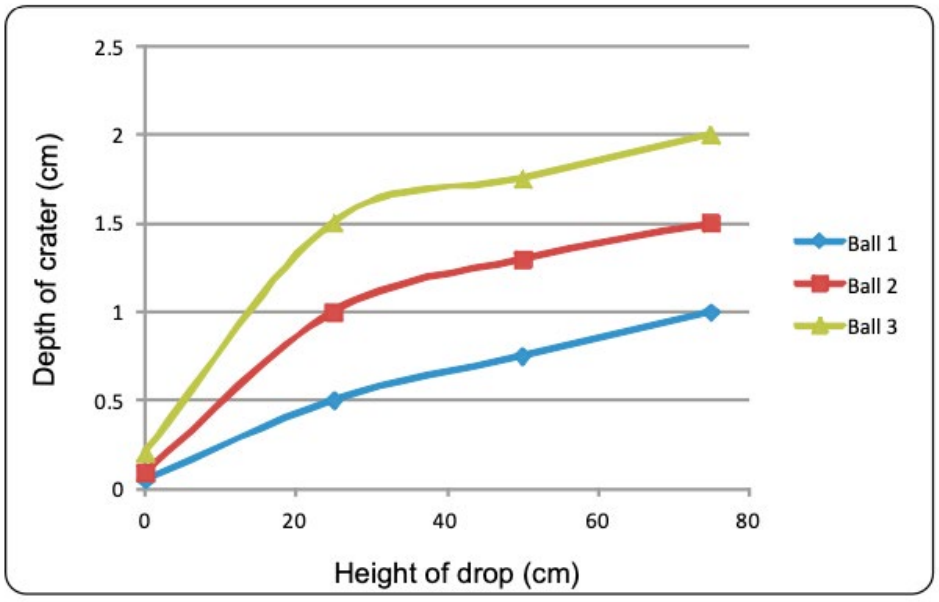
- *Are they similar or not? Why?*
- *What are the limitations of the model?*
- *How would they improve their tests? Were they fair?*
- *Were the results reliable? Were they repeated?*
- *What have they learned about real crater formation?*

The only fair comparison is to change only one variable at a time; different sizes or mass of ball should be dropped from the same height, or the same mass from different heights and craters compared. In reality, meteorites would break up into pieces and possibly produce secondary craters, but in this case, the masses dropped stay in the craters produced.

	Crater depth (cm)		
Height of drop (cm)	25	50	75
Ball 1	0.5	0.75	1.0
Ball 2	1.0	1.3	1.5
Ball 3	1.5	1.75	2.0

The table below shows the depth of crater produced when dropping balls with identical volume but increasing mass.

The graph below shows the depth of crater produced when dropping balls with identical volume but increasing mass into damp sand.



EXTENSION

The children may suggest investigating dropping the masses at different angles rather than straight down or dropping rocks of similar mass but different size or shape. They could make meteorites from a material that will break on impact, such as damp sand.

SAFETY NOTES, PRACTICAL TIPS AND GUIDANCE

An example of an easily-made device for measuring crater depth is shown on Activity sheet 8. Ensure that the bottom of the straw, on which has been placed a blob of Blu-Tack, is resting lightly on the bottom of the crater.

The card circle can be moved up or down the straw to gently rest on the edge of the crater, whilst the depth is marked on the straw. The straw can then be placed next to a ruler and the depth measured. A possible way to achieve same size/ different masses is to use plasticine wrapped around objects of varying weight. Alternatively, various weights could be placed inside hollow spheres.

Landscape

Images can be downloaded from www.cciproject.org/topicbank/space.htm

Image K

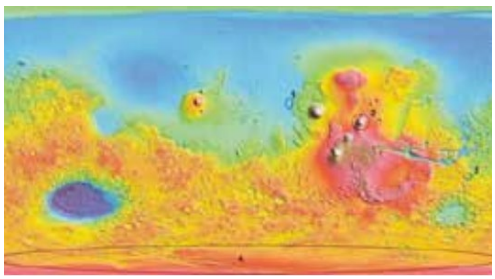


Image of Mars with landscape features for pupils

Image Q

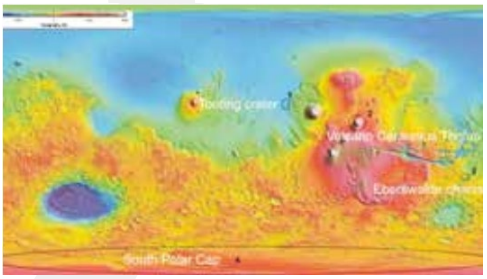
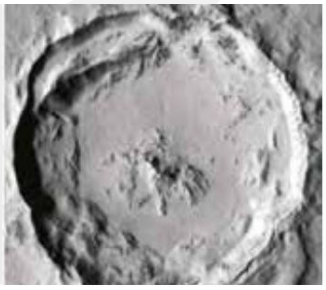


Image of Mars with landscape features marked and named for teachers pupils

Image L

Tooting Crater

Image M

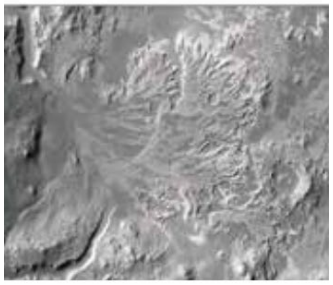


Tooting Crater close up

Image N

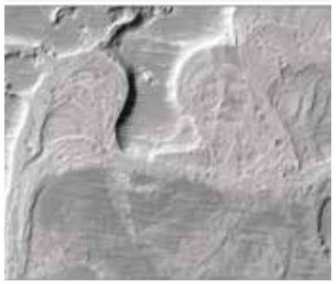
Volcano Ceraunius Tholus

Image O



Eberswalde Channels

Image P



Eberswalde Channels close up

Image R

Crater on Earth viewed from space

Image S

Volcano on Earth

Image T

Water channels on Earth

Image U

River delta on Earth viewed from space