

## STAR WARS CRATERS



### GRADE LEVELS

This activity is appropriate for grades K-8.



### MISSION

Make your own craters.



### VOCABULARY

**CRATER:** a large, bowl-shaped cavity in the ground or on the surface of a planet or the moon, typically one caused by an explosion or the impact of a meteorite or other celestial body.

**METEORITE:** a rock that falls to earth after a brilliant meteor has passed through the earth's atmosphere.

**ENERGY:** power derived from the utilization of physical or chemical resources, especially to provide light and heat or to work machines.



### MATERIALS

- » Large baking pan or shallow cardboard box
- » Flour (enough to fill the pan)
- » Cocoa powder (enough to create a thin layer on top of the flour)
- » Sieve or sifter
- » Balls of various sizes
- » Optional: ruler and meter stick

### ABOUT THIS ACTIVITY



The Star Wars movie series loves space exploration! With so many planets to explore, a crater-making activity is always a good fit!

*How did the moon get its craters?*

*What about the craters on Earth?*

*Why do they look the way they do?*

Find out in this fun science activity as you make your own craters by dropping balls into a tray of flour.

# INSTRUCTIONS

## PREP WORK

This project is messy. If possible, you should do it outside. If you must do the project inside, lay down a sheet or towels first to make cleanup easier.

## PROCEDURE

- 1 Fill the baking pan with flour.
- 2 Use the sieve to put a thin layer of cocoa powder on top of the flour.
- 3 Try dropping a ball into the pan from about half a meter above it. Optional: Use the meter stick so you can drop from a consistent height.
- 4 Look at the resulting impact crater. What color is the surface immediately around the crater? How does that compare to the surface of the rest of the pan? How far did the flour and cocoa powder spread? Optional: Use the ruler to measure these distances.
- 5 Try dropping the same ball from a different height. What does the resulting crater look like?
- 6 Try dropping balls of different sizes from the same height and examine the resulting craters.
- 7 You can even try throwing a ball sideways, so it hits the pan at an angle, instead of coming straight down. How is the resulting impact pattern different from when you dropped the balls straight down?
- 8 If needed, smooth out the surface of the pan, and sift a fresh layer of cocoa powder on top.

## CLEANUP

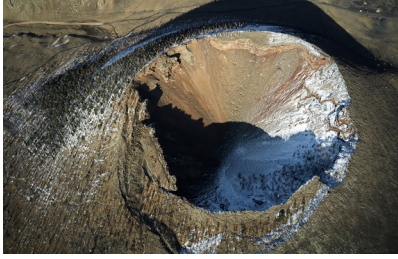
If you did the project inside, vacuum or sweep up any flour and cocoa powder that got on the floor.

## WHAT HAPPENED?



You should have found that the bigger the ball, or the faster it was moving, the bigger the resulting crater would be. This is because larger, faster-moving balls have more kinetic energy than smaller, slower-moving balls. This energy is transferred to the flour and cocoa powder when the ball hits the ground, causing it to fly outward, creating the crater (and a mess!). You should also have seen that the impacts churned up the “soil,” bringing some of the white flour to the surface near the impact site. While the pattern around the crater was probably symmetrical if you dropped the ball straight down, sideways impacts would result in asymmetrical patterns as more flour/cocoa powder were thrown in one direction than the other.

## THE SCIENCE BEHIND IT



Craters are round, bowl-shaped depressions surrounded by a ring, like the one shown on the left. Impact craters are made when a meteorite crashes into a planet or moon (as opposed to volcanic craters, which are created when a volcano erupts). Just like in your science experiment, the size and shape of the crater depends on how big the meteorite was and how fast it was going when it hit the ground. A bigger, faster-moving meteorite will create a bigger crater, sometimes throwing material very far away from the impact site.

Some of the craters on the moon are so big that you can see them with the naked eye! While Earth has over 100 known impact craters, not all of them are obvious. Unlike the moon, Earth has an atmosphere with weather that causes erosion (wind and rain), along with animals and plants that can move soil and change landscapes over time. So, some craters on Earth's surface may be eroded or overgrown. Many meteoroids (they are called meteoroids while they are still in space, and meteorites once they hit the ground) also burn up in Earth's atmosphere, never reaching the ground at all.

## EXTENSIONS

- » Scale this project up! Do you have access to a sandbox, a shovel, and some dirt? Try the project outside. Create a large pile of loose material: dirt covered with a layer of sand (similar to the flour covered with cocoa powder). Ask an adult for help dropping a larger ball, like a basketball, from a higher location (like standing on a ladder).
- » For a more colorful project, use colored sand or sprinkles instead of cocoa powder. Create a rainbow of different layers, or different patterns on the surface. What do your resulting craters look like?
- » Do you have a smartphone with a slow-motion camera setting? Try filming your meteorite impacts in slow motion! What do you see when you watch the videos?

## RESOURCES

### » DIY Flour Craters

<https://www.sciencebuddies.org/stem-activities/creating-craters?from=Blog#summary>

## LEARN MORE

### *Students + Parents + Educators*

For information on grants, training and student opportunities, curriculum ideas, and other resources, please visit ***stem.inl.gov***.