

# Space Rock Scavenger Hunt



VIRGINIA  
**AQUARIUM**  
& MARINE SCIENCE CENTER

*Did you know thousands of small meteorites land on planet Earth every day? Learn how to search, collect, and separate meteorites from sediment found around your house or school.*

## Duration

Activity: 45-60 minutes

## Supplies

- Dust pan and brush
- Gently used plastic bag
- Sheet of paper
- Magnets
- Magnifying glass



*Micrometeorites under 40x magnification.*



## Background

As earth orbits around the sun, it passes through debris made of rock and ice. When space rock enters earth's atmosphere, it is classified as a meteor. Many meteors disintegrate from the friction caused by the rock pushing through the air molecules in the atmosphere. Can you rub your hands together to create friction? It gets warm right? Meteors are subjected to intense friction and heat as they travel through the atmosphere. If a meteor passes through the atmosphere and collides with the surface of a planet or moon, it is then classified as a meteorite.

Some of earth's mass extinction events and geographical features are the result of large meteorite impacts. An impact crater is the circular depression that is left behind after a meteorite collides with the surface of a planet or moon. Have you visited an impact crater site? Barringer Meteor Crater in Arizona is a famous impact crater site for tourism. Did you know there is an impact crater under the Chesapeake Bay that is 53 miles in diameter? The Chesapeake Bay Impact Crater formed approximately 35 million years ago when a 2-mile-wide impactor traveling at 70,000mph slammed into the region we currently call the Chesapeake Bay. Although this event happened millions of years ago, we can see the influence the impact crater; modern rivers in the lower bay region, such as the York and James, make sharp turns near the rim of the crater.

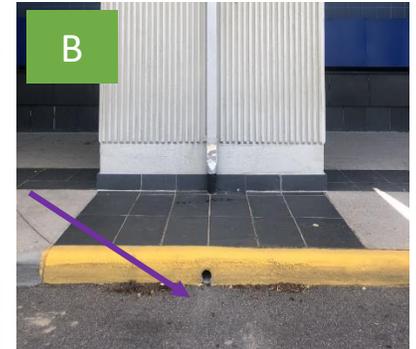
Everyday thousands of micrometeorites land on Earth. The prefix "micro" means small therefore micrometeorites are small space rocks that can be seen with the help of magnification tools, like a magnifying glass or microscope. We can look for micrometeorites by understanding their composition. Many meteorites are rich with iron. Iron is one of the three common ferromagnetic elements. Can you name the other two? Nickel and cobalt. "FeNiCo" is a great way to remember these three elements; it's made of the atomic symbols for the three naturally occurring magnetic elements. If micrometeorites contain magnetic iron, what can we use to separate them from non-magnetic soil? A magnet! A magnet will be your tool of choice to help you locate micrometeorites around your home.



*Chesapeake Bay Impact Crater*

## Instructions

- Go outside with your dustpan and look for locations to collect sediment that might be rich with micrometeorites. A great place to look would be where water run-off collects; micrometeorites often get swept along with rain water. Safely look near gutter drains and sidewalk curbs. See the images below of locations around the aquarium that were used as sampling sites.
  - Side walk ramp
  - Gutter drain
  - Collection of sand near a drain
  - Sand left behind after rain water evaporated
- Collect sand samples from your location. If choosing multiple locations, keep your samples separate and be sure to label your samples with a description of the collection location.
- Return inside. Fold your sheet of paper in half, like a taco, and set aside in a nearby spot.
- Place magnet inside the plastic bag.
- Drag the plastic bag and magnet through the dirt and sand in the dustpan.
- Place the magnet and the bag over the crease of the folded paper.
- Carefully open the bag, reach in, and remove the magnet. Next, remove the bag from the paper. The magnetic material should fall and land in the crease.
- What you just collected might contain actual meteorites! Micrometeorites are incredibly small; they can be as small as one millionth of a meter. They form spheres as they pass through the atmosphere. Spread a thin layer of your magnetic material and look through a magnifying glass to see if you can find a spherical, shiny object. You've just found a meteorite!



## Vocabulary

**Atmosphere:** blanket of gases that coats a celestial body, like a moon or planet.

**Impact Crater:** a circular, geographical feature formed when a meteorite slams into a moon or planet.

**Magnetic:** exhibiting magnetism. The capability of attracting or repelling a force between objects, which is produced by the motion of electric charges. Iron, Nickel, and Cobalt are three naturally occurring magnetic elements.

**Meteor:** a rock that originated from space and has entered an atmosphere.

**Meteorite:** a space rock that collides with the surface of a planet or moon.

**Micro:** a unit prefix meaning “small”. Specifically, micro denotes a factor of  $10^{-6}$  (one millionth).

## Extension

- Try collecting from multiple locations and compare the amount of micrometeorites collected at each site. Hypothesize why one location might have a higher yield of micrometeorites than another location.
- Design and engineer a reusable micrometeorite separation tool that will separate the magnetic material from sandy sediment. See an example of a tool created below. The magnetic space rock attracts to the bottom of the spoon when passed over sediment collected. When the clothespin is pinched, the magnet lifts and the magnetic meteorites are released.



- Make your own impact craters using flour, cocoa powder, and various household object as the meteorite.
- Explore the explosive formation of the Chesapeake Bay Impact Crater at the [United States Geological Survey's website](http://www.usgs.gov).

## References

NASA Exploring Meteorite Mysteries, A Teacher’s Guide With Activities for Earth and Space Science; EG-1997-08-104-HQ

[http://er.jsc.nasa.gov/seh/Exploring\\_Meteorite\\_Mysteries.pdf](http://er.jsc.nasa.gov/seh/Exploring_Meteorite_Mysteries.pdf)

Whipple, Fred (1950), "The Theory of Micro-Meteorites", *National Academy of Sciences* **36**(12): 687–695.