

STEM Lesson Plan:



Research Experiences
FOR TEACHERS

Earth Meets Outer Space: Meteorites (Grade 5)

Purpose:

- Students will be able to explain the difference between asteroids, meteors, and meteorites.
- Students will compare and contrast common characteristics of meteorites (density, magnetism, texture, luster)
- Students will create a model to represent what happens to a meteor as it enters Earth's atmosphere.
- Students will analyze real meteorite fall events and explain their effects on Earth.
- Students will model and observe how friction causes heating and material loss.

FL Science Standards:

SC.5.E.5.3 Distinguish among the following objects of the Solar System -- Sun, planets, moons, asteroids, comets -- and identify Earth's position in it.

SC.3.P.11.2 Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one's hands together.

Disciplinary Core Ideas

PS2.B: Types of Interactions

- The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5- PS2-1)

Science and Engineering Practices

Developing and Using Models

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

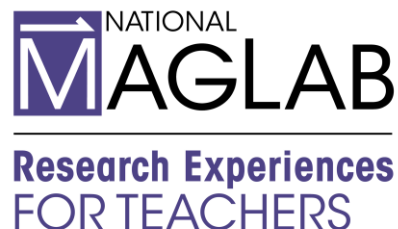
- Use models to describe phenomena. (5-PS3-1)

Time: 45-60 minutes

Materials:

- Large Marshmallows- Campfire
- Graham Crackers
- Chocolate Squares
- Heat Source- (Microwave or Safe Camp Fire Burner)
- Paper Towels- Paper Plates
- Toothpicks
- Journals

STEM Lesson Plan:



STEM Rationale for Lesson:

Students use the layers and behavior of a S'more to model how an asteroid travels through space, burns as a meteor, and lands as a meteorite.

Lesson 5 E's

Engage (5 minutes): Teacher says, "Have you ever seen a streak of light shooting across the night sky? Did it make you hypothesize its origin, its molecular composition, or simply its identification?"

Play video for students: [Watch Meteor streaks across Florida video](#)

Explore (30 Minutes): Build the S'more Model

1. Build your Asteroid: Students will assemble a S'more that will represent an asteroid (a space rock in space).
 - a. Marshmallow- stony interior of the asteroid
 - b. Chocolate chips- metal-rich layer/dense material
 - c. Graham cracker pieces = outer crust

Students will take the chocolate chips and graham cracker pieces and stuff them into marshmallows. This represents the varied materials that make up an asteroid.

2. Atmosphere Entry: Heat the S'more for a few seconds – Microwave is easiest in the classroom. (Show the video of making smores with fire. Then show the students an example of a marshmallow that has been burned with fire.
3. Students observe and record observations in a journal. Teacher may need to guide students with the following:
 - a. Chocolate Melting
 - b. Marshmallow Expanding
 - c. Edges softening or dripping, rounding
4. This simulates an asteroid entering Earth's atmosphere and heating up through a force called friction. Teachers need to make sure the key connection has been made. The gooey melted parts represent the material that burns off, forming a glowing meteor.

Explain: (20 minutes): Modeling the Meteor

Teacher says:

- "What changed when the S'more heated up?"
- "What part of our model represents the glowing meteor?"

STEM Lesson Plan:



Teachers will use the Canva “Space Rocks” to present to the class.

[Go to Canva “Space Rocks” Presentation](#)

Students will use their journals to take notes with the Canva “Space Rocks” presentation. Teacher will model notes taking along with the students by writing in teacher’s journal under document camera.

4 KEY FACTS:

- An Asteroid is in space
- An Asteroid becomes a Meteor as it burns in the Earth’s Atmosphere
- If any parts of the Meteor survive the heat of the Earth’s Atmosphere, the leftover pieces hit the Earth’s surface as a Meteorite.
- The hole created by the meteorite on the Earth’s surface is a Crater

STEM Lesson Plan:



Show the students the video for “What is a Shooting Star” by They Might Be Giants:

[Watch the video “What Is a Shooting Star”](#)

Elaborate: (10 minutes): “Meteorite Core Sample”

Part 1: Teacher will display 3 authentic meteorites. Make sure to talk about the properties of each. (Luster, Hardness, Fracture)

Model journal entries for each type of meteorite. Sketch a small image of each meteorite along with the type of meteorite.

Part 2: Students will cut through their S’more (Use plastic spoons or safe plastic knives)

1. Students will examine
 - a. Layer structure
 - b. How much “material” was lost
 - c. What the “surviving meteorite” looks like
2. Ask: “If your S’more was a real space rock, what clues would it give scientists about where it came from?” Explain your answer.

Evaluate: (5 minutes): Exit Ticket. Students will complete the following:

Draw and label the 3 stages:

1. Asteroid: (S’more Untouched)
2. Meteor (heated and melting)
3. Meteorite (surviving parts of original asteroid)

STEM Lesson Plan:



Extension Activity: Hands On Lab: Crater Makers

Purpose: Modeling meteorite impacts.

Materials: Flour, cocoa powder, marbles/rocks, rulers, trays

Activities:

- Students experiment by dropping different size rocks/marbles “meteorites” from different heights into the trays with flour and cocoa powder.
- Measure crater diameter and depth (always in metric)
- Write a claim: “What affects crater size the most?”

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