

Cupcake Drilling

OBJECTIVE

Students will model geologic drilling using layered cupcakes to learn about rocks below the Earth's surface.

PURPOSE OF ACTIVITY

Read or Listen, Identify Details, Apply Skills

21st CENTURY SKILLS

Critical Thinking, Collaboration, Creativity

COGNITIVE LEVEL

Strategic Thinking, Extended Thinking, Skills and Concepts

CLASS TIME

1 hour

MATERIALS

- White cake mix
- Frosting
- Food coloring
- Foil baking cups (must be opaque)
- Cupcake or muffin pan
- Plastic cutlery
- Clear plastic straws
- Crayons, markers or colored pencils
- Student Worksheet

Procedure

1. Prepare layered cupcakes prior to beginning the lesson. See baking instructions below.

Mix the batter according to cake mix directions. Separate the batter into three bowls and add drops of food coloring to each bowl until desired color is achieved. Line a cupcake pan with foil baking cups. Spoon one tablespoon of each colored batter into the foil cup; order of color does not matter, and layers do not need to be smooth or uniform. Continue adding batter until the foil cup is half full. Bake according to cake mix instructions. Mix green (for grass) or brown (for soil) food coloring into the frosting. Once the cupcakes have baked and cooled, ice the top so that no part of the cupcake is showing.

2. Distribute a cupcake, plastic cutlery, three straws and student worksheets to each student. Instruct students to not touch or eat the cupcake until told to do so.
3. Explain that each cupcake represents a small part of the Earth.
4. Ask the class what techniques could be used to determine what the cupcake looks like inside. Common answers include: *(see next page)*

- Scrape back the icing. This will show the cupcake's surface, much like a bulldozer is used to expose rock, but it does not expose rocks at depth.
 - Cut or bite into the cupcake. This would work similar to man-made outcrops (quarries, pits, roadcuts) or natural outcrops (river valleys). Unfortunately, outcrops are scarce, not always located where information is needed and limited in depth below the surface.
 - Use an "X-ray machine." This is similar to ground-penetrating radar and seismic shockwaves that allow geologists to image the Earth below their feet. However, this approach does not tell geologists what type or age the rocks are, only how they are arranged.
 - Use the straw to drill into the cupcake. The straw can drill into the cupcake to reveal the layers below the surface. Geologists call these samples a core.
5. Instruct students to use one straw to drill a hole directly into the center of their cupcake. Hold the straw upright and rotate it slowly until it reaches the bottom of the cupcake. Pull the straw out to reveal the colored layers of the core.
 6. Instruct students to draw the colored layers of their core on their student sheet.
 7. Using a clean straw, drill a second hole into the cupcake and draw the colored layers of the core on the student worksheet. Repeat until all three cupcake cores are drilled and drawn.
 8. Students will connect the contacts between the colored layers of the three cores to create a cross section of their cupcake. Ask students to make an inference on what the interior of cupcake looks like based on their core observations.
 9. Use the plastic cutlery to cut the cupcake in half. Students should cut through their core holes in a straight line.
 10. Instruct students to draw the cupcake interior once it is cut open. Compare the student's cross section to the actual cupcake layers.



CRITICAL THINKING QUESTIONS

What could you have done to make a more accurate cross section?

Used more straws to take more core samples.

Why do geologists study the subsurface?

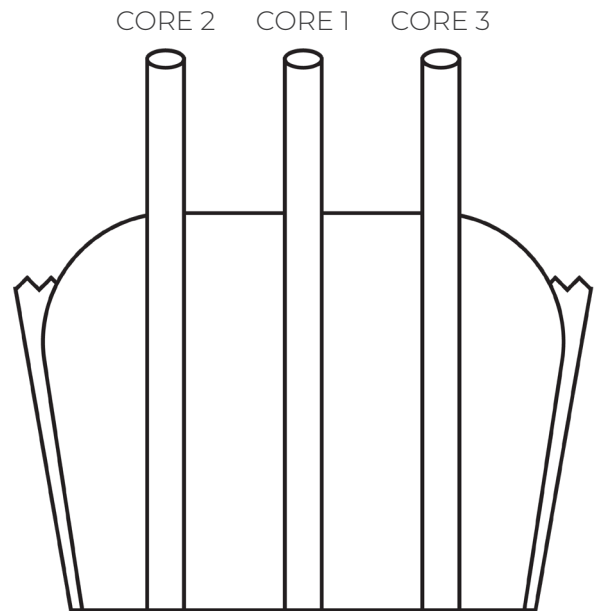
They can discover natural gas deposits, they can study rocks, they can see fossils, etc.

STUDENT WORKSHEET

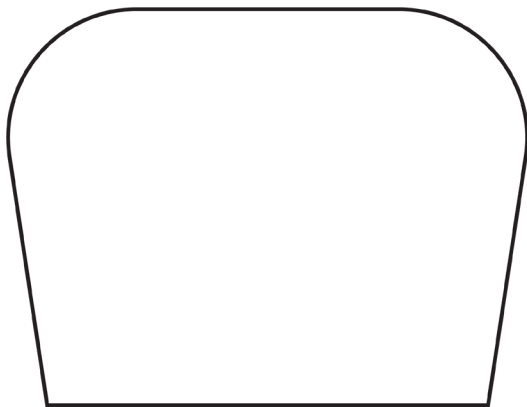
Cupcake Drilling

Name _____

1. Use a straw to drill a hole directly into the center of your cupcake. Pull the straw out and draw the colored layers in Core 1 to the right.
2. Use new straws to drill Core 2 and Core 3. Draw your cores in the spaces to the right.



3. Use your observations of the core to make an inference of what the cupcake looks like inside.



4. Cut the cupcake in half. Draw the inside layers of the cupcake in the space below.

