



North Pond Restoration: Cupcake Geology

Seeing through the Earth's surface

As part of the North Pond Nature Sanctuary restoration scientists took soil samples from North Pond and the surrounding park. These soil samples will tell us more about the sediment in the pond and surrounding areas. (learn more at <http://lincolnparkconservancy.org/the-campaign-for-north-pond/>) Knowing the soil profile tells us more about each layer; what kinds of materials make up each soil layer, how thick the layers are, and where there are possible pollutants that need to be removed. For instance, areas of sand allow groundwater (and pollutants) to move freely, while clay-rich soils hold water in place. Understanding the sediments in and under the pond also help us understand how deep the pond once was and how deep we can make it to improve its water quality and habitat for the animals and plants that live there.

Geologists (scientists who study the earth) use a process called core sampling to figure out what is underground. Core sampling pulls a tiny column of sediment out of the ground so geologists can study it. Based on collecting many samples from a variety of places, geologist can make cross sections and maps of what the earth looks like below the surface.

You can be a geologist yourself and unearth what is happening in a cupcake (or a whole cake!) with a straw and a bit of imagination.

Materials: cupcake materials (cake mix or ingredients to make it from scratch, food coloring to make visually different layers, baking cups or foil that kids can't see through, frosting), clear plastic straws (colored straws also work), drawing paper, colored pencils, plastic knife.

Guiding Questions: How can we figure out what something is made of, even if we cannot see for ourselves? How could we tell what is under the surface of the ground? Why do you think knowing what's underground is important? Why would we want to understand the soils at North Pond as we work to improve the pond and its habitat for plants and animals?

NOTE for Grownups: it is fun to do these activities with your children, and they may need your help making the cupcakes, but remember they (not you), should be the ones leading the activity. Letting them lead helps them to learn confidence and problem-solving skills.

Directions to Make a Geologic Map of a Cupcake:

1. Follow the recipe/directions to make cupcake batter. Use food coloring to make at least three different colors of batter. (You could also make several different batters, e.g. chocolate, yellow, strawberry). Fill the foil cups with at least one layer of each color. (Adding more variation in layers will make for more interesting discoveries; including mixing up colors in the same layer). Varying the thickness of the batter or the sequence of the batter between cupcakes adds interest later when taking core samples.
2. Bake and frost the cupcakes (the frosting hides what's underneath and is equivalent to the soil and/or plants we see on the surface). If you can, let the cupcakes sit overnight.



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3. Remind everyone not to eat the experiment until they have made all their observations!
4. Start your exploration by drawing what you think the cupcake would look like if you cut it in half. Then draw a map of the top of your cupcake, and mark where you plan to drill.
5. Start drilling! Insert your straw, slowly twisting it into the cupcake. When you pull it out, you have your core sample! Cut through the straw above your sample, and leave it as is, or gently squeeze or push it out of the straw. Remember to mark the location of the core sample on your map.
6. Repeat this process to collect several core samples. When you finish, examine all the samples side by side. Is the same color always on the bottom? The middle? The top?
7. Based on the core samples you collected, draw what you now think your cupcake looks like if you cut it in half.
8. Cut open your cupcake (do not eat it yet!) and compare it to your drawings. It is okay if you guessed wrong, that is why we do these experiments, to confirm if we were right, or to change our understanding of the world if we are wrong.
9. Celebrate the success of your experiment by eating the cupcake! If you made more than one cupcake, try again! Maybe add a challenge by designating one color as water and see if you can figure out the best spot to drill a well or dig a pond. Or make more cupcakes and add tiny bits of candy in addition to the different colored layers.
10. In the real-world different types of soil and sediment are not always as clearly different as different colors of cake. But the process of drilling to get core samples is very similar. By looking at the core samples, geologists and soil scientists learn about what is underground which allows us all to know what to expect when deepening a pond, planting flowers, or thinking about how water moves under the surface of a park. Geologists and other earth scientists can take this information to make maps that can be smaller than the area around the North Pond or bigger than the whole United States.
11. Geologists are studying core samples from the North Pond, so they know what is underground. This helps us know what to expect when we want to make the pond deeper, and therefore healthier for fish and other animals that live there.

Explore more ideas and lesson plans:

[scholastic.com/teachers/blog-posts/alycia-zimmerman/mystery-bags-develop-observation-and-inference-skills/](https://www.scholastic.com/teachers/blog-posts/alycia-zimmerman/mystery-bags-develop-observation-and-inference-skills/)

ceetep.oregonstate.edu/sites/ceetep.oregonstate.edu/files/resources/22-cupcake-geology.pdf

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taylorhardinghanson.wordpress.com/2012/11/17/cupcake-geology/

homeschool.rebeccareid.com/core-sampling-play-dough/

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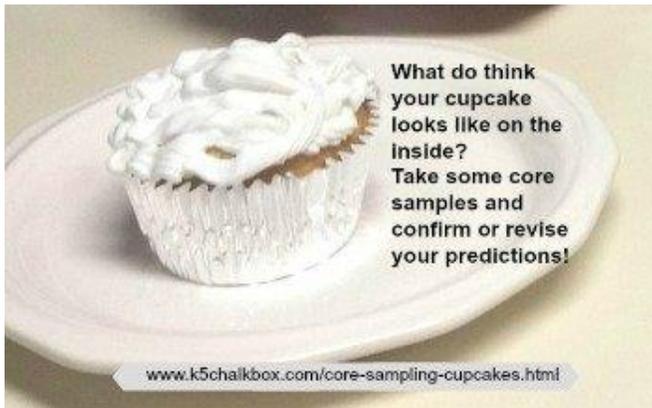
soils4kids.org/experiments

www.uky.edu/KGS/education/cookbook.htm



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Cupcake Core Sampling Images from the web





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Geologic Core Samples, Maps, and Cross Sections from the Web

