

H₂O Below Exploration

Challenge: How can you use a variety of materials to create a model of an aquifer?

Materials: hard candy clear plastic cups
 drinking water straws
 vanilla ice cream crushed cookies
 food coloring

Let's Dig In:

Making an edible aquifer will help you better understand the nature of this underground water system. Begin by taking the hard candy and place it in the bottom of the cup. Pour in enough water to easily cover all the candy. Scoop a layer of ice cream (about 2 cm) on top of the mixture. Sprinkle a layer of crushed cookies at the very top. Finally, add a few drops of food coloring and observe the progress of the color.

After several minutes of observation, you are ready to drill a well. Take your straw and carefully push it to the bottom. Slowly, drink the water out of the bottom of the cup. Keeping the straw in the cup, slowly add more water to the cup and make more observations.

Go Figure:

1. What happened to the food coloring when it was added at the beginning of the exercise?
2. Describe what happened to the food coloring when the “well” was drilled.
3. When the water was added after the “well” was drilled, what happened to the food coloring? What do you think this pouring in of the water represents in regard to an actual aquifer?
4. What do you think the food coloring represents in nature?
5. Aquifers have different layers, each of which behaves differently. What do you think each of the different components of your edible aquifer represent in a real aquifer?

Teacher Notes
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GEOMES Topic: Groundwater

Lab setup:	none	<u>easy</u>	moderate	difficult
Reasoning level:	easy	<u>moderate</u>	difficult	
Time required:	<u>20-40 minutes</u>	40-60 minutes	60-90 minutes	
Process skills:	<u>observing</u>	<u>inferring</u>	<u>interpreting data</u>	

Objectives: Students will construct a model that represents an aquifer in order to understand how groundwater can be contaminated.

National Science Education Standards:

Content Standard: Earth Science – Structure of the earth system.

Unifying Concepts and Processes: – Evidence, models, and explanation
 Form and function.

Materials: hard candy (any type of candy that won't start to melt right away and/or dissolve its colors into the water)
 clear plastic cups
 drinking water (clear soda pop may be substituted, but the fizzing may cause a problem)
 straws
 vanilla ice cream
 crushed cookies (or some other yummy ice cream topping)
 food coloring
 (Additionally, you may want to have plastic spoons on hand to eat the materials when the activity is complete)

Teaching Strategies:

Make sure the students make their ice cream barrier as flat as possible. You might substitute Jello so you don't have to deal with keeping the ice cream frozen. The Jello can be formed in a cup cake pan at about an inch in depth.

Sample Data and Observations:

Observations before well was drilled	Observations after well was drilled	Observations after water was added
The food coloring spread out on the surface and soaked into the cookie crumbs.	The food coloring was pushed into the hole that was made by the straw.	The food coloring went down to the lower layer and colored all of the water below

Sample Responses to Go Figure:

1. At the beginning of the experiment, the food coloring stayed on top of the ice cream. It does not pass to the lower layers.
2. Pushing the straw through the ice cream layer pulled some of the food coloring down to the water level.
3. As the water was added, it pulled even more food coloring down to the lower level. You could see the food coloring all through the water.
4. When water was added, the food coloring was “washed deeper into the “aquifer”. The water being poured on the top represents the rain recharging the aquifer.
5. The food coloring represents contaminants in the soil. These contaminants are washed into the aquifer by rainwater.
6. The candy could represent gravel, sand, or some porous layer that holds the water, the ice cream represents the impermeable layer, and the cookies represent the topsoil layer.

Internet Connection: Suggested keywords for an internet search: aquifer, groundwater