

SOIL INVESTIGATION: GRADE 3

Overview:

Students investigate the layers of soil.

Objectives:

The students should be able to

- analyze and describe the different components of soil;
- comprehend the key terminology related to soil;
- see, interpret, and illustrate the major soil layers.

Materials:

Per student:

- One spoonful of soil
- Clear plastic cup
- Water
- Wooden popsicle stick or other stirrer
- “Layers of Soil” handout

INSTRUCTIONAL ACTIVITY

Content/Teacher Notes:

- Soil covers much of the land on Earth. It is made up of minerals (rock, sand, clay, silt), air, water, and organic (plant and animal) material.
- **Soil Formation:** Soil is formed slowly as the parent material, rock, erodes into tiny pieces near Earth’s surface. Organic matter decays and mixes with inorganic material (rock particles, minerals, and water) to form soil.
- **Soil Layers:** Soil is made up of distinct horizontal layers called *horizons*. These range from the rich, organic upper layers (humus and topsoil) to the underlying rocky layers (subsoil, regolith, and bedrock). To best match the diagram that the students will fill out, it is best to describe these layers as follows:
 1. **humus:** leaf litter and other decomposing organic material, such as dead animals and plant material
 2. **topsoil:** humus mixed with mineral particles (This is where plant roots grow.)
 3. **subsoil:** mostly sand/silt and clay near the bottom
 4. **bedrock:** parent material for soil once it reaches the surface.

Engagement:

1. Lead the students in creating a KWL chart on what they know about soil. (For a description of the KWL reading strategy)

Exploration:

1. Have each student bring in a spoonful of soil from his/her yard. They may not bring potting soil.
2. Have the students pour their soil sample into a clear plastic cup, add water to fill the cup about three-fourths full, and stir the soil and water mixture thoroughly. Then have them set the mixtures aside so they can settle without being disturbed.
3. Have the students observe and draw diagrams of their soil samples at various times throughout the day and finally the next morning. Instruct them to label each drawing with the time it was drawn

and the interval of time since the last drawing was made. The students should be able to see different layers forming in their cups.

Explanation:

1. Discuss that the floating debris on top is humus, i.e., leaf litter and decomposing organic matter. The next layer is a sand/silt mixture. There may sometimes be a third layer, which is heavier particles of soil. These layers help to show how natural soil is layered.
2. Review with students the four layers of soil as listed under the Teacher Notes above. Make sure that they understand each layer.

Evaluation of Observations and Conclusions

Help the students conclude from their drawings of their soil samples that when soil is deposited by storms, flooding, etc., it will layer depending on the different weights of the various particles. Lead them to understand that the layering of soil is a continuing process.

Elaboration:

- Have the students label the “Layers of Soil” diagram.

Follow-up/elaboration/extension

- Have the students create a folded-layered book about the layers of the soil by drawing a diagram of each layer and giving an explanation of it and what makes it up.
- Have the students create “edible soil” representing the four layers of the soil. Have them describe each layer in their “soil sample,” write about it, and finally eat it. The recipe is shown below.

Edible Soil

Ingredients per student

Small container of chocolate pudding
Clear plastic cup
Two vanilla wafers
Plastic baggie
Spoon
Spoonful of chocolate chips
Two gummy worms
Two chocolate wafer cookies

Directions

1. Place one vanilla wafer on the bottom of the cup. (bedrock)
2. Place the chocolate chips on the wafer. (boulders in the upper portion of the bedrock)

3. Put a very small amount of chocolate pudding over the chips.
4. Place the second vanilla wafer in the baggie, crush the wafer as fine as possible, and pour the crushed wafer on top of the pudding. (silt and sand)
6. Pour the remaining chocolate pudding on top.
7. Place the gummy worms in the pudding with one sticking out of the top.
8. Finally, place the chocolate wafers in the baggie, crush them as fine as possible, and pour the crushed wafers on top. (topsoil)

You should be able to see and identify the layers through the cup.

Enjoy!

Resources:

- *The Case of the Disappearing Dirt, 2003–2004 NASA SCI Files™ Series.* <http://scifiles.larc.nasa.gov/educators/index.html?p=episodes/guides>. Offers a unit on soil.
- “The Dirt on Soil: What’s Really Going on under the Ground.” *DiscoverySchool.com.* <http://school.discovery.com/schooladventures/soil/>. Offers three educational games that students can play, including one on soil layers.
- *The Great Plant Escape.* University of Illinois Extension. <http://www.urbanext.uiuc.edu/gpe/index.html>. Offers information on plant life and soil in a cute mystery format with Detective LaPlant.
- *Soil Science Education Home Page.* <http://soil.gsfc.nasa.gov/>. This NASA site offers good background information for the teacher and some for the students.