Digging In

Strand		Interrelationships in Earth/Space Systems
Topic		Soil layers
Primary SOL	3.7	The student will investigate and understand the major components of soil, its origin, and its importance to plants and animals including humans. Key concepts include b) topsoil is a natural product of subsoil and bedrock; c) rock, clay, silt, sand, and humus are components of soils.
Related SOL	3.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) observations are made and are repeated to ensure accuracy; b) predictions are formulated using a variety of sources of information; h) data are gathered, charted, graphed, and analyzed.

Background Information

Over many years, weather, water, and living organisms help break down rocks and create soil. This breaking down is called weathering. The nutrients found in soil are important for plants to grow. Soil is made up of rock, clay, silt, sand, and humus.

Topsoil is a natural product of subsoil and bedrock. It is the upper layer of soil and is the best for plant growth. Humus is decayed matter in soil. It is located in the topsoil and adds nutrients to the soil. Clay contains tiny particles of soil which holds water; it also adds nutrients. Clay does not drain well. Sand is made of small grains of worn-down rock. It has few nutrients and drains water well. Silt is made up of very small pieces of rock. Silt particles are larger than clay but smaller than sand.

Materials

- Map of local community surrounding the school
- Push-pins or tacks to use on the map

Per student:

- 1/2 cup of soil from home
- One cup of water
- Clear jar
- Water
- Soil Recording sheet
- Magnifying glasses
- Layers of Soil handout

Vocabulary

rock, clay, sand, silt, weathering, humus, topsoil, subsoil, bedrock

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Introduction

1. Ask students to bring a cup of soil from home in a plastic bag.
2. Have students pour their soil on a paper towel and use their senses to make observations.
3. Have students record their observations on the Soil Recording sheet.
4. On the local community map, record with a tack where different soil samples came from (student homes). Discuss the differences in the different soil samples. Discuss about the different layers of soil.
5. Have the students answer the questions on the Soil Recording sheet.

Procedure

1. Explain that we will be mixing the soil that they brought from home with water. Ask the students to make a prediction about what will happen. Have the students write their predictions in their science journals.
2. Have the students pour their soil sample into a jar, add water to fill the jar about three-fourths full, and stir the soil and water mixture thoroughly. Then have them set the mixture aside so it 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 jars.
4. Discuss their predictions and their actual results.
5. Discuss that the floating debris on top is humus, 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. Explain each layer of soil.

Conclusions

1. 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.

Assessment

- **Questions**
  - What are the different layers of soil?
  - Which layer is where plants grow the best?
- **Journal/Writing Prompts**
  - Describe what your soil from home looked like when you first brought it in. Describe what it looked like one day after having the water added. Explain in your own words what happened.

- **Other**
  - Complete the "Layers of Soil" diagram.

Extensions and Connections (for all students)

- 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.

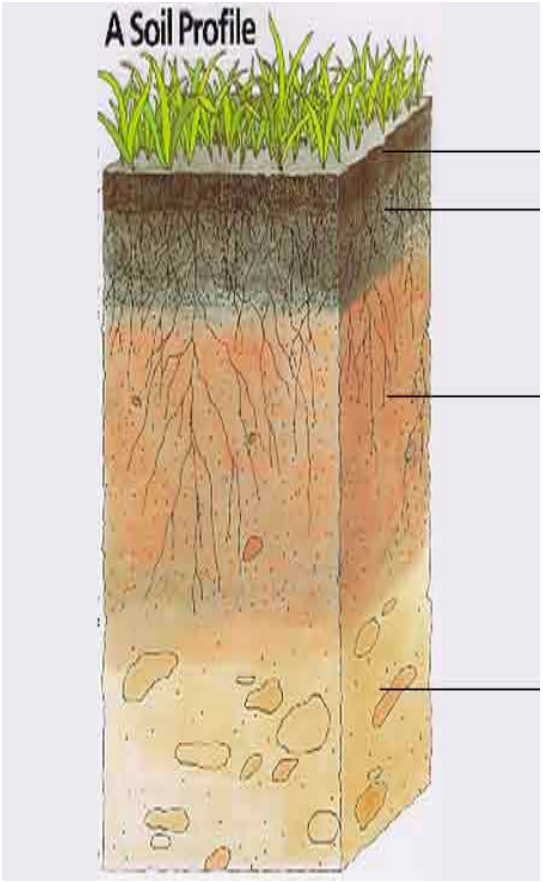
Strategies for Differentiation

- Have students complete a KWL chart to document what they know, want to know and what they learned about the layers of soil.
- Have students draw pictures of what is happening to go along with Soil recording experiment.
- Take the diagram of the soil and cut it apart to make it into an activity where the student has to glue the soil layers in order and glue the word to label each part. This could also be laminated so that the student could practice doing this several times to reinforce the concept.
- Use a color-coded layer of soil diagram.
- Use a draw or paint program to create the layers of soil.
- Use activities such as picture/word concentration and have students create symbols and develop a definition for each one.
- Have a horticulturalist come to discuss the layers of soil and its effects.
- Visit a local botanical garden or nursery.

Layers of Soil

Name: _____ Date: _____

Label the soil layers in the diagram, using the following terms:
Subsoil humus bedrock topsoil



Cut and paste these definitions next to the correct word.

-upper layer of soil. It is the natural product of subsoil and bedrock. This layer is best for growing plants.	-located in the topsoil. It is decayed material and provides nutrients in the soil.
-layer below the subsoil. It develops over a long period of time by action of water and has the most rocks in it.	-layer just below the topsoil. It develops over a long period of time by action of water.

Soil Recording

Name: _____

Date: _____

Using our senses

1. Draw and color a picture of your soil sample.
2. Describe the texture of your soil sample.

_____

_____

_____

3. Describe the odor of your soil sample.

_____

_____

_____

Compare and contrast

4. How is your soil sample like a classmate's soil sample?

_____

_____

_____

5. How is your soil sample different than a classmate's sample?

_____

My Soil Sample

Soil Recording

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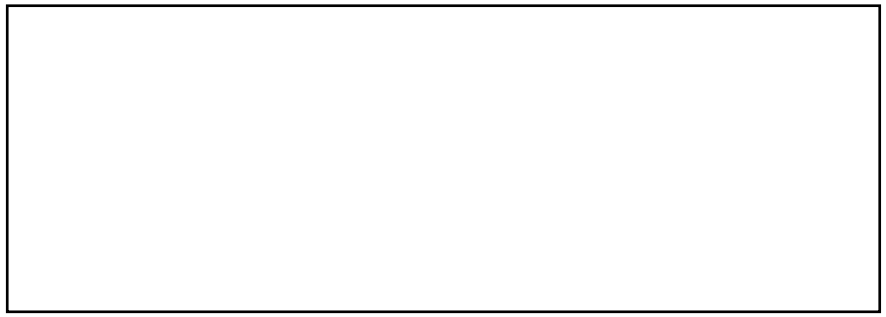
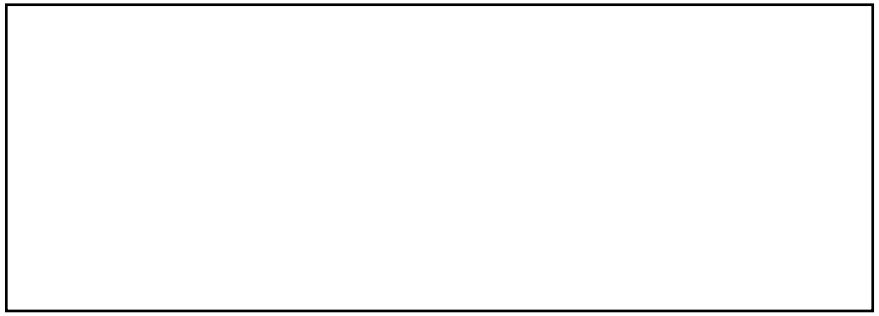
Experimenting with Soil

6. Draw and color a picture of your soil mixture after 20 seconds of mixing the soil.



7. Draw and color a picture of your soil mixture after 1 hour of mixing the soil.



8. Draw and color a picture of your soil mixture after 24 hours of mixing the soil.