



Canadian Earth Science Teacher
Workshop Program

Bringing Earth Science to Life



Earth History

Geomorphology

Surface Processes

Soils

Rocks

Minerals

Tectonics

Using Natural Resources

Careers

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Collecting and Observing Soils

Students dig a hole in the ground to observe soil layers and collect a soil profile.

Explanation

Soil is made from a combination of rocks and minerals that have been broken into small pieces and mixed with water, air, and the remains of dead plants and animals. All soils are different and can be classified by characteristics such as composition, texture and acidity. Most soil is about 80% rock and mineral particles, with the rest made up of humus. The largest mineral particles are usually grains of sand, ranging down through silt particles that can barely be seen to the smallest, which are clay particles that are invisible without a microscope.

Materials

Shovel
Hand lens
Measuring tape
White paper
Glue

Caution

Wear appropriate clothing for outdoor activity.
Wash hands after handling soil.

Time

Medium

Grouping

Pairs, small groups

Preparation

Find a location where you have permission to dig a hole and it is safe for students to work.

Prompt

Show students a potted plant and have them describe what they see. Ask where each component (e.g. plant, dirt, pot) came from and what materials it contains. Share that they are going to investigate what is in the 'dirt.'



Collecting and Observing Soils

Delivery

Direct students to:

1. Examine material lying on the surface of the ground. Ask what types of decaying plant material they see? If they can see stringy white threads, it is an indication that bacteria and moulds are growing.
2. Dig a hole with straight sides. It should be around 50 cm deep.
3. Count the numbers of layers they see and make careful observations about the following characteristics of each layer:
 - a. Colour
 - b. Texture: they need to moisten a bit soil and rub it between their fingers.
 - i. Sandy soil feels gritty.
 - ii. Clay-rich soil feels sticky.
 - iii. Silty soil will be somewhere in between.
 - iv. Loam (a rich mixture of silt, sand, clay and humus) feels gritty and sticky at the same time.
 - c. Smell: may be sweet, sour or earthy
 - d. Ingredients: types of organic matter, sand, pebbles, evidence of living things, etc.
4. Fold a sheet of paper down the centre lengthwise and fill the crease with glue.
5. Carefully add soil from each layer to the glue, making sure that it is in the same order as the soil layers, from top to bottom.
6. After the glue dries, shake off excess dirt and label the layers with the characteristics observed in step 3.
7. Fill up the hole.

Question for Discussion

Describe the similarities and differences between each layer.

Extensions

Use a commercially available soil test kit to measure the soil's acidity and nutrient content.

Compare soil samples taken from different locations (e.g. from under a tree vs. a river bank) and speculate on the causes for any observed differences in the soil characteristics.



Making Soils

Students simulate the process of how soil is formed and compare the different compositions of soils.

Explanation

Soil is made from a combination of rocks and minerals that have been broken into small pieces and mixed with water, air, and the remains of dead plants and animals. All soils are different and can be classified by characteristics such as composition, texture and acidity.

Materials

Large jar with a lid
Plastic bag
Sand
Clay
Water
Seeds

Caution

Wash hands after handling organic materials and soil.

Time

Medium, plus growing time for seeds

Grouping

Pairs, small groups

Preparation

If taking students outside is not desired, collect organic matter prior to the activity.

Fast-food chains may have oversize relish jars suitable for this activity, free for the asking.

Prompt

Show students a pile of leaves and bag of sand. Ask how they think these materials turn into soil.

Delivery

Direct students to:



Making Soils

1. Collect the surface decaying materials from an uncultivated area of soil, e.g. under trees, and place in a plastic bag.
2. Knead the plastic bag to break up and mix the decaying material, simulating what worms, rodents and roots do in nature.
3. Mix the bag contents with some sand and clay. Have different groups use varying amounts to change the soil characteristics.
4. Place the mixture in the jar and add water until it is about 2 cm above top of the solids.
5. Put the lid on the jar and shake it thoroughly so that all ingredients are moving with the water.
6. Set the jar down and let it settle.
7. Notice how the layers automatically form just as in nature: organic material on the top, with grain-size coarsening downward).
8. Leave the lid off and allow the water to evaporate for several days.
9. Plant some seeds in their jar and compare how soils of different composition affect the plants' growth.

Questions for Discussion

How was the resulting soil affected by the proportions of dry materials?

Which soil was best for plant growth?

Extension

Look at the types of soils and how each has a different land use.

