

Soil Learning Cycle

Standards of learning

Science 3.1, 3.7

Objective

The student will:

- List five observations that they made about their soil sample;
- Describe the components of soil, including mineral matter, organic matter (humus), air and water;
- Explain why soil is a natural resource and why it should be conserved and protected. The word “decompose” should be used in this explanation when referring to the function of soil in the environment.

Materials

- Student science journals
 - Paper bag containing soil sample – about half a cup will be plenty – one bag per pair of students
 - Magnifying lens – one per pair of students
 - One sheet of white paper – per pair of students
 - Copy of the poem, “Sarah Cynthia Sylvia Stout Would Not Take the Garbage Out” by Shel Silverstein (from *Where the Sidewalk Ends*) – one copy per student
 - Colored pencils or crayons
- ❖ **Safety Alert:** Make sure that the soil you collect for this activity is free of animal waste. However, avoid using bagged potting soil as this gives the students an incorrect perception of the components of soil. It may also lead the students to think that all soil can be purchased at Wal-Mart!

Background Knowledge

This learning cycle activity is designed to introduce third grade students to soil – its composition, its function in our environment, and its importance as a natural resource. Students will “get their hands dirty” as they investigate the dirt beneath their feet!

There are three main types of soil—sand, silt and clay. When all three are mixed together they create loam. Humus, anything in the process of decaying, is the organic matter found in soil. Sand is the largest and heaviest soil particle, silt is a fine textured soil that feels like talcum powder, and clay will precipitate out last. Clay is the smallest and lightest particle of soil. This lesson will review the layers of soil as they are in the ground. On the bottom is bedrock, which is the parent material for the soil that will not be shown until erosion or an earthquake exposes it to the world. Next is subsoil, which is mostly sand/silt and clay. This is where most of the nutrients are found and deep plant roots will come here for water. Next is topsoil, which is where plant roots grow and animals live. This is sometimes called the organic layer where decomposers recycle dead plants and animals into the top layer. On top is humus, which includes more decomposing organic material.



A natural resource is something of wealth that occurs in the environment around us without any help from man. It is important to know that soil is a very important natural resource that everyone in the world uses. Soil is also a reusable resource, which is important for your students to know. Plants need it to survive and animals, in turn, need to eat the plants for food. There are also the many people all over the world who live off of soil whether it is by growing the food that they eat or using it in their home.

Procedure

1. As a class, ask students to brainstorm answers to this question – “Dirt is made of _____.” Record answers on the board. This sets the stage for the students to hypothesize what they will find in their soil samples. For their hypotheses have the students copy and complete this sentence in their science journals: “We think that soil is made of _____.”
2. Distribute one bag containing the soil sample, a magnifying lens and a white sheet of paper to each pair of students. Students must first describe the soil sample using their senses of touch, hearing, and smell before looking at their sample. Gently shake the soil out of the bag and onto the white paper. Examine the soil with the magnifying lens. Students should list as many observations about their soil sample as they can in their science journals, including what makes up the soil sample.
3. Once the students have had a chance to make observations, ask them to compare this list to the class list of what they hypothesized they would find in soil. Did they find any items that they didn't expect to find? Students often forget that soil contains living matter (including bits of leaves and twigs, insects, and castings), air and moisture. Air and moisture fill up the spaces in the soil.
4. While students are still in pairs, ask them to group the items that they found in their soil sample into two categories – living and non-living – recording this information in their science journals. Review this list as a class and write some of their responses on the board. Identify the items that the students list in the non-living category as “mineral matter”. These are the bits and pieces of rock that weather into soil. Identify the items that the students list as living as organic matter or humus. Humus refers to the remains of organisms that were once living. Conclude this part of the discussion by emphasizing that soil has four major components – mineral matter (bits of rocks), humus (living or once living matter), air and water. Refer students to the overhead transparency listing the four major components of soil as students copy this information into their science journals.
5. Ask students to infer or hypothesize how the living (organic) matter/humus came to be in the soil. Guide the students' discussion toward decomposition as a major function of soil. Bacteria, earthworms and other life forms that live in the soil break down (decay) humus so that these nutrients can go back into the soil for plants to use. Ask students to explain why this is beneficial for humans and the environment (waste is removed and nutrients are recycled). Does everything decay or decompose? No – ask students to give examples of some waste that does not readily decompose. Plastics are an example.
6. Now that this exploration is complete ask students “Is soil more than just dirt?” Guide the students' discussion to review the four major components of soil and the function of soil that was just introduced. Use this to explain why soil is a natural resource and why it should be conserved.



7. Review the new vocabulary that has been introduced in this lesson – mineral matter, organic, humus, decay, decompose, natural resource, conserve. Students will copy this vocabulary and definitions from an overhead transparency into their science journals.
8. Have the students clean off their desks.
9. Distribute to each student a copy of the poem “Sarah Cynthia Sylvia Stout Would Not Take the Garbage Out” by Shel Silverstein. Read this poem aloud.
10. In their science journals have students copy and answer the following questions:
 - List ten items in the poem that will decay and form humus in the soil.
 - Explain how our soil “takes the garbage out”.
 - What would our world look like if soil did not exist to “take the garbage out”? Draw a picture of how you imagine this in your science journal.
 - Describe one action that you can take to protect our soil as a valuable natural resource.
11. The students’ science journals will be examined and assessed for completion and accuracy on the following:
 - The list of observations for the soil sample;
 - The division of this list into categories – non-living (mineral matter) and humus (living/once living/decaying matter);
 - The answers to the three discussion questions and their illustration in relation to the poem.

Extension

What if no one took out the trash? Prompt a discussion on this lesson extension question.

