



# Name That Soil

An introduction to soil properties and composition

grade level: 4<sup>th</sup>-6<sup>th</sup> grade | time needed: 90 minutes



## Lesson Objectives:

Students will:

- Identify what components make up soil.
- Explain ways in which soil differs from one place to another and why these differences are important
- Demonstrate inquiry skills including making observations, recording data, and developing hypotheses.

## Materials:

### Provided:

6 different soil samples in ziplock bags  
6 hand lenses

### Additional supplies needed:

6 sheets of plain white paper  
Scratch paper and pencil for each group  
Whiteboard or large paper for compiling data

## Curriculum Benchmarks:

**Structure and Function:** Living and non-living things can be classified by their characteristics and properties.

**Scientific Inquiry:** Scientific inquiry is a process of investigation through questioning, collecting, describing, and examining evidence to explain natural phenomena and artifacts.

## Activity:

### **Anticipatory Set (optional):**

“Essentially, all life depends upon the soil ... There can be no life without soil and no soil without life; they have evolved together.” - *Charles E. Kellogg, USDA Yearbook of Agriculture, 1938*

Share this quote with students and have them write a response: What does the quote mean? Why do think it is important to learn about soil? Share and discuss responses as a group.

Or...“The Chef’s Challenge” video on the Smithsonian’s *Dig It! The Secrets of Soil*

website: <http://forces.si.edu/soils/> An entertaining and informative short video on the “ingredients” in soil and some factors that affect its formation for kids ages 8-12.

## Part 1: 45 minutes

1. Set out 6 stations consisting of one soil sample bag, one hand lens, and one sheet of paper on different tables or work stations. Divide the class into 6 groups. Each group needs a piece of paper and writing implement. Have students set up their data sheet by dividing the paper into six sections and numbering one through six.
2. Explain the activity before students move to their station. The group will have four or five minutes to work with their soil sample. (Do not tell them at this time that each sample is different.) The objective for this part of the activity is for all of the group members to interact with the soil, the materials, and each other for the entire 4-5 minutes. They should record as much as possible on their paper that their group observed, discussed, or wondered about their soil.
3. At the end of three or four minutes, have each group share with the class the things they recorded. These things will include some combination of: observations about the texture, smell, or appearance of the soil; guesses of where it came from or what is in it; questions about the soil or the activity itself, etc. Write the contributions of all groups on the blackboard. Have the class help to group similar thoughts/questions/observations together. By this time, the students should have figured out that each soil sample is different and resulted in some different and some similar observations and questions.
4. Explain that, in a moment, each group will have the opportunity to spend a couple of minutes investigating each of the other soil samples. Decide as a group on four or five different questions/observations that each group should focus on as they investigate each sample. At each sample, they should record the sample number and their responses to the questions. They will have 2 minutes per sample, and will not revisit the one they already worked with. In addition, they may record anything else that particularly interested them or seemed important about any of the samples.

## **Part 2: Analysis and discussion (35 minutes)**

5. Students should bring their last soil sample with them and sit with their group in a central area near the blackboard. Write the numbers 1-6 across the board, creating vertical columns in which to record data. Have a student from each group come up and record the group's observations for each sample. Tell them to write their observations even if another student has already written the same thing.
6. When all groups have added their data to the board, have the class identify observations that are the same or similar within each sample. Erase duplicates and add a star next to one of the observations for each similar observation made by another group.
7. What things do all of these soils have in common?  
Discuss how each soil has some **inorganic material** (rocks particles) and some **organic material** (things that are or once were alive: leaves, organisms, twigs, etc.). Organic and inorganic materials make up most of the soil and provide nutrients for plants, allow soil to hold water and air, and provide a habitat for soil-dwelling animals. The type and amount of inorganic and organic materials can differ greatly between soils from different areas. This is one reason that soils in different areas may support different plants and animals. What are the major differences in the soil samples we look at?
8. Where do you think each of these soil samples came from? If this wasn't one of the original questions, have students take a minute to individually write down a guess of where they think each sample came from. Then give them a few minutes to discuss their guesses in their small groups, and then share their thoughts with the whole class. Reveal to them the actual sources of the samples once

they have guessed and discussed. (#1-Compost pile, #2-Beach, Oregon Coast, #3-Garden bed, #4-Forest Floor, Oregon Coast, #5-On a steep slope in Lithia Park, #6-On a trail in Lithia Park)

**Part 3: Closure (10 minutes)**

9. Review the main ideas of the lesson:

What is soil made of? Why are these materials important in soil?

What are some differences that might be found between soils? How might these differences be important?

**Assessment:**

Reflecting and applying: Have students write or journal a short passage hypothesizing what factors cause the differences among soil in different places. What specific factors affect the soil in the particular locations where our soil samples came from? How do you think those factors make a difference? If you like, you can ask students to consider climate, living things, time, or geologic factors in their answers. Alternatively, students could draw and label a diagram of factors they think influence soil in one of the locations discussed.



# NOTES

## **Background information:**

Soil is made up of organic material, **inorganic** material, water, and air. The organic material includes living plants and animals along with dead, decomposing plant and animal matter. The inorganic material consists of particles of rocks of various sizes. Different soils have different characteristics, such as color, structure, texture, depth, and nutrient content. Five major factors influence the type of soil that is formed in a particular location. These five soil-forming factors are: **topography, climate, parent material, organic material, and inorganic material.**

Topography refers to the slope of the land. On steep slopes, there is the opportunity for more **erosion** and **weathering**. Soils on steep slopes generally have less nutrients, while flat areas and valleys can form deep, rich soils.

The climate of an area, including temperature, precipitation, and wind, has an impact on the soil formed. Climate can inhibit soil formation through wind and water erosion. However, moist climates can also promote soil development by allowing for rapid decomposition of organic matter.

A third-soil forming factor is parent material. Parent material is the inorganic matter from which soil is formed. It can be weathered bedrock or can be from materials deposited by water.

Plant and animal life in an ecosystem eventually becomes the organic matter in the soil. In ecosystems, such as deserts, where there is little plant and animal life, there is not much organic material in the soil.

Inorganic materials found in a particular soil depend on the rocks and minerals present in the area. Rocks break down and become part of the soil through a process called **weathering**. Some important causes of weathering include water, wind, ice, and roots.