

## Materials

- 3-4 soil samples from different locations around school grounds, placed in jars
- Seed flats and magnifying glasses
- Pencils and paper
- Small bowls (approx. 2 cups) for student-made soil mixes
- Paper, poster board, crayons, markers

## Preparation

- Collect two soil samples – one from a fertile location where plants are growing (sample A) and another from a sterile location where no plants are present (sample B). Place samples in small buckets or jars and label them. Note where you collected each sample.
- Place additional soil ingredients in separate containers. Some suggestions include: rocks, small twigs, veggie scraps, leaves, lawn clippings, sand, clay, and worms.

## PROCEDURE

### Part 1: Examine Garden Soil

- “We rely on plants to feed us, but what feeds the plants?” Hold up a handful of garden soil and display it to students. “The soil, of course!”
- Split students into groups and arrange each group around a large table or collection of desks. Supply each group with a seed flat, a magnifying glass, and the two different soil samples (place 1 cup of each in seed flats).
- Starting with sample A, have students examine the soil using their senses (touch, smell, sight). As they work, have groups make a list of the different “soil ingredients” present in their sample. Repeat the same process for sample B.
- As students finish, compare soil samples. “Do the two soil samples look/smell/feel the same?” “Which soil sample do you think would best support growing plants?”
- On the board, make a heading for soil samples A and B. Under each heading, record the location where the sample was collected. Note if plants were present in the location where each sample was collected.
- As a class, make a list on the board entitled “How Soil Supports Plants”. Have students offer responses or supply some of your own, i.e. “soil holds roots in place, absorbs water, and supplies plants with essential nutrients they need for growth”. Collect soil samples and transition to the next activity.

### Part 2: Make a Recipe for Healthy Soil

- Arrange separate containers full of additional soil ingredients on a table. If necessary, list all the ingredients on the board and introduce any unfamiliar ones. Model the procedure for creating a soil mix – carefully select ingredients, record recipe, and list each ingredient’s function.
- Supply each group with a small bowl (no more than 2 cups) in which to create their soil mix. In shifts, have students come to the table and select soil ingredients, recording the approximate amount they select from containers. Have students record their recipes and ingredient functions on paper or poster board.
- Have groups present their recipes and homemade soil mixes to the class. Pass around soil mixes for students to examine. Discuss differences in texture and appearance. Explain the difference between home-made soil mixes and real soil found in nature.

### ENGAGE

“Do you have a favorite type of cookie?” Make a list of student’s favorite cookie types on the board. For each cookie, have students offer 1—2 adjectives to describe its taste and/or texture. “Do you prefer chewy and gooey cookies? Cake-like? Crisp and crunchy?”

“What are your favorite cookie ingredients? Do you prefer simple sugar cookies or cookies loaded with extra ingredients like chocolate chips, oatmeal, or nuts?” Make another list. “Just as humans prefer different types of cookies, plants prefer different types of soil. As you’ll see, it takes the right mix of ingredients to create great soil.”

### Objectives

- Students will understand the importance of building healthy soil and how healthy soil supports strong plant growth
- Students will be able to identify and list the different components of healthy garden soil
- Students will create a home-made soil mix and explain the function of each chosen soil ingredient

### EXPLAIN

#### What makes healthy garden soil?

Soil content and texture will vary from place to place, but good garden soils generally share some common characteristics: loose texture to allow for adequate airflow, water drainage, and root growth; the presence of beneficial soil life; and plenty of organic matter. Organic matter, or humus, forms the foundation of healthy garden soil and plays a vital role in plants’ survival. It helps the soil capture and retain the right amount of water and nutrients. Humus is also home to hundreds of soil creatures. These beneficial soil creatures help to break down decaying plant matter, releasing valuable nutrients back into the soil.

#### What are the major differences between student-made soil mixes and real soil found in nature?

- One tiny spoonful of garden soil can be home to billions of microscopic organisms. These beneficial microorganisms are responsible for breaking down organic matter and releasing nutrients back into the soil.
- Physical and chemical process can alter the soil over time. Changes in weather as temperature, such as repeated frosts and thaws, can cause the ground to expand and contract, therefore changing the soil structure. Large roots from a nearby tree can break up clumps of soil or rocks, which are broken down and incorporated into the soil. Earthworms move through the soil, munching on organic matter as they go.
- Time! It takes thousands of years for separate soil components to break down enough to form the loose, nutrient-rich topsoil that supports our garden plants.

### PROCEDURE MODIFICATION

Using the magnifying glass, have students draw an “up-close” illustration of one soil ingredient. If worms are present in your soil sample, consider connecting this activity to an additional lesson on worm anatomy.

#### Additional Materials

- Magnifying glasses (one per student)

### EVALUATE

**Journal prompt:** Do you think your home-made soil mix would support healthy plant growth? How do you think your soil mix would compare to soil found in nature? Which soil mix would support the strongest growth over time?