

## Activity 4.1.1 Separating the Pieces

### Purpose

What is found in soil? Quite a bit can be found in soil, as you will learn during this lesson. However, to sort things out, you will need to use a structured approach to investigating soil components.

Soil contains minerals, air, water, and organic matter. Each component plays an essential role supporting living organisms. Reduced rock minerals generally classified as gravel, sand, silt, or clay provide a place for roots of plants to grow and micro-organisms to live. Gravel particles are the largest and heaviest, while clay particles are the smallest. Silt particles are slightly larger and heavier than clay, while sand particles are larger than silt.

The pore spaces in between the minerals hold water and air needed by plants. Decaying organisms, animal feces, and microorganisms make up organic matter in the soil. Organic matter increases the fertility of the soil and provides nutrients for plant growth. Figure 1 shows in ideal mix of minerals, organic matter, air and water for plant growth.

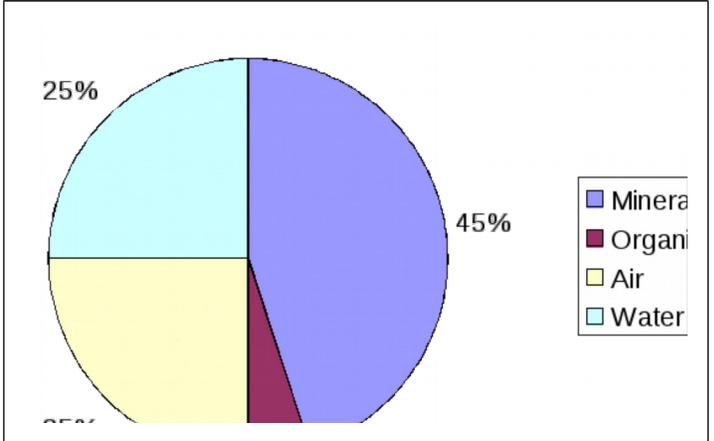


Figure 1. Soil Mixture

What are the proportions of gravel, sand, silt, clay, and organic matter in a local soil sample?

### Materials

**Per pair of students:**

- Garden soil
- Plastic cup, 9-oz
- Razor blade
- Construction paper
- Permanent marker
- Lab-Aids® profile tube
- Lab-Aids® profile tube cap
- Water

**Per student:**

- Pencil
- *Agriscience Notebook*

### Procedure

You and your partner will suspend a sample of garden soil in water to separate the particles. Once the soil and water are thoroughly mixed, allow the suspended particles to settle in the profile tube.

**Part One – Prepare Soil Suspension**

1. Fill a 9-ounce plastic cup one-fourth (1/4) full of garden soil.
2. Dump the soil out onto a piece of construction paper and use a razor blade to break up any clods. The soil sample does not need to be finely ground, but break up clods as much as possible.

3. Write your name and your partner's name on a profile tube with a permanent marker.
4. Hold your finger over the hole in the bottom of the profile tube and have your partner pour water into the tube filling it approximately  $\frac{1}{4}$  of the way full.
5. While holding your finger over the hole in the profile tube, gently pour the soil sample into the tube.
6. Continue holding your finger over the hole in the profile tube and gently pour more water into the tube until it is about three-fourths ( $\frac{3}{4}$ ) of the way full.
7. Place the cap on the profile tube and while covering the hole with your finger, shake the tube vigorously for at least one minute.
8. Stand the tube upright (cap end) on the table and remove your finger from over the hole. Place the tube in an area designated by your teacher.

At this point, let the profile tube settle for one day. In the meantime, complete other work as instructed by your teacher. Your teacher will instruct you when to complete Part Two.

### Part Two – Observation of Layers

**NOTE: You and your partner will complete this section the following day. Be very careful moving the profile tubes to ensure you do not mix up the layers.**

1. Observe the layers that have formed.
9. Describe your observations for each layer in Table 1 of *Activity 4.1.1 Student Worksheet*. Indicate colors, size of particles, and general "looks like..." comments for each layer.
10. Identify the materials in each layer of the profile tube by recording the following letters in the Material column of Table 1. Note, not all materials are in every soil sample.
  - O – Organic matter
  - C – Clay
  - St – Silt
  - Sd – Sand
  - G – Gravel
11. Answer the analysis questions on the student worksheet.
12. Once you have answered the questions, clean out the profile tubes according your teacher's directions.

### Conclusion

1. How are the types of soil mineral different?

They have different minerals and other things in them

2. Which component(s) of soil were not measured during this activity?

The amount of each mineral in the soil

## Activity 4.1.1 Student Worksheet

**Table 1. Soil Layers**

Area of Profile Tube	Material	Observation of Substance
Floating on Surface	Gravel	Bumpy stuff
Suspended in Water	Organic Matter	Long green strips
Top Layer	Sand	Tan in color soft in appearance
Second from Top Layer	silt	Gray soft in appearance
Third from Top Layer	gravel	Rough and brown, hints of gray spots
Bottom Layer	Clay	Dark brown and rough looking

### **Analysis Questions**

- What do you see floating on and suspended in the water?

Grass and little pieces from soil

- What type of sediment is in the bottom layer? How do you know?

Clay, that's what it appears to be

- How are the mineral particles in each layer different?

Each layer has different amounts/types of mineral particles

- Which component makes up the majority of the soil?

Gravel