

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

## Soil Sleuth

### Learner Outcomes:

- Investigate and describe characteristics of different soils and their major components. (e.g., distinguish between clayey soils, sandy soils, and soils rich in organic content; investigate and describe particle size, compaction and moisture content of soil samples.)



### Key Terms:

humus	parent material	compaction
clay	organic matter	loam
topsoil	sand	silt

**Background Information:** Soil gives plants a place to sink their roots and anchor themselves. It also provides nutrients, water and air that plants need to survive. Healthy soil produces healthy plants while unhealthy soils may contribute to poor plant growth.

**Investigation Question:** How do different soils differ in terms of organic matter, texture, and their ability to hold water?

**Hypothesis:** Form an hypothesis about how potting soil, garden (or yard) soil and sand differ in their ability to provide nutrients, and hold water.

### Materials:

Thumbtack	Disposable cups	Silt
50 mL grad cylinder	Potting soil	Glass jars
3 x 250 mL beakers	Sand	Water
Ruler	Garden or yard soil	
Magnifying glass	Clay	

This investigation / activity has been adapted from:

Bullard J, Krupa G, Krupa M, et al. *Science Focus 7*. Toronto, ON: McGraw-Hill Ryerson.

## Procedure:

### Part 1: Texture Test

1. Label each soil sample *A*, *B*, *C* and *D*. Prepare an observation table.
2. **Squeeze test** - take a handful of moist soil and squeeze it in your fist. Record whether the soil forms a clump that holds together or crumbles when you press it.
3. **Ribbon Test** - rub a small ball of soil between your thumb and index finger to form a ribbon. Soils with more clay will form longer ribbons. Record your observations.
4. **Wet Rubbing Test** - add water to make the soil a soupy mud and rub with the end of your finger. Record whether the soil feels gritty, or smooth.
5. **Particle Size Test** - Examine a few particles of each soil with a magnifying glass and estimate the particle size and shape of each. Note whether the particles are the same size or different sizes.

### Part 2: Organic matter Test

6. **Visual Test** - pick apart a small sample of soil and observe the types of materials present in the soil under your magnifying lens. Record whether you think the materials may be organic or not.
7. **Float Test** - place about 10 mL of soil into a clear container filled with water. Observe whether any particles float on the top. Organic particles often float. Record your observations.
8. **Soup Test** - place about 125 mL of soil in a small jar half filled with water. Screw the lid on the jar tightly and shake well. Let the soup settle for about 5 minutes and draw and describe the layers that you see

### Part 3: Drainage Test

9. **Drainage test** - label each of the disposable cups according to the different soil types. Use a thumbtack to punch 15 holes in the bottom of each cup. Place the cups inside a 250 mL beaker so the bottom doesn't touch the bottom of the beaker. Place about 100 mL of gently packed soil in the bottom of the cups and slowly add 100 mL of water. Record the time you poured the soil to the time the cup stopped dripping. After about 20 minutes, use the graduated cylinder to measure the amount of water in the beaker and record your observations. Repeat with all samples.

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**Observations:**

<b>Test</b>	<b>Sample A</b>	<b>Sample B</b>	<b>Sample C</b>	<b>Sample D</b>	<b>Sample E</b>
<b>Description</b>					
<b>Squeeze test</b>					
<b>Wet rubbing</b>					
<b>Particle size</b>					
<b>Visual test</b>					
<b>Float test</b>					
<b>Soup test</b>					
<b>Drainage Test (time)</b>					
<b>Drainage Test (vol)</b>					

**Analysis:**

1. Use the descriptions on p. 154 of your textbook and identify which description best matches each of your soil samples.
  
2. Which sample was least sticky and crumbled the most?

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3. In what ways would a soil that easily crumbles be healthy? In what ways would it be a problem?
  
4. Which sample had the greatest amount of organic matter? Which sample had the least?
  
5. Why is organic matter an important component of healthy soil?
  
6. Which soil held water the best? Which was the worst?
  
7. Why is the ability to hold water an important component of healthy soil?

**Conclusion:** Which type of soil would be best for growing root vegetable such as carrots or potatoes in your garden? Why?

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**Extension:**

**Soil Profile of your Playground**

1. Using a soil sampling tube, acquire a 10-12" deep soil sample from the topsoil in your school's playground. Sketch the layers you see in the sample.
2. Carefully separate each layer and perform each of the tests in the Soil Sleuth investigation.
3. From the results of your tests, identify the major soil component found in each layer.
4. Using this information, construct a story of how you think the soil in your school yard may have formed.

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