

Skill Check

- Observing
- Measuring
- Classifying
- Evaluating information

Safety Precaution

- Be careful when using objects with sharp points or edges.

Materials

- soil sample, sand, gravel, clay
- paper
- hand lens
- ruler
- 4 large plastic cups
- thumbtack or pushpin
- cheesecloth
- rubber bands
- scissors
- 4 plastic coffee-can lids
- 4 glasses or beakers (250 mL)
- measuring cup or graduated cylinder
- water
- watch

What is the difference between clay, sand, and gravel? In this activity, you will use tests to determine the characteristics of a soil sample by comparing it to samples of clay, sand, and gravel.

Question

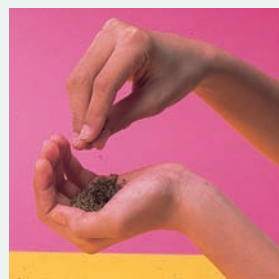
What are the characteristics of a soil sample?

Procedure

1. Make a table of observations like the one below.

Soil Sample				
	Your Soil Sample	Clay	Sand	Gravel
Colour				
Average particle size				
Texture when wet				
Texture when dry				
Time to drain 25 mL				

2. Spread your soil sample on a sheet of paper.
 - (a) Record the colour of the soil.
 - (b) Measure the diameter of an average particle while looking through the hand lens. If there is a variety in the size of particles, measure the diameter of a group of particles. Divide the diameter by the number of particles you estimate are present along the diameter. This will give you an estimate of the size of one particle.
3. Repeat step 2 with the sand, gravel, and clay samples.



4. Rub a small amount of your soil sample between your fingers to evaluate its texture. How does it feel? Press the soil sample together. Does it stick together or crumble? Wet the sample and try again. Record your observations in the table.

5. Repeat step 4 with the sand, gravel, and clay samples.
6. Test for water drainage.
 - (a) Label the plastic cups "sand," "clay," "gravel (with sand and clay)," and "area soil sample." Using the thumbtack, punch an equal number of holes around the bottom of each cup.
 - (b) Cover the area of holes on each cup with a cheesecloth square. Secure the cheesecloth with a rubber band.
7. To hold each cup over the glass or beaker, cut a hole in a coffee-can lid so that the cup will just fit inside the hole. Place a cup and lid over each glass or beaker.
8. Half-fill the appropriate cups with dry sand, clay, and your soil sample. Make a mixture of equal parts gravel, sand, and clay, and half-fill the last cup with this mixture.
9. Use the measuring cup (or graduated cylinder) to pour 100 mL of water into each cup. Record the time for 25 mL of water to drain through the sample.
10. Wash your hands thoroughly after completing this investigation. Clean up and put away the equipment you have used.

Analyze

1. Compare the feel and stickiness (texture) of the sand, gravel, and clay samples.
 - (a) Which one is the grittiest?
 - (b) Which one is the stickiest?
 - (c) How does your soil sample compare to these? Is it more like one than another?
2. (a) Compare the drainage of the sand, clay, and gravel mixture. Which drained the most quickly? Which drained the least quickly?
 - (b) How did the drainage rate of the gravel mixture compare with the drainage rate of the others?
 - (c) Which one did your soil sample resemble the most in drainage?

Conclude and Apply

1. How does the addition of gravel and sand affect the speed at which water drains through the clay?
2. What would you do to increase the speed at which water drains through your soil? What would you do to decrease its speed? Why would this be useful to know?
3. (a) Describe three characteristics of soil.
 - (b) Which characteristics do you think most affect how quickly water drains through the soil?
4. Rank the size of the soil particles from largest to smallest in clay, sand, and gravel.
5. Which types of soil would be the best to grow vegetables in your garden? Why?