

Question: Can one determine the texture of soil by examining the particles found in a particular sample? The purpose of this activity is to determine the amount of clay, silt, and sand particles in a given soil. This additional method of determining the profile of soil is to conduct a profile test using a soil sieve to separate out the different particles by their relative size.

Background: Soil is made of both living and dead plants and animals (organic matter) and mineral particles such as sand, silt, and clay. It is said to consist of rocks and minerals (about 45%), water (25%), air (25%), and organic matter (5%). The profile and texture of soil indicate the relative types of rocks and minerals that compose the soil, chief of which are sand, silt, and clay. Soil texture is an important indicator of the ability of soil to absorb and hold both water and plant nutrients. Soil type can be classified as follows:

Procedure:

1. Place your cup on the pan of the balance and determine its mass. Record this on your data table.
2. Arrange the soil sieves so that the largest screen size is on the top, followed by decreasing screen size to the bottom.
3. Place a plastic cup on the balance and ZERO the balance. Weigh out 100 g of either Soil Type A or B.
4. Add your 100 g of soil to the sifter and sift for 2-3 minutes in a gentle circular motion at the lab counter.
5. Zero the empty cup and weigh each fraction from the various sifters. When you have finished weighing each portion, return it to the bag that matches your sample.
9. Calculate the relative percent of sand, silt, and clay in the soil sample and record your data in the table below.

$$\% \text{Sand} = \text{mass of sand} / \text{total soil mass} \times 100$$

$$\% \text{Silt} = \text{mass of silt} / \text{total soil mass} \times 100$$

$$\% \text{Clay} = \text{mass of clay} / \text{total soil mass} \times 100$$

10. Determine the type of soil based on the relative overall percents you calculated using the soil triangle.
11. Repeat for the other sample, answer the conclusion questions, and clean up your materials.

Data Analysis: Fill in your data and use the soil triangle from your notes to determine the soil type.

Data Table	SOIL SAMPLE A		SOIL SAMPLE B	
Sample	Mass measured	Soil Percentage	Mass measured	Soil Percentage
Cup				
Total Soil sample	<i>Should be 100 g</i>	<i>100%</i>	<i>Should be 100 g</i>	<i>100%</i>
Sieve #1: Sand particles				
Sieve #2: Silt particles				
Sieve #3: Clay particles				

Sample A Soil Type: _____ **Sample B Soil Type?** _____

1. How would the size of soil particles affect the ability of soils to hold moisture?
2. Which type of soil would be most likely to allow for the greatest amount of ground water beneath the soil? Explain your choice.
3. Why might trees and other terrestrial vegetation have difficulty growing in sandy or gravel-like soil?
4. Why would a soil texture analysis be important not only to an ecologist, but to a construction or a highway engineer?
5. What types of minerals do you think would be helpful to add to soil to make it a healthier substrate for plant growth?