

Dirt Shake

Soil is made up of four components—air, water, organic matter, and mineral matter. The mineral component, made up of tiny particles of rock, determines the texture of the soil. Soil particles are categorized according to their size as sand, silt, or clay. Sand is the largest category, including particles that measure 2.0 to 0.05 mm. Silt particles measure between 0.05 and 0.002 mm, and clay particles are less than 0.002 mm. Most soils are a mixture of sand, silt, and clay. When the three particles are present in approximately equal amounts, the soil is considered a loam. A soil that has more sand is a sandy loam, one with more silt is a silty loam, and one with more clay is a clay loam. The Soil Texture Triangle provides standardized soil textural classes based on the relative quantities of sand, silt, and clay particles in a soil.

Materials

- Soil sample, about 1 cup (do not use potting soil)
- Quart jar
- Ruler
- [Soil Texture Triangle](#)

Vocabulary

clay: soil particle less than 0.002 mm

loam: a mixture of sand, silt, and clay

sand: soil particle that measures between 2.00 and 0.05 mm

silt: soil particle that is between 0.05 and 0.002 mm

Activity

1. Collect a soil sample from outside (do not use potting soil). Remove rocks, roots, and anything else that is clearly not soil from the sample, and break up any large clumps.
2. Place 2-4 inches of soil into the jar, measure the level of soil, and record the measurement as “total soil.”
3. Add water until the jar is $\frac{2}{3}$ - $\frac{3}{4}$ full. Tightly secure the lid.
4. Shake the jar vigorously until all the particles have been separated by the water, about two minutes.
5. Set the jar down, and allow the soil to settle.

6. After 1 minute, measure the amount of soil on the bottom of the jar. Record this measurement as “sand fraction.”
7. Allow the sample to settle for 3-4 hours, then measure again and record the level as “silt fraction.”
8. The remaining clay particles may take as long as a week to settle depending on the composition of the sample. However, you can use the measurements you already have to determine the amount of clay in the soil. Subtract the combined sand and silt measurements from the total soil measurement. Organic matter will float on the surface of the water. Generally, it is a small component that won't affect your measurements, but if there is a floating organic layer large enough to measure, subtract its measurement from the total soil before calculating the clay fraction and before moving on to calculate percentages. For example:

Total soil = 2"

Sand fraction (first layer) = 1"

Silt fraction (second layer) = ½"

Clay fraction (third layer) = ½"

Sand percentage (sand/total soil x 100) = (1 ÷ 2) x 100 = 50 %

Silt percentage (silt/total soil x 100) = (½ ÷ 2) x 100 = 25%

Clay percentage (clay/total soil x 100) = (½ ÷ 2) x 100 = 25%

9. Use the calculated percentages with the [Soil Textural Triangle](#) to find the texture of your soil.



Soil Texture Triangle

To find the texture of your soil, read percentages of sand, silt, and clay in the direction of the arrows at the sides. For example, a soil with 20% clay and 40% each of sand and silt is a loam.

