

OUTDOORS ✿ GRADES 4-6 ✿ FALL, SPRING ✿ PROJECT



The Nitty-Gritty

DESCRIPTION

Through a simple process, students separate soil into its three major components: sand, silt, and clay.

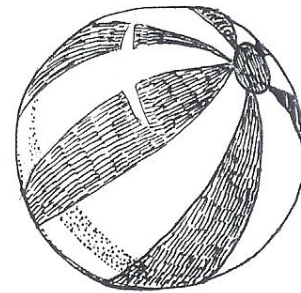
OBJECTIVE

To explore the composition of garden soil and determine its quality.

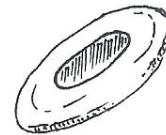
TEACHER BACKGROUND

Soil is composed of a blend of various-sized particles. The proportion of sand to silt to clay is one factor that determines the quality of the soil. Sand, silt, and clay may seem to be uniformly categorized as small particles, but there is a great difference in the size of each of them, and this difference affects soil quality. If a particle of sand were the size of a beach ball, then silt would be roughly the size (and shape) of a Frisbee, and clay would be roughly the size and shape of a dime (see illustration, right).

Gardeners describe soil types in many ways: heavy, light, sandy, clay, loam, rich loam, and so on. Scientists and horticulturists classify soil types by the proportion of sand, silt, and clay particles they contain, based on the sizes of mineral particles. The texture of the soil is determined by the blend of these various-sized particles. Classifying the soils in our garden will give us some indication of the problems we are likely to encounter in working with them: *Soil that has too much clay is hard to work* and *Soil that has too much sand dries out fast*. Through the years, it is possible to change the texture of soil by adding amendments such as sand and compost to balance the proportions.



sand (beach ball size)



silt (Frisbee size)



clay (dime size)

MATERIALS

- ✿ 1 glass quart jar with a lid per group of 5
- ✿ 1 piece of masking tape per group
- ✿ 1 trowel per group
- ✿ markers
- ✿ soil samples gathered by student groups during activity
- ✿ water
- ✿ 1 Clay, Silt, Sand Chart (blackline master) per group, page 379

CLASS DISCUSSION

What have we learned about how soils are made? (*They are made when materials break down.*) Are all soils the same? (*no*) Why would some be different from others? (*They are made from different types of materials, during different weathering processes, and in different climates.*) Do you think all soils are good for growing food? (*no*) What might make some soils better than

others? (*good drainage, ability to hold nutrients, easy to dig, lots of living things*) In this activity, we are going to do a simple demonstration to determine the parts of soil. We will find out if it will be hard or easy to dig and if it holds water.

ACTION

1. Divide the class into groups of five. Give each group their materials.
2. Fill each quart jar about $\frac{2}{3}$ full of water.
3. Demonstrate how to take a soil sample. First dig a few inches (2 to 7 cm) below the surface. Then carefully scoop up soil for the sample.
4. Help each group select a different location in the garden or schoolyard to take soil samples.
5. Instruct each group to add soil to their jar until it is almost full, then put the lid on the jar.
6. Have groups label the jar lids with the group name and soil location.
7. Have students shake each jar vigorously. Let the soil settle. Have each group observe their jar. What do they see happening? (*In a short time, the heaviest sand particles sink to the bottom and the sand layer becomes visible, but the silt and clay particles will take hours to settle.*)
8. Place the jars in a location where they may be easily observed. Be sure no one lifts the jars to observe them.
9. In 24 hours the soil will be completely layered. Have each group describe the layers. Which layer is on the bottom? (*one with the heaviest, biggest particles*) Is that the same for each group? Which layer is the thickest? (*Answers may vary.*) How do you think the thickest layer will affect your soil for gardening?
10. Each group can use the Clay, Silt, Sand Chart, page 379, to determine their soil name. Then have them mark off the layers on a piece of paper held up to the jar, as shown on the chart, and compare each one to the chart. If the particles divide into about 40% sand, 40% silt, and 20% clay, the soil is called **loam** — a very good kind of soil to have. If the soil falls into other classifications, you could add sand or organic matter to change its classification.

WRAP UP

Were all of the soils the same? How did they differ? What are the three different particles in soil? Which is the biggest? Which is the smallest? What do you predict will make your soil better for gardening? Why? Which soil sample will be easiest to dig? Which will not let water drain?

DIGGING DEEPER

Keep a soil history from year to year for comparison.

🍏 Clay, Silt, Sand Chart

(From: The Nitty-Gritty, page 83)

