



Soil Shake

Connected Next Generation Science Standard

4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.

Featured Science and Engineering Practice

Planning and Carrying Out Investigations

Featured Cross-Cutting Concept

Structure and Function

Sand is the largest and heaviest soil particle and can be seen by the human eye. **Silt** is the soil found at the bottoms of rivers and blown around by the wind. **Clay** is the finest and lightest particle in soil. **Loam** is a soil with about equal amounts of sand, silt, and clay and is the best for gardening. **Organic Matter** from decomposing plants will float in the soil shake.

Overview

After students have learned the basic recipe for soil (organic matter, rocks, water, air), this lesson will deepen their understanding of soil by introducing the three mineral particle sizes of soil texture: sand, silt, and clay.

Students will

- Recognize the three particle sizes of soil structure.
- Identify the type of soil in a given area of their school garden.
- Understand how soil structure affects plant growth.

Teacher Preparation

- It can take anywhere from an hour - 1 day for the soil shake to settle before observing. To save time, create the soil shakes at the end of the Soil Recipe Lesson with leftover soil samples.
- Either collect different silt, clay, and sand soil samples or identify garden locations that will represent those soil types.

Guiding Question - How do scientists identify and classify the different types of soil?

Explore

- On the way to the garden, ask students, *What have you noticed about the soil when we are digging in the garden? How is the soil similar and different in different locations in the garden?*
- Once in the garden, explain to students that today they will be digging deeper into soil by learning about the different types of soil. *How do you think scientists classify soil into groups?*
- Divide students into small groups. Either pass out a sample of each soil type you collected (**silt**, **clay**, and **sand**) to each group or direct the group to dig up soil from designated areas. Do not tell students which type of soil they have, but you should know which sample is each soil type. This is easier if you color-coordinate the containers used for each type of soil.



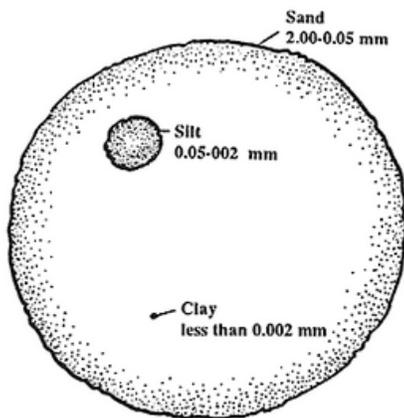
Soil Shake

Materials

- Teacher – small whiteboard or chalkboard
- Garden notebooks or Soil Shake worksheets
- Pencils
- Magnifying glasses
- Hand trowel
- Tape
- Permanent markers
- 5-10 large clear jars with a lid for testing soil (pint-sized mason jars work well)
- 3 different colored cups, paper, or trays to observe soil on
- *Optional*- Sand, silt, and clay samples; powdered laundry detergent

Setting

- School garden or green space
- Can be taught at any time of year the ground is not frozen



Soil Particle Sizes
www.soil.org

- Pass out magnifying glasses to each group. Let the students observe the soil for several minutes and create a list of descriptive words for the soil, especially its texture.

Digging Deeper

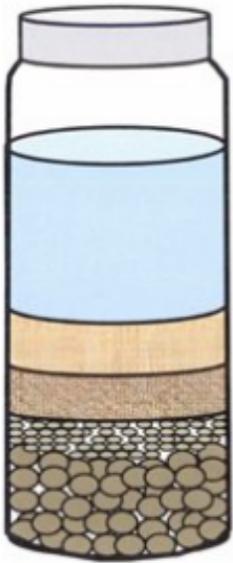
- Once students have observed all soil types, bring the group back together. Do a whip-around of adjectives for each type.
- Guide students to think about the soil particle size by asking, *Which soil felt the smoothest? Which felt the roughest?*
- Share the terms used to describe the 3 soil types and their properties. *Which soil type do they think is the heaviest, the biggest one (sand) or smallest (clay)?*
- Most soil is a combination of soil types, we are going to see what kinds of soil we have in the schoolyard!

Making Connections

- In pairs or small groups, students choose different locations to test the soil. Encourage a variety of sites to test different types of soil – grassy lawn, garden bed, next to a compost pile, under mulch, etc. Students fill a large jar about 1/3rd full of soil. Fill the remainder of the jar with water (leaving a little space at the top for air). Allow students to take turns shaking the jar vigorously for a few minutes. Label where the soil came from and (optional) add a pinch of powdered laundry detergent. Set the jar in the classroom where it will not get disturbed.
- Once the soil has settled (wait at least an hour, but ideally a full day), observe the soil layers. Be careful to not disturb and mix up the layers.
- Use the Soil Shake worksheet or have students draw the jar and layers to record the amount of sand, silt, clay, and organic matter located in the soil.
- If appropriate, have students calculate the ratio or percentage of each soil type.



Soil Shake



Clay layer – water clears
Silt layer – 2 hours
Sand layers – 1 minute

- Either use a soil texture chart (see below) or explain that healthy garden soil (loam) has about equal amounts of each soil particle type. Loam is able to hold water for plants but does not get easily saturated. *What do they think their soil texture is?*
- Have students compare their soil to another group. As a class, decide which schoolyard location has soil closest to loam.
- In the St. Louis area, soil frequently has too much clay. Either have students research or explain that adding organic matter/compost will loosen up the soil. Create a class plan to improve the garden soil if necessary.
- Revisit the guiding question of how scientists classify soil.
- *How would they explain what they learned about soil to someone in a grade lower than them?* Turn and talk responses.

Gateway Greening

Resources

Connect with us on Facebook or Eventbrite to keep up to date on Gateway Greening resources and events at:



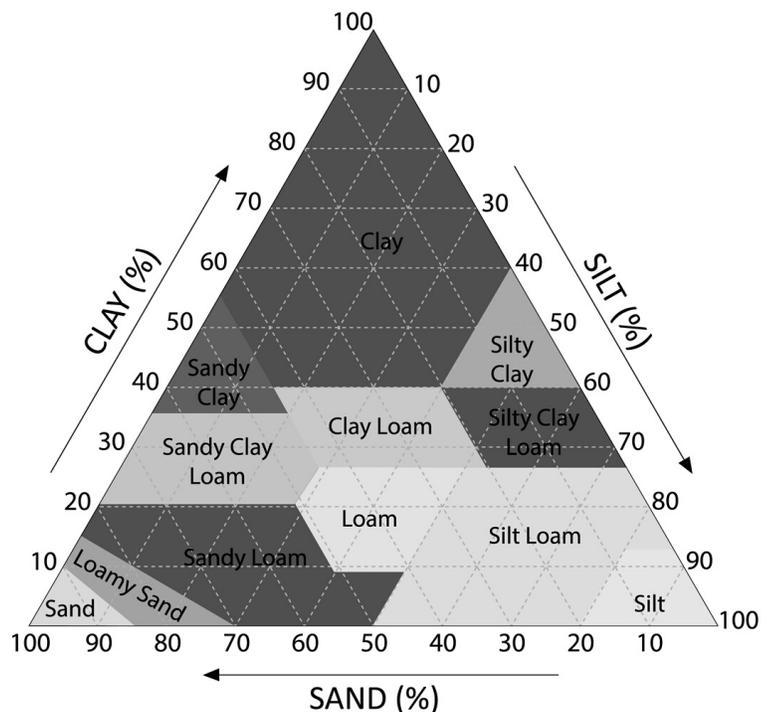
@GatewayGreening

Discover season-specific gardening how-to's and examples of current lessons:



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Looking for Field Trip opportunities or have a question about our education services? Please contact
education@gatewaygreening.org
or 314-588-9600 ext 106



Additional soil texture information available at
<https://www.soils4teachers.org/>