



Environmental Science

Dig In!

In this activity, students will learn about soil texture as a property of soils and learn a method for determining soil texture by feel.

Project Area:
Environmental Science

Skill Level: Beginner to Intermediate

Learner Outcomes:

- ⇒ Learn about the three classes of soil particles that determine a soil's texture.
- ⇒ Learn to evaluate soil texture by feel.
- ⇒ Learn how texture affects soil properties (moisture).

Tennessee Science Curriculum Standard GLEs:

S1. Embedded Inquiry
0607.Inq.1-5,
0707.Inq.1-5,
0807.Inq.1-5

S7. The Earth 0707.7.3

Success Indicator:

Students can broadly classify soils as sandy, loamy or claylike based on feel.

Science Skills: Develop hypothesis, observe, collect data, interpret

Life Skills: Observing, Reasoning

Tags: Soil texture, soil particles, soil moisture

Suggested follow-up lesson: "A Recipe for Soil"

Preparation:

Get at least three samples of soils. You want enough to distribute a few tablespoons to each student.

To illustrate soils of different textures, try to find different types of soils:

- ⇒ Sandy soil (you can use sand from the hardware store).
- ⇒ Silty or loamy soil (look near riverbeds or garden soil).
- ⇒ Claylike soil.

To illustrate that soil texture is a constant property of soils, regardless of the organic matter content, collect two soils from the same place (i.e., same texture) but that have different amounts of organic matter. For example, collect some soil from your backyard in an open grassy area (probably low organic matter) and some from underneath a tree, bush or compost-amended gardens. The students will see that there is a color difference between the soils (organic matter makes the soil look darker), but after proceeding through the texture-by-feel activity, they will see that they have the same texture.

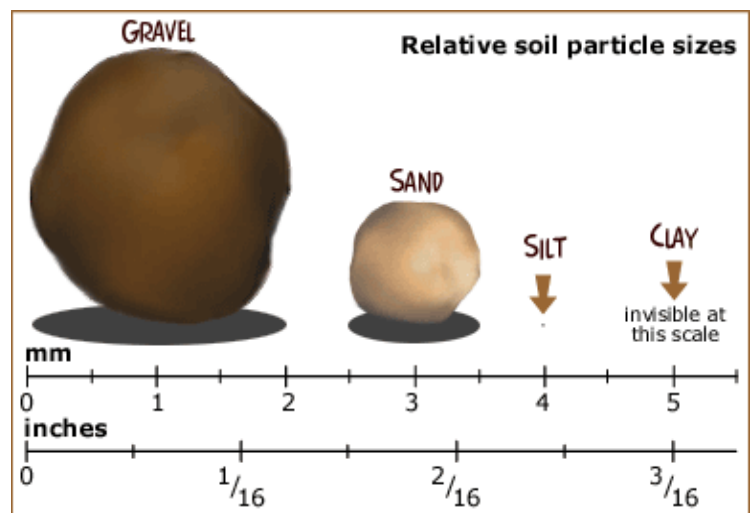
MESS ALERT! Your students WILL get muddy. Have a bucket of water nearby for washing if there is no sink in the classroom. The only requirements for this activity are soil and water, so it also could be easily done outdoors .

In the Classroom:

Ask: Think about your garden soil. What does it look like? What does it feel like? Now think about the sand on the beach. What does it look like? What does it feel like? Do you see the same plants growing on a beach as you would in your backyard?

Introduce key concepts about soils and soil texture:

- ⇒ Not all soil is the same; soils in different places have different properties.
- ⇒ One of the most stable properties of soils is their texture. Soil texture refers to the proportion of the various size groups of soil grains in a mass of soil.
- ⇒ Soil grains, or soil separates, are sand, silt and clay.
- ⇒ Soils are almost always a mixture of these three particles. The proportions in the mixture affect soil properties.



http://school.discoveryeducation.com/schooladventures/soil/name_soil.html



Materials:

- ⇒ Three samples of soils — sandy, claylike and loamy soil, if possible.
- ⇒ Water
- ⇒ Water droppers

Optional:
Four jars with ping-pong balls, marbles, gravel and a mixture of all three

Demonstrate: The concept of different particle sizes can be demonstrated easily with three jars of different sized spheres; for example, ping-pong balls to represent sand, marbles to represent silt, and small beads to represent clay. A fourth jar should have a mixture or the three “particles” to illustrate that most soil is a mixture of particle sizes (see Figure 1).



Figure 1. A visual representation of soil particle sizes. (L to R) Ping-pong balls to represent sand, marbles to represent silt, gravel to represent clay, and a mixture of the three represents soil as a mixture of particles.

Investigate: Dig In!

Without telling them anything about these soils, let your students examine the three soils and ask them to make observations (fill in worksheet).

Predict: What is the texture of each soil? Are they sandy? Loamy? Claylike? Or a mixture? Have them write down their predictions and discuss as a class.

Investigate: Determine texture by feel.

Guide your students through the instructions in the flowchart to determine texture by feel. This process starts by adding moisture until it is the consistency of putty, then rolling into a ball. The easiest way to do this is with a small water dropper, so the students don't add too much water. If they do add too much water, simply add more soil.

If the students can successfully roll their soil into a ball, then have them roll it into long “snakes,” according to the flowchart.

Alternate/Supplement: Determine texture by settling rates.

Large particles will sink faster than small particles. Put a tablespoon of each soil you are investigating into a bottle of water. Shake vigorously to disperse then let settle. Sand will settle out right away; silt takes a long time; and clay takes the longest.

Discuss and Apply:

- ⇒ Were your soils the texture you predicted?
- ⇒ Did soils that were the same color have the same texture?
- ⇒ What soil would be best for holding water?
- ⇒ If you are a gardener or a farmer, what soil would be easiest to dig in or till up?
- ⇒ If you were a plant, what soil would you like to grow your roots in? Why?

Resources

Soil Education. USDA Natural Resources Conservation Service. <http://soils.usda.gov/education>



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Dig In!

Have you ever stopped to think about the soil below your feet?

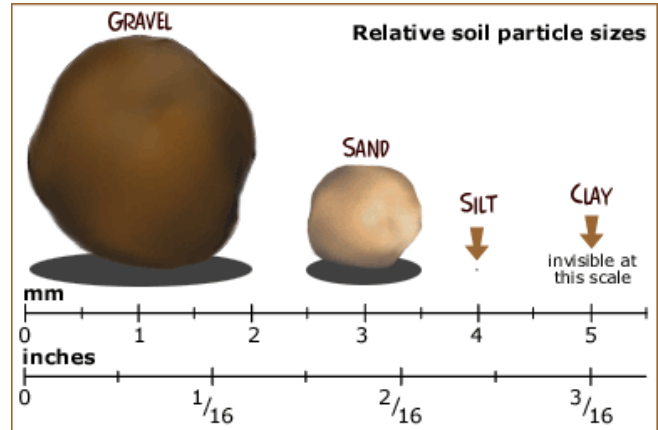
Not all soils are the same. Look at the soil in your garden. Now look at the soil by the side of the road, or beside a river, or on the beach (sand). What do you notice? They look and feel different, right?

One of the things that makes soils different is their **TEXTURE**. Soil is made up of three types of particles:

Sand particles are the largest. They are rough and irregular and hard to mold. Sand feels gritty.

Silt particles are medium-sized. They are smooth and feel like flour.

Clay particles are the smallest. They attract water and, when wet, feel sticky.



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Activity: Dig In!

Your leader will give you three samples of soils. Examine them closely. Look at them under a microscope or magnifying glass if you have one. **Write your observations below:**

	Soil #1	Soil #2	Soil #3
What color is the soil?			
How big are the soil grains?			
What shape are the soil grains?			
Do you see other things in the soil (e.g., plant roots, insects?)			
Where do you think this soil came from?			

Words to Explore:

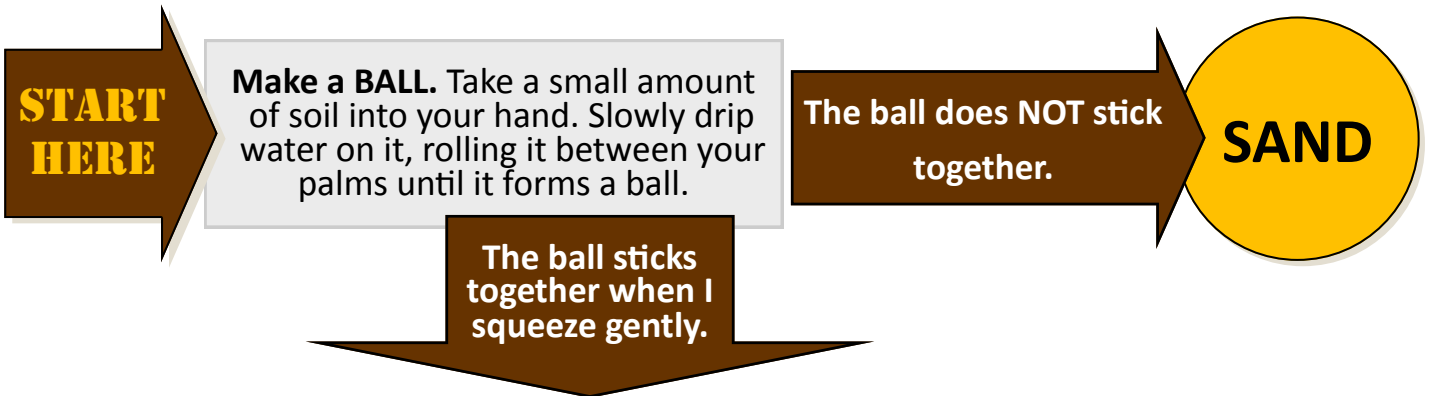
- ⇒ Soil texture
- ⇒ Sand
- ⇒ Silt
- ⇒ Loam
- ⇒ Clay



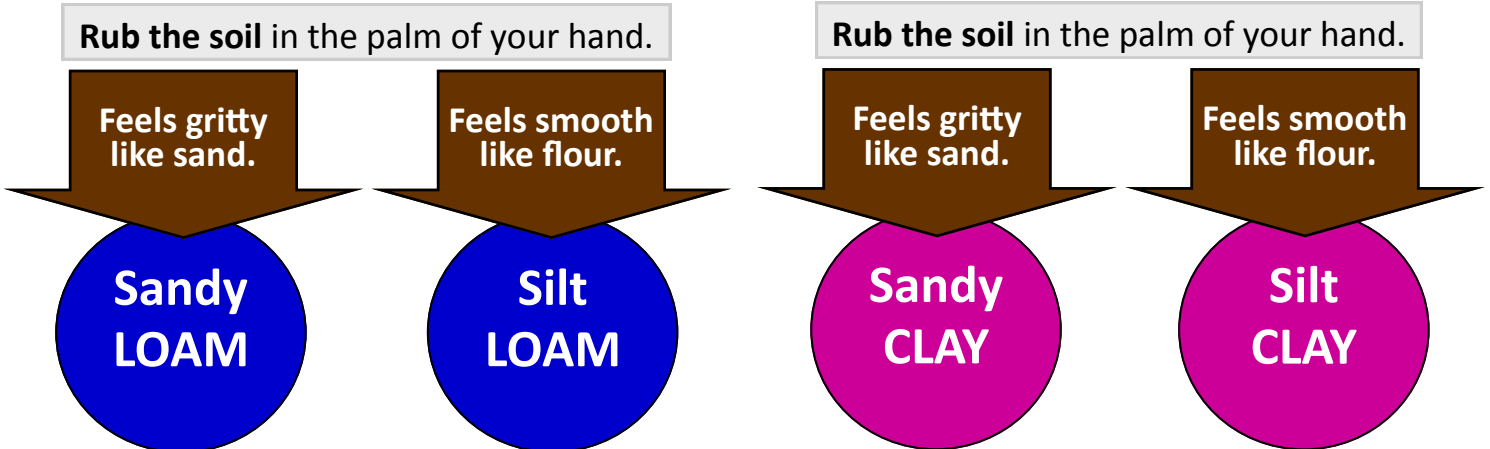
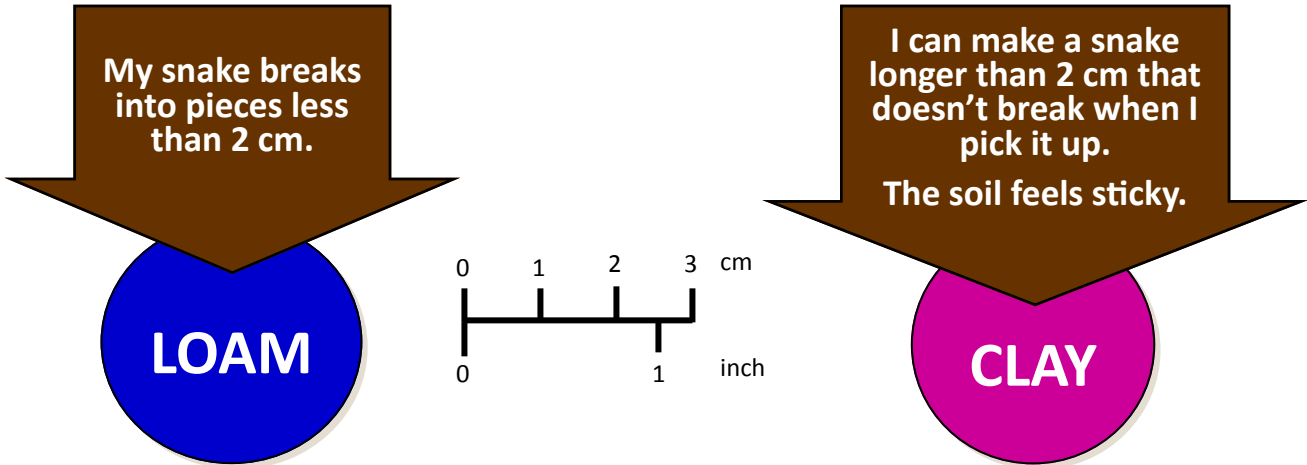
Activity: Determine the texture of the soil by feel.

Make a Prediction: For each of the three soils, write down whether you think it is more sandy, loamy or clayey. **Then find out if you were right! Follow the instructions below. When you get to answer, fill it in on the chart.**

	Soil Texture: PREDICTION	Soil Texture: ACTUAL
Soil #1		
Soil #2		
Soil #3		



Make a SNAKE. Roll into a long skinny "snake." Pick up your snake.





Reflection

Think about the different sizes of particles. If you were a gardener or a farmer, what soil types would be the easiest to dig in or till up? Why?

Plants need both water and oxygen around their roots to grow. Which of the three textures (sand, silt or clay) do you think would be best for growing plants? Why?

Extension

Collect some soil from your back yard or garden. Use the “texture-by-feel” method to find out what soil texture you have. Write your soil texture here:

And the winner is ... LOAM!

Farmers and gardeners say LOAM is the perfect soil for plants and soil organisms. Loam has about the same amount of sand (40%) and silt (40%), plus a smaller amount of clay (20%). This soil has enough large and small spaces for air and water to flow in. It also has enough clay to allow it to stick together and hold humus.

