

LESSON: Soil Composition**GRADE: 5****OBJECTIVES:****Matter and It's Interactions-**

- 5-PS1-3. Make observations and measurements to identify materials based on their properties.

Science as Inquiry-**S.3-5.SI.4 Use appropriate tools and techniques to gather, process, and analyze data.**

- Students enhance their skills with tools such as rulers, thermometers, balances, spring scales, magnifiers and microscopes.

S.3-5.SI.5 Incorporate mathematics in science inquiries.

- Mathematics is used to gather, organize and present data and to construct convincing explanations.

MATERIALS & RESOURCES:

- Glass jars with lids (1 quart canning jars are most suitable)
- Soil samples
- Water
- Additional learning opportunity requires: microscope, clock or stopwatch, jar of water, graph paper and pencils
- Optional- websites: Fun Science
http://www.funsci.com/fun3_en/exper1/exper1.htm
Estimating Soil Texture
<http://www.ext.colostate.edu/mg/gardennotes/214.html>
- Ruler
- Reference page (included in lesson)

PRESENTATION:

The soil is composed of many different sized particles. With this simple experiment you can separate the main components of the soil and evaluate their proportions.

Describe the composition of each soil and try to explain the differences. You can apply this technique to evaluate and correct the composition for any soil. Example: if water doesn't drain well, would more sand help? If it needs to hold water longer would clay or organic matter be helpful?

DIRECTIONS:

1. In teams or individually, students collect 2 cups of soil. Be sure the samples are from different areas of a garden, playground, or each student can bring a sample from home.
2. Measure 1 cup of the soil into a quart size jar.
3. Put 3 cups of water in the jar, put lid on jar and shake up contents.
4. Set jar on a level surface where it will not be disturbed so that the soil will settle evenly into layers.
5. Observe and describe what is happening as the soil sediments settle in the jar of water. The heavier particles will settle toward the bottom.
6. After 5 minutes, measure the thickness of sediment. Label this measurement A
7. After 30 minutes measure again and label the measurement B.
8. After 24 hours, measure again and label it C.
9. During the 24 hour wait, complete the following:
Using the 2nd cup of soil that was collected, have each student hold the soil in their hand and squeeze. Students should observe how the soil feels and what happens. Compare this to the following descriptions:
 - Coarse texture soils (sand or loamy sands) break with slight pressure.
 - Medium texture soils (sandy loams and silt loams) stay together but change shape easily.
 - Fine textured soils (clayey or clayey loam) resist breaking.
10. Write down observations about the layers in the jar. Measure the various layers by holding a ruler against the jar. Make comparisons to layers in the example (Figure 1) See reference sheet included with this lesson.
11. After observation, have students divide into small groups and discuss why knowledge about soil composition matters to 5th grade students. Then make a list of people who might find importance in soil composition (example; farmers, scientists, and architects) and make a list of questions these people might have about the soil. For example, the farmer may want to know the types of crops that grow well. Or a scientist might want to know about a particular organism or fungus.

Additional learning opportunity:

With a microscope, measure the size of the particles. (See Table 1 for particle sizes of various types of soil) See Table 1 in Reference sheet, included with this lesson.

With a clock or stop watch, measure the time required for a particle to drop to the bottom of a jar of water. Create a graph by recording the size of particles on the Y-axis and time required to drop on the X-axis.

TIME:

**1-2 classes to set up & observe
+ 24 hours for soil to settle**

REFERENCE PAGE

Fun Science Gallery

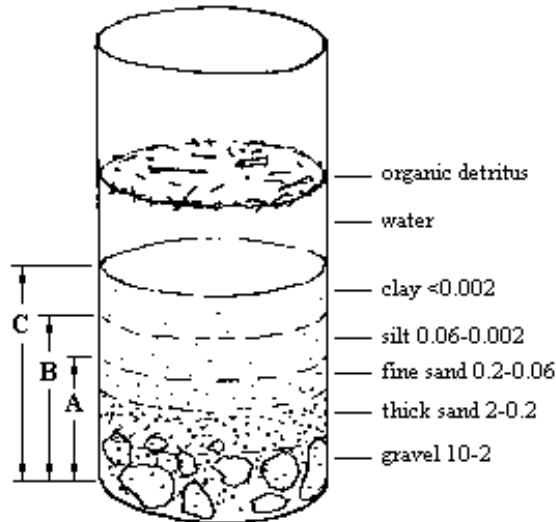


Figure 1 - Test for the composition of the soil.
(The sizes are in mm)

Table 1.	
The Size of Sand, Silt and Clay	
Name	Particle Diameter
Clay	below 0.002 millimeters
Silt	0.002 to 0.05 millimeters
Very fine sand	0.05 to 0.10 millimeters
Fine sand	0.10 to 0.25 millimeters
Medium sand	0.25 to 0.5 millimeters
Coarse sand	0.5 to 1.0 millimeters
Very coarse sand	1.0 to 2.0 millimeters
Gravel	2.0 to 75.0 millimeters
Rock	greater than 75.0 millimeters (~2")