



# Lesson Plan



**Grade:** Upper Elementary/Middle

**Title:** Dirt Shake

## Supplies in the resource kit:

- 30 Quart-sized containers with lids
- Measuring cup
- Non-foaming liquid dish soap
- Masking Tape
- Permanent marker
- Paper Towels
- Master handout copy

## Supplies needed:

- Different soil samples (we recommend having students bring in a small bag of soil from home)
- Water
- Ruler(s)
- Copies of handouts
- *Optional: Newspaper to cover desks*

## Objectives

- Investigate soil texture
- Determine the texture of soil samples

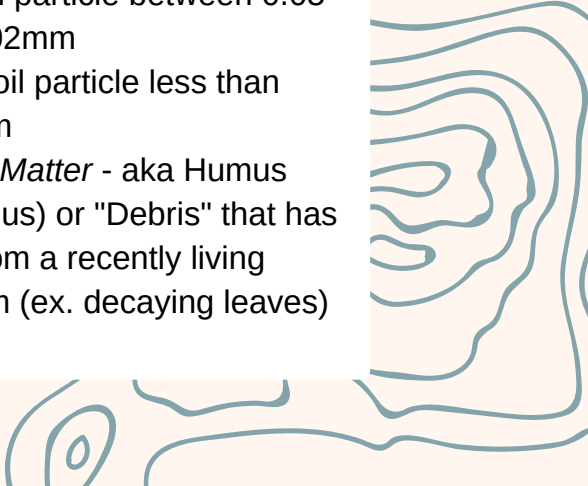
## Background Information:

Soil is made of tiny pieces of rock or minerals, but not all of the particles are the same size. Soil composition is based on how much and what types of minerals are present. Knowing the amount of sand, silt, and clay will give a good estimate of the soil's texture and type. Sandy soil has large particles that allow plenty of space for air and water to disperse. However, it cannot hold water and valuable nutrients for very long and drains quickly. Clay is much denser and has tiny particles which allow it to hold water and nutrients well. It releases water very slowly. Silt holds water better than sand but not as well as clay. Most soils have some mix of all three types; a "loamy" soil has approximately equal amounts of silt, sand, and clay.

## Modifications/Ideas for implementation

- If time is an issue, have students start jars for the next class
- Work in groups or pairs
- Rotate around to see other textures
- Follow up with ribbon testing excess soil samples (Flow Chart).

## Key Terms

- *Sand* - Soil particle between 2.00 and 0.05mm
  - *Silt* - Soil particle between 0.05 and 0.002mm
  - *Clay* - Soil particle less than 0.002mm
  - *Organic Matter* - aka Humus (HEW-mus) or "Debris" that has come from a recently living organism (ex. decaying leaves)
- 



# Lesson Plan

**Grade:** Upper Elementary/Middle

**Title:** Dirt Shake

## Fun Facts:

- Almost all the food you eat, the fiber used to make your clothing, and lumber to build homes is produced by soil.
- One shovelful of soil can contain more species of living things than live in the Amazon rain forest above the ground.
- 6 billion bacteria species can be found living in a cup of soil.
- Farmers use conservation techniques and practices to help maintain fertile soil for planting crops.

## Interest Approach:

*Start a conversation about soil with your students. Ask the following questions to build interest.*

- What forms of life does soil support? (*plants, bacteria, insects, earthworms, crops*)
- Name a function of soil that plants depend upon? (*medium for plant growth, transports nutrients & water, anchors roots*)
- Do all soils look the same, feel the same, and contain the same nutrients? (*no*)
- How do farmers find out what nutrients are missing in the soil before planting their crops? (*take soil samples and have them analyzed in a laboratory*)
- What environmental factors play a role in determining soil types? (*mineral material, time of formation, climate, landscape position, organisms*)



# Procedures

## Notes:

- This activity will not work with potting soil. Soil texture is an evaluation of the mineral components of soil; potting soil is mostly organic matter.
- Remove rocks, roots, and anything else that is clearly not soil from samples and break up any large clumps before beginning.

## Get started:

1. Provide each student with a jar. Masking tape and markers are to label each jar. Instruct the students to place 2 cups of soil into the jar.
2. Add water until the jar is three-fourths full.
3. Add one teaspoon of the liquid dish soap.
4. Put the lid on and make sure the lid is tight.
5. Shake the jar vigorously for 3 minutes. There shouldn't be any clumps or residue on the sides of the jar.
6. Place the jar on a flat surface and time 1 minute.
7. Measure and record the amount of soil that has settled to the bottom of the jar. This is the amount of **SAND**.
8. Time 1 hour.
9. Measure and record the amount of soil that has settled to the bottom of the jar. Subtract the amount of sand from the total. This is the amount of **SILT**.
10. Leave the jar sitting on a flat surface for 1-3 days, letting the remainder of the soil settle.
11. Measure and record the total amount of soil that has settled and calculate the amount of **CLAY** by subtracting the total from the amount of sand and silt.
12. Organic Matter will be floating on the top of the jar for students to observe.
13. Convert the measurements into percentages and use the soil texture triangle to determine what kind of soil each student has.

## **Optional Discussion Questions:**

- Why do the larger particles settle to the bottom of the jar first?
- How is your sample similar/different to the students next to you?
  - Why do you think it is similar or different?
- Why is soil structure important for plant growth?
- How can you help make the soil better for plants?

# Soil Texture Triangle

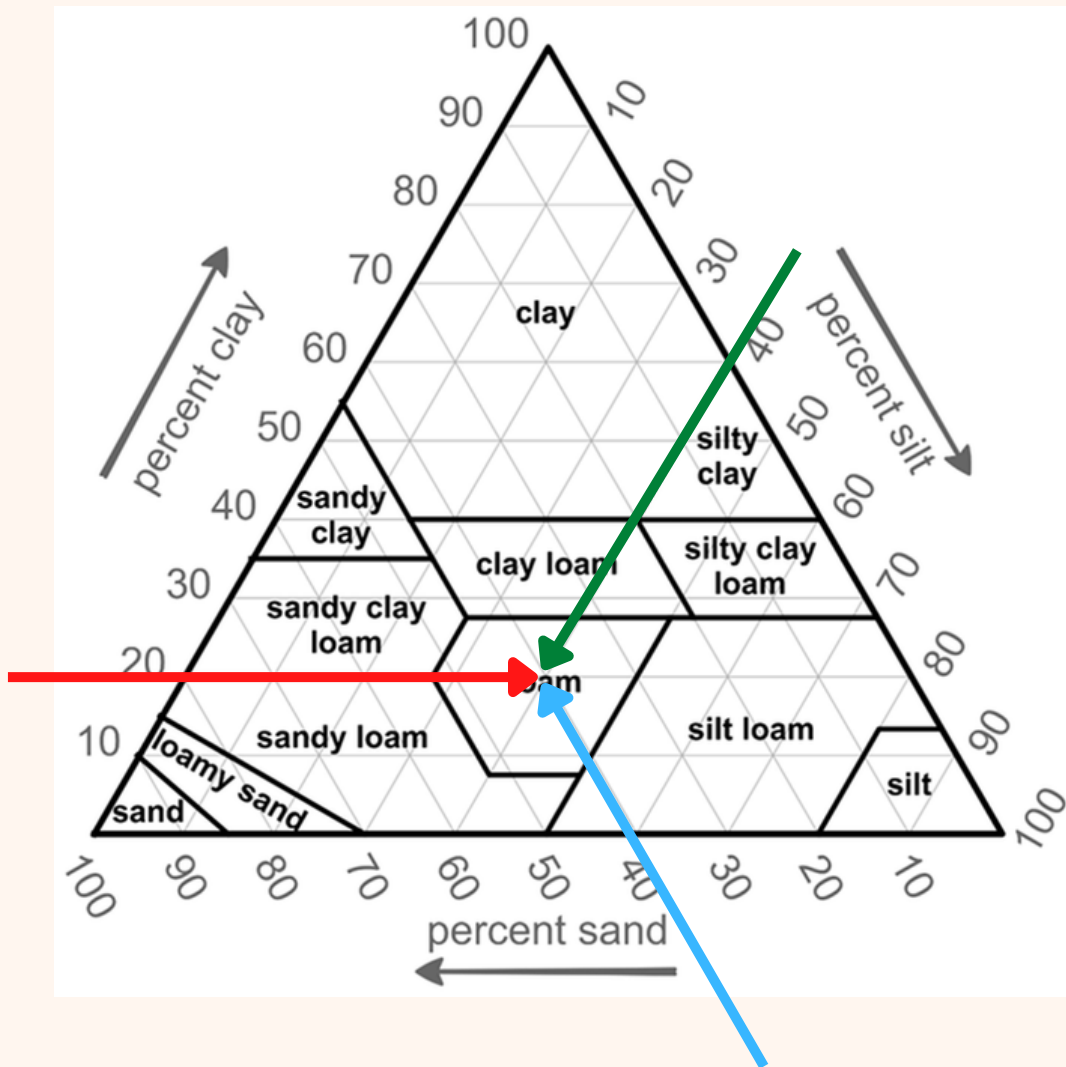
**Example:**

20% Clay

40% Silt

40% Sand

Soil Texture Type: Loam



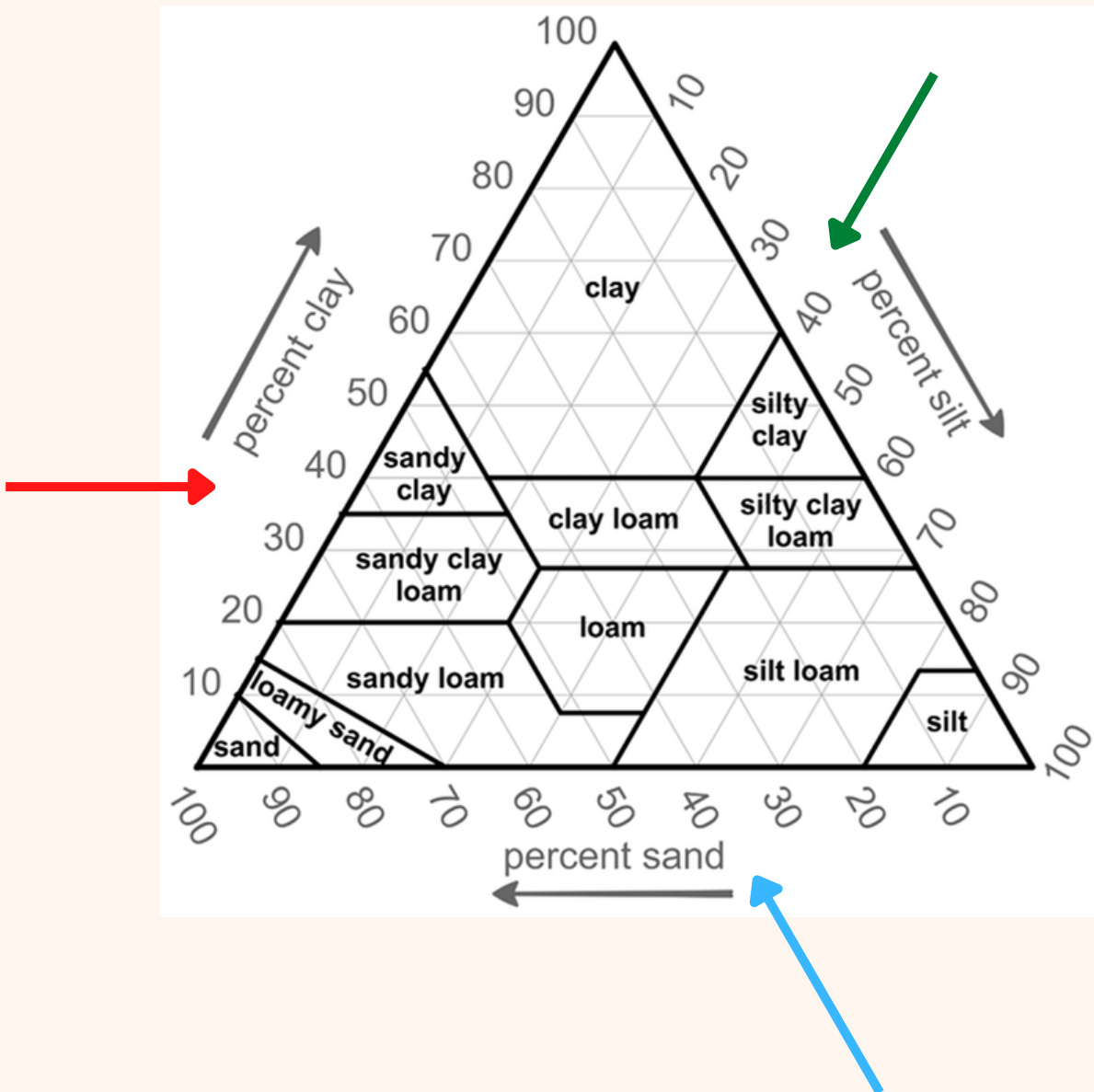
# Soil Texture Triangle

\_\_\_\_\_ % Clay

\_\_\_\_\_ % Silt

\_\_\_\_\_ % Sand

Soil Texture Type: \_\_\_\_\_





# Dirt Shake

## A Soil Texture Test



In this activity, you will test the texture of your soil to learn more about it.

**Measure the heights of each individual layer in inches and write them down.**

Height of sand layer (bottom) \_\_\_\_\_ inches

Height of silt layer (middle) \_\_\_\_\_ inches

Height of clay layer (top) \_\_\_\_\_ inches

**Measure the total height of the soil in inches (all the layers combined)**

Total soil height \_\_\_\_\_ inches

**Divide the height of each layer by the total soil height and multiply by 100.**

Sand Height \_\_\_\_\_ / Total Height \_\_\_\_\_ = \_\_\_\_\_ x 100 = \_\_\_\_\_ %

Silt Height \_\_\_\_\_ / Total Height \_\_\_\_\_ = \_\_\_\_\_ x 100 = \_\_\_\_\_ %

Clay Height \_\_\_\_\_ / Total Height \_\_\_\_\_ = \_\_\_\_\_ x 100 = \_\_\_\_\_ %

**Use the soil texture triangle chart to determine your soil's texture.**

Soil texture type \_\_\_\_\_

**Why do you think soils are different?**

---

---

---