



IMPORTANT:

Read all directions before proceeding

Soil Search

OVERVIEW: This lesson discusses the basic properties of soil.

OBJECTIVE: To introduce students to the layers of soil, the types of soil, and experiment with properties of soil

GRADE LEVEL: 4-6

STATE STANDARDS:

Grade 4 ESS— Earth's surface has specific characteristics and landforms that can be identified

The surface of the Earth changes due to weathering

The surface of the Earth changes due to erosion and deposition

Grade 6 ESS—Soil is unconsolidated material that contains nutrient matter and weathered rock

Rocks, minerals, and soil have common and practical uses

TIME: 45 minutes

VOCABULARY: Topsoil, subsoil, parent material, clay, sand, silt, loam, porosity, permeability, attenuation capacity

MATERIALS: Per group of 4-5 students

- 3 Separate containers with sand, silt, and clay
- 1 cup with water and a dropper
- Baby wipes
- Table cloth
- Vials for shaking up soil and lids
- Paper towels
- Magnifying Glass

Materials for Demonstration:

4 Cups with filters and rubber bands

Sand, silt, and clay from the Allen County Soil and Water Conservation District

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PROCEDURE:

Discuss what soil is. Soil is a mixture of mineral matter, organic matter, water, and air.

Why is soil important? Soil is important because almost all of our food comes directly or indirectly from soil. It also releases gas like carbon dioxide into the air. It is the home to living animals/organisms, and it filters water.

Next talk about the layers of the soil:

1. Organic—Thick layer from plant remains
2. Topsoil—5 to 10 inches with a lot of organic material
3. Subsoil—Clay, iron, and organic matter
4. Parent material—Upper layer developed from this

There are four types of soil. Clay, Sand, Silt, and Loam (loam is a combination of sand, silt, and clay). Tell the students that we are going to be discussing these types of soil and doing experiments with them.

EXPERIMENTS:

Tell the students there are several observations that scientists notice when observing soil.

1. Color—Look at the color of the samples. How would you describe what you see?
2. Texture—How does the soil feel? Now, put a little in the palm of your hand and water. Do you notice how this makes the sand and silt feel different? What does it do to the clay? Clay will form a ribbon when wet. Sand has large particles, silt is medium, and clay is fine.
3. See how the soil separates when you put a little of each in a tube until half full. Fill the other half with water and put the lid on it. Shake it up about 20 times. After shaking, let it sit. Observe how the soil settles. Due to density, they separate at different rates. The sand will settle at the bottom, then the silt, and the particles are clay.
4. Test for Porosity— Inform the students that porosity is the air space between soil particles. Why is that important? Air space allows for water to fill the soil. It also allows for living organisms to survive. Test sand versus silt. Have two cups with coffee filters attached to the top with rubber bands. Have similar amounts of sand in one and silt in the other. Pour 1/2 cup of water over each of them. Sand flows faster because of the larger spaces in between. Also, discuss the difference in the color of the water.
5. Permeability Test—Permeability is the ability to transmit water. Test Clay versus Sand the same way as above. Ask the students to make a guess or hypothesis as to which allows the most water to flow through it. Both clay and sand have about the same porosity. Clay has greater surface area so low specific yield and permeability...less water flowing through it.
6. Discuss Attenuation Capacity—The natural filtering ability of soil. Soil is like a magnet repelling some things and attracting others.

CONCLUSION:

1. Discuss the importance of soil and why we study it.
2. Allow the students to ask about the types of soils
3. Remind the students that the best types of soil are loam...combinations of sand, silt, and clay

ALLOW TIME FOR CLEAN UP!!