

Is It A Test?

Standards of Learning

Science 6.9

Objective

Students will:

- prove that all soils are not the same.

Materials

- Various soils (either brought in by teacher or students)
- Stopwatch per group
- Water
- 3 large clear cups per group
- 3 small clear cups per group
- 1 large beaker per group

Background Knowledge

There are three main types of soil—sand, silt and clay. When all three are mixed together they create loam. Humus, anything in the process of decaying, is the organic matter found in soil. In this activity, the students will take soil samples, place them in a jar with water, then shake. The soil will settle out in different layers. Sand, being the largest and heaviest soil particle, will settle at the bottom of the container first. Silt, a fine textured soil that feels like talcum powder, settles out next. The final soil, clay, will settle out last. Clay is the smallest and lightest particle of soil. The material floating on top of the water will be organic matter in the process of decaying.

This lesson will review the layers of soil as they are in the ground. On the bottom is bedrock, which is the parent material for the soil that will not be shown until erosion or an earthquake exposes it to the world. Next is subsoil, which is mostly sand/silt and clay. This is where most of the nutrients are found and deep plant roots will come here for water. Next is topsoil, which is where plant roots grow and animals live. This is sometimes called the organic layer where decomposers recycle dead plants and animals into the top layer. On top is humus, which includes more decomposing organic material.

Pamunkey soil is the state soil of Virginia. The James River crosses the entire state and carries soil from all areas, which it deposits on what are called flood plains. These soils are made up of sediments from all over the state. The soil is called Pamunkey soil after the Pamunkey River, which was named after an Indian tribe that lives along the river today. Pamunkey soils were first identified on a farm near Jamestown, VA, which is known as the oldest tilled farm in the United States. Pamunkey soils are prime agriculture soils in Virginia and occur on about 30,000 acres. Extensive areas of Pamunkey soils have been mapped in the counties of Charles City, Chesterfield, Essex, Goochland, Hanover, Henrico, James City, New Kent, Prince George, Richmond, Westmoreland, and York. Pamunkey soil is the most fertile because it contains a little bit of sand, silt, and clay to make for an abundant crop. The surface is dark brown fine, sandy loam, the upper and lower subsoils are yellowish red clay loam and yellowish red sandy loam. Lastly, the substratum is a yellowish and reddish brown with stratified sand and gravel.



Review the types of soil available in Virginia. Where are sand, silt, and clay located in the state? Discuss which soil type is most prevalent in your area.

Procedure

1. Label large cups A, B, and C and poke small hole in the bottom of the cup.
2. Get three different types of soil from your teacher, and place in cups labeled A, B, and C.
3. Fill beaker with 100 ml of water
4. Place larger cup A into small cup, and slowly pour 100 ml of water into cup A. When water starts coming out of the bottom start the stop watch keep timing until the water stops.
5. Repeat Steps 3 and 4 with cups B and C.
6. Record times for all cups.

Material	Observation	Time
Cup A		
Cup B		
Cup C		

7. Discussion Questions:

- Which soil had the fastest time?
- Which soil had the slowest time?
- Why do you think the times were different?
- What occupations do you think would care about these results?

Extension

1. Invite a hydrologist in the day that you do this lab.
2. Test for things other than permeability, such as acidity, nitrogen level, etc.

