

Playing in the Dirt: Discovering Soil

Objective

Students will conduct experiments with different kinds of soil and chart results.

Materials

- soil samples from three different areas, as follows:
 - A. topsoil from a flower bed.
 - B. soil from a building excavation site.
 - C. subsoil from an eroded road bank.
- 3 straight-sided jars and lids, equal in size and shape (Large glass pickle jars work well.)
- rulers
- clear plastic cups (9 to 12 oz)
- seeds (wheat, corn, soybeans, alfalfa)
- spray bottles for watering
- calculators
- computer access

Procedures

1. Read and discuss background and vocabulary.
 - Discuss the three basic soil components and the qualities that each add to the soil.
2. Provide each student with a small handful of soil. Distribute samples of different soil types to students at random so that not everyone has the same soil type.
 - Students will determine soil type by feel. **THIS ACTIVITY IS MESSY.**
 - Student will gradually add water to their soil samples until they can make balls of moist soil.
 - Students will gently stretch the soil between their thumbs and forefingers and try to make a ribbon. (Some samples will not form into a ribbon, depending on the soil texture).
 - Students will note the feel of the soil as they are working it.
 - Students will use the descriptions below to assign soils to different textural classes.

SAND	Loose and single-grained with a gritty feeling when moistened. Not sticky and will not form a ribbon when pressed between thumb and index finger.
SANDY LOAM	Contains sufficient silt and clay to give coherence to the moistened soil. Feels gritty and also slightly sticky. Will not form a ribbon.
CLAY LOAM	Forms short ribbons of less than 3 cm long.
CLAY	Extremely sticky and plastic when moist. Easily forms a ribbon longer than 3 cm.

Oklahoma Academic Standards

GRADE 6

Ecosystems: LS2-1,3,4

GRADE 8

Earth Science: 3-1

HIGH SCHOOL

Earth Systems: 2-2,7; 3-1

3. Provide jars and soil samples.
 - Students will follow the procedure on the worksheet included with this lesson to complete the experiment.
 - Students will classify the soil samples by comparing the information recorded on the “Soil Layers Chart” for each sample with the information found on the “Soil Texture Chart.”
 - Students will compare and contrast the percentages for each soil samples with the percentages shown for “loam” on the “Soil Texture Chart.”
 - Students will answer the following questions
 - Does the soil from each sample have better, worse, or the same drainage as loam?
 - How would the samples compare to loam for water capacity, airiness and ease of handling?
 - Students will design and develop their own charts to compare the above attributes for each soil sample.
4. Divide the class into groups. There should be an equal number of groups planting the same kind of seed.
 - Each group needs three cups.
 - Students will fill each cup with soil from one of the three samples.
 - Students will record group name, soil sample used (A,B, or C), and kind of seed on the outside of each cup.
 - Students will use the spray bottles to water as needed.
 - Students will set cups near a window or in a plant center for germination.
 - Students will design charts and use a separate chart for each sample to record observations.
 - Students will continue their observations for 3 – 4 weeks.
 - At the end of the study, set all cups together by seed and soil sample.
 - Students will make final observations and discuss possible conclusions to the study.
 - Students will use the “Scientific Method Format” to make a formal lab report on the study.

Discovering Soil

Read and follow directions carefully. You will need a metric ruler and a calculator to complete the chart.

1. Fill 3 jars $\frac{2}{3}$ full of water.
2. Pour one soil sample into each jar until the water is almost to the top.
3. Label the jar with the soil sample used. (A, B, or C)
4. Place lids on the jars and shake vigorously, about 2 minutes, until all soil is suspended.
5. Place jars in a safe place where they won't be disturbed.
6. Wait 24-48 hours.

After jars have settled and you can see distinct layers:

1. Observe the layers of sediment. (Floating material is organic.)
2. Measure the total depth of sediment and record.
3. Measure the depth of each layer and record on the chart.
4. Compute the percentages.
5. Record the percentages in the "Soil Layers Chart."

Soil Layers Chart

		Sample A	Sample B	Sample C
B	depth of sand layer			
$B \div A$	% sand			
C	depth of silt layer			
$C \div A$	% silt			
D	depth of clay layer			
$D \div A$	% clay			
A	total depth of sediment			
	type of soil			

After recording the percentages on the "Soil Layers Chart," classify the soil sample by comparing the percentages to those on the "Soil Texture Chart" on the next page. Record your results on the last line of the "Soil Layers Chart."

Soil Texture Chart

	% clay	% silt	% sand
loam	20	40	40
silt loam	15	60	25
silt	5	85	10
sandy loam	10	20	70
loamy sand	5	10	85
sand	2	3	95
clay loam	35	35	30
clay	60	20	20

Draw a picture of each jar in the spaces below. Include percentages of the soil levels and the soil textures you have identified for each sample. A more detailed description of soil textures can be found on the internet by using a search engine and typing in “Soil Texture Triangle.”

Sample A

Sample B

Sample C

soil texture

soil texture

soil texture

Scientific Method Format

Title of Experiment or Study:

I. Stating the Problem:

What do you want to learn or find out?

II. Forming the hypothesis:

What is known about the subject or problem, and what is a prediction for what will happen?

III. Experimenting: (Set up procedures)

This should include: materials used; dates of the experimental study; variables, both dependent and independent (constant and experimental); how and what was done to set up the experiment; fair testing procedures.

IV. Observations:

Includes the records, graphs, data collected during the study.

V. Interpreting the Data:

Does the data support/defend the hypothesis?

VI. Drawing Conclusions:

Justify the data collected with concluding statements about what has been learned. discuss any problems or concerns. Use other studies to support the conclusion. Give alternative ideas for testing the hypothesis.