

Lesson Name: *Lake Sedimentology: Soil Particle Layering*

Expedition Link: Lake Sedimentology – Shore material, bottom sediments and mud will be sampled for laboratory analysis. This investigation during the expedition will provide critical information about the composition and grain size of the sediment. It will allow the team to assess sedimentary rates. Some of the team members will be diving in the lake to retrieve the samples.

National Science Standards:

K-4.4 students should develop understanding of changes in earth and sky

K-4.6 students should develop understanding of changes in environments

5-8.3 students should develop understanding about populations and ecosystems

9-12.6 students should develop understanding of natural resources

9-12.6 students should develop understanding of environmental quality

California State Science Standards:

California State Science Standards 4th

Earth Science

5. Waves, wind, water, and ice shape and reshape Earth's land surface.

California State Science Standards 6th

Earth Science

2. Topography is reshaped by the weathering of rock and soil and by the transportation and deposition of sediment.

California State Science Standards 7th

Earth and Life History (Earth Science)

4. Evidence from rocks allows us to understand the evolution of life on Earth.

- c. Students know that the rock cycle includes the formation of new sediment and rocks and that rocks are often found in layers, with the oldest generally on the bottom.

9th-12th California State Science Standards

Ecology

6. Stability in an ecosystem is a balance between competing effects.

Biogeochemical Cycles

7. Each element on Earth moves among reservoirs, which exist in the solid earth, in oceans, in the atmosphere, and within and among organisms as part of biogeochemical cycles.

Objectives: Students will be able to:

Communicate their observations of different soil samples they collect;

Classify soil particles according to size and texture;

Observe and simulate the natural layering of soil particles.

Materials: test tubes, magnifiers, plastic trays, plastic spoons, trowel, and water

Procedure

The students will examine soil samples to build an understanding of soil composition.

- A. Have the students find a partner to work with. Hand out 1 tray and spoon per group.
- B. Have the students take their trays out to the school grounds to collect soil samples. (Approximately 10 spoonfuls). Be sure to have them get samples from as many different areas of the school ground as possible. Use the trowel to get samples as deep as possible.
- C. Return to class when each group has obtained a soil sample. Distribute one magnifier to each student. Have them spread their samples on their trays and closely examine the soil by feeling it and examining it with their magnifiers.
- D. Have the students answer questions #1-6 on their worksheet.
- E. Have the students get a test tube, put 2-3 spoonfuls of soil in the tube, and then fill it to the top with water.
- F. Have the students shake the tube so the water and soil mixture is swirling. While they are shaking the water solution, have them answer questions #7-9.
- G. After the students have finished shaking the tube and answering the questions, tell them to let their soil settle for about 5 minutes.
- H. After 5 minutes, have the students observe the test tube. Tell them to pay attention to how the soil settled. Have the students record their observations on the student worksheet. Then have them complete the worksheet questions #10-14.
- I. Encourage the students to look at all of the test tubes and compare them to theirs.
- J. Lastly, have a class discussion on how soil settles and talk about the differences and similarities amongst each of their soil samples.

Student Data Sheet

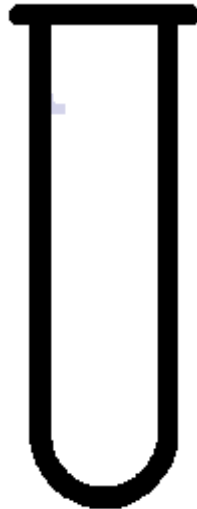
Worksheet Questions:

1. What do you think you would find if you dug down into the soil on the school grounds?
2. What do you see in your soil sample?
3. Are all particles the same size? What do you feel?
4. Do you see anything that might have once been a part of a plant?
5. Do you see any animals or insects in your soil sample?
6. Upon adding water, what do you see?
7. What is the source of the bubbles if there are any?
8. Are the materials in the soil moving with the water?
9. After you stop shaking the jar, are the particles still moving?
10. After 5 minutes, is the water clear? Did all the materials in the soil settle?
11. Do you see layers in the material that has settled?
12. Do all the samples in your class show the same layering?
13. Draw the layers that you see in your test tube. Try to identify and label the layers.

Soil Components

Fill a test tube $\frac{3}{5}$ way with your soil sample. Fill about $\frac{1}{5}$ of the remaining space with water. Hold your thumb over the opening of the test tube and shake the test tube vigorously. Allow 15-20 minutes for the particles to settle. Draw a picture of the results. Label the parts.

Label the layers as they settle.



Bottom

Larger components settle 1st.
Other soil components fall out in layers.

5th from Bottom (Floating): Organic Material

4th from Bottom: Clay

3rd from Bottom: Silt

2nd from Bottom: Sand

Bottom Level: Pebbles