
Environmental Scientist

Overview:

This lesson and activity are designed to give students hands-on experience investigating and classifying soils.

Grade: 4

TEKS

Scientific Processes

4.2(B, C, E)

4.4 (A, B)

Science Concepts

4.6 (A)

4.7 (B)

4.10 (A)

4.11 (A)

Literature

If you're not from the prairie...

Vocabulary

Clay

Sand

Loamy Soil

Silt

Materials

Trowel

Soil Samples

Discovery Book

1 Plastic Soda Bottle

Thermometer

Ziploc Baggies

Coffee Can

Soil Detectives

Classroom Activity

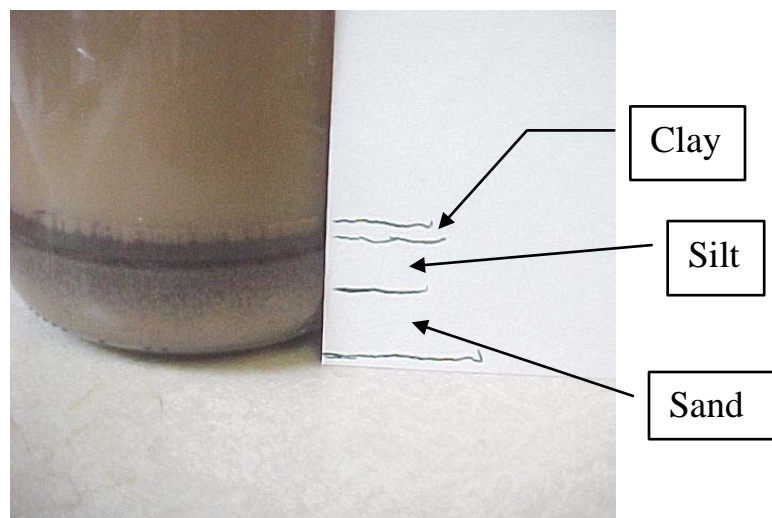
1. Have each student bring an empty 1-quart plastic (clear) soda bottle to class. Take your students outside and collect a soil sample (2 cups of soil) from different areas around your school's campus. Have your students collect their sample 5 centimeters below the surface. Pour 1 cup of soil in the soda bottle and replace the cap. Collect another cup of soil and place in a ziploc baggie and return to the classroom.
2. Fill the plastic soda bottle with 3 cups of water; replace the cap shake for 5 minutes. Set the bottle on the desk and ask your students to observe the settling action of the sand, silt and clay. It will take 24 hours for most of the sand, silt and clay to completely settle. However, your students will begin to see sand particles begin settling in just a few minutes.



3. While the soil is settling, have your students take the ziploc baggie containing soil and pour a small amount on a sheet of notebook paper. Ask your students to look closely at the soil.

What color is the soil? What does the soil feel like? Sandy soil will feel gritty, silt feels like flour and clay is sticky to the touch. Use a hand lens or loupe to investigate the texture of the soil. Write a description of the soil sample.

4. After 24 hours, ask your students to look carefully at their soil and determine the amount of sand, silt and clay. The amount of each of these is called "particle size distribution". Sand is the heaviest and will settle on the bottom. The middle layer is silt and finally clay, being the lightest, will settle on top of the silt. Soil samples may or may not contain all three groups.
5. Have each student place an index card next to his or her soil sample. Mark the location of sand, silt and clay. Estimate the percent of each and create a bar graph that represents their soil sample.



6. Ask your students to compare their soil data. Is there a pattern to the data? Are there any students with the same results? Soil scientists use a texture triangle to classify soils. Use the texture triangle at http://soils.usda.gov/education/resources/lessons/texture/textural_tri_hi.jpg to determine the specific classification of your soil. Locate the percent sand, silt and clay on the sides of the triangle. Follow all three lines to the point of intersection. Have your students repeat the process until they feel confident using the texture triangle.
7. Close the lesson by reading David Bouchard's *If You're Not From the Prairie*. This is an excellent book about people and their close connection with the land. Discuss or ask your students to write their own story about their experiences with the land.

In the Field

Soil Detectives

1. Prior to leaving your school make sure you have the following items.
 - Discovery Books
 - Ziploc Baggies (1 gallon size)
 - Pencils (inexpensive mechanical pencils are excellent)
 - Compass
 - Thermometer
 - Water
 - First Aid Kit
 - Sack Lunch or light snack
 - Camera
 - Backpack
 - Plastic 1 Quart (Clear) Soda Bottles
 - Coffee Can
 - Soil pH test kit (Purchase from garden supply center.)
2. Before getting on the trail, remind students their observations and data collected will be used back in the classroom to create charts, graphs and reports.
3. Set your behavior expectations before leaving the parking lot. Explain how students are to behave along the trail and in small groups. State specifically what behaviors you want to see along the trail. Remind students the higher their voices are the less likely they will see wildlife along the trail.
4. Distribute Discovery Books to students and record weather data observations. Teachers a gallon size ziploc baggie makes an excellent container for pencils and Discovery Books during lunch or at the end of the day.
5. Walk through the gate and follow the trail. Remember to go slow and listen to your student's observations along the trail.
6. If you have enough adult supervision, divide your class into two groups. Have each group go in opposite directions along the trail. This will help reduce the noise level and also give your students an opportunity to share their observations when the class comes together at the halfway point. This is a good opportunity reinforce the idea that scientists share data too.

Post Eastman Activities

Soil Detectives

- Ask your students to discuss their experiences while at the Eastman Nature and Wildlife Habitat Center.
- Write a narrative about their experiences at the Eastman Nature and Wildlife Habitat Center.
- Have your students create charts and graphs of the data they collected while at the Eastman Nature and Wildlife Habitat Center. Compare the Eastman data with the data collected at your school. Have your students draw conclusions about their observations.
- Have your students write a narrative about their experience at the Eastman Nature and Wildlife Habitat Area.
- Invite a Soil Scientist to visit your classroom and discuss the importance of soil conservation.
- Students create an "Environmental Report" based on their Discovery Book observations.
- Write a Haiku about soil.
- Create bar graphs at home or in the Computer Lab. Use the data collected in the field to compare and contrast your school's soil with that at the Eastman and Wildlife Habitat Center.
- Student produced books about their observations.
- Maintain an Environmental Journal for 1 school year.
- Research your local agricultural history. What did farmers grow in the 1920s?
- Find some old photographs of your local area. Scan and place pictures on your school's web page.
- Plant a tree on your school's campus.
- Construct a soil map of your school.

Soil Data

Date: _____ Time: _____

Location: _____

Present Weather: _____

(Clear, Cloudy, Overcast or Raining)

Air Temperature: _____ Celsius

Air Temperature: _____ Fahrenheit

Soil Temperature: _____ Fahrenheit

Soil Temperature: _____ Celsius

Wind: _____

(Which direction is the wind coming from?)

Resources

Publications

If you're not from the prairie by David Bouchard

Peach and Blue by Sarah Kilborne

Teaching in the Outdoors by Hammerman

Field Guide for the Eastman Nature Trail by Eric L. Taylor, Ph.D.

One Small Square Backyard, by Donald M. Silver. W.H. Freeman and Company, New York, NY.

Our Endangered Planet, Soil. by Suzanne Winckler and Mary M. Rodgers. Lerner Publications Company, Minneapolis, MN.

Amazing Dirt Book, by Paulette Bourgeois. Addison-Wesley Publishing Company, Reading, MA.

Wonderful Worms, by Linda Glaser. The Millbrook Press, Brookfield, CT.

Walkabout: Under the Ground, by Henry Pluckrose. Children's Press, Chicago, IL.

Compost Critters, by Bianca Lavies. Dutton Children's Books, New York, NY.

The Magic School Bus Meets the Rot Squad. A Book About Decomposition, by Linda Beech. Scholastic Inc., New York, NY.

Web Pages

Soil and Water Conservation Society

<http://www.swcs.org/>

Soil and Stuff

<http://www.nrcs.usda.gov/feature/education/squirm/skworm.html>

Soil Science

<http://globe.gov/k-4/soil>

Dirt on Dirt

<http://school.discovery.com/schooladventures/soil/index.html>

Journey to Planet Earth

http://www.pbs.org/teachersource/science_tech/planetearth/agriculture.htm

Professional Soil Scientists Association of Texas

<http://pssat.org/MemberPage.htm>

Texas Project Learning Tree

<http://www.plttexas.org/>

Texture by Feel Guide

<http://soils.usda.gov/education/resources/lessons/texture>

The Dust Bowl

<http://www.nasm.si.edu/research/ceps/drylands/dust.html>