

What is Soil?



OVERVIEW:

Students will learn about what is soil and where it comes from and how to make it.

OBJECTIVES:

After completing this activity, students should be able to know:

1. Definition of microorganisms and their role in soil.
2. Definition of humus.
3. The process of making soil.

BACKGROUND:

Plants and animals in the soil are important. They recycle dead plants and animals. If dead things never decayed, imagine the pile-up of plants and animals. These recyclers or decomposers help by returning chemicals to the soil to be used again.

These plants and animals are so small they can be seen only with a microscope. A **microorganism** is any microscopic organism, particularly bacteria, viruses and protozoans. Some are so small that a spoonful of soil can contain more of these creatures than there are people on earth.

When things decay, they form a material called humus. This humus is rich in minerals and nutrients and becomes part of the soil.

PROCEDURE:

1. Ask the students if they recycle and if so what? Ask them if they know how soil is made? Inform the students that nature recycles through the help of decomposers. **Decomposers** are organisms whose feeding action results in decay or rotting of organic material. These decomposers are called microorganisms. Ask the students to give a couple of examples of decomposers, for example bacteria or fungi. Ask the class if they know how many microorganisms are in one teaspoon of soil? (Answer = millions) Soil is made from recycling dead plants and animals and making it into a material called humus. **Humus** is a dark brown or black, soft, spongy residue of organic matter that remains after the bulk of dead leaves, wood, or other organic matter has decomposed.
2. Hand out the Science Investigation Report sheet to each student and as a class fill them out. Start with "What is a hypothesis?" The Answer: A **hypothesis** is an educated guess.
3. Give each student a waterproof container (plastic cup) and lay it on its side.
4. Collect food scraps from a meal (**no meat, dairy products or processed foods**) and cut them up. If they are wet, drain off any liquid.

SUBJECT:

Life Science: Ecology

GRADE LEVEL:

K-5

Michigan Curriculum Framework Science Content Benchmarks:

Elementary

Constructing New Scientific Knowledge

(C) 1.1.1 Generate questions about the world based on observation

(C) 1.1.2 Develop solutions to problems through reasoning, observation, and investigations.

Ecosystems

(LEC) 111.5.1 Identify familiar organisms as part of a food chain or food web and describe their feeding relationships within the web.

Geosphere

(EG) V.1.2 Recognize and describe types of earth materials.

TIME:

1 Period, 50 minutes

TEACHING STRATEGIES:

Discussion

Cooperative learning

What is Soil?



5. Spread your food mix in the waterproof container. Cover it with a layer of soil. In established habitats soil from the compost pile could be collected and used in this experiment. Add a small amount of water. Have each student close the cup with a lid and seal it with some tape. Shake the cup.
6. Each day, add another recycled meal and layer of soil. Fill to within 1 inch of the top. Set your carton aside to let bacteria and molds do their work. Stir your mix every day. If it looks dry, add a little water.
7. Ask the students if they know what is going to happen in their containers? Have the students write down their hypothesis of how the food scraps will break down and how long it will take.
8. In 3 weeks, you should have brown humus. Remember to check your compost bins every day. Have the students record their observations in their database chart. After the three weeks discuss what happens to different compost and why.
9. The compost can be added to established compost piles or start one in the habitat.

ONGOING ACTIVITY:

Each club session will also include weather monitoring, tree observations and a plant part activity.

1. In their journals, students will record the date, time, location, temperature, weather conditions and any other notable weather features.
2. Students will observe the same tree every club meeting and answer questions. This week, answer the following questions: Measure the size of the tree if the sun is out. Write a poem about your tree.
3. For snack, give the students celery and discuss the celery as a plant part, the stem. Have the children draw a picture of the stem in their journal and label the stem with the function of a stem. *The stem is the main stalk of a plant that transports food and water to the rest of the plant. The stem also supports the plant.*

MATERIALS:

- Waterproof container (milk jug or plastic cup & lid)
- Top Soil (no potting soil)
- Food scraps (fruit or vegetable peelings, **no meat, no dairy products or processed foods**)
- Spoons
- Rubber gloves
- Water
- Newspapers
- Science Investigation Report
- Journal
- Weather Meter
- Tape Measure

PROCESSES:

Observe
Hypothesize
Classify
Oral Communication
Written Communication

CAREERS:

Ecologist
Naturalist
Forester

SUGGESTED BOOKS:

Appelhof, Mary. (1982)
Worms Eat My Garbage.
Kalamazoo, Michigan:
Flower Press.

Organize your data into a chart or graph.

Date

Observations

Conclusions (Use Complete Sentences)

Soil Experiment using the Scientific Process

Scientist _____ Date _____ Grade _____

Title of Experiment _____

Question _____
What is soil?

Hypothesis _____
Soil is recycled dead plants and animals.

Reasons for Hypothesis _____
From observations of soil in our habitat.

Materials

_____	1 Marker
1 Milk Jug	3 Pieces of Tape
1 Piece of lettuce per person in the group	1 Cup
1/2 Cup of Water	Paper Towel
1 Teaspoon	Newspaper
1 Scoop of Top Soil for each person in the group	2 Potatoes

Procedures

Step 1 Rip the lettuce or cut the potatoes into small pieces and put them in the milk

Step 2 Mix one scoop of soil for each member in the group and have them put it in the milk jug.

Step 3 Mix one third cup of water for each group and add it to the soil mixture in the milk jug.

Step 4 Close the milk jug and have each group member shake their milk jug.

Step 5 Have each group member make observations of the mixture in the jug and record it on the database chart.

Step 6 Tape up your milk jug.

Step 7 Store the milk jug in a warm and dry place.

Organize your data into a chart or graph.

Date	Observations
Week 1 1/1/01	I saw chunks of lettuce, soil and it was wet.
Week 2 1/8/01	I smell decaying lettuce and I can hardly see pieces of the lettuce.
Week 3 1/15/01	I see soil and no pieces of lettuce.

Conclusions (Use Complete Sentences)

They need to make the conclusion that decomposition was the cause for the lettuce disappearance. They could also draw the conclusion that they created humus.

OVERVIEW:

Students will learn about soil .

OBJECTIVES:

After completing this activity, students should be able to know:

- 1) Students will observe the plant and animal activity in four sections of their school grounds.
- 2) Students will mark each section and gather a soil sample from them.
- 3) Students will identify the contents of their soil and infer what the contents say regarding the health of that section of soil.

BACKGROUND:

Soils are composed of three main ingredients: minerals of different sizes, organic materials from the remains of dead plants and animals, and open space that can be filled with water and air. A good soil for growing most plants should have about 45% minerals (with a mixture of sand, silt and clay), 5% organic matter, 25% air and 25% water.

Soils are dynamic and change over time. Some properties, such as temperature and water content change very quickly. Others, such as mineral transformations, occur very slowly over hundreds or thousand of years.

Teacher Preparation:

Make a survey of your school yard and find areas that differ in plant and animal activity to ensure a variety of samples. Areas should be clearly marked A, B, C and D.

PROCEDURE:

1. Ask the question: How can we tell how healthy our soil is?
2. Have students work with a partner. Pass out one set of materials for each set of partners. (each group should get four plastic cups with lids, a trowel, a sifter, an eye dropper, some vinegar, some ph paper, a hand lens, a sheet of newspaper a marker and a chart.) Have students label the cups A, B, C, and D.
3. Next, students will go to each section of the school yard and write a description of the area on their chart (dry, very little grass, no insects, light in color etc), gather a sample of the soil in the appropriate cup and move on to the next site.
4. Once all the samples have been collected, students will return to their base area (possibly their classroom) and begin their tests.
5. First they should pour the soil through the sifter onto the newspaper. Use their hand lens to identify the contents of the soil and log the data in their chart.
6. Add a few drops of vinegar. The more it bubbles, the more carbonates in the soil. Carbonates indicate a basic soil.

SUBJECT:

Earth Science

GRADE LEVEL:

3-5

Michigan Curriculum Framework Science Content Benchmarks:**Elementary***Organization of Living Things*

(LO) III.2.3 Describe life cycles of familiar organisms.

(LO) III.2.5 Explain functions of select seed plant parts.

(LO) III.2.4 Compare and contrast food, energy and environmental needs of selected organisms.

SC5..1.E.4 Describe natural changes in the earth's surface.

SC5.1.M.2 Explain how rocks and minerals are formed.

SC5.1.M.4 Explain how rocks are broken down to form soil.

TIME:

1 Period, 50 minutes

TEACHING STRATEGIES:**MATERIALS:**

- Trowel
- Cup with lid
- Sifter
- Vinegar
- PH paper
- Water
- Hand lens
- Petri dish
- Newspaper
- Color soil chart (if available)
- Markers

PROCESSES:

Observe

Hypothesize

Soil

Soil

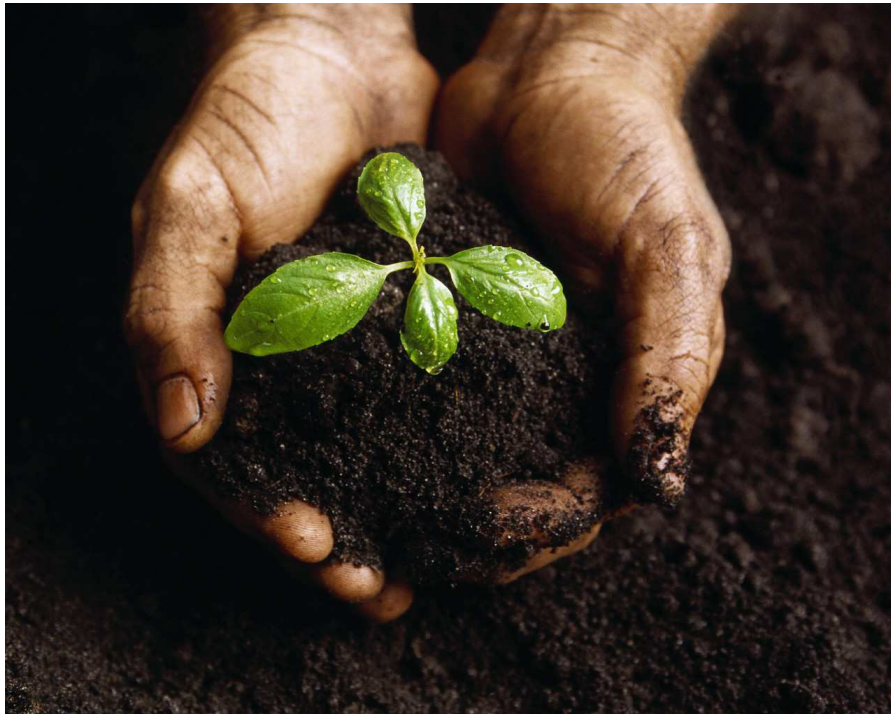


7. Place a small amount back into the cup and add 50 ml of water. Shake it well and allow the soil to settle.
8. Then, use the ph paper to test the acidity level (you might want to test the acidity level of the water first to make sure it is balanced).

* A healthy soil will be 1) dark in color, 2) contain large amounts of organic mater, 3) have earthworms present, 4) show a balance pH (7), 5) show few carbonates (few bubbles)

CAREERS:

Ecologist
Naturalist
Forester



ADAPTED BY:

Linda Keteyian

Soil Chart

Area	Description	Contents	Carbonates	pH Level
A				
B				
C				
D				

Which area of your school yard appears to be the most healthy? Explain.

Which area of your school yard appears to be the least healthy? Explain

What can be done to improve the health of your soil?
