

Lesson 1: Soil (2 Days)

Getting Started

✿ Questions to Explore

- How is the soil dependent on living things?
- How are living things dependent on the soil?

📖 Facts and Definitions

- Soil is made up of sand, silt, gravel, clay, and organic matter (rotting things that were once living, i.e., dead leaves and twigs).
- The layers of soil include humus, topsoil, subsoil, and parent material.

🕒 Skills

- Observe and describe the properties of soil: color, texture, and capacity to hold water. (S)
- Investigate and observe that different soils absorb water at different rates. (S)
- Determine the ability of soil to support the growth of many plants, including those important to our food supply. (S)
- Identify the basic components of soil: sand, clay, and humus. (S)

✂ Materials

- | | |
|---|---------------------------------|
| • <i>Dirt</i> by Steve Tomecek | • measuring cup |
| • 2-liter soda bottle | • measuring spoons |
| • 4 zip top bags | • paper towel |
| • 6-inch square of thin cloth (kit) | • plastic cups (kit) |
| • blindfold | • potting soil (kit) |
| • clay soil (kit) | • sand (kit) |
| • colored pencils or markers | • science journal |
| • colored pencils or markers* (Activity 1 - Option 1) | • scissors |
| • dirt | • sharp pencil |
| • grass seed (kit) | • silt or flour |
| • gravel (kit) | • spray bottle with water (kit) |
| • large rubber band (kit) | • Styrofoam cup (kit) |

Introduction

Give your child a cup of dirt and encourage him to share what he knows about dirt. Ask him why it is one of the most important resources on the planet.

Reading and Questions

Encourage your child to read the book, *Dirt*, aloud. Ask him the following questions when he has finished reading the book.

1. Why is dirt important?

It's a natural resource that supports life on Earth. It supports our food supply and provides foundations for roads, buildings, and homes.

2. What are the components of soil?

Gravel, sand, silt, clay, and organic matter.

3. How is soil made?

Rain, ice, and wind wear rocks into smaller pieces called sediments. The four types of sediments combine to make soil.

4. What is organic matter, and why is it an important part of soil?

It comes from living things like twigs and dead leaves. When organic matter rots, it puts nutrients into the soil.

5. What lives in the soil? How are they dependent on the soil? How is the soil dependent on them?

Many different things like critters, microbes, and worms live in the soil. Worms eat the dirt for food. They excrete loose, fluffy soil enriched with nutrients. They also dig tunnels in the soil, making spaces for water and air.

6. Why is soil important to people? Why could people not survive without soil?

Soil lets plants grow, and plants provide food and oxygen for us to live. Animals eat plants, and animals provide us with food, too. Without food or oxygen, we couldn't live.

7. Describe the four layers of soil.

Humus is the fluffy top layer made up of dead plants and leaves. Topsoil is the layer where plants put their roots. Subsoil is heavy and hard to dig. Parent material is rocky and hard, and it provides good support for building foundations.

Activities

Activity 1: Components of Soil

Ask your child to reread p. 8 in the book *Dirt*. Put a blindfold on your child and place about 1/2 cup of each soil component (clay, silt, sand, and gravel) in its own zip top bag. Let your child feel each component of soil and identify each by its texture. Place a label on each bag according to your child's guesses. Then take the blindfold off and let him analyze each bag. Ask him if he wants to change any of the labels after looking at the components. Once you've finished, be sure to save the soil components for use in future activities.

NOTE: Silt can be found at almost any river, stream, or lake. If you cannot find silt in your area, substitute flour and explain that silt particles feel similar to flour.

Select one of the following options.

Option 1

Give your child the "Components of Soil" (Option 1) sheet. On this page, he will identify and color each component of soil. Then he will match the description at the bottom of the page with the components. Let him feel the difference between sugar and flour.

Answer Key:

- Large, rough pieces that feel like rocks. (gravel)
- Feels like hard clumps of dirt and is sticky when wet. (clay)
- Fine grains that feel like sugar in your hand. (sand)
- Very fine grains that feel like flour in your hand. (silt)

Option 2 (Advanced)

Give your child the "Components of Soil" (Option 2) sheet. On this page, he will identify and color each component of soil. Then he will write his own sentence that describes the texture of each component.

(Answers for Option 2 will vary — see sample answers for Activity 1.)

Activity 2: Experimenting with Soil

For this activity, your child will try to grow seeds in different types of soil. Let your child mix varying amounts of the components of soil along with some planting soil or organic matter in small containers where seeds can be planted. For example, he may mix 1/8 cup of clay soil with a 1/4 cup of potting soil, or a 1/4 cup of sand with a 1/4 cup of potting soil, or a 1/4 cup of sand, 1/4 cup of clay soil, and a 1/4 cup of potting soil. He can record the mixture of each of the three containers on the "Experimenting with Soil" sheet. Then, he can record the question he is hoping to answer for the experiment: "In which mixture of soil do seeds grow best?"

Ask him what plants need to grow. He should think about the best place to set the plants and how often to water them. He can record his hypothesis on the experiment page and guess which soil will be the best for growing plants. After two or three weeks, he can determine in which type of soil the seeds are growing the strongest and largest. He can use a ruler to measure the heights of the plants in each cup.

Day 2

Activity 3: Which Soils Hold Water?

First, ask your child to reread the book, *Dirt*.

Tell your child that he is going to experiment with which soil type holds the most water: clay soil, sand, or potting soil. Ask your child to record in his science journal his hypothesis about which one will hold the most water. Then let him record the amount of water that comes from the cup after pouring water over each type of soil. He can record the soil and the amount of water as seen below in his journal.

- Sand _____ tsp/cup of water
- Potting Soil _____ tsp/cup water
- Clay soil _____ tsp/cup water

Walk him through the experiment as described.

1. Let your child use a sharp pencil to punch three small holes in the bottom of a Styrofoam cup.
2. Tell him to trace the bottom of the cup on a paper towel, cut out the circle from the paper towel, and put the circle in the bottom of the cup.
3. Tell him to put 1/2 cup of sand in the cup and pour 1/2 cup of water over the sand. Let him use a bowl or measuring cup to catch the water that is filtered out of the bottom of the cup.

4. Ask him to measure the water (using measuring spoons or cups depending on the amount of water that dripped out) once it stops dripping.
5. He can repeat a second time with potting soil and a third time with clay soil.
6. Ask him to record the conclusion of his experiment in his journal. Be sure that he records the units that he used to measure the water (for example, "Sand: 1/4 c." or "Potting Soil: 2 1/2 tsp.").

Ask your child the following questions once he has completed the experiment:

- Which soil held the most water? (Remind your child that the one that holds the most water will leave the least water in the cup.)
- Which soil held the least water?
- Why did some soils hold more water than others?
- How do plants affect the absorption of water on topsoil?

Activity 4: What's in the Soil?

Ask your child to reread pages 14-17 in *Dirt*. In the picture on the "What's in the Soil?" page, your child can draw examples of organisms that live beneath the soil. Beneath the picture, he can write a paragraph that describes the importance of living things in the soil.

Activity 5: Life in a Bottle

Follow the directions on pages 30-31 of *Dirt* and encourage your child to create the soil ecosystem.

Activity 6: We Need Soil

Ask your child to list and illustrate in his journal three reasons that soil is important to people. Then let your child walk through the house and identify things that indirectly or directly came from the soil, such as wood furniture, fruits, vegetables, spices, and cotton clothing.

Ask your child to list three ways that people are dependent on soil (plants provide oxygen, plants that we eat grow in the soil and provide us with nutrients, trees grow in soil and provide us with wood).

Wrapping Up

Ask your child to describe how soil and plants are dependent upon each other. Discuss that interdependence refers to a relationship where two things are dependent on each other. Many interdependent relationships exist in nature. In his journal, he can describe how soil is dependent on plants and how plants are dependent on soil.

Answers:

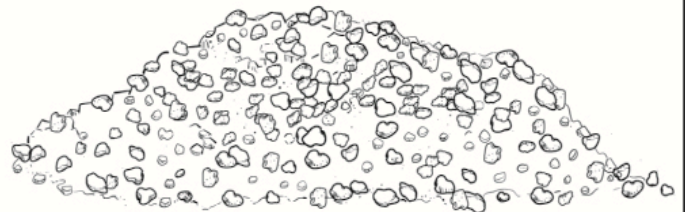
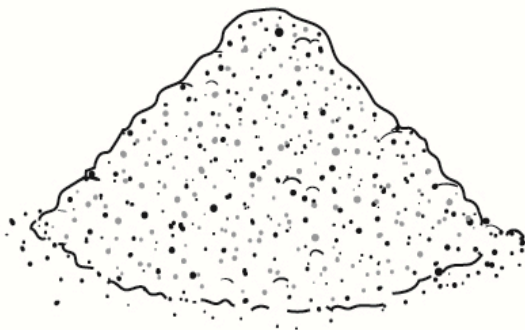
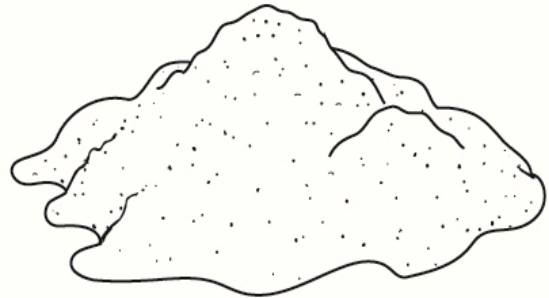
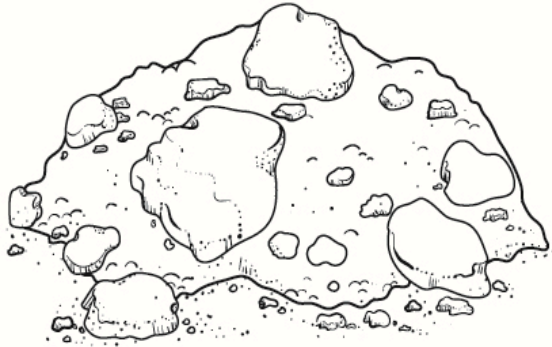
Soil is made up of decaying plants. The decaying plants loosen the soil and enrich it with nutrients. Plants are dependent on soil because they use the nutrients for food. Soil also gives plant roots something to hold onto.

Life Application

Let your child examine the soil in your yard and have him identify the components of that soil.

Components of Soil

Directions: Identify each component of soil and color it. Then match each description with the component it describes or write your own sentence that describes the feel or texture of each component.

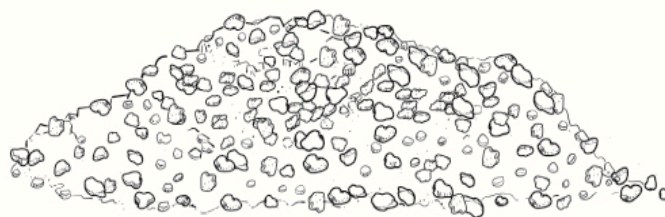
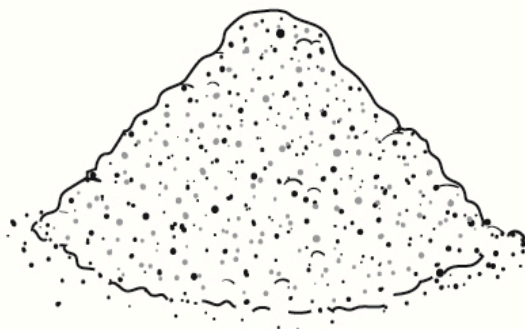
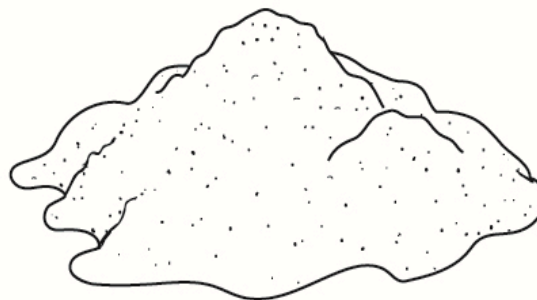
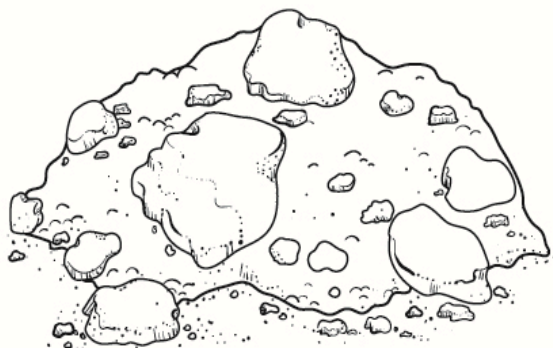


Descriptions

1. rough pieces that feel like small rocks
2. hard clumps of dirt, sticky when wet
3. fine grains, feels like sugar
4. very fine grains, feels like flour

Components of Soil

Directions: Identify each component of soil and color it. Then write your own sentence that describes the feel or texture of each component.



Experimenting with Soil

Question: _____

Hypothesis: _____

Describe the components and amounts of each soil:

Soil 1:

Soil 2:

Soil 3:

_____	_____	_____
_____	_____	_____
_____	_____	_____

Results: _____

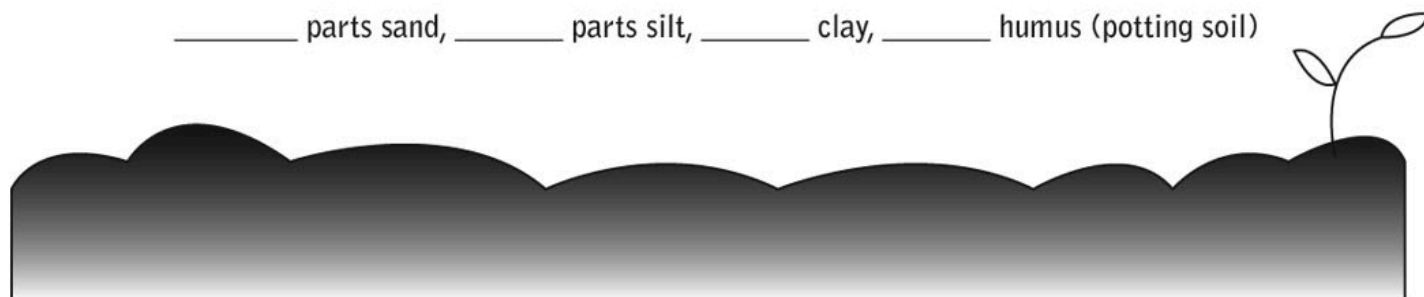
Conclusion: _____

Follow-up Questions:

1. How can you explain why the seeds grew better in certain types of soil than in others?

2. What do you think is the ideal mixture for soil?

_____ parts sand, _____ parts silt, _____ clay, _____ humus (potting soil)



WHAT'S IN THE SOIL?

Directions: Draw examples of living organisms that live beneath the soil. Write a paragraph at the bottom to describe the importance of living things in the soil.

