

Edible Soil

BACKGROUND INFORMATION:

How Soil is Formed:

It takes soil several years to form from a starting point of bedrock or parent material. As time goes by, good quality soil will develop four or more distinct layers. Soil will be composed of inorganic and organic components such as minerals, air, water and plant and animal material.

- At the surface is the **O horizon**, The **O horizon** is the upper layer of the topsoil which is mainly composed of organic materials such as dried leaves, grasses, dead leaves, small rocks, twigs, surface organisms, fallen trees, and other decomposed organic matter. This horizon of soil is often black brown or dark brown in color and this is mainly because of the presence of organic content
- Next is the **A horizon**, known as topsoil. Most plant roots grow in this layer and it holds most of the soil's nutrients.
- The **B horizon**, or subsoil, contains sand, silt and clay. Soils are classified according to their texture. Soil texture is determined by the amount of sand, silt or clay in the soil.
- The **C horizon** is partially broken down bedrock.
- The last layer is the **R horizon**. These layers make up the parent material. Some classification schemes add other layers, but these are the simplest forms.

The deeper the O and A layers are, the richer the soil. Soil profiles vary greatly from location to location.

How Soil is Lost:

The loss of soil is called erosion. Erosion occurs when soil is moved by water, wind or gravity. Several conservation practices that help prevent soil erosion include: planting trees to slow the speed of the wind, securing topsoil with plant roots, and using terraces to carry run-off water away from bare topsoil. There are many methods farmers and conservationists have utilized to protect the fertile, productive soil. They include reducing the frequency of tillage, planting cover crops during dormant seasons, farming along the contour of the land (contour farming), planting crops in a strip cropping pattern, utilizing crop rotations, planting and maintaining windbreaks, and planting grass waterways and terraces.

LEVEL: 3rd-4th grade

SUBJECTS/STANDARDS:

Subject: Earth Science
Standard: Earth's Systems, Processes that Shape the Earth

Benchmark: Identify evidence from patterns in rock formations and fossils in rock layers for changes in a landscape over time to support an explanation for those changes.

Indicator: Students identify layers of soil in soil profile.

ACTIVITY DESCRIPTION:

Students will use edible ingredients to create a soil profile. They will learn about the different layers of soil and the components that make up a soil profile.



photo from www.indulgy.com

ACTIVITY:

Prepare Ahead:

1. Purchase ingredients for Edible Soil Profile.
2. Prepare, if necessary, the pudding according to the directions on the package.
3. Place chocolate sandwich cookies into a sealed plastic bag and crush using a rolling pin or heavy spoon.
4. Set out 5 bowls and spoons with the ingredients to be served from.
5. Have plastic gloves for person serving gummy worms.
6. Arrange ingredients along a long table buffet style in order from the bottom to the top of their soil profile ingredients.
7. Label each ingredient as its appropriate soil layer.

Procedure:

1. Have students wash their hands to prepare for the lesson.
2. Review the layers of a soil profile, and tell the students they will be making their own edible soil profile.
3. Demonstrate how each soil layer is represented and what the profile should look like.
4. Place each soil layer ingredient by its appropriate label
 - a. candy coated chocolate = 'Bedrock'
 - b. pudding = 'Subsoil'
 - c. crushed chocolate sandwich cookies = 'Topsoil'
 - d. coconut = 'Organic Material'
 - e. gummy worms = 'Earthworms' or 'Organisms'.
5. Demonstrate making the soil horizons of your edible soil.
6. Put a spoonful of candy-coated chocolates into the bottom of an individual cup; discuss what Parent Material is. Repeat this procedure with the pudding (Subsoil), followed by cookie crumbs (Topsoil), coconut (O Horizon) and finally a gummy worm (Earthworms or organisms).
7. Allow each student to layer (correctly) their own Edible Soil. Dig in and Enjoy!

STUDENT LEARNING

Students will:

- Identify the layers of a soil profile.
- Recognize three factors that cause soil erosion.
- Recognize four methods Kansas farmers use to protect against erosion.

ESTIMATED

TEACHING TIME: 30 minutes; 10 minutes prep time

NEW VOCABULARY:

Erosion
Parent Material
Subsoil
Topsoil
Residue

MATERIALS NEEDED:

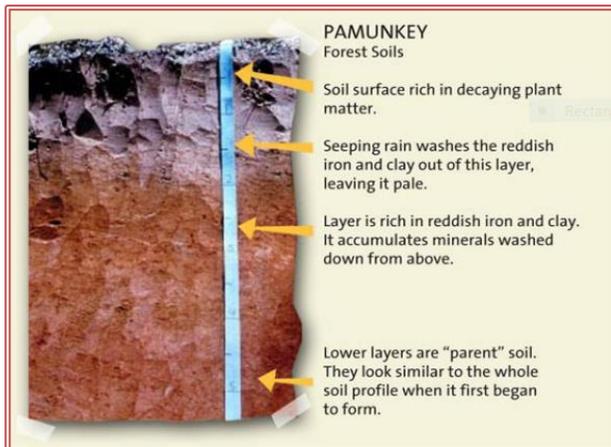
Adjust amounts for number of students

- Candy coated chocolate (M&M's)
- Several snack packs of chocolate or butterscotch pudding OR a box of pudding (prepared)
- Chocolate sandwich cookies, crushed
- ½ cup coconut (add a little green food coloring to coconut to represent vegetation.)
- Gummy worms for each student
- **Clear** plastic 4-6 oz. cups for each student
- Spoons for scooping ingredients
- 5 serving bowls
- Plastic gloves
- Labels for each soil layer ingredient

TEACHER'S NOTES

Discussion Questions:

1. Which layer is represented by the candy coated chocolate? (Parent Material)
2. Which layer does the pudding mixture represent? (Subsoil)
3. Which layer is represented by the crushed cookies? (Topsoil)
4. Why are soils with deeper topsoil layers more productive? (More room for plant root growth and development, and also more nutrient storage capacity)
5. What did the coconut layer represent? (Residue)
6. What types of organisms live in soil and aid in soil production? (Earthworms, bugs, grubs, etc.)
7. Where have you seen the four soil layers exposed? (In a creek bed or along the side of the road where the hill was cut away, etc.)
8. Where have you seen erosion? (Ditches in a field or road, soil blowing during dry summer, canyon)
9. Describe how the erosion looked and tell if it was done by wind, water or gravity.
10. How might it have been prevented?
11. What are at least four conservational practices farmers are currently doing to decrease soil erosion?



*Pamunkey is the Virginia State Soil.
Pamunkey soil profile, credit: Smithsonian Institution*

***“While the farmer holds the title to the land, actually, it belongs to all the people because civilization itself rests upon the soil.”
-Thomas Jefferson***

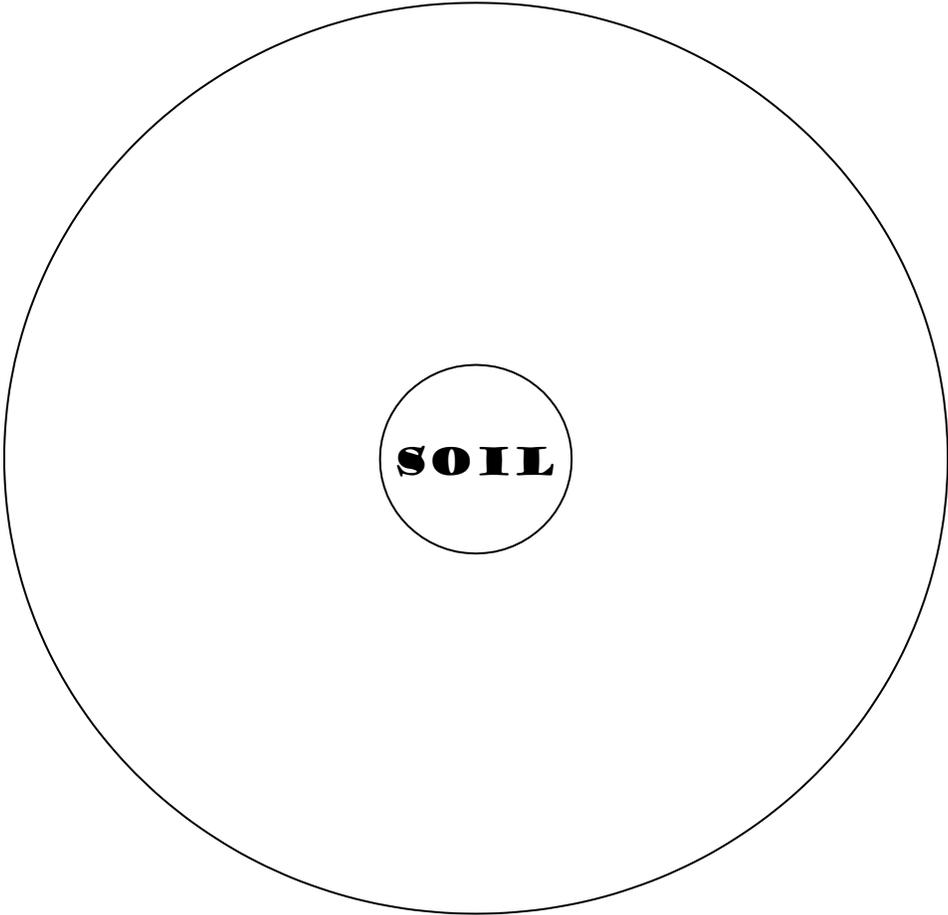
Student name:

Worksheet 1 – Soil in Your Life

Have you ever thought about how important soil is in your daily life? It grows the fibers that make your clothes, produces the crops that feed you, makes food for livestock that will be eaten for meat, and lots more.

Directions: In the big circle surrounding “Soil,” list everything you have done today, everything you have eaten, and any products you may have used.

On the lines provided, write down how your listed items are connected to the soil.



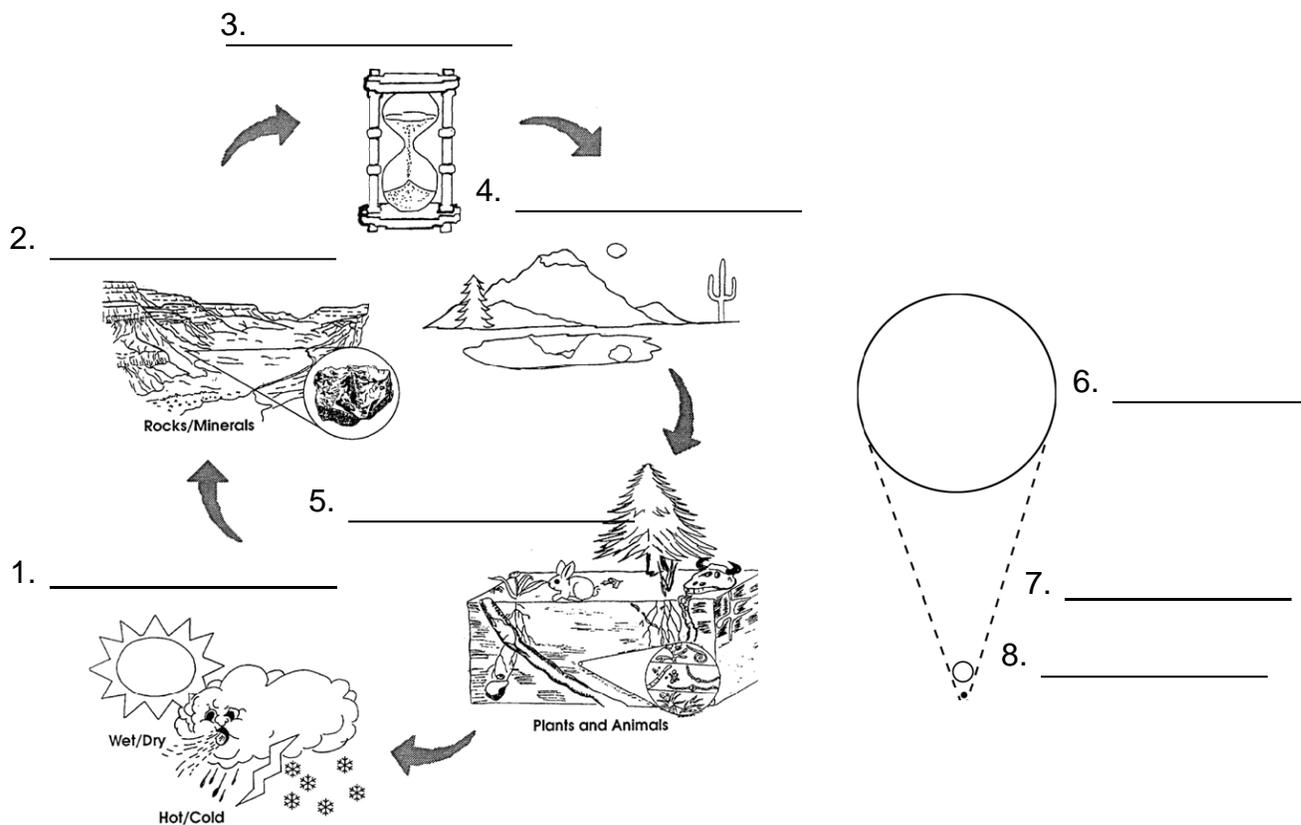
Worksheet 2 - Factors That Build Soil

Directions

Fill in the blanks using words in the word bank.

Climate refers to general weather including temperature and rainfall. **Living organisms**, such as microbes, plants, insects, animals, and humans exert considerable influence on the formation of soil. Bacteria help break down plant and animal residues in the soil. **Parent material** is the layer of unconsolidated material from which a soil develops. Fertility, which affects the ability to grow crops, is greatly influenced by the parent material of a soil. **Topography** affects how soil moves across the surface of the land. The slope, hills and valleys affect the way that water drains and carries soil particles. The amount of water held in soil due to the topography causes the soil to form slower or faster. Soil forms from the chemical and physical weathering of parent material over **time**, as affected by climate. Some soils form faster than others.

Particle size: remember, individual **silt** and **clay** particles cannot be seen unless they are magnified. **Sand** particles can be seen by the naked eye.



Word Bank

Climate

Living Organisms

Sand

Topography

Clay

Time

Silt

Parent Material

Student name:

Worksheet 3 – Soil Layers

Directions

Label the four layers of soil using the words from the word bank.

Word Bank

A Horizon/Topsoil
C Horizon/Bedrock
O Horizon
B Horizon/Subsoil

