

**Grades:** 4  
**Subjects:** Science, Social Studies

## I. Creating A Soil Creature

**Objective:** Students will ...

1. Identify and describe the advantages of soil creature adaptations and evaluate the importance of adaptations to these animals.
2. Create their own animal organism incorporating adaptation ideas learned in the program and then describe how their organism is specialized to survive underground in the soil.

**Materials:**

- wipe-off board and markers or chalkboard
- various craft materials (pipe cleaners, pom-poms, toilet paper tubes, straws, clay, etc.)
- glue
- scissors
- Soil Critter Charts* (see attached)
- critter worksheets (see attached)

**Background Information:**

Underground habitat has unique features that require special adaptations for survival. The world beneath our feet is dark, cool, wet, contains pockets of small spaces, and contains less oxygen than the aboveground world. The underground world has predators, scavengers, plants, and animals, and limited amounts of food and space like the just like the world above.

**Lesson Plan:**

1. With the entire class define adaptation, which is the ability of an organism to make adjustments to the environment. Another term for adaptation is “smart part”. For example, forests develop only where soil types, moisture, and sunlight are balanced for what they need. Desert plants have adaptations to survive under intense sunlight, in poor quality soils, and with limited water. Explain that you are going to investigate the adaptations of several creatures that live in the soil.
2. Ask students if they can think of any animals that have special adaptations. Give examples from the following list to get the students thinking about this. Also ask them why these adaptations are helpful.

<b>Animal</b>	<b>Adaptation</b>	<b>Advantage</b>
Great - Blue Heron	Beak	Can probe shallow water and mud for insects, frogs, and worms
Snowshoe Hare	Fur	Fur color changes from brown in summer to white in winter to blend with snow in winter and the forest in summer
Chameleon	Skin	Changes color to blend with their surroundings
Moose	Legs	Legs are long and have special joints for moving through deep snow
Walking Sticks	Shape	Twig-like appearance helps the insect blend in with its environment

Now have the students look at the *Soil Critter Chart* enclosed in this packet. Go over the information for each of these creatures.

3. After reading the information on the *Soil Critter Chart*, discuss what makes the soil a unique habitat. Write ideas on the board, trying to elicit that it is a dark, cool, and wet place that does not contain a lot of air, and has small spaces between soil particles. Next, list some features that are shared by all habitats: plants and animals, predators, scavengers, limited amounts of food and space.

4. Review the underground critters' special adaptations from the *Soil Critter Chart*. Ask the students for examples of the special adaptations these critters have. For example: poison, keen senses of smell, ability to curl up tight, ability to carve tunnels.

5. Challenge the students to create a creature with special adaptations that allow it to survive in an underground environment. Divide the classroom into four groups and assign a creature type (predator, decomposer, aerator or scavenger) to each group. Pass out a critter worksheet (see attached) to each group for recording their creature's unique characteristics. Using the craft supplies located in a central location, have each group work together to make one creature. Allow ten to fifteen minutes for this activity. At the end of this activity, students should be ready to explain their creature's special adaptations to the rest of the class, consulting their worksheets if needed.

6. At the end of the activity, ask each group to give a short presentation of the creature they created.

## II. Worm Observation

**Objective :** Students will...

1. Learn how earthworms mix and till the soil.
2. Observe how worms create compost.

**Materials:**

- clear narrow jars (pickle or olive jars work well)
- thick canvas or felt for jar coverings
- variety of different colored soils
- leaves and/or grass clippings
- worm foods (any vegetable matter: apple or pear cores & peels, outer leaves of lettuce, banana peel, cottage cheese, left over cereal, oatmeal, pizza and bread crust, grapefruit and orange rinds, etc, just remember NO meat!)
- spray bottle
- craft supplies such as colored paper, tissue paper, glitter, googly eyes
- rubber bands
- window screening
- worm journals
- worms (Carolina Biological Supply has earthworms, 1-800-334-5551)

**Lesson Plan:**

1. Tell the students that earthworms are very important in the garden because they act like plows tilling the soil. Gather and record the students' ideas on how worms work the soil. Explain that they will perform an experiment to test this unique ability of earthworms. The students will construct worm homes in school and then take them home for monitoring.
2. Have on hand worms, several soil types, and tall narrow jars for this activity. Students can bring some soil from home in a jar or bag. Explain that they will create distinct soil layers by filling the jars with different color soils. They will then add two to three worms to the jars.
3. Tell the students that they will be responsible for the well being of their worms over the next few weeks. What kinds of things will they need to provide for the worms? (Food, water, air, and a comfortable, cool, home.) Explain that to make their homes comfortable, the worms need an air supply. Have them secure pieces of plastic screening with rubber bands to the tops of their jars. The jars also need light-proof covers to protect the worms from the harmful rays of the sun. Pass out construction paper and provide colored paper, tissue paper, sequins, glitter, googly eyes, and various other craft items for the students to decorate their jar covers. Remind the students that they need to keep the worms cool, ideally between the temperature of 50-60 degrees Fahrenheit.

4. Worms also need food. Ask the students what worms eat and record their responses. Show the students a short list of traditional worm food, such as grass clippings, lettuce leaves, carrot scraps and cornmeal. Have the students bury the food just below the surface of the soil and check periodically to see if it is being eaten. Ask the students how they could determine which food types worms prefer. Suggest they add a small portion of different food items to their worm jar every day, noting if it has disappeared or been pulled down into the soil the following day. If so, they can hypothesize that worms like that type of food. Keep an ongoing list of foods worms do and do not like. If a food item remains untouched, remove it promptly to prevent mold from growing in the jar.

5. Water is also very important to the life of a worm. Caution the students that too much water will flood their homes and tunnels, causing them to drown. Have them imagine what sidewalks and driveways look like after a heavy rain, when worms come out of saturated soil. Using a plant mister or spray bottle, they should spray their soil jar at least once every three days. If they see water pooling at the bottom of the jar, have them drain off the excess water by putting the jar on its side with paper towel beneath it.

6. Remind the students of the important job they are about to undertake.

7. Have the students construct a special worm journal to record their observations over several weeks. What do the students think will happen to the layers in their jar? How long will it take for the worms to till up all the layers? Record predictions.

8. Explain that they will let their worms go after two or three weeks when the experiment is complete, depending on when all the soil layers have been tilled. Have the students bring their jars to class at the end of the experiment. Ask the students about how the worms changed the soil and what happened to the food they added. Talk about the importance of worms in creating compost and in mixing the soil so that it is more aerated. Before the students release the worms, have them count the number of worms in their jar. Have them note whether the population increased or decreased.