



Scenic Soil

Lesson Description

Students discover how soils are formed, then paint pictures to show soil colors.

Subjects

Art, Language Arts,
Science

Teacher Background

Soils form over millions of years from *parent material* that is broken down by *weathering* from wind, water, temperature, chemical changes, and living organisms. Over time, glaciers move over the land and grind rocks together, rubbing off particles of all sizes. By day rocks are warmed by the Sun and expand, while at night the rocks cool and contract. Over time, enough expansion and contraction cause rock particles to chip off.

Change in water temperature also contributes to soil formation—in cold temperatures, water in the cracks of rocks freezes and expands, causing the rocks to break into smaller pieces. Growing plant roots can also split a rock, contributing to soil formation from parent rock material. When the rock particles from these various sources combine with living microorganisms, air, moisture, and *organic matter* from *decomposing* plants and animals, soil is formed.

A student's first impression when looking at bare soil may be of its color. You may be familiar with the Painted Desert in Arizona, red desert soils in California, Arizona, and Nevada, or the dark, fertile soils of the Plains states. Many early human cultures used earth materials (such as the soil mentioned above) to color ceramics, cosmetics, and paints.

Time

Prep: 30 minutes

Activities: 1 ¾–2 hours
(not including Extensions)



Student Objectives

Students will be able to:

- explain how soil is made;
- recognize that soil is composed of different colors; and
- design a soil painting using those different colors.

Soil color and development are parts of weathering. For example, as rocks containing iron are exposed to air, the elements turn yellow or red. Organic matter in soil decomposes into fertile black *humus*. The element manganese forms black mineral deposits in soil, while quartz can create white layers in the soil. Soils deep below the surface become lighter, redder, or more yellow. Soils influenced by water are gray or have gray spots, depending on how long the water is present and where it is located in the soil. Climate, physical geography, and geology influence the rates and conditions under which these chemical reactions occur and color the soil.

Materials

For the Class

- Newspaper
- Index cards
- White glue
- Water
- Clear plastic or glass jars with lids (any size)
- Spoon
- Bucket

For Each Student Group

- Resealable plastic sandwich bag
- Spoon
- Paper towels
- Small plastic hand magnifier (approximately 5x magnification)
- Plastic jar with lid (approximately 0.35 Liters)

Learning Cycle

Perception: 30 minutes

Prep Set up the demonstration table and student work areas as in Lesson 1. Each work area should have dry and damp paper towels, and a magnifier.

- 1** Take the class to the school yard. Give each student group a spoon and small plastic bag.
- 2** Ask each student group to dig up one spoonful of soil and put it in the plastic bag. For best results, dig loose and crumbly soil. If inclement weather or frozen ground makes this impossible, bring in your own soil samples (see page x for suggestions on obtaining soil).
- 3** Back in the classroom, ask students to match the school-yard soil sample with one of the larger samples on the index cards. Pass around plastic bags and help students distinguish differences in color and texture.



- 4 On the demonstration table, sort soil samples into piles according to color. Use index cards and the marker to label the location of each soil. If the colors are too similar, add samples from other locations such as local parks and farms.
- 5 Have students examine the new samples with magnifiers at their work areas. Students may discover that their school-yard soil samples contain plant and animal matter, pebbles, and moisture. Compare the discoveries in the soil samples.
- 6 Ask students to observe changes in soil color as their samples dry. Students should become aware that soils are lighter when dry than when wet.
- 7 Clean up the demonstration table and work areas. Save the soil samples for the Exploration section.

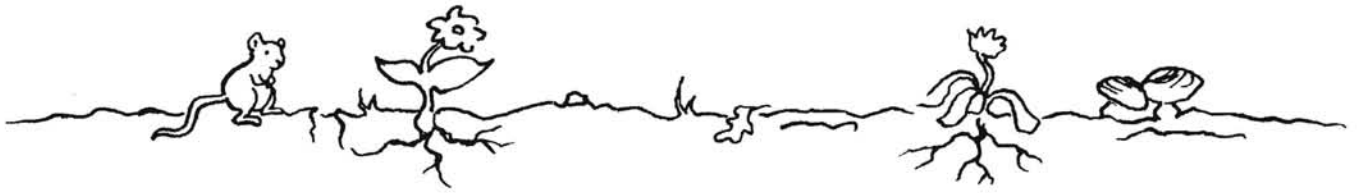
Exploration: 30 minutes

Prep Cover student work areas with newspaper. Each work area should have a jar, a bag with a school-yard soil sample (from the Perception section), rocks, grass, leaves, twigs, and a bottle of water.

- 1 Seat students at work areas and have them put on smocks or old shirts.
- 2 Have students create new soil by mixing equal parts of soil from the demonstration table with grass, bits of leaves, twigs, and drops of water. Students can rub rocks together to add minerals to their recipe. (Pebbles and rock chips will weather faster than larger rocks.) Have students put their mixtures into jars, tightly screw on the lid, and gently shake. Students in each group should write their names on tape and label their jar.

Materials Cont'd.

- Several soft, crumbly sedimentary rocks—e.g., shale, limestone, or sandstone
- Grass clippings
- Dried leaves
- Twigs
- Squeeze bottle
- Water
- White tape
- Permanent marker
- White watercolor paper or posterboard (approximately 21.5 x 27.9 centimeters/8.5 x 11 inches)
- Pencil
- Ruler or straightedge
- Three to five clear plastic cups
- Egg carton
- Watercolor brush
- Jar without lid for water
- Toothpicks
- Smock or old shirt
- Student Handout 2A (optional)



- 3 Gather the jars and ask students to name any differences among the jars' color and texture. You may wish to record student observations on the board. Review what makes the colors and textures.
- 4 Once a week for the next few months, have students add water and then gently shake their jars. Students can draw and label pictures of their jars as the leaves and clippings become part of the soil.
- 5 After your class has finished observation of the jars, empty the two jars into the bucket, then dispose of the waste material outside.

Application: 30 minutes

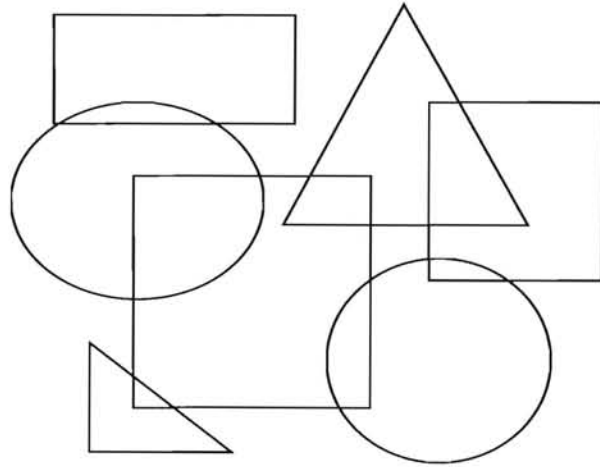
Prep Mix white "paint" by combining equal parts of white glue and water in jars, then seal the jars. (Experiment with painting designs to determine how much paint your students will need.) Cover student work areas with newspaper. Each work area should have one or two pieces of watercolor paper or posterboard, a ruler, a pencil, a watercolor brush, an egg carton, a jar with water, toothpicks, a spoon, and several plastic cups with different colored soil.

- 1 At their work areas, older students can use a pencil and ruler to trace or draw a design using basic shapes on a piece of watercolor paper or posterboard. The design could be made of overlapping circles, squares, rectangles, and triangles (see Figure 2.1). For younger learners, prepare the colored paints beforehand and label jars with the names of the colors. Focus on painting using three basic colors, and then have students give names to both the colors and the soil.



Figure 2.1. A design for soil painting.

- 2** Ask students to put on their smocks and then spoon different colored soils into spaces in the egg cartons. Students can mix soil types to create different colors, but no more than six of the twelve spaces should contain soil.
- 3** Walk around the class and for each student group, ladle two spoonfuls of white paint into each egg carton space containing soil.
- 4** Students can mix each soil paint with a different toothpick, then paint their designs.
- 5** After the paintings dry, hang all the pictures to show the variety of colors found in soil.
- 6** Clean up work areas. Keep the piles of dry, unused soil for Lessons 3, 6, 9, and 10, which also require soil. Collect wet and mixed soil in the bucket, then dispose of the material outside. Dispose of waste material that contains glue in a trashcan.



Evaluation: 15–30 minutes

Ask students to present their soil paintings and use the paintings to describe the different soil colors and how soil forms.



Extensions: 30 minutes each

- Experiment with soil colors in a way that may be easier for young students: distribute copies of Student Handout 2A. Instruct students to color the flower and roots, use a cotton swab to carefully smear glue in and around the roots, and then sprinkle soil on all the glue areas. Allow the pictures to dry before gently shaking off excess soil.
- Get moist clay from an art teacher, pottery shop, or crafts store. Remind students that clay is one of the soil components discussed. Have students push their thumbs into the clay, then press their thumbprint onto paper. Repeat this process several times. Have students add character to these thumbprints by drawing lines to make faces, limbs, tails, and feet, or stems and leaves.
- Ask students to bring to class soil samples from their yards or local parks. Compare the soil textures, colors, and observations.

Name: _____

