ACTIVITY INSTRUCTIONS

Part A

Exploring Soil Attributes

Teacher Tip

This activity will take 3–4 class sessions. Break at the points that work best for your class, but consider breaking after Step 4, Step 10, and again after Step 17.

1 **Review with students what they learned about sand in Lesson 3. They may refer to their science notebooks as needed. Ask,**

- What are some attributes of sand? *(Color, size, shape, texture)*
- How does sand form? Does this happen over a short or long period of time? *(Sand is formed when rocks break down by erosion and weathering. Rocks break down into smaller rocks, such as gravel, and then into even smaller particles of sand. It takes a long time for rocks to break down and sand is formed.)*
- How does erosion affect sand and sand landforms such as deserts and sand dunes? *(Wind erosion moves sand and water erosion washes it from one place to another. Wind has the greatest effect on dry regions and open spaces with little vegetation, such as sand dunes and deserts.)*
- What are some ways to reduce erosion to sand dunes? *(Students may recall from the investigation in Lesson 3, Part C, that vegetation and moisture are some ways to reduce wind erosion. Students may recall from Lesson 3, Part D, that barriers are another solution to the problem of wind erosion.)*

Teacher Tip

Save the list and encourage students to add to it as you continue with the lesson.

2 **Show students a cup of soil. Inform them they will explore soil, another earth material, in this lesson. Display the class chart titled "What We Know about Soil." Allow time for students to brainstorm everything they know about soil, and record their responses on the chart.**

3 **Tell students that soil is a natural earth material comprised of small particles of humus, rock, air, and water. Soil forms over long periods of time as rocks break down through weathering and combine with humus, air, and water. Explain that soil makes up the top layer of the earth's crust. The top layers of soil are nutrient-rich, and good for growing plants. The bottom layer of soil is bedrock.**

4 **Write *humus* on the board, and tell students that it is one part of soil. Have students copy the term and the following definition into their science notebooks.**

- An organic material resulting from the decomposition of dead plants and animals that is rich in nutrients that promote plant growth.

Write *topsoil* on the board, and explain that another part of soil that is important for plant growth is topsoil. Have students copy the term and the following definition into their science notebooks.

- The nutrient-rich layer of soil made up of humus, decaying plants and animals, weathered rock particles, and minerals that promote plant growth.

5 **Distribute materials to each pair of students. Encourage students to take the lid off the cup of soil and to place a spoonful onto the lid. Allow ample time for students to explore the soil, and encourage them to use their hand lenses. Direct pairs to discuss the attributes they notice in the soil.**

6 **Display the Venn diagram you prepared titled "Comparing Soil and Sand." Direct students to copy the diagram into their science notebooks. Then, ask students to share the attributes of soil that they observed, and record their suggestions in the left circle of the diagram. Have students copy the attributes into their Venn diagrams in their science notebooks.**

7 **Instruct students to take the lid off the cup of sand and to place a spoonful onto the lid. Most students will recall the attributes of sand from Lesson 3, but allow ample time for students to observe the sand with their hand lenses. Draw students' attention again to the Venn diagram, and ask them to share the attributes of sand that they observed. Record their suggestions in the right circle, and direct students to copy the attributes into the Venn diagram in their science notebooks.**

8 **Hold a discussion with students to compare the soil and the sand. As you discuss each question below, record students' responses in the appropriate section of the Venn diagram. Ask,**

- What are some attributes that soil and sand have in common? *(They share attributes such as particles and texture.)*
- What else can you think of that soil and sand have in common? *(They are both earth materials, they are part of the land, they both were formed by erosion over a long period of time.)*
- Why do you think soil may be better than sand for growing plants? *(Answers may include that the soil looks darker/appears richer and has decaying particles whereas the sand does not.)*

Allow time for students to complete the Venn diagram in their science notebooks.

Teacher Tip

Have paper towels handy so students can wipe their hands after they explore the wet and dry soil, and wipe up any spilled water.

9 **Instruct students to carefully take the lid off the cup of water and to place a spoonful of soil onto the lid. Then, direct them to use the spoon to pour a very small amount of water onto the soil on the cup lid, just until the soil is moist. Allow time for students to observe the wet and dry soil with their hand lenses and to make comparisons between the wet and dry soils with their partner. Encourage students to use their senses of smell and touch to observe the differences between the wet and dry soil. Ask,**

- Look at the wet soil with your hand lens. Are the shapes of the bits of soil all the same? Are the colors different than in the dry soil?
- Sniff the soil. How does the smell change when the soil is wet? Is there more odor than with dry soil?
- Pick up some soil and squeeze it in your hand. Does it make a clump?

10 **Display the T-chart you prepared titled "Comparing Wet and Dry Soil." Discuss students' observations and comparisons of the dry and wet soil and record them in the appropriate columns on the T-chart. Have students copy the completed T-chart into their science notebooks.**

11 **Distribute a copy of Student Activity Sheet 4A: *Observing Soil in a Settling Jar* to each student. Display the culture jar of soil and the pitcher of water. Tell students that they will explore a settling jar of soil.**

12 **Explain that students will make two predictions, and then observe as you add water to the soil in the jar and stir the contents, and record these observations. After 24 hours, the class will observe the contents of the jar and record their observations again.**

13 **Direct students to complete Part A of the activity sheet by writing to record their predictions of what will happen when water is added to the soil in the jar and it is stirred, and also what will happen after the jar is left to sit for 24 hours.**

14 **Fill the collecting jar almost to the top with water, and then use the long-handled spoon to stir the contents of the jar. Secure the lid. Allow time for students to observe the contents of the settling jar and record what they see by drawing and writing in the first section of Part B, titled "Before Settling."**

Teacher Tip

Make sure that students write their names on the activity sheets before you collect them. You will redistribute them after 24 hours so they can record their second round of observations.

15 **Facilitate a class discussion of students' observations of the jar's contents. Then collect the activity sheets.**

16 **Review with students the different attributes of soil, and the differences between sand and soil and between wet and dry soil.**

17 **Place the settling jar in an undisturbed location for 24 hours. Collect all materials, and save the spoons, sand, and soil for reuse. Dispose of other materials in the trash.**

Science Notebook Opportunity

Notebook Prompt:
Write two differences between wet and dry soil.

One difference between wet and dry soil is _____.
A second difference between wet and dry soil is _____.

Learning Center Opportunity

Fill two cups with equal amounts of sand and soil and secure the lids. Place the covered cups in a learning center, and have students use a balance scale to find out which weighs more. Have students record their findings in their science notebooks. You might add cups of wet soil and/or wet sand for additional comparisons.

18 **Review with students what they learned in the previous class session about how soil is formed. *(Students should recall that soil forms over long periods of time as rocks break down through weathering and combine with humus, air, and water.)* Ask for volunteers to share a few of the attributes they recorded in their science notebooks.**

19 **Have the soil settling jar available. The contents should have settled overnight so that students may see different layers in the jar. Large particles such as pebbles and rocks will fall first. Materials that are less dense, such as bits of partially decomposed plants, will sink more slowly or sometimes even float on the surface for a period of time before sinking. Explicitly explain that different types of soil will show as different layers in the settling jar.**

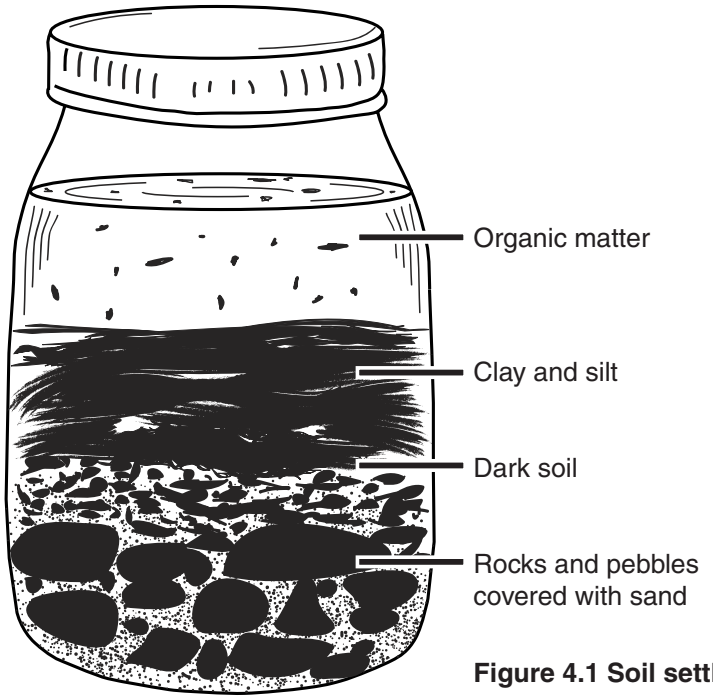

Figure 4.1 Soil settling jar

20 **Redistribute students' copies of Student Activity Sheet 4A: *Observing Soil in a Settling Jar*. Review students' predictions and their drawing of the settling jar after it was stirred. Allow time for students to observe the settling jar and draw to record how the contents appear after 24 hours of settling. They should do this in the second section of Part B, titled "After Settling."**

21 **After students have had ample time to record their observations, ask,**

- What has happened to the soil in the jar after it has settled overnight? *(The different components of the soil have formed layers in the jar.)*

22 **Have students complete Part C of the activity sheet by writing a conclusion of what they observe. Ask,**

- Are there any particles in the settling jar that you can identify? *(Students may observe bits of rocks and pebbles on the bottom layer, and darker soil in a layer before the water. There may be bits of organic material floating in the water layer.)*

23 **Guide cleanup. Direct students to dump the soil from the cup lids into the trash, and put the lids back on the cups. Collect the cups, and save the cups of sand for reuse in Lesson 6. Save the spoons and hand lenses as well.**

Learning Center Opportunity

Place the soil settling jar in a learning center. Allow students to stir and observe periodically to establish that each type of earth material follows a pattern as it sinks to the bottom of the container. Have them record observations in words and drawings in their science notebooks.