

Unit B: Components of Soil

Lesson 1: Holes of Soil

Student Learning Objectives: Instruction in this lesson should result in the students achieving the following objectives:

1. Identify differences between large holes and small holes
2. Explain importance of small holes and large holes

Recommended Teaching Time: 1 Hour

Recommended Resources: The following resources may be useful in teaching this lesson

- A PowerPoint has been provided

List of Equipment, Tools, Supplies, and Facilities:

Writing surface
PowerPoint Projector
PowerPoint Slides
Transparency Masters
5 different samples of soil textures

Key Terms: The following terms are presented in this lesson (shown in bold italics and on PowerPoint Slide 2:

(PowerPoint Slide 2)

- Large holes
- Small holes

Interest Approach: Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Put rocks in a bowl with a small hole located at the bottom. Put sand in another bowl with a small hole located at the bottom. Take 2 large cups of water with the same amount of water in each. At the same time and the same speed, pour the water into the bowls. As this is happening ask the students for their observations. Students should see that the bowl with the larger rocks will allow water to move more quickly through to the small hole in the bowl than the sand. Use this example to transition into the lesson as you talk about holes in soil.

Summary of Content and Teaching Strategies

Objective 1: Identify differences between large and small holes.

(PowerPoint Slide 3)

- I. Holes in soil are the spaces between soil particles in a soil sample. They are defined in two ways:
 - a. **Large holes** are found in sandy soils due to the large surface area found on separate sand particles.
 - b. **Small holes** are found in soils with predominately clay and silt as they have smaller surface areas when compared to sand.

(PowerPoint Slide 4) *In slide 4, you see the different sizes in pore space in the bottom left picture and the differences in size of particles in the picture in the top right.*

(PowerPoint Slide 5)

- II. Soil is made of four sections.
 - a. 45% minerals of soil; sand, silt, and clay.
 - b. 25% air
 - c. 25% water
 - d. 5% organic matter

Show PowerPoint Slide 6 or TM: B1-1 to the students. They have seen this picture in a previous lesson. Have the students look closely at the 50% of water and air. Explain that all of this is found in the large and small holes in soil. Ask the students how the holes might differ between soil textures.

Objective 2: Explain importance of small holes and large holes.

(PowerPoint Slide 7)

- I. Large holes are important for water drainage to allow air to travel through the soil for the roots of a plant to respire. Soils high in sand will have fewer and larger holes which creates the easiest pathway for the movement of air and water through the soil.

(PowerPoint Slide 8)

- II. Small holes hold water in place where plant roots can use the water when there is no rain. Soil particles like silt and clay have many small holes which retains more water and nutrients in the soil.

Have the students put all notes away. Provide each student with a blank sheet of paper. Ask the students to write their answer to the following questions on the blank sheet of paper:

What happens to soil during an extended drought?

What would happen to soil during a long period of rain?

What would be the best kind of soil to have in both situations?

What kind of soil do you think you have at home?

What type of soil do you think we have on the school farm?

Review/Summary: Have five different soil texture samples. Each soil texture is unique in what types of soil holes they have. Some have more large holes than others. Each student must write down on the sheet of paper from the previous exercise whether the texture has more large holes or small holes. Help them understand that large holes mean sand is in the texture, and you can tell sand is in the texture due to the grit. Explain that lack of grit means more clay which means small holes are in this texture. Then they must write down why they think the texture has more large holes or small holes to justify their answer. *Have students turn their paper in to you the instructor to provide you with feedback if they understand the concept of holes in soil. The questions on PowerPoint Slide 8 can also be used to assess the knowledge of the students on this lesson.*

Application:

Have the students split into groups of four. Each group member should take a turn writing down an example of why it would be important for the people of Afghanistan to know about the holes of soil. (For example, when building a house or growing crops.) Allow no more than five minutes for this activity and then have each group share their list of examples with the other groups.

Evaluation: Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is attached.

Answers to Sample Test:

Part One: Matching

1=a, 2=b, 3=b, 4=a, 5=b

Part Two: Completion

1. respire
2. Large holes
3. large and small holes
4. Sand, silt, and clay
5. Small holes

Test

Unit B Lesson 1: Holes of Soil

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

- a. Large Holes
- b. Small Holes

- _____ 1. Found in soils with a lot of sand.
- _____ 2. Found in soils with a lot of clay.
- _____ 3. Found in soils with a lot of silt.
- _____ 4. Used for water to travel quickly through the soil.
- _____ 5. Used to hold water in the soil for plant use.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

- 1. Large holes are used to help roots _____.
- 2. Air is allowed through the soil through _____.
- 3. _____ allows roots to travel easily through the soil.
- 4. A mixture of large and small holes will be found in a soil that mixes _____, _____, and _____.
- 5. In a drought, soil with _____ holes would be best for plant growth and survival.

TM: B1-1

COMPOSITION OF AVERAGE SOIL

