



# Soil & Recycling Department

## Lesson 3 - Digging in to the Soil Department

### Essential Questions:

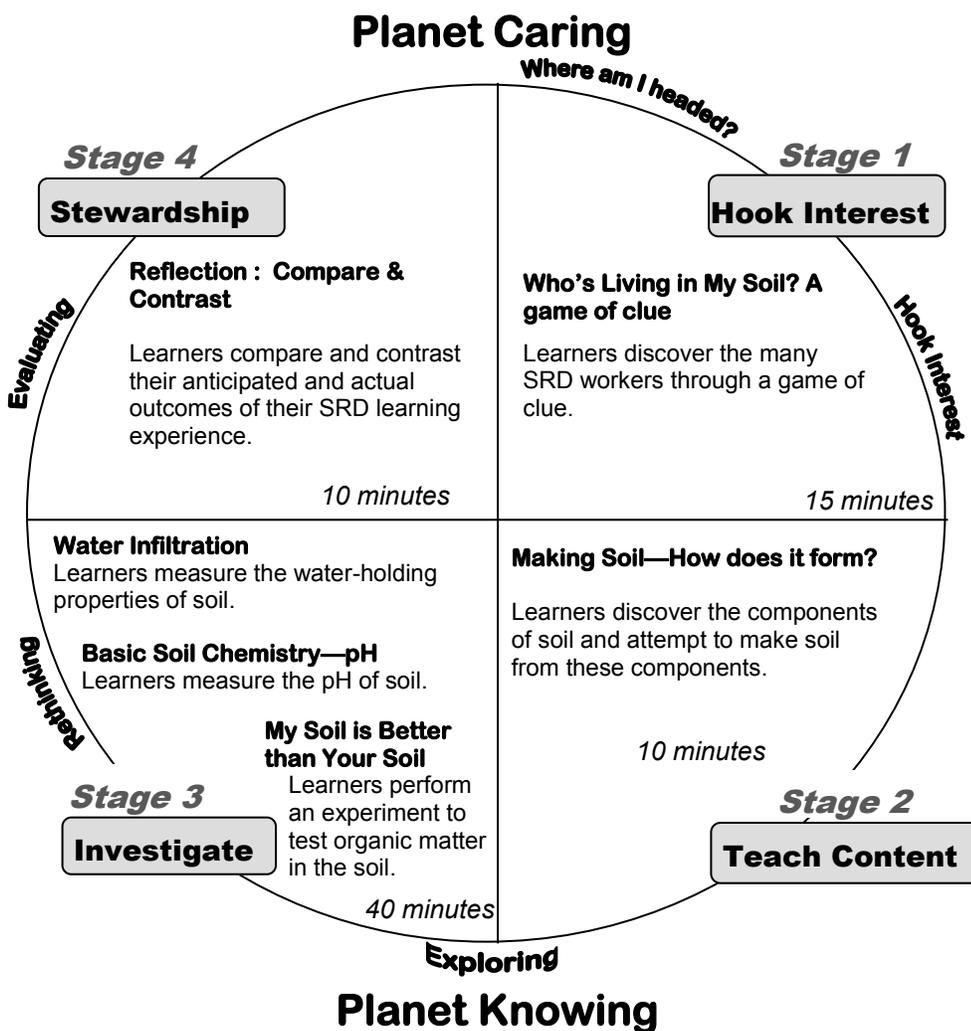
- Who are the workers in the Soil & Recycling Department?*
- How is soil formed?*
- What makes some soil better than others?*

### At a Glance:

In Stage 1, learners will play a game to reinforce their knowledge of soil organisms, then investigate these organisms further through observation of a pitfall trap. The Stage 2 activity demonstrates how soil is made by combining its different components. Water infiltration and soil chemistry are investigated in Stage 3. A reflection activity of comparing and contrasting anticipated and actual outcomes of the learning experience with the Soil & Recycling Department concludes this lesson in Stage 4.

### Concepts:

- Physical and biological processes are responsible for soil formation.
- Soils are not considered a renewable resource.
- Soils are complex materials, containing both organic and inorganic components.
- Earthworms and decomposer insects are important workers in the Soil & Recycling Department.



### Objectives

Learners ...

- discover what type of organisms live and work in the soil.
- discover the ingredients of soil and attempt to create soil from these ingredients.
- measure the water-holding properties of soil.
- measure the pH of soil.
- understand the effect of different soil pH on surrounding organisms.
- do an experiment to test the amount of available carbon (organic matter) in the soil.
- describe how levels of organic matter can affect plants.
- compare and contrast their anticipated and actual outcomes of the SRD learning experience.

## PROCEDURES IN BRIEF: Lesson 3—Digging in to the Soil Department!

### Stage 1. Who's Living in My Soil? *A clue game*

#### Procedure:

1. Divide club members into groups of 2-3 learners.
2. Pass out the clue cards and tell learners that they are to match the information on their card to one of the Eco-service Worker Cards.
3. Once all the groups have decided upon their Soil worker, discuss the answers and how each organism is important in keeping the Soil & Recycling Department healthy.

#### Supplies

- Who's Living in my Soil Clue cards
- Eco-worker cards

### Stage 2. Making Soil—How does it form?

#### Procedure:

1. Have learners identify the components of soil.
2. To represent mechanical weathering, the learners can crush rocks and sand with the hammer as parent material for the mineral portion of the soil. Keep the rocks and particles inside the cloth bag to prevent injuries from flying pieces. Explain the ways in which weathering occurs in nature (the freezing and thawing of rock, wearing down of rock by wind and water).
3. To represent the products of chemical weathering, the learners can file off the rust from rusty metal (scrap iron bars). Explain that chemical weathering occurs when chemicals in the environment react and break down. Iron reacts with oxygen in the air and forms rust. This process also occurs with the minerals in rocks.
4. Learners can shred leaves and other fresh organic material. Dead bodies, animal wastes, living organisms such as worms and insects are present in the organic material in soil but may not be appreciated or appropriate.
5. Have the learners combine these ingredients to create soil.

#### Supplies

- rocks, sand
- rusty metal (*no sharp edges*)
- leaves
- hammer
- cloth bag
- File
- safety goggles

### Stage 3. Water Infiltration, pH, and Soil Organic Matter

#### Procedure: *Assign learners to 3 different outdoor locations*

1. Learners should remove any vegetation from the soil surface, leaving the roots in place.
2. Push a tin can into the soil about 1/2 inch deep.
3. Using a watering can or bucket, fill the tin can to the rim with water.
4. Record the amount of time it takes for all the water to be absorbed by the soil.
5. Record the times on the data sheets.

#### Basic Soil Chemistry—pH

1. Place three soil samples from each site into three separate cups or beakers (nine cups total).
2. Add 100 ml of distilled water to each cup.
3. Use the plastic rod to break apart the soil and mix the water with the soil.
4. After letting the mixture settle for about 15 minutes, tear off a small strip of pH paper (1").
5. Touch the paper to the water, not the soil.
6. Match the color of the wet paper to the colors found on the pH package.
7. Average the pH values for each bucket and record the pH of the soil at each site.

#### My Soil is Better than Your Soil

1. Gather soil from 3 sites and place in different cups to bring back to the classroom.
2. In the classroom, label the cups so that learners know which soil came from which site.
3. Place 2 tablespoons of each type of soil in a separate cup. Add 3-4 tablespoons of hydrogen peroxide to the soil in the cups until the soil is completely covered. This should produce bubbles.
4. Record the length of time bubbling occurs on the data sheets.

#### Supplies

- pencils
- data sheets
- three buckets
- tin cans with both ends removed
- watering can
- stop watch
- nine beakers or plastic cups
- a plastic rod
- distilled water
- pH paper
- six clear plastic cups
- marker
- 6% hydrogen peroxide
- sticks for stirring
- soil auger/trowel

### Stage 4. Compare and Contrast *Reflection*

#### Procedure:

1. Pre-learning exercise: Ask students what they anticipate from the learning experience:
  - What do you expect to encounter?
  - What are your preconceptions about the Soil & Recycling Department?
2. Post-learning exercise: Ask students what they experienced, and compare this to their expectations:
  - What surprised you about your experience?
  - Is there anything you would do differently in the future?

#### Reflection Questions:

- *How did your answers compare: anticipation/expectations to actual experience?*
- *Did you learn more than you expected?*
- *What types of things did you learn, feel, experience that were unexpected?*
- *What would you change about your learning experience in the Soil & Recycling Department?*
- *What is your role in the Soil & Recycling Department?*
- *Why do you need the Soil & Recycling Department?*
- *Does the Soil & Recycling Department need you? Why or why not?*
- *What are some actions you can take to minimize your impact on the Soil & Recycling Department?*