Soil Detective Challenge

Grade Level: 3 4 5 6
Lesson Time: 75 minutes
Objective: Students will be able to understand material properties of soil and the implications on soil origins by making and recording observations on different soil samples.

Preparation

Before going to the classroom, you will need to:

1. Contact the teacher to find out the length of the class period. Alert the teacher that this investigation is set up for groups of four and whole class discussion. You will also need to arrange for an overhead or digital projector and screen.
2. Gather the soil, rock, and vegetation samples and supplemental data as described in the Materials list. Gather enough equipment sets for all teams. Make sure you record where each soil, rock and vegetation sample came from. Collect enough different types of soils from as many environments as possible (e.g. sand or clay rich, arid or humid environments, etc)
3. Take pictures of the place where you took each sample and make a color copy of the image.
4. Duplicate the observation sheet.
5. When you get to the classroom you will need to arrange the rock samples, vegetation and photographs on a table. Make sure the teacher knows that you will need a table for this purpose. Arrange the rock samples, vegetation and photographs on the table by areas. (E.G. Area A will have a picture of a desert, sandstone samples, and maybe cactus; Area B will have a picture of a forest, samples of dead leaves, and pebbles)
6. Make signs that identify each area where the soil sample came from. (e.g. Area A, Area B, Area C, Area D)
7. Collect any giveaways for the students, such as soil posters or bookmarks.

Materials:

Provide students, in groups of four, with the following:

- 1 soil sample: should be a handful or two of soil in a quart size zip-closing plastic bag
- White paper to cover desktops
- Magnifiers or hand lenses
- Ruler
- Observation sheet
- Colored pencils

These items will be placed on a table for the second part of the investigation:

- Signs that identify each area that the soil came from (E. G. Area A, Area B, Area C)
- Rock samples: collect the appropriate bed rock sample for each soil, both fresh and weathered if possible.
- Vegetation samples: collect representative leaves, grass, etc.
- Supplemental data such as photos of each sample site

Instructional purposes:

- White board or flip chart
- Markers

Purpose

Soils come from rocks and other things that reflect local conditions. Soil is essential for life. In this investigation, students will be able to identify soil properties that can be related to original bedrock, climate and vegetation. At the same time, they will learn about practical issues related to soils.

Safety

This investigation is considered safe to do with students. Monitor student movement when they start looking at the samples on the table. Consider the contents of your individual sample kits for potential hazards.

Investigation Question: What can you investigate about soil?

What to do

1. (5 minutes) Prompt a discussion about soils. Be sure to accept as many explanations as you can. Questions you might ask students:
    a. What is soil?
    b. How is soil useful?

c. How is soil formed?
d. What is soil made from?
e. How is soil different from other soil? Why?

2. (10-15 minutes) Distribute the soil samples to each student team. Explain to students that the soil samples are all different, so there will be different interpretations/answers. Instruct students to:
    a. Cover their workspace with the white paper.
    b. Place soil sample on the paper.
    c. Use their senses (sight, touch and smell), hand lenses and ruler to examine the soil sample.
    d. Record observations on their observation sheet.

(*As students are making observations on their observation sheet, walk around to each group and help those groups that are having problems. When 1 or 2 groups have finished making observations, move to the next part of the investigation.*)

3. (10-20 minutes) Introduce students to the next part of the investigation. You will have to stop the investigation process and get students' attention. Ask the classroom teacher to help you with this because they have special tricks that they use. Explain to the students that they will have time to finish making observations to their soil after you are done talking to them. Point out the table with the bedrock, vegetation and photographs. Explain to the students that they will use their observations about the soil to make an educated guess about where their soil came from. The samples of bedrock, vegetation and the photographs are all of areas where each soil sample came from. This is the last question on their observation sheet. Tell students that they need to be done making their observations about the soil before they are allowed to become a detective and go to the table. (*Monitor students as they come up to the table. There should be no pushing or shoving and they are only allowed to come up to the table if they have finished their observations.)*
4. (5 minutes) Discuss student observations. Draw a table on the board with column headings of Sight, Smell, Touch to record student's observations. Be sure to accept as many explanations as you can. Questions you might ask students:
    a. What did your soil look like?
    b. How did your soil smell?
    c. How did your soil feel?
    d. Did all groups have the same observations? Why? Why not?
    e. Where did your soil sample come from? Why did you think this?

5. (2 minutes) Thank students for their time and attention. You can leave giveaways behind for the classroom teacher to distribute.

Your name: _____

Observation Sheet: The Soil Detective Challenge

Draw a picture of your soil sample.

How does your soil smell? (Stale, metallic)

What does your soil feel like? (Wet, sandy, gritty, smooth, sticky, dry, slick, silty, clay-like)

What does your soil look like? (Color, sediments, materials in the soil)

Identify where you think your soil sample came from. What evidence from your observations support your answer?