

## Testing Soil Samples

# Grade Level:

- 4
- 5
- 6
- 7
- 8

# Lesson Time:

45 minutes

### Objective:

- Students will be able to use indicator solutions to find the pH and concentrations of nitrates, phosphates and potassium in three 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, as well as how many copies of handouts and sets of materials you need to bring. Alert the teacher that this investigation is set up for groups of four.
2. Collect all the materials in the list below and organize them into one shoebox for each group of four students.
3. Make photocopies of the handouts. Collect any giveaways for the students, such as soil bookmarks or posters.
4. Run through the investigation yourself and record the data, just to see how long it takes. Adjust the timing to the class period, remembering that you will need time to introduce the investigation, clean up afterwards and re-set up for the next class (if you are working with more than one class). You can reduce the amount of time this investigation takes by cutting the number of soil samples from three to two.
5. Collect any giveaways for the students, such as soil posters or bookmarks.

### Materials:

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

- 3 Sample Bags of different types of soil labeled A, B, and C
- 1 soil test kit (pH, N, K, P) with plant growth information on the back
- Large sheet of white paper or poster board
- 4 pairs of safety goggles
- 4 magnifiers
- Small dropper bottle of distilled water
- Paper towels
- Directions for the soil test kit
- Blank paper to record the soil test results

For instructional purposes:

- Flip chart or overhead
- Plant Preference for pH (If this information is not on the soil kits you might want to make an overhead transparency of it and put it up for students to use in their discussion.)

### Purpose

Soil plays a unique role in our life. Soil helps to maintain air quality, stores water and nutrients for plants, and filters contaminants from surface water. Where there is soil, life flourishes. Determining a soil's pH is important because many plants will only grow in either alkaline or acidic conditions, additionally, the pH can affect the availability of nutrients in the soil. In this activity students will learn how soil scientists and gardeners determine which soil is best for the growth of certain plants, by sampling different soils and testing their pH levels.

### Safety

Students should wear goggles and be sure to wash their hands after finishing this investigation. Please review the investigation for any additional safety precautions for the specific setting, materials, or students.

### Investigation Question

How do you know what soil is best for what plants?

### What to do

1. **(5 minutes)** Prompt a small discussion on the importance of soils. Be sure to accept as many explanations as you can. Some questions you might use are:
  - What is soil made of? (*Some students might say that it is made up of plants and animals and miss the fact that soil is also made up of rocks and water. Record them on a flip chart or overhead.*)
  - What would the world be like if there was no soil? (*Student responses should reflect how there would be no life or plants.*)
  - Why is soil important? (*Student responses should reflect how things grow in soil.*)
2. **(7 minutes)** Hand out the shoeboxes containing all the materials to each group of four students. Ask the students to put a small amount of soil from each of the three bags onto the white paper

and examine the soil with both the naked eye and the magnifier. Ask what differences they see between the three types of soil.

3. **(3 minutes)** Explain that soil is a mixture of living and non-living material. Ask students to identify some examples of each in their soil samples. Tell students that soil scientists have a number of ways of finding out what's in soil. One is to observe the soil, just as the students are doing. Another way is to use chemicals to test the soil for different important components.
4. **(5 minutes)** Ask students to look on the backs of their soil test kits. There, they should find information about what types of plants do best in certain types of soil. Ask students why they think it is important to test soil for pH, N, P, and K. Take all responses.
5. **(5 minutes)** Hand out the directions for using the soil test kits and make sure that students put on their safety goggles. Demonstrate how to test the soil by adding water and the test chemicals to the soil samples.
6. **(15 minutes)** Direct the students to test their soil samples and record their results. Walk around as they work to help students who have questions or concerns.
7. **(5 minutes)** When everyone is finished, ask students to report their results for soil samples A, B, and C. You might find it easiest to do this by having a large chart on the board that students can fill in when they finish with their soil testing.
8. **(5 minutes)** Have students compare and discuss the various results for soils A, B, and C. Be sure to accept as many explanations as you can. Questions you might ask the students:
  - How might you be able to explain any wide variations in the data?
  - What plants grow best in soil A? Soil B? Soil C? Do you agree with this? Why? Why not?
9. **(2 minutes)**. Thank students for their time and attention. You can leave giveaways behind for the classroom teacher to distribute.

