



HANDS-ON LAB

The Study of Life

Believe it or not, every day you walk on billions of living things. Soil is a unique and amazing combination of nonliving matter and organisms. Soil organisms are responsible for cycling carbon, nitrogen, and sulfur from dead or decaying matter back into the environment. Without these organisms, plants and other organisms would be unable to obtain the nutrients required for their survival. Many of the organisms in soil can be observed by using a magnifying lens; others require the use of a dissecting scope or a light microscope.

Earthworms and insects are common inhabitants of soil, but they are not the only ones. Certain bacteria, fungi, and protists also live in soil. These organisms, as well as all living things, share certain characteristics: they can reproduce, respond to stimuli, are made of one or more cells, and require energy.

The variety and types of organisms may vary depending on the type and location of the soil. Very damp soils generally contain fewer organisms because of the anaerobic (oxygen-deficient) conditions that exist. Soils that have been compacted or treated with chemicals such as pesticides may have fewer organisms as well. There is an amazing variety of life right under your feet. You just need to dig in and check it out!

PREDICT

In this lab, you will design and conduct an experiment to determine the number of living organisms in different types of soil. Make a prediction about how the type of soil will affect the number of organisms found.

POSSIBLE MATERIALS

- agar
- balance
- cheesecloth
- computers with Internet access
- cornmeal
- desk lamps with adjustable necks
- dissecting scope
- Erlenmeyer flask, 250 mL
- flask or beaker, 1 L
- hot plate
- labeling tape and/or permanent markers
- light microscope
- magnifying glass
- microorganism identification guides/books
- petri dishes, disposable or glass
- pipettes, plastic disposable
- plastic bags, resealable (quart or gallon)
- microscope slides with cover slips
- soil samples
- thermometers
- trowels

**PROCEDURE**

1. Develop and conduct an experiment that will allow you to make observations of living things found in different types of soil samples. Limit the number of conditions you choose for your experiment to those that can be completed during the time your teacher has allotted for this lab. Consult with your teacher to make sure that the locations and conditions you have chosen are appropriate.
2. Write out a procedure for your experiment. As you plan the procedure, make the following decisions:
 - Decide on the locations and soil types for your sample collections, and determine how you will observe the organisms. Decide what characteristics of living things you will be able to observe with the supplies that are available to you.
 - Select the materials and technology that you will need for your experiment from those that your teacher has provided.
 - Decide what your control(s) will be, if necessary.
 - Decide what safety procedures are necessary.

Name: _____

Date: _____

3. Have your teacher approve your plan.
4. Obtain the necessary materials and set up the apparatus you will use.
5. Take appropriate safety precautions.
6. Make objective observations.
7. Collect data in your Evidence Notebook and organize the information in appropriate tables and/or graphs. Be certain that the graphs and tables are properly constructed and labeled.
8. Clean all apparatus and your lab station. Return equipment to its proper storage area. Dispose of soil samples and solutions in the containers designated by your teacher. Do not pour materials down the drain or put them in the trash unless your teacher directs you to do so. Wash your hands thoroughly after all work is finished and before you leave the lab.

ANALYZE

1. Describe the factors that differed between your soil samples. How did you measure these factors?

2. Share your results with your classmates. According to the class data, was your prediction correct? Explain your answer.

Name:

Date:

EXPLAIN

Write a conclusion explaining how soil type affects the number of organisms found. Include each of the of the following sections in your explanation.

Claim According to your results, what is the relationship between soil characteristics and the number of organisms found?

Evidence Describe specific examples from your data to support your claim.

Reasoning Explain how the evidence you gathered supports your claim. Describe, in detail, the connections between the evidence you cited and the argument you are making.

REFINE

Explain how you would improve this investigation if you were to do it again.

Precision and Accuracy Was your experiment a good model for identifying different organisms in soil and the conditions that affect them? Explain why or why not, and give examples of what might be missing from your model.

Propose Changes What improvements would you make in this procedure to obtain more precise data? Why would you make these changes?
