
Soil Profile Investigations

Activity Overview

Students learn about the process of soil development through examination of soil profiles.

Objectives

Students will:

- Describe the characteristics of soil horizons from samples taken on their school grounds
- Understand the processes of soil and horizon development

Subjects Covered

Science

Grades

3 through 12

Activity Time

1 hour

Season

Spring or fall

Materials

16" Soil Auger, crayons or colored pencils, water, clipboards, pencils, profile worksheets, and the Soil Texture Feel Test. Soil augers may be available for loan through your county extension office.

State Standards

Science:

Use scientific equipment (C.4.4)

Use data to answer questions (C.4.5)

Support conclusions with logic (C.4.7)

Ask new questions (C.4.8)

Use inferences and observations (C.8.4)

State learning from investigations (C.8.6)

Explain data & conclusions (C.8.7)

Evaluate questions, hypotheses, conclusions (C.8.9)

Discuss results (C.8.10)

Identify further questions (C.8.11)

Background

Soil-forming results from physical, chemical, and biological processes that change the parent material (usually rock) into soil. As soil forms, different horizons or layers develop. Each horizon has its own characteristics due to the soil-forming processes. The character, depth, and arrangement of the horizons determines the nature and classification of soil. A rich carpet of soils blanket the earth as a result of the diversity of parent materials, climates, floras, faunas, and topography.

Major Horizons:

A HORIZON. The top layer of soil is the A horizon. This topsoil, contains organic matter and minerals. It is darker in color than the lower horizons due to humus and other organic matter. Prairie soil has an organically rich, dark-colored A horizon. Tama silt loam, a Wisconsin prairie soil, is 33" deep. Fayette silt loam, a lighter-colored forest soil has an A horizon that measures 14". Wetland soils may be comprised of peat, muck, or dark minerals. The wetland A horizon may be 1 to 40' deep because of the build up of decomposed and undecomposed organic content. Rain forest and desert soils have a thin A layer or no layer at all due to the high rainfall and leaching of organic material or lack of rainfall and vegetation .

B HORIZON. The B horizon, or subsoil, has a high mineral content. It is lighter in color than the topsoil; the compounds leached from above influence its color. Clay often accumulates in this layer.

C HORIZON. The C horizon consists of rocks and other parent material from which the soil is derived. This zone consists of rocks of different sizes and stages of weathering. These rocks form the soil particles. This zone is outside the zone of biological activity.

Activity Description

You will examine soil profiles from different areas on your schoolyard. A soil profile is a vertical column of soil that is extracted with a soil auger or probe.

1. Select areas of study and take a 16" soil profile in each area. To take a profile, insert the soil probe perpendicular to the soil surface. Obtain deeper soil profiles by using an extension on the probe. If the soil is too hard to remove a sample, pour a bucket of water on the ground and allow the water to seep into the soil.
2. Examine your profile and identify the depth of the A and B horizons, soil color, structure, contents, and organisms. Diagram to scale your samples using colored pencils or crayons on the profile worksheets.

Soil Profile Investigations (cont.)

Evaluate data (C.12.3)

Use explanations & models to describe results (C.12.5)

Understand physical properties of objects (D.4.1)

Group/classify objects based on properties (D.4.2)

Observe & describe changes in objects (D.4.4)

Use rocks, minerals, and soils vocabulary (E.4.1)

Identify different physical & chemical properties of earth materials (E.4.2)

Describe earth's underlying structures (E.8.2)

Describe changes on the earth's surface (E.8.3)

3. At each sample site, determine the soil texture (sand, silt, and clay) of each horizon using the soil texture feel test. See the Earth Partnership for Schools activity, "Soil Texture Feel Test" for instructions.
4. Back in the classroom, describe and compare soil color, texture, and contents among the samples.
5. Add this information to the soil's site map.

Extensions

- Contact your local county extension agent for a soil survey map that identifies soil types on and around the school grounds. Determine if the existing soils on your school site matches the soil map. Often the recent soil profiles will not match the classification on the soil surveys due to the alteration of soil during construction and grading. What are the differences?
- Compare soil characteristics, profile, infiltration rate and soil life present in a restoration, lawn, and/or construction site.

Additional Resources

- Hole, F. (1976). Soils of wisconsin. Madison, WI: The University of Wisconsin Press.

Assessments

- Describe the characteristics of each soil horizon.
- Name the three processes of soil development and give an example of each process.

Soil Profile Investigations Field Sheet

Sample # 1

Soil Temperature: _____

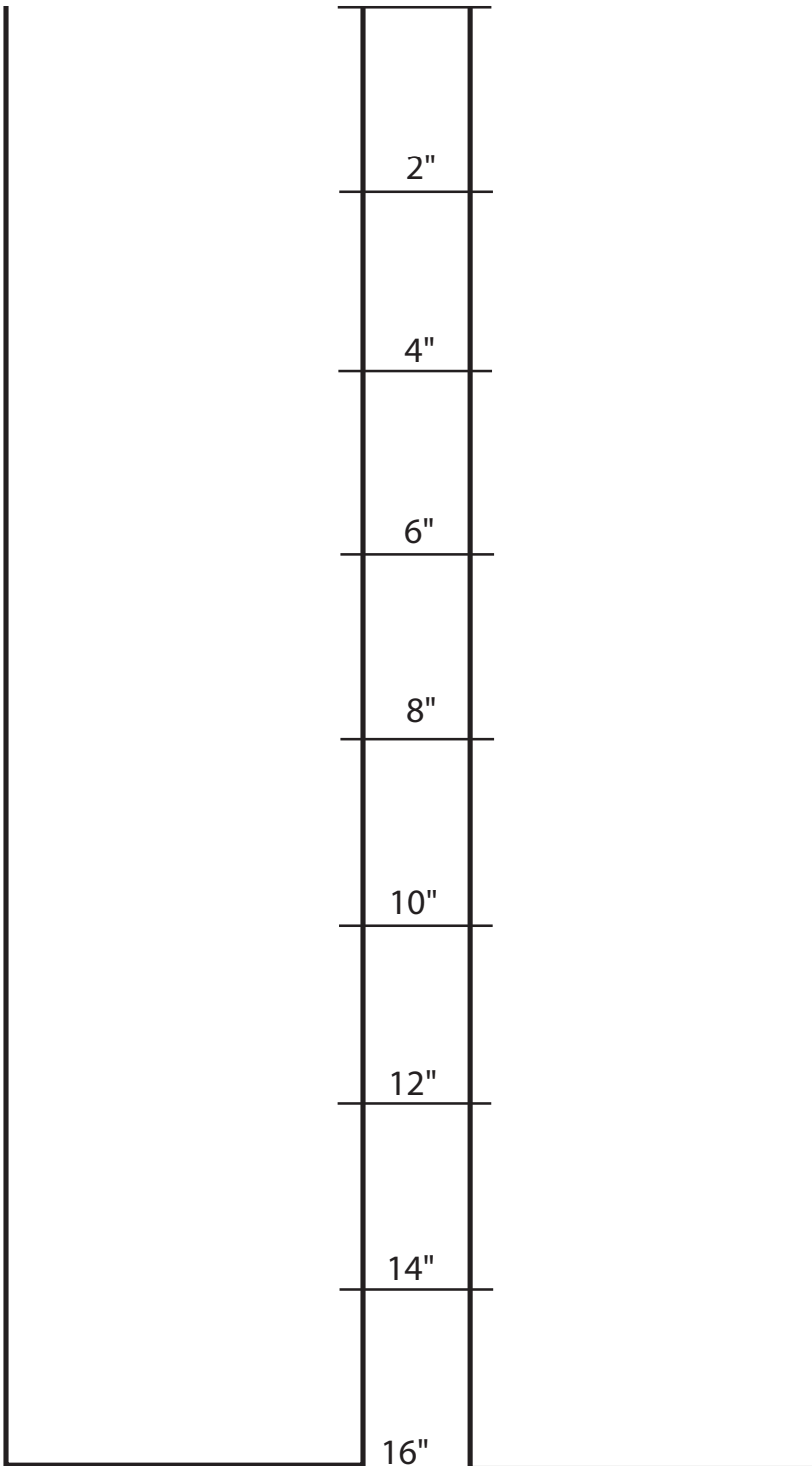
Soil Texture: _____

Sample # 2

Soil Temperature: _____

Soil Texture: _____

Describe and list contents of each layer:



Describe and list contents of each layer:

Location of profiles: _____