



LEARN ABOUT

Soil Formation

The Importance of Soil

FIND OUT

- why soil is important
- how soil forms

VOCABULARY

humus

Think about the foods you've eaten and the objects you've used today. Maybe you had breakfast at a wooden table. You may have eaten toast and a banana. For lunch perhaps you had a glass of milk and an egg salad or bologna sandwich. Maybe you wore cotton jeans to school. You probably sat at a desk and wrote on paper.

Soil is needed to provide these things and other things you use every day. Fruits and vegetables grow in soil. Meat, milk, and eggs come from animals, of course. The animals, however, eat corn, wheat, and other plants that grow in soil. Houses, desks, and paper are made from wood. Wood comes from trees, which grow in soil. Cotton and other clothing materials come from plants that grow in soil. Because you buy many of these things in stores, it is easy to forget that they depend on soil.

✓ **What are some foods that depend on soil?**

This dairy cow feeds on grass and hay, which grow in soil. ▼



The wheat that grows in this rich farmland soil may become part of your favorite bread or breakfast cereal. ▼



Soil Begins with Rock

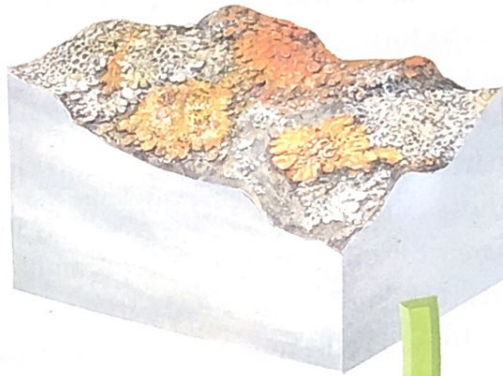
The processes that form soil occur all the time, little by little. Most of the soil you see today has been forming for thousands of years.

Weathering is the process that breaks up rocks. As the outsides of rocks warm and cool, they expand, or become larger, and contract, or become smaller. You don't notice these changes in size. But they are big enough over time to crack rocks. The cracks become larger and larger. Bits of rock break off. Water gets into the cracks. When the water freezes, it expands. This forces the rock to break up even faster.

Wind and moving water erode bits of rock and other material. These bits of rock are dropped in another area, where they may build up and become part of soil.

✓ **How does rock become soil?**

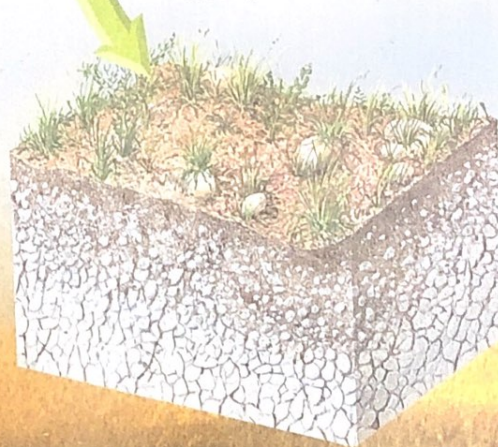
Lichens (LYK•uhnz), or tiny plantlike living things, grow on the outsides of rocks. They slowly break down rock to get nutrients. ▼



Temperature changes, wind, and water also slowly break the rock apart. Small plants can grow in the cracks. Plant roots continue to break the rock apart. ▼



Wind and water move bits of weathered rock to new places. Later, the bits are part of well-developed soil. ▼



Soil Forms Layers

In the investigation, you saw that soil forms layers when it settles in water. The layers form by the size of the particles. If you dug a hole in the ground, you would also see layers. As in the investigation, the particles in the top layers are smaller than those in the bottom layers. The three main layers of soil are topsoil, subsoil, and bedrock, sometimes called parent rock.

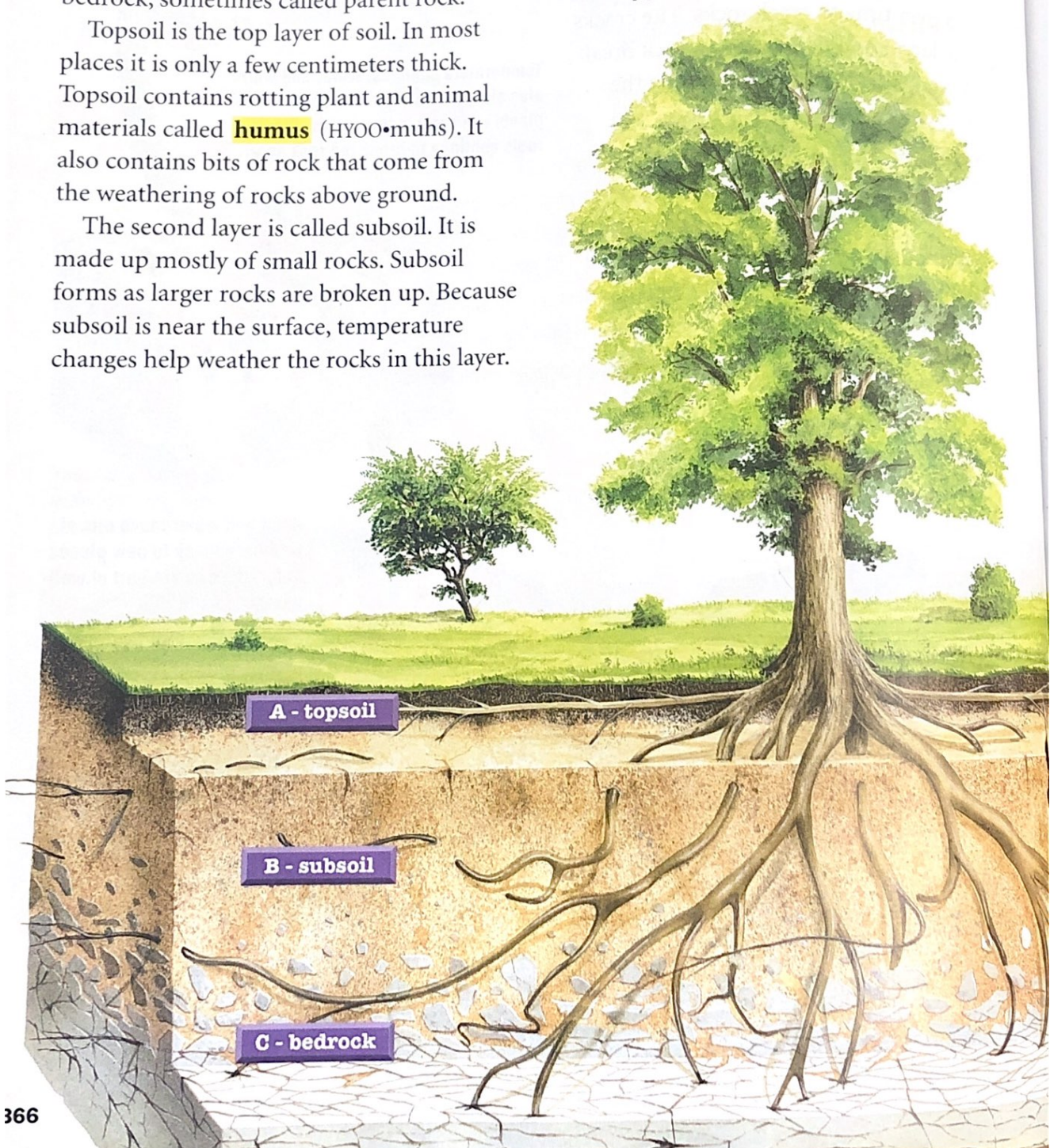
Topsoil is the top layer of soil. In most places it is only a few centimeters thick. Topsoil contains rotting plant and animal materials called **humus** (HYOO•muhs). It also contains bits of rock that come from the weathering of rocks above ground.

The second layer is called subsoil. It is made up mostly of small rocks. Subsoil forms as larger rocks are broken up. Because subsoil is near the surface, temperature changes help weather the rocks in this layer.

In fact, most weathering of rock takes place in this layer and the layer below. Tree roots also break up rocks in these layers.

The bottom layer, bedrock, is mostly solid rock. Cracks slowly widen and break up the top parts of the bedrock. Bits of rock break off. Over time, these rock bits become part of the upper layers of soil.

✓ **Where does most rock weathering happen?**

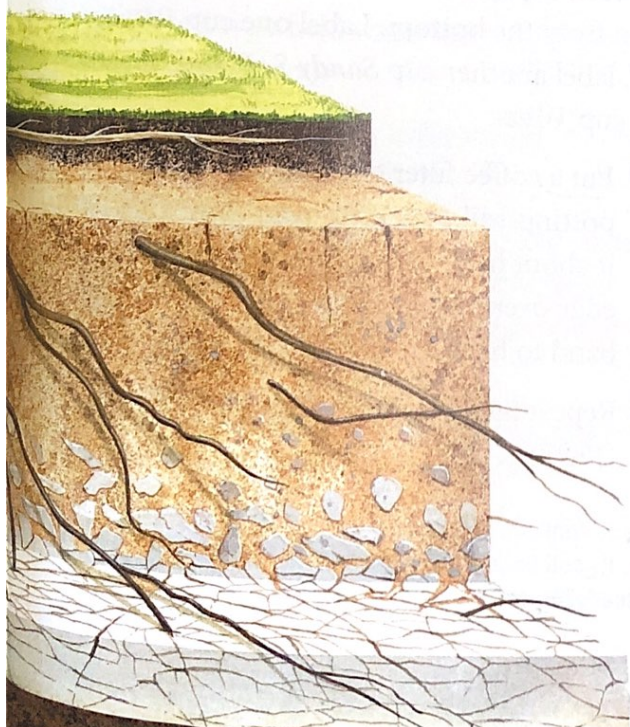


Summary

Most products that we need, such as food, clothing, and building materials, depend on soil. Soil forms by the weathering and erosion of rocks. In weathering, plants and changes in weather cause rocks to break apart. In erosion, wind and moving water carry bits of rock to new places.

Review

1. Explain how a wool sweater depends on soil.
2. How does water freezing in a crack in a rock help break the rock apart?
3. What are the three layers of soil?
4. **Critical Thinking** Effects of weather, such as temperature changes, are greater on the surface than in deeper layers of soil. Why then does most weathering take place in the deeper layers?
5. **Test Prep** Which layer of soil contains the most dead plant and animal materials?
A bedrock C parent rock
B subsoil D topsoil



LINKS



MATH LINK

Graphing On your own, make a water and soil sample like the one in the investigation. Shake the container and then allow the soil parts to settle. Measure each layer with a metric ruler. Then make a bar graph to show how thick each layer is.



WRITING LINK

Expressive Writing — Poem Write a poem for a classmate describing how a tree root helps weather rocks to make soil. Begin your poem by describing how the tree seed comes to the spot where it sprouts and grows.



ART LINK

Clay Different kinds of clay are used to make dishes, pottery, sculpture, and other objects. Use the library to learn more about how artists use clay. Make a poster that shows sources of clay. For each source, include a picture of an artwork made of that clay.



TECHNOLOGY LINK

Learn more about how humus forms by visiting the National Museum of Natural History Internet site.

www.si.edu/harcourt/science