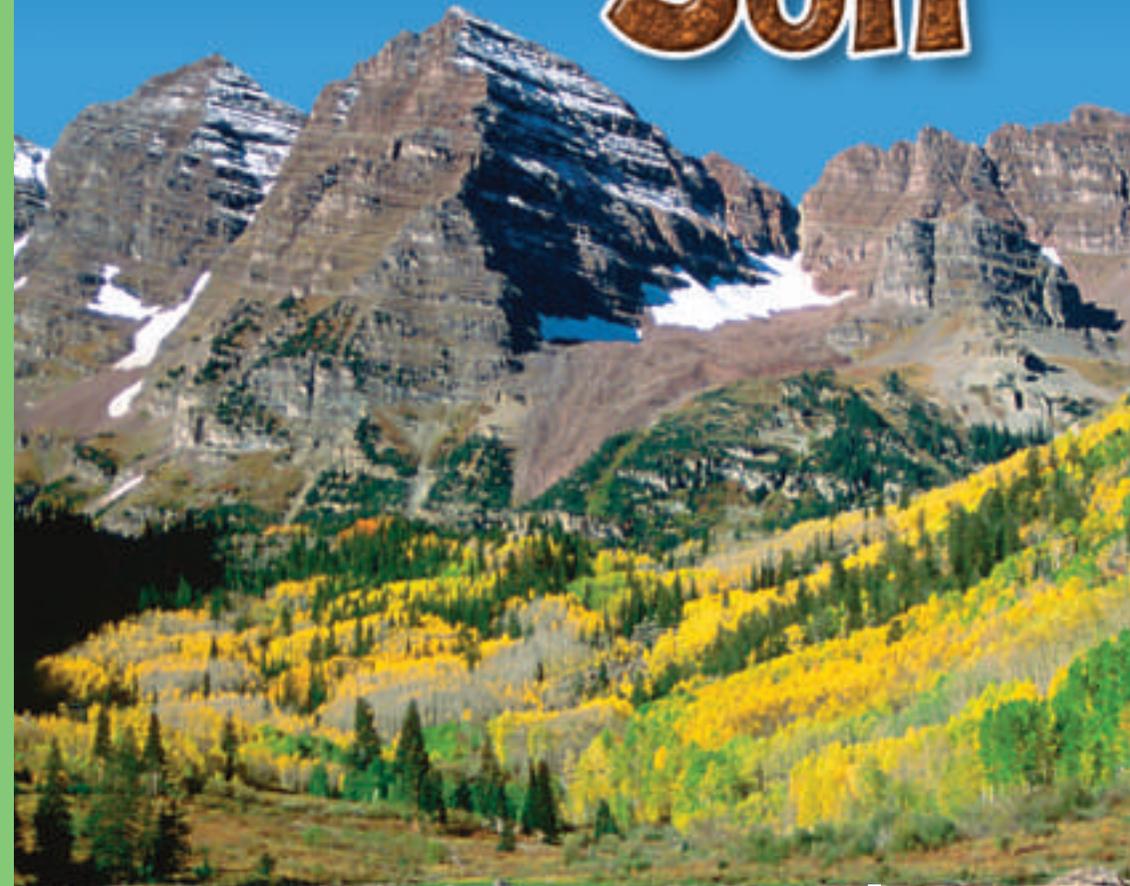


Science

Science

Earth Science

Rocks and Soil



Genre	Comprehension Skill	Text Features	Science Content
Nonfiction	Compare and Contrast	<ul style="list-style-type: none"> • Captions • Charts • Labels • Glossary 	Rocks and Soil

Scott Foresman Science 3.7



by Lorrie Oestreicher



scottforesman.com

Vocabulary

decay

igneous rock

loam

metamorphic rock

mineral

nutrient

rock

sedimentary rock

soil

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Rocks and Soil

by **Lorrie Oestreicher**





How do rocks form?

Rocks

Rock is found in nature. Rock is solid. It is nonliving matter. All rocks are made of one or more minerals. A **mineral** is a natural material that forms from nonliving matter.

You can tell rocks apart by their properties. Physical properties are what we see by looking at a rock. These properties include the rock's color, the minerals in the rock, and the texture.



Rocks can be many different colors. The texture of the rock is the size of the bits of minerals that make up the rock. Is it smooth to touch? Is it rough? Does it feel scratchy? Does it feel hard or soft? The grains of the minerals that make up the rock determine how it feels. In some rocks the bits of minerals are so small you can't see them easily.





Rock Groups

Rocks are put into three different groups.

Igneous rock forms from minerals and gases melted together. Sometimes this mixture cools slowly and hardens below ground. Then the mineral grains may be easy to see. Other times, the red-hot mixture cools quickly above ground, or in the ocean. Then the mineral grains may be too small to see.



Igneous rock



Sediment is material that settles to the bottom of rivers, lakes, and oceans. Little bits of rock make up sediment. After a very long time, layers of these bits of rock pile up and stick together. Over time, the layers get pressed together, and they form **sedimentary rock**. Sedimentary rock forms in layers. It forms one layer at a time.

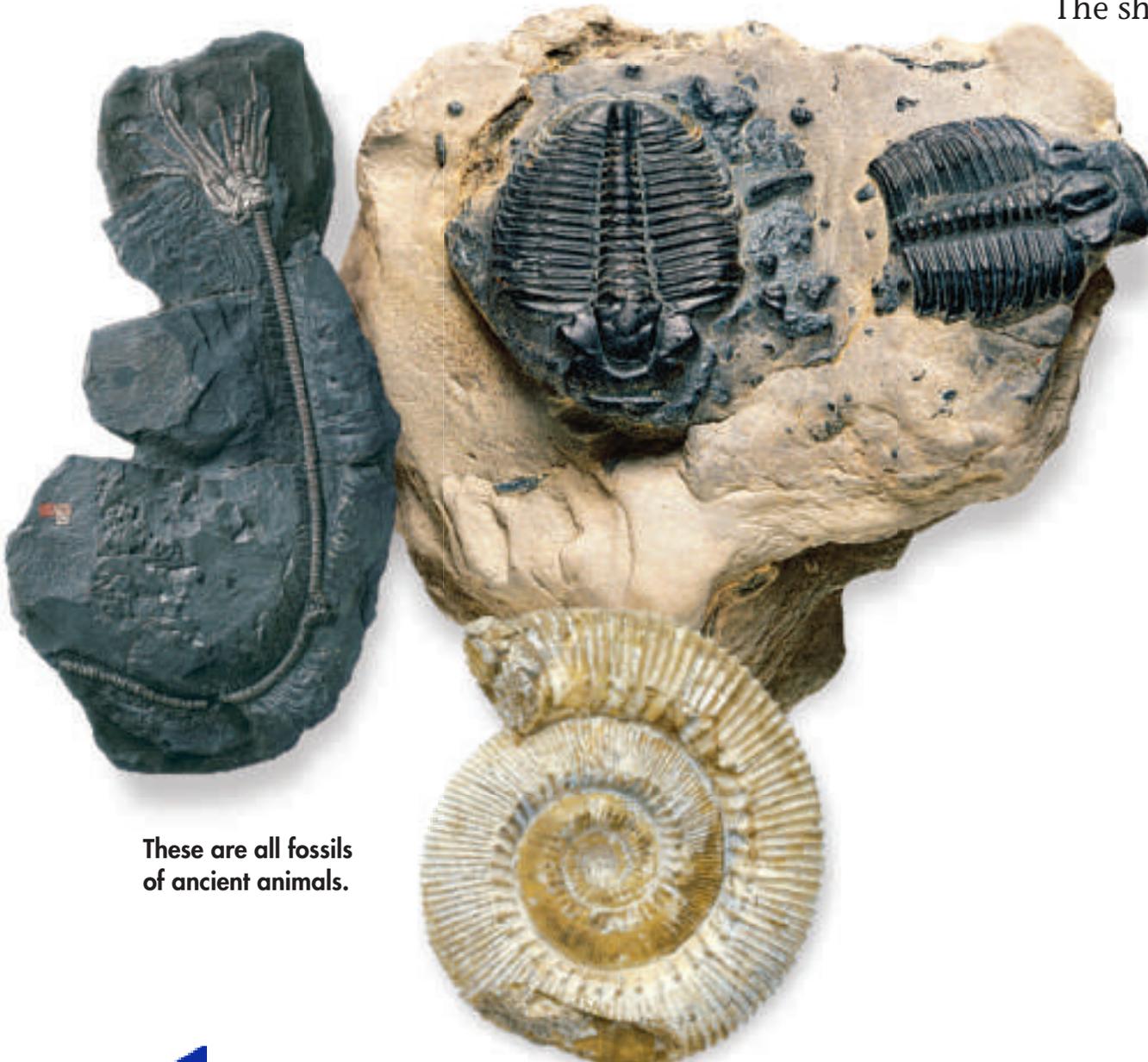




Fossil remains can be found in sedimentary rocks. Extinct plants and animals were buried in sand and mud. This hardened into rock. Layers of rocks with fossils show the history of life.



The word *metamorphic* means “to change form.” **Metamorphic rock** is rock that is changed by heat, pressure, or both into another kind of rock. Shale is a sedimentary rock. When shale gets buried deep underground, heat and pressure change its minerals. The shale becomes slate, a metamorphic rock.



These are all fossils of ancient animals.



Shale changes to slate.





What are minerals?

Identifying Minerals

Color is a property of minerals. Some minerals come in many different colors. Quartz can be pink, purple, yellow, brown, white, or black. Some minerals only come in one color.

Scientists use many tests to help identify minerals. Rub a mineral across a rough surface. It may leave a streak mark or powder. Even if a mineral comes in different colors, it will always leave the same color streak mark.

Minerals also have luster. This property shows how a mineral reflects light.



Another test to identify minerals checks their hardness. The hardest mineral is diamond. No mineral can scratch it except another diamond.

Some minerals can be identified by how they look. Gold sometimes comes in nuggets. Other minerals can be identified by how they feel, smell, or taste.

Properties of Minerals

Mineral	Color	Luster	Streak	Hardness
Mica Mica breaks into flaky pieces when struck. 	black, gray, green, violet	pearly on surfaces	white 	can be scratched with a knife
Molybdenite This mineral is one of the strongest and most commonly used heat-resistant metals. 	silvery	metallic	bluish gray 	can be scratched with a fingernail
Crocoite Much of this mineral comes from Australia. 	reddish-orange	very shiny	orange-yellow 	can be scratched with a coin





How We Use Minerals

Every day we use minerals. Most toothpaste contains fluoride that helps fight cavities. Fluoride comes from the mineral fluorite. The windows in your house are made from the minerals quartz, soda, ash, and limestone. The salt in your food is the mineral halite. The fork and spoon you eat with are made from minerals. We use minerals for almost everything.

Minerals Keep Us Healthy

Our bodies need minerals to stay healthy. Minerals help form bones and skin. Minerals also help release energy and move it through our bodies.

Many of the minerals we need are found in plants. Green leafy vegetables, such as spinach, contain calcium. Iron is found in fruit and green vegetables. Sodium is a mineral found in celery. Potassium is found in fruits. Phosphorus is found in green beans. Minerals are in almost everything we eat.



Halite



The mineral halite is crushed and then ground up. We use it to flavor and preserve food. (We know this mineral as table salt.)

Copper



The mineral copper is found in igneous rock. The rocks are mined from the ground. When the rocks are crushed and heated, the copper becomes separated from the rock. Then the copper can be made into objects, such as pots and pans.

Fluorite



The mineral fluorite is found in many rocks, such as granite. The rocks are crushed and the fluorite is separated out. Then it is used to make many products, such as toothpaste.

Lead



Lead is found in a mineral known as galena. The rocks are crushed and heated to produce lead. Lead is put into aprons, such as the ones shown, to protect people while X-ray pictures are taken.

Iron



Iron is found in the rock called hematite. The rocks are crushed and heated. Then iron in the melted material is separated out. Iron is mixed with other materials to make steel. Steel is used for many tools and machines.





Why is soil important?

Parts of Soil

Soil is a thin layer of loose material. It covers most of Earth's land. Soil takes a long time to develop. It has the material plants need to grow.

Soil is more than just bits of rock. It holds water. It holds material that was once living.

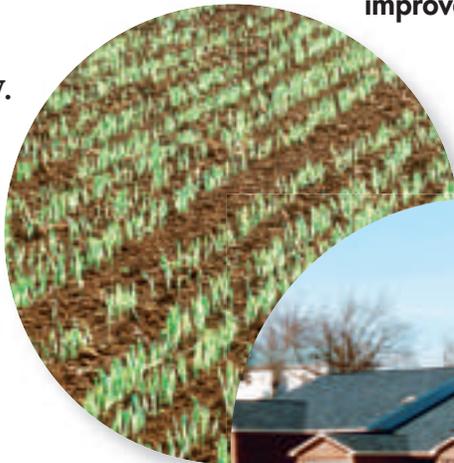
Living things in soil break down what is left of plants and animals after they die. This process is called **decay**. Decay releases **nutrients** into the soil. Some minerals release nutrients too. Plants need nutrients to grow.



Earthworms mix up the topsoil as they dig through it. That improves the soil.



We depend on topsoil to grow our food.



Soil must pack down hard and stay firm so that houses built on it don't shift.



Soil Layers

Soil has three different layers. The layers are topsoil, subsoil, and bedrock. The layers may look different in different places.

Topsoil

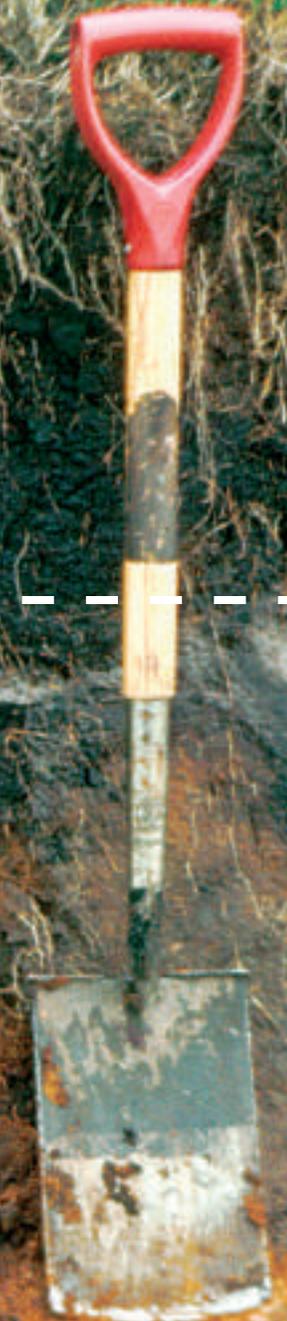
Topsoil is the first layer. It has rock pieces mixed with decayed parts of plant and animal remains. The decayed remains are called humus. Humus has a lot of what plants need to grow.

Subsoil

Subsoil is the soil under topsoil. It is lighter in color. It has less humus. It has pieces of broken rocks. The roots of trees grow down into subsoil. Water from rain may soak down into this layer.

Bedrock

As this rock breaks down, it slowly turns into new soil over many, many years.





Comparing Soils

Soils can be different. Sand, silt, and clay particles are found in soil. Sand particles are the largest. They have large spaces between them. Water runs quickly through sandy soil. Silt has medium-sized particles. Its spaces are not as large as those in sand. Silty soil holds water well. Clay particles are the smallest. Once clay soil gets wet, the particles hold tightly together.



All soil has the same four ingredients. Most of the soil is made up of weathered rocks. These rocks have minerals. Humus makes up soil too. It is a very important part of soil. Air and water fill in the spaces between rocks and humus.

Loam is a good soil for growing plants. It contains sand, silt, clay, humus, and air. Plants can soak up water easily from loam.



Sandy soil feels rough and gritty.



How do you think silt feels?



Wet clay feels smooth and sticky.



Glossary

decay	the breaking down of plant or animal matter
igneous rock	rock that is formed from a red-hot mixture of melted minerals and gases
loam	soil that contains sand, silt, clay, air, water, and humus
metamorphic rock	rock that is formed from other rocks by heat, pressure, or both
mineral	natural substances that form rocks
nutrient	a thing needed by plants to grow strong and healthy
rock	natural, solid, nonliving material found in Earth
sedimentary rock	rock that is formed by layers of sediment that are pressed together
soil	loose material that covers most of Earth's land

What did you learn?

1. How are metamorphic rocks formed?
2. Name some different ways minerals are used.
3. What are the three layers of soil?
4. **Writing in Science** In this book you have read about minerals. Write to explain how scientists identify minerals. Use details from the book.
5.  **Compare and Contrast** Compare and contrast ways igneous rock forms and the effects these ways have on the rock.

