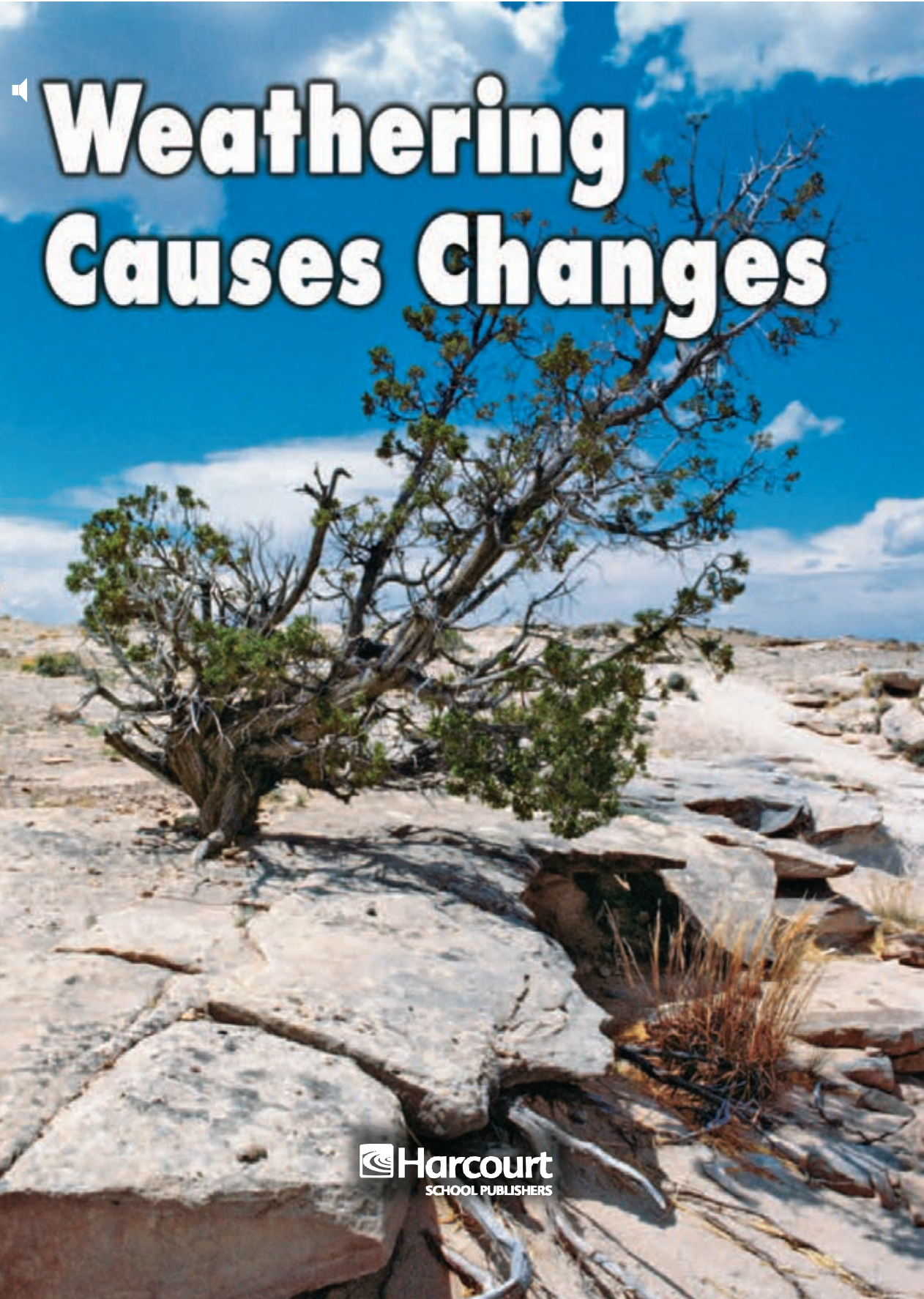




Weathering Causes Changes

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Earth Changes

What makes up the surface of Earth? You can look for clues. You might see sand or stones on the ground. Near beaches or mountains you might see large rocks or cliffs.

Earth is made up of rock. The rock near the surface of Earth is called the crust. It is cool. The rock below Earth's crust is a lot warmer.

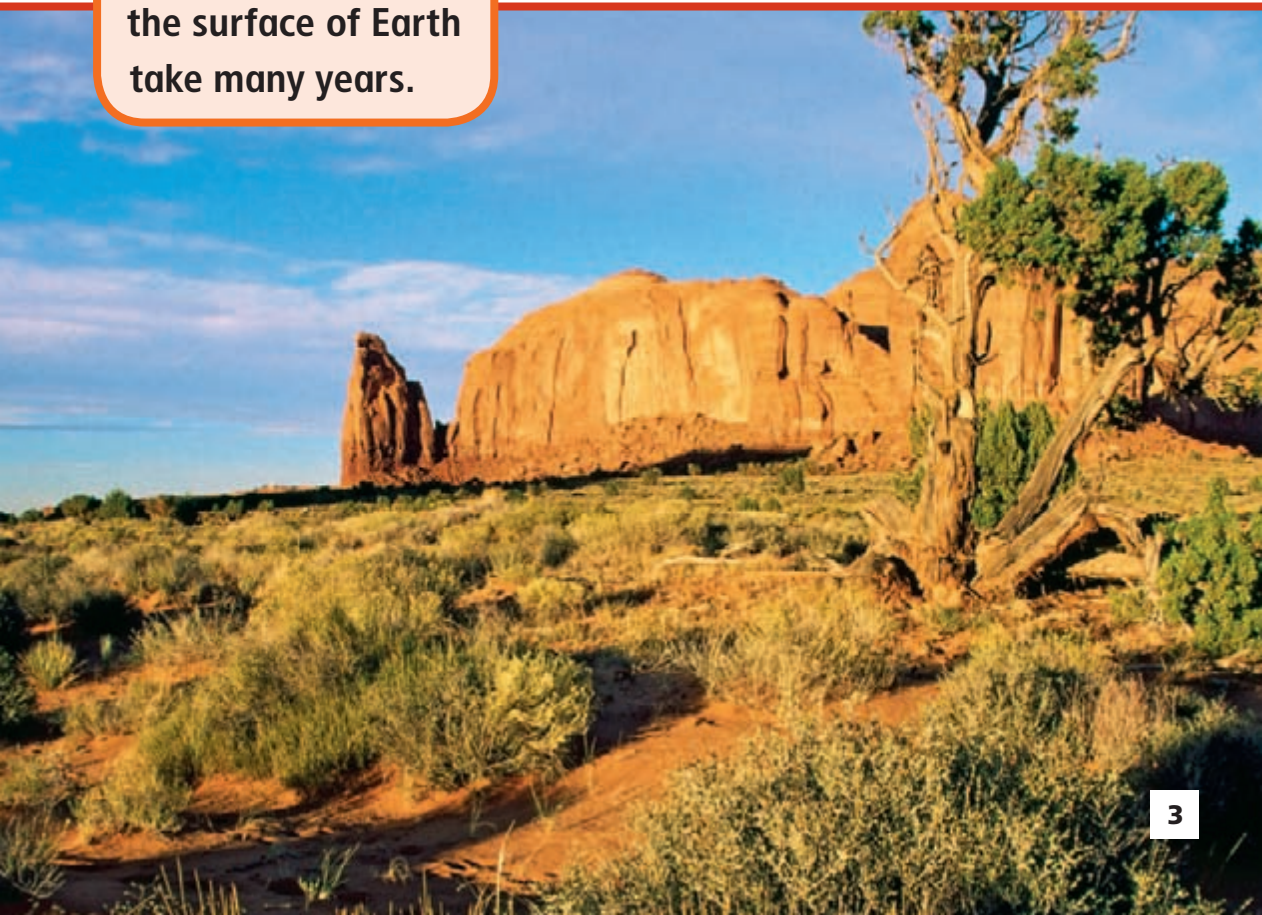
Rocks near the shore are a clue. They help tell us what Earth is made of.

▶ You might think rock is so hard that it never changes. But Earth's crust changes all the time. Some things like wind and water make rock change very slowly. Other things can make rock change very quickly.



CAUSE AND EFFECT What are two things that cause changes to Earth's crust?

▶ Some changes to the surface of Earth take many years.



Wind and Rain

Weathering is a change that happens when rocks on Earth's crust are broken down into smaller and smaller pieces.

 Some rocks are harder than others. They are made up of harder minerals. This kind of rock weathers more slowly than rock with softer minerals, but all rock weathers.

 Many things can cause rocks to weather. Wind and rain, water, things in the air, and even plants and animals can weather rocks.

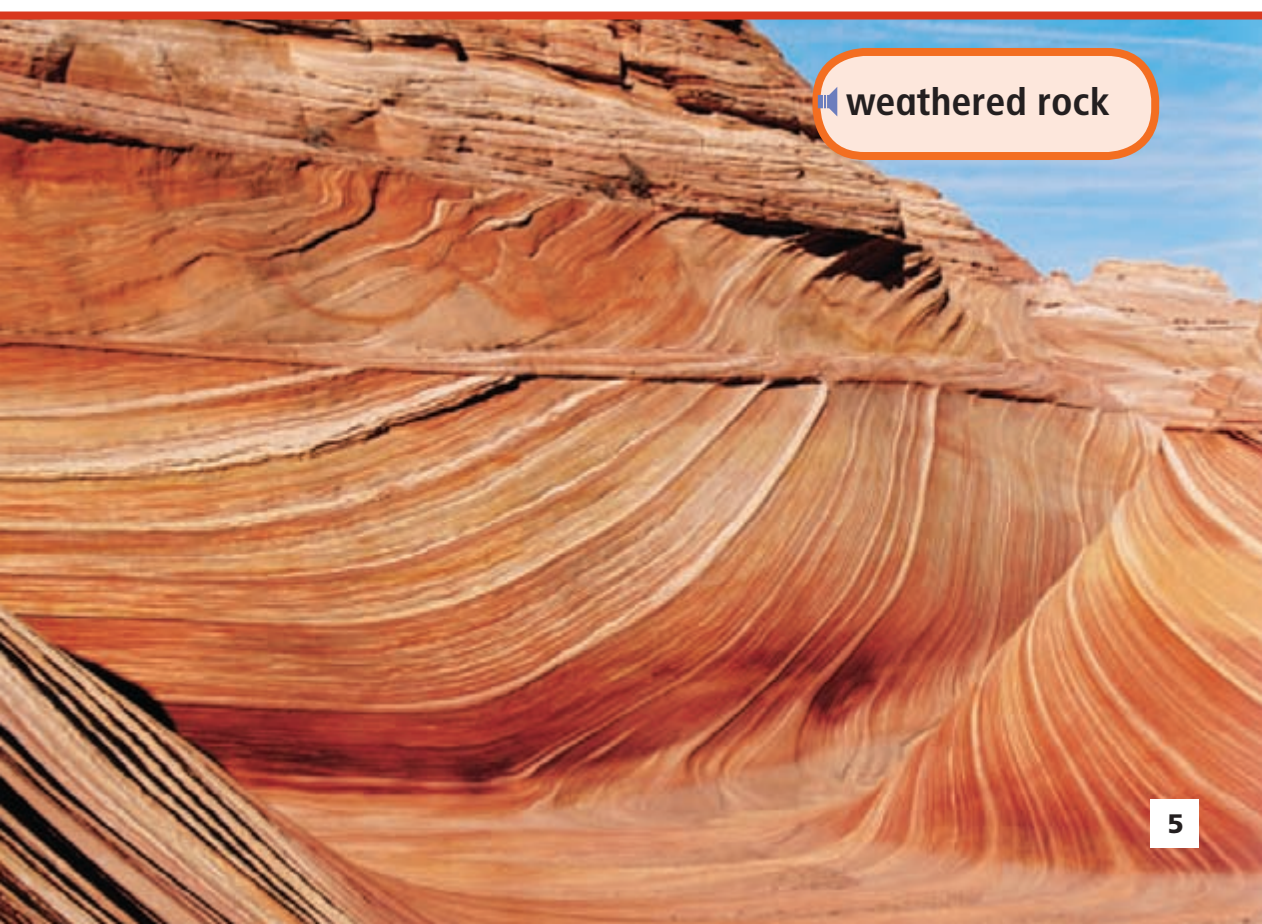


 **Wind and water weathered this rock.**

Wind and rain carry grains of sand, which are tiny pieces of broken rock. The grains of sand can hit against rock with great force. They act like sandpaper to wear down large rocks. Over time, they chip off tiny pieces of rocks, and the rocks begin to wear down.



CAUSE AND EFFECT What are two causes of weathering?



weathered rock

Water

Freezing water can cause weathering. **Freezing** happens when water changes to ice. Water runs into cracks in rocks. When it gets cold enough, the water freezes.

Ice takes up more space than water. When the water in the cracks of the rocks freezes, it pushes on the cracks in the rocks. The ice forces the cracks to get bigger until the rock breaks.

Frozen water takes up more space than liquid water. It causes the ground to crack. It even breaks rocks.



▶ Moving water also causes weathering. The force of the moving water makes rocks hit one another. This action causes tiny pieces of rock to break off.

▶ The water then carries them to new places. A flowing river can carry away small rock pieces.



CAUSE AND EFFECT What effects do wind and water have on rock?

Fast Fact

▶ The Grand Canyon was formed by moving water. Some scientists think it took five to six million years to form.



Plants

Sometimes plants cause weathering, too. Plant roots grow into cracks in rocks. As the plant grows, the roots get bigger and stronger, too. They grow down into the ground. The roots of trees and other plants can split the rock around them into smaller pieces.

The strong roots of this tree cracked the rocks around it.



Things in the Air

Weathering is caused by things such as wind, water, ice, and plant roots pushing against rock.

Things in the air also cause weathering. Water in the air mixes with smoke, dirt, and other things in the air. This mixture comes in contact with rock.

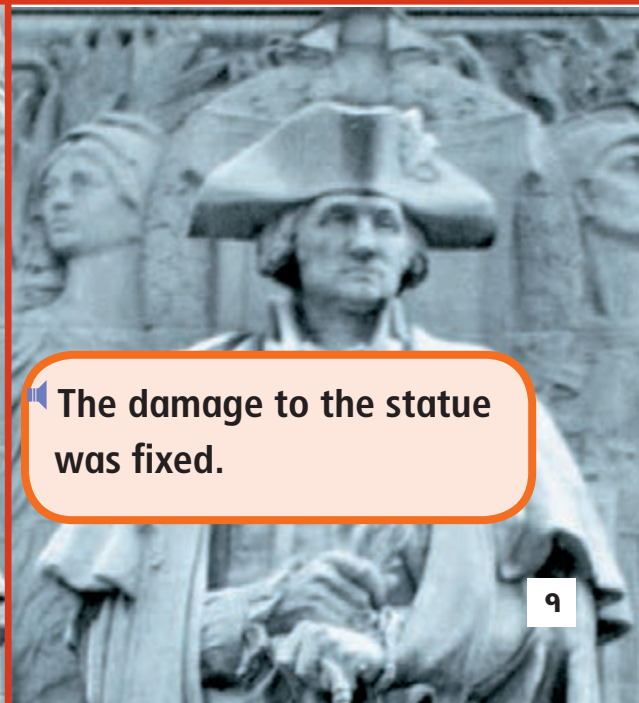
Some of the things in the mixture can cause rock to change color or to be eaten away. You can see how the weathering causes the rock to change.



CAUSE AND EFFECT How do things in the air cause weathering?



This statue was weathered by things in the air.



The damage to the statue was fixed.

Weathering Causes Soil to Form

When rock weathers, it breaks down more and more. Over time, the pieces break down into smaller and smaller pieces until they are tiny grains of sand. These grains are part of soil. **Soil** is made up partly from weathered rocks and partly from dead plant and animal materials.



The top layers of soil have the most weathered bits of rock. The bottom layers have larger pieces of rock.



Some kinds of soil have more weathered rock in them. Other kinds of soil have more plant and animal materials. These differences cause soils to be different colors. They have different textures, or feels. Some kinds of soil hold in water better. Some are better for growing plants.



CAUSE AND EFFECT What causes the top layers of soil to be more weathered than the bottom layers of soil?

Summary

Earth is made up of rock. Weathering slowly changes Earth's surface. Wind, water, ice, plants, and things in the air all cause weathering.

Glossary

-  **freeze** To change from a liquid, such as water, to a solid, such as ice. (6)
-  **soil** Small bits of rock mixed with material that was once living. (10)
-  **weathering** The change that happens when rocks are broken into smaller pieces. Wind, water, and some other things cause weathering. (4)

Think and Write

-  **1.** What causes weathering?
-  **2. CAUSE AND EFFECT** How do wind and rain cause weathering?
-  **3. CAUSE AND EFFECT** How do plants cause weathering?
-  **4.** How does weathering help cause different kinds of soil to form?

Hands-On Activity

Over a sheet of white paper, rub colored chalk with sandpaper. How do the chalk and paper change?

School-Home Connection

Explore your neighborhood with an adult family member. Look for changes in Earth's crust that were caused by weathering. List each change and what you think caused it.