

Moving and Changing



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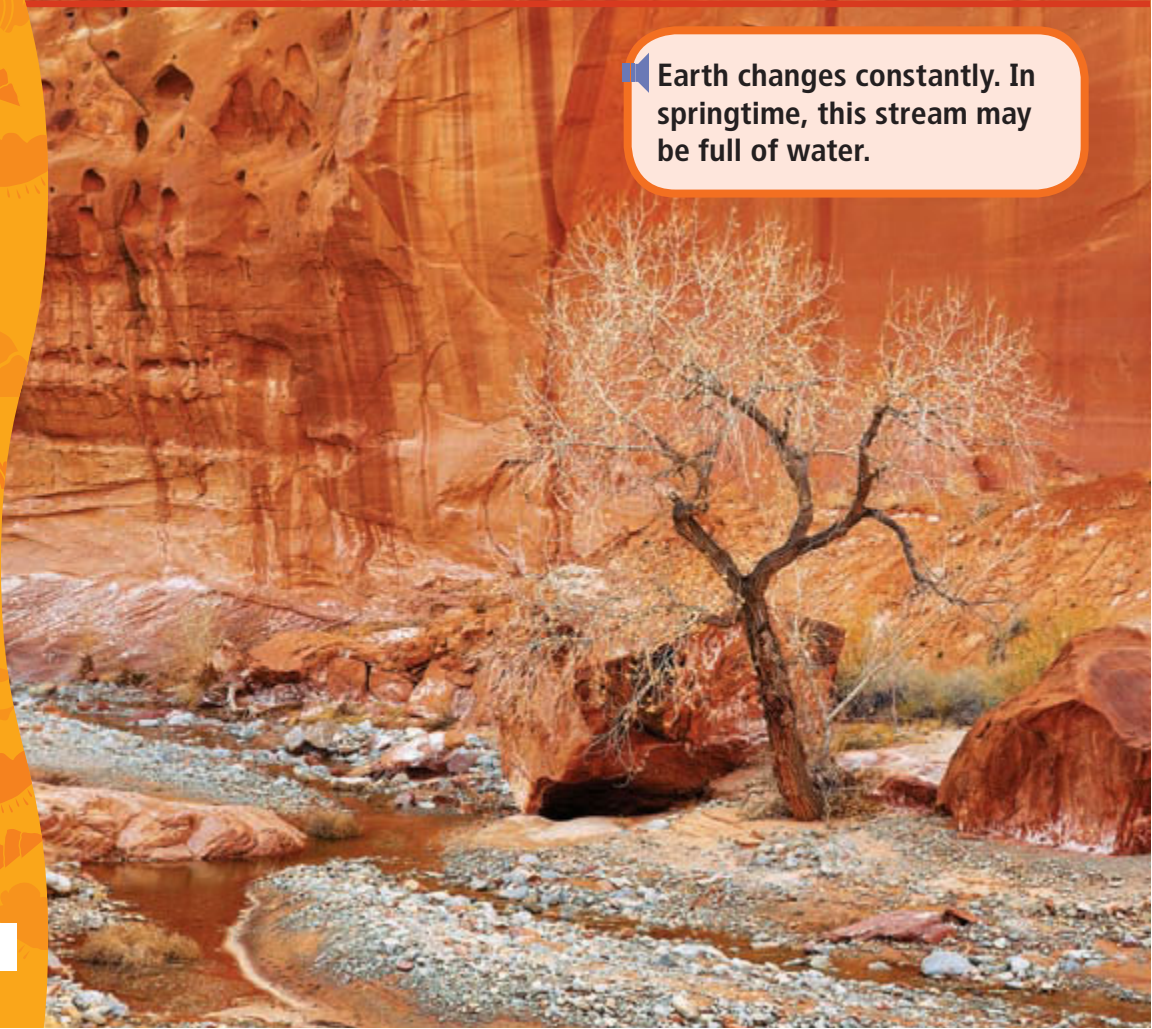



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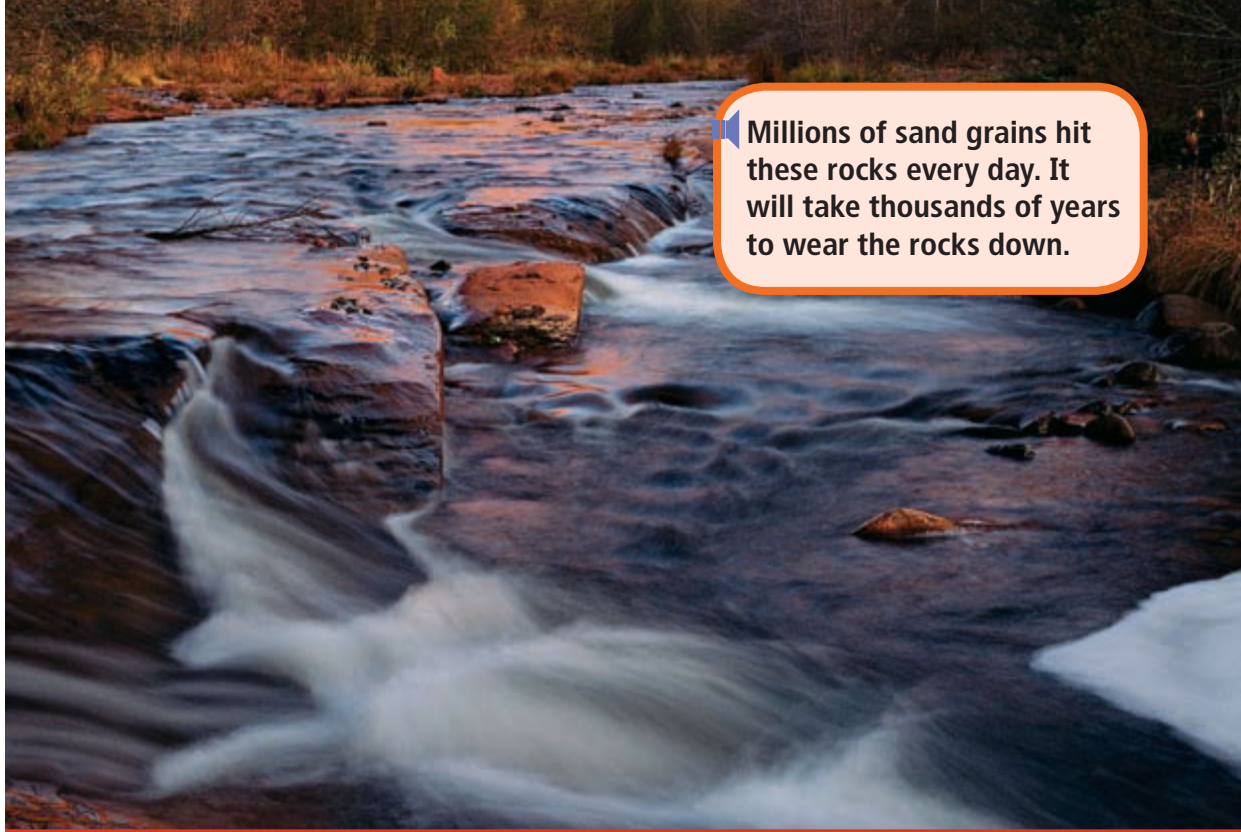
Weathered Away

The planet Earth may look the same to you every day. However, Earth's surface changes all the time. Some changes are slow. Some happen right away.

 Can you think of ways that Earth's surface changes? You have probably seen a flower sprout in springtime. You may have seen a pond dry up in the fall. Believe it or not, these are small changes. Some changes are much slower. But over time, they make big changes.



 Earth changes constantly. In springtime, this stream may be full of water.



Millions of sand grains hit these rocks every day. It will take thousands of years to wear the rocks down.

Weathering causes slow changes in Earth's surface. **Weathering** wears away rocks. It breaks them into small pieces.

Water can cause weathering. Picture a fast river moving along. The water carries many tiny grains of sand. The sand grains hit against rocks that line the river. Over time, the rocks are chipped away.


Wind can cause weathering, too. Grains of dirt and sand are picked up by the wind. Then they slam against a rock and fall to the ground. If the rock gets hit all the time, it may be chipped and change shape.



SEQUENCE How does water weather rocks?


Slow Change

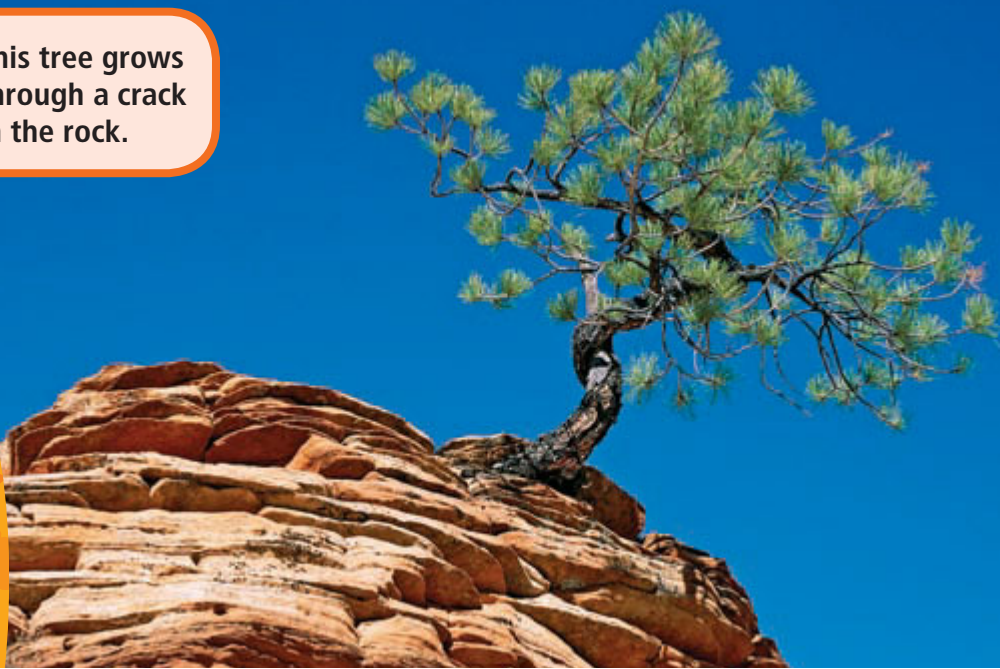
Ice can weather rocks, too. Water gets into cracks in rocks. When water freezes, it takes up more room. The cracks get bigger. Plants can grow in the tiniest cracks. Have you ever seen a flower growing out of a crack in the sidewalk? That sidewalk was weathered.

 Sometimes it takes thousands of years for weathering to change something. Imagine throwing a grain of sand at a tiny rock over and over again. You probably would never see any change in the rock. Now imagine how long it takes to weather away a big rock!

Fast Fact

Even tiny plants are strong. Their roots reach deep into soil. During tough rains and winds, their roots actually help keep soil from washing away!

 This tree grows through a crack in the rock.



Over time, weathering can change Earth's surface. You learned that ice expands cracks in rocks. Suppose ice makes cracks in a large rock. Then, the ice melts. The next winter, water slips into the cracks and freezes again. Each time this happens, the crack gets pushed wider. When the ice melts, pieces of the rock may crack off with it. This continues each year until the one large rock has turned into many small rocks.



MAIN IDEA AND DETAILS

Give an example of how weathering can change the way Earth looks.

Water gets into the cracks in this rock. When the water freezes, the cracks will be pushed wider.



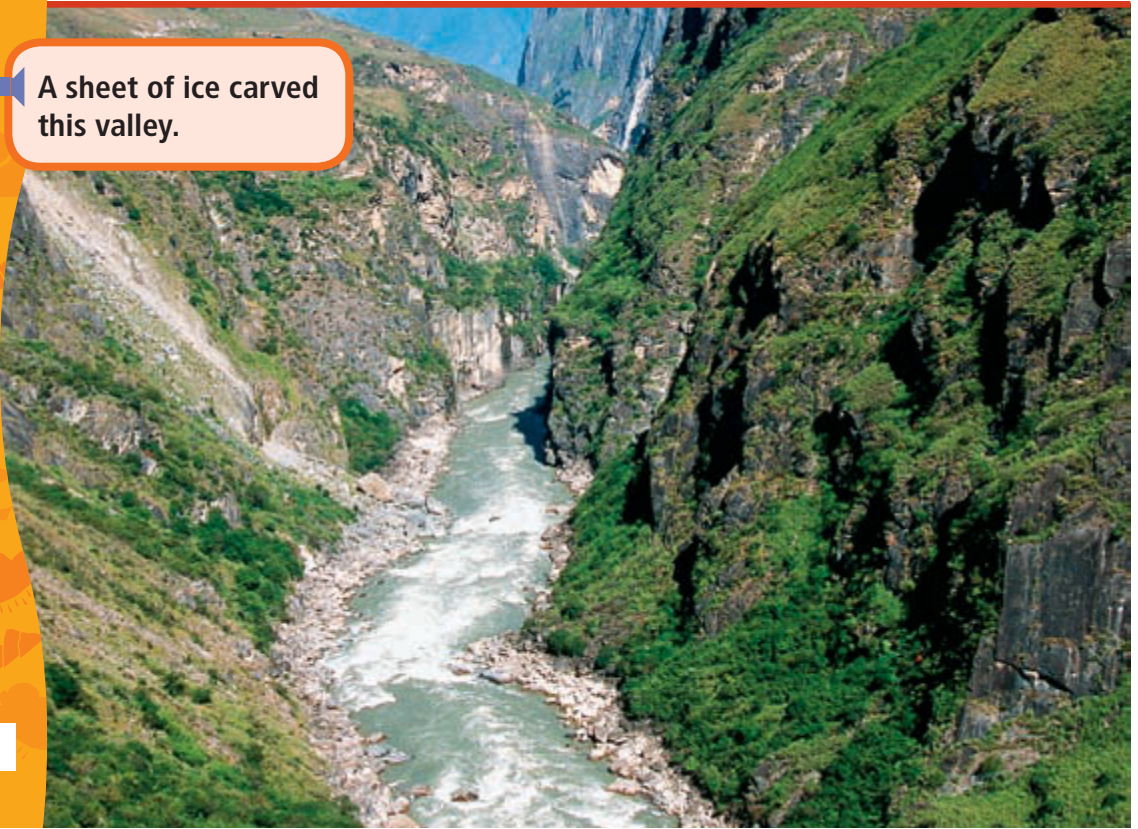
▶ **Moving Right Along**

Erosion takes place when soil and pieces of weathered rock are moved to a new place. Erosion changes the shape of the land.

▶ Have you ever lost your hat in the wind? Wind moves things in its path. Wind can cause erosion. Wind carries weathered materials to new places. Then, it drops them.

▶ Ice causes erosion, too. Suppose a sheet of ice covers a rocky hill. The sheet will slowly slide down the hill. On the way, it will move rocks by hitting them. It will freeze and crack others into small pieces. The small pieces may get frozen into the ice sheet.

▶ A sheet of ice carved this valley.



■ All of this mud was weathered. Now it is being moved by erosion.

■ Have you ever seen dirt in the street after a rain? That's water erosion. Rain carries soil in tiny rain rivers. The soil is dropped in the street.


■ Sometimes, rain washes weathered material into a river. The river carries the weathered material, then drops it in a new place. Over time, the place where material is dropped becomes less deep than other parts. It becomes hard for the river to flow past. The river will then find a new, easier path. Changing the shape of a river changes the way Earth looks.



SEQUENCE Which happens first, weathering or erosion?

Big Changes

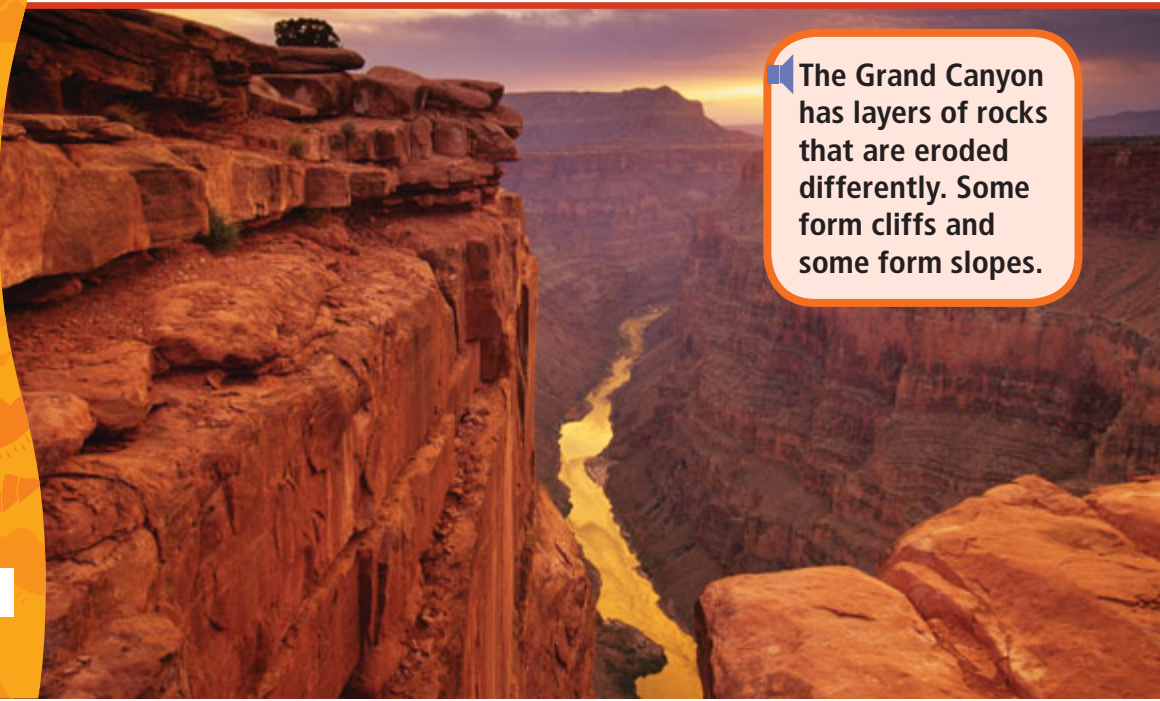
Erosion can cause big changes in Earth's features. You may have heard of the Grand Canyon. It was carved by erosion over thousands of years. The Colorado River helped carve it.

 Over long periods of time, erosion can bring down huge landforms. If a tall cliff is near the ocean, the ocean waves slap against it. Large pieces from the bottom will weather and fall into the ocean. Once the ocean has eroded away enough of the bottom, there will be nothing to support the rest of the cliff. The top part will crack off and fall into the ocean, too.



Fast Fact

What makes the Grand Canyon so beautiful? One reason is its many-colored walls. The walls are made of different minerals. The minerals color the canyon red, yellow and green!



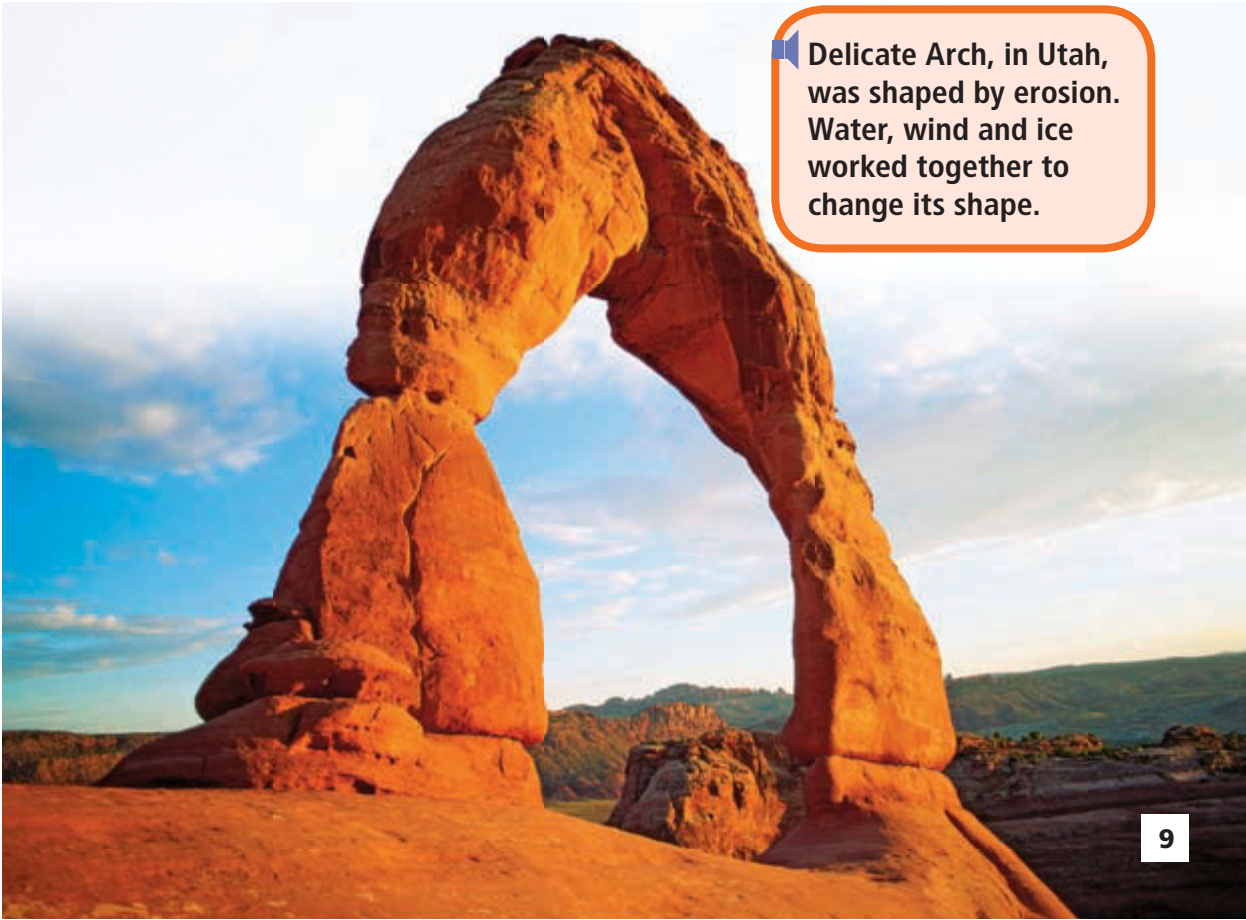
The Grand Canyon has layers of rocks that are eroded differently. Some form cliffs and some form slopes.

Wind erosion is very common in the desert. There is little to get in the way of the wind. Grains of sand and soil go faster and faster in the wind. Then they hit a rock at great speed. It is easy to tell rocks that have been eroded this way. For example, a long, thin rock may be holding up a round rock. It may look as if someone put the round rock there. Really, the bottom of the rock was eroded. Erosion can even make holes in rocks. When this happens, the rocks look like arches, or bridges.



MAIN IDEA AND DETAILS Name ways Earth's features can be eroded.

Delicate Arch, in Utah, was shaped by erosion. Water, wind and ice worked together to change its shape.

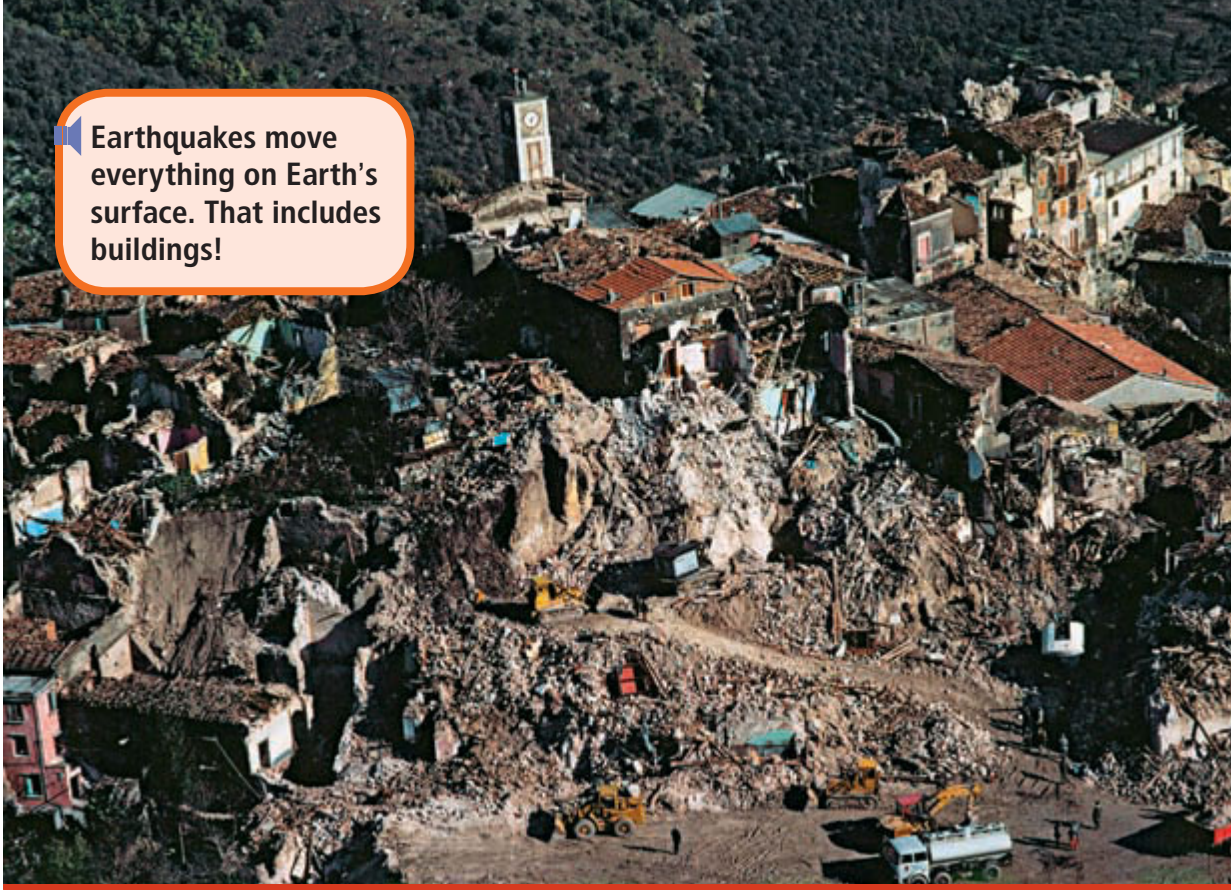


■ Natural Disasters

Not all changes to Earth's features are slow. Some happen very quickly. For example, lightning can cause a tree to fall down. A flood can carry trees and rocks far away. If it rains a lot, mud can be weathered away. Trees, plants, and rocks can come loose from the mud and spill down hills in mudslides. All of these events can leave trees or rocks in places that change the land even more. For example, what if a tree from a mudslide blocked a river? That would change the shape of the river.



■ A mudslide can change the way Earth's surface looks—very quickly!



Earthquakes move everything on Earth's surface. That includes buildings!

What do all of these changes have in common? They are natural disasters. Natural disasters change Earth's surface very quickly.

Earthquakes and volcanoes are other natural disasters that cause fast change. **Earthquakes** happen when Earth's surface moves. This is caused by movement in Earth's crust. Earth's surface shakes, and everything on it can shift. **Volcanoes** are large openings in Earth's surface from which hot, melted rock flows. Volcanoes can cause erosion much faster than wind or water.



CAUSE AND EFFECT What causes earthquakes?

Earthquakes and Volcanoes

Earthquakes can change Earth's surface—and fast. Earth's outer surface is called the crust.

The crust is made of plates of rock. Sometimes, the plates shift near a crack. This causes earthquakes.


■ A large earthquake can cause a lot of damage. The shifting ground uproots trees and knocks down buildings. It can cause fires and clog rivers. It can loosen soil and make mud slide down hills. Earthquakes can also make mountains. Plates in the crust slam into each other. Part of one plate is pushed up, and a mountain is formed.

Fast Fact

Mountains show their age! Old mountains are rounded. They have been eroded by wind, ice, and rain. New mountains are still jagged and sharp. They haven't been worn down yet.

■ The Himalayan mountains formed when underground rock layers came together.





It can take years before the land around a volcano is useable.

When a volcano erupts, change is on its way. Inside of Earth is a layer of hot, melted rock. The liquid rock comes up to Earth's surface and flows down the sides of the volcano.

Erupting volcanoes change Earth's features quickly. Hot, melted rock covers nearby land, where it cools and hardens. Gases and ash burn trees and land. When a volcano erupts, hot, melted rock covers its sides. The mountain becomes larger. This changes Earth's land.



CAUSE AND EFFECT What effects does a volcanic eruption have on Earth's features?

▶ **Comparing Changes**

In one change, erosion carries pebbles down a river. The pebbles drop in the same spot. The pebbles begin to block the flow of the river. The river changes its shape to move around the pebbles.


▶ In another change, a forest fire burns down acres of trees. Which change happens faster? If you answered that the trees burn faster, you were right. Natural disasters make changes happen quickly. Erosion and weathering change Earth's features so slowly that you can't always notice it happening.



COMPARE AND CONTRAST Compare a change made by weathering and erosion to one made by a natural disaster.

▶ Fire moves fast. Thousands of acres can burn in a few weeks.





Earth can change in many ways. Volcanic eruptions formed the Hawaiian Islands.





Summary

Earth's features are always changing. Some changes are slow. Weathering slowly breaks down rocks into little pieces. Erosion carries them away. These two kinds of changes can bring down cliffs, form canyons, and wear down mountains. Natural disasters change Earth's surface quickly. Hot, melted rock flows from volcanoes. It later cools and hardens into rock. Plates of rock make up Earth's surface. When they move, they create earthquakes. Earthquakes change Earth in many ways. They can knock down trees, cause fires, and even make mountains.


Fast Fact

Scientists use technology to predict when earthquakes may happen.

Glossary

-  **earthquake** (ERTH•kwayk) The shaking of Earth's surface caused by movement in Earth's crust (11, 12, 15)
-  **erosion** (uh•ROH•zhuhn) The movement of weathered rock and soil (6, 7, 8, 9, 11, 14, 15)
-  **volcano** (vahl•KAY•noh) An opening in Earth's surface from which hot, melted rock flows (11, 12, 13, 15)
-  **weathering** (WETH•er•ing) The breaking down of rocks into smaller pieces (3, 4, 5, 7, 14, 15)

🔊 Think and Write

- 🔊 1. A large earthquake takes place. Explain what caused it. Predict the effects it will have.
- 🔊 2. **SEQUENCE** Explain the steps that lead to weathering and erosion.
- 🔊 3. **CAUSE AND EFFECT** How can earthquakes cause mountains to take shape?
- 🔊  4. **Expository Writing** Suppose you are a scientist watching a volcano erupt. Write a scientific explanation for what you see around you.

🔊 Hands-On Activity

See desert wind erosion for yourself! Fill a baking pan with sand. Put a fan on one side of the pan and see what happens. Then, move the fan to the other side. How was the shape of the desert changed?

🔊 School-Home Connection

Walk through a park with a family member. Look for signs of erosion on statues, rocks, and hillsides. Explain how each happened.

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