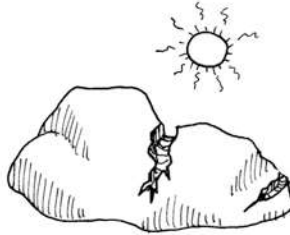


Lesson 9 Weathering and Erosion

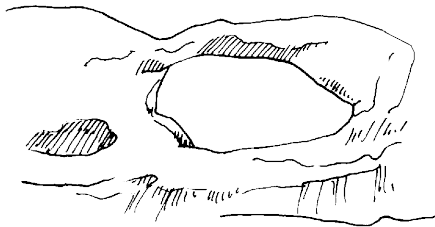
Lesson 9

—Day 1

When rocks are exposed to rain and extreme temperature changes, they gradually break down. This process is called **weathering**.

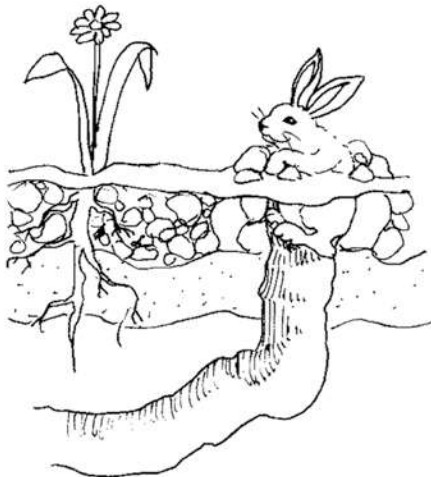
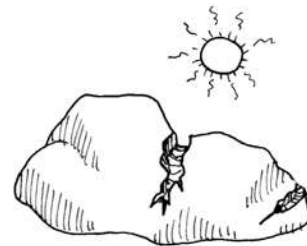
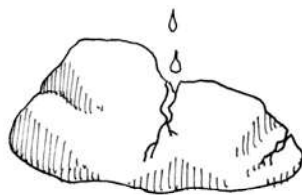


One type of weathering is called **physical** weathering and can be caused by changes in temperature. Most rocks contain two or



more minerals. When these minerals become hot, they expand. When they cool, they **contract**, or get smaller again. This process causes rock to crumble and break.

Another process that causes physical weathering is freezing and thawing. Many rocks have small cracks. When water seeps into these cracks and freezes the water expands making the crack larger. The ice may thaw only to freeze again, over and over, finally breaking the rock into pieces.



Animals and plants can also cause physical weathering. Plant roots may grow into a crack in a rock and force it apart. Burrowing animals can break apart weathered rocks.

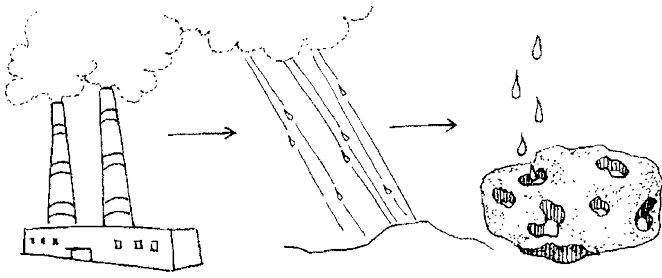
Materials:

SP Lesson 9 Day 1
Surface Features of Earth book
Lab Graphics Page 1
Lab Book
Lab Card
modeling clay
plastic wrap
a freezer

Vocabulary Words:

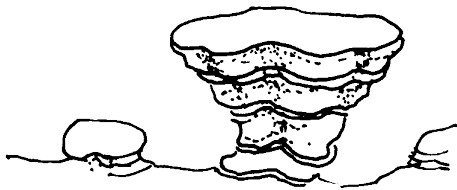
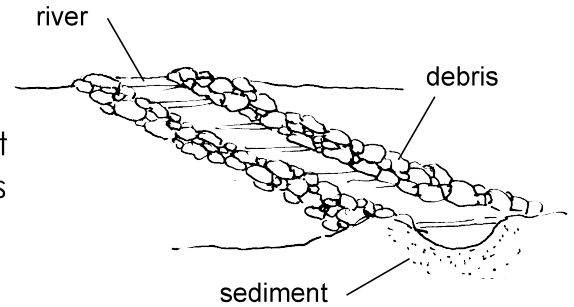
Hand out vocabulary strip for this lesson. Encourage your students to use the words while talking about the material and in their written work.

weathering
physical
contract
chemical
debris
erosion



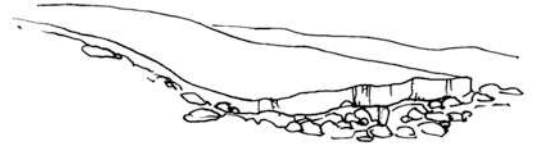
Chemical weathering occurs when chemicals wear the minerals in rocks away or when water dissolves minerals in rocks. Rainwater sometimes contains a mild acid that can eat away at rocks causing them to break off and crumble.

Pieces of rock broken off of a bigger rock are called **debris** (duh **bre**). This debris can be picked up by water, ice, or wind. As debris is carried, it grinds against other rocks and land, causing them to wear down. This process is called **erosion**. Rivers carry a great deal of debris that wears down riverbeds and river banks.



Winds pick up fine particles of debris and blast them against rock causing the rocks to erode. This is a major cause of erosion in areas with little or no vegetation.


In cold areas, debris is frozen into ice. As the ice moves, it erodes the surface areas that it comes into contact with.




Surface Features of Earth Book

Hand out SP Lesson 9 Day 1 and **Surface Features of Earth** book.

Cut out image 9A.

 Color the illustrations. Title the page *Weathering*. Under first image copy *temperature*. Under second image copy *plants and animals*. Under the bottom illustration copy: *chemicals*.

 Label top images *physical weathering*. Label the bottom image *chemical weathering*. Write words about each type of weathering:

physical: temperature changes, freeze/thaw, animals, plants

chemical: rain containing mild acid wears away minerals.



Under the top two images write sentences describing physical weathering. Under the bottom image write sentences about chemical weathering. Ex:

physical weathering – Changes in temperature can cause minerals and water to expand and contract causing cracks and breakage in rocks. Plant roots may grow into a crack in a rock and force it apart, and burrowing animals can break apart weathered rocks.

chemical weathering - Chemical weathering occurs when chemicals wear the minerals in rocks away or when water dissolves minerals in rocks. Rainwater sometimes contains a mild acid that can eat away at rocks causing them to break off and crumble.

Crease on the dotted line. Lay flat and glue under the previous page of your *Surface Features of Earth* book on the glue line.

Freeze and Thaw Lab 9-1



Hand out Lab Graphics Page 1, Lab Book, Lab Card, modeling clay, plastic wrap. Students will need access to a freezer.

Cut out Lab image 9-1 and glue on the third pocket in your Lab Book. Write the name of the Lab and the date on a Lab Card.

Divide the clay into two pieces. Roll each piece into a ball, moistening it with water. On the Lab Card, describe the balls of clay. *Example: smooth sides, round, equal sizes.*

Wrap each ball in plastic wrap and label one A and the other B. Place B in the freezer and A on an indoor shelf (not in the sun).

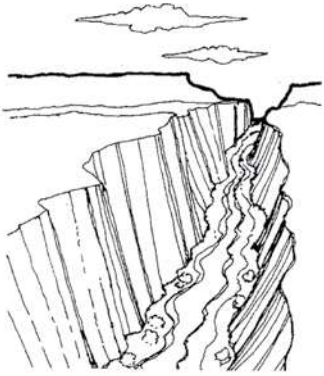
After 24 hours, remove the frozen clay ball from the freezer, let it thaw out, then moisten it with water again and re-wrap. What do you think we will find? Write your prediction on a Lab Card. Refreeze it for another 24 hours. Unwrap both balls of clay and examine them.

Discuss how the clay balls look now and how each one has changed since the beginning of the Lab. Write or draw how the balls look at the end of the Lab. *The freezing water should have caused small particles of the clay to split off B.* How does that compare to your prediction?

Put your Lab Card in the correct pocket.

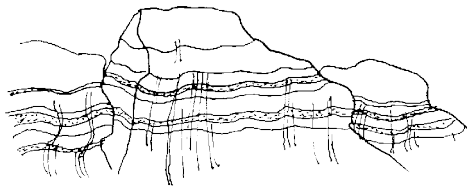
Lesson 9

—Day 2

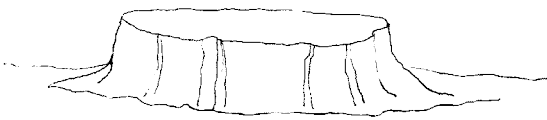


Some of the most dramatic land features on Earth are the result of **erosion**. The erosion caused by streams and rivers can carve deep **canyons** (**kan** yuhns) in land. These canyons are often the best places to observe layers of sedimentary rocks. The

deepest canyon in the world is Colca Canyon in Peru. It is over 10,500 feet deep (3,223 m).

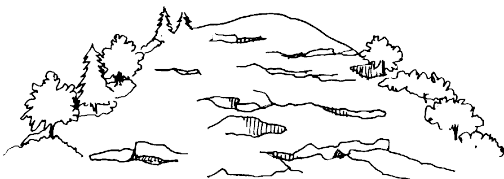
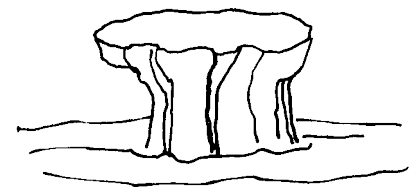


Sometimes a glacier will erode most of the sedimentary rock in an area. After the glacier is gone, the granite bedrock is left exposed. Without the pressure and weight of the glacier on it, the granite will bulge upward. Manhattan Island is an example of exposed granite bedrock.



Sometimes water erodes land leaving rocky places that did not erode intact. These remaining high areas are not true mountains, although they are higher than the surrounding land. A mesa is an example of such a feature. A **mesa** (**mey** suh) is a broad flat-topped hill rising above the surrounding land.

A **butte** (**byoot**) is similar to a mesa with a smaller, narrower top and steep sides. These features are seen in the southwestern United States.



Complete mountain ranges can erode away leaving only a few rock formations standing. These standing pieces are called **monadnocks** (**muh nad** noks). Stone Mountain in Georgia is an example of a monadnock.

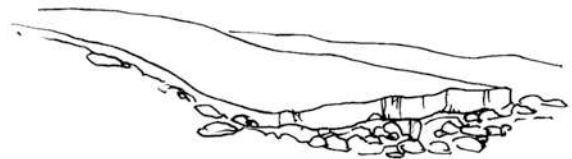
Materials:

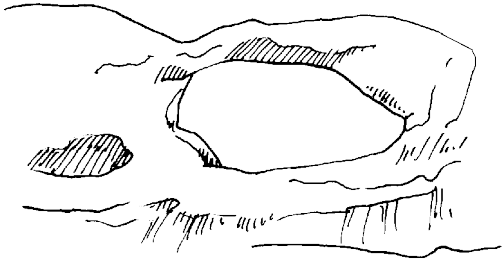
SP Lesson 9 Day 2
Surface Features of Earth book
Earth Shutter Fold
Lab Graphics Page 1
Lab Book
Lab cards
plastic bucket
large bowl
dirt
salt
water

Vocabulary Words:

Hand out vocabulary strip for this lesson. Encourage your students to use the words while talking about the material and in their written work.

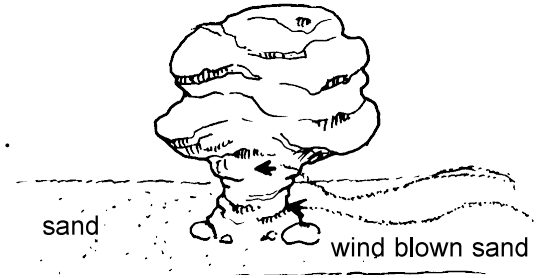
erosion
canyon
mesa
butte
monadnock





Erosion shapes nearly every feature of Earth's surface, large or small. This natural bridge was formed when the rocks beneath it eroded away.

Many unusual natural sculptures are created by erosion.



Surface Features of Earth Book

Hand out SP Lesson 9 Day 2, **Surface Features of Earth** book and **Earth** Shutter Fold.

Cut out image 9A



Color images. Copy *Erosion* in the middle of the images



Title the page *Erosion*. Label each image: *canyon, glacier, mesa, rock formation*



At the bottom of the page write: *Some of the most dramatic land features on Earth are the result of erosion. Under each image, write a sentence about erosion. Ex: Streams and rivers can carve deep canyons.*

Sometimes a glacier will erode most of the sedimentary rock in an area.

Water erosion can create a broad flat-top hill called a mesa.

Many unusual natural formations are caused by erosion.

Crease on the dotted line. Lay flat and glue under the previous page of your *Surface Features of Earth* book on the glue line.

Earth Shutter Fold

Cut out image 9B (Colca Canyon) and fold on the middle line so that the illustration is on the cover. Color the cover and follow the directions below for the inside.



Copy *Colca Canyon*.



Write words about the front picture: *deepest canyon, Peru*



Write one or two facts about the front picture. Ex: *Colca Canyon, Peru, deepest canyon, over 10,500 feet deep*

Glue the book on the southern end of Peru, inside your *Earth* Shutter Fold.



Erosion Lab 9-2



Materials: Lab Graphics Page 1, Lab Book, Lab Card, small plastic bucket, large bowl, dirt, salt, and water.

Cut out Lab image 9-2 and glue on the next pocket of your Lab Book. Write the name of the Lab and the date on a Lab Card.

In a bowl, mix 1 cup of salt and 2 cups water. Add enough dirt to make it firm. Press the mixture in the bucket firmly and turn the bucket over to make a dirt tower. Do the same with unsalted water and dirt. Let the dirt towers dry outside, overnight and under cover.

What do you think will happen to the tower with the salt and the one without the salt? Discuss. Write your prediction on the Lab Card.

Observe both towers looking for any changes in them. What happened to each of the dirt towers? What was different about the towers? How do you explain what happened to the towers when they dried? Discuss the towers and any changes observed. *The salt should help the first dirt tower not crumble. It acts like a cement with the dirt.*

Write or draw your observations on your Lab Card. Put your Lab Card in the pocket of your Lab Book.

Lesson 9 —Day 3

Choose one or more activities to complete today:

1. Materials: 2 quarters, 2 nickels, plate, dirt, small watering can

Place a mound of dirt on the plate. Put the coins at different locations on the dirt. Use the watering can to simulate rain on the plate. Describe the dirt mound after the rainfall. Why are some areas different than other areas? What land features do the elevated areas remind you of? *Possible answers: mesa or butte.*

2. Look for examples of weathering and erosion where you live. For example, watch for ditches that wash deeper with each rain and look for debris that has been carried by water or wind.

Collect materials to complete the activities you choose:

2 quarters
2 nickels
plate
dirt
small watering can
clay

3. Investigate ways in which erosion can be stopped.
4. Research how people who farm on sloped land or on mountainsides battle erosion.
5. Use clay to form a mesa and a butte.
6. Research Stone Mountain, Georgia. Report on your findings.

Our Extraordinary Earth

The longest canyon in the world is the Grand Canyon on the Colorado River in Arizona. It is 277 miles (446 km) long.

