

# Earth's Changing Surface

## Earth's Surface

### Surface Features

The surface of the Earth is constantly going through changes. These changes are caused by "destructional" and "constructional" forces. The work of these forces results in the Earth's different surface features.

1. **Destructional forces** are weathering and erosion. They wear down and remove land features that already exist.
2. **Constructional forces** build up the Earth's surface. They tend to raise the crust upward. New land forms are created in this way. Earthquakes and volcanoes can cause this to happen.

The Earth's surface is worn down by \_\_\_\_\_ forces.

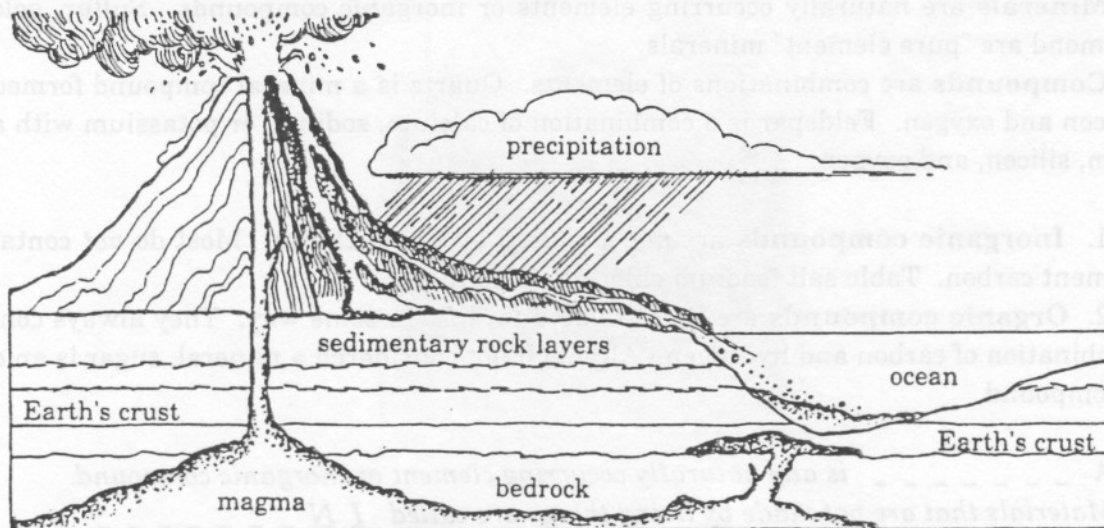
Two destructional forces are \_\_\_\_\_ and \_\_\_\_\_.

New land forms are created by \_\_\_\_\_ forces.

What are two constructional forces?

1. \_\_\_\_\_
2. \_\_\_\_\_

Study the drawing below. Label the destructional and constructional forces:



### Rock Fragments And Bedrock

**Bedrock** is the layer of "solid rock" beneath the soil. When exposed to the agents of weathering, bedrock breaks down into **fragments**. Very fine fragments are the basis of **soil**.

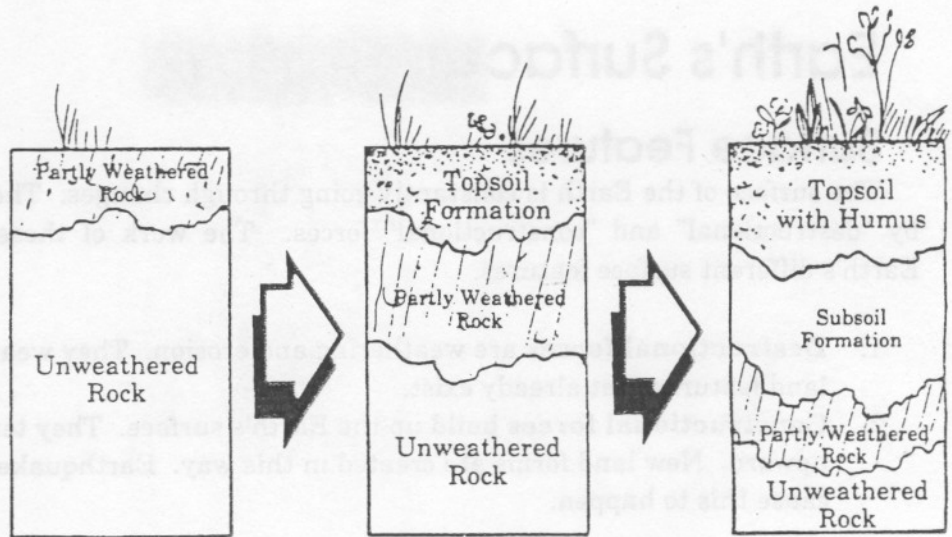
- Place a clean sheet of notebook paper on your desk. Rub together two pieces of sandstone. What do you notice on the paper? \_\_\_\_\_
- Where did these particles come from? \_\_\_\_\_
- These tiny particles could be the beginning of future soil.

**Soil Formation:**

Left - Original state of the surface (unweathered).

Center - Weathering occurs, proceeding downwards.

Right - Mature soil forms with definite layers, each having characteristic features.



Organic materials must be added to rock fragments to form soil. These usually come from the remains of plants and animals. Left in or on the soil, this once living material rots and decays. After decaying, it turns to humus.

Soil is a combination of tiny \_\_\_\_\_ fragments and \_\_\_\_\_.

## Minerals

Minerals are naturally occurring elements or inorganic compounds. Sulfur, gold, and diamond are "pure element" minerals.

Compounds are combinations of elements. Quartz is a mineral compound formed from silicon and oxygen. Feldspar is a combination of calcium, sodium, or potassium with aluminum, silicon, and oxygen.

1. **Inorganic compounds** are *not* produced by living things. Most do *not* contain the element carbon. Table salt (sodium chloride) is inorganic.

2. **Organic compounds** are those related to "life" in some way. They always contain a combination of carbon and hydrogen. Although not considered a mineral, sugar is an organic compound.

A \_\_\_\_\_ is any naturally occurring element or inorganic compound.

Materials that are not made by living things are called **IN** \_\_\_\_\_.

Materials related to living things are called \_\_\_\_\_.

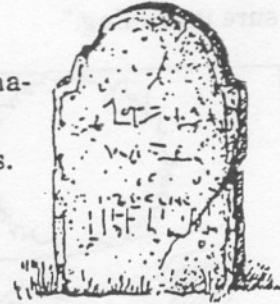
An **element** is the simplest form of a substance. It *cannot* be broken down any further. Many elements are found in the *solid* part of the Earth's crust. Eight of them make up about 98% of the Earth's crust.

# Surface Changes

The Earth is constantly changing. Two kinds of forces that create this change work against each other. The **destructional** forces are constantly **wearing down** the Earth's surface. At the same time, **constructional** forces are **building it up**.

## Destructional Forces

Destructional forces are always working to break down and move materials. The major destructional forces are **weathering** and **erosion**. They tend to move materials from the continents into the ocean basins. The "force" to do this comes largely from gravity and the water cycle.



## Weathering

Rocks that are at, or near, the Earth's surface are always exposed to the atmosphere. The condition of the atmosphere at a specific place and time is **weather**. **Weathering** is the term used to explain how atmospheric conditions change bedrock and rocks.

**Physical**, **chemical**, and **biological** weathering act to break down and crumble rocks. These rock fragments are produced on the Earth's surface. Continued weathering produces fragments small enough to form soil.

Three types of weathering are            AL,            AL,  
and            AL.

### 1. Physical Weathering

Physical weathering takes place when rock breaks down without any chemical change. This happens in two ways.

**Freezing** can cause rocks to break down. Cracks in rocks can fill up with water. When the temperature drops below freezing, the water turns to ice. Freezing causes water to expand. The ice pushes against the rock and cracks it.



Get a small glass jar that is clean but ready to be "thrown out." Fill it to the brim with water. Screw the lid on tightly. Place the jar in a strong plastic bag or paper bag. Put the bag and jar in the freezer overnight.

*Note: Do not forget to use a bag for protection.*

The next day take the bag from the freezer and *carefully* look inside.

What do you observe? \_\_\_\_\_

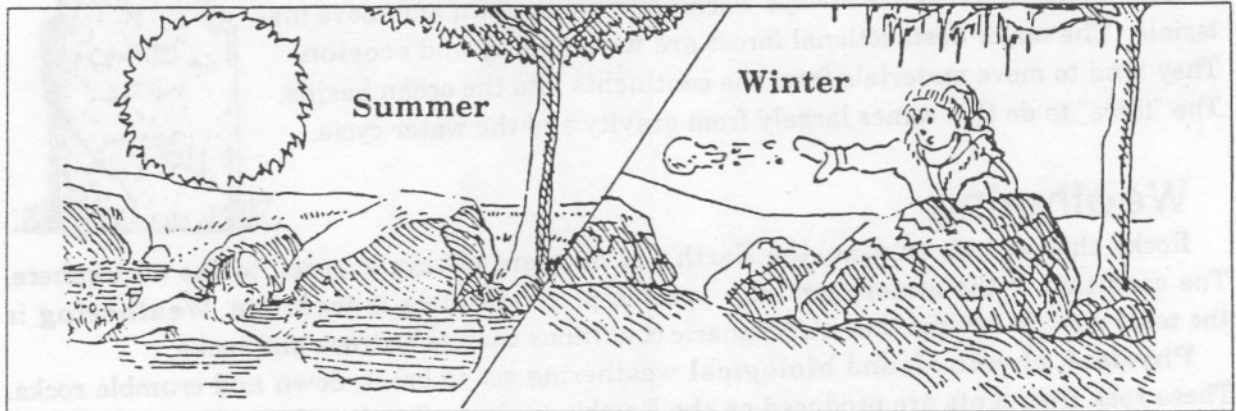
What caused this to happen? \_\_\_\_\_

Why were you directed to place the jar in a bag? \_\_\_\_\_

Suppose the water was inside a rock. What do you think might have happened to the rock? \_\_\_\_\_

**Expansion and contraction** can also cause rocks to break up. Rocks contain different kinds of minerals. Each mineral expands and contracts at its own rate. These different rates, along with different temperatures, help to break up rocks.

Study this illustration. The rocks have developed cracks. Changes in temperature from summer to winter could cause them, although most cracking seen in rocks is due to "pressure unloading."



Suppose a rock is exposed to the summer sun for a full day. The rock would heat up to the very center. After the sun goes down, what part of the rock would cool off first?

What part of the rock would "contract" first? \_\_\_\_\_

What might happen to the outside while the inside is still warm and expanded?

If the outside CONTRACTS before the INSIDE, it gets "smaller" first. BUT, since the inside is still EXPANDED, the outside "cracks" as it "shrinks."

## 2. Chemical Weathering

Chemical weathering takes place in four different ways. In each way there is a breakdown in the chemical makeup of the rock.

**Oxidation** occurs when an element unites with oxygen. This happens especially when some minerals are wet. New compounds are formed. The new compounds "lose their hold" on the rock, and it crumbles.



### Oxidation Of Steel

#### Purpose:

To explain or make a decision about experimental technique

#### Materials:

2 small jars (same size) with lids  
fine steel wool  
denatured alcohol  
water  
paper towel

