

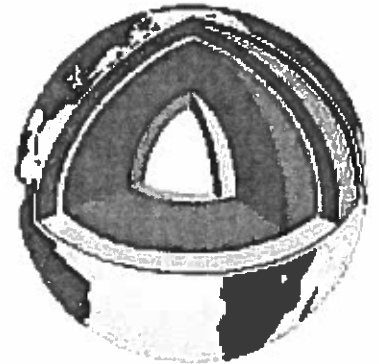
Key Concepts

Earth/Space Systems and Cycles

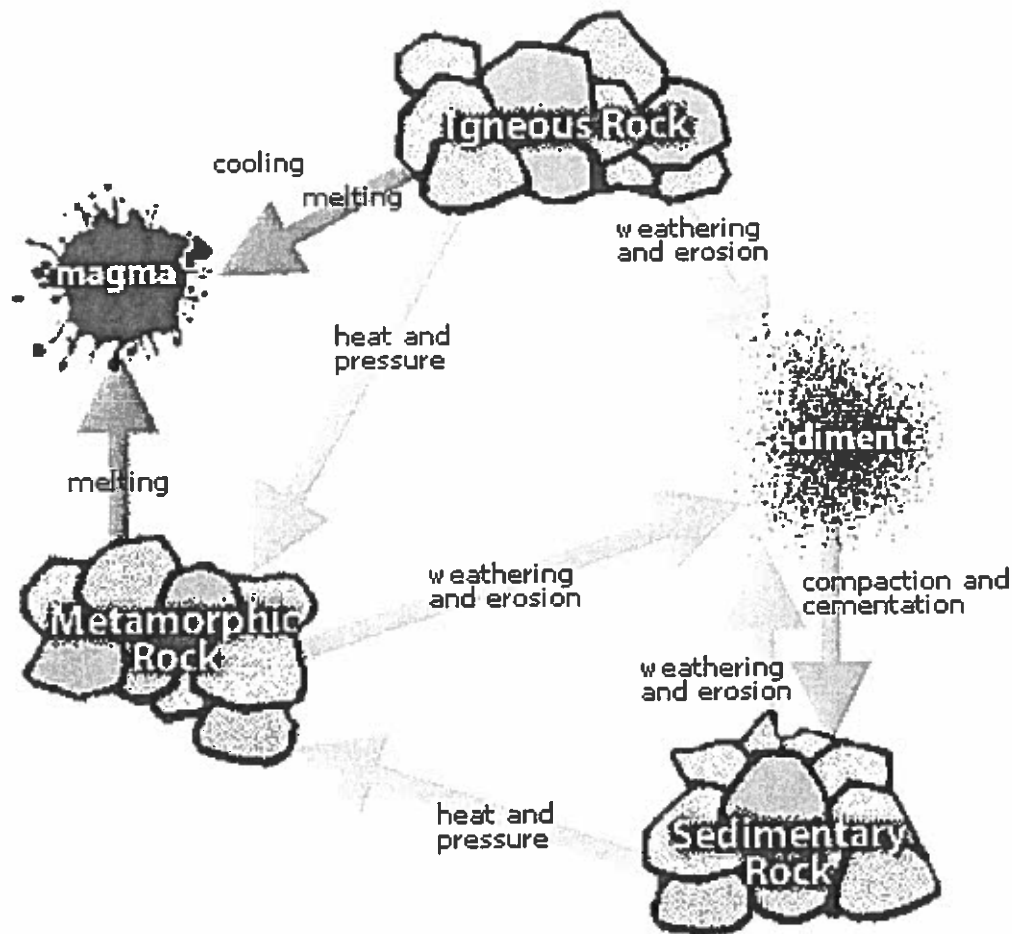
(SOL 5.7)

Rocks

- Rocks move and change over time due to heat and pressure within the Earth and to **weathering** and **erosion** at the surface. These and other processes constantly change rock from one type to another.
- Rocks have properties that can be observed, tested, and described. Composition, grain size, texture, color, and the presence of fossils help with identification.
- Depending on how rocks are formed, they are classified as **sedimentary** (layers of sediment cemented together), **igneous** (melted and cooled, e.g., lava and magma), and **metamorphic** (changed by heat and pressure).
- Scientific evidence indicates the **Earth is very ancient — approximately 4.6 billion years old**. The age of many rocks can be determined very reliably. **Fossils** provide information about life and conditions of the past.
- Scientific evidence indicates that the Earth is composed of four layers — **crust, mantle, inner core, and outer core** — each with its own distinct characteristics. The outer two layers are composed primarily of rocky material. The innermost layers are composed mostly of iron and nickel. Pressure and temperature increase with depth beneath the surface.
- The Earth's heat energy causes movement of material within the Earth. Large continent-size blocks (**plates**) move slowly about the Earth's surface, driven by that heat.
- Most **earthquakes** and **volcanoes** are located at the boundary of the plates (faults). Plates can move together (**convergent boundaries**), apart (**divergent boundaries**), or slip past each other horizontally (sliding boundaries, also called strike-slip or transform boundaries).
- Geological features in the oceans (including trenches and mid-ocean ridges) and on the continents (mountain ranges, including the Appalachian Mountains) are caused by current and past plate movements.



Rocks and other materials on the Earth's surface are constantly being broken down both chemically and physically. The products of weathering include clay, sand, and rock fragments. Weathered rock material can be moved by water and wind and deposited as sediment.



Directions: Use the illustration of the rock cycle to answer the questions.

1. When heat and pressure are applied to sedimentary rock, which type of rock is formed?

2. Which type of rock forms from the compacting and cementing of sediments? _____
3. In which type of rock are fossils most frequently found? _____
4. Which type of rock is formed when magma or lava cools? _____
5. What might happen to metamorphic rock under a very high temperature?

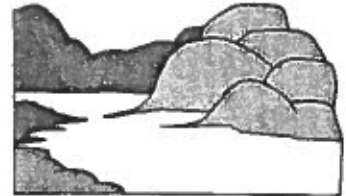
6. Which is formed when minerals and rocks are broken down into smaller pieces?

Weathering

- The breaking down of minerals and rocks into small pieces (sediments)
- Moving water, wind, ice, and chemical reactions are all agents of weathering.

Erosion

- The carrying away of sediments caused by wind and water
- Planting trees, grass, and shrubs can prevent erosion.



Deposition

- Materials that can be moved by water and wind (eroded) and deposited in new locations as sediment (deposition).

Three Types of Rocks

Igneous Rocks

- Formed when hot, melted materials cool and harden
- Found where volcanoes exist or where they once existed

Sedimentary Rocks

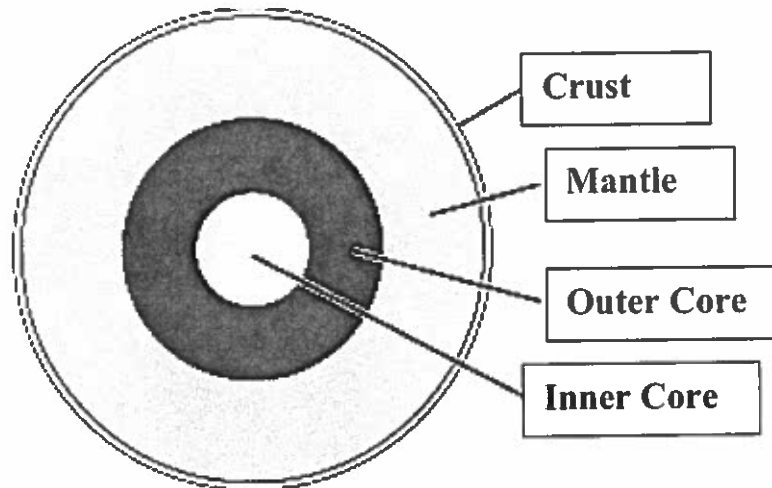
- Formed when layers of sediment are pressed together
- Found where water exists or where it once existed
- Sometimes contain fossils



Metamorphic Rocks

- Formed by heat and pressure
- Found deep within the Earth or where layers have been pushed to the surface

Layers of the Earth



Directions: Draw lines to connect each word to the correct definition.

Crust

thick middle layer

Mantle

made of *solid* iron and nickel

Inner core

outer layer of the earth; very thin

Outer core

made of *melted* iron and nickel

Plate Tectonics

The Earth's heat energy causes movement of material within the Earth. Large continent-sized plates move slowly about the Earth's surface driven by that heat. Millions of years ago, there was only one super continent known as Pangaea. **Plate tectonics** is a theory that the Earth's crust is divided into distinct, moving plates. **Continental drift** is the slow movement of Earth's land masses riding on continental and oceanic plates.



Three pieces of scientific evidence support the theory of plate tectonics:

1. The same fossils have been found on neighboring continents.
2. Scratches made by glaciers have been found on neighboring continents.
3. The seven continents fit together like pieces of a puzzle.

Most earthquakes and volcanoes are located at the boundaries of the plates (faults).

Plate Movement

Convergent boundaries – formed where plates are moving together



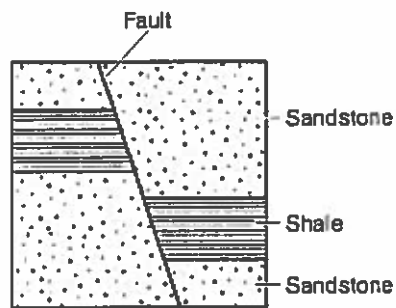
Divergent boundaries – formed where plates are moving apart



Sliding boundaries or transform fault boundaries – formed where plates are sliding past each other



Here you can see how the sediment and rock types no longer match due to an **earthquake**.



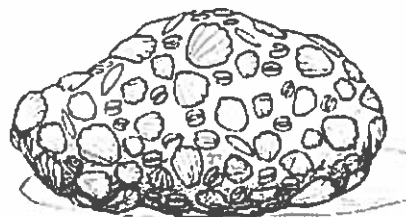
Fossils

Scientific evidence indicates that Earth is about 4.6 billion years old. The age of many rocks can be determined very reliably.



Fossils provide information about life and conditions of the past.

Fossils are typically found in **sedimentary rocks** such as limestone.



Limestone

Typically, your oldest fossils will be found in layer (4) of this diagram of sedimentary rock.

