

5.8 Earth's surface is constantly changing. Key concepts include

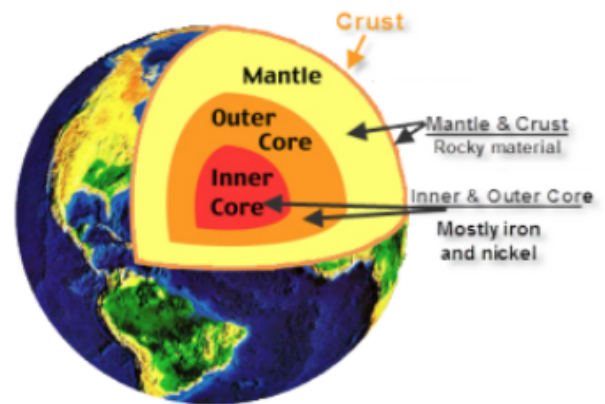
- Earth's internal energy causes movement of material within the Earth;
- plate tectonics describe movement of the crust;
- the rock cycle models the transformation of rocks;
- processes such as weathering, erosion, and deposition change the surface of the Earth; and
- fossils and geologic patterns provide evidence of Earth's change.

5.9 The conservation of energy resources is important. Key ideas include

- some sources of energy are considered renewable and others are not;
- individuals and communities have means of conserving both energy and matter; and
- advances in technology improve the ability to transfer and transform energy.

Central Idea: Earth's geosystem is constantly changing; these changes are modeled in the rock cycle and through plate tectonics.

A system is a set of interrelated parts that make up a unified whole. The **Earth system** is composed of interrelated parts to include the **atmosphere (air)**, **geosphere (solid Earth)**, **biosphere (organisms)**, and **hydrosphere (water)**. Systems are seamlessly connected through the **flow of matter and energy**.

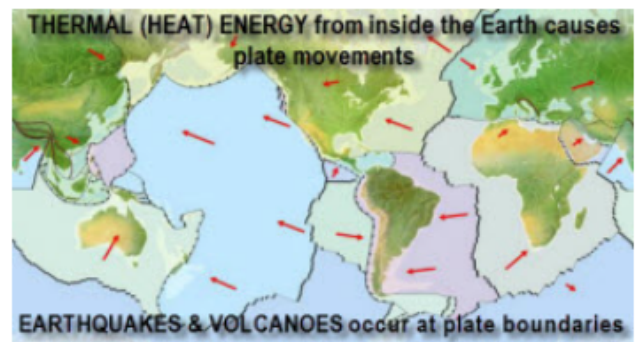


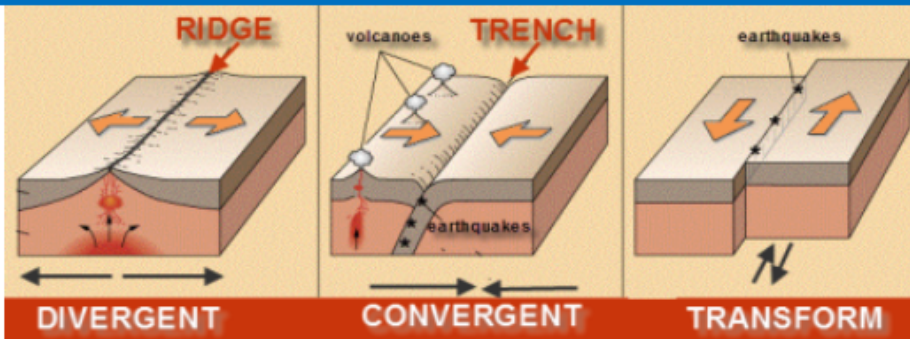
## EARTH'S LAYERS

- Earth is constantly **changing**; these changes occur both on and beneath **Earth's surface**.
- Earth is composed of **four** concentric layers—the **crust**, **mantle**, **outer core**, and **inner 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.

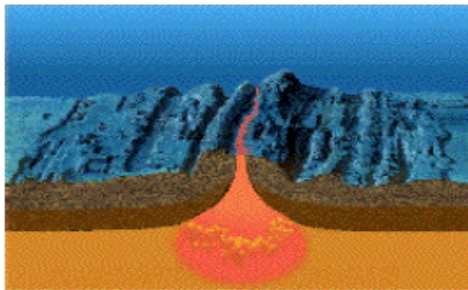
## PLATE MOVEMENT

- Earth's **thermal energy** causes movement of material within Earth.
  - Large continent-size **plates move slowly** about Earth's surface, driven by that **thermal energy**.
- Most **earthquakes** and **volcanoes** are located at the **boundaries** of the plates (**faults**).
- Plates can move
  - toward each other** (**convergent boundaries**),
  - apart** from each other (**divergent boundaries**), or
  - slip past** each other horizontally (**transform boundaries**)

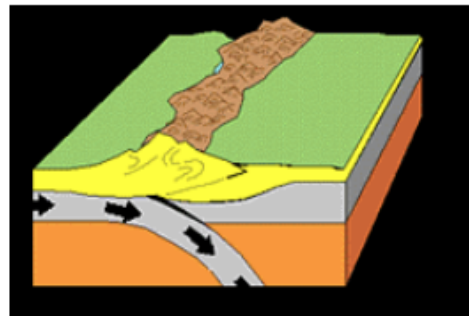




- Geological features in the **oceans** (including **trenches** and **mid-ocean ridges**) and on the continents (**mountain ranges**, including the **Appalachian Mountains**) are caused by current and past **plate movements**.



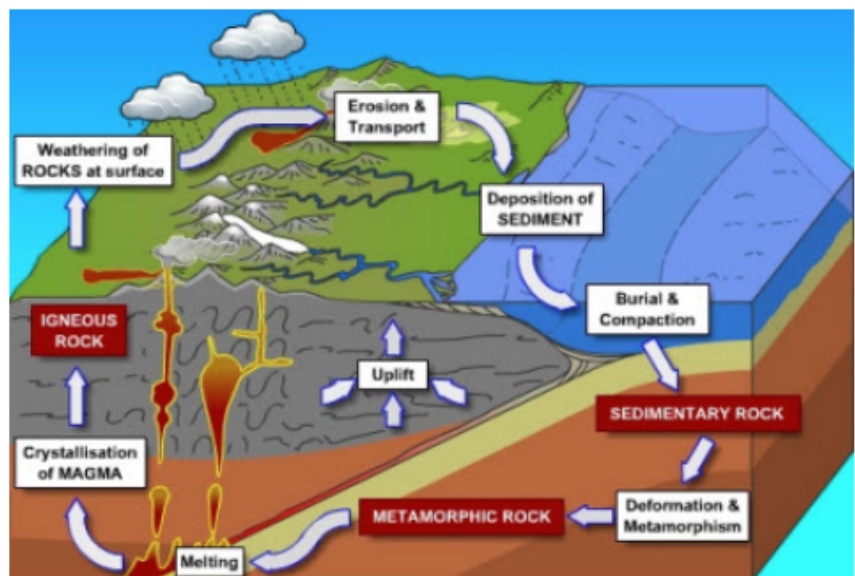
Mid-ocean Ridge Formation



Appalachian Mountain Formation

## ROCK CYCLE

- Rocks move and change** due to **heat and pressure** within Earth and due to **weathering, erosion, and deposition** at the surface.
- These and other processes constantly **change rock** from one type to another.
- Depending on how rocks are formed, they are classified as
  - sedimentary** (layers of sediment cemented together),
  - igneous** (melted and cooled), and
  - metamorphic** (changed by heat and pressure).



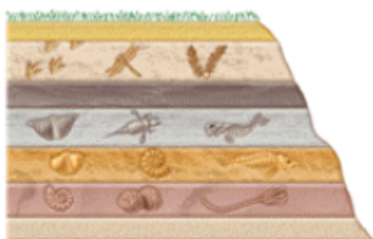
## WEATHERING & EROSION

- Rocks and other materials on Earth's surface are constantly being **broken down** by both **chemical** and **physical weathering**.
  - The products of **weathering** include **clay, sand, rock fragments**, and **soluble substances**.
  - Materials can be moved by **water** and **wind (erosion)** and deposited in new locations as **sediment (deposition)**.



Erosion - sediment moved by water





Fossils may be found in different rock layers

## ANCIENT EARTH - FOSSILS

- **Fossils** provide information about life and conditions in the past.
- Fossils may be found in **different rock layers**, which allows scientists to infer changes in landscapes.

Central Idea: Some resources are considered renewable and others are not. It is possible to conserve energy.

Energy cannot be **created or destroyed**; however, the availability of certain energy sources differs. Most of the energy used in the United States comes from **non-renewable** sources.

- **Nonrenewable energy sources** are natural resources that **cannot be replaced** after they are used because they take millions of years to form.
  - **Fossil fuels** such as **petroleum**, **coal**, and **natural gas** are all nonrenewable energy sources.

- **Renewable energy sources** come from resources that are **replaced naturally** and can be **used again**.
  - Wind energy, water behind dams, and sunlight are examples of renewable energy sources.

### RENEWABLE ENERGY SOURCE



- Energy use affects the **environment** in many ways.
  - In general, **fossil fuels** do more harm to the environment than the use of renewable energy sources.
  - Some harmful consequences of energy use include **air** and **water pollution** and wildlife and **habitat loss**.

### NONRENEWABLE ENERGY SOURCE



- There are many ways to **conserve energy**.
  - In the home, actions such as **turning off** the lights and electronic devices when not in use, taking shorter hot showers, and adjusting the thermostat by a few degrees (higher in summer, lower in winter) will **conserve energy**.
  - Walking or biking instead of taking the car for short trips also **conserves energy**.
- **Advances in technology** continually improve our ability to harness and use energy more efficiently.