

Unit 4: The Rock Cycle

Objective:

E 3.1A Discriminate between igneous, metamorphic, and sedimentary rocks and describe the processes that change one kind of rock into another.

E 3.1B Explain the relationship between the rock cycle and plate tectonics theory in regard to the origins of igneous, sedimentary, and metamorphic rocks.

Expectation 1

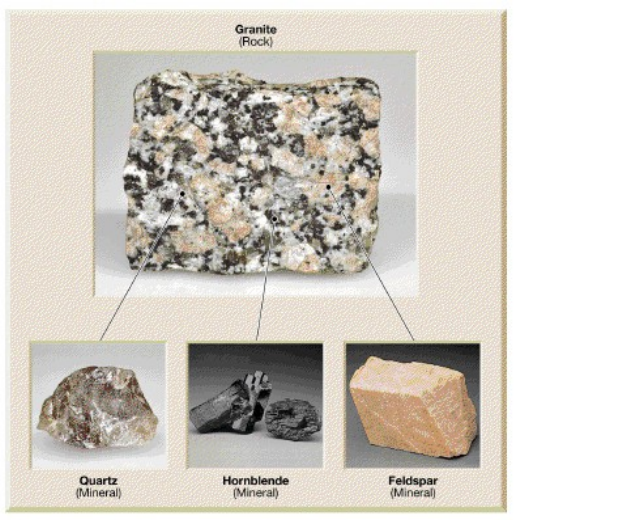
- Discriminate between igneous, metamorphic, and sedimentary rocks and describe the processes that change one kind of rock into another.

What Is a Rock?

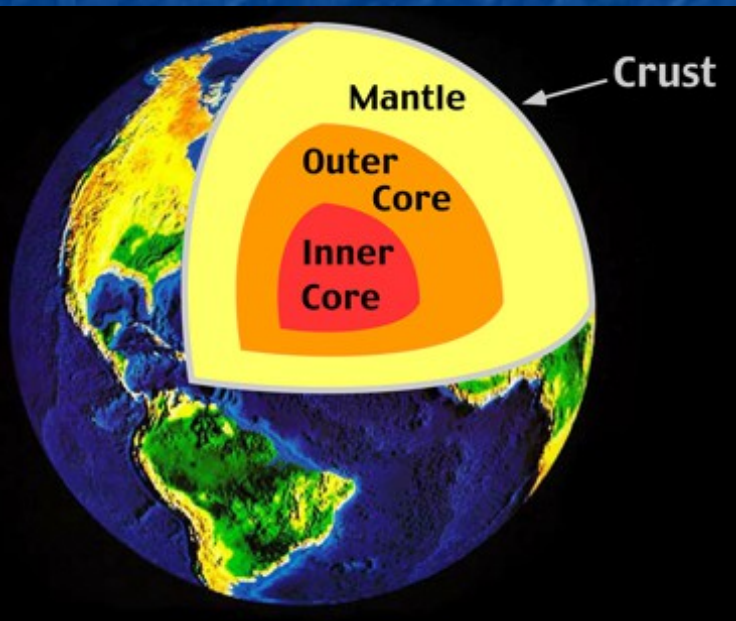
If you could dig a hole straight down through Earth's crust, eventually you would find the sturdy base on which we live, the solid material called rock.

An understanding of Earth's processes requires knowledge about rocks and how they form. In general, a rock is a group of minerals bound together.

Rocks can consist largely of one mineral or of several different minerals in varying quantities.



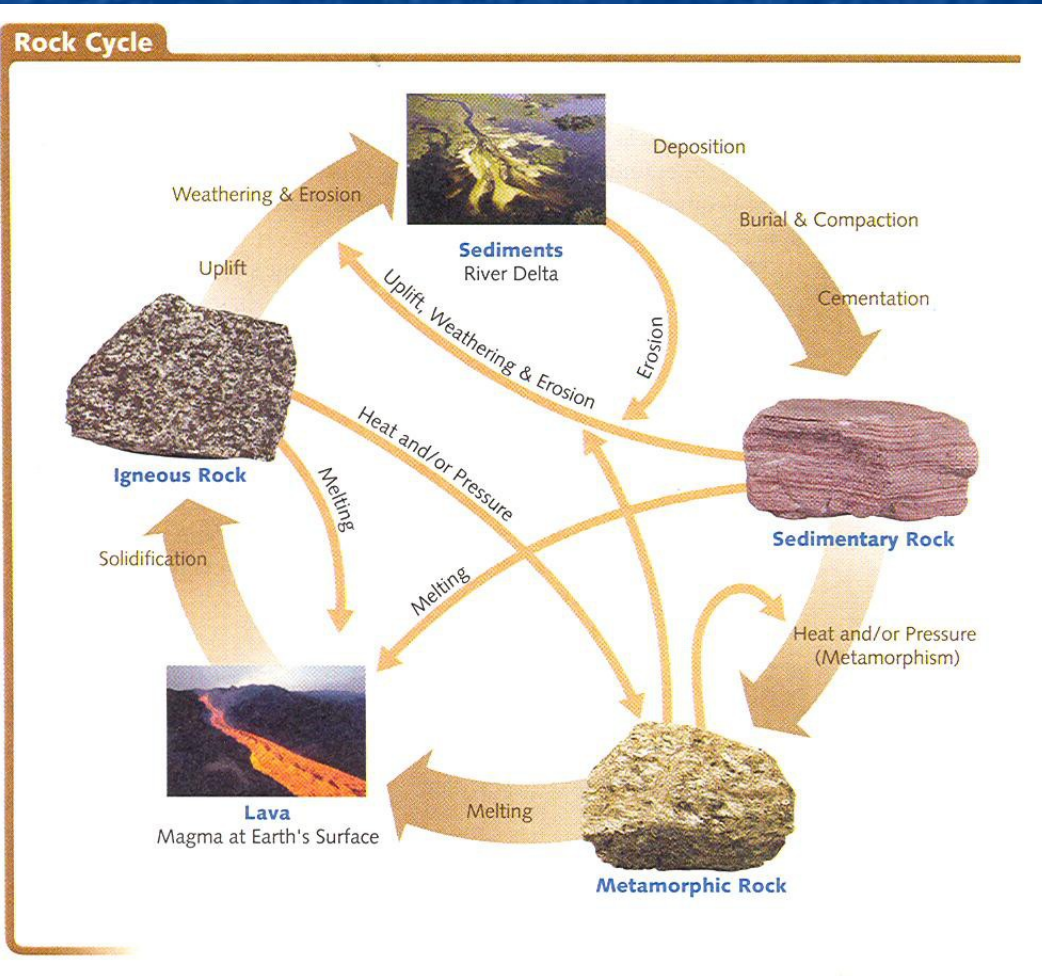
What Is a Rock?



Rocks are found in Earth's crust and mantle. The rocks of the mantle are seldom seen at the surface and are largely similar.

The crust, however, contains many different types of rocks. These rocks can be classified according to the processes by which they are formed.

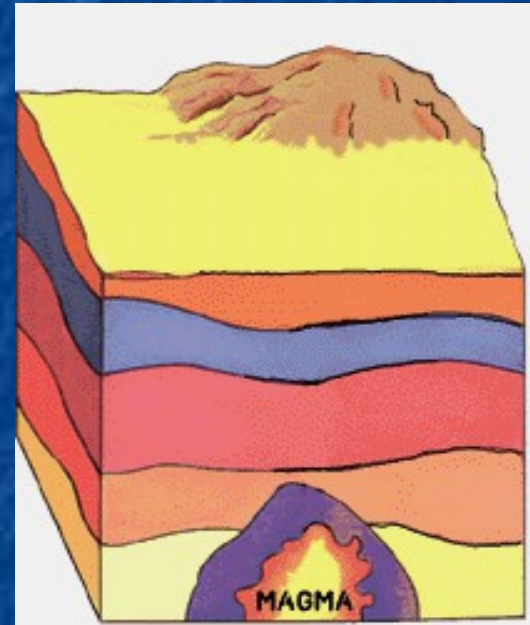
The Rock Cycle



- Rocks form from other rocks.
- Classifying the rocks of the crust according to their origins shows how closely related they are.
- The rock cycle is the repeated series of events by which rock gradually and continually changes from one type to another.

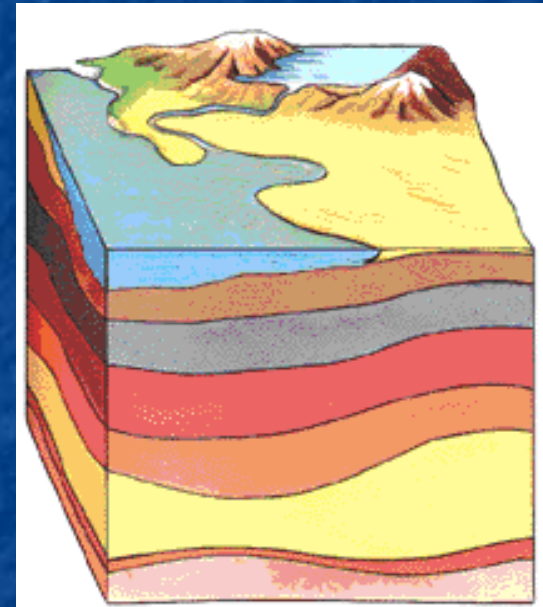
What Is an Igneous Rock?*

- Igneous rocks are usually distinguished by their crystalline texture, ranging from glassy (no crystals) to fine-grained (small crystals) to coarse-grained (large crystals).
- Igneous rocks are formed by the cooling and hardening of hot, molten rock (magma) from inside Earth.



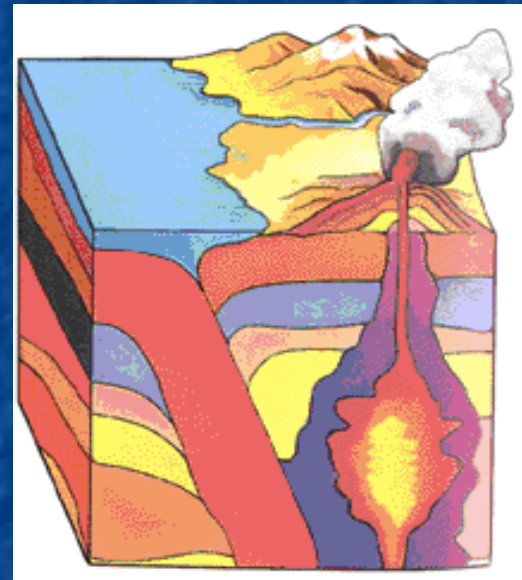
What Is a Sedimentary Rock?*

- Sedimentary rocks are usually distinguished by the size of the sediments which make up the rock. Sizes range from small grains (clay, silt) to medium grains (sand) to large grains (pebbles, cobbles, boulders).
- Sedimentary rocks are formed by the compaction and cementing of layers of sediments. Sediments are materials such as rock fragments, plant and animal remains, or minerals that settle out of solution onto lake and ocean bottoms.



What Is a Metamorphic Rock?*

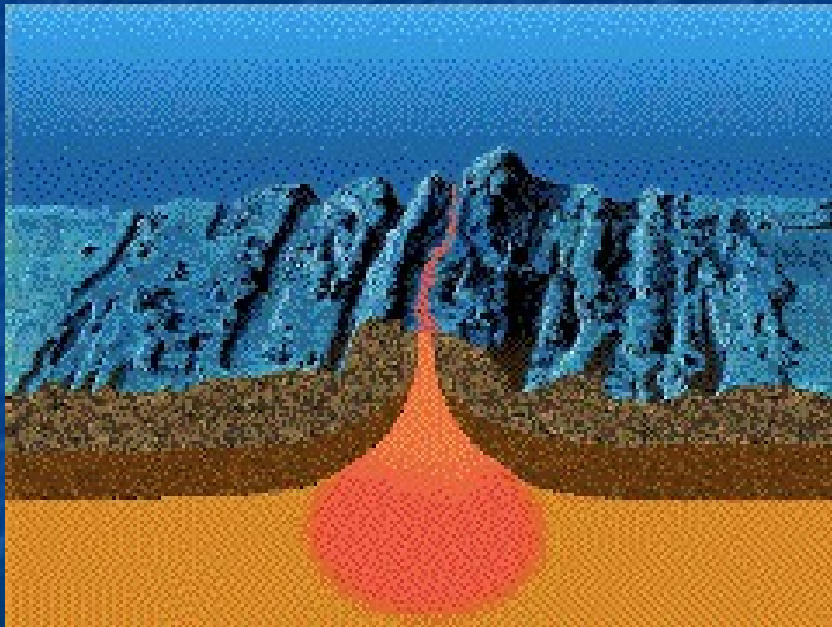
- Metamorphic rocks usually are distinguished by their appearance as either foliated (having bands) or nonfoliated (no visible bands).
- Metamorphic rocks are formed by the effect of heat and pressure on other rocks.



Expectation 2

- Explain the relationship between the rock cycle and plate tectonics theory in regard to the origins of igneous, sedimentary, and metamorphic rocks.

Plate Tectonics*



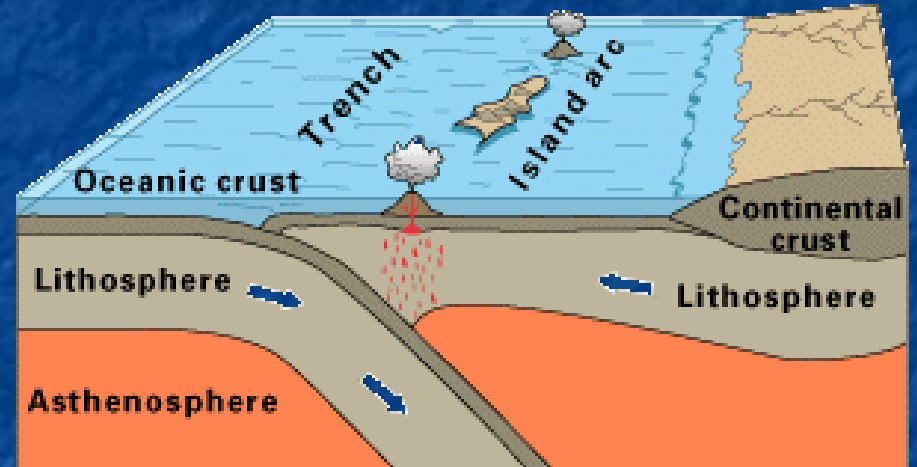
We have learned that igneous rocks are formed by the cooling and hardening of hot, molten rock from inside the Earth.

Two possible plate tectonic “areas” can produce the necessary magma. The first are divergent boundaries. Many of these are found around the ocean floor.

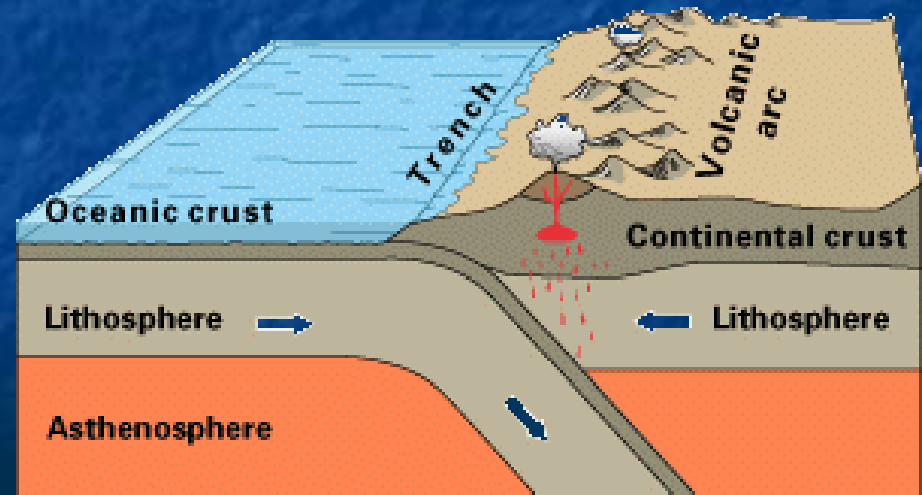
Plate Tectonics*

The second “area” where igneous rocks are created are convergent boundaries.

These areas are located where one plate subducts under another plate.



Oceanic-oceanic convergence



Oceanic-continental convergence

Plate Tectonics*

Plate tectonics is not directly responsible for the creation of sedimentary rocks.

However, plate movement does carry sediments to locations where they are converted into other types of rocks.

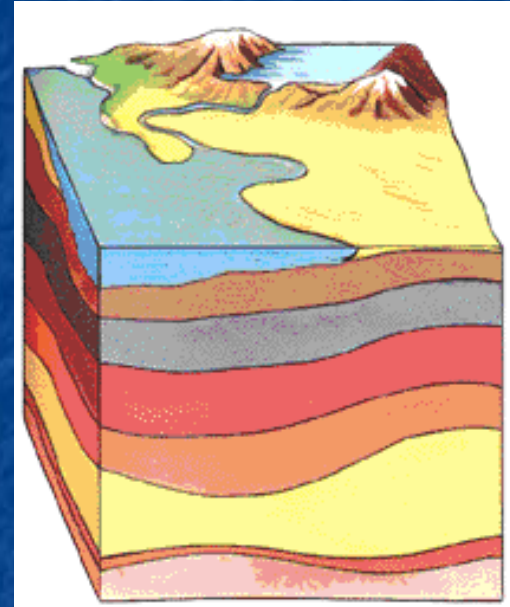


Plate Tectonics*

We have learned that metamorphic rocks are formed by the effect of heat and pressure on rocks.

Three possible “areas” can produce the necessary stress to form metamorphic rocks.

1. Convergent boundaries - where two plates collide.

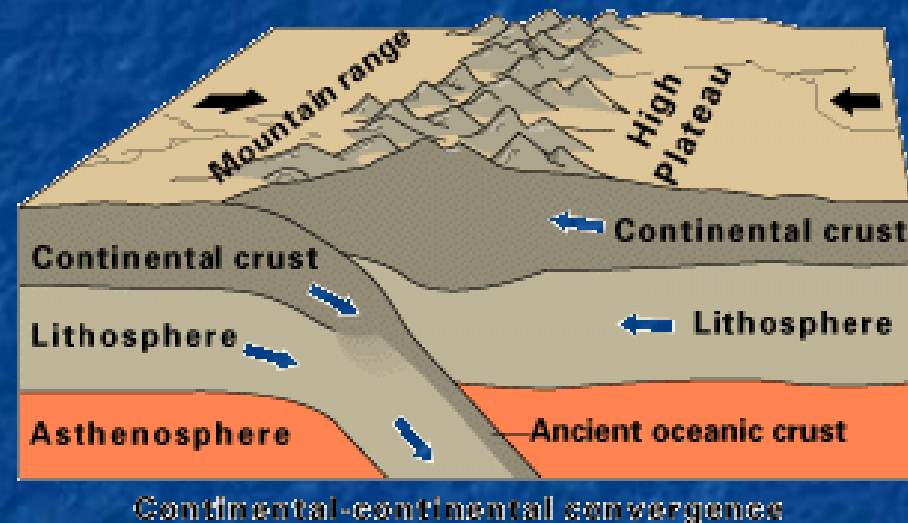
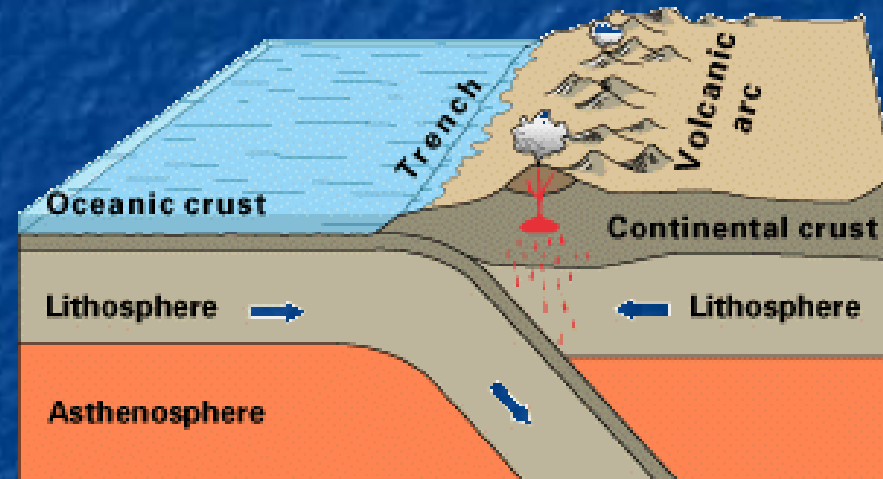


Plate Tectonics

2. Convergent boundaries - where a plate subducts (rubbing against the overlying plate).

3. Transform boundaries - where two plates are trying to pass next to one another.



Oceanic-continental convergence

