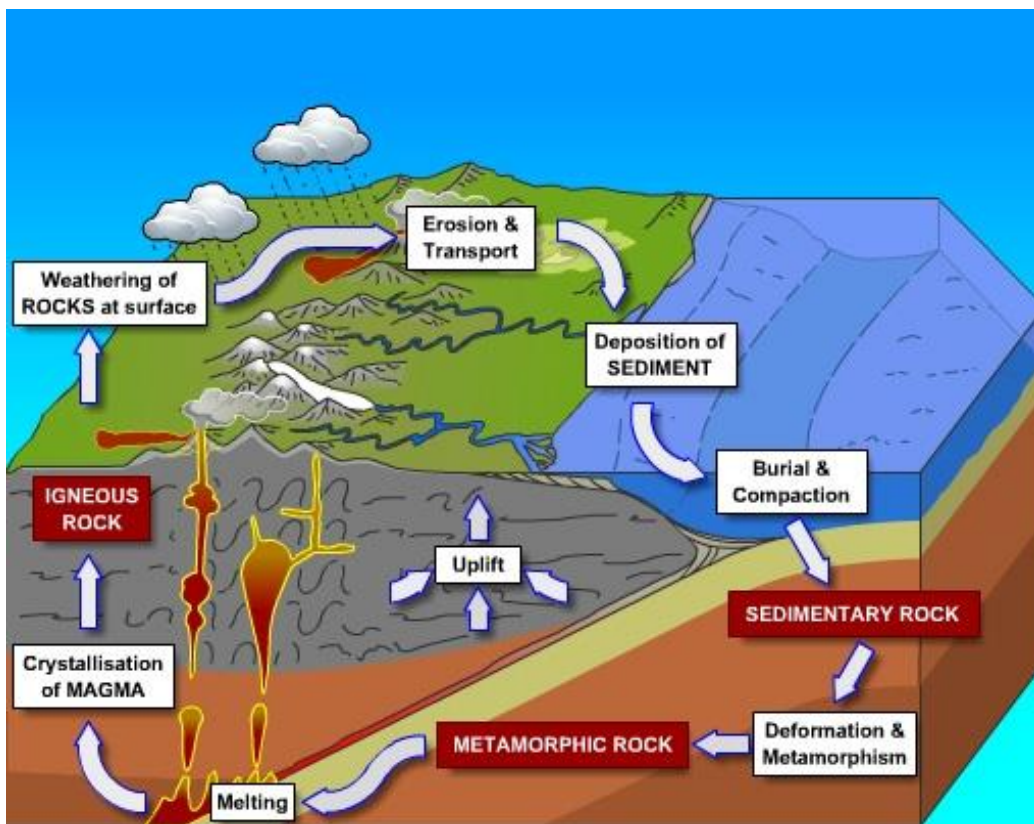
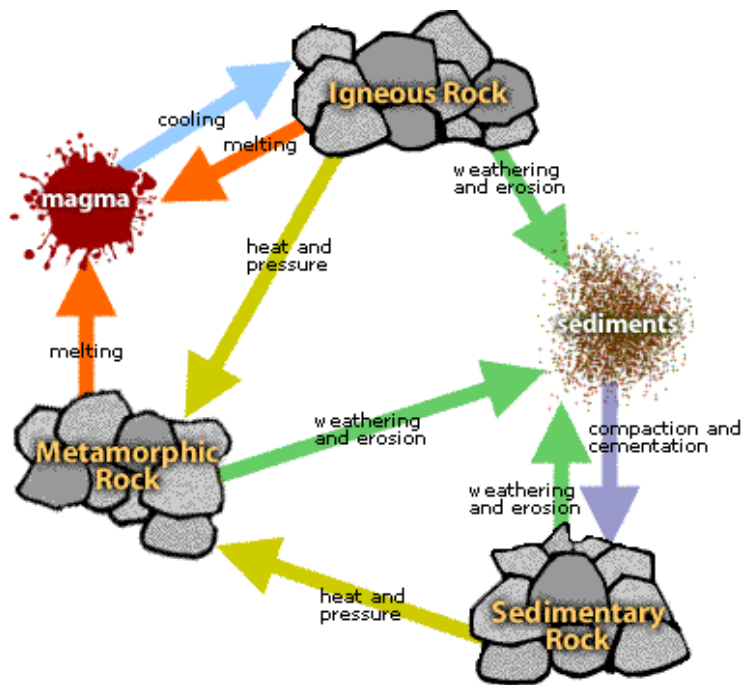


The Rock Cycle!

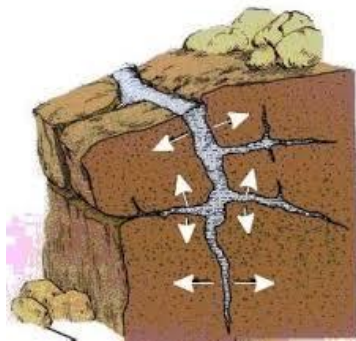
The Rock Cycle is a term used by geologists to describe the way rocks form on our Earth.

It is a dynamic and ever-changing system that defines the process by which the three main rock groups are formed.

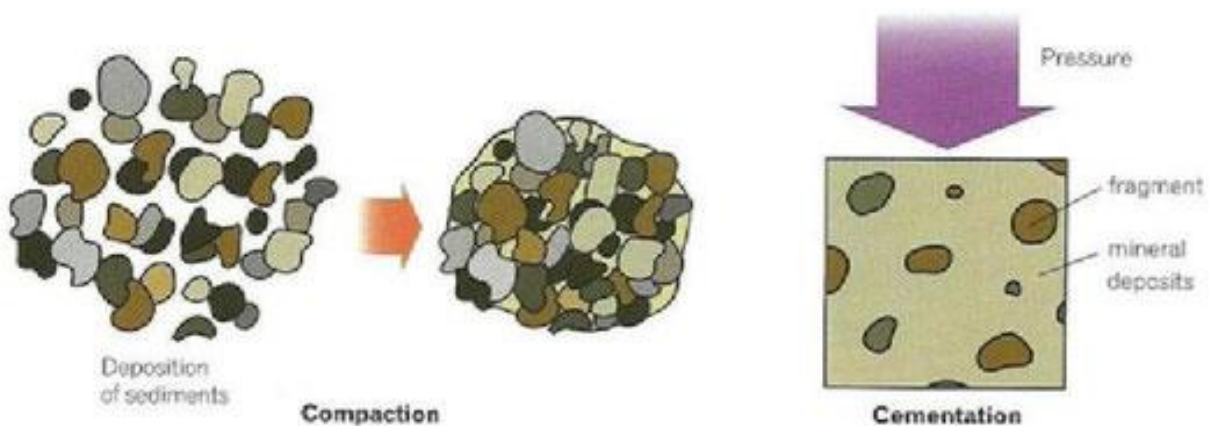


The three main rock groups

A typical rock cycle begins with an **igneous rock** that formed from the cooling and solidifying of molten magma. When igneous rocks are exposed at the surface of the Earth, time and weather break the rock down into smaller and smaller pieces through processes of **weathering** and **erosion**. Weathering occurs **in place**, whereas erosion occurs when wind, water or ice remove and **transport** the weathered surface materials (rocks, soil, mud, etc.) some distance away.

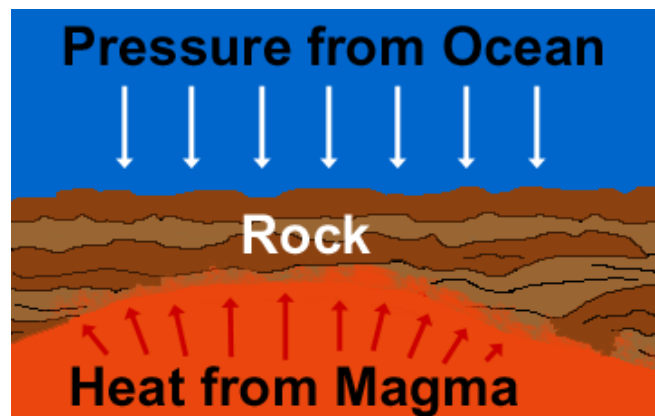


Wind, water and ice carry the smaller pieces of igneous rock some distance and redeposit them into layer upon layer of sediment. Over time, these layers, or beds of sediment are buried and the pieces of rock are **compacted** and **cemented** together to form a new type of rock called **sedimentary rock**. Compaction occurs when the sediment is squeezed and the pore space (empty space) between the grains is reduced from the **weight** and **pressure** of the overlying layers of sediment. Cementation happens when the grains in the sediment are **glued** together by minerals that are dissolved in water passing through the sediment.

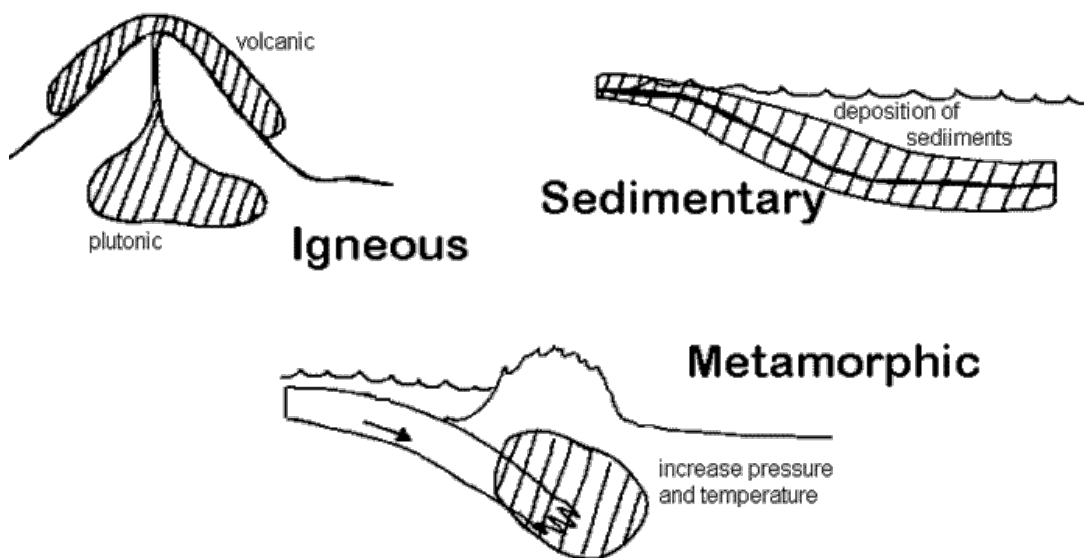


The sedimentary rock can also be weathered, eroded, and redeposited into a new sedimentary rock. However, this rock may continue to be buried deeper and deeper below the Earth's surface. Eventually there will be enough **heat** from below, and **pressure** from burial to essentially 'bake' the rock and change it to something new. This process of change is called **metamorphism** and the new rock is called a **metamorphic rock**. Igneous rocks can also be metamorphosed into new metamorphic rocks.

Metamorphic rocks can also be weathered and eroded and eventually changed into sedimentary rocks. They can also be forced deeper into the Earth where they can **melt** and become **magma**. If this magma cools and hardens, it will form a new igneous rock; igneous and sedimentary rocks can also be forced deep into the Earth and undergo the same process of



melting into magma. Once this magma rises to shallower depths or reaches the Earth's surface, it will cool and form an igneous rock and so the cycle begins!



The three main rock groups

Sedimentary rocks

Where: These are formed on the surface of the Earth.

How: These are formed when eroded particles from existing rocks are displaced by water, wind or ice and eventually settle layer upon layer and harden over time (compaction and cementation).

Examples:

- limestone (formed in shallow seas)
- sandstone
- mudstone or shale



Metamorphic rocks

Where: These are formed underground.

How: These are formed when sedimentary, igneous or other metamorphic rocks found under the surface of the Earth are exposed to extreme heat and pressure. As you move deeper and deeper below the Earth's crust, it becomes hotter. The pressure also increases because of the weight of all the rocks from above.

Examples:

- quartzite (metamorphosed sandstone)
- slate (metamorphosed shale)
- marble (metamorphosed limestone)



Igneous rocks

Where: These are formed under the surface of the Earth (**intrusive igneous rock**) or on the surface as volcanoes (**extrusive igneous rock**).

How: These are formed from molten rock that cools and eventually hardens below, or on the surface of the Earth.

Examples:

- basalt (igneous extrusive from volcanoes)
- rhyolite (igneous extrusive from volcanoes)
- granite (igneous intrusive from deep below the Earth's surface)



Simple Key to Identifying Main Rock Groups

- 1) Is the rock made of rounded grains or crystals?
 - a. If rounded grains, then sedimentary.
 - b. If crystals, then igneous or metamorphic.
- 2) Are the crystals arranged in layers or randomly?
 - a. If layers, then metamorphic.
 - b. If randomly, then igneous.
- 3) If igneous, are the crystals fine (very small, hard to see without the use of a magnifying glass) or coarse (easily seen without the use of a magnifying glass)?
 - a. If crystals fine, then volcanic (extrusive igneous rock).
 - b. If crystals coarse, then intrusive igneous rock (e.g., granite).

