

# Earth Science 11

## Unit 3 – Minerals and Rocks

### Day 10 – Metamorphic Rocks

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Block: \_\_\_\_\_

**Metamorphism:** \_\_\_\_\_ when rocks are changed by heat and pressure

Metamorphism means “to change form”

Usually look very different from the original rocks (parent rocks)

**Formation of metamorphic rocks:**

- Most metamorphic changes occur at elevated temperatures and pressures.
- There are two forms of metamorphism based on setting. 1) Contact metamorphism  
2) Regional metamorphism

**Contact Metamorphism:** \_\_\_\_\_

During contact metamorphism, hot magma moves into rock.

This is also known as low-grade metamorphism.

One example is marble... magma intrudes into limestone to make marble.

**Regional Metamorphism:** \_\_\_\_\_

Regional metamorphism results in large-scale deformation and high-grade metamorphism.

Basically this is when large areas of rocks are put under extreme pressures and temperatures.

**Causes of Metamorphism:** heat, pressure, and hydrothermal solutions.

Rocks are usually subjected to all three of these things at the same time.

**Heat:**

- The most important agent of metamorphism.
- Provides the energy needed to drive the chemical reactions.
- These cause minerals to re-crystallize or new ones to form.
- Comes from two locations – magma & change in the depth

**Pressure:**

- Pressure increases with depth – the farther you go under the earth's surface, the more pressure the rocks are under.
- This causes rocks to be more compact.
- These will also cause the minerals to flatten out instead of stay rounded and break.

**\*\*This is why some mountains and rocks look like they are layered.\*\***

**Hydrothermal Solutions:**

- The hot water around the rock help minerals re-crystallize by dissolving original minerals and then depositing new ones.
- The overall composition of the rock may change



## Classification of Metamorphic Rocks:

Metamorphic rocks can be classified by texture and composition.

### Foliated vs. Non-Foliated

Texture (see examples below) and Grain Size (mm)

#### Foliated Metamorphic Rocks:

- The texture looks banded... it kind of looks striped.
- Occurs because of contact metamorphism and the rock becomes more compacted.
- Examples: slate, gneiss, schist



#### Non-Foliated Metamorphic Rocks:

- Does not have a banded (striped) texture.
- Most contain only one kind of mineral.
- Example: marble, quartzite, anthracite



#### Fancy words to describe textures:

**Granoblastic:** very dense, granular, fine-grained, similar crystal size.... "textural equilibrium"

**Sandy:** looks like... you guessed it... sand

**Gneissic Bedding:** refers to the segregation of light and dark minerals into bands

**Crystalline:** any rock composed entirely of crystallized minerals without glassy matter (not igneous ext)

**Slaty:** flat orientation of the small platy crystals (mica & chlorite). Dull in appearance. Looks "slaty"

**Schistosity:** parallel alignment of platy and lath-shaped mineral. Looks like shiny muscovite/biotite.

**Porphyroblastic:** a large mineral crystal in a metamorphic rock which has grown within the finer grained matrix

**Phyllitic:** very small grains and shiny, crenulated (crinkled) surfaces. They also split apart easily.

Rocks with phyllitic texture, are slightly more metamorphosed than those with slaty texture

**Textural Evolution with increasing metamorphic grade ON THE SAME ROCK :**

