Rocks and the Rock Cycle Notes

Mrs. Weimer

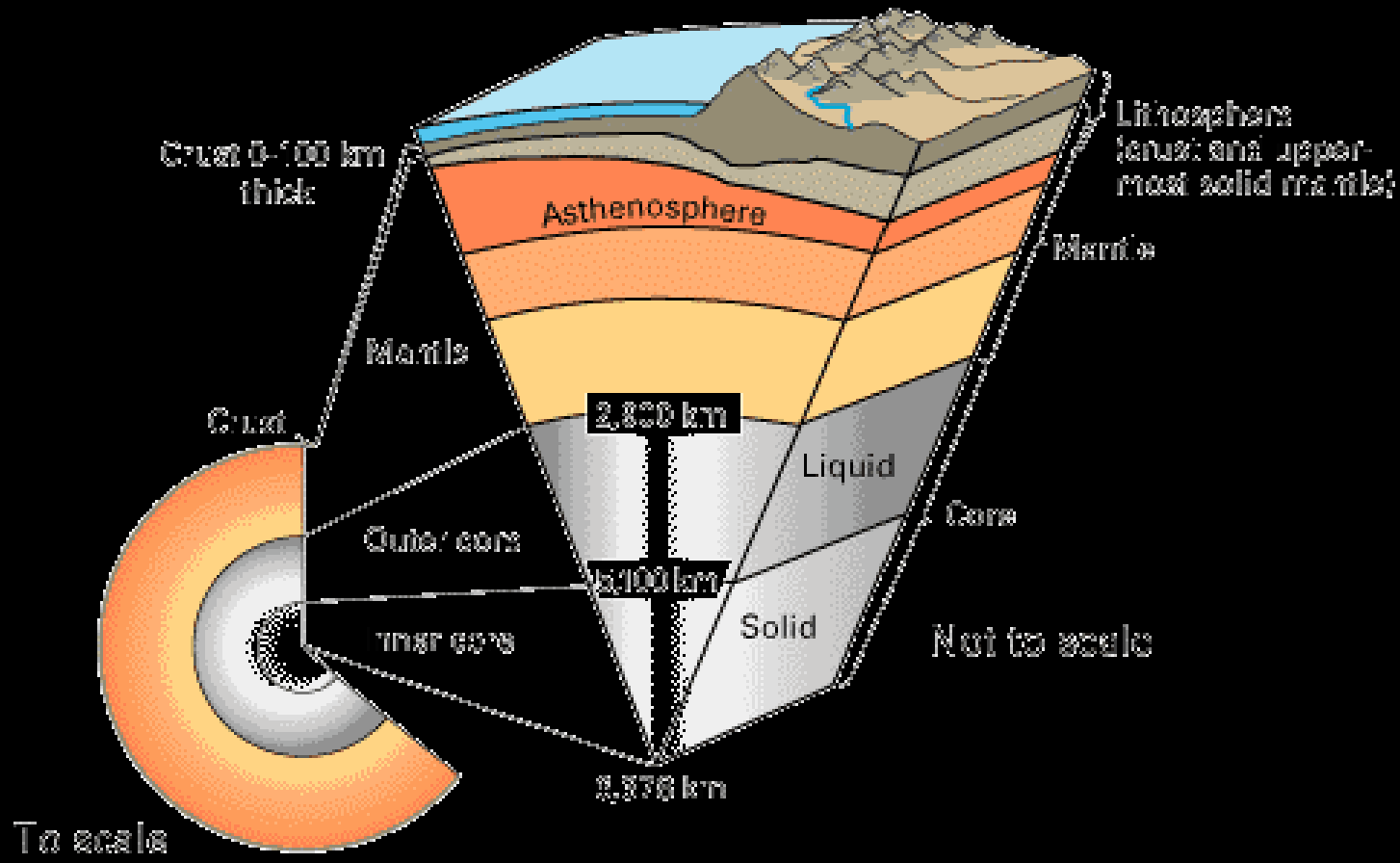
What is a mineral?

- A mineral is a naturally occurring inorganic solid, with a definite chemical composition, and an ordered atomic arrangement. (nonliving)
- **Minerals are naturally occurring-humans do not make them**
- **Minerals are inorganic**-They have never been alive and are not made up from plants or animals
- **Minerals are solids**-They are not liquids (like water), or gases (like the air around you)
- **Minerals have a definite chemical composition** -Each one is made of a particular mix of chemical elements
- **Minerals have an ordered atomic arrangement**-The chemical elements that make up each mineral are arranged in a particular way - this is why minerals 'grow' as crystals

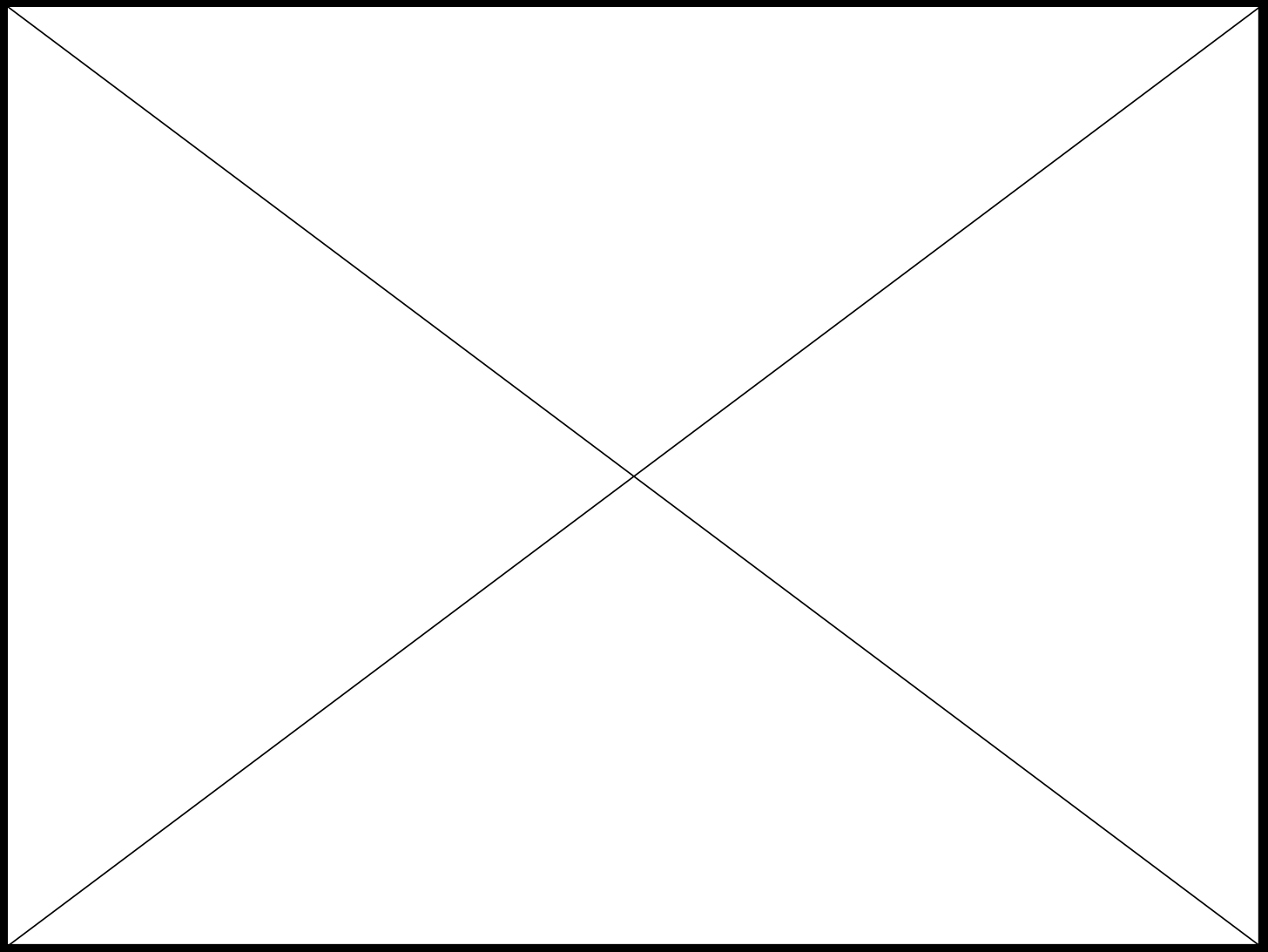
Tend to maintain their crystal shape

Layers of the Earth

- Crust
- Mantle
- Core



How are rocks made and cycled?



Three forms of Rock

- Igneous
- Sedimentary
- Metamorphic

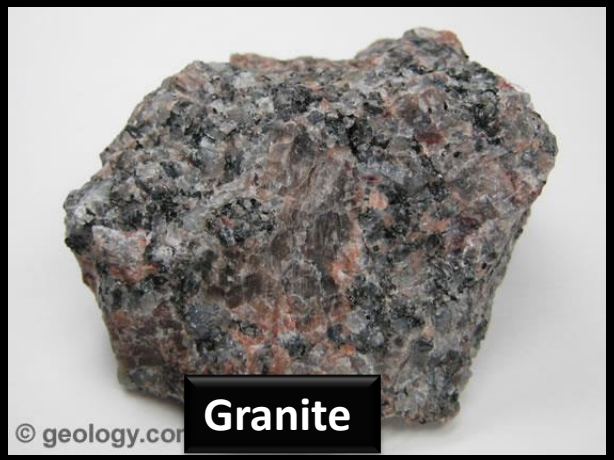
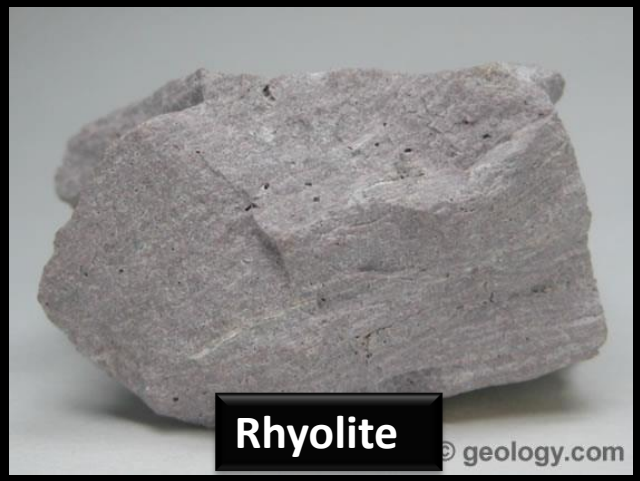
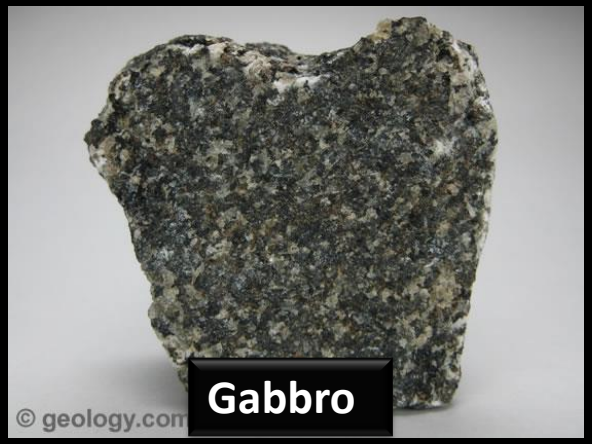
Igneous

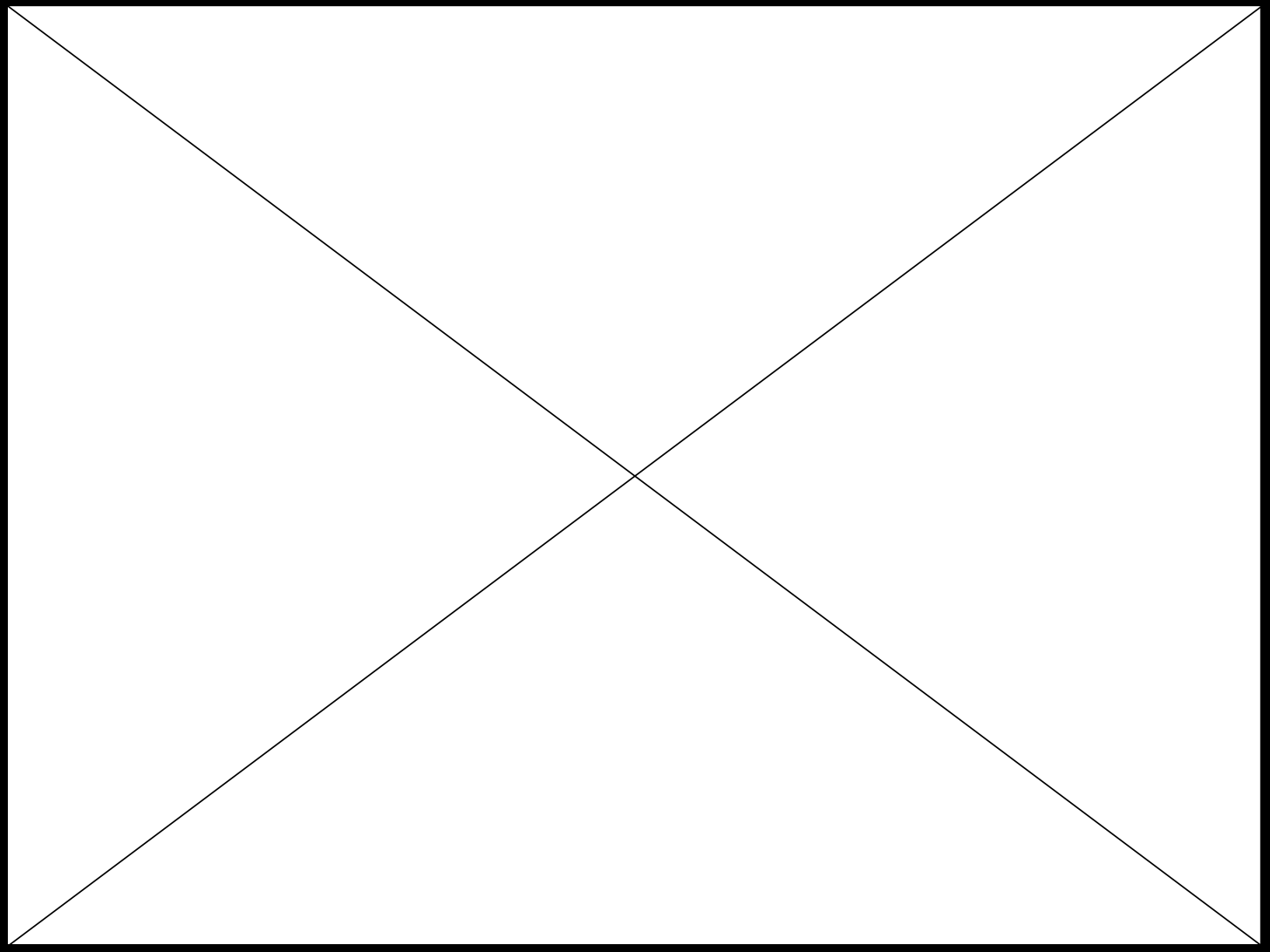
- Formed from Volcanic Action

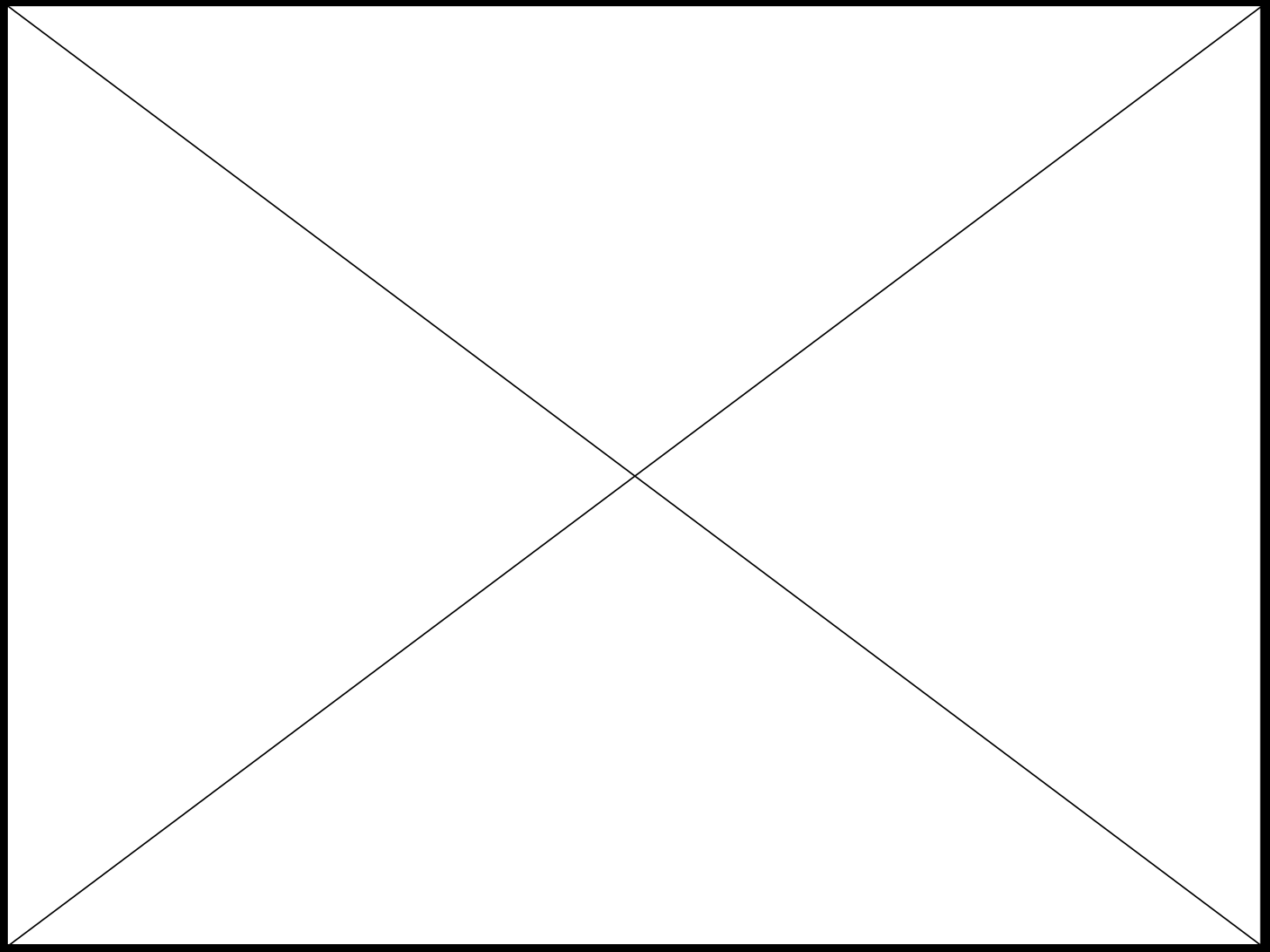
Igneous Rocks-Physical Forms

- Felsic: light colored rocks that are rich in elements such as aluminum, potassium, silicon, and sodium
- Mafic: dark colored rocks that are rich in calcium, iron, and magnesium, poor in silicon
- Coarse-grained: takes longer to cool, giving mineral crystals more time to grow
- Fine-grained: cools quickly with little to no crystals

Igneous Rocks

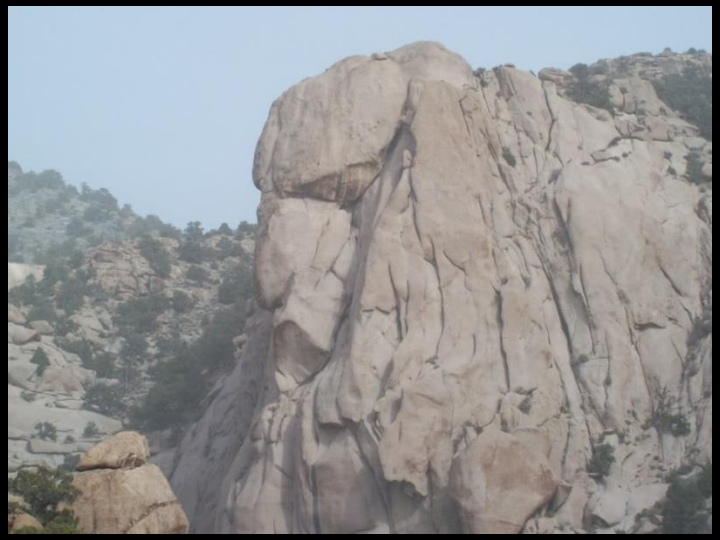
	Coarse-Grained	Fine-Grained
Felsic-LIGHT		
Mafic-DARK		





Types of Igneous Rocks

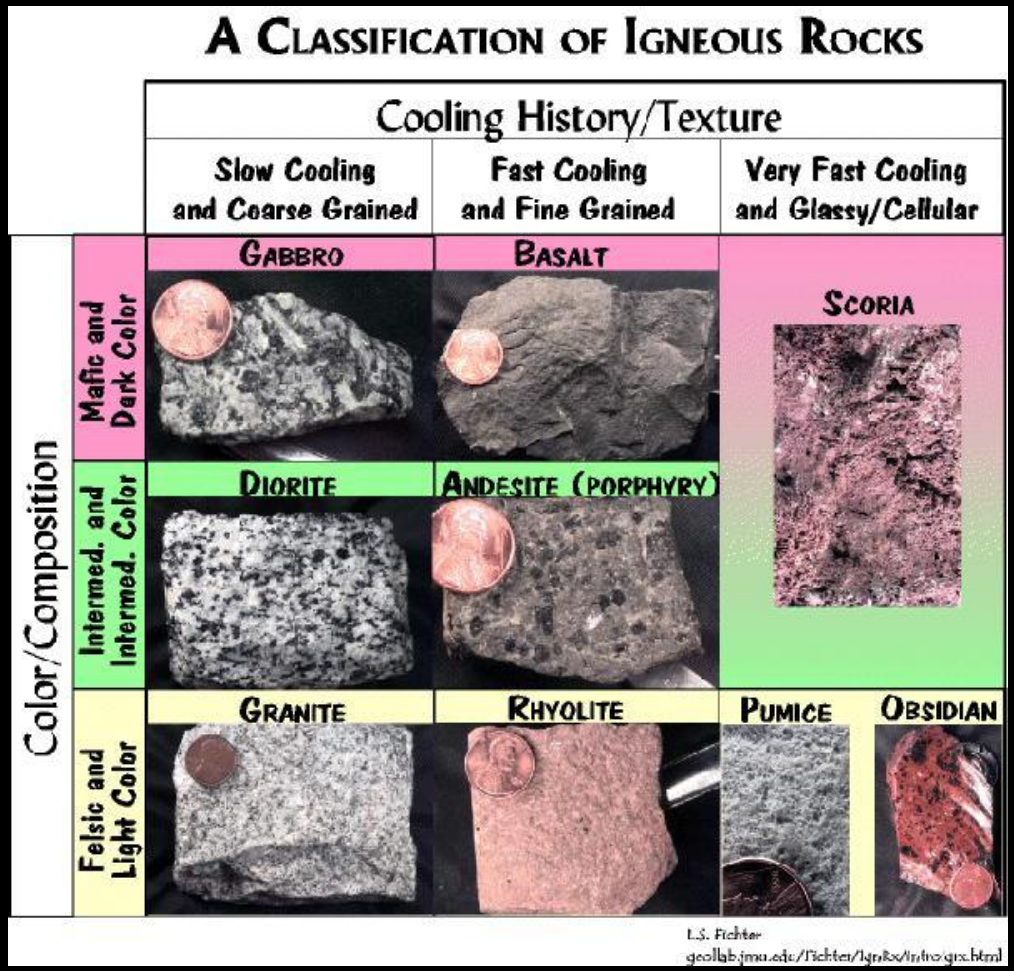
- PLUTONIC
  - is intrusive igneous rock that is crystallized from magma slowly cooling below the surface of the Earth.



- Intrusive
  - **Igneous** rocks which form by the crystallization of magma at a depth within the Earth

- Extrusive
  - **Extrusive** refers to the mode of **igneous** volcanic rock formation in which hot magma from inside the Earth flows out (extrudes) onto the surface as lava

Examples of Igneous Rocks



REVIEW-Igneous Rocks (not on notes)

Obsidian is a dark-colored volcanic glass that forms from the very rapid cooling of molten rock material. It cools so rapidly that crystals do not form.

Is this rock Felsic or Mafic?

Is it fine-grained or coarse-grained?

Is this rock Intrusive or Extrusive?

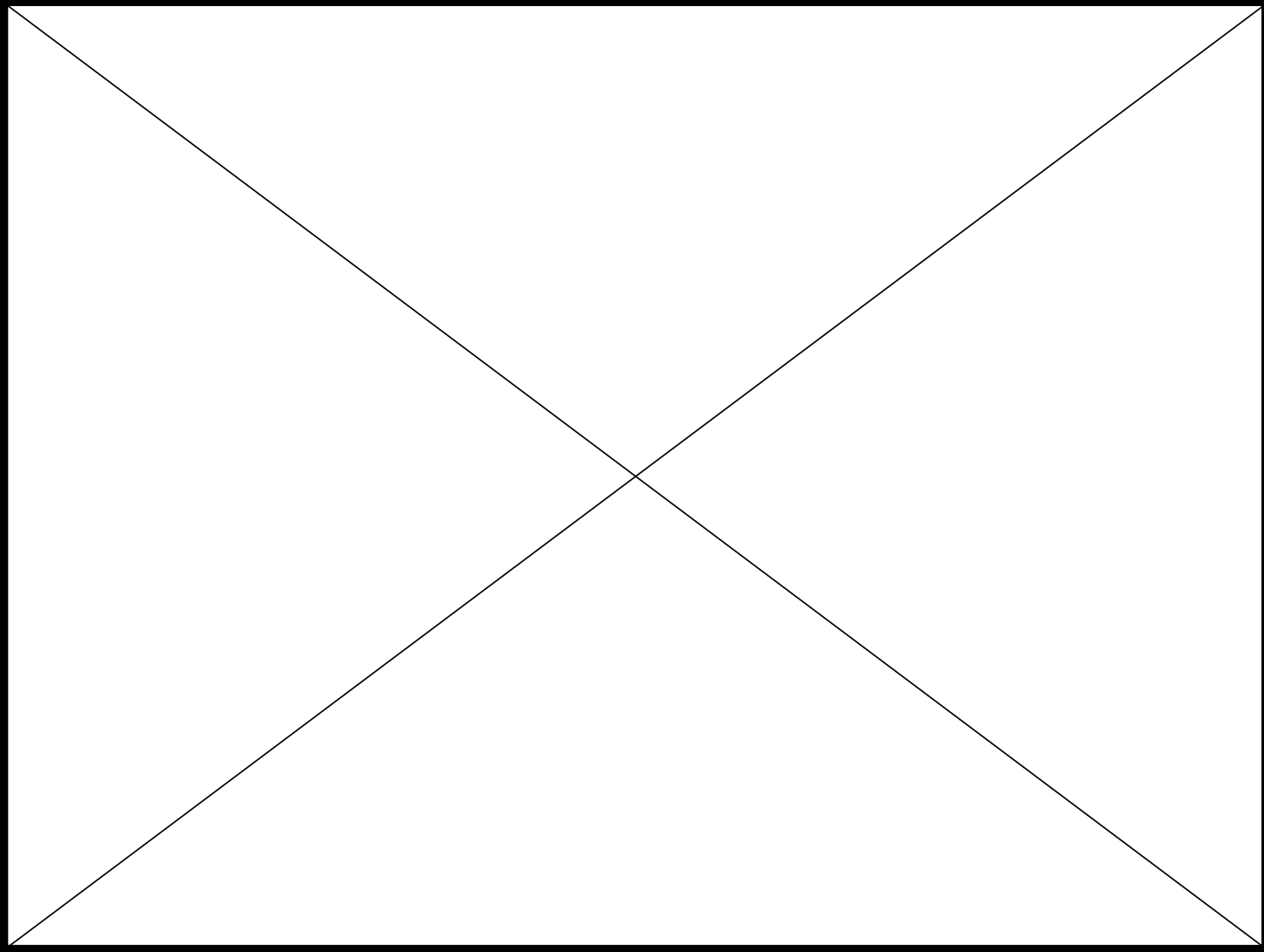
Mafic, fine grained, extrusive

SEDIMENTARY ROCKS

- Formed from igneous, metamorphic, or other sedimentary rocks. When these rocks are exposed at the earth's surface they begin the long slow but relentless process of becoming sedimentary rock.

Cementation

- TASK:
- Individually, on your notes, summarize how sedimentary rocks are formed though cementation.



Erosion

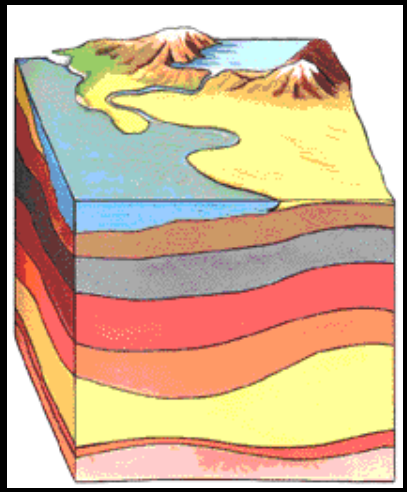
- Breaking down rocks and soil with wind and water
  - http://ees.as.uky.edu/sites/default/files/elearning/module08swf.swf

Difference in WEATHERING AND EROSION

- WEATHERING-No movement is involved in weathering,; it is the breakdown of rock
- EROSION-when those weathered items are transported

REVIEW-Sedimentary Rocks

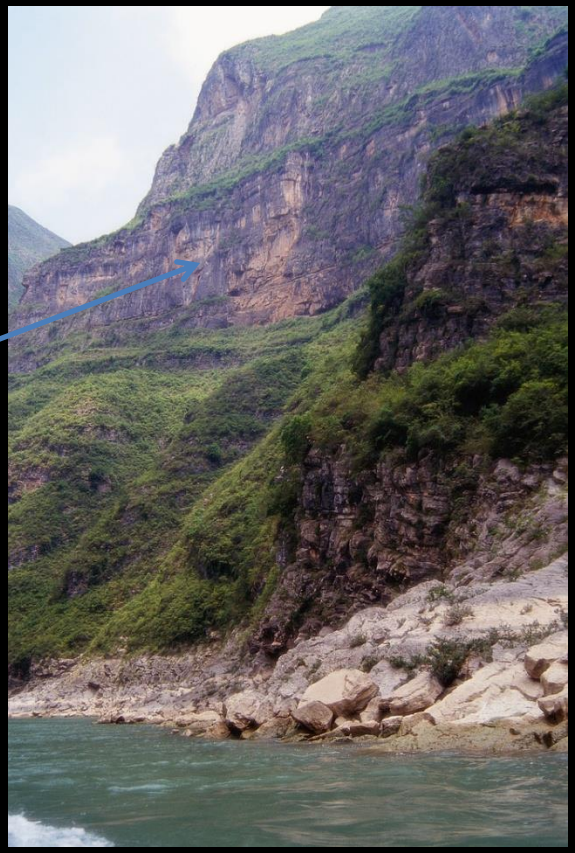
- Sedimentary rock is formed by erosion and weathering
- Sediments are moved from one place to another
- Sediments are deposited in layers, with the older ones on the bottom
- The layers become compacted and cemented together-cementation



http://www.fi.edu/fellows/payton/rocks/create/sediment.htm

Sedimentary Rock

- Sedimentary Rocks are formed at or near the Earth's surface
- No heat and pressure involved
- Strata – layers of rock
- Stratification – the process in which sedimentary rocks are arranged in layers



Sedimentary Rock

Clastic – made of fragments of rock cemented together with calcite or quartz

Breccia is a term most often used for clastic sedimentary rocks that are composed of large angular fragments (over two millimeters in diameter).

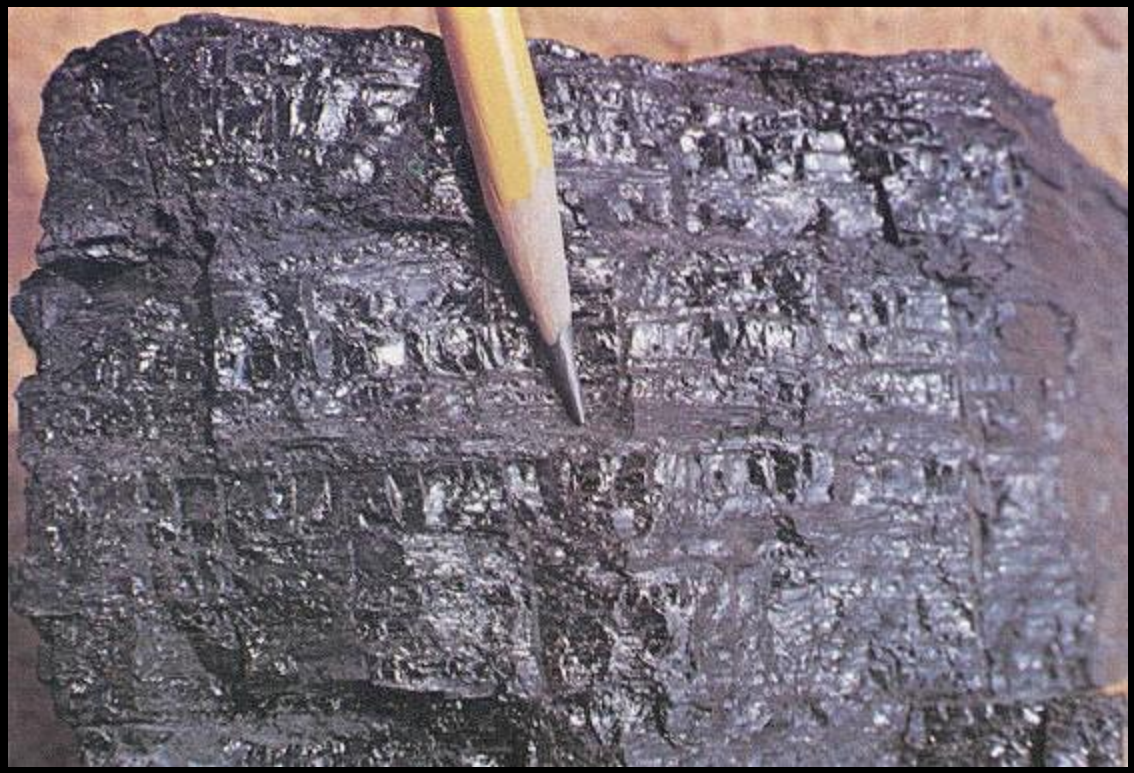
The spaces between the large angular fragments can be filled with a matrix of smaller particles or a mineral cement that binds the rock together.

Sedimentary Rock

Organic sedimentary – remains of plants and animals

Coal is an organic sedimentary rock that forms from the accumulation and preservation of plant materials, usually in a swamp environment.

Coal is a combustible rock and along with oil and natural gas it is one of the three most important fossil fuels.



Sedimentary Rock

Chemical sedimentary – minerals crystallize out of solution to become rock

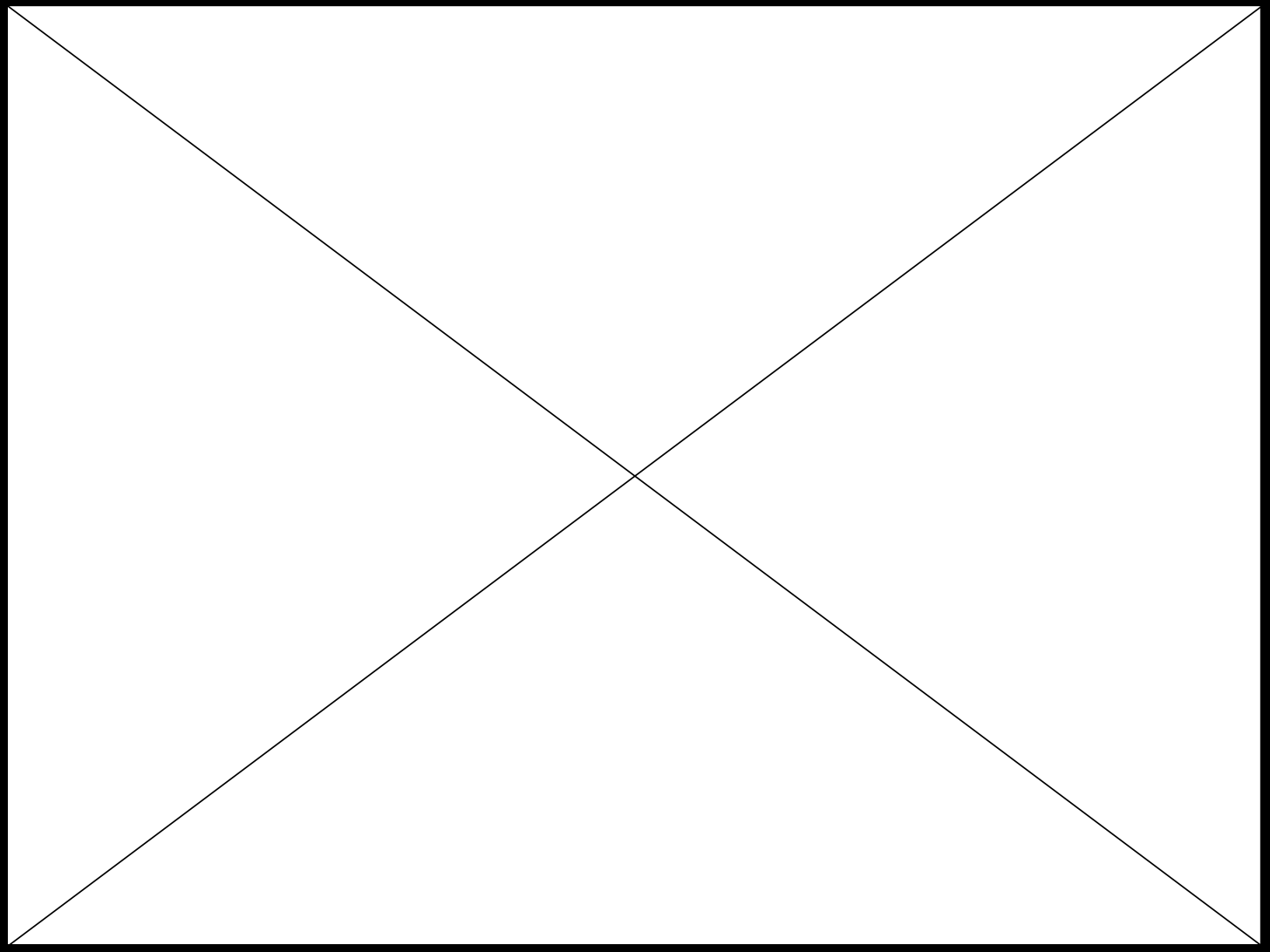
Limestone is a sedimentary rock composed primarily of calcium carbonate ($CaCO_3$) in the form of the mineral calcite. It most commonly forms in clear, warm, shallow marine waters.

It is usually an organic sedimentary rock that forms from the accumulation of shell, coral, algal and fecal debris.

Examples of Sedimentary Rocks

FOSSILS

- **Fossils are generally found in sedimentary rocks formed by soft silts and muds.**
  - **The soft sediment preserves the fine details in the bones, teeth, and leaves of plants.**
  - **Sometimes sediments fill an opening in a bone or shell and leave behind a cast of the inside of the living thing.**
  - **Plants are often fossilized in soft sediments which preserve the structure of the veins in the leaves.**

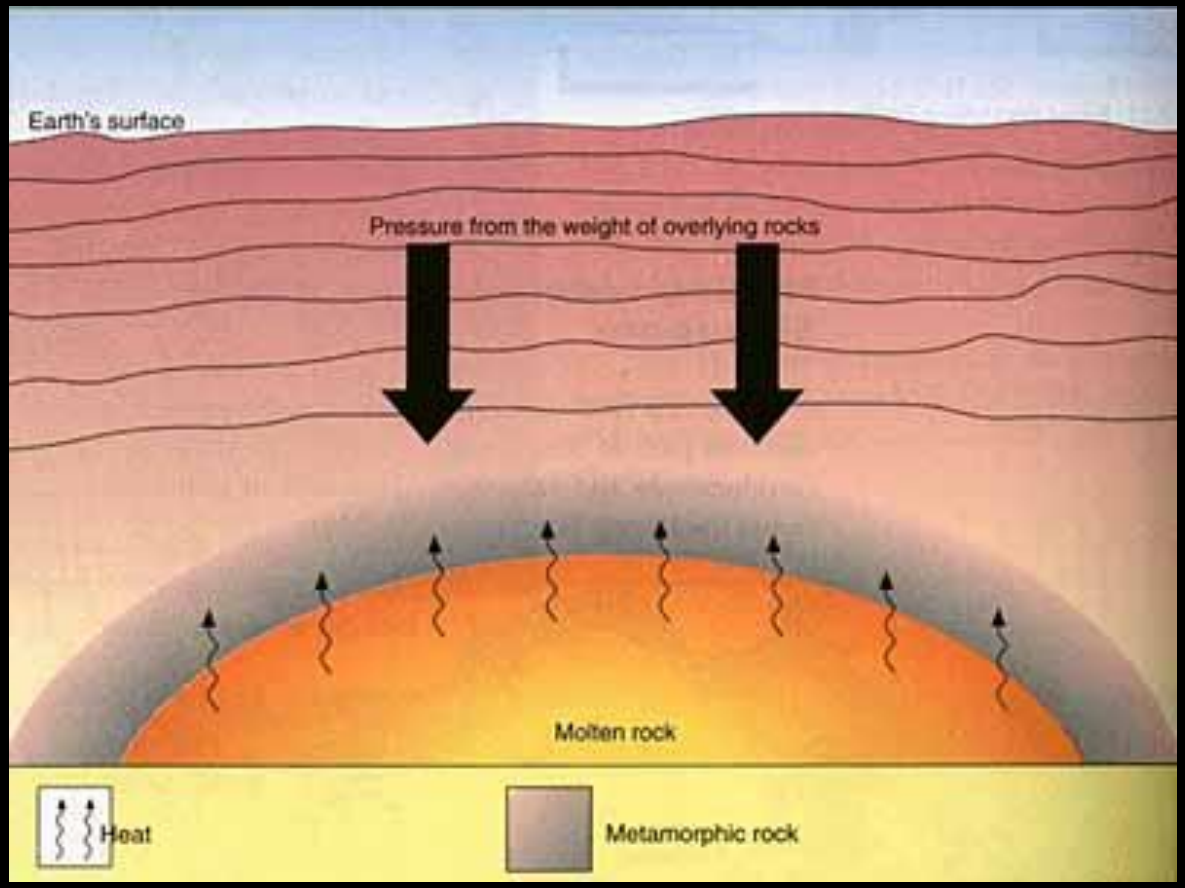


TASK

- In the next 10 minutes, use the 4 boxes on your notes to make a comic strip outlining the process of fossilization.
  - Must be colored
  - All 4 boxes must be filled
  - Must have captions for each box
  - EACH BOX IS WORTH 3 POINTS=____/12 points
- Mrs. Weimer will be around to check your work and initial it.

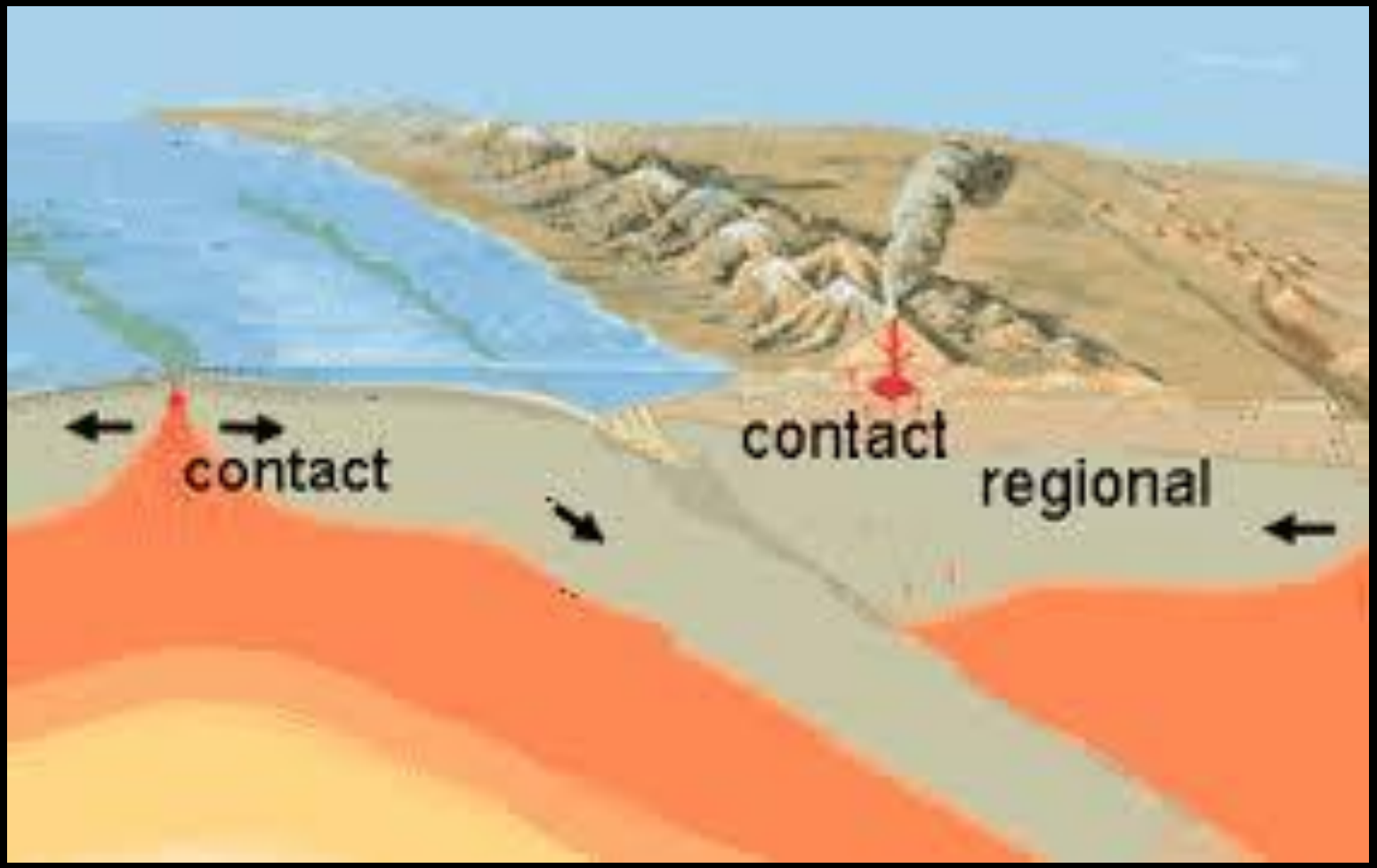
METAMORPHIC

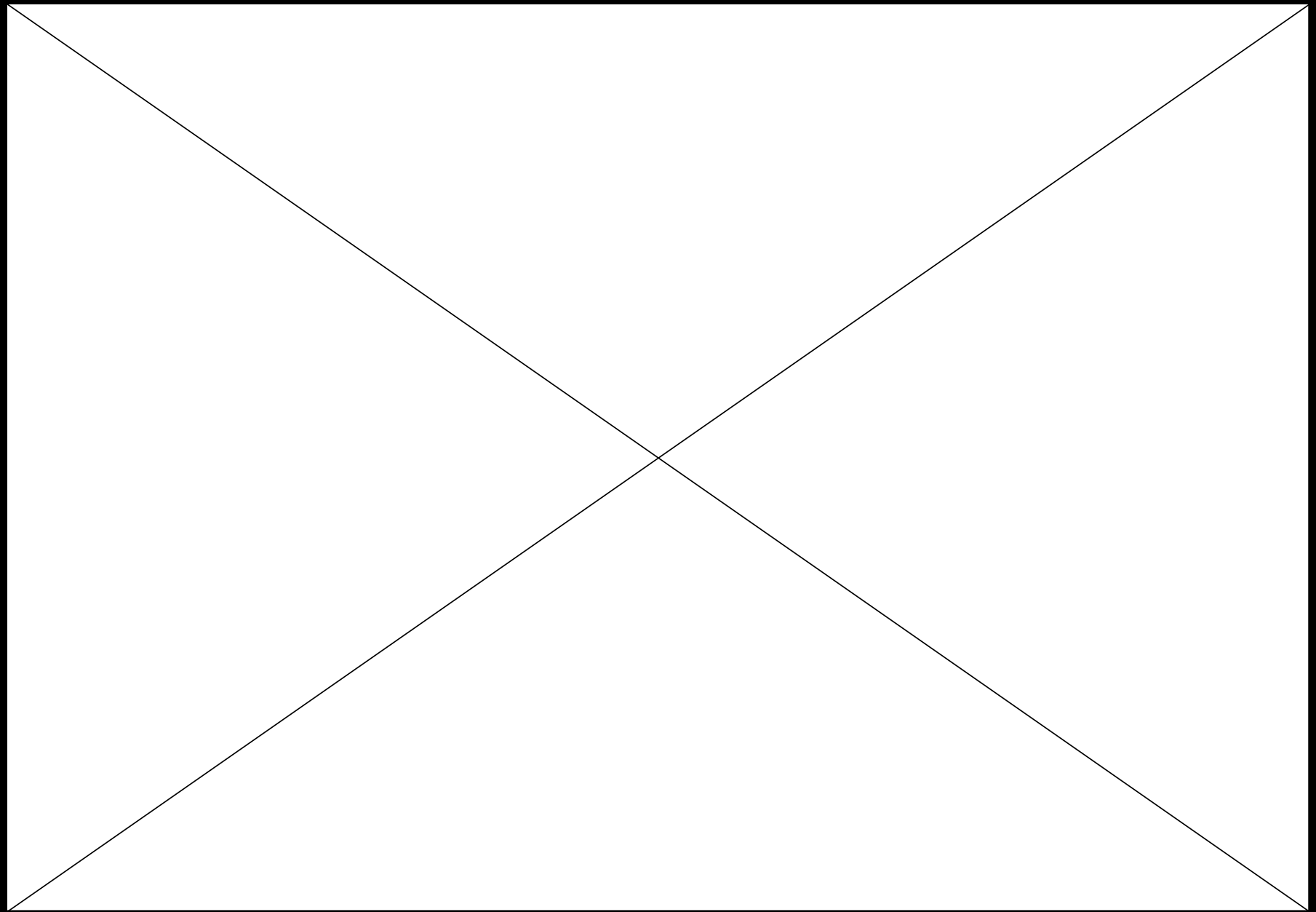
- FORMED FROM
  - Heat and pressure
  - Chemical Changes
  - Foliation

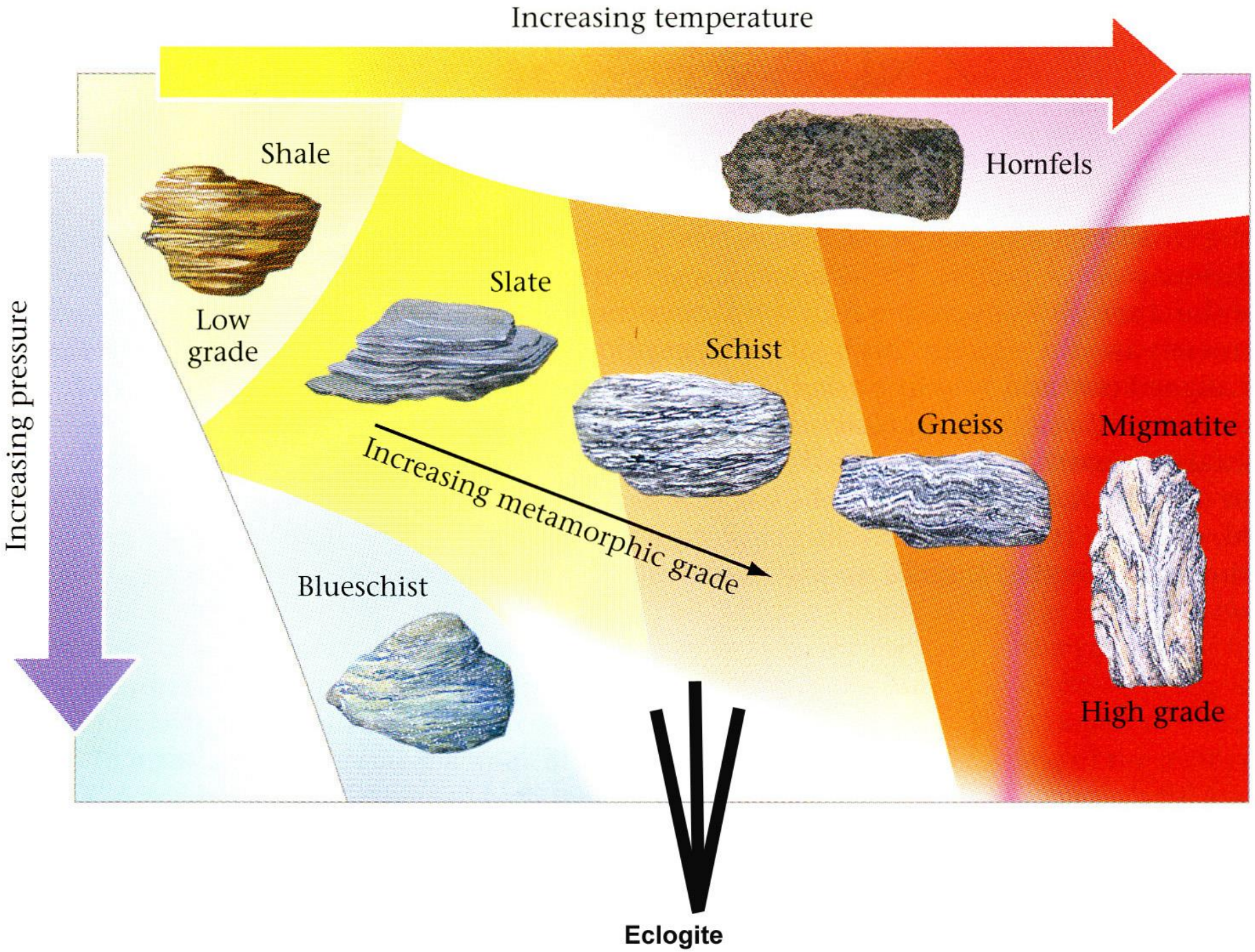


Regional vs. Contact

- Regional metamorphism is the creation of metamorphic rock from large geographically significant processes like plate tectonics.
- Contact metamorphism is the creation of metamorphic rock from the proximity of an existing rock to a heat source provided by a plutonic intrusion.


contact
contact
regional




Increasing temperature
Increasing pressure
Shale
Low grade
Slate
Schist
Hornfels
Gneiss
Migmatite
High grade
Increasing metamorphic grade
Blueschist
Eclogite

Metamorphic Rock

- Foliated - contain aligned grains of flat minerals

Gneiss is foliated metamorphic rock that has a banded appearance and is made up of granular mineral grains.

It typically contains abundant quartz or feldspar minerals.

Metamorphic Rock

- Non-Foliated – mineral grains are not arranged in plains or bands

Marble is a non-foliated metamorphic rock that is produced from the metamorphism of limestone.

It is composed primarily of calcium carbonate.

Metamorphic Rock

- Determine if the following rock samples are foliated or non-foliated:

Amphibolite

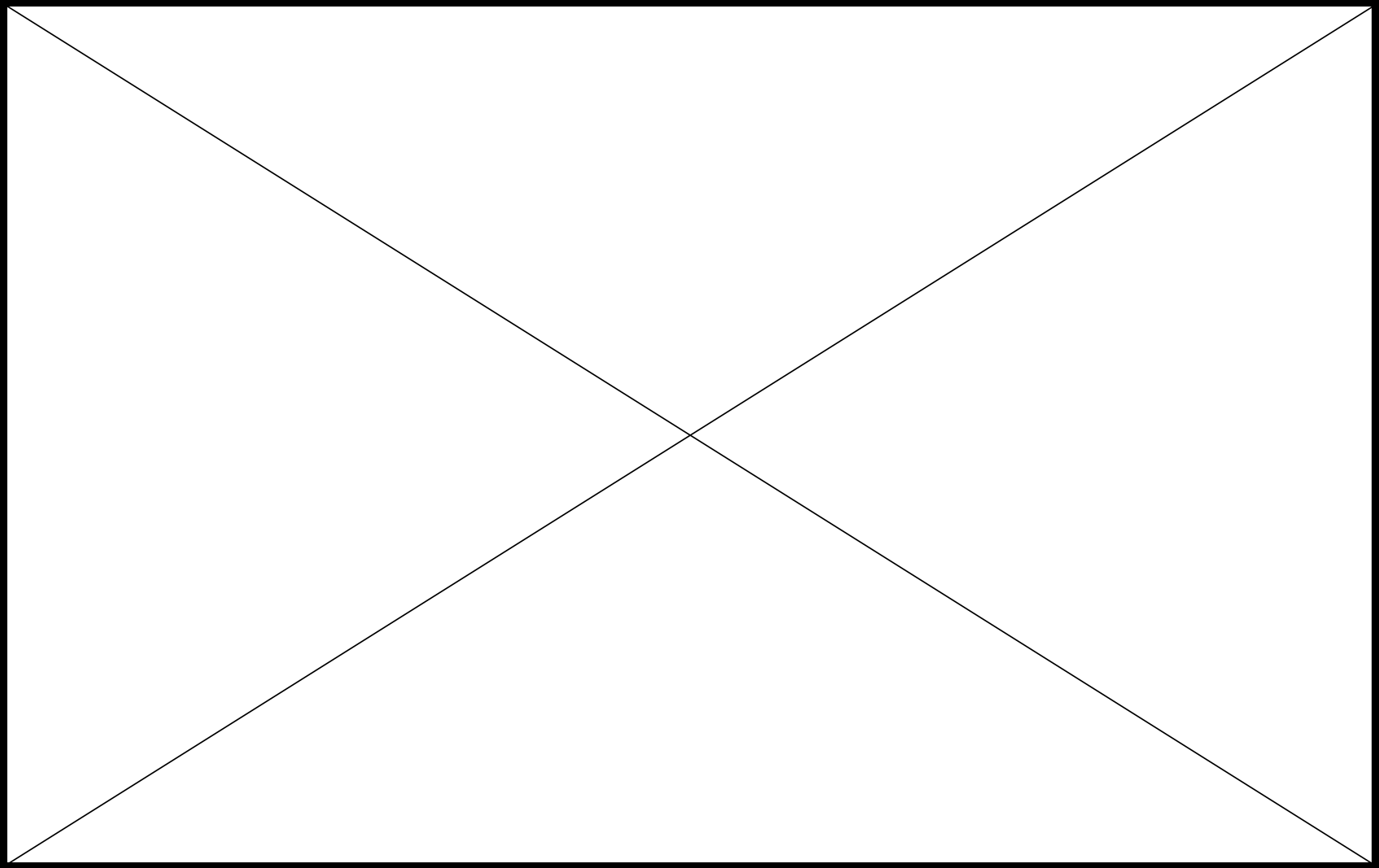
NonFoliated

Quartzite

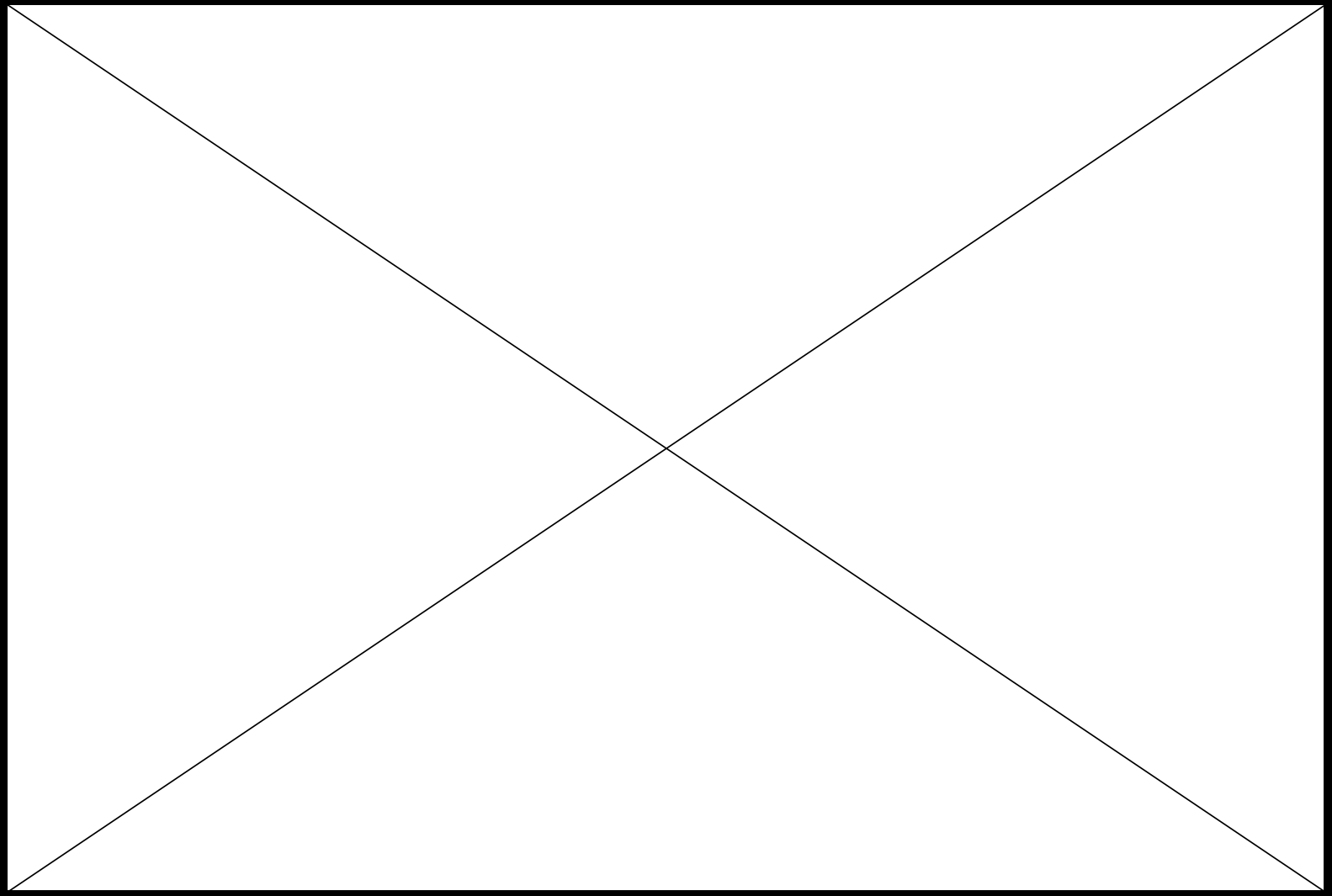
NonFoliated

Phyllite

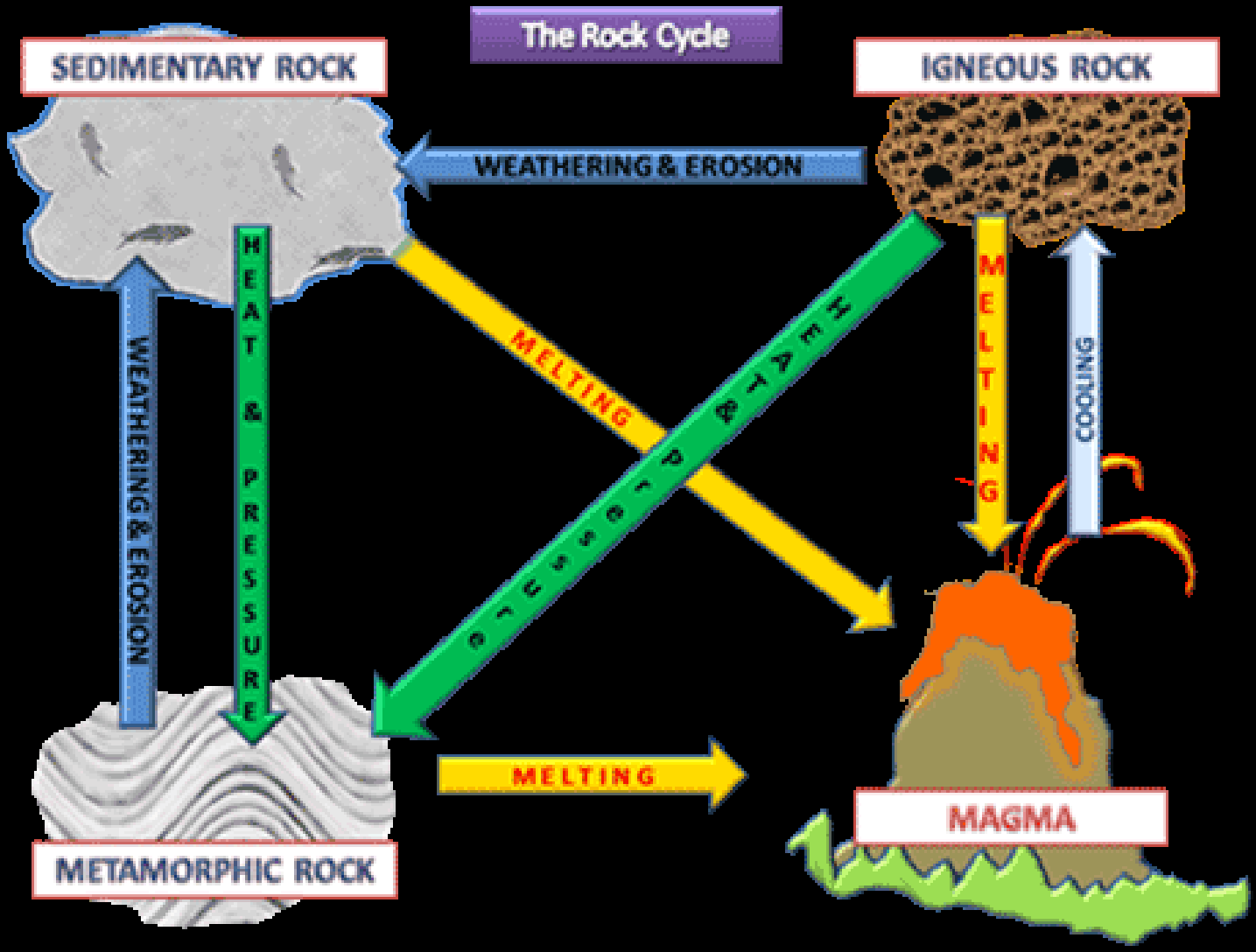
Foliated



Intro to Rock Cycle



Rock Cycle


The Rock Cycle
SEDIMENTARY ROCK
IGNEOUS ROCK
METAMORPHIC ROCK
MAGMA
WEATHERING & EROSION
WEATHERING & EROSION
HEAT & PRESSURE
MELTING
HEAT & PRESSURE
MELTING
COOLING
MELTING

How to get rocks and minerals?

- MINING

- Strip Mining-a form of surface mining. The ore is close to the surface of the land but has one or more layers of rock and dirt on top of it.

- Deep Mining- coal or mineral deposits by underground **mining** methods. '**Deep**' is often interpreted as meaning 5,000 ft (1.5 km) or more