**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Unit 5&6 Guided Notes**

**Weathering & Sedimentary Rocks,**

**Metamorphism & Metamorphic Rocks**

**Text Reference: Ch 5-pg 126-132**

 **Ch 3-pg 75-84**

**Part I: Weathering**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: the break-up of \_\_\_\_\_\_\_ due to exposure to the atmosphere
* Weathering involves \_\_\_\_\_\_ processes that often work together at the same time to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_ down rocks
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Mechanical Weathering
	+ Involves \_\_\_\_\_\_\_\_\_\_\_\_\_\_ breaking rocks into fragments \_\_\_\_\_\_\_\_\_\_\_ changing the chemical make-up of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ within them
	+ Increasing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ leads to increase of \_\_\_\_\_\_\_\_\_\_\_\_ weathering
	+ There are \_\_\_\_ main sources of power for mechanical weathering: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Of these \_\_\_\_\_\_\_\_\_\_\_\_\_ appears to be the leader in changing the surface
	+ Physical processes of Mechanical weathering
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Frost Wedging:
		- When water freezes, it expands by \_\_\_\_\_\_%
		- Frost wedging is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of water in cracks, breaking rocks into pieces
		- \_\_\_\_\_\_\_\_\_\_\_: sections of rock that are wedges \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_ into large piles; found at the base of steep, rocky \_\_\_\_\_\_\_\_\_\_
	+ Mechanical Unloading & Exfoliation
		- Is when \_\_\_\_\_\_\_\_\_\_\_\_ on \_\_\_\_\_\_\_\_\_\_\_ rocks is reduced after large masses of igneous rocks are exposed through uplift and \_\_\_\_\_\_\_\_ of overlying rocks
		- Mechanical \_\_\_\_\_\_\_\_\_\_\_\_\_\_: is the peeling off of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of rock as they expand and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Biological activities
		- Occurs because of the activities of organisms including \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: plants have to be strong to survive the elements. They grow into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, wedging the rock as they grow
		- Burrowing animals move rocks to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_animals produce \_\_\_\_\_\_\_\_\_ that cause chemical weathering
		- Humans \_\_\_\_\_\_\_\_\_\_\_\_\_\_ mechanical weathering through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Chemical Weathering
	+ Or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, takes place when at least some of the rock’s minerals are changed into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ substances
	+ Chemical processes include \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Water
		- Promotes chemical weathering by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the atmosphere and ground
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_ dissolved in water reacts to form oxides (\_\_\_\_\_\_\_\_\_\_\_)
		- Water absorbs \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when rain falls to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Water also absorbs sulfur oxides and nitrogen oxides to cause \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Chemical weathering of Granite
		- Remember granite consists mainly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- When exposed to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, feldspar converted to mostly \_\_\_\_\_\_\_ material
		- Quartz remains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and are then \_\_\_\_\_\_\_\_\_\_\_\_ from the granite
	+ Chemical weathering of silicate minerals
		- Remember, silicates make up most of the Earth’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- When these minerals undergo chemical weathering, the \_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are dissolved and carried away by groundwater
		- \_\_\_\_\_\_\_\_\_\_\_ reacts with oxygen to form iron oxide (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ combine with water to produce \_\_\_\_\_\_\_\_\_\_\_\_ materials
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ weathering causes the corners and edges of rock to be more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Rate of weathering
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ weathering increases the rate of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ weathering
	+ \_\_\_\_\_\_ other factors that affect the rate of weathering are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
		- Rock characteristics
			* Physical characteristics like \_\_\_\_\_\_\_\_\_\_\_\_\_
			* Chemical composition
			* Crystallization patterns (if it crystallizes first, it weathers \_\_\_\_\_\_\_ rapidly)
		- Climate
			* Higher \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ increases rate of weathering
			* Higher amounts of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ increases rate of weathering
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ weathering: when different parts of a rock weathers at different \_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Why? Mineral \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ differences, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of cracks
* Remember, if particle is loosened by weathering put stays put, it’s just \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. If it starts moving it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Part 2: Sedimentary Rocks**

* Formed from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ products of pre-existing rocks that have been \_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_

*Formation of Sedimentary Rocks*

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: any process that breaks rocks into \_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: when minerals in rocks change into \_\_\_\_\_\_ substances
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: involves the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_ of rocks
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: occurs when an agent of erosion (\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_\_\_) loses \_\_\_\_\_\_\_ and drops \_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: is a process that \_\_\_\_\_\_\_\_\_\_\_\_\_, or compacts, sediments
	+ Caused by \_\_\_\_\_\_\_\_\_\_ of sediments, most of the \_\_\_\_\_\_\_\_\_ in sediments is driven out
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: takes place when \_\_\_\_\_\_\_\_\_\_\_\_minerals are deposited in the tiny spaces among the sediments

*Nature of Sedimentary Rocks*

* Sedimentary rocks are composed of: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Sedimentary rocks are common at the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Cover \_\_\_\_\_\_\_\_\_\_\_\_\_of the continents
	+ Cover \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Occur in distinct \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Layers are easily identified
	+ Major layer formations: easily recognized over large distances
	+ Layers separated by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Sedimentary rocks contain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the environment of \_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Sedimentary Structure indicate environment and mode of transport of sediment (later in notes)

*Classification of Sedimentary Rocks*

* \_\_\_\_\_\_ main groups
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_sedimentary rocks:
	+ Composed of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Classified by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ size
	+ Clast=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_sedimentary rocks:
	+ Form when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ substances \_\_\_\_\_\_\_\_\_\_\_\_\_\_. or separate from water

*Clastic Sedimentary rocks*

* Clastic rocks are classified by particle shape and particle size
* Particle size controlled by:
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Common Clastic Sedimentary rocks:
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Different Particle Sizes & Shapes
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: grain size greater than \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_\_\_
		- Rock type:
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: grain size is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_\_\_
		- Rock type:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: grain size greater than \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_\_\_
		- Rock type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: grain size greater than \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_\_\_
		- Rock type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* How do you distinguish Siltstone from shale? (write own abbreviated notes below)

*Chemical/Biochemical Sedimentary Rocks*

* Process that take \_\_\_\_\_\_\_\_\_ from solution to form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Chemical sediments:
	+ Precipitates from what by an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ process
* Biochemical sediments:
	+ Formed during the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Subdivided by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_formation by aglae, coral, etc
		- Direct \_\_\_\_\_\_\_\_\_\_\_\_\_ precipitate from warm sea water
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Chemical precipitates from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_chemical sedimentary rock
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- May resemble \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Microscopic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organisms (fizzes in \_\_\_\_\_\_\_\_\_\_)
	+ \_\_\_\_\_\_\_\_\_\_\_\_: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Various modes of formation
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



*Sedimentary Structures*

* Features of some sedimentary rocks are clues to \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_ the rocks are formed:
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: beach or stream bed
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: dry environment
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layers on bottom, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ layers on top
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Distinct \_\_\_\_\_\_\_\_\_\_\_\_\_ having variations in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Formations
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_stratification
	+ Contain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Indicate paleo environment
	+ Detailed study may provide
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Sedimentary Systems*

* Systems include: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Sedimentary rock \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that produced it
* Advance and retreat of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Common example of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Cycle consists of: sandstone-shale-limestone-shale-sandstone
* Sequence Stratigraphy
	+ Sedimentary rock formations classified by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Sequences of formations may be grouped together
		- Relate global scale events;
		- Ex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Plate tectonics play a major role in:
	+ Sediment deposition, sediment sources, formation of sequences

**Part 3: Metamorphism & Metamorphic Rocks**

*Metamorphic Rock Basics*

* Metamorphism means to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Formed by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of pre-existing rock deep within the earth by \_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_, and/or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_active fluids
* Most metamorphic changes occur at \_\_\_\_\_\_\_\_\_\_\_\_\_\_ temperatures and \_\_\_\_\_\_\_\_\_\_\_\_\_
* Conditions for formation are found a few kilometers \_\_\_\_\_\_\_\_\_\_\_the Earth’s surface and extend into the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Metamorphic Rocks & Tectonics*

* Most metamorphic rocks develop due to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ rocks present control mineral assemblages

*Contact vs Regional Metamorphism*

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ metamorphism occurs when \_\_\_\_\_\_\_\_\_\_ moves into \_\_\_\_\_\_\_\_\_
	+ Occurs near a body of \_\_\_\_\_\_\_\_\_\_\_
	+ Changes are driven by a \_\_\_\_\_\_\_ in temperature
	+ Example: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_metamorphism results in large-scale \_\_\_\_\_\_\_\_\_\_\_ and high-grade metamorphism.
	+ Directed \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_ temperatures occur during \_\_\_\_\_\_\_\_\_\_\_\_\_ building
	+ Produces the \_\_\_\_\_\_\_\_\_\_\_\_\_\_volume of metamorphic rock

*Agents of Metamorphism*

* \_\_\_\_\_\_\_\_\_\_
	+ Provides the \_\_\_\_\_\_\_\_ needed to drive chemical reactions
	+ Heat comes from \_\_\_\_\_\_\_ and the change in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with depth
* \_\_\_\_\_\_\_\_\_\_
	+ Causes a more \_\_\_\_\_\_\_\_\_\_ rock with greater \_\_\_\_\_\_\_\_\_\_\_\_
	+ Also \_\_\_\_\_\_\_\_\_\_\_\_\_ with \_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_-based solutions escaping from the mass of \_\_\_\_\_\_\_\_. Promote \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by dissolving original minerals and then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ new ones.

*Metamorphism Basics*

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ initiate change in the mineral assemblage
	+ Reaction occurs entirely in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_changes occur during metamorphism
	+ \_\_\_\_\_\_\_\_ minerals grow during metamorphism
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_rock \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ rock subject to metamorphism.
	+ Can be \_\_\_\_\_rock type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Origin of Metamorphic Rocks*

* Metamorphism begins when temperatures exceed \_\_\_\_\_\_\_\_\_\_\_ and pressure exceeds \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Metamorphism ends when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ begins (\_\_\_\_\_\_\_\_\_\_\_\_°C)
* Sources of heat
	+ Proximity to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_metamorphism
		- Different metamorphic grade brings the intrusions
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_increase per km
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Determining the degree of metamorphism*

* Pressure and Stress
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Pressure: pressure \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with \_\_\_\_\_\_\_\_\_\_\_ due to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the overlying rocks
		- If equal in all directions is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Referred to as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_stress
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_determine the degree of metamorphism
	+ Low grade metamorphism:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Intermediate grade metamorphism:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ High grade metamorphism:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



*Classification of Metamorphic Rocks*

* Metamorphic rocks are classified by:
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Texture Classification*

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Metamorphic Rock
	+ Has a \_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ appearance
	+ Examples: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* More examples:
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Similar to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Recrystallization; crystals are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Common Protolith:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(dominated by platy minerals)
		- Multiple protoliths
	+ Gneiss
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Foliation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Protoliths:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Metamorphic rock
	+ Does \_\_\_\_\_ have a \_\_\_\_\_\_\_\_\_\_\_\_\_ texture
	+ Examples:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Recrystallization of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* Sedimentary features destroyed
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Metamorphism of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is recrystallized

