**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*

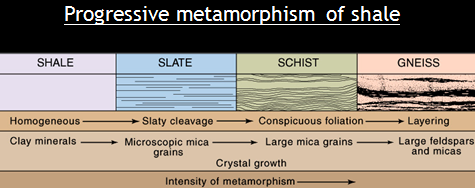
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ initiate change in the mineral assemblage
  + Reaction occurs entirely in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_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

