

GEOL 02: Historical Geology with Lab

Mid Term Study Guide

Scientific Method

What are the steps of the scientific method? What is the difference between a theory, an hypothesis, and a law? What is an example of the scientific method?

Geologic Time

What are the two kinds of geologic time? What is the basis for each? What is the principle of superposition? What is the principle of original horizontality? What is the principle of cross cutting relations? What is the principle of lateral continuity? What are the three types of unconformities (describe how they are different: if you can describe them, this is as important as knowing their names)? What is a half-life? What is the difference between a parent and a daughter isotope? What is the difference between atoms, isotopes, and ions (e.g. how are these three particles defined)? After 4 half-lives have passed, what percent of the parent isotope remains? Given a half-life of 5730 years, after 3 half-lives of time, how many years have passed? What are some assumptions (3 or 4) that we make when we use radioactive decay for age control?

Minerals and Igneous Rocks

What is a mineral? What are the ways that we can distinguish between minerals (list the optical and material strength properties)? What is a rock? How are each of the three types of rocks formed (what is their origin; what processes lead to their formation; what are the factors that control the formation of different rocks in each of these 3 rock types)? What is the difference between intrusive and extrusive rocks? What is another name for intrusive and extrusive rocks? List the main ways to classify each of the three types of rocks (list 2-3 ways that rocks are classified in each rock type). How does the percent silica (4-sided dice) affect rocks? List intrusive and extrusive rocks, ranked from low to high silica content. Why/How does silica content control lava/magma behavior and volcano shape? There will be several hand samples to identify (of each type of rock).

Sedimentary and Metamorphic Rocks

What are the three types of sedimentary rocks? What are sedimentary rocks the product of? Provide several examples of how sedimentary processes control what type of sedimentary rock is formed. What are the chief constituents of detrital rocks? How is particle size used to distinguish rock types? What is the size range of sand? What is sorting and what does it tell us? What is roundedness and what does it

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tell us? How are particle size and energy related? What are two ways that chemical sedimentary rocks are formed? How are evaporites formed? How is coal formed? What are the processes that lead to lithification? What is meant by sedimentary facies? What is bedding and what is cross bedding? What are turbidites and how are they formed?

What is metamorphism? What are the three factors that control the different types of metamorphic rocks? What is foliation? What are the different foliated textures? Describe what metamorphic grades are. Describe the 6 metamorphic environments. What are index minerals?

What are the three main categories of depositional environment? What is an alluvial fan? What is the difference between intra- and extra-basinal origins? What is a fluvial environment? Describe sinuosity. What is a lacustrine environment? What are pluvial lakes? What are aeolian deposits? How are aeolian sediments transported? What is the difference between erosional and depositional shorelines? What is the difference between a transgression and a regression? What would a transgressive sequence look like (in a core)? What would a regressive sequence look like (in a core)? What does Walther's Principle describe?

Fossils and Evolution

Describe the process of natural selection. How do mutations control evolution? What are some sources for mutations? What is the difference between a population and a gene pool? What part do barriers play in evolution? What are some different barriers? What is speciation? Describe the two main evolutionary models. What is a phylogenetic tree? What is an index fossil and what makes a good index fossil? Be able to place fossils in the correct Phyla/Class (and Order in a few cases).

Plate Tectonics

Describe the process of thermal convection (cooking ramen or in the mantle). How do we know where the plate boundaries are? Why are the continents sticking above sea level (in other words, why does oceanic crust stay below sea level); think about the next question when you answer this one? What is more dense, oceanic or continental crust? Why? What are the three types of plate boundaries (and describe them)? Why does oceanic crust subduct beneath continental crust and not the other way around? What are some of the evidences for continental drift? Describe how "rate" is defined (e.g. plate motion rate)? What are magnetic anomalies and how are they formed? How can magnetic anomalies tell us about plate motions? How can hot spots provide us with plate motion rates? Can you calculate a

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plate motion rate from either hot spot or spreading ridge measurements? Why is younger oceanic crust shallower and older oceanic crust deeper in the ocean? What are some examples of the different types of plate boundaries? What evidence do we have for earthquakes and tsunamis along the plate boundary along the coast of northern California, Oregon, and Washington? How does a ghost forest form? How can we use an offset stream channel to calculate a plate motion rate?