**Study Guide for Advanced Geology Multiple Choice**

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| **Subject** | **Key Points** | **Key Vocabulary** |
| **Time** | **a. relative**  **- geologic laws**  **- interpret cross-section: put events in order**  **- broad overview of changes in life over time**  **b. absolute**  **- define half-life**  **- reflect on Virtual Isochron**  **- do simple calculations/problems as done in class or lab**  **- significant ages (see handout); Eras: names, ages,**  **- relate absolute data to cross-sections (like we did with clicker quiz)** | **Law of superposition**  **Half-life**  **Principle of fossil succession**  **Relative dating**  **Absolute dating**  **Radioactivity**  **Radiometric dating**  **Radiocarbon dating**  **Cross-cutting relationships**  **Unconformity**  **Principle of original horizontality**  **Index fossil**  **Disconformity**  **nonconformity**  **Angular unconformity** |
| **Minerals** | **- define**  **- identifying characteristics**  **- physical features**  **- types of minerals**  **- structure of silicate minerals**  **- examples of non silicate minerals**  **- composition of the crust** | **Mineral**  **Hardness**  **Cleavage**  **Luster**  **Streak**  **Silicate Minerals**  **Crystal form** |
| **Igneous Rocks** | **- what conditions favor the melting of rocks**  **- describe the grain size, color, and mineralogy of the most common igneous rocks**  **- describe the general chemistry of the most common igneous rocks**  **- describe Bowen’s discontinuous and continuous reaction series**  **- interpret the texture of igneous rocks**  **- recognize the different types of intrusive features** | **Extrusive**  **Intrusive**  **Phenocryst**  **Aphanitic texture**  **Bowen’s reaction series**  **Glassy texture**  **Pyroclastic texture**  **Pegmatitic texture**  **Mafic**  **Ultramafic**  **Felsic**  **Volatiles**  **Granitic**  **Basaltic** |
| **Sedimentary Rocks** | **Why study them?**  **Define/describe beds, clastic**  **Describe the common clastic, chemical, and biogenic sedimentary rocks.**  **Recognize common sedimentary structures and describe an environment they form in.**  **Describe common environments of deposition for sedimentary rocks.** | **Clastic**  **Organic\*\*\* (biogenic, book says biochemical)**  **Chemical**  **Lithification**  **Cementation**  **Compaction**  **Sediment**  **Sorting**  **Environment of deposition**  **Weathering & Erosion\*\*\***  **Cross-bedding**  **Clastic texture**  **Mud crack**  **Ripple mark** |
| **Metamorphic Rocks** | **Describe the factors that influence metamorphism.**  **Describe the classification of metamorphic rocks.**  **Describe confining and directed pressure and how they influence foliation.**  **Describe the changes in a rock during progressive metamorphism.**  **Describe the foliation and composition of metamorphic rocks.**  **Describe the locations where metamorphism takes place** | **Contact metamorphism**  **Hydrothermal metamorphism**  **Foliated textures**  **Gneissic texture**  **slaty cleavage**  **porphyroblastic texture**  **Regional metamorphism**  **Schistosity**  **Slaty cleavage**  **Parent rock**  **Recrystallization** |
| **Coastal features and processes** | **1. Explain longshore drift.**  **2. Describe/identify the landscape features made by deposition in a coastal environment.**  **3. Describe/identify the landscape features made by erosion in a coastal environment.**  **4. Explain how and where groins, breakwaters and seawalls can cause problems along a beach.** | **Longshore drift**  **Groin**  **Breakwater**  **Seawalls**  **Berm**  **Barrier island**  **Baymouth bar**  **Jetty**  **Tombolo**  **Submergent coastline**  **Emergent coastline**  **Beach**  **Estuary**  **Delta**  **Spit**  **Wave-cut cliff**  **Wave-cut platform**  **Tidal flat**  **Marine terrace**  **Headland** |
| **Glaciers** | **1. Describe the present-day distribution of alpine glaciers, ice sheets and ice caps.**  **2. Describe the conditions that favor the formation and advance/retreat of glaciers.**  **3. How do glaciers erode their beds?**  **4. Describe and identify (erosional and depositional) landscape features of alpine glaciers.**  **5. What is the difference between till and outwash.**  **6. What are the types of moraines and recognize them on a map or diagram.**  **7. What are the landscape features made of stratified drift (outwash) and recognize them on a map, diagram, or photo.**  **8. Describe the distribution of ice sheets in the recent geologic past.**  **9. Describe the indirect effects of glaciation (changes in sea level, pluvial lakes).**  **10. Describe two hypotheses for glaciation.**  **11. What are some of the parameters associated with the Milankovich cycle?** | **Valley glaciers**  **Alpine glaciers**  **Ice sheets**  **Ice shelves**  **Ice caps**  **Piedmont glacier**  **Firn**  **Plastic flow**  **Basal slip**  **Zone of fracture**  **Crevasses**  **Surges**  **Zone of accumulation**  **Snowline**  **Zone of wastage**  **Calving**  **Glacial budget**  **Zone of fracture**  **Ablation**  **Plucking**  **Abrasion**  **Rock flour**  **Glacial striation**  **U-shaped glacial trough**  **Hanging valleys**  **Arete**  **Horn**  **Truncated spur**  **Medial moraine**  **Lateral moraine**  **End moraine**  **Terminal moraine**  **Recessional moraine**  **Ground moraine**  **Drumlin**  **Kettles**  **Kame**  **Esker**  **Pluvial lake**  **Outwash plain**  **Cirque**  **Glacial drift**  **Till** |
| **Groundwater** | **1. Draw an unconfined aquifer and label the zones of aeration and saturation and the water table.**  **2. Define porosity and permeability.**  **3. What materials are good aquifers.**  **4. What materials commonly make aquicludes.**  **5. Draw a cross-section of a hillside that produces a spring.**  **6. Describe a setting for a well that would provide water all year long.**  **7. Draw a confined aquifer and label the recharge area, aquicludes, aquifer, the water table and the potentiometric surface**  **8. Describe and identify karst features.**  **9. General characteristics of groundwater in Michigan.** | **Water table**  **Ground water**  **Aquifers**  **Confining beds**  **Karst**  **Sinkholes**  **Solution valleys**  **Springs**  **Disappearing streams**  **Zone of aeration**  **Zone of saturation**  **Speleotems**  **Stalactites**  **Stalagmites**  **Artesian wells**  **Nonflowing artesian well**  **Flowing artesian well**  **Recharging**  **Zone of saturation**  **Capillary fringe**  **Zone of aeration**  **Gaining stream**  **Losing stream**  **Porosity**  **Permeability**  **Aquitards**  **Aquifers**  **Hydraulic gradient**  **Hydraulic conductivity/Darcys law?**  **Spring**  **Perched water table**  **Geysers**  **Caverns**  **Well**  **Drawdown, cone of depression?** |
| **Volcanoes** | **1. Be able to distinguish the seven types of volcanoes we describe in class based on shape, size, rock composition, and volcanic material.**  **2. Be able to recognize or describe types of lava, pyroclasts, or gases.**  **3. What factor control the violence of volcanic eruptions**  **4. Describe the distribution of volcanoes.** | **Shield Volcano**  **Cinder cone**  **Composite cone**  **Scoria cone**  **Stratovolcano**  **Hotspot**  **Fissure**  **Caldera**  **Volcanic neck**  **Xenoliths**  **Pahoehoe flow**  **Block lava**  **Pillow lava**  **Pyroclastic flow**  **Lahar**  **Aa flow**  **Viscosity**  **Volatiles**  **Sills**  **Laccoliths**  **Batholiths**  **Continental volcanic arc**  **Intraplate volcanism**  **Island arcs** |
| **Earthquakes** | **1. Explain elastic rebound theory.**  **2. Describe the movement of P- and S-waves. Which is faster. Which travels through solids? Liquids?**  **3. Explain how earthquakes are located.**  **4. Compare and contrast earthquake intensity and magnitude.**  **5. Where are there shallow, intermediate, and deep-focus earthquakes? Relate this to plate tectonics.**  **6. What are the effects of earthquakes? e.g. fire, etc**  **7. Explain how earthquakes were used to locate the base of the crust, the lithosphere, the core, and he inner and outer core.** | **Focus**  **Hypocenter**  **Faults**  **Elastic rebound**  **Aftershocks**  **Foreshocks**  **Seismology**  **Surface waves**  **Body waves**  **Primary (P) Waves**  **Secondary (S) Waves**  **Long (L) Waves**  **Epicenter**  **Intensity**  **Magnitude**  **Modified Mercalli Scale**  **Richter Scale**  **Moment magnitude**  **Liquefaction**  **Seiches**  **Tsunami**  **Landslide** |
| **Plate Tectonics** | **1. Outline Wegener’s evidence for continental drift**  **2. Explain why his model was not widely accepted**  **3. Describe Hess’ sea-floor spreading model**  **4. What is the evidence for sea-floor spreading**  **5. Be able to recognize profiles of tectonic boundaries (MORs, trenches) and hot spot volcanoes**  **6. Know the types (convergent, divergent, and transform ) and characteristics of plate boundaries**  **7. Provide or locate (classic) examples of each of three types of boundaries**  **8. Describe the distribution of earthquakes (shallow, intermediate, and deep) , volcanoes (stratovolcanoes, shields) and rock compositions (basalt, andesite, granite) at boundaries**  **9. Be able to determine the relative motion between two locations.** | **Continental drift**  **Pangaea**  **Oceanic ridge system**  **Seafloor spreading**  **Geomagnetic reversal**  **Normal polarity**  **Reverse polarity**  **Convergent boundaries**  **Divergent boundaries**  **Transform fault boundaries**  **Mid-ocean ridges**  **Trenches**  **Hot spot volcanoes**  **Spreading centers**  **Rift valley**  **Deep-ocean trench**  **Hot spot volcanoes**  **Volcanic island arc**  **Slab pull**  **Ridge push**  **Slab suction**  **Mantle drag**  **Plate resistance**  **Lithosphere**  **Asthenosphere** |
| **Streams** | **1. What are the global reservoirs for water?**  **2. What is the largest reservoir for freshwater?**  **3. Describe the hydrologic cycle.**  **4. Given a cross-section of a stream channel, show the area of maximum water velocity and explain why the water moves at different speeds.**  **5. Use the discharge equation to solve for an unknown parameter.**  **6. What is a hydrograph? Be able to read a hydrograph. What are they used for?**  **7. Be able to read and interpret a flood-frequency curve.**  **8. What is base level? What is the base level of the Grand River? Trace the path of water from the Grand River to the ocean.**  **9. How is grain size and velocity related to erosion of particles?**  **10. Describe how steams erode their channels.**  **11. Describe how steams transport material.**  **12. Given a map that shows streams draw a line around a drainage basin.**  **13. What are 4 types of stream patterns and what do they indicate about the underlying geology?**  **14. Identify and describe features of stream valleys/floodplains.**  **15. Tell a braided stream from a meandering stream.**  **16. Be able to recognize a terrace.** | **Hydrologic cycle**  **Laminar flow/turbulent flow (Which?)**  **Sheet flow**  **Infiltration capacity**  **Discharge**  **Longitudinal profile**  **Hydrograph**  **Base level**  **Graded stream**  **Dissolved load**  **Suspended load**  **Bed load**  **capacity**  **Settling velocity**  **Sorting**  **Alluvium**  **Bars**  **Point bars**  **Playfair’s Law**  **Braided stream**  **Flood plain**  **Mouth**  **Back swamps**  **Yazoo tributaries**  **Natural levee**  **Alluvial fans**  **Deltas**  **Terrace**  **Drainage basin**  **Meander**  **Cutoff**  **Oxbow lake**  **Meander scar**  **Dendritic pattern**  **Radial pattern**  **Rectangular pattern**  **Trellis drainage pattern**  **Floods**  **Recurrence interval**  **Return period** |

**BE ABLE TO PLACE ROCKS IN THEIR SUBGROUPS: Sedimentary (clastic, chemical, biogenic), Metamorphic (foliated, non-foliated) AND KNOW THE SIGNIFICANCE OF THEIR TEXTURES**

**KNOW THE ROCK CLASSIFICATION CHARTS**

**Sedimentary: Table 7.1, p. 214; Figure 7.17, p. 227 Metamorphic: Figure 8.12, p. 255 (8th edition)**

**Tips:**

**1. Which of these would best be asked about by diagrams, graphs, or photographs?**

**2. Which diagrams in the book match these specific topics?**

**3. How did I ask questions on these topics on the old exam.**

**4. Review your quizzes.**

**Tips:**

**1. Which of these would best be asked by diagrams or graphs?**

**2. Which diagrams in the book match these specific topics?**

**3. Which homework questions match these specific topics?**

**4. How did I ask questions on these topics on old exam?**

**5. What lab activities support these lecture topics?**