

Geosciences 211 **Physical Geology**
Study Guide for Test # 1, Feb 3rd, 2005
February 1, 2005

Please note: I modified this study guide to reflect 2 things. 1.) Addition of Hot Spots, and 2.) Removal of the end portion of Igneous Rocks. The subject areas for this test include Marshak, 2004, 1, 2, 3, and 4

1. The Earth in Context (Chapter 1)

- a. Know the definitions of the Key Terms listed on the Jargon webpage.
- b. What are the differences between the geocentric and the heliocentric universe?
- c. What characteristics of the solar system were correctly deduced by ancient humans?
- d. Describe the nebula theory of planet formation.
- e. What are some of the characteristics of the universe as understood by modern science?
- f. What is the red shift and what does it indicate about the universe?
- g. What are the characteristics of the terrestrial planets? The Jovian planets?
- h. Describe the theory that explains the origin of the moon? Why is this theory favored?
- i. Why is the earth spherical?
- j. What are the Van Allen belts and why are they important to life on Earth?
- k. What is the hypsometric curve and what does it reveal about the crust of Earth?

2. The Way the Earth Works: Plate Tectonics (Chapter 2)

- a. What is the lithosphere? The asthenosphere?
- b. Describe the lines of evidence used by Wegener to support continental drift.
- c. What were the major criticisms of continental drift?
- d. What is paleomagnetism?

- e. Describe the magnetic field of the Earth. How is this field generated?
- f. What kind of rocks preserve a magnetic signal?
- g. What is a magnetic reversal? How often do they occur?
- h. What is the chronology (time-series) of magnetic reversals?
- i. Describe the evidence that Harry H. Hess used in proposing sea-floor spreading.
- j. How does the magnetic reversal record support sea-floor spreading?
- k. How does the distribution of ocean crustal age support sea-floor spreading?
- l. Describe how oceanic crust and lithosphere change as they move away from a MOR?
- m. What geologic phenomena are explained by plate tectonics?
- n. What are the components of the lithosphere and how does lithosphere vary?
- o. What features characterize each of the three major types of plate boundaries?
- p. How are plate boundaries recognized?
- q. Contrast oceanic vs. continental crustal thickness, density, mineralogy and average age.
- r. What is an accretionary prism; where does it form and how?
- s. Why are MOR segments offset and why do earthquakes occur between ridge offsets?
- t. What does the Wadati-Benioff zone reveal about a convergent tectonic margin?
- u. How do continental landmasses rift?
- v. Describe the processes whereby an ocean basin is completely destroyed.
- w. How does continent-continent convergence differ from continent-ocean convergence?

- x. What are hot spots?
- y. How do hot spots preserve information about the motion of tectonic plates?
- z. What are the characterizes volcanic chains created by hot spots?

3. Patterns in Nature: Minerals (Chapter 3)

- a. What are some uses of minerals?
- b. What is the definition of a mineral?
- c. What is a crystal lattice and how do we know they exist?
- d. What is a crystal?
- e. What conditions are necessary for the development of euhedral crystal faces?
- f. Give an example of a polymorph pair other than diamond - graphite.
- g. What are processes that create minerals?
- h. List 10 physical properties that can be used to identify minerals.
- i. Draw a silica tetrahedron and independent, single chain and double chain tetrahedra.
- j. Why are the silicates called “the rock forming minerals?”
- k. How are minerals classified? Name some of the important non-silicate mineral groups.
- l. What features characterize gem minerals? Name some.
- m. What are pegmatites and why are they prized mineralogically?

4. Up from the Inferno: Magma and Igneous Rocks (Chapter 4)

- a. Know definitions to the Key Terms listed on the webpage.

- b. Lava is not just magma that has reached the surface. How does it differ?
- c. What are the sources of heat for magma formation?
- d. What is the geothermal gradient and how does it vary spatially?
- e. How do changes in pressure and volatile content influence melting temperature?
- f. What is decompressional melting and where does it occur?
- g. What are the major types of magma? What factors control magma composition?
- h. How is magma/lava cooling rate reflected in igneous rock textures?
- i. List important mafic and felsic (sialic) minerals.
- j. Which minerals dominate in basalt? In granite?
- k. What are the mechanisms by which a magma composition may change over time?
- l. How is it possible to erupt an early basalt and a later sialic melt from one volcano?
- m. What is magmatic contamination?

Good Job!