

## Physical Geology

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### **Review for exam 1 = Important Points to Know for Each Chapter**

#### **Minerals**

- 1 Definition of a mineral and examples of what are and are not minerals.
- 2 What is an atom?
- 3 What are the three most important subatomic particles? How do they differ in their characteristics?
- 4 How does an atom differ from an ion?
- 5 What are the two types of ions and how are they different?
- 6 What are isotopes? What controls their stability?
- 7 What are the physical properties used to identify minerals?
- 8 What is cleavage, fracture?
- 9 What is density and what are some examples that are heavy?
- 10 What are various types of nonmetallic luster?
- 11 What are ionic, covalent, and metallic bonds, what are their characteristics, and examples of each?
- 12 Why does calcite effervesce (fizz)?
- 13 Give examples of minerals with good cleavage in 1 direction, 2 directions, cubic, rhombohedral, and more.
- 14 What is streak and which mineral has a distinctive reddish brown streak?
- 15 What are the distinguishing characteristics of quartz, calcite, gypsum, galena, graphite?
- 16 What are the common rock-forming minerals?
- 17 What are the major classes of minerals, examples, and the anions that define each class?
- 18 What is the atomic structure of a silicon-oxygen tetrahedron (shape and how many Si, O)?
- 19 What determines the chemical identity of an atom?

#### **Igneous Rocks**

- 20 What is lava?
- 21 What are the processes involved in the rock cycle?
- 22 What causes the texture of phaneritic (coarse grained), aphanitic (fine grained), porphyritic (fine grained matrix containing some coarse crystals)?
- 23 What is pyroclastic texture in igneous rocks and how does it form?
- 24 Define and describe the differences between intrusive (phaneritic or plutonic or coarse grained) and extrusive (aphanitic or volcanic or fine grained) igneous rocks.
- 25 How do felsic (silicic), intermediate, mafic (basaltic), and ultramafic rocks differ in temperature of formation, water content, silica content, and explosivity at eruption?
- 26 What are products (types of flows and land forms) of basaltic eruptions?

- 27 What is the composition of composite volcanos?
- 28 Where are granitic (silicic) magmas formed in a plate tectonic setting?
- 29 What types of flows, rock types, land forms are associated with shield volcanos?
- 30 Define porphyritic texture and describe how it forms.
- 31 Define vesicular texture and describe what causes it.
- 32 What are the common types of intrusive rock bodies (batholith, laccolith, dikes, sills)? How do they form?
- 33 What is the Bowen's reaction series and which minerals are first to crystallize and which are last to crystallize?

## **Volcanoes**

- 34 Which are the most viscous lavas – silicic or mafic?
- 35 What causes vesicles?
- 36 What is the relationship of silicate structure to cleavage and give examples?
- 37 What is pyroclastic texture, what is its composition, and how does it form and behave?
- 38 What type of magma was involved in the eruption of Mount St. Helens on May 18, 1980 and what types of deposits and landforms did it cause?
- 39 What are plutonic rocks, what are their characteristics and where do they form?
- 40 What happened at Mt. Pinatubo in the Philippines in 1991?
- 41 What are the three factors that determine the nature of a volcanic eruption and how do they affect the viscosity of a magma?
- 42 Know the differences between these types of volcanic materials: pahoehoe flows, aa flows, lava tubes, pillow lavas, volcanic gases (volatiles), pyroclastic materials, welded tuff, cinders, bombs, nuee ardente, lahar, flood basalts, lava domes
- 43 What are the following and what is an example of these landforms: vent, crater, lava flow, dike, sill, conduit or pipe, volcanic neck, composite cone, cinder cone, fissure eruption, batholith, caldera.
- 44 What are the characteristics and examples of 3 different types of volcanic environments: hot spots, subduction zones, and oceanic rifts?
- 45 What is magma? How does it differ from lava?
- 46 Explain the worldwide distribution of volcanoes and their relationship to plate tectonics (ring of fire, etc.).
- 47 How do basaltic (mafic) and silicic (sialic) lavas differ in their characteristics and eruption?
- 48 What is a nuee ardente, what kind of lava does it form from, and what are its effects?
- 49 What are lahars? How do they form?
- 50 What are flood basalts? Where do they form?
- 51 What are pillow lavas? How do they form?
- 52 What are the characteristics of eruptions in the Hawaiian Islands and associated seamounts and how do they provide evidence for the behavior of hot spots?

## **Weathering and Soils**

- 53 What is weathering?
- 54 What is physical weathering, what are three processes of physical weathering, and how do they occur?
- 55 What is chemical weathering and what are some examples?
- 56 What are talus piles and how do they form?
- 57 What is oxidation and what iron minerals does it form
- 58 What acid is formed by a chemical reactions in soils involving carbon dioxide?
- 59 What is the source of clay in soils and where does it accumulate?
- 60 What is the chemical reaction involved in the weathering of limestone?
- 61 What are unloading and exfoliation, and what causes it?
- 62 How does spheroidal weathering, columnar weathering, and exfoliation occur?
- 63 What are the major soil horizons and their characteristics?
- 64 What are caliche, laterite, and bauxite and how do they form?

## **Sediment and Sedimentary Rocks**

- 65 What processes turn sediment into sedimentary rock? (Know the difference between lithification, compaction, and cementation).
- 66 What are the differences between clastic (detrital) and nonclastic (chemical) sedimentary rocks?
- 67 What is the size range of particles in the four basic types of clastic sediment and how do you tell them apart?
- 68 How can organic sedimentary rock form? What are carbonates?
- 69 How does chemical sedimentary rock form? What are evaporites?
- 70 What are the common cements in sedimentary rocks?
- 71 How do graded bedding, cross bedding, ripple marks, and mudcracks form? How are they useful to geologists?
- 72 How are sedimentary structures used to determine paleocurrent directions?
- 73 What is a formation?

## **Metamorphic Rocks**

- 74 What is the environment, temperature, and processes where metamorphism takes place?
- 75 What are the three agents of metamorphism and what do they do?
- 76 How are metamorphic rocks distinguished from other types of rock?
- 77 What causes foliation in metamorphic rocks?
- 78 What are some sources of metamorphic temperatures and pressures?
- 79 What are examples of nonfoliated metamorphic rocks and what are their compositions?
- 80 Define and describe the differences between foliated and nonfoliated metamorphic rocks.

- 81 What are the four types of foliated metamorphic textures and what are the resulting rock names?
- 82 Which metamorphic textures develop under directed pressure? Under regional burial? In contact with igneous intrusions?
- 83 How do metamorphic temperatures differ from temperatures associated with the formation of igneous and sedimentary rocks?
- 84 What are the parent rocks that metamorphose to form slate, schist, gneiss, marble, and quartzite?
- 85 What is the order of typical foliated metamorphic rocks indicating increasing metamorphism?
- 86 What minerals indicate low grade metamorphism? Intermediate grade? High grade?

### **Geologic time**

- 87 What are the characteristics of the key principles of relative dating: Relative dating, Law of Superposition, Principle of Original Horizontality, Principle of Cross-Cutting Relationships, Law of Fossil Succession, Inclusions?
- 88 What does an unconformity represent? Describe the different kinds of unconformities: angular unconformity, disconformity, nonconformity.
- 89 Describe the various types of correlation: Correlation, Physical criteria correlation, Principle of fossil succession, index fossils.
- 90 What is the principle of uniformitarianism?
- 91 What is relative dating and how does relative dating differ from absolute dating?
- 92 What is radioactive data and what is half life, parent isotopes, and daughter isotopes?
- 93 Which isotope pairs are commonly used for radiometric dating?
- 94 What is radioactivity?
- 95 What is a parent isotope? daughter products?
- 96 Which portion of earth history represents the most geologic time?
- 97 Which radioactive dating method do archeologist use for dating things from the last 40,000 years?
- 98 When was the earth formed (when was the beginning of the Precambrian)?
- 99 Which is the longest time period?
- 100 What is the order from oldest to youngest of Precambrian, Paleozoic, Mesozoic, and Cenozoic Eras?