EXAM 1: ANSWER KEY

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For each question, select the best answer and fill in your choice on the scantron form.

1. The meaning of the word geology is:
   A. the study of rocks
   B. chemistry of the Earth
   C. earth science
   D. the origin of the solar system
   E. planet earth

2. Which of the following materials used in everyday life is a product of Earth’s geological resources?
   A. salt
   B. glass
   C. plastic
   D. motor oil
   E. all of the above

3. Which of the following statements is true about the solar system?
   A. there are 9 planets and approximately 70 moons
   B. the planets are divided into the Terrestrial planets and the Jovian planets
   C. asteroids, comets, and meteoroids orbit the sun
   D. stable orbits result from the forces of gravitational attraction
   E. all of the above

4. The density of rock is defined as:
   A. the ratio of different minerals present
   B. the resistance to flow
   C. the effects of temperature and pressure
   D. the mass in proportion to the volume
   E. the amount of metal present

5. When the interior of the earth cooled early in its history, different layers formed inside the Earth. Which of the following combinations defines the entire thickness of the Earth's interior?
   A. the core, mantle, and crust
   B. the core, asthenosphere, and crust
   C. the inner core, outer core, and mantle
   D. the asthenosphere, lithosphere, and atmosphere
   E. the lithosphere, atmosphere, hydrosphere and biosphere

6. The asthenosphere is a solid with properties resembling:
   A. brittle candy cane
   B. salt water taffy
   C. magma
   D. iron and nickel
   E. steel
7. The four earth systems made up of (1) rock, (2) water, (3) air, and (4) biological life are:
   A. (1) asthenosphere, (2) hydrosphere, (3) lithosphere, and (4) biosphere
   B. (1) lithosphere, (2) hydrosphere, (3) asthenosphere, and (4) biosphere
   C. (1) lithosphere, (2) atmosphere, (3) hydrosphere, and (4) biosphere
   D. (1) lithosphere, (2) hydrosphere, (3) atmosphere, and (4) biosphere
   E. (1) mesosphere, (2) hydrosphere, (3) lithosphere, and (4) asthenosphere

8. The geological concept that “the present is the key to the past” is known as:
   A. the principle of wishful thinking
   B. the principle of evolution
   C. the principle of sectarianism
   D. the principle of uniformitarianism
   E. the principle of vegetarianism

9. Matter is made up of (1) _________ which define (2) _________, which in turn define (3) _________.
   A. (1) atoms. (2) protons. (3) electrons.
   B. (1) protons. (2) neutrons. (3) electrons.
   C. (1) minerals. (2) compounds. (3) atoms.
   D. (1) atoms. (2) elements. (3) compounds.
   E. (1) elements. (2) minerals. (3) atoms.

10. Which of the following statements about atoms is true?
    A. atoms are only about $10^{-10}$ m across
    B. the atom is the smallest particle that uniquely defines an element, like a fingerprint
    C. atoms are comprised of a nucleus and a cloud of electrons
    D. all of the above three answers are correct
    E. none of the above

11. The negatively charged particle in an atom is a/an (1) _________ and the positively charged particle is a/an (2) _________.
    A. (1) neutron. (2) positron.
    B. (1) electron. (2) proton.
    C. (1) proton. (2) electron.
    D. (1) negatron. (2) positron.
    E. (1) muon. (2) moron.

12. The sum of the number of protons and neutrons in an atom is called the:
    A. mass number
    B. atomic number
    C. atomic size
    D. atomic charge
    E. number of electrons

13. An atom that gains electrons is called a/an (1) _________ whereas a loss of electrons forms a/an (2) _________.
    A. (1) cation. (2) anion.
    B. (1) ion. (2) molecule.
    C. (1) anion. (2) cation.
    D. (1) ion. (2) anion.
    E. (1) cation. (2) ion.
14. Atomic bonding that involves electrons being shared between atoms is called:
   A. molecular bonding
   B. ionic bonding
   C. **covalent bonding**
   D. metallic bonding
   E. van der Waals bonding

15. A good example of a mineral that exhibits van der Waals bonding is:
   A. talc
   B. graphite
   C. muscovite mica
   D. **all of the above**
   E. none of the above

16. A mineral must be a (1) _________ that (2) ____________.
   A. (1) solid. (2) formed organically.
   B. **(1) solid. (2) formed naturally.**
   C. (1) solid. (2) crystallized from magma.
   D. (1) liquid. (2) formed at room temperature.
   E. (1) liquid. (2) has a general chemical formula.

17. Which of the following combinations are all minerals?
   A. ice, mica, sugar
   B. mercury, quartz, limestone
   C. obsidian, plastic, chalk
   D. salt, mica, coal
   E. **mica, salt, gold**

18. The process whereby atoms in a mineral are replaced by atoms with a similar size and bonding properties is called:
   A. atomic manipulation
   B. atomic coordination
   C. atomic bonding
   D. atomic dissolution
   E. **atomic substitution**

19. The two most abundant elements in the Earth’s crust are:
   A. **oxygen and silicon**
   B. oxygen and nitrogen
   C. oxygen and aluminum
   D. silicon and hydrogen
   E. silicon and iron

20. Which of the following physical properties of minerals is the most misleading for mineral identification?
   A. hardness
   B. cleavage
   C. **color**
   D. chemical formula
   E. crystal shape
21. A mineral that consists of only a single element is:
   A. not really a mineral
   B. always metallic
   C. always a polymorph
   D. a native element
   E. never very stable at the Earth’s surface

22. The ordered geometric arrangement of atoms in a mineral is called the:
   A. crystal structure
   B. crystal lattice
   C. both A and B above
   D. crystal shape
   E. none of the above

23. Which of the following statements about minerals is incorrect?
   A. vitreous, resinous, and greasy are all types of luster
   B. crystal faces and cleavage planes are the same thing
   C. minerals with no cleavage break with a conchoidal fracture
   D. mineral hardness is controlled by the strength of the atomic bonds
   E. the mineral calcite dissolves in hydrochloric acid

24. The most abundant mineral family is the:
   A. silicates
   B. oxides
   C. carbonates
   D. sulfides
   E. sulfates

25. About 75% of the Earth’s crust is made up of the two minerals:
   A. olivine and calcium plagioclase
   B. quartz and olivine
   C. quartz and feldspar
   D. feldspar and pyroxene
   E. plagioclase and orthoclase

26. The silica tetrahedron consists of:
   A. one oxygen atom and four silicon atoms
   B. four oxygen atoms and four silicon atoms
   C. one oxygen atom and one silicon atom
   D. one silicon atom and four oxygen atoms
   E. one silicon atom and three oxygen atoms

27. The mineral that consists entirely of silica is:
   A. feldspar
   B. muscovite mica
   C. olivine
   D. quartz
   E. calcite
28. A ferromagnesian silicate always contains these two elements:
   A. K and Al
   B. Fe and Mg
   C. Fe and Al
   D. Mg and K
   E. none of the above

29. If cations bond with oxygen, they form (1) ________, if they bond with sulfur they form (2) ________
    and if they bond with both oxygen and sulfur they form (3) ________.
   A. (1) oxides.  (2) sulfates.  (3) sulfides.
   B. (1) oxides.  (2) sulfates.  (3) sulfates.
   C. (1) silicates.  (2) sulfides.  (3) oxides.
   D. (1) silicates.  (2) sulfides.  (3) sulfates.
   E. (1) carbonates.  (2) sulfides.  (3) phosphates.

30. Two polymorphs of carbon are:
   A. coal and diamond
   B. coal and graphite
   C. graphite and lead
   D. diamond and corundum
   E. diamond and graphite

31. Minerals are named:
   A. after places where they were discovered
   B. after people who discovered them
   C. based on their chemistry
   D. based on their physical appearance
   E. by any of the criteria listed above

32. The actual amount of a mineral present in rocks is the (1) __________ whereas the amount that can
    be economically extracted is the (2) __________.
   A. (1) mineral reserve  (2) mineral reservation
   B. (1) mineral reserve  (2) mineral resource
   C. (1) mineral resource  (2) mineral reserve
   D. (1) mineral resource  (2) mineral reservation
   E. (1) mineral deposit  (2) mineral reserve

33. The three main classes of rocks are classified by how they formed. (1) ________ rocks form from
    molten rock. (2) ________ rocks form by surface processes. (3) ________ rocks form from existing
    rocks that are changed by pressure and temperature.
   A. (1) igneous   (2) metamorphic (3) sedimentary
   B. (1) igneous   (2) sedimentary   (3) metamorphic
   C. (1) metamorphic (2) sedimentary   (3) igneous
   D. (1) sedimentary (2) metamorphic (3) igneous
   E. none of the above combinations

34. Molten rock inside the earth is called (1) ________ but on the surface it is called (2) ________.
   A. (1) lava  (2) magma
   B. (1) lava  (2) extrusive
   C. (1) intrusive  (3) magma
   D. (1) magma  (2) lava
   E. (1) extrusive  (2) intrusive
35. The melting of rock depends on the following factors:
   A. **pressure, temperature, and chemistry**
   B. pressure, temperature, and density
   C. pressure, temperature and viscosity
   D. pressure and temperature only
   E. depth inside the Earth only

36. Geothermal gradient is defined as:
   A. **the rate that temperature increases with increasing depth inside the earth**
   B. the rate that pressure increases with increasing depth inside the earth
   C. the rate that pressure increases with increasing temperature
   D. the ratio of temperature underneath the oceans to that underneath the continents
   E. none of the above

37. The process where one mineral in a rock melts before the other is called (1) ________. The process where one mineral in a magma crystallizes before the others and is removed from the melt is called (2) __________.
   A. (1) partial melting   (2) crystal settling
   B. (1) partial melting   (2) fractionation
   C. **(1) partial melting  (2) fractional crystallization**
   D. (1) magmatic differentiation   (2) fractional crystallization
   E. (1) fractionation   (2) fractional crystallization

38. The type of magma that contains the most silica is:
   A. felsic
   B. intermediate
   C. mafic
   D. ultramafic
   E. dependent on the viscosity

39. Two examples of regions of hotspot volcanic activity are:
   A. Hawai‘i and the Cascades
   B. Hawai‘i and Iceland
   C. Iceland and the Galapagos Islands
   D. Iceland and Yellowstone
   E. **Hawai‘i and Yellowstone**

40. The size of the crystals that grow from magma or lava depends on:
   A. the pressure and temperature
   B. **the rate of cooling**
   C. the chemistry of the molten material
   D. the amount of water present
   E. the amount of volatiles

41. Which of the following combinations of (1) igneous rock type, and (2) rock texture, are correct?
   A. (1) volcanic   (2) phaneritic
   B. (1) volcanic   (2) coarse grained
   C. **(1) plutonic  (2) phaneritic**
   D. (1) plutonic   (2) aphanitic
   E. (1) plutonic   (2) pyroclastic
42. Which of the following list of minerals is in the correct order according to Bowens Reaction Series?
   A. Na-plagioclase, Ca-plagioclase, K-feldspar, quartz
   B. amphibole, biotite, K-feldspar, muscovite
   C. olivine, quartz, muscovite, amphibole
   D. olivine, pyroxene, K-feldspar, Ca-plagioclase
   E. none of the above

43. The volcanic igneous rock types that form from (1) mafic, (2) intermediate, and (3) felsic lavas are:
   A. (1) basalt (2) diorite (3) rhyolite
   B. (1) rhyolite (2) andesite (3) basalt
   C. (1) andesite (2) basalt (3) rhyolite
   D. (1) andesite (2) rhyolite (3) basalt
   E. (1) basalt (2) andesite (3) rhyolite

44. Approximately how many people in the world live on or near an active volcano?
   A. 500 thousand
   B. 1 million
   C. 50 million
   D. 500 million
   E. 1 billion

45. Volcanoes with shallow slopes that form from runny lava are (1) _________ whereas volcanoes with steep slopes that form from viscous lava are (2) __________.
   A. (1) shield volcanoes (2) cinder cones
   B. (1) shield volcanoes (2) stratovolcanoes
   C. (1) stratovolcanoes (2) shield volcanoes
   D. (1) explosive (2) nonexplosive
   E. (1) fissure eruptions (2) shield volcanoes

46. Which of the following statements about the eruption of Mt. St. Helens is false?
   A. Mt. St. Helens erupted in May 1980
   B. the eruption was triggered by a gigantic landslide on the side of the volcano
   C. the eruption started off as a lateral blast and then formed a Plinian column
   D. the eruption of Mt. St. Helens came as a complete surprise to volcanologists
   E. the prevailing winds carried most of the ash eastwards across Washington and Idaho

47. The type of weathering involving the physical breakdown of rocks into smaller fragments is called (1) __________ weathering, whereas the type that involves alteration of minerals is (2) __________ weathering.
   A. (1) mechanical (2) chemical
   B. (1) physical (2) mechanical
   C. (1) chemical (2) biochemical
   D. (1) chemical (2) mechanical
   E. (1) erosion (2) chemical

48. The form of erosion that involves the influence of gravity is called:
   A. saltation
   B. plucking
   C. abrasion
   D. mass wasting
   E. gravity cannot cause erosion
49. The three types of sediment that form sedimentary rocks are:
   A. **clastic, chemical, and biogenic**
   B. clastic, detrital, and biogenic
   C. detrital, chemical, and fragmental
   D. chemical, biochemical, and biogenic
   E. bioclastic, biochemical, and detrital

50. The physical, chemical and biological processes that affect sedimentary rocks during lithification are part of an overall process called:
   A. consolidation
   B. cementation
   C. **diagenesis**
   D. recrystallization
   E. compaction

**BONUS QUESTIONS**

51. A type of wind-blown soil that is common on the Palouse is:
   A. humus
   B. laterite
   C. **loess**
   D. expansive soil
   E. pedalfer

52. The three types of slope failure are:
   A. slumps, flows, and creep
   B. **slumps, falls, and slides**
   C. slides, creep, and debris avalanches
   D. slides, flows, and solifluction
   E. flows, creep, and solifluction

53. The major metropolitan areas in the U.S.A. that are at risk for volcanic eruptions are:
   A. **Seattle and Portland**
   B. Seattle and San Francisco
   C. Los Angeles and San Francisco
   D. Portland and San Francisco
   E. no metropolitan areas are at risk

54. The deepest lake in North America, Crater Lake in Oregon, is an example of the following type of volcanic feature:
   A. cinder cone
   B. fumarole
   C. **caldera**
   D. geyser
   E. Crater Lake is not a volcanic feature at all

55. I have made sure that my student ID number is correctly filled in on the scantron sheet and I will remember to hand in the scantron sheet and take the test question sheet with me when I leave.
   A. **yes**
   B. no