Exam

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The first minerals to be mined (over 6000 years ago) were _____ and _____. 1) _____
A) lead; quartz B) gold; silver C) copper; bronze D) flint; chert
Answer: D

2) Which of the following is not a criterion for defining something as a mineral? 2) _____
A) naturally occurring B) generally inorganic
C) orderly crystalline structure D) hard
Answer: D

3) Which of the following is a mineral as defined by a geologist? 3) _____
A) concrete B) salt C) sugar D) boulder E) water
Answer: B

4) Why are boulders not a mineral? 4) _____
A) They are organic.
B) They are not naturally occurring.
C) They are not solid.
D) They do not have an orderly crystalline structure.
E) They do not have a well-defined chemical composition.
Answer: E

5) Limestone is composed almost entirely of calcite, which has the chemical formula $CaCO_3$. As a result, limestone is classified as _____. 5) _____
A) a rock
B) a mineral
C) both a mineral and a rock
D) neither a mineral nor a rock because it is organic
Answer: A

6) Which of the following best defines a mineral and a rock? 6) _____
A) A rock consists of atoms bonded in a regular, geometrically predictable arrangement; a mineral is a consolidated aggregate of different rock particles.
B) A rock has an orderly, repetitive, geometrical, internal arrangement of minerals; a mineral is a lithified or consolidated aggregate of rocks.
C) A mineral consists of its constituent atoms arranged in a geometrically repetitive structure; in a rock, the atoms are randomly bonded without any geometric pattern.
D) In a mineral the constituent atoms are bonded in a regular, repetitive, internal structure; a rock is a lithified or consolidated aggregate of different mineral grains.
Answer: D

7) Which one of the following is not true for minerals? 7) _____
A) They can be identified by characteristic physical properties.
B) They can be a liquid, solid, or gas.
C) They have a specific, internal, crystalline structure.
D) Many have a specific, predictable chemical composition.

Answer: B

8) The basic building blocks for halite are _____ and _____. 8) _____
A) Na; Cl B) Ca; K C) Al; O D) C; Si

Answer: A

9) Which of the following is not a fundamental particle found in atoms? 9) _____
A) electron B) neutron C) protons D) selectron

Answer: D

10) Atoms of the same element, zinc for example, have the same number of _____. 10) _____
A) protons in the nucleus B) neutrons in the outer nuclear shell
C) electrons in the valence bond level D) electrons in the nucleus

Answer: A

11) Which the following denotes the positively charged particles in an atom's nucleus? 11) _____
A) protons B) electrons C) neutrons D) isotrons

Answer: A

12) An atom's mass number is 13 and its atomic number is 6. How many neutrons are in its nucleus? 12) _____
A) 13 B) 6 C) 7 D) 19

Answer: C

13) Heavy elements like Pb (lead) and U (Uranium) were generated _____. 13) _____
A) by the Sun and expelled to the solar system via the solar wind
B) during collapse of a star and subsequent nuclear synthesis in a supernova
C) by humans in nuclear reactors
D) during the big band when the universe was formed

Answer: B

14) Which of the following minerals is not a chemical compound? 14) _____
A) quartz (SiO_2) B) graphite (C) C) pyrite (FeS) D) halite (NaCl)

Answer: B

15) When Calcium (Ca) bonds with oxygen, it gives up two electrons. What is the charge of the Ca ion in this compound? 15) _____
A) -2 B) -1 C) +2 D) +1

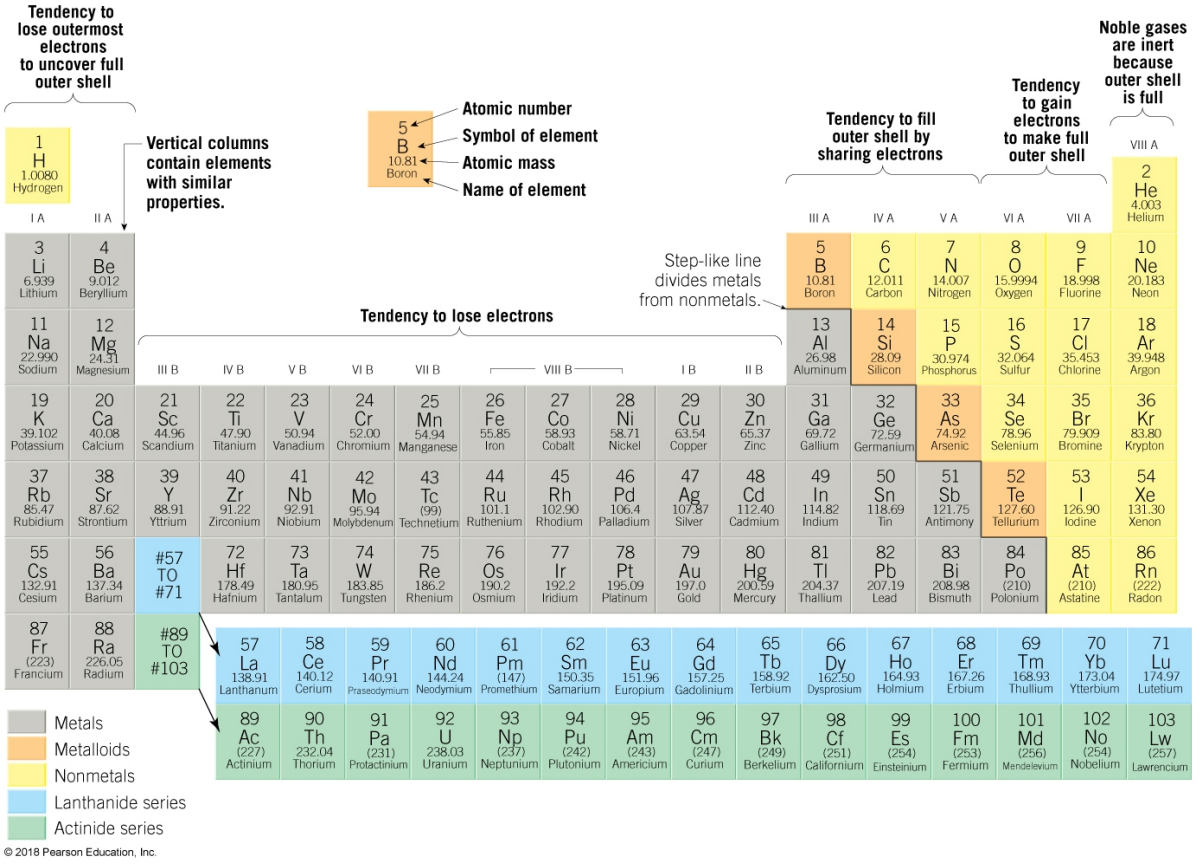
Answer: C

16) Which electrons are responsible for most chemical bonding? 16) _____

A) innermost electron shell because the electrons can be transferred to the nucleus
B) middle electron shell because they are intermediate in distance between the nucleus and the adjacent atom that bonds with the atom
C) outer electron shell because these electrons can be readily exchanged with adjacent atoms
D) Any electron can exchange with adjacent atoms to form a bond; there is no preference.

Answer: C

Use the Periodic table below to answer the following questions:



17) Element 20, Ca, has what chemical property? 17) _____

A) It tends to form covalent bonds and an ion with a charge of +1.
B) It behaves as a nonmetal, accepting electrons to form an ion with charge -2.
C) It tends to be inert, and thus is dispersed throughout the crust.
D) It behaves as a metal ion, giving up two electrons to form a +2 ion.

Answer: D

18) Element 17 (Cl) and 9 (F) _____. 18) _____

A) behave as metals because they lie on the right side of the periodic table
B) are chemically similar because they lie directly below each other on the periodic table
C) are chemically relatively inert because they adjacent to the inert gases on the periodic table
D) are chemically very different because they lie directly below each other on the periodic table

Answer: B

19) Be is to Mg as _____. 19) _____
A) K is to Mg B) K is to Rb C) Ti is to F D) Ti is to V
Answer: B

20) In 1960 the largest gold producer was South Africa. Now it is _____. 20) _____
A) Russia B) China C) India D) Brazil
Answer: B

21) Changing the number of neutrons in an atom will affect its _____. 21) _____
A) charge B) atomic number C) atomic weight D) All of the above
Answer: C

22) The columns of the periodic table divide atoms by their _____. 22) _____
A) number of valence electrons B) number of neutrons
C) atomic mass D) number of protons
Answer: A

23) Atoms that share electrons have a(n) _____ bond. 23) _____
A) metallic B) covalent C) ionic D) partial
Answer: B

24) When electrons are shared amongst all atoms, the resulting bond is a(n) _____ bond. 24) _____
A) covalent B) ionic C) metallic D) partial
Answer: C

25) The bond between sodium (Na) and Chlorine (Cl) to form halite (salt) is a(n) _____ bond. 25) _____
A) covalent B) valent C) ionic D) metallic
Answer: C

26) The bond between two hydrogen atoms (a covalent bond) is based on the force of attraction between _____. 26) _____
A) two nuclei B) two ions
C) two atoms D) protons and electrons in the same atom
Answer: D

27) Atoms that have an electrical charge due to a gain or loss of electrons are called _____. 27) _____
A) isotopes B) ions
C) periodic elements D) isochrons
Answer: B

28) Atoms tend to gain, lose, or share electrons until they are surrounded by _____ valence electrons. 28) _____
A) 8 B) 2 C) 5 D) 4
Answer: A

29) What mineral is the hardest known substance in nature? 29) _____
A) muscovite B) silicate C) native gold D) diamond
Answer: D

30) Which mineral reacts readily with cool, dilute hydrochloric acid to produce visible bubbles of carbon dioxide gas? 30) _____
A) calcite B) gypsum C) quartz D) plagioclase
Answer: A

31) The resistance of a mineral to abrasion is known as _____. 31) _____
A) luster B) hardness C) streak D) cleavage
Answer: B

32) The strong tendency of certain minerals to break along smooth, parallel planes is known as _____. 32) _____
A) cleavage B) habit C) cracking luster D) streak
Answer: A

33) The most unreliable (variable) diagnostic property of minerals such as quartz is _____. 33) _____
A) habit B) color C) specific gravity D) hardness
Answer: B

34) 1 gram is defined as the mass of 1 cubic centimeter of water. A cubic centimeter of quartz weighs 2.65 g and a cubic centimeter of galena weighs 7.5 g. The density of these materials from highest to lowest is _____. 34) _____
A) galena, quartz, water B) water, quartz, galena
C) galena, water, quartz D) quartz, galena, water
Answer: A

35) What does the tendency of micas to produce thin cleavage flakes suggest about its crystal structure? 35) _____
A) The structure is characterized by rings that form an interlocking network, forming planar sheets.
B) The crystal structure is characterized by complex polymerized mats that form a sheetlike structure.
C) The structure is produced by flow in the igneous rock, aligning glass layers within the crystal structure.
D) The atoms are arranged in orderly arrangements that form strongly bonded sheets separated by weak bonds between the sheets.
Answer: D

36) Angles are important when looking at which physical properties of minerals? 36) _____
A) cleavage B) fracture C) luster D) streak
Answer: A

37) Which of the following physical properties is <u>not</u> generally used to identify most minerals? 37) _____
A) cleavage B) smell C) hardness D) luster
Answer: B

38) Geologists may choose to lick a mineral to identify it. What mineral is the geologist expecting with this test? 38) _____

A) NaCl (halite) or KCl (sylvite)
B) a sulfide bearing rock which will taste like rotten eggs
C) None, it clears the dust off the sample so he/she can see if more clearly.
D) None, they are clearing the hydrochloric acid from the sample to rerun a test for calcite.

Answer: A

39) Which of the following describes the light reflecting and transmission characteristics of a mineral? 39) _____

A) luster
B) fluorescence
C) color streak
D) virtual absorption

Answer: A

40) When a mineral fractures along a cleavage plane, what does this suggest about the crystal structure of the mineral? 40) _____

A) The crystal grows only planar faces that become weak zones that form cleavage.
B) The crystal contains warped planes called twin planes that weaken the crystal structure and allow it fracture along a planar surface, causing cleavage.
C) The atoms are arranged in a simple orderly arrangement with uniform bonding.
D) The crystal structure contains planes along which chemical bonding is much weaker than other directions.

Answer: D

41) Why do the minerals calcite and dolomite bubble with the mineral or its powder are placed in hydrochloric acid? 41) _____

A) Both minerals are metal hydrides, and when placed in hydrochloric acid they give off hydrogen gas.
B) Both minerals are sulfides, and the acid reacts to release sulfur dioxide gas.
C) The acid reacts with the mineral to release CO_2 gas that is bound into the crystal as carbonate ion.
D) The acid and the mineral together react with oxygen in the air, releasing CO_2 gas.

Answer: C

42) The mineral fluorite is commonly _____. 42) _____

A) conchoidal
B) octohedral
C) sheetlike
D) cubical

Answer: B

43) Quartz has a characteristic conchoidal fracture, yet rock shops often sell quartz as elongate six sided objects with a pointed termination. What causes this shape? 43) _____

A) You should never buy a crystal like this because it is clearly fake, only artificial crystals grow this way.
B) Quartz usually is amorphous, consistent with its conchoidal fracture, but when it grows it grows against minerals with planar faces, causing this shape.
C) The rock shop cuts them that way with abrasives. The facets are cut to give the crystals more "power" for the crystal people.
D) The planar faces that form the object are crystal faces that grow when the crystals grew into a void.

Answer: D

44) A cubic centimeter of quartz, olivine, and gold weighs 2.5, 3.0, and 19.8 grams, respectively. This indicates that _____. 44) _____

A) gold has a higher specific gravity than quartz and olivine
B) olivine and quartz powders are harder than metallic gold
C) gold and olivine are silicates, whereas quartz is elemental silicon
D) gold is 6 to 7 times harder than olivine and quartz

Answer: A

45) Which mineral will "double refract" written text? 45) _____

A) flourite B) apatite C) quartz D) calcite

Answer: D

46) Your fingernail will scratch 46) _____

A) talc B) orthoclase C) calcite D) corundum

Answer: D

47) Although it is relatively common, limestone is an economically important rock type because its major constituent mineral, _____, is used in the production of _____. 47) _____

A) calcite; cement B) halite; halogen C) halite; salt D) calcite; calcium

Answer: A

48) Which of the following is <u>not</u> a common rock forming mineral but by contrast is always found in living things. 48) _____

A) iron B) potassium C) magnesium D) carbon

Answer: D

49) Which two elements combine to make most of the common rock forming minerals in the crust? 49) _____

A) silicon and oxygen
B) silicon and nitrogen
C) carbon and nitrogen
D) nitrogen and oxygen
E) carbon and oxygen

Answer: A

50) The most common group of rock forming minerals is _____. 50) _____

A) the halides B) the silicates C) the sulfates D) carbonate

Answer: B

51) The most common group of silicates is _____. 51) _____

A) granite B) mica C) quartz D) feldspar

Answer: D

52) The basic building block of a silicate is composed of _____. 52) _____

A) 1 oxygen and 1 silicon B) 3 oxygens and 1 silicon
C) 2 oxygens and 1 silicon D) 4 oxygens and 1 silicon

Answer: D

53) Silicates most commonly form _____. 53) _____

A) at the surface of Earth
B) under extreme pressure
C) from other silicates
D) from cooling molten rock

Answer: D

54) Clay is an example of _____. 54) _____

A) a sulfate that forms from weathering of other sulfates
B) a carbonate that forms from weathering of other carbonates
C) a silicate that forms from weathering of other silicates
D) a halide that forms from weathering of other halides

Answer: C

55) Light colored silicates have a specific gravity of about 2.7 grams/cm^3 are composed primarily of the silica tetrahedra and _____. 55) _____

A) iron, magnesium, calcium, and sodium
B) potassium, calcium, sodium, and aluminum
C) aluminum, magnesium, calcium, and iron
D) potassium, aluminum, magnesium, and sodium
E) magnesium, aluminum, sodium, and calcium

Answer: B

56) Clay minerals are light silicates that form _____. 56) _____

A) from chemical weathering of igneous rocks
B) from mechanical weathering of any rock
C) from pressure and heat
D) from molten rock

Answer: A

57) Dark silicates have a specific gravity of 3.2 to 3.6 and are composed primarily of silica tetrahedral and _____. 57) _____

A) aluminum and sodium
B) iron and magnesium
C) aluminum and magnesium
D) potassium and iron
E) potassium and calcium

Answer: B

58) Carbonates always include _____. 58) _____

A) SiO_4^{-4}
B) SO_4^{-2}
C) Cl^{-1}, F^{-1}, or Br^{-1}
D) CO_3^{-2}

Answer: D

59) Halides always include _____. 59) _____

A) Cl^{-1}, F^{-1}, or Br^{-1}
B) SO_4^{-2}
C) CO_3^{-2}
D) SiO_4^{-4}

Answer: A

60) Sulfates always include _____. 60) _____

A) Cl^{-1}, F^{-1}, or Br^{-1} B) SO_4^{-2}

C) CO_3^{-2} D) SiO_4^{-4}

Answer: B

61) Gypsum, which is widely used in plaster and wallboard, is a member of the _____ group. 61) _____

A) silicate B) halide C) carbonate D) sulfate

Answer: D

62) Dolomite is a magnesium-rich member of the _____ group. 62) _____

A) halide B) carbonate C) sulfate D) silicate

Answer: B

63) Which of the following minerals is a silicate? 63) _____

A) halite B) feldspar C) hematite D) calcite

Answer: B

64) Which one of the following mineral groups exhibits a sheet-like silicate structure? 64) _____

A) carbonates B) micas C) pyroxenes D) feldspars

Answer: B

65) Which common mineral is composed entirely of silicon and oxygen? 65) _____

A) quartz B) calcite C) diamond D) olivine

Answer: A

66) What is true of three-dimensional networks of silicates? 66) _____

A) they form sheets

B) they form complex masses

C) they are bonded equally strong in all directions

D) they tend to be separate tetrahedral units

Answer: B

67) A naturally occurring concentration of one or more metallic minerals that can be extracted economically is a(n) _____. 67) _____

A) ore B) reserve C) tailing D) resource

Answer: A

68) Which of the following is a renewable resource? 68) _____

A) water B) helium gas C) coal D) rock salt

Answer: A

69) This element is classified as an ore even in average concentrations because it is so abundant. 69) _____

A) uranium B) carbon C) aluminum D) boron

Answer: C

70) What theory dramatically improved geologist's ability to predict where certain ore deposits were formed? 70) _____

A) quantum mechanics B) plate tectonics
C) faulting theory D) geosynclines

Answer: B

71) Deposits of which of the following minerals would never be considered an ore due to their relatively low market value? 71) _____

A) chalcopyrite B) galena C) hematite D) quartz

Answer: D

72) In the late 20th century most metal prices were very low but metal prices increased dramatically in the early 21st century. Simultaneously, the early 21st century saw extensive "brown fields exploration" in which companies went to old mining areas and extracted old mine wastes or reopened old mine workings. What is the primary explanation for this activity? 72) _____

A) The companies were only interested acquiring properties through a sleazy land grab, and had no intention of doing anything with the deposits assuming no one cared about brown fields.
B) Environmental regulations make it impossible to explore anywhere but old mining areas, so this was the only place the companies could look for deposits.
C) The increase of metal prices made mineral resources that were previously uneconomic into ores that could potentially be extracted profitably.
D) The old miners were wasteful and left large amounts of ore in the ground.

Answer: C

73) What time span is required to produce most mineral deposits? 73) _____

A) billions of years
B) tens of thousands to millions of years
C) 1-100 years, or about a human life span
D) We have no way of knowing this, but most were formed at the same time as Earth.

Answer: B

74) Below is a picture of the enormous Bingham Canyon copper mine in Utah. What is the reason that the mine is so large? 74) _____

A) It is unknown if any copper underlies this deposit, so miners must continue to dig to find it.
B) Copper is economically valuable even in small quantities, so it is considered to be worth creating a large hole to extract as much as possible.
C) Copper exists in abundant quantities, so miners are trying to extract as much as possible.
D) The mine is the only location on Earth where copper is found, so the hole needs to be large.

Answer: B

75) Examine the words and/or phrases below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern. 75) _____

A) neutron B) atom C) proton D) electron

Answer: B

76) Examine the words and/or phrases below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern. 76) _____

A) valence B) hydrogen C) covalent D) ionic

Answer: A

77) Examine the words and/or phrases below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern. 77) _____

A) cubic B) amorphous C) bladed D) tabular

Answer: B

78) Examine the words and/or phrases below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern. 78) _____

A) feldspar B) quartz C) olivine D) calcite

Answer: D

79) Examine the words and/or phrases below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern. 79) _____

A) feldspar B) quartz C) olivine D) calcite

Answer: D

80) Examine the words and/or phrases below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern. 80) _____

A) carbon B) aluminum C) oxygen D) iron

Answer: A

81) Rocks are aggregates of _____. 81) _____

A) elements B) protons C) compounds D) minerals

Answer: D

82) All minerals have at least _____ element(s). 82) _____

A) two B) ten C) one D) 4000

Answer: C

83) Electrons orbit the nucleus of an atom _____. 83) _____

A) in clouds of probability
B) briefly and then bond to other atoms
C) in fixed orbits, like planets going around the sun
D) by continually passing through the nucleus

Answer: A

84) An atom with 30 protons, 30 neutrons and 30 electrons has an atomic number of: 84) _____

A) 90 B) 30 C) 60 D) 27,000

Answer: B

85) The mass of an atom does not come from its _____. 85) _____

A) nucleus B) protons C) electrons D) neutrons

Answer: C

86) An element's atomic mass is defined by the number of _____ in the nucleus. 86) _____

A) neutrons B) electrons
C) protons D) both protons and neutrons

Answer: D

87) Electrically neutral atoms have _____ numbers of electrons and protons. 87) _____

A) enormous B) equal C) contrasting D) differing

Answer: B

88) All atoms of the same element have the same number of _____. 88) _____

A) neutrons B) electrons C) protons D) minerals

Answer: C

89) Atoms are _____ to be seen with an optical microscope. 89) _____

A) just barely large enough B) too small
C) too large D) too weak

Answer: B

90) The octet rule states that atoms tend to gain, lose, or share electrons until they are surrounded by _____ valence electrons. 90) _____

A) eight B) three
C) no D) as many protons as they have

Answer: A

91) Chemical compounds retain most of the characteristics of their constituent elements. 91) _____

A) none B) few C) all D) most

Answer: B

92) Which of the following is true of cleavage? 92) _____

A) Some minerals exhibit no cleavage.
B) Cleavage and fracture are the same thing.
C) All minerals exhibit some form of cleavage.
D) Most minerals have three or more directions of cleavage.

Answer: A

93) Mineral luster is broadly classified as either being metallic or _____. 93) _____

A) nonmetallic B) pearly C) vitreous D) opaque

Answer: A

94) Most minerals have _____ specific gravity than water. 94) _____

A) a lower
B) the same
C) a higher
D) Water does not have specific gravity as it is not a mineral.

Answer: C

95) The micas, biotite and muscovite, both exhibit _____ direction(s) of cleavage. 95) _____

A) no B) one C) two D) three

Answer: B

96) A brown mineral specimen and a green mineral specimen have identical hardness. This means _____. 96) _____

A) they may or may not be the same mineral, because hardness is only one indicator of mineral identification
B) they are definitely the same mineral, due to having the same hardness
C) they cannot be the same mineral, as they are different colors
D) hardness would not necessarily be useful here, as only metallic minerals have hardness and they may be nonmetallic

Answer: A

97) A mineral's is produced by its ability to transmit light. Opaque minerals always have a _____ luster because they _____ light. 97) _____

A) nonmetallic; transmit B) metallic; transmit
C) metallic; do not transmit D) nonmetallic; do not transmit

Answer: D

98) Cleavage is related to the _____ of a mineral. 98) _____
A) color B) internal structure
C) fracture D) streak
Answer: B

99) Silicon-oxygen bonds are _____ and cause cleavage to be _____ in silicate minerals. 99) _____
A) strong, uncommon B) strong, common
C) weak, common D) weak, uncommon
Answer: A

100) In the silicon-oxygen tetrahedron, there are _____ silicon atoms than there are in oxygen atoms. 100) _____
A) as many B) many more C) a few more D) less
Answer: D

101) Quartz forms at _____ temperature than olivine. 101) _____
A) a higher B) a much higher C) a lower D) the same
Answer: C

102) Diamond and graphite are both minerals composed of _____. 102) _____
A) silica B) oxygen
C) a compound D) a single element
Answer: D

103) Halite and gypsum are _____ minerals. 103) _____
A) metallic B) opaque
C) synthetic D) industrially useful
Answer: D

104) Many metals are extracted from ores that contain _____ minerals. 104) _____
A) carbonate B) sulfate C) silicate D) halide
Answer: B

105) Quartz can be found in _____. 105) _____
A) plastic B) steel C) glass D) metal
Answer: C

106) A compound is a stable chemical substance composed of two or more _____. 106) _____
A) minerals B) atoms C) elements D) protons
Answer: C

107) What are the smallest particles of matter that exhibit and define the distinctive chemical characteristics of the individual elements? 107) _____
A) protons B) atoms C) elements D) minerals
Answer: B

108) The atomic particle that carries a positive charge is called a(n) _____. 108) _____
A) element B) mineral C) atom D) proton
Answer: D

109) What physical property denotes the color of a powdered mineral? 109) _____
A) streak B) hardness C) luster D) cleavage
Answer: A

110) The physical property denoting a mineral's tendency to crack along parallel, planar surfaces is known as _____. 110) _____
A) hardness B) streak C) luster D) cleavage
Answer: D

111) Wood floats in water and rocks sink; thus, the density of wood is _____. 111) _____
A) exactly the same as water
B) higher than that of water
C) lower than that of water
D) unable to be compared to water, as they are two different sates of matter
Answer: C

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

112) Talc and graphite are two of the lowest minerals on the hardness scale. They are also described by terms like greasy or soapy. Both have a crystal structure characterized by sheet-structures at the atomic level, yet they don't behave like micas. What accounts for their unusual physical properties?
Answer: The chemical bonds between the sheets is so weak that very low stresses can allow slip between the sheets; hence, the greasy feel and low hardness.

113) There are people who specialize in "cutting" diamonds, yet diamond is the hardest known substance. From your knowledge of minerals, which of the following describes what the diamond cutter does?
Answer: Diamond has more than one cleavage, and the cutter looks for small cracks along the cleavage and uses a chisel to break the mineral along the cleavage.

114) Gold is one of the rarest elements in the universe, yet it is extracted from ores on Earth. How is this possible?
Answer: Gold does not bond with other elements and the native metal is extremely concentrated in Earth's crust, which allows it to be extracted from rocks but low concentrations still contribute to its low price.

115) Joe Geologist discovers a vein made up primarily of quartz but also containing significant amounts of pyrite as well as chalcopyrite. He knows better than to fall for fool's gold, and decides to ignore the vein. Did he make the right decision? Explain.
Answer: No, although the pyrite has no value the chalcopyrite has copper and sulfide minerals in quartz veins are a common association with gold bearing veins. He should have examined this in much more detail.