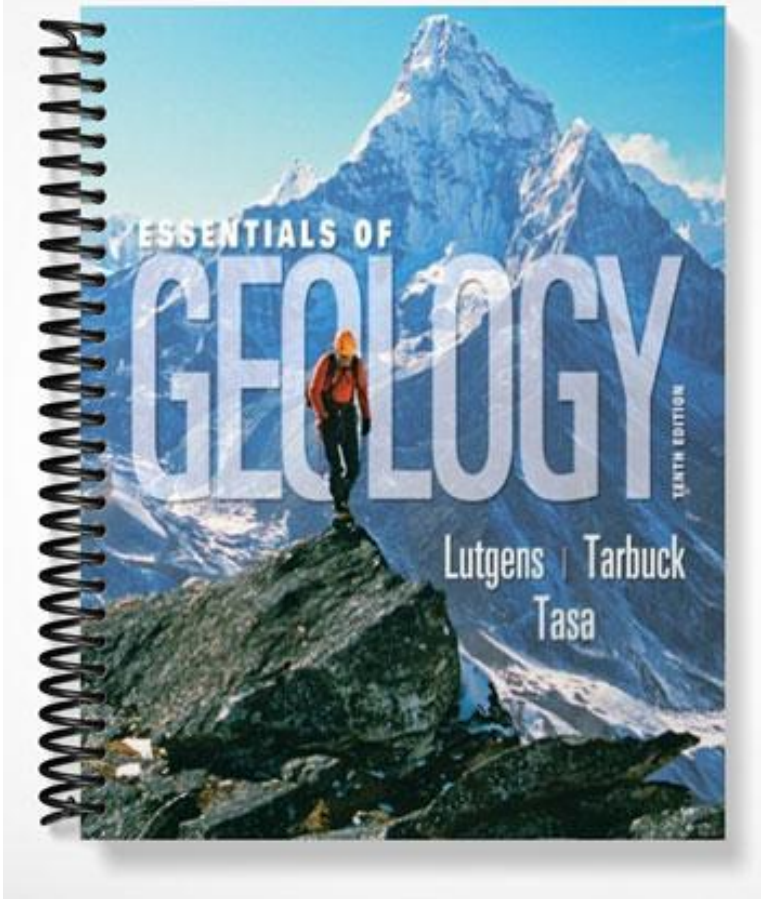
TEST BANK



**Essentials of Geology, 10e (Lutgens/Tarbuck/Tasa)**
**Chapter 2 Matter and Minerals**

1) Which of the following best defines a mineral and a rock?
   A) a rock has an orderly, repetitive, geometrical, internal arrangement of minerals; a mineral is a lithified or consolidated aggregate of rocks
   B) 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
   C) 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
   D) a rock consists of atoms bonded in a regular, geometrically predictable arrangement; a mineral is a consolidated aggregate of different rock particles
   Answer: C
   Diff: 1

2) Which of the following is not a fundamental particle found in atoms?
   A) neutron
   B) selectron
   C) electron
   D) protons
   Answer: B
   Diff: 1

3) Atoms of the same element, zinc for example, have the same number of _____.
   A) electrons in the nucleus
   B) protons in the nucleus
   C) neutrons in the outer nuclear shell
   D) electrons in the valence bond level
   Answer: B
   Diff: 1

4) Which of the following is an accurate description of ionic bonding?
   A) nuclei of bonding atoms exchange electrons; the resulting ions are bonded together by the attractive forces between the negative and positive nucleons
   B) atoms of two different elements share electrons and protons; the resulting compound is bonded together by the strong, binding energy of shared protons
   C) nuclei of two different atoms share electrons, and the resulting compound is tightly bonded by the very strong, induced, electronuclear bonds
   D) atoms of different elements, having gained or lost electrons, form negative and positive ions that are bonded together by attractive forces between ions with opposite charges
   Answer: D
   Diff: 1

5) Which of the following is correct for isotopes of the same element?
   A) the atoms have different numbers of protons and the same number of neutrons
   B) the atoms have the same number of electrons and different numbers of protons
   C) the atoms have different numbers of neutrons and the same number of protons
   D) the atoms have different numbers of electrons but the same number of neutrons
   Answer: C
   Diff: 1

6) What mineral is the hardest known substance in nature?
A) silicate
B) native gold
C) diamond
D) muscovite
Answer: C
Diff: 1

7) Which carbonate mineral reacts readily with cool, dilute hydrochloric acid to produce visible bubbles of carbon dioxide gas?
A) calcite
B) quartz
C) dolomite
D) plagioclase
Answer: A
Diff: 1

8) Which mineral is composed of silicon dioxide ($Si0_2$)?
A) calcite
B) diamond
C) olivine
D) quartz
Answer: D
Diff: 1

9) Which of the following minerals is a silicate?
A) hematite
B) muscovite
C) calcite
D) halite
Answer: B
Diff: 1

10) A cubic centimeter of quartz, olivine, and gold weigh 2.5, 3.0, and 19.8 grams respectively. This indicates that _____.
A) gold has a higher density and specific gravity than quartz and olivine
B) gold is 6 to 7 times harder than olivine and quartz
C) gold and olivine are silicates, quartz is elemental silicon
D) olivine and quartz powders are harder than metallic gold
Answer: A
Diff: 2

11) Which one of the following is a sodium and calcium feldspar with twinning striations?
A) orthoclase
B) microcline
C) plagioclase
D) sanidine
Answer: C
Diff: 1

12) Which of the following minerals is a ferromagnesian silicate?
A) quartz
B) orthoclase
C) hornblende
D) muscovite
Answer: C
Diff: 1

13) Which of the following minerals is in the mineral group known as mica?
A) orthoclase
B) muscovite
C) augite
D) olivine
Answer: B
Diff: 1

14) Which of the following best characterizes ferromagnesian silicates?
A) they contain iron and magnetite, are black in color, and they have metallic lusters
B) they are black to dark-green, silicate minerals containing iron and magnesium
C) they contain magnetite and ferroite and they are clear to light green
D) they are mostly clear, colorless, and rich in the elements magnesium and ferrium
Answer: B
Diff: 1

15) Which one of the following mineral groups exhibits a sheet-like silicate structure?
A) carbonates
B) pyroxenes
C) clays
D) feldspars
Answer: C
Diff: 1

16) Which one of the following is a typical product of weathering?
A) micasmicas
B) ferromagnesians
C) feldspars
D) clays
Answer: D
Diff: 1

17) The ion at the center of a silicate tetrahedron is surrounded by _____.
A) 4 oxygen ions
B) 6 oxygen ions
C) 4 sodium ions
D) 6 sodium ions
Answer: A
Diff: 1

18) Which one of the following describes a mineral's response to mechanical impact?
A) luster
B) cleavage
C) streak
D) crystal form
Answer: B
Diff: 1

19) Chrysotile, crocidolite, and amosite are different mineralogical forms of what industrial commodity?
A) gemstones
B) metallic sulfide ores
C) Portland cement
D) asbestos
Answer: D
Diff: 1

20) Which of the following diseases has been linked directly to prolonged inhalation of asbestos dust?
A) muscular dystrophy
B) diabetes
C) glaucoma
D) lung cancer
Answer: D
Diff: 1

21) Which of the following is the unit of weight used for measuring diamonds (about 0.2 grams)?
A) carat
B) Troy ounce
C) point
D) kilo
Answer: A
Diff: 1

22) Which of the following denotes the purity of gold used in jewelry?
A) carnot
B) carette
C) karat
D) carlot
Answer: D
Diff: 1

23) Ruby and sapphire are red and blue forms of the mineral _____.
A) diamond
B) turquoise
C) emerald
D) corundum
Answer: D
Diff: 1

24) All silicate minerals contain which two elements?
A) iron, silicon
B) silicon, sodium
C) oxygen, carbon
D) silicon, oxygen
Answer: D
Diff: 1

25) Which mineral is easily soluble in water at room temperature conditions?
A) diamond
B) talc
C) halite
D) olivine
Answer: C
Diff: 1

26) What element is the most abundant in the Earth's crust by weight?
A) carbon
B) chlorine
C) oxygen
D) sodium
Answer: C
Diff: 1

27) The strong tendency of certain minerals to break along smooth, parallel planes is known as _____.
A) streak
B) cleavage
C) cracking luster
D) crystal form
Answer: B
Diff: 1

28) What in the name given to an atom that gains or loses electrons in a chemical reaction?
A) molecule
B) ion
C) isotope
D) nucleon
Answer: B
Diff: 1

29) An atom's mass number is 13 and its atomic number is 6. How many neutrons are in its nucleus?
A) 19
B) 7
C) 13
D) 6
Answer: B
Diff: 1

30) Which one of the following is not true for minerals?
A) they have a specific, internal, crystalline structure
B) they can be a liquid, solid, or glass
C) they have a specific, predictable chemical composition
D) they can be identified by characteristic physical properties
Answer: B
Diff: 1

31) In which type of chemical bonding are electrons shared between adjacent atoms?
A) ionic
B) subatomic
C) covalent
D) isotopic
Answer: C
Diff: 1

32) How do the electrons behave in a mineral with metallic bonding?
A) they are tightly bound to certain atoms and cannot readily move
B) they can move relatively easily from atom to atom inside the mineral
C) they react with protons to make neutrons in the outer valence shells
D) they move to adjacent negative ions, forming positive ions
Answer: B
Diff: 1

33) Which group of minerals are the most abundant in the Earth's crust?
A) sulfides
B) carbonates
C) silicates
D) chlorides
Answer: C
Diff: 1

34) Which the following denotes the massive, positively charged, nuclear particles?
A) protons
B) electrons
C) isotrons
D) neutrons
Answer: A
Diff: 1

35) What are the lightest or least massive of the basic atomic particles?
A) uranium nuclei
B) protons
C) electrons
D) neutrons
Answer: C
Diff: 1

36) Which of the following has the highest specific gravity?
A) wood
B) water
C) gold
D) quartz
Answer: C
Diff: 1

37) Which of the following will react readily with acids such as hydrochloric?
A) calcite
B) quartz
C) diamond
D) talc
Answer: A
Diff: 1

38) Which of the following describes the light reflecting and transmission characteristics of a mineral?
A) luster
B) color streak
C) virtual absorption
D) fluorescence
Answer: A
Diff: 1

39) What is the name of dark-colored mica?
A) calcite
B) biotite
C) quartz
D) olivine
Answer: B
Diff: 1

40) Hornblende and the other amphiboles have what type of silicate structure?
A) metallic
B) sheet
C) 3-D framework
D) double chains
Answer: D
Diff: 1

**Word Analysis. Examine the words and/or phrases for each question below and determine the relationship among the majority of words/phrases. Choose the option which does not fit the pattern.**

41) a. electron b. atom c. proton d. neutron
Answer: B
Diff: 1

42) a. hardness b. streak c. luster d. cleavage
Answer: C
Diff: 1

43) a. quartz b. olivine c. feldspar d. calcite
Answer: D
Diff: 1

44) a. olivine b. quartz c. amphibole d. pyroxene
Answer: B
Diff: 1

45) a. galena b. calcite c. gypsum d. halite
Answer: A
Diff: 2

46) Calcite and dolomite are both carbonate minerals.
Answer: TRUE
Diff: 1

47) Graphite and diamond have the same chemical compositions and different crystalline structures.
Answer: TRUE
Diff: 1

48) Rocks are aggregates of one or more minerals.
Answer: TRUE
Diff: 1

49) Mineral luster is broadly classified as either being metallic or opaque.
Answer: FALSE
Diff: 1

50) Electrically neutral atoms have equal numbers of electrons and protons.
Answer: TRUE
Diff: 1

51) Rock-forming silicate minerals have higher specific gravities than water.
Answer: TRUE
Diff: 1

52) In a silicon-oxygen structural unit, silicon atoms occupy corners of a tetrahedron.
Answer: FALSE
Diff: 1

53) Calcite and halite react with dilute acids to evolve carbon dioxide.
Answer: FALSE
Diff: 2

54) All atoms of the same element have the same atomic number.
Answer: TRUE
Diff: 1

55) Orthoclase and plagioclase feldspars have quite different forms of cleavage.
Answer: FALSE
Diff: 1

56) Diamond and quartz are both minerals composed of a single element.
Answer: FALSE
Diff: 1

57) The micas, biotite and muscovite, both exhibit one direction of cleavage.
Answer: TRUE
Diff: 1

58) Nonmetallic minerals like quartz and gypsum have no industrial uses.
Answer: FALSE
Diff: 1

59) Ferromagnesian silicate minerals contain some magnesium and/or iron.
Answer: TRUE
Diff: 1

60) Positive ions are atoms that have gained electrons during a chemical reaction.
Answer: FALSE
Diff: 1

61) Isotopes of the same element have the same mass number.
Answer: FALSE
Diff: 1

62) Moh's hardness scale is a relative measure of which physical property of minerals?
Answer: hardness
Diff: 1

63) What physical property denotes the color of a powdered mineral?
Answer: streak
Diff: 1

64) The physical property denoting a mineral's tendency to crack along parallel, planar surfaces is known as what?
Answer: cleavage
Diff: 1

65) What is the hardest mineral known?
Answer: diamond
Diff: 1

66) What is the chemical composition of graphite and diamond?
Answer: carbon
Diff: 1

67) In atoms, which electrons are involved in chemical bonding?
Answer: valence
Diff: 1

68) A compound is a stable chemical substance composed of two or more what?
Answer: elements
Diff: 1

69) What is the dominant form of chemical bonding exhibited by minerals such as native gold, native copper and copper-rich sulfides?
Answer: metallic
Diff: 1

70) What two major characteristics differentiate minerals from natural glasses?
Answer: solid, internal arrangement of atoms
Diff: 1

71) Most glasses and some minerals exhibit a type of fracture characterized by nested and curved, crack surfaces. What term describes this property?
Answer: conchoidal
Diff: 1

72) Parallel, straight, linear imperfections visible on the cleavage surfaces of plagioclase feldspar are called what?
Answer: striations
Diff: 1

73) What is the smallest particle of matter that exhibits and defines the distinctive chemical characteristics of the individual elements?
Answer: atom
Diff: 1

74) What ferromagnesian silicate mineral is named for its green color?
Answer: olivine
Diff: 1

75) What mineral group forms by the breakdown and weathering of rock-forming silicate minerals and are important constituents of soils?
Answer: clays
Diff: 1

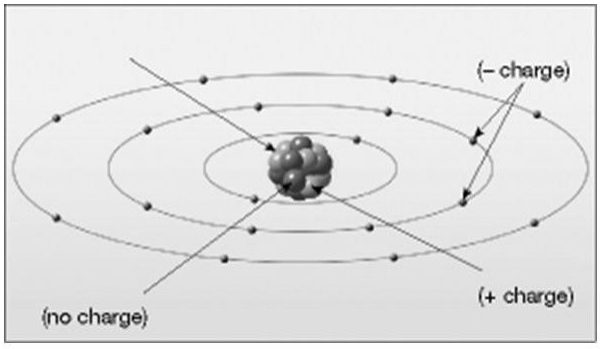
**Critical thinking and discussion questions. Use complete sentences, correct spelling, and the information presented in Chapter 2 to answer the questions below.**

76) Overall, the physical properties of minerals provide a reliable means to identify common minerals. However, certain properties can exhibit a range of characteristics or values making them less useful for identification purposes. Choose three physical properties that might vary considerably between samples of the same mineral and explain why such variability would exist.
Diff: 2

77) Based on the brief discussion of chemistry and chemical bonding in chapter 2, why do minerals rarely exhibit pure chemical compositions (100% always the same chemical composition)?
Diff: 2

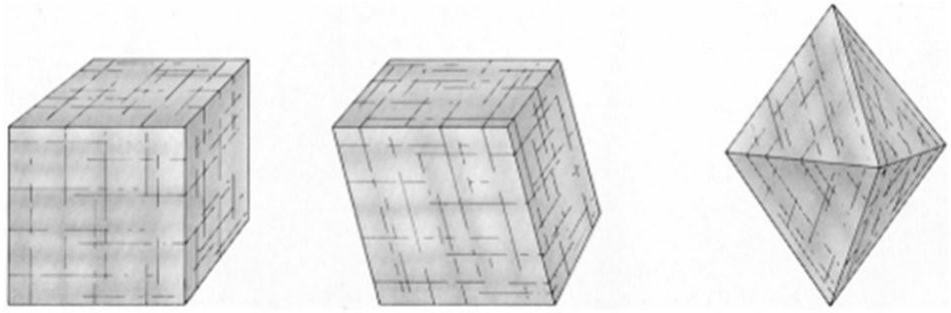
78) Considering the composition and structure of Earth discussed in chapter 1, do you think all of the possible silicate (and even mineral) structures have been identified by scientists? Discuss why or why not. Also, does this same reasoning apply to all possible chemical elements of Earth?
Diff: 3

79) Label the various parts of an atom in the diagram below.




Answer: See Figure 2.5 A in chapter 2 of the Essentials of Geology, 10e textbook
Diff: 1

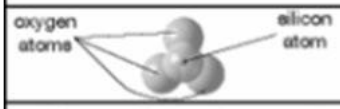
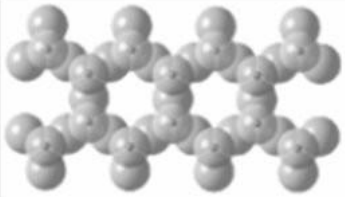
80) For each illustration below, note the number of cleavage directions.



(a) _____ (b) _____ (c) _____

Answer: (a) 3 (b) 3 (c) 4
Diff: 2

81) Fill in the table below on silicate minerals.

| Silicate structure | Oxygen to silicon ratio | mineral | cleavage |
|---|---|---|---|
|   | 4:1 | olivine | (a) |
|  | (b) | (c) | two planes at right angles |
|  | (d) | (e) | (f) |

Answer: (a) none (b) slightly more than 3:1 (c) pyroxene group - augite
(d) slightly less than 3:1 (e) amphibole group- hornblende (f) two planes at 60 and 120 degrees
Diff: 2