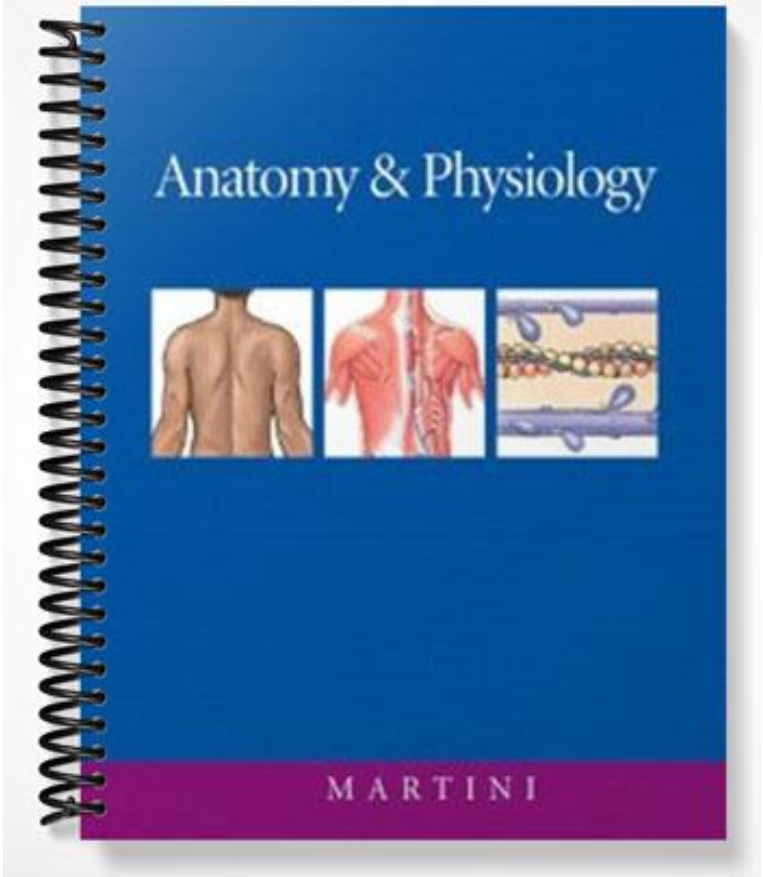
TEST BANK



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

1) The simplest chemical units of matter are 1) _____
A) protons. B) atoms. C) molecules. D) electrons. E) neutrons.

2) Isotopes of an element differ in the number of 2) _____
A) protons in the nucleus.
B) electrons in the nucleus.
C) neutrons in the nucleus.
D) electrons in energy shells.
E) electron clouds.

3) The atomic number represents the number of 3) _____
A) neutrons in an atom.
B) neutrons and electrons.
C) protons in an atom.
D) protons and neutrons.
E) electrons in an ion.

4) All atoms with the same atomic number are grouped into 4) _____
A) compounds.
B) molecules.
C) isotopes.
D) cells.
E) elements.

5) The mass number of an atom indicates the number of 5) _____
A) protons in the nucleus.
B) protons and electrons in an atom.
C) electrons in the outer shells.
D) neutrons in the nucleus.
E) protons and neutrons in the nucleus.

6) Radioisotopes have unstable 6) _____
A) nuclei.
B) isotopes.
C) ions.
D) protons.
E) electron clouds.

7) The chemical behavior of an atom is determined by 7) _____
A) the mass of the atom.
B) the number of neutrons.
C) the number and arrangement of electrons.
D) the number of protons.
E) the size of the atom.

8) A substance containing atoms of different elements that are bonded together is called a(n) 8) _____
A) isotope.
B) molecule.
C) mixture.
D) compound.

E) solution.

9) Ions with a positive charge are called 9) _____
A) isotopes.
B) cations.
C) radicals.
D) anions.
E) polyatomic ions.

10) In living cells, the weakest bond between two or more atoms is the _____ bond. 10) _____
A) covalent B) polar C) nonpolar D) hydrogen E) ionic

11) Ionic bonds are formed when 11) _____
A) atoms share electrons.
B) two or more atoms lose electrons at the same time.
C) electrons are completely transferred from one atom to another.
D) hydrogen forms bonds with negatively charged atoms in the same or different molecule.
E) a pair of electrons is shared unequally by two atoms.

12) In a molecule of nitrogen, three pairs of electrons are shared by two nitrogen atoms. The type of bond that is formed would be an example of a(n) 12) _____
A) triple covalent bond.
B) polar covalent bond.
C) hydrogen bond.
D) double covalent bond.
E) single covalent bond.

13) If a pair of electrons is unequally shared between two atoms, a(n) _____ occurs. 13) _____
A) double covalent bond
B) hydrogen bond
C) polar covalent bond
D) single covalent bond
E) triple covalent bond

14) Elements that have atoms with full outer shells of electrons 14) _____
A) frequently form hydrogen bonds.
B) will normally form cations.
C) will normally form anions.
D) will form many compounds.
E) are inert.

15) Inorganic compounds that are soluble and whose ions will conduct an electrical current are called 15) _____
A) polar covalent molecules.
B) hydrophobic.
C) electrolytes.
D) covalent bonds.
E) hydration spheres.

16) Which of the following is the largest in size? 16) _____
A) a proton
B) an atom

C) a molecule
D) an electron
E) a neutron

17) Which one of the following statements is not correct about the reaction $H_2 + Cl_2 \rightarrow 2\ HCl$? 17) _____
A) HCl is the product.
B) H_2 and Cl_2 are the reactants.
C) Two molecules of HCl are formed in the reaction.
D) One molecule of hydrogen contains 2 atoms.
E) This reaction is an example of a decomposition reaction.

18) AB → A + B is to decomposition as A + B → AB is to 18) _____
A) synthesis.
B) replacement.
C) exchange.
D) metabolism.
E) combustion.

19) The reaction $N_2 + 3\ H_2 \rightarrow 2\ NH_3$ is an example of a(n) 19) _____
A) synthesis reaction.
B) enzyme reaction.
C) decomposition reaction.
D) exchange reaction.
E) metabolic reaction.

20) The reaction A + B → AB + energy is an example of a(n) 20) _____
A) decomposition reaction.
B) exergonic reaction.
C) exchange reaction.
D) endergonic reaction.
E) equilibrium reaction.

21) Chemical reactions that require an input of energy, such as heat, are said to be 21) _____
A) activated.
B) at equilibrium.
C) neutral.
D) exergonic.
E) endergonic.

22) Chemical reactions in the human body are controlled by special catalytic molecules called 22) _____
A) cytozymes.
B) cofactors.
C) enzymes.
D) activators.
E) cytochromes.

23) All of the following are true concerning enzymes, except: 23) _____
A) affect only the rate of a chemical reaction.
B) are proteins.
C) function as biological catalysts.
D) lower the activation energy required for a reaction.
E) become a part of the reaction's product.

24) Substrate molecules bind to enzymes at the _____ sites. 24) _____
A) neutral zone
B) active
C) carboxyl group
D) reactant
E) amino group

25) All of the compounds that can be synthesized or broken down by chemical reactions inside the body are called 25) _____
A) enzymes.
B) nutrients.
C) metabolites.
D) organic compounds.
E) inorganic compounds.

26) Each of the following is an example of an inorganic compound, except 26) _____
A) bases. B) glucose. C) acids. D) water. E) salts.

27) All organic compounds in the human body contain all of the following except 27) _____
A) calcium.
B) hydrogen.
C) oxygen.
D) carbon.
E) both A and D

28) Which of the following statements about water is not correct? 28) _____
A) is composed of polar molecules
B) can be considered a 'universal solvent'
C) has a relatively low heat capacity
D) contains hydrogen bonds
E) is responsible for about 2/3 of the mass of the human body

29) During ionization, water molecules disrupt the ionic bonds of a solute and a mixture of ions is produced. These ions are called 29) _____
A) anions.
B) dissociates.
C) anti-ions.
D) electrolytes.
E) cations.

30) Oppositely charged ions in solution are prevented from combining by 30) _____
A) water's nonpolar nature.
B) radicals.
C) hydration spheres.
D) the high heat capacity of water.
E) hydrogen bonding.

31) A solution containing equal numbers of hydrogen ions and hydroxide ions is 31) _____
A) basic. B) ionated. C) acidic. D) neutral. E) alkaline.

32) Which of the following substances would be least acidic? 32) _____

A) urine, pH = 6
B) tomato juice, pH = 4
C) stomach secretions, pH = 1
D) white wine, pH = 3
E) lemon juice, pH = 2

33) If a substance has a pH that is greater than 7, it is 33) _____
A) neutral. B) a buffer. C) alkaline. D) acidic. E) a salt.

34) An important buffer in body fluids is 34) _____
A) NaOH. B) H_2O. C) $NaHCO_3$. D) HCl. E) NaCl.

35) In the body, inorganic compounds 35) _____
A) can serve as buffers.
B) are important nutrients.
C) can make up proteins.
D) are structural components of cells.
E) both A and D

36) Carbohydrate molecules 36) _____
A) are composed of C, H, O and N atoms.
B) are integral molecules of the cell membrane.
C) contain the genetic information found in cells.
D) form the regulatory molecules known as enzymes.
E) are the body's most readily available source of energy.

37) The most important metabolic fuel molecule in the body is 37) _____
A) vitamins. B) glucose. C) starch. D) sucrose. E) protein.

38) Molecules that have the same molecular formula but different structural formulas are called 38) _____
A) isotopes.
B) isomonomers.
C) isotypes.
D) isomers.
E) isozymes.

39) A polysaccharide that is formed in liver and muscle cells to store glucose is 39) _____
A) cellulose. B) fructose. C) sucrose. D) glycogen. E) starch.

40) The group of organic compounds containing carbon, hydrogen, and oxygen in a near 1:2:1 ratio is defined as a 40) _____
A) nucleic acid.
B) carbohydrate.
C) lipid.
D) protein.
E) both C and D

41) Lipids 41) _____
A) form essential structural components of cells.
B) provide roughly twice the energy as carbohydrates.
C) help to maintain body temperature.
D) all of the above

E) B and C only

42) A fatty acid that contains three double covalent bonds in its carbon chain is said to be 42) _____
A) hydrogenated.
B) saturated.
C) carboxylated.
D) polyunsaturated.
E) monounsaturated.

43) Most of the fat found in the human body is in the form of 43) _____
A) phospholipids.
B) triglycerides.
C) prostaglandins.
D) steroids.
E) monoglycerides.

44) A type of lipid that is produced by nearly every tissue in the body and that acts as a local regulator of metabolism are the 44) _____
A) glycolipids.
B) monoglycerides.
C) steroids.
D) phospholipids.
E) prostaglandins.

45) Cholesterol, phospholipids, and glycolipids are examples of 45) _____
A) prostaglandins.
B) dietary fats.
C) structural lipids.
D) steroids.
E) lipid drugs.

46) Which of the following is <u>not</u> a function of protein? 46) _____
A) metabolic regulation
B) movement
C) transport
D) support
E) storage of genetic information

47) You would expect a peptide bond to link 47) _____
A) a fatty acid and a glycerol molecule.
B) a cholesterol molecule and a fatty acid molecule.
C) two simple sugars.
D) two nucleotides.
E) two amino acids.

48) Each amino acid differs from another in the 48) _____
A) number of carboxyl groups.
B) nature of the R group.
C) number of peptide bonds in the molecule.
D) size of the amino group.
E) number of central carbon atoms.

49) In proteins the alpha-helix and pleated sheet are examples of a _____ structure of a protein. 49) _____
A) primary
B) pentanary
C) quaternary
D) secondary
E) tertiary

50) Proteins have very complex shapes. Interactions between globular or fibrous polypeptide chains result in which type of structure? 50) _____
A) primary
B) secondary
C) quaternary
D) pentagonal
E) tertiary

51) Glycoproteins and proteoglycans are combinations of proteins and 51) _____
A) fatty acids.
B) lipids.
C) nucleic acids.
D) carbohydrates.
E) none of the above

52) Molecules that store and process genetic information are the 52) _____
A) proteins.
B) steroids.
C) lipids.
D) nucleic acids.
E) carbohydrates.

53) Nucleic acids are composed of units called 53) _____
A) nucleotides.
B) fatty acids.
C) pyrimidines.
D) amino acids.
E) purines.

54) A nucleotide consists of 54) _____
A) a five-carbon sugar, a nitrogenous base, and a phosphate group.
B) a five-carbon sugar and phosphate group.
C) a five-carbon sugar and an amino acid.
D) a five-carbon sugar and a nitrogenous base.
E) a phosphate group and a nitrogenous base.

55) According to the rules of complementary base pairing, a nucleotide containing the base cytosine would pair with a nucleotide containing the base 55) _____
A) uracil. B) thymine. C) guanine. D) adenine. E) cytosine.

56) The most important high energy compound in cells is 56) _____
A) adenosine triphosphate.
B) ribonucleic acid.
C) deoxyribonucleic acid.
D) adenosine-diphosphate.

E) adenosine-monophosphate.

57) A nanometer is 57) _____
A) 10^{-10} meter.
B) 10^{-8} meter.
C) 10^{-12} meter.
D) 10^{-6} meter.
E) 10^{-9} meter.

58) A thyroid scan utilizes radioactive isotopes of the element _____ to help diagnose thyroid disorders. 58) _____
A) chromium B) sodium C) iodine D) calcium E) cobalt

59) An excess of hydrogen ions in the body fluids can have disastrous results because 59) _____
A) excess hydrogen ions can change the shape of large complex molecules, rendering them nonfunctional.
B) excess hydrogen ions can break chemical bonds.
C) excess hydrogen ions can disrupt tissue functions.
D) all of the above
E) A and B only

60) Artificial sweeteners 60) _____
A) are naturally similar to sugars.
B) are always some form of carbohydrate.
C) are inorganic sugar substitutes.
D) produce the same number of calories as the equivalent amount of sucrose.
E) are generally 100 or more times sweeter than sucrose.

61) Alaska Natives have a lower incidence of heart disease even though their diets are high in fat and cholesterol. This may be due to the large amount of _____ in their diets. 61) _____
A) prostaglandins
B) oleic acid
C) triglycerides
D) omega-3 fatty acids
E) steroids

62) A dehydration synthesis reaction between glycerol and a single fatty acid would yield a(n) 62) _____
A) omega-3 fatty acid.
B) micelle.
C) monoglyceride.
D) diglyceride.
E) triglyceride.

63) If an element is composed of atoms with an atomic number of 6 and a mass number of 14, then a neutral atom of this element contains 63) _____
A) 6 neutrons.
B) 6 protons.
C) 14 electrons.
D) 14 protons.
E) 8 electrons.

64) One mole of any element 64) _____

A) has the same mass.
B) has the same number of atoms.
C) has the same weight.
D) has the same number of electrons.
E) all of the above

65) When electrons are transferred from one atom to another, and the two atoms unite as a result of the electrostatic attraction, 65) _____
A) an ion is formed.
B) an ionic bond is formed.
C) a molecule is formed.
D) a covalent bond is formed.
E) a hydrogen bond is formed.

66) Calcium atoms have two electrons in the outermost shell. As a result, you would expect calcium to form ions with a charge of 66) _____
A) -1. B) -2. C) 0. D) +1. E) +2.

67) Magnesium atoms have two electrons in the outermost shell and chlorine atoms have seven. The compound magnesium chloride would contain 67) _____
A) 1 magnesium and 1 chlorine.
B) 2 magnesium and 1 chlorine.
C) 2 magnesium and 7 chlorine.
D) 1 magnesium and 2 chlorine.
E) impossible to tell without more information

68) Each of the following statements concerning hydrogen bonds is true, <u>except</u> one. Identify the exception. 68) _____
A) Hydrogen bonds can occur within a single molecule.
B) Hydrogen bonds are strong attractive forces between hydrogen atoms and negatively charged atoms.
C) Hydrogen bonds can form between neighboring molecules.
D) Hydrogen bonds are important forces for holding large molecules together.
E) Hydrogen bonds are responsible for many of the unique properties of water.

69) In the reaction listed below, what coefficient needs to be added to balance the equation? 69) _____
$6\ CO_2 + 6\ H_2O \rightarrow C_6H_{12}O_6 + \_\_\_\_\_\ O_2$
A) 10 B) 4 C) 6 D) 8 E) 2

70) In an exergonic reaction 70) _____
A) energy is released during the reaction.
B) large molecules are broken down into smaller ones.
C) molecules move from reactants to products and back.
D) molecules are rearranged to form new molecules.
E) small molecules are assembled into larger ones.

71) In an equilibrium reaction 71) _____
A) increasing the amount of one of the products will increase the amount of reactants available.
B) decreasing the amount of one of the reactants will increase the amount of product formed.
C) the rate of formation of products equals the rate of formation of reactants.
D) all of the above

E) A and C only

72) The hydrogen bonding that occurs in water is responsible for all of the following, except 72) _____
A) the low freezing point of water.
B) the ability of water to dissolve nonpolar substances.
C) the surface tension of water.
D) the high boiling point of water.
E) the ability of water to dissolve inorganic salts.

73) Nonpolar organic molecules are good examples of 73) _____
A) hydrophilic compounds.
B) electrolytes.
C) molecules that will dissociate when placed into water.
D) hydrophobic compounds.
E) solutes.

74) An inorganic compound, when placed in water, dissociates 99% forming hydrogen ions and anions. This substance would be 74) _____
A) a weak acid.
B) a weak base.
C) a strong base.
D) a strong acid.
E) a salt.

75) When a small amount of hydrochloric acid is added to a solution of Na_2HPO_4, the pH of the solution does not change. The pH does not change when a small amount of NaOH is added either. Based on these observations, all of the following are true concerning the compound Na_2HPO_4, except: 75) _____
A) Na_2HPO_4 acts as a buffer.
B) Na_2HPO_4 is able to accept extra hydrogen ions from the HCl.
C) Na_2HPO_4 is a salt formed from reacting a strong base with a weak acid.
D) Na_2HPO_4 is able to donate hydrogen ions to the OH- from NaOH.
E) Na_2HPO_4 adsorbs excess H^+ and -OH directly onto the surface of its crystalline structure.

76) Fructose 76) _____
A) is an isomer of glucose.
B) is a hexose.
C) is found in male reproductive fluids.
D) all of the above
E) A and B only

77) A shortage of cholesterol in the body would interfere with the formation of 77) _____
A) glycogen.
B) sex hormones.
C) proteins.
D) nucleic acids.
E) both A and C

78) How would the lack of a cofactor for an enzyme affect that enzyme's function? 78) _____
A) The enzyme would cease to function after reaching a maximum rate.
B) The enzyme would function more slowly.

C) The enzyme's function would not be altered.
D) The enzyme would not be able to function.
E) The enzyme would function more quickly.

79) The nucleic acid RNA 79) _____
A) contains the pyrimidine uracil in place of thymine.
B) contains the cell's genetic information.
C) contains the pentose deoxyribose.
D) is restricted to the nucleus.
E) is double stranded.

80) When two monosaccharides undergo a dehydration synthesis 80) _____
A) a new monosaccharide is formed.
B) a disaccharide is formed.
C) hydrolysis occurs.
D) a polysaccharide is formed.
E) a starch is formed.

81) If a polypeptide contains 10 peptide bonds, how many amino acids does it contain? 81) _____
A) 10 B) 0 C) 12 D) 11 E) 5

82) You would expect to find proteoglycan molecules 82) _____
A) acting as receptors on the surface of cell membranes.
B) acting as antibodies to viruses.
C) in the secretions coating the respiratory tract.
D) functioning as hormones from the pancreas.
E) functioning as enzymes in the stomach.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

83) An _____ is a substance that consists entirely of atoms with the same atomic number. 83) _____

84) The center of an atom is called the _____. 84) _____

85) Electrons whirl around the center of the atom at high speed forming a(n) _____. 85) _____

86) Electrons in an atom occupy an orderly series of electron shells or _____. 86) _____

87) A _____ is a combination of two or more atoms and has different physical and chemical properties than its individual atoms. 87) _____

88) Ions with a positive charge are called _____. 88) _____

89) Ions with a negative charge are called _____. 89) _____

90) In a _____ chemical bonds between atoms are broken as atoms are rearranged in new combinations to form different chemical substances. 90) _____

91) Chemical reactions that release energy are called _____. 91) _____

92) Chemical reactions that require energy are called _____. 92) _____

93) _____ control the rate of chemical reactions that occur in the human body. 93) _____

94) In living cells, complex reactions proceed in a series of interlocking steps called a _____. 94) _____

95) _____ molecules are compounds that contain carbon as the primary structural atom. 95) _____

96) _____ compounds do not contain carbon as the primary structural atom. 96) _____

97) A(n) _____ is a homogeneous mixture containing a solvent and a solute. 97) _____

98) _____ are soluble inorganic compounds whose ions will conduct an electric current in solutions. 98) _____

99) Molecules that readily dissolve in water are called _____. 99) _____

100) Molecules that do not dissolve in water are called _____. 100) _____

101) The _____ of a solution is the negative logarithm of the hydrogen ion concentration expressed in moles per liter in the solution. 101) _____

102) _____ are compounds that in solution maintain pH within given limits. 102) _____

103) All fatty acids contain an arrangement of atoms called the _____ at one end of the chain. 103) _____

104) In water, large numbers of fatty acids tend to form droplets called _____. 104) _____

105) _____ are lipid molecules that form biological membranes. 105) _____

106) The molecule DNA contains a five-carbon sugar called _____. 106) _____

107) The molecule RNA contains a five-carbon sugar called _____. 107) _____

108) The purines found in DNA are _____ and _____. 108) _____

109) The pyrimidine bases found in DNA are _____ and _____. 109) _____

110) When a nitrogen base is added to a pentose sugar, a _____ is formed. 110) _____

111) A(n) _____ is a covalent bond that stores an unusually large amount of energy. 111) _____

112) In the process of _____ a phosphate group is attached to a molecule. 112) _____

113) The hydrolysis of ATP yields the molecule _____. 113) _____

114) The _____ of a radioactive substance is the time required for a 50% reduction in the rate of radiation emission. 114) _____

115) _____ are radioactively labeled compounds that are used in diagnosis and research. 115) _____

116) In _____, the radiation emitted by injected radioisotopes creates an image on a special photographic plate. 116) _____

117) The technique known as _____ uses computers to reconstruct sections through the body that permit extremely precise localization of blood flow and metabolic activity in specific organs. 117) _____

118) Radioactive particles that consist of a helium nucleus are called _____. 118) _____

119) Radioactive particles that consist of electrons are called _____. 119) _____

120) High energy waves emitted by radioactive nuclei are called _____. 120) _____

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

121) Why is it life-threatening to have a high fever?

122) A certain reaction pathway consists of 4 steps. How would decreasing the amount of enzyme that catalyzes the second step affect the amount of product produced at the end of the pathway?

1) B
2) C
3) C
4) E
5) E
6) A
7) C
8) D
9) B
10) D
11) C
12) A
13) C
14) E
15) C
16) C
17) E
18) A
19) A
20) B
21) E
22) C
23) E
24) B
25) C
26) B
27) A
28) C
29) D
30) C
31) D
32) A
33) C
34) C
35) A
36) E
37) B
38) D
39) D
40) B
41) E
42) D
43) B
44) E
45) C
46) E
47) E
48) B
49) D
50) C
51) D

52) D
53) A
54) A
55) C
56) A
57) E
58) C
59) D
60) E
61) D
62) C
63) B
64) B
65) B
66) E
67) D
68) B
69) C
70) A
71) E
72) B
73) D
74) D
75) E
76) E
77) B
78) D
79) A
80) B
81) D
82) C
83) element
84) nucleus
85) electron cloud
86) energy levels
87) compound
88) cations
89) anions
90) chemical reaction
91) exergonic
92) endergonic
93) Enzymes
94) pathway
95) Organic
96) Inorganic
97) solution
98) Electrolytes
99) hydrophilic
100) hydrophobic
101) pH
102) Buffers
103) carboxylic acid group

104) micelles
105) Structural lipids (or phospholipids)
106) deoxyribose
107) ribose
108) adenine; guanine
109) thymine; cytosine
110) nucleoside
111) high energy bond
112) phosphorylation
113) ADP
114) half-life
115) Tracers
116) nuclear imaging (or radioautography)
117) PET, positron emission tomography
118) alpha particles
119) beta particles
120) gamma rays
121) A high body temperature can be life-threatening because the heat can cause certain proteins, such as vital enzymes to become denatured. When this occurs, the proteins become nonfunctional and if they catalyze reactions that are necessary for life, life will cease.
122) Decreasing the amount of enzyme at the second step would slow down the remaining steps of the pathway because less substrate would be available for the next two steps. The net result would be a decrease in the amount of product.