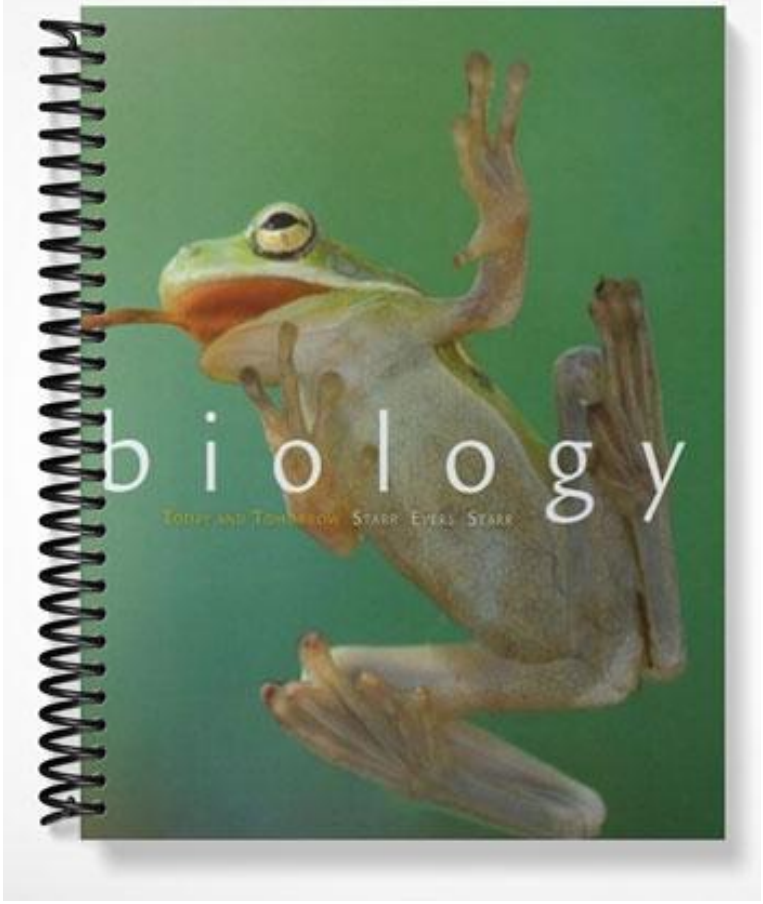
TEST BANK



CHAPTER 2--MOLECULES OF LIFE

Student: _____

1. According to nutritional evidences, the human body requires about ____ of fat each day to stay healthy.

   A. 1 teaspoon
   B. 4 teaspoons
   C. 1 tablespoon
   D. 4 tablespoons
   E. 1 cup

2. An average New Yorker consumes the equivalent of ____ of butter per day.

   A. 1 teaspoon
   B. 4 teaspoons
   C. 1 tablespoon
   D. 1 stick
   E. 1 cup

3. An average New Yorker consumes about ____ pounds of fat per year.

   A. 100
   B. 85
   C. 75
   D. 55
   E. 25

4. Which of the following may matter the least to health?

   I. the type of fat
   II. the average quantity of fat
   III. the form of fat

   A. I only
   B. I and II
   C. I and III
   D. II and III
   E. II only

5. Fats are major components of the cell

A. membranes.
B. cytoplasm.
C. cytosol.
D. ribosomes.
E. mitochondria.

6. A typical fat has ____ fatty acids.

A. 1
B. 2
C. 3
D. 4
E. 5

7. What are the properties that favor *trans* fat over other types of fats?

I. long shelf-life
II. cheaper than butter
III. mild flavor

A. I and II
B. I, II, and III
C. I only
D. II and III
E. II only

8. Hydrogenated vegetable oil or *trans* fats are

A. as healthy as natural vegetable oil.
B. as healthy as animal fats.
C. more healthy than animal fats.
D. solid cooking fat.
E. completely wiped off from the market.

9. *Trans* fats accumulate in our body because

A. enzymes that we produce are overwhelmed with the quantity that we ingest.
B. we may not produce enzymes able to metabolize these molecules.
C. enzymes that we produce are often defective.
D. those molecules help take the sugar out of the blood.
E. our body can tolerate a fair amount of those molecules.

10. What is the smallest particle of an element that retains all the properties of that element?

    A. molecule
    B. atom
    C. ion
    D. compound
    E. electron

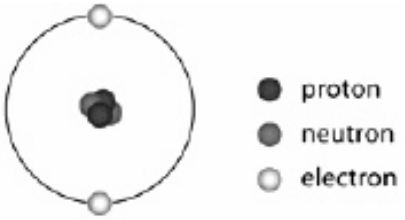
11. ____, ____, and ____ are subatomic particles.

    A. Cations; anions; electrons
    B. Cations; anions; ions
    C. Cations; neutrons; ions
    D. Protons; neutrons; ions
    E. Protons; neutrons; electrons

12. The nucleus of an atom is constituted of

    A. protons
    B. electrons
    C. neutrons
    D. protons and neutrons
    E. electrons and neutrons

13. Consider the following figure. It is technically INCORRECT in the sense that



    A. protons and neutrons are represented in the nucleus.
    B. electrons spin around the nucleus.
    C. the charge of protons are not represented.
    D. the charge of electrons are not represented.
    E. electrons should be much farther away from the atomic nucleus.

14. In an atom, ____ spin around the nucleus.

    A. electrons
    B. protons
    C. neutrons
    D. both neutrons and protons
    E. both protons and electrons

15. The negative subatomic particle is

    A. the neutron.
    B. the proton.
    C. the electron.
    D. both the electron and the proton.
    E. both the proton and the electron.

16. The positive subatomic particle is

    A. the neutron.
    B. the proton.
    C. the electron.
    D. both the electron and the proton.
    E. both the neutron and the electron.

17. The neutral subatomic particle is

    A. the neutron.
    B. the proton.
    C. the electron.
    D. both the electron and the proton.
    E. both the neutron and the electron.

18. Radioactive isotopes

    A. are electrically unbalanced.
    B. behave the same chemically and physically but differ biologically from other isotopes.
    C. are the same physically and biologically but differ from other isotopes chemically.
    D. have an excess number of neutrons.
    E. are produced when substances are exposed to radiation.

19. For a given element, all atoms of that element have the same number of

    A. neutrons.
    B. electrons.
    C. protons.
    D. protons and neutrons.
    E. ions.

20. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

The number 30 on the element above represents the

A. mass number.
B. atomic number.
C. number of electrons.
D. number of protons.
E. number of neutrons.

21. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

How many protons are in the nucleus of a phosphorus atom?

A. 5
B. 7
C. 10
D. 15
E. 30

22. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

How many electrons are in the innermost electron shell of a phosphorus atom?

A. 1
B. 2
C. 3
D. 5
E. 8

23. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

How many electrons are in the outermost electron shell of a phosphorus atom?

A. 1
B. 2
C. 3
D. 5
E. 8

24. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

Phosphorus has ____ vacancies.

A. 1
B. 2
C. 3
D. 5
E. 8

25. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

How many electrons are in the second electron shell of a phosphorus atom?

A. 1
B. 2
C. 3
D. 5
E. 8

26. Instability of radioisotopes is caused by

A. sudden temperature variations.
B. environmental humidity.
C. the random motion of atoms.
D. the disintegration of a neutron into a proton and an electron.
E. the motion of electrons and neutrons.

27. Which of the following statements is NOT true?

A. All isotopes of an element have the same number of electrons.
B. All isotopes of an element have the same number of protons.
C. All isotopes of an element have the same number of neutrons.
D. All radioactive isotopes are unstable.
E. All isotopes of an element have the same atomic number.

28. Radioactive isotopes have

A. excess electrons.
B. excess protons.
C. excess neutrons.
D. insufficient neutrons.
E. insufficient protons.

29. Tracer isotopes

A. are used only in plants.
B. work differently than nontracers in reactions.
C. have an unbalanced electrical charge.
D. are detected by their radioactivity.
E. are not found in nature.

30. Which of the following statements is (are) TRUE about radioisotopes?

A. Radioisotope decays at a constant rate.
B. Decay of a radioisotope is independent of temperature.
C. Decay of a radioisotope is independent of pressure.
D. A radioisotope decays into a predictable product.
E. All of these are true.

31. An atom

A. is positively charged.
B. is negatively charged.
C. is electrically neutral.
D. carries the charge of its electrons.
E. carries the charge of its protons.

32. An atom that carries a charge is called a(n)

A. ion.
B. molecule.
C. compound.
D. element.
E. microelement.

33. Which of the following statements is TRUE?

A. Chemical bonds play an important role at keeping subatomic particles together.
B. Chemical bonds keep electrons close to the nucleus.
C. Molecules are formed when two or more atoms come together through chemical bonds.
D. Neighboring molecules could interact together through ionic bonds.
E. Compounds associate together to form molecules.

34. How many types of chemical bonds are found within and between molecules?

A. 1
B. 2
C. 3
D. 5
E. 7

35. A(n) ____ is a type of chemical bond in which a strong mutual attraction forms between ions of opposite charge.

A. hydrogen bond
B. nonpolar bond
C. polar bond
D. covalent bond
E. ionic bond

36. Electrons are shared in bonds called

A. covalent bonds.
B. ionic bonds.
C. polar bonds.
D. nonpolar bonds.
E. all of these except ionic bonds.

37. The bond in table salt (NaCl) is

A. polar.
B. ionic.
C. covalent.
D. double.
E. nonpolar.

38. In ____ bonds, atoms share electrons equally.

A. double covalent
B. unstable covalent
C. polar covalent
D. nonpolar covalent
E. triple covalent

39. ____ bonds hold molecules of DNA in their characteristic shape.

A. Hydrogen
B. Ionic
C. Covalent
D. Inert
E. Single

40. Which chemical bonds are found within water molecules?

A. hydrogen
B. ionic
C. covalent
D. inert
E. single

41. Which chemical bonds are found between water molecules?

A. hydrogen
B. ionic
C. covalent
D. inert
E. single

42. A hydrogen bond is

A. a sharing of a pair of electrons between a hydrogen and an oxygen nucleus.
B. a sharing of a pair of electrons between a hydrogen nucleus and either an oxygen or a nitrogen nucleus.
C. an attractive force that involves a hydrogen atom and an oxygen or a nitrogen atom that are either in two different molecules or within the same molecule.
D. none of these.
E. all of these.

43. Methane gas (CH_4) is an example of a molecule containing which type of chemical bonds?

A. hydrogen bonds
B. double bonds
C. ionic bonds
D. polar covalent bonds
E. nonpolar covalent bonds

44. A water molecule is polar

A. because it is positively charged.
B. because it is negatively charged.
C. because it is magnetized.
D. because oxygen pulls the shared electrons a bit more than either hydrogen.
E. because each hydrogen is charged negatively while oxygen is charged positively.

45. Which compound is NOT soluble in water?

A. olive oil
B. table salt
C. sugar
D. albumin
E. sucrose

46. Water is an excellent solvent because

A. it forms spheres of hydrogenation around charged substances pulling their individual molecules away from one another.
B. it forms hydrogen bonds with many substances.
C. it has a high-heat containing property.
D. of its cohesive properties.
E. of all of these.

47. A liquid that can dissolve other substances is called a

A. compound.
B. mixture.
C. solvent.
D. solute.
E. solution.

48. A substance that is dissolved by a liquid is called a

A. compound.
B. mixture.
C. solvent.
D. solute.
E. solution.

49. A mix of glucose and water is called a

A. compound.
B. suspension.
C. solvent.
D. solute.
E. solution.

50. Which of the following is TRUE about water?

A. The oxygen end is slightly electropositive.
B. Hydrogen bonds hold water molecules together.
C. Water covers about one-half of the surface of the earth.
D. Hydrophobic interactions attract water molecules.
E. Solvent properties are greatest with nonpolar molecules.

51. Hydrophobic molecules are ____ water.

A. attracted by
B. absorbed by
C. repelled by
D. mixed with
E. polarized by

52. A ____ is a compound that releases ions other than OH^- and H^+ when dissolved in water.

A. protein
B. lipid
C. fat
D. salt
E. sugar

53. ____ is the tendency of water molecules to stay attached to one another.

A. Adhesion
B. Cohesion
C. Fusion
D. Interaction
E. Junction

54. Which property of water molecules is responsible for movement of water from roots to leaves in a plant?

A. hydrophobicity
B. temperature stability
C. fusion
D. adhesion
E. cohesion

55. Water has the ability to retard heat gain and loss due to its

A. hydrophilic interactions.
B. evaporation.
C. hydrogen bonds.
D. crystal structure.
E. liquidity.

56. Glucose dissolves in water because it

A. ionizes.
B. is a polysaccharide.
C. is a polar and forms many hydrogen bonds with water molecules.
D. has a very reactive primary structure.
E. is an isotope.

57. Which of the following represents H^+?

A. hydrogen ions
B. acid
C. base
D. hydroxyl ion
E. acceptor

58. A pH of 10 is how many times as basic as a pH of 7?

A. 2
B. 3
C. 10
D. 100
E. 1,000

59. A solution with a pH of 8 is how many times fewer hydrogen ions than a solution with a pH of 6?

A. 2
B. 3
C. 10
D. 100
E. 1,000

60. Cellular pH is kept near a value of 7 because of

A. salts.
B. buffers.
C. acids.
D. bases.
E. water.

61. The pH of banana juice is likely to be

A. below 3.
B. between 3 and 5.
C. between 5 and 6.5.
D. 7.
E. above 7.

62. The three most common atoms in your body are

A. hydrogen, oxygen, and carbon.
B. carbon, hydrogen, and nitrogen.
C. carbon, nitrogen, and oxygen.
D. nitrogen, hydrogen, and oxygen.
E. carbon, oxygen, and sulfur.

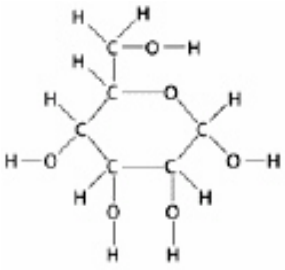
63. Molecules of life are also called organic molecules because

A. they are mainly constituted of carbon and hydrogen atoms.
B. they are mainly constituted of oxygen and hydrogen atoms.
C. they are building blocks of our organs.
D. they are exclusively found in living organisms.
E. they are mainly constituted of oxygen and nitrogen atoms.

64. Which of the following suggestions is NOT completely true?

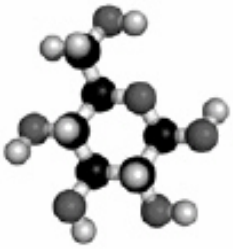
A. Carbon backbones may form rings.
B. Carbon backbones may be arranged in triangle.
C. Carbon backbones may vary in length.
D. Carbon backbones may be linear or branched.
E. Carbon backbones may contain double bonds.

65. Which of the following models would NOT reveal all the bonds found in the molecule?



glucose

I



glucose

II

glucose

III

A. I only
B. II only
C. III only
D. I and II
E. II and III

66. The formation of large polymers from smaller repeating units is known as what kind of reaction?

A. oxidation
B. reduction
C. condensation
D. hydrolysis
E. decarboxylation

67. The breakdown of large molecules by the enzymatic addition of water is an example of what kind of reaction?

A. oxidation
B. reduction
C. condensation
D. hydrolysis
E. decarboxylation

68. A condensation reaction typically produces

A. amino acids.
B. simple sugars.
C. monomers.
D. salts.
E. polymers.

69. Condensation and hydrolysis are accomplished in cells by

A. bonding attraction.
B. functional group interactions.
C. spontaneous action.
D. the action of enzymes.
E. all of these.

70. Which of the following could be used to describe a monomer of carbohydrates?

A. glycogen
B. starch
C. nucleotide
D. amino acid
E. monosaccharide

71. Which substance is the most common in cells?

A. carbohydrates
B. salts and minerals
C. proteins
D. nucleic acids
E. lipids

72. A larger biological molecule is composed of smaller units called

A. polymers.
B. isomers.
C. monomers.
D. tetramers.
E. dimers.

73. Which of the following is composed of a 1:2:1 ratio of carbon, hydrogen, and oxygen?

A. protein
B. carbohydrate
C. lipid
D. nucleic acid
E. steroid

74. Glucose and fructose are

A. ring forms.
B. structurally different.
C. monosaccharides.
D. simple sugars.
E. all of these.

75. Sucrose is composed of

A. two molecules of fructose.
B. two molecules of glucose.
C. a molecule of fructose and a molecule of glucose.
D. a molecule of fructose and a molecule of galactose.
E. two molecules of galactose.

76. Which of the following carbohydrates is the most abundant on earth?

A. cellulose
B. starch
C. glycogen
D. sucrose
E. galactose

77. Plants store their excess carbohydrates in the form of

A. cellulose.
B. starch.
C. glycogen.
D. sucrose.
E. galactose.

78. Glycogen is a polysaccharide used for energy storage by

A. plants.
B. animals.
C. protists.
D. bacteria.
E. mushrooms.

79. Cellulose is

A. the most complex of the organic compounds.
B. a polymer of glucose and fructose.
C. a polymer of glucose and galactose.
D. a component of plasma membranes.
E. a material found in cell walls.

80. Which of the following CANNOT be used to describe some aspects of polysaccharides?

A. energy storage
B. glucose subunits
C. straight or branched chain
D. insoluble in water
E. complex

81. Which is NOT a monosaccharide?

A. glucose
B. fructose
C. deoxyribose
D. starch
E. ribose

82. A triglyceride molecule is made up of

A. one glycerol and two fatty acids.
B. two fatty acids and two glycerols.
C. one fatty acid and three glycerols.
D. one glycerol and three fatty acids.
E. any of these.

83. Oils are

A. liquid at room temperature.
B. unsaturated fats.
C. found only in animals.
D. complex carbohydrates.
E. both liquid at room temperature and unsaturated fats.

84. Which of the following are lipids?

A. sterols
B. triglycerides
C. oils
D. waxes
E. all of these.

85. Which of the following molecules is NOT a sterol?

A. testosterone
B. estrogen
C. adrenaline
D. cholesterol
E. phytosterol

86. Unsaturated fatty acids

A. have fewer hydrogens than saturated fatty acids.
B. are more characteristic of animal fats than plant fats.
C. contribute to the possibility of arteriosclerosis.
D. have no double bonds.
E. are solid at room temperature.

87. If the cuticle were removed from an apple while leaving the skin intact,

A. the apple would undergo fungal decomposition.
B. the apple would lose water and dehydrate.
C. the apple would begin to swell as it absorbs moisture from the air.
D. all of these would happen.
E. nothing would happen.

88. All sterols have

A. the same number of double bounds.
B. double bonds in the same positions.
C. four rings of carbon to which are attached other atoms.
D. the same functional groups.
E. the same number and positions of double bonds.

89. Cell membranes are characterized by the presence of

A. triglycerides.
B. phospholipids.
C. unsaturated fats.
D. steroids.
E. saturated fats.

90. Which of the following is a monomer of protein?

A. nucleotide
B. monosaccharide
C. simple sugar
D. amino acid
E. ribose

91. How many levels of protein structures exist?

A. 1
B. 2
C. 3
D. 4
E. 5

92. Primary protein structure is dependent on

A. hydrophobic interactions.
B. hydrogen bonds.
C. bonds between carbon and nitrogen.
D. covalent linkages between carbon and oxygen.
E. all of these.

93. Secondary protein structure is dependent on

A. hydrophobic interactions.
B. hydrogen bonds.
C. bonds between carbon and nitrogen.
D. covalent linkages between carbon and oxygen.
E. all of these.

94. Proteins may function as

A. structural units.
B. hormones.
C. storage molecules.
D. transport molecules.
E. all of these.

95. What kind of bond exists between two amino acids in a protein?

A. peptide
B. ionic
C. hydrogen
D. amino
E. sulfhydroxyl

96. The secondary structure of proteins can be

A. helical.
B. sheetlike.
C. globular.
D. the sequence of amino acids.
E. both helical and sheetlike.

97. Most proteins produced by the cell are functional in

A. their primary structure.
B. their secondary structure.
C. their tertiary structure.
D. their quaternary structure.
E. all of these.

98. Which of the following parameters could affect the shape of a protein?

A. heat
B. pH
C. detergents
D. all of these.
E. heat and pH only.

99. Protein misfolding may cause

A. Creutzfeldt-Jakob disease.
B. Alzheimer's.
C. immunodepression.
D. schizophrenia.
E. tuberculosis.

100. Mad cow disease is caused by

A. viruses.
B. prions.
C. infectious bacteria.
D. parasites.
E. all of these.

101. Nucleotides are monomers of

A. complex lipids.
B. proteins.
C. polysaccharides.
D. nucleic acids.
E. all of these.

102. A nucleotide is constituted of

A. a five carbon sugar, a nitrogenous acid, and a phosphate tail.
B. a six carbon sugar, a nitrogenous base, and a phosphate tail.
C. a five carbon sugar, a nitrogenous base, and a phosphate tail.
D. a six carbon sugar, a nitrogenous acid, and a phosphate tail.
E. a four carbon sugar, a nitrogenous acid, and a phosphate tail.

103. Which of the following sugars is found in RNA and NOT in DNA?

A. D-xylose
B. deoxyribose
C. deoxyribulose
D. ribose
E. ribulose

104. Which of the following sugars is found in DNA and NOT in RNA?

A. D-xylose
B. deoxyribose
C. deoxyribulose
D. ribose
E. ribulose

105. Nucleotides contain what kind of sugars?

A. three-carbon
B. four-carbon
C. five-carbon
D. six-carbon
E. seven-carbon

106. Deoxyribonucleic acid

A. is one of the adenosine phosphates.
B. is one of the nucleotide coenzymes.
C. stores and retrieves heritable information in all cells.
D. translates protein-building instructions into actual protein structure.
E. is none of these.

107. **Selecting the Exception**

Which of the following statements is INCORRECT about *trans* fats?

A. *Trans* fats are the main thing responsible for increase in the level of cholesterol in the blood.
B. *Trans* fats increase the risks of atherosclerosis.
C. *Trans* fats increase the risks of diabetes.
D. *Trans* fats increase the risks of heart attack.
E. *Trans* fats alter the function of arteries and veins.

108. **Selecting the Exception**

Which of the following statements is INCORRECT about molecules of life?

A. All organisms contain the same types of molecules.
B. Organization of molecules of life have a deep impact on an organism.
C. The proportion of a given molecule may vary from one organism to another.
D. Eukaryotic and prokaryotic are similar structurally, but different at a molecular level.
E. The structural organization of molecules of life vary from one organism to another.

109. **Selecting the Exception**

The following statements related to electrons are correct, EXCEPT one. Select the EXCEPTION.

A. Electrons closest to the nucleus are at the lowest energy level.
B. No more than two electrons can occupy the same orbital.
C. Electrons are unable to move out of the assigned orbital space.
D. The innermost orbital holds two electrons.
E. At the second energy level, there are four possible orbitals with a total of eight electrons.

110. **Selecting the Exception**

Which of the following is NOT true of hydrogen bonds?

A. They are quite weak.
B. The hydrogen is slightly positive.
C. They are common in macromolecules.
D. They form in salts such as NaCl.
E. They always involve hydrogen.

111. **Selecting the Exception**

Which of the following would NOT be used in connection with the word "acid"?

A. excess hydrogen ions
B. magnesium hydroxide
C. contents of the stomach
D. HCl
E. pH less than 7

112. **Selecting the Exception**

Which of the following statements is INCORRECT?

A. Acids release hydrogen ions.
B. In a neutral solution, the amount of hydrogen and hydroxyl ions are almost equal.
C. Hydrogen bonding between water molecules gives water its temperature-stabilizing and cohesive properties.
D. Salts precipitate out of solution and have no function in cells.
E. Polar water molecules are attracted to water.

113. **Selecting the Exception**

Denaturation of protein may result in all EXCEPT one of the following. Which one is it?

A. breakage of hydrogen bonds
B. loss of three dimensional structure
C. removal of R groups from amino acids
D. alteration of enzyme activity
E. endangerment of cell's life

114. **Selecting the Exception**

Which molecule is INCORRECTLY matched with its component parts?

A. fat: fatty acids.
B. starch: riboses.
C. protein: amino acids.
D. glycogen: glucoses.
E. nucleic acids: nucleotides.

115. Match the following letters to the number with which they best correspond.

1. number of protons in the atomic nucleus.	Isotopes	____
2. forms of an element that differ in the number of neutrons their atoms carry.	Atomic number	____
3. total number of protons and neutrons in the nucleus of an atom.	Radioisotope	____
4. isotope with an instable nucleus.	Mass number	____
5. process by which atoms of a radioisotope spontaneously emit energy and subatomic particles when their nucleus disintegrates.	Radioactive decay	____

116. Match the following letters to the number with which they best correspond.

1. substance that releases hydrogen ions in water	Neutral	____
2. substance that can keep the pH of a solution from varying drastically	pH	____
3. solution that contains as much H^+ ions as OH^- ions	Acid	____
4. measure of the number of hydrogen ions in a fluid	Base	____
5. substance that accepts hydrogen ions in water	Buffer	____

CHAPTER 2--MOLECULES OF LIFE Key

1. According to nutritional evidences, the human body requires about ____ of fat each day to stay healthy.

   A. 1 teaspoon
   B. 4 teaspoons
   C. 1 tablespoon
   D. 4 tablespoons
   E. 1 cup

2. An average New Yorker consumes the equivalent of ____ of butter per day.

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   B. 4 teaspoons
   C. 1 tablespoon
   D. 1 stick
   E. 1 cup

3. An average New Yorker consumes about ____ pounds of fat per year.

   A. 100
   B. 85
   C. 75
   D. 55
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   II. the average quantity of fat
   III. the form of fat

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   B. I and II
   C. I and III
   D. II and III
   E. II only

5. Fats are major components of the cell

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C. cytosol.
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D. those molecules help take the sugar out of the blood.
E. our body can tolerate a fair amount of those molecules.

10. What is the smallest particle of an element that retains all the properties of that element?

A. molecule
B. atom
C. ion
D. compound
E. electron

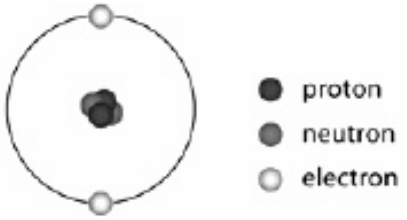
11. ____, ____, and ____ are subatomic particles.

A. Cations; anions; electrons
B. Cations; anions; ions
C. Cations; neutrons; ions
D. Protons; neutrons; ions
E. Protons; neutrons; electrons

12. The nucleus of an atom is constituted of

A. protons
B. electrons
C. neutrons
D. protons and neutrons
E. electrons and neutrons

13. Consider the following figure. It is technically INCORRECT in the sense that



A. protons and neutrons are represented in the nucleus.
B. electrons spin around the nucleus.
C. the charge of protons are not represented.
D. the charge of electrons are not represented.
E. electrons should be much farther away from the atomic nucleus.

14. In an atom, ____ spin around the nucleus.

A. electrons
B. protons
C. neutrons
D. both neutrons and protons
E. both protons and electrons

15. The negative subatomic particle is

A. the neutron.
B. the proton.
C. the electron.
D. both the electron and the proton.
E. both the proton and the electron.

16. The positive subatomic particle is

A. the neutron.
B. the proton.
C. the electron.
D. both the electron and the proton.
E. both the neutron and the electron.

17. The neutral subatomic particle is

A. the neutron.
B. the proton.
C. the electron.
D. both the electron and the proton.
E. both the neutron and the electron.

18. Radioactive isotopes

A. are electrically unbalanced.
B. behave the same chemically and physically but differ biologically from other isotopes.
C. are the same physically and biologically but differ from other isotopes chemically.
D. have an excess number of neutrons.
E. are produced when substances are exposed to radiation.

19. For a given element, all atoms of that element have the same number of

A. neutrons.
B. electrons.
C. protons.
D. protons and neutrons.
E. ions.

20. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

The number 30 on the element above represents the

A. mass number.
B. atomic number.
C. number of electrons.
D. number of protons.
E. number of neutrons.

21. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

How many protons are in the nucleus of a phosphorus atom?

A. 5
B. 7
C. 10
D. 15
E. 30

22. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

How many electrons are in the innermost electron shell of a phosphorus atom?

A. 1
B. 2
C. 3
D. 5
E. 8

23. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

How many electrons are in the outermost electron shell of a phosphorus atom?

A. 1
B. 2
C. 3
D. 5
E. 8

24. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

Phosphorus has ____ vacancies.

A. 1
B. 2
C. 3
D. 5
E. 8

25. **Phosphorus**
Consider the element Phosphorus below, and answer the following question(s).

$^{30}\mathbf{P}$

How many electrons are in the second electron shell of a phosphorus atom?

A. 1
B. 2
C. 3
D. 5
E. 8

26. Instability of radioisotopes is caused by

A. sudden temperature variations.
B. environmental humidity.
C. the random motion of atoms.
D. the disintegration of a neutron into a proton and an electron.
E. the motion of electrons and neutrons.

27. Which of the following statements is NOT true?

A. All isotopes of an element have the same number of electrons.
B. All isotopes of an element have the same number of protons.
C. All isotopes of an element have the same number of neutrons.
D. All radioactive isotopes are unstable.
E. All isotopes of an element have the same atomic number.

28. Radioactive isotopes have

A. excess electrons.
B. excess protons.
C. excess neutrons.
D. insufficient neutrons.
E. insufficient protons.

29. Tracer isotopes

A. are used only in plants.
B. work differently than nontracers in reactions.
C. have an unbalanced electrical charge.
D. are detected by their radioactivity.
E. are not found in nature.

30. Which of the following statements is (are) TRUE about radioisotopes?

A. Radioisotope decays at a constant rate.
B. Decay of a radioisotope is independent of temperature.
C. Decay of a radioisotope is independent of pressure.
D. A radioisotope decays into a predictable product.
E. All of these are true.

31. An atom

A. is positively charged.
B. is negatively charged.
C. is electrically neutral.
D. carries the charge of its electrons.
E. carries the charge of its protons.

32. An atom that carries a charge is called a(n)

A. ion.
B. molecule.
C. compound.
D. element.
E. microelement.

33. Which of the following statements is TRUE?

A. Chemical bonds play an important role at keeping subatomic particles together.
B. Chemical bonds keep electrons close to the nucleus.
C. Molecules are formed when two or more atoms come together through chemical bonds.
D. Neighboring molecules could interact together through ionic bonds.
E. Compounds associate together to form molecules.

34. How many types of chemical bonds are found within and between molecules?

A. 1
B. 2
C. 3
D. 5
E. 7

35. A(n) ____ is a type of chemical bond in which a strong mutual attraction forms between ions of opposite charge.

A. hydrogen bond
B. nonpolar bond
C. polar bond
D. covalent bond
E. ionic bond

36. Electrons are shared in bonds called

A. covalent bonds.
B. ionic bonds.
C. polar bonds.
D. nonpolar bonds.
E. all of these except ionic bonds.

37. The bond in table salt (NaCl) is

A. polar.
B. ionic.
C. covalent.
D. double.
E. nonpolar.

38. In ____ bonds, atoms share electrons equally.

A. double covalent
B. unstable covalent
C. polar covalent
D. nonpolar covalent
E. triple covalent

39. ____ bonds hold molecules of DNA in their characteristic shape.

A. Hydrogen
B. Ionic
C. Covalent
D. Inert
E. Single

40. Which chemical bonds are found within water molecules?

A. hydrogen
B. ionic
C. covalent
D. inert
E. single

41. Which chemical bonds are found between water molecules?

A. hydrogen
B. ionic
C. covalent
D. inert
E. single

42. A hydrogen bond is

A. a sharing of a pair of electrons between a hydrogen and an oxygen nucleus.
B. a sharing of a pair of electrons between a hydrogen nucleus and either an oxygen or a nitrogen nucleus.
C. an attractive force that involves a hydrogen atom and an oxygen or a nitrogen atom that are either in two different molecules or within the same molecule.
D. none of these.
E. all of these.

43. Methane gas (CH_4) is an example of a molecule containing which type of chemical bonds?

A. hydrogen bonds
B. double bonds
C. ionic bonds
D. polar covalent bonds
E. nonpolar covalent bonds

44. A water molecule is polar

A. because it is positively charged.
B. because it is negatively charged.
C. because it is magnetized.
D. because oxygen pulls the shared electrons a bit more than either hydrogen.
E. because each hydrogen is charged negatively while oxygen is charged positively.

45. Which compound is NOT soluble in water?

A. olive oil
B. table salt
C. sugar
D. albumin
E. sucrose

46. Water is an excellent solvent because

A. it forms spheres of hydrogenation around charged substances pulling their individual molecules away from one another.
B. it forms hydrogen bonds with many substances.
C. it has a high-heat containing property.
D. of its cohesive properties.
E. of all of these.

47. A liquid that can dissolve other substances is called a

A. compound.
B. mixture.
C. solvent.
D. solute.
E. solution.

48. A substance that is dissolved by a liquid is called a

A. compound.
B. mixture.
C. solvent.
D. solute.
E. solution.

49. A mix of glucose and water is called a

A. compound.
B. suspension.
C. solvent.
D. solute.
E. solution.

50. Which of the following is TRUE about water?

A. The oxygen end is slightly electropositive.
B. Hydrogen bonds hold water molecules together.
C. Water covers about one-half of the surface of the earth.
D. Hydrophobic interactions attract water molecules.
E. Solvent properties are greatest with nonpolar molecules.

51. Hydrophobic molecules are ____ water.

A. attracted by
B. absorbed by
C. repelled by
D. mixed with
E. polarized by

52. A ____ is a compound that releases ions other than OH^- and H^+ when dissolved in water.

A. protein
B. lipid
C. fat
D. salt
E. sugar

53. ____ is the tendency of water molecules to stay attached to one another.

A. Adhesion
B. Cohesion
C. Fusion
D. Interaction
E. Junction

54. Which property of water molecules is responsible for movement of water from roots to leaves in a plant?

A. hydrophobicity
B. temperature stability
C. fusion
D. adhesion
E. cohesion

55. Water has the ability to retard heat gain and loss due to its

A. hydrophilic interactions.
B. evaporation.
C. hydrogen bonds.
D. crystal structure.
E. liquidity.

56. Glucose dissolves in water because it

A. ionizes.
B. is a polysaccharide.
C. is a polar and forms many hydrogen bonds with water molecules.
D. has a very reactive primary structure.
E. is an isotope.

57. Which of the following represents H^+?

A. hydrogen ions
B. acid
C. base
D. hydroxyl ion
E. acceptor

58. A pH of 10 is how many times as basic as a pH of 7?

A. 2
B. 3
C. 10
D. 100
E. 1,000

59. A solution with a pH of 8 is how many times fewer hydrogen ions than a solution with a pH of 6?

A. 2
B. 3
C. 10
D. 100
E. 1,000

60. Cellular pH is kept near a value of 7 because of

A. salts.
B. buffers.
C. acids.
D. bases.
E. water.

61. The pH of banana juice is likely to be

A. below 3.
B. between 3 and 5.
C. between 5 and 6.5.
D. 7.
E. above 7.

62. The three most common atoms in your body are

A. hydrogen, oxygen, and carbon.
B. carbon, hydrogen, and nitrogen.
C. carbon, nitrogen, and oxygen.
D. nitrogen, hydrogen, and oxygen.
E. carbon, oxygen, and sulfur.

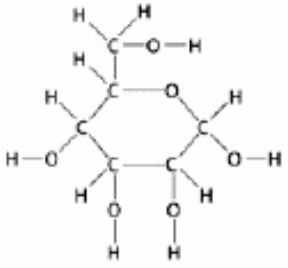
63. Molecules of life are also called organic molecules because

A. they are mainly constituted of carbon and hydrogen atoms.
B. they are mainly constituted of oxygen and hydrogen atoms.
C. they are building blocks of our organs.
D. they are exclusively found in living organisms.
E. they are mainly constituted of oxygen and nitrogen atoms.

64. Which of the following suggestions is NOT completely true?

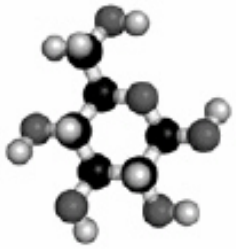
A. Carbon backbones may form rings.
B. Carbon backbones may be arranged in triangle.
C. Carbon backbones may vary in length.
D. Carbon backbones may be linear or branched.
E. Carbon backbones may contain double bonds.

65. Which of the following models would NOT reveal all the bonds found in the molecule?



glucose

I



glucose

II

glucose

III

A. I only
B. II only
C. III only
D. I and II
E. II and III

66. The formation of large polymers from smaller repeating units is known as what kind of reaction?

A. oxidation
B. reduction
C. condensation
D. hydrolysis
E. decarboxylation

67. The breakdown of large molecules by the enzymatic addition of water is an example of what kind of reaction?

A. oxidation
B. reduction
C. condensation
D. hydrolysis
E. decarboxylation

68. A condensation reaction typically produces

A. amino acids.
B. simple sugars.
C. monomers.
D. salts.
E. polymers.

69. Condensation and hydrolysis are accomplished in cells by

A. bonding attraction.
B. functional group interactions.
C. spontaneous action.
D. the action of enzymes.
E. all of these.

70. Which of the following could be used to describe a monomer of carbohydrates?

A. glycogen
B. starch
C. nucleotide
D. amino acid
E. monosaccharide

71. Which substance is the most common in cells?

A. carbohydrates
B. salts and minerals
C. proteins
D. nucleic acids
E. lipids

72. A larger biological molecule is composed of smaller units called

A. polymers.
B. isomers.
C. monomers.
D. tetramers.
E. dimers.

73. Which of the following is composed of a 1:2:1 ratio of carbon, hydrogen, and oxygen?

A. protein
B. carbohydrate
C. lipid
D. nucleic acid
E. steroid

74. Glucose and fructose are

A. ring forms.
B. structurally different.
C. monosaccharides.
D. simple sugars.
E. all of these.

75. Sucrose is composed of

A. two molecules of fructose.
B. two molecules of glucose.
C. a molecule of fructose and a molecule of glucose.
D. a molecule of fructose and a molecule of galactose.
E. two molecules of galactose.

76. Which of the following carbohydrates is the most abundant on earth?

A. cellulose
B. starch
C. glycogen
D. sucrose
E. galactose

77. Plants store their excess carbohydrates in the form of

A. cellulose.
B. starch.
C. glycogen.
D. sucrose.
E. galactose.

78. Glycogen is a polysaccharide used for energy storage by

A. plants.
B. animals.
C. protists.
D. bacteria.
E. mushrooms.

79. Cellulose is

A. the most complex of the organic compounds.
B. a polymer of glucose and fructose.
C. a polymer of glucose and galactose.
D. a component of plasma membranes.
E. a material found in cell walls.

80. Which of the following CANNOT be used to describe some aspects of polysaccharides?

A. energy storage
B. glucose subunits
C. straight or branched chain
D. insoluble in water
E. complex

81. Which is NOT a monosaccharide?

A. glucose
B. fructose
C. deoxyribose
D. starch
E. ribose

82. A triglyceride molecule is made up of

A. one glycerol and two fatty acids.
B. two fatty acids and two glycerols.
C. one fatty acid and three glycerols.
D. one glycerol and three fatty acids.
E. any of these.

83. Oils are

A. liquid at room temperature.
B. unsaturated fats.
C. found only in animals.
D. complex carbohydrates.
E. both liquid at room temperature and unsaturated fats.

84. Which of the following are lipids?

A. sterols
B. triglycerides
C. oils
D. waxes
E. all of these.

85. Which of the following molecules is NOT a sterol?

A. testosterone
B. estrogen
C. adrenaline
D. cholesterol
E. phytosterol

86. Unsaturated fatty acids

A. have fewer hydrogens than saturated fatty acids.
B. are more characteristic of animal fats than plant fats.
C. contribute to the possibility of arteriosclerosis.
D. have no double bonds.
E. are solid at room temperature.

87. If the cuticle were removed from an apple while leaving the skin intact,

A. the apple would undergo fungal decomposition.
B. the apple would lose water and dehydrate.
C. the apple would begin to swell as it absorbs moisture from the air.
D. all of these would happen.
E. nothing would happen.

88. All sterols have

A. the same number of double bounds.
B. double bonds in the same positions.
C. four rings of carbon to which are attached other atoms.
D. the same functional groups.
E. the same number and positions of double bonds.

89. Cell membranes are characterized by the presence of

A. triglycerides.
B. phospholipids.
C. unsaturated fats.
D. steroids.
E. saturated fats.

90. Which of the following is a monomer of protein?

A. nucleotide
B. monosaccharide
C. simple sugar
D. amino acid
E. ribose

91. How many levels of protein structures exist?

A. 1
B. 2
C. 3
D. 4
E. 5

92. Primary protein structure is dependent on

A. hydrophobic interactions.
B. hydrogen bonds.
C. bonds between carbon and nitrogen.
D. covalent linkages between carbon and oxygen.
E. all of these.

93. Secondary protein structure is dependent on

A. hydrophobic interactions.
B. hydrogen bonds.
C. bonds between carbon and nitrogen.
D. covalent linkages between carbon and oxygen.
E. all of these.

94. Proteins may function as

A. structural units.
B. hormones.
C. storage molecules.
D. transport molecules.
E. all of these.

95. What kind of bond exists between two amino acids in a protein?

A. peptide
B. ionic
C. hydrogen
D. amino
E. sulfhydroxyl

96. The secondary structure of proteins can be

A. helical.
B. sheetlike.
C. globular.
D. the sequence of amino acids.
E. both helical and sheetlike.

97. Most proteins produced by the cell are functional in

A. their primary structure.
B. their secondary structure.
C. their tertiary structure.
D. their quaternary structure.
E. all of these.

98. Which of the following parameters could affect the shape of a protein?

A. heat
B. pH
C. detergents
D. all of these.
E. heat and pH only.

99. Protein misfolding may cause

A. Creutzfeldt-Jakob disease.
B. Alzheimer's.
C. immunodepression.
D. schizophrenia.
E. tuberculosis.

100. Mad cow disease is caused by

A. viruses.
B. prions.
C. infectious bacteria.
D. parasites.
E. all of these.

101. Nucleotides are monomers of

A. complex lipids.
B. proteins.
C. polysaccharides.
D. nucleic acids.
E. all of these.

102. A nucleotide is constituted of

A. a five carbon sugar, a nitrogenous acid, and a phosphate tail.
B. a six carbon sugar, a nitrogenous base, and a phosphate tail.
C. a five carbon sugar, a nitrogenous base, and a phosphate tail.
D. a six carbon sugar, a nitrogenous acid, and a phosphate tail.
E. a four carbon sugar, a nitrogenous acid, and a phosphate tail.

103. Which of the following sugars is found in RNA and NOT in DNA?

A. D-xylose
B. deoxyribose
C. deoxyribulose
D. ribose
E. ribulose

104. Which of the following sugars is found in DNA and NOT in RNA?

A. D-xylose
B. deoxyribose
C. deoxyribulose
D. ribose
E. ribulose

105. Nucleotides contain what kind of sugars?

A. three-carbon
B. four-carbon
C. five-carbon
D. six-carbon
E. seven-carbon

106. Deoxyribonucleic acid

A. is one of the adenosine phosphates.
B. is one of the nucleotide coenzymes.
C. stores and retrieves heritable information in all cells.
D. translates protein-building instructions into actual protein structure.
E. is none of these.

107. **Selecting the Exception**

Which of the following statements is INCORRECT about *trans* fats?

A. *Trans* fats are the main thing responsible for increase in the level of cholesterol in the blood.
B. *Trans* fats increase the risks of atherosclerosis.
C. *Trans* fats increase the risks of diabetes.
D. *Trans* fats increase the risks of heart attack.
E. *Trans* fats alter the function of arteries and veins.

108. **Selecting the Exception**

Which of the following statements is INCORRECT about molecules of life?

A. All organisms contain the same types of molecules.
B. Organization of molecules of life have a deep impact on an organism.
C. The proportion of a given molecule may vary from one organism to another.
D. Eukaryotic and prokaryotic are similar structurally, but different at a molecular level.
E. The structural organization of molecules of life vary from one organism to another.

109. **Selecting the Exception**

The following statements related to electrons are correct, EXCEPT one. Select the EXCEPTION.

A. Electrons closest to the nucleus are at the lowest energy level.
B. No more than two electrons can occupy the same orbital.
C. Electrons are unable to move out of the assigned orbital space.
D. The innermost orbital holds two electrons.
E. At the second energy level, there are four possible orbitals with a total of eight electrons.

110. **Selecting the Exception**

Which of the following is NOT true of hydrogen bonds?

A. They are quite weak.
B. The hydrogen is slightly positive.
C. They are common in macromolecules.
D. They form in salts such as NaCl.
E. They always involve hydrogen.

111. **Selecting the Exception**

Which of the following would NOT be used in connection with the word "acid"?

A. excess hydrogen ions
B. magnesium hydroxide
C. contents of the stomach
D. HCl
E. pH less than 7

112. **Selecting the Exception**

Which of the following statements is INCORRECT?

A. Acids release hydrogen ions.
B. In a neutral solution, the amount of hydrogen and hydroxyl ions are almost equal.
C. Hydrogen bonding between water molecules gives water its temperature-stabilizing and cohesive properties.
D. Salts precipitate out of solution and have no function in cells.
E. Polar water molecules are attracted to water.

113. **Selecting the Exception**

Denaturation of protein may result in all EXCEPT one of the following. Which one is it?

A. breakage of hydrogen bonds
B. loss of three dimensional structure
C. removal of R groups from amino acids
D. alteration of enzyme activity
E. endangerment of cell's life

114. **Selecting the Exception**

Which molecule is INCORRECTLY matched with its component parts?

A. fat: fatty acids.
B. starch: riboses.
C. protein: amino acids.
D. glycogen: glucoses.
E. nucleic acids: nucleotides.

115. Match the following letters to the number with which they best correspond.

1. number of protons in the atomic nucleus.	Isotopes	**2**
2. forms of an element that differ in the number of neutrons their atoms carry.	Atomic number	**1**
3. total number of protons and neutrons in the nucleus of an atom.	Radioisotope	**4**
4. isotope with an instable nucleus.	Mass number	**3**
5. process by which atoms of a radioisotope spontaneously emit energy and subatomic particles when their nucleus disintegrates.	Radioactive decay	**5**

116. Match the following letters to the number with which they best correspond.

1. substance that releases hydrogen ions in water	Neutral	**3**
2. substance that can keep the pH of a solution from varying drastically	pH	**4**
3. solution that contains as much H^+ ions as OH^- ions	Acid	**1**
4. measure of the number of hydrogen ions in a fluid	Base	**5**
5. substance that accepts hydrogen ions in water	Buffer	**2**