

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

- 1) The four elements that make up about 96% of body matter are _____. 1) _____
A) carbon, oxygen, hydrogen, nitrogen B) sodium, potassium, hydrogen, oxygen
C) nitrogen, hydrogen, calcium, sodium D) carbon, oxygen, phosphorus, calcium

Answer: A

Explanation: A)
B)
C)
D)

- 2) Which of the following is an example of a suspension? 2) _____
A) rubbing alcohol B) cytoplasm C) blood D) salt water

Answer: C

Explanation: A)
B)
C)
D)

- 3) Which of the following would be regarded as an organic molecule? 3) _____
A) NaCl B) CH₄ C) NaOH D) H₂O

Answer: B

Explanation: A)
B)
C)
D)

- 4) Which of the following is *not* a role of molecular chaperonins? 4) _____
A) help to translocate proteins and certain metal ions across cell membranes
B) aid the desired folding and association process of polypeptides
C) promote the breakdown of damaged or denatured proteins
D) prevent accidental, premature, or incorrect folding of polypeptide chains
E) act as a biological catalyst

Answer: E

Explanation: A)
B)
C)
D)
E)

- 5) Which bonds often bind different parts of a molecule into a specific three-dimensional shape? 5) _____
A) Oxygen B) Amino acid C) Hydrogen D) Carbon

Answer: C

Explanation: A)
B)
C)
D)

6) What happens in redox reactions? 6) _____
A) the reaction is always easily reversible
B) the electron acceptor is oxidized
C) both decomposition and electron exchange occur
D) the electron donor is reduced

Answer: C
Explanation: A)
 B)
 C)
 D)

7) The genetic information is coded in DNA by the _____. 7) _____
A) arrangement of the histones
B) sequence of the nucleotides
C) three-dimensional structure of the double helix
D) regular alteration of sugar and phosphate molecules

Answer: B
Explanation: A)
 B)
 C)
 D)

8) An atom with a valence of 3 may have a total of _____ electrons. 8) _____
A) 13 B) 3 C) 8 D) 17

Answer: A
Explanation: A)
 B)
 C)
 D)

9) Choose the answer that best describes fibrous proteins. 9) _____
A) are usually called enzymes B) rarely exhibit secondary structure
C) are cellular catalysts D) are very stable and insoluble in water

Answer: D
Explanation: A)
 B)
 C)
 D)

10) Carbohydrates are stored in the liver and muscles in the form of _____. 10) _____
A) cholesterol B) glycogen C) glucose D) triglycerides

Answer: B
Explanation: A)
 B)
 C)
 D)

- 11) What is the ratio of fatty acids to glycerol in neutral fats? 11) _____
A) 1:1 B) 3:1 C) 4:1 D) 2:1
Answer: B
Explanation: A)
 B)
 C)
 D)
- 12) Amino acids joining together to make a peptide is a good example of a(n) _____ reaction. 12) _____
A) synthesis B) exchange
C) reversible D) decomposition
Answer: A
Explanation: A)
 B)
 C)
 D)
- 13) The numbers listed represent the number of electrons in the first, second, and third energy levels, respectively. On this basis, which of the following is an unstable or reactive atom? 13) _____
A) 2, 8, 8 B) 2 C) 2, 8 D) 2, 8, 1
Answer: D
Explanation: A)
 B)
 C)
 D)
- 14) An example of a coenzyme is _____. 14) _____
A) iron B) copper
C) zinc D) riboflavin (vitamin B₂)
Answer: D
Explanation: A)
 B)
 C)
 D)
- 15) Choose the statement that is false or incorrect. 15) _____
A) A key feature of the body's metabolism is the almost exclusive use of exergonic reactions by the body.
B) Exergonic reactions release more energy than they absorb.
C) In chemical reactions, breaking old bonds requires energy and forming new bonds releases energy.
D) Endergonic reactions absorb more energy than they release.
Answer: A
Explanation: A)
 B)
 C)
 D)

16) Which of the following constitutes a long chain of simple sugars? 16) _____
A) polysaccharide B) nucleic acid
C) protein D) monosaccharide

Answer: A

Explanation: A)
B)
C)
D)

17) Which protein types are vitally important to cell function in all types of stressful circumstances? 17) _____
A) catalytic proteins B) structural proteins
C) molecular chaperones D) regulatory proteins

Answer: C

Explanation: A)
B)
C)
D)

18) In a DNA molecule, the phosphate serves _____. 18) _____
A) as a code B) to hold the molecular backbone together
C) as nucleotides D) to bind the sugars to their bases

Answer: B

Explanation: A)
B)
C)
D)

19) Which of the following describes coenzymes? 19) _____
A) enzymes that work together
B) organic molecules derived from vitamins
C) metal ions
D) two enzymes that perform the same function

Answer: B

Explanation: A)
B)
C)
D)

20) A chemical reaction in which bonds are broken is usually associated with _____. 20) _____
A) a synthesis B) forming a larger molecule
C) the release of energy D) the consumption of energy

Answer: C

Explanation: A)
B)
C)
D)

21) What does CH₄ mean? 21) _____
A) This was involved in a redox reaction.
B) There is one carbon and four hydrogen atoms.
C) This is an inorganic molecule.
D) There are four carbon and four hydrogen atoms.

Answer: B

Explanation: A)
B)
C)
D)

22) Select which reactions will usually be irreversible regarding chemical equilibrium in living systems. 22) _____
A) glucose to CO₂ and H₂O
B) H₂O + CO₂ to make H₂CO₃
C) ADP + Pi to make ATP
D) glucose molecules joined to make glycogen

Answer: A

Explanation: A)
B)
C)
D)

23) What is a chain of 25 amino acids called? 23) _____
A) starch B) polypeptide C) protein D) nucleotide

Answer: B

Explanation: A)
B)
C)
D)

24) Select the correct statement about isotopes. 24) _____
A) Isotopes occur only in the heavier elements.
B) All the isotopes of an element are radioactive.
C) Isotopes of the same element have the same atomic number but differ in their atomic masses.
D) All the isotopes of an element have the same number of neutrons.

Answer: C

Explanation: A)
B)
C)
D)

25) Which property of water is demonstrated when we sweat? 25) _____
A) high heat capacity
B) reactivity
C) high heat of vaporization
D) cushioning
E) polar solvent properties

Answer: C

Explanation: A)
B)
C)
D)
E)

26) What is a dipole? 26) _____
A) a type of reaction
B) a polar molecule
C) a type of bond
D) an organic molecule

Answer: B

Explanation: A)
B)
C)
D)

27) Select the most correct statement regarding nucleic acids. 27) _____
A) DNA is a long, double-stranded molecule made up of A, T, G, and C bases.
B) tDNA is considered a molecular slave of DNA.
C) RNA is a long, single-stranded molecule made up of the bases A, T, G, and C.
D) Three forms exist: DNA, RNA, and tDNA.

Answer: A

Explanation: A)
B)
C)
D)

28) Which of the following is the major positive ion outside cells? 28) _____
A) hydrogen
B) sodium
C) nitrogen
D) potassium

Answer: B

Explanation: A)
B)
C)
D)

29) A solution that has a pH of 2 could best be described as being _____. 29) _____
A) acidic
B) slightly acidic
C) basic
D) neutral

Answer: A

Explanation: A)
B)
C)
D)

30) What level of protein synthesis is represented by the coiling of the protein chain backbone into an alpha helix? 30) _____
A) quaternary structure B) tertiary structure
C) primary structure D) secondary structure

Answer: D
Explanation: A)
B)
C)
D)

31) Which of the following is *not* an electrolyte? 31) _____
A) H₂O B) NaOH C) Ca₂CO₃ D) HCl

Answer: A
Explanation: A)
B)
C)
D)

32) Which of the following statements is false? 32) _____
A) Chemical reactions progress at a faster rate when the reacting particles are present in higher numbers.
B) Catalysts increase the rate of chemical reactions.
C) Larger particles move faster than smaller ones and thus collide more frequently and more forcefully.
D) Chemical reactions proceed more quickly at higher temperatures.

Answer: C
Explanation: A)
B)
C)
D)

33) Which of the following does *not* describe the ATP molecule? 33) _____
A) transport B) pigments
C) mechanical work D) chemical work

Answer: B
Explanation: A)
B)
C)
D)

34) Select the statement about mixtures that is correct. 34) _____
A) Solutions contain particles that settle out in time.
B) A solution contains solvent in large amounts and solute in smaller quantities.
C) Suspensions can change reversibly from liquid to solid.
D) Suspensions are homogeneous mixtures of two or more components.

Answer: B
Explanation: A)
B)
C)
D)

35) Two good examples of a colloid would be Jell-O[®] and _____. 35) _____
A) urine B) cytosol C) blood D) toenails

Answer: B
Explanation: A)
 B)
 C)
 D)

36) Sucrose is a _____. 36) _____
A) triglyceride B) polysaccharide
C) monosaccharide D) disaccharide

Answer: D
Explanation: A)
 B)
 C)
 D)

37) Which of the following is *not* considered a factor in influencing a reaction? 37) _____
A) concentration B) temperature C) particle size D) time

Answer: D
Explanation: A)
 B)
 C)
 D)

38) _____ is fat soluble, produced in the skin on exposure to UV radiation, and necessary for normal bone growth and function. 38) _____
A) Cortisol B) Vitamin K C) Vitamin A D) Vitamin D

Answer: D
Explanation: A)
 B)
 C)
 D)

39) What does the formula C₆H₁₂O₆ mean? 39) _____
A) There are 12 hydrogen, 6 carbon, and 6 oxygen atoms.
B) There are 6 calcium, 12 hydrogen, and 6 oxygen atoms.
C) The molecular weight is 24.
D) The substance is a colloid.

Answer: A
Explanation: A)
 B)
 C)
 D)

- 40) Which of the following is true regarding the concentration of solutions? 40) _____
A) To calculate molarity, one must know the atomic weight of the solvent.
B) Percent solutions are parts per 1000 parts.
C) Molarity is one mole of solute per 1000 ml of solution.
D) To calculate molarity, one must know the atomic number of the solute.

Answer: C

- Explanation: A)
B)
C)
D)

- 41) Choose the answer that best describes HCO_3^- . 41) _____
A) common in the liver
B) a weak acid
C) a proton donor
D) a bicarbonate ion

Answer: D

- Explanation: A)
B)
C)
D)

- 42) If atom X has an atomic number of 74 it would have which of the following? 42) _____
A) 37 protons and 37 electrons
B) 37 protons and 37 neutrons
C) 74 protons
D) 37 electrons

Answer: A

- Explanation: A)
B)
C)
D)

- 43) Carbohydrates and proteins are built up from their basic building blocks by the _____. 43) _____
A) addition of a carbon atom between each two units
B) removal of a nitrogen atom between each two units
C) addition of a water molecule between each two units
D) removal of a water molecule between each two units

Answer: D

- Explanation: A)
B)
C)
D)

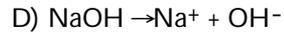
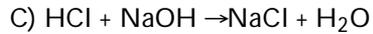
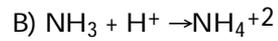
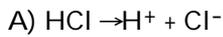
- 44) In liquid XYZ, you notice that light is scattered as it passes through. There is *no* precipitant in the bottom of the beaker, though it has been sitting for several days. What type of liquid is this? 44) _____
A) colloid
B) solution
C) suspension
D) mixture

Answer: A

- Explanation: A)
B)
C)
D)

50) Which of the following is a neutralization reaction?

50) _____



Answer: C

Explanation: A)
B)
C)
D)

51) Salts are always _____.

51) _____

A) double covalent compounds

B) ionic compounds

C) hydrogen bonded

D) single covalent compounds

Answer: B

Explanation: A)
B)
C)
D)

52) The chemical symbol $\text{O}=\text{O}$ means _____.

52) _____

A) zero equals zero

B) this is an ionic bond with two shared electrons

C) both atoms are bonded and have zero electrons in the outer orbit

D) the atoms are double bonded

Answer: D

Explanation: A)
B)
C)
D)

53) Heat shock proteins (hsp) are a type of protein called _____.

53) _____

A) chaperonins

B) eicosanoids

C) cofactors

D) coenzymes

Answer: A

Explanation: A)
B)
C)
D)

54) The single most abundant protein in the body is _____.

54) _____

A) collagen

B) glucose

C) DNA

D) hemoglobin

Answer: A

Explanation: A)
B)
C)
D)

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

55) Explain why chemical reactions in the body are often *irreversible*.

55) _____

Answer: Chemical reactions that release energy cannot be reversed unless energy is put back into the system. Also, the body may use the chemicals solely for its energy, such as glucose, or some reactions produce molecules in excessive quantities (like CO₂ and NH₄) that the body needs to discard.

Explanation:

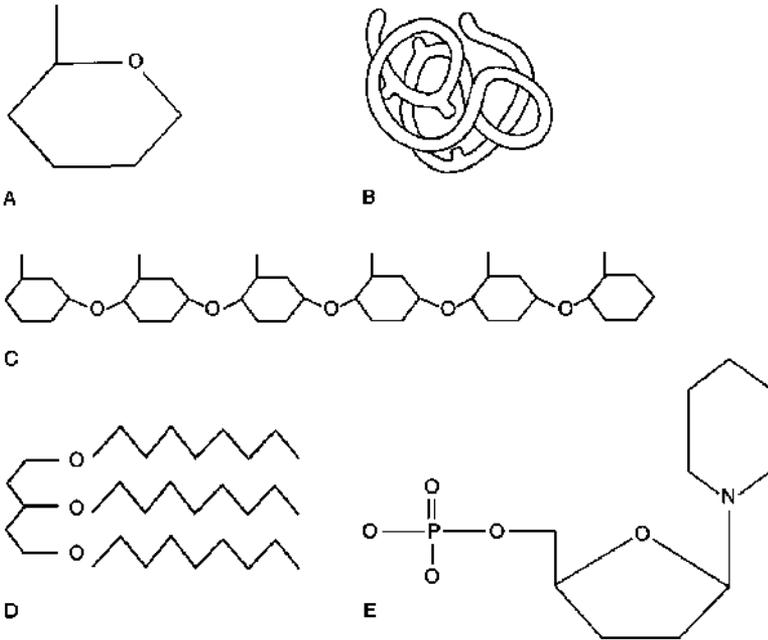


Figure 2.1

Using Figure 2.1, match the following:

56) Tertiary (protein) structure.

56) _____

Answer: B

Explanation:

57) How can phospholipids form a film when mixed in water?

57) _____

Answer: Phospholipids have both polar and nonpolar ends. The polar end interacts with water, leaving the nonpolar end oriented in the opposite direction.

Explanation:

58) Explain the difference between potential and kinetic energy.

58) _____

Answer: Potential energy is inactive stored energy that has potential to do work. Kinetic energy is energy in action.

Explanation:

- 59) All chemical reactions are *theoretically* reversible. Comment on this statement. 59) _____
Answer: It is possible to reverse any reaction if the products are still present. Those that are only slightly exergonic are easily reversible. Some would require an enormous amount of energy to reverse. In the simple reaction $\text{Na} + \text{Cl} \rightarrow \text{NaCl}$ the amount of energy it takes to reverse table salt to chlorine gas and sodium metal is enormous. The reversing of the covalently bonded sugar molecule once it is reduced to ATP molecules is even harder or next to impossible.
Explanation:
- 60) What properties does water have that make it a very versatile fluid? 60) _____
Answer: High heat capacity, high heat of vaporization, polarity and solvent properties, reactivity, and cushioning.
Explanation:
- 61) Are all chemical reactions reversible? If not, why aren't they all reversible? 61) _____
Answer: All chemical reactions are theoretically reversible, but only if the products are not consumed.
Explanation:
- 62) In a DNA molecule, guanine would connect to _____. 62) _____
Answer: cytosine
Explanation:
- 63) _____ have a bitter taste, feel slippery, and are proton acceptors. 63) _____
Answer: Bases
Explanation:

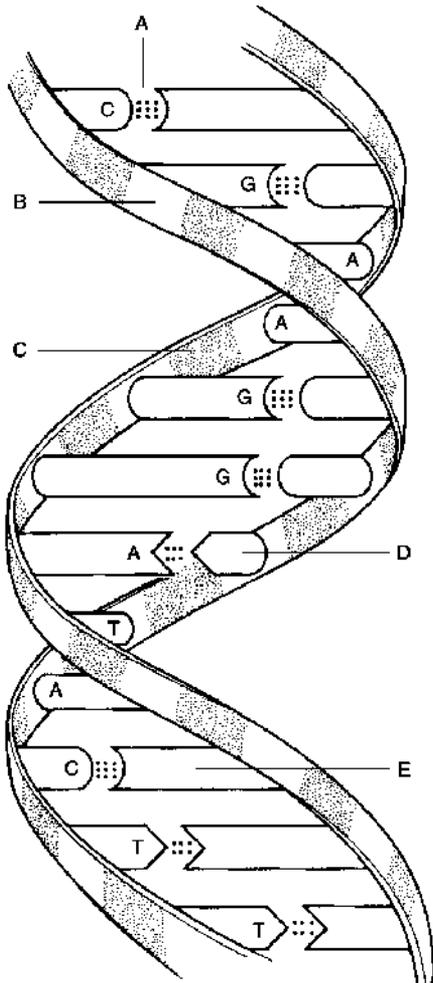


Figure 2.2

Using Figure 2.2, match the following:

64) Thymine.

64) _____

Answer: D

Explanation:

65) Weak acids and bases make good _____.

65) _____

Answer: buffers

Explanation:

66) What type of chemical bond can form between an element with 11 protons and an element with 17 protons?

66) _____

Answer: ionic

Explanation:

67) $AB \rightarrow A + B$ is an example of a(n) _____ reaction.

67) _____

Answer: decomposition

Explanation:

68) What does the polar end of a phospholipid contain?

68) _____

Answer: a phosphorus-containing group

Explanation:

69) What is the major difference between polar and nonpolar covalent bonds?

69) _____

Answer: Polar bonds have an unequal sharing of electrons resulting in a slight negative charge at one end of the molecule and a slight positive charge at the other end.

Nonpolar bonds have an equal sharing of electrons, resulting in a balanced charge among the atoms.

Explanation:

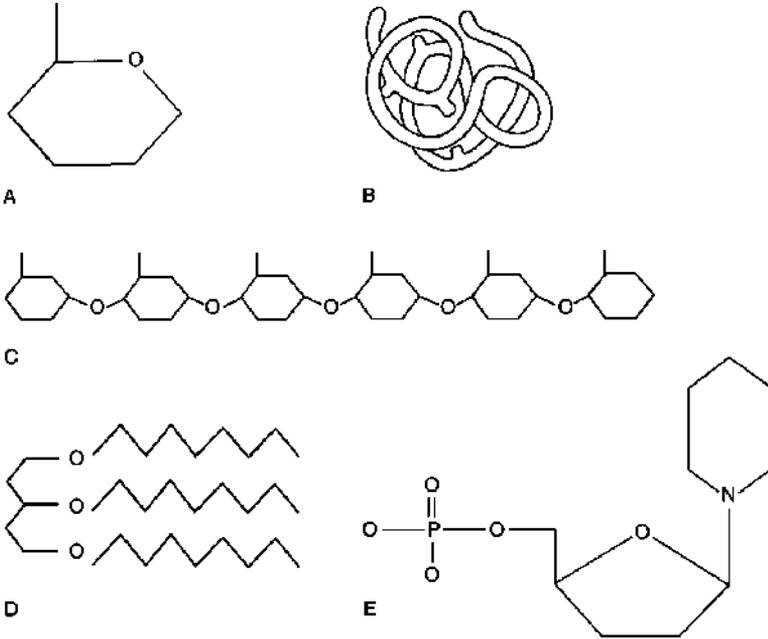


Figure 2.1

Using Figure 2.1, match the following:

70) Nucleotide.

70) _____

Answer: E

Explanation:

71) A holoenzyme is composed of an apoenzyme and a(n) _____.

71) _____

Answer: cofactor

Explanation:

72) An amino acid may act as a proton acceptor or donor. Explain.

72) _____

Answer: Amino acids have two components—a base group (proton acceptor) and an organic acid part (a proton donor).

Explanation:

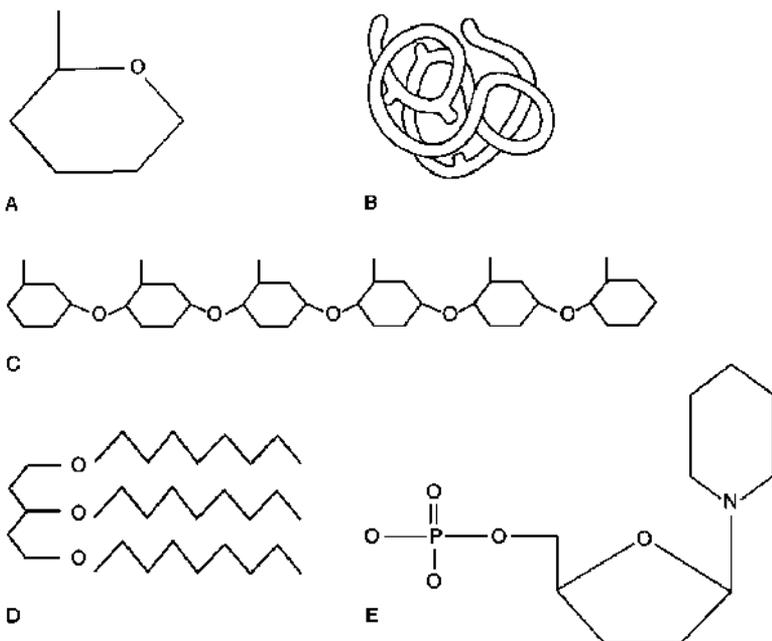


Figure 2.1

Using Figure 2.1, match the following:

73) Polysaccharide.

73) _____

Answer: C

Explanation:

74) Describe the factors that affect chemical reaction rates.

74) _____

Answer: Temperature increases kinetic energy and therefore the force of molecular collisions. Particle size: smaller particles move faster at the same temperature and therefore collide more frequently; also, smaller particles have more surface area given the same concentration of reactants. Concentration: the higher the concentration, the greater the chance of particles colliding. Catalysts increase the rate of the reaction at a given temperature. Enzymes are biological catalysts.

Explanation:

75) The _____ molecule directly provides energy for cellular work.

75) _____

Answer: ATP

Explanation:

76) Molecules such as methane that are made of atoms that share electrons have _____ bonds.

76) _____

Answer: covalent

Explanation:

77) Name at least four things you know about enzymes.

77) _____

- Answer:
1. They are proteins.
 2. They have specific binding sites for specific substrates.
 3. They lower the activation barrier for a specific reaction.
 4. The names end in "ase."
 5. They can be denatured.
 6. They can be used again and again.

Explanation:

78) When a set of electrodes connected to a lightbulb is placed in a solution of dextrose and a current is applied, the lightbulb does not light up. When the same unit is placed in HCl, it does. Why?

78) _____

Answer: HCl ionizes to form current-conducting electrolytes. Dextrose does not ionize, and therefore does not conduct current.

Explanation:

79) A chemical bond never occurs in a mixture. Discuss this.

79) _____

Answer: Mixtures come in three forms— solutions, colloids, and suspensions. Components of these mixtures always retain their original makeup and can be separated into their individual components; therefore no chemical bonding has taken place.

Explanation:

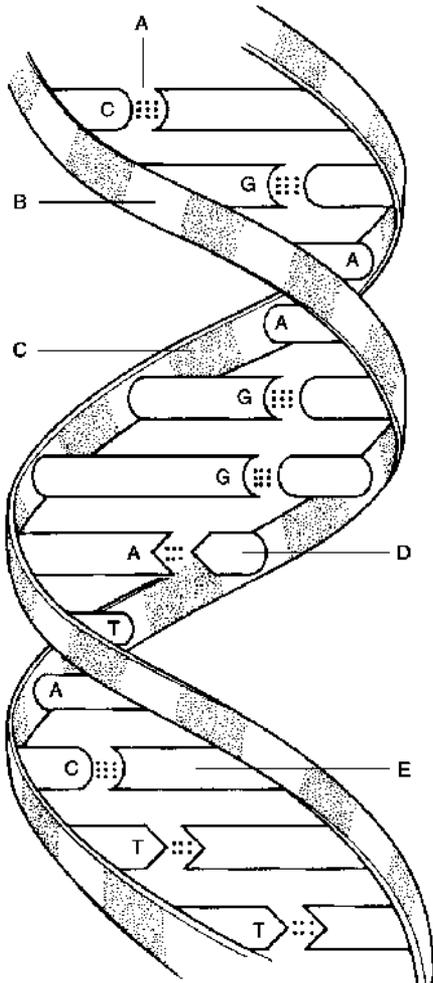


Figure 2.2

Using Figure 2.2, match the following:

80) Deoxyribose sugar.

Answer: B

Explanation:

80) _____

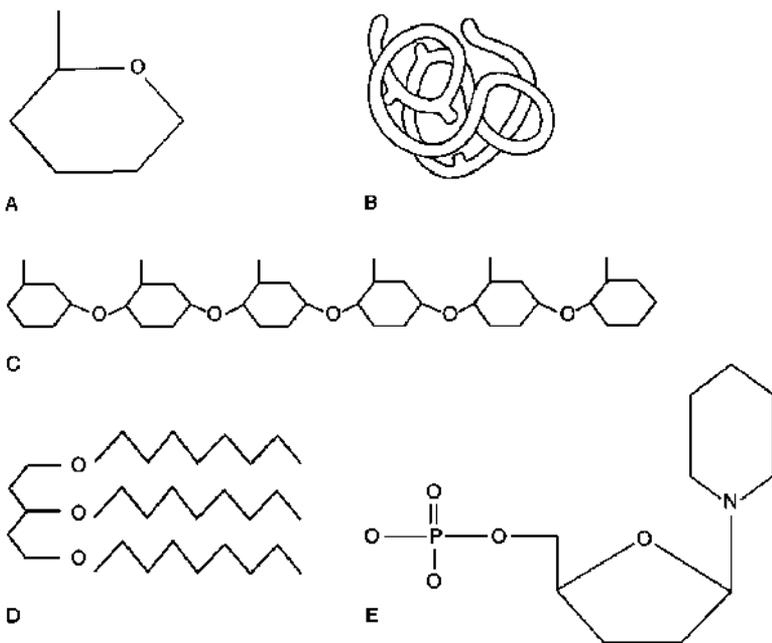


Figure 2.1

Using Figure 2.1, match the following:

81) Functional protein.

81) _____

Answer: B

Explanation:

82) In the compound H_2CO_3 , what do the numbers 2 and 3 represent?

82) _____

Answer: The 2 indicates that there are two hydrogen atoms in the compound and the 3 indicates that there are three oxygen atoms in the compound.

Explanation:

83) Starch is the stored carbohydrate in plants, while _____ is the stored carbohydrate in animals.

83) _____

Answer: glycogen

Explanation:

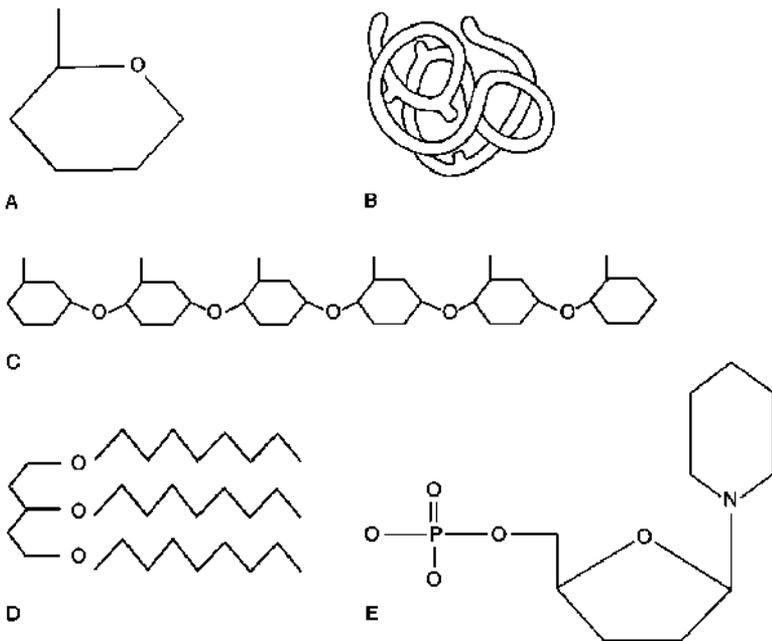


Figure 2.1

Using Figure 2.1, match the following:

84) Monosaccharide.

Answer: A

Explanation:

84) _____

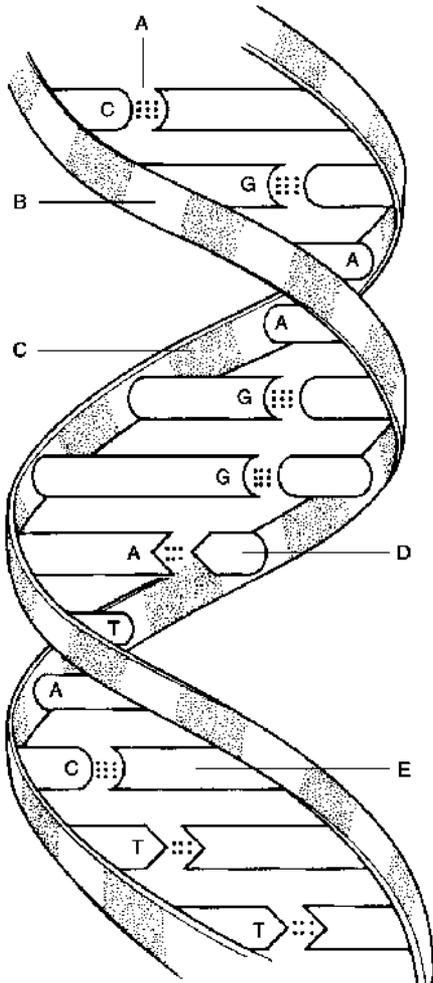


Figure 2.2

Using Figure 2.2, match the following:

85) Guanine.

85) _____

Answer: E

Explanation:

86) How many phosphates would AMP have attached to it?

86) _____

Answer: one

Explanation:

87) The atomic number is equal to the number of _____.

87) _____

Answer: protons (and electrons)

Explanation:

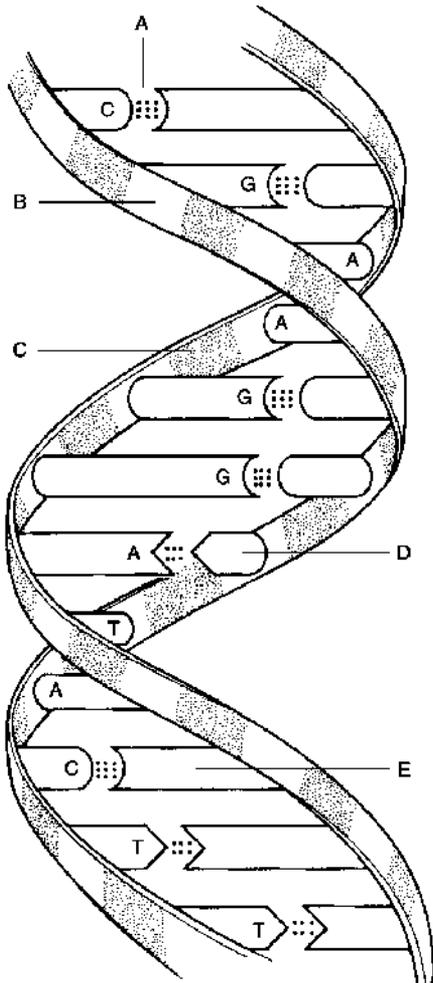


Figure 2.2

Using Figure 2.2, match the following:

88) Hydrogen bonds.

88) _____

Answer: A

Explanation:

89) What happens when globular proteins are denatured?

89) _____

Answer: The active sites are destroyed.

Explanation:

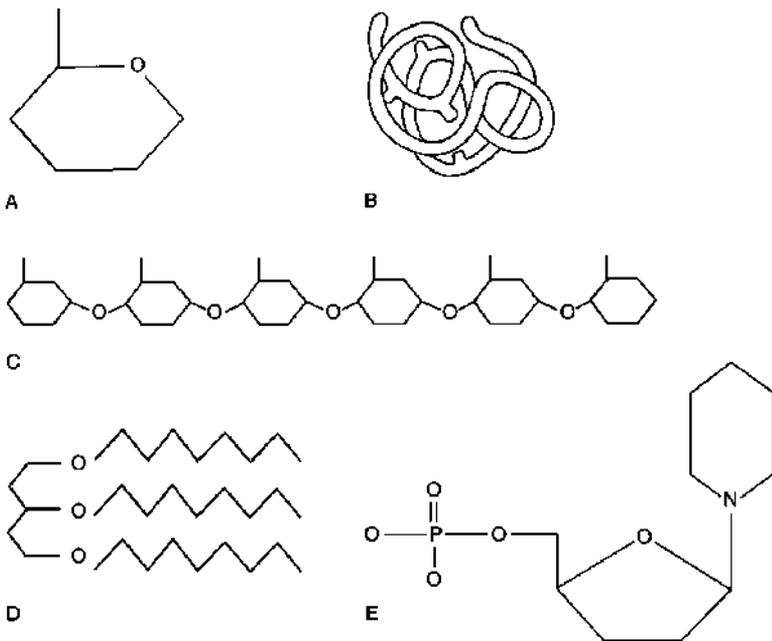


Figure 2.1

Using Figure 2.1, match the following:

90) Lipid.

90) _____

Answer: D

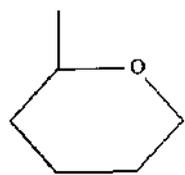
Explanation:

91) What advantages does ATP have in being the energy currency molecule?

91) _____

Answer: Its energy is easy to capture and store; it releases just the right amount of energy for the cell's needs so it is protected from excessive energy release. A universal energy currency is efficient because a single system can be used by all the cells in the body.

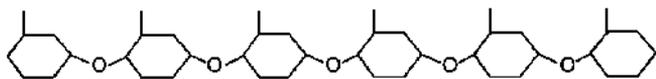
Explanation:



A



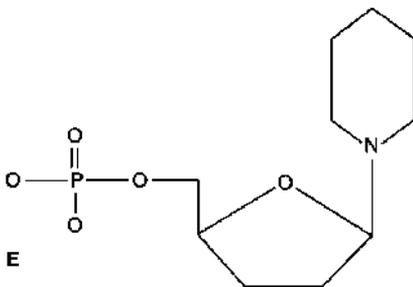
B



C



D



E

Figure 2.1

Using Figure 2.1, match the following:

92) Polymer.

92) _____

Answer: C

Explanation:

93) An atom with three electrons would have a valence of _____.

93) _____

Answer: one

Explanation:

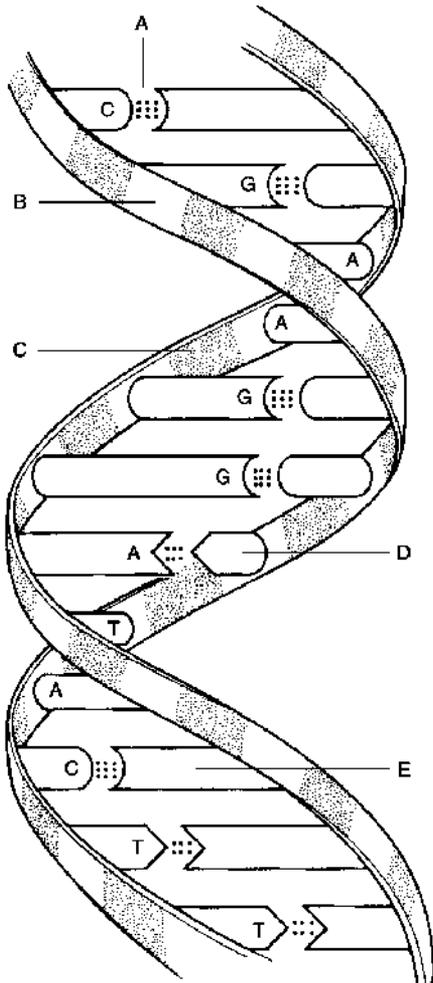


Figure 2.2

Using Figure 2.2, match the following:

94) Phosphate.

94) _____

Answer: C

Explanation:

95) Protons and electrons exist in every atom nucleus except hydrogen. Is this statement true or false and why?

95) _____

Answer: False—Hydrogen has one proton and one electron. It is the neutron that hydrogen does not have.

Explanation:

96) Hydrogen bonds are more like a type of weak _____ than true bonds.

96) _____

Answer: attraction

Explanation:

97) Which metals have a toxic effect on the body?

97) _____

Answer: heavy

Explanation:

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

- 98) A molecule consisting of one carbon atom and two oxygen atoms is correctly written as CO₂. 98) _____
Answer: True False
Explanation:
- 99) Current information theorizes that omega-3 fatty acids decrease the risk of heart disease. 99) _____
Answer: True False
Explanation:
- 100) No chemical bonding occurs between the components of a mixture. 100) _____
Answer: True False
Explanation:
- 101) About 60% to 80% of the volume of most living cells consists of organic compounds. 101) _____
Answer: True False
Explanation:
- 102) Isotopes differ from each other only in the number of electrons contained. 102) _____
Answer: True False
Explanation:
- 103) Glucose is an example of a monosaccharide. 103) _____
Answer: True False
Explanation:
- 104) The lower the pH, the higher the hydrogen ion concentration. 104) _____
Answer: True False
Explanation:
- 105) A charged particle is generally called an ion. 105) _____
Answer: True False
Explanation:
- 106) The atomic weight is only an average of relative weights of an atom and its isotopes, and it may vary from the weight of a specific isotope. 106) _____
Answer: True False
Explanation:
- 107) All organic compounds contain carbon. 107) _____
Answer: True False
Explanation:
- 108) A dipeptide can be broken into two amino acids by dehydration synthesis. 108) _____
Answer: True False
Explanation:
- 109) Emulsions and colloids are the same thing. 109) _____
Answer: True False
Explanation:

- 110) Mixtures are combinations of elements or compounds that are physically blended together but are not bound by chemical bonds. 110) _____
 Answer: True False
 Explanation:
- 111) Alpha particles, although relatively weak energy particles, are second only to smoking as a cause of lung cancer. 111) _____
 Answer: True False
 Explanation:
- 112) Buffers resist abrupt and large changes in the pH of the body by releasing or binding ions. 112) _____
 Answer: True False
 Explanation:
- 113) The fact that *no* chemical bonding occurs between the components of a mixture is the chief difference between mixtures and compounds. 113) _____
 Answer: True False
 Explanation:
- 114) Chemical properties are determined primarily by neutrons. 114) _____
 Answer: True False
 Explanation:
- 115) Covalent bonds are generally less stable than ionic bonds. 115) _____
 Answer: True False
 Explanation:
- 116) Hydrogen bonds are comparatively strong bonds. 116) _____
 Answer: True False
 Explanation:
- 117) The pH of body fluids must remain fairly constant for the body to maintain homeostasis. 117) _____
 Answer: True False
 Explanation:
- 118) Lipids are a poor source of stored energy. 118) _____
 Answer: True False
 Explanation:

MATCHING. Choose the item in column 2 that best matches each item in column 1.

Match the following:

- 119) Heterogeneous, will settle. A) Suspensions 119) _____
 Answer: A

Match the following chemical bonds to the correct description:

- 120) A bond in which electrons are completely lost or gained by the atoms involved. A) Ionic bond 120) _____
 Answer: A

Match the following:

121) Can be measured only by its effects on matter.

Answer: A

A) Energy

121) _____

B) Weight

122) Is a function of, and varies with, gravity.

Answer: B

122) _____

Match the following particles to the correct description:

123) Smallest particle of a compound that still retains its properties.

Answer: A

A) Molecule

123) _____

Match the following:

124) Carbon.

Answer: A

A) Element

124) _____

Match the following particles to the correct description:

125) Neutral subatomic particle.

Answer: A

A) Neutron

125) _____

Match the following:

126) Represented by the flow of charged particles along a conductor, or the flow of ions across a membrane.

Answer: A

A) Electrical energy

126) _____

Match the following:

127) Homogeneous, will not settle.

Answer: A

A) Solutions

127) _____

Match the following:

128) Although a man who weighs 175 pounds on Earth would be lighter on the moon and heavier on Jupiter, his _____ would not be different.

Answer: A

A) Mass

128) _____

Match the following:

129) Dry ice (frozen carbon dioxide).

Answer: A

A) Compound

129) _____

Match the following:

130) Anything that occupies space and has mass.

Answer: A

A) Matter

130) _____

Match the following:

131) Legs moving the pedals of a bicycle.

Answer: A

A) Mechanical energy

131) _____

Match the following:

132) Blood.

Answer: A

A) Mixture

132) _____

Match the following:

133) Energy that travels in waves. Part of the electromagnetic spectrum.

Answer: A

A) Radiant energy

133) _____

B) Chemical energy

134) When the bonds of ATP are broken, energy is released to do cellular work.

Answer: B

134) _____

Match the following:

135) Heterogeneous, will not settle.

Answer: A

A) Colloids

135) _____

B) Solutions

136) Will not scatter light.

Answer: B

136) _____

Match the following:

137) Water.

Answer: A

A) Compound

137) _____

Match the following chemical bonds to the correct description:

138) A bond in which electrons are shared unequally.

Answer: C

A) Hydrogen bond

138) _____

B) Nonpolar covalent bond

139) A type of bond important in tying different parts of the same molecule together into a three-dimensional structure.

Answer: A

C) Polar covalent bond

139) _____

140) A bond in which electrons are shared equally.

Answer: B

140) _____

Match the following particles to the correct description:

141) Smallest particle of an element that retains its properties.

Answer: A

A) Atom

141) _____

142) Electrically charged particle due to loss of an electron.

A) Cation

142) _____

Answer: A

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

143) A 64-year-old man is admitted to the hospital for nonhealing pressure ulcers to his heels. He has been bedridden for 10 years because of a degenerative muscle disease. Explain why protein would be an important part of his diet to promote wound healing.

Answer: Protein composes 10% to 30% of cell mass and is the basic structural material of the body. Proteins regulate body processes. Skin, hair, and eyes are made of protein, as are the enzymes needed for digestion and absorption. Protein is essential for growth, maintenance, and repair of tissue.

144) Mrs. Mulligan goes to her dentist and, after having a couple of cavities filled, her dentist strongly suggests that she reduce her intake of sodas and increase her intake of calcium phosphates in the foods she eats. Why?

Answer: Sodas are strong acids that can reduce bone and tooth salts. Calcium phosphate makes teeth hard and therefore more resistant to tooth decay.

145) How can DNA be used to "fingerprint" a suspect in a crime?

Answer: The DNA of a person is unique to that individual. By obtaining the DNA from nucleated cells from the crime scene (e.g., tissue, sperm), enzymes may be used to break up the DNA into fragments. Because nearly everyone's DNA is different, it also breaks up into fragments differently. When the fragments are separated, they form patterns even more unique than fingerprint patterns. A match of suspect and crime scene DNA is strong evidence.

146) A 23-year-old male was riding his road bike in 100-degree heat, when he suddenly became nauseated and weak. He called 911 from his cell phone. When the ambulance came, the paramedics started intravenous therapy for severe dehydration. Explain the critical role of water to maintain homeostasis.

Answer: Water is the most abundant and important inorganic compound in living material. It makes up 60% to 80% of the volume of most living cells. The properties of water are: high heat capacity, high heat of vaporization, polar solvent properties, reactivity, and cushioning. In this case the bicyclist lost a large amount of water through perspiration in an effort to cool his body. This caused a disruption in homeostasis.

147) Brenda is a 26-year-old female who is being discharged from the hospital after a vaginal delivery of an 8-pound healthy infant. Brenda is instructed by the nurse to eat a diet high in fiber and to drink 8 glasses of water per day to prevent constipation. Explain the role of fiber and water to promote defecation.

Answer: Cellulose is a polysaccharide found in all plant products that adds bulk to the diet to promote feces through the colon. Water acts as a lubricating liquid within the colon, which eases feces through the bowel.

148) Why is it possible for us to drink a solution that contains a mixture of equal concentration of a strong acid and a strong base, either of which, separately, would be very caustic?

Answer: When an acid and base of equal strength are mixed, they undergo a displacement reaction to form a water and a salt.

149) Although his cholesterol levels were not high, Mr. Martinez read that cholesterol was bad for his health, so he eliminated all foods and food products containing this molecule. He later found that his cholesterol level dropped only 20%. Why did it not drop more?

Answer: Cholesterol is produced by the liver, in addition to being ingested in foods.

150) A 65-year-old patient came to the emergency room with complaints of severe heartburn unrelieved by taking a "large handful" of antacids. Would you expect the pH to be high or low? Explain why.

Answer: You would expect a high pH. Taking antacids will neutralize the acidic stomach. Taking a "handful" of antacids can cause an alkaloid state. Certain drugs, such as corticosteroids and antacids that contain baking soda, will lead to metabolic alkalosis.

Answer Key
Testname: C2

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

Answer Key
Testname: C2

- 51) B
52) D
53) A
54) A
55) Chemical reactions that release energy cannot be reversed unless energy is put back into the system. Also, the body may use the chemicals solely for its energy, such as glucose, or some reactions produce molecules in excessive quantities (like CO₂ and NH₄) that the body needs to discard.
56) B
57) Phospholipids have both polar and nonpolar ends. The polar end interacts with water, leaving the nonpolar end oriented in the opposite direction.
58) Potential energy is inactive stored energy that has potential to do work. Kinetic energy is energy in action.
59) It is possible to reverse any reaction if the products are still present. Those that are only slightly exergonic are easily reversible. Some would require an enormous amount of energy to reverse. In the simple reaction $\text{Na} + \text{Cl} \rightarrow \text{NaCl}$ the amount of energy it takes to reverse table salt to chlorine gas and sodium metal is enormous. The reversing of the covalently bonded sugar molecule once it is reduced to ATP molecules is even harder or next to impossible.
60) High heat capacity, high heat of vaporization, polarity and solvent properties, reactivity, and cushioning.
61) All chemical reactions are theoretically reversible, but only if the products are not consumed.
62) cytosine
63) Bases
64) D
65) buffers
66) ionic
67) decomposition
68) a phosphorus-containing group
69) Polar bonds have an unequal sharing of electrons resulting in a slight negative charge at one end of the molecule and a slight positive charge at the other end. Nonpolar bonds have an equal sharing of electrons, resulting in a balanced charge among the atoms.
70) E
71) cofactor
72) Amino acids have two components—a base group (proton acceptor) and an organic acid part (a proton donor).
73) C
74) Temperature increases kinetic energy and therefore the force of molecular collisions. Particle size: smaller particles move faster at the same temperature and therefore collide more frequently; also, smaller particles have more surface area given the same concentration of reactants. Concentration: the higher the concentration, the greater the chance of particles colliding. Catalysts increase the rate of the reaction at a given temperature. Enzymes are biological catalysts.
75) ATP
76) covalent
77) 1. They are proteins.
2. They have specific binding sites for specific substrates.
3. They lower the activation barrier for a specific reaction.
4. The names end in "ase."
5. They can be denatured.
6. They can be used again and again.
78) HCl ionizes to form current-conducting electrolytes. Dextrose does not ionize, and therefore does not conduct current.
79) Mixtures come in three forms— solutions, colloids, and suspensions. Components of these mixtures always retain their original makeup and can be separated into their individual components; therefore no chemical bonding has taken place.
80) B
81) B

Answer Key
Testname: C2

- 82) The 2 indicates that there are two hydrogen atoms in the compound and the 3 indicates that there are three oxygen atoms in the compound.
- 83) glycogen
- 84) A
- 85) E
- 86) one
- 87) protons (and electrons)
- 88) A
- 89) The active sites are destroyed.
- 90) D
- 91) Its energy is easy to capture and store; it releases just the right amount of energy for the cell's needs so it is protected from excessive energy release. A universal energy currency is efficient because a single system can be used by all the cells in the body.
- 92) C
- 93) one
- 94) C
- 95) False—Hydrogen has one proton and one electron. It is the neutron that hydrogen does not have.
- 96) attraction
- 97) heavy
- 98) TRUE
- 99) TRUE
- 100) TRUE
- 101) FALSE
- 102) FALSE
- 103) TRUE
- 104) TRUE
- 105) TRUE
- 106) TRUE
- 107) TRUE
- 108) FALSE
- 109) TRUE
- 110) TRUE
- 111) TRUE
- 112) TRUE
- 113) TRUE
- 114) FALSE
- 115) FALSE
- 116) FALSE
- 117) TRUE
- 118) FALSE
- 119) A
- 120) A
- 121) A
- 122) B
- 123) A
- 124) A
- 125) A
- 126) A
- 127) A
- 128) A

Answer Key

Testname: C2

- 129) A
- 130) A
- 131) A
- 132) A
- 133) A
- 134) B
- 135) A
- 136) B
- 137) A
- 138) C
- 139) A
- 140) B
- 141) A
- 142) A
- 143) Protein composes 10% to 30% of cell mass and is the basic structural material of the body. Proteins regulate body processes. Skin, hair, and eyes are made of protein, as are the enzymes needed for digestion and absorption. Protein is essential for growth, maintenance, and repair of tissue.
- 144) Sodas are strong acids that can reduce bone and tooth salts. Calcium phosphate makes teeth hard and therefore more resistant to tooth decay.
- 145) The DNA of a person is unique to that individual. By obtaining the DNA from nucleated cells from the crime scene (e.g., tissue, sperm), enzymes may be used to break up the DNA into fragments. Because nearly everyone's DNA is different, it also breaks up into fragments differently. When the fragments are separated, they form patterns even more unique than fingerprint patterns. A match of suspect and crime scene DNA is strong evidence.
- 146) Water is the most abundant and important inorganic compound in living material. It makes up 60% to 80% of the volume of most living cells. The properties of water are: high heat capacity, high heat of vaporization, polar solvent properties, reactivity, and cushioning. In this case the bicyclist lost a large amount of water through perspiration in an effort to cool his body. This caused a disruption in homeostasis.
- 147) Cellulose is a polysaccharide found in all plant products that adds bulk to the diet to promote feces through the colon. Water acts as a lubricating liquid within the colon, which eases feces through the bowel.
- 148) When an acid and base of equal strength are mixed, they undergo a displacement reaction to form a water and a salt.
- 149) Cholesterol is produced by the liver, in addition to being ingested in foods.
- 150) You would expect a high pH. Taking antacids will neutralize the acidic stomach. Taking a "handful" of antacids can cause an alkaloid state. Certain drugs, such as corticosteroids and antacids that contain baking soda, will lead to metabolic alkalosis.