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CORRECT ANSWERS ARE LOCATED IN THE 2ND HALF OF THIS DOC.

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

1) True or False? The term *mass* describes the material that makes up all living and nonliving things.
   - ◎ true
   - ◎ false

2) True or False? Synthesis reactions are also called catabolic reactions.
   - ◎ true
   - ◎ false

3) True or False? The importance of O_2 in the human body is to extract energy (ATP) from food molecules.
   - ◎ true
   - ◎ false

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

4) The amount of matter in an object is its_____.
   - A) mass
   - B) weight
   - C) atomic number
   - D) element
   - E) ionic charge

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5) The three forms of matter are
   - A) air, water, and solids.
   - B) solids, liquids, and gases.
   - C) blood, bone, and air.
   - D) vapor, water, and solid.

6) The four most abundant elements in the human body are
   - A) carbon, hydrogen, oxygen, and iron.
   - B) carbon, hydrogen, oxygen, and nitrogen.
   - C) calcium, hydrogen, sodium, and potassium.
   - D) carbon, oxygen, magnesium, and zinc.
   - E) carbon, sulfur, calcium, and potassium.

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7) The smallest particle of an element that still exhibits the chemical characteristics of that element is a/an_____.
   A) electron
   B) atom
   C) chemical bond
   D) orbital
   E) proton

8) Subatomic particles located around the nucleus of an atom are_____.
   A) protons
   B) electrons
   C) neutrons
   D) neutrinos
   E) photons

9) Electrons
   A) comprise the majority of the mass of an atom.
   B) are located in the nucleus of an atom.
   C) have a positive charge of one.
   D) are the subatomic particles most involved in bonding behavior of atoms.
   E) do not participate in the bonding of atoms.

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10) X-rays can be used to view bones because
   A) x-rays pass through bone.
   B) x-rays react with bone.
   C) x-rays cannot pass through bone.
   D) bones are less dense than soft tissue.

11) Which of the following is not a use of x-ray imaging?
   A) Breast cancer screening in mammography
   B) Upper digestive tract abnormalities following barium ingestion
   C) Brain tumor progression
   D) Vertebrae fractures

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12) In an x-ray film of the skeletal system, the dense tissue areas appear_____ because they_____ the x-rays; the less dense tissues appear_____ because they_____ the x-rays.
A) light; absorb; dark; do not absorb
B) dark; absorb; light; do not absorb
C) light; do not absorb; dark; absorb
D) dark; do not absorb; light; absorb

13) A neutral atom contains
A) more protons than electrons.
B) more electrons than protons.
C) the same number of electrons and protons.
D) only neutrons.
E) None of the choices are correct.

14) Which of the following best describes a proton?
A) One negative charge, no mass, found in orbitals
B) No charge, mass of one, found in nucleus
C) One positive charge, mass of one, found in nucleus
D) Subatomic particle with no electric charge
E) None of the choices are correct.

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15) The mass number of an atom is the number of
A) protons in the atom.
B) neutrons in the atom.
C) protons plus electrons in the atom.
D) electrons plus neutrons in the atom.
E) neutrons plus protons in the atom.

16) An atom has an atomic number of 19 and a mass number of 39. This atom will have_____ neutrons.
A) 19
B) 20
C) 39
D) 58
E) 30

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17) An atom of chlorine has 17 protons and 18 neutrons. Which of the following statements is true?
A) Chlorine atoms have 18 electrons.
B) Chlorine has a mass number of 35.
C) Chlorine has an atomic number of 18.
D) Chlorine has 35 electrons.
E) Chlorine has an atomic number of 35.

18) Isotopes of the same element have
A) the same number of neutrons but different numbers of protons.
B) different numbers of protons and electrons.
C) the same mass number.
D) the same atomic number but differ in their mass numbers.
E) no mass number.

19) The number of atoms in exactly 12 grams of carbon-12 is called_____ number.
A) Dalton's
B) Socrates's
C) Avogadro's
D) Pasteur's
E) Le Chatelier's

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20) A neutral atom will become a cation if it
A) gains electrons.
B) gains protons.
C) loses electrons.
D) loses protons.
E) gains neutrons.

21) In ionic bonding,
A) only non-polar molecules are involved.
B) a "sea of electrons" forms.
C) electrons are transferred from one atom to another.
D) two hydrogen atoms share one pair of electrons.
E) the charge of the ion does not play a role in the bond.

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22) Covalent bonds form when
A) atomic nuclei fuse.
B) molecules become ionized.
C) neutrons are transferred from one atom to another.
D) protons are lost from atoms.
E) electrons are shared between two atoms.

23) When ionic compounds dissolve in water, their ions
A) cling tightly together.
B) dissociate or separate from one another.
C) lose their charge.
D) get lost in the solvent.
E) settle to the bottom of the container.

24) Molecules that form when electrons are shared unequally between atoms are called_____ molecules.
A) salt
B) polar
C) nonpolar
D) lopsided
E) None of the choices are correct.

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25) A substance composed of two or more different types of atoms is a/an_____.
A) compound
B) element
C) ion
D) molecule
E) Both compound and molecule are correct.

26) Sodium chloride is considered a/an_____.
A) molecule
B) compound
C) Both molecule and compound are correct.
D) element
E) ion

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27) A molecule is
A) a combination of atoms held together by chemical bonds.
B) a positively charged ion.
C) a negatively charged ion.
D) a substance that conducts electricity when placed in solution.
E) an alteration in the three-dimensional structure of a protein.

28) Carbon dioxide is considered a/an_____.
A) molecule
B) compound
C) Both molecule and compound are correct.
D) element
E) ion

29) When the hydrogen bonds that maintain a protein's three-dimensional shape are broken, the protein becomes nonfunctional, and is said to be_____.
A) essential
B) denatured
C) structural
D) unsaturated
E) saturated

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30) Hydrogen bonds form between molecules containing_____ bonds; the hydrogen bond is between a hydrogen atom of one molecule and a partially_____ charged atom of another.
A) polar covalent; negatively
B) polar covalent; positively
C) nonpolar covalent; positively
D) nonpolar covalent; negatively
E) ionic; positively

31) An individual hydrogen bond in a sample of water would be described as
A) strong and intramolecular.
B) strong and intermolecular.
C) weak and intramolecular.
D) weak and intermolecular.

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32) Cations and anions that dissociate in water are sometimes called
A) nonelectrolytes, because they do not conduct an electrical current.
B) molecules.
C) electrolytes, because they can conduct an electrical current.
D) nonelectrolytes and solutes.
E) molecules and electrolytes.

33) Electrolytes are substances that
A) form covalent bonds with water.
B) conduct electricity when dissolved in water.
C) cannot conduct electricity in solution.
D) are NOT found in the human body in any appreciable amounts.
E) are NOT charged particles.

34) Chemical substances that dissolve in water or react with water to release ions are known as_____.
A) buffers
B) enzymes
C) bases
D) inorganic compounds
E) electrolytes

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35) Intermolecular forces
A) form dissociated ions.
B) are electrostatic attractions between different molecules.
C) evenly distribute electrical charge among all atoms in a sample.
D) separate atoms and ions from one another.
E) are found within molecules.

36) A cation is
A) a combination of atoms held together by chemical bonds.
B) a positively charged ion.
C) a negatively charged ion.
D) a molecule that conducts electricity when placed in solution.
E) an alteration in the three-dimensional structure of a protein.

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37) An anion is
A) a combination of atoms held together by chemical bonds.
B) a positively charged ion.
C) a negatively charged ion.
D) a molecule that conducts electricity when placed in solution.
E) an alteration in the three-dimensional structure of a protein.

38) An electrolyte is
A) a combination of atoms held together by chemical bonds.
B) a positively charged ion.
C) a negatively charged ion.
D) a substance that conducts electricity when placed in solution.
E) the alteration in the three-dimensional structure of a protein.

39) Solubility refers to the ability of one substance to_____ in another.
A) react
B) dissolve
C) precipitate
D) conduct
E) None of the choices are correct.

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40) All of the synthesis reactions in the body are called_____.
A) catabolism
B) hydrolysis
C) oxidation-reduction
D) anabolism
E) dissociation

41) Which of the following is a synthesis reaction?
A) Two amino acids are bonded together to form a dipeptide.
B) Sucrose is chemically separated to form one molecule of glucose and one molecule of fructose.
C) Sodium chloride is dissolved in water.
D) Several dipeptide chains are formed from digestion of a long polypeptide chain.
E) ATP is converted to ADP.

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42) Which of the following pairs is mismatched?
A) Synthesis reaction - two reactants combine to form a larger product
B) Decomposition reaction - large reactant broken into smaller products
C) Oxidation - gain of electrons
D) Dehydration reaction - water is a product of the reaction
E) Hydrolysis - water is used in decomposition reaction

43) In the reversible reaction, $CO_2 + H_2O \leftrightarrow H_2CO_3 \leftrightarrow H^+ + HCO_3^-$, a decrease in respiration rate will increase the concentration of CO_2 in the blood. What will this do to the amount of H^+ in the blood?
A) H^+ will increase.
B) H^+ will decrease.
C) H^+ will be unchanged.

44) Reactions that use water to split molecules apart are called_____ reactions.
A) dehydration
B) synthesis
C) hydrolysis
D) reversible
E) oxidation

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45) In a reversible reaction, when the rate of product formation is equal to the rate of reactant formation, the reaction is
A) stopped.
B) at equilibrium.
C) in danger of exploding.
D) a net decomposition reaction.
E) a net synthesis reaction.

46) Chemical reactions with the property of being able to proceed from reactants to products and from products to reactants are called_____ reactions.
A) exchange
B) synthesis
C) decomposition
D) reversible
E) mirrored

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47) Why are cyanide compounds lethal to humans?
A) They interfere with protein synthesis.
B) They interfere with nerve impulses.
C) They interfere with the production of ATP.
D) They interfere with muscle contraction.
E) All of the choices are correct.

48) Potential energy stored in bonds of molecules is_____ energy.
A) mechanical
B) thermal
C) chemical
D) molecular
E) None of the choices are correct.

49) Chemical energy
A) moves matter.
B) results from the position or movement of objects.
C) is a form of potential energy within chemical bonds.
D) comes from the sun.
E) is not important in physiological processes.

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50) If the potential energy in the chemical bonds of the reactants is greater than the potential energy in the chemical bonds of the product,
A) energy must be supplied for the reaction to occur.
B) energy is released by the reaction.
C) the chemical reaction equalizes the potential energy levels.
D) energy has not been gained or lost.
E) energy is not a factor in the reaction.

51) The energy stored in ATP is a form of_____ energy.
A) mechanical
B) chemical
C) kinetic
D) heat
E) electrical

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52) Potential energy is
A) the form of energy that actually does work.
B) movement of ions or electrons.
C) energy that flows between objects with different temperatures.
D) stored energy that could do work but is not doing so.
E) energy that moves in waves.

53) Kinetic energy is
A) the form of energy that actually does work.
B) movement of ions or electrons.
C) energy that flows between objects with different temperatures.
D) stored energy that could do work but is not doing so.
E) energy that moves in waves.

54) Heat energy is
A) the form of energy that actually does work.
B) movement of ions or electrons.
C) energy that flows between objects with different temperatures.
D) stored energy that could do work but is not doing so.
E) energy that moves in waves.

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55) The minimum amount of energy that reactants must have to start a chemical reaction is called_____energy.
A) kinetic
B) mechanical
C) activation
D) electromagnetic
E) potential

56) The conversion between different states of energy (e.g. potential energy to kinetic energy)
A) is not 100% efficient.
B) is 100% efficient.
C) typically generates heat.
D) is not possible; energy cannot change its state.
E) is not 100% efficient and typically generates heat.

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57) If the products of a chemical reaction contain less potential energy than the reactants,
A) energy has been stored in the molecular bonds of the product.
B) energy has been released by the breaking of molecular bonds.
C) the reaction will be reversible without additional energy input.
D) a synthesis reaction is likely to have occurred.
E) All of the choices are correct.

58) Enzymes are proteins that increase the rate of chemical reactions by
A) increasing the activation energy of the reaction.
B) decreasing the activation energy of the reaction.
C) adjusting the temperature of the reaction.
D) increasing the concentration of the reactants.

59) A substance that will increase the rate of a chemical reaction without being permanently changed is called a/an_____.
A) solute
B) catalyst
C) oxidator
D) reducing agent

60) For most chemical reactions, an increase in temperature will cause the reaction rate to
A) increase.
B) decrease.
C) remain unchanged.

61) Which of the following factors will influence the rate of chemical reactions?
A) Temperature
B) Concentration of reactants
C) Presence of catalysts
D) Presence of enzymes
E) All of these factors will influence the rate of chemical reactions.

62) Which of the following is an organic compound?
A) Hydrochloric acid (HCl)
B) Salt (NaCl)
C) Sucrose ($C_{12}H_{22}O_{11}$)
D) Water (H_2O)
E) None of the choices are correct.

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63) The hydrogen and oxygen atoms in a molecule of water are held together by_____ bonds.
A) ionic
B) peptide
C) savings
D) polar covalent
E) nonpolar covalent

64) A group of water molecules are held together by_____ bonds.
A) savings
B) hydrogen
C) ionic
D) nonpolar covalent
E) polar covalent

65) The molecular formula H_2O means
A) 1 hydrogen atom and 2 oxygen atoms.
B) 1 hydrogen atom and 1 oxygen atom.
C) 2 hydrogen atoms and 1 oxygen atom.
D) 2 hydrogen atoms and 2 oxygen atoms.
E) None of the choices are correct.

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66) The presence of water in our bodies allows us to
A) cool the body with sweat.
B) maintain a fairly constant body temperature.
C) provide an environment for chemical reactions.
D) keep tissues moist and reduce friction.
E) All of the choices are correct.

67) Which of the following statements is false?
A) Water allows the body to resist sudden temperature changes.
B) Water transports nutrients in the body.
C) Water serves as an effective lubricant in our bodies.
D) Water evaporation cools the body.
E) Water evaporation heats the body.

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68) Substances dissolved in the liquid portion of a solution are called_____.
A) solutes
B) solvents
C) catalysts
D) osmoles
E) insoluble

69) A solution that contains one osmole of solute in one kilogram (kg) of water is called a
A) 1% solution.
B) 1 molar solution.
C) 10% solution.
D) 1 osmolal solution.
E) None of the choices are correct.

70) Two solutions, A and B, have the same osmolality. What does that mean?
A) Solution A has more solute particles than solution B.
B) Solution B has more solute particles than solution A.
C) Both solutions have the same number of solute particles.
D) Solution A is water and sugar; solution B is water and salt.
E) Solution A is pure water, and solution B is water and salt.

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71) Why is water involved in most metabolic reactions in the human body?
A) It can dissolve many chemical compounds.
B) It can absorb and release heat without changing temperature very much.
C) It has a high surface tension.
D) Its bonds are nonpolar.
E) It is a solute.

72) Hyperventilation causes the loss of large amounts of CO_2 from the body, decreasing the amount of H^+ in solution. As a result,
A) the pH of body fluids will rise.
B) the pH of body fluids will fall.
C) the pH of body fluids will become neutral.
D) the pH of body fluids will not be affected.
E) None of these choices are correct.

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73) A base is a proton_____.
A) donor
B) converter
C) acceptor
D) creator
E) Both acceptor and creator are correct.

74) Which of the following is a proton donor?
A) An acid
B) A base
C) A salt
D) Glucose
E) A neutral substance

75) Sam adjusts solution A to increase its acidity. This means that the
A) solution is closer to neutrality.
B) pH of the solution has increased.
C) solution will now accept more protons.
D) number of hydrogen ions in the solution has decreased.
E) number of hydrogen ions in the solution has increased.

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76) The pH value
A) increases with acidity.
B) is measured on a scale from 0 to 10.
C) is determined by the concentration of H^+ in a solution.
D) reflects the Na^+ content of body fluids.
E) decreases with alkalinity.

77) What particle is formed when an acid loses a proton (H^+<!--cke_bookmark_121E-->)?
A) Buffer
B) Conjugate acid
C) Salt
D) Conjugate base

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78) Solution A has a pH of 10, and solution B has a pH of 2. Which of the following statements about these solutions is true?
A) Solution A and solution B are both basic.
B) Solution B is basic.
C) Solution A is acidic.
D) Solution B has a higher H^+ concentration than solution A.
E) Solution A has a higher H^+ concentration than solution B.

79) A buffer will
A) enhance changes in the pH of the solutions.
B) resist drastic changes in the pH of the solutions.
C) have no effect on the pH of the solutions.
D) make a solution more acidic.
E) make a solution more basic.

80) Normal blood pH is maintained within a range of
A) 7.35 - 8.5.
B) 7.35 - 7.45.
C) 4.5 - 5.5.
D) 1.0 - 14.0.
E) 6.5 - 9.5.

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81) Normal pH range for blood is 7.35 to 7.45. If blood pH falls below 7.35,
A) an imbalance called alkalosis results.
B) nothing happens as this is an acceptable deviation.
C) an imbalance called acidosis results.
D) the blood becomes saltier.
E) the number of red blood cells decreases.

82) Normal pH for blood is 7.35 to 7.45. Maintenance of the pH in this range is
A) critical because enzymes work best within narrow ranges of pH.
B) not critical because extreme pH values do not affect enzyme function.
C) called denaturation.
D) not required.
E) None of the choices are correct.

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83) Which molecule is produced as a waste product of the metabolism of glucose by cells?
A) Water
B) Oxygen
C) Carbon dioxide
D) Carbon monoxide
E) Nitrogen

84) Large carbohydrates are formed from smaller units called_____.
A) phosphate groups
B) monosaccharides
C) amino acids
D) steroids
E) lipids

85) Which of the following is a carbohydrate?
A) Triglyceride
B) Hemoglobin
C) Cholesterol
D) Animal fat
E) Sucrose

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86) Polysaccharides
A) are formed when sucrose and glucose combine.
B) are the smallest carbohydrates.
C) contain carbon, hydrogen, and phosphate atoms.
D) contain long chains of monosaccharides.
E) are not found in plants.

87) Consider the following five terms. Which term does not belong with the other four terms?
A) Disaccharide
B) Sucrose
C) Lactose
D) Maltose
E) Glucose

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88) Which of the following lists includes only monosaccharides that are isomers of one another?
A) Glycogen, glucose, sucrose
B) Starch, glycogen, cellulose
C) Glucose, fructose, galactose
D) Ribose, glycogen, glucose
E) Deoxyribose, glycogen, starch

89) The molecule used most frequently by cells as a fuel belongs to which of the following groups?
A) Prostaglandins
B) Carbohydrates
C) Nucleic acids
D) Steroids
E) Phospholipids

90) Glucose is the
A) storage carbohydrate in animals.
B) storage carbohydrate in plants.
C) nondigestible plant polysaccharide.
D) major nutrient for most body cells.
E) sugar found in RNA.

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91) Glycogen is the
A) storage carbohydrate in animals.
B) storage carbohydrate in plants.
C) nondigestible plant polysaccharide.
D) major nutrient for most body cells.
E) sugar found in RNA.

92) Ribose is the
A) storage carbohydrate in animals.
B) storage carbohydrate in plants.
C) nondigestible plant polysaccharide.
D) major nutrient for most body cells.
E) sugar found in RNA and ATP.

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93) Starch is the
A) storage carbohydrate in animals.
B) storage carbohydrate in plants.
C) nondigestible plant polysaccharide.
D) major nutrient for most body cells.
E) sugar found in RNA.

94) Cellulose is the
A) storage carbohydrate in animals.
B) storage carbohydrate in plants.
C) nondigestible plant polysaccharide.
D) major nutrient for most body cells.
E) sugar found in RNA.

95) Deoxyribose is a sugar found in_____.
A) glycogen
B) starch
C) DNA
D) RNA
E) ATP

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96) Which of the following is NOT a function of carbohydrates in the body?
A) Structural component of DNA
B) Protection
C) Bulk in feces
D) Energy
E) Structural component of RNA

97) Which of the following statements accurately describes lipids?
A) Lipids are the building blocks of carbohydrates.
B) Lipids serve as buffers.
C) Lipids are an important component of plasma membranes.
D) Lipids tend to be water soluble.
E) Lipids tend to be polarized.

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98) Triglycerides are composed of
A) monosaccharides.
B) amino acids.
C) nucleotides.
D) glycerol and fatty acids.
E) None of the choices are correct.

99) Fatty acid A has 10 double covalent bonds scattered throughout its carbon chain while fatty acid B has only single covalent bonds between the carbons in its chain.
A) Fatty acid A is saturated.
B) Fatty acid B is unsaturated.
C) Both fatty acids are saturated.
D) Both fatty acids are unsaturated.
E) Fatty acid B is saturated.

100) Which of the following would be classified as a lipid?
A) Cholesterol – a steroid
B) Alanine – an amino acid
C) Starch – a polysaccharide
D) Catalase – an enzyme
E) Sucrose – a disaccharide

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101) All of the following terms relate to lipids. Which does not belong with the other four?
A) Cholesterol
B) Estrogen
C) Steroid
D) Triglyceride
E) Bile salts

102) Phospholipids
A) contain subunits called amino acids.
B) are water-soluble.
C) are a type of steroid.
D) are fat-soluble vitamins.
E) are found in plasma membranes.

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103) Lipids
A) can insulate and help prevent heat loss.
B) yield little energy per unit of weight.
C) function as enzymes.
D) are all water soluble.
E) comprise the genetic material of cells.

104) Eicosanoids
A) are structural proteins.
B) are fat-soluble vitamins.
C) are components of the plasma membrane.
D) comprise the genetic material.
E) play a role in the response of tissues to injuries.

105) An example of a fat-soluble vitamin is
A) vitamin C.
B) vitamin D.
C) vitamin B.
D) vitamin F.
E) vitamin H.

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106) Which of the following molecules is NOT made from cholesterol?
A) Estrogen
B) Bile salts
C) Testosterone
D) Prostaglandins
E) Progesterone

107) Phospholipids have a hydrophilic end which is
A) polar and not water soluble.
B) polar and water soluble.
C) nonpolar and not water soluble.
D) nonpolar and water soluble.

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108) Which function of proteins is NOT correctly matched with the example?
A) Transport – hemoglobin
B) Structure – collagen and keratin
C) Regulation – enzymes and hormones
D) Protection – packing around organs and glands
E) Contraction – actin and myosin in muscles

109) An organic molecule consists of carbon, hydrogen, oxygen, nitrogen, and sulfur; the molecule is probably
A) carbon dioxide.
B) an amino acid.
C) a triglyceride (fat).
D) a monosaccharide.
E) a phospholipid.

110) The building blocks of proteins are_____.
A) triglycerides
B) phospholipids
C) amino acids
D) monosaccharides
E) eicosanoids

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111) Proteins
A) are the body's source of immediate energy.
B) are the building blocks of nucleotides.
C) provide much of the structure of body cells and tissues.
D) contain the genetic information of the cell.
E) insulate and cushion the body.

112) Adjacent amino acids in a polypeptide chain are held together by_____ bonds.
A) hydrogen
B) ionic
C) Van der Waals
D) peptide
E) high energy

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113) Which of the following is a source of nitrogen for the body?
A) Carbohydrates
B) Water
C) Proteins
D) Glucose
E) Lipids

114) The primary structure of a protein is
A) the number of polypeptide chains in the molecule.
B) the sequence of amino acids in the polypeptide chain.
C) the folded, helical nature of the molecule.
D) represented by multiple polypeptide chains.
E) the hydrogen bonds between amino acids.

115) Denaturation is
A) a combination of atoms held together by chemical bonds.
B) a positively charged ion.
C) a negatively charged ion.
D) a substance that conducts electricity when placed in solution.
E) a change in the three-dimensional structure of a protein.

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116) Which of the following is the correct sequence from smallest to largest?
A) Amino acid, cell, protein, atom
B) Amino acid, atom, cell, protein
C) Cell, protein, amino acid, atom
D) Atom, amino acid, protein, cell
E) Protein, cell, amino acid, atom

117) Which of the following is determined by the sequence of amino acids bound by peptide bonds?
A) Amino acid
B) Peptide bond
C) Primary structure of protein
D) Secondary structure of protein
E) Denaturation

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118) Which of the following means a change in shape of a protein?
A) Amino acid
B) Peptide bond
C) Primary structure of protein
D) Secondary structure of protein
E) Denaturation

119) What type of covalent bond is formed between amino acid molecules during protein synthesis?
A) Amino bond
B) Peptide bond
C) Primary bond
D) Hydrogen bond
E) Electrovalent bond

120) What is the building block molecule of a protein?
A) Amino acid
B) Nucleic acid
C) Monosaccharide
D) Glycerol
E) Fatty acid

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121) Which protein structure results from folding or coiling of a polypeptide chain caused by hydrogen bonds between amino acids?
A) Quaternary structure
B) Tertiary structure
C) Secondary structure
D) Primary structure
E) Peptide structure

122) Which of the following is mismatched?
A) Ribose – RNA
B) Enzyme – protein
C) Cholesterol – nucleic acid
D) Triglyceride – fat
E) Eicosanoid – prostaglandin

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123) To which of the following organic groups does an enzyme belong?
A) Carbohydrate
B) Protein
C) Lipid
D) Nucleic acid
E) Vitamin

124) To which of the following organic groups does DNA belong?
A) Carbohydrate
B) Protein
C) Lipid
D) Nucleic acid
E) Vitamin

125) To which of the following organic groups does lactose belong?
A) Carbohydrate
B) Protein
C) Lipid
D) Nucleic acid
E) Vitamin

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126) To which of the following organic groups does a steroid belong?
A) Carbohydrate
B) Protein
C) Lipid
D) Nucleic acid
E) Vitamin

127) To which of the following organic groups does hemoglobin belong?
A) Carbohydrate
B) Protein
C) Lipid
D) Nucleic acid
E) Vitamin

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128) An organic molecule such as a vitamin that makes an enzyme functional is called a/an_____.
A) buffer
B) coactivator
C) catalyst
D) coenzyme

129) The minimum energy required to start a chemical reaction
A) moves in energy surges.
B) results from random molecular movement.
C) comes from ionic energy motion.
D) is elevated by a catalyst.
E) can be lowered by enzymes.

130) An enzyme
A) has a two-dimensional shape.
B) is permanently changed in a chemical reaction.
C) increases the activation energy needed in a chemical reaction.
D) is a protein catalyst.
E) cannot be denatured.

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131) Which of the following is NOT true of enzymes?
A) They are catalysts that increase the rate of a reaction.
B) One enzyme can have many reactions.
C) They may need a cofactor to be functional.
D) The active site has a specific shape to match the reactant(s).
E) A slight change in shape can affect function.

132) The model that helps explain how an enzyme works is the_____ model.
A) activation
B) lock-and-key
C) three-dimensional
D) denaturation

133) Nucleotides
A) are part of DNA molecules but not RNA molecules.
B) hold the nucleus together.
C) are the building blocks of nucleic acids.
D) are proteins that function as enzymes.
E) have nothing to do with the genetic information in the nucleus.

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134) Which of the following is a component of a nucleotide?
A) Adenine – a nitrogen base
B) Glucose – a monosaccharide
C) Cholesterol – a steroid
D) Calcium ions
E) ATP

135) DNA
A) must travel to ribosomes to function.
B) contains the sugar deoxyribose.
C) is a single-stranded molecule.
D) is one of several amino acids.
E) assembles amino acids to make proteins.

136) Which of the following nitrogen bases is found in RNA but not DNA?
A) Adenine
B) Guanine
C) Thymine
D) Uracil
E) Cytosine

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137) Arrange the following from largest to smallest:
(1) Nucleus
(2) DNA molecule
(3) Skin cell
(4) Chicken eggs
A) 1, 2, 3, 4
B) 4, 3, 1, 2
C) 3, 4, 2, 1
D) 2, 3, 1, 4
E) 4, 2, 3, 1

138) Which of the following statements best describes RNA?
A) RNA is found outside a cell.
B) RNA contains the base thymine.
C) RNA is a single-stranded molecule.
D) RNA molecules are antiparallel.
E) RNA is a double helix.

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139) Which of the following lists the components of a nucleotide?
A) Phosphate, lipid, nitrogenous base
B) Monosaccharide, nitrogenous base, sucrose
C) Phosphate, monosaccharide, nitrogenous base
D) Phosphate, sucrose, amino acid
E) Monosaccharide, amino acid, phosphate

140) Which of the following is the correct complementary strand to CATGTC?
A) GTACAG
B) CATGTC
C) GUACAG
D) AGCACA
E) TCGTAT

141) ATP
A) is a nucleotide found in DNA.
B) stores genetic information.
C) is a sugar found in transfer RNA.
D) serves as the energy currency of the cell.
E) can store, but cannot release energy in the cell.

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142) Which of the following statements correctly describes ATP?
A) Can be synthesized from ADP
B) Stores and releases energy in the cell
C) Is associated with a reversible reaction
D) Is associated with anabolism and catabolism
E) All of the choices are correct.

143) Which of the following chemical reactions best represents the decomposition of ATP?
A) ATP + ADP → ATP
B) ADP + ADP + ADP → ATP
C) ATP + energy → ADP + H_2O
D) ADP + P_i + energy → ATP + H_2O
E) ATP + H_2O → ADP + P_i + energy

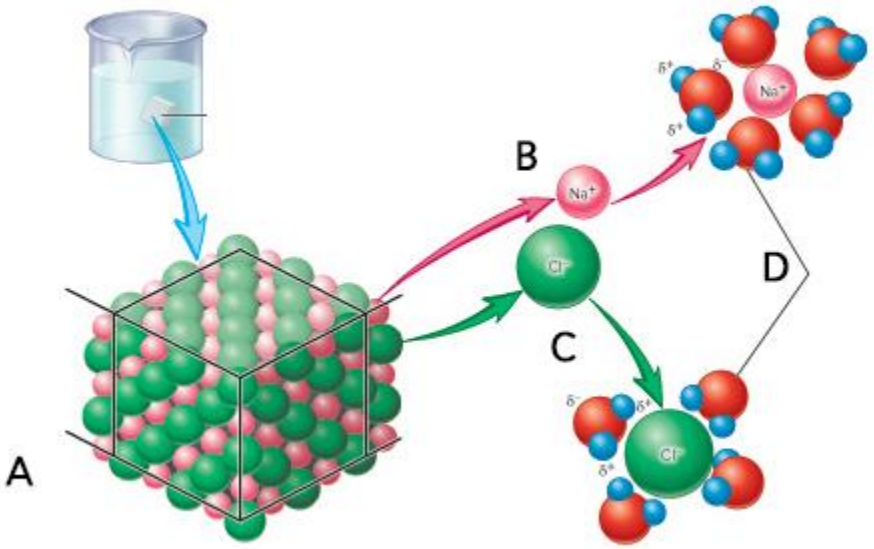
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144) Which of the following chemical reactions best represents the synthesis of ATP?

A) $ATP + H_2O \rightarrow ADP + P_i + energy$
B) $ADP + P_i + energy \rightarrow ATP + H_2O$
C) $ADP + ADP + ADP \rightarrow ATP + energy$
D) $ATP + energy \rightarrow ADP + H_2O$
E) $ATP + ADP \rightarrow ATP$

145) The sodium chloride molecule breaks apart in water. What does "D" represent?



A) Chloride ion
B) Dissociation
C) Water molecule
D) Sodium ion
E) Salt crystal

146) The mass of a chemical equal to its molecular weight in grams, containing 6.023×10^{23} molecules is a/an_____.

A) mole
B) molarity
C) ion
D) atomic mass unit

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147) Intermolecular forces are weak electrostatic attractions that exist between
A) two molecules.
B) two atoms.
C) two protons.

148) Hydrogen bonds are important for all of the following *except*
A) producing surface tension in water.
B) helping hold a protein structure together.
C) helping hold DNA strands together.
D) helping atoms give up or receive electrons.

149) In an oxidation-reduction reaction,_____ are transferred between molecules.
A) electrons
B) charges
C) neutrons
D) protons

150) Sucrose is formed when the simple sugars fructose and glucose are covalently bonded. This reaction releases water. What type of reaction is this?
A) Catabolic
B) Hydrolysis
C) Dehydration
D) Monomeric

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151) If the ratio of products and reactants are stable, the system is in_____.
A) equilibrium
B) steady state
C) activation

152) Identify the material that would NOT be considered an important inorganic substances in our bodies.
A) Glucose
B) Oxygen
C) Calcium
D) Iron

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153) From the following list, select the one organic substance found in the human body.
A) Oxygen
B) Water
C) Glucose
D) Calcium

154) Inorganic chemists study substances_____ carbon, while organic chemists study substances_____ carbon.
A) lacking; containing
B) containing; lacking
C) containing more than 1 mole of; with less than a mole of

155) In order to get energy (ATP) from food molecules in the final stage of respiration, humans require_____.
A) oxygen
B) sodium
C) carbon dioxide
D) ribose

156) How does a buffer help a solution maintain pH?
A) A buffer can act like a base if pH is acidic, and it can act like an acid if pH is basic.
B) A buffer releases a base to neutralize an acid.
C) A buffer forms both cations and anions to counteract acids.
D) A buffer releases acid to maintain proper pH.

157) Sodium has an atomic number of 11 and an atomic mass of 23. Sodium has_____.
A) 12 neutrons and 11 protons
B) 12 protons and 11 neutrons
C) 12 electrons and 11 neutrons
D) 12 protons and 11 electrons
E) 12 electrons and 11 protons

158) Na (atomic no. 11) reacts with Cl (atomic no. 17) to become stable. In the reaction, Na will_____, while Cl will_____.
A) accept one electron; give up one electron
B) give up one proton; accept one proton
C) share one electron with chlorine; share one electron with sodium
D) become an anion; become a cation
E) give up one electron; accept one electron

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159) Oxygen has an atomic number of 8 and an atomic mass of 16. How many valence electrons does it have?
A) 2
B) 4
C) 6
D) 8
E) 16

160) Oxygen has an atomic number of eight. When two oxygen atoms come together, they form a/an_____ bond.
A) hydrogen
B) nonpolar covalent
C) polar covalent
D) ionic
E) Van der Waals

161) When jumping into water, you notice resistance. This resistance is caused by water's_____.
A) adhesiveness
B) cohesiveness
C) hydrophobic tension
D) hydrophilic tension
E) osmotic equilibrium

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162) Which of these is hydrophobic?
A) Glucose
B) K^+
C) Cl^-
D) Water
E) Lipid

163) Blood contains NaCl, protein, and cells. The NaCl is in a/an_____, the protein is in a/an_____, and the cells are in a_____.
A) emulsion; solution; suspension
B) solvent; emulsion; colloid
C) colloid; suspension; solution
D) suspension; colloid; solution
E) solution; colloid; suspension

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164) Which of these has the highest H^+ concentration?
A) Lemon juice, pH = 2.3
B) Red wine, pH = 3.2
C) Tomato juice, pH = 4.7
D) Saliva, pH = 6.6
E) Household ammonia, pH = 10.8

165) The breakdown of glucose to yield carbon dioxide, oxygen, and ATP can be described as_____.
A) anabolic and endergonic
B) catabolic and exergonic
C) anabolic and exergonic
D) catabolic and endergonic
E) anabolic and exothermic

166) Which of the following terms encompasses all of the other ones?
A) Catabolism
B) Anabolism
C) Metabolism
D) Oxidation reactions
E) Reduction reactions

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167) Which of the following is *not* an organic compound?
A) $C_{16}H_{18}N_3ClS$
B) $Na_2HPO_3(H_2O)_5$
C) CH_4
D) $C_3H_7O_2N$

168) _____ is a monosaccharide, whereas_____ is a polysaccharide.
A) Fructose; sucrose
B) Galactose; maltose
C) Lactose; glycogen
D) Glucose; starch
E) Cellulose; glucose

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169) Which of these molecules is hydrophobic?
A) Glucose
B) Cholesterol
C) Amino acid
D) Protein
E) Disaccharide

170) _____ is the substrate of_____.
A) Glucose; lactose
B) Lactase; glucose
C) Lactose; lactase
D) Galactose; lactose
E) Sucrase; sucrose

171) Most enzymes are_____.
A) cofactors
B) proteins
C) lipids
D) carbohydrates
E) nucleic acids

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172) An atom with 12 electrons, 13 neutrons, and 11 protons is a/an _____.
A) anion
B) cation
C) free radical
D) isotope
E) both an anion and an isotope
F) both an anion and a free radical

173) In the following reaction, what is/are the product(s)? $CO_2 + H_2O$ ---> H_2CO_3
A) H_2CO_3
B) CO_2 and H_2O
C) CO_2 and H_2CO_3
D) H_2O and H_2CO_3

174) Which of the following will increase the rate of a chemical reaction?
A) An increase in reactant concentration
B) An increase in product concentration
C) A decreased temperature
D) Enzyme inhibition

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175) Metabolic water refers to the water molecules produced during normal cellular metabolism. Which types of metabolic reactions are important for the production of metabolic water?
A) Dehydration reactions
B) Hydrolysis reactions
C) Catabolic reactions
D) Reversible reactions

176) Which of the following scenarios appropriately represents kinetic energy?
A) A student marking an answer on a exam paper
B) A swinging door propped open
C) A large truck parked at the top of a steep hill
D) All of the choices are correct.

177) Considering the following analogy, determine which component represents ATP's role in the cells of the body. As the river flows past the old mill, it turns the water wheel, which in turns powers the movement of the millstone that grinds the wheat.
A) Water wheel
B) River
C) Millstone
D) Wheat

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178) A student's science fair project examined changes in chemical reaction rate by mixing vinegar and baking soda together and observing the formation of carbon dioxide gas. The student noticed that as the volume of vinegar_____, there was a noticeable_____ in bubbling in the beaker.
A) increased; increase
B) decreased; decrease
C) increased; decrease
D) decreased; increase

179) Which of the following is**not** an example of an important inorganic substance necessary for normal human physiology?
A) Iodide ions are important components of certain hormones in the body.
B) The sugar-phosphate backbone of DNA form from covalent bonds between nucleotides.
C) Calcium ions are important components of cellular communication.
D) Oxygen is the final electron acceptor in cellular respiration, the process that generates much of the ATP in cells.

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180) Substance A is added to a solution, resulting in a decrease in the pH of the solution. Substance A_____ the H^+ concentration; therefore, it is considered a/an_____.
A) increased; acid
B) increased; base
C) decreased; acid
D) decreased; base

181) Proteins in cells can act as important buffer systems. If intracellular pH rises, certain_____ of proteins can_____ H^+ to return pH to normal conditions.
A) amino acids; donate
B) nucleotides; donate
C) amino acids; accept
D) nucleotides; accept

182) When someone eats a cookie, what happens to the carbon atoms in the sugar molecules after the cookie is ingested?
A) The carbon atoms combine with hydrogen ions to buffer the stomach acids.
B) The carbon atoms are released as part of carbon dioxide, which later is excreted as part of the urine.
C) The carbon atoms are released as part of carbon dioxide, which later is excreted as part of exhaled air.
D) The carbon atoms are stored in bones until they are needed for some other cellular process.

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183) A weak acid was introduced to a solution. Which of the following accurately describes the condition of the solution after adding the weak acid?
A) The solution would have an increase in H^+ with some of the weak acid molecules still intact.
B) The solution would have a decrease in H^+ with some of the weak acid molecules still intact.
C) The solution would have an increase in H^+ with none of the weak acid molecules still intact.
D) The solution would have a decrease in H^+ with none of the weak acid molecules still intact.

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184) Viruses are composed primarily of proteins and nucleic acids. Which of the following elements could be used to track the fate of viral proteins to determine if they entered the cell?
A) Phosphate because proteins contain phosphate, but nucleic acids do not
B) Sulfur because proteins contain sulfur, but nucleic acids do not
C) Nitrogen because proteins contain nitrogen, but nucleic acids do not
D) Oxygen because proteins contain oxygen, but nucleic acids do not

185) An unknown molecule was detected in a tissue sample. The molecule is composed of carbon, hydrogen, and oxygen; appears to be a branching polymer; and is hydrophilic. This molecule is most likely a_____.
A) carbohydrate
B) lipid
C) protein
D) nucleic acid

186) Prions are pathogenic proteins that are linked to different neurodegenerative diseases. Investigations of some have indicated that normal cellular proteins and prions have the same amino acid sequence. How is this possible?
A) Though the primary structure is the same between the prion and the normal cellular protein, differences at higher levels (secondary or tertiary) alter protein activity.
B) The amino acid sequence is not important to the function of the protein because protein function is completely determined by the pH of the environment.
C) The double helix structure of proteins is easily altered by separating the nitrogenous bases holding the strands together, allowing for a protein to act as a prion.
D) The amino acids of the prion must have more hydrophilic sections, causing it to interact with the lipids of the plasma membrane and disrupting cell activity.

187) During the first step of gene expression, an RNA copy of a gene is made. Which of the following represents the correct sequence produced from a gene segment with the following sequence: GAACTAAGC?
A) CUUGAUUCG
B) GAACUAAGC
C) CTTGATTCG
D) GUUCTUUGC

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188) A research group is monitoring a series of reactions and have determined it is most likely a hydrolysis reaction because the number of_____.
A) water molecules decreased
B) water molecules increased
C) oxygen molecules increased
D) oxygen molecules decreased

189) Which of the following subatomic particles can be changed in number without affecting the element identity of the atom?
A) Electrons
B) Protons
C) Neutrons
D) Both "electrons" and "neutrons" are correct.

190) A polar covalent bond forms between Atom 1 and Atom 2. The Atom 1 side of the bond is slightly negative, and the Atom 2 side of the bond is slightly positive. Which atom has the higher electronegativity?
A) Atom 1
B) Atom 2
C) Atom 1 and Atom 2 have equal electronegativity.

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191) Which of the following best describes the effect that holding your breath has on blood pH?
A) Holding your breath increases blood pH by increasing the amount of carbon dioxide in the blood.
B) Holding your breath decreases blood pH by increasing the amount of carbon dioxide in the blood.
C) Holding your breath increases blood pH by decreasing the amount of carbon dioxide in the blood.
D) Holding your breath decreases blood pH by decreasing the amount of carbon dioxide in the blood.

192) If water accumulates between two sheets of glass, it is very difficult to separate them. Which of the following explanations best explains this situation?
A) The cohesive property of water holds the two sheets of glass together.
B) The adhesive property of water holds the sheets of glass together.
C) The nonpolar covalent bonds in the class are attracted to the polar covalent bonds of the water, holding the two sheets of glass together.

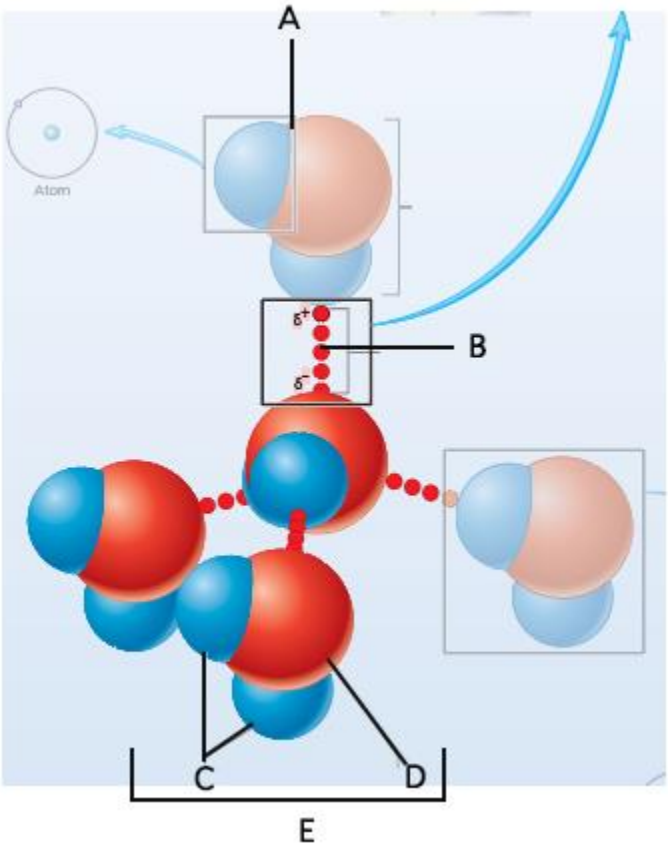
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193) If you were able to sort nucleotides into DNA nucleotides and RNA nucleotides, which component of the nucleotide would you use to do so?

A) Pentose sugar
B) Phosphate group
C) Nitrogenous bases

SECTION BREAK. Answer all the part questions.



194)

194.1) Water accounts for 50% of the weight of a young adult female and 60% of a young adult male. What kind of bond is found at "A"?

A) Hydrogen bond
B) Water molecule
C) Oxygen atom
D) Hydrogen atom
E) Polar covalent bond

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194.2) Water accounts for 50% of the weight of a young adult female and 60% of a young adult male. What kind of bond is found at "B"?

A) Hydrogen bond
B) Water molecule
C) Oxygen atom
D) Hydrogen atom
E) Polar covalent bond

194.3) Water accounts for 50% of the weight of a young adult female and 60% of a young adult male. What kind of atom is found at "C"?

A) Hydrogen bond
B) Water molecule
C) Oxygen atom
D) Hydrogen atom
E) Polar covalent bond

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194.4) Water accounts for 50% of the weight of a young adult female and 60% of a young adult male. What kind of atom is found at "D"?

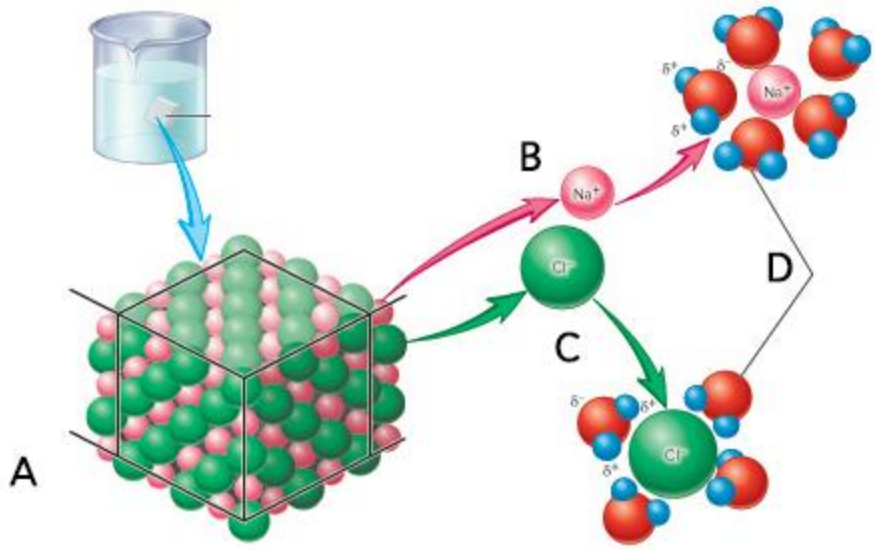
A) Hydrogen bond
B) Water molecule
C) Oxygen atom
D) Hydrogen atom
E) Polar covalent bond

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194.5) Water accounts for 50% of the weight of a young adult female and 60% of a young adult male. What kind of molecule is found at "E"?

A) Hydrogen bond
B) Water molecule
C) Oxygen atom
D) Hydrogen atom
E) Polar covalent bond

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195)

195.1) The sodium chloride molecule breaks apart in water. What does "A" represent?
- A) Chloride ion
- B) Dissociation
- C) Water molecule
- D) Sodium ion
- E) Salt crystal

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195.2) The sodium chloride molecule breaks apart in water. What does "B" represent?
- A) Chloride ion
- B) Dissociation
- C) Water molecule
- D) Sodium ion
- E) Salt crystal

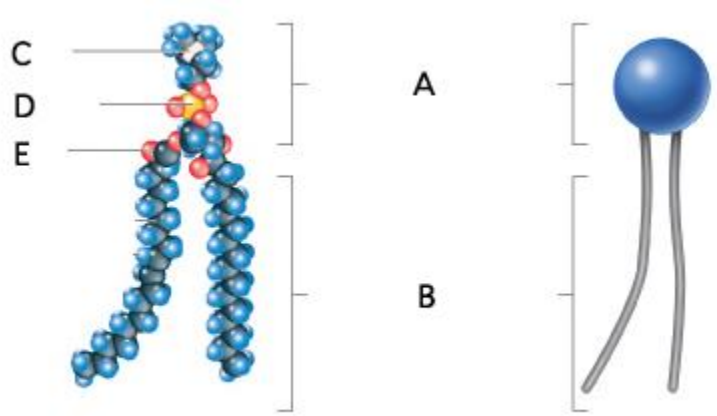
195.3) The sodium chloride molecule breaks apart in water. What does "C" represent?
- A) Chloride ion
- B) Dissociation
- C) Water molecule
- D) Sodium ion
- E) Salt crystal

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195.4) The sodium chloride molecule breaks apart in water. What does "E" represent (the process)?

A) Chloride ion
B) Dissociation
C) Water molecule
D) Sodium ion
E) Salt crystal



196)

196.1) Phospholipids are important components of the plasma membrane. What does "A" represent on the diagram?

A) Phosphorus
B) Oxygen
C) Nitrogen
D) Polar (hydrophilic) region
E) Nonpolar (hydrophobic) region

196.2) Phospholipids are important components of the plasma membrane. What does "B" represent on the diagram?

A) Phosphorus
B) Oxygen
C) Nitrogen
D) Polar (hydrophilic) region
E) Nonpolar (hydrophobic) region

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196.3) Phospholipids are important components of the plasma membrane. What does "C" represent on the diagram?

A) Phosphorus
B) Oxygen
C) Nitrogen
D) Polar (hydrophilic) region
E) Nonpolar (hydrophobic) region

196.4) Phospholipids are important components of the plasma membrane. What does "D" represent on the diagram?

A) Phosphorus
B) Oxygen
C) Nitrogen
D) Polar (hydrophilic) region
E) Nonpolar (hydrophobic) region

196.5) Phospholipids are important components of the plasma membrane. What does "E" represent on the diagram?

A) Phosphorus
B) Oxygen
C) Nitrogen
D) Polar (hydrophilic) region
E) Nonpolar (hydrophobic) region

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Answer Key

Test name: Chapter 02

1) FALSE
2) FALSE
3) TRUE
4) A
5) B
6) B
7) B
8) B
9) D
10) C
11) C
12) A
13) C
14) C
15) E
16) B
17) B
18) D
19) C
20) C
21) C
22) E
23) B
24) B
25) E
26) B
27) A
28) C
29) B
30) A
31) D
32) C
33) B
34) E
35) B
36) B
37) C

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38) D
39) B
40) D
41) A
42) C
43) A
44) C
45) B
46) D
47) C
48) C
49) C
50) B
51) B
52) D
53) A
54) C
55) C
56) E
57) B
58) B
59) B
60) A
61) E
62) C
63) D
64) B
65) C
66) E
67) E
68) A
69) D
70) C
71) A
72) A
73) C
74) A
75) E
76) C
77) D

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78) D
79) B
80) B
81) C
82) A
83) C
84) B
85) E
86) D
87) E
88) C
89) B
90) D
91) A
92) E
93) B
94) C
95) C
96) B
97) C
98) D
99) E
100) A
101) D
102) E
103) A
104) E
105) B
106) D
107) B
108) D
109) B
110) C
111) C
112) D
113) C
114) B
115) E
116) D
117) C

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118) E
119) B
120) A
121) C
122) C
123) B
124) D
125) A
126) C
127) B
128) D
129) E
130) D
131) B
132) B
133) C
134) A
135) B
136) D
137) B
138) C
139) C
140) A
141) D
142) E
143) E
144) B
145) C
146) A
147) A
148) D
149) A
150) C
151) A
152) A
153) C
154) A
155) A
156) A
157) A

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158) E
159) C
160) B
161) B
162) E
163) E
164) A
165) B
166) C
167) B
168) D
169) B
170) C
171) B
172) E
173) A
174) A
175) A
176) A
177) A
178) A
179) B
180) A
181) A
182) C
183) A
184) B
185) A
186) A
187) A
188) A
189) D
190) A
191) A
192) B
193) A

Phosphates do not differ between DNA and RNA nucleotides. Both DNA and RNA nucleotides may be adenine, guanine or cytosine. Only the presence of thymine and uracil can be used to determine if the nucleotide is DNA or RNA.

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194) Section Break
194.1) E
194.2) A
194.3) D
194.4) C
194.5) B
195) Section Break
195.1) E
195.2) D
195.3) A
195.4) B
196) Section Break
196.1) D
196.2) E
196.3) C
196.4) A
196.5) B

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