

Student name: _____

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

- 1) An element cannot be broken down by chemical means.
 true
 false

- 2) Radiation can have both positive and negative impact on humans.
 true
 false

- 3) Water makes up 60–70% of total body weight.
 true
 false

- 4) A solution with a pH of 7 has 10 times as many H^+ as a pH of 6.
 true
 false

- 5) The presence of a buffer in our blood helps maintain homeostasis.
 true
 false

- 6) In biology, calling something organic means that it was grown without the use of any type of herbicide.
 true
 false

- 7) NaCl is not an organic molecule.

- true
- false

8) After lunch, our digestive system will use the process of hydrolysis to break the food down into smaller subunits.

- true
- false

9) A hydrolysis reaction involves the loss of water.

- true
- false

10) The main function of carbohydrates is for long-term energy storage.

- true
- false

11) Our body is capable of converting starch into glycogen.

- true
- false

12) Fats are usually of animal origin, while oils are usually of plant origin.

- true
- false

13) Fats and oils function better than other biological molecules as energy-storage molecules because of the carbon they contain.

- true
- false

14) The primary level of protein structure is composed of amino acids in a linear sequence joined by peptide bonds.

- true
- false

15) All amino acids are alike in that their R groups are polar.

- true
- false

16) The function of RNA in the body is to store the genetic information in the nucleus.

- true
- false

17) ATP is called the energy currency of the body because it is a type of electricity.

- true
- false

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

18) The smallest unit of an element that still retains the chemical and physical properties of that element is called a(n)

- A) isotope.
- B) nucleus.
- C) atom.
- D) molecular bond.
- E) neutrino.

19) In an electrically neutral atom, the number of protons always equals the number of

- A) electrons.
- B) neutrons.
- C) neutrons and protons.
- D) quarks.
- E) neutrinos.

20) How many elements occur naturally?

- A) 112
- B) 92
- C) 64
- D) 32
- E) 6

21) The atomic number of an atom is determined by the number of

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

22) Why is He positioned above Ne in the periodic table?

- A) They both have the same atomic mass.
- B) They both have the same number of electrons in their outermost orbital.
- C) They both have a full outermost orbital.
- D) They both have the same atomic number.
- E) They both have the same number of protons in their nuclei.

23) Be has an atomic number of 4 and an atomic mass of 9. How many protons does it have?

- A) 4
- B) 5
- C) 9
- D) 13
- E) 7

24) What is the symbol for sodium?

- A) Na
- B) S
- C) So
- D) N
- E) Dm

25) Which of the following elements will have more than two electrons and have a full outer orbital?

- A) He
- B) Ne
- C) C
- D) N
- E) O

26) Isotopes of an element differ due to the number of

- A) protons.
- B) neutrons.
- C) electrons.
- D) both protons and electrons.
- E) neutrinos.

27) Carbon dating is a common method employed in dating certain kinds of fossils. It is based on the radioactive decay of an isotope of carbon (C^{14}). Referring to the atomic number of carbon attained from the periodic table, how many neutrons does C^{14} have?

- A) 2
- B) 4
- C) 8
- D) 12
- E) 14

28) What substance is used in medicine to produce various images of organs and tissues?

- A) a mixture
- B) a tracer
- C) an emulsion
- D) a colloid
- E) a sensor

29) Two or more atoms joined together through the sharing of electrons are called a(n)

- A) atomic unit.
- B) molecule.
- C) compound.
- D) isotope.
- E) ion.

30) $Ca_3(PO_4)_2$ represents a(n)

- A) element.
- B) mixture.
- C) compound.
- D) isotope.
- E) atom.

31) Atoms that share electrons have what type of bonds?

- A) covalent
- B) neutral
- C) hydrogen
- D) colloidal
- E) ionic

32) CaCl_2 is a salt that forms as the result of what type of bond?

- A) covalent
- B) hydrogen
- C) polar
- D) nonpolar
- E) ionic

33) Which type of bond is responsible for holding two water molecules together, creating the properties of water?

- A) hydrogen
- B) covalent
- C) ionic
- D) polar
- E) double covalent

34) Hydrogen bonds

- A) result from the loss of neutrons by an atom.
- B) result in the formation of salts.
- C) involve the loss and gain of electrons.
- D) involve the sharing of electrons.
- E) are relatively weak and can be broken rather easily.

35) The reason water is polar is because

- A) in polar molecules atoms share electrons evenly.
- B) the electrons spend more time circling the oxygen atom than the hydrogens.
- C) hydrophilic molecules interact with water.
- D) hydrophobic molecules do not interact with water.
- E) there is a transfer of electrons from the hydrogen to the oxygen.

36) Which of the following characteristics of water is most responsible for the sinking of the Titanic?

- A) Water is liquid at room temperature.
- B) Water has a high heat of vaporization.
- C) The temperature of liquid water rises and falls slowly.
- D) Frozen water is less dense than liquid water.
- E) Water molecules are cohesive.

37) On a warm day in April, Tina jumped into the swimming pool. To her surprise, the water was really cold. Which property of water did she discover?

- A) Water molecules are cohesive.
- B) The temperature of liquid water rises and falls slowly.
- C) Water possesses hydrogen bonds.
- D) Water is a polar molecule.
- E) Frozen water is less dense than liquid water.

38) William noticed water mysteriously climbing up a capillary tube. This is an example of which property of water?

- A) Frozen water is less dense than liquid water.
- B) The temperature of liquid water rises and falls slowly.
- C) Water molecules are cohesive.
- D) Water has a high heat of vaporization.
- E) Water is a solvent.

39) In an acidic solution, the number of H^+ is

- A) less than the number of OH^- .
- B) greater than the number of OH^- .
- C) equal to the number of OH^- .
- D) 3 times less than the number of OH^- .
- E) 10 times less than the number of OH^- .

40) A solution containing 0.00001 moles of H^+ has a pH of

- A) 3.
- B) 5.
- C) 7.
- D) 9.
- E) 11.

41) Joining small molecules (monomers) together to form longer chains (polymers) requires a process called

- A) a hydrolysis reaction.
- B) a dehydration reaction.
- C) monomerization.
- D) emulsification.
- E) disassembly.

42) Which of the following is one of the four classes of organic molecules found in cells?

- A) vitamins
- B) lipids
- C) nutrients
- D) minerals
- E) nuclei

43) Which grouping of elements is found in carbohydrates?

- A) C - H - O
- B) C - H - P
- C) H - O - Cl
- D) N - S - O
- E) Ca - H - O

44) Sugars with three to seven carbon atoms are called

- A) monosaccharides.
- B) disaccharides.
- C) trisaccharides.
- D) polysaccharides.
- E) steroids.

- 45) A potato stores a reserve of energy in its underground tuber in the form of
- A) glycogen.
 - B) fat.
 - C) protein.
 - D) vitamins.
 - E) starch.
- 46) Which of the following is a monosaccharide?
- A) glucose
 - B) sucrose
 - C) lactose
 - D) maltose
 - E) None of these is a monosaccharide.
- 47) Which polysaccharide is stored as an energy source in the body of animals?
- A) glycogen
 - B) glucose
 - C) cellulose
 - D) starch
 - E) chitin
- 48) What passes through the digestive tract as fiber or roughage?
- A) maltose
 - B) glucose
 - C) glycogen
 - D) starch
 - E) cellulose

49) Which of the following foods would be a good source of fiber?

- A) peaches
- B) whole-wheat bread
- C) peanuts
- D) bran cereal
- E) All of the answer choices are good sources of fiber.

50) Which polysaccharide is branched the most?

- A) cellulose
- B) starch
- C) glycogen
- D) glucose
- E) fructose

51) Which polysaccharide is consumed as a source of fiber?

- A) cellulose
- B) glycogen
- C) glucose
- D) chitin
- E) starch

52) Starch, cellulose, and glycogen are alike in that they

- A) are all made of glucose.
- B) contain the same number of side chains.
- C) have the same types of bonds between the monomer units.
- D) are all found in animals.
- E) can all be digested by our bodies.

- 53) A fat contains how many fatty acids?
- A) 1
 - B) 2
 - C) 3
 - D) 4
 - E) 5
- 54) How are fats, phospholipids, and steroids alike?
- A) They are all solid at room temperature.
 - B) They each contain a polar phosphate group.
 - C) They each contain only one fatty acid.
 - D) They do not dissolve in water.
 - E) They all contain at least one carbon ring.
- 55) A fatty acid that contains only single bonds between the carbon atoms is considered
- A) saturated.
 - B) unsaturated.
 - C) trans unsaturated.
 - D) a cholesterol.
 - E) a steroid.
- 56) The sex hormones belong to which category of lipids?
- A) steroids
 - B) fats
 - C) oils
 - D) triglycerides
 - E) phospholipids

57) The membranes of cells are composed primarily of

- A) phospholipids.
- B) fats.
- C) oils.
- D) steroids.
- E) triglycerides.

58) The monomer unit of a protein is

- A) fatty acids.
- B) amino acids.
- C) monosaccharides.
- D) polysaccharides.
- E) nucleic acids.

59) What makes each amino acid unique?

- A) the central carbon
- B) the *R* group
- C) the amino group
- D) the carboxyl group
- E) the carbon ring

60) Which of the following is a function of proteins?

- A) quick energy
- B) genetic material
- C) main component of the cell membrane
- D) enzymes
- E) digest cell waste

61) Why does a protein not function after it has been denatured?

A) The normal bonding between the *R* groups has been disturbed and the protein loses its normal shape.

B) The normal bonding between the beta sheets has been disturbed and the protein loses its normal shape.

C) The normal bonding between the hydrogens in the alpha helix has been disturbed and the protein loses its normal shape.

D) The *R* groups form additional bonds, causing the structure to become more compact.

E) The normal peptide bonds are ruptured and the individual amino acids are not held together anymore.

62) An alpha helix or a beta sheet are examples of what level of protein structure?

A) secondary

B) primary

C) tertiary

D) quaternary

E) octagon

63) Which level of protein structure is characterized by alpha helices and beta pleated sheets in which hydrogen bonding holds the shape in place?

A) primary structure

B) secondary structure

C) tertiary structure

D) quaternary structure

E) pentagonal structure

64) When two amino acids combine via a dehydration reaction

- A) a peptide bond is formed.
- B) the *R* groups are lost.
- C) water is added to begin the reaction.
- D) the carboxyl group of each join together.
- E) the amino group of each join together.

65) The sides of the DNA ladder (backbone) are

- A) alternating carbons and nitrogens.
- B) the *R* groups.
- C) the nitrogenous bases.
- D) alternating nitrogens and phosphates.
- E) sugars and phosphates.

66) When an ATP molecule is used to supply energy, which of the following occurs?

- A) A phosphate bond is added.
- B) A phosphate bond is broken.
- C) Oxygen is removed.
- D) Oxygen is added.
- E) An adenine is added.

67) Which of the following nitrogenous bases is found in DNA?

- A) cytosine
- B) phosphorous
- C) uracil
- D) guanine
- E) ribonucleic acid

68) Which of the following is a feature of a nucleotide?

- A) potassium
- B) nitrogenous base
- C) six-ring sugar
- D) an *R* group
- E) a fatty acid

69) A species has 29% of its DNA composed of the nucleotide containing guanine (G). What percent does the nitrogen base thymine (T) equal?

- A) 58%
- B) 42%
- C) 21%
- D) 67%
- E) 29%

70) ATP carries energy in the form of high-energy

- A) carbohydrate bonds.
- B) peptide bonds.
- C) lipid bonds.
- D) phosphate bonds.
- E) hydrogen bonds.

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

71) List the functions of proteins.

72) List the properties of water.

73) Describe the structure and function of the DNA molecule.

Answer Key

Test name: chapter 2

- 1) TRUE
- 2) TRUE
- 3) TRUE
- 4) FALSE
- 5) TRUE
- 6) FALSE
- 7) TRUE
- 8) TRUE
- 9) FALSE
- 10) FALSE
- 11) TRUE
- 12) TRUE
- 13) FALSE
- 14) TRUE
- 15) FALSE
- 16) FALSE
- 17) FALSE
- 18) C
- 19) A
- 20) B
- 21) A
- 22) C
- 23) A
- 24) A
- 25) B
- 26) B

- 27) C
- 28) B
- 29) B
- 30) C
- 31) A
- 32) E
- 33) A
- 34) E
- 35) B
- 36) D
- 37) B
- 38) C
- 39) B
- 40) B
- 41) B
- 42) B
- 43) A
- 44) A
- 45) E
- 46) A
- 47) A
- 48) E
- 49) E
- 50) C
- 51) A
- 52) A
- 53) C
- 54) D
- 55) A
- 56) A

57) A

58) B

59) B

60) D

61) A

62) A

63) B

64) A

65) E

66) B

67) A

68) B

69) C

70) D

71) Functions of proteins include:
1. support
2. enzymes that bring reactants together in chemical reactions
3. transport of substance through the cell membrane and within the cell
4. defense of the body from foreign substances
5. hormones that serve as intercellular messengers
6. motion of the body

72) 1. Water has a high heat capacity.
2. Water has a high heat of evaporation.
3. Water is a solvent.
4. Water molecules are cohesive and adhesive.
5. Frozen water is less dense than liquid water.

73) DNA is composed of a phosphate group, nitrogen-containing base, and a five-carbon (pentose) sugar. The nitrogen-containing base can have one of four bases associated with it (adenine, thymine, cytosine, and guanine). Functions of DNA include: stores information about how to copy or replicate itself and specifies the order in which amino acids are joined to make a protein.