MULTIPLE CHOICE

1. Which subatomic particle has a positive charge?
   A. proton
   B. neutron
   C. electron
   D. nucleus

   ANS: A PTS: 1 DIF: Memorization
   REF: Page 27 TOP: Atoms

2. Which subatomic particle has no charge?
   A. proton
   B. neutron
   C. electron
   D. nucleus

   ANS: B PTS: 1 DIF: Memorization
   REF: Page 27 TOP: Atoms

3. Which subatomic particle has a negative charge?
   A. proton
   B. neutron
   C. electron
   D. nucleus

   ANS: C PTS: 1 DIF: Memorization
   REF: Page 27 TOP: Atoms

4. Which subatomic particle is found in the nucleus?
   A. proton
   B. neutron
   C. electron
   D. both A and B

   ANS: D PTS: 1 DIF: Memorization
   REF: Page 27 TOP: Atoms

5. Electrons are found
   A. in the nucleus
   B. in orbitals
   C. at various distances from the nucleus called energy levels
   D. both B and C

   ANS: D PTS: 1 DIF: Application REF: Pages 27-28
   TOP: Atoms

6. The atomic number of an atom is the number of
   A. protons
   B. neutrons
   C. electrons
   D. both A and B

   ANS: A PTS: 1 DIF: Memorization
   REF: Page 27 TOP: Atoms

7. The atomic mass of an atom is the number of

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

ANS: D PTS: 1 DIF: Memorization
REF: Page 27 TOP: Atoms

8. The subatomic particle that determines how an atom unites with other atoms is the
A. proton
B. neutron
C. electron
D. both A and B

ANS: C PTS: 1 DIF: Memorization
REF: Page 27 TOP: Atoms

9. An atom that contains 20 protons, 21 neutrons, and 20 electrons has an atomic number of
A. 20
B. 41
C. 40
D. 61

ANS: A PTS: 1 DIF: Application REF: Page 27
TOP: Atoms

10. An atom that contains 20 protons, 21 neutrons, and 20 electrons has an atomic mass of
A. 20
B. 41
C. 40
D. 61

ANS: B PTS: 1 DIF: Application REF: Page 27
TOP: Atoms

11. An atom that contains 20 protons, 21 neutrons, and 20 electrons has
A. a positive charge
B. a negative charge
C. no charge (electrically neutral)
D. not enough information is given to determine its charge

ANS: C PTS: 1 DIF: Application REF: Page 27
TOP: Atoms

12. Which of these elements is not one of the four elements that make up most of the human body?
A. carbon
B. nitrogen
C. oxygen
D. calcium

ANS: D PTS: 1 DIF: Memorization
REF: Page 28 TOP: Elements, molecules, and compounds

13. Bonds that usually dissociate in water to form electrolytes are _____ bonds.
A. ionic
B. covalent
C. organic
D. both B and C

ANS: A PTS: 1 DIF: Memorization
REF: Page 29 TOP: Ionic bonds

14. The bonds formed when electrons are shared are called

A. electrolytes
B. ionic bonds
C. covalent bonds
D. inorganic bonds

ANS: C PTS: 1 DIF: Memorization
REF: Page 30 TOP: Covalent bonds

15. The process of dehydration synthesis
A. uses water to turn large molecules into smaller ones
B. adds a molecule of water to the reactants
C. converts smaller molecules into larger ones by removing water
D. both A and B

ANS: C PTS: 1 DIF: Memorization
REF: Page 31 TOP: Water

16. The process of hydrolysis
A. uses water to turn large molecules into smaller ones
B. removes a molecule of water from the reactants
C. converts smaller molecules into larger molecules by removing water
D. both B and C

ANS: A PTS: 1 DIF: Memorization
REF: Page 31 TOP: Water

17. Acids have
A. a pH less than 7
B. more H^+ ions than OH^- ions
C. more OH^- than H^+ ions
D. both A and B

ANS: D PTS: 1 DIF: Memorization
REF: Page 32 TOP: Acids, bases, and salts

18. Bases have
A. a pH less than 7
B. more H^+ ions than OH^- ions
C. a pH greater than 7
D. both A and B

ANS: C PTS: 1 DIF: Memorization
REF: Page 32 TOP: Acids, bases, and salts

19. A solution with a pH of 4
A. has 100 times more H^+ ions than a solution with a pH of 2
B. has 100 times fewer H^+ ions than a solution with a pH of 2
C. has 100 times fewer H^+ ions than a solution with a pH of 6
D. is basic

ANS: B PTS: 1 DIF: Synthesis REF: Page 32
TOP: Acids, bases, and salts

20. The end product of a reaction between a strong acid and a strong base is
A. water
B. a salt
C. a weak acid and a weak base
D. both A and B

ANS: D PTS: 1 DIF: Memorization

REF: Page 32 TOP: Acids, bases, and salts

21. Which of the following is an example of a monosaccharide?
A. sucrose
B. glucose
C. lactose
D. glycogen

ANS: B PTS: 1 DIF: Memorization
REF: Page 33 TOP: Carbohydrates

22. Which of the following is an example of a polysaccharide?
A. sucrose
B. glucose
C. lactose
D. glycogen

ANS: D PTS: 1 DIF: Memorization
REF: Page 33 TOP: Carbohydrates

23. Triglycerides
A. are steroid lipids
B. have a phosphorus-containing unit on one end
C. have two fatty acids
D. have three fatty acids

ANS: D PTS: 1 DIF: Memorization
REF: Page 34 TOP: Lipids

24. Phospholipids
A. contain glycerol
B. contain two fatty acids
C. contain three fatty acids
D. are steroid lipids

ANS: B PTS: 1 DIF: Memorization
REF: Page 34 TOP: Lipids

25. Cholesterol
A. contains three fatty acids
B. contains two fatty acids
C. is a steroid lipid
D. contains glycerol

ANS: C PTS: 1 DIF: Memorization
REF: Pages 34-35 TOP: Lipids

26. Which of the following is not true of proteins?
A. They have water-repelling tails.
B. They are made up of amino acids.
C. They contain nitrogen.
D. They contain peptide bonds.

ANS: A PTS: 1 DIF: Memorization
REF: Page 34 TOP: Proteins

27. Which of the following is a structural protein?
A. collagen
B. keratin
C. enzymes
D. both A and B

ANS: D PTS: 1 DIF: Memorization
REF: Page 35 TOP: Proteins

28. Which of the following is a functional protein?
    A. collagen
    B. keratin
    C. enzymes
    D. both A and B

    ANS: C PTS: 1 DIF: Memorization
    REF: Page 36 TOP: Proteins

29. Which of the following substances is not found in a DNA nucleotide?
    A. phosphate unit
    B. glycerol molecule
    C. nitrogen base
    D. a sugar

    ANS: B PTS: 1 DIF: Memorization
    REF: Page 34 TOP: Nucleic acids

30. Which substance is found only in DNA?
    A. adenine
    B. guanine
    C. thymine
    D. cytosine

    ANS: C PTS: 1 DIF: Memorization
    REF: Page 36 TOP: Nucleic acids

31. The nitrogen atom has a total of seven electrons. To have a full outer energy level, it would have to
    A. add one electron
    B. lose one electron
    C. add three electrons
    D. lose two electrons

    ANS: C PTS: 1 DIF: Synthesis REF: Page 27
    TOP: Atoms

32. Which type of chemical bond does not result in the formation of a new molecule?
    A. hydrogen bond
    B. ionic bond
    C. covalent bond
    D. None of the above; all chemical bonds result in the formation of a new molecule.

    ANS: A PTS: 1 DIF: Memorization
    REF: Page 30 TOP: Hydrogen bonds

TRUE/FALSE

1. Matter is anything that occupies space and has mass.

    ANS: T PTS: 1 DIF: Memorization
    REF: Page 27 TOP: Levels of chemical organization

2. The mass of an atom is determined by the total number of protons and electrons.

    ANS: F PTS: 1 DIF: Memorization
    REF: Page 27 TOP: Atoms

3. The two subatomic particles found in the nucleus of the atom are protons and neutrons.

   ANS: T PTS: 1 DIF: Memorization
   REF: Page 27 TOP: Atoms

4. A full atomic orbital always contains eight electrons.

   ANS: F PTS: 1 DIF: Memorization
   REF: Page 28 TOP: Atoms

5. The atomic number of an atom is the number of protons plus the number of electrons.

   ANS: F PTS: 1 DIF: Memorization
   REF: Page 27 TOP: Atoms

6. The closer an orbital is to the nucleus of an atom, the higher its energy level.

   ANS: F PTS: 1 DIF: Memorization
   REF: Page 28 TOP: Atoms

7. An atom with 11 protons, 12 neutrons, and 10 electrons has an atomic number of 11.

   ANS: T PTS: 1 DIF: Application REF: Page 27
   TOP: Atoms

8. An atom with 11 protons, 12 neutrons, and 10 electrons has an atomic mass of 21.

   ANS: F PTS: 1 DIF: Application REF: Page 27
   TOP: Atoms

9. An atom with 11 protons, 12 neutrons, and 10 electrons has a +1 charge.

   ANS: T PTS: 1 DIF: Application REF: Page 27
   TOP: Atoms

10. An element is a substance composed of only one type of atom.

    ANS: T PTS: 1 DIF: Memorization
    REF: Page 28 TOP: Elements, molecules, and compounds

11. All molecules are not necessarily compounds.

    ANS: T PTS: 1 DIF: Application REF: Page 28
    TOP: Elements, molecules, and compounds

12. Chemical bonds form when atoms share, donate, or borrow electrons.

    ANS: T PTS: 1 DIF: Memorization
    REF: Page 29 TOP: Chemical bonding

13. Ionic bonds result from atoms sharing electrons.

ANS: F PTS: 1 DIF: Memorization
REF: Page 29 TOP: Ionic bonds

14. When an ionic compound is put into water, it dissociates into ions.

ANS: T PTS: 1 DIF: Memorization
REF: Page 29 TOP: Ionic bonds

15. Covalent bonds are formed when atoms share electrons.

ANS: T PTS: 1 DIF: Memorization
REF: Page 30 TOP: Covalent bonds

16. When a covalent compound is put into water, it dissociates into ions.

ANS: F PTS: 1 DIF: Memorization
REF: Page 30 TOP: Covalent bonds

17. For a compound to be considered an organic compound it must have a C-O or an H-O bond.

ANS: F PTS: 1 DIF: Memorization
REF: Page 31 TOP: Inorganic chemistry

18. Water is the most abundant organic compound in the body.

ANS: F PTS: 1 DIF: Memorization
REF: Page 31 TOP: Water

19. The process of dehydration synthesis makes bigger molecules from smaller molecules.

ANS: T PTS: 1 DIF: Memorization
REF: Page 31 TOP: Water

20. The process of dehydration synthesis has water as one of its end products.

ANS: T PTS: 1 DIF: Memorization
REF: Page 31 TOP: Water

21. The process of hydrolysis has water as one of its end products.

ANS: F PTS: 1 DIF: Memorization
REF: Page 31 TOP: Water

22. One of the end products of hydrolysis would have one more hydrogen atom than it did at the beginning of the reaction.

ANS: T PTS: 1 DIF: Synthesis REF: Page 31
TOP: Water

23. Acids have a higher concentration of H^+ ions than OH^- ions.

ANS: T PTS: 1 DIF: Memorization
REF: Page 32 TOP: Acids, bases, and salts

24. Bases have a higher concentration of OH^- ions than H^+ ions.

ANS: T PTS: 1 DIF: Memorization
REF: Page 32 TOP: Acids, bases, and salts

25. A solution with a pH of 8 has more H^+ ions than a solution with a pH of 4.

ANS: F PTS: 1 DIF: Application REF: Page 32
TOP: Acids, bases, and salts

26. A solution with a pH of 5 has more H^+ ions than a solution with a pH of 7.

ANS: T PTS: 1 DIF: Application REF: Page 32
TOP: Acids, bases, and salts

27. A solution with a pH of 2 has 10 times the number of H^+ ions than a solution with a pH of 3.

ANS: T PTS: 1 DIF: Application REF: Page 32
TOP: Acids, bases, and salts

28. When a strong acid and a strong base react, one of the end products is water.

ANS: T PTS: 1 DIF: Memorization
REF: Page 32 TOP: Acids, bases, and salts

29. A weak acid almost completely dissociates in water.

ANS: F PTS: 1 DIF: Memorization
REF: Page 32 TOP: Acids, bases, and salts

30. When a strong acid and a strong base react, one of the end products is a salt.

ANS: T PTS: 1 DIF: Memorization
REF: Page 32 TOP: Acids, bases, and salts

31. A buffer is a substance that resists a sudden change in pH.

ANS: T PTS: 1 DIF: Memorization
REF: Page 33 TOP: Acids, bases, and salts

32. The basic unit of a carbohydrate is a monosaccharide.

ANS: T PTS: 1 DIF: Memorization
REF: Page 33 TOP: Carbohydrates

33. A molecule of glucose is larger than a molecule of sucrose.

ANS: F PTS: 1 DIF: Application REF: Page 33
TOP: Carbohydrates

34. Sucrose is an example of a disaccharide.

ANS: T PTS: 1 DIF: Memorization
REF: Page 33 TOP: Carbohydrates

35. Glycogen and starch are both examples of polysaccharides.

ANS: T PTS: 1 DIF: Memorization
REF: Page 33 TOP: Carbohydrates

36. The process of dehydration synthesis could be used to convert a monosaccharide into a disaccharide.

ANS: T PTS: 1 DIF: Synthesis REF: Page 31 | Page 33
TOP: Water and carbohydrates

37. Both fats and oils are lipids.

ANS: T PTS: 1 DIF: Memorization
REF: Page 34 TOP: Lipids

38. A triglyceride contains two fatty acid molecules.

ANS: F PTS: 1 DIF: Memorization
REF: Page 34 TOP: Lipids

39. A triglyceride contains a molecule of glycerol.

ANS: T PTS: 1 DIF: Memorization
REF: Page 34 TOP: Lipids

40. Phospholipids contain three fatty acids.

ANS: F PTS: 1 DIF: Memorization
REF: Page 34 TOP: Lipids

41. Phospholipids are important molecules in the cell membrane.

ANS: T PTS: 1 DIF: Memorization
REF: Pages 34-35 TOP: Lipids

42. Cholesterol is a steroid lipid.

ANS: T PTS: 1 DIF: Memorization
REF: Page 35 TOP: Lipids

43. Cholesterol contains two fatty acid molecules.

ANS: F PTS: 1 DIF: Memorization
REF: Page 34 TOP: Lipids

44. Cholesterol is needed for the formation of several hormones in the body.

ANS: T PTS: 1 DIF: Memorization
REF: Page 34 TOP: Lipids

45. The basic building block of proteins is nucleotides.

ANS: F PTS: 1 DIF: Memorization
REF: Page 35 TOP: Proteins

46. The basic building blocks of protein are held together by peptide bonds.

ANS: T PTS: 1 DIF: Memorization
REF: Page 35 TOP: Proteins

47. Structural proteins include collagen, keratin, and enzymes.

ANS: F PTS: 1 DIF: Memorization
REF: Pages 35-36 TOP: Proteins

48. Enzymes are functional proteins that act as chemical catalysts.

ANS: T PTS: 1 DIF: Memorization
REF: Page 36 TOP: Proteins

49. The basic building blocks of nucleic acids are nucleotides.

ANS: T PTS: 1 DIF: Memorization
REF: Page 36 TOP: Nucleic acids

50. The DNA and RNA molecules are the same except the DNA has thymine and the RNA molecule has uracil.

ANS: F PTS: 1 DIF: Application REF: Page 36
TOP: Nucleic acids

51. The nitrogen bases adenine, guanine, and cytosine can be found in both RNA and DNA.

ANS: T PTS: 1 DIF: Memorization
REF: Page 36 TOP: Nucleic acids

52. One difference between DNA and RNA is the type of sugar found in the nucleotides.

ANS: T PTS: 1 DIF: Memorization
REF: Page 36 TOP: Nucleic acids

53. The smallest unit of matter is the electron.

ANS: F PTS: 1 DIF: Memorization
REF: Page 27 TOP: Levels of chemical organization

54. The oxygen atom has a total of eight electrons. That means it has six electrons in its outer energy level.

ANS: T PTS: 1 DIF: Analysis REF: Page 27
TOP: Atoms

55. The number of electrons in the outer energy level of an atom determines how it behaves chemically.

ANS: T PTS: 1 DIF: Memorization
REF: Page 27 TOP: Atoms

56. The formula for glucose is $C_6H_{12}O_6$. This indicates that there are 24 atoms in a molecule of glucose.

ANS: T PTS: 1 DIF: Application REF: Page 28
TOP: Elements, molecules, and compounds

57. The electrolyte most often formed by magnesium (Mg) is Mg^{++}. This shows that the ion has two more electrons than protons.

ANS: F PTS: 1 DIF: Application REF: Page 30
TOP: Ionic bonds

58. Water is the most common solute in the human body.

ANS: F PTS: 1 DIF: Memorization
REF: Page 31 TOP: Water

59. Both sucrose and lactose are examples of disaccharides.

ANS: T PTS: 1 DIF: Memorization
REF: Page 33 TOP: Carbohydrates

60. Fats tend to be solids at room temperature.

ANS: T PTS: 1 DIF: Memorization
REF: Page 34 TOP: Lipids

61. Both cholesterol and phospholipids are involved in the structure of the cell membrane.

ANS: T PTS: 1 DIF: Memorization
REF: Page 34 TOP: Lipids

62. The lock-and-key model describes how two strands of DNA are able to join so precisely to form a double helix.

ANS: F PTS: 1 DIF: Memorization
REF: Page 36 TOP: Proteins

MATCHING

Match each part of the atom with its corresponding description.

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

1. part of the atom that is found in the nucleus
2. part of the atom that is found in orbitals around the nucleus
3. part of the atom that gives an atom its atomic number
4. part of the atom that when combined with the proton gives the atom its atomic mass

1. ANS: D PTS: 1 DIF: Memorization
   REF: Page 27 TOP: Atoms
2. ANS: C PTS: 1 DIF: Memorization
   REF: Page 27 TOP: Atoms
3. ANS: A PTS: 1 DIF: Memorization
   REF: Page 27 TOP: Atoms
4. ANS: B PTS: 1 DIF: Memorization
   REF: Page 27 TOP: Atoms

Match each organic compound with its corresponding description.

A. carbohydrates
B. triglycerides
C. phospholipids
D. cholesterol
E. proteins
F. RNA
G. DNA

5. compound whose basic unit is a monosaccharide
6. nucleic acid that contains the nitrogen base uracil
7. lipid that is used to make hormones such as estrogen and testosterone
8. nucleic acid that contains the nitrogen base thymine
9. lipid that is composed of a molecule of glycerol and three fatty acids
10. lipid that has two fatty acids and is important in the cell membrane
11. an enzyme

5. ANS: A PTS: 1 DIF: Memorization
   REF: Page 33 TOP: Carbohydrates
6. ANS: F PTS: 1 DIF: Memorization
   REF: Page 36 TOP: Nucleic acids
7. ANS: D PTS: 1 DIF: Memorization
   REF: Page 34 TOP: Lipids
8. ANS: G PTS: 1 DIF: Memorization
   REF: Page 36 TOP: Nucleic acids
9. ANS: B PTS: 1 DIF: Memorization
   REF: Page 34 TOP: Lipids
10. ANS: C PTS: 1 DIF: Memorization
    REF: Page 34 TOP: Lipids
11. ANS: E PTS: 1 DIF: Memorization
    REF: Page 35 TOP: Proteins

Match each term with its corresponding description or definition.

A. nucleus
B. ionic bond
C. atomic mass
D. compound
E. electrolyte
F. atomic number
G. covalent bonds
H. orbitals
I. hydrolysis
J. dehydration synthesis
K. acid
L. base

12. part of the atom in which electrons are found
13. equal to the number of protons an atom has
14. molecules that form ions when dissolved in water
15. process by which reactants combine only after hydrogen and oxygen atoms have been removed
16. compound that produces H^+ ions
17. part of the atom in which protons are found
18. bond formed by the attraction of atoms or molecules that have opposite charges
19. compound that produces OH^- ions
20. equal to the number of protons and neutrons in an atom
21. process by which water is used to make smaller molecules form larger molecules
22. bond that is formed when electrons are shared
23. a molecule that contains more than one type of atom

12. ANS: H PTS: 1 DIF: Memorization
    REF: Page 27 TOP: Atoms
13. ANS: F PTS: 1 DIF: Memorization
    REF: Page 27 TOP: Atoms
14. ANS: E PTS: 1 DIF: Memorization
    REF: Page 30 TOP: Ionic bonds
15. ANS: J PTS: 1 DIF: Memorization
    REF: Page 31 TOP: Water
16. ANS: K PTS: 1 DIF: Memorization
    REF: Page 32 TOP: Acids, bases, and salts
17. ANS: A PTS: 1 DIF: Memorization

REF: Page 27 TOP: Atoms

18. ANS: B PTS: 1 DIF: Memorization
REF: Page 30 TOP: Ionic bonds
19. ANS: L PTS: 1 DIF: Memorization
REF: Page 32 TOP: Acids, bases, and salts
20. ANS: C PTS: 0 DIF: Memorization
REF: Page 27 TOP: Atoms
21. ANS: I PTS: 0 DIF: Memorization
REF: Page 31 TOP: Water
22. ANS: G PTS: 0 DIF: Memorization
REF: Page 30 TOP: Covalent bonds
23. ANS: D PTS: 0 DIF: Memorization
REF: Page 28 TOP: Elements, molecules, and compounds

SHORT ANSWER

1. Name the three parts of the atom and give a description of each.

   ANS:
   Answers will vary.

   PTS: 1 DIF: Memorization REF: Page 27
   TOP: Atoms

2. Explain how an ionic bond forms.

   ANS:
   Answers will vary.

   PTS: 1 DIF: Memorization REF: Page 30
   TOP: Ionic bonds

3. Explain how a covalent bond forms.

   ANS:
   Answers will vary.

   PTS: 1 DIF: Memorization REF: Page 30
   TOP: Covalent bonds

4. Explain the processes of dehydration synthesis and hydrolysis.

   ANS:
   Answers will vary.

   PTS: 1 DIF: Memorization REF: Page 31
   TOP: Water

5. Describe the difference between an acid solution and a base solution in terms of the amount and types of ions in each.

   ANS:
   Answers will vary.

   PTS: 1 DIF: Memorization REF: Page 32
   TOP: Acids, bases, and salts

6. Explain the relationship among H^+ ion concentration, OH^- ion concentration, and pH.

   ANS:
   Answers will vary.

   PTS: 1 DIF: Memorization REF: Page 32
   TOP: Acids, bases, and salts

7. Describe the structure of carbohydrates and explain their use in the body.

   ANS:
   Answers will vary.

   PTS: 1 DIF: Memorization REF: Page 33
   TOP: Carbohydrates

8. Describe the three types of lipids and give the function of each.

   ANS:
   Answers will vary.

   PTS: 1 DIF: Memorization REF: Page 34
   TOP: Lipids

9. Describe the structure of a protein and give examples of a structural protein and a functional protein.

   ANS:
   Answers will vary.

   PTS: 1 DIF: Memorization REF: Page 35
   TOP: Proteins

10. Explain the structure of a nucleic acid and list the differences between RNA and DNA.

    ANS:
    Answers will vary.

    PTS: 1 DIF: Memorization REF: Page 36
    TOP: Nucleic acids