Student name:_____

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

1) Minerals are organic elements extracted from the soil by plants.

◎ true
◎ false

2) Molecules composed of two or more atoms are called compounds.

◎ true
◎ false

3) Hydrogen, deuterium, and tritium are three isotopes of hydrogen.

◎ true
◎ false

4) Potassium, sodium, and chlorine are trace elements.

◎ true
◎ false

5) Ionic bonds break apart in water more easily than covalent bonds do.

◎ true
◎ false

6) A solution is a mixture of two or more substances that are physically blended but*not* chemically combined.

◎ true
◎ false

7) The pH of blood plasma is approximately 7.4, which is slightly acidic.

◎ true
◎ false

8) The high heat capacity of water makes it a very ineffective coolant.

◎ true
◎ false

9) In an exchange reaction, covalent bonds are broken and new covalent bonds are formed.

◎ true
◎ false

10) Chemical reactions in which larger molecules are broken down into smaller ones are called catabolic reactions.

◎ true
◎ false

11) The opposite of a dehydration synthesis reaction is a hydrolysis reaction.

◎ true
◎ false

12) Unsaturated fatty acids have as much hydrogen as they can carry.

◎ true
◎ false

13) A dipeptide is a molecule with two peptide bonds.

◎ true
◎ false

14) All amino acids have both a carboxyl group and an amino group attached to a central carbon.

◎ true
◎ false

15) ATP is the body's most important form of long-term energy storage.

◎ true
◎ false

16) A molecule that is oxidized gains electrons and energy.

◎ true
◎ false

17) Minerals are organic molecules that must be obtained through food.

◎ true
◎ false

CHECK ALL THE APPLY. Choose all options that best completes the statement or answers the question.

18) Which of these is a cation? Check all that apply.

A) O_2
B) K+
C) Na+
D) Ca^{2+}
E) Cl^-

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

19) The most abundant element in the human body, by weight, is _____.

A) nitrogen
B) hydrogen
C) carbon
D) oxygen
E) calcium

20) 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

21) The chemical properties of an atom are determined by its _____.

A) protons
B) electrons
C) neutrons
D) protons and neutrons
E) particles

22) 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

23) 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

24) Oxygen has an atomic number of eight. When two oxygen atoms come together, they form a(n) _____ bond.

A) hydrogen
B) nonpolar covalent
C) polar covalent
D) ionic
E) Van der Waals

25) When table salt, sodium chloride (NaCl), is placed in water _____.

A) Na^+ and Cl^- form ionic bonds with each other
B) Na^+ and Cl^- form polar covalent bonds with each other
C) Na^+ and Cl^- form hydrogen bonds with water
D) ionic bonds between Na^+ and Cl^- are broken
E) Na^+ and Cl^- become separated by their Van der Waals forces

26) The bonding properties of an atom are determined by its _____.

A) electrons
B) protons
C) positrons
D) neutrons
E) photons

27) What type of bond attracts one water molecule to another?

A) An ionic bond
B) A peptide bond
C) A hydrogen bond
D) A covalent bond
E) A hydrolytic bond

28) _____ account for 98.5% of the body's weight.

A) Carbon, oxygen, hydrogen, sodium, potassium, and chlorine
B) Carbon, oxygen, iron, sodium, potassium, and chlorine
C) Carbon, nitrogen, hydrogen, sodium, potassium, and chlorine
D) Carbon, oxygen, hydrogen, nitrogen, sodium, and potassium
E) Carbon, oxygen, hydrogen, nitrogen, calcium, and phosphorus

29) _____ differ from one another in their number of neutrons and atomic mass.

A) Cations
B) Anions
C) Isotopes
D) Electrolytes
E) Free radicals

30) 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

31) Which of these is hydrophobic?

A) Glucose
B) K^+
C) Cl^-
D) Water
E) Fat

32) Blood contains NaCl, protein, and cells. The NaCl is in a(n) _____, the protein is in a(n) _____, 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

33) Which of these is the most appropriate to express the number of molecules per volume?

A) Molarity
B) Volume
C) Percentage
D) Weight per volume
E) Milliequivalents per liter

34) A solution with pH 4 has _____ the H^+ concentration of a solution with pH 8.

A) ½
B) 2 times
C) 4 times
D) 10,000 times
E) 1/10,000

35) 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

36) In a workout your muscle cells produce lactate, yet you maintain a constant blood pH because _____.

A) metabolic acids are neutralized in muscle cells before released into the blood
B) metabolic bases are produced at the same rate by muscle cells to neutralize the acids
C) the respiratory system removes excess H^+ from the blood before the pH is lowered
D) the body contains chemicals called buffers that resist changes in pH
E) endothelial cells secrete excess H^+ to prevent a decrease in pH

37) A solution that resists a change in pH when an acid or base is added to it is a(n) _____.

A) buffer
B) catalyst
C) reducing agent
D) oxidizing agent
E) colloid

38) A chemical reaction that removes electrons from an atom is called a(n) _____ reaction.

A) reduction
B) condensation
C) hydrolysis
D) anabolic
E) oxidation

39) The most relevant free energy in human physiology is the energy stored in _____.

A) electrolytes ionized in water
B) free radicals with an odd number of electrons
C) radioisotopes
D) the chemical bonds of organic molecules
E) Van der Waals forces

40) The breakdown of glycogen (an energy-storage compound) is an example of a(n) _____ reaction.

A) exergonic
B) endergonic
C) exchange
D) synthesis
E) equilibrium

41) Potential energy stored in bonds is released as _____ energy.

A) electromagnetic
B) electrical
C) chemical
D) heat
E) kinetic

42) 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

43) Which one of the following would *not* increase the rate of a reaction?

A) An increase in reactant concentrations
B) A rise in temperature
C) The presence of a catalyst
D) The presence of an enzyme
E) A decrease in reactant concentrations

44) Which of the following terms encompasses all of the other ones?

A) Catabolism
B) Anabolism
C) Metabolism
D) Oxidation reactions
E) Reduction reactions

45) The breakdown of starch by digestive enzymes into glucose molecules is a(n) _____ reaction.

A) synthesis
B) decomposition
C) exchange
D) anabolic
E) reduction

46) Which of the following equations depicts an exchange reaction?

A) $AB \rightarrow A + B$
B) $A + B \rightarrow AB$
C) $AB + CD \rightarrow AC + BD$
D) $AB \rightarrow A^- + B^+$
E) $A + B \rightarrow AB \rightarrow C + D$

47) Which of these functional groups contains nitrogen?

A) Carboxyl group
B) Methyl group
C) Hydroxyl group
D) Amino group
E) Phosphate group

48) 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) $C_3H_7O_2N$

49) A _____ reaction breaks a _____ down into its monomers.

A) hydrolysis; polymer
B) dehydration synthesis; molecule
C) dehydration synthesis; polymer
D) polymer; molecule
E) condensation; reactant

50) The formula of an amino group is _____; the formula of a carboxyl group is _____.

A) -COOH; -OH
B) $-CH_3$; $-NH_2$
C) -OH; -SH
D) $-NH_2$; -COOH
E) -SH; $-H_2PO_4$

51) Table sugar is a disaccharide called _____ and is made up of the monomer(s) _____.

A) maltose; glucose and sucrose
B) sucrose; glucose and fructose
C) lactose; glucose and galactose
D) glycogen; glucose and fructose
E) glucose; galactose and fructose

52) Which of the following is a disaccharide?

A) Galactose
B) Lactose
C) Glucose
D) Fructose
E) Amylose

53) _____ is a monosaccharide, whereas _____ is a polysaccharide.

A) Fructose; sucrose
B) Galactose; maltose
C) Lactose; glycogen
D) Glucose; starch
E) Cellulose; glucose

54) In general, _____ have a 2:1 ratio of hydrogen to oxygen.

A) enzymes
B) proteins
C) lipids
D) carbohydrates
E) nucleic acids

55) Proteoglycans are composed of _____.

A) carbohydrates and fats
B) nucleic acids and fats
C) carbohydrates and proteins
D) proteins and fats
E) nucleic acids and proteins

56) Triglycerides consist of a 3-carbon compound called _____ bound to three _____.

A) pyruvate; fatty acids
B) lactate; glycerols
C) eicosanoid; steroids
D) glycerol; fatty acids
E) sterol; fatty acids

57) _____ are major components of cell membranes, and are said to be _____.

A) Triglycerides; hydrophobic
B) Steroids; hydrophilic
C) Bile acids; fat-soluble
D) Eicosanoids; water-soluble
E) Phospholipids; amphiphilic

58) Which of these molecules is hydrophobic?

A) Glucose
B) Cholesterol
C) Amino acid
D) Protein
E) Disaccharide

59) Proteins perform all of the following functions *except* _____.

A) catalyze metabolic reactions
B) give structural strength to cells and tissues
C) produce muscular and other forms of movement
D) regulate transport of solutes into and out of cells
E) store hereditary information

60) A drastic conformational change in a protein in response to extreme heat or pH is called _____.

A) contamination
B) denaturation
C) saturation
D) sedimentation
E) deconformation

61) Proteins are _____ built from _____ different amino acids. 01_20_2015_CS-3282

A) monomers; 10
B) molecules; 10
C) polymers; 20
D) macromolecules; 40
E) peptides; 25

62) The folding and coiling of a protein into a globular shape is the _____ structure of the protein.

A) primary
B) secondary
C) tertiary
D) quaternary
E) denatured

63) An enzyme is substrate-specific because of the shape of its _____.

A) active site
B) receptor
C) secondary structure
D) terminal amino acid
E) alpha chain

64) Lactose is the substrate of which enzyme?

A) Lactase
B) Amylase
C) Galactase
D) Protease
E) Sucrase

65) All enzymes are _____.

A) cofactors
B) proteins
C) lipids
D) carbohydrates
E) nucleic acids

66) Nucleic acids are _____ of _____.

A) monomers; monosaccharides
B) monomers; ATP
C) polymers; nucleotides
D) polymers; cAMP
E) polymers; DNA

67) ATP_____ endergonic and exergonic reactions.

A) opposes
B) decomposes
C) reduces
D) links
E) dehydrates

68) An atom with 12 electrons, 13 neutrons, and 11 protons is a(n) _____.

A) anion
B) cation
C) free radical
D) both an anion and a free radical
E) both a cation and a free radical

69) The concentration of a solution may be expressed by all of the following *except* _____.

A) weight per volume
B) percentage
C) molarity
D) pH

70) The vibration of an ear drum is an example of _____ energy.

A) kinetic
B) potential
C) elastic
D) radiant

71) 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

72) 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

73) Carbon is very versatile in forming bonds with other atoms because it has _____ valence electrons.

A) four
B) two
C) eight
D) six

74) Amylase is a digestive enzyme that breaks starches down into sugars through _____ reactions.

A) hydrolysis
B) dehydration synthesis
C) anabolic
D) endergonic

75) Which of the following is***not*** a nucleotide?

A) RNA
B) GTP
C) ATP
D) cAMP

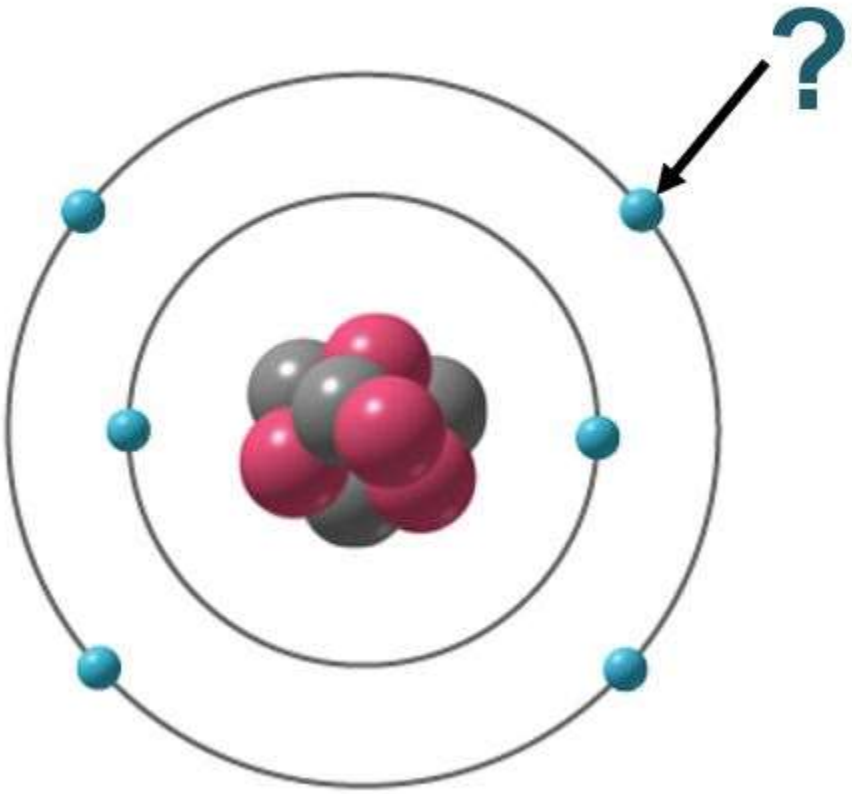
76) Metabolism is the sum of _____ and _____.

A) inhalation; exhalation
B) growth; differentiation
C) anabolism; catabolism
D) positive; negative feedback
E) responsiveness; movement

77) Minerals do which of the following?

A) Contribute to the structure of bones and teeth
B) Act as fully functional enzymes
C) Store energy within the body
D) Act as the monomers of nucleic acids
E) Form the nuclei of atoms

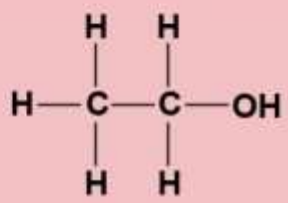
78)



What is indicated by the arrow?

A) Electron
B) Proton
C) Neutron
D) Anion
E) Prion

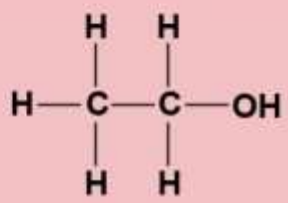
79)

	Structural formulae	Condensed structural formulae	Molecular formulae
Ethanol		CH_3CH_2OH	C_2H_6O
Ethyl ether		1	2

What is the correct condensed structural formula for ethyl ether? (What goes in the box labeled 1?)

A) CH_3OCH_3
B) CH_3O
C) CH_3CH_3OH
D) C_2H_6O
E) CH_2CH_2OH

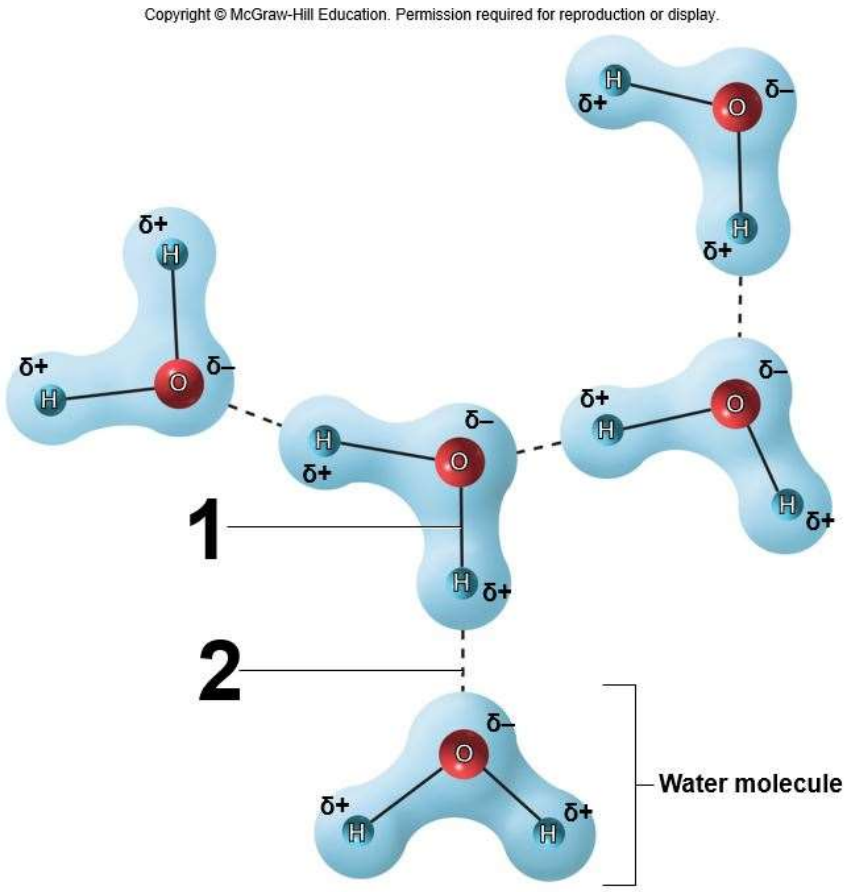
80)

	Structural formulae	Condensed structural formulae	Molecular formulae
Ethanol		CH_3CH_2OH	C_2H_6O
Ethyl ether		1	2

What is the correct molecular formula for ethyl ether? (What goes in the box labeled 2?)

A) C_2H_6O
B) C_2H_3O
C) CH_3O
D) C_3H_6O
E) C_3H_3O

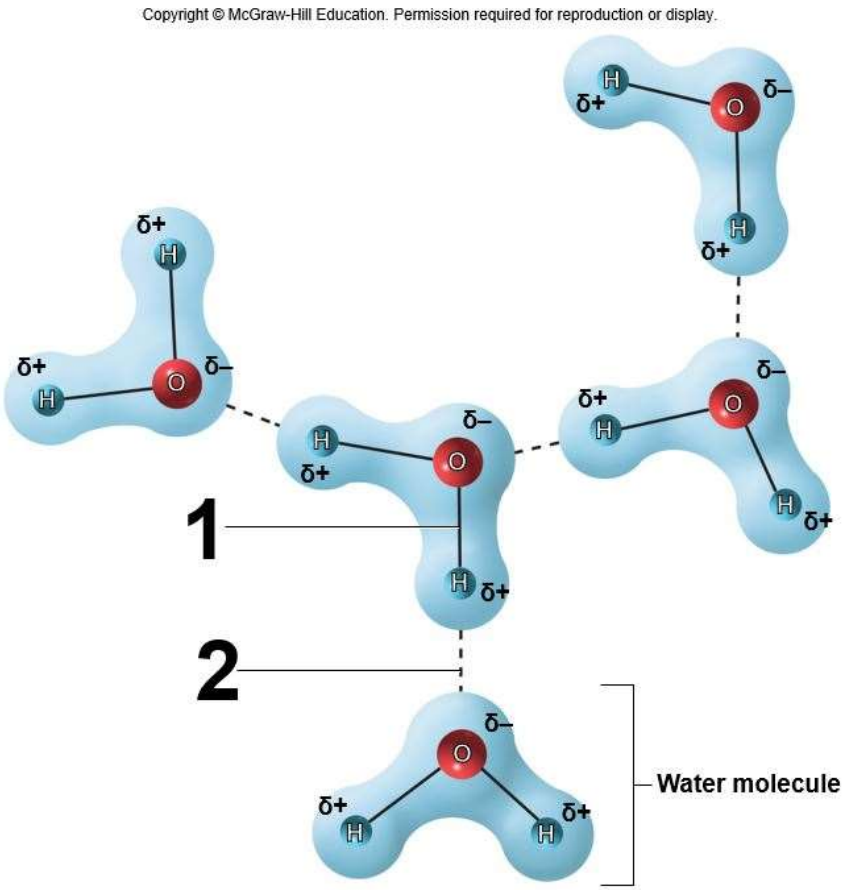
81)



What type of bond is labeled 1?

A) Covalent
B) Hydrogen
C) Ionic
D) Disulfide
E) Van der Waals

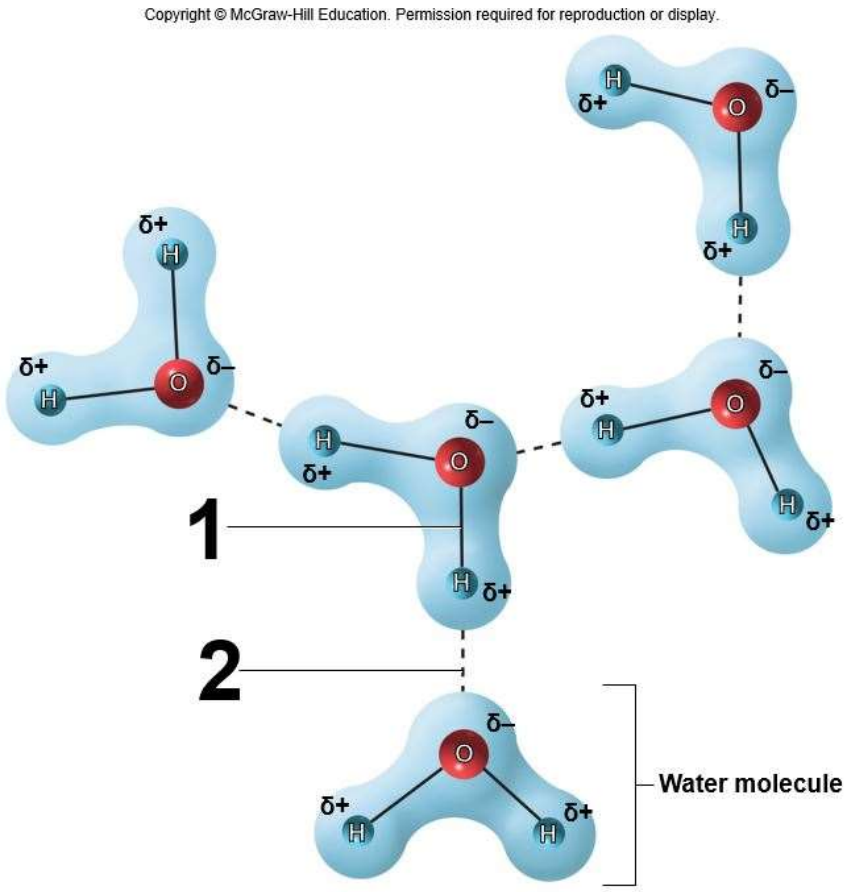
82)



What type of bond is labeled 1?

A) Single polar covalent bond
B) Double polar covalent bond
C) Single nonpolar covalent bond
D) Double nonpolar covalent bond
E) Triple covalent bond

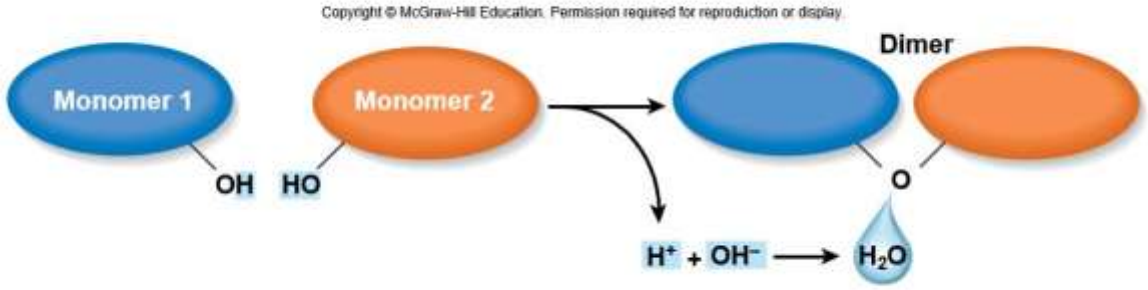
83)



What type of bond is labeled 2?

A) Hydrogen
B) Polar covalent
C) Nonpolar covalent bond
D) Ionic
E) Disulfide

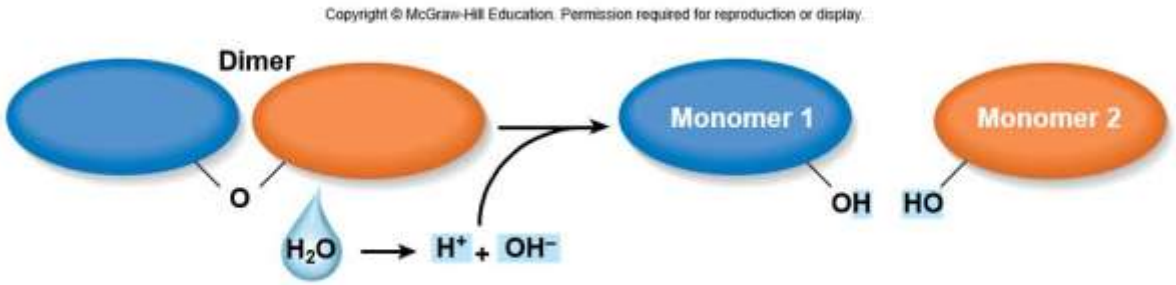
84)



What type of reaction is shown here?

A) Dehydration synthesis reaction
B) Hydrolysis reaction
C) Exergonic reaction
D) Catabolic reaction
E) Oxidation reaction

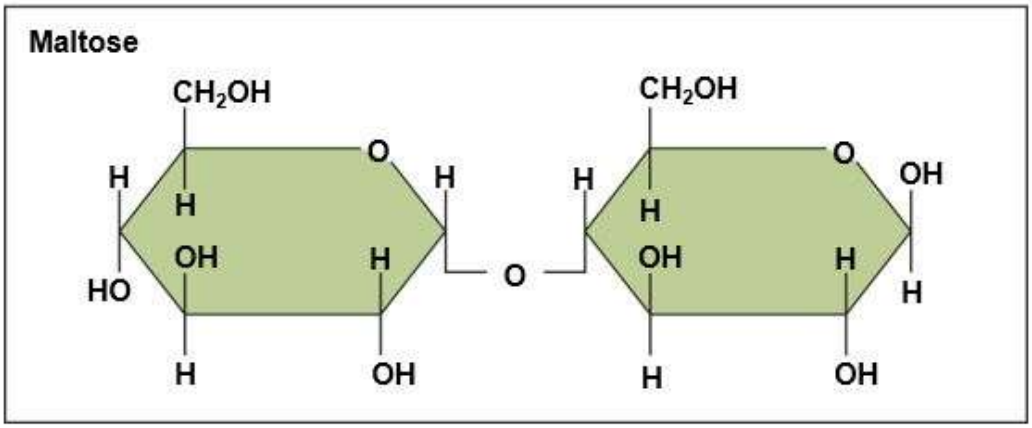
85)



What type of reaction is shown here?

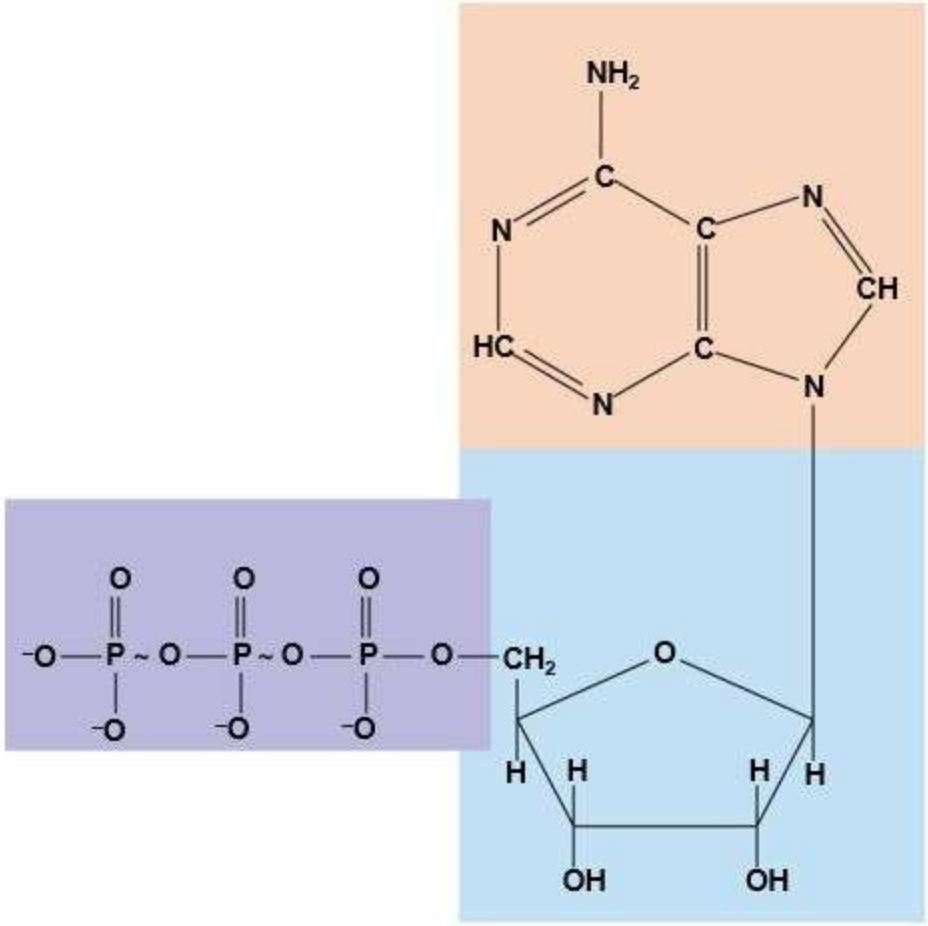
A) Hydrolysis reaction
B) Dehydration synthesis reaction
C) Endergonic reaction
D) Anabolic reaction
E) Reduction reaction

86)



What type of molecule is maltose?

A) Disaccharide
B) Monosaccharide
C) Polysaccharide
D) Polypeptide
E) Oligopeptide
F) Triglyceride

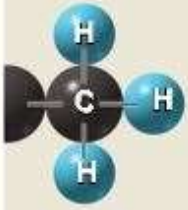
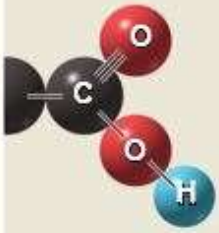
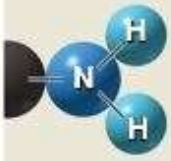
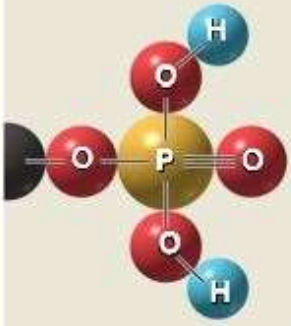


87)

What molecule is shown here?

A) ATP
B) cAMP
C) Lecithin
D) Glucose
E) Cholesterol

SECTION BREAK. Answer all the part questions.
88)

Name and Symbol	Structure	Occurs in
1		Sugars, alcohols
2		Fats, oils, sterolds, amino acids
3		Amino acids, sugars, proteins
4		Amino acids, proteins
5		Nucleic acids, ATP

88.1) Which functional group is labeled 1?

A) Hydroxyl
B) Methyl
C) Carboxyl
D) Amino
E) Phosphate

88.2) Which functional group is labeled 2?

A) Hydroxyl
B) Methyl
C) Carboxyl
D) Amino
E) Phosphate

88.3) Which functional group is labeled 3?

A) Hydroxyl
B) Methyl
C) Carboxyl
D) Amino
E) Phosphate

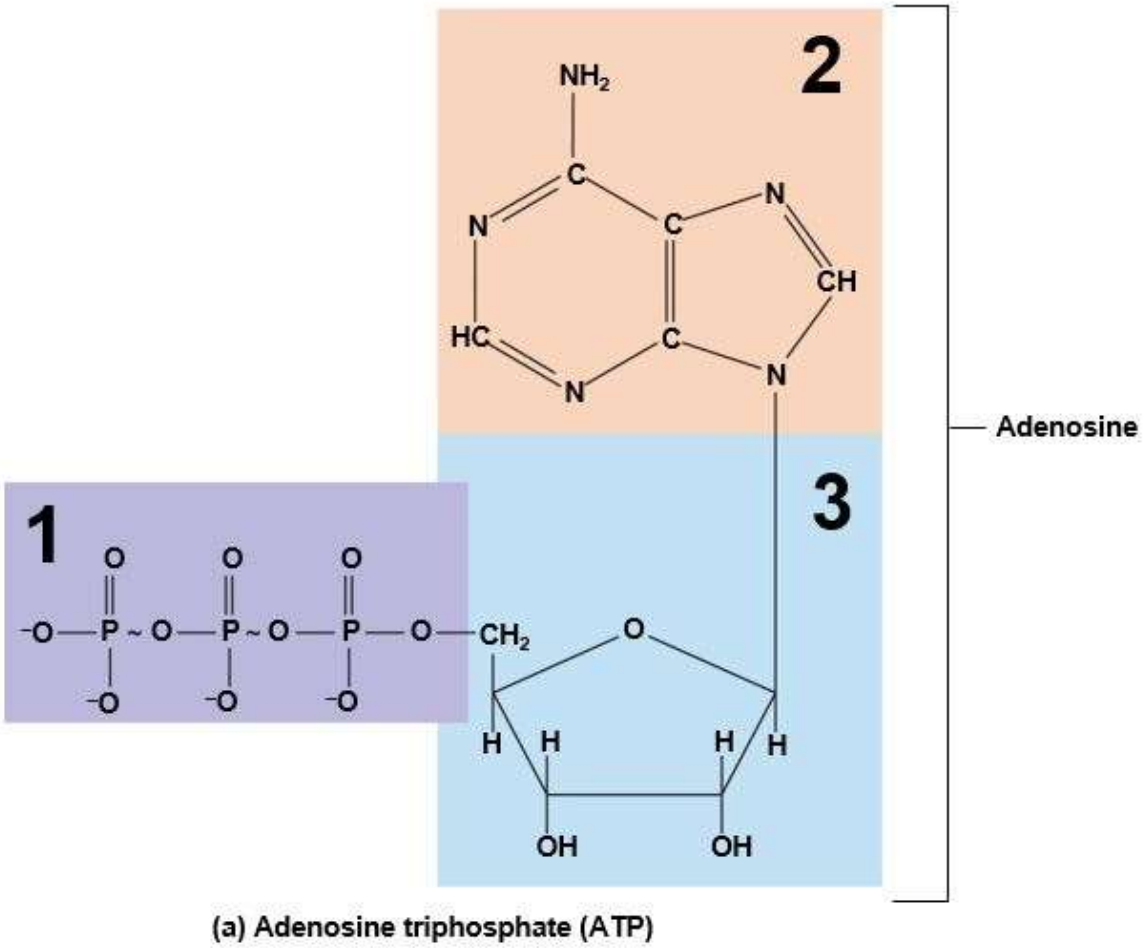
88.4) Which functional group is labeled 4?

A) Hydroxyl
B) Methyl
C) Carboxyl
D) Amino
E) Phosphate

88.5) Which functional group is labeled 5?

A) Hydroxyl
B) Methyl
C) Carboxyl
D) Amino
E) Phosphate

89)



(a) Adenosine triphosphate (ATP)

89.1) Identify the structural component of ATP labeled 1.

A) Triphosphate
B) Adenine
C) Ribose
D) Adenosine
E) cAMP

89.2) Identify the structural component of ATP labeled 2.

A) Triphosphate
B) Adenine
C) Ribose
D) Adenosine
E) cAMP

89.3) Identify the structural component of ATP labeled 3.

A) Triphosphate
B) Adenine
C) Ribose
D) Adenosine
E) cAMP

Answer Key

Test name: Physiology 2

1) FALSE
2) FALSE
3) TRUE
4) FALSE
5) TRUE
6) TRUE
7) FALSE
8) FALSE
9) TRUE
10) TRUE
11) TRUE
12) FALSE
13) FALSE
14) TRUE
15) FALSE
16) FALSE
17) FALSE
Minerals are inorganic elements extracted from the soil by plants and passed up the food chain to humans.

18) [B, C, D]
19) D
20) A
21) B
22) E
23) C

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

54) D
55) C
56) D
57) E
58) B
59) E
60) B
61) C
62) C
63) A
64) A
65) B
66) C
67) D
68) A
69) D
70) A
71) A
72) A
73) A
74) A
75) A
76) C
77) A
78) A
79) A
80) A
81) A
82) A
83) A

84) A
85) A
86) A
87) A
88) Section Break
    88.1) A
    88.2) B
    88.3) C
    88.4) D
    88.5) E
89) Section Break
    89.1) A
    89.2) B
    89.3) C