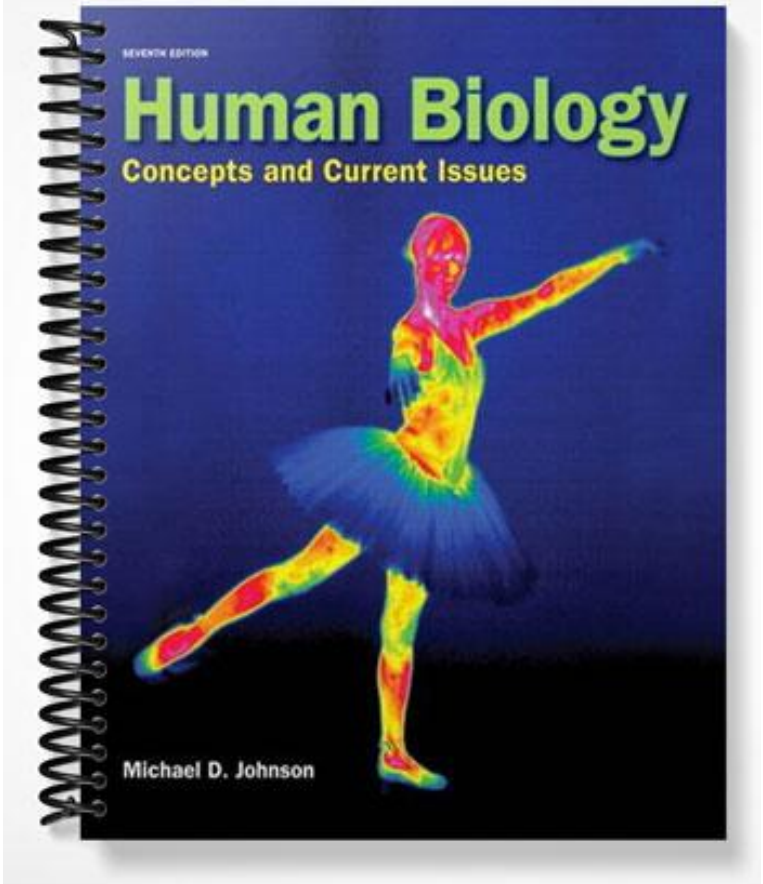
TEST BANK


SEVENTH EDITION
Human Biology
Concepts and Current Issues
Michael D. Johnson

***Human Biology, 7e* (Johnson)**
Chapter 2 The Chemistry of Living Things

2.1 Multiple Choice Questions

1) Which one of the following characteristics applies to both living organisms and nonliving things?
A) composed of matter
B) capable of reproduction
C) capable of storing energy for later use
D) capable of growth
E) composed of cells
Answer: A
Topic: Sec. 2.0
Skill: Knowledge/Comprehension

2) Which one of the following is the study of matter and the energy that causes matter to combine, break apart, and recombine in everything living and nonliving?
A) biology
B) geology
C) chemistry
D) physics
Answer: C
Topic: Sec. 2.0
Skill: Knowledge/Comprehension

3) _____ is the capacity to do work, the capacity to cause some change in matter.
A) Energy
B) Atom
C) Matter
D) Molecule
Answer: A
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

4) A mad scientist has ripped apart an atom and collected all the subatomic particles located in the nucleus of the atom. Which one of the following has he collected?
A) electrons
B) protons
C) protons and neutrons
D) electrons and protons
E) neutrons and electrons
Answer: C
Topic: Sec. 2.1
Skill: Application/Analysis

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5) Which one of the following statements is TRUE regarding the structure of the atom?
A) The nucleus is composed of equal numbers of positively charged particles and negatively charged particles.
B) All electrons are located at the same distance from the nucleus.
C) In small elements, such as carbon, electrons have a positive charge; in larger elements, such as barium, electrons have a negative charge.
D) Most of the mass of an atom is due to its protons and neutrons.
E) Neutrons carry a negative charge.
Answer: D
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

6) Which one of the following statements CORRECTLY describes the relationship between an atom and an element?
A) An element is the fundamental unit of an atom.
B) An element is composed of atoms that are joined together by ionic and covalent bonds.
C) An atom is composed of different elements that are joined together by ionic and covalent bonds.
D) An atom is the smallest unit of an element that demonstrates all of the properties of that element.
Answer: D
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

7) The total number of protons and neutrons in an atom can best be determined by
A) atomic mass
B) the subscript number following the chemical symbol
C) atomic number
D) the charge of the atom
E) the chemical symbol
Answer: A
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

8) Isotopes of an element have the same _____, but different _____.
A) number of electron shells, numbers of protons
B) atomic number, atomic masses
C) number of neutrons, numbers of protons
D) atomic mass, atomic numbers
E) name, chemical symbols
Answer: B
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

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9) Radioisotopes have a number of uses in science and medicine. These uses include which one of the following?
A) repairing damaged heart tissue
B) dating fossils and treating cancer
C) providing the power supply in heart pacemakers
D) treating asthma and regulating nerve transmission
E) curing diabetes
Answer: B
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

10) Chlorine has an atomic number of 17 and an atomic mass of 35. Therefore, chlorine has _____ electrons and _____ neutrons.
A) 17, 18
B) 18, 17
C) 17, 35
D) 35, 17
E) 18, 18
Answer: A
Topic: Sec. 2.1
Skill: Application/Analysis

11) Which one of the following is TRUE regarding electrons, shells, and energy?
A) Electrons are located in shells around the nucleus.
B) Electrons are attracted to each other because they have the same charge.
C) In order for an electron to move closer to the nucleus, it must absorb energy.
D) The innermost electron shell has the most potential energy.
E) As an electron moves to a shell further from the nucleus, it loses energy.
Answer: A
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

12) Which one of the following is a molecule?
A) NaCl
B) O
C) C
D) Lead
E) N
Answer: A
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

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13) _____ bonds hold the hydrogens to the oxygen within a water molecule, and _____ bonds attract one water molecule to other water molecules.
A) Ionic, hydrogen
B) Hydrogen, ionic
C) Hydrogen, covalent
D) Covalent, hydrogen
E) Ionic, covalent
Answer: C
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

14) Ions in body fluids of a human are referred to as
A) electrolytes
B) osmolytes
C) isotopes
D) atoms
Answer: A
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

15) Which one of the following is TRUE regarding water?
A) Each molecule of water consists of two atoms of hydrogen and one atom of oxygen covalently bonded to each other.
B) The oxygen side of the water molecule is partially positive.
C) Water is a type of ion.
D) Electrons are shared equally between the atoms of water.
E) Water molecules are attracted to each other by ionic bonds.
Answer: A
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

16) Each of the following statements is TRUE regarding hydrogen bonds EXCEPT which one?
A) Hydrogen bonds hold the two strands of DNA together.
B) Hydrogen bonds are responsible for the attraction of Na^+ to Cl^-.
C) Hydrogen bonds are responsible for some aspects of the three-dimensional structure of proteins.
D) Hydrogen bonds form between different water molecules.
Answer: B
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

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17) Molecules such as water are referred to as _____ because they are electrically neutral overall but still have partially charged regions.
A) electrolytes
B) polar molecules
C) ions
D) covalently charged
E) isotopes
Answer: B
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

18) Water is an excellent solvent for biological systems because
A) it can maintain a relatively unstable temperature for chemical reactions to occur.
B) compounds with ionic bonds as well as those with polar covalent bonds readily dissolve in water.
C) it is semisolid at body temperature, preventing it from flowing freely through the human body.
D) it can rearrange its bonds, forming covalent bonds with other molecules once dissolved.
Answer: B
Topic: Sec. 2.3
Skill: Knowledge/Comprehension

19) A solution has been prepared by mixing glucose in water. Which one of the following statements CORRECTLY describes this solution?
A) Both water and glucose are solutes.
B) Both water and glucose are solvents.
C) Water is the solute, and glucose is the solvent.
D) Water is the solvent, and glucose is the solute.
Answer: D
Topic: Sec. 2.3
Skill: Application/Analysis

20) A solution with a pH of 6 has _____ times as many hydrogen ions as a solution with a pH of 8.
A) 1,000
B) 10
C) 100
D) 10,000
E) 100,000
Answer: C
Topic: Sec. 2.4
Skill: Knowledge/Comprehension

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21) A student measuring the pH of the water in a fish tank found it to have a pH of 8. Which one of the following statements is TRUE regarding that solution?
A) The water is alkaline.
B) The water does not contain hydrogen ions.
C) The water contains equal numbers of hydrogen ions and hydroxyl ions.
D) The water is highly acidic.
E) The water is more alkaline than a solution with a pH of 10.
Answer: A
Topic: Sec. 2.4
Skill: Knowledge/Comprehension

22) Body fluids in humans have a high buffering capacity because of
A) the presence of the bicarbonate/carbonic acid buffer system
B) the natural result of water as a solvent
C) hydrogen bonding between water molecules in biological fluids
D) shifts in blood pH that are required to maintain homeostasis
Answer: A
Topic: Sec. 2.4
Skill: Knowledge/Comprehension

23) Each of the following statements about carbon is TRUE EXCEPT which one?
A) All organic molecules contain carbon.
B) Carbon atoms form four covalent bonds.
C) Carbon atoms form diverse molecules that may be linear, branched, or circular.
D) Carbon can form strong hydrogen bonds with other elements.
E) Carbon can form bonds with hydrogen, oxygen, nitrogen, as well as another carbon atom.
Answer: D
Topic: Sec. 2.5
Skill: Knowledge/Comprehension

24) Which one of the following is TRUE regarding macromolecules?
A) Cells cannot use macromolecules to signal other cells.
B) An example of a macromolecule is H_2O.
C) Cells produce macromolecules by the process of hydrolysis.
D) Macromolecules are broken down by hydration synthesis.
E) Cells use certain macromolecules to store energy.
Answer: E
Topic: Sec. 2.5
Skill: Knowledge/Comprehension

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25) Which one of the following statements accurately describes hydrolysis reactions in biological systems?
A) Hydrolysis reactions enable the breakdown of food molecules during digestion.
B) Hydrolysis reactions enable small molecules to be joined to form larger molecules.
C) Hydrolysis reactions generally require substantial input of energy.
D) Hydrolysis reactions are spontaneous and don't require catalysis by enzymes.
E) Hydrolysis reactions generally occur for the purpose of energy storage.
Answer: A
Topic: Sec. 2.5
Skill: Knowledge/Comprehension

26) Carbohydrates have which one of the following characteristics?
A) They are composed of carbon, hydrogen, nitrogen, and oxygen.
B) They release energy when their peptide bonds are broken.
C) They are indigestible by most organisms.
D) They contain carbon, hydrogen, and oxygen in a ratio of 1-2-1.
E) They are able to store and transmit genetic information.
Answer: D
Topic: Sec. 2.5
Skill: Knowledge/Comprehension

27) Which one of the following is a very important source of energy for nearly all cells?
A) cellulose
B) deoxyribose
C) starch
D) glucose
E) ribose
Answer: D
Topic: Sec. 2.6
Skill: Knowledge/Comprehension

28) Which one of the following is an oligosaccharide?
A) glucose
B) DNA
C) maltose
D) starch
E) ribose
Answer: C
Topic: Sec. 2.6
Skill: Knowledge/Comprehension

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29) Sucrose is an oligosaccharide made up of which one of the following sugars?
A) glucose and glucose
B) deoxyribose and ribose
C) starch and glycogen
D) maltose and glucose
E) glucose and fructose
Answer: E
Topic: Sec. 2.6
Skill: Knowledge/Comprehension

30) Lipids are important to biological systems because
A) they are solid at body temperature so they stabilize membranes
B) some lipid types are potentially large sources of energy to perform cellular work
C) most help to buffer aqueous solutions in the body
D) all lipids are very soluble in water
E) they are able to store and transmit genetic information
Answer: B
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

31) Which one of the following molecules is stored in adipose tissue and serves as an important source of energy for the human body?
A) glucose
B) steroids
C) glycogen
D) triglycerides
E) phospholipids
Answer: D
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

32) Which one of the following is a lipid?
A) cholesterol
B) alanine
C) maltose
D) glycogen
E) cellulose
Answer: A
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

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33) The most important physical characteristic of lipids with regard to living organisms is that they
A) are hydrophobic
B) are very large and therefore difficult to store
C) dissolve easily in water
D) are typically a form of waste product that is difficult to eliminate
E) are denser than water
Answer: A
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

34) Which one of the following forms a bilayer structure that is found in cell membranes?
A) triglycerides
B) amino acids
C) cholesterol
D) phospholipids
E) saturated fats
Answer: D
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

35) Pancreatic cells make insulin, which is a type of protein. These cells use _____ in order to synthesize insulin by the process of _____.
A) oligosaccharides, hydrolysis
B) nucleotides, condensation
C) amino acids, dehydration synthesis
D) fatty acids and glycerol, hydrolysis
E) monosaccharides, dehydration synthesis
Answer: C
Topic: Sec. 2.8
Skill: Application/Analysis

36) Each amino acid is composed of a central carbon that forms covalent bonds with four other atoms/molecules. These atoms/molecules include each of the following EXCEPT which one?
A) an R group
B) an A group
C) an amino group
D) a hydrogen atom
E) a carboxyl group
Answer: B
Topic: Sec. 2.8
Skill: Knowledge/Comprehension

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37) Alpha helices and beta sheets are characteristic of protein
A) primary structure
B) secondary structure
C) tertiary structure
D) quaternary structure
E) enzymatic structure
Answer: B
Topic: Sec. 2.8
Skill: Knowledge/Comprehension

38) Which one of the following is a function of a protein?
A) stores genetic material and enables its transmission to the next generation
B) acts as a catalyst, speeding up chemical reactions
C) is a major subunit of cellulose
D) is a primary structural component of a cell membrane
E) provides energy for a muscle contraction
Answer: B
Topic: Sec. 2.8
Skill: Knowledge/Comprehension

39) Which one of the following is TRUE regarding enzymes?
A) Enzyme function is not affected by changes in temperature or pH.
B) Enzymes slow the rate of chemical reactions in living systems.
C) Enzymes are consumed in a chemical reaction, so an organism must constantly replace these enzymes.
D) Each enzyme catalyzes one specific reaction or group of reactions.
E) Enzymes convert products into reactants.
Answer: D
Topic: Sec. 2.8
Skill: Knowledge/Comprehension

40) Which one of the following is needed to synthesize a new strand of DNA?
A) lipids
B) glucose
C) amino acids
D) nucleotides
E) ribose
Answer: D
Topic: Sec. 2.9
Skill: Knowledge/Comprehension

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41) DNA differs from RNA in that DNA
A) is single stranded
B) contains deoxyribose
C) is made up of nucleotides
D) contains cytosine
E) contains phosphates
Answer: B
Topic: Sec. 2.9
Skill: Knowledge/Comprehension

42) A research student is analyzing the nucleic acid of a virus. He finds that the nucleic acid contains thymine. From this it can be concluded that the nucleic acid
A) contains uracil
B) contains ribose
C) is actually a protein
D) contains glucose
E) is a strand of DNA
Answer: E
Topic: Sec. 2.9
Skill: Application/Analysis

43) Which one of the following is TRUE regarding nucleotides?
A) There are three different DNA nucleotides.
B) DNA nucleotides are assembled into RNA by the process of dehydration synthesis.
C) DNA nucleotides contain deoxyribose; RNA nucleotides contain sucrose.
D) Nucleotides are bonded together by covalent bonds between the sugars and the phosphates.
E) A DNA nucleotide could be made up of ribose, a phosphate, and cytosine.
Answer: D
Topic: Sec. 2.9
Skill: Knowledge/Comprehension

44) Which one of the following occurs when a phosphate is removed from an ATP molecule?
A) Energy is added to the ATP molecule to form ADP.
B) Oxygen produced in the reaction causes the molecule to explode.
C) Energy is released for cell work.
D) Chemical reactions stop in a cell due to lack of an energy source.
E) Fat is converted to protein.
Answer: C
Topic: Sec. 2.10
Skill: Knowledge/Comprehension

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45) Proteins that function as a catalyst
A) slow down the speed at which chemical reactions occur, but do not alter the final products formed
B) facilitate chemical reactions by altering the final products formed
C) maintain primary structure
D) can participate only in reactions that synthesize new products
E) are referred to as enzymes
Answer: E
Topic: Sec. 2.8
Skill: Knowledge/Comprehension

46) A student has isolated a large compound (macromolecule) from cells. Chemical analysis of the compound shows that it is made up of the following elements: carbon, hydrogen, oxygen, nitrogen, and sulfur. To which group of macromolecules does this compound most likely belong?
A) carbohydrate
B) protein
C) nucleic acid
D) lipid
E) aqueous
Answer: B
Topic: Sec. 2.6-2.9
Skill: Application/Analysis

47) A student has isolated a large compound (macromolecule) from cells. Chemical analysis of the compound shows that it is made up of the following elements: carbon, hydrogen, oxygen, nitrogen, and phosphorus. To which group of macromolecules does this compound most likely belong?
A) carbohydrate
B) protein
C) nucleic acid
D) lipid
E) aqueous
Answer: C
Topic: Sec. 2.6-2.9
Skill: Application/Analysis

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2.2 True/False Questions

1) Electrons are smaller than protons, are negatively charged, and orbit the nucleus.
Answer: TRUE
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

2) All matter is made up of atoms.
Answer: TRUE
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

3) If the number of protons in an atom equals the number of electrons in the atom, the atom is an ion.
Answer: FALSE
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

4) Atoms with either more or fewer neutrons than the usual number for an element are referred to as isotopes.
Answer: TRUE
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

5) Potential energy is energy that has not been used yet, but has the potential to do work.
Answer: TRUE
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

6) When water is released from a dam, potential energy is converted to chemical energy.
Answer: FALSE
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

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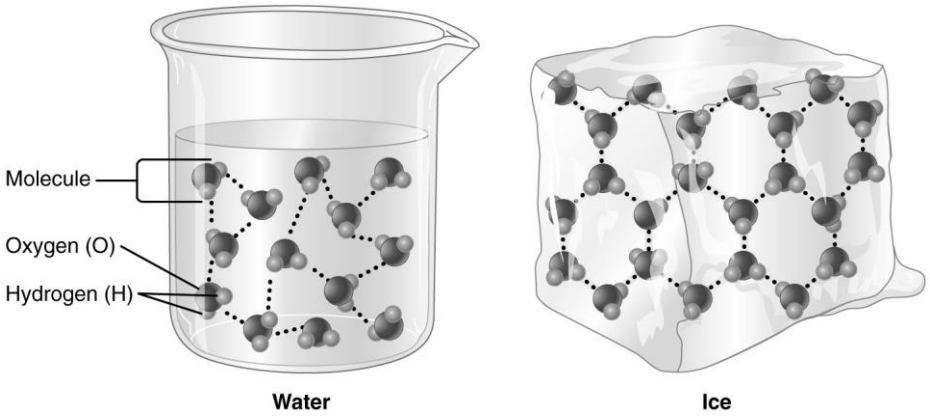

7) The type of bond indicated by the dotted lines in the figure above is a hydrogen bond.
Answer: TRUE
Topic: Sec. 2.3
Skill: Knowledge/Comprehension

8) The difference between water molecules in liquid water and water molecules in ice is in the number of covalent bonds that form.
Answer: FALSE
Topic: Sec. 2.3
Skill: Knowledge/Comprehension

9) During intense exercise, you produce a lot of heat energy, yet your body temperature rises only in small increments. This temperature stability is because water in body fluids releases the heat very quickly.
Answer: FALSE
Topic: Sec. 2.3
Skill: Knowledge/Comprehension

10) One of the most important buffer pairs in blood is carbonic acid and bicarbonate because they regulate the pH of blood by absorbing and releasing hydrogen ions as needed.
Answer: TRUE
Topic: Sec. 2.4
Skill: Knowledge/Comprehension

11) The more buffers present in a body fluid, the more likely that the blood pH will change after absorbing nutrients during digestion.
Answer: FALSE
Topic: Sec. 2.4
Skill: Application/Analysis

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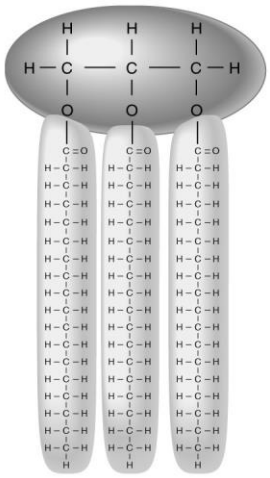
12) Because carbon requires four additional electrons to fill its outermost shell, it has a natural tendency to form four covalent bonds with other atoms, making it an ideal element for forming structures in living cells.
Answer: TRUE
Topic: Sec. 2.5
Skill: Knowledge/Comprehension



Triglycerides with saturated fatty acids have straight tails, allowing them to pack closely together.

13) The figure above shows a triglyceride that contains unsaturated fatty acids.
Answer: FALSE
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

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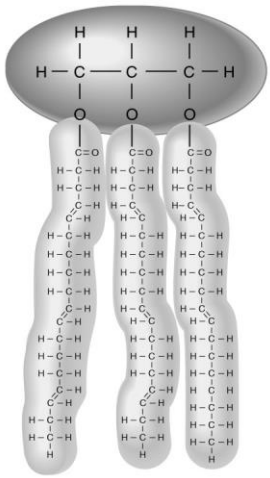

Triglycerides with unsaturated fatty acids have kinked tails, preventing them from packing closely together.

14) The figure above shows a triglyceride that is liquid at room temperature.
Answer: TRUE
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

15) If your blood pH is lowered significantly, many proteins will not be able to fold correctly. The result will be decreased enzyme function throughout the body.
Answer: TRUE
Topic: Sec. 2.8
Skill: Application/Analysis

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2.3 Matching Questions

Match each of the following descriptions to the appropriate term. Each term may be used only once.

A) molecules
B) nucleic acids
C) chemical bonds
D) atom
E) elements
F) proton
G) electrons
H) carbohydrates
I) amino acids
J) matter
K) isotopes
L) lipids

1) a component of an atom that carries a positive charge
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

2) the smallest unit of matter that can take part in a chemical reaction
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

3) anything that has mass and occupies space
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

4) attractive forces between atoms in molecules
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

5) different forms of the same element that differ in their number of neutrons
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

6) steroids, triglycerides
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

7) matter that cannot be broken down
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

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8) DNA, RNA
Topic: Sec. 2.9
Skill: Knowledge/Comprehension

9) water, sodium chloride, carbon dioxide
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

10) alanine, glycine, cysteine
Topic: Sec. 2.8
Skill: Knowledge/Comprehension

11) glucose, cellulose, glycogen
Topic: Sec. 2.6
Skill: Knowledge/Comprehension

12) part of an atom that may participate in bonding with another atom
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

Answers: 1) F 2) D 3) J 4) C 5) K 6) L 7) E 8) B 9) A 10) I 11) H 12) G

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Match the following.

A) unsaturated fat
B) saturated fat
C) glucose
D) glycogen
E) cellulose
F) DNA
G) cholesterol
H) polypeptide

13) a double strand of nucleotides; stores genetic information
Topic: Sec. 2.9
Skill: Knowledge/Comprehension

14) lipid that stabilizes membranes and is a precursor to many hormones
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

15) dominant energy source used by cells
Topic: Sec. 2.6
Skill: Knowledge/Comprehension

16) major structural polysaccharide produced by plants
Topic: Sec. 2.6
Skill: Knowledge/Comprehension

17) a molecule consisting of glycerol plus fatty acid chains with two hydrogen atoms per carbon atom; solid at room temperature
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

18) a polysaccharide stored in the human body
Topic: Sec. 2.6
Skill: Knowledge/Comprehension

19) a strand of 3 to 100 amino acids
Topic: Sec. 2.8
Skill: Knowledge/Comprehension

20) a triglyceride that has double bonds in its fatty acids and is a liquid at room temperature
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

Answers: 13) F 14) G 15) C 16) E 17) B 18) D 19) H 20) A

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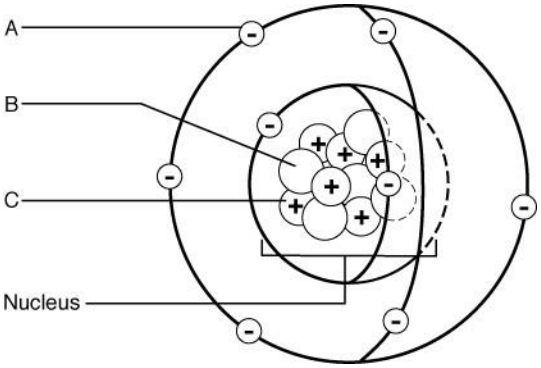
2.4 Short Answer Questions

Use the letters from the figure below to answer the following questions.



1) The subatomic particles _____ and _____ have approximately the same mass.
Answer: B, C
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

2) Isotopes of this element would differ in the number of _____.
Answer: B
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

3) In order for this atom to be electrically neutral, the number of subatomic particles labeled "A" in the figure would have to equal the number of _____.
Answer: C
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

4) The label _____ points to a neutron.
Answer: B
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

5) In order for this atom to develop a positive charge, it would have to lose _____.
Answer: A
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

6) The number of subatomic particles _____ is the atomic number of that atom.
Answer: C
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

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7) All things on Earth are made up of _____, which is defined as anything that has mass and occupies space.
Answer: matter
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

8) The pure form of matter that cannot be broken down into a simpler form is a(n) _____.
Answer: element
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

9) Protons and neutrons are located in the _____ of an atom.
Answer: nucleus
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

10) In the atom, electrons are located in clouds, with negative charges around the nucleus; these are called _____.
Answer: shells
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

11) Isotopes that give off energy and emit particles are known as _____.
Answer: radioisotopes
Topic: Sec. 2.1
Skill: Knowledge/Comprehension

12) Water held behind a dam has a large amount of _____ energy.
Answer: potential
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

13) An electrically charged molecule or atom is a(n) _____.
Answer: ion
Topic: Sec. 2.2
Skill: Knowledge/Comprehension

14) Molecules that are polar and attracted to water are _____; molecules that are nonpolar and therefore not attracted to water are _____.
Answer: hydrophilic, hydrophobic
Topic: Sec. 2.3
Skill: Knowledge/Comprehension

15) Evaporation of water from the skin results in a(n) _____ in body temperature.
Answer: decrease
Topic: Sec. 2.3
Skill: Knowledge/Comprehension

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16) Molecules that give up or donate hydrogen ions are _____.
Answer: acids
Topic: Sec. 2.3
Skill: Knowledge/Comprehension

17) The acidity or alkalinity of a solution can be measured in terms of _____.
Answer: pH
Topic: Sec. 2.4
Skill: Knowledge/Comprehension

18) Which solution has more free hydrogen ions: pH = 9 or pH = 3?
Answer: pH = 3
Topic: Sec. 2.4
Skill: Knowledge/Comprehension

19) The normal pH of human blood falls within a range that is near a(n) _____ pH.
Answer: neutral
Topic: Sec. 2.4
Skill: Knowledge/Comprehension

20) A substance that helps to maintain a stable pH is a(n) _____.
Answer: buffer
Topic: Sec. 2.4
Skill: Knowledge/Comprehension

21) Large organic molecules that are composed of thousands of smaller molecules bonded to one another are known as _____.
Answer: macromolecules
Topic: Sec. 2.5
Skill: Knowledge/Comprehension

22) The process by which cells break down organic macromolecules into their subunits is _____.
Answer: hydrolysis
Topic: Sec. 2.5
Skill: Knowledge/Comprehension

23) In order for a cell to produce a fat, it must have one molecule of _____ and three _____.
Answer: glycerol, fatty acids
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

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24) A diet rich in _____ fat is believed to contribute to the development of cardiovascular disease.
Answer: saturated
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

25) The structure of a cell membrane includes a modified form of lipid called a(n) _____.
Answer: phospholipid
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

26) Lipid molecules composed of four joined carbon rings are known as _____.
Answer: steroids
Topic: Sec. 2.7
Skill: Knowledge/Comprehension

27) When a protein is heated, it may unfold, losing its secondary, tertiary, and even quaternary structure. This process is known as _____.
Answer: denaturation
Topic: Sec. 2.8
Skill: Knowledge/Comprehension

28) A polypeptide is generally referred to as a(n) _____ if it has more than 100 amino acids and has folded into a complex structure with a specific function.
Answer: protein
Topic: Sec. 2.8
Skill: Knowledge/Comprehension

29) The molecule that stores the set of instructions of a cell and directs everything a cell does is _____.
Answer: DNA
Topic: Sec. 2.9
Skill: Knowledge/Comprehension

30) The molecule with which an enzyme reacts is a(n) _____.
Answer: substrate (reactant)
Topic: Sec. 2.8
Skill: Knowledge/Comprehension

31) There are _____ different deoxyribonucleotides found in the human genome.
Answer: four
Topic: Sec. 2.9
Skill: Knowledge/Comprehension

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32) Plants produce a polysaccharide made of glucose known as _____, which is virtually indigestible by most animals.
Answer: cellulose
Topic: Sec. 2.6
Skill: Knowledge/Comprehension

33) The universal energy source for cells is a nucleotide known as _____.
Answer: ATP
Topic: Sec. 2.10
Skill: Knowledge/Comprehension

2.5 Essay Questions

1) Describe how denaturing a protein alters the function of that protein.
Answer: Denaturing a protein permanently disrupts protein structure. Ordinarily, if the protein shape is altered, so is the function of that protein. This can be seen with denatured enzymes that lose the ability to bind the substrate, and thus no chemical reaction can occur.
Topic: Sec. 2.8
Skill: Application/Analysis

2) Explain how water in the human body helps to regulate body temperature following a long-distance bike ride.
Answer: Water in body fluids is able to absorb heat without experiencing large temperature shifts. Water is also able to hold the heat, so that when the warm fluid moves to the periphery of the body, the heat can be exchanged or released into the environment. Perspiration is one means for the heat to be released from the body, which in turn allows a person to maintain a relatively constant body temperature.
Topic: Sec. 2.3
Skill: Synthesis/Evaluation

3) In the human body, bicarbonate and carbonate ions work together to stabilize or buffer the pH of body fluids. What would happen to blood if these buffering agents were removed?
Answer: Blood pH could not be regulated in the absence of this buffering pair. Anything absorbed or released from body fluids that altered the hydrogen or hydroxyl ion content of blood would cause a pH change. For humans who tightly regulate homeostasis, even relatively modest changes in blood pH can have devastating consequences.
Topic: Sec. 2.4
Skill: Application/Analysis

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