Human Biology 9th edition Johnson Test Bank

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Human Biology: Concepts and Current Issues, 9e **(Johnson)**
Chapter 2 The Chemistry of Living Things

2.1 Multiple Choice Questions

1) 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
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

2) 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
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Answer: A
Topic: Sec. 2.0
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

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3) 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
Bloom's: Applying/Analyzing
LO: 2.1
GLO: G2

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4) 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
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

5) 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
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Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

6) 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) the atomic number.
D) the charge of the atom.
E) the chemical symbol.
Answer: A
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

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7) 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
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

8) 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 energy to form molecules
D) treating asthma and regulating nerve transmission
E) curing diabetes
Answer: B
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

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9) 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
Bloom's: Applying/Analyzing
LO: 2.1
GLO: G1

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10) 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. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

11) Which one of the following is a molecule?
A) NaCl
B) O
C) C
D) Lead
E) N
Answer: A
Topic: Sec. 2.2
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G2

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12) An example of potential energy is/are
A) bonds that hold atoms together.
B) the creation of new molecules.
C) dancing.
D) running a marathon.
Answer: A
Topic: Sec. 2.2
Bloom's: Applying/Analyzing
LO: 2.2
GLO: G2

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
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G1

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14) Because they are good conductors of electricity, ions dissolved in water are sometimes referred to as
A) electrolytes.
B) osmolytes.
C) isotopes.
D) hydrocurrents.
Answer: A
Topic: Sec. 2.2
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G1

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 has a partial positive charge.
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
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G1

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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
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G1

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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
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G1

18) Water is an excellent solvent for biological systems because
A) it can maintain a relatively unstable temperature for chemical reactions to occur.
B) molecules 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
Bloom's: Remembering/Understanding
LO: 2.3
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GLO: G2

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
Bloom's: Applying/Analyzing
LO: 2.3
GLO: G2

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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
Bloom's: Applying/Analyzing
LO: 2.4
GLO: G4

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
Bloom's: Remembering/Understanding
LO: 2.4
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GLO: G2

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
Bloom's: Remembering/Understanding
LO: 2.4
GLO: G1

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23) Each of the following statements about carbon is TRUE EXCEPT which one?
A) All organic molecules contain carbon.
B) Carbon atoms can 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
Bloom's: Remembering/Understanding
LO: 2.5
GLO: G2

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 create 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
Bloom's: Remembering/Understanding
LO: 2.5
GLO: G1

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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 do not require the input of energy.
D) Hydrolysis reactions are quick, 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
Bloom's: Remembering/Understanding
LO: 2.5
GLO: G1

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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. 2.6
Bloom's: Remembering/Understanding
LO: 2.6
GLO: G1

27) Which monosaccharide is a very important source of energy for nearly all cells?
A) cellulose
B) deoxyribose
C) sucrose
D) glucose
E) ribose
Answer: D
Topic: Sec. 2.6
Bloom's: Remembering/Understanding
LO: 2.6
GLO: G1

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28) Lactose is a(n)
A) ribose.
B) monosaccharide.
C) oligosaccharide.
D) polysaccharide.
E) starch.
Answer: C
Topic: Sec. 2.6
Bloom's: Remembering/Understanding
LO: 2.6
GLO: G1

29) Sucrose is an oligosaccharide made up of which 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
Bloom's: Remembering/Understanding
LO: 2.6
GLO: G1

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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
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

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
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

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32) Which one of the following is a lipid?
A) cholesterol
B) alanine
C) cellulose
D) glycogen
E) thymine
Answer: A
Topic: Sec. 2.7
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LO: 2.7
GLO: G1

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33) Without this special property of certain lipids, the formation of cell membranes would not be possible.
A) straight tails that are solid at room temperature
B) three fatty acid tails linked to a glycerol backbone
C) both a hydrophilic end and a neutral hydrophobic end
D) carbon rings to which different chemical groups can attach
E) tails of different lengths that allow them to pack closely together
Answer: C
Topic: Sec. 2.7
Bloom's: Applying/Analyzing
LO: 2.7
GLO: G2

34) Important sex hormones are created from this kind of lipid.
A) triglycerides
B) amino acids
C) cholesterol
D) phospholipids
E) saturated fats
Answer: C
Topic: Sec. 2.7
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

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35) Proteins are polymers created with _____ through 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
Bloom's: Remembering/Understanding
LO: 2.8
GLO: G1

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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
Bloom's: Remembering/Understanding
LO: 2.8
GLO: G1

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
Bloom's: Remembering/Understanding
LO: 2.8
GLO: G1

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38) Which one of the following is a possible 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) directly provides energy for a muscle contraction
Answer: B
Topic: Sec. 2.8
Bloom's: Remembering/Understanding
LO: 2.8
GLO: G1

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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
Bloom's: Remembering/Understanding
LO: 2.8
GLO: G1

40) Proteins that function as a catalyst
A) slow down the speed at which chemical reactions occur.
B) speed up chemical reactions by altering the final products formed.
C) alter their primary structure every time they act.
D) can bind products to form reactants.
E) are referred to as enzymes.
Answer: E
Topic: Sec. 2.8
Bloom's: Remembering/Understanding
LO: 2.8
GLO: G1

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41) 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
Bloom's: Remembering/Understanding
LO: 2.9
GLO: G1

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42) 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
Bloom's: Remembering/Understanding
LO: 2.9
GLO: G1

43) 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
Bloom's: Applying/Analyzing
LO: 2.9
GLO: G2

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44) Which one of the following is TRUE regarding nucleotides?
A) There are three different kinds of 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, phosphate, and cytosine.
Answer: D
Topic: Sec. 2.9
Bloom's: Remembering/Understanding
LO: 2.9
GLO: G1

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45) Which one of the following occurs when the outermost 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 to do work for the cell.
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
Bloom's: Remembering/Understanding
LO: 2.10
GLO: G2

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) water
Answer: B
Topic: Sec. 2.6, 2.7, 2.8, 2.9
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Bloom's: Applying/Analyzing
LO: 2.6-2.9
GLO: G7

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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) water
Answer: C
Topic: Sec. 2.6, 2.7, 2.8, 2.9
Bloom's: Applying/Analyzing
LO: 2.6-2.9
GLO: G7

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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
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

2) All matter is made up of atoms.
Answer: TRUE
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

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
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

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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
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

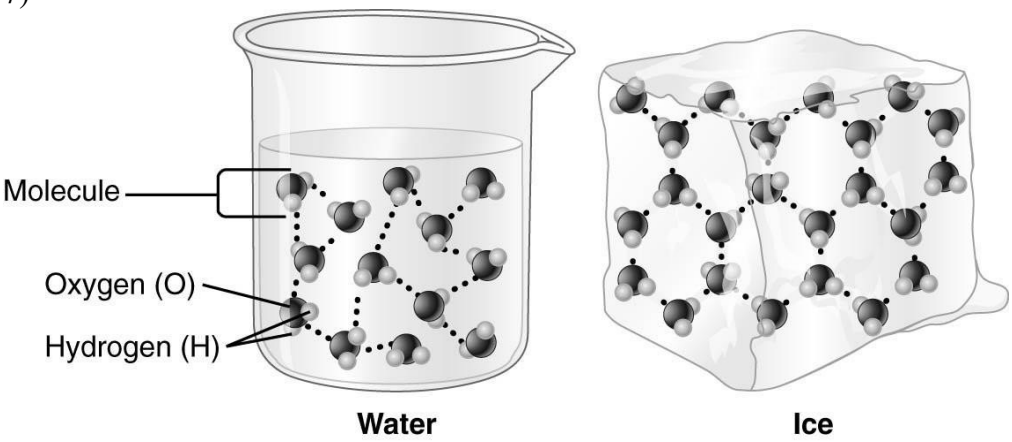
5) Lipids stored in the body are an example of potential energy.
Answer: TRUE
Topic: Sec. 2.2, 2.7
Bloom's: Applying/Analyzing
LO: 2.2, 2.7
GLO: G1

6) When water is released from a dam, potential energy is converted to chemical energy.
Answer: FALSE
Topic: Sec. 2.2
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G1

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7)



The type of bond indicated by the dotted lines in the accompanying figure is a hydrogen bond.
Answer: TRUE
Topic: Sec. 2.3
Bloom's: Remembering/Understanding
LO: 2.3
GLO: G1

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
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Topic: Sec. 2.3
Bloom's: Remembering/Understanding
LO: 2.3
GLO: G1

9) Despite generating a lot of heat, your body temperature rises only modestly during intense exercise because water does not hold heat very well and quickly releases heat energy into the environment.
Answer: FALSE
Topic: Sec. 2.3
Bloom's: Remembering/Understanding
LO: 2.3
GLO: G1

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
Bloom's: Remembering/Understanding
LO: 2.4
GLO: G1

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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
Bloom's: Remembering/Understanding
LO: 2.4
GLO: G2

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
Bloom's: Remembering/Understanding
LO: 2.5
GLO: G1

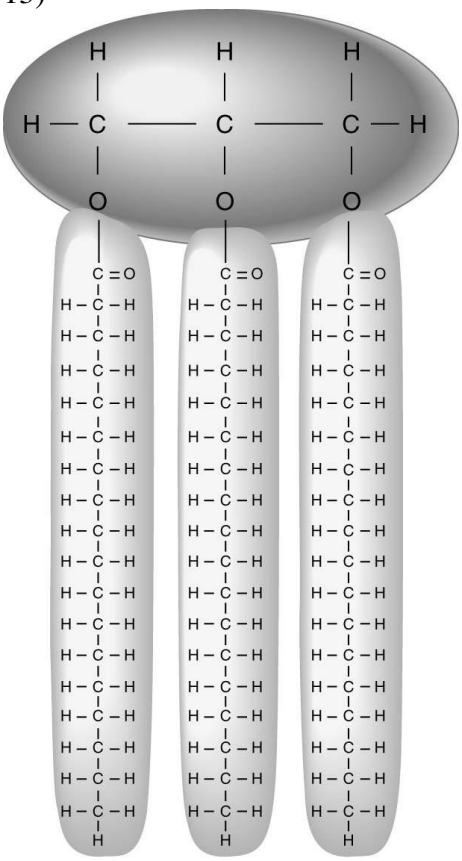
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13)



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

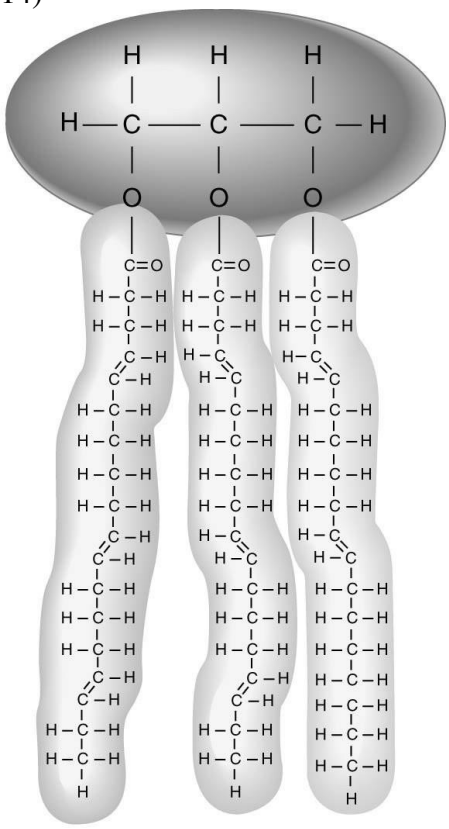
The accompanying figure shows a triglyceride that is a type of oil.
Answer: FALSE
Topic: Sec. 2.7
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

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14)



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

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The accompanying figure shows a triglyceride that is likely to be liquid at room temperature.
Answer: TRUE
Topic: Sec. 2.7
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

15) If your blood pH is lowered significantly, many proteins will not be able to fold correctly. The result could be decreased enzyme function throughout the body.
Answer: TRUE
Topic: Sec. 2.8
Bloom's: Applying/Analyzing
LO: 2.8
GLO: G2, G7

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

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1) a component of an atom that carries a positive charge
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

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2) the smallest unit of matter that can take part in a chemical reaction
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

3) anything that has mass and occupies space
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

4) attractive forces between atoms in molecules
Topic: Sec. 2.2
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G1

5) different forms of the same element that differ in their number of neutrons
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

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6) steroids, triglycerides
Topic: Sec. 2.7
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

7) matter that cannot be broken down
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

8) DNA, RNA
Topic: Sec. 2.9
Bloom's: Remembering/Understanding
LO: 2.9
GLO: G1

9) water, sodium chloride, carbon dioxide
Topic: Sec. 2.2
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G2

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10) alanine, glycine, cysteine
Topic: Sec. 2.8
Bloom's: Remembering/Understanding
LO: 2.8
GLO: G1

11) glucose, cellulose, glycogen
Topic: Sec. 2.6
Bloom's: Remembering/Understanding
LO: 2.6
GLO: G1

12) part of an atom that may participate in bonding with another atom
Topic: Sec. 2.2
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G1

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

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

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

13) a double strand of nucleotides; stores genetic information
Topic: Sec. 2.9
Bloom's: Remembering/Understanding
LO: 2.9
GLO: G1

14) a lipid that stabilizes cell membranes and is a precursor to many hormones
Topic: Sec. 2.7
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

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15) a six-carbon molecule that is the major energy source used by cells
Topic: Sec. 2.6
Bloom's: Remembering/Understanding
LO: 2.6
GLO: G1

16) the major structural polysaccharide produced by plants
Topic: Sec. 2.6
Bloom's: Remembering/Understanding
LO: 2.6
GLO: G1

17) a molecule consisting of glycerol and fatty acids that have two hydrogen atoms per carbon atom
Topic: Sec. 2.7
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

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18) a polysaccharide stored in the human body
Topic: Sec. 2.6
Bloom's: Remembering/Understanding
LO: 2.6
GLO: G1

19) a strand of 3 to 100 amino acids
Topic: Sec. 2.8
Bloom's: Remembering/Understanding
LO: 2.8
GLO: G1

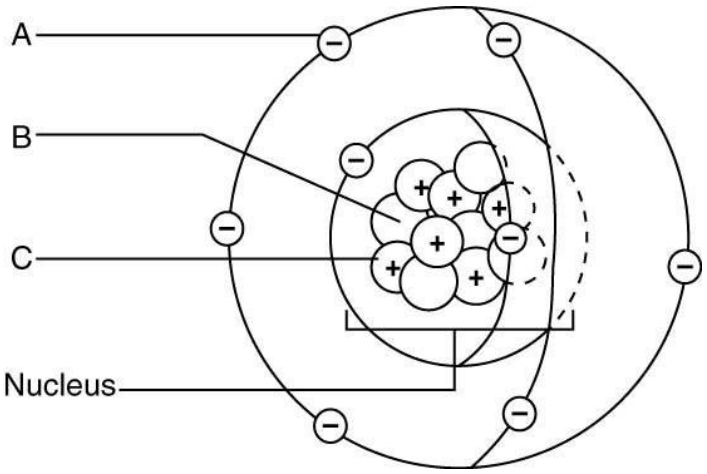
20) a triglyceride that has double bonds in its fatty acids
Topic: Sec. 2.7
Bloom's: Remembering/Understanding
LO: 2.6
GLO: G1

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

2.4 Short Answer Questions

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

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1) The subatomic particles _____ and _____ have approximately the same mass.
Answer: B; C (C; B)
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

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2) Isotopes of this element would differ in the number of _____.
Answer: B
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

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
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

4) The label _____ points to a neutron.
Answer: B
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

5) In order for this atom to develop a positive charge, it would have to lose _____.
Answer: A
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Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

6) The number of subatomic particles _____ is the atomic number of that atom.
Answer: C
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

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
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

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8) The pure form of matter that cannot be broken down into a simpler form is a(n) _____.
Answer: element
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

9) Protons and neutrons are located in the _____ of an atom.
Answer: nucleus
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

10) The outermost electron _____ of an atom can interact with other atoms to form a molecule.
Answer: shell
Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

11) Isotopes that give off energy and emit particles are known as _____.
Answer: radioisotopes
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Topic: Sec. 2.1
Bloom's: Remembering/Understanding
LO: 2.1
GLO: G1

12) Water held behind a dam has a large amount of _____ energy.
Answer: potential
Topic: Sec. 2.2
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G1

13) An electrically charged molecule or atom is a(n) _____.
Answer: ion
Topic: Sec. 2.2
Bloom's: Remembering/Understanding
LO: 2.2
GLO: G1

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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
Bloom's: Remembering/Understanding
LO: 2.3
GLO: G1

15) Water can _____ heat to help prevent rapid body temperature changes.
Answer: absorb
Topic: Sec. 2.3
Bloom's: Applying/Analyzing
LO: 2.2
GLO: G2

16) Molecules that give up or donate hydrogen ions are _____.
Answer: acids
Topic: Sec. 2.3
Bloom's: Remembering/Understanding
LO: 2.3
GLO: G1

17) The acidity or alkalinity of a solution can be measured in terms of _____.
Answer: pH
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Topic: Sec. 2.4
Bloom's: Remembering/Understanding
LO: 2.4
GLO: G1

18) Which solution has more free hydrogen ions: pH = 9 or pH = 3?
Answer: pH = 3
Topic: Sec. 2.4
Bloom's: Applying/Analyzing
LO: 2.4
GLO: G1

19) The pH of human blood falls within a(n) _____ pH range that is near 7.4.
Answer: neutral
Topic: Sec. 2.4
Bloom's: Remembering/Understanding
LO: 2.4
GLO: G1

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20) A substance that helps to maintain a stable pH is a(n) _____.
Answer: buffer
Topic: Sec. 2.4
Bloom's: Remembering/Understanding
LO: 2.4
GLO: G1

21) Living organisms covalently link smaller molecules to synthesize large organic molecules called _____.
Answer: macromolecules
Topic: Sec. 2.5
Bloom's: Remembering/Understanding
LO: 2.5
GLO: G1

22) The process by which cells break down organic macromolecules into their subunits is _____.
Answer: hydrolysis
Topic: Sec. 2.5
Bloom's: Remembering/Understanding
LO: 2.5
GLO: G1

23) Plants produce a polysaccharide made of glucose known as _____, which is virtually indigestible by most animals.
Answer: cellulose
Topic: Sec. 2.6
Bloom's: Remembering/Understanding
LO: 2.6
GLO: G1

24) In order for a cell to produce a triglyceride, it must have one molecule of _____ and three _____.
Answer: glycerol; fatty acids
Topic: Sec. 2.7
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

25) A diet rich in _____ fat is believed to contribute to the development of cardiovascular disease.
Answer: saturated
Topic: Sec. 2.7
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

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26) The structure of a cell membrane includes a modified form of lipid called a(n) _____.
Answer: phospholipid
Topic: Sec. 2.7
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

27) Lipid molecules composed of four joined carbon rings, such as cholesterol, are known as _____.
Answer: steroids
Topic: Sec. 2.7
Bloom's: Remembering/Understanding
LO: 2.7
GLO: G1

28) 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
Bloom's: Remembering/Understanding
LO: 2.8
GLO: G1

29) 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
Bloom's: Remembering/Understanding
LO: 2.8
GLO: G1

30) The molecule that an enzyme reacts with is a(n) _____.
Answer: substrate (reactant)
Topic: Sec. 2.8
Bloom's: Remembering/Understanding
LO: 2.8
GLO: G1

31) The molecule that stores the set of instructions of a cell and directs everything a cell does is _____.
Answer: DNA
Topic: Sec. 2.9
Bloom's: Remembering/Understanding
LO: 2.9
GLO: G1

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32) The four nucleotides that make up DNA contain a sugar component called _____.
Answer: deoxyribose
Topic: Sec. 2.9
Bloom's: Remembering/Understanding
LO: 2.9
GLO: G1

33) The universal energy source for cells is a nucleotide known as _____.
Answer: ATP
Topic: Sec. 2.10
Bloom's: Remembering/Understanding
LO: 2.10
GLO: G1

2.5 Essay Questions

1) Explain how water in the human body helps to regulate body temperature during 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.
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Topic: Sec. 2.3
Bloom's: Applying/Analyzing
LO: 2.3
GLO: G2, G5, G8

2) 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. Humans require tightly regulated homeostasis because even relatively modest changes in blood pH can have devastating consequences.
Topic: Sec. 2.4
Bloom's: Applying/Analyzing
LO: 2.4
GLO: G2, G8

3) 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
Bloom's: Applying/Analyzing
LO: 2.8
GLO: G2, G7, G8

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