Multiple Choice Questions

1. Saturated fatty acids and unsaturated fatty acids differ in
   A. the number of carbon-to-carbon bonds.
   B. the consistency at room temperature.
   C. the number of hydrogen atoms present.
   D. all of the choices are differences between saturated and unsaturated fatty acid.

   All of the choices are differences between saturated and unsaturated fatty acid.

Bloom's Level: 2. Understand
Learning Outcome: 03.03.02 Distinguish between saturated and unsaturated fatty acids.
Section: 03.03
Topic: Lipids

2. Which of the following carbohydrates would NOT be a molecule used for energy storage?
   A. starch
   B. cellulose
   C. glycogen
   D. All of the above are used for energy storage

Bloom's Level: 2. Understand
Learning Outcome: 03.02.03 Compare the energy and structural uses of starch, glycogen, and cellulose.
Section: 03.02
Topic: Carbohydrates
3. The lipids of the cell membrane and the lipids found in butter and vegetable oil differ in which of the following?
   A. the number of fatty acids attached to the glycerol molecule
   B. the glycerol molecule
   C. the carbon to carbon bonds
   D. lipids of the cell membrane do not have hydrophobic sections of the molecule

   The lipids of the cell membrane and the lipids found in butter and vegetable oil differ in the number of fatty acids attached to the glycerol molecule.

   Bloom's Level: 2. Understand
   Learning Outcome: 03.03.03 Contrast the structures of fats, phospholipids, and steroids.
   Section: 03.03
   Topic: Lipids

4. Which functional group will attach to a hydrocarbon chain to form alcohol?
   A. hydroxyl
   B. carbonyl
   C. carboxyl
   D. amino
   E. phosphate

   Bloom's Level: 1. Remember
   Learning Outcome: 03.01.02 Explain the relationship between a functional group and the chemical reactivity of an organic molecule.
   Section: 03.01
   Topic: Chemical Reactions

5. Organic molecules are those that contain at least
   A. carbon.
   B. carbon and oxygen.
   C. carbon and hydrogen.
   D. carbon, oxygen, and hydrogen.

   Organic molecules are those that contain at least carbon and hydrogen.

   Bloom's Level: 1. Remember
   Learning Outcome: 03.01.01 Explain how the properties of carbon enable it to produce diverse organic molecules.
   Section: 03.01
   Topic: Chemical Reactions
6. The differences between organic and inorganic molecules do not follow simple absolute rules. However, most organic molecules are associated with living organisms. Which of the following statements does NOT correspond to the general distinctions between these types of molecules?

A. Carbon dioxide (CO\(_2\)) lacks hydrogen atoms found in organic molecules.
B. Formaldehyde (CH\(_2\)O) is a small molecule compared to most organic molecules.
C. Salt (Na\(^+\)Cl\(^-\)) is not an organic molecule but is important to the life of many organisms.
D. Because they are in living organisms, organic carbon atoms are different from the inorganic carbon atoms forming the molecular structure of soot or a diamond.

Bloom's Level: 2. Understand
Learning Outcome: 03.01.01 Explain how the properties of carbon enable it to produce diverse organic molecules.
Section: 03.01
Topic: Chemical Reactions

7. A hydrocarbon is hydrophobic
A. at all times.
B. only in the living cell environment.
C. except when it has an attached ionized functional group.
D. in carbohydrates but not in lipids.

A hydrocarbon is hydrophobic except when it has an attached ionized functional group.

Bloom's Level: 2. Understand
Learning Outcome: 03.01.01 Explain how the properties of carbon enable it to produce diverse organic molecules.
Section: 03.01
Topic: Chemical Reactions
8. What term is used for molecules that have identical molecular formulas but the atoms in each molecule are arranged differently?
   A. isotope
   B. isomer
   C. homomolecules
   D. organic
   E. balanced

Molecules that have identical molecular formulas but different molecular configurations are isomers.

Bloom's Level: 1. Remember
Learning Outcome: 03.01.01 Explain how the properties of carbon enable it to produce diverse organic molecules.
Section: 03.01
Topic: Chemical Reactions

Short Answer Questions

9. What is the molecular formula of these molecules? How do these molecules differ? Are these the same molecule?

These are different molecules, glyceraldehyde on the left and dihydroxyacetone on the right. They are structural isomers, having the same molecular formulas but different structural formulas.

Bloom's Level: 4. Analyze
Learning Outcome: 03.01.01 Explain how the properties of carbon enable it to produce diverse organic molecules.
Section: 03.01
Topic: Chemical Reactions
Multiple Choice Questions

10. Identify the following molecule:

A. amino acid  
B. hydrocarbon  
C. carbohydrate  
D. alcohol  
E. cholesterol

This molecule is cholesterol.

Bloom's Level: 1. Remember  
Learning Outcome: 03.03.03 Contrast the structures of fats, phospholipids, and steroids.  
Section: 03.03  
Topic: Lipids
11. Glucose (C₆H₁₂O₆) can exist as both an open-chain form and a closed-ring form. Before 1900, glucose was only thought to occur as an open chain. Now we know that over 99 percent of the time, glucose occurs in the closed-ring form. What possible difference between these forms would give chemists a clue that the open-chain form was not present?

A. Open-chain molecules can form polymers and glucose does not.
B. Only open-chain forms can undergo condensation, which does not occur with glucose.
C. An open chain presents ends with functional groups (in this case aldehyde), and glucose failed to undergo typical aldehyde reactions; a phenomenon that could be explained by having no end functional group in a ring structure.
D. Because glucose is solid at room temperature, it must have saturated hydrocarbon chains.
E. Glucose could not be "denatured" so it must be a tight chain.

An open chain presents ends with functional groups (in this case aldehyde), and glucose failed to undergo typical aldehyde reactions; a phenomenon that could be explained by having no end functional group in a ring structure.

Bloom's Level: 3. Apply
Learning Outcome: 03.02.02 Distinguish among the forms of carbohydrates.
Section: 03.02
Topic: Carbohydrates

12. What is the molecular formula for 5 glucose molecules?
A. C₃₀H₅₀O₂₅
B. C₃₀H₆₀O₃₀
C. C₃₀H₅₂O₂₆
D. C₆H₂₄O₁₂

C₃₀H₅₂O₂₆ is the molecular formula for 5 glucose molecules. C₆H₁₂O₆ is multiplied by 5 to equal C₃₀H₆₀O₃₀. There are four bonds formed through dehydration synthesis to form the chain of 5 glucoses. One water is removed with the formation of each bond to equal: H₈O₄. Subtract H₈O₄ from C₃₀H₆₀O₃₀ to equal C₃₀H₅₂O₂₆.

Bloom's Level: 4. Analyze
Learning Outcome: 03.02.02 Distinguish among the forms of carbohydrates.
Section: 03.02
Topic: Carbohydrates
13. A polysaccharide is a polymer made up of which kind of monomers?
A. simple sugars  
B. amino acids  
C. nucleotides  
D. alternating sugar and phosphate groups  
E. fatty acids and glycerol

*Bloom's Level: 1. Remember  
Learning Outcome: 03.02.03 Compare the energy and structural uses of starch, glycogen, and cellulose.  
Section: 03.02  
Topic: Carbohydrates*

14. A lipid is a polymer made up of which kind of monomers?
A. glucose or modified glucose molecules  
B. amino acids  
C. nucleotides  
D. alternating sugar and phosphate groups  
E. fatty acids and glycerol

A lipid is a polymer made of monomers of fatty acids and glycerol.

*Bloom's Level: 1. Remember  
Learning Outcome: 03.03.03 Contrast the structures of fats, phospholipids, and steroids.  
Section: 03.03  
Topic: Lipids*

15. A dehydration reaction can also be called a (an) __________ reaction since it forms water.
A. condensation  
B. hydrolysis  
C. isomeric  
D. an energy-releasing  
E. monomer formation

A dehydration reaction can also be called a condensation reaction since it forms water.

*Bloom's Level: 1. Remember  
Learning Outcome: 03.01.03 Compare the role of dehydration synthesis and hydrolytic reactions in organic chemistry.  
Section: 03.01  
Topic: Chemical Reactions*
16. Which of the following are structural carbohydrate molecules?
A. starch and glycogen
B. starch and cellulose
C. glycogen and cellulose
D. cellulose and chitin
E. glycogen and chitin

Cellulose and chitin are structural carbohydrate molecules.

Bloom's Level: 2. Understand
Learning Outcome: 03.02.03 Compare the energy and structural uses of starch, glycogen, and cellulose.
Section: 03.02
Topic: Carbohydrates

17. Which carbohydrate is found in the cell walls of plants?
A. starch
B. chitin
C. cellulose
D. glycogen
E. glycerol

Cellulose is the carbohydrate found in the cell walls of plants.

Bloom's Level: 1. Remember
Learning Outcome: 03.02.02 Distinguish among the forms of carbohydrates.
Section: 03.02
Topic: Carbohydrates
18. Which carbohydrate is used in the liver for energy storage?
A. starch
B. chitin
C. cellulose
D. glycogen
E. glycerol

Glycogen is used in the liver for energy storage.

Bloom's Level: 1. Remember
Learning Outcome: 03.02.03 Compare the energy and structural uses of starch, glycogen, and cellulose.
Section: 03.02
Topic: Carbohydrates

19. Which carbohydrate is found in the exoskeleton of insects and crabs?
A. starch
B. chitin
C. cellulose
D. glycogen
E. glycerol

Chitin is found in the exoskeleton of insects and crabs.

Bloom's Level: 1. Remember
Learning Outcome: 03.02.02 Distinguish among the forms of carbohydrates.
Section: 03.02
Topic: Carbohydrates
20. Identify this molecule:

```
\[ \text{\includegraphics[width=2cm]{molecule.png}} \]
```

A. amino acid  
B. hydrocarbon  
C. carbohydrate  
D. alcohol  
E. lipid

This molecule is a carbohydrate. It may easily be identified by confirming the C:H:O ratio as 1:2:1.

_Bloom’s Level: 4. Analyze_  
_Learning Outcome: 03.02.02 Distinguish among the forms of carbohydrates._  
_Section: 03.02_  
_Topic: Carbohydrates_

21. If an animal needed to store energy for long-term use, but not be encumbered with the weight of extra tissue, which is the best molecule for storage?

A. fructose and glucose in the form of honey  
B. high-calorie fat molecules  
C. complex cellulose molecules  
D. starch  
E. glycogen with extensive side branches of glucose

If an animal needed to store energy for long-term use, but not be encumbered with the weight of extra tissue, the best molecules for storage are high calorie fat molecules.

_Bloom’s Level: 3. Apply_  
_Learning Outcome: 03.03.01 Describe why lipids are essential to living organisms._  
_Section: 03.03_  
_Topic: Lipids_
22. A peptide bond is found in which type of biological molecule?
A. carbohydrate  
B. lipid  
C. nucleic acid  
D. protein

A peptide bond is found in protein molecules.

Bloom's Level: 1. Remember  
Learning Outcome: 03.04.02 Explain how a polypeptide is constructed from amino acids.  
Section: 03.04  
Topic: Proteins

23. The alpha helix and beta sheet are found at which level of protein organization?
A. primary structure  
B. secondary structure  
C. tertiary structure  
D. quaternary structure

The alpha helix and beta sheet are the secondary structure of a protein.

Bloom's Level: 2. Understand  
Learning Outcome: 03.04.03 Compare the four levels of protein structure.  
Section: 03.04  
Topic: Proteins
24. After eating eggs for breakfast, you return in the evening, dunk the dirty dishes in water, and notice the yellow streaks remain "dried on." However, after soaking awhile, the complex of various egg yolk molecules easily "washes off." What has happened?

A. Heating denatured the egg protein molecules, hydrolysis reactions then formed bonds in the dried egg, and soaking in water eventually resulted in condensation reactions where water broke these bonds.

B. Heating denatured the egg protein molecules, unorganized condensation reactions then formed bonds in the drying egg, and soaking in water eventually resulted in hydrolysis reactions where water broke these bonds.

C. The egg monomers were fused to become one polymer, which was easily dissolved by water back into monomers.

D. The presence or absence of water changes the molecules from hydrophilic to hydrophobic respectively.

E. The addition of water converted organic molecules into inorganic molecules.

Heating denatured the egg protein molecules, unorganized condensation reactions then formed bonds in the drying egg, and soaking in water eventually resulted in hydrolysis reactions where water broke these bonds.

_Bloom’s Level: 5. Evaluate_
_Learning Outcome: 03.04.04 Understand the factors that affect protein structure and function._
_Section: 03.04_
_Topic: Proteins_
25. Below freezing and above boiling, cells are unable to function as "liquid machinery." However, most organisms' cells are still limited from functioning throughout this full range of liquid temperatures. At the molecular level in different organisms, cells' ability to vary in their tolerance to temperature, etc., is most closely related to variation in **A.** enzyme activity and protein denaturation.  
**B.** ATP efficiency.  
**C.** ability to form glucose polymers.  
**D.** replication of nucleic acids.  
**E.** extent of saturation of fatty acids.

At the molecular level in different organisms, cells' ability to vary in their tolerance to temperature, etc., is most closely related to variation in enzyme activity and protein denaturation.

---

26. Which of these statements is NOT true about DNA?  
**A.** It is the genetic material of the cell.  
**B.** It forms a double helix.  
**C.** Adenine pairs with thymine and guanine pairs with cytosine.  
**D.** It contains the sugar ribose.  
**E.** The sugar and phosphate groups form the backbone of the molecule.

---

*Bloom's Level: 3. Apply  
Learning Outcome: 03.04.04 Understand the factors that affect protein structure and function.  
Section: 03.04  
Topic: Proteins*

*Bloom's Level: 1. Remember  
Learning Outcome: 03.05.02 Compare the structure and function of DNA and RNA nucleic acids.  
Section: 03.05  
Topic: Nucleic Acids*
27. Fish sperm is composed mostly of the male fish's DNA. If we tested a sample chemically, we should find relatively high amounts of 
A. nitrogenous bases, sugar, and phosphate groups.  
B. phospholipids and steroids.  
C. amino acids and unsaturated fats.  
D. triglycerides and ATP.  
E. globular proteins and stored fats.  

DNA contains high amounts of nitrogenous bases, sugar, and phosphate groups.  

Bloom's Level: 1. Remember  
Learning Outcome: 03.05.02 Compare the structure and function of DNA and RNA nucleic acids.  
Section: 03.05  
Topic: Nucleic Acids

28. Which statement is true about RNA?  
A. It contains adenine paired to thymine.  
B. One of the bases from DNA is replaced by uracil.  
C. It contains the sugar deoxyribose.  
D. Its nucleotides contain twice as many phosphate groups as DNA's nucleotides.  
E. It is a double-stranded molecule.  

In RNA, one of the bases from DNA is replaced by uracil.  

Bloom's Level: 2. Understand  
Learning Outcome: 03.05.02 Compare the structure and function of DNA and RNA nucleic acids.  
Section: 03.05  
Topic: Nucleic Acids
Chapter 03 - The Chemistry of Organic Molecules

29. The reactivity of an organic molecule is primarily dependent upon ____________ of the molecule.  
A. the carbon skeleton  
**B.** the attached functional groups such as a hydroxyl group  
C. the isomer  
D. All of the choices are correct.

The reactivity of an organic molecule is primarily dependent on the attached functional group of the molecule.

*Bloom's Level: 1. Remember*  
*Learning Outcome: 03.01.02 Explain the relationship between a functional group and the chemical reactivity of an organic molecule.*  
*Section: 03.01*  
*Topic: Chemical Reactions*

30. Which Figure is that of an unsaturated fat?

![Figure A](image1.png)  
![Figure B](image2.png)

A. Figure A  
B. Figure B

Figure A is an unsaturated fat. It has double bonds between some of the carbon atoms.  
Figure B is a saturated fat with all single bonds between the carbon atoms.

*Bloom's Level: 4. Analyze*  
*Learning Outcome: 03.03.02 Distinguish between saturated and unsaturated fatty acids.*  
*Section: 03.03*  
*Topic: Lipids*
31. A saturated fat  
A. is often solid at room temperature.  
B. has fatty acids with no double bonds between the carbon atoms.  
C. is of animal origin.  
D. All of the choices are correct.  

A saturated fat is often solid at room temperature, has fatty acids with no double bonds between the carbon atoms, and is of animal origin.

_Bloom's Level: 1. Remember_  
_Learning Outcome: 03.03.02 Distinguish between saturated and unsaturated fatty acids._  
_Section: 03.03_  
_Topic: Lipids_

32. A polypeptide has an amino acid sequence of: alanine-leucine-tryptophane-glycien-valine-alanine.  
This chain of amino acids is further organized into a helix that in-turn, folds in and around itself to form a globular structure. The primary structure of this polypeptide is  
A. globular.  
B. pleated-sheet.  
C. alpha helix.  
D. alanine-leucine-tryptophane-glycien-valine-alanine.

_Bloom's Level: 3. Apply_  
_Learning Outcome: 03.04.02 Explain how a polypeptide is constructed from amino acids._  
_Section: 03.04_  
_Topic: Proteins_
33. How many molecules of water are used to degrade this polypeptide, using hydrolysis reactions, into its constituent amino acids: alanine-leucine-tryptophane-glycine-valine-alanine?
A. six
B. five
C. one
D. seven

Five molecules of water are used in hydrolysis reactions to degrade this polypeptide. One water for each broken bond.

*Bloom's Level: 4. Analyze
Learning Outcome: 03.01.03 Compare the role of dehydration synthesis and hydrolytic reactions in organic chemistry.
Section: 03.01
Topic: Proteins*

**Essay Questions**

34. A strand of DNA has the following base sequence (genetic code): ATTGCGAATGGCA. Construct the complementary strand of DNA.

Adenine and thymine and cytosine and guanine are complementary base pairs. The complementary strand has the sequence: TAACGCTTACCGT.

*Bloom's Level: 6. Create
Learning Outcome: 03.05.02 Compare the structure and function of DNA and RNA nucleic acids.
Section: 03.05
Topic: Nucleic Acids*
35. Construct a portion of cell membrane using the typical phospholipid symbol. Indicate the location of the cytoplasm and outside of the cell. Explain how the chemical characteristics of phospholipids molecules dictate membrane structure and cause it to be fluid in nature.

A phospholipids bilayer forms due to the chemical nature of phospholipids molecules - both polar and nonpolar regions. The hydrophilic head are attracted to aqueous regions of the cytoplasm and extracellular fluid (or outside the cell). The hydrophobic tails cluster away from the aqueous regions. Kinks in the tails due to unsaturated bonds increase the fluidity of the bilayer.

36. The feet of penguins and reindeer contain large amounts of unsaturated triglycerides. Why would these animals have these fats in their feet rather than saturated fats?

Triglycerides containing fatty acids with unsaturated bonds melt at a lower temperature than those containing only saturated fatty acids. An abundance of polyunsaturated fats helps to protect the organism from freezing in colder climates.
37. Chitin and cellulose are molecules that do not spontaneously break down but can be digested by bacteria and some other microorganisms. Since carbon is not among the most common elements in the earth's crust, what would happen if all of the chitin-digesting and cellulose-digesting organisms on the earth were destroyed?

Answers may vary. When chitin and cellulose containing organisms are decomposed the carbon may be recycled as carbon dioxide if oxygen is present or methane if there is no oxygen available. Inorganic elements are returned to the soil. If there are no decomposers, the carbon would remain as undigested chitin and cellulose. This would alter the carbon cycle and would leave undigested, dead organisms everywhere. In addition, the carbon available for the building of new life would decrease.

Bloom's Level: 5. Evaluate
Learning Outcome: 03.02.02 Distinguish among the forms of carbohydrates.
Section: 03.02
Topic: Carbohydrates

38. Do disaccharide isomers exist? If so, describe how they are formed.

Two glucose molecules (each C₆H₁₂O₆) undergo a dehydration reaction to form maltose (C₁₂H₂₂O₁₁). A glucose molecule and a fructose molecule (each C₆H₁₂O₆) undergo a dehydration reaction to form sucrose (C₁₂H₂₂O₁₁). A glucose and a galactose molecule (each C₆H₁₂O₆) undergo a dehydration reaction to form lactose (C₁₂H₂₂O₁₁). The three disaccharides are isomers, having the same molecular formulas but different structures.

Bloom's Level: 5. Evaluate
Learning Outcome: 03.01.03 Compare the role of dehydration synthesis and hydrolytic reactions in organic chemistry.
Section: 03.01
Topic: Carbohydrates
Multiple Choice Questions

39. Choose the Figure that depicts polymer synthesis.

A. Figure 1
B. Figure 2

Figure 2 depicts a polymer being hydrolyzed. In degradation, the monomers in a polymer separate during a hydrolysis reaction. A bond is broken as water is added.

Bloom's Level: 4. Analyze
Learning Outcome: 03.01.03 Compare the role of dehydration synthesis and hydrolytic reactions in organic chemistry.
Section: 03.01
Topic: Chemical Reactions

40. If a segment of DNA has 20% adenine in its base composition, what percent thymine is there?
A. 20%
B. 80%
C. 60%
D. 30%

Adenine and thymine are complementary base pairs. Since adenine bonds to thymine in DNA, the amount of thymine is the same, 20%.

Bloom's Level: 3. Apply
Learning Outcome: 03.05.02 Compare the structure and function of DNA and RNA nucleic acids.
Section: 03.05
Topic: Nucleic Acids
Short Answer Questions

41. If a certain segment of DNA has 30% adenine in its base composition, what percentage of guanine will there be?

Adenine and thymine are complementary base pairs. Since adenine bonds to thymine in DNA, the amount of thymine is the same, 30% also. This means the pyrimidines, adenine and thymine would be 60% of the base composition. Therefore, the purines, guanine and cytosine make up 40% of the base composition. Since guanine and cytosine are complementary base pairs, their individual concentrations should be equal, and half of the total purine concentration. Divide 40% by 2 to get 20%. Guanine is 20% of the base pair composition.

True / False Questions

42. Carbon can form covalent bonds with as many as four other atoms.

TRUE

It is true that carbon can form covalent bonds with as many as four other atoms.
43. Waxes consist of a glycerol bonded to three long-chain fatty acids. **FALSE**

Triglycerides are composed of glycerol and three fatty acids. Waxes are long-chain fatty acids bonded with long-chained alcohols.

*Bloom's Level: 1. Remember
Learning Outcome: 03.03.03 Contrast the structures of fats, phospholipids, and steroids.
Section: 03.03
Topic: Lipids*

44. ATP is a protein that supplies energy to the cell. **FALSE**

ATP is a nucleotide-based molecule that supplies energy to the cell.

*Bloom's Level: 2. Understand
Learning Outcome: 03.05.03 Explain how ATP is able to store energy.
Section: 03.05
Topic: Nucleic Acids*

45. Starch is a protein that serves in energy storage in plant cells. **FALSE**

Starch is a polysaccharide that serves in energy storage in plant cells.

*Bloom's Level: 2. Understand
Learning Outcome: 03.02.03 Compare the energy and structural uses of starch, glycogen, and cellulose.
Section: 03.02
Topic: Carbohydrates*
46. Migratory birds store energy as glycogen which is lighter than fat. **FALSE**

Migratory birds store energy as fat, since gram per gram, fat stores more energy than glycogen.

*Bloom's Level: 2. Understand*

*Learning Outcome: 03.03.01 Describe why lipids are essential to living organisms.*

*Section: 03.03*

*Topic: Lipids*

**Multiple Choice Questions**

47. Which of the following functional groups represents sulfhydryl?
   A. SH
   B. H-N-H
   C. OH
   D. O=C-OH
   E. C=O

Sulfhydryl is represented by the functional group SH.

*Bloom's Level: 2. Understand*

*Learning Outcome: 03.01.02 Explain the relationship between a functional group and the chemical reactivity of an organic molecule.*

*Section: 03.01*

*Topic: Chemical Reactions*
48. Which of the following is a function of a steroid?

A. sex hormone  
B. transmission of genetic information  
C. long term energy storage  
D. insulation against cold  
E. protective layer

Steroids function as sex hormones and as a component of the cell membrane (cholesterol).

Bloom's Level: 2. Understand
Learning Outcome: 03.03.04 Compare the functions of phospholipids and steroids in cells.
Section: 03.03
Topic: Lipids

49. Due to an increased risk of heart disease many doctors have suggested shifting our diet to include more oils instead of fats. As you cook dinner tonight the recipe calls for 2 tbs of oil. What is the most likely source of the oil you should use in preparing your meal?

A. canola or olives  
B. bees wax distilled down to an oil form  
C. melted butter  
D. lard that was left out at room temperature  
E. none of these choices are oils

The most likely source of oil would be canola and olive oils.

Bloom's Level: 2. Understand
Learning Outcome: 03.03.03 Contrast the structures of fats, phospholipids, and steroids.
Section: 03.03
Topic: Lipids
50. Which of the following is NOT a protein function?
A. support
B. transportation
C. defense
D. motion
E. insulation

Proteins function in all of the following except for insulation.

51. Which of the following protein is correctly matched with its function?
A. hemoglobin is found within the red blood cells
B. myosin is found within the ligaments
C. actin is found within the tendons
D. collagen is found within the muscle cells
E. hemoglobin is found within the cell membrane

Hemoglobin is found within the red blood cells.
52. Which of the following protein structures is exemplified by globular proteins?
A. tertiary
B. secondary
C. primary
D. quaternary
E. all of the protein structures are exemplified by globular proteins

the tertiary protein structure is exemplified by globular proteins.

*Bloom's Level: 2. Understand
Learning Outcome: 03.04.03 Compare the four levels of protein structure.
Section: 03.04
Topic: Proteins

53. What are the basic structures that make up a nucleotide?
A. pentose sugar, phosphate and nitrogen-containing base
B. pentose sugar, nitrate and phosphorus-containing base
C. ribose sugar, phosphate and nitrogen-containing base
D. hydroxide group, phosphate and nitrogen-containing base
E. pentose sugar, sodium and nitrogen-containing base

A pentose sugar, phosphate and nitrogen-containing base are the components that make up a nucleotide.

*Bloom's Level: 2. Understand
Learning Outcome: 03.05.01 Distinguish between a nucleotide and nucleic acid.
Section: 03.05
Topic: Nucleic Acids
54. Which of the following structures is classified as a nucleic acid?
A. adenine  
B. RNA  
C. thymine  
D. guanine  
E. cytosine

RNA is a nucleic acid, the rest of the choices are nucleotides, the subunits of nucleic acids.

Bloom's Level: 2. Understand  
Learning Outcome: 03.05.01 Distinguish between a nucleotide and nucleic acid.  
Section: 03.05  
Topic: Nucleic Acids

55. Which statement below correctly describes why ATP is a high energy structure?
A. ATP contains 2 phosphate bonds that contain high levels of energy.  
B. ATP contains hydro-carbon chains that hold energy.  
C. ATP is composed of thymine which is a high energy molecule.  
D. The last two phosphate bonds are unstable and easily broken.  
E. The first phosphate bond is unstable and easily broken.

Bloom's Level: 2. Understand  
Learning Outcome: 03.05.03 Explain how ATP is able to store energy.  
Section: 03.05  
Topic: Nucleic Acids

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