Name _____ Date _____

Macromolecules Unit Review: Carbohydrates, Lipids, Proteins and Nucleic Acids

Directions: Answer each question about macromolecules, including a group of questions on a table of food test results.

1. Hemoglobin, antibodies and most enzymes all belong to which class of macromolecules?

A. Nucleic acids B. Lipids C. Proteins D. Carbohydrates

2. Match each large molecule to the smaller units it is built from.

Write the letter of the matching answer on each line.

1. _____ A fat (triglyceride)
2. _____ DNA
3. _____ Starch
4. _____ A protein

A. One glycerol and three fatty acids
B. Amino acids
C. Many glucose molecules
D. Nucleotides
E. A long chain of fatty acids only

3. Use the word bank to name each reaction.

Word bank

hydrolysis • photosynthesis • diffusion • dehydration synthesis • denaturation

When two building units join and release a water molecule, the reaction is called _____. When adding a water molecule breaks the bond between two building units, the reaction is called _____.

4. Sucrose, or table sugar, is made of one glucose molecule joined to one fructose molecule. Which kind of carbohydrate is sucrose?

A. A polypeptide B. A monosaccharide C. A polysaccharide D. A disaccharide

5. In which form do your liver and muscle cells store glucose so that it can be used later?

A. Sucrose B. Starch C. Cellulose D. Glycogen

6. Which three of these molecules are lipids?

☐ A. Triglycerides (fats and oils)
☐ B. Glycogen
☐ C. Insulin
☐ D. Cholesterol
☐ E. Phospholipids
☐ F. Cellulose

7. Butter is solid at room temperature, but olive oil is liquid. Which statement explains the difference?

A. Butter is made mostly of protein, while olive oil is made mostly of lipid.
B. Butter's fatty acids are mostly unsaturated and pack tightly, while olive oil's are mostly saturated and bent.
C. Butter's fatty acids are mostly saturated and pack tightly, while olive oil's are mostly unsaturated and bent.
D. Butter is made of fatty acids, while olive oil is made of glycerol alone.

8. A ground squirrel stores most of the energy it needs for its winter hibernation as body fat rather than as glycogen. What is one advantage of storing energy as fat?

A. Fat is built from amino acids, which hold more energy than sugars.
B. Fat dissolves easily in the blood, so it reaches cells quickly.
C. A gram of fat stores more than twice as much energy as a gram of carbohydrate.
D. Fat can release all of its stored energy without any oxygen.

9. Cooking an egg turns the clear, runny egg white into a firm white solid. What happens to the proteins in the egg white?

A. Heat adds water to the proteins, which makes them hard.
B. Heat changes their folded shape without breaking their chains apart.
C. Heat turns the proteins into fats, which are white and solid.
D. Heat turns the proteins into starch, which thickens the egg.

10. Which list names the three parts that make up a nucleotide?

A. An amino group, a carboxyl group and a side chain
B. A five-carbon sugar, a phosphate group and a nitrogen-containing base
C. A glycerol, a phosphate group and two fatty acids
D. A six-carbon sugar, a fatty acid and an amino group

Food Tests on Five Unknown Samples

In a lab, five unknown samples were each tested with iodine solution, Benedict's solution and biuret solution. Each test used 2 mL of sample and 5 drops of reagent, the Benedict's tubes were heated in a hot water bath for 5 minutes, and every test was run twice with the same result.

Color of five unknown samples in three food tests. Iodine turns blue-black when starch is present. Heated Benedict's solution turns green, orange or brick red when glucose or certain other sugars are present. Biuret solution turns violet when protein is present. A reagent that keeps its starting color (yellow-brown for iodine, blue for Benedict's and biuret) gives a negative result.

Sample	Iodine test	Benedict's test (heated)	Biuret test
A	Blue-black	Stayed blue	Stayed blue
B	Stayed yellow-brown	Brick red	Stayed blue
C	Stayed yellow-brown	Stayed blue	Violet
D	Blue-black	Stayed blue	Violet
E	Stayed yellow-brown	Stayed blue	Stayed blue

11. According to the food test results, which sample contained both starch and protein?

A. Sample C B. Sample B C. Sample D D. Sample A

12. Which samples gave no sign of protein in the biuret test?

A. Samples A, D and E B. Samples C and D C. Sample E only D. Samples A, B and E

13. Which conclusion about Sample E do its food test results support?

A. Sample E had no starch, glucose or protein that these tests could detect.
B. Sample E must have been pure water.
C. Sample E contained no nutrients of any kind.
D. Sample E contained fat and nothing else.

14. Suppose Sample A is mixed with amylase, an enzyme that breaks starch into smaller sugars that react with Benedict's solution, and then tested again. Which result is most likely?

A. The Benedict's test would change color, and the iodine test would show less starch than before.
B. The Benedict's test would stay blue, and the iodine test would show more starch than before.
C. The Benedict's test would change color, and the iodine test would show more starch than before.
D. Both tests would give the same results as before, because enzymes cannot break down starch.