

## Organic Molecules Worksheet: Review

Name: \_\_\_\_\_

Page: \_\_\_\_\_

Period: \_\_\_\_\_

### Read through each section and answer the following questions.

Organic molecules are the molecules that exist in all living things. They are life's building blocks. All things are formed from these organic molecules. There are four categories of organic molecules: Carbohydrates, lipids, proteins and nucleic acids.

1. How are organic molecules related to all living organisms? \_\_\_\_\_

---

### 2. Name four categories of organic molecules which form the basis of all living things:

a. \_\_\_\_\_ b. \_\_\_\_\_ c. \_\_\_\_\_ d. \_\_\_\_\_

Organic molecules have four common characteristics. First, they are all carbon based, meaning they all contain carbon. Second, they are formed from just a few elements, which join together to form small molecules, which join together, or bond, to form large molecules. The third characteristic of all organic molecules is that each kind of organic molecule is built from a single type of monomer (building block). For example, the monomer of carbohydrates is sugar, the monomer of lipids is fatty acids, the monomer of protein is amino acids and the monomer of nucleic acids is the nucleotide. When these building blocks are joined together, they form a large molecule (polymer), just as bricks joined together form a wall. For example, sugars join together to form a carbohydrate.

3. All of the organic molecules are based on which element? \_\_\_\_\_

4. Many times, the molecules join to form long chains with what kind of backbone? \_\_\_\_\_

5. How are the monomers of organic molecules like bricks? \_\_\_\_\_

---

6. What is the monomer of each of the four classes of organic molecules?

The monomers of carbohydrates are: \_\_\_\_\_

The monomers of lipids are: \_\_\_\_\_

The monomers of proteins are: \_\_\_\_\_

The monomers of nucleic acids are: \_\_\_\_\_

7. What is a polymer? \_\_\_\_\_

The last common characteristic of all organic molecules is that their form determines their function. That means that their shape determines how they will behave and how they will react with other molecules. For example, the order of amino acids in a protein will determine the shape and function of the protein just as the order of words in a sentence shapes the meaning of the sentence.

8. What determines how organic molecules will look and behave? \_\_\_\_\_

---

9. What are the four common characteristics of all organic molecules?

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

### Carbohydrates

Carbohydrates are the most common organic molecule, because they make up most plant matter. They are made from carbon, hydrogen and oxygen. Their monomer, a single sugar is called a monosaccharide. Sugars (monosaccharides) consist of carbon rings. When two monosaccharides, or sugars, combine, they form a disaccharide (di = two). When **more than two** monosaccharides join together, a polysaccharide (poly = many) is formed.

10. What are the elements contained in carbohydrates? \_\_\_\_\_
11. What is the monomer of carbohydrates? \_\_\_\_\_
12. What is a monosaccharide? \_\_\_\_\_
13. How does a polysaccharide differ from a disaccharide? \_\_\_\_\_

There are three classes of carbohydrate polysaccharides. The first is starch. Starch is a carbohydrate used in food storage in plants. Potatoes, pasta and rice are rich in starch. Starches are very valuable because they provide a quick form of energy for the body. The second is glycogen. Glycogen is used for food storage in animals. The third is cellulose. Cellulose is used for structural support in plants (stems, leaves).

14. What are the three classes of carbohydrates?  
a. \_\_\_\_\_ b. \_\_\_\_\_ c. \_\_\_\_\_
15. Which involves food storage in plants? \_\_\_\_\_
16. Which involves food storage in animals? \_\_\_\_\_
17. What is cellulose used for? \_\_\_\_\_
18. Why would an athlete have a big past dinner the night before a race? \_\_\_\_\_

### Lipids

Lipids are a class of organic molecules that includes fats and oils. Fats and oils function as long-term storage of energy in the body. The monomer of lipids is the fatty acid, which is a chain of carbons with hydrogen attached to each side of the carbon atoms. The head of saturated fats have two carbons attached to each carbon (except the one at the end), are unhealthy fats usually from animal sources, and solid at room temperature. Unsaturated fats are missing at least one hydrogen, are kinked in shape, are healthy and from plant sources, and liquid at room temperature.

19. What is the monomer of lipids? \_\_\_\_\_
20. Name two specific examples of lipids? \_\_\_\_\_
21. Describe the structure of a fatty acid: \_\_\_\_\_

22. What is a saturated fatty acid? \_\_\_\_\_

### Proteins

Proteins are organic molecules that form muscles, transport O<sub>2</sub> (hemoglobin), and act as hormones and enzymes. Most importantly, proteins determine how our bodies look and function. Their monomer is the amino acid. Proteins are made of amino acids linked by a peptide bond. When groups of amino acids are joined together, a protein is formed.

23. What are some of the functions of proteins? \_\_\_\_\_

24. What is the monomer of proteins? \_\_\_\_\_

25. What is the name of the bond that joins amino acids? \_\_\_\_\_

There are about 20 different kinds of amino acids. These amino acids consist of five separate parts: a central carbon atom, a carboxyl group (-COOH), an amino group (NH<sub>2</sub>), a hydrogen, and a "R" group. The only difference in the 20 kinds of amino acids is the "R" group. Some "R" groups are very small, others are large, and others form chains and rings. The sequence and shapes of the "R" groups control the shape and function of the protein.

26. How many different amino acids are there? \_\_\_\_\_

27. What part of the amino acid varies from one amino acid to another? \_\_\_\_\_

28. What determines the shape and function of a protein? \_\_\_\_\_

### Nucleic Acids

The fourth class of organic molecules is the nucleic acids. This class involves the genetic materials, Deoxyribonucleic Acid (DNA) and Ribonucleic Acid (RNA). DNA is the blueprint of life because it contains instructions on how to make proteins in the body. Each individual's DNA is unique, which means that each individual has a unique set of proteins; that is why each of us looks and behaves differently. RNA creates a copy of DNA because DNA cannot leave the cell's nucleus, and because proteins are constructed outside of the nucleus in the cytoplasm – the RNA is necessary to carry the instructions from DNA to the cytoplasm where the protein is made.

What are the two types of nucleic acids? \_\_\_\_\_

What is the role of DNA? \_\_\_\_\_

How does the role of RNA differ from that of DNA? \_\_\_\_\_

The monomer of nucleic acids is the nucleotide. All nucleic acids are formed from a series of these nucleotides. Nucleotides consist of three parts: a five-carbon sugar, a phosphate group and a nitrogen base.

What is the monomer of nucleic acids?

What are the three parts of this monomer?

a. \_\_\_\_\_ b. \_\_\_\_\_ c. \_\_\_\_\_ d. \_\_\_\_\_