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

**Biochemistry Review Worksheet**

**Carbohydrates: C, H, O**



1. This is a glucose molecule, the sugar made in photosynthesis. Saccharides, or sugars, are the building blocks for carbohydrates. What is another term for “building block?” \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Is glucose a monosaccharide, disaccharide or polysaccharide? *- Circle your answer.*

3. The suffix *-ose* means sugar. Is glucose a simple or complex sugar/carbohydrate? *- Circle your answer.*

4. Fructose (found in fruit) is a monosaccharide that supplies energy. Do monosaccharides provide long-term energy ? *or* energy for immediate use? - *Circle your answer.*

5. Sucrose (table sugar) is a disaccharide. What does the prefix “di” mean? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. Do disaccharides, such as sucrose, provide long term or short term energy? - *Circle your answer.*

7. Starch is a glucose polymer. Define the term “polymer:” \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. Glucose monomers join to form the polymer starch through the process of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which includes the loss of a molecule of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at each bond site.

9. Starch is a complex carbohydrate. You tested for its presence with iodine in the lab. What kind of foods contain complex carbs? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. What kind of foods contain simple carbohydrates? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. Complex carbs or polysaccharides function to store energy. What is the name of the plant storage polysaccharide? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *and* What is the name of the animal storage polysaccharide? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. The body will break down complex carbs into simple sugars through the process of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which includes the addition of a water molecule.



13. Carbohydrates also provide structure. Which carbohydrate provides plant cell walls with support (as illustrated in the picture to the left)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Note: another name for this is *fiber*.

14. Chitin is another structural carbohydrate. What is its function?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lipids: C, H, O *and P***

1. Do lipids dissolve in water? - *Answer yes or no*: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. What are some examples of lipids? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 B

A

*Examine the diagram of the lipid at left.*

3. Region A is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. Region B consists of 3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5. Is this molecule saturated *or* unsaturated?

 *- Circle your answer.*

6. Circle the area on the molecule that was your “clue” to question #5.



7. Saturated lipids are “full” or “saturated” with this element: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and are solid at room temperature.

8. One of the functions of lipids is to store energy. Do they store more *or* less energy than carbs? *- Circle your answer.*

9. Phospholipids form this part of a cell: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. Lipids also function in the following ways: insulation, padding for organs, and a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ covering.

11. Cholesterol, estrogen, and testosterone are examples of lipids that act as chemical messengers and are known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Nucleic Acids: C, H, O, N, P**

1. The monomer of a nucleic acid is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



2. This monomer is made up of the following 3 parts:

* \_\_\_\_\_\_\_\_\_ - carbon sugar
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ base
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ group

3. **Label the 3 parts** (from question #2) on the following picture:

4. What are the two types of nucleic acids? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. What is the ***primary*** responsibility of nucleic acids? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Proteins: C, H, O, N**



1. The monomer of a protein called an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. This monomer is made up of an amino group, a carboxyl group and a “R” group which makes each one different. How many different ones are there? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Some proteins form structures. An example is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which forms hair, skin and nails.

4. An example of a functional protein is hemoglobin. What is its job? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Protein hormones regulate various \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

6. Proteins form channels in cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are a type of protein that speed up chemical reactions. This is what they are called in organisms. In general, they are known as “catalysts.”



**Use the picture at right to answer the following questions:**

8. Letter A represents the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. Letter B represents the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. Letter C is the enzyme-substrate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. Letter D represents the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. As you can see in the picture, this chemical reaction resulted in a substrate being changed into two products. So, is this picture showing the process of dehydration synthesis? or hydrolysis? *- Circle your answer.*

13. An enzyme was needed for this reaction. At the bond site, was water added? or lost? *- Circle your answer.*

*Hint: Remember to use your word root knowledge to help you with these questions!*

**14. Examine the graph below and answer questions A - E.** Place your answers in the blanks to the left of the questions.

\_\_\_\_\_\_\_\_\_\_ A. What is the temperature at which enzyme X functions most efficiently?

\_\_\_\_\_\_\_\_\_\_ B. Which enzyme functions well over a broader range of temperatures?

\_\_\_\_\_\_\_\_\_\_ C. Which enzyme would be more practical in an organism that lives in a hot spring?

\_\_\_\_\_\_\_\_\_\_ D. At what temperatures does enzyme Y cease to function?

\_\_\_\_\_\_\_\_\_\_ E. Which enzyme would more likely be found in a human? *Note: 37°C is normal body temperature.*

\_\_\_\_\_\_\_\_\_\_ F. At what temperature do both enzymes have similar activity?

****

 Name: **KEY**

**Biochemistry Review Worksheet**

**Carbohydrates: C, H, O**



1. This is a glucose molecule, the sugar made in photosynthesis. Saccharides, or sugars, are the building blocks for carbohydrates. What is another term for “building block?” **monomer**

2. Is glucose a **monosaccharide**, disaccharide or polysaccharide? *- Circle your answer.*

3. The suffix *-ose* means sugar. Is glucose a **simple** or complex sugar/carbohydrate? *- Circle your answer.*

4. Fructose (found in fruit) is a monosaccharide that supplies energy. Do monosaccharides provide long-term energy ? *or* **energy for immediate use**? - *Circle your answer.*

5. Sucrose (table sugar) is a disaccharide. What does the prefix “di” mean? **two**

6. Do disaccharides, such as sucrose, provide long term or **short term energy**? - *Circle your answer.*

7. Starch is a glucose polymer. Define the term “polymer:” **a molecule made of smaller units, monomers**

8. Glucose monomers join to form the polymer starch through the process of **dehydration synthesis**

which includes the loss of a molecule of **water** at each bond site.

9. Starch is a complex carbohydrate. You tested for its presence with iodine in the lab. What kind of foods contain complex carbs? **potato, pasta, etc.**

10. What kind of foods contain simple carbohydrates? **sugary sweets**

11. Complex carbs or polysaccharides function to store energy. What is the name of the plant storage polysaccharide? **starch** *and* What is the name of the animal storage polysaccharide? **glycogen**

12. The body will break down complex carbs into simple sugars through the process of **hydrolysis** which includes the addition of a water molecule.



13. Carbohydrates also provide structure. Which carbohydrate provides plant cell walls with support (as illustrated in the picture to the left)?

**cellulose**

Note: another name for this is *fiber*.

14. Chitin is another structural carbohydrate. What is its function?

**exoskeleton in arthropods and fungi cell walls**

**Lipids: C, H, O *and P***

1. Do lipids dissolve in water? - *Answer yes or no*: **no**

2. What are some examples of lipids? **fats, oils, waxes and steroids**

 B

A

*Examine the diagram of the lipid at left.*

3. Region A is called **glycerol**.

4. Region B consists of 3 **fatty acids**.

5. Is this molecule saturated *or* **unsaturated**?

 *- Circle your answer.*

6. Circle the area on the molecule that was your “clue” to question #5.



7. Saturated lipids are “full” or “saturated” with this element: **hydrogen** and are solid at room temperature.

8. One of the functions of lipids is to store energy. Do they store **more** *or* less energy than carbs? *- Circle your answer.*

9. Phospholipids form this part of a cell: **cell / plasma membrane**

10. Lipids also function in the following ways: insulation, padding for organs, and a **waterproof** covering.

11. Cholesterol, estrogen, and testosterone are examples of lipids that act as chemical messengers and are known as **hormones.**

**Nucleic Acids: C, H, O, N, P**

1. The monomer of a nucleic acid is called a **nucleotide**.



2. This monomer is made up of the following 3 parts:

* **5** - carbon sugar
* **nitrogenous** base
* **phosphate** group

3. **Label the 3 parts** (from question #2) on the following picture:

4. What are the two types of nucleic acids? **DNA** and **RNA**

5. What is the ***primary*** responsibility of nucleic acids? **store and transmit hereditary information**

**Proteins: C, H, O, N**



1. The monomer of a protein called an **amino acid**.

2. This monomer is made up of an amino group, a carboxyl group and a “R” group which makes each one different. How many different ones are there?  **20**

3. Some proteins form structures. An example is c**ollagen** which forms hair, skin and nails.

4. An example of a functional protein is hemoglobin. What is its job? **carry oxygen in blood**

5. Protein hormones regulate various **body functions**.

6. Proteins form channels in cell **membranes.**

7. **Enzymes** are a type of protein that speed up chemical reactions. This is what they are called in organisms. In general, they are known as “catalysts.”



**Use the picture at right to answer the following questions:**

8. Letter A represents the **Substrate**

9. Letter B represents the **Enzyme**

10. Letter C is the enzyme-substrate **complex**

11. Letter D represents the **Substrate** (unchanged)

12. As you can see in the picture, this chemical reaction resulted in a substrate being changed into two products. So, is this picture showing the process of dehydration synthesis? or **hydrolysis**? *- Circle your answer.*

13. An enzyme was needed for this reaction. At the bond site, was **water added**? or lost? *- Circle your answer.*

*Hint: Remember to use your word root knowledge to help you with these questions!*

**14. Examine the graph below and answer questions A - E.** Place your answers in the blanks to the left of the questions.

**42/43** A. What is the temperature at which enzyme X functions most efficiently?

**Y** B. Which enzyme functions well over a broader range of temperatures?

**Y** C. Which enzyme would be more practical in an organism that lives in a hot spring?

**about 95** D. At what temperatures does enzyme Y cease to function?

**X** E. Which enzyme would more likely be found in a human? *Note: 37°C is normal body temperature.*

**about 45** F. At what temperature do both enzymes have similar activity?

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