1) All organic compounds contain ______________

Part 2: CARBOHYDRATES: Answer the following questions.

1) What atoms make up carbohydrates? ________________________________

2) What is the ratio of hydrogen to oxygen atoms present in all carbohydrates? ______

3) What are the three types of carbohydrates?
   a. ________________________________
   b. ________________________________
   c. ________________________________

Part 3: MONOSACCHARIDES & DISACCHARIDES: Answer the following questions.

1) What is the difference between monosaccharides and disaccharides?

2) What are the three examples of monosaccharides?
   a. ________________________________
   b. ________________________________
   c. ________________________________

3) What are the two examples of polysaccharides?
   a. ________________________________
   b. ________________________________
4) Monosaccharides all have the same formula: C₆H₁₂O₆. How can you write this formula in the simplest form that illustrates the proportion of elements in monosaccharides?

Below is an example of dehydration synthesis. In dehydration synthesis, a hydrogen atom from one molecule joins with a hydroxyl group (-OH) from another molecule to form water, leaving two molecules bonded to the same oxygen atom. For example, when glucose and glucose combine by dehydration synthesis, they form maltose and water.

\[
\begin{align*}
\text{Glucose} + \text{Glucose} & \rightarrow \text{Maltose} + \text{H}_2\text{O} \\
\end{align*}
\]

5) Below is an example of hydrolysis. Complex organic molecules are broken down by the addition of the components of water – H⁺ and OH⁻.

\[
\begin{align*}
\text{Sucrose} + \text{H}_2\text{O} & \rightarrow \text{Glucose} + \text{Fructose} \\
\end{align*}
\]

6) What are the products of the hydrolysis reaction? ________________________________

7) What are the reactants of the dehydration synthesis reaction? __________________________

8) How are the reactions in #5 and #6 related? ______________________________________

9) Look at the three reactions below. Which reaction(s) is hydrolysis taking place in?

a. How do you know?

10) Look at the three reactions below. Which reaction(s) is dehydration synthesis taking place in? ______________

a. How do you know?
11) What are polysaccharides? 

12) What substance is the repeating unit that makes up glycogen?

Directions: Write each name or formula under the correct heading in the charts below. Use these items:

Sucrose  Glucose  Starch  C₆H₁₂O₆
Cellulose  Maltose  Fructose  C₁₂H₂₂O₁₁
Galactose  Lactose  Glycogen
### Direction:

**Answer the following questions.**

1. What is the difference between a monosaccharide, disaccharide and a polysaccharide?

2. What is the following reaction showing? **Maltose + water → Glucose + Glucose**

<table>
<thead>
<tr>
<th>Monosaccharide</th>
<th>Disaccharide</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>5.</td>
</tr>
<tr>
<td>2.</td>
<td>6.</td>
</tr>
<tr>
<td>3.</td>
<td>7.</td>
</tr>
<tr>
<td>4.</td>
<td>8.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Polysaccharide</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
</tr>
<tr>
<td>10.</td>
</tr>
<tr>
<td>11.</td>
</tr>
</tbody>
</table>
Biomolecules Worksheet

PART 1: BUILDING A MACROMOLECULE: All living things make large molecules, called macromolecules, from smaller molecules. Macromolecules can be made from a few repeating units, or can be composed of hundreds or thousands of smaller molecules. Each macromolecule has properties quite different from the units of which it is composed. Study the diagrams below, which show carbohydrate molecules. Beside each molecule, write whether it is a monosaccharide, a disaccharide, or a polysaccharide.

1. __________________________  2. __________________________

3. __________________________

4. What is the function of #1 in our bodies?

5. What is the function of #3 in our bodies?
PART 2: DEGREE OF SATURATION: Each of the following structural formulas shows a fatty acid molecule. On the line, identify the fatty acid as saturated, unsaturated, or polyunsaturated.

1. Define a saturated fatty acid. Provide one example of a saturated fatty acid.

2. Define an unsaturated fatty acid. Provide one example of an unsaturated fatty acid.

3. Define a polyunsaturated fatty acid.
PART 3: SYNTHESIS-ANALYZING MACROMOLECULES: Study the diagram below and then answer the following questions.

1. What are the reactants?

2. What are the products?

3. What chemical process occurred in order to create this protein?
   a. How do you know?

Part 4:
1. What are the building blocks of proteins? Draw and label all of the functional groups below.
2. Perform dehydrations synthesis and create a dipeptide below.
3. Perform hydrolysis on a dipeptide below.
4. Define the following:
   a) amino acid
   b) dipeptide
   c) tripeptide
   d) polypeptide