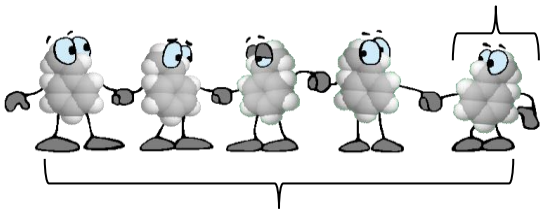
Organic Chemistry Worksheet

*Name*_____

Section A: Intro to Organic Compounds

1. Organic molecules exist in all living cells. In terms of biochemistry, what does the term "organic" mean?
   _____
2. Identify the monomer and the polymer in the diagram.



3. Organic compounds are large molecules called macromolecules. Macromolecules are made of smaller subunits called monomers. Click on "Websites-Cells" page then click on "Biomolecules". Watch the animation.
   a. Explain how condensation (dehydration synthesis) reaction occurs. _____ _____ What molecule is removed during the reaction? _____ What molecules is needed to help join the monomers? _____
   b. Explain how hydrolysis occurs. _____ _____ What molecule is added? _____ What molecule is needed to help separate the polymer? _____
4. What are the four types of organic compounds (macromolecules)? _____ _____

Section B: Carbohydrates

Click on "Websites-Cells" page then click on "Organic Molecules". Select 'Carbohydrates' & answer these questions.

1. What elements are found in a carbohydrate? _____
2. What is the function of carbohydrates? _____
3. What are the three main groups of carbohydrates? _____ _____
4. Play the animation of dehydration synthesis. What two monosaccharides did you start with? _____ Which disaccharide was formed? _____ What molecules was released during the reaction? _____
5. How are polysaccharides different from disaccharides? _____ _____
6. Identify the function of the following polysaccharides.

Polysaccharides	Functions
Starch	
Glycogen	
Cellulose	
Chitin	

Section C: Concept Check

Identify if the statements are referring to a Monosaccharide (M), a Disaccharide (D) or a Polysaccharide (P).

1. The monomer of a carb _____
2. Made when two monosaccharides combine _____
3. Found in the plant cell walls as cellulose _____
4. A polymer _____
5. Made when 3 or more monosaccharide combine _____
6. Examples include glucose and fructose _____
7. Examples include starch, cellulose and glycogen _____
8. Has the formula $C_6H_{12}O_6$ _____

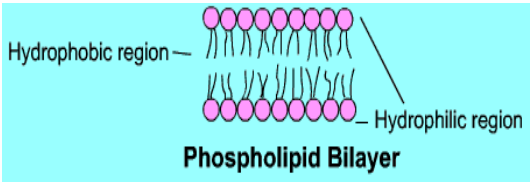
Section D: Concept Check

1. Olive oil is liquid at room temperature and therefore expected to have a high proportion of _____ fatty acids.
2. All organic compounds contain which element? _____
3. Which of the following is the primary function of lipids?
    a. To deliver messages between cells.
    b. To assist in chemical reactions within cells.
    c. To transport oxygen throughout the body.
    d. To provide long-term storage of energy.
4. What is the monomer of a lipid? _____

Section E: Lipids

Click on "Websites-Cells" page then click on "Organic Molecules". Select 'Lipids' & answer these questions.

1. Lipids are insoluble in water. What does this mean? _____
2. What are some examples of lipids? _____
3. What are the functions of lipids? _____
   _____
4. What are triglycerides (lipids) composed of? _____
5. Play the animation. When making one triglyceride, how many water molecules are formed? _____
6. What elements are found in a lipid? _____
7. Describe the structure of a phospholipid bilayer. _____
   _____
8. Describe what the terms mean in the diagram.
    a. Hydrophobic - _____
    b. Hydrophilic - _____



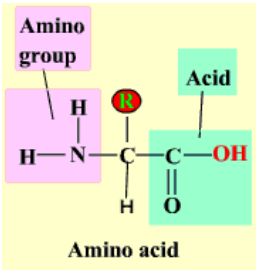
Section F: Nucleic Acids

1. What are the 2 types of Nucleic Acids? _____
2. What is the function of Nucleic Acids? _____
3. What is the monomer of Nucleic Acids? _____
4. What elements are found in DNA and RNA? _____
5. What are the 3 parts of a nucleotide? _____

Section G: Proteins

Click on "Websites-Cells" page then click on "Organic Molecules". Select 'Proteins' & answer these questions.

1. What is the monomer of a protein? _____
2. What elements are found in a protein? _____
3. How many different amino acids are used to build proteins? _____ How are these amino acids different from each other? _____
   _____
4. Play the animation. What is the name of the bond formed between the two amino acids?
   _____
5. Define the term: polypeptide _____
   _____



6. Explain the functions of proteins….

Function	Explanation
Support	
Hormones	

Blood proteins	
Receptor sites on membranes	
Movement	
Defense	
Enzymes	

7. How is the primary structure of a protein determined? _____
_____
8. Why is the primary structure fundamental to protein function? _____
_____
9. What can happen if a single amino acid is in the wrong place? _____
_____
10. Briefly explain the secondary structure of a protein. _____
_____
11. Briefly explain the tertiary structure of a protein. _____
_____
12. Briefly explain the quaternary structure of a protein. _____
_____

Section H: Concept Check

Identify if the following statements are referring to: carbs (CA), lipids (L), nucleic acid (NA) or proteins (P)

1. composed of nitrogen bases, sugar & phosphate _____
2. monomers have the formula $C_6H_{12}O_6$ _____
3. produced by plant cells and stored in the cell walls _____
4. deoxyribonucleic acid is an example _____
5. found in the cell membrane to regulate function _____
6. functions to waterproof and insulate the body _____
7. functions to control cell metabolism _____
8. the monomer is a nucleotide _____
9. structural component of muscle _____
10. transfers oxygen throughout the body _____
11. composed of glycerol and fatty acid chains _____
12. provides the body with immediate energy _____
13. increases the rate of reaction as an enzyme _____
14. stores and transmits genetic information _____
15. provides the body with long-term energy storage _____
16. examples include starch, cellulose and glycogen _____
17. the monomer is an amino acid _____
18. forms peptide bonds when monomers combine _____
19. excess is stored as oil droplets in fat tissue _____
20. the monomer is a monosaccharide _____

Section I: What's in your food? LAB

What are indicators? - - - - - An indicator is a substance that changes color in the presence of a particular type of molecule. Today you will use several indicators to test for the presence of several organic compounds.

Testing for Monosaccharides:

1. Fill a beaker about 1/3 full of water. Bring the water to a boil on a hot plate. CAUTION: HOT WATER!
2. Label 2 test tubes. In test tube 1, add 30 drops of honey. In test tube 2, add 30 drops of water.
3. Add 15 drops of Benedicts' reagent to each test tube. Place the test tubes in the hot water bath for 1 minute.
4. Use the test tube clamp to remove the tubes from the hot water bath. Turn off your hot plate.
5. Observe any color changes in the solutions. In the presence of a monosaccharide, the solution will change color from blue to orange, yellow, red or green. Record the color change in data table 1.

Testing for Starch (Polysaccharide):

1. Label 2 test tubes. In test tube 1, add 30 drops of cornstarch. In test tube 2, add 30 drops of water.
2. Add 5 drops of iodine reagent to each test tube. CAUTION: Be careful when handling iodine, it can stain hands and clothing.
3. Observe any color changes in the solutions. In the presence of starch, the solution will change from yellow-brown to a blue-black. Record the color change in data table 1.

Testing for Proteins:

1. Label 2 test tubes. In test tube 1, add 30 drops of egg whites. In test tube 2, add 30 drops of water.
2. Add 20 drops of Biuret reagent to each test tube. CAUTION: Biuret reagent contains sodium hydroxide, a strong base. If you splash any reagent on yourself, wash it off immediately with water.
3. Observe any color changes in the solutions. In the presence of a protein, the solution will change from blue to purple. Record the color change in data table 1.

Data Table 1:

Sample	**Carbohydrate Tests**				**Protein Test**	
	Benedicts test color	Mono-saccharide present + or -	Iodine test color	Starch present + or -	Biuret test color	Protein present + or -
Honey						
Cornstarch						
Egg whites						
Water						

Testing Food Samples:

You will perform the Benedicts, Iodine and Biuret test for two food samples. Use the above procedures to test the samples for the presence of a monosaccharide, starch and a protein. Record your results in data table 2.

Data Table 2:

Food	**Carbohydrate Tests**				**Protein Test**	
	Benedicts test color	Glucose present	Iodine test color	Starch present	Biuret test color	Protein present

Post-Lab Questions:

1. What color change indicates the presence of a protein? What indicator was used?

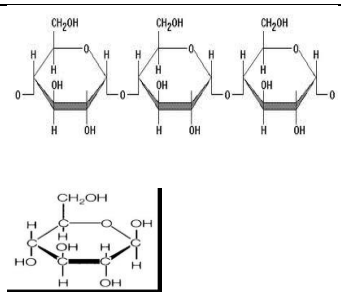
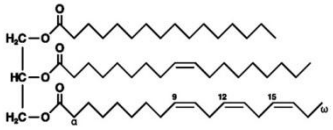
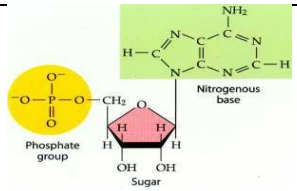
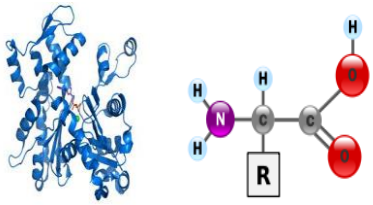
2. What color change indicates the presence of a monosaccharide? Which indicator was used?

3. What color change indicates the presence of starch (polysaccharide)? Which indicator was used?

4. What were the results of the different test on the water sample? Why was water used in the test?

5. When testing for a carbohydrate, a student obtains the following result: Benedicts – no color change, Iodine – purple. What type of sugar is it?

Section J: Organic Compound Summary

Macromolecule	Monomer	Functions	
Carbohydrates			
Lipids			
Nucleic Acids			
Proteins			

Practice quiz on Organic Compounds
http://edhsgreensea.net/Biology/taters/biochem_vocab_mc.htm