CP Biology Name Date

**HOMEWORK**

**PACKET**

**UNIT 1C:**

**Basic Biochemistry**

**Part 1 – Carbs, Lipids, Nucleic Acids**

**Carbohydrates**

\_\_\_\_\_\_1. What do glucose, fructose, and galactose have in common? (choose all that apply)

a) they are monosaccharides c) they are isomers

b) they are disaccharides d) they are proteins

2. What is the general name for a carbohydrate made of many simple sugars? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. What is the name of the simple sugar used to synthesize starch, glycogen and cellulose?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Use the words in italics to fill in the following concept map: *polysaccharide, simple sugar, intermediate molecule.*

Two combined

Many combined

5. Fill in the following chart by listing the three important **polysaccharides** above in the first column below.

|  |  |  |  |
| --- | --- | --- | --- |
| **POLYSACCHARIDE** | **TYPE OF ORGANISM THAT SYNTHESIZES THE POLYSACCHARIDE** | **SIMPLE SUGAR USED TO SYNTHESIZE THE POLYSACCHARIDE** | **FUNCTION OF THE POLYSACCHARIDE IN THE ORGANSIM** |
| **starch** |  |  |  |
| **glycogen** |  |  |  |
| **cellulose** |  |  |  |

6. Complete the following analogies:

a) glycogen is to animals as starch is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) glucose and fructose are to sucrose as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is to starch.

d) simple sugar is to glucose as polysaccharide is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(3 possible answers)

7. List 3 foods that contain a large amount of carbohydrate:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. What is the name of the process by which plants make glucose? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. Name two carbohydrate molecules that a plant synthesizes or makes *from* glucose.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. Animals cannot make glucose. How do they obtain it? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

11. Name the carbohydrate molecule that animals make from glucose. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Choose from the following to answer questions 12 and 13. **Choose all answers that apply.**

a. used as a reactant in cell respiration d. used as a form of energy

b. composed of carbon, hydrogen and oxygen e. contain many covalent bonds

c. form plant cell walls f. contain –OH (hydroxyl groups)

\_\_\_\_\_\_\_\_\_\_\_\_\_12. Which of the above is considered a structural characteristic of carbohydrates?

\_\_\_\_\_\_\_\_\_\_\_\_\_13. Which of the above is considered a functional characteristic of carbohydrates?

\_\_\_\_\_\_\_\_\_\_\_\_\_14. Which of the following IS a carbohydrate? Choose all that apply.

a. sucrose d. lactose g. carbon dioxide

b. water e. DNA h. glucose

c. polysaccharide f. cellulose i. simple sugar

\_\_\_\_\_\_\_\_\_\_\_\_ 15. Which of the following is composed of *at least one* molecule of glucose?

(choose all that apply)

a. galactose b. cellulose c. lactose d. glycogen

\_\_\_\_\_\_\_ 16. Which of the following terms could be used to describe table sugar?(Choose all that apply)

1. monosaccharide c. polymer e. disaccharide
2. dimer d. organic compound f. monomer

\_\_\_\_\_\_\_17. Which of the following are inorganic compounds found in all living things?

1. glucose c) water e) table sugar
2. NaCl d) starch f) oxygen

\_\_\_\_\_\_\_ 18. List three types of food that would contain a large amount of monosaccharides.

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

\_\_\_\_\_\_\_ 19. Synthesis of a carbohydrate from monomers could produce (choose all that apply)

* 1. starch c. glucose e. fructose
  2. dimers d. polysaccharides f. DNA

20. Fill in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name of**  **Polysaccharide** | **Organism that**  **produces this molecule** | **Monomer unit that is used to make this polysaccharide** | **General Function of this polysaccharide** |
| **Starch** |  |  |  |
| **Cellulose** |  |  |  |
| **Glycogen** |  |  |  |

21. Describe in your own words (not using pictures) the structural difference between cellulose and glycogen.

# Dehydration Synthesis & Hydrolysis

1. Select which of the following describe Hydrolysis (H) or Dehydration Synthesis (DS)

\_\_\_\_\_ builds larger compounds

\_\_\_\_\_creates smaller compounds

\_\_\_\_\_water is produced

\_\_\_\_\_water is required

2. Hydrolysis of a trisaccharide produces ( 0 1 2 3 ) molecules of simple sugars.

3. Synthesis of a disaccharide requires ( 0 1 2 3 ) molecules of a monosaccharide.

4. Complete the following analogy:

Synthesis is to build as hydrolysis is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. The structure to the right is **table sugar**, discuss as much as you can about

1) what types of foods it is found in

2) the type of macromolecule it is

3) what types of elements it contains

4) what are the products if the molecule was to undergo hydrolysis

Write your answer in paragraph format.

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

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

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

6. Describe **synthesis** (dehydration synthesis) of **carbohydrates** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. Describe **hydrolysis** of **carbohydrates** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_8. Which of the following is a TRUE statement   
 a. carbohydrates contain many atoms of nitrogen  
 b. monosaccharides can be hydrolyzed to form disaccharides  
 c. cellulose can be hydrolyzed to form glucose and fructose molecules   
 d. glycogen can be synthesized from glucose molecules

**Lipids**

1) What are the smaller molecules that make up fats and oils? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

2) What is the process by which lipid molecules are synthesized or made?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3) What is the difference between the chemical structures **saturated** and **unsaturated** fatty acids?

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

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

4) Use your note packet and draw the structural formula of an imaginary **saturated fatty acid** using 5 carbons:

5) Redraw your molecule as an **unsaturated fatty acid** (use 5 carbons):

6) What did you **add** and/or **subtract** to build the unsaturated fatty acid?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

7) Is your unsaturated fatty acid monounsaturated or polyunsaturated (mono means on C=C and poly means more than one C=C)?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8) Describe the difference between an **oil** and a **fat** based on:

1. Which contains saturated fatty acids? Unsaturated?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

1. Give three examples of foods that have fat in them \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

1. Give three examples of foods that have oil in them \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

9) Which is healthier? (circle one bold-faced word or words per line)

1. **Unsaturated** or **saturated** lipid

B) **solid** or **liquid** lipid at room temperature

**C) animal fat** or **plant oil**

**Nucleic Acids**

1. Complete the following analogies:
2. amino acid is to protein as nucleotides are to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. nucleotide is to DNA as simple sugar is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(3 possible answers)
4. What are the main elements found in nucleic acids?
5. What are the monomer units of nucleic acids?
6. Which molecule is in the nucleic acid category but does not form polymers?
7. What are the three parts of a nucleotide?
8. What is the relationship of RNA to DNA?
9. DNA codes for the production of what other type of organic compound?
10. Which of these contain deoxyribose?
    1. ATP b. DNA c. RNA
11. Which of these contain ribose?
    1. ATP b. DNA c. RNA
12. Which of these stores information?
    1. ATP b. DNA c. RNA
13. Which of these stores energy?
    1. ATP b. DNA c. RNA
14. Label the nitrogen bases, sugars, and phosphates in the diagram below.

**REVIEW OF ORGANIC COMPOUNDS**

1) What are the four major groups of organic molecules and what are the subunits of each group?

|  |  |
| --- | --- |
| **GROUP** | **UNITS USED TO SYNTHESIZE MOLECULES IN THE GROUP** |
|  |  |
|  |  |
|  |  |
|  |  |

2) Fill in the reactants and products missing in the **hydrolysis** of the four major organic compounds:

|  |  |  |
| --- | --- | --- |
| **Organic Compound** | **Hydrolysis** | |
|  | **Reactant(s)** | **Product(s)** |
| **carbohydrate** | polysaccharide |  |
| **lipid** |  | glycerol + fatty acids |
| **protein** |  | amino acids |
| **nucleic acid** | DNA or RNA |  |

**Answer questions #3 to 11 by listing the letters of the following compounds, which apply to each statement. There *may* be more than one answer per question.**

a) polypeptides

b) lipids

c) simple sugars

e) polysaccharides

f) amino acids

g) nucleotides

h) nucleic acids

i) glycerol and fatty acids

3) Which of the above are broken down by hydrolysis?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4) Which of the above are the simple units used to synthesize organic compounds?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5) Which of the above are made up of many amino acids? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6) Which of the above are used to make a triglyceride like oil? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7) Which of the above are used as reactants in the synthesis of glycogen? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8) Which of the above are components of DNA? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9) Which of the above are carbohydrates? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10) Which of the above contain nitrogen? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11) Which of the above contain Phosphorus? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_