Biology
Life Substances Notes

Name: _____
Period: _____ Date: _____

MACROMOLECULES:

Introduction: All compounds can be classified in 2 broad categories:

1.) _____ compounds- Contain _____ and _____ atoms
2.) _____ compounds- Can have one or the other, but do not contain *both* carbon and hydrogen atoms

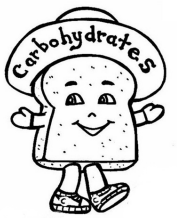
A. Most of your body's molecules are _____ compounds.
   a. _____ are built from small organic compounds the same way a railroad train is built, by linking a lot of smaller units together into long chains.
      i. Large carbon compounds are built up from smaller simpler molecules called _____ (mono = _____)
      ii. Monomers can bind to one another to form complex molecules known as _____ (poly = _____)
      iii. A polymer consists of repeated, linked units, which can also bind forming large polymers called _____. (macro = _____)
   b. Monomers link to form polymers through a chemical reaction called _____ _____ or _____ _____. During the formation of polymers, Water (H_2O), is <u>released</u> or is by-product of the reaction.
   c. The breakdown of some complex molecules, such as polymers, occurs through a process known as _____.
      i. Hydrolysis is the _____ of a condensation reaction. The <u>addition</u> of water, to some polymers can break the bonds that hold them together.

There are <u>four main types of macromolecules</u> found in living organisms:

1.) _____
2.) _____
3.) _____
4.) _____

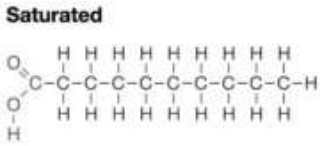
I. **Carbohydrates**
   i. Composed of _____, _____, and _____ atoms in the proportion of __ : __ : __
      1. General formula: $(CH_2O)_n$ where n is the number of carbon atoms.
         a. Example: The sugar glucose is a small carbohydrate; its n equals 6. Therefore its chemical formula is _____.
   ii. The building blocks (or monomers) of carbohydrates are monosaccharides.
   iii. **Monosaccharides** are _____ _____ (saccharide = sugar). Examples:
      1. <u>Glucose</u>: commonly found in _____ of animals
      2. <u>Galactose</u>: a simple sugar found in _____
      3. <u>Fructose</u>: commonly found in _____
         a. Glucose and Fructose both have the formula $C_6H_{12}O_6$, Sometimes compounds may have the same formula, however they have different structures/ arrangements. In such cases, those compounds are called _____.
   iv. **Disaccharides** contain _____ monosaccharides joined by dehydration synthesis. Examples:
      1. <u>Lactose</u>: commonly found in _____, made up of Galactose + Glucose

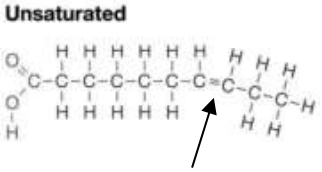
2. Sucrose: "table sugar", transported in _____, made up of Fructose + Glucose



v. **Polysaccharides** are carbohydrates formed from linking individual sugars into _____ _____. Examples:
   1. _____: a common storage form of glucose in plants (breads, pasta, potatoes)
   2. _____: a polysaccharide contained in the cell walls of _____; gives strength and rigidity to plant cells.
   3. _____: a common storage form of glucose in animals (stored in the _____ and _____ to be used as quick energy)

II. **Lipids** (include fats, oils, waxes, etc.)
   i. Class of macromolecules that _____
   ii. Lipids usually serve one of three functions:
      1. _____ storage
      2. structural support in cell membranes (phospholipids)
      3. serve as reactants (_____ materials) for metabolic reactions
   iii. _____ _____ are the building blocks (or monomers) that make up most lipids.
   iv. Fatty acids are classified as either _____ or unsaturated.
   The classification depends on the proportion of hydrogen atoms to carbon - carbon bonds in the molecule:

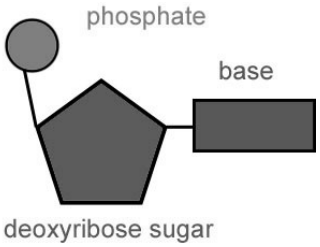




      1. Saturated fatty acids have the _____ number of bonds possible, they are _____.
         a. Saturated fats are usually _____ at room temperature, and most come from _____ products.
      2. Unsaturated fatty acids have _____ in the carbon chain and are not full.
         a. Most unsaturated fats are _____ at room temperature, and are usually referred to as _____.
      3. Saturated animal fats are associated with _____ disorders; _____ _____ can be substituted for animal fats in the diet.
   v. A common lipid that contains fatty acids is a triglyceride. **Triglycerides** (referred to as neutral fats) are glycerol linked to _____ fatty acids (in the shape of an "_____") by condensation reaction.

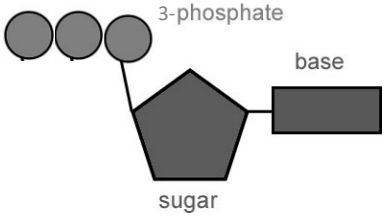
III. **Proteins**
   i. Proteins are organic compounds composed mainly of _____, _____, and _____ atoms.
   ii. Proteins are the construction materials for body parts such as _____, _____, _____, and _____.
   iii. _____ _____ are the building blocks (or monomers) that make up most proteins
      1. There are _____ different kinds of amino acids that humans use.
   iv. One important group of proteins - _____ - help control chemical reactions by acting as catalysts. Catalysts speed up reactions by lowering activation energy.

IV. **Nucleic Acids**
   i. Nucleic Acids are complex organic molecules that store _____ _____ in the cell.
   ii. _____ are the building blocks (or monomers) that make up most nucleic acids.
      1. Nucleotides consist of a _____ + _____ + _____.
      Example- DNA nucleotide:



iii. Three main types of nucleic acids

1. _____ = Deoxyribonucleic acid
   a. Is the genetic information inside the _____ of cells
2. _____ = Ribonucleic acid
   a. Instructions which code for _____ _____
3. _____ = Adenosine triphosphate = has a slightly different structure than DNA and RNA. It contains a base + sugar + _____ phosphates
   a. ATP is used as _____ for the cell



REVIEW QUESTIONS

Directions Place each item below under the correct heading.

sucrose	glucose	starch	$C_6H_{12}O_6$	cellulose	glycogen	$C_{12}H_{24}O_{12}$	fructose

Monosaccharides	Disaccharides	Polysaccharides

Directions Complete the table by shading in the correct column for each description. (Only one box per question.)

Description	Lipids	Nucleic Acids	Proteins	Carbo-hydrates
Commonly called fats and oils				
Contain carbon, hydrogen, and nitrogen				
Contain peptide bonds				
DNA and RNA are examples				
Follow the general formula $(CH_2O)_n$				
Form skin, blood, hair, muscles				
Lactose and Cellulose are examples				
Made up of amino acids				

Made up of nucleotides				
Most consist of 3 fatty acids bonded to a glycerol				
Used for long-term energy storage				