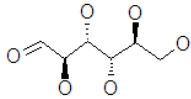
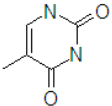
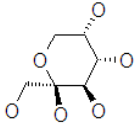
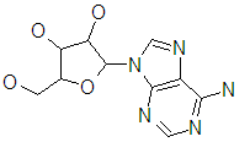
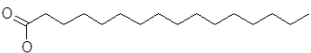
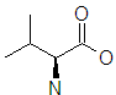
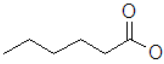


Biological Macromolecules

1. Determine the chemical formula of the following molecules (add implicit H) and determine whether the molecule can be classified as a sugar, fat, amino or nucleic acid. Also, decide if an empirical formula (the lowest ratio of atoms) is different from the chemical formula.

Molecular structure*	Chemical formula	Empirical formula	Classification
			
			
			
			
			
			
			
			

* Always remember that we need to represent our three dimensional molecules using this two dimensional medium of paper. In the structures drawn above, we have attempted to capture the 3-D aspects of some molecules using a filled-in triangle to represent bonds that project out of the paper and a dashed line to represent bonds that project behind the paper.

2. Fill in the blanks:

- a.) A molecule whose name ends in -ose is a _____.
- b.) The three amino acids that contain nitrogens in their side groups are _____, _____, and _____.
- c.) The 2 amino acids that have acidic side groups are _____ and _____.
- d.) The simple sugars _____ and _____ come together to form the disaccharide commonly called sugar which is chemically known as _____.
- e.) All fats contain a number of $-C_nH_m$ groups that make them _____.
- f.) The difference between an adenine molecule and an adenosine molecule is the _____.
- g.) The basic group in every amino acid is _____.
- h.) The acid in DNA is a _____.
- i.) The acid in a fatty acid is a _____.
- j.) Fatty foods containing _____ double bonds are bad for us to consume in large quantities.
- k.) Saturated fatty acids have _____ double bonds and are _____ at room temperature because the $-C_nH_m$ groups can get very _____ together.
- l.) Omega fatty acids are given that name because _____.
- m.) When two fatty acids and one phosphate group binds to a glycerol molecule, the structure is called a _____ and it is used to form _____ which is a critical feature of every cell.
- n.) Proteins are made of polymers of _____ which are all joined together by a _____ bond.
- o.) Complex carbohydrates are polymers of _____ which are all joined together by a _____ bond.
- p.) RNA is a polymer of _____ which are all joined together by a _____ bond.

3. Define the following terms using words and structures or drawings if helpful:

a. Fluid Mosaic Model

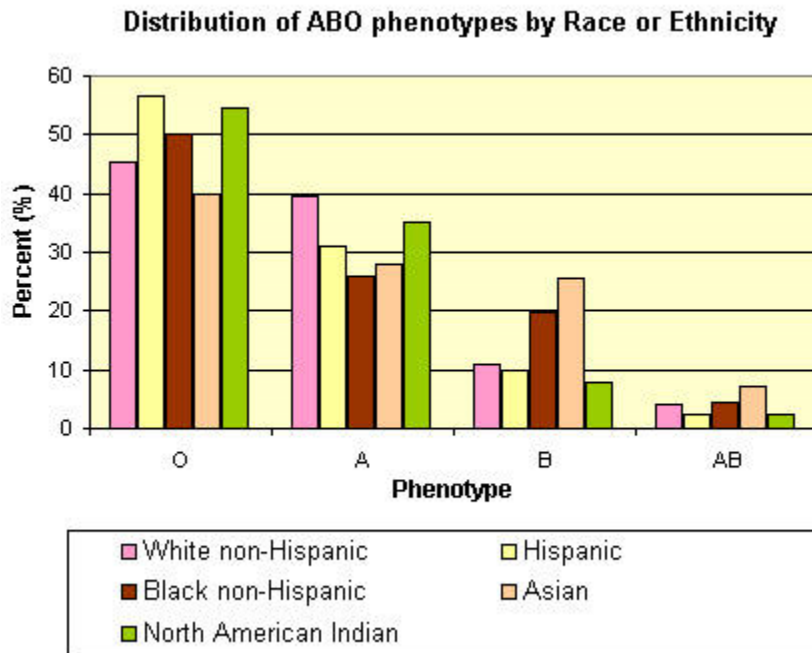
b. Chair and boat forms in sugars

c. The essential amino acids

d. Watson Crick Base Pairs

4. What are the differences between red blood cells of the O, A, B, and AB type? Be specific.

5. Using the bar graphs provided in lecture answer the following questions:



- a. What is the ratio of O:A:B:AB blood in North American Indians?
- b. Which blood type is most rare for a Black non-Hispanic?
- c. For which blood type would Black non-Hispanics be the least common ethnic group?
- d. For blood type B, calculate the distribution ratio for individuals of white, Black, Indian, Hispanic and Asian heritage.

6. Please draw the chemical structures of the following molecules (include positions of charges at pH 7):

a. ATP^{4-}

b. Omega 3 decanoic acid (cis)

c. Val-Phe-Gly

d. glucosamine