Macromolecules Models
Part 1: Carbohydrates and Lipids

LO: SYI-1.B. Describe the properties of the monomers and the types of bonds that connect the monomers in biological macromolecules.

- EK: SYI-1.B.1. Hydrolysis and dehydration synthesis are used to cleave and form covalent bonds between monomers.
- EK: SYI-1.B.2. Structure and function of polymers are derived from the way their monomers are assembled-
    - c. Complex carbohydrates comprise sugar monomers whose structures determine the properties and functions of the molecules
    - d. Lipids are nonpolar macromolecules-
        - i. Differences in saturation determine the structure and function of lipids.
        - ii. Phospholipids contain polar regions that interact with other polar molecules such as water, and with nonpolar regions that are often hydrophobic.

Begin Model building. Cut apart models. Be prepared to demonstrate all of these to your teacher or the class. Look in your text for molecular detail.

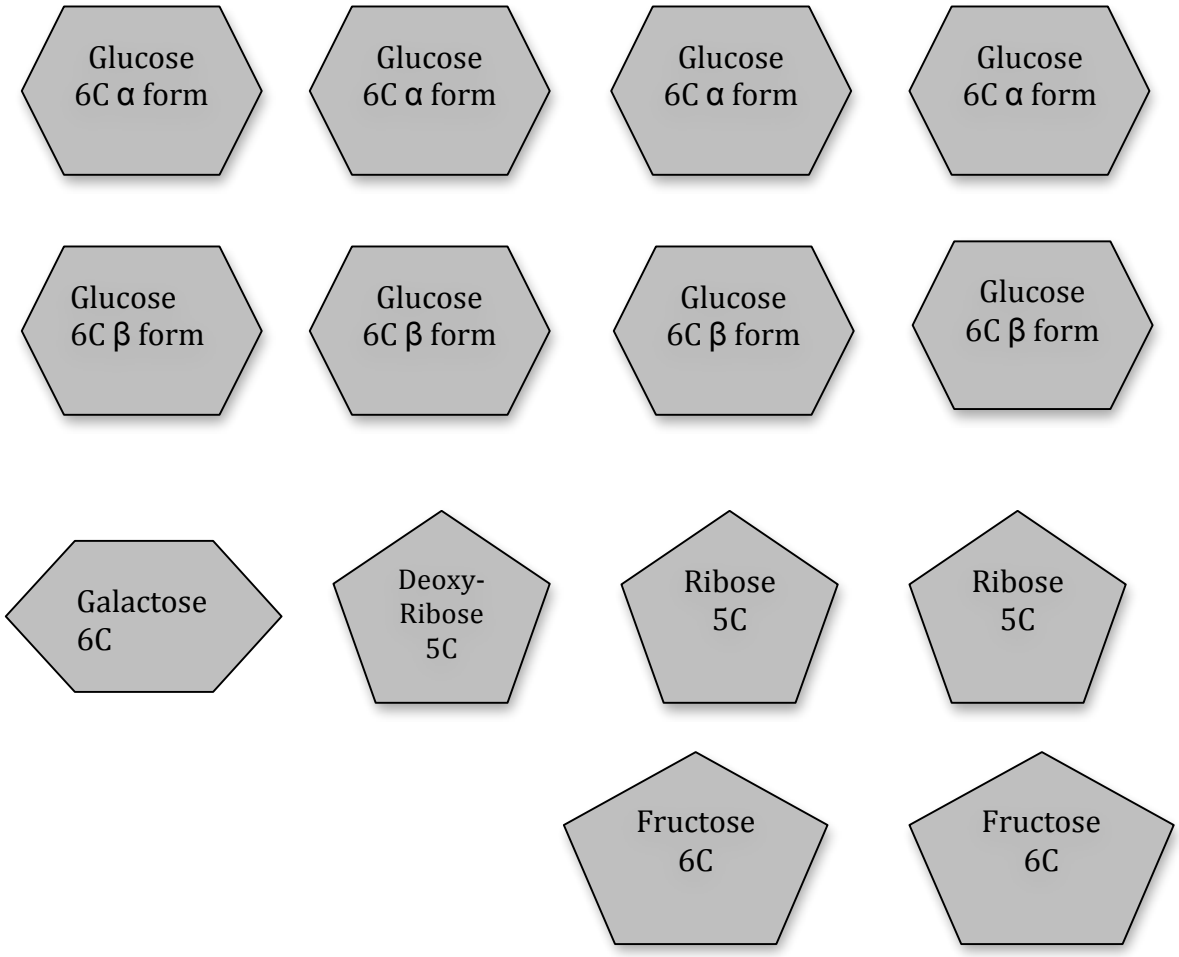
Carbohydrates

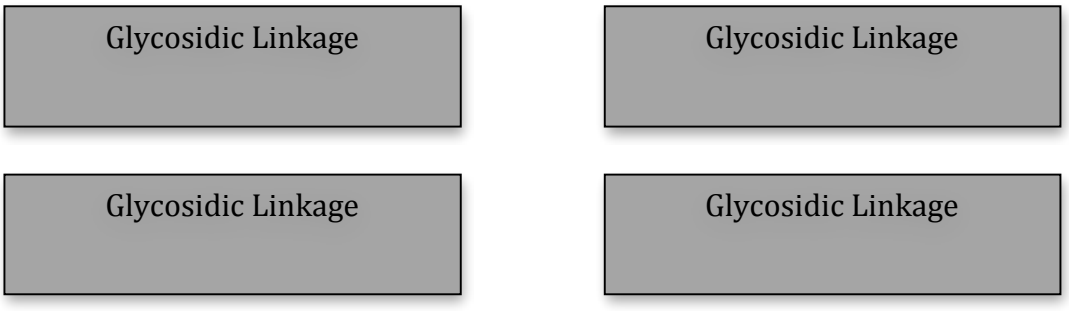
1. Show how water is involved in dehydration synthesis and hydrolysis reactions. What type of bond is broken or formed?
2. Find the monosaccharides.
3. Make a disaccharide. Make a different disaccharide.
4. Divide the monosaccharides into pentose and hexose sugars.
5. Use model pieces to make the biggest polysaccharide you can.
6. Label the bonds.
7. Make a polymer of starch and one of cellulose. How are they different? Refer to texts.
8. Explain this statement: The nature of the bonding between carbohydrate subunits determines their relative orientation in the carbohydrate, which then determines the secondary structure of the carbohydrate.

Lipids

1. Identify the fatty acids.
2. Separate saturated fats from unsaturated fats.
3. Make a triglyceride. Be sure to model the joining of the fatty acids. What is the name of this process?
4. Make a lipid that is less likely to solidify. Explain.
5. Find a glycerol.
6. Make a phospholipid.
7. Label the regions of the phospholipid with regard to water interaction.
8. Join your phospholipid with the others made at your table. What structure are you making?

Carbohydrate Models: Print in Yellow





Lipid Models: Print Green

Phosphate

Choline

Hydrophilic

Hydrophobic

OH
O=C
C
C
C
C
C
C
C
C
C
C
C
C
C

OH
O=C
C
C
C
C
C
C
C
C
C
C
C
C
C

OH
O=C
C
C
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C
C
C
C
C

OH
O=C
C
C
C
C
C
C
C
C
C
C
C

OH
O=C
C
C
C
C
C
C
C
C
C
C
C

Glycerol H
H2C---------------C----------------CH2
OH OH OH

Glycerol H
H2C---------------C----------------CH2
OH OH OH

Water: Print Blue

OH	H	OH	H	OH	H
OH	H	OH	H	OH	H
OH	H	OH	H	OH	H
OH	H	OH	H	OH	H
OH	H	OH	H	OH	H
OH	H	OH	H	OH	H
OH	H	OH	H	OH	H
OH	H	OH	H	OH	H