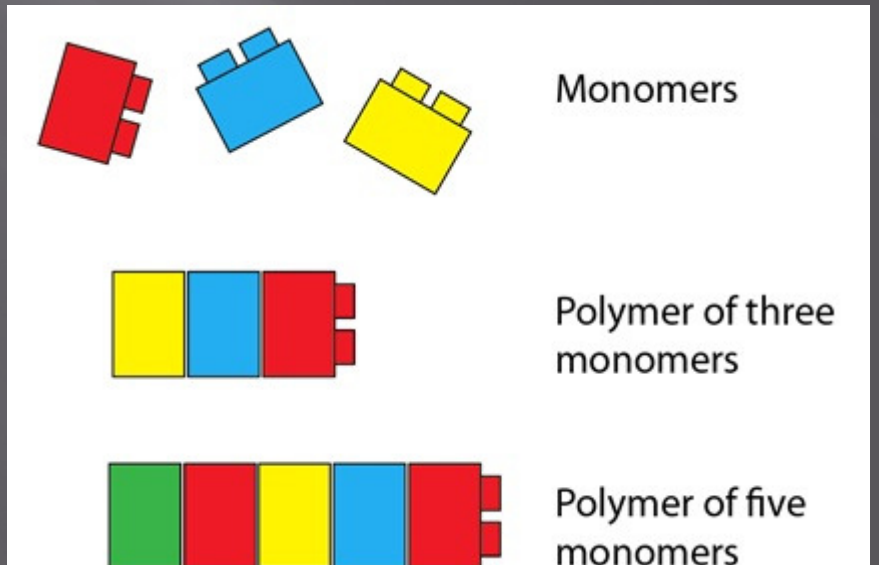
MACROMOLECULES

Introduction into the 4 major molecules of living things

What are Macromolecules?

- Macromolecules are very large molecules important to living organisms.
- Most macromolecules are built by joining smaller molecule subunits, often called "monomers".
- Like the individual pearls on a necklace, they are the building blocks



Types of macromolecules

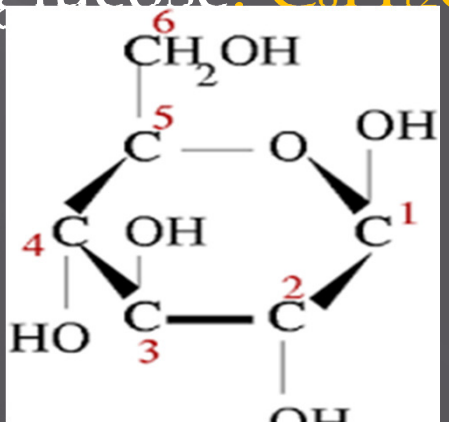
There are 4 classes of macromolecules:

- Carbohydrates
- Lipids
- Proteins
- Nucleic Acids

Let's look at each of these individually

Carbohydrates

- Carbohydrates may be used for energy storage or for structure.
- Carbohydrates come in different sizes. Large carbohydrates (polysaccharides) are long chains of smaller carbohydrates (monosaccharides).
- Made mostly of carbon, hydrogen and oxygen
- Small carbohydrates are called monosaccharides, single or simple sugars.
- Most common monosaccharide is glucose: $C_6H_{12}O_6$
- In cells, glucose looks like:
  Hexagonal shape –
  notice where the carbon is…



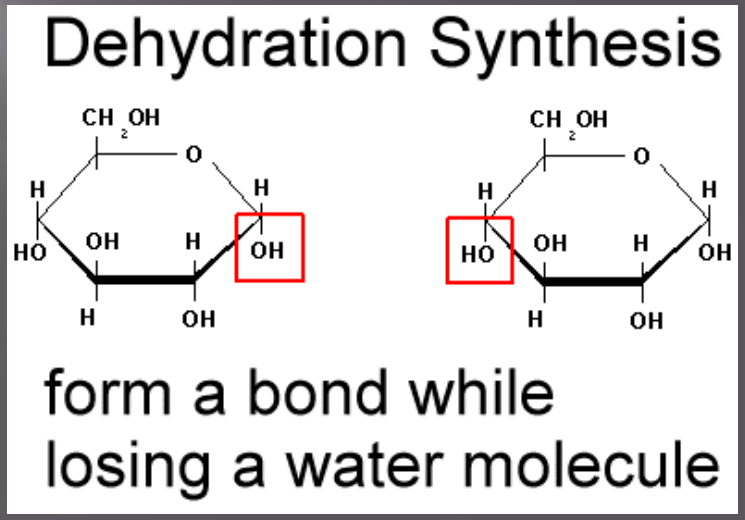
How are macromolecules formed from their monomers?

The Condensation or Dehydration Reaction

EXAMPLE: Carbohydrates

Monosaccharides are joined to form polysaccharides by removing water, creating a covalent bond between them.

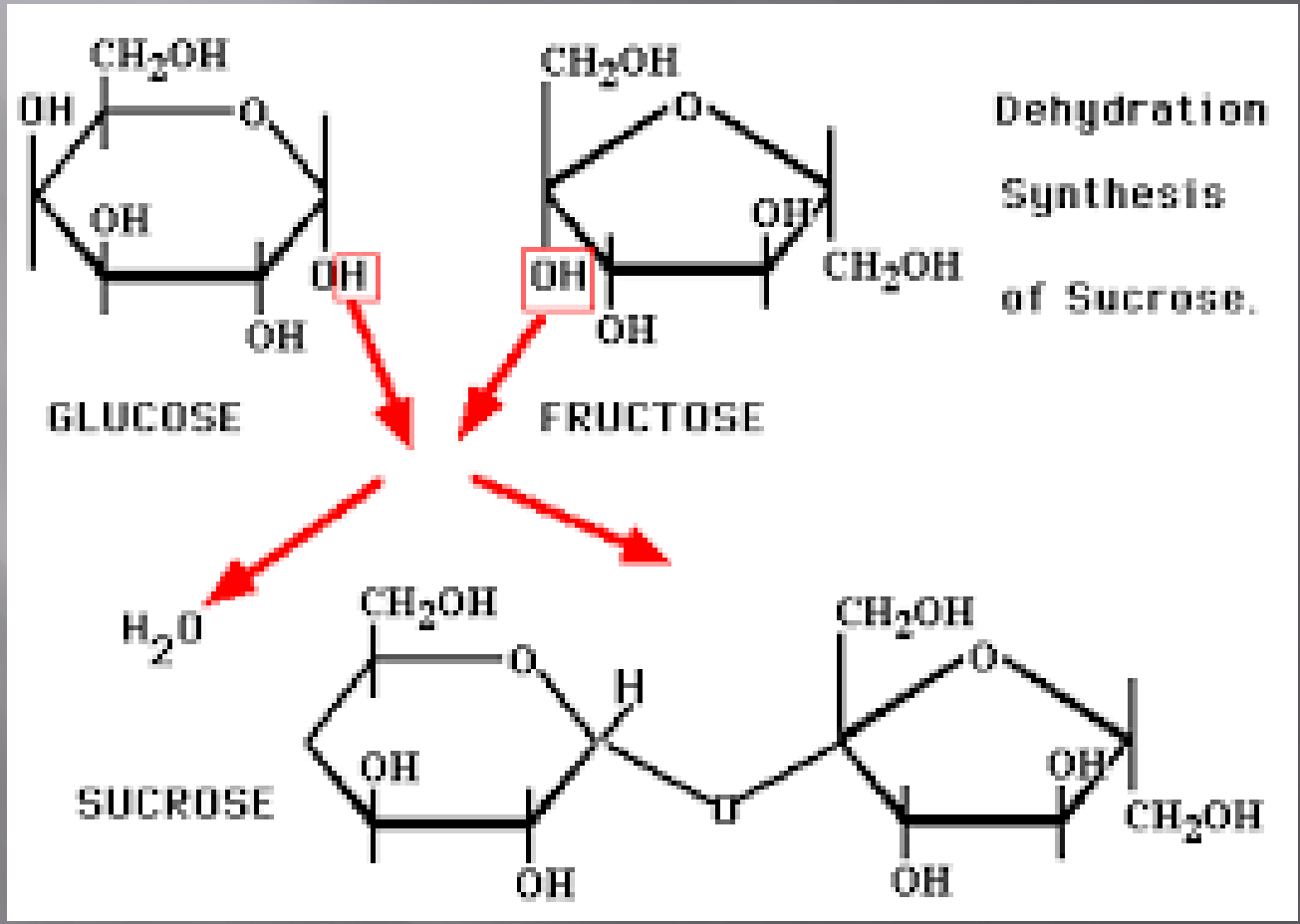
Polysaccharides are used as storage more stable form.



plant's storage is called starch (amylopectin)

animal;s storage is called glycogen

Dehydration Synthesis Condensation Reaction



Animals use glycogen as short-term energy storage, stockpiling it in the *liver and mus*cles.

Can you think of some areas where plants *hide* their starch?

Uses of Polysaccharides

Chitin is the polysaccharide made by joining many of these modified glucose molecules.

- Chitin is in the exoskeletons of insects, spiders, crabs and other animals.
- Chitin is also found in fungi, such as mushrooms.
- Surgical thread made of chitin dissolves over time.

Summary of Carbohydrates

- Smallest carbohydrates are called monosaccharides. Glucose is a common monosaccharide.
- Polysaccharides are made by joining many monosaccharides, forming covalent bonds between them by condensation or dehydration reactions
- Storage Polysaccharides Starch in plants
  Glycogen in animals
- Structural Polysaccharides
  Cellulose in plants
  Chitin in animals & fungi