B1.1

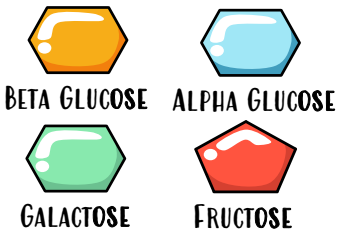
Carbohydrates

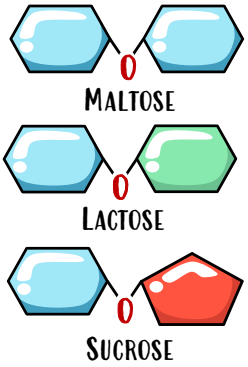
The 4 macromolecules
- CARBOHYDRATES
- LIPIDS
- NUCLEIC ACIDS
- PROTEINS

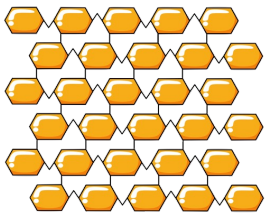
MONOSACCHARIDES — Single Sugar

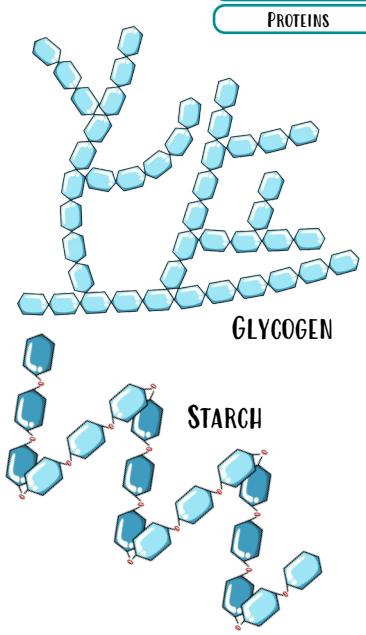
DISACCHARIDES — Two Sugar

POLYSACCHARIDES — Many Sugar





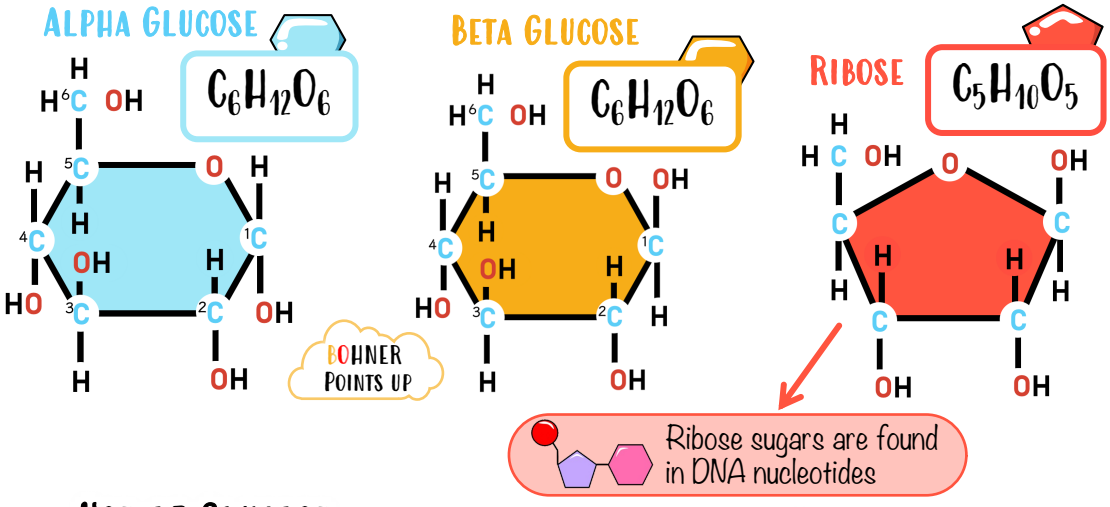




GLUCOSE
"ose" indicates sugar

STRUCTURE OF MONOSACCHARIDES

1. Hexose monosaccharide - Glucose (Six carbons)
2. Pentose monosaccharide - Ribose (Five carbons)

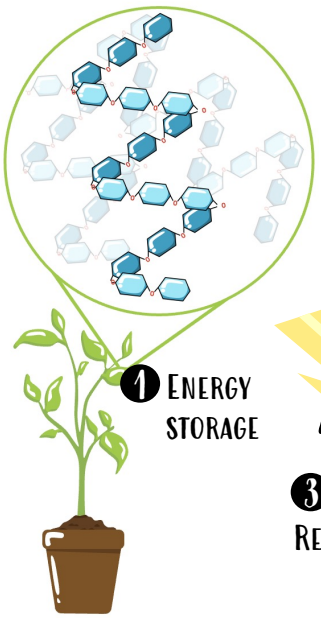


$C_NH_{2N}O_N$
Formula used to find number of H (hydrogen) or O (oxygen) when already know the number of C (carbon)

NOTE!
Make sure you know HOW to draw the strcuture of all three monosaccharides

Ribose sugars are found in DNA nucleotides

USE OF GLUCOSE



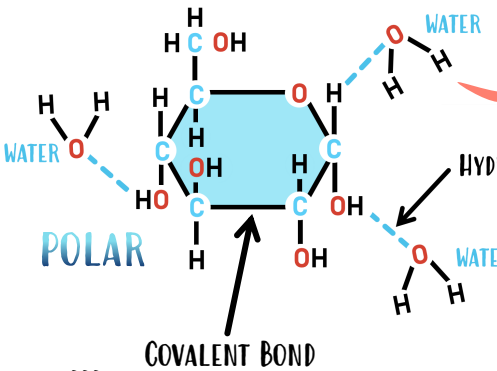
1. ENERGY STORAGE
2. STURCTURE
3. CELL RESPIRATION

ATP

PROPERTIES OF GLUCOSE

I. High Solubility in water

II. Easily Transportable

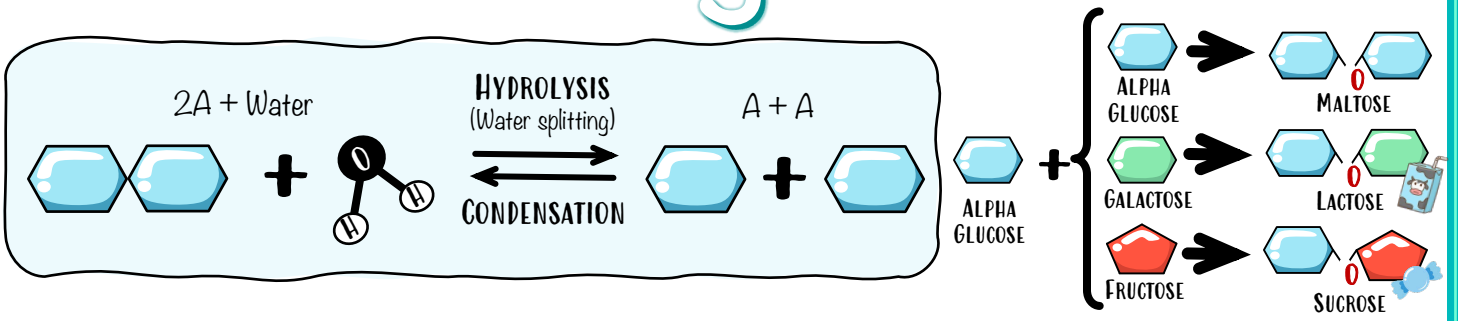


III. Molecular Stability

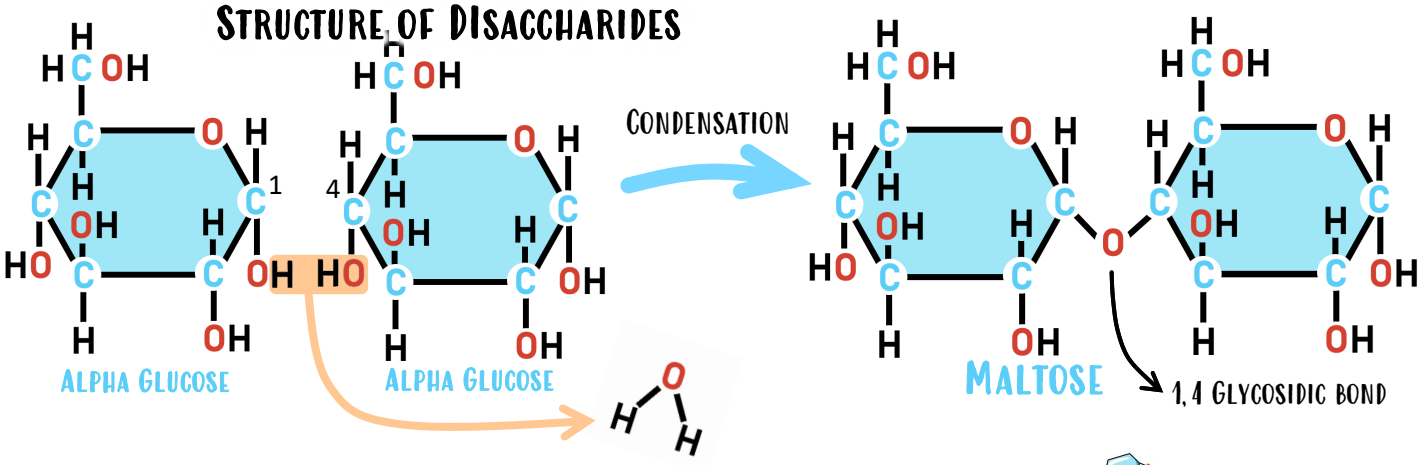
IV. Chemical Energy

ATP

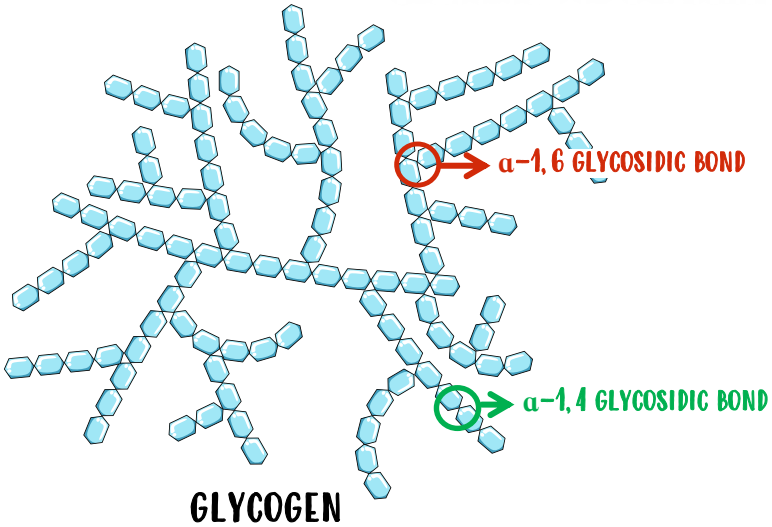
Carbohydrates



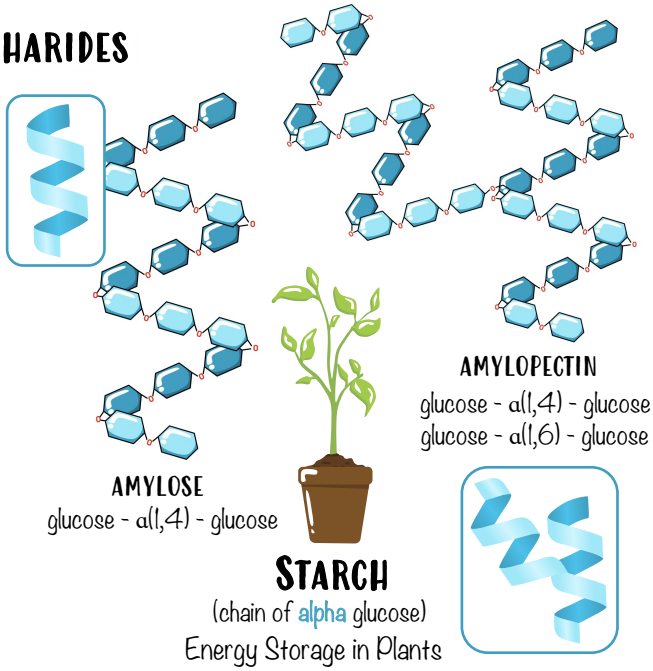
Structure of Disaccharides



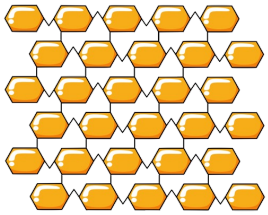
Structure of Polysaccharides



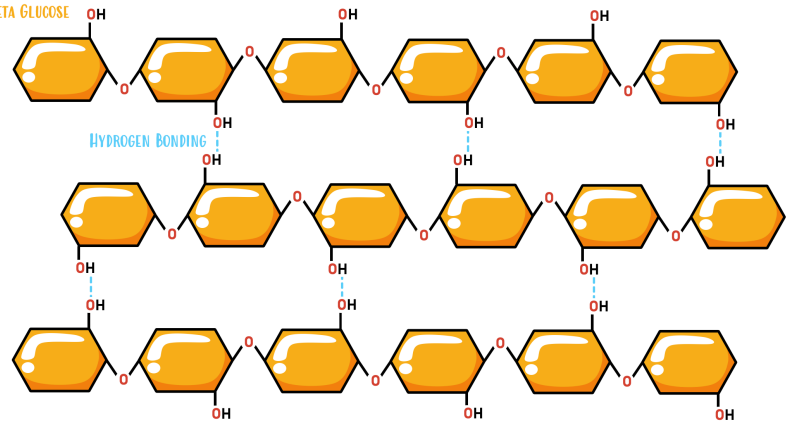
GLYCOGEN
(chain of alpha glucose)
Energy Storage in Humans



STARCH
(chain of alpha glucose)
Energy Storage in Plants



CELLULOSE
(chain of beta glucose)
We can't digest cellulose

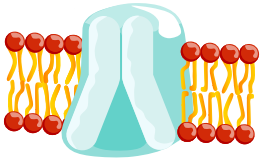


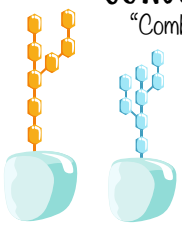
Carbohydrates

Conjugated carbon molecules

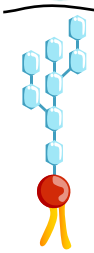
"Combination"

Lipid + Protein
Lipoprotein





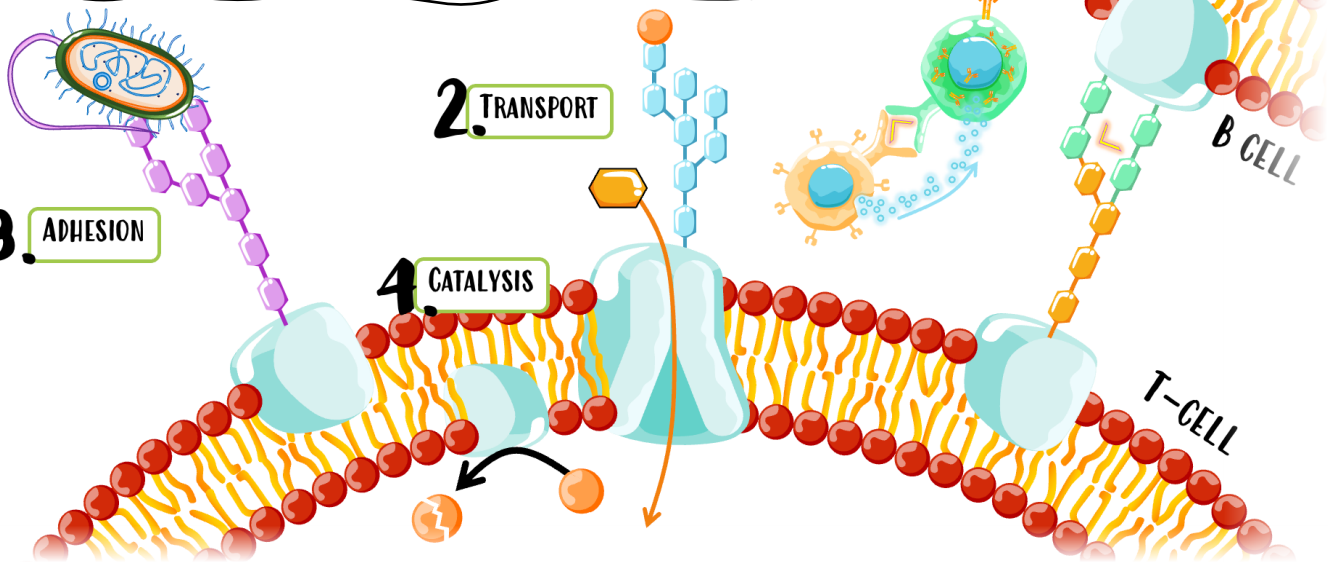
Glycoprotein
Carbohydrate + Protein



Glycolipid
Carbohydrate + Lipid

Functions of Conjugated carbon molecules

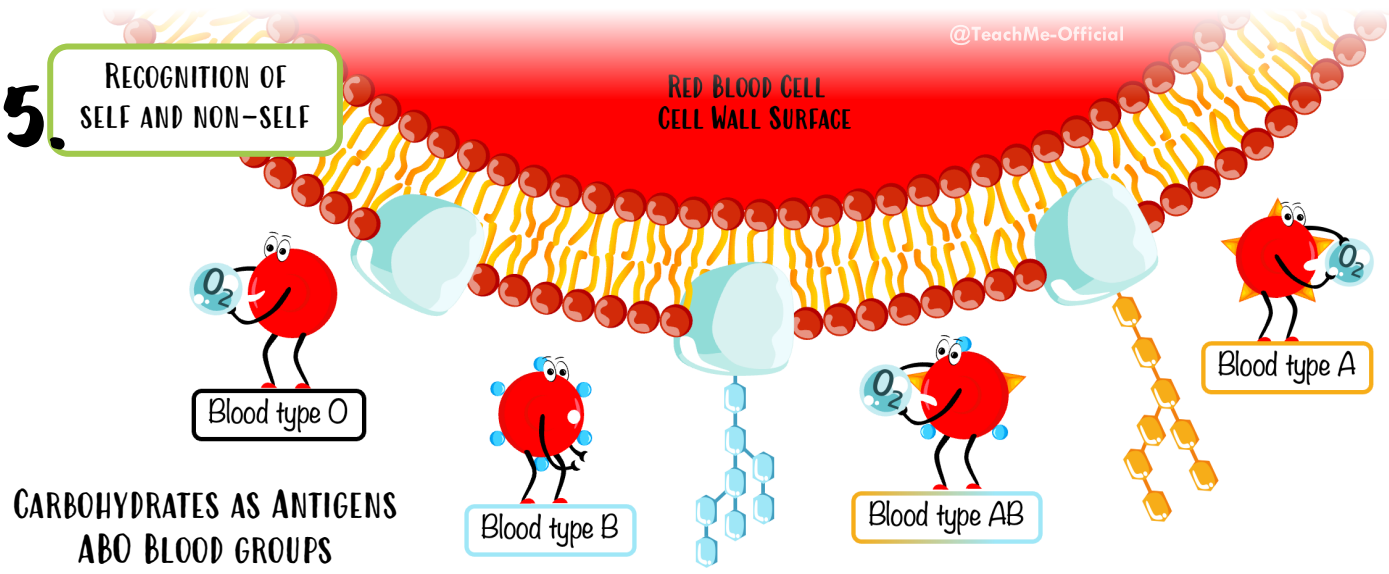
1. Cell to cell communication (Cell Signaling)



2. Transport

3. Adhesion

4. Catalysis



5. Recognition of self and non-self

Carbohydrates as Antigens ABO Blood Groups

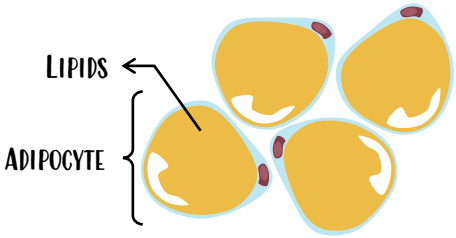
	Blood Group O	Blood Group B	Blood Group AB	Blood Group A
Antigens	None			
Antibodies	 B A	 A	None	 B

Lipids

The 4 macromolecules
- Carbohydrates
- **Lipids**
- Nucleic acids
- Proteins

Adipose Tissue

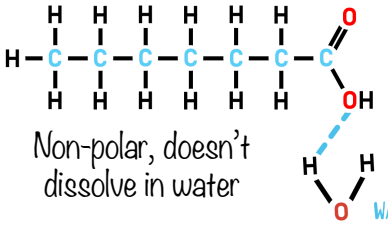
Composed of cells (adipocyte) that store fat (lipids)



Properties of Lipids

1 Solubility 2 Density 3 Insulation 4 Energy

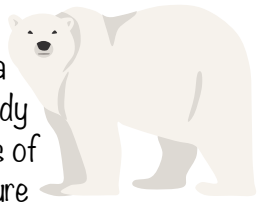
1 Solubility



Non-polar, doesn't dissolve in water

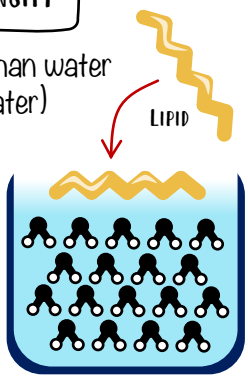
3 Insulation

Bird and mammals are <u>endotherms</u> – maintaining a steady internal body temperature regardless of environment temperature



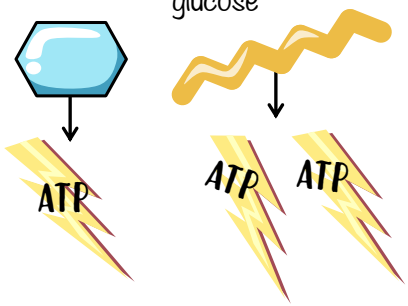
2 Density

Fat is less dense than water (Floats on water)



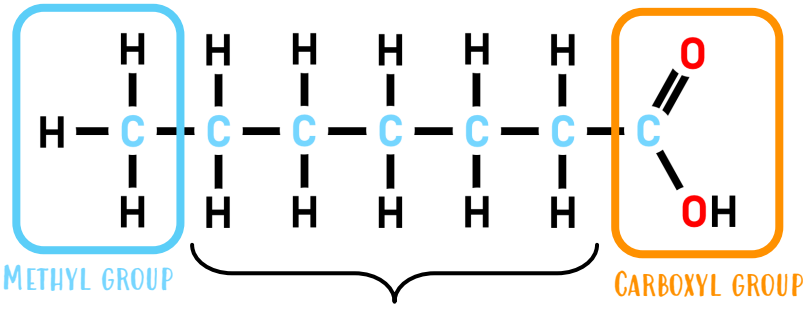
4 Energy

More energy produced compared to glucose



- **Lipids**
  - Hormone Lipids (Steroids + Cholesterol)
  - Store Lipids (Triglycerides)
  - Membrane Lipids (Phospholipids)

Fatty Acid Structure (Saturated)

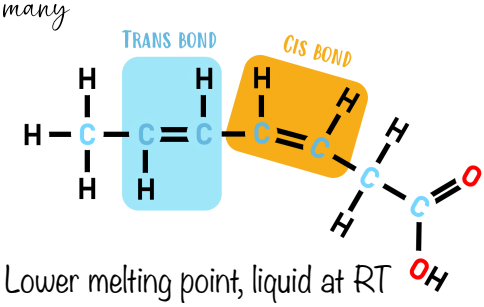


High melting point, solid at RT*

Fats (butter) & Animal meat

Polyunsaturated Fatty Acid

many

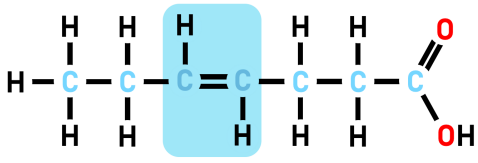


Lower melting point, liquid at RT

Oils

Monounsaturated Fatty Acid

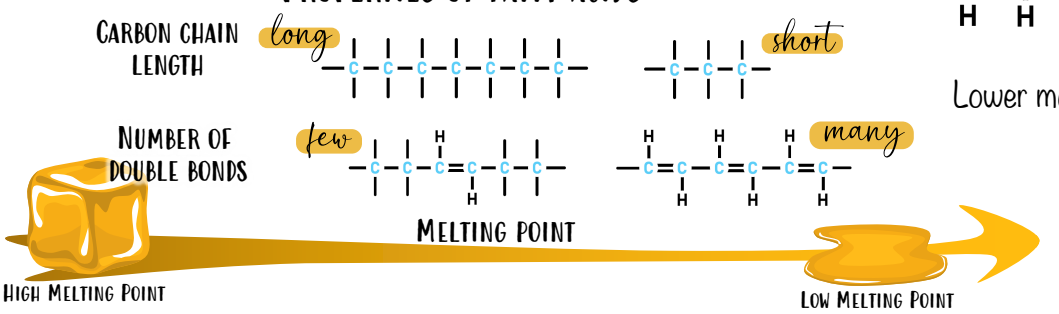
one



Lower melting point, liquid at RT

Oils

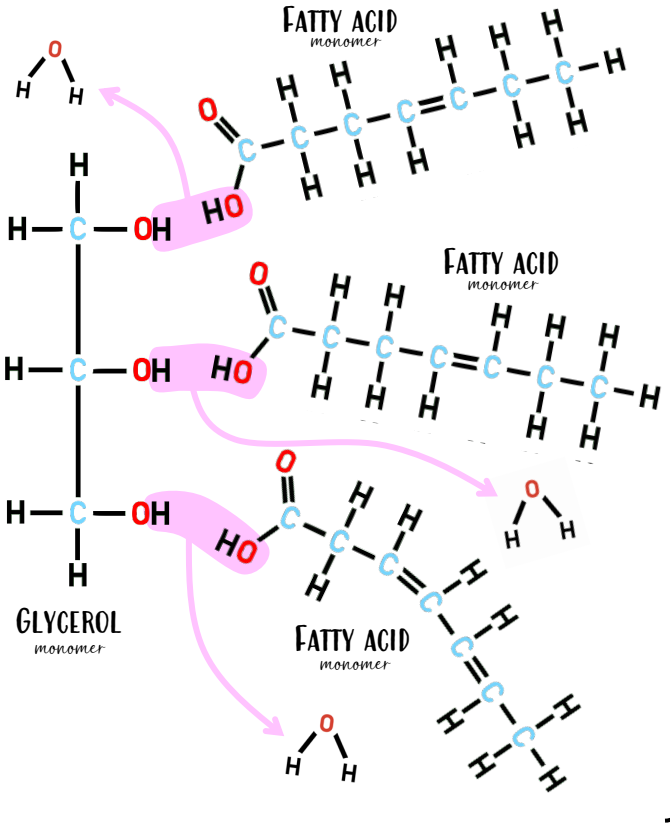
Properties of Fatty Acids

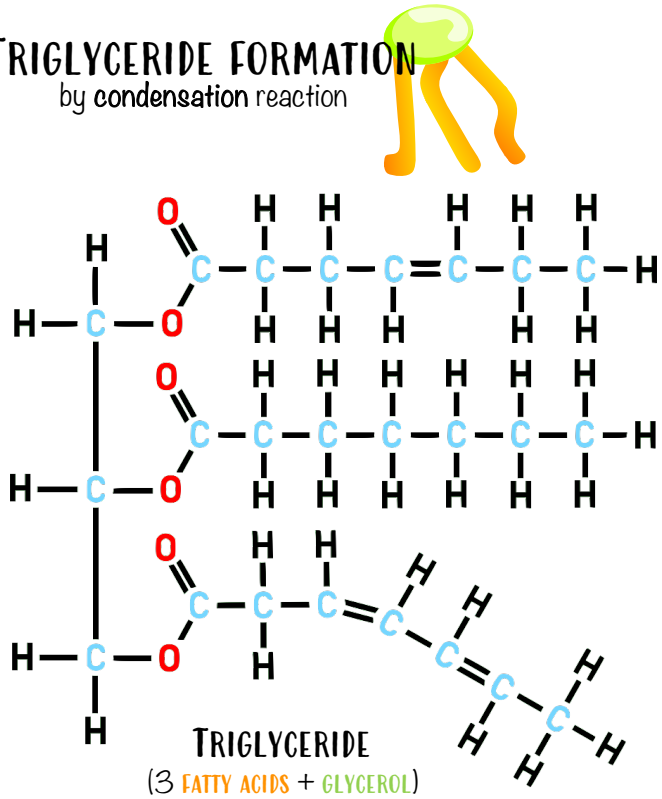


*RT = Room Temperature

Lipids

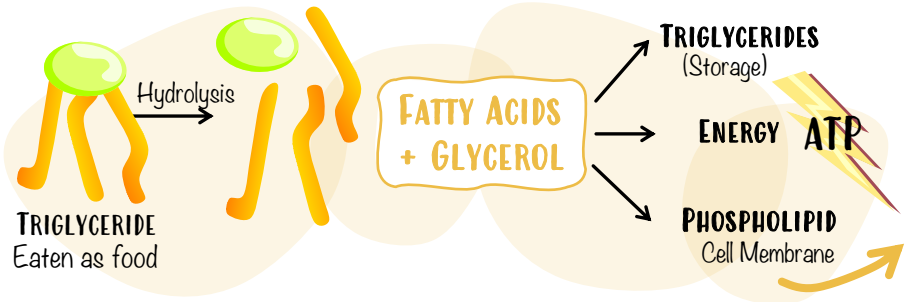
Triglyceride formation
by condensation reaction

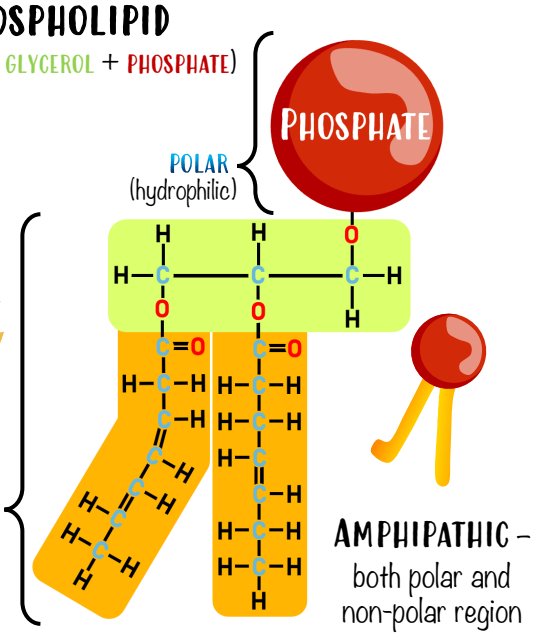




Triglyceride
(3 fatty acids + glycerol)

Phospholipid
(2 fatty acids + glycerol + phosphate)

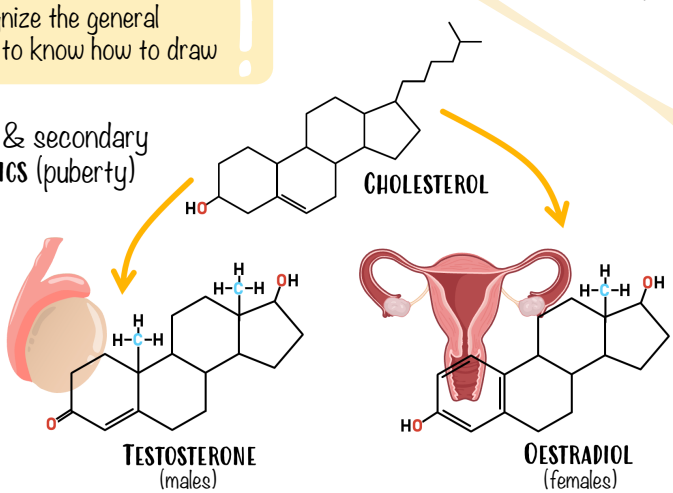




Steroid Hormones
Made by gonadal tissue

NOTE!
For the exam: recognize the general structure - no need to know how to draw

Give the primary & secondary **sex characteristics** (puberty)



Hormones – Molecules produced by glands (variety) in the body. One group of hormones are called steroids. They are made up from a type of lipid: **cholesterol**.

They regulate a wide variety of processes in the body

notes