Carbohydrates

Monosaccharides: monomers and building blocks (**glucose, fructose**)

Polysaccharides: complex chain of monomers linked together (**cellulose, starch, glycogen**)

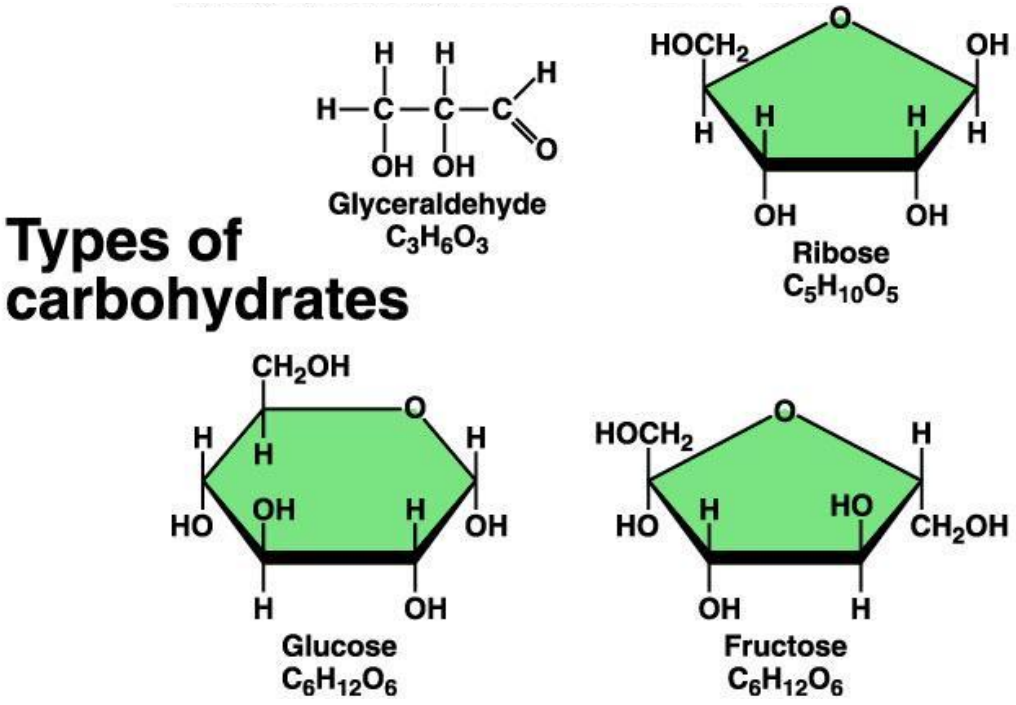
Monosaccharides

simple sugars containing 3 - 7 carbons

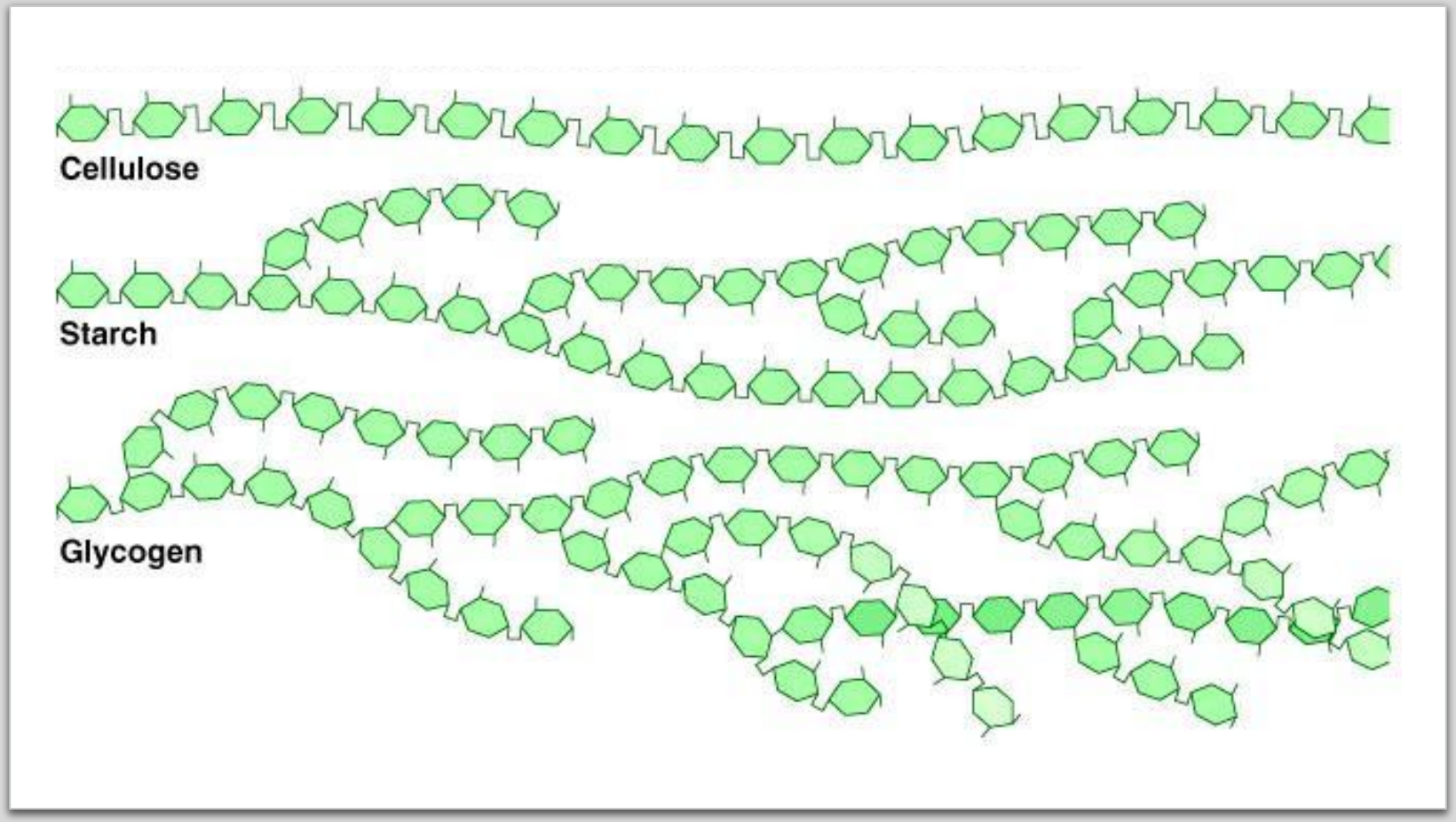
Cells use to create ATP or cellular energy

C, H, O ratio is 1:2:1

Glucose, Fructose, Ribose



Polysaccharides



Complex carbohydrates made up of hundreds of monomers linked by *dehydration synthesis*

Examples of polysaccharides:

Common polysaccharides include:

- Cellulose - forms wood & parts of plant cell walls.
- Starch - energy storage form in plants
- Glycogen - short term energy storage form in animals.
- Cellulose, starch & glycogen are long chains of glucose units; differ in branching patterns

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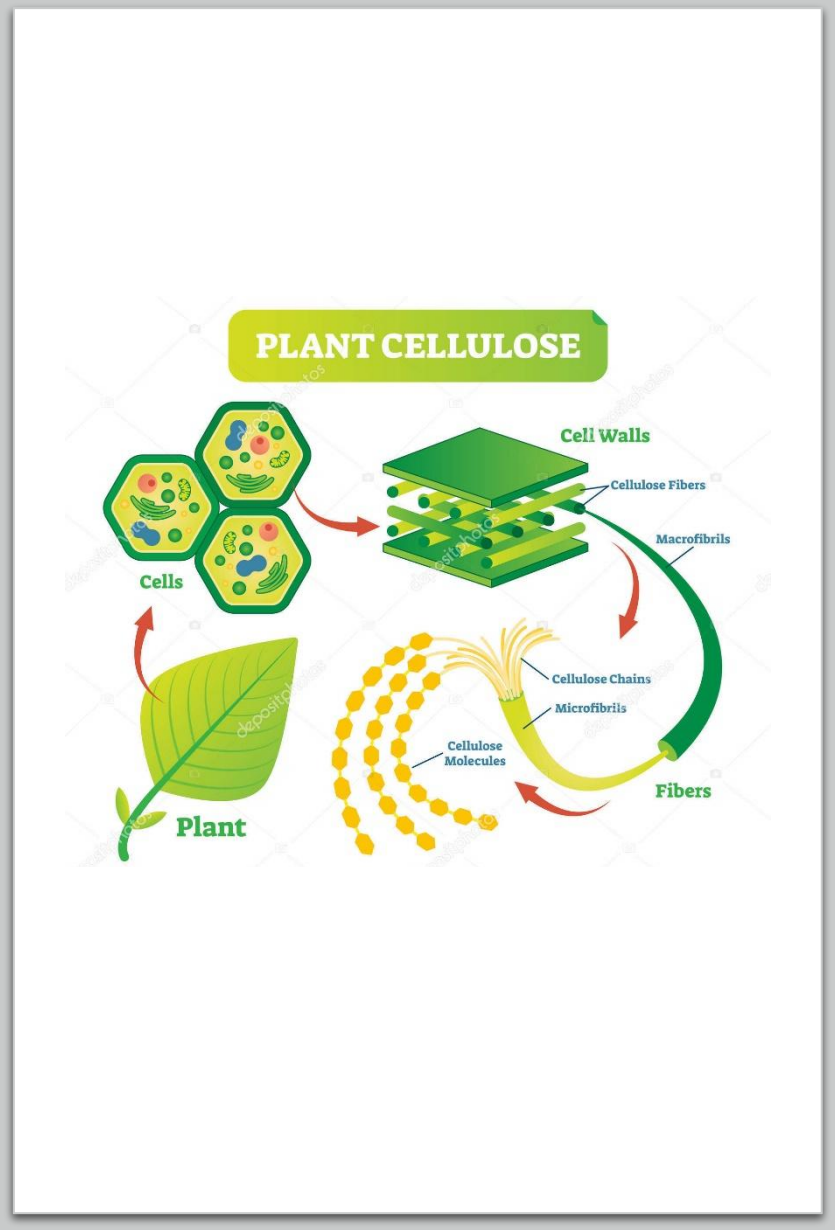


2. Lipids

- fatty, waxy, or oily substances in nature
- contain C, H, O
- do not dissolve in water
- Some of the most important are
- Triglycerides
- Phospholipids
- Steroids
- Waxes

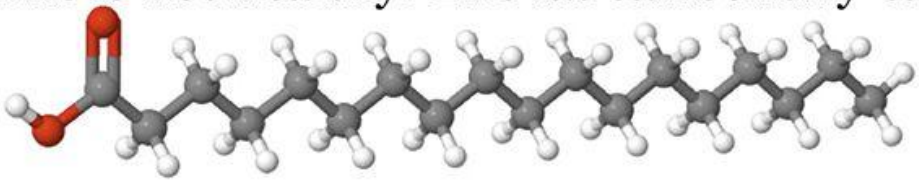
Lipids in food

Saturated fats are found in animal products such as butter, cheese, whole milk, ice cream, fatty meats, coconut oil, palm kernel oil.

Saturated vs. Unsaturated Fatty Acids

All of the chemical bonds in the tails of *saturated fats* are single bonds. This gives the acid the ability to rotate freely and pack together tightly. This is not healthy! The fat can solidify easily.

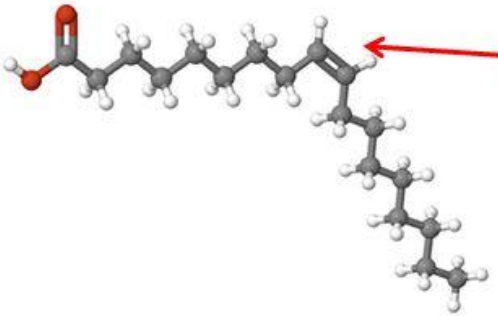
Stearic acid (saturated)



(Black atoms = C, white atoms = H, red atoms = O)

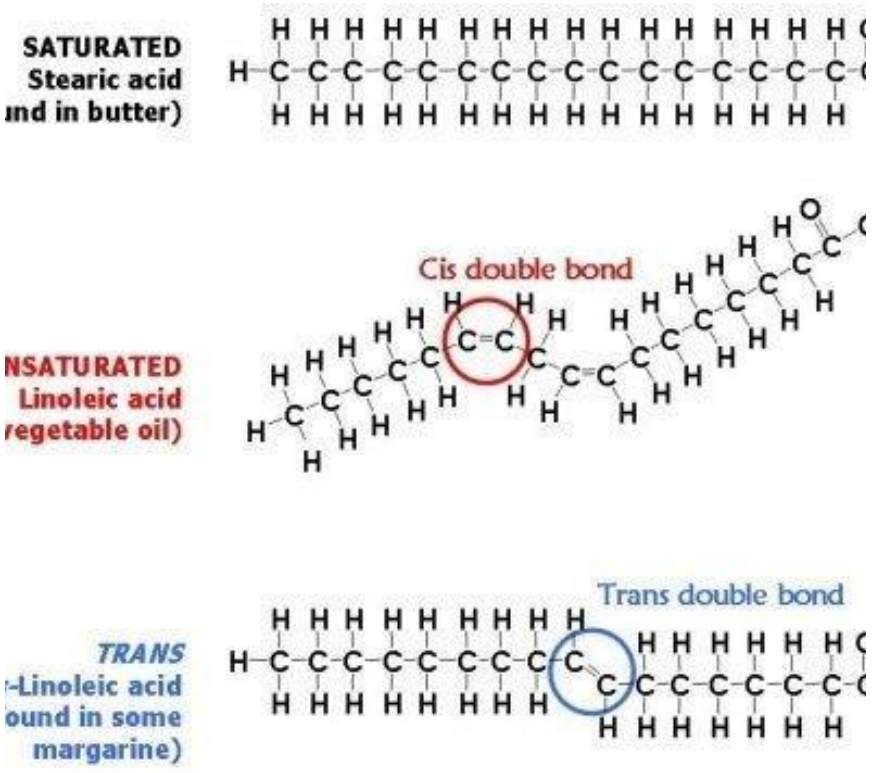
Unsaturated fats have at least one double bond in their tail. This double bond can be *cis* or *trans* in its orientation.

Oleic acid (cis-unsaturated)



Double bond

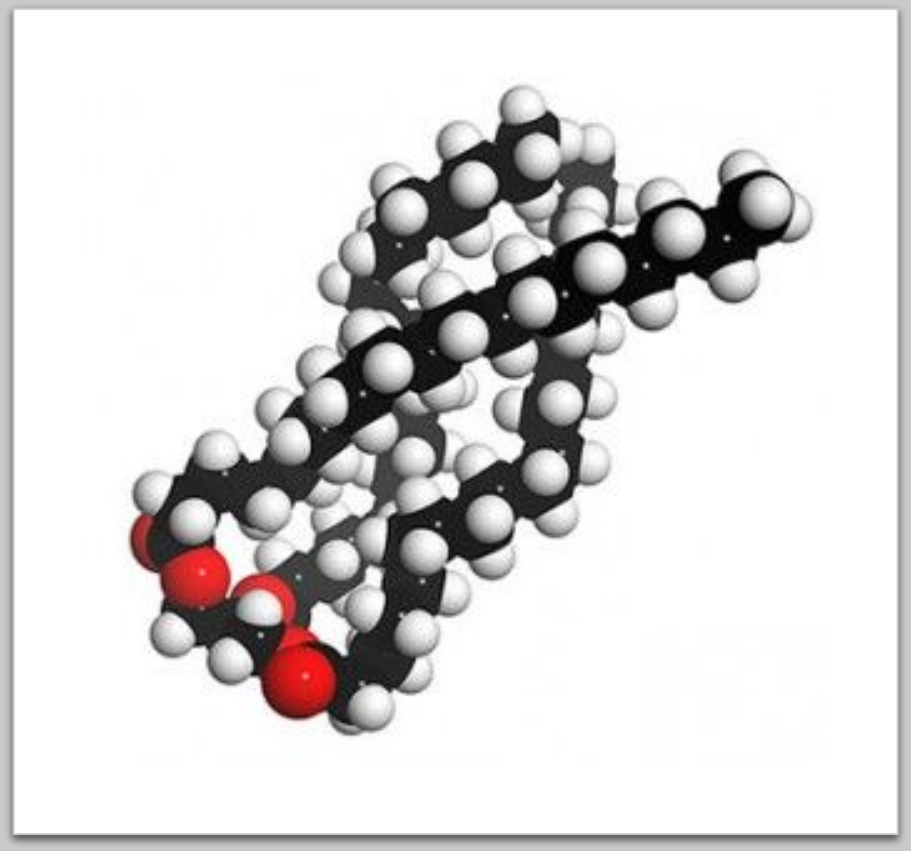
Healthy food vs unhealthy food

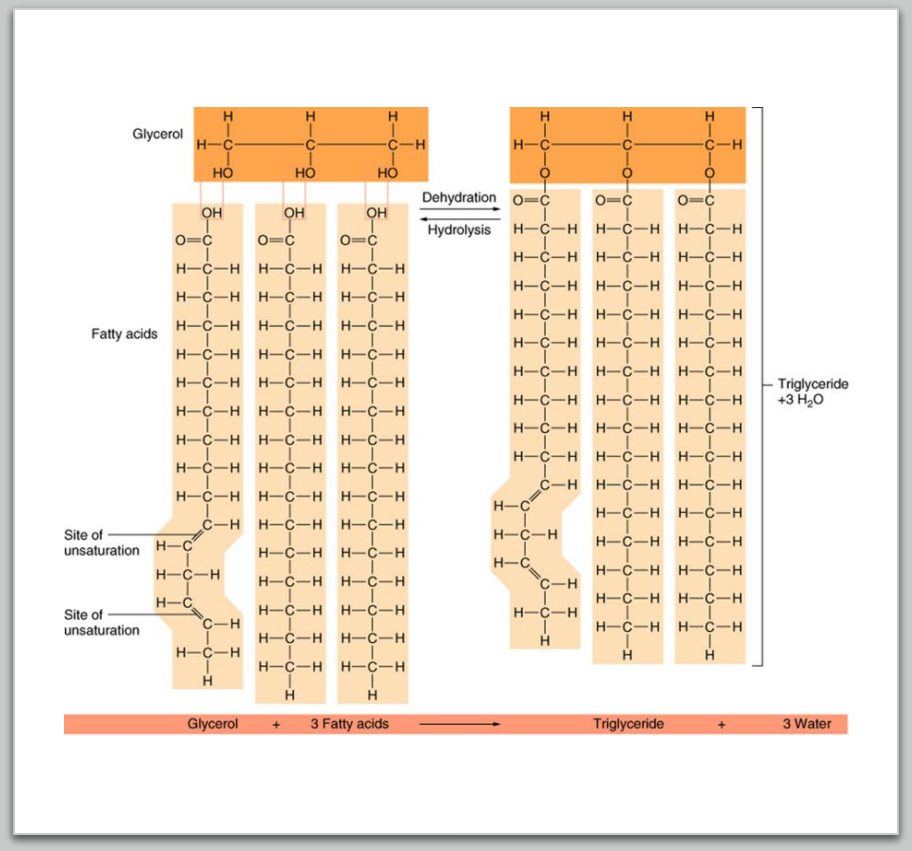


Example of lipids:

TRIGLYCERIDES

- composed of glycerol linked to 3 fatty acid chains by *dehydration synthesis*
- They function like cushion organs, insulation and in long-term energy storage as adipose tissue



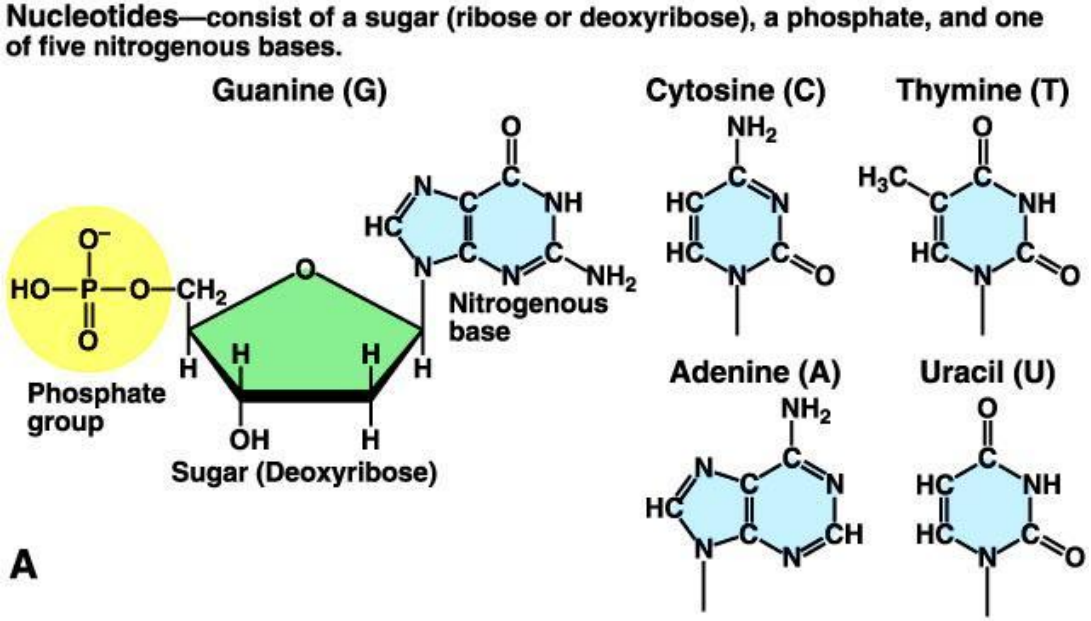


4. Nucleic Acids

Nucleic acids contain C, H, O, N, P. Their monomers are nucleotides.

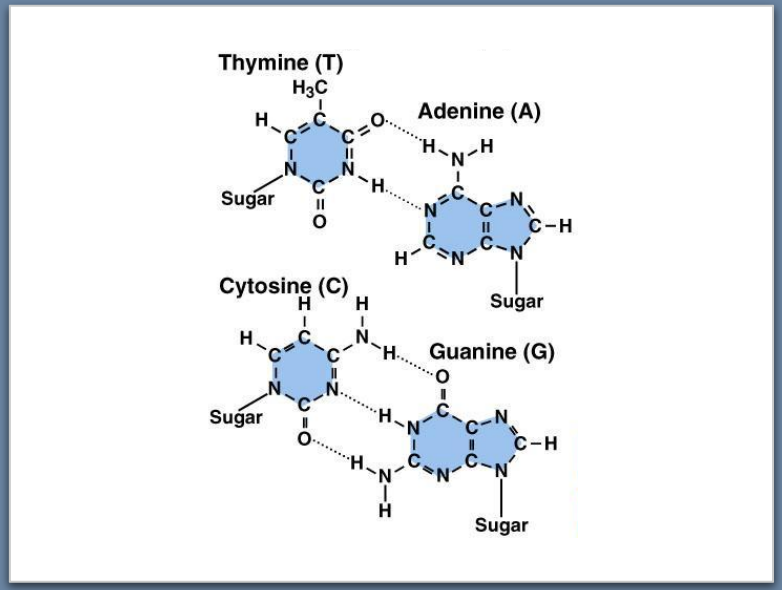
Each nucleotide is composed of:

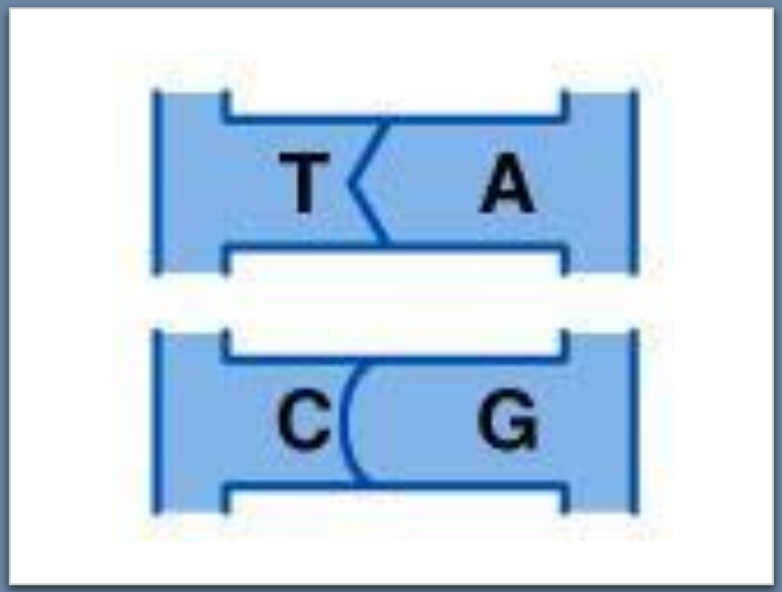
- a 5 carbon sugar (ribose or deoxyribose)
- a phosphate group
- a nitrogenous base (guanine, cytosine, thymine, adenine or uracil).
- They are **DNA, deoxyribonucleic acid** and **RNA, ribonucleic acid**



Pyrimidines (T & C) form hydrogen bonds with purines (A & G)

- Thymine pairs with Adenine, forming 2 hydrogen bonds
- Cytosine pairs with Guanine, forming 3 hydrogen bonds





Comparison of DNA and RNA