8.2 Structure of DNA

Objective:

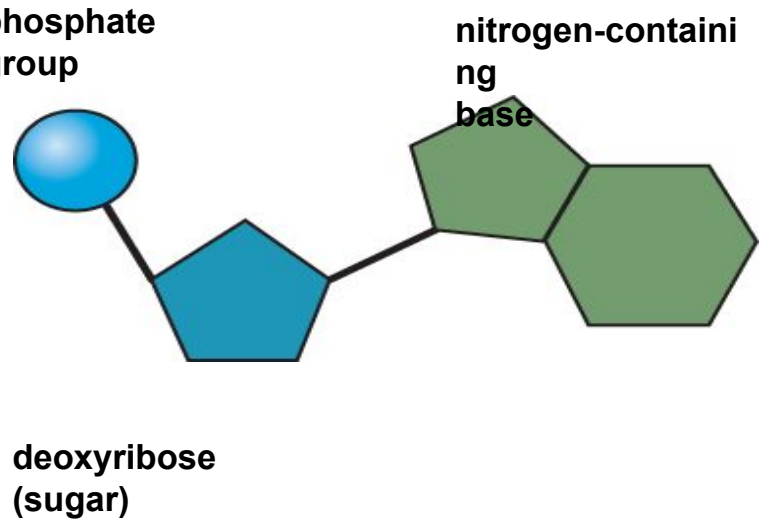
Identify the Structure of DNA.

8.2 Structure of DNA

- **DNA is:**
  - **-deoxyribonucleic acid**
  - **-an organic compound (nucleic acid)**
  - **-made up of the elements CHONP**
  - **-composed of molecules called nucleotides.**

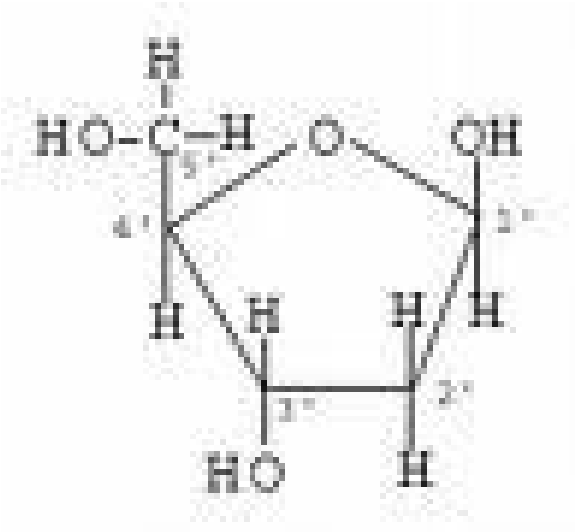
--Each nucleotide has three parts. It is "L" shaped:

- a phosphate group
- a deoxyribose sugar
- a nitrogen-containing base



8.2 Structure of DNA

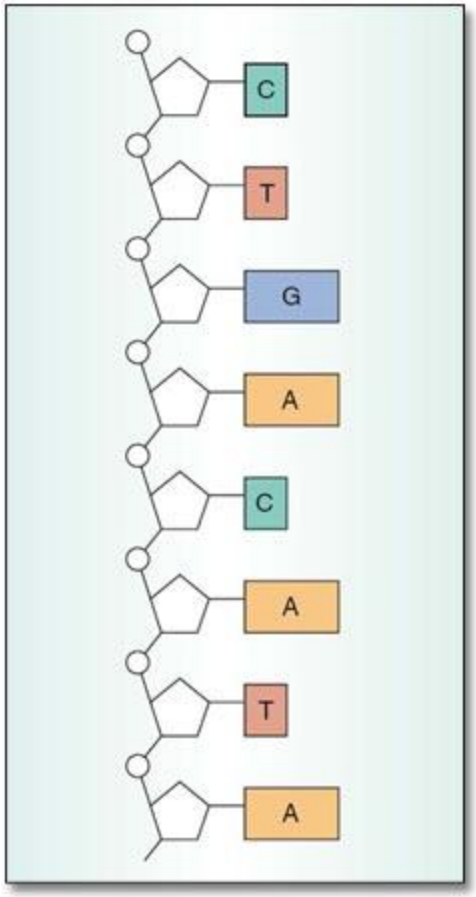
- **Deoxyribose = sugar is DNA**
  Is a RIBOSE = sugar and is missing ONE oxygen (therefore is DEOXY). Draw this:



→ DNA is called a ladder or a double helix of nucleotides

8.2 Structure of DNA

- **The SIDES of the ladder or backbone of the double helix are made up of alternating sugars and phosphates**



8.2 Structure of DNA

- The middle of the helix or the rungs that face inward in the ladder are made up of 4 nitrogen BASES (they all have nitrogen).

-Bases are: Thymine (T)
Cytosine (C)
Adenine (A)
Guanine (G)

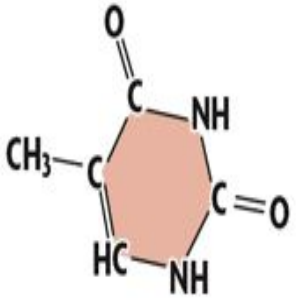
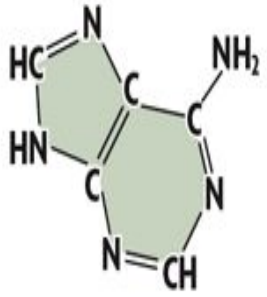
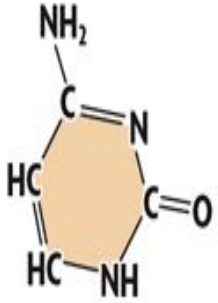
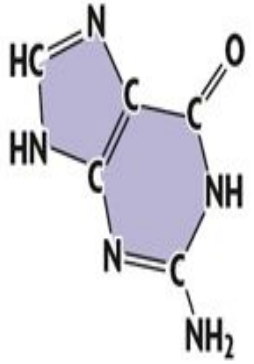
8.2 Structure of DNA

- -The bases bond together in a specific way because of their shape. A big base hydrogen bonds with a small base
- There are 2 categories of bases: pyrmidines and purines

- -Pyrimidines are -SMALLER bases
  - **-Thymine (T)**
  - **-Cytosine (C)**
  - Remember by: *-PyTC*
- -Purines are -BIGGER bases:
  - **-Adenine (A)**
  - **-Guanine (G)**
  - - PuAG

- SO in DNA….A always goes with T (2 hydrogen bonds)
  C always goes with G (3 hydrogen bonds)
  Small bases bonds to big base

8.2 Structure of DNA

PYRIMIDINES = SINGLE RING			PURINES = DOUBLE RING		
Name of Base	Structural Formula	Model	Name of Base	Structural Formula	Model
thymine			adenine		
cytosine			guanine		

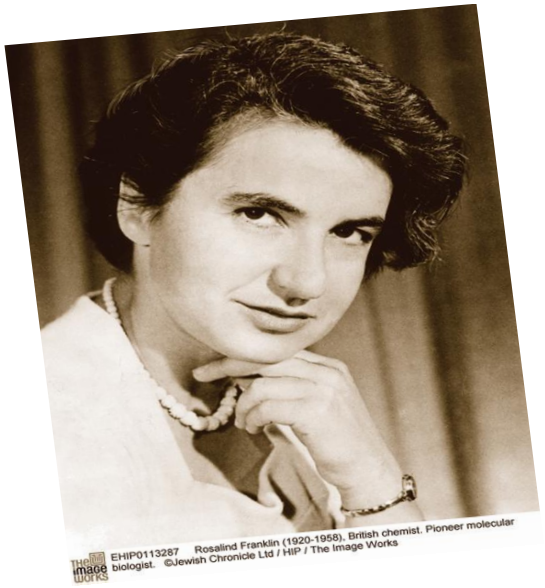
8.2 Structure of DNA

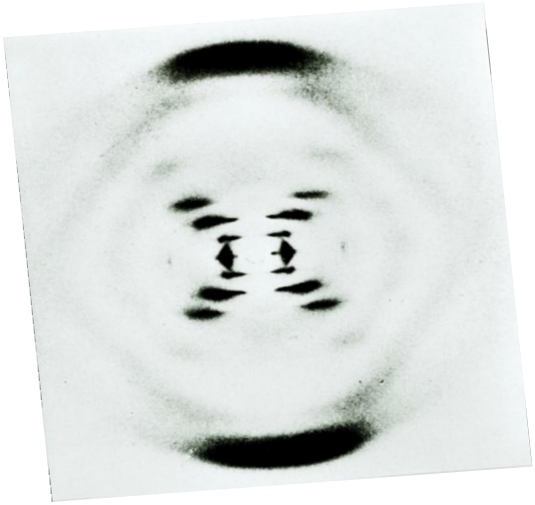
- **Discovery of DNA**
  Watson and Crick determined the 3-D structure of DNA by building models.

Watson and Crick's discovery built on the work of Rosalind Franklin and Erwin Chargaff

8.2 Structure of DNA

- Franklin's x-ray images suggested that DNA was a double helix of even width = crystallography
- Chargaff's rules stated that A=T and C=G
  - If there is 20% Adenine & 20% Thymine, then there is 30% Cytosine and 30% Guanine.





Analyzing DNA

	A	T	G	C
Human	30.4	30.1	19.6	19.9
Sheep	29.3	28.3	21.4	21.0
sea urchin	32.8	32.1	17.7	17.3
salmon	29.7	29.1	20.8	20.4
Wheat	27.3	27.1	22.7	22.8
E.coli	24.7	23.6	26.0	25.7
lambda	21.3	22.9	28.6	27.2

8.2 Structure of DNA

- BONDING
- The backbone is connected by covalent bonds.
- The bases are connected by WEAK hydrogen bonds. These are weak b/c DNA has to go through replication to be copied and to make proteins