What is DNA?

* It’s a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* It is the chemical link between your genes and your traits.
* Chromosomes are made of \_\_\_\_\_\_\_\_\_\_\_ which is made of \_\_\_\_\_\_\_\_\_\_\_ which is a sequence of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* It’s an abbreviation for Deoxyribonucleic acid.
* It’s located in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* It was known to exist in the early 20th century but its structure not understood until the late 1950’s
* All living things use DNA( or RNA) as part of their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Its general shape is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**,which is 2 spirals held together with cross braces like a twisted ladder.**

DNA’s structure

* As a chemical, DNA contains the same elements as other macromolecules: \_\_\_\_, \_\_\_\_, \_\_\_\_, and \_\_\_\_ It also contains P(phosphorus)
* DNA is made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(building blocks) called **nucleotides.**
* Each nucleotide is made up of 3 parts:

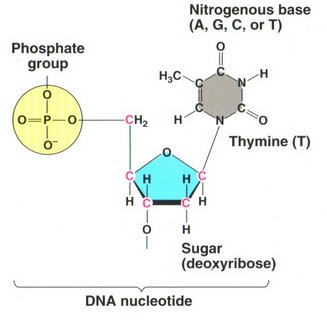
1. **a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. **1 of 4 nitrogen-containing \_\_\_\_\_\_\_\_\_\_\_ named \_\_\_\_\_\_\_\_\_\_\_\_\_\_*(A), \_\_\_\_\_\_\_\_\_\_\_\_(T), \_\_\_\_\_\_\_\_\_\_\_\_\_(C), and \_\_\_\_\_\_\_\_\_\_\_\_\_\_(G).***
3. **A phosphate group (PO4)**

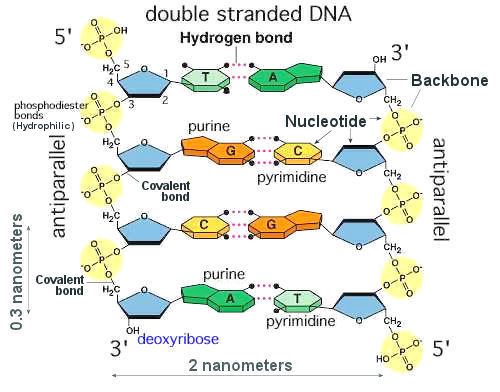
Nucleotides assembled

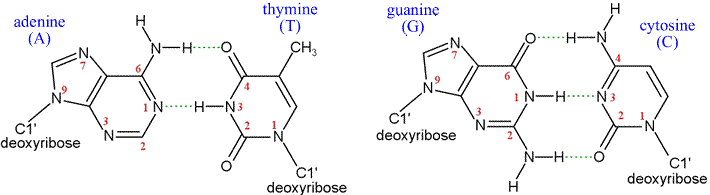
* Nucleotides are arranged in a very specific manner.
* The arrangement takes on the appearance of a ladder.
* The bases of 2 nucleotides *pair up* to make a rung(step) of the ladder. They are held together by hydrogen bonds.
* The sugars and phosphates make up the sides of the ladder. Since ladders have 2 sides we refer to DNA as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

It’s all about those bases.

* All DNA is arranged in this manner.
* How then can we all make the statement “we have different DNA”?
* It’s the sequences of the base pairing.
* The same 2 bases always pair up.
* \_\_\_\_\_\_ pairs with \_\_\_\_\_ and \_\_\_\_\_ pairs with \_\_\_\_\_\_
* The order of these base pairs can occur in more than trillions of combinations.







DNA replication

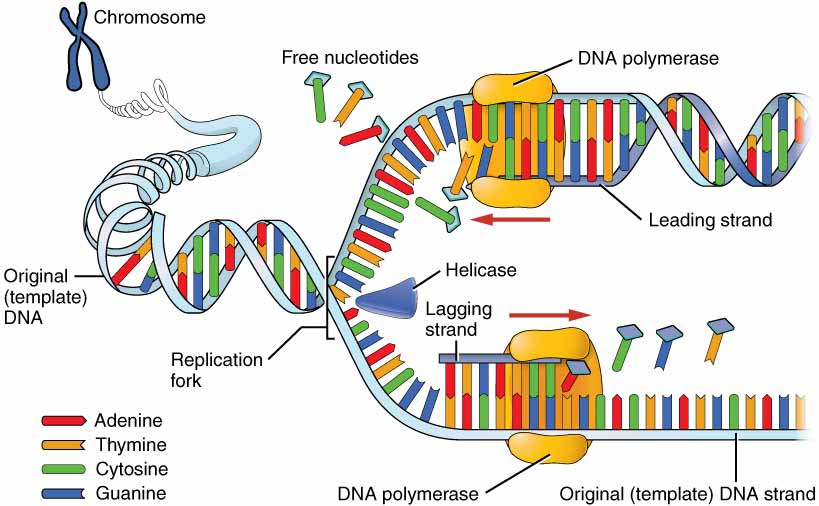
* Recall the *S phase* of the cell cycle where “DNA replicates.” *This* is that process.
* DNA replication: is the process of producing two identical replicas from one original **DNA** molecule.
* This is a complex process that occurs in the nucleus. It involves many enzymes.
* I will provide you with a trimmed down version of the process involving a few of the enzymes.

Step 1: The DNA “unzips” by breaking the hydrogen bonds between the bases in a pair. At the same time the double helix is unwound. The enzyme **helicase** does these tasks.

Step 2: the separated base pairs are quickly paired back up with the appropriate bases on new nucleotides that come into the nucleus from the cytoplasm.

Step 3: Each new strand of DNA is replicated in a different manner. Best explained by an animation. Ill post on the website.

Step 4: Once replication is complete you have 2 identical strands of double stranded DNA identical to the original.





Mutations

* Sometimes mistakes are made copying DNA during replication and during transcription
* DNA polymerase checks itself for errors
* Sometimes errors aren’t corrected properly and this “mistake” or **mutation** becomes part of that organisms DNA
* Types of mutations:
  + POINT MUTATIONS: a single base pair is different.
    - Substitutions- one base is substituted for another
    - Insertions- an extra base is inserted into the sequence
    - Deletions- a based is removed from the sequence
* Insertions and deletions cause frameshifts.
* Insertions causes the frame to shift to the right or downstream.
* Deletions causes the frame to shift to the left or upstream.
* Frameshifts usually affect al amino acids from the point onward.
* Can cause different amino acids to be used or premature STOP signals.