Nucleic Acids and Protein Synthesis

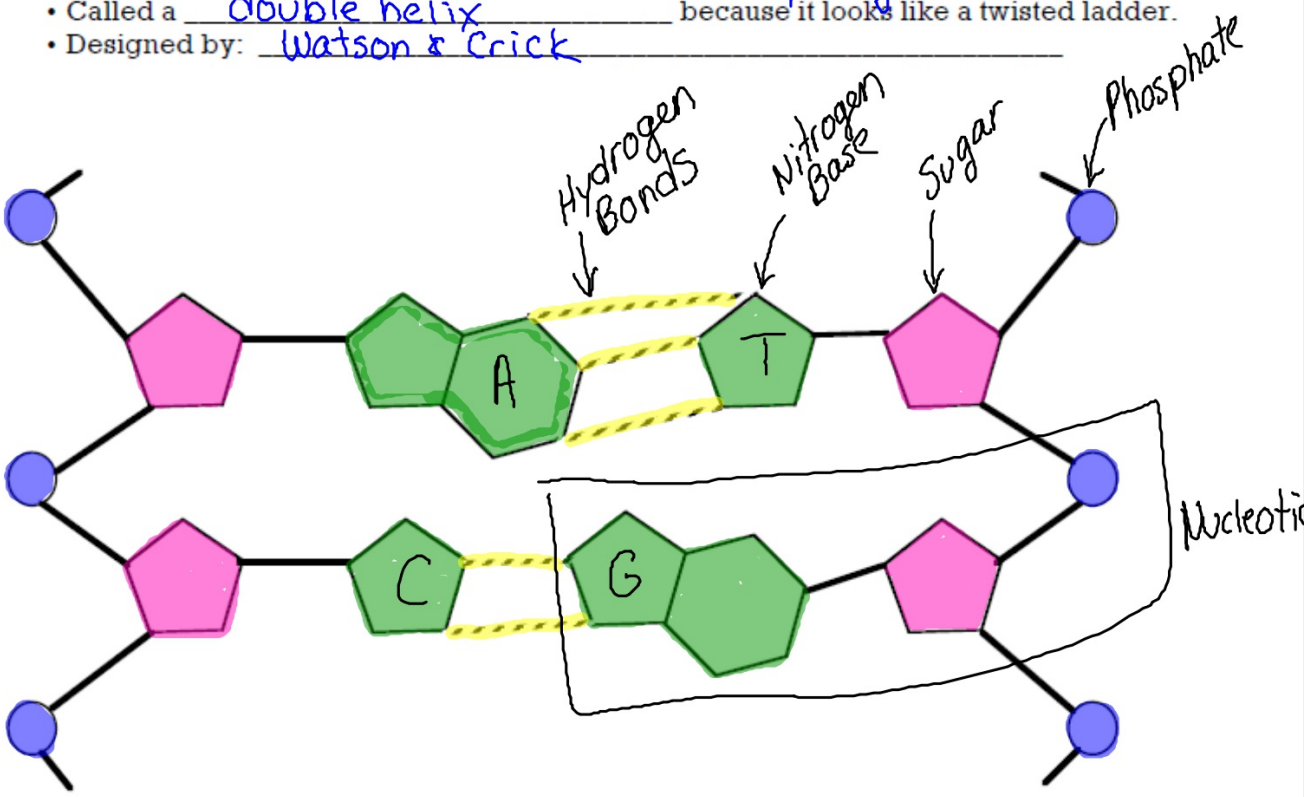
What is DNA? Deoxyribonucleic Acid

- DNA Basics:
  - DNA is a nucleic acid. (The building blocks of nucleic acids are nucleotides.)
  - DNA is composed of three things:
    - 1. Sugar - Deoxyribose
    - 2. Phosphate
    - 3. Nitrogen Base

- DNA Nitrogen Bases:
  - Two bases are Purines (double ring structures)
    - 1. Adenine (A)
    - 2. Guanine (G)
  - Two bases are Pyrimidines (single ring structures)
    - 1. Cytosine (C)
    - 2. Thymine (T)

- **Chargaff's Rule** - Edwin Chargaff Complimentary Base Pairing
  - For every __A__ there is a __T__, and for every __C__ there is a __G__.
  - Therefore: __A__ pairs with __T__, and __C__ pairs with __G__.

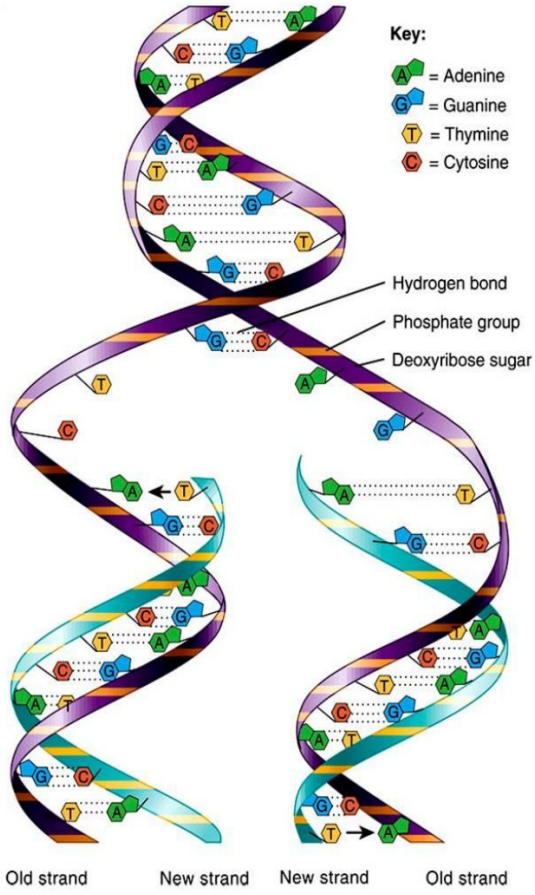
- DNA Structure (Drawing)
  - The bonds between nitrogen bases are __weak hydrogen bonds__.
  - Called a __double helix__ because it looks like a twisted ladder.
  - Designed by: __Watson & Crick__



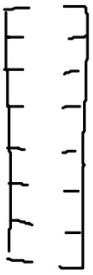
- Importance of Nucleotide Sequences (order of nitrogen base pairs)
  - unique for each ___species___
  - unique for each ___individual___ in each ___species___
  - The more alike two species are, the ___more similar___ their DNA.

DNA Replication: DNA → DNA

- DNA must be replicated so cells can undergo ___growth___ and ___division___.
- To replicate means to ___copy___.
- Process of DNA replication:
  - DNA unwinds at the ___replication fork___. (Unwinds in either direction.)
  - New ___nitrogen bases___ are attached from the places that have unwound.
  - Proteins called ___enzymes___ aid in DNA replication.
  - Happens during interphase of the cell cycle.


Key:
A = Adenine
G = Guanine
T = Thymine
C = Cytosine
Hydrogen bond
Phosphate group
Deoxyribose sugar
Old strand
New strand
New strand
Old strand

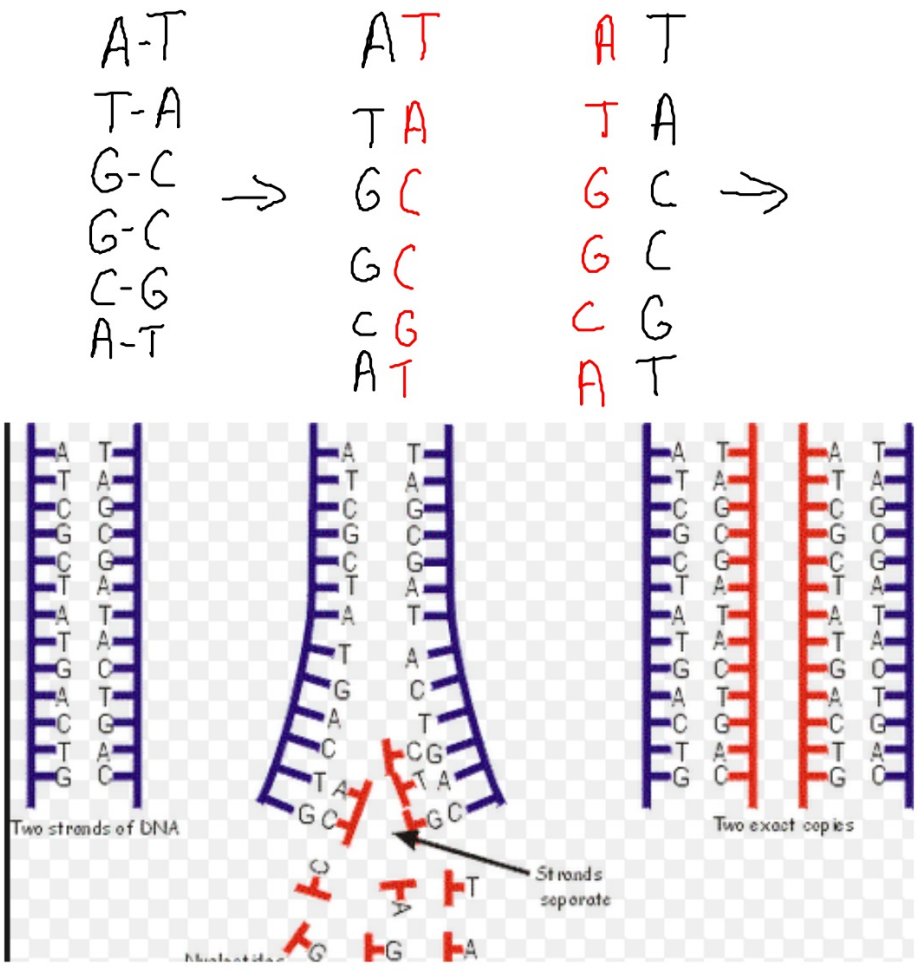
DNA in the nucleus needs to replicate in order for the cell to divide.



The enzyme helicase breaks the weak hydrogen bonds. This causes the helix to "unzip."

The enzyme DNA Polymerase adds new complimentary bases to the old strand. (A-T, C-G)

Once the bases are added, the enzyme Ligase proof reads & "rezips" the DNA. Each helix has one old strand & one new strand. This is called semi-conservative.


Two strands of DNA
Strands separate
Two exact copies