1. What are Chargaff's rules?

- Studied DNA from many different species
- Interested in the four different nitrogen bases of DNA: adenine (A), guanine (G), cytosine (C), and thymine (T)
- Discovered concentrations of the four bases differed from one species to another
- Observed within each species -- concentration of adenine (about the same) concentration of thymine.
  -- concentrations of guanine and cytosine (about the same)

2. Identify the structure of the DNA molecule. What are nucleotides?

- A Nucleic Acid macromolecule (Textbook page 171)
- Double helix shape of two polynucleotide chains of DNA
- Made from nucleotide monomers with 3 parts:

3. What makes up a nucleotide?

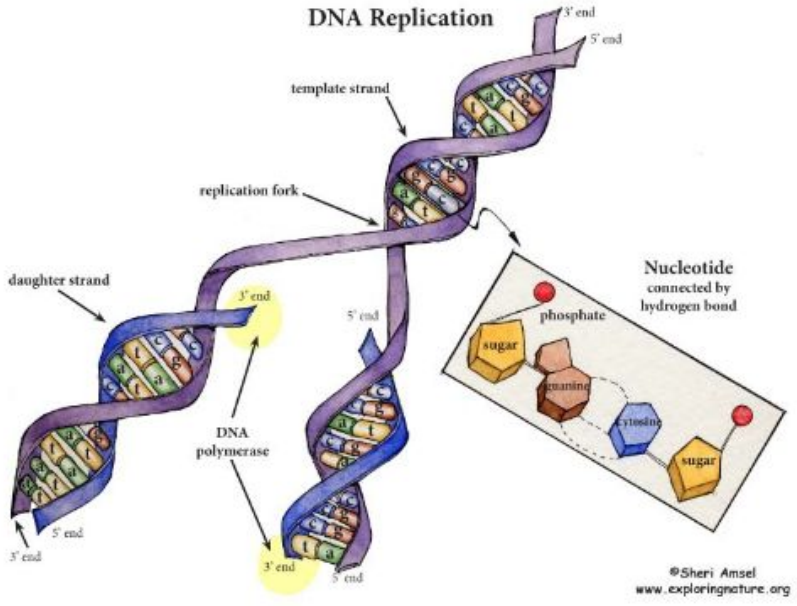
- phosphate group
- sugar "deoxyribose"
- nitrogen-containing base (A,C, G, or T) (Held together with H-bonding)
  Adenine & Guanine 2-ring; Thymine & Cytosine 1-ring

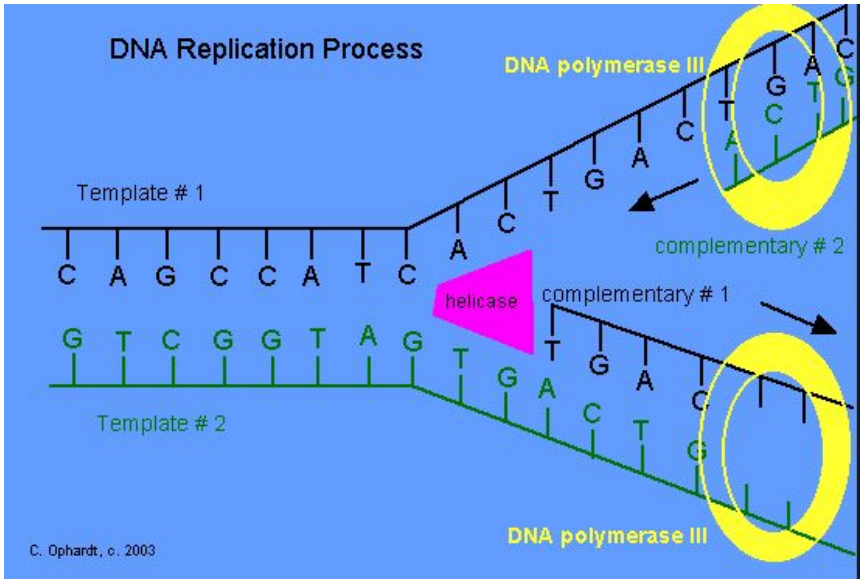
(Knowing structure helps in better understanding function)

4. Why is DNA replication said to be semi-conservative?

The two daughter molecules contain one strand from the parent molecule and one new strand that is complementary to it…
ie, half of the parent DNA molecule is conserved in each of the two daughter DNA molecules.

5. Create a diagram that shows how DNA replication occurs.





6. What is complementary base pairing?

Adenine - Thymine and Guanine - Cytosine

7. Explain why complementary base pairing is necessary to maintain the double helix shape of the DNA molecule.

The one-ring molecule binds with a two-ring molecule ... the distance between the two chains is constant to maintains the uniform shape of the DNA double helix

8. What components make up DNA?

Deoxyribonucleic Acid; each organism's DNA is unique with different arrangements of nitrogen-based molecules (code)

Encoded with directions for traits (unique characteristics) as diverse as color of eyes, scent of rose ways bacteria infect a lung cell

Nucleotides

- Nitrogenous base (nitrogen-containing region)
- deoxyribose (carbon-based sugar molecule)
- phosphate group

When nucleotides join together in a series, they form a structure known as a **polynucleotide**.

- 5' end of one nucleotide attaches to the 3' end of the adjacent nucleotide
- alternating sugar-phosphate arrangement that forms the "backbone" of a DNA molecule

9. How is the DNA strand organized?

Double-stranded DNA consists of two polynucleotides that are arranged such that the nitrogenous bases within one polynucleotide are attached to the nitrogenous bases within another polynucleotide by way of special chemical bonds called **hydrogen bonds**

sugar-phosphate ends are anti-parallel, or arranged in opposite orientations (5' to 3')

10. How is DNA packaged inside cells?

Chromatin (DNA packaging and supercoiling) to form Chromosomes (Use proteins called histones in Eukaryotes)

11. How do Scientist visualize DNA?

Extract DNA

from tissue samples, thereby pooling together miniscule amounts of DNA from thousands of individual cells. When this DNA is collected and purified, the result is a whitish, sticky substance that is somewhat translucent.

Karyotype: chromosomes are in their most condensed form captured from a cell and arranged in a picture

Note:
specific sequence of A, T, C, and G nucleotides within an organism's DNA is unique to that individual, and it is this sequence that controls not only the operations within a particular cell, but within the organism as a whole.

scientist **Rosalind Franklin** used a process called X-ray diffraction to capture images of DNA molecules. Dr. Franklin interpreted the black lines in photos as representing distances between the nucleotides that were arranged in a spiral shape called a **helix**.

Watson and Crick: DNA actually takes the form of a **double helix**, a ladder-like structure that is twisted along its entire length (Figure 6). Franklin, Watson, and Crick all published articles describing their related findings in the same issue of *Nature* in 1953.

One Human:
100 trillion cells
DNA in each cell nearly two meters long