

Name: \_\_\_\_\_

## DNA Structure and Replication

### 1. DNA: Deoxyribonucleic Acid

- Credit for discovery is given to Watson & Crick
- DNA** stands for \_\_\_\_\_
- This chemical substance is present in the \_\_\_\_\_ of all cells in all living organisms – both \_\_\_\_\_ and \_\_\_\_\_
- DNA controls all the chemical changes which take place in cells
- The kind of cell which is formed through \_\_\_\_\_ (muscle, blood, nerve etc) is controlled by DNA
- The kind of organism which is produced (buttercup, giraffe, herring, human etc) is controlled by DNA
- DNA carries \_\_\_\_\_ information and codes for the \_\_\_\_\_ of all organisms

**Your Turn:** Where is DNA found in eukaryotes? \_\_\_\_\_

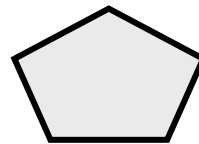
Where is DNA found in prokaryotes? \_\_\_\_\_

### 2. DNA Molecule

- DNA** is a very large molecule made up of a long chain of sub-units
- The sub-units are called \_\_\_\_\_
- Each nucleotide is made up of a sugar called \_\_\_\_\_, a \_\_\_\_\_ group  $-PO_4$  and an organic nitrogenous \_\_\_\_\_

### 3. Ribose & Deoxyribose

- Ribose is a \_\_\_\_\_, like glucose, but with only \_\_\_\_\_ carbon atoms in its molecule
- Deoxyribose is almost the same but lacks \_\_\_\_\_ atom
- Both molecules may be represented by this symbol:



### 4. The Bases

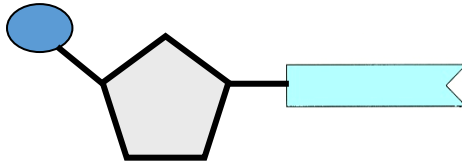
- The most common organic bases are:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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## 5. Nucleotide

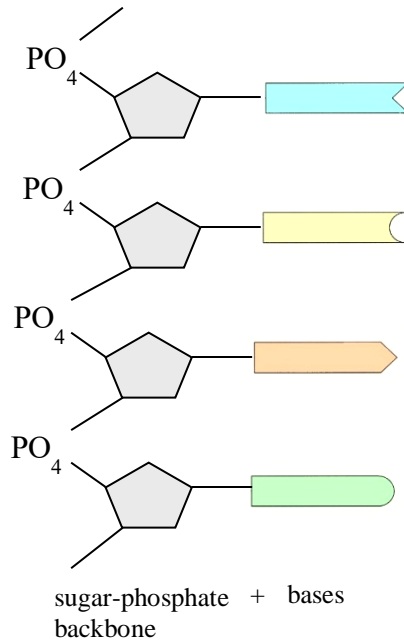
- The deoxyribose, the phosphate and one of the bases combine to form a \_\_\_\_\_
- Label the structure below:



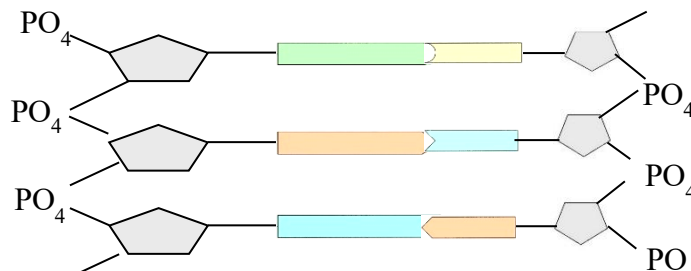
Your Turn: What are the three parts of a nucleotide? \_\_\_\_\_,  
\_\_\_\_\_ and \_\_\_\_\_

## 6. Joined Nucleotides

- A molecule of DNA is formed by \_\_\_\_\_ of nucleotides joined together in a long \_\_\_\_\_
- 



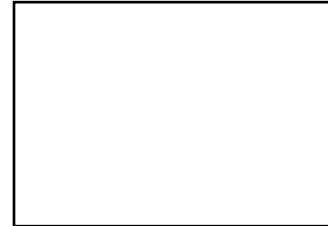
- In fact, DNA consists of a \_\_\_\_\_ strand of nucleotides
- The \_\_\_\_\_ - \_\_\_\_\_ chains are on the \_\_\_\_\_ and the strands are held together by \_\_\_\_\_ between the \_\_\_\_\_



## 7. Bonding 1

- The bases \_\_\_\_\_ pair up in the same way (Chargaff's Rule)
  - \_\_\_\_\_ forms a bond with \_\_\_\_\_
  - \_\_\_\_\_ bonds with \_\_\_\_\_
- The bases are held together by \_\_\_\_\_ bonds.
  - Adenine forms a \_\_\_\_\_ H bond with Thymine
  - \_\_\_\_\_ and Cytosine forms a \_\_\_\_\_ H bond with Guanine

**Your Turn:** Draw A and T with a double H bond below: Draw C and G with a triple H bond below:

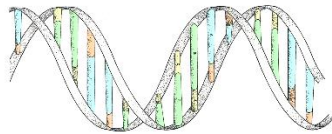


- The amounts of the four bases on DNA ( A,T,C,G) in a body or somatic cell:
 

|           |           |
|-----------|-----------|
| A = _____ | T = _____ |
| G = _____ | C = _____ |

**Your Turn:** An organism's DNA contains 15% Adenine, 15% Thymine, how much guanine and cytosine is in the DNA? Guanine = \_\_\_\_\_ % and Cytosine = \_\_\_\_\_ %

## 8. Double-stranded DNA

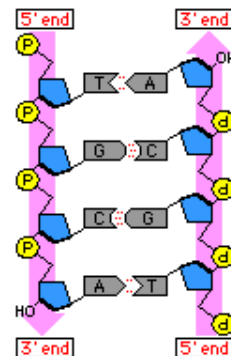
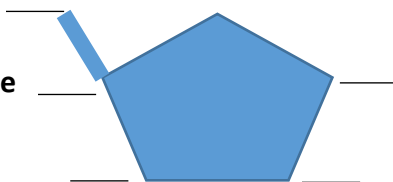


- The genetic \_\_\_\_\_ is carried in the nitrogen \_\_\_\_\_, it's important DNA is copied correctly.
- The paired strands are coiled into a spiral called a \_\_\_\_\_

## 9. Anti-parallel

- One side is 3' to 5', the other is 5' to 3' (3' pairs with 5' and 5' pairs with 3')
- Deoxyribose sugar has 5 carbons:

**Your Turn:**  
Number the carbons on the deoxyribose sugar.



**Your Turn:** How many carbon atoms are in deoxyribose and ribose? \_\_\_\_\_

What's the difference between deoxyribose and ribose? \_\_\_\_\_

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**Write a DNA strand that will pair with this DNA strand:**

3' ATT CGG AGC 5'

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### 10. Replication

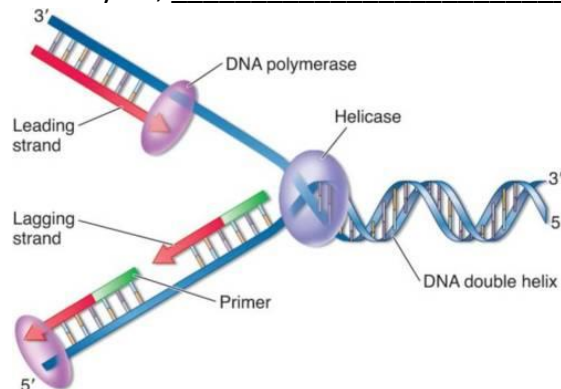
- Before a cell \_\_\_\_\_, the DNA strands \_\_\_\_\_ and \_\_\_\_\_
- Each strand makes a \_\_\_\_\_ partner by adding the appropriate \_\_\_\_\_
- The result is that there are now \_\_\_\_\_-stranded DNA molecules in the \_\_\_\_\_
- So that when the cell divides, each nucleus contains \_\_\_\_\_ DNA
- This process is called \_\_\_\_\_

**Your Turn:** During what phase in interphase does DNA replicate?

What is the significance of DNA replication in cells, why does it happen?

### 11. Enzymes Involved in Replication

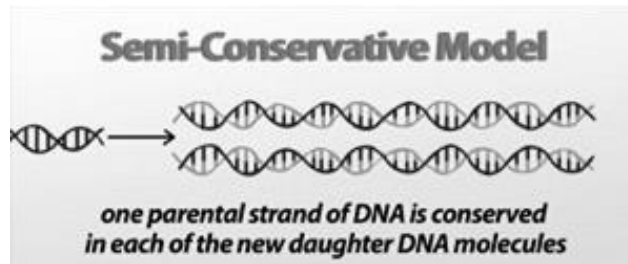
- An enzyme, \_\_\_\_\_, unzips DNA
- An enzyme, \_\_\_\_\_ adds new nucleotides.



**Your Turn:** What determines the traits of an organism?

## 12. Semiconservative Model of Replication

- a. The new DNA consists of 1 \_\_\_\_\_ (original) and 1 \_\_\_\_\_ strand of DNA



b.

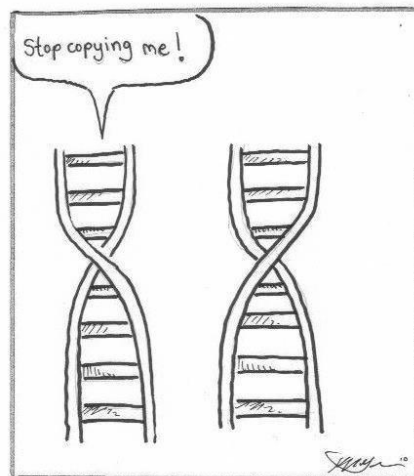
Your Turn: Explain the Semiconservative Model in your own words. \_\_\_\_\_

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## 13. Proofreading New DNA

- a. \_\_\_\_\_ initially makes about \_\_\_\_\_ in 10,000 base pairing errors
- b. \_\_\_\_\_ proofread and correct these mistakes
- c. The new error rate for DNA that has been proofread is \_\_\_\_\_ in 1 billion base pairing errors



**THESE NOTES COVER EVERYTHING YOU NEED TO KNOW FOR YOUR TEST!!**