

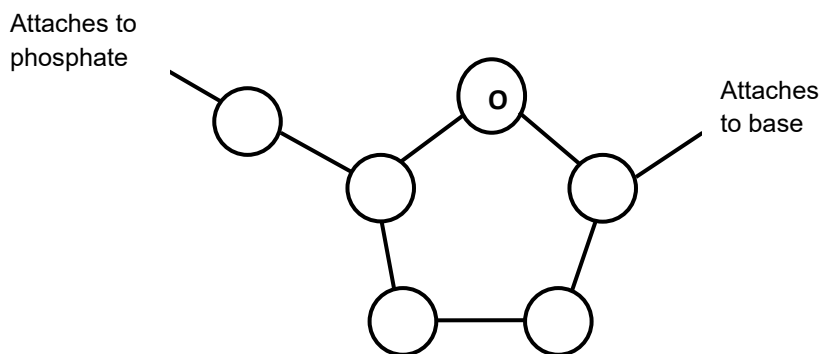
Name \_\_\_\_\_

## Exploring DNA Structure with the DNA Discovery Kit

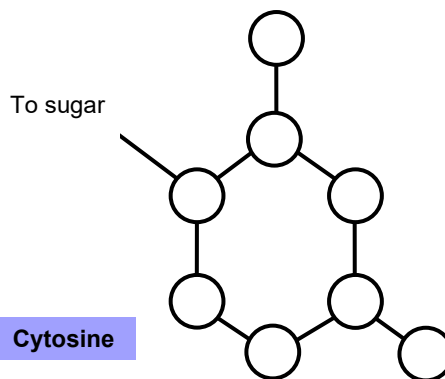
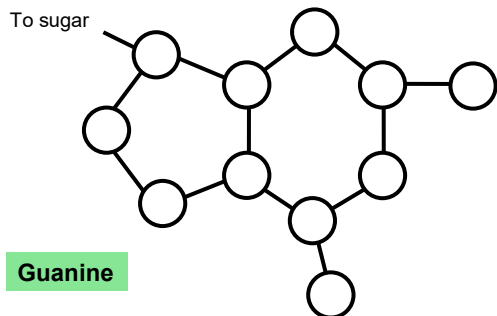
Work through the Jmol Exploration on DNA structure

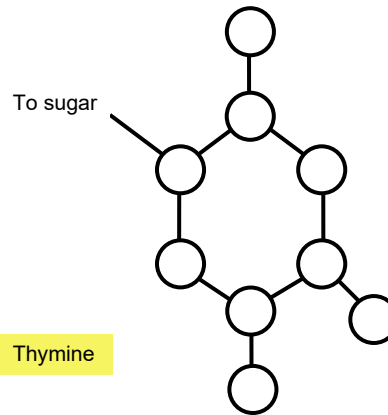
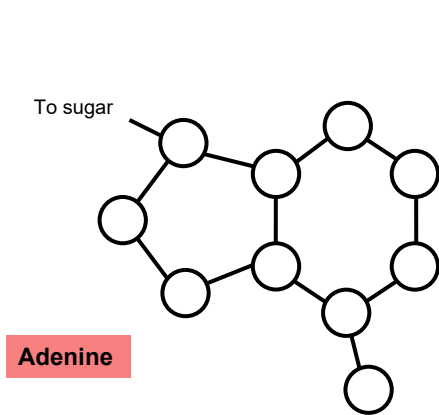
(<https://cbm.msoe.edu/modelingResources/molecularExplorations/DNAstructure.html>) and complete the following questions when directed.

1. What parts of all nucleotides are the same?
2. What parts of all nucleotides are different?
3. Below is the structure of the **deoxyribose**. Number the carbons (1' to 5') and place an asterisk (\*) on the carbon that contains an -OH group in ribose. [Numbering begins with the carbon that attaches to the base.]



4. For each of the **nitrogenous bases** below, label the atoms as carbon (C), oxygen (O) or nitrogen (N). Notice that Hydrogens (H) are not shown on the diagrams below. Draw dotted lines to indicate where the hydrogen bonds form with the complementary base. NOTE: you cannot draw hydrogen bonds to connect the complementary bases.





5. Based on your drawings, record your prediction as to which bases pair with which:

\_\_\_\_\_ pairs with \_\_\_\_\_ and \_\_\_\_\_ pairs with \_\_\_\_\_ .

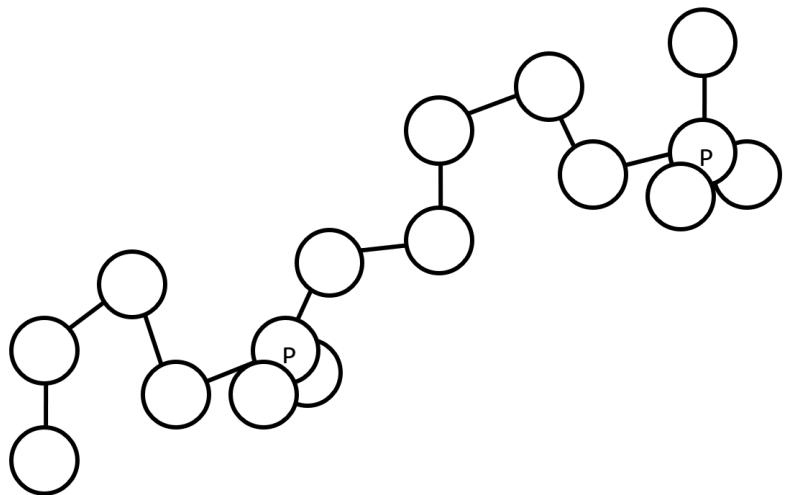
6. Indicate which of the bases (A, C, G and T) goes with each of the following terms. Some descriptions will require more than one answer.

\_\_\_\_\_ purines      \_\_\_\_\_ pairs with C      \_\_\_\_\_ has three hydrogen bonds

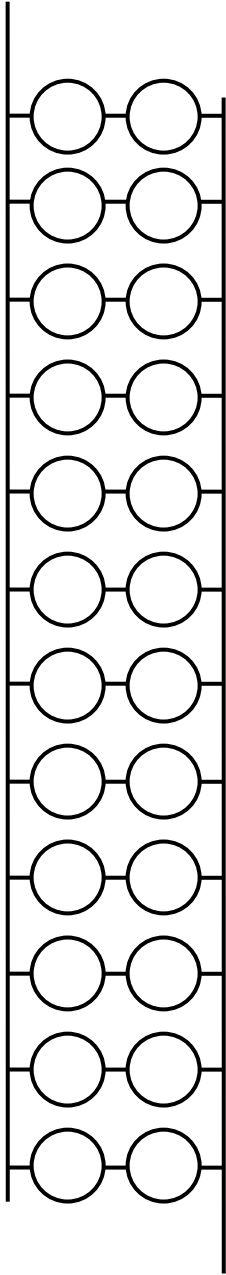
\_\_\_\_\_ pyrimidines      \_\_\_\_\_ pairs with G      \_\_\_\_\_ has two hydrogen bonds

\_\_\_\_\_ pairs with A      \_\_\_\_\_ pairs with T      \_\_\_\_\_ attaches to the 1' carbon of deoxyribose

7. Label the atoms that you see in the sugar-phosphate backbone. Circle the 5' carbon of each deoxyribose. Place an asterisk next to the 3' carbon of each deoxyribose. Finally, draw an arrow to indicate the direction, from the 5' end of the molecule toward the 3' end of the molecule.



8. Using either the model or the Jmol image of DNA, sketch the order of the bases on the helix and indicate the 5' and 3' ends of the strands. It may be useful to draw the bases on one strand upside down, to remind you that two strands run in opposite directions.



9. Explain what is meant by the term 'antiparallel.'