3-D Molecular Designs
...where molecules become real ™

DYNAMIC DNA KIT©

Student Answer Sheet

Part 1 - DNA Structure: Nucleotides as Building Blocks of DNA

Date: _____ Student Name: _____

1. What color represents each of the following atoms?

   Carbon _____ Nitrogen _____ Hydrogen _____

   Oxygen _____ Phosphorus _____

2. A. Draw the structural formula for each of your identified component parts in the space below.

   Phosphate **Deoxyribose sugar** **Nitrogen base**

   B. Identify your base as adenine, guanine, cytosine or thymine.

3. Record your observations of your comparison of the constituent parts.

   Similarities **Differences**

Student Answer Sheet

4. A. Draw the chemical structure of your DNA nucleotide in the space below.

B. Design a simple schematic model structure in the space below.

C. Label the **deoxyribose sugar**, **phosphate group** and **nitrogen base** in each of your drawings above.

5. How many different DNA nitrogen bases do you observe? _____

6. What is the common structural feature found in the pyrimidines cytosine (C) and thymine (T)?

_____

7. What common structural feature found in the purines guanine (G) and adenine (A) distinguishes these nitrogenous bases from the pyrimidines?

_____

8. How do the nitrogen bases pair to support Chargaff's discovery?

_____

_____

_____

9. Compare the number of hydrogen bonds (white) that hold the A-T base pairs together with the number of hydrogen bonds that hold the G-C base pairs together.

_____

Student Answer Sheet

10. Which group(s) form the sides or backbone of the DNA structure?

11. Which group(s) make up the “steps” of the DNA ladder structure?

12. List other possible non-standard base pairing combinations and explain why these combinations would not be compatible with DNA molecular structure.

13. What group(s) are found on the end of each strand of the DNA molecule?

14. On which carbon of the deoxyribose sugar does the phosphate group attach when the DNA double helix is assembled?

15. Why do you think the carbons are designated with a prime (‘) on the sugar?

16. Explain why the orientation of the DNA strands is considered antiparallel.

17. Under what circumstances would the DNA molecule need to “unwind”?

18. George Box is quoted as saying, “All models are wrong, some models are useful.” Identify some limitations of the model. How was the model useful in your study of DNA structure?