

DNA Molecule Model Activity

CORNELL • HHMI



Name: _____

Date: _____

Pre-Lab Questions

Answer the following questions for homework and be prepared to discuss your answers with your group before starting the activity.

1. What is DNA?
2. What are the building blocks of DNA called? Name the three main components of these building blocks.
3. Where in a eukaryotic cell is DNA found?
4. List and describe as many functions of DNA in living things that you can think of (at least three!).

Model Procedure

Work with your group to construct the DNA molecule model. Answer the following questions *as you proceed*.

1. Examine the nucleotides. Draw a nucleotide and label the three parts. Use your textbook or consult Google images if you need help.

2. What do all the four types of nucleotides have in common?

3. How do they differ?

4. Start building the model by pairing the nitrogen bases. Pair all bases before proceeding.
_____ pairs with _____
_____ pairs with _____

5. What type of bonds form between the nitrogen base pairs? (Look it up if nobody in the group knows.)

Once you finish assembling the base pairs continue to form the helical structure by connecting the sugar-phosphate sides of the ladder.

6. What type of bonds form between the sugar-phosphate groups?

7. Is there a difference in the relative strengths of the bonds between the sugar-phosphates and the bonds between the nitrogen base pairs? Which bond is stronger? How do you know?

8. Visit another group. Compare your DNA model to the DNA models made by the other groups and answer the following questions.
 - a) Are there any differences in the *types* of nitrogen bases? If yes, what?

 - b) Are there any differences in the *sequence* of bases? If yes, explain.

c) Are there any differences in the *arrangement of the sugars and phosphate groups*? Explain.

d) Are the nitrogen bases *paired* the same way? Explain.

9. Write a brief summary of your findings in question 8 based on your comparative study.

10. Your DNA model represents a *part of a gene*. Remember, genes are made up of a sequence of nitrogen bases. Select one strand of nucleotides in your DNA molecule. Write the sequence of nitrogen bases in the chart below. Next, use your DNA strand to construct a part of a messenger RNA molecule. Finally, use the chart in the text or provided by your teacher to determine the sequence of amino acids in your polypeptide chain.

DNA Strand												
mRNA												
Amino Acids												

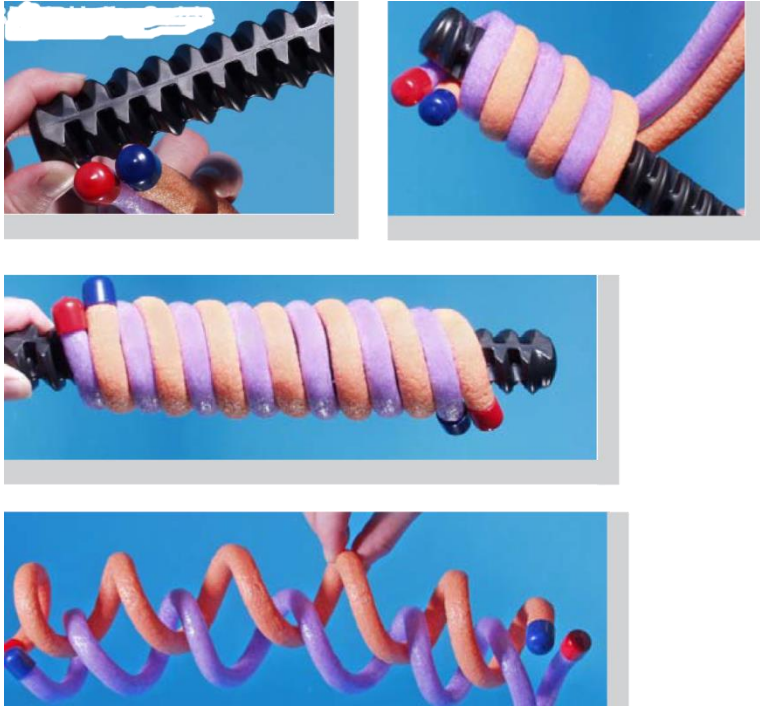
(one AA per three bases)

11. Compare your amino acid sequence to the other group's amino acid sequence. Even though each group used the exact same model components, almost every amino acid sequence will be different. Why?

12. In looking at your model, can you see clearly what part of the model makes up the double helix? Discuss this with your group and write your group's thoughts below. The next step (below) might help...

Mini-Toober Model

Follow the directions given in the figure below to construct a DNA double helix using the Mini-Toobers.



Now, using both your completed DNA model and the Toober model, determine the parts that make up the sides of the double helix. Were your group's initial thoughts correct? Why or why not?