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

Partner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Edible DNA

**Purpose:**

To review the structure of DNA with an emphasis on the base pairing rules.

To build a model of a *small section* of a DNA molecule.

**Materials:**

1 piece of red licorice

1 piece of black licorice

DNA sequence

12 coloured gum drops/gummy bears (DO NOT GATHER THESE UNTIL YOU KNOW WHAT COLOURS YOU NEED)

6 tooth picks

**Structure of DNA:**

Recall that DNA is made up of *nucleotides* linked together to form a chain.

Nucleotides have 3 components: a sugar group,

a phosphate group,

a nitrogenous base.

In DNA, there are 4 possible nitrogenous bases. 1.

2.

3.

4.

The structure of DNA is a *double helix* similar to the shape of a “ladder” that has been twisted. The alternating phosphate and sugar (deoxyribose) molecules make up the backbones of the DNA helix while the nitrogenous bases extend across from the sugar molecules joining the two strands together. The nitrogenous bases are joined by weak hydrogen bonds.

**Complementary Base Pairing:**

The alternating bases join together between the 2 DNA strands in complementary pairs.

Recall that: Adenine always pairs with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Cytosine always pairs with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Once you have obtained all your materials (except gummy bears), assign a colour to each nitrogenous base. Record your “key” in the table below. You are now ready to start!* ☺**

|  |  |
| --- | --- |
| **Colour** | **Nitrogenous Base** |
|  | Adenine |
|  | Guanine |
|  | Thymine |
|  | Cytosine |

**Procedure**

1. Use a red licorice for your original DNA strand.

2. Break each toothpick in half. Complete the original strand of your DNA model by adding the gummy bear bases to the red licorice piece with a half toothpick. Be sure to follow the DNA sequence you were given.

3. Use the black licorice as your second backbone.

4. Using the rules for base pairing, create the complementary strand of DNA by attaching gummy bears to the black licorice piece of the second back bone using the remaining toothpicks. **Write the sequence of bases in this second strand on the back of your base pair slip.**

6. Connect the two strands together by poking the toothpicks through into the complementary gummy bear bases.

7. Once you have completed attaching the bases to the backbone, SLOWLY twist the “molecule” into a double helix.

8. Your candy model of DNA is now complete.

9. Check your understanding of your model by explaining your structure to a student in the class. Finally, have your model checked by Mr. McPhee.

Science 10 Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Discussion Questions – The Structure of DNA

1. What do the licorice pieces represent in your model of DNA?

2. What do the gummy bears represent in your model of DNA?

3. What structure does the nitrogenous base (adenine, cytosine, thymine, or guanine) attach to in the DNA backbone? Sugar or phosphate?

4. Write your original DNA sequence.

5. Write the complementary DNA sequence.

6. Once you had made one strand of DNA, how many different possibilities were there for the sequence of gummy bear bases in the second strand?

7. How would your model have been different if you were given the complementary list of bases instead of your original list.

9. Use the diagram below to identify structures 1-6 on this model DNA segment.

1

2

A

G

6

3

5

4

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. In the space provided, draw a sketch of your DNA model.

**DNA**