DNA Model Investigation

Biology

Objectives:

- Students will be able to identify the different parts of a DNA monomer using appropriate vocabulary
- Students will understand how DNA bases are hooked together to make a single strand
- Students will understand how two DNA strands match to make a double strand
- Students will be able to predict the sequence of a matching DNA strand from a single strand of DNA
- Students will be able to explain how the chemical interactions of DNA allow cells to make copies of DNA so they can divide and reproduce

Part 1: **Exploration** (make sure not to lose any pieces from your kit!):

1. Describe each individual piece of the DNA model – make a quick sketch in your notes and include any writing or letters that are on the model pieces.
2. Attach the different parts of the DNA model in as many ways as you can. In your notes, describe what you notice about the models and any patterns you notice about the way that they connect.
3. Using the magnets, try to hook the pieces with letters (A, C, G, T) together. What do you notice about the way that they fit? Are there some that seem to fit more closely than others?
4. See if you can assemble the DNA model pieces into long "strands" and then attach those strands to each other to make a "double strand". Make drawings of your work as you go.

Part 2: Predictions and Testing (make sure you end up with the same number and type of model pieces that you started with!):

1. Build a single strand of DNA (4-5 nucleotides minimum).
    a. Note that there is only one way to make the polymer (the sugar part of one nucleotide will always connect to the phosphate group of another).
    b. Also, notice that you can attach as many nucleotides to each other as you want – and that each nucleotide can have any nitrogenous base attached to it.
2. Now, turn your single strand of DNA into a double strand by attaching nucleotides with the nitrogenous bases of your existing strand
    a. Note that the new strand also has the same, predictable connection between each nucleotide.
    b. Also note that the nitrogenous bases of the new strand are NOT random – in order for them to fit to your existing strand, the bases must be complementary.
3. Write down the sequence of each strand in your DNA molecule (remember that the orientation of the strands doesn't really matter so C-G-T-T-T-A is the same as A-T-T-T-G-C).

4. Split your double-stranded DNA into two single strands again. Exchange one of your strands with another group.
5. Recreate double strands of DNA from both the single strand you built and the single strand the other group gave you. (The other group will do the same thing!)
6. You should now have two double strands of DNA (one that you made from one of your original single strands, and one that you made from one of the other group's single strands). Compare your double strands of DNA to those of the other groups. In your notes, explain your observations and discuss how the structure of DNA helps you understand what you are seeing.
7. Repeat steps 4, 5, and 6 with at least two other groups.
8. **Take a picture of your notes and model and turn into Canvas.**