Candy DNA

Objective:

To teach students about DNA by building their own model they will learn about genes and base pairing rules.

Materials For Deoxyribonucleic Acid Double Helix Candy Model:

- Regular Wood Toothpicks
- Bag of Gummy Bears (cut gummy bears in half with scissors or Multicolored Gum Drops (4 Colors)
- Box of Long Red Licorice or Red Vines
- Small White Marshmallows
- Kinex model of DNA

Intro to DNA:

What is DNA? (in nucleus of our cells (bacteria don't have nuclei so DNA is just in the cytoplasm. A lot of kids will say blood. there are cells in our blood that have DNA but red blood cells that carry oxygen do not have DNA-there's no room for it and they don't need it cause they die 28days later)

Where do we find DNA, is it in plants? (yes, its in cells of all living things)

Do we eat DNA? (yes, it's in all living things!)

So if we eat a cookbook, will it taste good? No, we rather eat what the recipe codes for like a  cake or cookies. So if we just take DNA from our cells/bodies and eat it, it won't do much for us, it's what DNA is the recipe for is what is important. it makes different proteins that help build our bodies.

Experiment:

OK, so DNA has an alphabet. How many letters do we have in our alphabet? (26). So DNA has 4 letters and they're not actual letters, they are molecules like the plastic parts that makes up a lego.

1. **Ask guests if they can write their letters and give them 4 sheets of paper.** Tell them to write "A" on one piece and then pick a gummy bear color they want to represent "A". Repeat for T, G, and C.

ie:

orange = thymine

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yellow = cytosine
red = adenine
green = guanine

2. So here we have a recipe for eye color. This is only one small part of the recipe and in science we call this a "gene" so it's one small part of the recipe that works with other genes to make proteins that make up your eye color.

Brown eyes sequence: AAAAGCGCCCGGG

Blue eyes sequence: AAATGCGCCCGC

"Here is the recipe, so on this DNA model (Kinex DNA model), this is the A, A, A, G, C" (show them how it goes up the one side of the DNA strand and comment about how this is only one side but DNA is 2-sided. So there is a rule that DNA follows to make itself double sided.

A pairs with T and	A-T
G pairs with C	G-C

3. Pick up a toothpick and ask them which color is "A" and put that on the toothpick

4. So what does A always pair with? (T so pick out a green one but to get A and T to stick together, they form a bond and so we put a white marshmallow on so that A sticks with T like a magnet

white marshmallow=hydrogen bond

on toothpick: A-marshmallow-T

5. Next letter is…repeat step 4 with a new toothpick

6. Talk about the changes between the brown and blue eye genes. They are called mutations. A mutation is just a change and it can either result in a good thing or a bad thing or no change. Make sure you read their "DNA" such that they have it in the right order with the colors representing the letters reading AAAT… If they are perfect, you can switch one and talk about how you made a mutation and maybe that mutation makes your eyes purple! or something cool like that. I often mention X-men and Teenage Mutant Ninja Turtles.

7. After they have done about 8 bases, give them 2 red vines to make the backbone of their DNA molecule. (can do 1 Red vine cut in half and do fewer basepairs if you don't have time or materials)
Have them poke their toothpicks into the redvine

redvine=sugar and phosphate backbone (deoxyribose sugar)

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8. Twist the DNA. Hold up your right hand with thumb up and twist. DNA found in us and all living things twists to the right. It twists to keep out water. It doesn't like water just like oil not mixing with water. At home, mix oil and water and see what happens.

About DNA

DNA is contained in all living things. DNA molecules give instructions, provide a road map, and lay out rules for the development and functioning of all living cells in organisms. DNA have two strands of nucleic acids held together by base pairs. This structure is called a double helix. The instructions are written in an alphabet using only four letters (GACT). The alphabet letters giving the instructions in DNA make up the steps of the ladder and are called bases. There are millions of different combinations of the DNA alphabet because DNA sentences can be very long. Contained within the 3 billion letters of the human genome are about 21,000 genes. Most of our known genes code for proteins, but some code for RNA molecules.

http://learn.genetics.utah.edu/content/basics/

All humans have the same genes arranged in the same order. And more than 99.9% of our DNA sequence is the same. But the few differences between us (all 1.4 million of them!) are enough to make each one of us unique. On average, a human gene will have 1-3 bases that differ from person to person. These differences can change the shape and function of a protein, or they can change how much protein is made, when it's made, or where it's made.