

Grade Level: Fourth Grade

Time: 20 minutes

Brief Description of Lesson: In this activity, students will learn about DNA and what it consists of by creating their own DNA with the materials given.

*FIU-EOW offers ways to **differentiate** to provide opportunities for all students to access the curriculum or standards. These are being provided as **suggestions**.*

SCIENCE	TECHNOLOGY	ENGINEERING	MATHEMATICS
<p>Standard: SC.4.L.16.3: Recognize that animal behaviors may be shaped by heredity and learning.</p>	<p>Standard: ISTE: 1.4: Innovative Designer: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.</p>	<p>Standard: 3-5-ETS1-3 Engineering Design: Plan and carry out fair tests in which variables are controlled, and failure points are considered to identify aspects of a model or prototype that can be improved.</p>	<p>Standard: MA.4.DP.1.2: Determine the mode, median or range to interpret numerical data including fractional values, represented with tables, stem-and-leaf plots or line plots.</p>
<p>Activity: The mentor will first introduce the experiment and ask the students if they know the difference between hereditary traits and learning behavior. The instructor will be able to show the students this video to discuss the difference.</p> <p>Learned Behavior and Inherited Traits</p> <p>Make sure to stop and check for comprehension throughout the video: @0:49- What is an example of an animal's inherited traits? @1:16- What is an example of an animal's learned behavior? @2:28- discuss whether the Pug learned or inherited those traits. @2:40- discuss whether the cows were born to walk back to their barn.</p>	<p>Activity: Students will be able to use technology to keep track of the data they have acquired, such as the amounts of each material they have used.</p> <p>They will also record, on a device, their experiments' results to analyze them after the STEM field day visit and share amongst their classmates. Where students can then provide feedback on each other's results.</p> <p>Supporting Resources/Devices: -A device so that students can record their data</p>	<p>Hook: DNA is the instructions for how to make the body, like the code to a video game or blueprints for a house. If you used a very strong microscope, you would see that DNA looks like a twisting ladder. An important part of your DNA is the Base Pairs. Adenine (A) bonds with Thymine (T), and Cytosine (C) bonds with Guanine (G).</p> <p>Problem: How would you build your DNA based on the materials given and the bonding of the Base Pairs?</p> <p>Measurable Goal: Students will determine if they were successful in their project by making sure that the following Base Pairs are bonded:</p>	<p>Activity: *All candy used is peanut free* As the students make the Edible DNA, they will complete the following worksheet to determine the Mean of the Dots they have been given.</p> <p>Worksheet 1</p> <p>The students will be given the necessary materials and perform the following:</p> <ul style="list-style-type: none"> Separate and Sort <ol style="list-style-type: none"> You'll want to separate your 4 colors of the soft candy into different cups or bowls. Assign each of the colors a specific nucleotide. Construct your Base <ol style="list-style-type: none"> Put the two-colored candy cups or bowls with their partner

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<p>The instructor will be able to let the students know that genes are the basic units of heredity. They consist of DNA and are part of a larger structure called the chromosome. Genes carry information that determine what characteristics are inherited from an organism's parents. They determine traits such as the color of your hair, how tall you are, and the color of your eyes.</p> <p>Then, they will teach the vocabulary needed to understand the experiment's components and purpose better. After this step, students should clearly understand how each component affects and its role in the experiment.</p> <p>VOCABULARY</p> <p><u>DNA (deoxyribonucleic acid):</u> the genetic information inside the body's cells that helps make people who they are.</p> <p><u>Genes:</u> are made up of segments of DNA and they determine physical traits, including the color of your eyes and whether your hair is straight or curly.</p> <p><u>Base Pairs:</u> form a code down the length of the DNA. Adenine (A) bonding with Thymine (T), and Cytosine (C) bonding with Guanine (G)</p>		<ul style="list-style-type: none">• Adenine (Yellow DOTS) and Thymine (Green DOTS)• Cytosine (Orange DOTS) and Guanine (Red DOTS) <p><i>*All candy used is peanut free*</i></p>	<p>before starting this step.</p> <ol style="list-style-type: none">2. Then choose the order for your base pairs and lay them out onto your workspace in the order you chose.3. Start putting your soft candies on the toothpicks in sets of two, one on each end.4. Continue doing this until you've used all of the nucleotides you set up in your sequence pairs. <ul style="list-style-type: none">• Assembling your 2D DNA Model<ol style="list-style-type: none">1. Once you have the number of desired base pairs for your DNA model constructed, you may want to lay them out in the order you're going to be attaching them to your "backbone pieces".• Turning your Edible DNA Model into a 3D Double Helix<ol style="list-style-type: none">1. Then grab both ends of your model and slightly twist them in opposite directions to create YOUR VERY OWN DNA DOUBLE-HELIX!
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Components: <ul style="list-style-type: none">• Twizzlers Candy• DOTS Candy• Wooden Toothpicks• Cups and Bowls			
Differentiation: <p>Students will be given the opportunity to view a video before and after it is presented to the class. Watching the video before or after individually or within a small group will allow the students to pause the video and ask clarifying questions in a small group setting.</p> <p>DIY Edible DNA</p>	Differentiation: <p>Students will be allowed to record their projects and look them over later. This accommodation will elevate any challenges around having to write down and describe the outcomes of their projects during the activity.</p>	Differentiation: <p>When creating the edible DNA, students should be allowed to reference an instruction manual with pictures and descriptions of each step.</p> <p>Worksheet 1</p>	Differentiation: <p>Worksheet with more DNA models to reference when comparing their results.</p> <p>Worksheet 1</p> <p>Worksheet 2</p>