

Grade Level: Fifth Grade

Time: 20 minutes

Brief Description of Lesson: In this activity, students will become engineers and learn about polymers as they investigate the BEST way to make a bouncy ball. The students will then test their bouncy ball to see how high they can bounce.

*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.5.P.8.1: Compare and contrast the basic properties of solids, liquids, and gases, such as mass, volume, color, texture, and temperature.</p>	<p>Standard: ISTE: 2.4.b: Collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.</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.5.M.1.1: Solve multi-step real-world problems that involve converting measurement units to equivalent measurements within a single system of measurement.</p>
<p>Activity: The mentor will first introduce the experiment. 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 Chemical Reaction: a process that involves rearrangement of the molecular or ionic structure of a substance, as opposed to a change in physical form or a nuclear reaction.</p> <p>Polymer: a substance that has a molecular structure consisting chiefly or entirely of a large number of similar units bonded together, e.g., many synthetic</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. They will also record their experiments' results to look over them later and learn from them.</p> <p>Supporting Resources/Devices: -A device so that students can record their data</p>	<p>Hook: Engineers often use "polymers" as part of their inventions. Though the word may sound unfamiliar, you interact with polymers every day! Plastic is a polymer that's in everything from toys to toothbrushes. Engineers and scientists even use polymers to help grow heart tissue.</p> <p>Problem: What would happen if you changed the ratio of the different materials?</p> <p>Measurable Goal: Students will determine if they were successful in their project by recording their results, such as:</p> <ul style="list-style-type: none"> • The changes • Observations • Bounce Height 	<p>Activity: As the students make the bouncy balls, they will compare their results to see what ratio of materials yielded the best ball.</p> <p>Students will compare their results by finding the difference between the different amounts of materials used.</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"> • To make the borax solution: <ol style="list-style-type: none"> 1. Pour 2 tablespoons of warm water into a cup 2. Add 1/2 teaspoon of borax 3. Stir until the borax dissolves • To make the bouncy ball:

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<p>organic materials used as plastics and resins.</p> <p>Ratio: the quantitative relation between two amounts showing the number of times one value contains or is contained within the other.</p> <p>Components:</p> <ul style="list-style-type: none">• Borax• Corn Starch,• Elmer's glue• Warm Water• Cups• Tablespoon/ Teaspoon/ Measurement Cups			<ol style="list-style-type: none">1. Pour 1 tablespoon of glue into the second cup2. Add 1 teaspoon of cornstarch3. Add a few drops of food coloring4. Now stir!5. Add 1/2 teaspoon of the borax solution6. When it gets too difficult to stir, pull the mix out and begin kneading it – it'll start off sticky, but soon you'll have a bouncy ball.7. Unlike a regular bouncy ball, this can dry out - stored in a plastic bag or container.
<p>Differentiation: 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 Bouncy Ball</p>	<p>Differentiation: 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>	<p>Differentiation: When creating the bouncy ball, students should be allowed to reference an instruction manual with pictures and descriptions of each step.</p> <p>Worksheet 1</p>	<p>Differentiation: Worksheet to compare the values of each ball with additional information.</p> <p>Worksheet 1</p>