

**WEEK 4 Day 1**

**STEM Investigation 3:  
Understanding Weight, Force, Stability**

Children roll three balls of different weights in attempt to knock down a water bottle. Through this Investigation, children will develop an understanding of how the weight of an object affects the amount of force it transfers and how the force impact affects the stability of an object.

<b>Big Idea</b>	Through using materials and interacting with them, people learn important concepts and gain skills relating to physical science, engineering and technology, and the arts.
<b>Guiding Questions</b>	What processes help people construct structures, ideas, and works of art?  How do people use different tools and materials for different purposes?
<b>Vocabulary</b>	<b>weight</b> <b>light</b> <b>heavy</b> <b>force</b>
<b>Materials and Preparation</b>	<ul style="list-style-type: none"> <li>● tennis ball</li> <li>● wiffle ball</li> <li>● baseball</li> <li>● 1 plastic water bottle filled halfway with sand</li> <li>● painters or masking tape (or other strong tape for marking floor)</li> <li>● pencils or crayons</li> <li>● scale</li> <li>● other everyday materials such as wooden unit blocks, toilet paper tubes, paper cups, plastic cups (for further STEM Exploration)</li> <li>● chart paper, 2 pieces</li> </ul> <p>On one piece of chart paper, write the focus question: How does</p>

	<p>the weight of a ball affect how much force it has to knock down a bottle?</p> <p>Recreate the STEM Investigation 4 Data Sheet on the second piece of chart paper.</p> <ul style="list-style-type: none"> <li>● writing tools</li> </ul> <p>Identify a clean floor space where children can conduct the Investigation (and the following Investigations). Set up the “bowling space.” Use tape to mark two squares on the floor where children will place the objects for each test. In addition, use the tape to mark a line on the floor where children will kneel to roll the balls (approximately 5 feet from the squares).</p> <p>Conduct the Intro to Centers in this “bowling space.”</p>
<p><b>Intro to Centers</b></p>	<p>[Conduct the Intro to Centers in the “bowling space.” Have children sit around the space.]</p> <p>Introduce this week’s focus. Point to the focus question and read it aloud.</p> <p><i>This week, we will investigate this focus question, <b>How does the weight of a ball affect how much force it has to knock down a bottle?</b></i></p> <p><i>What words do we need to understand as scientists in order to answer this question?</i></p> <p>Circle the words: weight, force. Discuss these words.</p> <p><i>How do you think we could investigate this question?</i></p> <p><i>Here are some different kinds of balls that we will use in this Investigation. Which ball feels <b>heavier</b> to you? Which ball feels <b>lighter</b>?</i></p> <p>Pass around the three balls for children to compare. Provide time for children to talk about and investigate the different weights of the balls. Use the scale. Discuss that the wiffle ball is <b>lighter</b> than the tennis ball, and the baseball is <b>heavier</b> than the tennis ball.</p> <p><i>When you go to Blocks this week, you will roll each ball one time towards the water bottle and see if the wiffle ball, tennis ball, or baseball makes it easier to knock down the water bottle. Write down your findings on this chart.</i></p> <p>Show the data chart. Model placing a mark under the column of the ball</p>

	that knocked down the bottle most easily.
<b>During Centers</b>	<p>Children take turns setting up the bottles and knocking them over. To set up each turn, place the water bottle in the square on the floor. Each child will kneel at the tape line and attempt to knock over the water bottle by rolling each type of ball gently: 1.) a wiffle ball 2.) a tennis ball and 3.) a baseball. Children will need to be encouraged to apply the same force for each turn.</p> <p>Children will place an X under the space for which ball or balls successfully knocked down the water bottle.</p> <p>After children have completed the Investigation they can experiment with knocking over a tower built from cardboard boxes, paper towel tubes, or wooden blocks. Children can experiment with knocking down the towers using the different balls.</p>
<b>Facilitation</b>	<ul style="list-style-type: none"> <li>• What do you notice about the way these balls roll? Does one roll more slowly, or more quickly?</li> <li>• What other experiments would you like to try with these different kinds of balls?</li> <li>• Which ball, the wiffle ball or the baseball, is better at knocking down the tower you constructed?</li> </ul>
<b>Sharing Our Research</b>	<p><b><i>How does the weight of a ball affect how much force it has to knock down a bottle?</i></b></p> <p>Revisit the focus question.</p> <p>Children share their data by counting the X's in each category on each chart. Discuss how successful the different balls were in knocking down the bowling pins. It is likely that there will be more X's in the 'tennis ball' or 'baseball' category. Considering this data, ask children to think about how the weight of the different balls makes a difference in how easy or difficult it is to knock over the water bottle.</p> <p><i>What did you notice?</i></p> <p>Children can share the results of explorations with other materials.</p>
<b>Standards</b>	<p><b>K-LS1-1</b> Use observations to describe patterns of what plants and animals (including humans) need to survive. Further explanation: Examples of patterns could include that animals need to take in food but plants do not, the different kinds of food needed by different types of animals, the requirement of plants to have light, and that all living things need water. Examples could include the pattern a bear makes when preparing to</p>

	hibernate for winter, the seasonal patterns of trees losing and/or keeping their leaves. Analyzing and Interpreting Data, Organization for Matter and Energy Flow in Organisms, Patterns
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