

Unit 3: Construction

WEEK 5 Day 1

**STEM Investigation 4:
Designing and Constructing**

Children apply what they have learned from previous Investigations to design and construct stable structures. They will test and retest their structures, continuing the revision process until their structure is stable.

Big Idea	Through using materials and interacting with them, people learn important concepts and gain skills relating to physical science, engineering and technology, and the arts.
Guiding Questions	What processes help people construct structures, ideas, and works of art? How do people use different tools and materials for different purposes?
Vocabulary	engineer design construct structure force stable/stability test
Materials and Preparation	<ul style="list-style-type: none">● tennis ball● wiffle ball● baseball● about 20 plastic water bottles filled halfway with sand● about 10 empty plastic water bottles● about 50 plastic cups (same cups from previous Investigations)● paper towel tubes and toilet paper tubes● paper

	<ul style="list-style-type: none"> ● writing tools ● Engineering Design Process visuals, from Intro Documents ● chart paper and marker <p>On one piece of chart paper, write the focus question: How can we design a structure that is difficult to knock down?</p> <p>Designate a “Construction Zone” or a space in the room to house structures that groups of children make during the week.</p>
<p>Intro to Centers</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, How can we design a structure that is difficult to knock down?</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: design, difficult. Discuss these words.</p> <p><i>What does it mean to design something?</i></p> <p>Remind children of the Engineering Design Process. Make connections to previous conversations.</p> <p><i>This week in STEM, you will be engineers. You can design your own structures, and your job is to make the structures as stable as possible. Why do you think it is important for a structure to be stable?</i></p> <p>Elicit responses.</p> <p><i>Remember that the base of the object is the part that is touching the floor. What did we learn about the size of the base through previous Investigations?</i></p> <p>Hold up materials from prior Investigations (e.g., plastic water bottles with sand and without, plastic cups, paper towels tubes, etc.). Take a few suggestions. If children don’t recall, remind them that a bigger base will make a more stable structure than a smaller base. And adding more weight will also make the structure more stable.</p> <p><i>As engineers this week you will work in teams to design your own structures by choosing from any of these materials. Once you design your structures, you can test them.</i></p> <p>Remind children that the wiffle ball, tennis ball, and baseball are available for conducting stability tests.</p> <p><i>Be sure to make a sign for your structure so we can save it for Sharing our Research.</i></p>

	Hold up sign-making materials: paper and writing tools.
During Centers	<p>Children work collaboratively to create structures using the materials provided. Then children test the structures for stability. They may choose to conduct the same kinds of experiments as Investigations 1 through 4 such as rolling different kinds of balls to see if the structures withstand the force. Children can document their experiments using their own designed data collection forms.</p> <p>Have data collection examples from prior Investigations available as models.</p> <p>If a structure proves unstable, encourage the group to discuss and revise their structure for enhanced stability. The children should then retest their structure, continuing the revision process until their structure is stable.</p> <p>Once the group has constructed a stable structure that they would like to share at Sharing our Research, they should document their work. Children can photograph or sketch the structure, and label their sketches to document how it was constructed. When labeling the sketch, encourage children to label the base of the structure and indicate whether they used a wide or narrow base.</p>
Facilitation	<ul style="list-style-type: none"> ● Which materials will you choose to construct your structure? ● How will you design your base? ● How will you test for stability? ● Did your structure withstand the stability test? If not, what will you do to revise, or change, your structure? ● How can you sketch this structure to remember it?
Sharing Our Research	<p><i>How can we design a structure that is difficult to knock down?</i> Revisit the focus question.</p> <p>Invite groups to share their structures and documentation. Ask the groups to describe how they tested for stability and how they revised their structures to make them more stable.</p> <p>Compare the structures. Which have wider bases? Which are heavier? Together, based on the findings of this and the prior four Investigations, create a class list of strategies for building stable structures. Strategies might include building a wide base, using heavier materials, or building a structure that stands straight.</p>

Standards	K-LS1-1 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 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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