CATAPULTS

ENGINEERING: DESIGN, EVALUATION

Every child is different. Do what works best for encouraging each child's exploration of this suggested activity.

OBJECTIVE OF THIS INVESTIGATION:

Children will review a catapult and make it better.

VOCABULARY:

- Catapult
- Lever
- Fulcrum

MATERIALS:

- Basic catapult (e.g., spoon or stick over a base) that students can make better
  - Lever options: popsicle sticks, blocks, spoons, paint stirrers, items that won't be great as levers like pipe cleaners
- Soft items to be the "load" (the things you will launch) such as pom poms, marshmallows, cotton balls, rubber erasers, rubber bath toys, playdough balls, balled up pieces of paper, ping pong balls (will travel far), cotton balls, any small stuffed animal, rubber bath toys are usually soft, rubber erasers, playdoh ball, balled up piece of paper
- Optional: painters' tape to mark how far items travel (or use landmarks in the area like a desk, chair etc.)

PROGRESSION STEPS (ENGINEERING: DESIGN, EVALUATOR):

Visit **STEMIE Learning Trajectories** for details
- Early Evaluator
- Early Engineer

THIS INVESTIGATION:

- Gather children and give basic background on catapults.

  "A catapult is a simple machine that is used to make things fly through the air."
- Present a basic catapult and say something like **"This is a catapult. I want to make this pom-pom fly through the air. Can you use these items to help me make the catapult move the pom-pom further?"**
- Take note of how far items go and challenge children to evaluate and adjust the catapult.
- As children investigate, notice if they inspect the original basic design? Do they take note of what does and doesn't work? **(Early Evaluator)**
- Do children use the knowledge they've gained through their evaluation to make the original design better? **(Early Engineer)**

ADAPTATIONS:

See **A Guide to Adaptations** for general ideas and strategies

Environment:
- Lead the activity outside so items can fly farther.

Materials:
- Ensure the catapult and load are large enough for children to easily grasp and manipulate
- Include visuals that represent different materials and steps involved in making/using the catapults.

CATAPULTS

ENGINEERING: DESIGN, EVALUATION

Every child is different. Do what works best for encouraging each child's exploration of this suggested activity.

THIS INVESTIGATION (CONTINUED):

- Ideas for improvement include:
  - moving the balance point of the lever to see what happens.
  - trying longer/shorter levers to see what happens
  - using taller/shorter bases (fulcrums)
- For children who need more support problem solving how to fix the catapult, try the following:
  - Set up the catapult so that it more obviously doesn't work (e.g., no base, very short base, very short lever)
  - Model evaluating and narrating what happens. Help children continue testing and adjusting.
  - Model different ways of adjusting the catapult (including ways that do NOT fix the problem)

ADAPTATIONS (CONTINUED)

- Consider using materials that are highly contrasting in color to support visual discrimination
- Use materials that make a sound when they "land" to increase child engagement

Instruction

- Provide choices for children when making improvements
- Break down the activity into smaller steps

HOW TO CONTINUE THIS INVESTIGATION:

- Have students design their own catapult from start to finish.
- Encourage students to experiment with objects that have different characteristics (size, shape, weight) to see how those characteristics affect how far the materials go.

SUPPORT MATERIALS: Use the blank ones to make your own!

Catapult