

## Hands on Engineering Activity 4

**Topic:** Motion and Forces

**Learning Objective:** Constructing a pyramid catapult to launch small objects. Tension and elasticity → different kinds of forces: Forces acting on popsicle sticks and rubber band, acceleration

### Alignment with NGSS Grades 3-5

Science and Engineering Practices

Planning and Carrying Out Investigations

- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
- Make predictions about what would happen if a variable changed.

Crosscutting Concepts and Connections to Engineering, Technology, and Applications of Science

Connections to Engineering, Technology, and Applications of Science

Influence of Science, Engineering, and Technology on Society and the Natural World

- Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands.

### Materials:

- Popsicle/craft sticks (~10 per student)
- Wooden skewers (~5 per student)
- Straws (3 per student)
- Small cups (like ketchup containers, 1 per student)
- Rubber bands (1 per student)
- Masking tape

### Detailed Description

- Activity
  - Brief discussion of mechanical engineering
    - Talk about how real catapults were made hundreds of years ago
    - What are the moving parts we must consider?
    - What would cause a catapult to fail or break over time?
  - Project –hand out materials to students and guide them in constructing a catapult
    - Ideally have an example ready for them to mimic

- Direct their attention to the moving parts → how does the catapult actually work?
- Test project –launch crumpled up paper balls using the catapults
  - Can have a contest to see who can launch the farthest
- Clean up & discuss
  - Gauge what students learned during the lesson about forces and engineering
  - Ask what other topics they would be interested in learning about and doing projects on

**How will you conclude the lesson to enforce the learning objective:**

Ask students what they learned from the activity today. What kinds of observations did they have? What adjustments did they have to make when working on the project?

**What science process skills will this lesson exercise?**

How moving and non-moving parts function together, Building things with hands

**Safety precautions**

Pointy ends of wooden skewers, Launching paper balls or other objects, Rubber bands