

**STEAM Subject:** Engineering  
**Lab:** Popsicle Stick Catapult

**Grades:** 5-8

**Learning objectives**

Students will be able to:

- define, identify, and demonstrate the projectile motion of an object
- build and launch a catapult device

**ENGAGE:**

**Ask students the following questions:**

- Watch this cartoon: <https://www.youtube.com/watch?v=5aCgSwmm5Ho>
  - What device is the coyote attempting to use to capture the road runner?
    - It's a catapult! Although the coyote was not very successful using it.
- What is a catapult?
  - A device for launching or projecting an object over a distance.
- Have you ever watched a cartoon or comic with a catapult? How does a catapult work?
- What can we use to build a catapult?

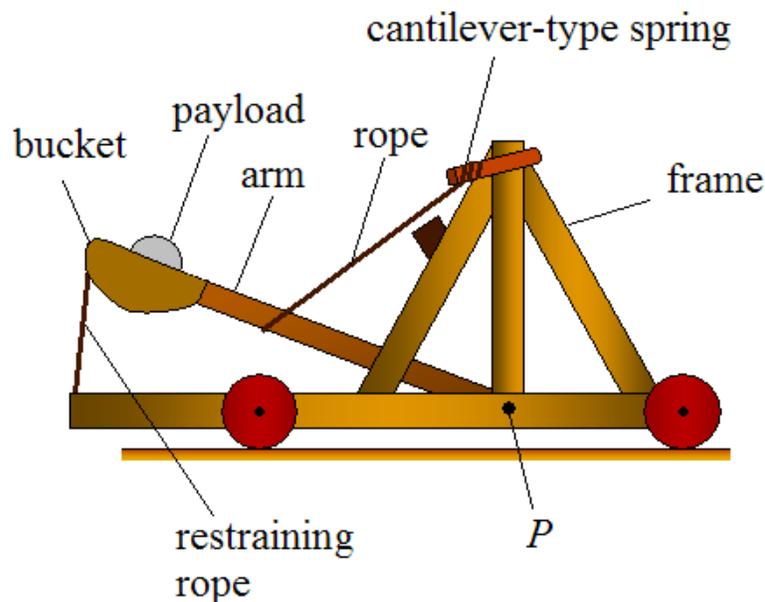


Image Credit: <https://kids.kiddle.co/Image:Mang2.png>

**EXPLORE:**

**Popsicle Stick Catapult Activity**

Students will build a catapult and explore how a catapult works.

**Materials needed per student:**

- 5 popsicle sticks
- Bottle cap (or a plastic spoon if preferred)
- Binder clip or nametag clip
- Glue (super glue preferred with adult supervision)
- Small objects for testing

**Directions:**

1. Lay out necessary materials



All activity photos  
provided by EIS  
Engineering Instructor  
Justin Joyce.

2. Take two popsicle sticks and glue them together over entire length. Take two additional popsicle sticks and glue them together over entire length.



3. Glue one of the combined popsicle sticks from step #2 to the halfway mark of the single popsicle stick forming a "Capital T".



4. Glue binder clip to the bottom of the "Capital T"



5. Take the remaining combined popsicle sticks from step #2 and glue to the free end of the binder clip.



6. Glue bottle cap (or plastic spoon if preferred) to catapult arm.



7. Once catapult device is fully dried, begin testing with various small materials (example: coins, marshmallows, ping pong balls, etc.). *Make sure to hold base of device with one finger and use another finger to push down on catapult arm.*



**Discussion:**

Have students observe how different materials placed in the catapult travel with respect to each other. Have students make predictions of which objects will fly the farthest amongst a group of objects and have them discuss why.

## EXPLAIN:

- Review STEAM vocabulary:
  - **Catapult:** a device used for launching or projecting an object over a distance.
  - **Force:** applied action towards any object for physical change or movement.
  - **Kinetic energy:** energy of mass in motion.
    - Example: when you push down a spring and release it, it bounces up and down, releasing kinetic energy.
  - **Potential energy:** energy that a piece matter has because of its position or nature, or because of the arrangement of its parts.
    - Example: a “spring” stores potential energy when it is pushed down or stretched.
  - **Projectile motion:** motion of an object thrown or projected into the air
- The catapult works when the potential energy stored in the popsicle stick (push down) is converted to kinetic energy when it launches the projectile!
- Watch this PBS video “Design Squad Global Build Catapult”. Students will learn about catapults and how a catapult works. <https://pbskids.org/video/design-squad-nation/2365918833>

## ELABORATE:

Watch this video from NASA for Kids: Intro for Engineering “<https://youtu.be/1u-MiKDo2VI>” What is the job of an engineer?

## EVALUATE:

Have students evaluate how projectiles have been used throughout history (both large and small) for travel. Some examples may include hitting a golf ball or rockets (think of how NASA launches rockets or satellites into outer orbit). Think about ways to improve your catapult design!

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