



## MINI POPSICLE STICK CATAPULT

### OVERVIEW

In this activity, the campers will make a mini catapult, while learning about the history of this structure, as well as kinetic energy and parabolic flight.

### TOPIC AREA(S)

- Physics
- Structures
- History
- Forces

### GRADE LEVEL

5-6 (Gizmos)

### QUESTIONS PRIOR TO THE LESSON/GETTING EXCITED

- Who has seen a catapult before?
- Who knows what it is used for?
- What is kinetic energy?
- Why do things fly in a predictable pattern (not randomly up and down)?
- Has anyone ever heard the term parabola before?

### BACKGROUND INFORMATION FOR INSTRUCTORS (INCLUDE QUESTIONS W/ ANSWERS)

A **catapult** is a ballistic device used to launch a projectile a great distance without the aid of gunpowder or other propellants – particularly various types of ancient and medieval siege engines. A catapult uses the sudden release of stored potential energy to propel its payload. Most convert tension or torsion energy that was more slowly and manually built up within the device before release, via springs, bows, twisted rope, elastic, or any of numerous other materials and mechanisms.

The counterweight trebuchet is a type of catapult that uses gravity.

In use since ancient times, the catapult has proven to be one of the most persistently effective mechanisms in warfare. In modern times the term can apply to devices ranging from a simple hand-held implement (also called a "slingshot") to a mechanism for launching aircraft from a ship.

The earliest catapults date to at least the 4th century BC with the advent of the mangonel in ancient China, a type of traction trebuchet and catapult. Early uses were also attributed to Ajatashatru of Magadha in his war against the Licchavis. Early Greek catapults emerged around the 1st century BC.



Catapults function by way of kinetic energy, which is the type of energy displayed when an object is in motion. This made them function well as projectile tools/weapons as it is easier to transfer a greater amount of energy when something is launched/thrown rather than dropped.

In terms of flight, whatever is launched out of a traditional catapult flies in a route known as parabolic flight (looks like an upside down smiley face.) This pattern of flight is seen in all launched objects, from throwing a football/basketball to launching something in a catapult. This pattern happens because gravity exerts a downward force on the flying object (which is why launched objects don't fly in a random zig-zag pattern). Birds or airplanes however have special adaptations that allow them to control their flight patterns (wings, engines etc)

#### RELEVANCE TO THE CURRICULUM

Grade 1 and 2	Grade 3 and 4	Grade 5 and 6	Grade 7 and 8
Needs & Characteristics of Living Things Growth and Changes in Animals Materials, Objects and Everyday Structures Movement Energy in Our Lives Properties of Liquids	Growth and Changes in Plants Habitats and Communities Strong and Stable Structures Pulleys and Gears Forces Causing Movement Light and Sound	Human Organ Systems Biodiversity Forces Acting on Structures and Mechanisms Flight Properties of and Changes in Matter Electricity and	Interactions in the Environment Cells Form and Function Systems in Action Pure Substances and Mixtures Fluids Heat in the Environment



and Solids Daily and Seasonal Changes Air and Water in the Environment	Soils in the Environment Rocks and Minerals	Electrical Devices Conservation of Energy and Resources Space	Water Systems
<b>MATERIALS (SPECIFY WHETHER PER CAMPER, GROUP OR CLASS)</b>			
<p><b>PER CAMPER:</b></p> <ul style="list-style-type: none"> <li>- 10 Popsicle Sticks (Jumbo works best)</li> <li>- 3-5 Rubber Bands</li> <li>- Bottle Cap</li> <li>- Scissors</li> <li>- Something small to launch (could be any tiny thing that fits inside the bottle cap)</li> </ul>			
<b>SAFETY CONSIDERATIONS</b>			
Practice care when making the notches with scissors			

<b>PROCEDURE</b>
<p>1) You will want to use a pair of scissors to make two v notches on either side of two jumbo craft or Popsicle sticks (in the same place on both sticks). Use the photo below as a guide for where to make your notches.</p>



- 2) Once you have made your notches in two of the sticks, set them aside! Take the remaining 8 craft sticks and stack them one on top of the other. Wind a rubber band tightly around each end of the stack.
- 3) Go ahead and push one of the notched sticks through the stack under the top stick of the stack.



- 4) At this point flip your partially made popsicle stick catapult over so that the stick you just pushed in is on the bottom of the stack. Lay the second notched stick on top of the stack and secure the two popsicle sticks together with a rubber band as shown below. The V notches that you cut help to keep the rubber band in place



5) Can glue/tape the bottle cap to the end of the top popsicle stick



6) Launch!



## REFERENCES

<https://en.wikipedia.org/wiki/Catapult>

<https://littlebinsforlittlehands.com/popsicle-stick-catapult-kids-stem-activity/>