

Launcher Challenge

What you'll need

- | | | | |
|--------------------------|-------------------------|--------------------------|------------------------|
| <input type="checkbox"/> | Rubber bands | <input type="checkbox"/> | Tape |
| <input type="checkbox"/> | Popsicle sticks | <input type="checkbox"/> | String |
| <input type="checkbox"/> | Misc recycled materials | <input type="checkbox"/> | Scrap paper OR pompoms |
| <input type="checkbox"/> | Scissors | | |

Introduction

In this activity, you and your child will learn about potential and kinetic energy, and use that knowledge to create a launcher!

What's a launcher? Discuss these questions with your child:

- What is a launcher? What does it do? (Launches something)
- Can you think of some examples of launchers? (Catapults, bow and arrows, trampoline, toaster [it launches the toast into the air])

Explain that each of those launchers use energy to launch things. Use the explanation below to help your child understand what energy is, and how launchers use it:

What is energy?

First, what's energy? Energy is simple: it's just the ability to do something. There are many forms of energy, and you might have heard of some, like electricity. Launchers use energy to launch items into the air, and to understand how, we need to learn about potential and kinetic energy.

Potential and Kinetic energy:

Potential energy and Kinetic energy are two basic kinds of energy. Kinetic energy is the energy of motion. When you toss a ball into the air, it has kinetic energy because it's moving. Potential energy is stored energy: it can become kinetic energy.

Demonstrate this with a rubber band: pull the rubber band back, but don't let go. This is potential energy--stored energy. Let it go! That's kinetic energy--the energy of motion.

Now, have your child try to guess where the potential and kinetic energy comes from in the types of launchers you thought of before.

Do it!

Set up a start line for the launchers, and a finish line that's five feet away. The rest of the challenge is simple: build a launcher that can launch a pompom or paper crumple at least five feet!

At the end of this handout are several examples of common launchers used in medieval times for warfare against castles. You may use these as examples, or build your own launcher.

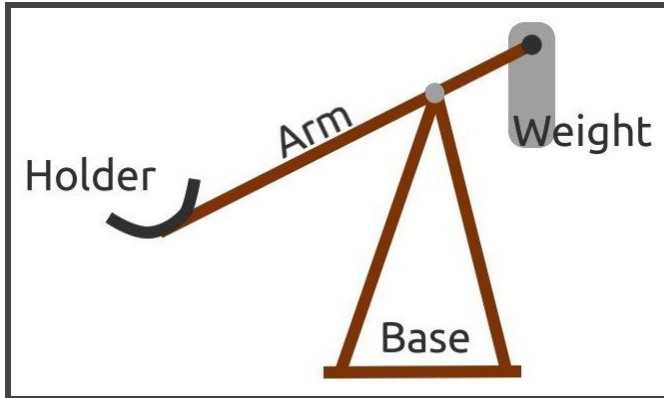
Depending on your child's confidence level, you can either work with them, or build your own launcher.

Tip: Search images online for "diy launcher" to get some inspiration for home-made launchers.

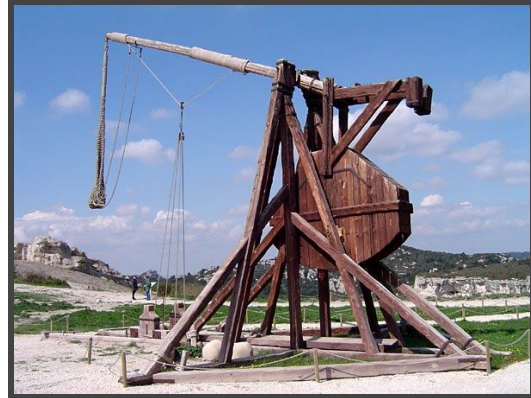
Adaptations	Vocabulary	Fun facts
<p>For Younger children Follow this online tutorial for a mini catapult instead of having your child design their own: https://youtu.be/A6hQsJxzIws</p> <p>For An Extra Challenge Increase the distance the launcher has to launch the item.</p>	<p>Energy: The ability to do work (the ability to do something)</p> <p>Kinetic energy: The energy of movement (a ball flying through the air has kinetic energy)</p> <p>Potential energy: Stored energy; energy that can be converted into kinetic energy.</p>	<p>More ideas for launchers: Search YouTube for "popsicle stick launcher" and you'll find lots of neat and easy ideas for cool launchers.</p> <p>Two kinds of catapults: This video shows how to build two different kinds of catapults with popsicle sticks: https://youtu.be/WpLFC_SOpXs</p> <p>A better explanation of potential and kinetic energy: This video by Khan Academy might help you understand potential and kinetic energy better, and would be great for a 6th grade or older child.</p>

Launcher Examples

Trebuchet (pronounced treh-beeuw-shey):



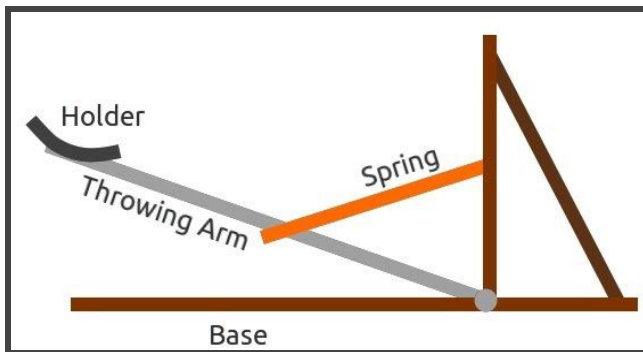
Credit: Jacob Field, CC BY 4.0



Credit: ChrisO via Wikimedia Commons

The Trebuchet uses a large weight to store potential energy. When it's released, the weight swings down, converting its potential energy to kinetic energy, and swinging the item on the other end up and into the air.

Catapult:



Credit: Jacob Field, CC BY 4.0



Public Domain via Max pixel

The catapult uses a spring (think rubber band) to store energy when it's pulled back, as potential energy. When released, the potential energy converts back to kinetic energy. The arm flies up, launching the object in the holder into the air very quickly.