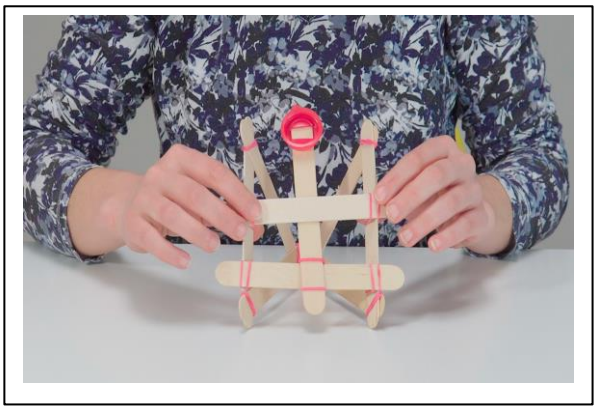
STEMBOT

Co-funded by the
Erasmus+ Programme
of the European Union

Catapult



Key words

- ballistic device
- Middle Age
- energy transformation
- physics

The science behind

Introduction
A catapult is a ballistic device used to launch a projectile a great distance without the aid of any fuel. It uses the sudden release of stored potential energy to project the projectile. Most convert tension or torsion energy that was more slowly and manually built up within the device before release, using springs, bows, twisted rope, elastic, or any of numerous other materials and mechanisms.

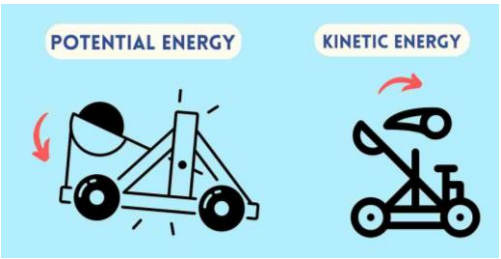
History
Catapults were first used during battles in wars. The earliest catapults date to at least the 7th century BC, with King Uzziah, of Judah, recorded as equipping the walls of Jerusalem with machines that shot great stones. In the 5th century BC, the mangonel appeared in ancient China, a type of traction trebuchet and catapult. Early uses were also attributed to Ajatashatru of Magadha in 5th century BC. Greek catapults were invented in the early 4th century BC, being attested by Diodorus Siculus as part of the equipment of a Greek army. In the medieval era castles and fortified walled cities were common and catapults were used as siege weapons against them. As well as their use in attempts to breach walls, incendiary missiles, or diseased carcasses or garbage could be catapulted over the walls.

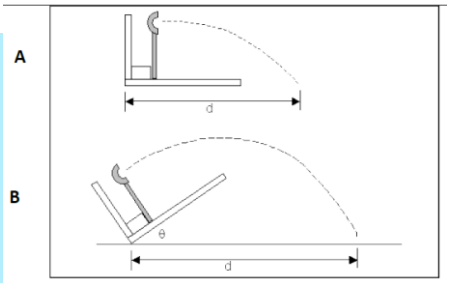
Different types of catapults and stone projectiles:

Explanation
In the experiment we have created the catapult and also test it. Some important scientific features we need to understand if we want to make a working catapult ourselves and hit a target with a catapult projectile (for example pink ponk ball).

1. One of them is **force**. The greater the force, the greater the speed and the longer the ball flies. The more force you achieve with a catapult, the more force the ball gets. Think of the simplest catapult - a plastic spoon. Try to get plastic spoon and shoot a pink-ponk ball with it two times – firstly, when the spoon is slightly tensioned backwards and secondly when it is very tense backwards. What is the difference? If you have ever fired something with a plastic spoon (I hope it was not food!) you know that the more you pushed the spoon back and strained it - you added a lot of force to it - the projectile travelled faster and farther.
Another simple example of a catapult is a slingshot. If you place the ball in the elastic and pull it back, force accumulates in the stretched elastic. The more elastic is stretched, the faster and farther the projectile will fly.

2. **Energy:** Everything around us contains some kind of energy. We can think of the example from before, the slingshot. When you place the ball in the elastic and pull it back, potential energy accumulates in the stretched elastic. When you lower the elastic, it quickly compresses back and the potential energy changes to kinetic. In this case, the potential energy of the elastic is equal to 0.
Potential energy is energy stored in things and can be converted into **kinetic energy** = energy of motion. The same thing happens with a spoon that we strain when we want to shoot a pink-ponk ball and also with your catapult.

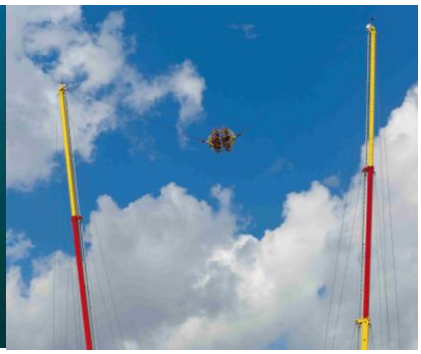




When you prepare a catapult for launch, you transfer energy to it. This energy is stored in the catapult as potential energy. The catapult uses potential energy for its launch, which is stored in the form of the elastic energy of the wood because the wooden stick bends. When you lower the wand, this stored potential energy is converted into kinetic or momentum energy, which is transferred to the projectile, which then flies into the air.
The projectile flies in the form of a parabola. If we want the projectile to fly as far as possible, it is recommended that we have a catapult at an angle of 45º (In the picture B below). If the angle is less than 45º, the projectile will fly higher, but not far. If it gets bigger, the projectile will fly low and fall to the ground sooner (In the picture A below). In the below picture, with d is marked the length the projectile flies.

Every day life

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. Some sort of catapult is used for entertainment in some fun parks to project people in the air, attached to the elastic ropes.



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Project code: 2021-1-FR01-KA220-SCH-000027775