

ENGINEERING

What's it all about?

Module 5.1



An Australian Government Initiative

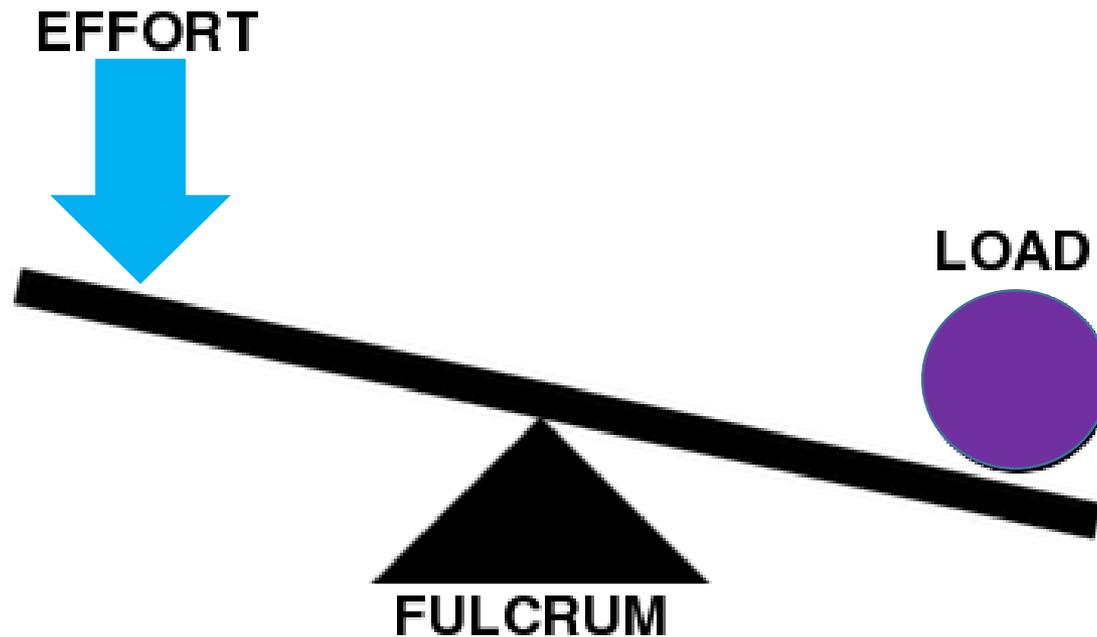


What types of **Engineers** are there?

- Mechanical Engineers
 - **Civil Engineers**
 - Structural Engineers
 - **Environmental Engineers**
 - Electrical Engineers
 - **Chemical Engineers**
 - Software Engineers
- and many more...



Simple Machines: Levers

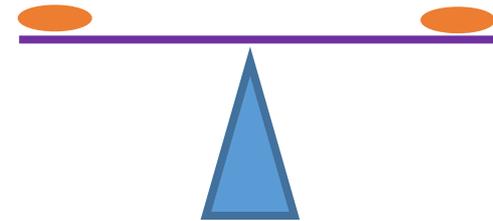


Levers

Aim: To observe how levers help to lift heavy weights

Materials (per group):

- Fulcrum (small hard cover book)
- 30cm ruler
- 10 x 20 cent coins
(or other small objects of equal weight)

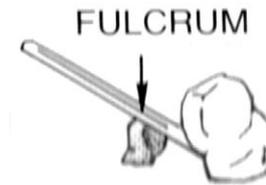
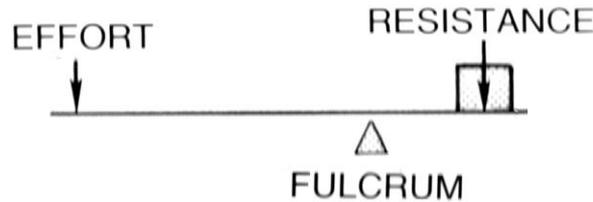


Procedure:

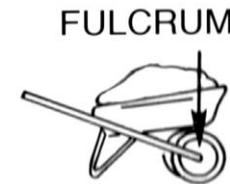
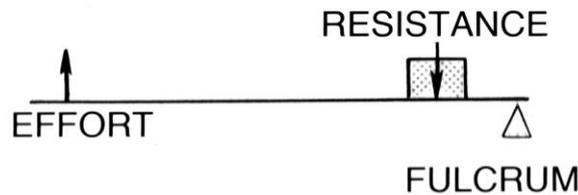
1. Form into groups and collect materials.
2. Balance the ruler on the book, with the book in the centre of the ruler, and one 20 cent coin on each end. It looks just like a see saw.
3. What happens if you move one coin closer to the book?
4. Next, keep the book in the centre, and place 2 coins on one end, and a single coin on the other. What happens?
5. Slide the ruler so the book is no longer in the centre, to see if you can make the ruler balance with the uneven number of coins.
6. Experiment with more coins!

There are 3 different types of levers!

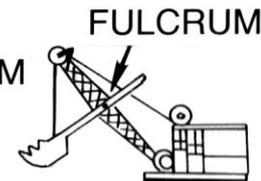
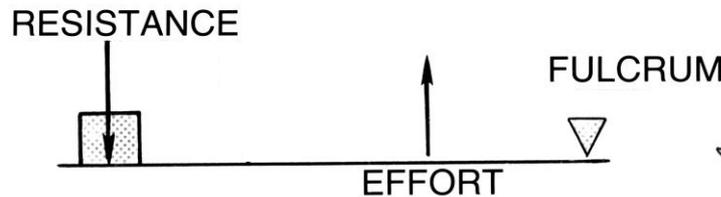
Type 1



Type 2



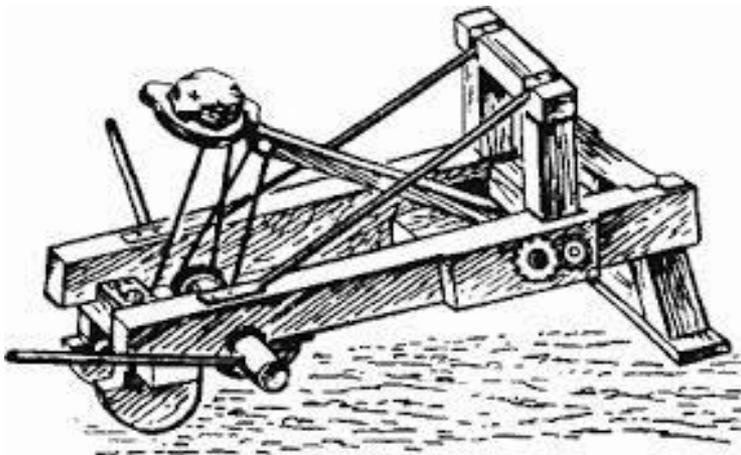
Type 3



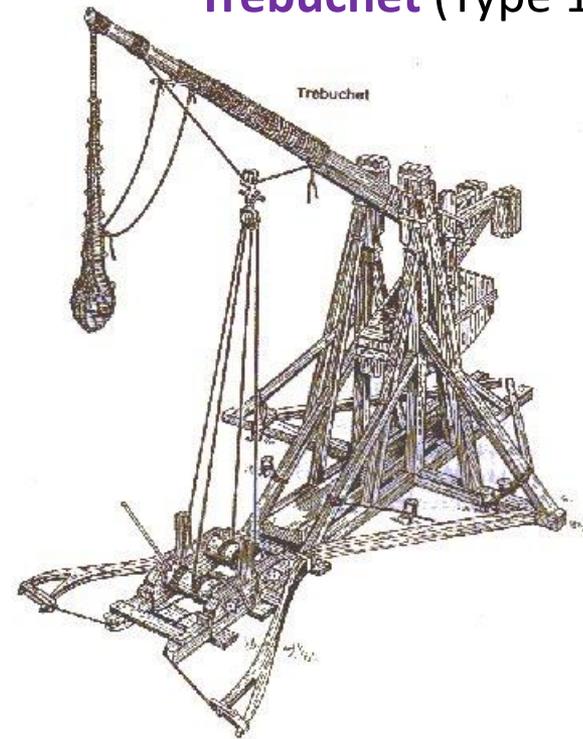
Catapults use levers

Catapults have lots of different designs, using different lever types!

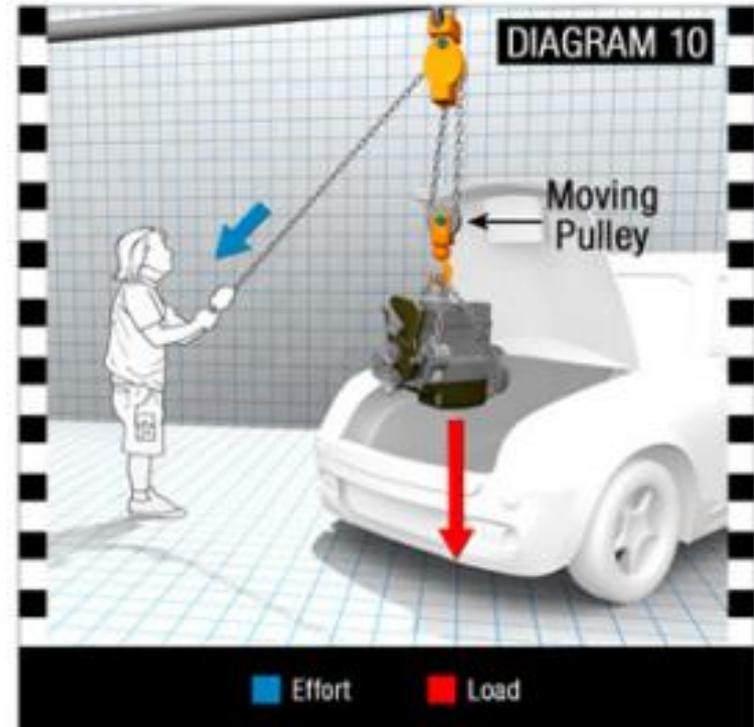
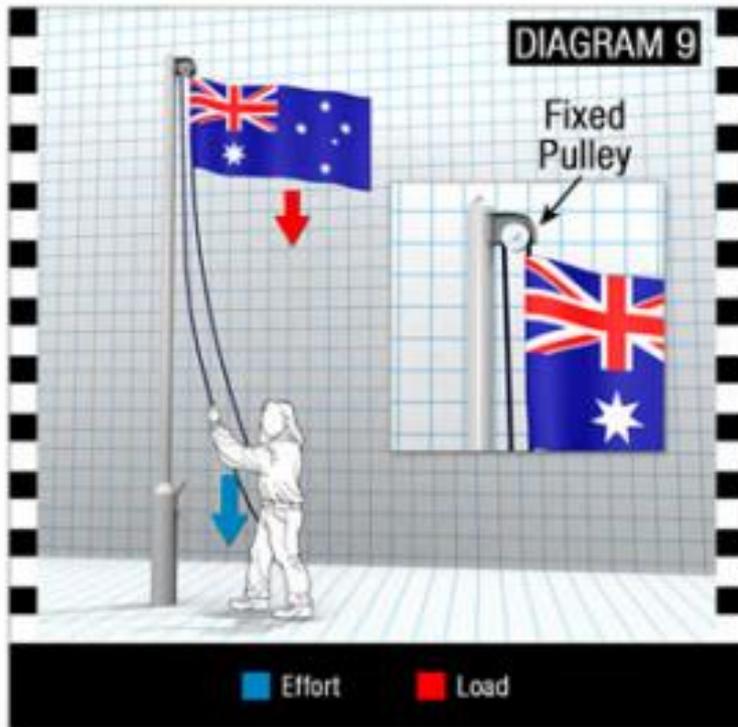
Mangonel (Type 3 lever)



Trebuchet (Type 1 lever)



Simple Machines: Pulleys



Pulleys

Aim: To observe how pulleys help to lift heavy weights

Materials (per group):

- 2 x 1m lengths of strong string
- Scissors (shared between groups)
- Empty cotton reel (or similar)
- Masking tape
- A weight to lift e.g. toy car, or drink bottle filled with water

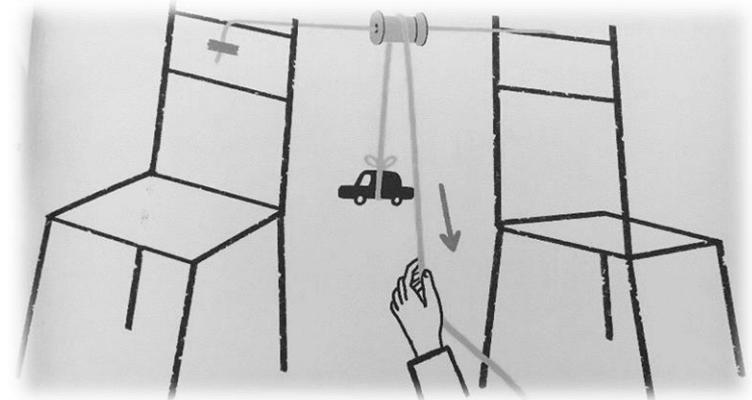


Illustration by Nastia Sleptsova, in "Engineer Academy" by Steve Martin

Procedure:

1. Form into groups and collect materials.
2. Thread one of the lengths of string through the middle of the cotton reel.
3. Tape or tie the ends of the string with the cotton reel at the same height between two chairs or two tables (or have two group members hold either end). Move the chairs, tables, or group members apart until the string is quite taut (straight and tight).
4. Tie the second piece of string to the weight. Place the weight on the floor and lift it up using just the string.
5. Next, return the weight to the floor, loop the string attached to the weight over the cotton reel, and pull down on the string.
6. Is it harder or easier, to lift the weight with the pulley?
Document your results!

Engineering Aid Challenge

The Problem:

A contagious virus has struck an area of Australia. There are doctors and nurses onsite, helping the local people but... the vaccine is running out!

All transportation has ceased to the infected town, and an exclusion zone has been set up, so no one can pass!

How will we get more vaccine packages to the doctors?



The Challenge



Your team of engineers must construct a **device** that will deliver the vaccine package to the infected town.

The closer you get to the town the more risk there is of becoming infected. So you need to build a device that can launch the packages from the greatest distance.

Your device also needs to be on target, so the doctors receive the vaccines on time and can treat their patients.

The Rules



- Build a device which can accurately propel the vaccine package into the infected town, over the exclusion fence. The further away you can launch the package from, the more points you will receive.
- You will be given a supply of resources materials. Any extra materials you collect will cost you points.
- During testing, your team will select a distance for your first attempt. You can only increase the distance for your other attempts if you are successful in getting the package to the target. Points for each distance are only achieved if the aid package (ball) lands in the town (hula hoop).

Designs...

There are unlimited ways you and your team can design your device. Don't be afraid to be creative!

One type of device you could build is a catapult...

What other designs could you use?

