

Not so simple machines

The six hardest working machines
in your world

What is a machine?

- Machines make work easier.

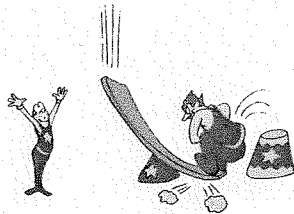
How do machines make work easier?

- They can change the amount of force
 - They can change the distance
 - They can also change the direction
1. Multiply force which decreases distance the load moves.
 2. Multiply the distance which decreases force.
 3. Or, they leave force and distance alone but change the direction in which the load moves.

What is mechanical advantage?

The number of times a machine multiplies the effort or input force.

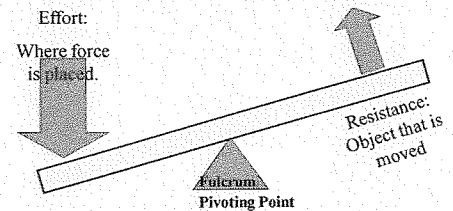
The Lever



What is a Lever?

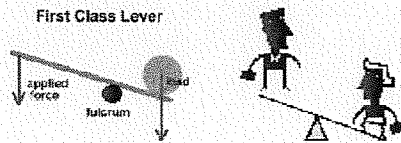
a rigid bar that is free to turn about a fixed point called the fulcrum

Every Lever has three (3) parts:

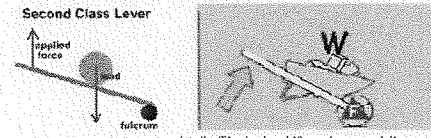


There are 3 types of levers:

- A first class lever is like a teeter-totter or see-saw. One end will lift an object (child) up just as far as the other end is pushed down.

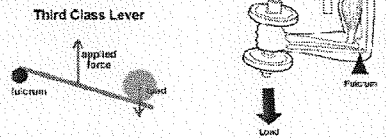


- A second class lever is like a wheel barrow. The long handles of a wheel barrow are really the long arms of a lever.

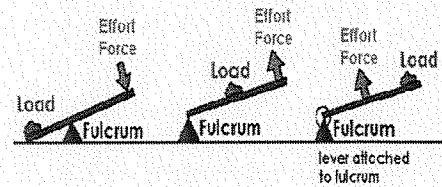


Picture from http://sta.f.jarrisonban.k12.va.us/~mwampole/1_resources/simple_machines/wheelbarrow.html

- A third class lever is like a fishing pole. When the pole is given a tug, one end stays still but the other end flips in the air catching the fish.



Diagrams of Levers

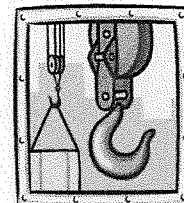


Effort force = input force
Load – output force

Examples of Levers

- 1st Class – Seesaw ✓
crowbar
- 2nd Class – Wheelbarrow
Nutcracker
- 3rd Class – Forearm, Rake, Brc

The Pulley



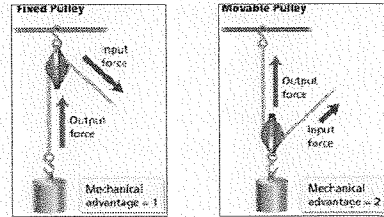
What is a pulley?

A rope, belt or chain wrapped around a grooved wheel.



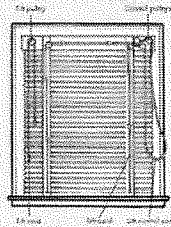
Picture from <http://www.education.com/encyclopedia/article/pulley>

Diagrams of Pulleys



Examples of Pulleys

- Window Blinds
- Flagpole



Picture from <http://home.howstuffworks.com/home-improvement/repair/how-to-repair-window4.htm>

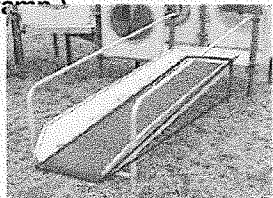
Picture from <http://www.encyclopedia.com/encyclopedia/article/pulley>

The Inclined Plane



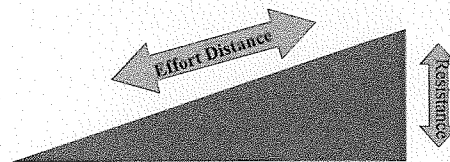
What is an inclined plane?

A straight slanted surface. (Ex. a ramp)



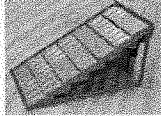
Picture from <http://staff.harrisonburg.k12.va.us/~mwampole/1-resources/simple-machines/handicap-walk.html>

The Inclined Plane



Examples of an Inclined Plane

- Ramp
- Stairs



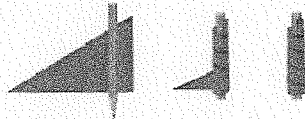
Picture from <http://staff.lanarkshire.ac.uk/~aawampole1/museum/physics/machines/levers.html>

The Screw



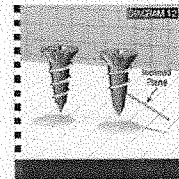
What is a screw?

An inclined plane that wraps around a shaft.



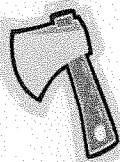
Picture from <http://www.msd44.bc.ca/sites/ReportsView/OneView.aspx?RID=5812>

Diagram of Screw



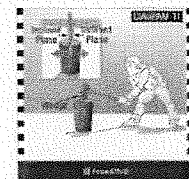
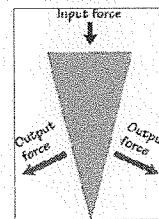
Picture from http://www.engineersaustralia.org.au/contest/app_templates/contestemplates/engineering/images/Machines/SM_diagram1.2.jpg

The Wedge



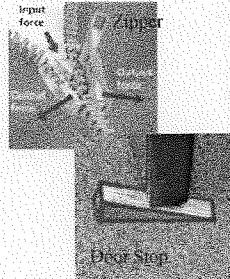
The Wedge

an inclined plane that tapers to a sharp edge

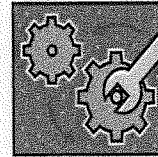


Picture from http://www.engineersaustralia.org.au/contest/app_templates/contestemplates/engineering/images/SM_Separation1.2.jpg

Examples of Wedges



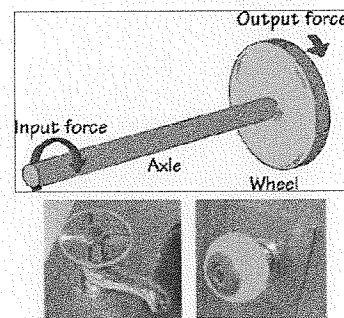
The Wheel & Axle



The Wheel & Axle a wheel connected to a rigid pole

- The Wheel & axle is a modified lever:
 - The center of the axle acts as a fulcrum – making the wheel a lever that rotates around in a circle.

Examples of a wheel & axle



What type of machine?

- <http://staff.harrisonburg.k12.va.us/~mwampole/1-resources/simple-machines/>

Sources

- <http://www.science-class.net/PowerPoints/Types%20of%20Simple%20Machines.htm>
- http://www.science-class.net/PowerPoints/Work_Simple_Machines.htm