

MACHINES



MACHINES

- ✘ Machines are devices that make work easier.
- ✘ Machines make work easier by decreasing or redirecting the force applied.
- ✘ Machines do not reduce the amount of work; they decrease the amount of effort needed.



Simple Machines

inclined plane



lever



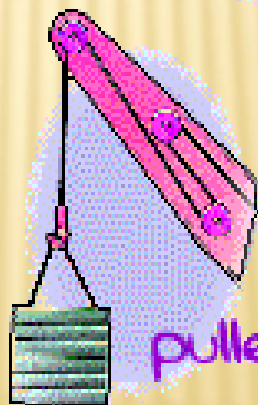
wheel and axle



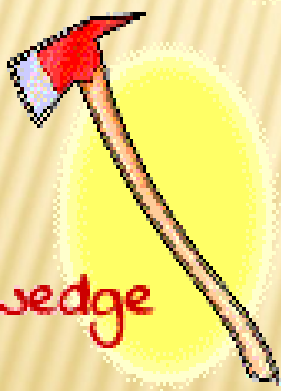
screw



pulley



wedge



LEVER

- ✘ A bar that is free to pivot around a fixed point or fulcrum.



First class lever

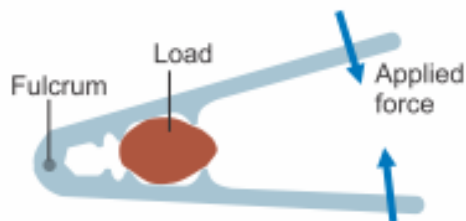
Lever in which **fulcrum is situated in between load and effort** is called first class lever.
e.g. pair of scissors, see-saw, pliers



Scissor

Second class lever

Lever in which **load is situated inbetween fulcrum and effort** is called second class lever.
e.g. nut cracker, wheel barrow, bottle opener



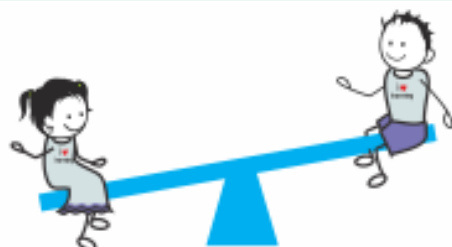
Nut cracker

Third class lever

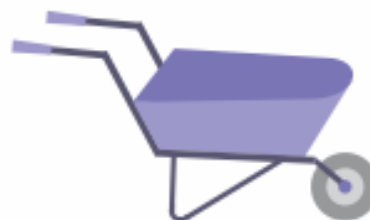
Lever in which **effort is situated inbetween the fulcrum and the load** is called third class lever.
e.g. fishing rod, pair of tongs, stapler



Pair of tongs



See-saw



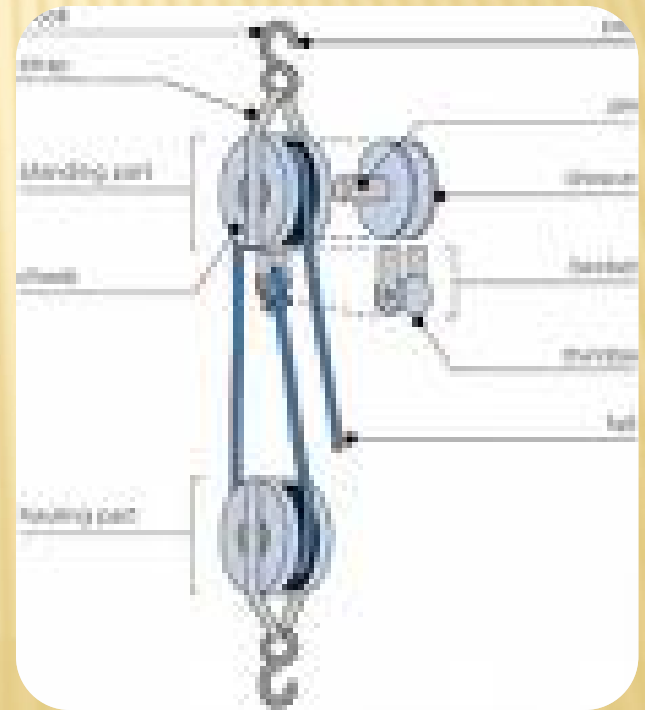
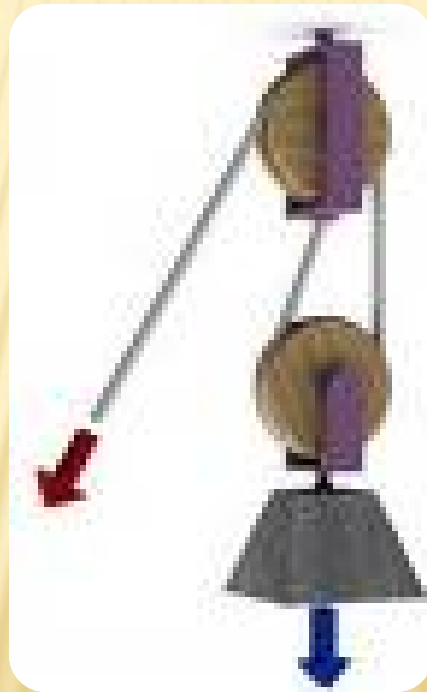
Wheel barrow



Fishing rod

PULLEYS

- ✘ A grooved wheel with a rope, chain or cable that changes the direction of the force.



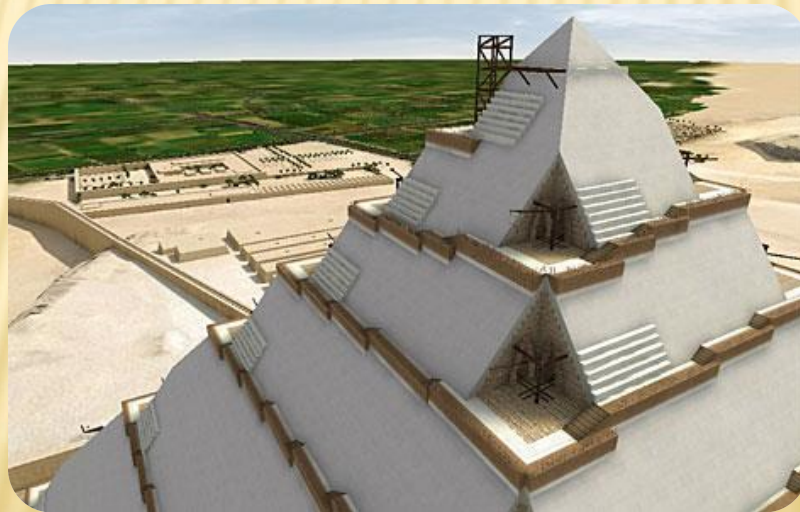
WHEEL AND AXLE

- ✘ A shaft attached to a large wheel that rotates together.



INCLINED PLANE OR RAMP

- ✘ A sloping surface that reduces the amount of force required to raise an object.



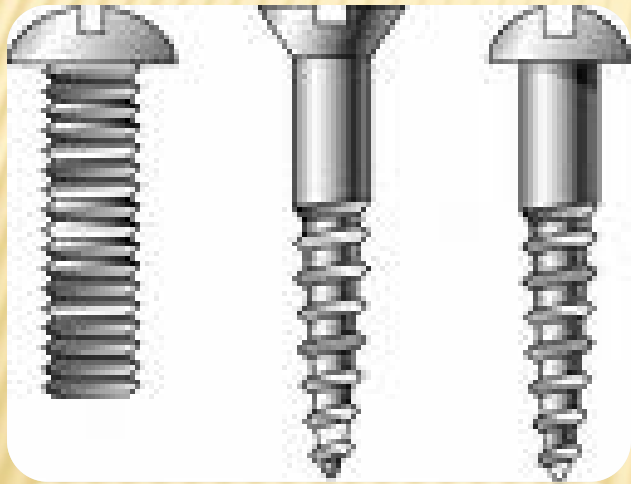
WEDGE

- ✘ A movable inclined plane that changes the direction of the force.



SCREW

- ✘ An inclined plane wrapped around a cylindrical post.



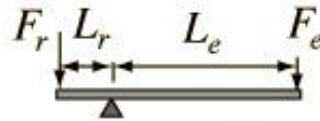
COMPLEX MACHINE

- ✘ A machine made of more than one simple machine.
- ✘ Can you list the types of simple machines used in this bike?
- ✘ Wheel & Axle
- ✘ Lever
- ✘ Screw
- ✘ Pulley

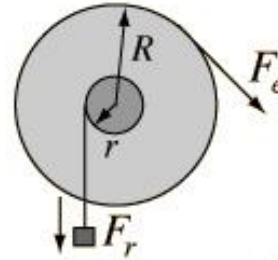


MECHANICAL ADVANTAGE (MA)

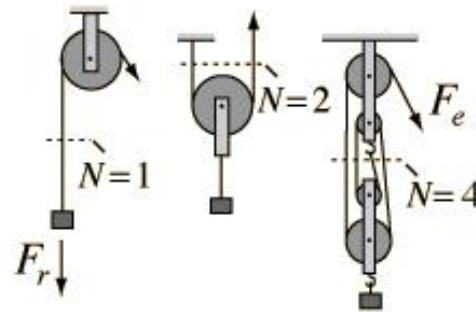
- ✘ The amount of times a machine multiplies force or distance.



Lever $MA = \frac{L_e}{L_r}$



Wheel and axle $MA = \frac{R}{r}$



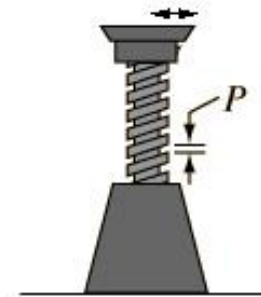
Pulley $MA = N$



Incline $MA = \frac{L}{h}$



Wedge $MA = \frac{L}{t}$



Screw $MA = \frac{2\pi L}{P}$