MECHANICS

TECNOLOGY BILINGUAL SECTION
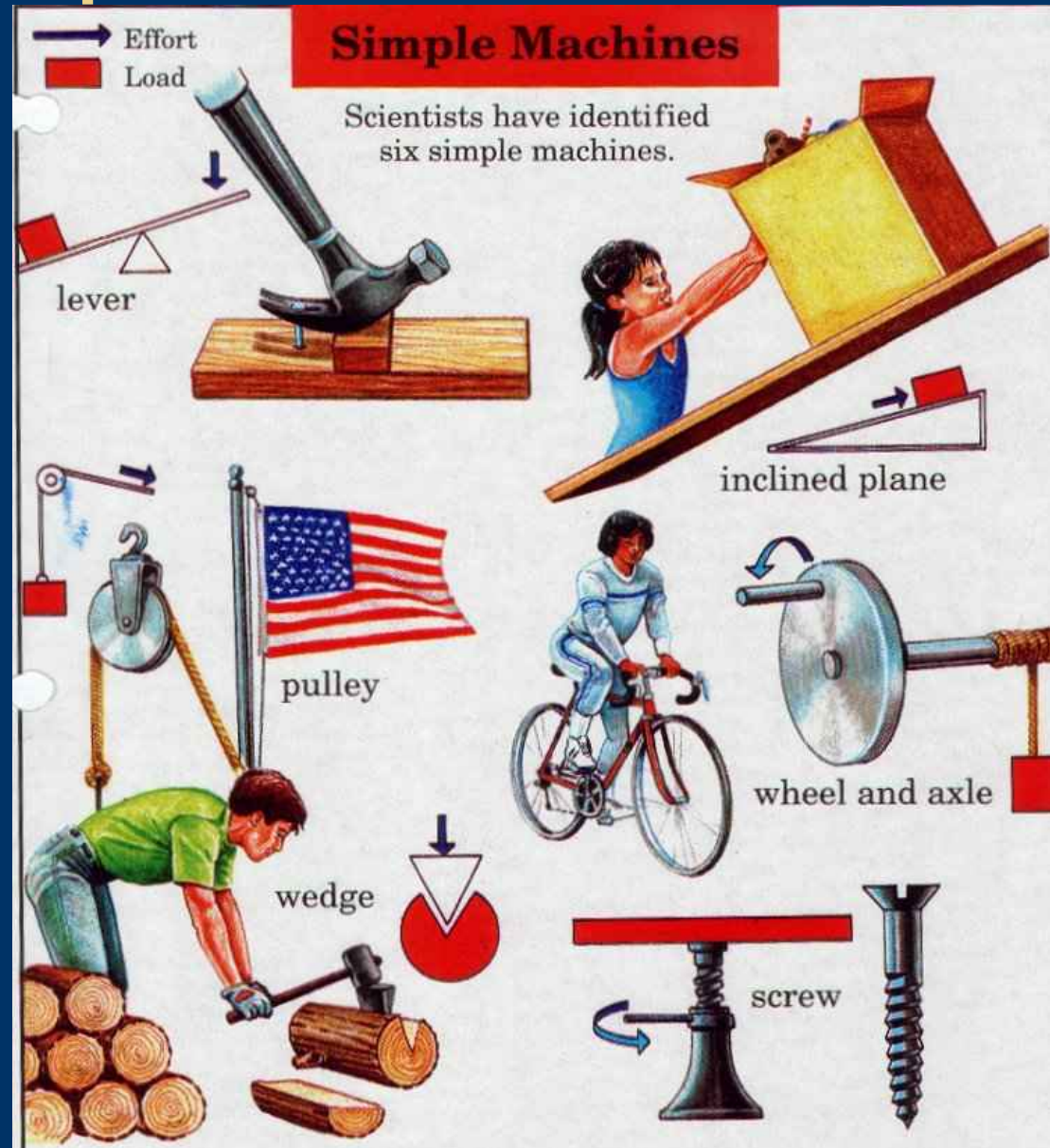
Simple Machines	Mechanical components	
--INCLINED PLANE -PULLEY -WHEELS AND AXLE -LEVER	MEDCHANICS TO TRANSMISSION THE MOVEMENT	MECHANICS TO TRANSFORM THE MOVEMENT
	- PULLEYS SYSTEM -GEARS SYSTEM	-RACK AND PINION -SCREW -CRANK CONECTING ROD -CRANKSHAFT

What is a Simple Machine?

- A simple machine has few or no moving parts

- Simple machines make work easier

LEVER

A lever is a simple machine that makes work easier for use; it involves moving a load around a pivot using a force. In a lever there is a load, a pivot and an Effort (force).

LEVER FIRST CLASS

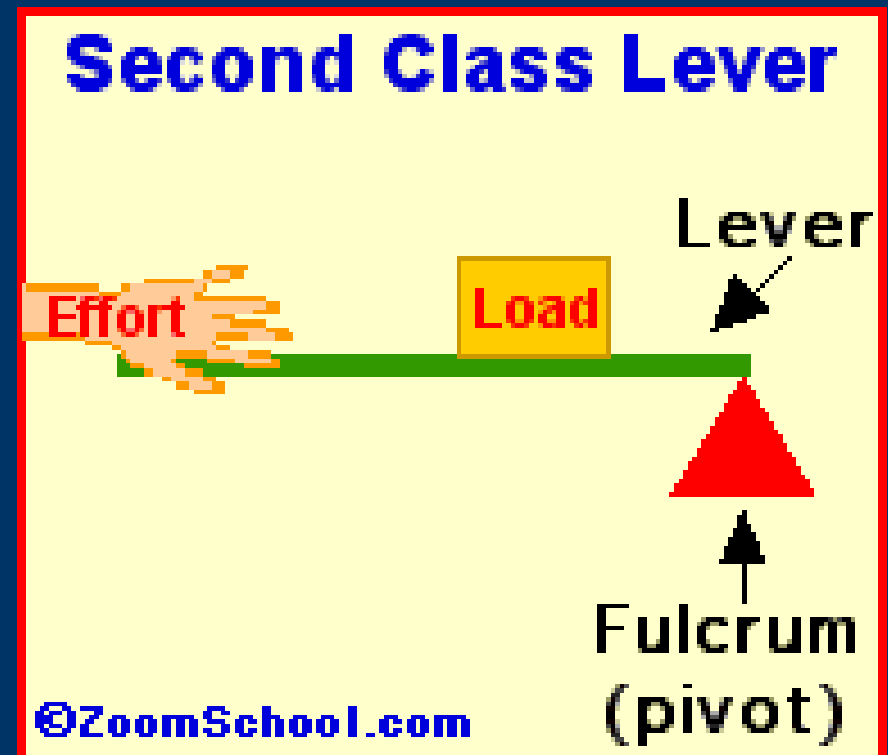- In a first class lever the fulcrum is in the middle and the load and effort is on either side

- Think of a see-saw

First Class Lever

Lever
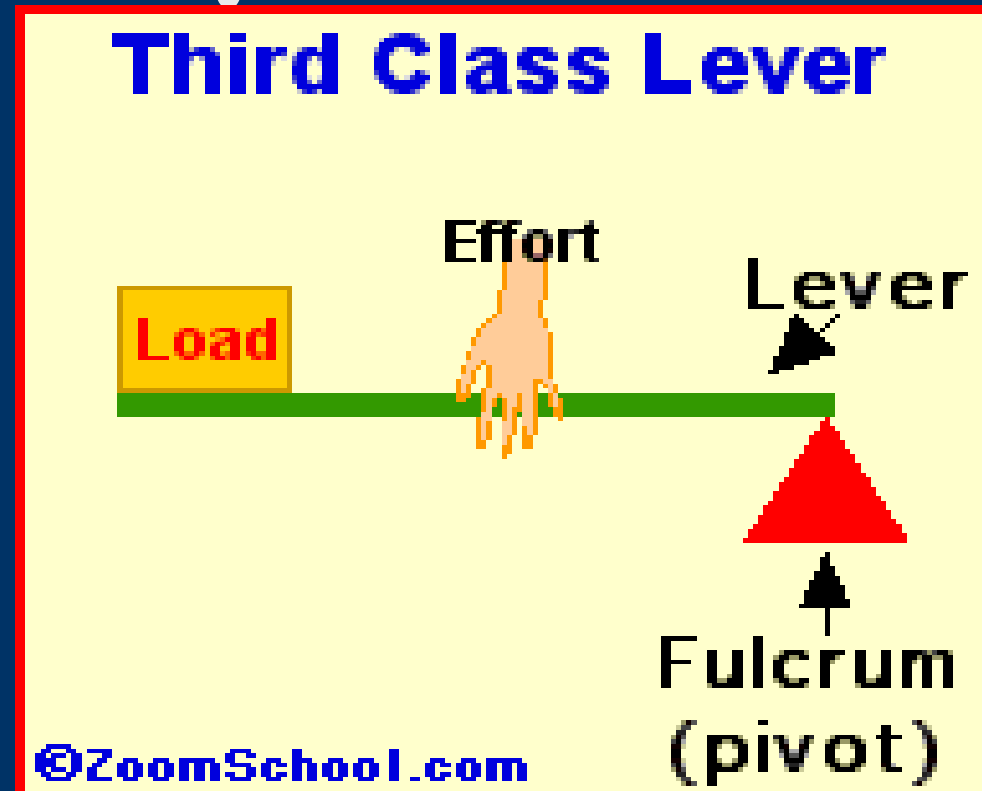
Effort

Load

Fulcrum (pivot)
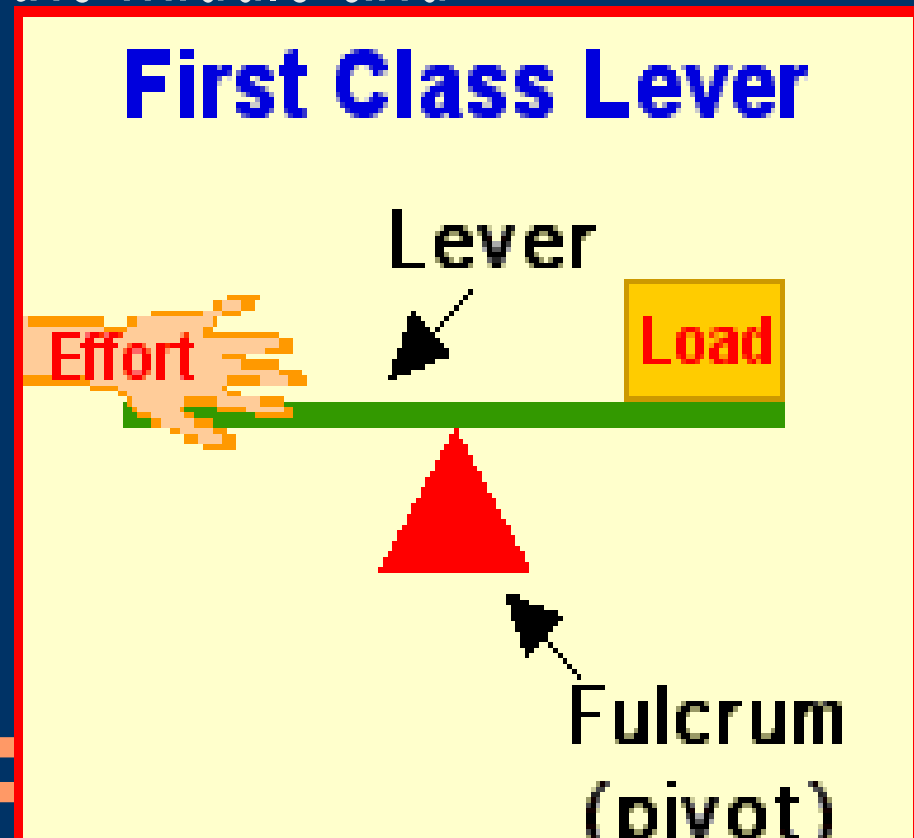
LEVERS-SECOND CLASS

* In a first class lever the fulcrum is in the middle and the load and effort is on either side

Think of a wheelbarrow

LEVERS-THIRD CLASS

- In a third class lever the fulcrum is again at the end, but the effort is in the middle

- Think of a pair of tweezers

Third Class Lever

Effort

Lever

Load

Fulcrum (pivot)

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PULLEY

- A pulley is a wheel that turns when a rope or a chain passes throught it.

- A simple pulley does not increase the speed of the rope nor reduce the effort needed to move a load.

- A simple pulley only changes the direction of the rope to be more ergonomic (easier to use by a person)

DOUBLE PULLEY

- The double pulley has two wheels.It reduces the speed of motion and also reduces the effort necessary to move the load.

- The first wheel hangs from the ceiling

- The second wheel hangs from the first pulley,held by the rope

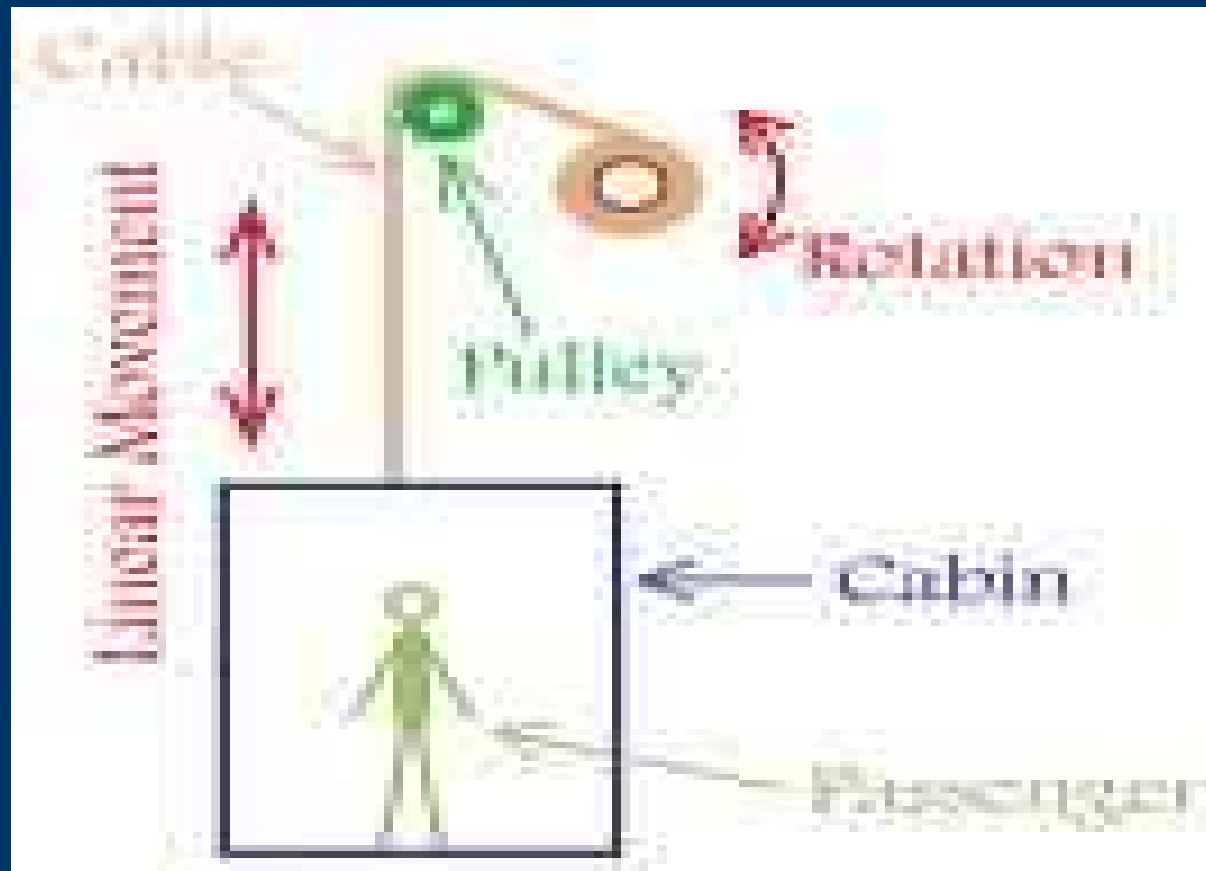- What is the force that you have to apply if the resistance is 100 kgf? .
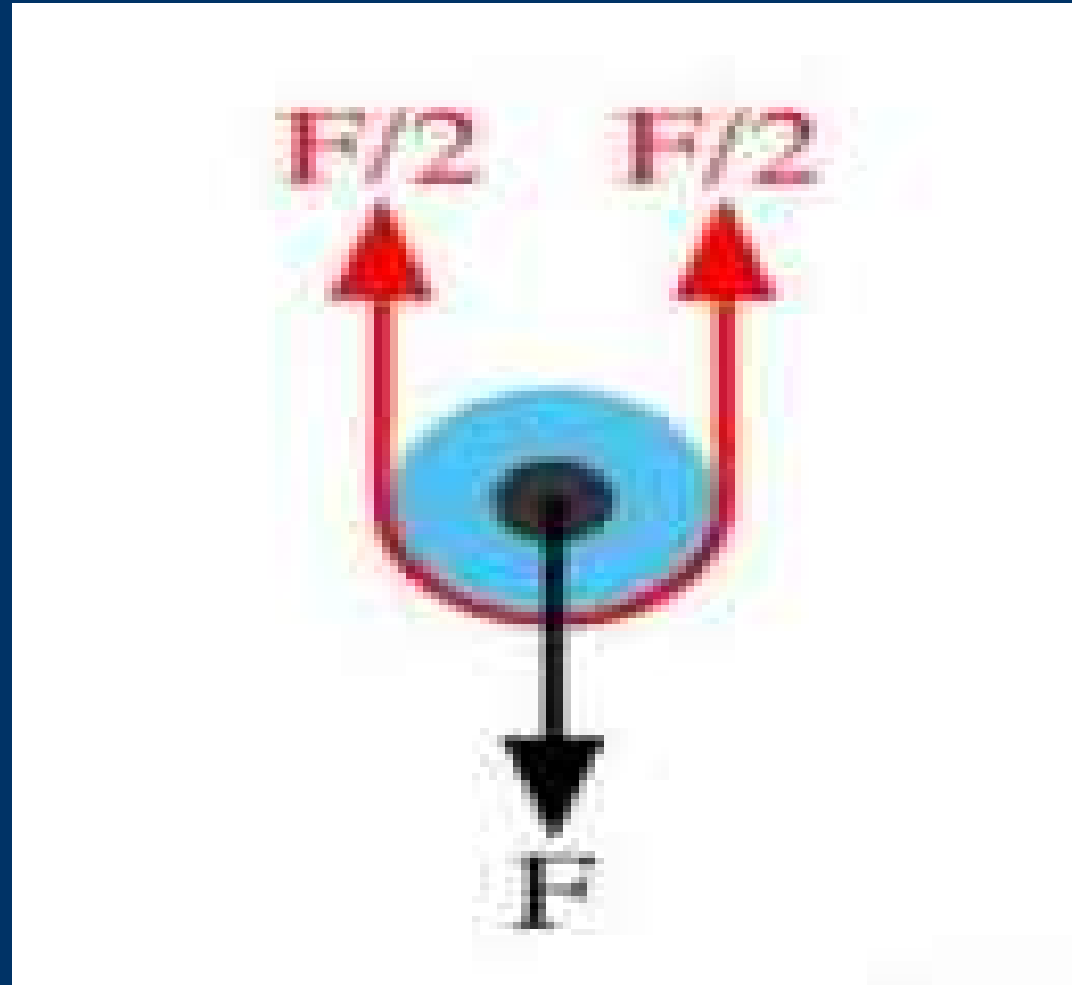
- We use pulley to reduce the effort necessary to move a load.Thanks to the double pulley we can use smaller motors
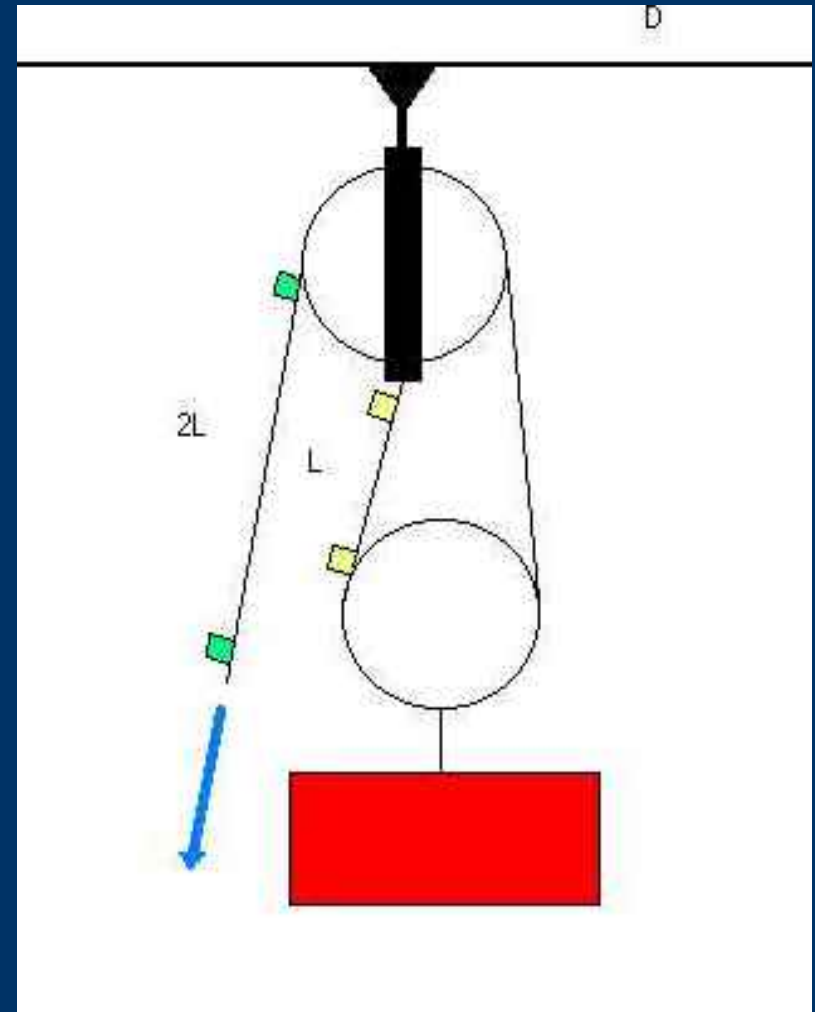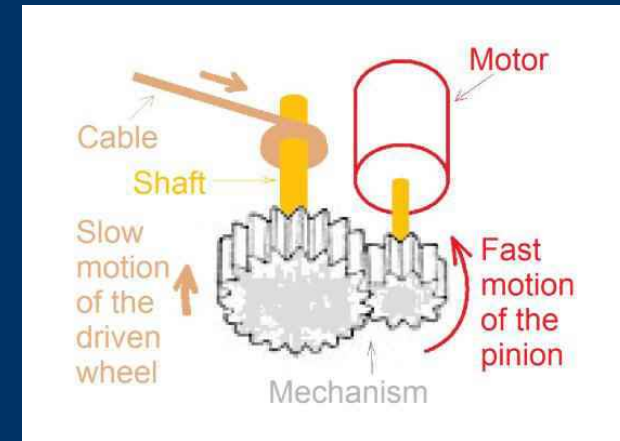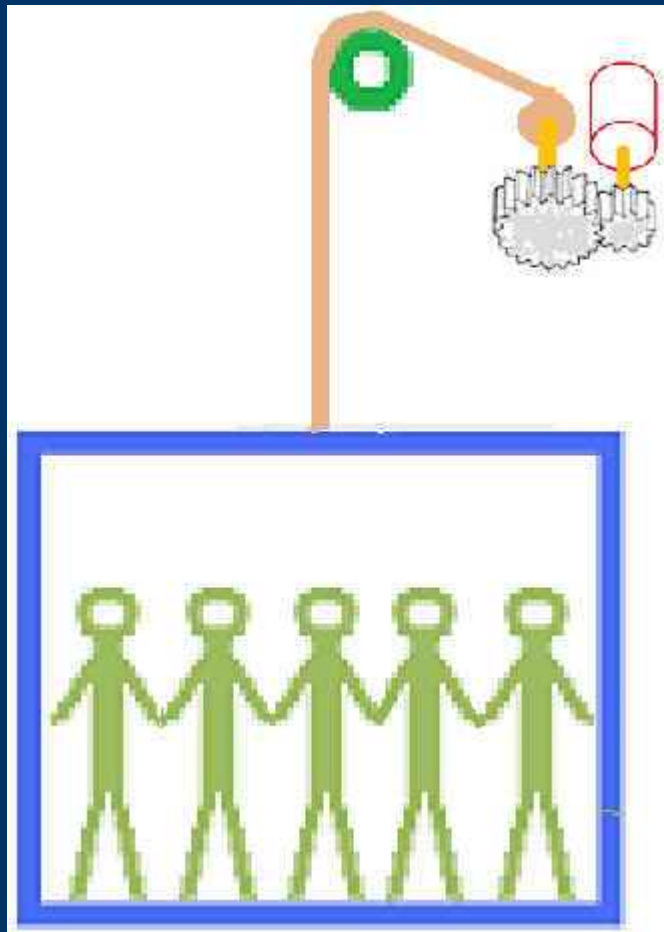
TRANSMISSION MOTION

Imagine ,for example te motor that moves the lift
Spins very quickly .

The electric motor that moves the lift spins very quickly.
The mechanism reduces the speed so that the lift moves at a reasonable speed.

The mechanism reduces the speed, but increases the force.
Thanks to that, the lift can move a big load with a relatively small motor.

BELTS [B] AND PULLEYS

- A belt passes around the pulley wheels.If the driver wheel moves,it moves the belt and the belt moves the driven wheel.

- If both wheel have te same size

  then te only purpose of te belt is to transmit te movement from te driver wheel(connected to the motor or the engine)to the driven wheel.

- If te wheels are different sizes,them te smaller wheel will move faster ,but with less force.
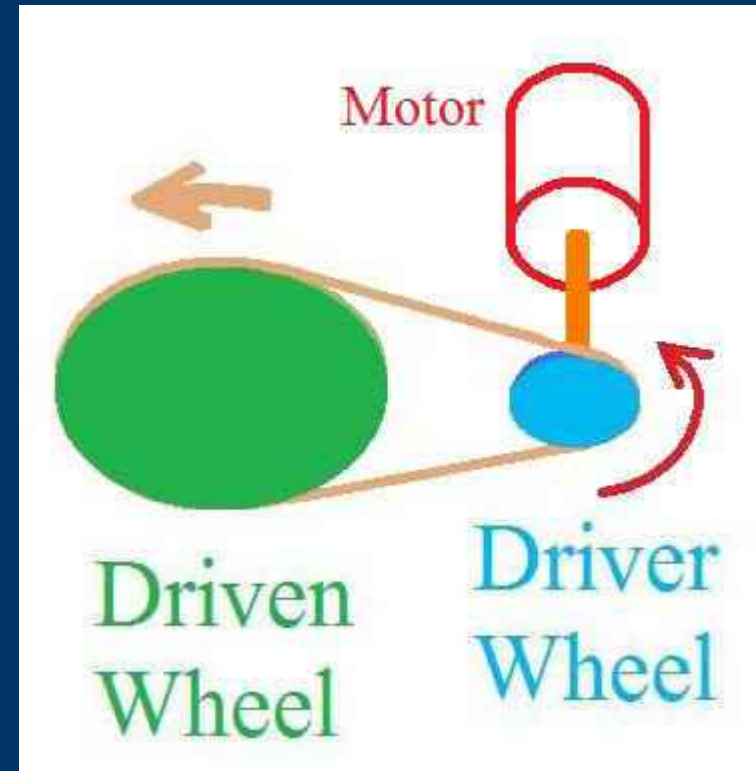
	Diameter	Angular motion	Diameter X angular motion
Driver wheel	1	2	1 x 2
Driven wheel	2	1	2x1

-

- We can calculate the speed of the driven wheel

-

Angular speed   of driven wheel   =diameter of driver wheel X angular speed of driver wh

diameter of driven wheel

-tHE UNIT OF ANGULAR SPEED IS r:p:m: OR REVOLUTIONS
MINUTES
-THE UNIT OF DIAMETER IS METER

Examples of belts and pulleys

Lenta   Rápida

Cambio del sentido de giro
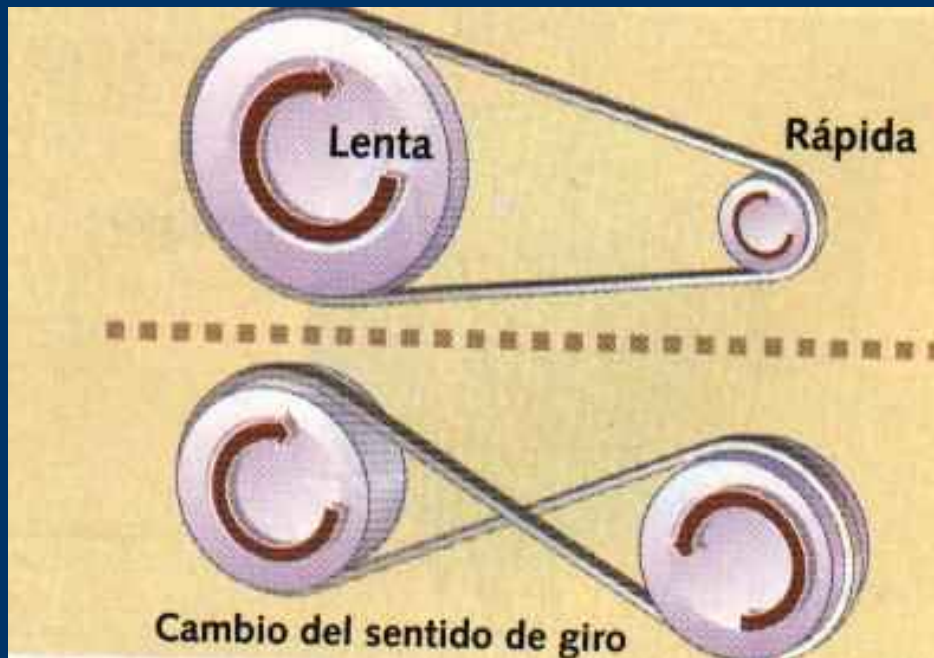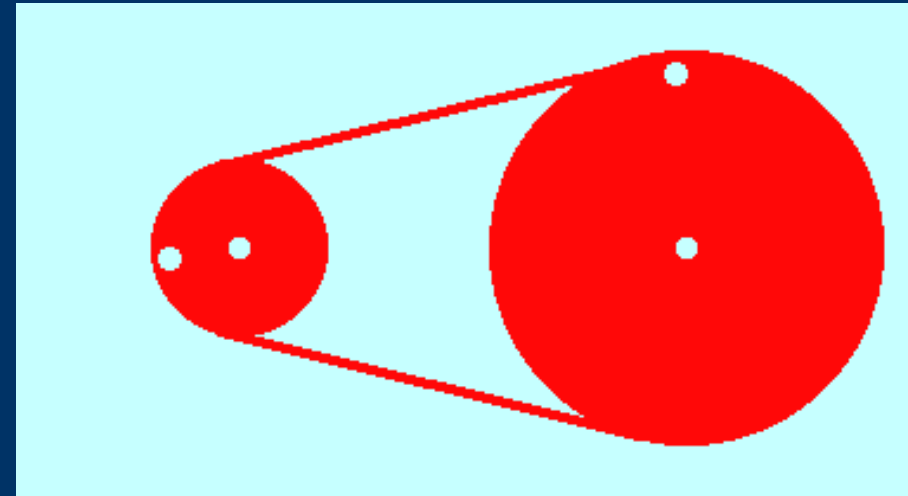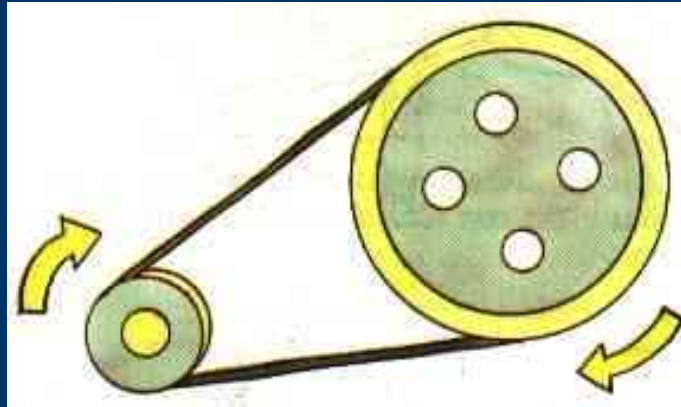
Gear wheels and chains

Everyone has used a bicycle and noticed that it is driven by a large driver gear wheel (pedal gear) with pedals attached. Smaller gears at the back are driven round, in turn driving round the back wheel. As the back wheel turns the bicycle moves forwards. Gears driven by chains are used in motorcycles, in car engines, etc.
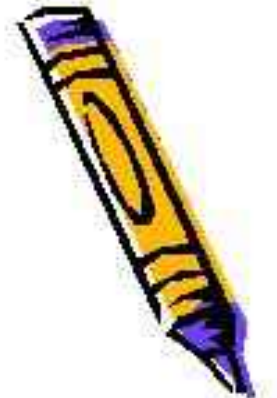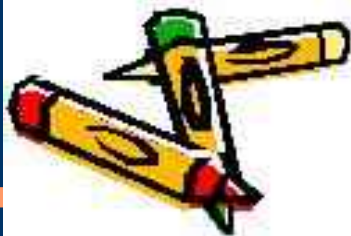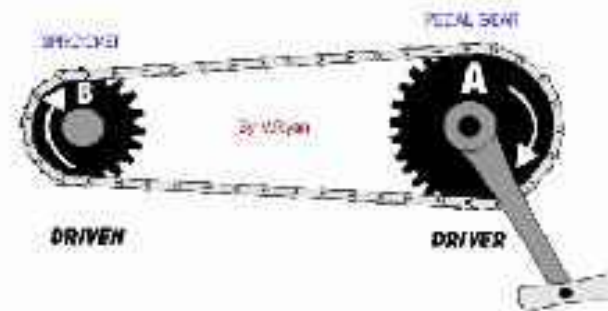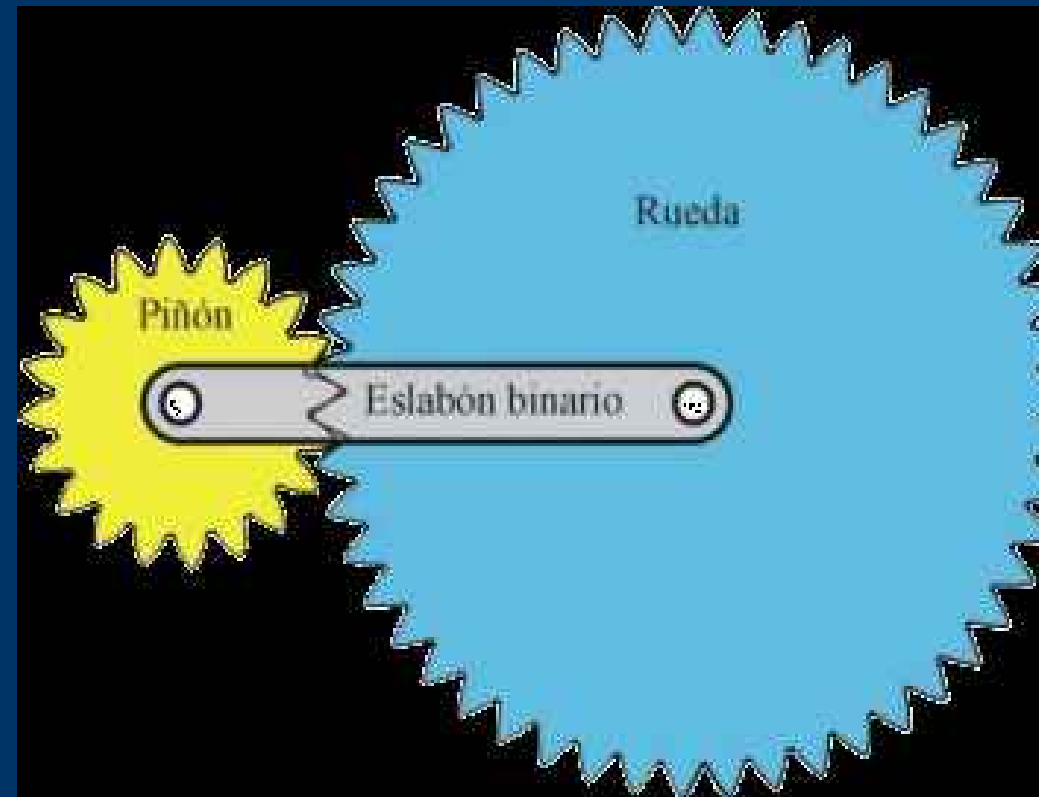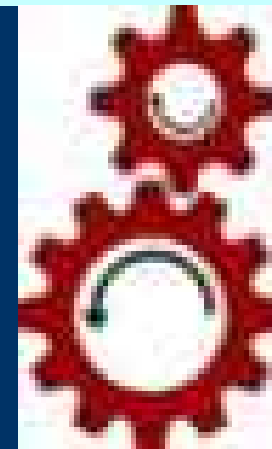
GEARS

They are the most common type of gears. When using spur gears noise can be a problem at high speeds.

The smaller gear (with fewer teeth) will be faster but will move with less force.
-The larger gear (with more teeth) will be slower but will move with more force.
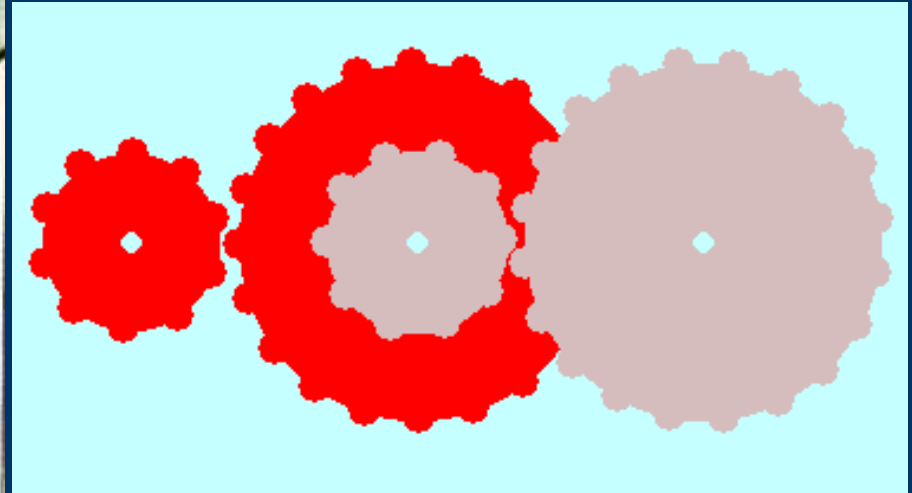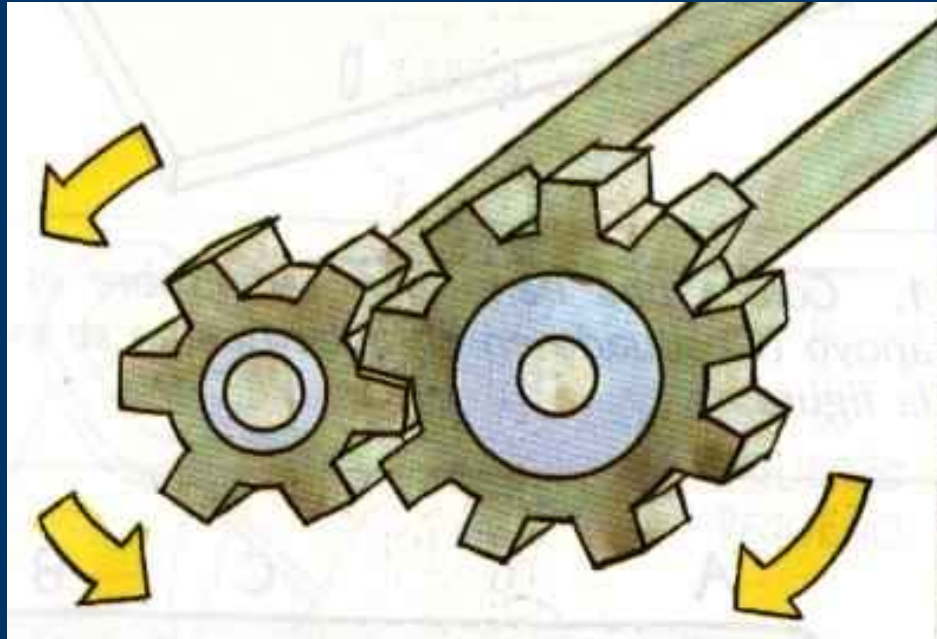
- We can calculate the speed of the driven gear:

angular speed of driven GEAR= $\dfrac{\text{angular speed of pinion} \times \text{number of teeth of pinion}}{\text{number of teeth of driven GEAR}}$
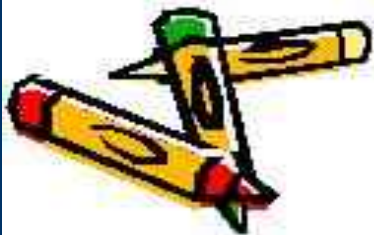
EXAMPLES OF GEARS
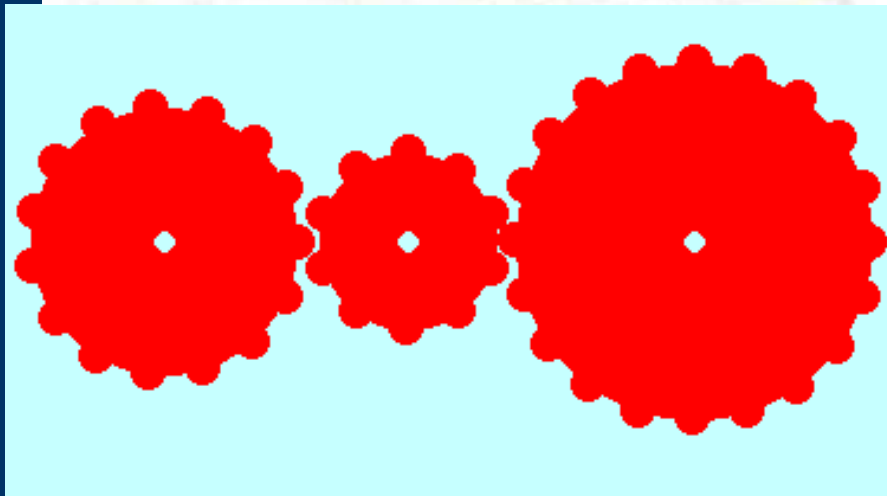
Compounds Gears

In a compound gear, all gears are fixed on the same axel moving at the same speed.

This is an example of a "*compound gear train*". Gear A rotates in a clockwise direction at 30 revs/min. What is the output in revs/min at D and what is the direction of rotation ?

GEAR A	GEAR B	GEAR C	GEAR D
120 T	40 T	80 T	20 T

Gear and belt

The advantages of chains and belts are light weight, the ability to separate the two gears by some distance, and the ability to connect many gears together on the same chain or belt
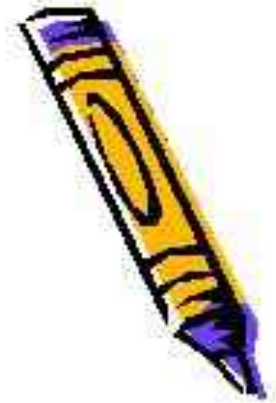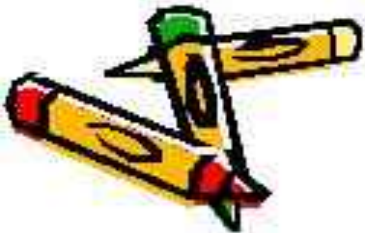
TRANSFORM MOTION

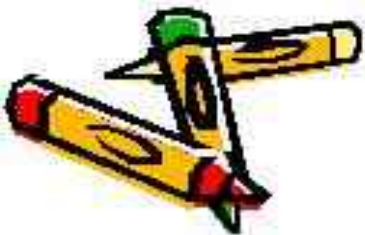For example, a lift needs to go up and down, but the motor that moves the lift has a rotary motion.

We need a mechanisms that transform te rotary movement of te electric motor into a linear up and down movement
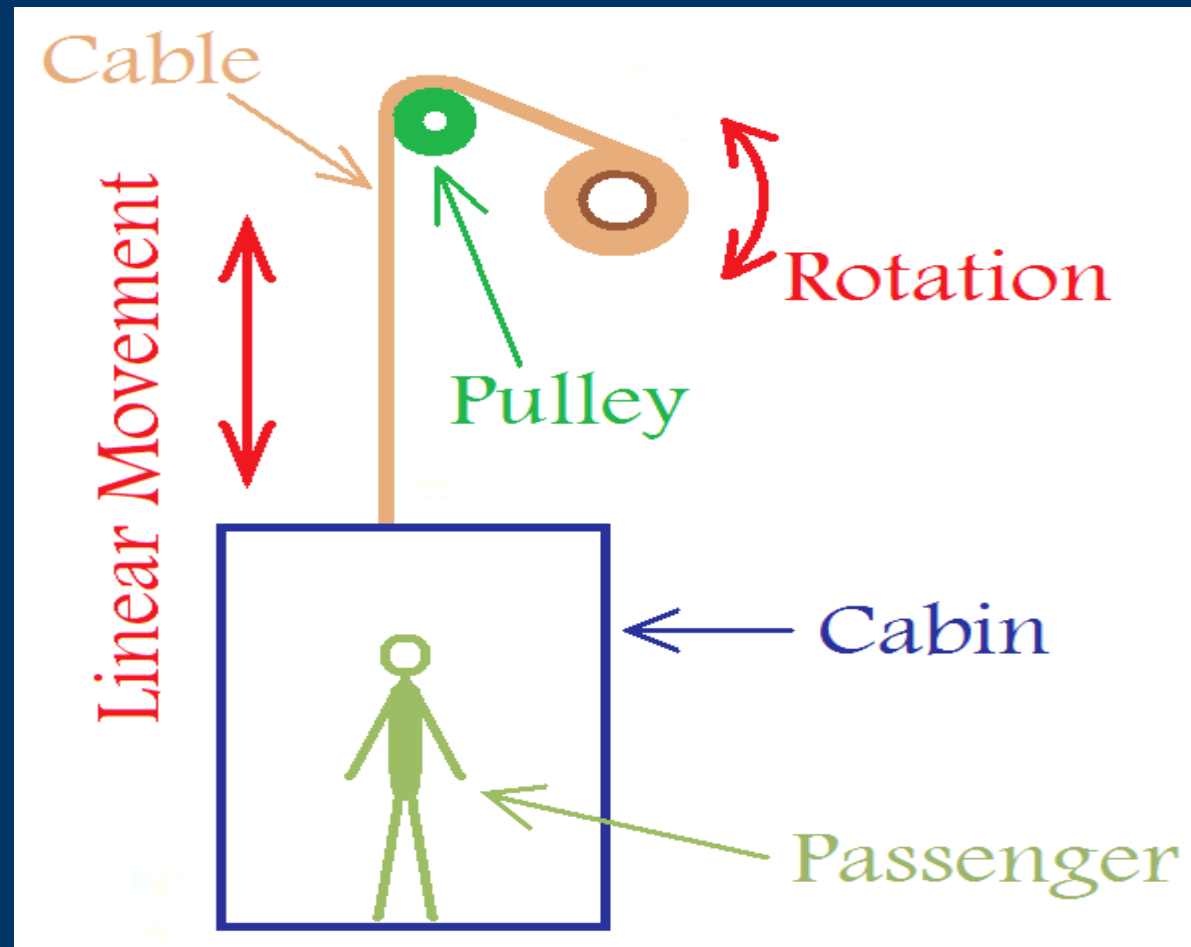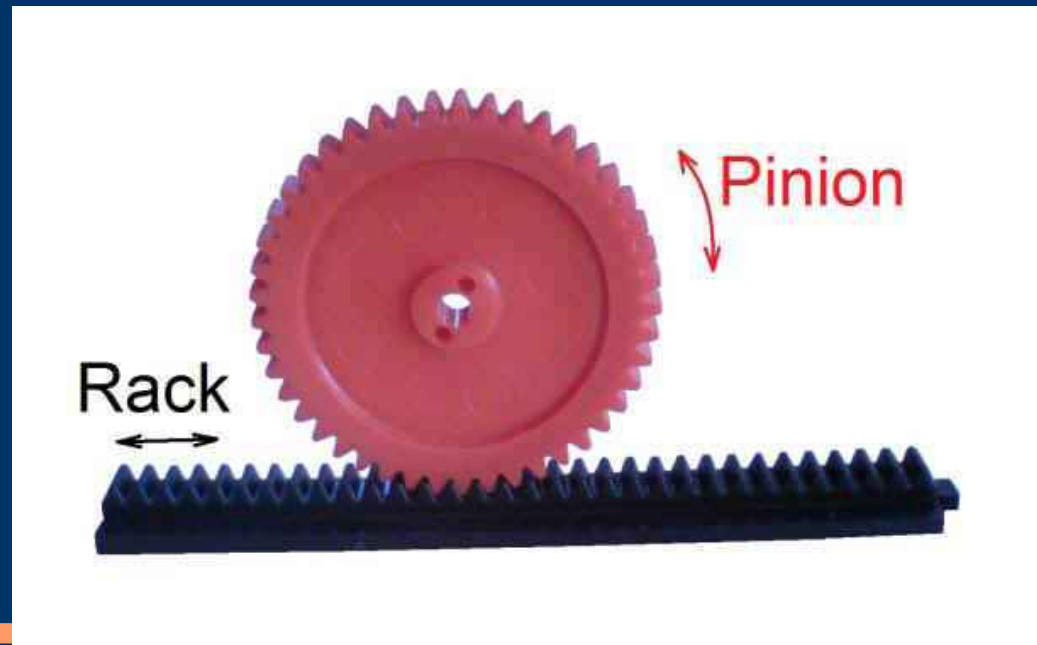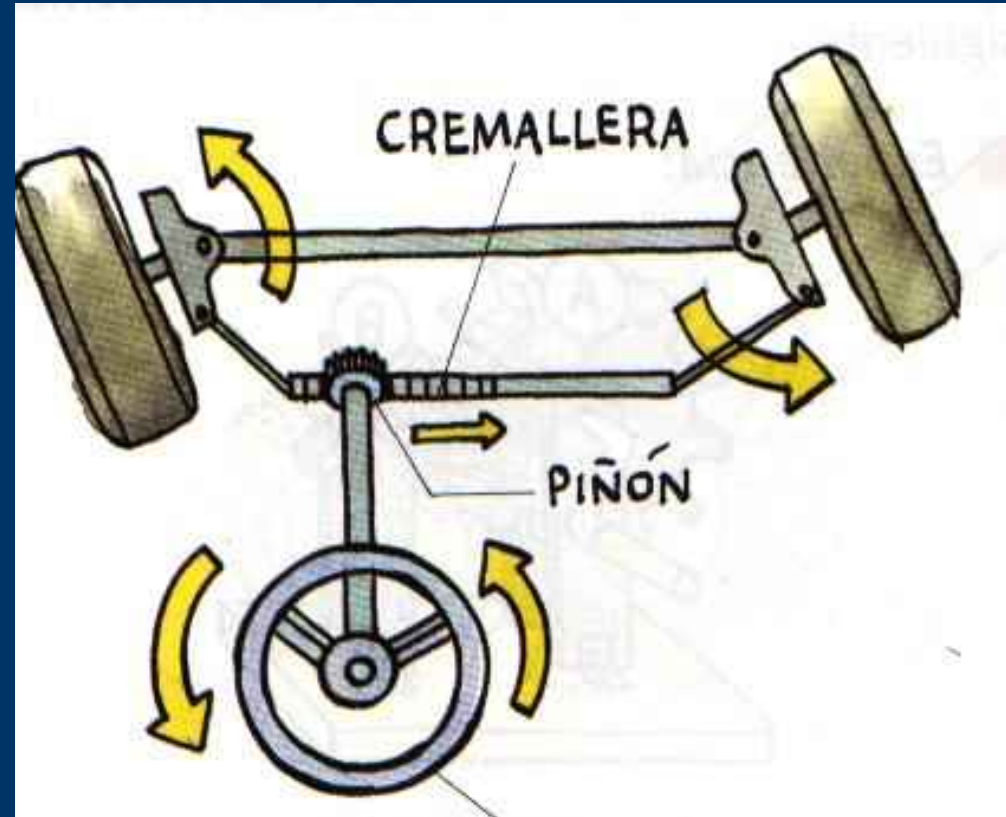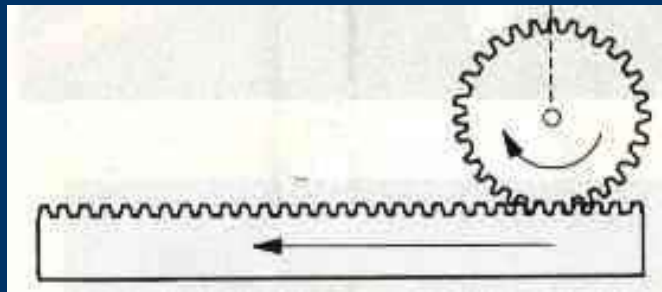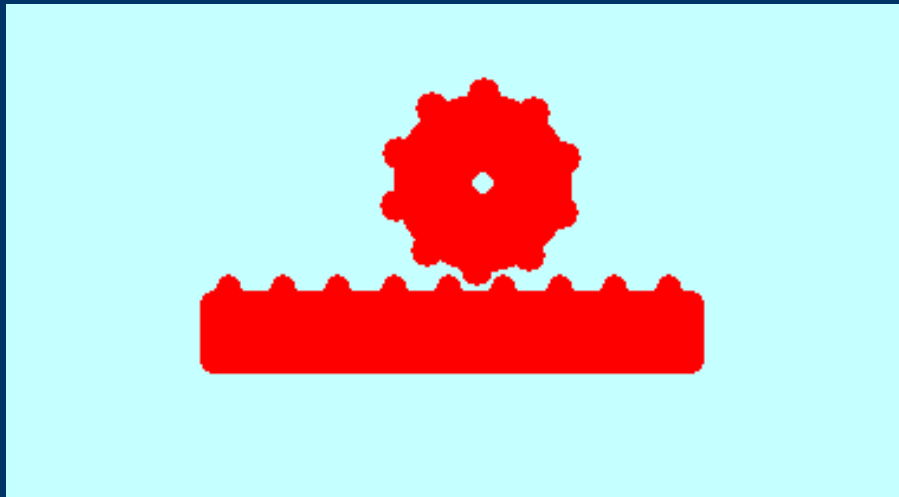
Rack and pinion

The rack and pinion gear system allows rotary motion of the steering wheel to be converted to linear motion.

Rack and pinion gears normally change rotary motion into linear motion, but sometimes we use them to change linear motion into rotary motion. They transform a rotary movement (that of the pinion) into a linear movement (that of the rack) or vice versa.
We use them for sliding doors moved by an electric motor. The rack is attached to the door and the pinion is attached to the motor. The motor moves the pinion which moves the rack and the door moves.
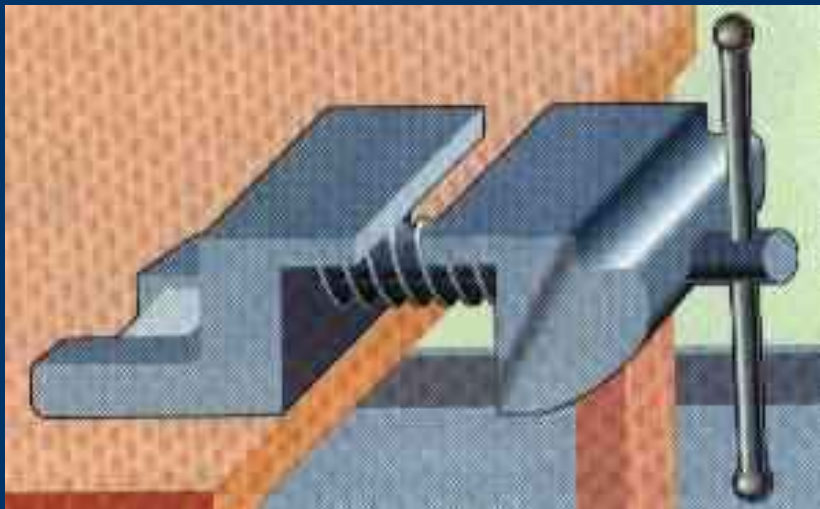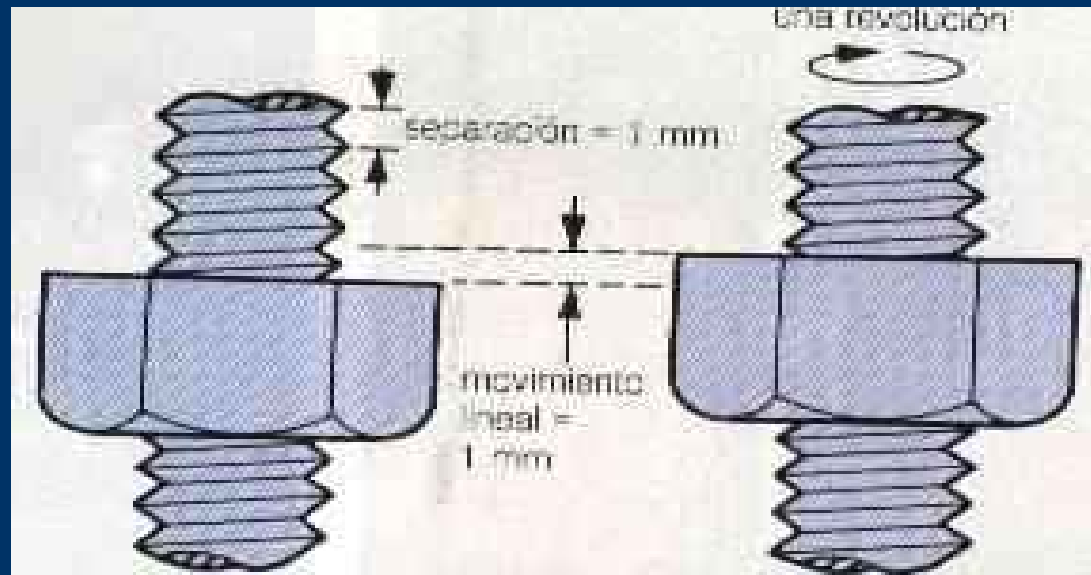
CREMALLERA

PIÑON

Rack and pinion

The diagram shows a vehicle and its steering system. This allows the steering wheel to turn the wheels left and right so that it can be steered.
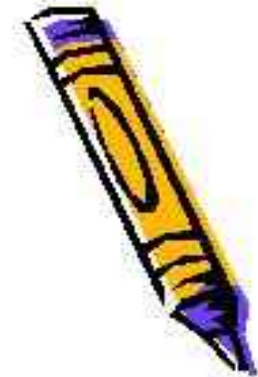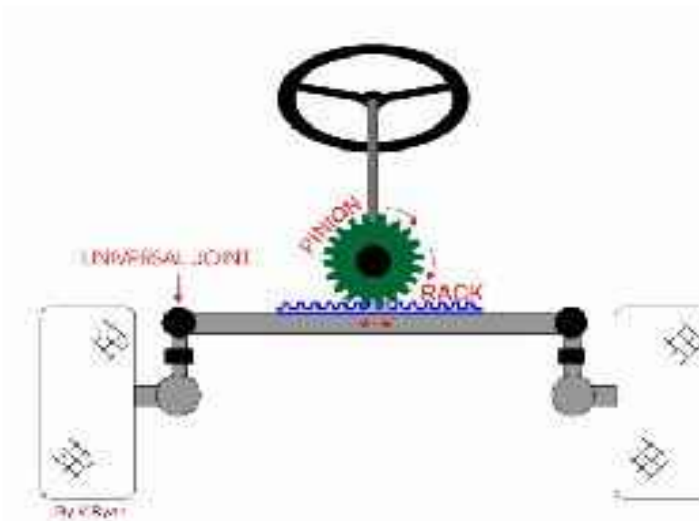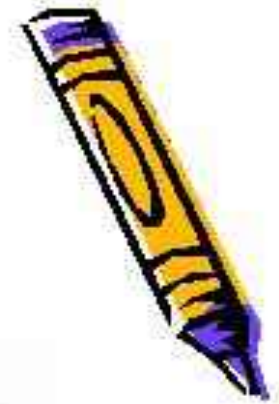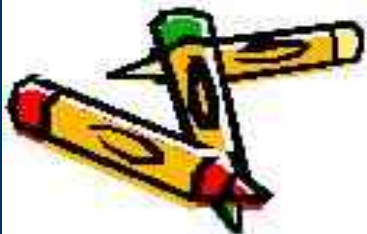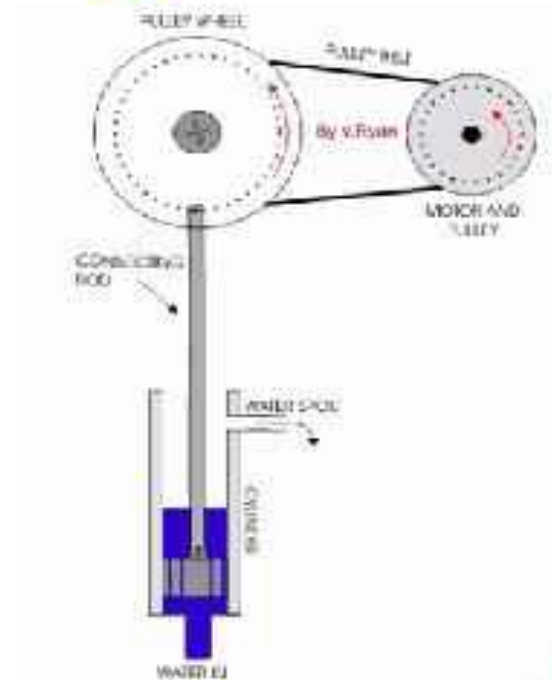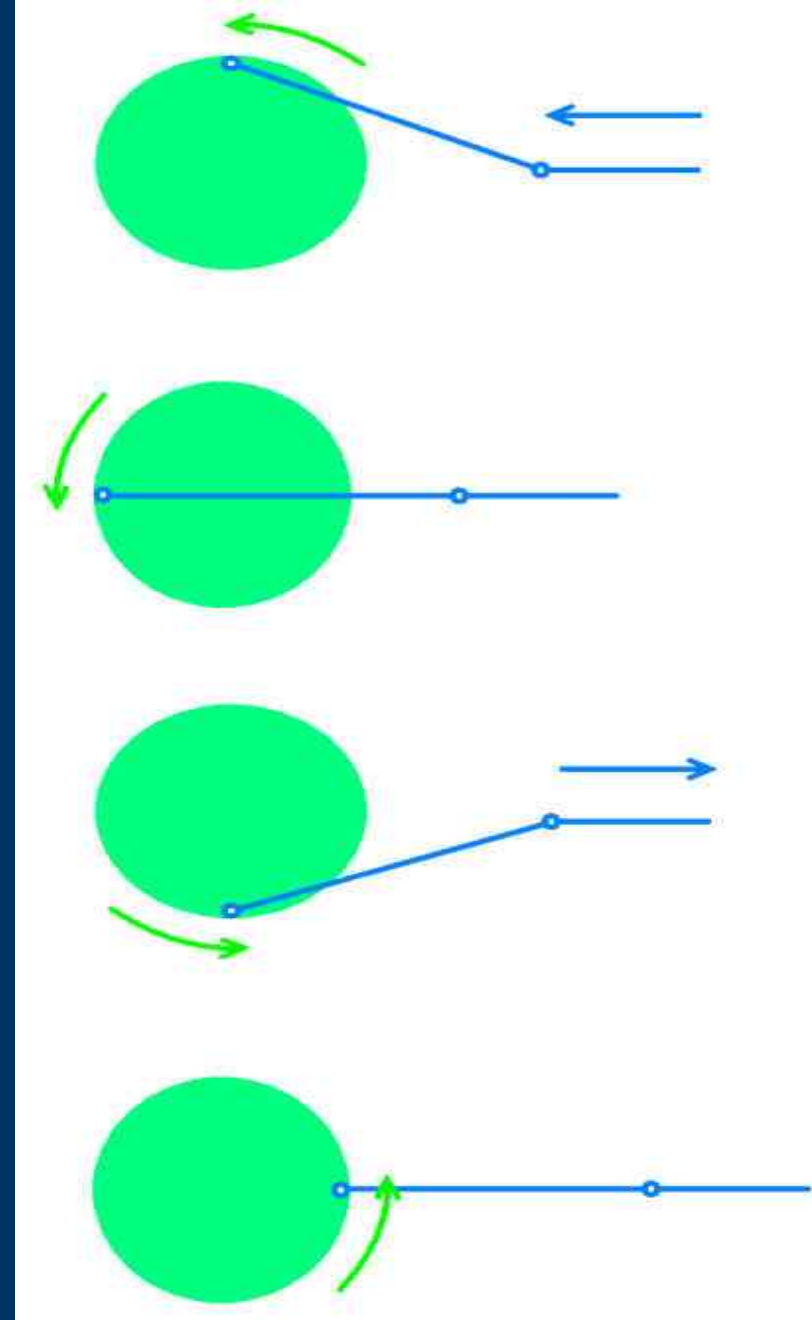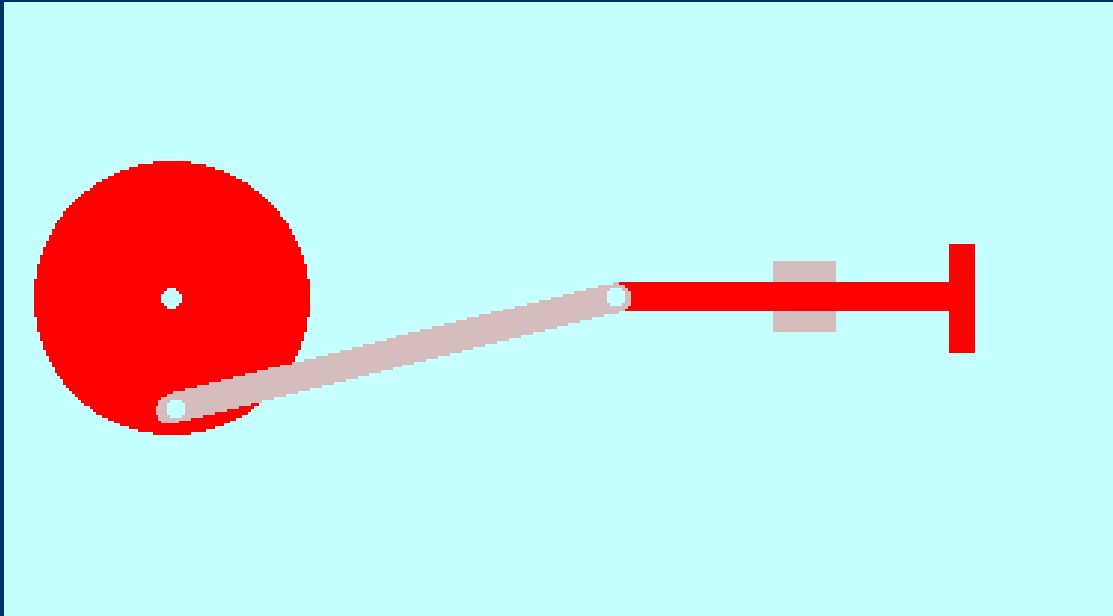
SCREW MECHANICS

Crank-connecting rod

- A Crank-connecting-rod is a Mechanism for transformation of rectilineal motion in rotatory one and vice versa.
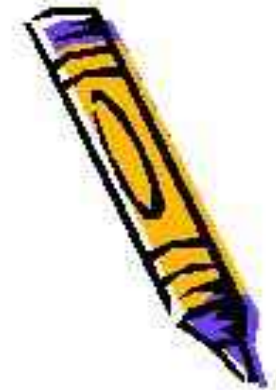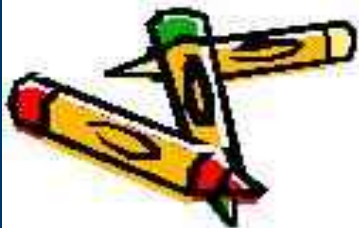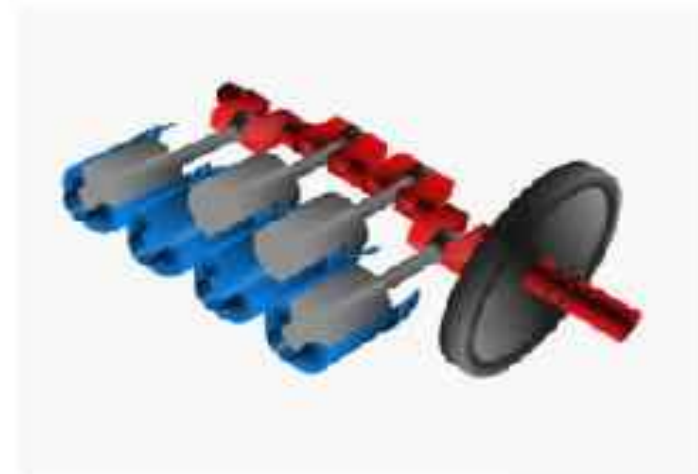
CRANK – CONNECTING ROD

The distance that runs the piston is equal to the diameter of the handle (looks).

Crankshaft

The crankshaft(in red),
sometimes casually
abbreviated to crank,
is the part of an
engine which
translates
reciprocating linear
piston motion into
rotation.

See more about the
engine here

CRANK AND *CRANKSHAFT*