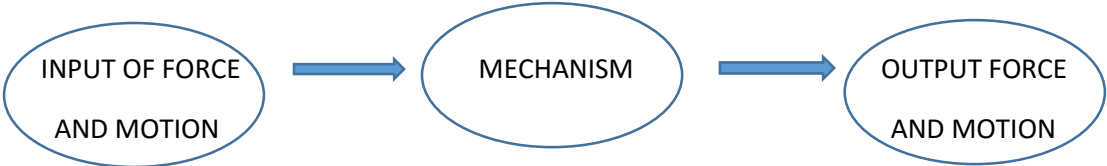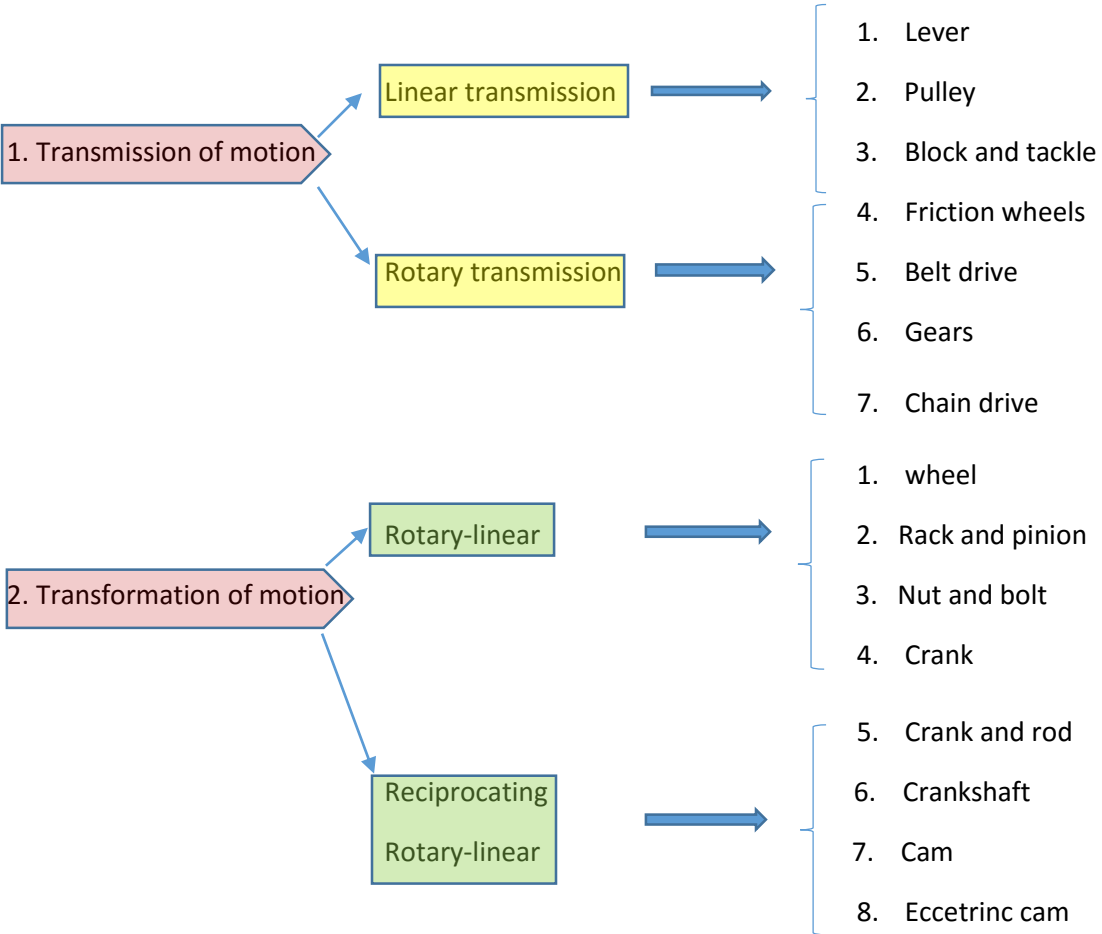# MECHANISMS

MECHANISMS- Are devices that transmit and covert forces and motions from a driving force (input) to an output element.

INPUT OF FORCE AND MOTION → MECHANISM → OUTPUT FORCE AND MOTION

Mechanisms transmit and transform force and motion from an input source (motor) to an output receptor. This transmission and transformation lets us perform different types of work with more comfort and less effort.

MECHANISM CLASSIFICATION

1. Transmission of motion

Linear transmission →
1. Lever
2. Pulley
3. Block and tackle

Rotary transmission →
4. Friction wheels
5. Belt drive
6. Gears
7. Chain drive

2. Transformation of motion

Rotary-linear →
1. wheel
2. Rack and pinion
3. Nut and bolt
4. Crank

Reciprocating Rotary-linear →
5. Crank and rod
6. Crankshaft
7. Cam
8. Eccetrinc cam

1. Put the words in each photograph. Pliers, drill transmission, balance, wheelbarrow, watch transmission, crankshaft, camshaft, pulley.

2. Complete this table. Use the dictionary if you don´t know the meaning of these words.

| Object	Type of transmission	Mechanisms name
Scissors		
pliers		
guillotine		
camshaft		
crankshaft		
pulley		
Drill transmission		
Bike transmission		
wheelbarrow		
rod		
watch transmission		
Car lifter		
crane		
balance		

EXPRESSIONS

Levers → $F \times d = R \times r$

F= force

d= distance from F to fulcrum.
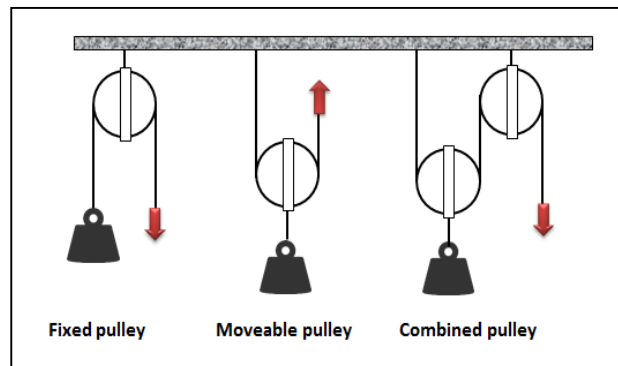
R= resistance

r= distance from R to fulcrum.

Class 1
Effort   Load

Class 2
Load
Effort

Class 3
Load
Effort
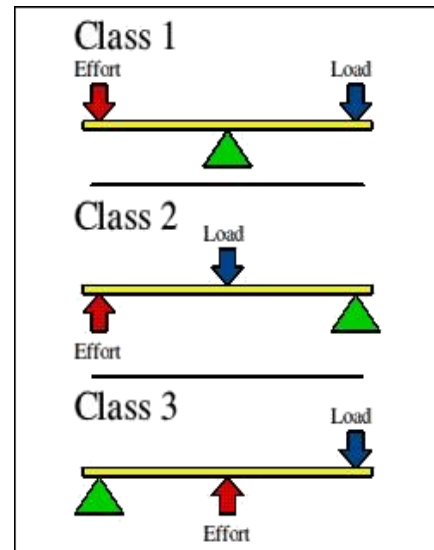
Pulleys →

Fixed pulley → F= R

F= force.

R= resistance.

Fixed pulley   Moveable pulley   Combined pulley

Combined pulley → $F = \dfrac{R}{2 \times n}$

F= force.

R= resistance.

n = number moveable pulleys.

Pulleys with belts

120mm

Belt

40mm

100rpm

Driver pulley   Driven pulley
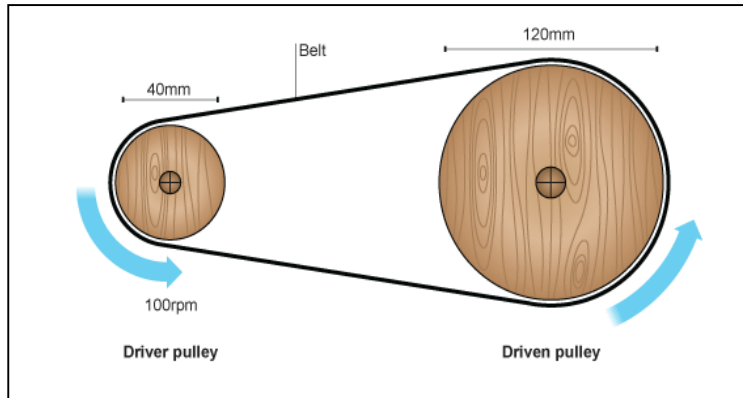
$D1 \times n1 = D2 \times n2$ $Rt = D1/D2$ $Rt = n2/n1$

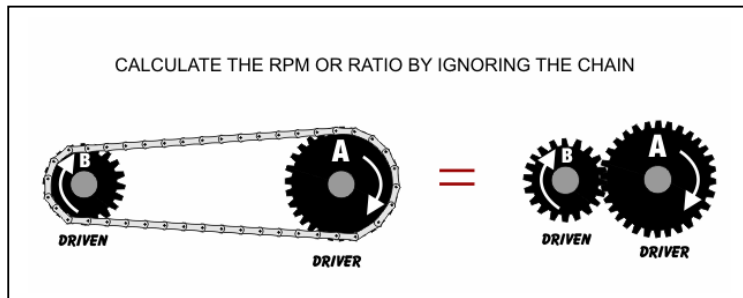n1 = velocity of the driver wheel.   Rt = ratio of transmission

D1= diameter of the driver wheel.

n2 = velocity of the driven wheel.

D2= diameter of the driven wheel.

Gear with a chain

CALCULATE THE RPM OR RATIO BY IGNORING THE CHAIN

B   A   =   B   A

DRIVEN   DRIVEN   DRIVER

DRIVER

$z1 \times n1 = z2 \times n2$ $Rt = z1/z2$ $Rt = n2/n1$

n1 = velocity of the driver wheel.   Rt = ratio of transmission

z1= number of teeth of the driver wheel.

n2 = velocity of the driven wheel.

z2= number of teeth of the driven wheel.

3. Match the mechanism with each expression.

- Lever type 1   - F = R.

- Fixed Pulley   - F x d = R x r

- Gear   - F=R/2xn

- Pulley with belt   - D1 x n1= D2 x n2

- Moveable pulley   - z1 x n1= z2 x n2

4. In a pulley system with a belt, when d1= 10 and d2= 30 the equation is resolved when…

a) N2= 3000 rpm if N1=1000 rpm.

b) N2= 1000 rpm if N1=1000 rpm.

c) N1= 3000 rpm if N2=1000 rpm.

5. What are the transmission ratios and n2, n3 and n4?

   N1 = 1000 rpm.