

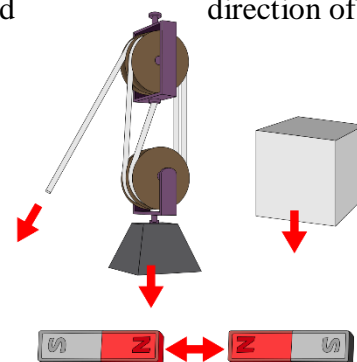
FORCE

Dynamics: This is the study of motion with the force that causes motion.

According to Newton, there cannot be motion without force. Force causes change in position and direction of an object.

List five (5) things force can do.

- 1
- 2
- 3
- 4
- 5



What then is Force?

Force is the product of mass and acceleration.

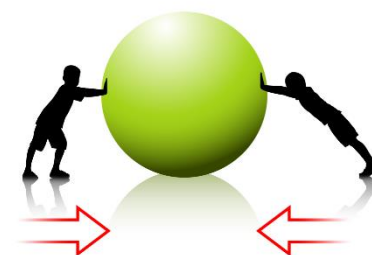
The unit of force is Newton [N] or kgm/s^2 . Force is a vector and derived quantity.

Force = mass x acceleration

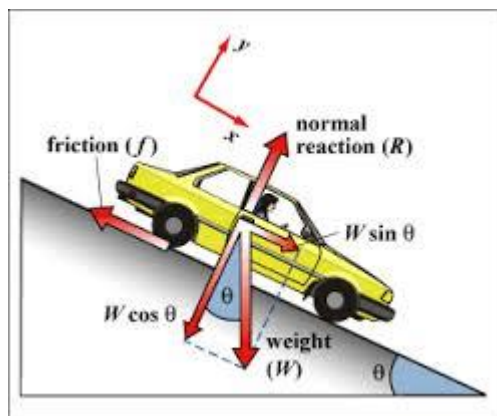
$$F = ma \text{ but } a = \frac{v-u}{t}$$

$$F = m\left(\frac{v-u}{t}\right)$$

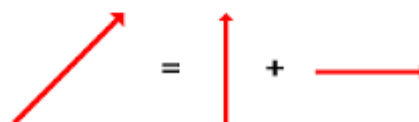
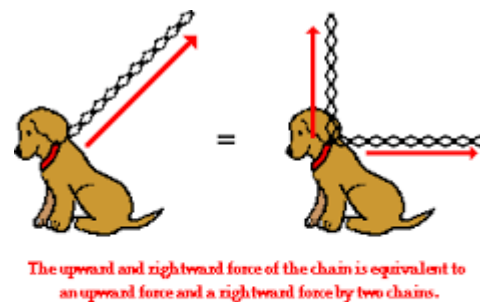
1. A stone of mass 40kg moves with an acceleration of 5m/s^2 , calculate the force exerted.
2. A Lorry moves with an acceleration of 4m/s^2 if the mass of the lorry is 2500g, calculate the applied force.
3. A car of mass 45kg moves from initial velocity of 5m/s to 23m/s in 6 seconds, calculate the applied force.
4. An aero plane moved at an acceleration of 4.5m/s^2 when a force of 90N is applied. Calculate it mass.
5. The driver of a lorry moving at 40m/s applied brake when he saw a dog on the road, if it comes to rest in 8 seconds, calculate the applied force.
6. A ball of mass 400g moves from initial velocity of 72km/hr to 108km/hr in just 10 seconds, calculate the applied force.



CALCULATION OF EFFECTIVE FORCE

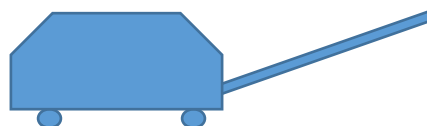
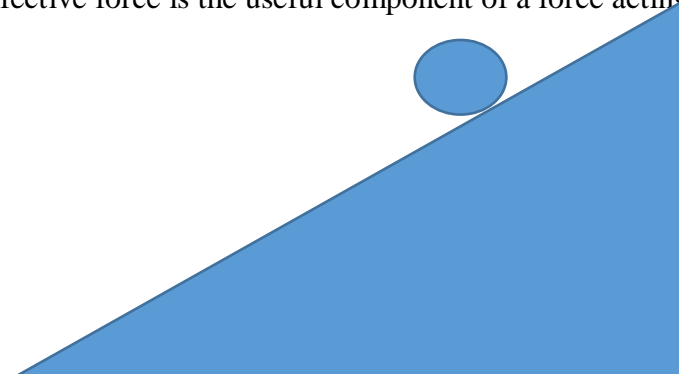


Since force is a vector quantity, its direction is very important. When force act at an angle, not all the force is useful because the force will have both vertical and horizontal component. The component that is desired is the useful force.



Therefore,

Effective force is the useful component of a force acting at an angle



(Determine your effective force but you start the calculation). Let us see how to resolve force.

Class Exercise.

- (1) A boy pulled a toy of mass 50kg with a rope inclined at an angle 30° . If the force in the rope is 100N, calculate the effective force (ii) Acceleration with which it moves
- (2) A girl loads a trolley of mass 20kg with a rope of tensional force 50N inclined at an angle 60° calculate (i) effective force (ii) Acceleration
- (3) A boy was trying to pull a stone from the wall with a rope inclined at angle 60° to the horizontal, if the force applied is 120N calculate the effective force.
- (4) A rope is tied round a nail on the wall if the rope is inclined at angle 30° to 130N calculate (i) effective horizontal force (ii) Effective vertical force
- (5) A drum of mass 750kg placed on which it rolls down.
- (6) A bag of beans was rolled down an inclined plane at angle 40° calculate the force with which it rolled down.

TYPES OF FORCE

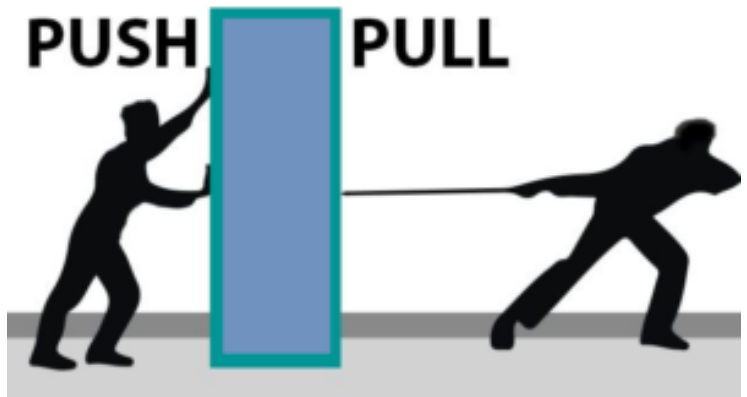
There are two types of force

1. Contact force
2. Field force

A. Contact force: - This is when the object and the force are in touch / contact.

Examples of contact force include

Pull Push Frictional force Tension
Upthrust viscous force



B. Field Force – This is when force and the object are not in touch or contact. E.g
– Magnetic force
– Gravitational force
– Electric force

ASSIGNMENT

1. What is friction?
2. List advantages and disadvantages of friction.
3. State laws of solid friction.