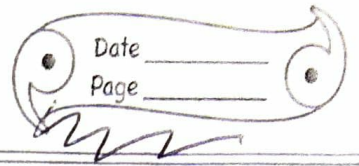


HW



1. Mass = 1200 kg.

Uniform velocity = 90 km/hr = $90 \times \frac{5}{18} = 25 \text{ m/s}$

Velocity decreased to = 18 km/hr = 5 m/s

time = 4 sec.

acceleration = ?

Change in Momentum = ?

$$acc^n = = \frac{5 - 25}{4} = \frac{-20}{4} = -5 \text{ m/s}^2$$

Here the motor car is decelerating with 5 m/s^2 .

Force = ma

$$F = 1200 \times 5 = 6000 \text{ kg m/s}^2$$

Change in Momentum = $\frac{PmV_2}{t} - \frac{PmV_1}{t}$

$$= \frac{1200 \times 18 - 1200 \times 25}{t}$$

$$21600 - 30000 = 8400$$

2. Mass = 10 kg.

Force = x acts for $t = 10$ s.

After 10 sec it stops and body moves 100 m in next 5 sec.

(i) Velocity acquired by body.

(ii) accⁿ produced by the force.

(iii) magnitude of force.

Body starts from start

$$u = 0$$

$$v = d/t = 100/5 = 20 \text{ m/s}$$

$$(i) v = u + at$$

$$\text{Velocity acquired} = 0 + 2 \times 10 = 20 \text{ m/s}$$

$$(ii) \text{Acc}^n = \frac{v-u}{t} = \frac{20-0}{10} = 2 \text{ m/s}^2$$

$$(iii) \text{Magnitude of Force} = F = ma$$

$$F = 10 \times 2$$

$$F = 20 \text{ kg m/s}^2$$

4 Newton's 1st law states that an object in rest will remain in rest until a force acts upon it while 2nd law states that a is dependent upon m and F is product of m and a .

5 ~~let~~ according to 2nd law $F = ma$,
according to 1st law

$F = 0$ and if mass is constant

$$F = a$$

$$a = 0$$

So when $F = 0$, a is also 0 when an obj at rest will stay at rest until an external force works.

- (a) Firing of a bullet from gun - when a bullet is shot, it accelerates forward which is action force and the gun is pushed backwards which is reaction force.
- (b) Hammering a nail - When we hammer a nail on wall it goes inside the wall and the wall also exerts a same force on the nail opp to it called reaction force.
- (c) A book lying on a table - Here the action and reaction force magnitude is equal so it cancels each other and it lies in same place.
- (d) moving rocket - ~~When~~ rocket moves forward is action force and the gases exhausted from bottom in opposite direction called reaction force.

2 a) When a person holds a hose pipe which ejects large amount of water with high velocity then a reaction force is exerted on him by the ejecting water in the backward direction.

b) Action and reaction force pairs don't cancel each other because they act on diff objects. Forces can cancel only if they act on same obj.