Home Assignment

Q. Mass of the motor car = 1200 kg along straight line

Initial velocity (u) = 90 km/h

Final Velocity (v) = 18 km/h

Change in Velocity = 18 − 90 = 72 km $= 72 \times \frac{5}{18} = 20$ m/s

Time = 4 secs

(i) $a = \frac{v-u}{t} = \frac{20}{4} = 5\ m/s^2$

(ii) Change in momentum = $mv - mu$

$= m(v-u)$

$= 1200\,(20)$

$= 24000$ kg x m/s

(iii) Force = Mass x Acceleration

$= 1200 \times 5 = 6000$ N

CW

130

② Given,
Time to apply force = 10 secs
Mass of the stationary body = 100 g
Initial velocity (u) = 0 m/s
Distance = 100 m in next 5 secs
Velocity = $\frac{\text{Distance}}{\text{Time}} = \frac{100}{5} = 20$ m/s
Acceleration = $\frac{v-u}{10} = \frac{20}{10} = 2\ m/s^2$
Magnitude of force = $F = ma = 100 \times 2$
$= 200$ N.

③ Rate of change of momentum
$= \frac{mv - mu}{t}$
According to Newton's second law
$= \frac{mv-mu}{t} \propto F$ or $F \propto m\frac{(v-u)}{t}$
Here $\frac{v-u}{t} = a$ (acceleration)
So $F \propto ma$ or $F = kma$,
Here k is proportionality constant

④ → Newton's First law provides quantitative definition of first law
→ Newton's second law provides a quantitative measure of the force that will produce a given acceleration of the mass
→ If $F=0$, we have $a = \frac{F}{m} = 0$.
Therefore v = constant; as the first law states.

CW

Newton's third Law Home Assigment

1(a) Action - Firing bullet
Reaction - Recoiling the gun

(b) Action - Hitting hammer on nail
Reaction - the nail exerts equal force on hammer

(c) Action - Book exerts force on the table due to gravity
Reaction - the table exerts equal force on the book

(d) Action - the fuel burns & release large amount of force in opposite direction of the mauement of rocket.
Reaction :- the burnt fuel exerts equal pressure on the other rocket & rocket move in upward direction

(e) Action - the person exerts force on the floor
Reaction - the floor exerts equal force on the legs of person due to which he move forward

(f) Action - The train collides to stationary train by applying large amount of force due to it's large momentum
Reaction :- The stationary train also exerts equal force on the moving train which opposes the motion of the moving train.

2(a) when large amount of water is ejected from a horse at a higher velocity, water pushes the horse in backward direction with the same force. Therefore, it is difficult for a fireman to hold a hose in which ejects large amount of water at a higher velocity

(b) The Action & Reaction force pairs don't cancel because they act on different objects. Forces can cancel only if they act on the same object.

3(a) ~~When we jump~~ If someone jumps to the shore from a boat the boat moves in the opposite direction We are applying force on the boat in the opposite direction in order to move forward & hence that boat moves in the opposite direction. Man gives action to boat & boat give a reaction to man. Because of action the boat moved backward & because of the reaction the boat move forward

(b) Gas particles exert pressure on the walls of the container in which the gas is filled. Ex ⇒ When a ballon is inflated, the air, inside it expands, thereby exerting pressure on the balloon walls. As a result, the of the balloon increases

Numericals

(a). The direction of the rocket's acceleration is forward whereas the direction of gas will be backward.

(b) The direction of the force is same direction as rocket.

(c). The magnitude of rocket's acceleration will be twiced ~~as before~~.

(d). The magnitude of rocket's acceleration will be twiced as before.

(e). The force exerted on the rocket by the gas would be 4 times.