7th foundation

WS-4

Tkank

(5)

$m = 2\ kg \quad u = 0, \quad t = 4sec \quad ; a = 1.5\ m/s^2$

According to newtons definition

change in momentum $= m(v-u)$

$= mv = m \times a \times t$

$\Rightarrow 2 \times 1.5 \times 4 = 12\ kg\ m/s$

(6)

Since momentum $p = m \times v$

$p \propto m$ as mass doubled

p also doubled.

(7)

$m_e = 9.1 \times 10^{-31} kg, \quad v = 2 \times 10^7\ m/s$

momentum $p = m_e v = 9.1 \times 10^{-31} \times 2 \times 10^7$

$= 18.2 \times 10^{-24}$

$= 1.82 \times 10^{-23} \simeq 1.91 \times 10^{-23}\ kgm/s$

(8)

$F = 30N \quad ; a = 2\ m/s^2.$

$m = \frac{F}{a} = \frac{30}{2} = 15\ kg$

(9)

$m = 5\ kg \quad ; a = 4\ m/s^2$

$F = ma = 5 \times 4 = 20N$

(10)

$m = 3000$ kg $\quad F = 4000$ N

$$a = \frac{F}{m} = \frac{4000}{3000} = \frac{4}{3} = 1.33 \text{ m/s}^2$$

Advanced

(5) (6)

$m = 4$ kg $\quad u = 7$ m/s, $\quad t = 0.2$ sec $\quad V = 8$ m/s

Initial momentum $P_I = mu = 4 \times 7 = 28$ kgm/s

Final momentum $P_F = m \times V = 4 \times 8 = 32$ kgm/s

(7)

$m = 0.5$ kg, $\quad V = 4$ m/s

momentum $P = mV = 0.5 \times 4 = 2$ kgm/s

(8)

$F = 50$ N : $m = 10$ kg

$$a = \frac{F}{m} = \frac{50}{10} = 5 \text{ m/s}^2$$

Class XI

SAQ's

(5)

Since momentum $p = mv$.

$\therefore p \propto v$. as velocity is doubled

$v' = 2v$

$p' = ?$

$\Rightarrow \frac{p}{p'} = \frac{v}{v'}$

$\Rightarrow \frac{p}{p'} = \frac{v}{2v} = \frac{1}{2}$

$\Rightarrow p' = 2p$.

(6)

$m = 300\ kg$; $v = 15\ m/s$

momentum $p = mv = 300 \times 15 = 4500\ kg\,m/s$

(7)

$m = 8\ kg$; $u = 4\ m/s$ $v = 0$; $t = 2\ sec$.

To move the body with same velocity

No force is required because as velocity = constant

Acceleration $a = 0$

$\therefore F = ma = m(0) = 0$

(8)

$m = 4 \times 10^{-2}\ kg$; $u = 20\ m/s$ $v = 0$; $t = 0.05\ sec = 5 \times 10^{-2}\ s$

$F = ma = m\left(\frac{v-u}{t}\right) = 4 \times 10^{-2} \times \left(\frac{0-20}{5 \times 10^{-2}}\right)$

$F = 4 \times \frac{(-20)}{5} = 4 \times (-4) = -16\ N$. '-ve' shows it is an opposing force

(9)

$u = 0$; $m = 5$ tonne $= 5000$ kg

$F = 400$ N Resistance per ton $= 60$ N

For 5 tons $= 60 \times 5$

$= 300$ N.

$\therefore$ Net force acting $= 400 - 300 = 100$ N

$ma = 100$

$\rightarrow a = \frac{100}{5000} = \frac{1}{50} = 0.02 \text{ m/s}^2$

$\downarrow$ of velocity at the end of 30 sec

$v = u + at = 0 + 0.02 \times 30$

$v = 0.6$ m/s.

Advanced

(11)

$P = 150$ kg m/s ; $v = 30$ m/s

Momentum $= mv$

$\rightarrow 150 = m \times 30 \rightarrow m = \frac{150}{30} = 5$ kg

(12)

$m = 8$ kg ; $a = 6 \text{ m/s}^2$

$F = ma = 8 \times 6 = 48$ N.