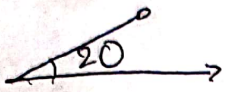
WS-11, for 7th class

T table

(1)



$s = 1\ km = 10^3\ m$

$W = FS\cos\theta$

$= 400 \times 10^3 \times \cos 20$

$= 4 \times 10^5 \times 0.9396$

$= 3.758 \times 10^5$

$= 3.76 \times 10^5\ J$

(2)

$M = 5\ kg$

When weight is suspended displacement & G.F make an angle 90°.

$W = FS\cos\theta$

$= mgS\cos 90$

$= 0$

(3) $m = 10\ kg$; $a = 5\ m/s^2$; $s = 10\ m$

$W = FS\cos\theta$

As the body moves horizontal

$\theta = 0^\circ$

$W = mas\cos 0^\circ$

$W = 10 \times a \times 20$ (1)

$= 10 \times 5 \times 20$

$= 1000\ J$

(4) $m = 50\ kg$.

$s = 20\ m$.

The weight of man and displacement of the body are perpendicular

$\theta = 90^\circ$

$W = mgS\cos\theta$

$= mgs\cos 90^\circ$

$W = 0$

(5) Given

$\vec{F} = 3\hat{i} + 4\hat{j} - 5\hat{k}$

$\vec{s} = 5\hat{i} + 4\hat{j} - 3\hat{k}$.

$W = \vec{F} \cdot \vec{s}$

$= (3\hat{i} + 4\hat{j} - 5\hat{k}) \cdot (5\hat{i} + 4\hat{j} - 3\hat{k})$

$= 15 + 16 + 15$

$= 46\ J$.

(6) $m = 1\ gm = 10^{-3}\ kg$

$h = 1\ km = 10^3\ m$.

$W_g = mgh$

$= 10^{-3} \times 10^3 \times 10$

$= 10\ J$

(7) $m = 0.1\ kg$.

$s = 5\ m$., $F = 20\ N$.

$\theta = 60^\circ$

$W = FS\cos\theta$

$= 20 \times 5 \times \cos 60^\circ$

$= 50\ J$

(8) $\frac{1}{n^{th}} = \frac{1}{5^{th}}$.

$W = \frac{mgL}{2n^2} = \frac{mgL}{2(5)^2}$

$= \frac{mgL}{50}$

(9) $W = -\frac{mgL}{2}\sin 30^\circ$.

$= -3 \times 10 \times \frac{2}{2} \times \frac{1}{2}$

$= 15\ J$

(10) $W = mgL\left(1 - \frac{dL}{db}\right)$

$= 5 \times 10 \times 2 \left(1 - \frac{3.5}{6}\right)$

$= 50 \times \frac{2.5}{2} = 71.4\ J$.

(19) Given $m = 300\,kg$

$u = 0$; $v = 90\,kmph$

$t = 5\,sec = 25\,m/sec$

$S = 1.5\,km$

(i) From $v = u + at$

$\Rightarrow 25 = 0 + a \times 5$

$\Rightarrow a = 5\,m/s^2$.

(ii) $F = Ma$

$= 300 \times 5$

$= 1500\,N$

(iii) $W = FS$

$= 1500 \times 1.5 \times 10^3$

$\Rightarrow 2250 \times 10^3\,J$

$\Rightarrow 225 \times 10^4\,J$.

(20) $W = mgh\left(1 - \frac{d_L}{d_b}\right)$

$= 10 \times 10 \times 6\left(1 - \frac{1 \times 10^3}{3 \times 10^3}\right)$

$\Rightarrow 100 \times \frac{2}{3}\left[\frac{2}{3}\right]$

$= 400\,J$

If $g = 9.8$

we get $W = 392\,J$.

(21) $l = 1m$, $m = 1kg$, $\theta = 60^\circ$

$W = mg\frac{l}{2}\cos\theta$

$= 1 \times 10 \times \frac{1}{2} \times \cos 60$

$\Rightarrow 5 \times \frac{1}{2}$

$= 2.5\,J$

L Task

(1) $F = 40N$

$m = 80kg$; $S = 8m$.

$\theta = 60^\circ$

$W = FS\cos\theta$

$= 40 \times 8 \times \cos 60^\circ$

$= 40 \times 8 \times \frac{1}{2}$

$\Rightarrow 160\,J$.

(2) $F = 20N$, $u = 0$

$m = 1kg$; $t = 8sec$

$a = \frac{F}{m} = 20\,m/s^2$

$S = \frac{1}{2}at^2$

$= \frac{1}{2} \times 20 \times 8^2$

$\Rightarrow 640$.

$W = FS$

$= 20 \times 640$

$= 12800\,J$.

(3) $F = 4\hat{i} + \hat{j} + 3\hat{k}\,N$

$\vec{r_1} = 3\hat{i} + 2\hat{j} + 6\hat{k}\,m$

$\vec{r_2} = 14\hat{i} + 13\hat{j} + 9\hat{k}\,m$

$S = \vec{r_2} - \vec{r_1}$

$= 11\hat{i} + 11\hat{j} - 15\hat{k}$

$W = \vec{F} \cdot \vec{S}$

$\Rightarrow (4\hat{i} + \hat{j} + 3\hat{k}) \cdot (11\hat{i} + 11\hat{j} - 15\hat{k})$

$\Rightarrow 44 + 11 - 45$

$= 10\,J$.

(4) $m = 500\,kg$; $d = 80m$

$t = 10\,sec$.

$W = mgd$

$= 500 \times 10 \times 80$

$\Rightarrow 400\,kJ$

(5) $m = 4\,kg$.

$a = 1.8\,m/s^2$

$S = 8\,m$.

$W = FS$

$= ma S$

$= 4 \times 1.8 \times 8$

$= 7.2 \times 8$

$\Rightarrow 57.6$

(6) $l = 2m$

$m = 3\,kg$; $\theta = 60^\circ$

$F = 5N$.

$W = mg\frac{l}{2}(1 - \cos\theta)$

$= 3 \times 10 \times \frac{2}{2}(1 - \cos 60)$

$\Rightarrow 30 \times \frac{1}{2}$

$= 15\,J$

(7) $m = 5kg$; $l = 3m$.

$W = mg\frac{l}{4}$

$\Rightarrow 5 \times 10 \times \frac{3}{4}$

$\Rightarrow 12.5 \times 3$

$\Rightarrow 37.5\,J$

(8) $m = 3kg$ $\theta = 30^\circ$

$l = 9m$.

$W = mgl\sin\theta$.

$= 3 \times 10 \times 9 \times \sin 30$

$= 3 \times 5 \times 9 = 135\,J$

(9) $m = \frac{m}{3}$; $L = \frac{L}{6}$

$W = mg\frac{L}{2}(1 - \cos\theta)$

$= \frac{m}{3} g \frac{\frac{L}{6}}{2}(1 - \cos\theta)$

$= -\frac{mgL}{36}(1 - \cos\theta)$

(10) $n = \frac{2}{3}$; $m = 2\,kg$; $l = 1m$

$W = \frac{mgl}{2n^2}$

$= \frac{2 \times 10 \times 1}{2 \times 9}$

$= 10 \times 4 = 4.4\,J$

Advanced level

(8) $m = 1\,kg$; $l = 1\,m$

$F = 8\,N$, $h = 2\,m$

$W_H = F \times s$

$= 8 \times 1 = 8\,J$

(9) $W_g = mgh$

$= 1 \times 10 \times 2$

$= 20\,J$

(10) Total work $= W_H + W_g$

$= 8 + 20$

$= 28\,J$

1.75-15 For class 7th