1-

(c) 3.5 — 1

2-

(b) 9 — 1

3-

(a) The equation of $\overrightarrow{OA}$

$$\frac{F-0}{n-0} = \frac{5-0}{2-0} \Rightarrow F = \frac{5}{2}t \qquad \frac{1}{2}$$

the impulse during the 1^{st} sec.

$$I = \int_0^1 F\,dt = \int_0^1 \frac{5}{2}t\,.dt = \left[\frac{5t^2}{4}\right]_0^1$$

$$I = \frac{5}{4} \text{ Newton . sec.} \qquad \frac{1}{2}$$

(b) The impulse during the interval $[0, 6]$

$$I = \int_0^2 \frac{5}{2}t\,dt + \int_2^6 5\,dt \qquad \frac{1}{2}$$

$$= \left[\frac{5t^2}{4}\right]_0^2 + \left[5t\right]_2^6 = 5 + (30 - 10)$$

$$= 25 \text{ Newton . Sec.} \qquad \frac{1}{2}$$

4-

let the number of boxes = y

$W = 30y \times 9.8 \times 0.9$ $\frac{1}{2}$

$\because$ The average power = $\frac{\text{work}}{\text{time}}$ $\frac{1}{2}$

$30y \times 9.8 \times 0.9 = 0.3 \times 75 \times 9.8 \times 60$ $\frac{1}{2}$

$y = 50$ $\frac{1}{2}$

$\therefore$ Number of boxes = 50 box

(تراعى الحلول الأخرى)

5-

(C) $12t+13$ $\triangle 1$

6-

(C) 16 $\triangle 1$

7-

(a) $\frac{3}{2}ma = 34g - mg \rightarrow (1)$ $\triangle \frac{1}{2}$

$ma = 32g - mg \rightarrow (2)$ $\triangle \frac{1}{2}$

From (1) and (2) by subtraction

$\frac{1}{2}ma = 2g \Rightarrow ma = 4g \rightarrow (3)$

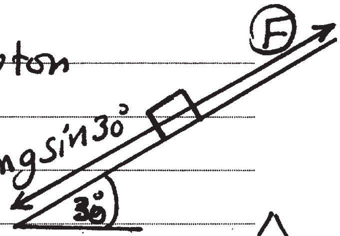
From (3) in (2)

$\therefore 4g = 32g - mg$ $\triangle \frac{1}{2}$

$mg = 28g \Rightarrow m = 28$ Kg. $\triangle \frac{1}{2}$

Sub. in (3) $\Rightarrow 28a = 4g$ $\triangle \frac{1}{2}$

$\therefore a = \frac{4g}{28} = \frac{4 \times 9.8}{28} = 1.4$ m/sec^2 $\triangle \frac{1}{2}$



b) $F = \frac{1}{2} \times 9.8 = 4.9$ Newton

$mg\sin 30 = \frac{1}{2} \times 9.8 \times \sin 30^\circ$
$= 2.45$ Newton

$\therefore F > mg\sin 30^\circ$ $\quad \frac{1}{2}$

$\therefore$ The motion upwards the plane

$\therefore ma = F - mg\sin 30^\circ$ $\quad \frac{1}{2}$

$\frac{1}{2} a = 4.9 - 2.45$

$\therefore a = 4.9 \text{ m/sec}^2$ $\quad \frac{1}{2}$

after 2 sec.

$V = u + at = 0 + 4.9 \times 2 = 9.8$ m/sec. $\quad \frac{1}{2}$

when the force vanish.

$a' = -g\sin 30^\circ = -9.8 \times \frac{1}{2}$

$\therefore a' = -4.9 \text{ m/sec}^2$ $\quad \frac{1}{2}$

$\therefore V^2 = u^2 + 2a'S$

$= (9.8)^2 - 2 \times 4.9\, S$

$S = 9.8$ meter. $\quad \frac{1}{2}$

(تراعى الحلول الأخرى)

8-

(b) 20 1

9-

(b) 168750 1

10-

(a) $P_A = mg \times 10$

$P_A = 0.3 \times 9.8 \times 10 = 29.4$ Joule $\frac{1}{2}$

$T_A = 0 \quad \because P_B = 0.3 \times 9.8 \times 3 = 8.82$ Joule 1

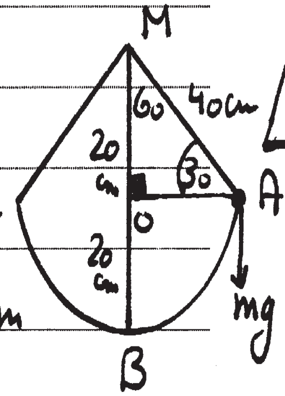
$\because T_A + P_A = T_B + P_B$ $\frac{1}{2}$

$0 + 29.4 = T_B + 8.82$

$T_B = 29.4 - 8.82 = 20.58$ Joule 1

$\boxed{b}$ $\because m(\angle AMC) = 120^\circ$

$\therefore m(\angle AMO) = 60^\circ$ $\frac{1}{2}$



$\frac{1}{2}$

In ΔAOM

$\because OM = 20cm \quad \therefore BO = 20cm$

(i) $P_A - P_B = mg \times 20$ $\frac{1}{2}$

$= 8 \times 980 \times 20 = 156800$ Erg. $\frac{1}{2}$

(ii) $\because T_B + P_B = T_A + P_A$

$\therefore \frac{1}{2} m v^2 + 0 = 0 + 156800$ $\frac{1}{2}$

$4v^2 = 156800$

$v^2 = 39200$

$v \simeq 198$ cm/sec. $\frac{1}{2}$

(تراعى الحلول الأخرى)

11-

(a) 32 $\triangle 1$

12-

(b) 72 $\triangle 1$

13-

$\because v = \frac{dx}{dt}$

$\therefore x = \int_0^3 v\,dt = \int_0^3 (3t^2 - 2t)\,dt$ $\frac{1}{2}$

$\therefore x = \left[t^3 - t^2\right]_0^3 = 27 - 9 = 18$ meter $\frac{1}{2}$

$\therefore$ The car will be at 18 m. apart from the start point.

$\because a = \frac{dv}{dt} = 6t - 2$ $\frac{1}{2}$

at $t = 3$ sec. $\therefore a = 6 \times 3 - 2 = 16\ m/sec^2$ $\frac{1}{2}$

14-

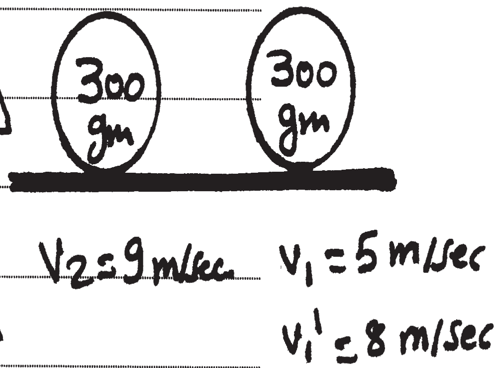
$\because m_1 v_1 + m_2 v_2 = m_1 v_1' + m_2 v_2'$ $\frac{1}{2}$

$\therefore 300 \times 5 + 300 \times 9 = 300 \times 8 + 300\, v_2'$ $\xrightarrow{(+)}$ $\frac{1}{2}$

$5 + 9 = 8 + v_2'$

$\therefore v_2' = 6$ m/sec. $\frac{1}{2}$

in the same direction of its motion. $\frac{1}{2}$



$I = m_1 (v_1' - v_1)$ $\frac{1}{2}$

$I = 300 (8 - 5)$

$I = 900$ gm.cm.sec $\frac{1}{2}$

(تراعى الحلول الأخرى)

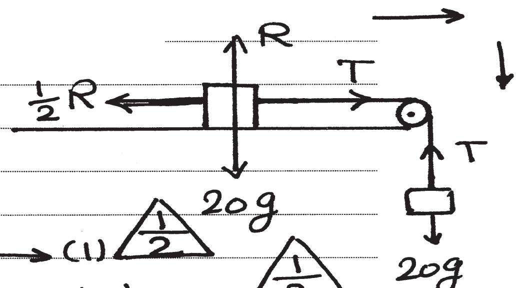
15-

(d) $t - \cos t - 2$ $\triangle 1$

16-

(c) 129.8 $\triangle 1$

17-



$R = 20g$

equation of motion:

$20a = 20g - T \longrightarrow (1)$ $\frac{1}{2}$

$20a = T - \frac{1}{2}R \longrightarrow (2)$ $\frac{1}{2}$

by adding

$40a = 20g - \frac{1}{2} \times 20g$

$40a = 10g$

$a = \frac{1}{4}g = 245 \text{ cm/sec}^2$ $\frac{1}{2}$

Subs. in (1)

$T = 20g - 20a$

$T = 20(980 - 245) = 14700$ dyne $\frac{1}{2}$

$\therefore P = \sqrt{2}T = 14700\sqrt{2}$ dyne. $\frac{1}{2}$

$V^2 = U^2 + 2as$

$V^2 = 0 + 2 \times 245 \times 250$

$V = 350$ cm/sec.

$\therefore$ The velocity of the suspended mass when it reached the ground $= 350$ cm/sec $\frac{1}{2}$

18-

$\vec{r} = (3t^2+2)\vec{i} + (4t^2+3)\vec{j}$

$\vec{r_0} = 2\vec{i} + 3\vec{j}$

$\vec{S} = \vec{r} - \vec{r_0}$

$\therefore \vec{S} = 3t^2\vec{i} + 4t^2\vec{j}$

$\vec{v} = \frac{d\vec{S}}{dt} = 6t\vec{i} + 8t\vec{j}$

$\vec{a} = \frac{d\vec{v}}{dt} = 6\vec{i} + 8\vec{j}$ $\frac{1}{2}$

$\vec{F} = m\vec{a} = 3(6\vec{i} + 8\vec{j})$

$\vec{F} = 18\vec{i} + 24\vec{j}$ $\therefore$ the force is constant $\frac{1}{2}$

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

$= (18, 24) \cdot (3t^2, 4t^2)$

$= 150t^2$ $\frac{1}{2}$

The work done in the interval from $t=1$ to $t=5$

$W = [150t^2]_1^5$

$= 150(5)^2 - 150(1)^2 = 3600$ work unit $\frac{1}{2}$

(تراعى الحلول الأخرى)

(انتهت الإجابة وتراعى الحلول الأخرى)