١

1-

(b) $5\sqrt{30}$ — 1

2-

(d) 1 joule — 1

3-

(a) $\vec{F} = (a+2)\vec{i} + (b+3)\vec{j} + (3-c)\vec{k}$ — $\frac{1}{2}$

$\vec{D} = t\vec{i} + (\frac{1}{2}t^2 + t)\vec{j} + 5\vec{k}$

$\vec{V} = \vec{i} + (t+1)\vec{j}$ — $\frac{1}{2}$

$\vec{a} = \vec{j}$ — $\frac{1}{2}$

$\vec{F} = m\vec{a}$ — 3

$\therefore \vec{j} = (a+2)\vec{i} + (b+3)\vec{j} + (3-c)\vec{k}$

$\therefore a+2 = 0 \quad \therefore a = -2$ — $\frac{1}{2}$

$b+3 = 1 \quad \therefore b = -2$ — $\frac{1}{2}$

$3-c = 0 \quad \therefore c = 3$ — $\frac{1}{2}$

(b)

$-\frac{1}{2}R - mg\sin\theta = ma$ ½

$-\frac{1}{2}mg\cos\theta - mg\sin\theta = ma$ ½

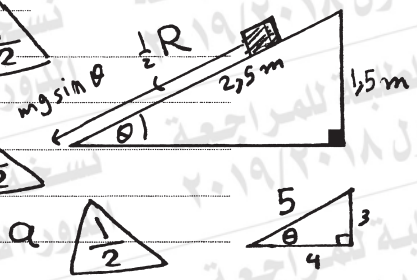
$-\frac{1}{2}\times 9{,}8\times\frac{4}{5} - 9{,}8\times\frac{3}{5} = a$ ½

$a = -9{,}8 \text{ m/sec}$ ½

$V^2 = V_0^2 + 2aD$

$0 = V_0^2 + 2\times(-9{,}8)\times 2{,}5$ ½

$\therefore V_0 = 7 \text{ m/sec}$ ½ (3)



autre solution:

$E - E_0 = T$ ½

$0 - \frac{1}{2}mV_0^2 = -mgS\sin\theta - \mu_k RD$ ½

$\frac{1}{2}mV_0^2 = mgS\sin\theta + \mu_k RD$

$\frac{1}{2}mV_0^2 = mgD\sin\theta + \frac{1}{2}mgD\cos\theta$ ½

$\frac{1}{2}V_0^2 = 9{,}8\times 2{,}5\times\frac{3}{5} + \frac{1}{2}\times 9{,}8\times\frac{4}{5}\times 2{\cdot}5$ ½

$V_0^2 = 49$ ½

$V_0 = 7 \text{ m/sec}$ ½ (3)

(تراعى الحلول الأخرى)

4-

(b) $]0,2[\cup]4,\infty[$ (1)

5-

(c) $t^3 - t^2 + 1$ (1)

6-

$V_1 = -9$ m/sec

$V_2 = 7,2 \times \frac{5}{18} = 2$ m/sec $\frac{1}{2}$

$I = m(V_2 - V_1)$

$= \frac{100}{1000}[2 - (-9)] = 1,1$ kg.m/sec $\frac{1}{2}$

$I = F \times t$

$1,1 = F \times \frac{1}{10}$

$\therefore F = 11$ N $\frac{1}{2}$

La pression de la balle sur le mur = F

$= 11$ N $\frac{1}{2}$

(2)

7-

$\therefore a = v \cdot \frac{dv}{dr}$ ½

$\therefore \frac{3}{8} r^2 \, dr = v \, dv$

$\therefore \frac{3}{8} \int_0^r r^2 \, dr = \int_0^v v \, dv$ ½

$\therefore \left[\frac{1}{2} v^2\right]_0^v = \left[\frac{1}{8} r^3\right]_0^r$ ½

$\therefore \frac{1}{2} v^2 = \frac{1}{8} r^3$

$\therefore v^2 = \frac{1}{4} r^3$ ½

(i) quand $r = 2$

$\therefore v^2 = 2 \quad \therefore v = \pm\sqrt{2}$ m/sec ½

(ii) quand $v = 4$

$\therefore 16 = \frac{1}{4} r^3$

$\therefore r^3 = 64$

$\therefore r = 4$ m ½

3

(تراعى الحلول الأخرى)

8-

(d) 10^{-1} (1)

9-

(d) 99 (1)

10-

(a) ∵ la vitesse Uniforme
∴ F = R = 150 X 2

F = 300 Kg.P (1/2)

$V = 108 \times \frac{5}{18}$

V = 30 m/sec (1/2)

La puissance = F X V

= 300 X 30

= 9000 Kg.P.m/sec (1/2)

La puissance = $\frac{9000}{75}$ = 120 Chevals (1/2)

(2)

(b) $\vec{r} = (3t^2+2)\vec{i} + (2t^2+1)\vec{j}$

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

$= (3t^2)\vec{i} + (2t^2)\vec{j}$ ½

La variation en energie potentielle du Corps $= -T$

$= -(\vec{F} \cdot \vec{D})$ ½

$= -(6;2) \cdot (3t^2; 2t^2)$

$= -22t^2$ ½ ; $t = 2$

$= -22 \times 4$

$= -88$ joule ½

2

(تراعى الحلول الأخرى)

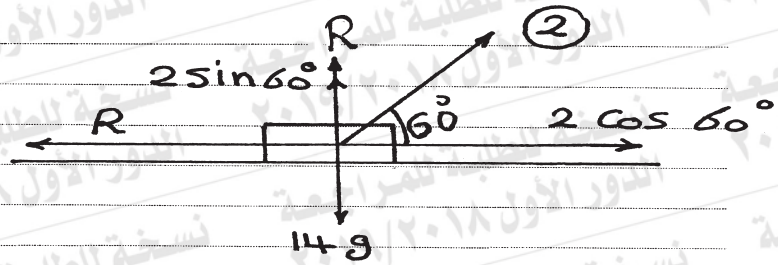
11-

(b) $2,45\ m/sec^2$ vers le haut du plan (1)

12-

(c) 0,4 (1)

13-



$2\cos 60° - R = ma$ (1/2)

$2 \times \frac{1}{2} \times 9,8 - 0,95 \times 9,8 = 14a$

$\therefore a = 0,035\ m/sec^2$ (1/2)

$D = V_0 t + \frac{1}{2} a t^2$

$= \frac{1}{2} \times 0,035 \times (60)^2$

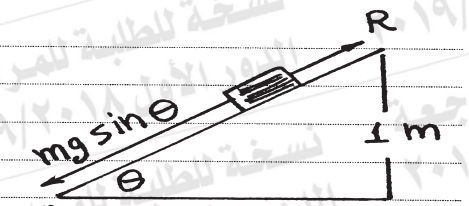
$= 63\ m$ (1/2)

$T = F \times D \times \cos 60°$

$= 2 \times 9,8 \times \frac{1}{2} \times 63$

$= 617,4$ joule (1/2) (2)

14-



$E - E_0 = T$ (1/2)

$\frac{1}{2} m v^2 - zéro = (mg\sin\theta - R) D$ (1/2)

$\frac{1}{2} \times 0,3 v^2 = 0,3 \times 9,8 \times \frac{1}{D} \times D - RD$ (1/2)

$\frac{1}{2} \times 0,3 v^2 = 0,3 \times 9,8 - 1,59$ (1/2)

$\therefore v^2 = 9$ (1/2) $\quad \therefore v = 3 m/sec$ (1/2)

(3)

autre solution

$\therefore mg\sin\theta - R = ma$ (1/2)

$0,3 \times 9,8 \times \frac{1}{D} - R = 0,3 a$ (1/2)

$0,3 \times 9,8 - RD = 0,3 aD$ (1/2)

$0,3 \times 9,8 - 1,59 = 0,3 aD$

$aD = 4,5$ (1/2)

$v^2 = v_0^2 + 2aD$ (3)

$v^2 = 9$ (1/2) $\quad \therefore v = 3 m/sec$ (1/2)

(تراعى الحلول الأخرى)

15-

(d) 32 (1)

16-

(c) 35 (1)

17-

$m_1 = 10 \text{ tonnes} = 10^4 \text{ kg}$, $v_1 = 20 \text{ m/sec}$

$m_2 = 10 \text{ tonnes} = 10^4 \text{ kg}$, $v_2 = 0$

(i) $m_1v_1 + m_2v_2 = (m_1 + m_2)v'$

$10 \times 20 + 10 \times 0 = (10 + 10)v'$ (1/2)

$\therefore v' = 10 \text{ m/sec}$ (1/2)

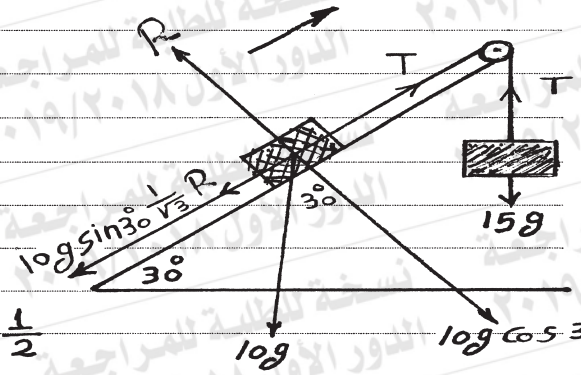
(ii) La quantité du mouvement qui perte juste après le choc.

$= \frac{1}{2} \times 10^4 \times 20^2 - \frac{1}{2} \times 2 \times 10^4 \times 10^2$ (1/2)

$= 10^6$ joule (1/2)

(2)

18-



$15 \times 980 > 10 \times 980 \times \frac{1}{2}$

$\therefore$ La direction du mouvement comme la Figure

Les equations du mouvement

$15 \times 980 - T = 15a$ (1/2)

$T - 10 \times 980 \times \frac{1}{2} - 10 \times 980 \times \frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{3}} = 10a$ (1)

par addition $4900 = 25a$

$\therefore a = 196 \ cm/sec^2$ (1/2)

$D = v_o t + \frac{1}{2} a t^2$

$98 = \frac{1}{2} \times 196 t^2$

$\therefore t = 1 \ sec$ (1/2)

$V = V_o + at$

$= 196 \times 1$

$V = 196 \ cm/sec$ (1/2) (3)

(تراعى الحلول الأخرى)

(انتهت الإجابة وتراعى الحلول الأخرى)