(١)

1-

(c) 1000 N (1)

2-

(b) 1 (1)

3-

$\therefore a = \frac{5}{100}$ m/sec

$t = 30$ sec

$\therefore d = v_0 t + \frac{1}{2} a t^2$

$\therefore d = 0 + \frac{1}{2} \times \frac{5}{100} \times (30)^2 = 22,5$ mètres (1)

$\therefore T = F \times d \cos 60^\circ$ (1/2)

$= 500 \times 9,8 \times 22,5 \times \frac{1}{2}$

$= 55125$ Joule. (1/2)

4-

∴ la puissance = F × v (1/2)

210 × 75 = F × 63 × 5/18

F = 900 kg.p (1/2)

F = r + P sin θ (1/2)

r = F − P sin θ

= 900 − 6 × 10^3 × 1/100

= 840 kg.p

∴ donc la résistance pour chaque tonne

= 840/6 = 140 kg pour chaque tonne. (1/2)

(تراعى الحلول الأخرى)

5-

(d) 5 (1)

6-

(c) 1 (1)

7-

(a) $ma = T - mg$ ($\frac{1}{2}$)

$T = m(a + g)$ ($\frac{1}{2}$)

$T = 100(9,8 + 0,25)$ ($\frac{1}{2}$)

$= 1005$ Newton ($\frac{1}{2}$)

(b)

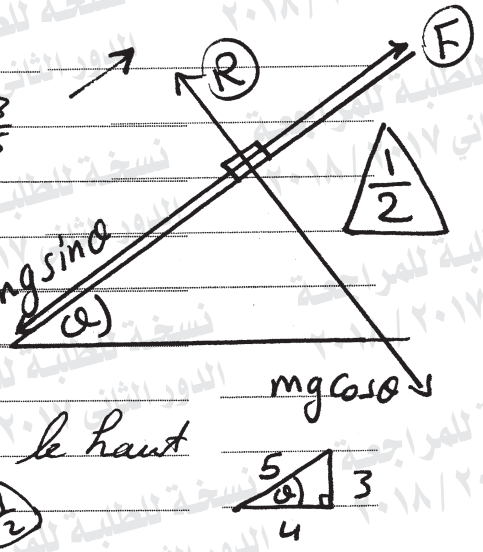
$\therefore F = 80\ N$

$\therefore mg\sin\theta = 10 \times 9,8 \times \frac{3}{5}$

$= 58,8\ N$

$\therefore F > mg\sin\theta$

$\therefore$ Le mouvement vers le haut du plan $(\frac{1}{2})$



$\therefore ma = F - mg\sin\theta$

$10a = 80 - 58,8$

$a = 2,12\ m/sec^2$ vers le haut $(\frac{1}{2})$

$\therefore R = mg\cos\theta$

$= 10 \times 9,8 \times \frac{4}{5}$

$= 78,4\ N$ $(\frac{1}{2})$

(تراعى الحلول الأخرى)

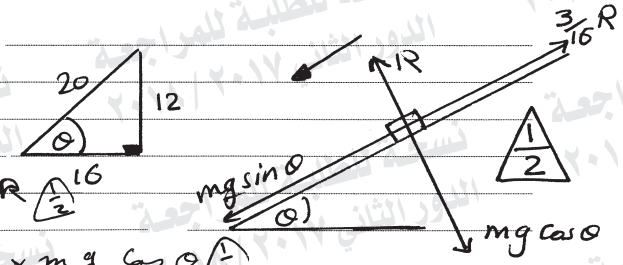
8-

(b) 480 (1)

9-

(c) 180 (1)

10-



(a) ∴ le corps descend

∴ $ma = mg\sin\theta - \frac{3}{16}R$ (1/2)

∴ $ma = mg\sin\theta - \frac{3}{16} \times mg\cos\theta$ (1/2)

∴ $a = 9,8\left[\frac{12}{20} - \frac{3}{16} \times \frac{16}{20}\right] = 4,41 \text{ m/s}^2$ (1/2)

∴ $v^2 = v_0^2 + 2ad$

$= 0 + 2 \times 4,41 \times 20 = 176,4$

∴ $E = \frac{1}{2}mv^2$ (1/2) $= \frac{1}{2} \times 60 \times 176,4$

$= 5292$ joule (1/2)

autre solution

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

∴ $E - 0 = (mg\sin\theta - \mu R)d$ (1)

$= [60 \times 9,8 \times \frac{12}{20} - \frac{3}{16} \times 60 \times 9,8 \times \frac{16}{20}] \times 20$ (1)

$= 5292$ joule (1/2)

(b)

$\vec{D} = r - r_0$ (½)

$\vec{D} = 2t^2\,\vec{i} + 4t\,\vec{j}$ (½)

$\therefore T = \vec{F} \cdot \vec{d}$ (½)

$T = (4; 5) \cdot (2t^2; 4t)$

$T = 8t^2 + 20t$ (½)

de $t = 0$ à $t = 2$

$T = [8t^2 + 20t]_0^2 = 72$ joule (½)

$\therefore$ la variation de l'énergie potentielle $= -T$

$= -72$ joule (½)

(تراعى الحلول الأخرى)

11-

(b) 320 (1)

12-

(a) 0,1 (1)

13-

$\therefore v = 6t^2 - 24$

Quand la vitesse devient 72 m/sec

$\therefore 72 = 6t^2 - 24 \Rightarrow t = 4$ sec (1/2)

Quand $v = 30$ m/sec

$\therefore 30 = 6t^2 - 24 \Rightarrow t = 3$ sec (1/2)

$\therefore a = \frac{dv}{dt} = 12t$ quand $t = 3$ sec

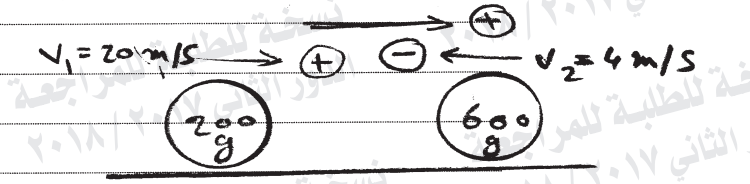
$\therefore a = 12 \times 3 = 36$ m/sec^2 (1/2)

$D = \int_1^4 v\,dt$ (1/2) $= \int_1^4 (6t^2 - 24)\,dt$ (1/2)

$D = [2t^3 - 24t]_1^4$

$D = [(32) - (-22)] = 54$ mètres (1/2)

14-



$\therefore V_1 m_1 + V_2 m_2 = m_1 V_1' + m_2 V_2'$ (1/2)

$200 \times 20 - 600 \times 4 = -200 \times 16 + 600 \times V_2'$ (1/2)

$600\ V_2' = 3200 + 1600$

$V_2' = 8$ m/sec (1/2)

donc la boule rebondi après le choc avec vitesse 8 m/sec (1/2)

donc l'impulsion de la deuxième boule sur la première

$I_1 = m_1 (V_1' - V_1)$ (1/2)

$= 200 (-16 - 20) =$

$= -7200$

$I_1 = 7200$ g.m/s (1/2)

(تراعى الحلول الأخرى)

15-

(d) 5 (1)

16-

(a) 100 (1)

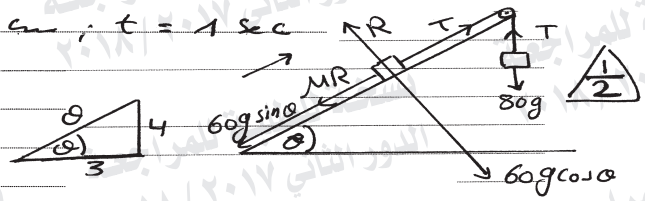
17-

$V_0 = 0$; $D = 49\ cm$; $t = 1\ sec$

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

$49 = 0 + \frac{1}{2} \times a \times 1$

$a = 98\ cm/sec^2$ (1/2)



(1/2)

$R = 60g \cos\theta$

$= 36g$ (1/2)

$\therefore 80 > 60g \sin\theta$ ∴ le sens du mouvement

Comme dans la figure

$\therefore 80a = 80g - T$ — ① (1/2)

$60a = T - 60g \sin\theta - \mu_D R$ — ② (1/2)

par addition ① et ②

$140a = 80g - 48g - 36g \times \mu_D$

$140 \times 98 = 32 \times 980 - 36 \times 980\ \mu_D$

on divise par 980

$14 - 32 = -36\ \mu_D$

$\mu_D = \frac{1}{2}$ (1/2)

18-

$$\therefore I = \int_0^t F \cdot dt$$

(a) $$I = \int_0^3 (3t^2 - 2t)\, dt$$ (½)

$$= [t^3 - t^2]_0^3 = (27 - 9)$$

$$= 18 \quad N.S$$ (½)

(b) $$I = \int_3^4 (3t^2 - 2t)\, dt$$ (½)

$$= [t^3 - t^2]_3^4$$

$$= (48 - 18)$$

$$= 30 \quad N.S$$ (½)

(تراعى الحلول الأخرى)

(انتهت الإجابة وتراعى الحلول الأخرى)