١

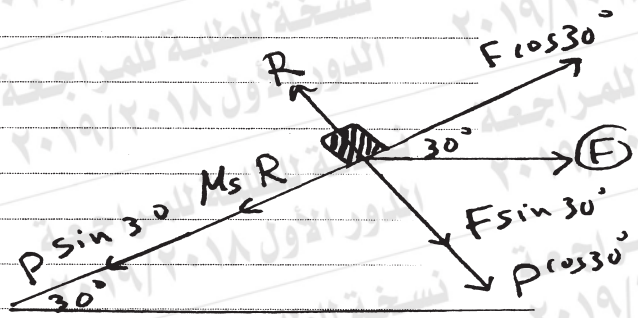
1-

(b) $\lambda = 60^\circ$ (1)

2-

(c) $F = 100\ N$; $\lambda = 30^\circ$ (1)

3-



$P = 2 \times 9,8 = 19,6\ N$ (½)

$R = F \sin 30^\circ + P \cos 30^\circ$

$= 20 \times \frac{1}{2} + 19,6 \times \frac{\sqrt{3}}{2}$

$\therefore R = \frac{50 + 49\sqrt{3}}{5}$ (½)

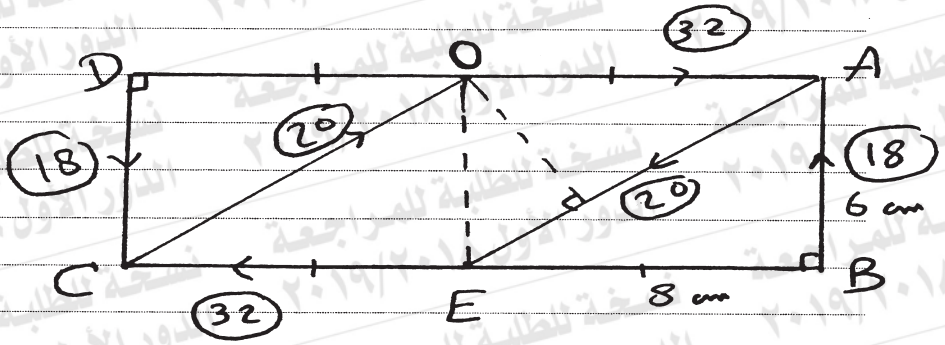
$F \cos 30^\circ = 19,6 \sin 30^\circ + M_s R$ (½)

$\therefore M_s = (10\sqrt{3} - 9,8) : \frac{50 + 49\sqrt{3}}{5}$

$\simeq 0,2788$ (½)

2

4-



Les deux Forces (32;32) Forment un couple du moment :

$M_1 = -32 \times 6 = -192$ N.cm ½

Les deux Forces (18;18) Forment un couple du moment :

$M_2 = 18 \times 16 = 288$ N.cm ½

Les deux Forces (20;20) Forment un couple du moment :

$M_3 = -20 \times \frac{6 \times 8}{10} = -96$ N.cm 1

$\therefore M_1 + M_2 + M_3 = -192 + 288 - 96$

$= 0$ ½

$\therefore$ le système est en equilibre ½

3

(تراعى الحلول الأخرى)

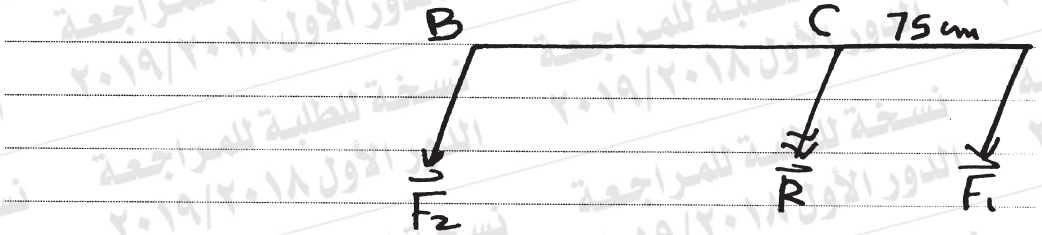
5-

(b) $-50\sqrt{2}$ (1)

6-

(b) $R = 5\ kg.p$; $h = 1\ m$ (1)

7-



$\therefore \vec{F_1}$; $\vec{R}$ Sont de même direction , $R > F_1$

$\therefore \vec{F_2}$, $\vec{F_1}$ Sont de même direction (½)

$\therefore R = F_1 + F_2$

$\therefore 150 = 100 + F_2$

$\therefore F_2 = 50\ N$ (½)

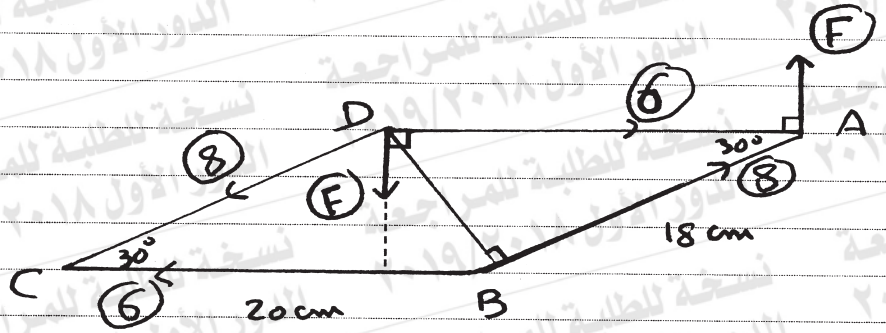
$\because F_1 \times AC = F_2 \times BC$

$\therefore 100 \times 75 = 50\ BC$ (½)

$\therefore BC = 150$ (½)

où $B \in \overrightarrow{AC}$, $B \notin \overline{AC}$ (2)

8-



Les deux Forces (8;8) Formant un couple du moment M_1,

$M_1 = 8 \times 20 \sin 30°$

$= 80\ N.cm$ (½)

Les deux Forces (6;6) Formant un couple du moment M_2,

$M_2 = -6 \times 18 \sin 30°$

$= -54\ N.cm$ (½)

∴ Le système equivalent un a couple du moment $M = M_1 + M_2$

$= 80 - 54 = 26\ N.cm$ (½)

$\therefore \|\vec{M}\| = 26\ N.cm$ (½)

∴ la direction des deux Forces en F ; F est indique dans la figure (½)

∴ $F \times 20 = 26$

∴ $F = 1,3\ N$. (½)

3

(تراعى الحلول الأخرى)

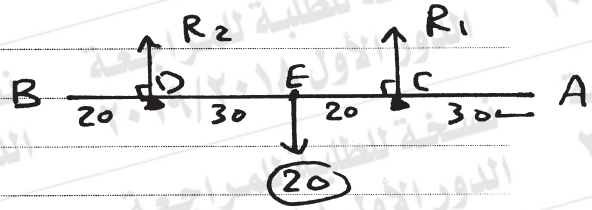
9-

(C) 26 (1)

10-

(a) $F = 15\ N$; $K = 10\ N$ (1)

11-



1er Cas :

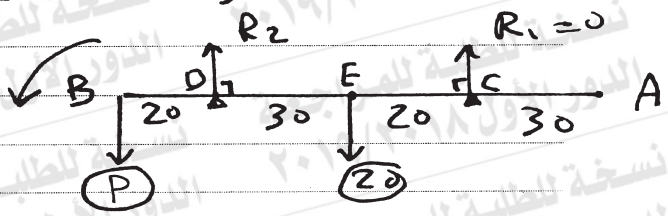
$R_1 + R_2 = 20$ (1)

$M_D = 0$

$\therefore 50 \times R_1 - 20 \times 30 = 0$ (1/2)

$\therefore R_1 = 12\ N$

(1) $R_2 = 8\ N$ (1/2)



2ème Cas :

$\therefore$ La barre est sur le point de basculer par rapport à B

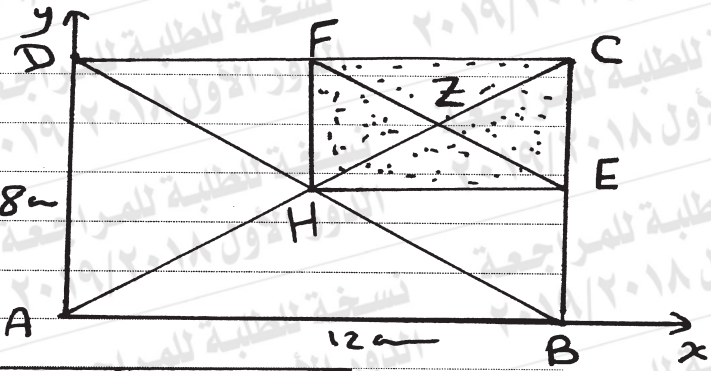
$\therefore R_1 = 0$, $M_D = 0$ (1/2)

$\therefore P \times 20 - 20 \times 30 = 0$

$\therefore P = 30\ N$ (1/2)

(2)

12-



	H	Z
mass	4 m	- m
x	6	9
y	4	6

1

$$X_G = \frac{4m \times 6 - 9m}{3m} = 5cm$$ 1

$$Y_G = \frac{4m \times 4 - 6m}{3m} = \frac{10}{3} cm$$ 1

3

(تراعى الحلول الأخرى)

13-

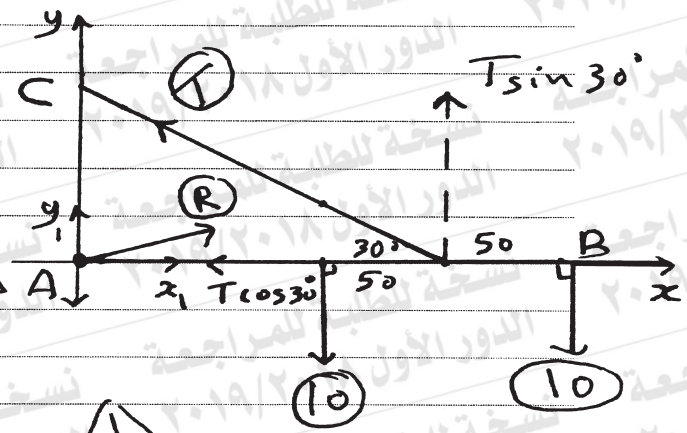
(a) 600 (1)

14-

(d) $LF\frac{\sqrt{3}}{2}$ (1)

15-

(A)



$\therefore y = 0$

$\therefore T\sin 30° + y_1 = 20$

$\therefore \frac{1}{2}T + y_1 = 20$ (1) (1/2)

$\therefore x = 0$

$\therefore x_1 = T\cos 30°$

$\therefore x_1 = \frac{\sqrt{3}}{2}T$ (2) (1/2)

$\therefore M_A = 0$

$\therefore T\sin 30° \times 150 = 10 \times 100 + 10 \times 200$ (1/2)

$\therefore 75T = 3000$

$\therefore T = 40\ N$ (1/2)

de (1) $\therefore y_1 = 0$

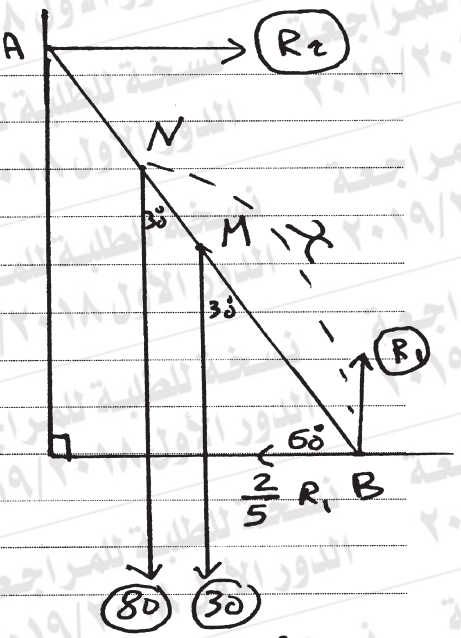
de (2) $\therefore x_1 = 20\sqrt{3}$

$\therefore R = 20\sqrt{3}\ N$ (1/2)

et agit en direction de $\overrightarrow{AB}$ (1/2)

3

(B)



Soit la distance maximal qu'un homme peut monter = x

∴ $R_1 = 30 + 80$

∴ $R_1 = 110$ kg.p (1/2)

∴ $R_2 = \frac{2}{5} R_1$

∴ $R_2 = \frac{2}{5} \times 110 = 44$ kg.p (1/2)

∴ $M_B = 0$

∴ $30 \times 2{,}5 \sin 30° + 80 x \sin 30° - 44 \times 5 \sin 60° = 0$ (1)

∴ $15 \times 2{,}5 + 40x - 22 \times 5\sqrt{3} = 0$ (1/2)

∴ $x \simeq 3{,}83$ m (1/2)

3

16-

(b) $(4;0)$ (1)

17-

(c) $\left(\frac{13}{2};3\frac{\sqrt{3}}{2}\right)$ (1)

18-

(A) $\vec{M_o} = \vec{r} \times \vec{F}$

$= (1;-1;1) \times (-2;3;5)$

$$= \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & -1 & 1 \\ -2 & 3 & 5 \end{vmatrix}$$ (1/2)

$= -8\vec{i} - 7\vec{j} + \vec{k}$ (1/2)

$L = \frac{\|\vec{M_o}\|}{\|\vec{F}\|} = \frac{\sqrt{(-8)^2+(-7)^2+1}}{\sqrt{4+9+25}}$ (1/2)

$= \sqrt{3}$ unités de longueur (1/2)

(2)

(B) $\vec{M}_O = \vec{0}$

$\therefore \overrightarrow{OA} \times \vec{F}_1 + \overrightarrow{OB} \times \vec{F}_2 = \vec{0}$ ½

$\therefore (5;1) \times (1;2) + (0;3) \times (m;-4) = \vec{0}$ ½

$\therefore (9 - 3m)\vec{k} = \vec{0}$

$\therefore m = 3$ ½

$L = \dfrac{\|\vec{M}_O\|}{\|\vec{F}_2\|} = \dfrac{\|-9\vec{k}\|}{\sqrt{9+16}}$

$= \dfrac{9}{5}$ unités de longueur ½

2

(تراعى الحلول الأخرى)

(انتهت الإجابة وتراعى الحلول الأخرى)