

نموذج إجابة مادة الاستاتيكا (باللغة الإنجليزية) شهادة إتمام الدراسة الثانوية العامة - الدور الثاني - العام الدراسي ٢٠١٧/٢٠١٨

النموذج (ب)

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1-

(b) $20\sqrt{5}$



2-

(c) 49



3-

$$R + R = 10 + 50$$

$$2R = 60$$

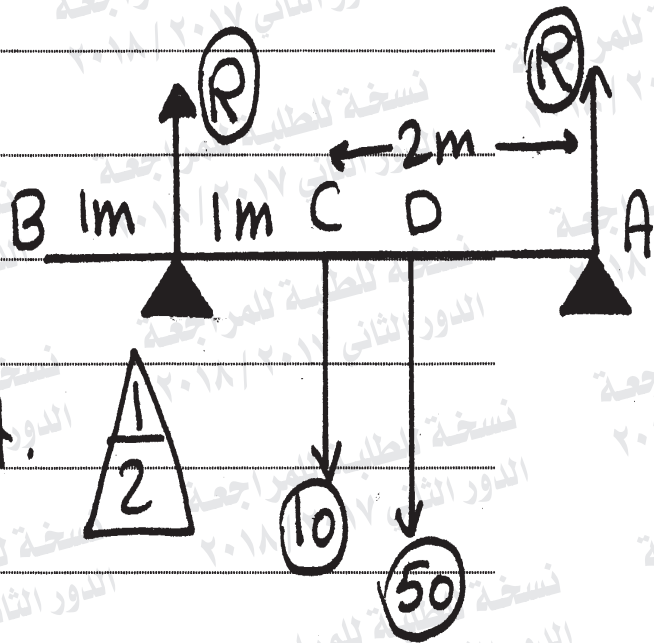
$$R = 30 \text{ Kg.wt.}$$

$$\therefore M_A = 0$$

$$\therefore 50 \times AD + 10 \times 2 - 30 \times 3 = 0$$

$$50 AD = 70$$

$$AD = 1.4 \text{ meter.}$$



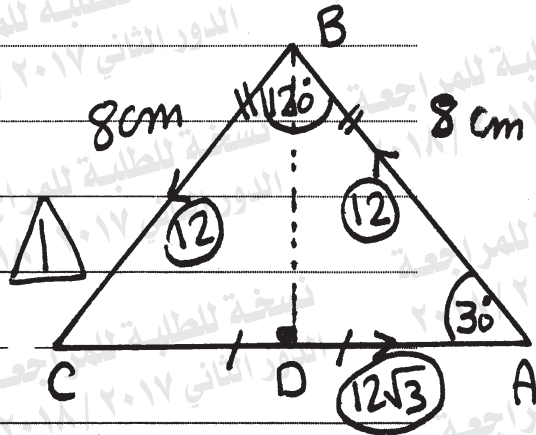
4-

$$AD = 8 \cos 30^\circ$$

$$AD = 4\sqrt{3} \text{ cm.}$$

$$AC = 8\sqrt{3}$$

$$m = \frac{12}{8} = \frac{12}{8} = \frac{12\sqrt{3}}{8\sqrt{3}} = \frac{3}{2}$$



∴ The forces act in the same cyclic order

∴ The set form a Couple whose

$$\text{moment} = 2 \times \text{area of triangle} \times m$$

$$= 2 \times \left(\frac{1}{2} \times 8 \times 8 \sin 120^\circ \right) \times \frac{3}{2}$$

$$= 48\sqrt{3} \text{ Newton.cm.}$$

(تراعى الحلول الأخرى)

5-

$$(C) \frac{\sqrt{3}}{2} Fl \quad \triangle$$

6-

$$(C) 20\sqrt{3} \quad \triangle$$

7-

$$\begin{aligned} \vec{R} &= \vec{F}_1 + \vec{F}_2 + \vec{F}_3 \\ &= 2\vec{i} - 4\vec{j} + \vec{i} - 3\vec{j} - 3\vec{i} + 7\vec{j} \\ &= \vec{0} \end{aligned} \quad \rightarrow (1) \quad \triangle$$

$$\vec{M}_O = \vec{OA} \times \vec{F}_1 + \vec{OB} \times \vec{F}_2 + \vec{OC} \times \vec{F}_3 \quad \triangle$$

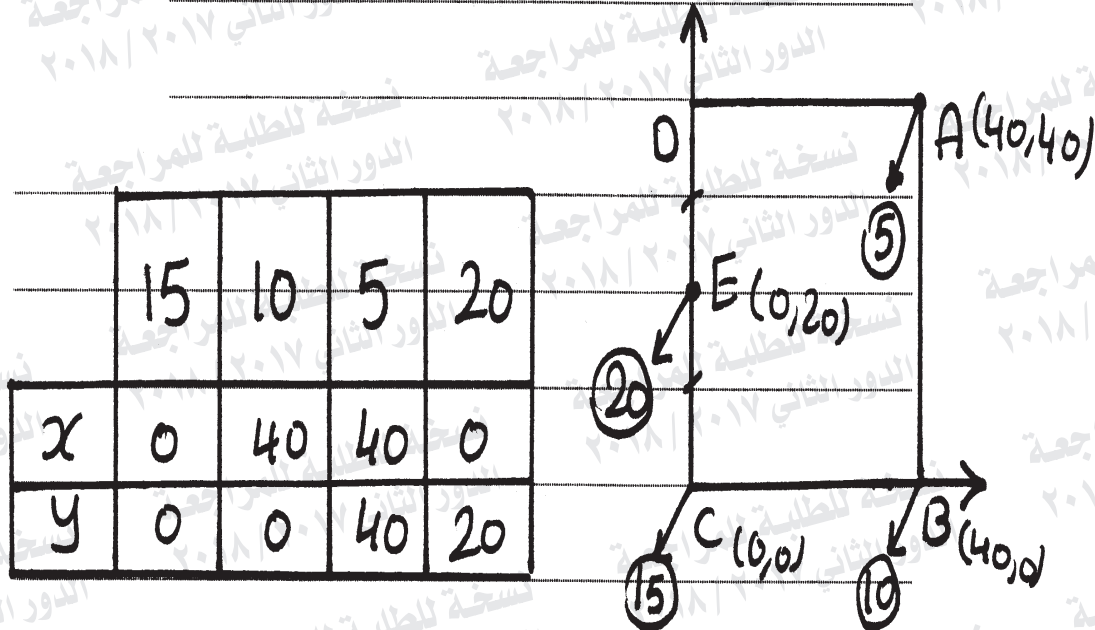
$$= (-1, 1) \times (2, -4) + (-2, 3) \times (1, -3) + (0, 1) \times (-3, 7) \quad \triangle$$

$$= 2\vec{k} + 3\vec{k} + 3\vec{k} = 8\vec{k} \quad \rightarrow (2) \quad \triangle$$

From (1) & (2)

The system is equivalent to a Couple of moment 8 moment unit. \triangle

8-



$$x_G = \frac{15 \times 0 + 10 \times 40 + 5 \times 40 + 20 \times 0}{15 + 10 + 5 + 20} = 12 \text{ cm}$$

$$y_G = \frac{15 \times 0 + 10 \times 0 + 5 \times 40 + 20 \times 20}{15 + 10 + 5 + 20} = 12 \text{ cm}$$

∴ The center of gravity is (12, 12)

$$\tan \theta = \frac{y_G}{x_G} = 1 \Rightarrow m(\hat{\theta}) = 45^\circ$$

(تراجعى الحلول الأخرى)

9-

(a) 4



10-

(d) $(\frac{2}{3}, \frac{5}{3})$



11-

$$a) \vec{r} = \vec{BA} = \vec{A} - \vec{B} = (-1, 1, -4)$$

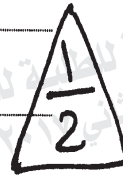


$$\vec{M}_B = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ -1 & 1 & -4 \\ 3 & -2 & 4 \end{vmatrix}$$

$$= -4\vec{i} - 8\vec{j} - \vec{k}$$



The length of perpendicular = $\frac{\|\vec{M}_B\|}{\|\vec{F}\|}$



$$= \frac{\sqrt{(-4)^2 + (-8)^2 + (-1)^2}}{\sqrt{(3)^2 + (-2)^2 + (4)^2}}$$



$$= \frac{9\sqrt{29}}{29} = 1.67$$

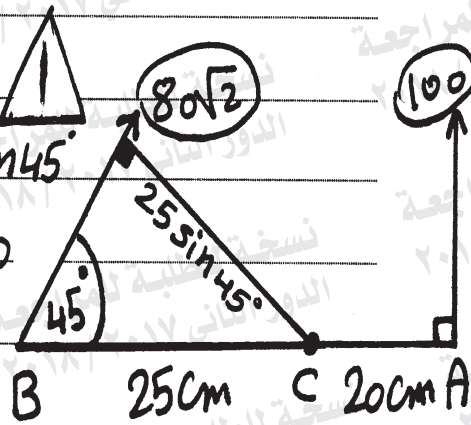
length unit

□ $M_C = 100 \times 20$

$- 80\sqrt{2} \times 25 \sin 45^\circ$

△ $M_C = 2000 - 2000 = 0$

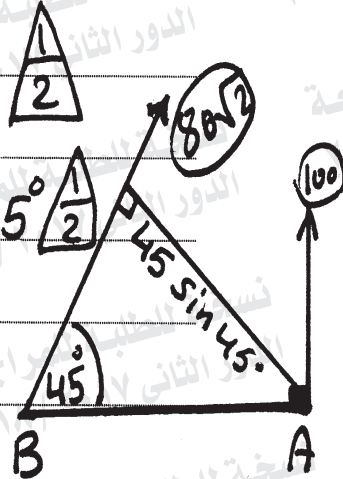
∴ The line of action of the resultant passes through the point C



$M_A = - 80\sqrt{2} \times 45 \sin 45^\circ$

$= - 3600 \text{ N.cm.}$

∴ The magnitude of the moment of the forces about A equals 3600 N.cm.




(تراجعى الحلول الأخرى)

12-

(b) 18 

13-

(b) 55 

14-

Let the length of the rod = $2l$ cm

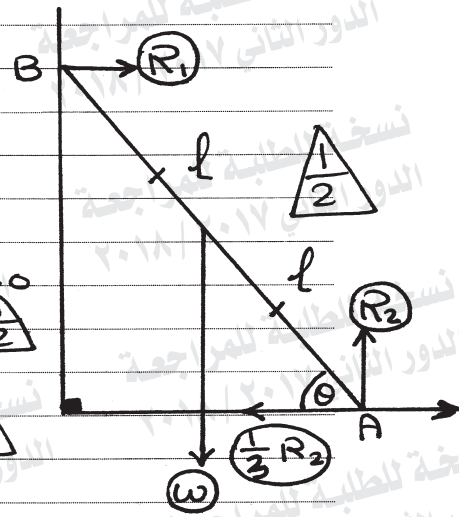
∴ the rod is in equilibrium

∴ $x=0, y=0, M_A=0$

∴ $R_2 = W$

$R_1 = \frac{1}{3} R_2$

∴ $R_1 = \frac{1}{3} W$



∴ $M_A = 0 \Rightarrow W l \cos \theta - R_1 \times 2l \sin \theta = 0$

$W l \cos \theta = \frac{1}{3} W \times 2l \sin \theta$

∴ $\cos \theta = \frac{2}{3} \sin \theta$

$\frac{\sin \theta}{\cos \theta} = \frac{3}{2} \Rightarrow \tan \theta = \frac{3}{2}$

∴ $m(\angle \theta) = 56^\circ 19'$

النموذج (ب)

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b

∴ The rod is in equilibrium.

∴ $X=0, Y=0, M_A=0$

∴ $T \sin \theta \times 60 - 8 \times 30 - 6 \times 40 = 0$

∴ $T \times \frac{4}{5} \times 60 = 480$

∴ $T = 10 \text{ Newton}$

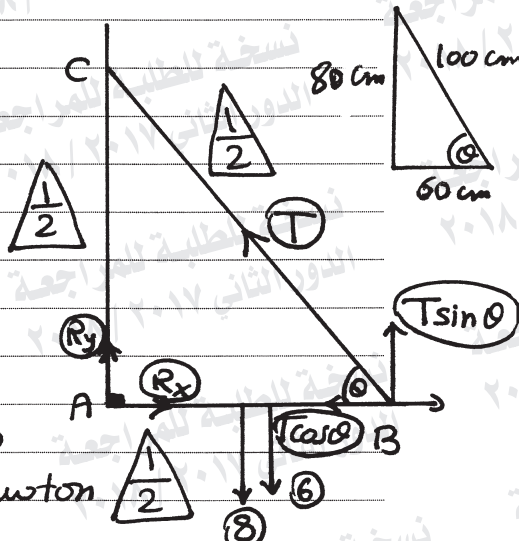
$R_x = T \cos \theta = 10 \times \frac{3}{5} = 6 \text{ Newton}$

$R_y = 6 + 8 - T \sin \theta = 14 - 10 \times \frac{4}{5} = 6 \text{ Newton}$

$R = \sqrt{(R_x)^2 + (R_y)^2}$

$R = \sqrt{(6)^2 + (6)^2} = 6\sqrt{2} \text{ Newton.}$

(تراعى الحلول الأخرى)



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النموذج (ب)

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15-

$$(c) \mu_s > \mu_k \quad \triangle 1$$

16-

$$(d) 32 \quad \triangle 1$$

17-

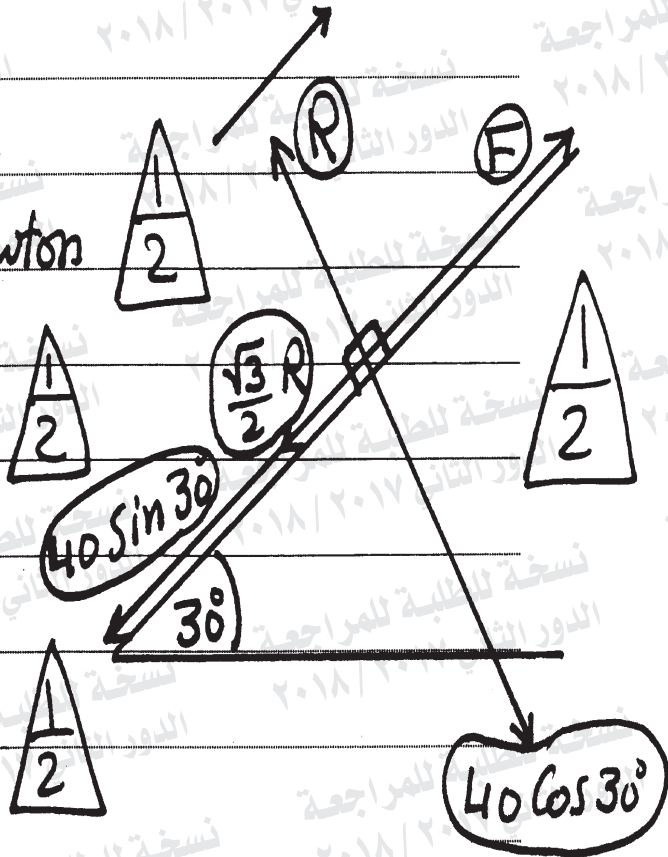
$$R = 40 \cos 30$$

$$\therefore R = 20\sqrt{3} \text{ Newton}$$

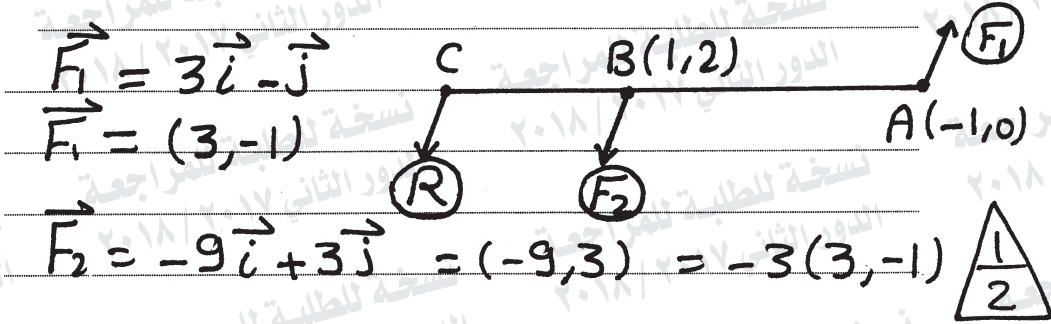
$$F = \frac{\sqrt{3}}{2} R + 40 \sin 30$$

$$F = \frac{\sqrt{3}}{2} \times 20\sqrt{3} + 20$$

$$F = 50 \text{ Newton}$$



18-



$\therefore \vec{F}_2 = -3\vec{F}_1$

$\therefore \vec{F}_1$ & \vec{F}_2 act along two parallel (opposite) direction

$\therefore C$ the point of the effect of the Resultant divides \overline{AB} in ratio 3:1 externally

$\vec{R} = \vec{F}_1 + \vec{F}_2 = -6\vec{i} + 2\vec{j}$

$\therefore C = \left(\frac{3 \times 1 - 1 \times (-1)}{3 - 1}, \frac{3 \times 2 - 1 \times 0}{3 - 1} \right)$

$C = (2, 3)$

(تراعى الحلول الأخرى)

(انتهت الإجابة وتراعى الحلول الأخرى)