COLLEGE
Tanta Engineering

إعدادي 2020

الميكانيكا

عزم القصور الذاتي

م. إسراء يوسف

(ميكانكا)

(ch 6 moment of energy)

$$I_X = \int_{y_1}^{y_2} y^2 \, dA$$

$$I_y = \int_{y_1}^{y_2} x^2 \, dA$$

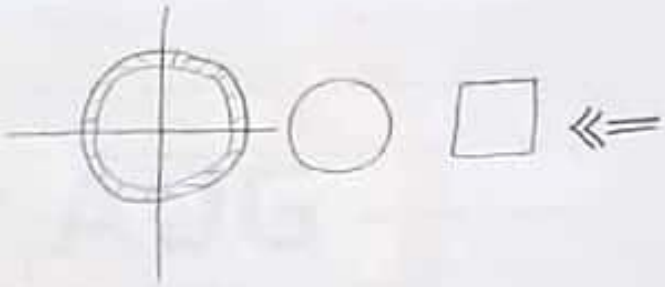
$$I_o = \int r^2 \, dA$$

$$I_o = \int (x^2 + y^2) \, dA$$

$$I_o = \int x^2 dA + \int y^2 dA$$

$$I_o = I_X + I_y$$

$$I_X = I_y = \frac{I_o}{2}$$



عزم العطور الذاتي للكتل $I_X = \int y^2 dm$

$$\rho = \frac{m}{v} \qquad v\rho = m$$

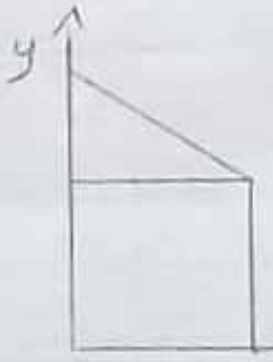
عزم العطور الذاتي للكتل $I_X = \rho \int y^2 dv$

$$\sigma = \frac{m}{A} \qquad dm = \sigma dA$$

$$I_X = \sigma \int y^2 dA$$

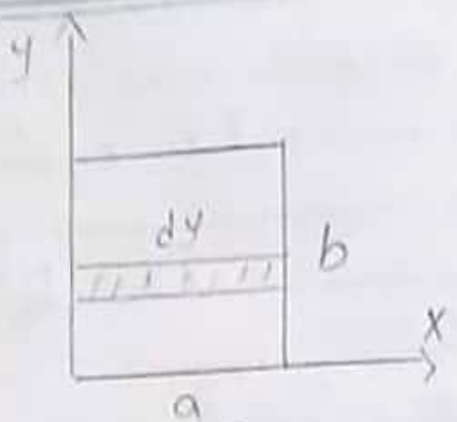
$$\lambda = \frac{m}{L} \qquad dm = \lambda dl$$

$$I_X = \lambda \int y^2 dl$$



$$I_X = I_{X1} + I_{X2}$$

$$I_y = I_{y1} + I_{y2}$$

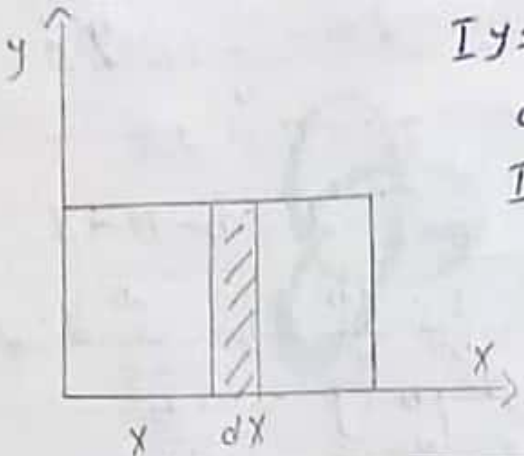


$$Ix = \int y^2 dA$$

$$dA = a\,dy$$

$$I = a\,\frac{y^3}{3}\Big|_0^b$$

$$= \frac{ab^3}{3} \Leftarrow Ix = \int_0^b a\,y^2 dy$$

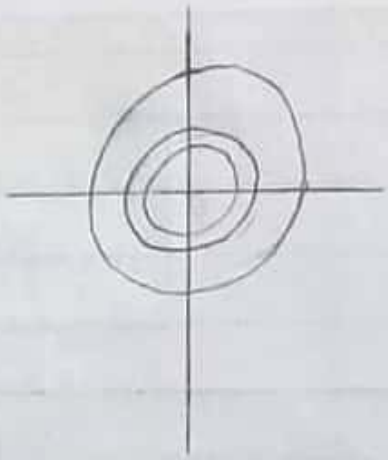


$$Iy = \int x^2 dA$$

$$dA = b\,dx$$

$$Iy = \int_0^a x^2 b\,dx$$

$$Iy = b\,\frac{x^3}{3}\Big|_0^a = \frac{ba^3}{3}$$



$$Io = \int r^2 dA$$

$$dA = 2\pi r\,dr$$

$$Io = \int_0^a 2\pi r\,dr\,r^2$$

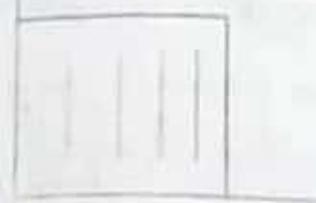
$$2\pi \int_0^a r^3 dr$$

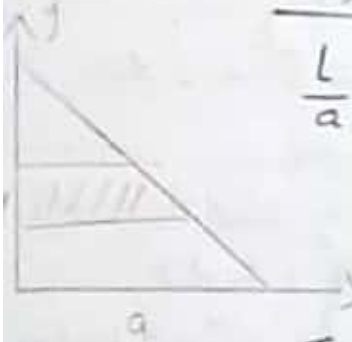
$$2\,\frac{\pi r^4}{4}\Big|_0^a = \frac{\pi a^4}{2}$$

$$\frac{Io}{2} = Ix = Iy = \frac{\pi a^4}{4}$$

$$I_X = \frac{sh^3}{3}$$

$$I_Y = \frac{hs^3}{3}$$





$$\frac{L}{a} = \frac{b-y}{b} \qquad L = \frac{a}{b}(b-y)$$

$$dA = \frac{a}{b}(b-y)dy \qquad dA = L\,dy$$

$$I_X = \int y^2\,dA$$

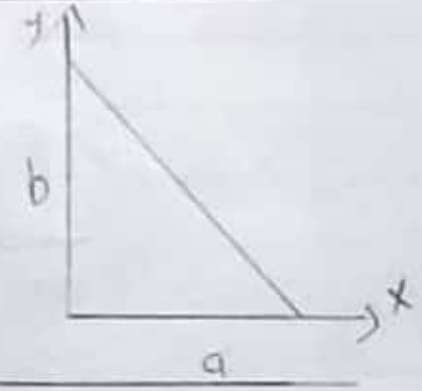
$$I_X = \frac{a}{b}\int_0^b y^2(b-y)\,dy$$

$$= \frac{a}{b}\left(\int_0^b y^2 b - \int_0^b y^3\,dy\right)$$

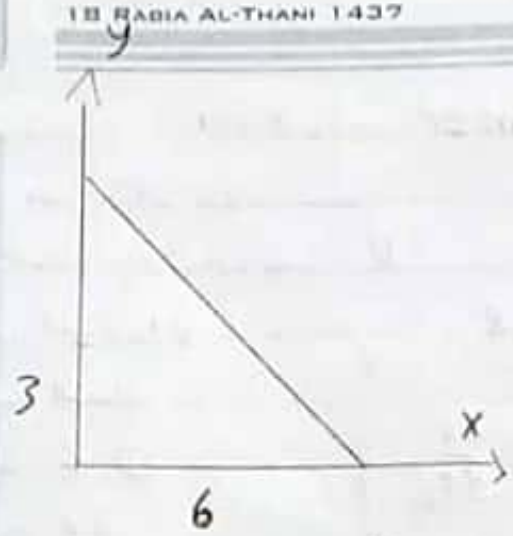
$$\frac{a}{b}\left[\frac{y^3}{3}\Big|_0^b - \frac{y^4}{4}\Big|_0^b\right] = \frac{ab^3}{12}$$

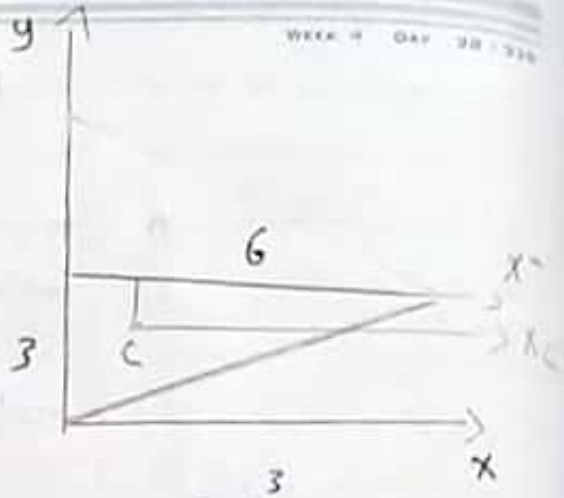
$$I_X = \frac{ab^3}{12}$$

$$I_Y = \frac{a^3 b}{12}$$



AUG PHARMA





$I_x = \frac{6 \times 3^3}{12} = \frac{27}{2}$

$I_y = \frac{3 \times 6^3}{12} = 54$

$I_y = \frac{3 \times 6^3}{12} = 54$

$I_{\bar{x}} = \frac{6 \times 3^3}{12} = \frac{27}{2}$

$I_{\bar{x}} = I_{xc} + \bar{i}^2 \times 9$

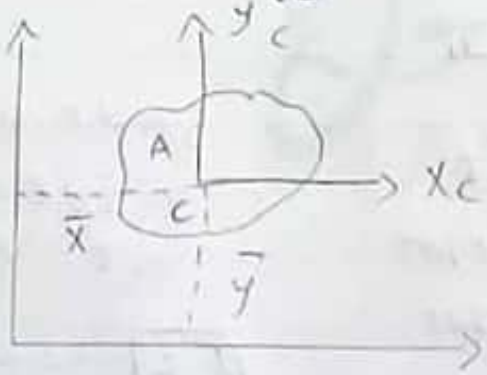
$\frac{27}{2} = I_{xc} + 9$

$I_{xc} = 4{,}5$

$I_x = I_{xc} + 2^2 \times 9$

$I_x = 4{,}5 + 34$

$= 40{,}5$



$\rightarrow I_x = I_{xc} + \bar{y}^2 A$

$\rightarrow I_y = I_{yc} + \bar{x}^2 A$

Planer

Planer motion الحركة المستوية

(1) الحركة في خط مستقيم

- واتجاه السرعة والإزاحة لهم نفس الاتجاه

أشكال الحلة

① $f = 0$ صفرية

$\frac{dv}{dt} = 0$

$v = const$

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

② $f = a = const$ ثابتة

$= \frac{dv}{dt}$

$\int a\,dt = \int dv$

$a \int dt = \int dv$

$at = v + c_1$

الشروط الابتدائية I-C

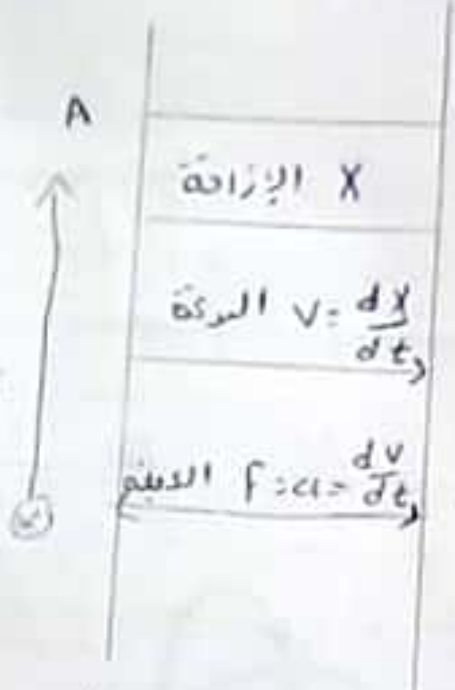
$t = 0 \quad x = x_0$

$v = v_0$

$-v_0 = c_1$

$v = v_0 + at \xrightarrow{v,t} I$

القانون الأول لنيوتن



السرعة $= \frac{dx}{dt}$

$= v_0 + at$

$dx = (v_0 + at)dt$

$\int dx = \int (v_0 + at)dt$

$x = v_0 t + \frac{1}{2} a t^2 + c_2$

$x_0 = 0 + 0 + c_2$

$x = v_0 t + \frac{1}{2} a t^2 + x_0$

$x - x_0 = v_0 t + \frac{1}{2} a t^2 \xrightarrow{x,t} II$

$\rightarrow f = \frac{dv}{dt} = \frac{dv}{dx} \times \frac{dx}{dt}$

$\rightarrow f = v \frac{dv}{dx}$

$$\int a\,dx = \int v\,dv$$

$$ax = \frac{v^2}{2} + C_3$$

$$ax_0 = \frac{v_0^2}{2} + C_3$$

$$ax_0 - \frac{v_0^2}{2} = C_3$$

$$ax = \frac{v^2}{2} + ax_0 - \frac{v_0^2}{2}$$

$$v^2 = v_0^2 + 2a(x - x_0)$$

$v_1 x_3$ III

③ $F = \frac{dv}{dt}$ متغيرة

$$F = t^2$$

$$\int t^2 dt = \int dv$$

$$\frac{t^3}{3} = v$$

$F = x^2$ فيكون السرعة بدلالة

$$f = v\frac{dv}{dx} = x^2$$