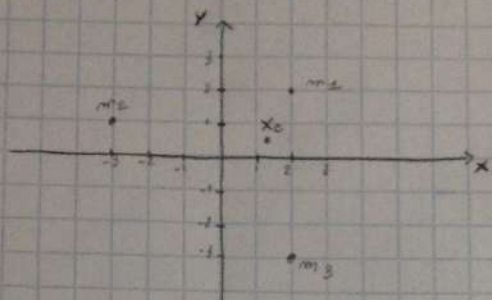


Questionário de física nº 7
Exercício 1

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$$m_1 = 500g = 0,5kg$$

$$m_2 = 100g = 0,1kg$$

$$m_3 = 200g = 0,2kg$$

$$x_1 (2, 2)$$

$$x_2 (-3, 1)$$

$$x_3 (2, -3)$$

$$X_c = \frac{m_1 x_1 + m_2 x_2 + m_3 x_3}{(m_1 + m_2 + m_3)} = \frac{0,5 \cdot (2) + 0,1 \cdot (-3) + 0,2 \cdot (2)}{0,8} = \frac{1 - 0,3 + 0,4}{0,8}$$

$$= 1,37$$

$$y_c = \frac{m_1 y_1 + m_2 y_2 + m_3 y_3}{(m_1 + m_2 + m_3)} = \frac{0,5 \cdot (2) + 0,1 \cdot (1) + 0,2 \cdot (-3)}{0,8} = \frac{1 + 0,1 - 0,6}{0,8}$$

$$= 0,62$$

$$X_c (1,37, 0,62)$$

Ejercicio

Ejercicio n° 2



$$h = \frac{\sqrt{3}}{2} L$$

Ej

$$M_0 = \rho L^2 d$$

$$M_0 = \rho L^2 d \frac{\sqrt{3}}{4}$$

x) -

y)



centro de masa, centro del cuadrado

$$M_{\text{com}} d_{\text{com}} = M_0 \cdot d_0$$

$$\frac{M_{\text{com}}}{M_0} = \frac{d_0}{d_{\text{com}}}$$

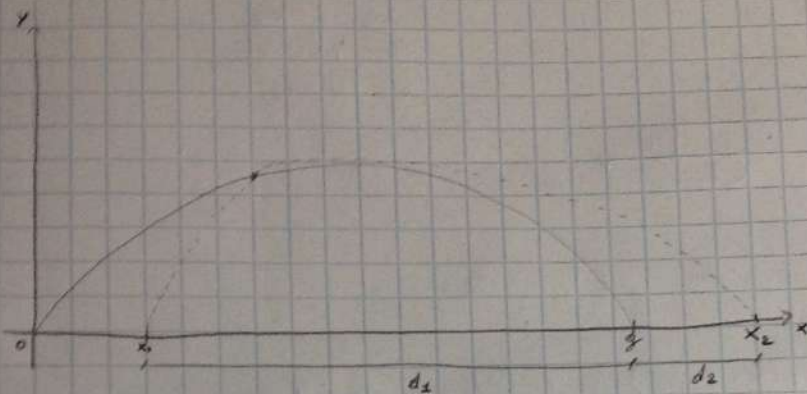
z)

$$M_{\text{com}} = M_0 + 2 M_0 = \rho L^2 d + 2 \left(\rho L^2 d \frac{\sqrt{3}}{4} \right)$$

$$= \rho L^2 d \left(1 + \frac{\sqrt{3}}{2} \right)$$

$$\frac{d_0}{d_{\text{com}}} = \frac{M_{\text{com}}}{M_0} = \frac{\rho L^2 d \left(1 + \frac{\sqrt{3}}{2} \right)}{\rho L^2 d \frac{\sqrt{3}}{4}} = \frac{4}{\sqrt{3}} \left(1 + \frac{\sqrt{3}}{2} \right) = \frac{4}{\sqrt{3}} + 2 = \frac{4 + 2\sqrt{3}}{\sqrt{3}}$$

Exercício n° 3



$$m = 1 \text{ kg}$$
$$v_0 = 200 \frac{\text{m}}{\text{s}}$$
$$\alpha = 30^\circ$$

$$x_1 = 50 \text{ m}$$
$$m_1 = 300 \text{ g} = 0,3 \text{ kg}$$

$$M = m_1 + m_2$$

$$m_2 = M - m_1 = 0,7 \text{ kg}$$

$$g = \frac{v_0^2 \sin^2 \alpha}{g} = \frac{200^2 \sin^2 30}{9,82} = \frac{40000 \cdot 0,25}{9,82} = 3543 \text{ m}$$

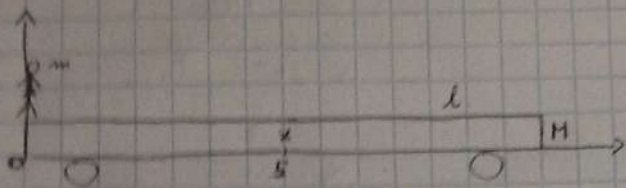
$$m_2 \cdot d_2 = m_1 \cdot d_1 \rightarrow d_2 = \frac{m_1}{m_2} d_1$$

$$d_1 = g - x_1 = 3543 - 50 = 3493 \text{ m}$$

$$d_2 = \frac{0,3}{0,7} \cdot 3493 = 1497 \text{ m}$$

$$x_2 = g + d_2 = 3543 + 1497 = 5040 \text{ m}$$

Carrello $m = 60$



$$\begin{aligned} m &= 60 \text{ kg} \\ M &= 600 \text{ kg} \\ l &= 10 \text{ m} \end{aligned}$$

Valore sull'estremità sinistra del carrello

$$x_e = \frac{M \cdot x_1 + m \cdot x_2}{M} = \frac{600 \cdot (10/2) + 60(0)}{660} = 4,5 \text{ m}$$

Valore al centro del carrello

$$x_{c1} = \frac{M \cdot x_1 + m \cdot x_2}{M} = \frac{600(10/2) + 60(10/2)}{660} = 5 \text{ m}$$

il centro di massa si sposta di

$$x = x_{c2} - x_e = 5 - 4,5 = 0,5 \text{ m}$$

Valore sull'estremità destra del carrello

$$x_{c3} = \frac{M \cdot x_1 + m \cdot x_2}{M} = \frac{600(10/2) + 60(10)}{660} = 5,5 \text{ m}$$

il centro di massa si sposta rispetto alla posizione iniziale

$$x = x_{c3} - x_e = 5,5 - 4,5 = 1 \text{ m}$$