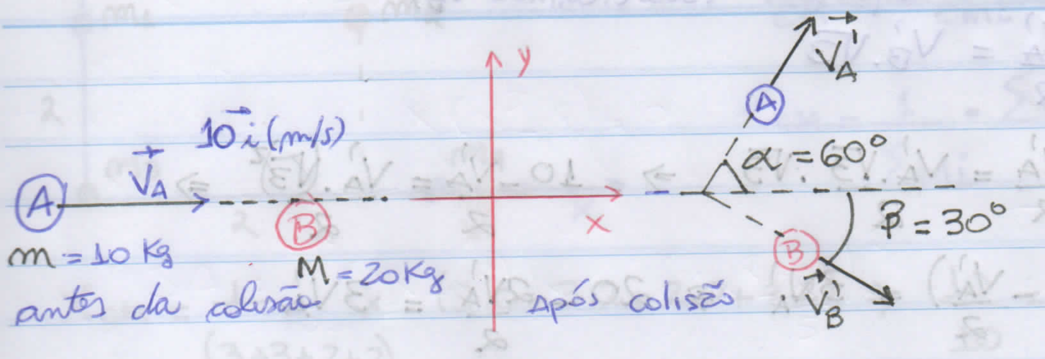
EXERCÍCIO 1

EDER JOSE DA SILVA
EP - Santos 1700970

$\cos 30 = \frac{\sqrt{3}}{2}$
$\cos 60 = 1/2$
$\text{sen}\,30 = 1/2$
$\text{sen}\,60 = \frac{\sqrt{3}}{2}$



Na ausência de força externa resultante o momento linear será conservado em X e em Y.

Em X:

$P_x = P_x'$

$P_{1x} + P_{2x} = P_{1x}' + P_{2x}'$

$m_A V_A + 0 = m_A V_A' \cos 60° + m_B V_B' \cdot \cos 30°$

Em Y:

$P_y = P_y'$

$P_{1y} + P_{2y} = P_{1y}' + P_{2y}'$

$0 + 0 = -m_A V_A' \,\text{sen}\,60° + m_B V_B' \cdot \text{sen}\,30°$

Em X:

$10 \cdot 10 = 10 \cdot V_A' \cdot \frac{1}{2} + 20 \cdot V_B' \cdot \frac{\sqrt{3}}{2}$

$100 = 5V_A' + 10\sqrt{3} \cdot V_B'$

$100 - 5V_A' = 10\sqrt{3} \cdot V_B'$

$\frac{100 - 5V_A'}{10} = \sqrt{3} \cdot V_B' \Rightarrow$

$10 - \frac{V_A'}{2} = \sqrt{3} \cdot V_B'$

Em y:

$0 = -10 \cdot V_A' \cdot \frac{\sqrt{3}}{2} + 20 \cdot V_B' \cdot \frac{1}{2}$

$10 \cdot V_A' \cdot \frac{\sqrt{3}}{2} = +20\, V_B' \cdot \frac{1}{2}$

$5 \cdot V_A' \cdot \sqrt{3} = 10 V_B' \Rightarrow$

$V_B' = \frac{5 \cdot V_A' \cdot \sqrt{3}}{10}$

$V_B' = \frac{\sqrt{3} \cdot V_A'}{2}$

Resolvendo a equação (substituindo V_B')

$$10 - \frac{V_A'}{2} = V_B' . \sqrt{3}$$

$$10 - \frac{V_A'}{2} = \frac{V_A' . \sqrt{3}}{2} . \sqrt{3} \Rightarrow 10 - \frac{V_A'}{2} = \frac{V_A' . (\sqrt{3})^2}{2} \Rightarrow$$

$$2 . \left(10 - \frac{V_A'}{2}\right) = 3V_A' \Rightarrow 20 - \frac{2V_A'}{2} = 3V_A'$$

$$20 - V_A' = 3V_A' \Rightarrow 4V_A' = 20 \Rightarrow \boxed{V_A' = 5}$$

Resolvendo a equação (substituindo V_A')

$$10 - \frac{V_A'}{2} = V_B' . \sqrt{3} \qquad \frac{20-5}{2} = V_B' . \sqrt{3}$$

$$10 - \frac{5}{2} = V_B' . \sqrt{3} \Rightarrow \frac{15}{2} = V_B' . \sqrt{3} \Rightarrow$$

$$V_B' = \frac{15}{2 . \sqrt{3}} \Rightarrow \frac{15 . \sqrt{3}}{2 . \sqrt{3} . \sqrt{3}} \Rightarrow \frac{15 . \sqrt{3}}{6} \Rightarrow \frac{5 . \sqrt{3}}{2} \Rightarrow \boxed{V_B' = 4,3302}$$

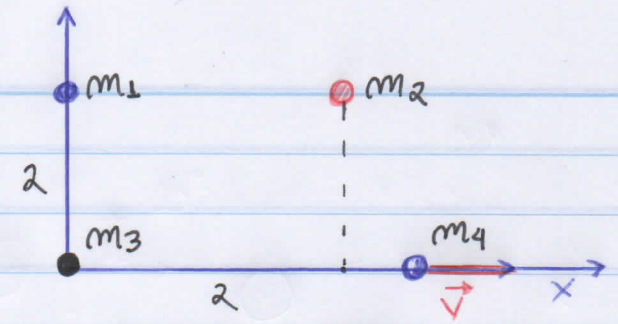
a) $V_A' = 5$ m/s

$V_B' = 4,3302$

SIM.

b) HOUVE POR SER ELÁSTICA A COLISÃO.

EXERCÍCIO 2



$$r_{CM} = x_{CM}i + y_{CM}j$$

$$x_{CM} = \frac{1}{\sum M_i} \cdot \sum m_i x_i$$

$$x_{CM} = \frac{1}{(3+3+2+2)} \times (3.0+3.2+2.0+2.2) \Rightarrow \frac{10}{10} = \boxed{1\,m}$$

$$y_{CM} = \frac{1}{(3+3+2+2} \times (3.2+3.2+2.0+2.0) \Rightarrow \frac{12}{10} = \boxed{1{,}2\,m}$$

a) $r_{CM} \approx (1m)i + (1{,}2m)j$

b)

$$V_{CM} = \frac{m_1.V_1 + m_2.V_2 + m_3.V_3 + m_4.V_4}{m_1+m_2+m_3+m_4}$$

. Estão em repouso

$V_{CM} = 0$

c) CM $(\underset{x}{1} ; \underset{y}{1{,}2})$

$V_0 = 4m/s$

$t = 5s$

$V = \frac{\Delta S}{\Delta t}$ (movimento uniforme)

$V = \frac{S - S_{inicial}}{t - t_{inicial}}$

$S = S_i + V.t$

No $\underline{X}$:

$S_x = 1 + 4.5$

$S_x = 21m$

No y :

$S_y = 1{,}2 + 4.5$

$S_y = 21{,}2\ m$

$$\boxed{CM\ (21 ; 21{,}2)}$$