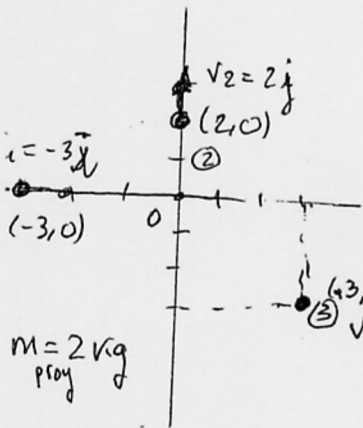


1) $mg \sin 30 = m a_{AB} \Rightarrow a_{AB} = g \sin 30 = 10 \cdot \frac{1}{2} = 5 \text{ m/s}^2$
 $-\mu mg = m a_{BC} \Rightarrow a_{BC} = -\mu g = -0.1 \cdot 10 = -1$
 2) $v_B^2 - v_A^2 = 2 a_{AB} e \Rightarrow v_B = \sqrt{2 a_{AB} e} = \sqrt{2 \cdot 5 \cdot 20} = \sqrt{200}$

3) $t_{AC} = t_{AB} + t_{BC}$
 $e = 2m = \frac{1}{2} a_{AB} t_{AB}^2 \Rightarrow t_{AB} = \sqrt{\frac{2 \cdot 20}{5}} = \sqrt{8} = 2.825$
 $a_{BC} = -1 \text{ m/s}^2 = \frac{\Delta v}{\Delta t} = \frac{v_C - v_B}{t_{BC}} = \frac{0 - \sqrt{200}}{t_{BC}} \Rightarrow t_{BC} = \sqrt{200} = 14.145$
 $t_T = 2.82 + 14.14 = 16.96 \text{ s}$
 $v_C^2 - v_B^2 = 2 a_{BC} BC \Rightarrow BC = \frac{v_C^2 - v_B^2}{2 a_{BC}} = \frac{0 - 200}{2(-1)} = 100 \text{ m}$

20)

1) Conservación de la cantidad de movimiento



$m_1 \vec{v}_1 + m_2 \vec{v}_2 + m_3 \vec{v}_3 = (m_1 + m_2 + m_3) \vec{v}_0$
 $+\frac{m}{3} 2\vec{j} - \frac{m}{3} 3\vec{i} + \frac{m}{3} \vec{v}_3 = m 3\vec{i} \Rightarrow \boxed{v_3 = 12\vec{i} - 2\vec{j}}$ 0'6

2) $x_{CM} = \frac{\sum x_i m_i}{\sum m_i} = \frac{\frac{m}{3}(3) + \frac{m}{3}(-3)}{m} = 0$
 $y_{CM} = \frac{\sum y_i m_i}{\sum m_i} = \frac{\frac{m}{3} \cdot 2 - \frac{m}{3} \cdot 3}{m} = -\frac{1}{3}$

$\Rightarrow y_{CM} = -\frac{1}{3} \Rightarrow \boxed{CM (0, -1/3)} (m/s)$ 0'4

3) $\vec{v}_{CM} \cdot m = \sum m_i \vec{v}_i = \frac{m}{3}(-3\vec{i}) + \frac{m}{3} 2\vec{j} + \frac{m}{3}(12\vec{i} - 2\vec{j})$

$\vec{v}_{CM} = \boxed{3\vec{i}} = \vec{v}_{antes}$ 0'3

4) $\vec{p}_T = \frac{m}{3}(-3\vec{j}) + \frac{m}{3} 2\vec{j} + \frac{m}{3}(12\vec{i} - 2\vec{j}) = 2(3\vec{i} + 0\vec{j}) = \boxed{6\vec{i}}$ 0'4

3) 1) $120 - T_1 = 12a$
 $T_2 - 30 = 3a$
 $T_1 - 120 = -12a$
 $30 - T_2 = -3a$
 $T_1 - T_2 = -15a + 90$

$T_1 \cdot R = T_2 R = \frac{1}{2} m R^2 \alpha = \frac{1}{2} m R^2 \frac{a}{R}$
 $\Rightarrow T_1 - T_2 = \frac{1}{2} m a = -15a + 90$

$\frac{1}{2} 4 \cdot a = -15a + 90 \Rightarrow \boxed{a = 5.3 \text{ m/s}^2}$

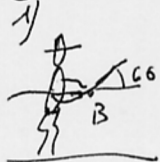
2) $\alpha = a/R = \frac{5.3}{0.2} = \boxed{26.5 \text{ rad/s}^2}$

4) $h = 3 = \frac{1}{2} a t^2 \Rightarrow t = \sqrt{\frac{6}{5.3}} = 1.063 \text{ s}$

$\omega_F = \omega_0 + \alpha t = 26.5 \cdot 1.063 = \boxed{28.16 \text{ rad/s}}$

3) $T_1 = 120 - 12a = 120 - 12 \cdot 5.3 = \boxed{56.4 \text{ (N)}}$
 $T_2 = 30 + 3a = 3 \cdot 5.3 + 30 = \boxed{45.9 \text{ (N)}}$

4) $v_B \sin 60 = v_A \sin 30 = 10 \cdot \frac{1}{2} \text{ cm/s} \Rightarrow v_B = 5 \text{ cm/s}$



$v_{Bx} = 50 \cos 60 = 25 \text{ m/s}$

$v_{By} = 50 \sin 60 = 25\sqrt{3} \text{ (m/s)}$

2) $p_A + \frac{1}{2} p_A^2 + p_B = p_B + \frac{1}{2} p_B^2 + p_C$

$p_A + \frac{1}{2} 10^3 \cdot 1.3^2 + 0 = 10^3 + \frac{1}{2} 10^3 \cdot 50^2 + 10^3 \cdot 10 + 1.5 \cdot 10^3 \Rightarrow \boxed{p_A = 1.364 \cdot 10^5 \text{ Pa}}$

$x = v_{ex} t \Rightarrow t = \frac{x}{v_{Bx}} = \frac{5}{25} = \frac{1}{5} = 0.2 \text{ s}$

$y = y_0 + v_{By} t - \frac{1}{2} g t^2 = 1.5 + 25\sqrt{3} \left(\frac{1}{5}\right) - \frac{1}{2} 10 \left(\frac{1}{5}\right)^2 = \boxed{9.195 \text{ m}}$

$v_A = \omega / s_A = \frac{10 \cdot 10}{7.5} = \frac{10000}{7.5} = 1333.3 \text{ cm/s} = 13.33 \text{ m/s}$

SEPTIEMBRE 2008