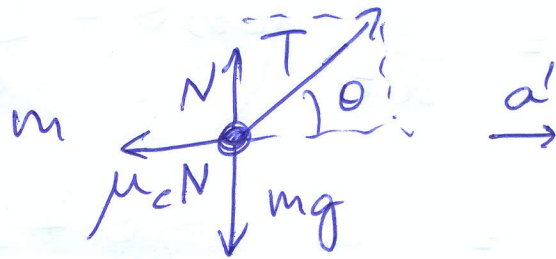
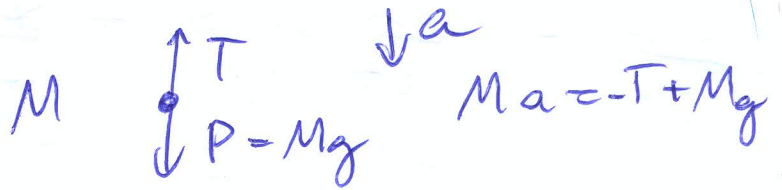
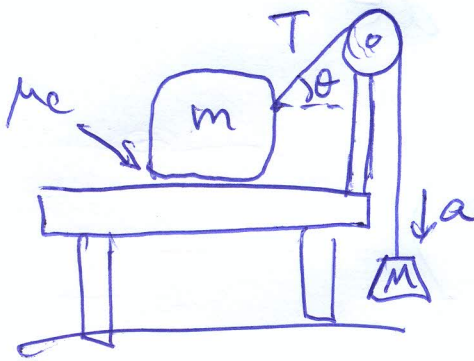


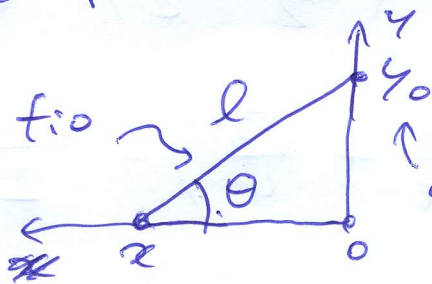
10 Questão número 2



2ª lei:

$$\begin{cases} Ma = Mg - T & N = mg - T \sin \theta \\ ma' = T \cos \theta - \mu_c N = T(\cos \theta + \mu_c \sin \theta) - \mu_c mg \\ mg = T \sin \theta + N & T = M(g - a) \end{cases}$$

Como relacionar a com a' ?



$$a = -\frac{dl}{dt} \quad y_0 = l \sin \theta$$

$$a' = -\frac{dx}{dt} \quad x = l \cos \theta$$

$$\frac{dy_0}{dt} = \frac{dl}{dt} \sin \theta + l \cos \theta \frac{d\theta}{dt} = 0 \quad (y_0 = \text{cte})$$

$$\frac{dx}{dt} = \frac{dl}{dt} \cos \theta - l \sin \theta \frac{d\theta}{dt}$$

$$l \cos \theta \frac{d\theta}{dt} = -\frac{dl}{dt} \sin \theta \quad l \frac{d\theta}{dt} = -\tan \theta \frac{dl}{dt}$$

$$\frac{dx}{dt} = \frac{dl}{dt} \cos \theta + \frac{\sin^2 \theta}{\cos \theta} \frac{dl}{dt}$$

$$\frac{dx}{dt} = \frac{dl}{dt} \left(\cos \theta + \frac{\sin^2 \theta}{\cos \theta} \right)$$

$$\therefore a' = a \left(\cos \theta + \frac{\sin^2 \theta}{\cos \theta} \right) = a \left(\frac{\cos^2 \theta + \sin^2 \theta}{\cos \theta} \right)$$

p/ $\theta = 30^\circ$
 $\mu = \frac{1}{\sqrt{3}}$

$$a' = \frac{2a}{\sqrt{3}}$$

$$a' = \frac{a}{\cos \theta}$$

$$T = M(g - a) \quad ma' = T(\cos \theta + \sin \theta) - \mu c mg$$

$$Ma' = \frac{2ma}{\sqrt{3}} = M(g - a) \left(\frac{\sqrt{3}}{2} + \frac{1}{2} \right) - \frac{1}{\sqrt{3}} mg$$

$$ma = (Mg - Ma) \left(\frac{3}{4} + \frac{\sqrt{3}}{4} \right) - \frac{mg}{2}$$

$$a \left(m + M \frac{3 + \sqrt{3}}{4} \right) = g \left(M - \frac{m}{2} \right)$$

$$a = g \frac{\left(M - \frac{m}{2} \right)}{m + M \times 1.183}$$

$$a' = \frac{g (2M - m)}{\sqrt{3}m + 1.183\sqrt{3}M}$$

p/ $m = 1.5 \text{ kg}$

$$a' = \frac{10 (2M - 1.5)}{2.6 + 2.05M}$$

ex: $M = 6.2 \text{ kg}$

$$a' = 7.12 \text{ m/s}^2$$