

# GABARITO DA P1 - Turma NZ - 14/09/2011

1) a) tempo de queda.  $1 = \frac{1}{2}gt^2$  ou  $t^2 = \frac{2 \cdot 0}{9.8} = 0.204$

$t = \sqrt{0.204} = 0.45s$

Veloc. de lançamento  $\Rightarrow 2.2 = v_0 \cdot 0.45 \Rightarrow v_0 = \frac{2.2}{0.45} = 4.9 \text{ m/s}$

b)  $\frac{1}{2}k\Delta x^2 = \frac{1}{2}mv_0^2$  e.  $k = \frac{0.1(4.9)^2}{(0.01)^2} = 24.0 \times 10^3 \text{ N/m}$

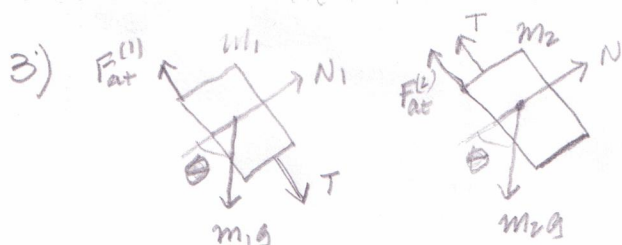
2)



$v_v \sin 45^\circ = v \sin \theta$   $\sin \theta = \frac{10 \sin 45^\circ}{20}$   
 $\sin \theta = \frac{\sqrt{2}}{4} \Rightarrow \theta = 20.7^\circ$

b)  $t = \frac{400 \text{ km}}{v \cos \theta + v \cos 45^\circ} = \frac{400 \times 10^3}{20 \cos 20.7 + 10 \cos 45^\circ} = \frac{400 \times 10^3}{18.71 + 7.07} = \frac{400 \times 10^3}{25.79} = 15503.8s$   
 $= 4.3 \text{ h}$

c)  $v = 13.5 \text{ m/s}$



$\mu_1 > \mu_2$

$\mu_1 N_1 - T - m_1 g \sin \theta = m_1 a$

$\mu_2 N_2 + T - m_2 g \sin \theta = m_2 a$

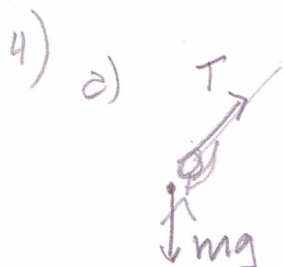
$\mu_1 N_1 + \mu_2 N_2 - (m_1 + m_2) g \sin \theta = (m_1 + m_2) a$

A partir do diagrama acima

ou  $a = -g \sin \theta + \frac{\mu_1 m_1 + \mu_2 m_2}{m_1 + m_2} g \cos \theta = -4.9 + \frac{0.4 + 0.4 \times 9.8 \cos 30^\circ}{6} = -3.8 \text{ m/s}^2$

b)  $a = -4.9 + \frac{0.4}{3} \times 9.8 \times \cos 30^\circ = -4.9 + 1.1 = -3.8 \text{ m/s}^2 \Rightarrow < 0 \Rightarrow \text{para baixo!}$

b)  $T = \mu_1 N_1 - m_1 g \sin \theta - m_1 a = 0.4 \times 9.8 \cos 30^\circ - 2 \times 9.8 \times \frac{1}{2} + 2 \times 3.8$   
 $= 3.4 - 9.8 + 7.6 = 1.2 \text{ N}$



b)  $mg\Delta h = \frac{1}{2}mv^2$   $\therefore v = \sqrt{2 \times 9.8 \times 2.65} = \sqrt{51.94} = 7.2 \text{ m/s}$

c)  $T - mg = m \frac{v^2}{R}$  e.  $T = m \frac{v^2}{R} + mg$   
 $= 90 \times \left( \left( \frac{7.2}{15} \right)^2 + 9.8 \right)$   
 $= 1194 \text{ N}$

O cipo arreventa