

# Prova. Mecânica 1

① a)  $\vec{v} = \frac{d\vec{r}}{dt} = (2t - 3)\vec{i} + 2(t-1)\vec{j}$

$|\vec{v}(5s) = 7\vec{i} + 8\vec{j} \left(\frac{m}{s}\right)$

b)  $\vec{v}_m = \frac{\Delta\vec{r}}{\Delta t} = \frac{\vec{r}(10) - \vec{r}(0)}{10 - 0}$

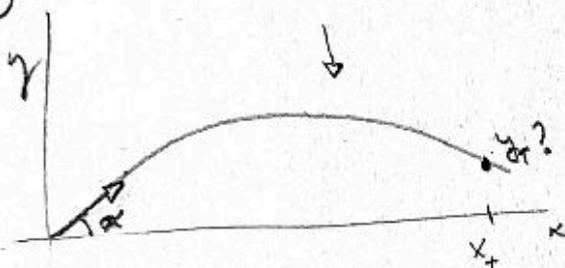
$\vec{r}(0) = 1\vec{j} \text{ (m)}$

$\vec{r}(10) = (100 - 3 \cdot 10)\vec{i} + (10 - 1)\vec{j} = 70\vec{i} + 81\vec{j} \text{ (m)}$

$|\vec{v}_m = 7\vec{i} + 8\vec{j} \left(\frac{m}{s}\right)$

c)  $\vec{a} = \frac{d\vec{v}}{dt} = 2\vec{i} + 2\vec{j} \left(\frac{m}{s^2}\right)$

②



$x_T = 18m$

$\alpha = 30m$

$v_0 = 15 \frac{m}{s}$

$v_{0x} = 15 \cos 30$

$v_{0y} = 15 \sin 30$

Eixo x:  $x = 13t$  (1)

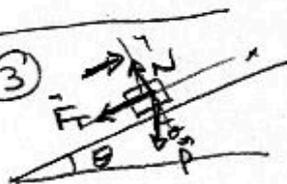
Eixo y:  $v_y = 7.5 - 9.8t$  (2)

$y = 7.5t - 4.9t^2$  (3)

a)  $x_T = 18m$ : E (1):  $18 = 13t \Rightarrow t = 1.39s$   
 E (3):  $y_T = 7.5 \cdot 1.39 - 4.9 \cdot 1.39^2 = 1.03m$

b) E (2):  $v_y = 7.5 - 9.8 \cdot 1.39 = -6.14 \frac{m}{s} \Rightarrow \vec{v} = 13\vec{i} - 6.14\vec{j} \left(\frac{m}{s}\right)$

③

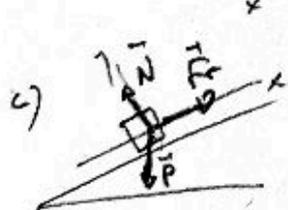


9) Eixo x:  $-F_f - mg \sin \theta = m \cdot a$   
 Eixo y:  $N - mg \cos \theta = 0$   
 $F_f = \mu N$

$-\mu mg \cos \theta - mg \sin \theta = m \cdot a$

$a = -0.35 \cdot 9.81 \cdot \cos 30 - 9.81 \sin 30 = -7.88 \frac{m}{s^2}$  sentido descendente (eixo x negativo)

5) MRUV:  $x = x_0 + v_0 t + \frac{1}{2} a_x t^2$  De (2):  $0 = 6 - 7.88 \cdot t \Rightarrow t = 0.761s$   
 $v_x = v_{0x} + a_x t$  (2) E (1)  $x = 6 \cdot 0.761 - \frac{7.88 \cdot 0.761^2}{2} = 2.28m$



9) Eixo x:  $F_f - mg \sin 30 = m \cdot a'$   
 $N - mg \cos \theta = 0$   
 $\mu mg \cos \theta - mg \sin 30 = m \cdot a'$

$a' = 0.35 \cdot 9.81 \cdot \frac{\sqrt{3}}{2} - 4.9 = -1.93 \frac{m}{s^2}$  descendente

\*