

EXERCICIOS CINEMÁTICA

Resolución dos exercicios de cinemática, poden facerse de outras formas diferentes e tamén poderían estar ben, esta só son unha mostra de como resolvelo. Se ao repasalos atopádesvos con calquera dúbida preguntádeme.

EXERCICIO 1.

1.- $\vec{r} = (3t^2 + 1)\vec{i} + (4t^2 + 2)\vec{j}$ $\left\{ \begin{array}{l} \vec{r}(4) = (3 \cdot 4^2 + 1)\vec{i} + (4 \cdot 4^2 + 2)\vec{j} = 49\vec{i} + 66\vec{j} \\ \vec{r}(2) = (3 \cdot 2^2 + 1)\vec{i} + (4 \cdot 2^2 + 2)\vec{j} = 13\vec{i} + 18\vec{j} \end{array} \right.$

a) $\vec{v} = \frac{\Delta \vec{r}}{\Delta t} = \frac{\vec{r}(4) - \vec{r}(2)}{4 - 2} = \frac{(49\vec{i} + 66\vec{j}) - (13\vec{i} + 18\vec{j})}{2} = 18\vec{i} + 24\vec{j} \text{ (m/s)}$

b) $\vec{v} = \frac{d\vec{r}}{dt} = 6t\vec{i} + 8t\vec{j}$ $\vec{v}(t=0) = 0 \text{ m/s}$

c) $\vec{a} = \frac{d\vec{v}}{dt} = 6\vec{i} + 8\vec{j} \text{ (m/s}^2\text{)}$

d) $a_t = \frac{d|\vec{v}|}{dt} = 10 \text{ m/s}^2$

$|\vec{v}| = \sqrt{36t^2 + 64t^2} = \sqrt{100t^2} = 10t$

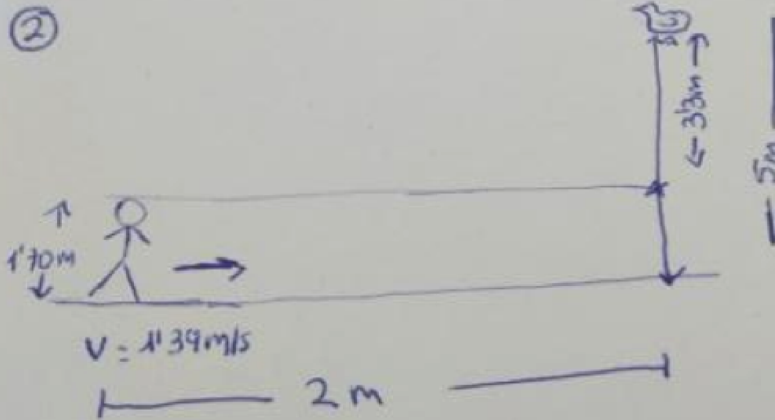
$a^2 = a_t^2 + a_n^2$
 $a_n = \sqrt{a^2 - a_t^2} = \sqrt{10^2 - 10^2} = 0 \text{ m/s}^2$

$x = 3t^2 + 1 \rightarrow t = \sqrt{\frac{x-1}{3}}$
 $y = 4t^2 + 2$
 $y = 4\left(\sqrt{\frac{x-1}{3}}\right)^2 + 2 = \frac{4x-4}{3} + 2$
 $\boxed{y = \frac{4x+2}{3}}$

$a_t = 10 \text{ m/s}^2$
 $\vec{v} = \sqrt{6^2 + 8^2} = 10 \text{ m/s}$

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AI DUAL CAMERA

EXERCICIO 2



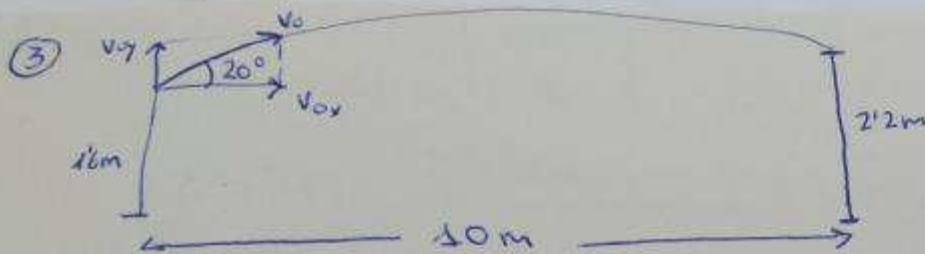
$$y = y_0 + v_{0y} \cdot t - \frac{1}{2} g \cdot t^2$$

$$1.70 = 5 - \frac{1}{2} \cdot 9.8 \cdot t^2 \rightarrow t = 0.82 \text{ s} \rightarrow \text{tempo que tarda em caer o excremento.}$$

$$x = v \cdot t \rightarrow 2 = 1.39 \cdot t \rightarrow t = 1.44 \text{ s} \rightarrow \text{tempo que tarda em chegar a pessoa.}$$

$$v = \frac{x}{t} = \frac{2}{0.82} = 2.44 \text{ m/s}$$

EXERCICIO 3



$$X = V_0 \cdot \cos 20^\circ \cdot t$$

$$Y = Y_0 + V_0 \cdot \sin 20^\circ \cdot t - \frac{1}{2} g \cdot t^2$$

$$10 = V_0 \cdot \cos 20^\circ \cdot t$$

$$2.20 = 1.60 + V_0 \cdot \sin 20^\circ \cdot t - \frac{1}{2} \cdot 9.8 t^2$$

$$10 = 0.94 \cdot V_0 \cdot t \rightarrow V_0 = \frac{10}{0.94 t} = \frac{10.64}{t}$$

$$2.20 = 1.60 + V_0 \cdot \sin 20^\circ \cdot t - 4.9 t^2$$

$$2.20 = 1.60 + \frac{10.64}{t} \cdot \sin 20^\circ \cdot t - 4.9 t^2 \rightarrow 2.20 = 1.60 + 3.64 - 4.9 t^2$$

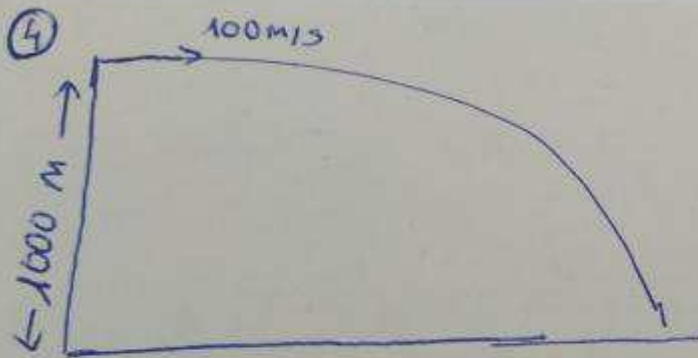
$$-3.04 = -4.9 t^2 \rightarrow t = 0.795$$

$$V_0 = \frac{10}{0.94 \cdot 0.795} = 13.47 \text{ m/s}$$



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EXERCICIO 4



$$\left. \begin{aligned} v_x &= 100 \text{ m/s} \\ v_y &= -g \cdot t \end{aligned} \right\}$$

$$\left. \begin{aligned} x &= 100 t \\ y &= y_0 - \frac{1}{2} g t^2 \end{aligned} \right\}$$

↓

$$0 = 1000 - 4'9 t^2 \rightarrow t = 14'3$$

$$X = 100 \cdot 14'3 = \boxed{1430 \text{ m}}$$



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