dicas do vESTibulaR

Sistema de Ensino Energia®
www.energia.com.br

→ Física: cinEmática

Elaborado pelo professor Jerry do **Sistema de Ensino Energia**.

1) Velocidade Média

Velocidade escalar média → $v_m = \frac{d}{\Delta t}$

Velocidade vetorial média → $\vec{v}_m = \frac{\vec{\Delta x}}{\Delta t}$

÷ 3,6 (km/h → m/s) | x 3,6 (m/s → km/h)

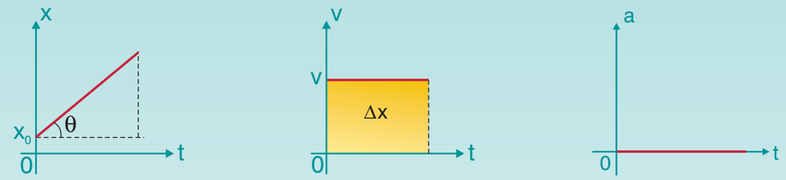
2) M.R.U

$\begin{cases} v \longrightarrow \text{constante} \neq 0 \\ a \longrightarrow 0 \end{cases}$

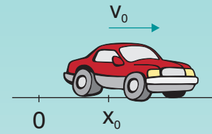
$v \oplus \longrightarrow$ progressivo

$v \ominus \longrightarrow$ retrógrado

$x = x_0 + v \cdot t$



3) M.R.U.V

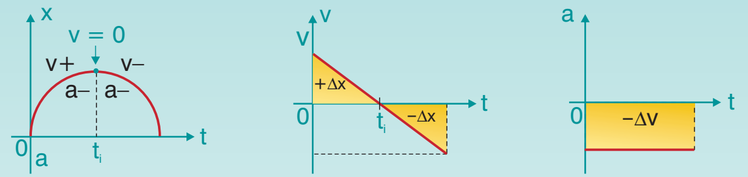


v → variável
a → constante ≠ 0

$\begin{cases} x = x_0 + v_0 \cdot t + \frac{1}{2} a \cdot t^2 \\ v = v_0 + a \cdot t \\ v^2 = v_0^2 + 2 \cdot a \cdot \Delta x \end{cases}$

$a = a_m = \frac{\Delta v}{\Delta t}$

$v_m = \frac{\Delta x}{\Delta t} = \frac{v + v_0}{2}$



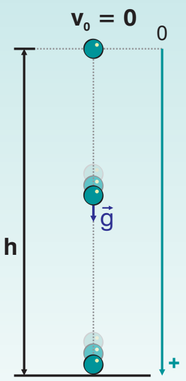
4) Queda livre

velocidade → **variável**
aceleração → **constante ≠ 0**

$h = \frac{1}{2} g \cdot t^2$

$v = g \cdot t$

$v^2 = 2 \cdot g \cdot h$

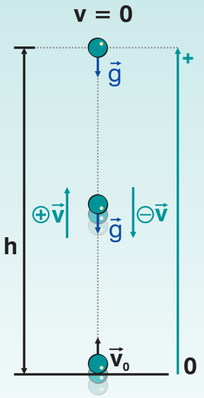


5) Lançamento vertical

$\begin{cases} v_m = x_0 + v_0 \cdot t + \frac{1}{2} a \cdot t^2 \\ h = v_0 \cdot t - \frac{1}{2} g \cdot t^2 \end{cases}$

$\begin{cases} v = v_0 + a \cdot t \\ v = v_0 - g \cdot t \end{cases}$

$\begin{cases} v^2 = v_0^2 + 2 \cdot a \cdot \Delta x \\ v^2 = v_0^2 - 2 \cdot g \cdot h \end{cases}$



6) Lançamento horizontal

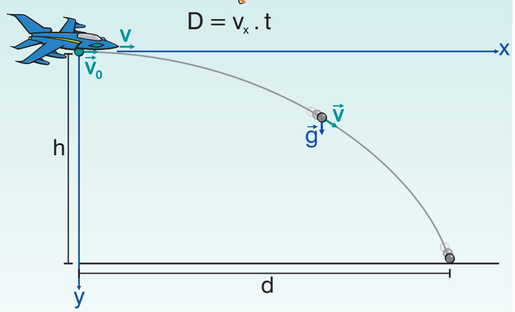
No eixo y
$\vec{a}_y = \vec{g}$; logo, temos um M.R.U.V.

$\begin{cases} x = x_0 + v_{0x} \cdot t + \frac{1}{2} a_y \cdot t^2 \\ h = \frac{1}{2} g \cdot t^2 \end{cases}$

$\begin{cases} v_y = v_{0y} + a_y \cdot t \\ v_y = g \cdot t \end{cases}$

$\begin{cases} v_y^2 = v_{0y}^2 + 2 \cdot a_y \cdot \Delta x \\ v_y^2 = 2 \cdot g \cdot h \end{cases}$

No eixo x
$a_x = 0$; logo, temos um M.R.U.
$x = x_0 + v \cdot t$
$D = v_x \cdot t$



7) Lançamento oblíquo

No eixo y: $a_y = -g$; logo, temos um M.R.U.V.

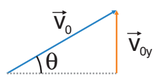
$\begin{cases} x = x_0 + v_{0y} \cdot t + \frac{1}{2} a_y \cdot t^2 \\ h = v_0 \cdot \text{sen}\,\theta \cdot t - \frac{1}{2} g \cdot t^2 \end{cases}$

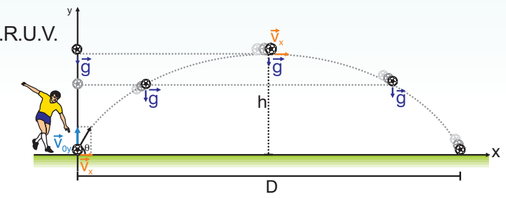
$\begin{cases} v_y = v_{0y} + a_y \cdot t \\ v_y = v_0 \cdot \text{sen}\,\theta \cdot t - g \cdot t \end{cases}$

$\begin{cases} v_y^2 = v_{0y}^2 + 2 \cdot a_y \cdot \Delta x \\ v_y^2 = (v_0 \cdot \text{sen}\,\theta)^2 - 2 \cdot g \cdot h \end{cases}$

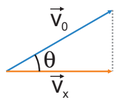
$\text{sen}\,\theta = \frac{v_{0y}}{v_0}$

$v_{0y} = v_0 \cdot \text{sen}\,\theta$





No eixo x: $a_x = 0$; logo, temos um M.R.U.



$\cos\theta = \frac{v_x}{v_0}$

$v_x = v_0 \cdot \cos\theta$

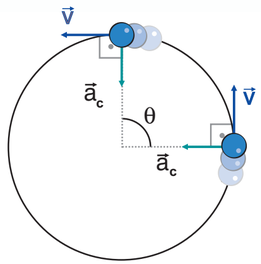
$x = x_0 + v_x \cdot t$

$D = v_0 \cdot \cos\theta \cdot t$

Importante!

$\theta = 45° \longrightarrow D_m = \frac{v_0^2}{g}$ $\quad \theta_1 + \theta_2 = 90° \quad D_1 = D_2$

8) M.C.U



$|\vec{v}| \longrightarrow$ constante ≠ 0 $\quad \vec{a} = \vec{a}_T^{\,0} + \vec{a}_C$

módulo | direção | sentido

$\vec{a} = \vec{a}_C$

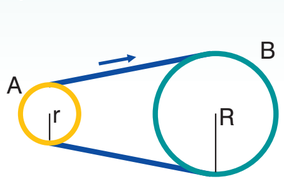
$a_c = \frac{v^2}{R}$ $\quad \begin{cases} \text{Centrípeta} \\ \text{Radial} \\ \text{Normal} \end{cases}$ $\quad a \longrightarrow \frac{m}{s^2}$

T → tempo de uma volta completa → (s)

$f = \frac{\text{nº de voltas}}{\Delta T} \longrightarrow \frac{\text{voltas}}{s} \longrightarrow \text{Hertz} \longrightarrow (\text{Hz})$

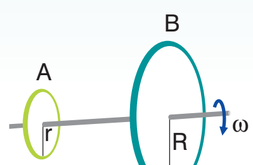
$f = \frac{1}{T}$ $\quad T = 2\pi\sqrt{\frac{\ell}{g}}$ $\quad T = 2\pi\sqrt{\frac{m}{k}}$

8) M.C.U



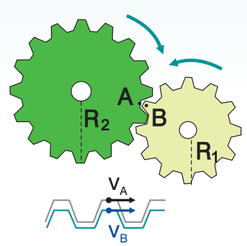
$v_A = v_B$

$\begin{cases} T_B > T_A \\ f_A > f_B \\ \omega_A > \omega_B \end{cases}$



$\omega_B = \omega_A$

$\begin{cases} T_A = T_B \\ f_B = f_A \\ v_B > v_A \end{cases}$



$v_A = v_B$

$\begin{cases} T_A > T_B \\ f_B > f_A \\ \omega_B > \omega_A \end{cases}$