Unidades, cantidades y vectores.

Componentes del vector

$|A| = A = \sqrt{A_x^2 + A_y^2}$ $\theta = \tan^{-1}\left(\frac{y}{x}\right)$

$\vec{A} = \vec{A_x} + \vec{A_y}$  $A_x = A\cos\theta$ $A_y = A\operatorname{sen}\theta$  $C_x = C\operatorname{sen}\beta$ $C_y = C\cos\beta$

$\vec{D} = c\vec{A} \Leftrightarrow D_x = cA_x$ y $D_y = cA_y$

Producto de vectores

Escalar $\vec{A}\cdot\vec{B} = AB\cos\phi = A_xB_x + A_yB_y + A_zB_z$

Cruz $\vec{C} = \vec{A}\times\vec{B} = AB\operatorname{sen}\phi$ $\vec{A}\times\vec{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ A_x & A_y & A_z \\ B_x & B_y & B_z \end{vmatrix}$ $C_x = A_yB_z - A_zB_z$

$C_y = A_xB_z - A_zB_x$ $C_z = A_xB_y - A_yB_x$

Vector Unitario

$u' = \frac{u}{|u|}$

Suma

$R = \sqrt{A^2 + B^2 - 2AB\cos\theta}$ ó sumar componentes

$\vec{R} = \vec{A} + \vec{B} \rightarrow R_x = A_x + B_x$ $R_y = A_y + B_y$ $R = \sqrt{R_x^2 + R_y^2}$ $\theta = \tan^{-1}\left(\frac{R_y}{R_x}\right)$

Resta

$\vec{A} - \vec{B} = \vec{A} + (-\vec{B})$ Cambia dirección

Movimiento Rectilíneo

$Inst = \lim_{\Delta t \to 0} \frac{\Delta x}{\Delta t}$

Velocidad Media $v_{med\text{-}x} = \frac{\Delta x}{\Delta t} = \frac{x_t - x_0}{t_t - t_0}$ Instantánea $v_x = \frac{d}{dt}x$

Aceleración Media $a_{med\text{-}x} = \frac{\Delta v}{\Delta t} = \frac{v_t - v_0}{t_t - t_0}$ Instantánea $a_x = \frac{d}{dt}v$

Ecuación	Cantidades que incluye
$v_x = v_{0x} + a_x t$	t v_x a_x
$x = x_0 + v_{0x}t + \frac{1}{2}a_x t^2$	t x a_x
$v_x^2 = v_{0x}^2 + 2a_x(x - x_0)$	x v_x a_x
$x - x_0 = \left(\frac{v_{0x} + v_x}{2}\right)t$	t x v_x

Caída libre

$g = 9{,}8\ m/s^2$ $a_y = -g = cte$

Ecuación	Cantidades que incluye
$v_y = v_{0y} + a_y t$	t v_x a_x
$y = y_0 + v_{0y}t + \frac{1}{2}a_y t^2$	t x a_x
$v_y^2 = v_{0y}^2 + 2a_y(y - y_0)$	x v_x a_x

$y_{max} = \frac{v_{0y}^2}{2g}$ $v_y = 0$ $y_0 = 0$ $a_y = -g$

Velocidad y Posición por Integración

$\Delta v_x = a_{med\text{-}x}\,\Delta t$ $v_{2x} - v_{1x} = \int_{v_{1x}}^{v_{2x}} dv_x = \int_{t_1}^{t_2} a_x\,dt$ $x_2 - x_1 = \int_{x_1}^{x_2} dx = \int_{t_1}^{t_2} v_x\,dt$

$v_x = v_{0x} + \int_0^t a_x\,dt$ $x = x_0 + \int_0^t v_x\,dt$

Movimiento en tres dimensiones

Posición $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$

Velocidad Media $\vec{v}_{med} = \frac{\vec{r}_2 - \vec{r}_1}{t_2 - t_1} = \frac{\Delta\vec{r}}{\Delta t}$

Instantánea $\vec{v} = \frac{d\vec{r}}{dt} = \lim_{\Delta t \to 0}\frac{\Delta\vec{r}}{\Delta t}$ $v_x = \frac{dx}{dt}$ $v_y = \frac{dy}{dt}$ $v_z = \frac{dz}{dt}$

Aceleración Media $a_{med\text{-}x} = \frac{\vec{v}_2 - \vec{v}_1}{t_2 - t_1} = \frac{\Delta\vec{v}}{\Delta t}$

Instantánea $\vec{a} = \frac{d}{dt}\vec{v} = \lim_{\Delta t \to 0}\frac{\Delta\vec{v}}{\Delta t}$ $a_x = \frac{d}{dt}v_x$ (i) $a_y = \frac{d}{dt}v_y$ (j) $a_z = \frac{d}{dt}v$ (k)

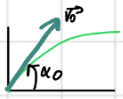
Proyectiles

Supuestos $a_x = 0$, $a_y = -g$, $V_x = cte$ $\alpha_{0\,inicial} = 0$

1) $X = X_0 + V_{0x}t$ 2) $V_y = V_{0y} - gt$ 3) $y = y_0 + V_{0y}t - \frac{1}{2}gt^2$

Si $x_0 = y_0 = 0$ 1) $X = (V_0\cos\alpha_0)t$ 2) $y = (V_0\operatorname{sen}\alpha_0)t - \frac{1}{2}gt^2$

3) $V_x = V_0\cos\alpha_0$ 4) $V_y = V_0\operatorname{sen}\alpha_0 - gt$



$r = \sqrt{x^2 + y^2}$ $v = \sqrt{v_x^2 + v_y^2}$ $\alpha = \tan^{-1}\left(\frac{v_y}{v_x}\right)$

x, y: $y = (\tan\alpha_0)x - \frac{g}{2v_0^2\cos^2\alpha_0}x^2 \rightarrow y = bx - cx^2$

Prefijo	Símbolo	Magnitud
giga-	G	10^9
mega-	M	10^6
kilo-	k	10^3
hecto-	h	10^2
dekta-	d	10^1
	base	10^0
deci-	d	10^{-1}
centi-	c	10^{-2}
milli-	m	10^{-3}
micro-	μ	10^{-6}
nano-	n	10^{-9}

1 pulgada = 1 in = 2,54 cm

1 pie = 1 ft = 30,48 cm

1 yarda = 1 yd = 0,914 m

1 milla = 1 mi = 1609 Km

SI m, Kg, s, A, K, mol, cd.

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} \begin{bmatrix} a & b & c \end{bmatrix} = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$3 \times 1 \quad 1 \times 3$

$$\begin{bmatrix} 2 & 12 \end{bmatrix} - \begin{bmatrix} 7 & 11 \end{bmatrix} = \underset{1 \times 2}{\begin{bmatrix} -5 & 1 \end{bmatrix}}$$

$$\begin{bmatrix} -5 \\ 1 \end{bmatrix} \begin{bmatrix} -5 & 1 \end{bmatrix} = \begin{bmatrix} 25 & -5 \\ -5 & 1 \end{bmatrix} + \begin{bmatrix} 1 & -2 \\ -2 & 4 \end{bmatrix} = \begin{bmatrix} 26 & -7 \\ -7 & 5 \end{bmatrix} =$$

$$\begin{bmatrix} 8 & 9 \end{bmatrix} - \begin{bmatrix} 7 & 11 \end{bmatrix} = \begin{bmatrix} 1 & -2 \end{bmatrix} \quad \begin{bmatrix} 1 \\ -2 \end{bmatrix} \begin{bmatrix} 1 & -2 \end{bmatrix} = \begin{bmatrix} 1 & -2 \\ -2 & 4 \end{bmatrix}$$

Taller Vectores, MRV, caída libre, proyectiles

3.16 a) $V_x = 50\frac{m}{s}\cdot\cos(60) = 25\frac{m}{s}$ $V_y = 50\frac{m}{s}\cdot\sin(60) - 0 = 25\sqrt{3}\frac{m}{s} = 43{,}3\frac{m}{s}$

b) $t = \frac{V_f - V_0\sin\alpha_0}{-g} = \frac{V_0\sin\alpha}{g} = 4{,}42\ s.$

c) $y = (V_0\sin\alpha_0)t - \frac{1}{2}gt^2 = 95{,}66\ m$

d) $x = \frac{-b\pm\sqrt{b^2-4ac}}{2a} = \frac{-\sqrt{3}\pm\sqrt{3-4\left(\frac{49}{625}\right)(0)}}{2\cdot\frac{49}{625}} = \begin{cases} x_1 = 0 \\ x_2 = 220{,}92\ m \end{cases}$

e) En $y = 95{,}66\ m$ $V_y = 0 = V_{0s}$ $V_x = 25$ $A_x = 0\ m/s^2$ $A_y = -9{,}8\ m/s^2$

(b) $y_0, x_0 = 0$ $a_x = 0$ $a_y = -g$ $V_{0x} = 3{,}05\ m/s$ $y = -38\ m$ $t = t + 9s$

$y = y_0 + V_{0y}t - \frac{1}{2}gt^2 \rightarrow -38 = -\frac{1}{2}9{,}8t^2$ $t = 2{,}78$ $\Delta t = 11{,}78$

$x = x_0 + V_{0x}t \rightarrow x = 35{,}93\ m$ $V_{0x} = \frac{x}{t} = \frac{35{,}93\ m}{2{,}78\ s} = 12{,}92$

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