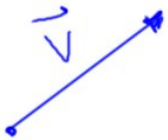
0.Conceptos Previos

1) Vectores:

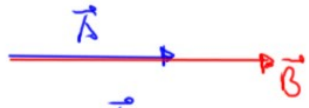


Dirección
Sentido u Orientación
Tamaño ó Módulo $|\vec{V}| = \sqrt{V_x^2 + V_y^2 + V_z^2}$

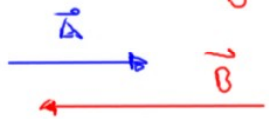
2) Tipos de Vectores

Paralelos:

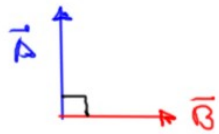
Colineales:



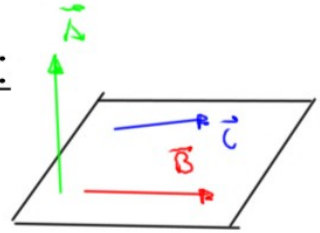
Antiparalelos:



Perpendiculares:



Coplanares:

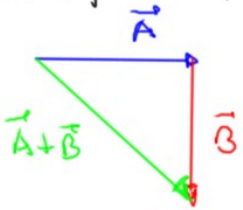


3) Operaciones de Vectores:

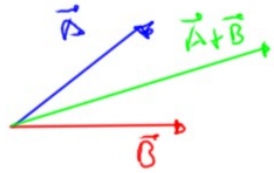
1) Suma de Vectores
2) Resta de Vectores
3) Multiplicación por escalar

1) Suma de Vectores: $\vec{A} = (a\hat{x} + b\hat{y} + c\hat{z})$, $\vec{B} = (d\hat{x} + e\hat{y} + f\hat{z})$

$\vec{A} + \vec{B} = ((a+d)\hat{x} + (b+e)\hat{y} + (c+f)\hat{z})$

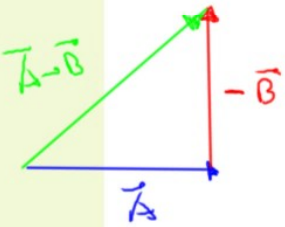


Ley del paralelogramo



2) Resta de Vectores:

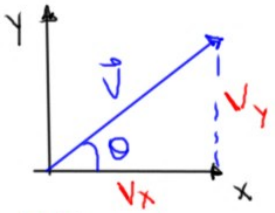
$\vec{A} + (-\vec{B}) = ((a-d)\hat{x} + (b-e)\hat{y} + (c-f)\hat{z})$



3) Multiplicación por escalar: $\alpha\vec{A} = \alpha(a\hat{x} + b\hat{y} + c\hat{z})$

4) Vectores en 2D:

$\hat{x} = \hat{i}$
$\hat{y} = \hat{j}$
$\hat{z} = \hat{k}$

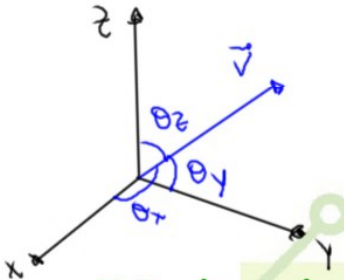


$\vec{V}_x = |\vec{V}| \cos\theta \, \hat{i}$

$\vec{V}_y = |\vec{V}| \operatorname{sen}\theta \, \hat{j}$

$\theta = Tg^{-1}\left(\frac{V_y}{V_x}\right)$

5) Vectores en 3D:



$\vec{V}_x = |\vec{V}| \cos\theta_x \, \hat{i}$

$\vec{V}_y = |\vec{V}| \cos\theta_y \, \hat{j}$

$\vec{V}_z = |\vec{V}| \cos\theta_z \, \hat{k}$

$\theta_x = \cos^{-1}\left(\frac{V_x}{|\vec{V}|}\right)$

$\cos^2\theta_x + \cos^2\theta_y + \cos^2\theta_z = 1$

(Cosenos directores)

6) Vector Unitario:

$|\hat{V}| = 1$

$\hat{V} = \frac{\vec{V}}{|\vec{V}|}$

7) Producto escalar:

$\vec{A} \perp \vec{B} \Rightarrow \vec{A} \cdot \vec{B} = 0$

$$\theta = \cos^{-1}\left(\frac{\vec{A}\cdot\vec{B}}{|\vec{A}||\vec{B}|}\right)$$ (Ángulo entre dos vectores)

Definición: $\vec{A} \cdot \vec{B} = |\vec{A}||\vec{B}| \cos\theta$

Forma Analítica: $\vec{A} \cdot \vec{B} = (a_x b_x) + (a_y b_y) + (c_x c_y) =$ Número (Escalar)

8) Producto Vectorial:

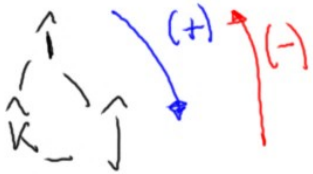
$\vec{A} \parallel \vec{B} \Rightarrow \vec{A} \times \vec{B} = 0$

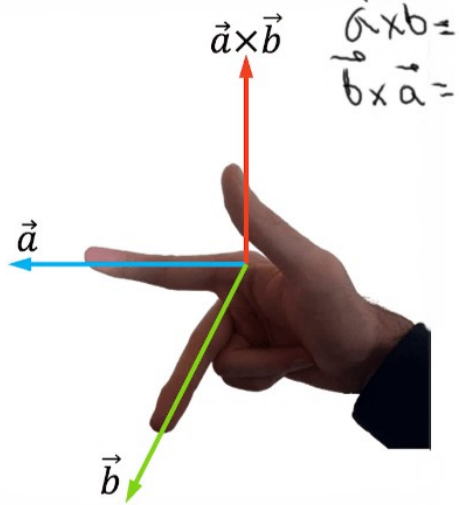
Regla de la mano derecha:

Definición: $\vec{A} \times \vec{B} = |\vec{A}||\vec{B}| \operatorname{sen}\theta$

Forma Analítica:

$$\vec{A}\times\vec{B} = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ a_x & a_y & a_z \\ b_x & b_y & b_z \end{vmatrix} = \hat{\imath}\left[(a_y b_z) - (a_z b_y)\right] - \hat{\jmath}\left[(a_x b_z) - (a_z b_x)\right] + \hat{k}\left[(a_x b_y) - (a_y b_x)\right]$$

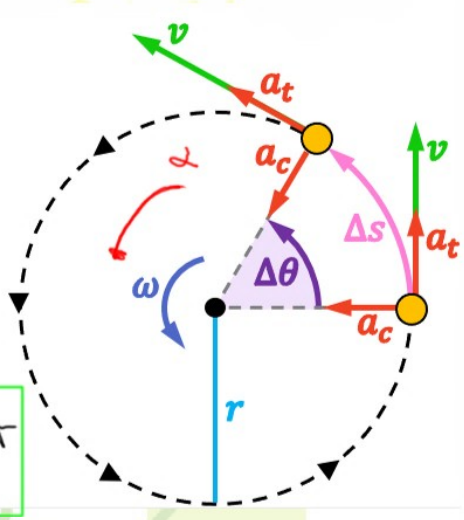




$\vec{a}\times\vec{b}$ = ⊙ Positivo

$\vec{b}\times\vec{a}$ = ⊗ Negativo

9) Movimiento Circular:



Velocidad Tangencial: $V = \omega r$ $[m/s]$

Posición Angular: $\theta = \int \omega \, dT$ $[rad]$

Velocidad Angular: $\omega = \frac{d\theta}{dT}$, $\omega = \int \alpha \, dT$

$\omega \rightarrow [rad/s]$

Aceleración Angular: $\alpha = \frac{d\omega}{dT} = \frac{d^2\theta}{dT^2}$ $[rad/s^2]$

Aceleración Centrípeta: $a_c = \frac{V^2}{r} = \omega^2 r$ $[m/s^2]$

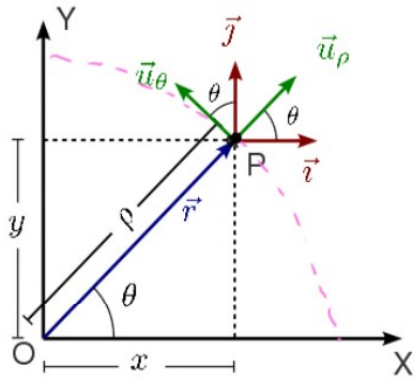
Aceleración Tangencial:

$a_T = \alpha r$ $[m/s^2]$

Arco de una circunferencia:

$\Delta s = r \, \Delta\theta$

10) Coordenadas Polares: $(\hat{\rho}, \hat{\theta}) \Rightarrow (\hat{r}, \hat{\Theta})$



$$\hat{\rho} = \cos\theta\,\hat{x} + \operatorname{sen}\theta\,\hat{y}$$

$$\hat{\theta} = -\operatorname{sen}\theta\,\hat{x} + \cos\theta\,\hat{y}$$