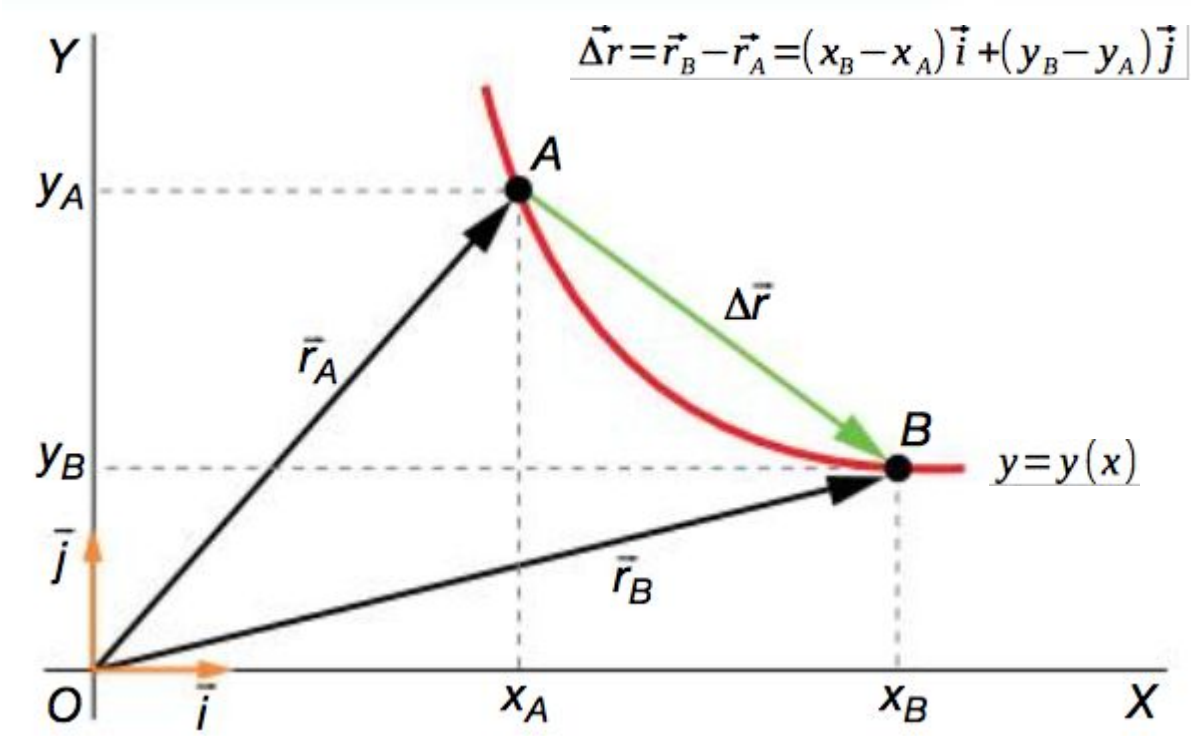
POSICIÓN

$$\vec{r}(t)=x(t)\,\vec{i}+y(t)\,\vec{j}$$

$$|\vec{r}|=r=\sqrt{(x^2+y^2)}$$



VELOCIDADE

$$\vec{v}_m = \frac{\Delta \vec{r}}{\Delta t} \quad \therefore \quad |\vec{v}_m| = \frac{|\Delta \vec{r}|}{\Delta t} = v_m$$

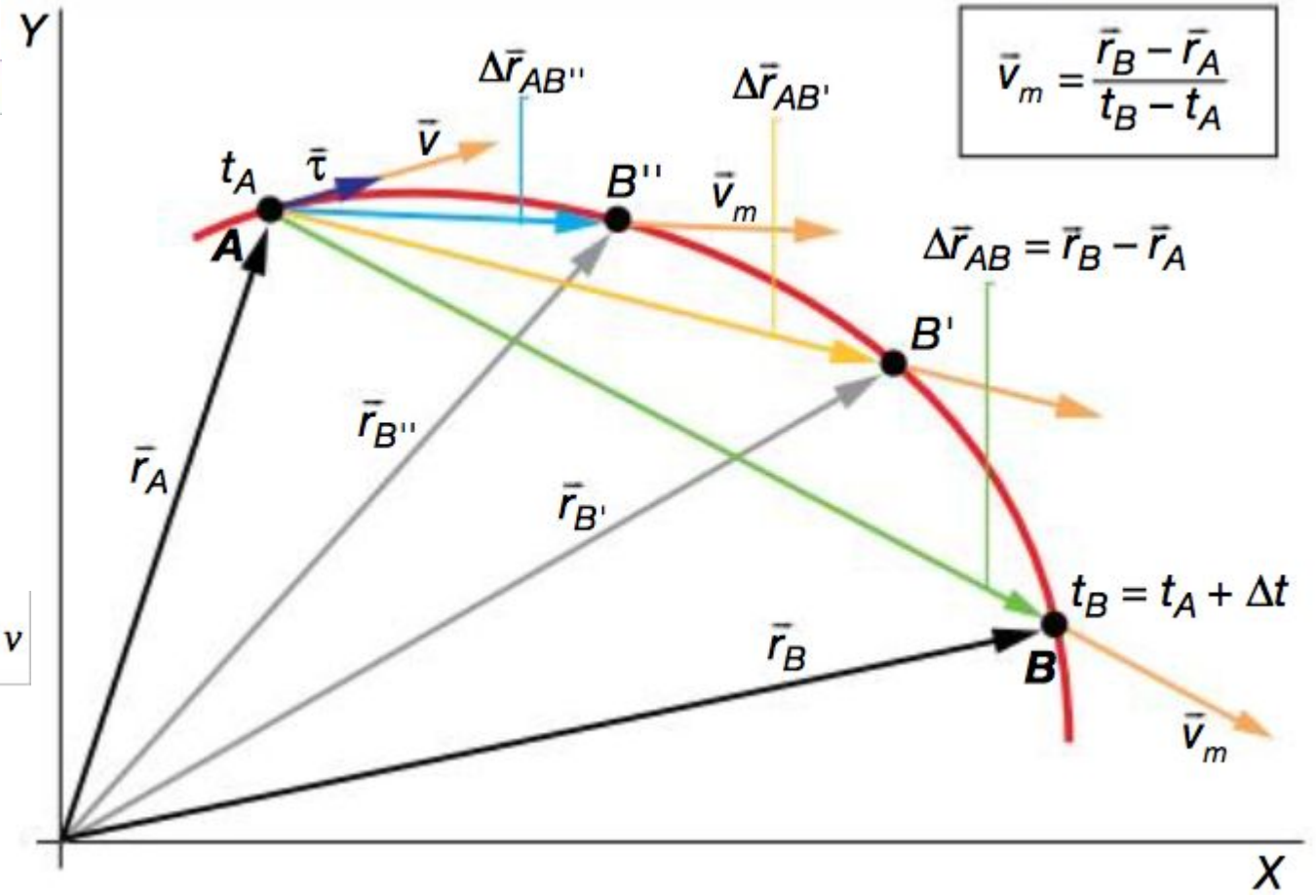
$$c_m = \frac{\Delta s}{\Delta t} \qquad \Delta s \geq |\Delta \vec{r}| \Rightarrow c_m \geq |\vec{v}_m|$$

$$\vec{v}(t) = \lim_{\Delta t \to 0} \frac{\Delta \vec{r}}{\Delta t} = \frac{d\vec{r}(t)}{dt}$$

$$\frac{dx(t)}{dt}\vec{i} + \frac{dy(t)}{dt}\vec{j} = v_x \vec{i} + v_y \vec{j}$$

$$|\vec{v}| = v = \sqrt{(v_x^2 + v_y^2)}$$

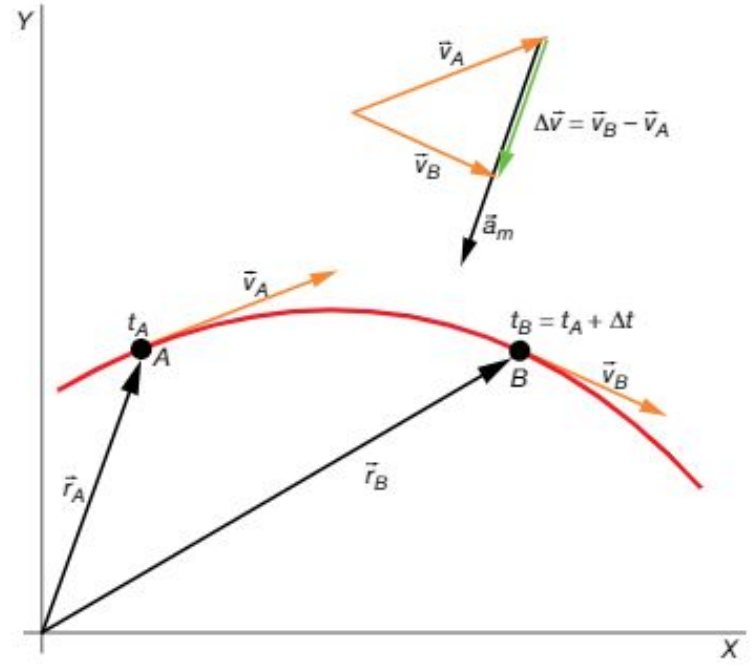
$$c = \lim_{\Delta t \to 0} \frac{\Delta s}{\Delta t} = \frac{ds(t)}{dt} = \frac{|d\vec{r}(t)|}{dt} = v$$

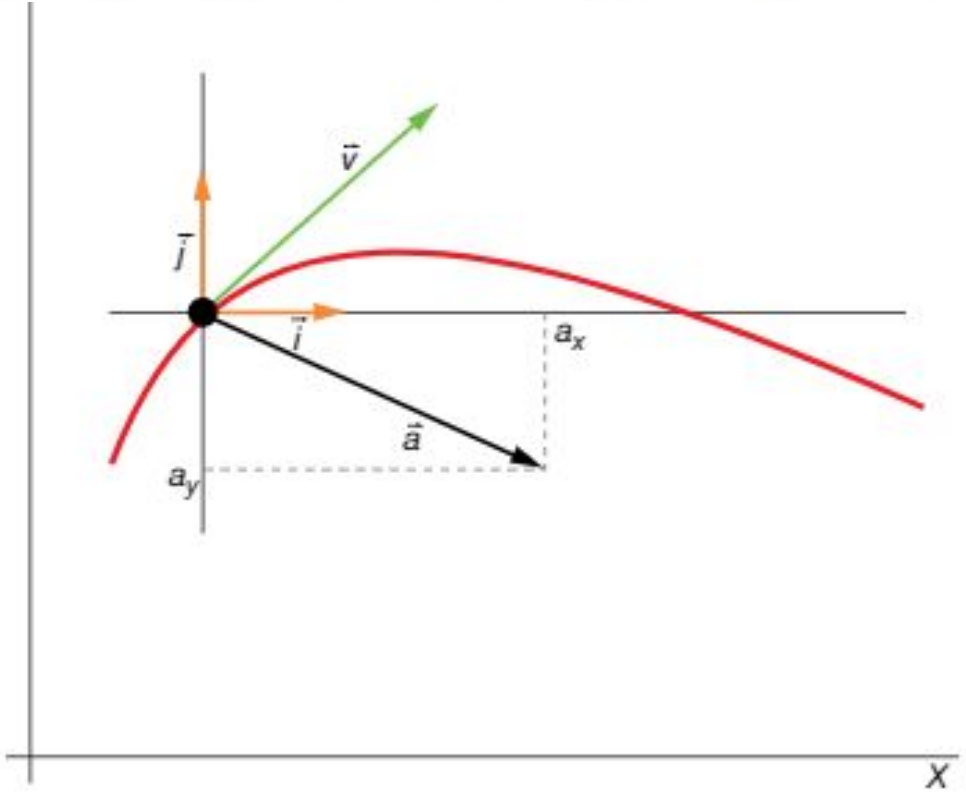


ACELERACIÓN

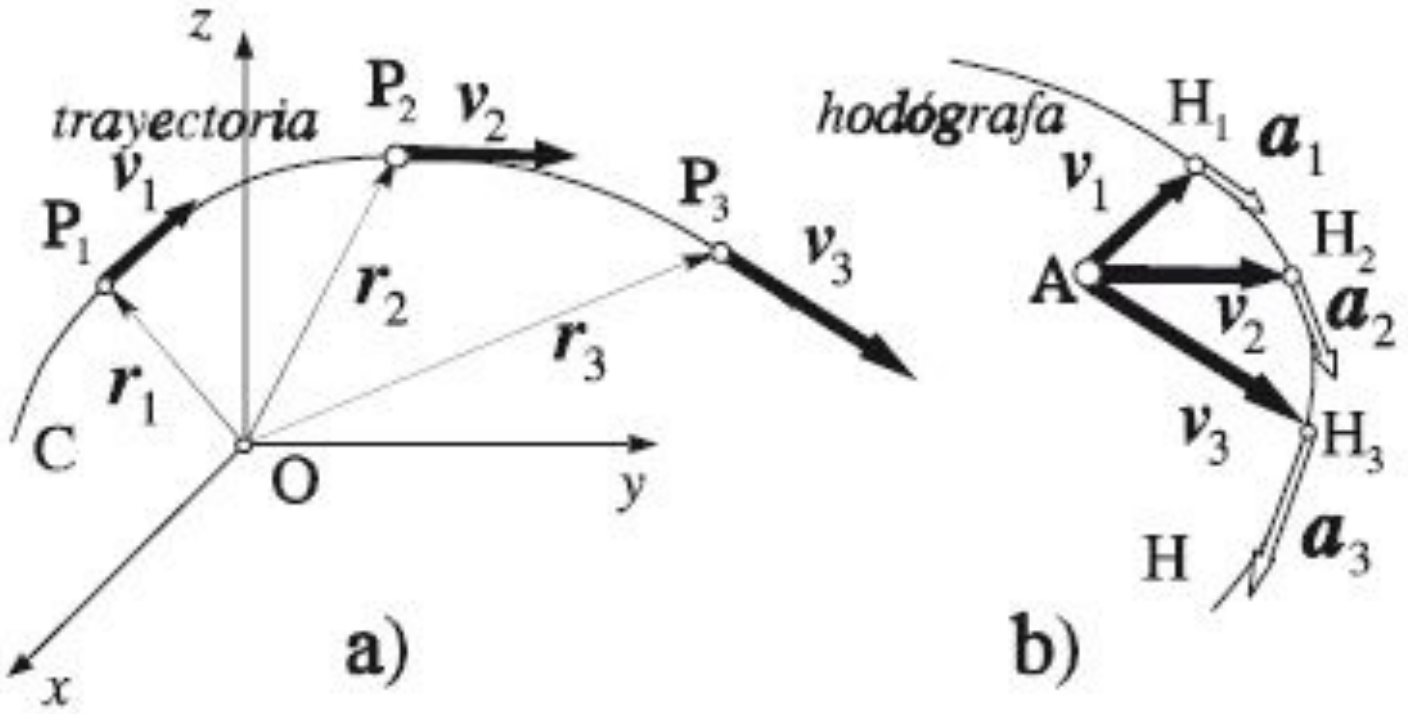
$$\vec{a}_m = \frac{\Delta \vec{v}}{\Delta t} \quad \therefore \quad |\vec{a}_m| = \frac{|\Delta \vec{v}|}{\Delta t} = a_m$$

$$\vec{a}(t) = \lim_{\Delta t \to 0} \frac{\Delta \vec{v}}{\Delta t} = \frac{d\vec{v}(t)}{dt} = \frac{d}{dt}\left(v_x(t)\,\vec{i} + v_y(t)\,\vec{j}\right) = \frac{dv_x(t)}{dt}\,\vec{i} + \frac{dv_y(t)}{dt}\,\vec{j} = a_x\,\vec{i} + a_y\,\vec{j}$$





Similitude entre a traxectoria (tr) e a hodógrafa (hd) para definir a velocidade(tr) e a aceleración (hd)

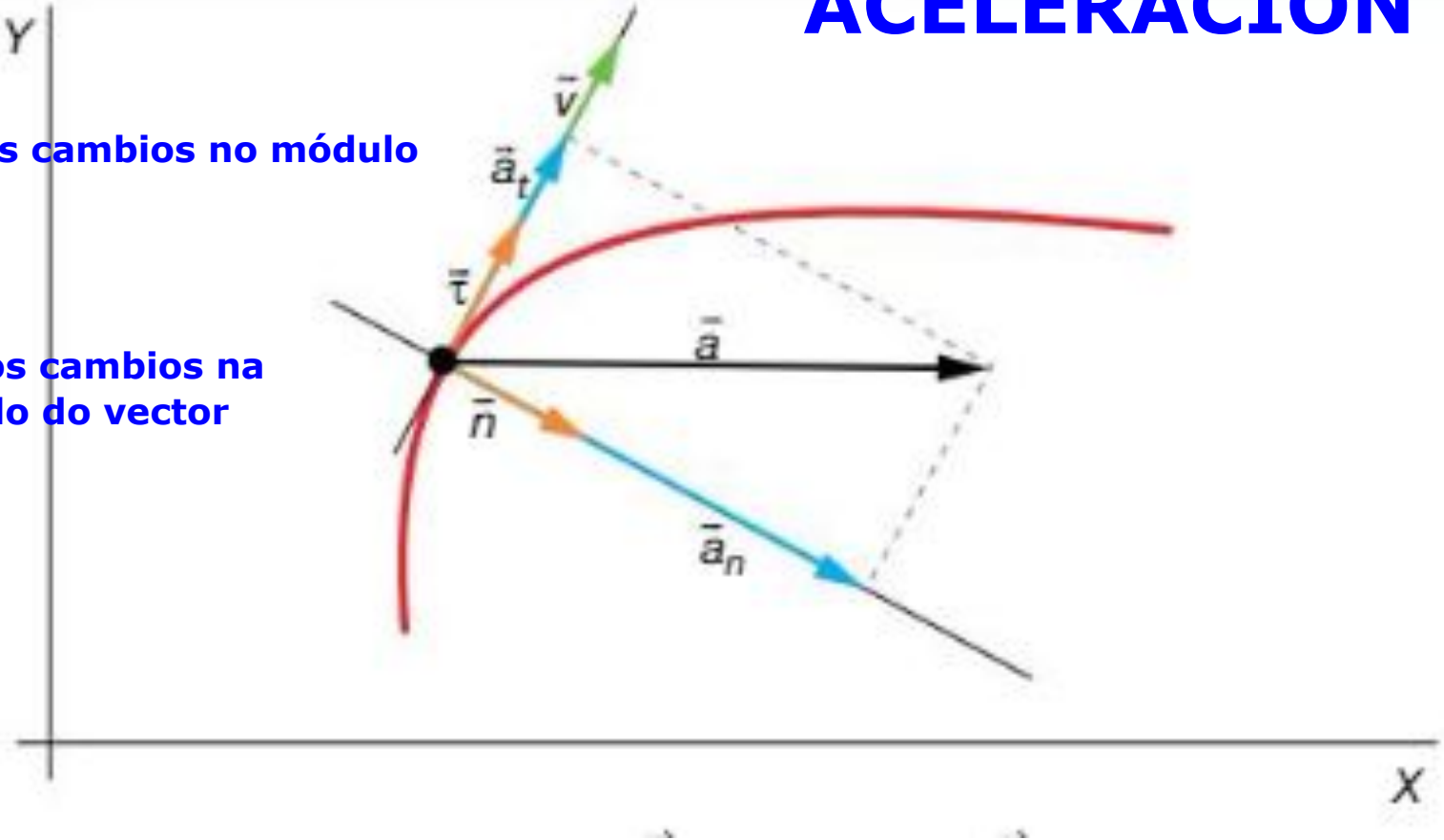


$$\vec{a}=\frac{dv}{dt}\vec{\tau}+v\frac{d\vec{\tau}}{dt}=\frac{dv}{dt}\vec{\tau}+\frac{v^2}{\rho}\vec{n}=a_t\vec{\tau}+a_n\vec{n}$$

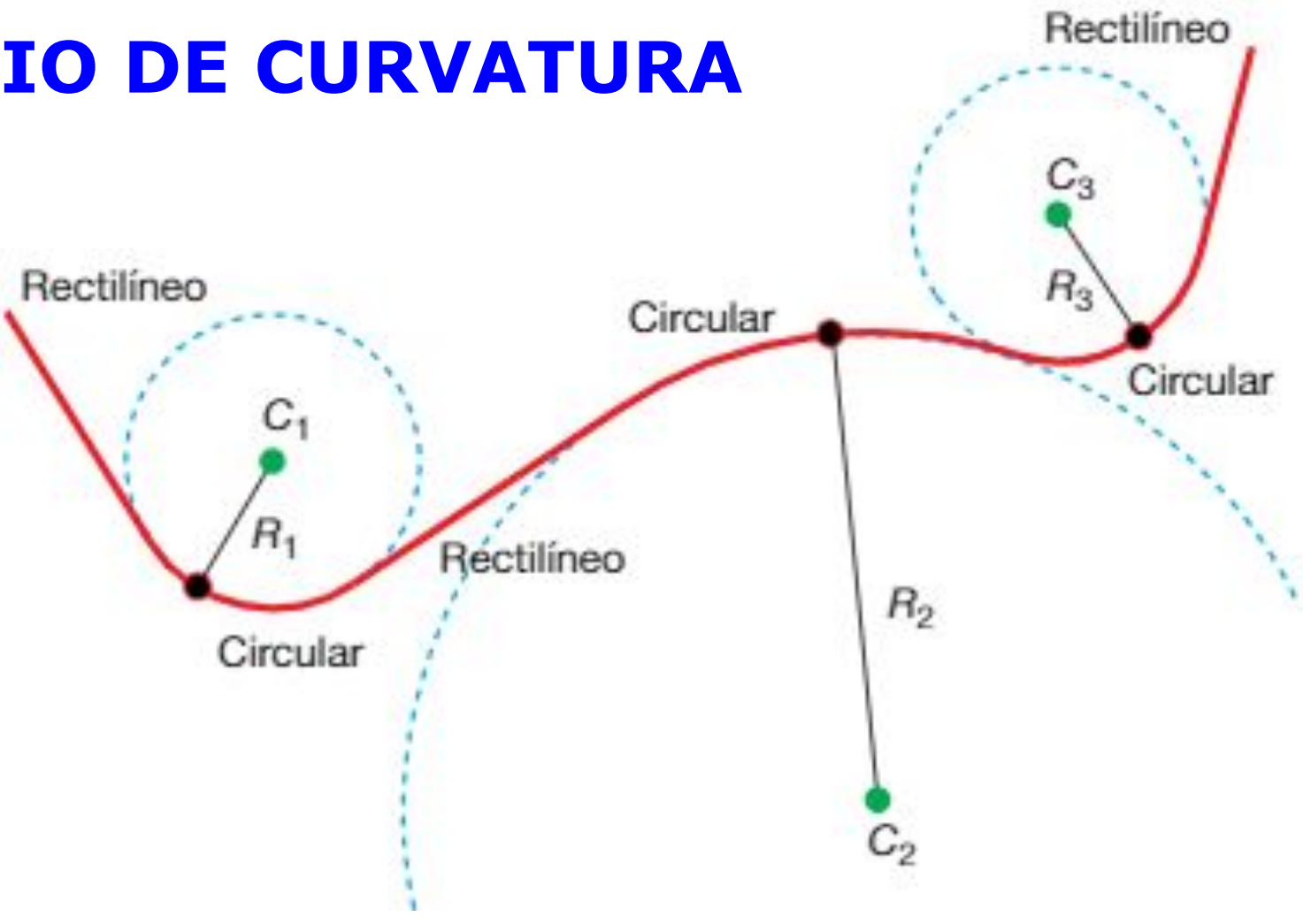
COMPOÑENTES DA ACELERACIÓN

a_t ten en conta os cambios no módulo da velocidade

a_n ten en conta os cambios na dirección e sentido do vector velocidade



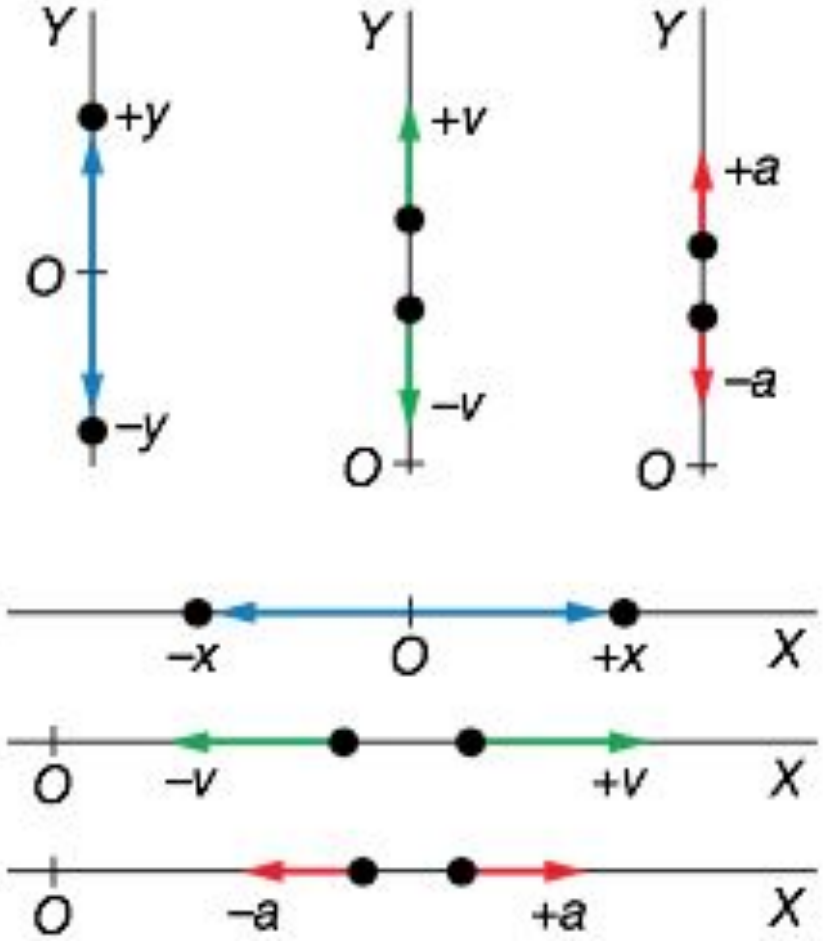
RAIO DE CURVATURA



TIPOS DE MOVEMENTOS EN FUNCIÓN DAS COMPOÑENTES DA ACELERACIÓN

Movemento	$a_t=0$	$a_t\neq0$ (cte)	$a_t\neq0$ (non cte)
$a_n=0$ ($\varrho \to \infty$)	MRU	MRUA	MRA
$a_n\neq0$ (ϱ=cte)	MCU	MCUA	MCA
$a_n\neq0$ ($\varrho\neq$cte)	MCvU	MCvUA	MCvA

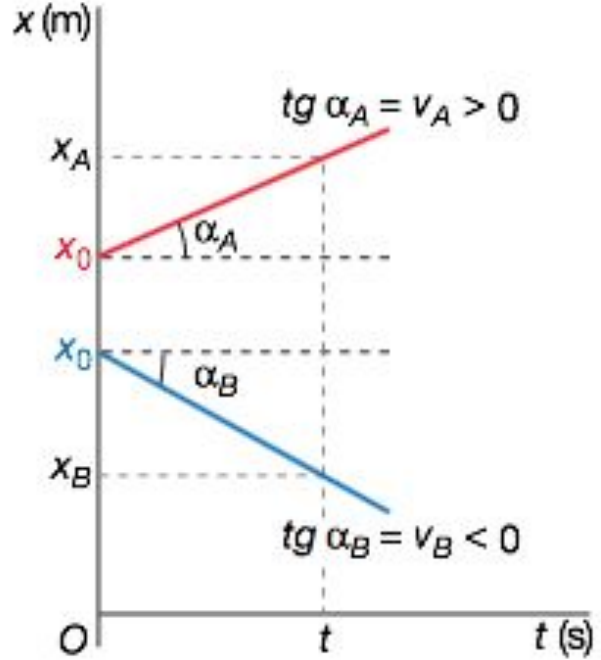
Convenio de signos

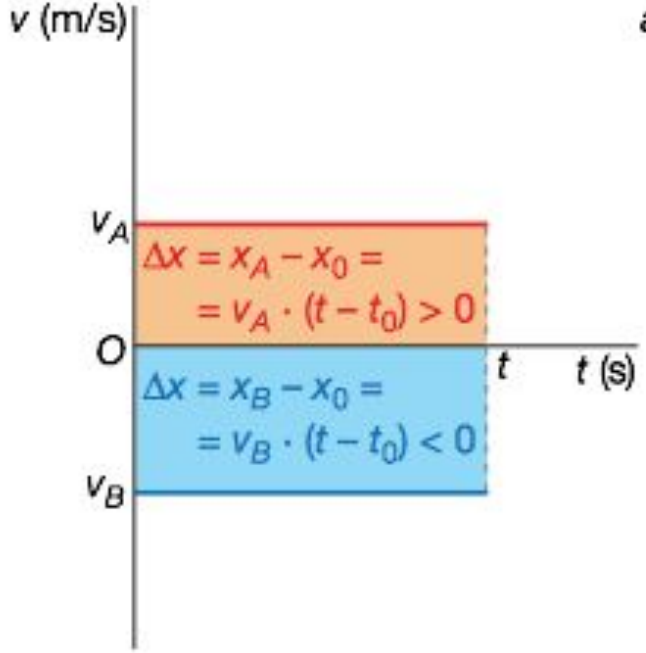


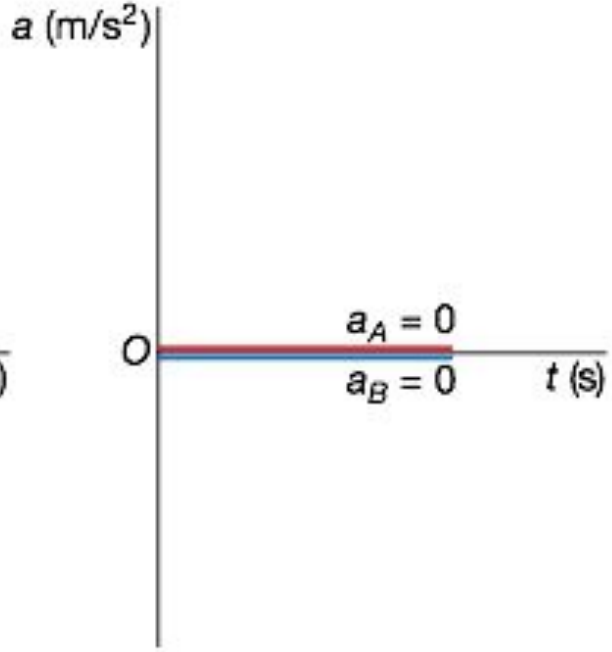
MRU

$$0=\vec{a}(t)=\lim_{\Delta t\to 0}\frac{\Delta\vec{v}}{\Delta t}=\frac{d\vec{v}(t)}{dt}\Rightarrow\Delta\vec{v}=0\Rightarrow\vec{v}=cte=\vec{v}_m$$

$$\vec{v}(t)=\lim_{\Delta t\to 0}\frac{\Delta\vec{r}}{\Delta t}=\frac{d\vec{r}(t)}{dt}\Rightarrow\frac{\Delta x}{\Delta t}=v\Rightarrow\Delta x=\Delta s=v\,\Delta t\Leftrightarrow(x-x_0)=v(t-t_0)\Leftrightarrow x=x_0+v(t-t_0)$$







MRUA

$$cte = \vec{a}(t) = \lim_{\Delta t \to 0} \frac{\Delta \vec{v}}{\Delta t} = \frac{d\vec{v}(t)}{dt} = \frac{\Delta \vec{v}}{\Delta t} = \vec{a}_m \Leftrightarrow a = \frac{\Delta v}{\Delta t} \Leftrightarrow \Delta v = a\,\Delta t \Leftrightarrow v = v_0 + a(t - t_0)$$

$$\frac{x - x_0}{t} = v_m = \frac{v + v_0}{2}$$

$$(x - x_0) = v_0\left(\frac{v - v_0}{a}\right) + \frac{1}{2}a\left(\frac{v - v_0}{a}\right)^2 \Leftrightarrow (x - x_0)\,2a = v^2 - v_0^2$$