Propuesto aux anterior

$$\cos\alpha + \cos\beta = 2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$$

$$\cos(u+v) = \cos u \cos v - \operatorname{sen} u \operatorname{sen} v$$

$$\cos(u-v) = \cos u \cos v + \operatorname{sen} u \operatorname{sen} v$$

$$\cos(u+v) + \cos(u-v) = 2\cos u \cos v$$

$\cos : \mathbb{R} \to [-1, 1]$

cualquier $\mathbb{R}$: $x = y + z$

$x = y' - z'$

$\alpha = u + v \quad \beta = u - v \longrightarrow u = \dfrac{\alpha+\beta}{2} \wedge v = \dfrac{\alpha-\beta}{2}$

$$\cos(\cancel{u+v}^{\,\alpha}) + \cos(\cancel{u-v}^{\,\beta}) = 2\cos \cancel{u}^{\,\frac{\alpha+\beta}{2}} \cos \cancel{v}^{\,\frac{\alpha-\beta}{2}}$$

$$\cos\alpha + \cos\beta = 2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right) \blacksquare$$

Ahora para la suma de senos:

$$\operatorname{sen} u + \operatorname{sen} v = 2\operatorname{sen}\left(\frac{u+v}{2}\right)\cos\left(\frac{u-v}{2}\right)$$

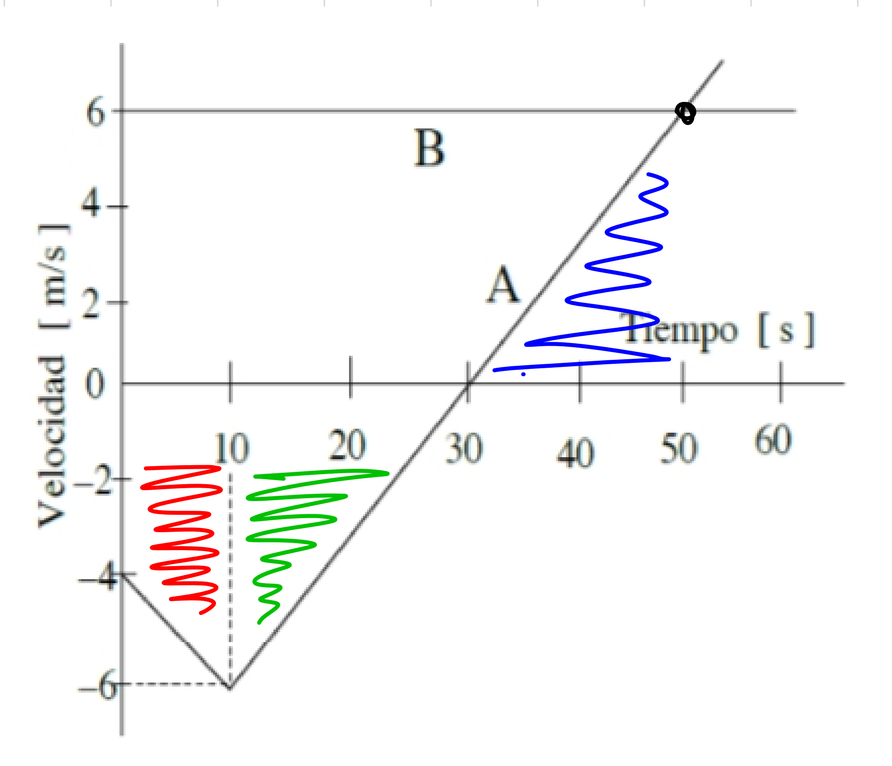
$$\operatorname{sen}(u+v) = \operatorname{sen} u \cos v + \operatorname{sen} u \cos v$$

$$\operatorname{sen}(u-v) = \operatorname{sen} u \cos v - \cos u \operatorname{sen} v$$

$$\operatorname{sen}(u+v) + \operatorname{sen}(u-v) = 2\operatorname{sen} u \cos v$$

CV : $\alpha = u + v \quad \beta = u - v \Rightarrow u = \dfrac{\alpha+\beta}{2} \quad v = \dfrac{\alpha-\beta}{2}$

$$\operatorname{sen}\alpha + \operatorname{sen}\beta = 2\operatorname{sen}\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right) \blacksquare$$



$x_0\ (t=0) = 25$ m

Analicemos el movimiento de A:

i) $= 4 \cdot 10 + \frac{10 \cdot 2}{2} = 50$ m → Área bajo el eje x → Retrocede

ii) $= 60$ → Retrocede

iii) $= 60$ → avanza

$\Rightarrow x_A = x_{0A} + DR_i + DR_{ii} + DR_{iii}$

$x_A = 25 - 50 - 60 + 60 = -25$ m

Analicemos ahora el mov. de B:

→ $6 \cdot 50 = 300$

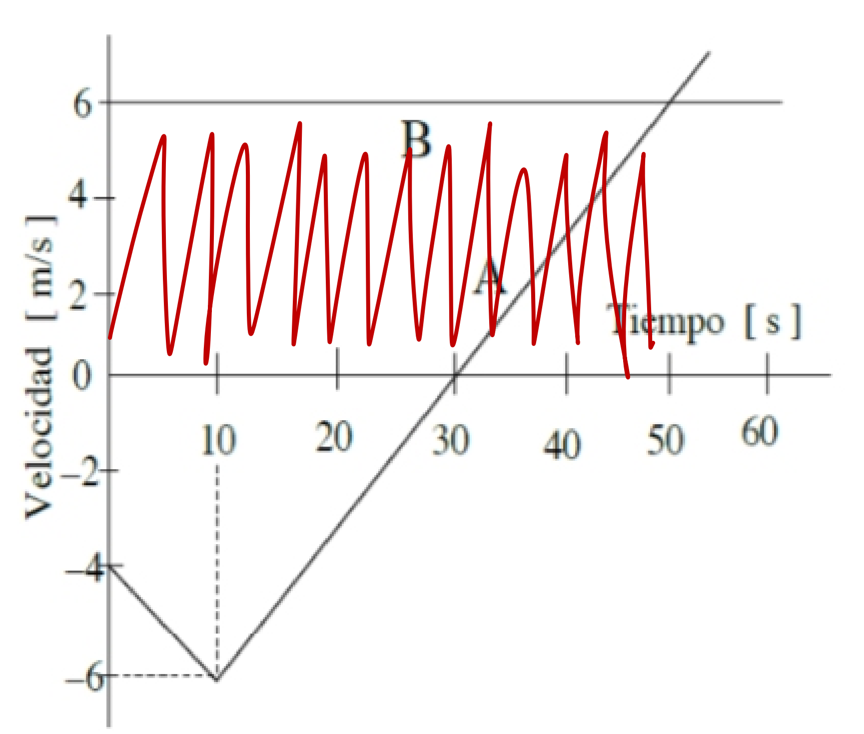
Área sobre el eje x

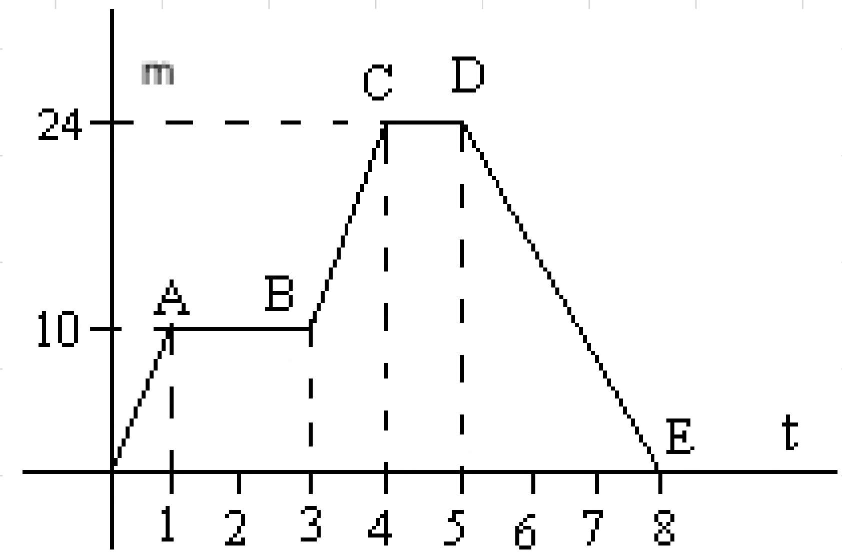
$\Rightarrow$ Avanza

$x_B = x_{0B} + DR_B$

$-25 = x_{0B} + 300$

$x_{0B} = -325$ m □





A - B 3,5
A - C 2
D - E 6,8

$$V_m(A-B) = 0 \text{ m/s}$$

$$V_m(A-C) = \frac{\Delta x}{\Delta t} = \frac{x_f - x_i}{t_f - t_i} = \frac{x_C - x_A}{t_C - t_A} = \frac{24 - 10}{4 - 1} = \frac{14}{3} \text{ m/s}$$

$$V_m(D-E) = \frac{0-24}{3} = -8 \text{ m/s}$$

V_{ins} 3,5 ; 2 ; 6,8

$V_{inst}(3,5) = 14$ m/s

$V_{inst}(2) = 0$ m/s

$V_{inst}(6,8) = -8$ m/s

$x_a = x_{oa} + v_a t \quad \wedge \quad x_b = x_{ob} - v_b t$

cuándo chocan? $\quad x_a = x_b$

$x_{oa} + v_a \cdot t = x_{ob} - v_b t$

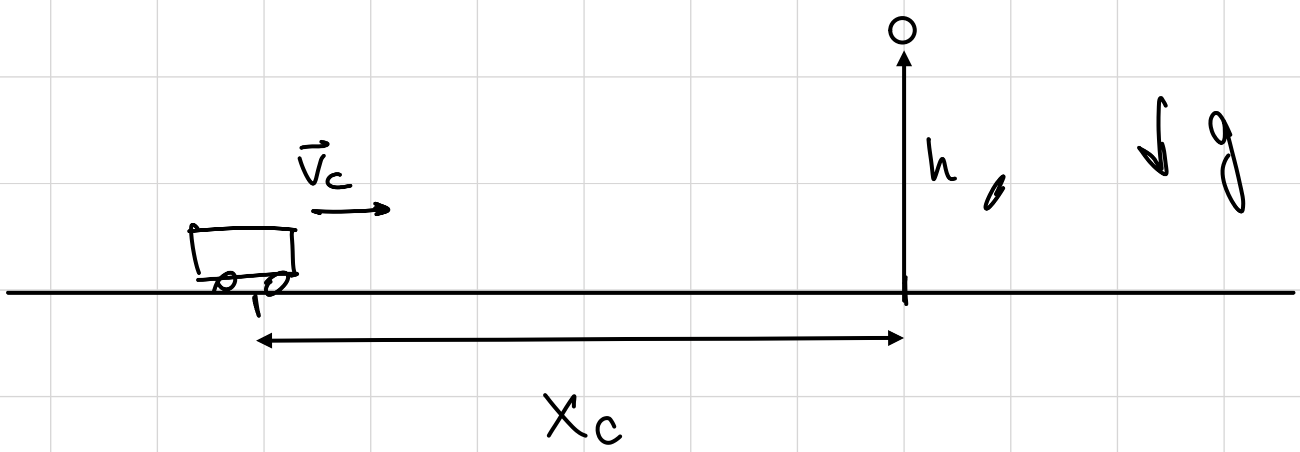
$v_a t + v_b t = x_{ob} - x_{oa}$

$t^* = \dfrac{x_{ob} - x_{oa}}{v_a + v_b}$ a

$x_a^* = x_{oa} + v_a \cdot t^*$

$x_{oa} + v_a \dfrac{x_{ob} - x_{oa}}{v_a + v_b}$

$\Rightarrow$ Propuesto: Despejar desde la Ec. de B, dar valores y ver si son iguales



$$X_c(t) = \cancel{X_{0c}}^{\,0} + V_c t$$

$$X_c = V_c t \rightarrow t^* = \frac{X_c}{V_c}$$

$$y(t) = y_0 + V_0 t - \frac{1}{2} g t^2$$

$$\cancel{y}^{\,0} - \cancel{y_0}^{\,h} = -h = \cancel{V_0 t}^{\,0} - \frac{1}{2} g t^2 \qquad \text{C.L}$$

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

$$h = \frac{1}{2} g \left(\frac{X_c}{V_c}\right)^2 \ \square$$

Preguntas interesantes del aux:

Cálculo de velocidad instantanea:

- Para que sea interesante veamos cambios de posición no lineales

i) sea $x(t) = t^2 + 4t + 1$, calcular V_{ins} en $t = 1$

$$\lim_{\Delta t \to 0} \frac{x(t+\Delta t) - x(t)}{\Delta t} = \lim_{\Delta t \to 0} \frac{(t+\Delta t)^2 + 4(t+\Delta t) + 1 - t^2 - 4t - 1}{\Delta t}$$

$$\lim_{\Delta t \to 0} \frac{\cancel{t^2} + 2t\Delta t + \Delta t^2 + \cancel{4t} + 4\Delta t + \cancel{1} - \cancel{t^2} - \cancel{4t} - \cancel{1}}{\Delta t}$$

$$\lim_{\Delta t \to 0} \frac{2t\Delta t + \Delta t^2 + 4\Delta t}{\Delta t} = \lim_{\Delta t \to 0} \frac{\cancel{\Delta t}(2t + \Delta t + 4)}{\cancel{\Delta t}}$$

$$\lim_{\Delta t \to 0} \Delta t + 2t + 4 = 2t + 4 \ \square$$

$\therefore V_{ins}(t) = 2t + 4$

↳ Para $t = 1$: $V_{ins}(t=1) = 2 \cdot 1 + 4 = 6 \ m/s$