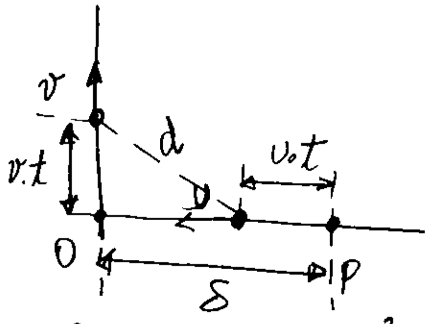
Resolução - Velocidade Escalar Média e Movimento Uniforme

1)



$d^2 = (\delta - vt)^2 + (v.t)^2$

$d^2 = \delta^2 - 2\delta v t + v^2t^2 + v^2t^2$

$d^2 = (v^2+v^2)t^2 - 2\delta v t + \delta^2$

⇒ d^2 em relação a t é uma função de 2° grau, cujo o mínimo é o vértice de seu gráfico. Assim, o instante em que a distância for mínima vale:

$$t_{min} = -\frac{b}{2a}$$

$$t_{min} = -\frac{(-2\delta v)}{2(v^2+v^2)}$$

$$t_{min} = \frac{\delta v}{(v^2+v^2)}$$

$$\delta - v \cdot \frac{\delta v}{v^2+v^2} = \frac{\delta v^2 + \delta v^2 - \delta v^2}{v^2+v^2}$$

$$= \frac{\delta v^2}{v^2+v^2}$$

Alternativa C

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2)

$$\begin{cases} v_b - v_c = \dfrac{\Delta s}{10} & \times(-1) \\ v_b + v_c = \dfrac{\Delta s}{4} \end{cases}$$

⇒ (+)

$$-v_b + v_c = -\frac{\Delta s}{10}$$

$$v_b + v_c = \frac{\Delta s}{4}$$

$$2v_c = \frac{\Delta s}{4} - \frac{\Delta s}{10}$$

$$2v_c = \frac{3\Delta s}{20}$$

$$\Rightarrow v_c = \frac{3\Delta s}{40}$$

$$\frac{\Delta s}{t} = \frac{3\Delta s}{40}$$

$$t = \frac{40}{3}$$

$\Rightarrow \therefore t = 13h20min$

Alternativa B

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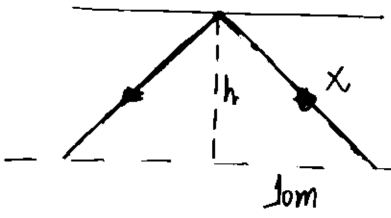
3)



$x^2 = h^2 + 10^2$

$x = \sqrt{h^2+100}$

$$\frac{2\sqrt{h^2+100}}{340} - \frac{20}{340} = 30.10^{-3}$$

$$= \frac{2\sqrt{h^2+100} - 20}{340} = 3.10^{-2}$$

$$2\sqrt{h^2+100} - 20 = 10{,}2$$

$$2\sqrt{h^2+100} = 30{,}2$$

Elevando ao quadrado ambos os membros

$4(h^2+100) \approx 900$

$= h^2 \approx 125$

$\therefore h \approx 11{,}3\,m$

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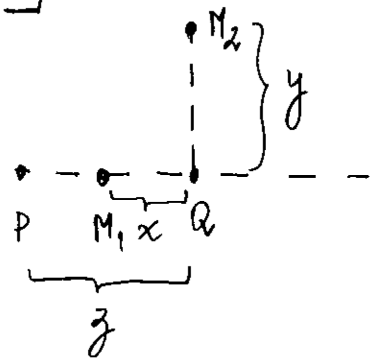
4)



$$\frac{z-x}{v_s} = \frac{z}{v} + \frac{x}{v_s}$$

Isolando o x, temos:

$$x = \frac{z}{2v} \cdot (v - v_s) \quad (1)$$

$$\frac{\sqrt{y^2+z^2}}{v_s} = \frac{z}{v} + \frac{y}{v_s}$$. Elevando ao quadrado ambos os membros e isolando o y, temos:

$$y = \frac{z}{2v} \cdot \frac{(v^2 - v_s^2)}{v_s} \quad (2)$$

$(1) \div (2)$

$$\frac{x}{y} = \frac{v_s(v - v_s)}{(v^2 - v_s^2)}$$

Alternativa A

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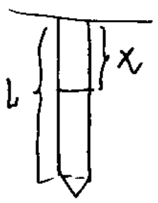
5)



$$v = \frac{2x}{t_1}$$

$$t_1 + t_2 = \frac{2L}{v}$$

$$t_1 + t_2 = \frac{2L}{\frac{2x}{t_1}} \Rightarrow x = \frac{L t_1}{t_1 + t_2}$$

Alternativa C

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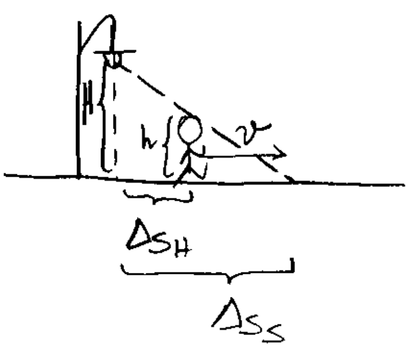
6)



$$\frac{\Delta s_S}{\Delta s_S - \Delta s_H} = \frac{H}{h} \Rightarrow \Delta s_S \cdot h = H \Delta s_S - H \Delta s_H$$

$$\Rightarrow H \Delta s_H = H \Delta s_S - h \cdot \Delta s_S$$

$$H \Delta s_H = (H - h) \Delta s_S \quad (\div \text{tempo})$$

$$H v = (H - h) \cdot v_s$$

$$\therefore v_s = \frac{H}{H-h} \cdot v$$

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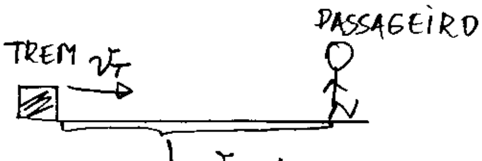
07)

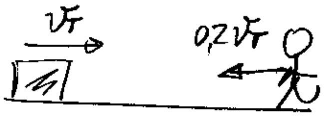


$$d = v_T \cdot 10$$

$$v_T - 0{,}2v_T = \frac{d}{te} \Rightarrow$$

$$0{,}8\cancel{v_T} = \frac{\cancel{v_T} \cdot 10}{te}$$

$$\therefore te = 12{,}5\,min$$

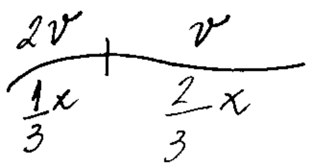


$$v_T + 0{,}2v_T = \frac{d}{te'} \Rightarrow$$

$$1{,}2\cancel{v_T} = \frac{\cancel{v_T} \cdot 10}{te'}$$

$$\therefore te' = \frac{25}{3}\,min$$

08)

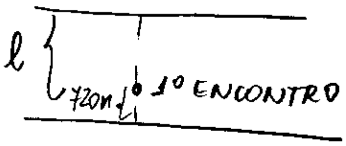


$$v_m = \frac{\Delta s}{\Delta t}$$

$$v_m = \frac{x}{\frac{\frac{1}{3}x}{2v} + \frac{\frac{2}{3}x}{v}}$$

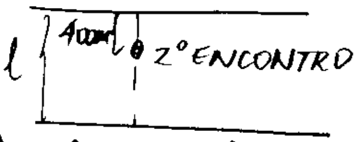
$$\therefore v_m = 1{,}2v$$

09)



$$\frac{l - 720}{v_1} = \frac{720}{v_2} \Rightarrow$$

$$\frac{v_1}{v_2} = \frac{l - 720}{720} \quad (1)$$



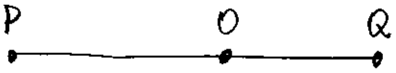
$$\frac{2l - 400}{v_1} = \frac{l + 400}{v_2} \rightarrow$$

$$\frac{v_1}{v_2} = \frac{2l - 400}{l + 400} \quad (2)$$

(1) = (2) e resolvendo em l

$$\therefore l = 1760\,m$$

10)



$$\frac{\overline{PO}}{v_1} = \frac{\overline{OQ}}{v_2} \Rightarrow \frac{\overline{PO}}{\overline{OQ}} = \frac{v_I}{v_{II}} \quad (1)$$

$$\begin{cases} \overline{PO} = v_{II} \cdot 49 \\ \overline{OQ} = v_I \cdot 36 \end{cases} \Rightarrow \frac{\overline{PO}}{\overline{OQ}} = \frac{v_{II} \cdot 49}{v_I \cdot 36} \quad (2)$$

(1) = (2)

$$\frac{v_I}{v_{II}} = \frac{v_{II} \cdot 49}{v_I \cdot 36}$$

$$\left(\frac{v_I}{v_{II}}\right)^2 = \frac{49}{36}$$

$$\therefore \frac{v_I}{v_{II}} = \frac{7}{6}$$

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