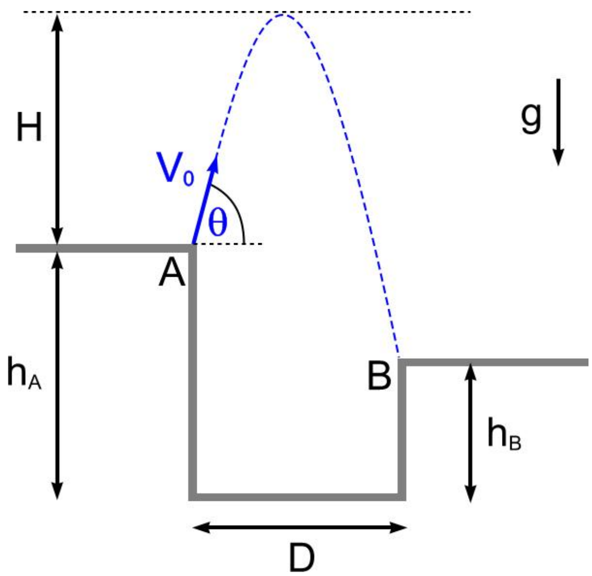
SOLUCIÓN EJERCICIO 3



$$x = v_0 \cos\theta \, t$$

$$y = v_0 \, \text{sen}\theta \, t - \frac{g t^2}{2}$$

$$v_x = v_0 \cos\theta$$

$$v_y = v_0 \, \text{sen}\theta - g t$$

EN B|

$$D = v_0 \cos\theta \, \tilde{t} \quad \Rightarrow \quad \tilde{t} = D / v_0 \cos\theta$$

$$y_B \equiv -(h_A - h_B) = v_0 \, \text{sen}\theta \, \tilde{t} - \frac{1}{2} g \tilde{t}^2$$

ENTONCES

$$\boxed{y_B = D \tan\theta - \frac{1}{2} \frac{g D^2}{v_0^2 \cos^2\theta}} \qquad (1)$$

EN PUNTO ALTURA MÁXIMA|

$$v_y = 0 \quad \Rightarrow \quad t^* = \frac{v_0 \, \text{sen}\theta}{g}$$

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$$y = H \quad \Rightarrow \quad H = v_0 \operatorname{sen}\theta \, t^* - \frac{1}{2} g \, t^{*2}$$

$$H = \frac{v_0^2 \operatorname{sen}^2\theta}{g} - \frac{1}{2}\frac{v_0^2 \operatorname{sen}^2\theta}{g}$$

$$H = \frac{1}{2}\frac{v_0^2 \operatorname{sen}^2\theta}{g}$$

$$\boxed{v_0 \operatorname{sen}\theta = \sqrt{2gH}} \qquad (2)$$

DE (2) SE TIENE

$$v_0 = \frac{\sqrt{2gH}}{\operatorname{sen}\theta}$$

REEMPLAZANDO EN (1)

$$y_B = D\tan\theta - \frac{1}{2}\frac{\cancel{g}\, D^2}{\cos^2\theta}\,\frac{\operatorname{sen}^2\theta}{2\cancel{g}H}$$

$$y_B = D\tan\theta - \frac{D^2}{4H}\tan^2\theta$$

$$\tan^2\theta - \frac{4H}{D}\tan\theta + \frac{4H}{D^2} y_B = 0$$

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$$\Rightarrow \qquad \tan\theta = \frac{1}{2}\left[\frac{4H}{D} \pm \sqrt{\frac{16H^2}{D^2} - \frac{16H}{D^2}h_B}\right]$$

$$\boxed{\tan\theta = \frac{2H}{D}\left[1 \pm \sqrt{1 + \frac{(h_A - h_B)}{H}}\right]}$$

SÓLO SIRVE EL SIGNO '+'

DE LA RELACIÓN

$$\sin^2\theta + \cos^2\theta = 1 \qquad / : \sin^2\theta$$

$$1 + \frac{\cos^2\theta}{\sin^2\theta} = \frac{1}{\sin^2\theta}$$

$$1 + \frac{1}{\tan^2\theta} = \frac{1}{\sin^2\theta}$$

$$\Rightarrow \qquad \sin\theta = \frac{\tan\theta}{\sqrt{1+\tan^2\theta}}$$

ENTONCES

$$\boxed{v_0 = \frac{\sqrt{2gH}}{\sin\theta} = \sqrt{2gH}\,\frac{\sqrt{1+\tan^2\theta}}{\tan\theta}}$$