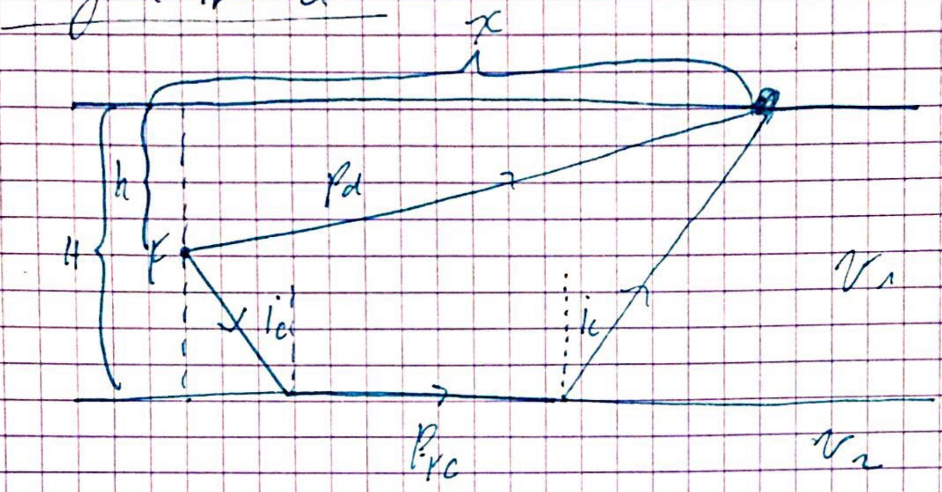
Ley de Snell



$\Delta t = 0{,}706$ s ; $x = 120$ Km ; $h = 5$ Km

$v_1 = 6$ Km/s ; $v_2 = 8$ Km/s ; $\boxed{H = ?}$

=> ① Calcular t_{rc} : => $t = \frac{d}{v}$

$$t_{rc} = \frac{H-h}{v_1 \cos(i_c)} + \frac{x}{v_2} - \frac{(H-h)\tan(i_c) + H\tan(i_c)}{v_2} + \frac{H}{v_1 \cos(i_c)}$$

$$= \frac{x}{v_2} - \frac{(2H-h)\tan(i_c)}{v_2} + \frac{2H-h}{v_1 \cos(i_c)}$$

$$= \frac{x}{v_2} + (2H-h)\left[\frac{1}{v_1 \cos(i_c)} - \frac{\tan(i_c)}{v_2}\right]$$

$$= \frac{x}{v_2} + \frac{(2H-h)}{\cos(i_c)}\left[\frac{1}{v_1} - \frac{\operatorname{sen}(i_c)}{v_2}\right]$$

, aplico ley de Snell con ic : $\frac{\operatorname{sen}(i_c)}{v_1} = \frac{\operatorname{sen}(\overset{1}{\pi/2})}{v_2}$

$$t_{rc} = \frac{x}{v_2} + \frac{(2H-h)}{\cos(i_c)}\left[\frac{1}{v_1} - \frac{v_1}{v_2 v_2}\right]$$

$$= \frac{x}{v_2} + \frac{(2H-h)}{\cos(i_c)}\left[\frac{1}{v_1} - \frac{1}{v_1}\left(\frac{v_1^2}{v_2^2}\right)\right]$$

$$t_{rc} = \frac{x}{v_2} + \frac{(2H-h)}{\cos(i_c)}\left[\frac{1-\operatorname{sen}^2(i_c)}{v_1}\right]$$

$$= \frac{x}{v_2} + \frac{(2H-h)}{\cos(i_c)}\,\frac{\cos^2(i_c)}{v_1} = \frac{x}{v_2} + \frac{(2H-h)\cos(i_c)}{v_1}$$

y ahora usando: $\cos^2(i_c) = 1-\operatorname{sen}^2(i_c)$ y $\operatorname{sen}(i_c) = \frac{v_1}{v_2}$

$$\Rightarrow \cos(i_c) = \sqrt{1-\frac{v_1^2}{v_2^2}} = \frac{1}{v_2}\sqrt{v_2^2-v_1^2}$$

$$t_{rc} = \frac{x}{v_2} + \frac{(2H-h)}{v_1}\sqrt{1-\frac{v_1^2}{v_2^2}} = \frac{x}{v_2} + \frac{(2H-h)}{v_1 v_2}\sqrt{v_2^2-v_1^2}$$

b) tiempo onda directa:

$$t_t = \frac{\sqrt{x^2+h^2}}{v_1}$$

c) H? sabemos $\Delta t = 0.706\ s = t_d - t_{rc}$

$$\Rightarrow \frac{x}{v_2} + \frac{(2H-h)}{v_1 v_2}\sqrt{v_2^2-v_1^2} - \frac{\sqrt{x^2+h^2}}{v_1} = 0,706$$

introducir valores: $H = 28.6$ km.

Escaneado con CamScanner