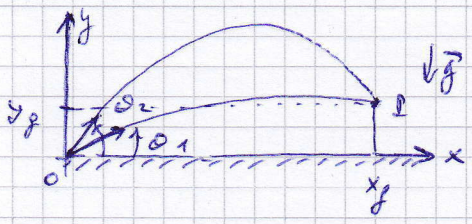
3.38



On utilise les 2 équations : $\begin{cases} \Delta y = -\frac{1}{2} g t^2 + v_{iy} t & (1) \\ \Delta x = v_{ix} . t & (2) \end{cases}$

On doit obtenir 2 temps de vol t, donc avec un θ distinct.

$$\Rightarrow \begin{cases} y_f = -\frac{1}{2} g t^2 + v_i \sin\theta \, t \\ x_f = v_i \cos\theta . t \end{cases} \Rightarrow t = \frac{x_f}{v_i \cos\theta}$$

$$\Rightarrow y_f = -\frac{1}{2} g \frac{x_f^2}{v_i^2 \cos^2\theta} + v_i \sin\theta . \frac{x_f}{v_i \cos\theta} = -\frac{1}{2} g \frac{x_f^2}{v_i^2 \cos^2\theta} + x_f . \tan\theta$$

$$\Rightarrow y_f = -\frac{g x_f^2}{2 v_i^2} (1 + \tan^2\theta) + x_f \tan\theta \Rightarrow -\frac{g x_f^2}{2 v_i^2} \tan^2\theta + x_f \tan\theta - \left(\frac{g x_f^2}{2 v_i^2} + y_f \right) = 0$$

$$\Rightarrow \tan\theta = \frac{-x_f \pm \left(\sqrt{x_f^2 - 4 . \frac{g x_f^2}{2 v_i^2} . \left(\frac{g x_f^2}{2 v_i^2} + y_f \right)} \right)}{\left(\frac{-g x_f^2}{v_i^2} \right)} \quad (A) \quad (B)$$

$$= \begin{cases} \nearrow 0,584 & (C) \\ \searrow 2,140 & (D) \end{cases}$$

Rappel : $x_f = 27,0\,m$

$y_f = 2,50\,m$

$v_i = 19,0\,m/s$

Cela donne les angles $\theta_1 = \tan^{-1}(0,584) \simeq \underline{30,3°}$

$\theta_2 = \tan^{-1}(2,140) \simeq \underline{65,0°}$