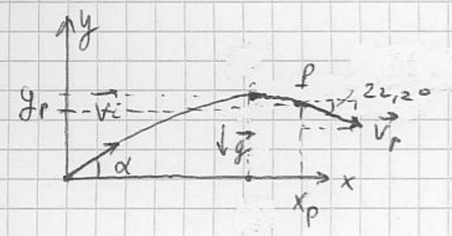
3.29



a). vitesse initiale :

$v_{px} = v_p \cos 22{,}2° = v_{ix} = 48{,}6 . \cos 22{,}2° \cong 44{,}9 \text{ m/s}$ (B)

$v_{py} = -v_p \sin 22{,}2°$

$a_y = \dfrac{v_{fy} - v_{iy}}{\Delta t}$; $-9{,}8 = \dfrac{v_{py} - v_{iy}}{\Delta t}$

$\Rightarrow -9{,}8 . \Delta t = v_{py} - v_{iy} \Rightarrow v_{iy} = v_{py} + 9{,}8 . \Delta t = -48{,}6 . \sin 22{,}2° + 9{,}8 . 5{,}1 \cong 31{,}6 \text{ m/s}$ (A)

$\Rightarrow v_i = \sqrt{v_{ix}^2 + v_{iy}^2} \cong \underline{\underline{55{,}0 \text{ m/s}}}$

b). direction de $\vec{v_i}$:

$\alpha = \text{Arctan}\left(\dfrac{v_{iy}}{v_{ix}}\right) \cong \underline{\underline{35{,}1°}}$

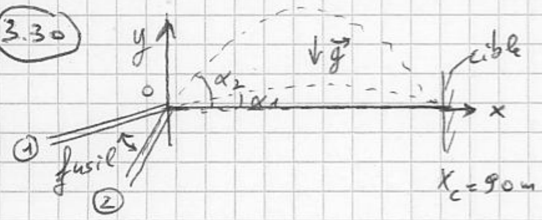
c). déplacement Δx :

$\Delta x = v_{ix} . \Delta t = 48{,}6 . \cos 22{,}2° . 5{,}1 \cong \underline{229{,}5 \text{ m}}$

d). déplacement Δy

$\Delta y = \frac{1}{2} a_y \Delta t^2 + v_{iy} \Delta t = -4{,}9 . (5{,}1)^2 + v_{iy} . (5{,}1) \cong \underline{\underline{33{,}8 \text{ m}}}$

3.30



• $a_y = \dfrac{v_{fy} - v_{iy}}{\Delta t} = \dfrac{-v_i \sin\alpha - v_i \sin\alpha}{\Delta t} = -g$

$v_{fy} = -v_{iy}$ (symétrie montée-descente)

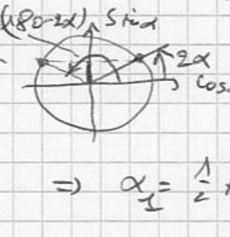
α : angle de tir

$\Rightarrow \Delta t = \dfrac{2 v_i \sin\alpha}{g}$ (1)

• $\Delta x = v_i \cos\alpha \, \Delta t \Rightarrow \Delta t = \dfrac{\Delta x}{v_i \cos\alpha}$ (2)

relation trigonométrique

(1) = (2) : $\dfrac{\Delta x}{v_i \cos\alpha} = \dfrac{2 v_i \sin\alpha}{g} \Rightarrow 2 v_i^2 \sin\alpha \cos\alpha = g \Delta x \Rightarrow 2 \sin\alpha \cos\alpha = \sin(2\alpha) = \dfrac{g \Delta x}{v_i^2}$



Or, $\sin(2\alpha) = \dfrac{g \Delta x}{v_i^2} = \sin(180 - 2\alpha)$

On a donc 2 solutions ! $\sin(2\alpha) = \dfrac{g \Delta x}{v_i^2} \Rightarrow \alpha_1 = \frac{1}{2} \text{Arcsin}\left(\dfrac{g \Delta x}{v_i^2}\right) \cong \underline{\underline{0{,}14°}}$

et $\alpha_2 = \frac{1}{2}(180 - 2\alpha) = 90 - \alpha_1 \cong \underline{\underline{89{,}86°}}$ trop dangereux !