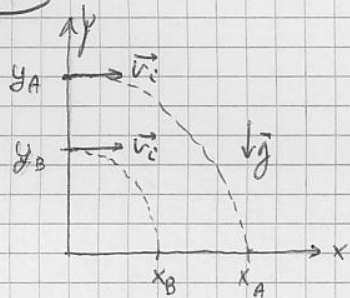


3.31



$$H_A = y_A$$

$$H_B = y_B$$

• Verticalement, $\Delta y = \frac{1}{2} a_y \Delta t^2$ (NRw A)

$$0 - y_A = -4,9 t_A^2$$

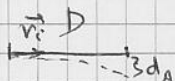
$$\Rightarrow t_A = \sqrt{\frac{y_A}{4,9}} \quad \text{et} \quad t_B = \sqrt{\frac{y_B}{4,9}}$$

• Horizontalement, $\Delta x = v_i \Delta t$

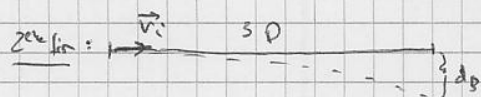
$$x_A = v_i t_A \quad \text{et} \quad x_B = v_i t_B \quad \Rightarrow \frac{x_A}{x_B} = \frac{t_A}{t_B}$$

$$\frac{x_A}{x_B} = \frac{t_A}{t_B} = 2 = \sqrt{\frac{y_A}{4,9}} \cdot \sqrt{\frac{4,9}{y_B}} = \sqrt{\frac{y_A}{y_B}} \quad \Rightarrow \frac{y_A}{y_B} = 4 \quad \Rightarrow \underline{\underline{y_A = 4 y_B}}$$

3.32

1^{er} tir :

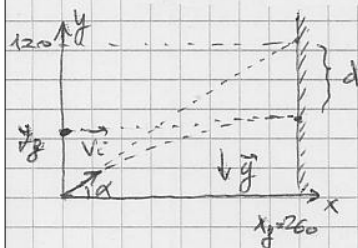
temps de vol $t_A = \frac{D}{v_i} \Rightarrow d_A = \frac{1}{2} g \left(\frac{D}{v_i} \right)^2$



temps de vol $t_B = \frac{3D}{v_i} \Rightarrow d_B = \frac{1}{2} g \left(\frac{3D}{v_i} \right)^2$

$$\Rightarrow \frac{d_A}{d_B} = \frac{D^2}{v_i^2} \cdot \frac{v_i^2}{9D^2} = \frac{1}{9}$$

3.33



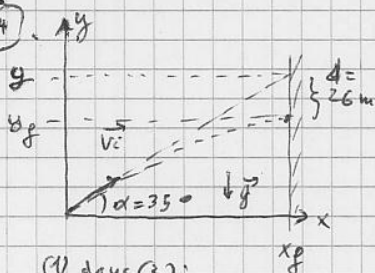
• angle de tir initial, $\tan \alpha = \frac{120}{260} = \frac{6}{13} \Rightarrow \sin \alpha = \frac{6}{\sqrt{205}} ; \cos \alpha = \frac{13}{\sqrt{205}}$

• Horizontalement, $x_g = v_i \cos \alpha t \Rightarrow t = \frac{x_g}{v_i \cos \alpha} = \frac{260}{v_i \cdot 13} \sqrt{205}$, temps de vol (A)

• Verticalement, $y_g = -4,9 t^2 + v_i \sin \alpha t \approx 40,3 \text{ m}$

$$\Rightarrow d = 120 - y_g = \underline{\underline{79,7 \text{ m}}}$$

3.34



• $\tan \alpha = \tan 35^\circ = \frac{y}{x_g} \Rightarrow y = x_g \tan 35^\circ$ ou encore $x_g = \frac{y_g + 26}{\tan 35^\circ}$ (1)

• $x_g = v_i \cos \alpha t = 52 \cos 35^\circ t$ (2)

• $y_g = -4,9 t^2 + v_i \sin \alpha t = -4,9 t^2 + 52 \sin 35^\circ t$ (3)

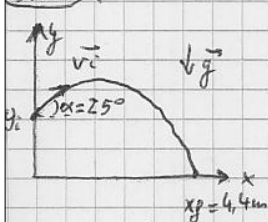
(1) dans (2):

$$\Rightarrow \frac{y_g + 26}{\tan 35^\circ} = 52 \cos 35^\circ t ; y_g + 26 = \tan 35^\circ \cdot \cos 35^\circ \cdot 52 \cdot t = 52 \sin 35^\circ t ; y_g = 52 \sin 35^\circ t - 26$$

dans (3): $52 \sin 35^\circ t - 26 = -4,9 t^2 + 52 \sin 35^\circ t \Rightarrow t = \sqrt{\frac{26}{4,9}} \approx 2,3 \text{ s}$ (A) temps de vol !

$$\Rightarrow x_g = 52 \cos 35^\circ \cdot t = \underline{\underline{98,1 \text{ m}}}$$

3.35



$$y_i = 1,4 \text{ m}$$

• $x_g = v_i \cos 25^\circ t ; 4,4 = v_i \cos 25^\circ t \Rightarrow v_i = \frac{4,4}{\cos 25^\circ t}$ (1)

• $y_f - y_i = -1,4 = -4,9 t^2 + v_i \sin 25^\circ t$ (2)

$\Rightarrow$ (1) dans (2): $-1,4 = -4,9 t^2 + v_i \sin 25^\circ t = -4,9 t^2 + \frac{4,4}{\cos 25^\circ t} \sin 25^\circ t = -4,9 t^2 + 4,4 \tan 25^\circ$

$$\Rightarrow 4,9 t^2 = 4,4 \tan 25^\circ + 1,4 \Rightarrow t = \sqrt{\frac{4,4 \tan 25^\circ + 1,4}{4,9}} \approx 0,84 \text{ s} \text{ (A)}$$

$$\Rightarrow v_i = \frac{4,4}{\cos 25^\circ t} \approx \underline{\underline{5,8 \text{ m/s}}}$$