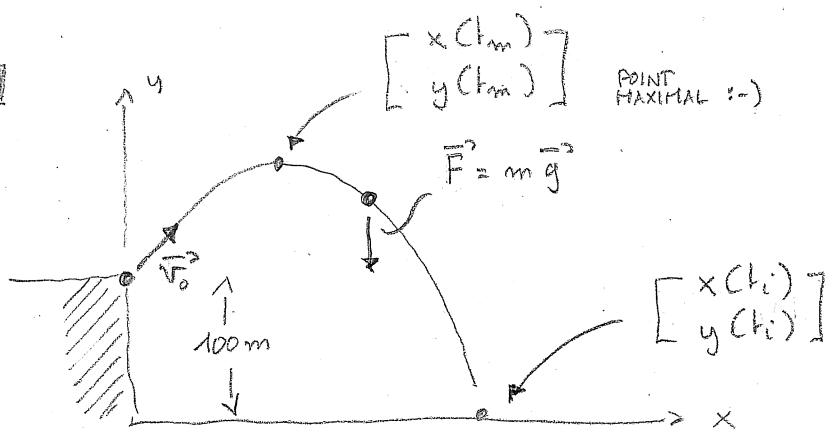


1



$$x(t) = 0 + v_{x0}t$$

$$y(t) = 100 + v_{y0}t - g \frac{t^2}{2}$$

MRUA :-)

$v_0 = 25$

$v_{y0} = 25 \sin(53^\circ) = 20 \text{ m/s}$

$v_{x0} = 25 \cos(53^\circ) = 15 \text{ m/s}$

1

$$0 = 100 + 20t - 4,9t^2$$

$$0 = \underbrace{4,9t^2}_a - \underbrace{20t}_b - \underbrace{100}_c$$

$$t' = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \begin{cases} 6,9 \text{ [sec]} \\ -2,9 \text{ [sec]} \end{cases}$$

a' negatif!

TEMPS
 $t_i = 7 \text{ [sec]}$

2 t_m tel que $\frac{dy}{dt}(t_m) = 0$

$$20 - g t_m = 0$$

$$t_m = \frac{20}{9,81} = 2 \text{ [sec]}$$

$$y(t_m) = 100 + \underbrace{20 \times 2}_{40} - \underbrace{9,81 \times \frac{4}{2}}_{20} = 120 \text{ [m]}$$

3

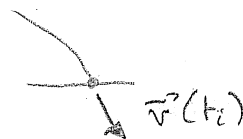
$$x(t_i) = 0 + 15 \times 7 = 105 \text{ [m]}$$

4

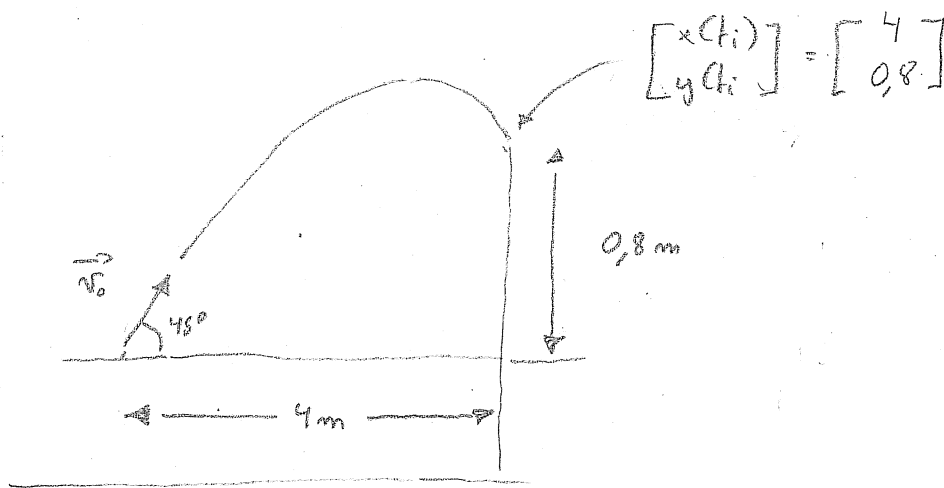
$$v_x(t_i) = 15 \text{ [m/s]}$$

$$v_y(t_i) = 20 - 9,81 \times 7 = -48,6 \text{ [m/s]}$$

$$v(t_i) = \sqrt{15^2 + 48,6^2} \text{ [m/s]}$$



2



$$\begin{aligned} x(t) &= v_0 \cos(45^\circ) t \\ y(t) &= v_0 \sin(45^\circ) t - g t^2 / 2 \end{aligned} \quad \text{MRUA :-)}$$

$$\begin{aligned} 4 &= v_0 \cos(45^\circ) t_i \\ 0,8 &= v_0 \sin(45^\circ) t_i - g t_i^2 / 2 \end{aligned} \quad \begin{aligned} &\rightarrow t_i = \frac{4}{v_0 \cos(45^\circ)} \\ &2 \text{ EQUATIONS} \\ &2 \text{ INCONNUES} \quad \text{OK!} \end{aligned}$$

$$0,8 = 4 \underbrace{\frac{\sin(45^\circ)}{\cos(45^\circ)}}_{=1} - g \frac{16}{v_0^2 \underbrace{\cos^2(45^\circ)}} \frac{1}{2}$$

$$\frac{1}{2} = \frac{\sqrt{2}}{2} \frac{\sqrt{2}}{2} = \frac{2}{4} \quad \text{:-)}$$

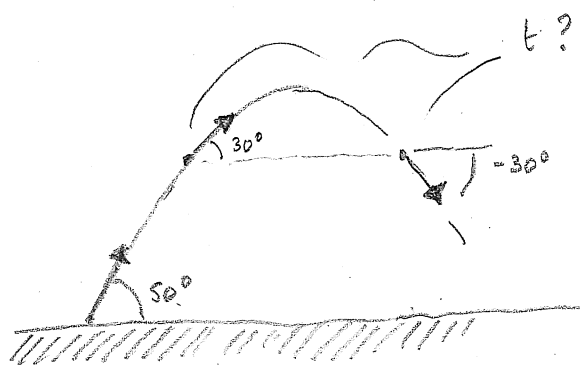
$$0,8 = 4 - \frac{9,81 \times 16}{v_0^2}$$

$$9,81 \times 16 = v_0^2 (4 - 0,8)$$

$$49 = v_0^2 \quad \text{3,2}$$

$$v_0 = 7 \text{ [m/s]}$$

3



$$x(t) = \underbrace{25 \cos(50^\circ)}_{16,07} t$$

$$y(t) = \underbrace{25 \sin(50^\circ)}_{19,15} t - \frac{9,81}{2} t^2$$

MRUA :-)

$$v_x(t) = 16,1$$

$$v_y(t) = 19,2 - 9,81 t$$

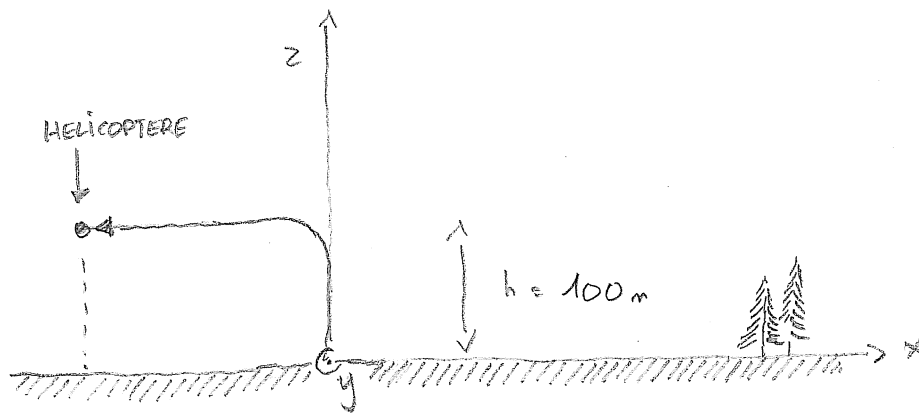
$$\underbrace{t_{gt}(\pm 30^\circ)}_{\pm 1/\sqrt{3}} = \frac{19,15 - 9,81 t}{16,07} = \frac{v_y(t)}{v_x(t)} !$$

$$\pm \frac{16,15}{\sqrt{3}} + 19,15 = 9,81 t$$

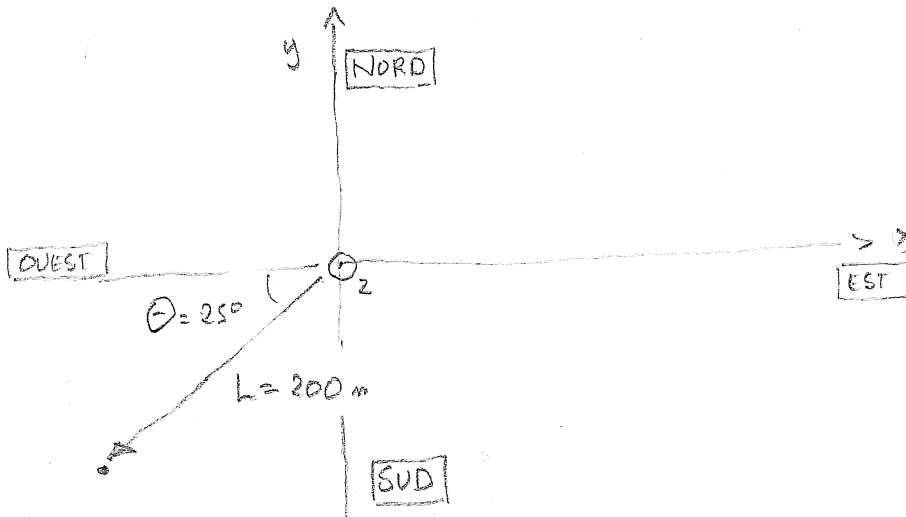
$$\pm 9,28$$

$$t = \begin{cases} 2,9 \text{ [sec]} \\ 1,0 \text{ [sec]} \end{cases}$$

4



VUE
EN
COUPE!



VUE
DU
DESSUS!

$$\vec{x} = \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -L \cos \theta \\ -L \sin \theta \\ h \end{bmatrix}$$

$$\vec{d} = \begin{bmatrix} x \\ y \\ z \end{bmatrix} - \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} -L \cos \theta \\ -L \sin \theta \\ h \end{bmatrix} = \begin{bmatrix} -200 \cos(250^\circ) \\ -200 \sin(250^\circ) \\ 100 \end{bmatrix}$$

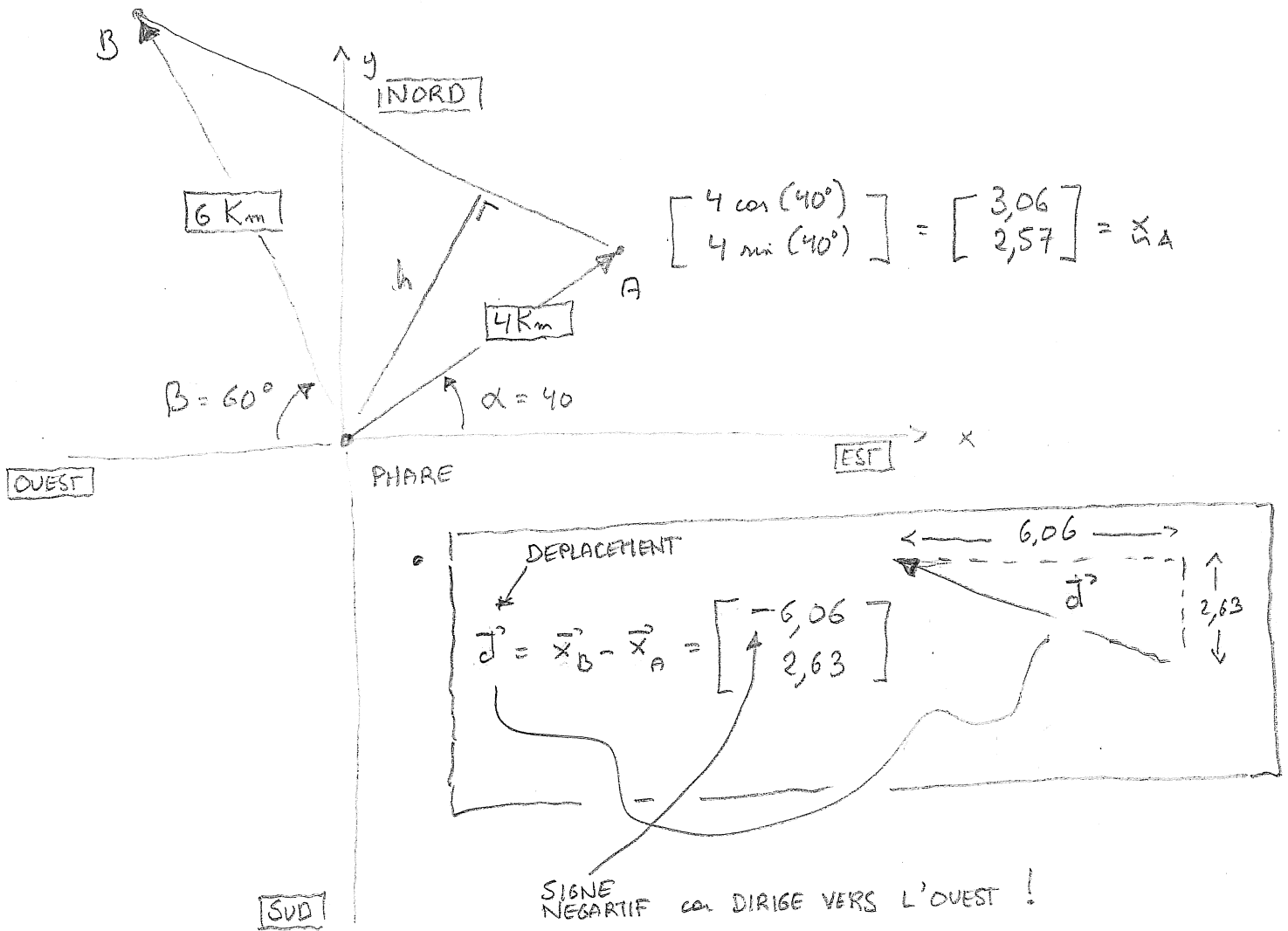
DEPLACEMENT

VECTEUR
DEPLACEMENT

$$\begin{bmatrix} -181,26 \\ -84,5 \\ 100 \end{bmatrix} = \vec{d}$$

5

$$\begin{bmatrix} -6 \cos(60) \\ 6 \sin(60) \end{bmatrix} = \begin{bmatrix} 6 \cos(120) \\ 6 \sin(120) \end{bmatrix} = \begin{bmatrix} -3 \\ 5,2 \end{bmatrix} = \vec{x}_B$$

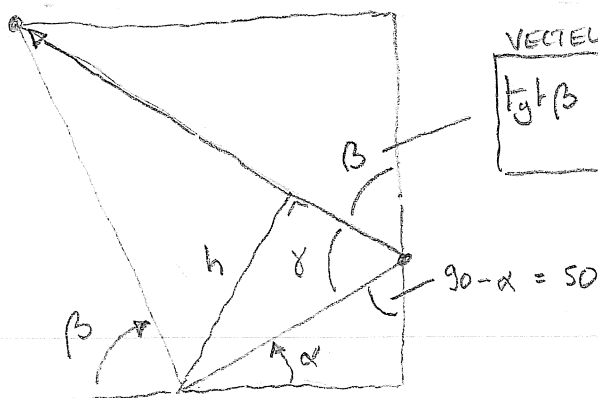


(***)
↑
DIFFICILE !

UN PEU DE TRIGONOMETRIE

TRICKY !

C'EST VRAIMENT PLUS COMPLIQUE QUE CE QUI EST EXIGE !



$$h = 3,58 \text{ Km}$$

VECTEUR $\vec{d}$

$$\tan \beta = \frac{6,06}{2,63}$$

$$\Rightarrow \beta = 66,5^\circ$$

⇓

$$\gamma = 180 - 66,5^\circ - 50^\circ = 63,5^\circ$$

⇓

$$h = 4 \sin(\gamma) = 4 \sin(63,5^\circ) = 3,58$$