

LDDR - Niveau 2: TE 1 Trigo.

Exercice 1

$$\tan(\alpha) = -3 \Rightarrow \frac{\sin \alpha}{\cos \alpha} = -3 \Rightarrow$$

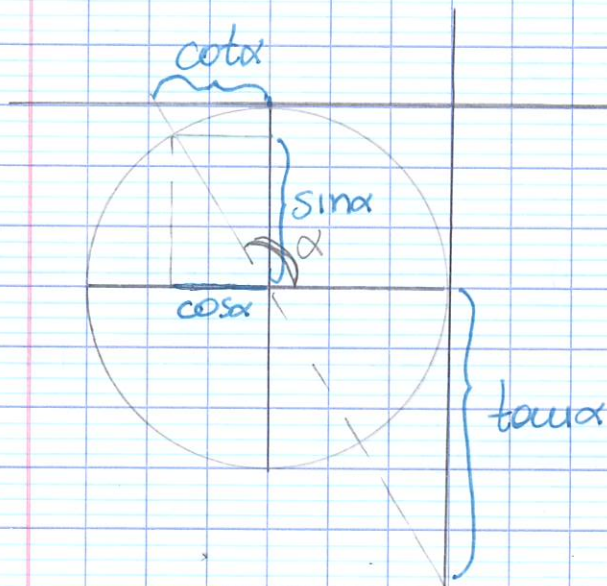
$$\Rightarrow \sin \alpha = -3 \cos \alpha \Rightarrow \sin^2 \alpha = 9 \cos^2 \alpha$$

$$\sin^2 \alpha + \cos^2 \alpha = 1 \Rightarrow 9 \cos^2 \alpha + \cos^2 \alpha = 1 \Rightarrow$$

$$\Rightarrow 10 \cos^2 \alpha = 1 \Rightarrow \cos^2 \alpha = \frac{1}{10} \Rightarrow \cos \alpha = \pm \frac{1}{\sqrt{10}}$$

$$\alpha \in \mathbb{Q}_{II} \Rightarrow \cos \alpha < 0 \Rightarrow \cos \alpha = -\frac{1}{\sqrt{10}}$$

$$\text{Donc } \sin \alpha = -3 \left(-\frac{1}{\sqrt{10}}\right) \Rightarrow \sin \alpha = \frac{3}{\sqrt{10}}$$



$$\cot \alpha = -\frac{1}{3}$$

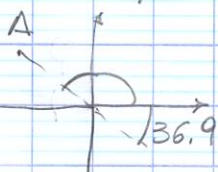
Exercice 2

$$1) A(-8, 6)$$

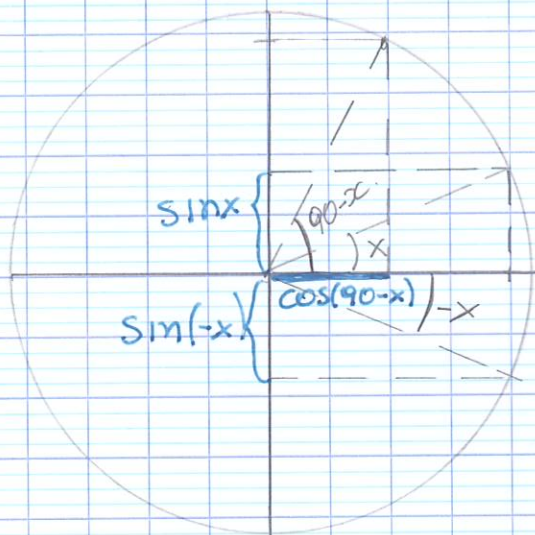
$$r = \sqrt{8^2 + 6^2} = \sqrt{100} = 10$$

$$\tan \varphi = -\frac{6}{8} = -\frac{3}{4} \Rightarrow \varphi = -36.9^\circ + 180^\circ \Rightarrow$$

$$\Rightarrow \varphi = 143.1^\circ$$



2)



$$\cos(90-x) = \sin x = -\sin(-x)$$

$$\begin{aligned} 3) \quad \cos(15) &= \cos(45-30) = \cos 45 \cos 30 + \sin 45 \sin 30 \\ &= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{\sqrt{2}(\sqrt{3}+1)}{4} \end{aligned}$$

Exercise 3

$$\begin{aligned} 1) \quad \sin(3x) &= \sin(x+10) \Rightarrow \\ \begin{cases} 3x = x+10 + k360 \Rightarrow 2x = 10 + k360 \\ 3x = 180 - x - 10 + k360 \Rightarrow 4x = 170 + k360 \end{cases} \\ \Rightarrow \begin{cases} x = 5 + k360 \\ x = \frac{170}{4} + 90k \end{cases} \end{aligned}$$

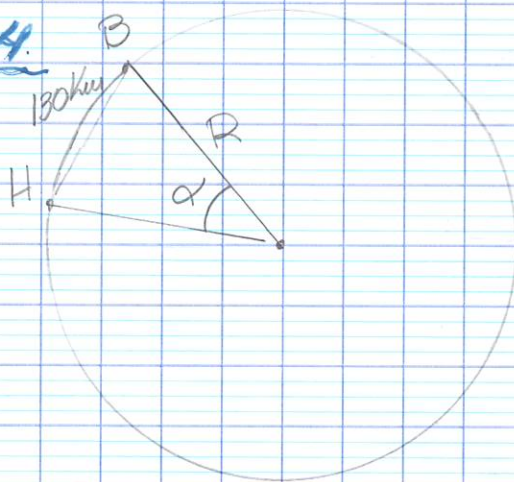
$$\begin{aligned} 2) \quad \sin(2x) - 7\cos(2x) &= 0 \Rightarrow \\ \Rightarrow \sin(2x) &= 7\cos(2x) \Rightarrow \\ \frac{\sin(2x)}{\cos(2x)} &= 7 \Rightarrow \tan(2x) = 7 \Rightarrow \\ \Rightarrow 2x &= 1.43 + k\pi \Rightarrow x = 0.71 + \frac{k\pi}{2} \end{aligned}$$

* Check: $\sin(90) - 3\cos 90 = 1 \checkmark$
 $\sin 126.9 - 3\cos 126.9 \neq 1$
 $\sin(-126.9) - 3\cos(-126.9) = 1 \checkmark$

3) $\sin(x) - 3\cos(x) = 1 \Rightarrow$
 $\Rightarrow \sin(x) = 1 + 3\cos x \Rightarrow$
 $\Rightarrow \sin^2 x = (1 + 3\cos x)^2 \Rightarrow$
 $\Rightarrow \sin^2 x = 1 + 6\cos x + 9\cos^2 x \Rightarrow$
 $\Rightarrow 1 - \cos^2 x = 1 + 6\cos x + 9\cos^2 x \Rightarrow$
 $\Rightarrow 10\cos^2 x + 6\cos x = 0 \Rightarrow$
 $2\cos x (5\cos x + 3) = 0 \Rightarrow$
 $\bullet \cos x = 0 \Rightarrow x = 90 + 180k \checkmark$

$\bullet \cos x = -\frac{3}{5} \Rightarrow x = \begin{cases} 126.9 + k360 & \times \\ -126.9 + k360 & \checkmark \end{cases}$

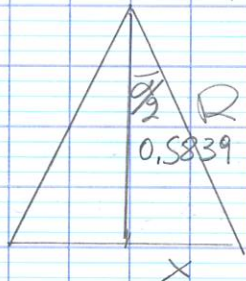
Exercise 4.



$$R = 6378 \text{ km}$$

$$L = 130 = 2\pi R \cdot \frac{\alpha}{360} \Rightarrow$$

$$\Rightarrow \frac{130 \cdot 360}{2 \cdot \pi \cdot R} = \alpha = 1.1678$$

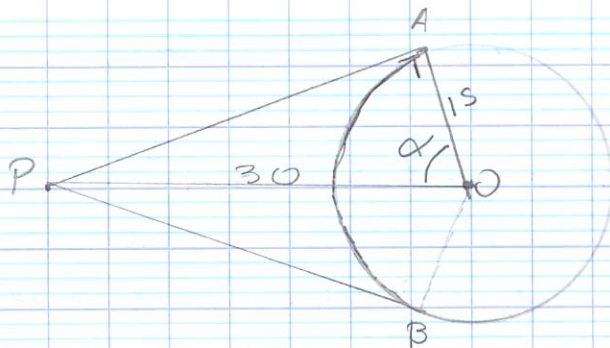


$$\sin 0.5839 = \frac{x}{R} \Rightarrow x = R \sin(0.58)$$

$$\Rightarrow x \approx 64.999 \text{ km}$$

$$\Rightarrow HB = 2x = 129.998 \text{ km}$$

Exercise 5.



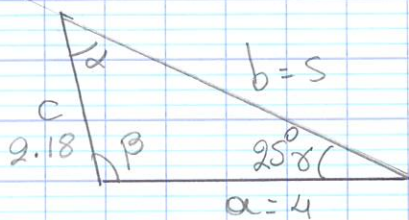
$$\cos \alpha = \frac{15}{30} = \frac{1}{2} \Rightarrow \alpha = 60^\circ \Rightarrow \widehat{AOB} = 120^\circ$$

$$\Rightarrow \widehat{AB} = 2\pi \cdot r \cdot \frac{120}{360} = 31.42 \text{ m}$$

$$L_{\text{tot}} = 2\pi r = 2\pi \cdot 15 = 94.25 \text{ m}$$

$$\Rightarrow \frac{31.42}{94.25} = 0.333 = 33.3\%$$

Exercise 6.



$$c^2 = a^2 + b^2 - 2ab \cos \gamma \Rightarrow$$

$$c^2 = 16 + 25 - 2 \cdot 4 \cdot 5 \cos 25 = 4.75 \Rightarrow$$

$$c = 2.18$$

$$\frac{\sin \alpha}{a} = \frac{\sin \gamma}{c} \Rightarrow \sin \alpha = \frac{a \cdot \sin \gamma}{c} \Rightarrow$$

$$\sin \alpha = 0.78 \Rightarrow \alpha = 50.85^\circ$$

$$\beta = 180 - \alpha - \gamma \Rightarrow \beta = 104.15^\circ$$

$$A = \frac{1}{2} a \cdot b \sin \gamma = \frac{1}{2} \cdot 4 \cdot 5 \cdot \sin 25 = 4.23$$