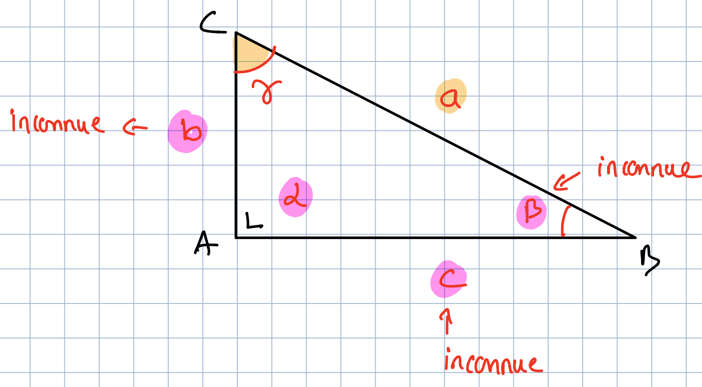
Ex 4.2.1 :

Δ ABC rectangle en A

a) $\gamma = 32°$ et $BC = 10$



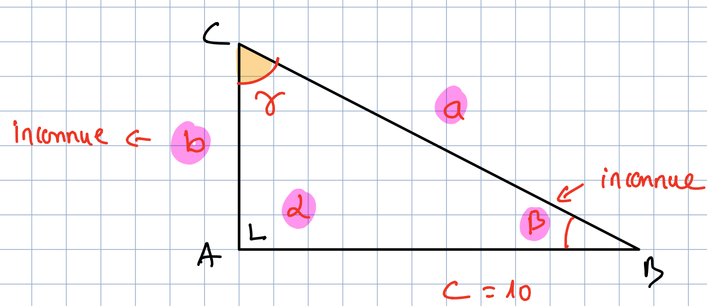
$\beta = 90° - 32° = \underline{58°}$ et $\alpha = \underline{90°}$

$AC = b = BC \cdot \cos(\gamma) = 10 \cdot \cos(32°)$

$\Rightarrow AC = b \cong \underline{8.48}$

$AB = c = BC \cdot \sin(\gamma) = 10 \cdot \sin(32°) \cong \underline{5{,}3}$

c) $\gamma = 27°$ et $AB = 10$



$\alpha = 90° \Rightarrow \beta = 90° - 27° = \underline{63°}$

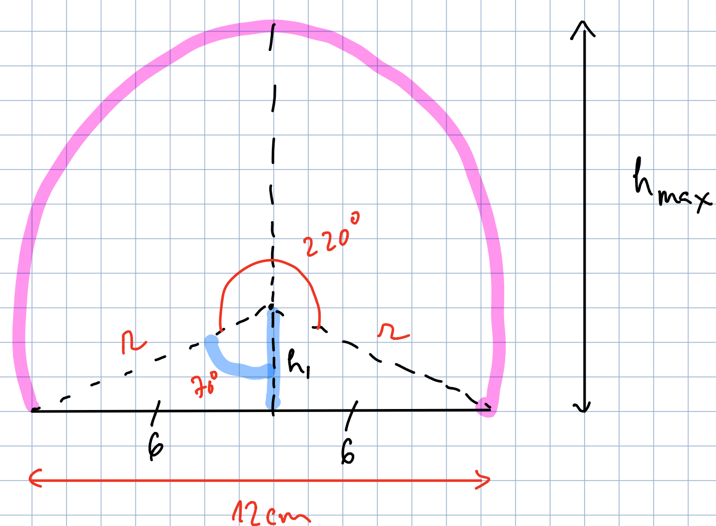
$AC = b = ?$ $\quad \tan(\gamma) = \frac{AB}{AC} = \frac{c}{b} \Rightarrow b = \frac{c}{\tan(\gamma)}$

$$b = \frac{10}{\tan(27°)} \simeq 19,63$$

$BC = a = ? \Rightarrow \sin(\gamma) = \frac{AB}{BC} \Rightarrow BC = \frac{AB}{\sin(\gamma)}$

$$BC = \frac{10}{\sin(27°)} \simeq 22,03$$

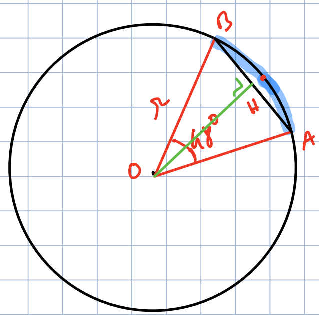
Ex 4.2.5 :



$$r = \frac{6}{\sin(70°)} \simeq 6,39$$

$$h_{max} = r + h_1 = r + \frac{6}{\tan(70°)} \simeq 8,57 \text{ m}$$

Ex 4.2.7 :



$AB = 18{,}4$ cm

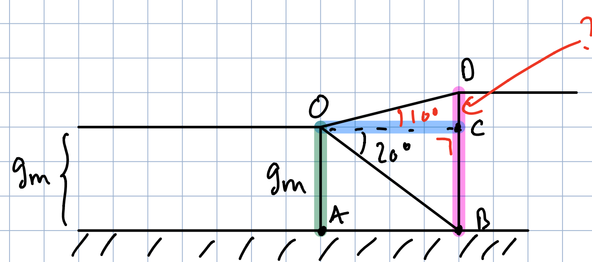
$\alpha = 48°$

OH : hauteur

$\Rightarrow \sin(24°) = \dfrac{AH}{OA} \Rightarrow OA = \dfrac{AH}{\sin(24°)}$

$\Rightarrow OA = r = \dfrac{9{,}2}{\sin(24°)} \simeq 22{,}62$ cm

Ex 4.2.8 :



Triangle OBC est rectangle en C :

$\tan(20°) = \dfrac{BC}{OC}$

$\Rightarrow OC = \dfrac{BC}{\tan(20°)} = \dfrac{9}{\tan(20°)}$

$\Rightarrow OC \simeq 24{,}73$ m

Triangle OCD est rectangle en C

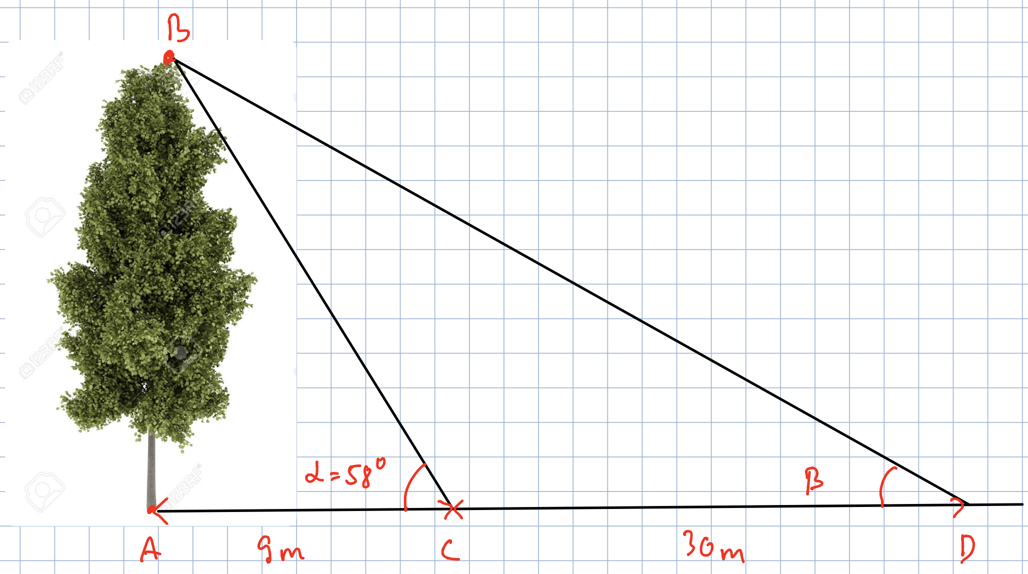
$\Rightarrow \tan(10°) = \dfrac{CD}{OC} \Rightarrow CD = OC \cdot \tan(10°)$

$\Rightarrow CD = 24{,}73 \cdot \tan(10°) \simeq 4{,}36$ m

$\Rightarrow BD = BC + CD = 9 + 4{,}36 = 13{,}36$ m

Donc la hauteur du bâtiment est d'environ 13,36 m

Ex 4.2.9 :



Δ ABC est rectangle en A :

$$\Rightarrow \tan(\alpha) = \frac{AB}{AC} \Rightarrow AB = AC \cdot \tan(\alpha)$$

$$\Rightarrow AB = 9 \cdot \tan(58°) \cong 14,40 \text{ m}$$

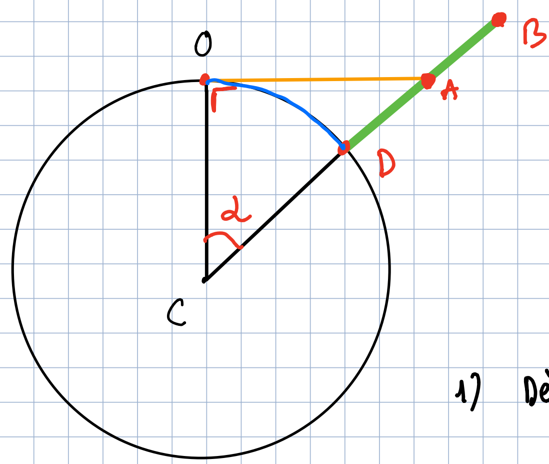
Δ ABD est rectangle en A :

$$\Rightarrow \tan(\beta) = \frac{AB}{AD} = \frac{14,40}{39} \cong 0,37$$

$$\Rightarrow \beta \cong \tan^{-1}(0,37) \cong 20,27°$$

Elle le voit sous un angle d'environ 20,27°

Ex 4.2.10 :



$AB = 24\ (m)$

$OD = 50\ (km)$

$OC = CD = 6350\ (km)$

$\Rightarrow DB = ?$

1) Déterminer α

$$l = \alpha \cdot R \rightarrow \alpha = \frac{l}{R}$$

(α en radian)

$$\rightarrow \alpha = \frac{50}{6350} \cdot \frac{180}{\pi} \cong 0{,}45^0$$

2) Déterminer DA :

$\rightarrow$ il faut calculer d'abord CA

$$\cos(\alpha) = \frac{OC}{CA} \Rightarrow CA = \frac{OC}{\cos(\alpha)} = \frac{6350}{\cos(0{,}45^\circ)}$$

$$CA \cong 6350{,}19686\ km = 6350196.86\ m$$

$$\Rightarrow CA = CD + DA \rightarrow DA = CA - CD$$

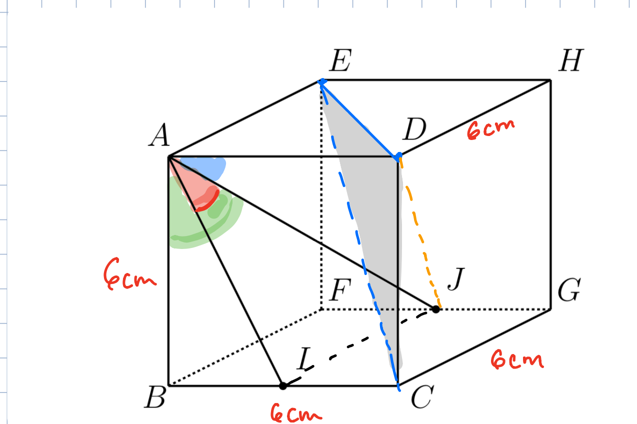
$$= 6350196{,}86 - 6350000 = 196\ m$$

3) Déterminer la hauteur DB

$$\Rightarrow DB = DA + AB = 196 + 24 = 220\ m$$

(brochure ~221m)

Ex 4.2.11



a) Triangle rectangle ABI : $AI = \sqrt{AB^2 + BI^2} = \sqrt{6^2+3^2} = \sqrt{45} = 3\sqrt{5}$

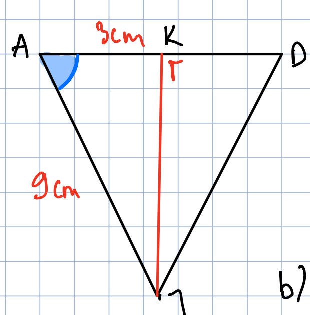
$\Rightarrow \tan(\widehat{JAI}) = \dfrac{IJ}{AI} = \dfrac{6}{3\sqrt{5}} = \dfrac{2}{\sqrt{5}}$

$\Rightarrow \widehat{JAI} \simeq 41,81^\circ$

$BJ = AI = 3\sqrt{5} \quad \Rightarrow \tan(\widehat{JAB}) = \dfrac{BJ}{AB} = \dfrac{3\sqrt{5}}{6}$

$\Rightarrow \widehat{JAB} \simeq 48,19^\circ$

$AJ = DJ \Rightarrow$ Pythagore : $AJ = \sqrt{AI^2 + IJ^2} = \sqrt{45 + 6^2} = 9$



$\Rightarrow \cos(\widehat{JAD}) = \dfrac{AK}{AJ} = \dfrac{3}{9}$

$\Rightarrow \widehat{JAD} \simeq 70.53^\circ$

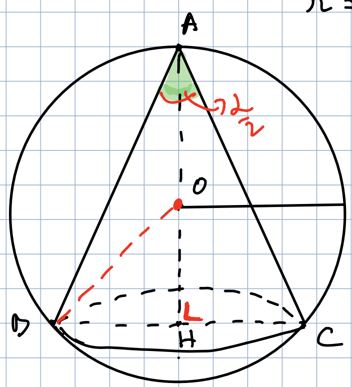
b) $EC = ?$ Pythagore : $EC^2 = ED^2 + CD^2$

$\Rightarrow EC^2 = EH^2 + HD^2 + CD^2 \Rightarrow EC = \sqrt{6^2+6^2+6^2}$

$\Rightarrow EC = 6\sqrt{3} \simeq 10.39\text{ cm}$

Ex 4.2.12 :

$r = 6\,cm \qquad R = 10\ cm$



$h = \ ?$

$h = OA + \underbrace{OH}_{?}$

$\Delta\ OHB \Rightarrow$ Pythagore :

$$OB^2 = HB^2 + OH^2$$

$$\Rightarrow OH^2 = OB^2 - HB^2$$

$$\Rightarrow OH = \sqrt{OB^2 - HB^2} = \sqrt{10^2 - 6^2}$$

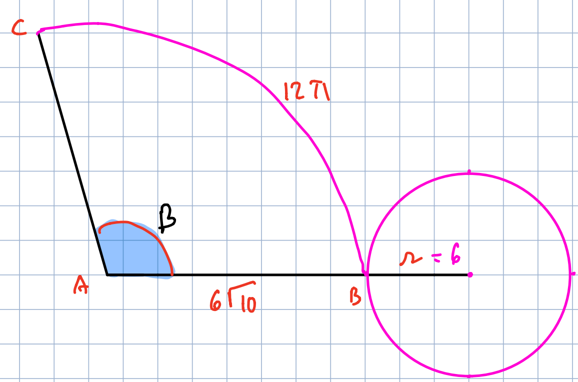
$$OH = 8\ cm$$

$$\Rightarrow AH = h = OA + OH = 10 + 8 = 18\ cm$$

$$\Rightarrow \tan\left(\frac{\alpha}{2}\right) = \frac{HC}{AH} = \frac{6}{18} \Rightarrow \frac{\alpha}{2} \simeq 18,43^\circ$$

$\Rightarrow$ Donc l'angle au sommet du cône $= 2 \cdot \frac{\alpha}{2} \simeq 36,87^\circ$

* Angle au sommet de son développement



$$AC = \sqrt{AH^2 + HC^2} = \sqrt{18^2 + 6^2} = \sqrt{360}$$

$$\Rightarrow AC = 6\sqrt{10}$$

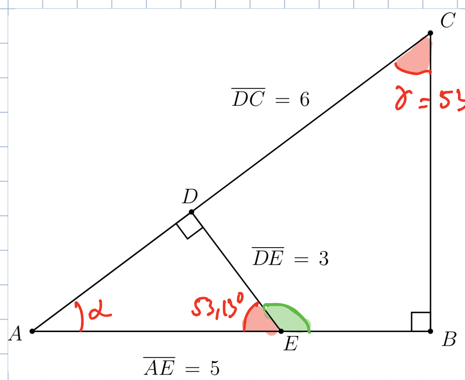
Périmètre de la base du cône :

$$p = 2\pi \cdot r = 2\pi \cdot 6 = 12\pi$$

Angle de développement : $\beta = \frac{\overset{\frown}{BC}}{AC} \cdot \frac{180}{\pi}$

$$\Rightarrow \beta = \frac{\cancel{12}^{\,2}\cancel{\pi} \cdot 180}{\cancel{6}\sqrt{10} \cdot \cancel{\pi}} = \frac{360}{\sqrt{10}} \simeq 113,84^\circ$$

Ex 4.13 :



Par Pythagore :

$AE^2 = AD^2 + DE^2 \Rightarrow AD = \sqrt{AE^2 - DE^2}$

$\Rightarrow AD = \sqrt{25 - 9} = 4$

$\Rightarrow AD = 4$

$\Rightarrow AC = AD + DC = 4 + 6$

$\Rightarrow AC = 10$

$\sin(\alpha) = \frac{DE}{AE} = \frac{3}{5} \Rightarrow \alpha \simeq 36{,}87°$

$\Rightarrow \widehat{AED} = 90° - 36{,}87° \simeq 53{,}13°$

$\Rightarrow \gamma = 90° - \alpha = 90° - 36{,}87° \Rightarrow \gamma = 53{,}13°$

Également, $\sin(\alpha) = \frac{BC}{AC} \Rightarrow BC = AC \cdot \sin(\alpha)$

$\Rightarrow BC = 10 \cdot \sin(36{,}87°) \Rightarrow BC \simeq 6$

$\cos(\alpha) = \frac{AB}{AC} \Rightarrow AB = AC \cdot \cos(\alpha) = 10 \cdot \cos(36{,}87°)$

$\Rightarrow AB \simeq 8$

$\Rightarrow EB = AB - AE = 8 - 5 \Rightarrow EB = 3$

Et $\widehat{DEB} = 180° - \widehat{AED} = 180° - 53{,}13° \Rightarrow \widehat{DEB} \simeq 126{,}87°$

Ex 4.2.14 :

a) $BC = ?$

$\sin(22°) = \frac{BC}{AB}$

$\Rightarrow BC = AB \cdot \sin(22°)$

$= 4 \cdot \sin(22°)$

$BC \simeq 1,5\ m$

b) Par Pythagore :

$AB^2 = BC^2 + AC^2$

$\Rightarrow AC^2 = \sqrt{AB^2 - BC^2}$

$= \sqrt{16 - 1,5^2}$

$\Rightarrow AC = \sqrt{13,75}$

$\Rightarrow AC \simeq 3,71\ m$

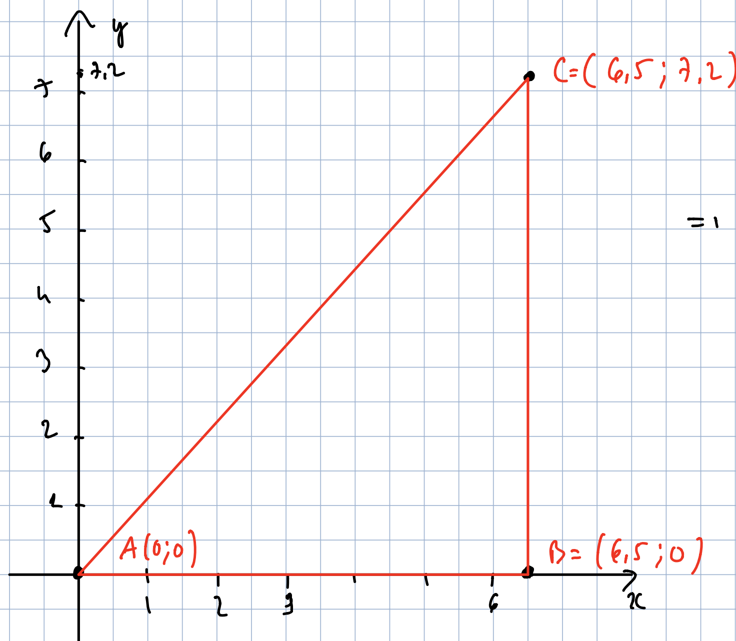
Si $BC \simeq 2,5\ m$

$\Rightarrow AC = \sqrt{16 - 2,5^2} = \sqrt{9,75}$

$\Rightarrow AC \simeq 3,12\ m$

Donc le point d'appui de l'échelle contre le mur descend d'environ 59cm

Ex 4.2.15 :



Oui car $Ox \perp Oy$

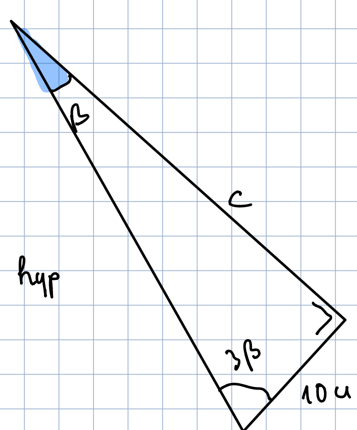
$\Rightarrow$ Pythagore :

$$\overline{AC} = \sqrt{\overline{AB}^2 + \overline{BC}^2}$$

$$= \sqrt{6,5^2 + 7,2^2}$$

$$\Rightarrow \overline{AC} \simeq 9,7$$

Ex 4.2.16 :



a) Les trois angles mesurent :

$90°$; $\frac{90°}{4} = 22,5°$;

et $3 \cdot 22,5° = 67,5°$

b) $\sin(22,5°) = \frac{10}{hyp}$

$$\Rightarrow hyp = \frac{10}{\sin(22,5°)} \simeq 26,13 \ u$$

$$c^2 = h^2 - 10^2 \Rightarrow c = \sqrt{(26,13)^2 - 10^2}$$

$$\Rightarrow c \simeq 24,14 \ u$$