Ex 4.1.1 :

a) $\frac{\pi}{6} \longrightarrow \frac{\pi}{6} \cdot \frac{180^\circ}{\pi} = \frac{180^\circ}{6} = 30^\circ$

b) $\frac{2\pi}{3} \longrightarrow \frac{2\pi}{3} \cdot \frac{180^\circ}{\pi} = \frac{360^\circ}{3} = 120^\circ$

$\longrightarrow \frac{2}{3} \cdot 180^\circ = \frac{360^\circ}{3} = 120^\circ$

g) $1 \longrightarrow 1 \cdot \frac{180^\circ}{\pi} \simeq 57,3^\circ$

h) $-2 \longrightarrow -2 \cdot \frac{180^\circ}{\pi} \simeq -114,6^\circ$

j) $3 \longrightarrow 3 \cdot \frac{180^\circ}{\pi} \simeq 171,9^\circ$

Ex 4.1.2 :

a) $45^\circ \longrightarrow 45^\circ \cdot \frac{\pi}{180^\circ} = \frac{\pi}{4}$

b) $60^\circ \longrightarrow 60^\circ \cdot \frac{\pi}{180^\circ} = \frac{\pi}{3}$

c) $75^\circ \longrightarrow 75^\circ \cdot \frac{\pi}{180^\circ} = \frac{5\pi}{12}$

d) $-30^\circ \longrightarrow -30^\circ \cdot \frac{\pi}{180^\circ} = -\frac{\pi}{6}$

e) $120^\circ \longrightarrow 120^\circ \cdot \frac{\pi}{180^\circ} = \frac{2\pi}{3}$

f) $315° \longrightarrow 315° \cdot \frac{\pi}{180°} \simeq \frac{7\pi}{4}$ (diviser par 45)

g) $22{,}7° \longrightarrow 22{,}7° \cdot \frac{\pi}{180°} \simeq 0{,}4$

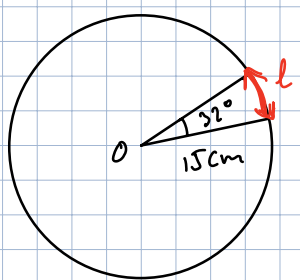
h) $-107{,}9° \longrightarrow -107{,}9° \cdot \frac{\pi}{180°} \simeq -1{,}88$

i) $292{,}3° \longrightarrow 292{,}3° \cdot \frac{\pi}{180°} \simeq 5{,}1$

j) $152{,}5° \longrightarrow 152{,}5 \cdot \frac{\pi}{180°} \simeq 2{,}66$

Ex 4.1.4 :

a)



$l = \frac{2\pi r \alpha}{360}$ α en degré

ou :

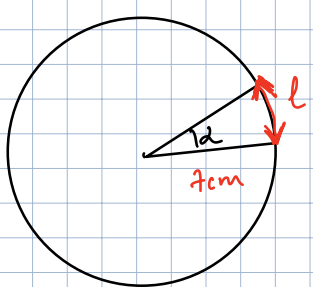
$l = \alpha r$ α en radian

$\alpha = 32° \Rightarrow \boxed{l = \frac{2\pi r \alpha}{360}} = 2\pi \cdot 150 \cdot \frac{32}{360}$

$r = 15\text{cm} = 150\text{mm}$

$= \frac{32}{180} \cdot \pi \cdot 150 \simeq 84\text{ mm}$

b)

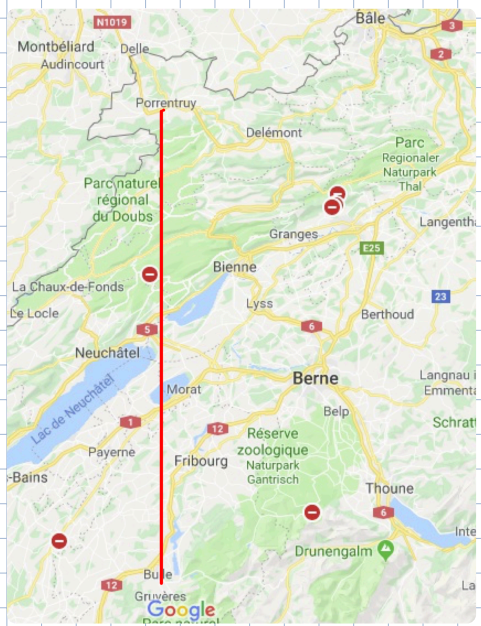


$r = 7\text{cm} = 70\text{ mm}$

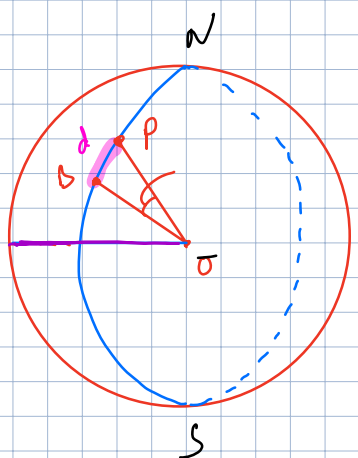
$\alpha = 2$

$\Rightarrow l = 2 \cdot 70 = 144\text{ mm}$

Ex 4.1.6



- Le méridien terrestre :
  => est un grand cercle imaginaire tracé sur le globe terrestre passant par les pôles
- La latitude : est une valeur angulaire, expression du positionnement Nord-Sud d'un point sur Terre, au Nord ou au Sud de l'équateur.



$R_{Terre} = 6370$ km

$d = \alpha \cdot R$

Latitude Porrentruy : 47° 25' N

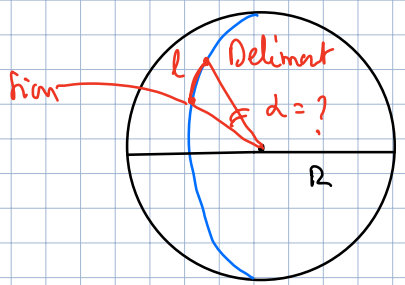
" Bulle : 46° 37' N

$$\alpha = \underbrace{47^\circ 25'}_{} - \underbrace{46^\circ 37'}_{} =$$

$$= 47^\circ + \frac{25^\circ}{60} - \left(46^\circ + \frac{37^\circ}{60}\right) = 0{,}8^\circ$$

donc $d = \alpha \cdot R = 0{,}8^\circ \cdot \frac{\pi}{180^\circ} \cdot 6370 \simeq 89$ km

Ex 4.1.7 :



$l = 123$ Km

Latitude Sion : 46°14' N

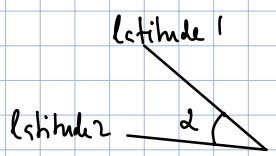
⇒ Latitude Delémont = ?

$$l = 2\pi R \frac{\alpha}{360} \; ?$$

$$\Rightarrow \alpha = \frac{l \cdot 360}{2\pi R} = \frac{123 \cdot 360}{2\pi \, 6370}$$

$$\alpha \cong 1,1^\circ = 1^\circ 06'$$

$$\left(= 1^\circ + 0,1^\circ = 1^\circ + 0,1 \cdot 60 = 1^\circ 06' \right)$$

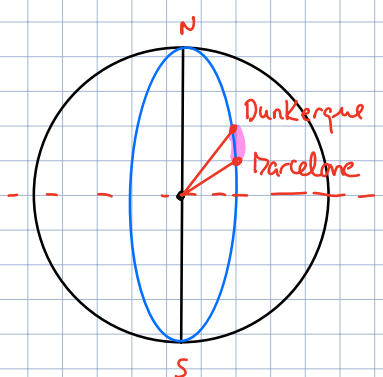


⇒ Latitude de Delémont = Latitude de Sion + α

⇒ $= 46^\circ 14' + 1^\circ 06'$

$= 47^\circ 20' N$

Ex 4.1.8 :



$49^\circ 45' N$

$40^\circ 15' N$

$l = ?$

$$l = \alpha \cdot R$$

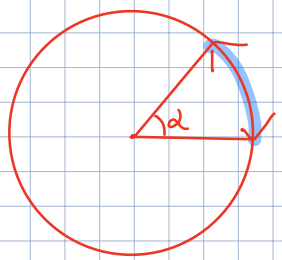
$$\alpha = 49^\circ 45' - 40^\circ 15'$$

$$= 9^\circ 30' = 9,5^\circ$$

$$\Rightarrow l = 9,5^\circ \cdot \frac{\pi}{180} \cdot 6370$$

$$l \cong 1056 \text{ Km}$$

Ex 4.1.3



a) $\alpha = 1^\circ$

$l = 3\,mm$

$l = \alpha \cdot r$

↓

en radian

$\Rightarrow \quad 1^\circ = 1 \cdot \frac{\pi}{180} \simeq 0,017$

$l = \alpha \cdot r \quad \Rightarrow \quad r = \frac{l}{\alpha} = \frac{3}{0,017} \simeq 176,5\,mm$

$\left(r = \frac{3}{\frac{\pi}{180}} = \frac{3.180}{\pi} \simeq 172\,mm \right)$

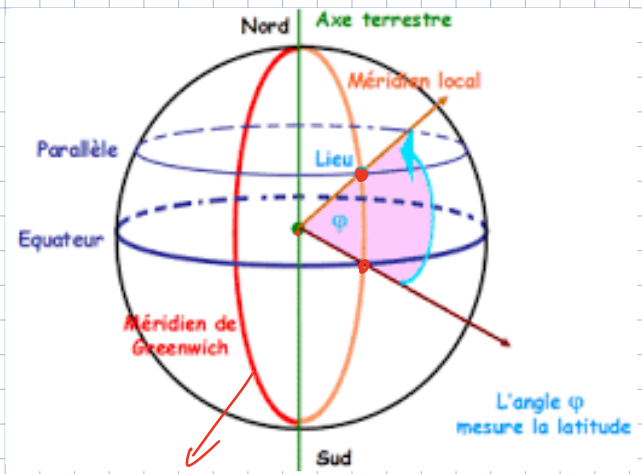
b) $\alpha = 0,03^\circ \quad \Rightarrow \quad l = 0,05\,mm$

$0,03^\circ = 0,03 \cdot \frac{\pi}{180} = \frac{0,03\pi}{180}$

$\Rightarrow \quad r = \frac{l}{\alpha} = \frac{0,05}{\frac{0,03\pi}{180}} = \frac{0,05 \cdot 180}{0,03\pi}$

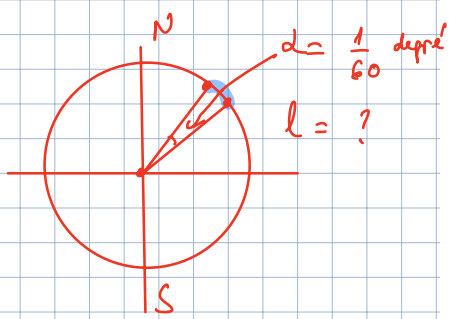
$r \simeq 95\,mm$

Ex 4.1.7 :



Méridien

$R = 6370$ km

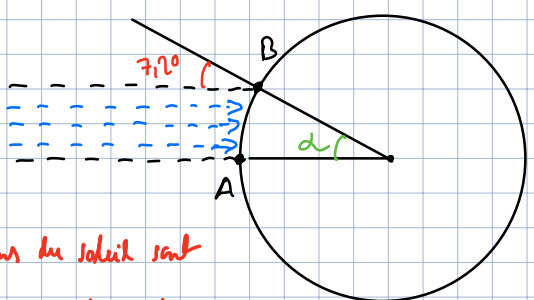


a) $l = ?$ $\Rightarrow l = \underbrace{\alpha}_{\text{en radian}} \cdot R$

$$l = \frac{1}{60} \cdot \frac{\pi}{180} \cdot 6370 \cdot 1000 \simeq 1853 \text{ m}$$

Ex 4.1.9 :

Circonférence et le rayon terrestre



$\Rightarrow \alpha = 7{,}2°$

Les rayons du soleil sont parallèles et les angles de sommet B et de sommet O sont correspondants

* Circonférence :

800 km → 7,2°

x ? → 360°

$$x = \frac{360° \cdot 800 \text{ km}}{7{,}2°} \simeq 40000 \text{ km}$$

* Rayon : $P = 2\pi R \Rightarrow R = \frac{P}{2\pi} = \frac{40000}{2\pi} \simeq 6366$ km