

Exercice 1

(Angle orienté)

1) Dans chacun des cas suivants, α et β sont-elles des mesures d'un même angle ?

a) $\alpha = \frac{\pi}{3}$ et $\beta = \frac{13\pi}{3}$

$$\alpha - \beta = \frac{\pi}{3} - \frac{13\pi}{3} = \frac{-12\pi}{3} = -4\pi = 2 \times (-2)\pi \Rightarrow \alpha \text{ et } \beta \text{ sont 2}$$

mesures, d'un même angle.

b) $\alpha = -\frac{5\pi}{4}$ et $\beta = \frac{17\pi}{4}$

$$\alpha - \beta = -\frac{5\pi}{4} - \frac{17\pi}{4} = \frac{-22\pi}{4} = \frac{-11\pi}{2} \neq 2k\pi \Rightarrow \text{Non.}$$

c) $\alpha = \frac{14\pi}{3}$ et $\beta = -\frac{35\pi}{2}$

$$\alpha - \beta = \frac{14\pi}{3} + \frac{35\pi}{2} = \frac{133\pi}{6} \neq 2k\pi \Rightarrow \text{Non.}$$

d) $\alpha = \frac{69\pi}{12}$ et $\beta = -\frac{\pi}{4}$

$$\alpha - \beta = \frac{69\pi}{12} + \frac{\pi}{4} = \frac{69\pi + 3\pi}{12} = \frac{72\pi}{12} = 6\pi = 2 \times 3\pi \quad (k=3)$$

$\Rightarrow \alpha$ et β sont 2 mesures d'un même angle.

2) Soit \vec{u} et \vec{v} deux vecteurs du plan tel que : $(\vec{u}, \vec{v}) \equiv \frac{2\pi}{3} [2\pi]$. Déterminer les mesures des angles orientés suivants :

$$(\vec{u}, \vec{v}) \equiv \alpha [2\pi] \Rightarrow (\alpha \vec{u}, \beta \vec{v}) \equiv \begin{cases} (\vec{u}, \vec{v}) \text{ si } \alpha \beta > 0 \\ \pi + (\vec{u}, \vec{v}) \text{ si } \alpha \beta < 0 \end{cases}$$

a) $(2\vec{u}, 3\vec{v}) \equiv (\vec{u}, \vec{v}) [2\pi] \equiv \frac{2\pi}{3} [2\pi]$

b) $(\vec{u}, -3\vec{v}) \equiv \pi + (\vec{u}, \vec{v}) [2\pi] \equiv \pi + \frac{2\pi}{3} [2\pi] \equiv \frac{5\pi}{3} [2\pi] \equiv$

$$\frac{6\pi}{3} - \frac{\pi}{3} [2\pi] \equiv \frac{5\pi}{3} [2\pi] \equiv \frac{5\pi}{3} [2\pi]$$

c) $(\vec{v}, \vec{u}) \equiv -(\vec{u}, \vec{v}) [2\pi] \equiv -\frac{2\pi}{3} [2\pi]$



$$d) (-\vec{u}, -\vec{v}) \equiv (\vec{u}, \vec{v}) [\pi] \equiv \frac{2\pi}{3} [\pi]$$

3) Déterminer la mesure principale de l'angle orienté α , dans chacun des cas suivant

$$a) \alpha \equiv \frac{9\pi}{2} [2\pi] \equiv 8\frac{\pi}{2} + \frac{\pi}{2} [\pi] \equiv 4\pi + \frac{\pi}{2} [\pi] \equiv \frac{\pi}{2} [2\pi]$$

$$b) \alpha \equiv -\frac{5\pi}{3} [2\pi] \equiv \frac{6\pi}{3} - \frac{\pi}{3} [\pi] \equiv \frac{2\pi}{3} - \frac{\pi}{3} [\pi] \equiv \frac{\pi}{3} [2\pi]$$

Exercice 2

1/a)

$$(\widehat{BM, BA}) \equiv \frac{6\pi}{16} [\pi] \equiv \frac{3\pi}{8} [\pi] \equiv \frac{3\pi}{8} [2\pi]$$

$$(\widehat{BM, BC}) \equiv \frac{43\pi}{16} [2\pi] \equiv \frac{32\pi}{16} + \frac{11\pi}{16} [2\pi] \equiv 2\pi + \frac{11\pi}{16} [2\pi] \equiv \frac{11\pi}{16} [2\pi]$$

$$b) (\widehat{BA, BC}) \equiv (\widehat{BA, BM}) + (\widehat{BM, BC}) [2\pi] \\ \equiv -\frac{3\pi}{16} + \frac{11\pi}{16} [2\pi] \equiv \frac{8\pi}{16} [2\pi] \equiv \frac{\pi}{2} [\pi]$$

\Rightarrow le triangle ABC est \perp en B.

$$2/a) (\widehat{AB, AM}) \equiv \pi - (\widehat{BM, BA}) - (\widehat{MA, MB}) [\pi] \\ \equiv \pi - \frac{\pi}{8} - \frac{3\pi}{8} [2\pi]$$

$$\equiv \pi - \frac{4\pi}{8} [2\pi]$$

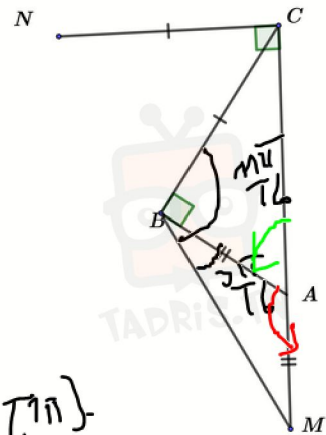
$$\equiv \pi - \frac{3\pi}{8} [2\pi]$$

$$\equiv \frac{5\pi}{8} [2\pi] \checkmark$$

$$* (\widehat{AC, AB}) \equiv \pi - (\widehat{AM, MB}) [\pi] \equiv \pi - \frac{5\pi}{8} [2\pi] \\ \equiv \frac{3\pi}{8} [2\pi]$$

$$* (\widehat{CB, CA}) \equiv \pi - (\widehat{AC, AB}) - \frac{\pi}{2} [2\pi] \equiv \pi - \frac{\pi}{2} - \frac{3\pi}{8} [2\pi] \\ \equiv \frac{\pi}{2} - \frac{3\pi}{8} [2\pi] \equiv \frac{\pi}{8} [2\pi]$$

$$* (\widehat{CN, CB}) \equiv \frac{\pi}{2} - (\widehat{CB, CA}) [2\pi] \equiv \frac{\pi}{2} - \frac{\pi}{8} [2\pi] \equiv \frac{3\pi}{8} [2\pi]$$



$$\begin{aligned}
 b) (\overrightarrow{BC}, \overrightarrow{BN}) &\equiv \pi - (\overrightarrow{NB}, \overrightarrow{NC}) - (\overrightarrow{CN}, \overrightarrow{CB}) [\pi]^N \\
 &\equiv (\overrightarrow{BC}, \overrightarrow{BN}) + (\overrightarrow{NB}, \overrightarrow{NC}) \equiv \pi - (\overrightarrow{CN}, \overrightarrow{CB}) \\
 &\equiv 2(\overrightarrow{BC}, \overrightarrow{BN}) \equiv \pi - \frac{3\pi}{8} [\pi] \equiv \frac{5\pi}{8} [\pi]
 \end{aligned}$$



$$\Rightarrow (\overrightarrow{BC}, \overrightarrow{BN}) \equiv \frac{5\pi}{16} [\pi]$$

$$c) (\overrightarrow{BM}, \overrightarrow{BN}) \equiv (\overrightarrow{BN}, \overrightarrow{BC}) + (\overrightarrow{BC}, \overrightarrow{BN}) [\pi]$$

$$\equiv \frac{11\pi}{16} + \frac{5\pi}{16} [\pi]$$

$$\equiv \frac{16\pi}{16} [\pi] \equiv \pi [2\pi]$$

$\Rightarrow B, M, N$ sont alignés.



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