# Les vecteurs

## exercice :

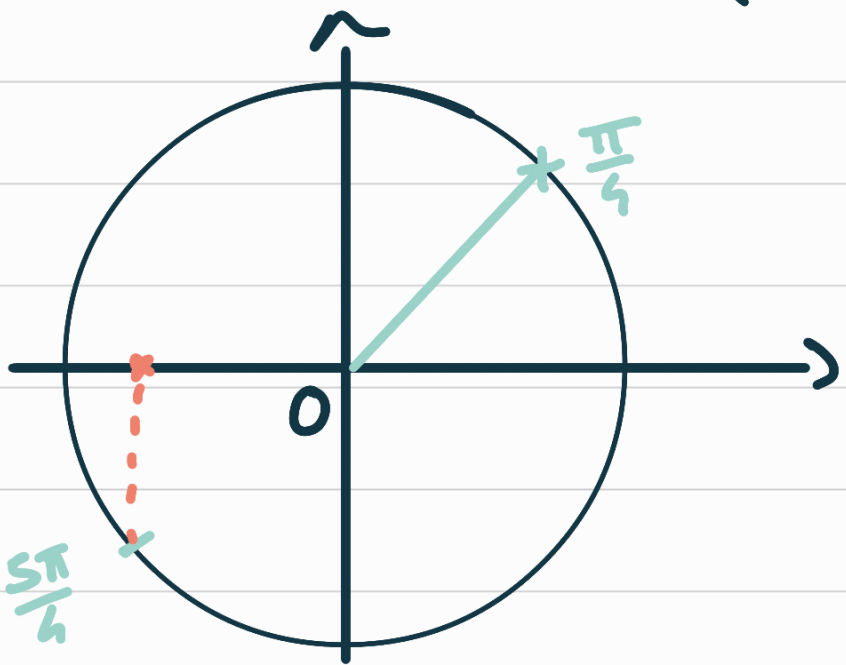
$\|\vec{u}\| = 6$ $\quad$ $\|\vec{v}\| = 4$

et $(\vec{u}, \vec{v}) = \frac{5\pi}{4}$.

Calculer le produit scalaire $\vec{u} \cdot \vec{v}$.

---

$\vec{u} \cdot \vec{v} = 6 \times 4 \times \cos\left(\frac{5\pi}{4}\right)$



$$\vec{u}.\vec{v} = 6 \times 4 \times -\frac{\sqrt{2}}{2}$$

$$= 24 \times -\frac{\sqrt{2}}{2}$$

$$= -12\sqrt{2}.$$

## exercice :

$\vec{u}(2;6)$ $\vec{v}(-3;5)$

1) Calculer $\|\vec{u}\|$, $\|\vec{v}\|$, $\|\vec{u}+\vec{v}\|$

---

$$\|\vec{u}\| = \sqrt{2^2 + 6^2} = \sqrt{4+36} = \sqrt{40}$$

$$\|\vec{v}\| = \sqrt{(-3)^2 + 5^2} = \sqrt{34}$$

$\vec{u} + \vec{v}\ (-1\ ;\ 11)$

↳ $\|\vec{u}+\vec{v}\| = \sqrt{(-1)^2 + 11^2} = \sqrt{122}$.

## 2) Calculer $\vec{u}.\vec{v}$.

---

$$\vec{u}.\vec{v} = \frac{1}{2}\left(\|\vec{u}+\vec{v}\|^2 - \|\vec{u}\|^2 - \|\vec{v}\|^2\right)$$

$$= \frac{1}{2}\left(122 - 40 - 34\right).$$

$$= \frac{1}{2} \times 48$$

$$= 24.$$

$$\vec{u}.\vec{v} = \frac{1}{2}\left(\|\vec{u}+\vec{v}\|^2 - \|\vec{u}\|^2 - \|\vec{v}\|^2\right)$$

$$\vec{u}.\vec{v} = \frac{1}{2}\left(\|\vec{u}\|^2 + \|\vec{v}\|^2 - \|\vec{u}-\vec{v}\|^2\right)$$

## exercice :

$A(-9;4)$ $B(1;-1)$

et $C(4;-2)$.

Calculer $\vec{AB}.\vec{AC}$.

---

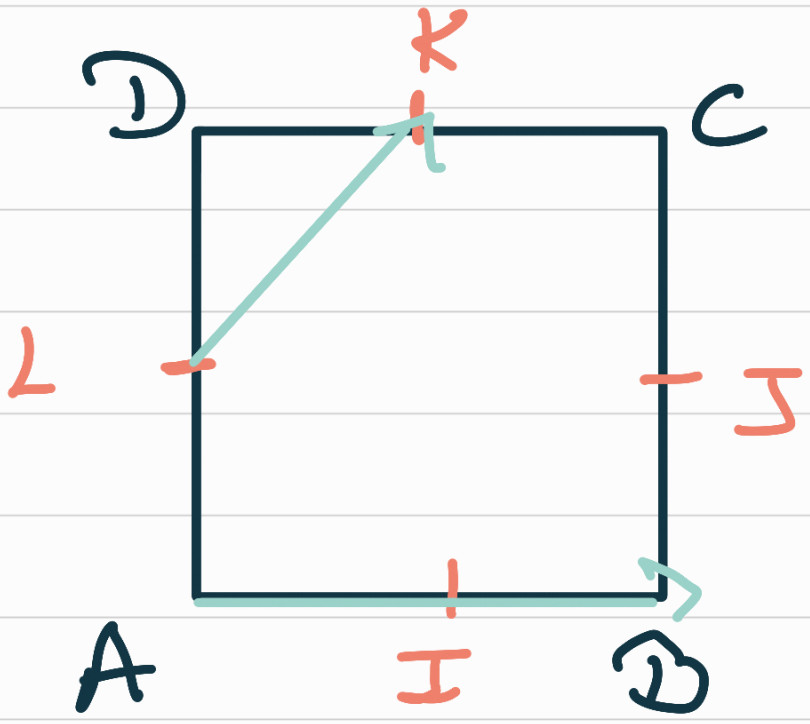
$\vec{AB}(10;-5)$ $\vec{AC}(13;-6)$

$\vec{AB}.\vec{AC} = 10\times13 + (-5)\times(-6)$

$= 130 + 30$

$= 160.$

# exercice :




côté 1

- $\vec{DC} \cdot \vec{DL} = \vec{DC} \cdot \vec{DA} = 0$

- $\vec{IB} \cdot \vec{ID} = \vec{IB} \cdot \vec{IA} = -IB \times IA$

$= -\frac{1}{2} \times \frac{1}{2} = -\frac{1}{4}$

- $\vec{KJ} \cdot \vec{KL} = \vec{KC} \cdot \vec{KD} = -KC \times KD$

$= -\frac{1}{2} \times \frac{1}{2}$

$= -\frac{1}{4}$.

. $\vec{AB} \cdot \vec{LK} = \vec{AB} \cdot \vec{AD} = 0$

---

**Exercice 3.**

MNPQ est un carré avec MN = 6, I est le centre du carré.

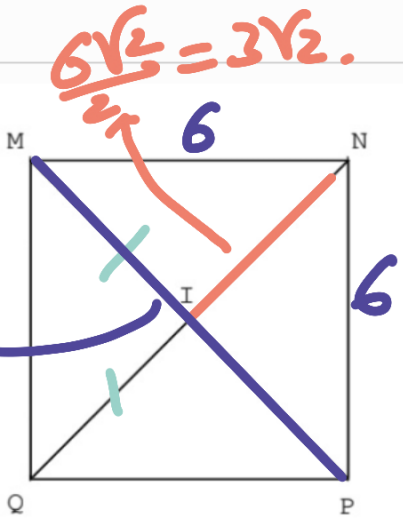
Calculer les produits scalaires suivants :

**1)** $\overrightarrow{MN} \cdot \overrightarrow{QP}$

**2)** $\overrightarrow{MN} \cdot \overrightarrow{PN}$

**3)** $\overrightarrow{IN} \cdot \overrightarrow{IP}$

**4)** $\overrightarrow{QI} \cdot \overrightarrow{NI}$ .




$\frac{6\sqrt{2}}{2} = 3\sqrt{2}$.

Pythagore

$6^2 + 6^2 = 36 + 36 = 72$

$\Rightarrow \sqrt{72} = 6\sqrt{2}$

. $\vec{MN} \cdot \vec{QP} = MN \times QP = 6 \times 6 = 36$

. $\vec{MN} \cdot \vec{PN} = 0$

. $\vec{IN} \cdot \vec{IP} = IN \times -IQ$

$= -IN \times IQ$

$= -(3\sqrt{2}) \times (3\sqrt{2})$

$= -18$

$\cdot \vec{QJ} \cdot \vec{NJ} = QJx - IN$

$= -18.$

---

$\vec{AB} = \vec{AC} + \vec{CB}$