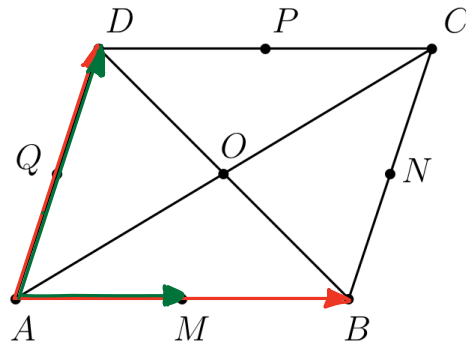


1.2.5 Les points  $M$ ,  $N$ ,  $P$  et  $Q$  sont les milieux des côtés du parallélogramme  $ABCD$ .



a) Donner, dans la base  $\mathfrak{B}_1 = (\overrightarrow{AB}; \overrightarrow{AD})$ , les composantes des vecteurs  $\overrightarrow{AB}$ ,  $\overrightarrow{AD}$ ,  $\overrightarrow{AM}$ ,  $\overrightarrow{AQ}$ ,  $\overrightarrow{AN}$ ,  $\overrightarrow{AP}$ ,  $\overrightarrow{AO}$ ,  $\overrightarrow{OB}$ ,  $\overrightarrow{QP}$  et  $\overrightarrow{CM}$

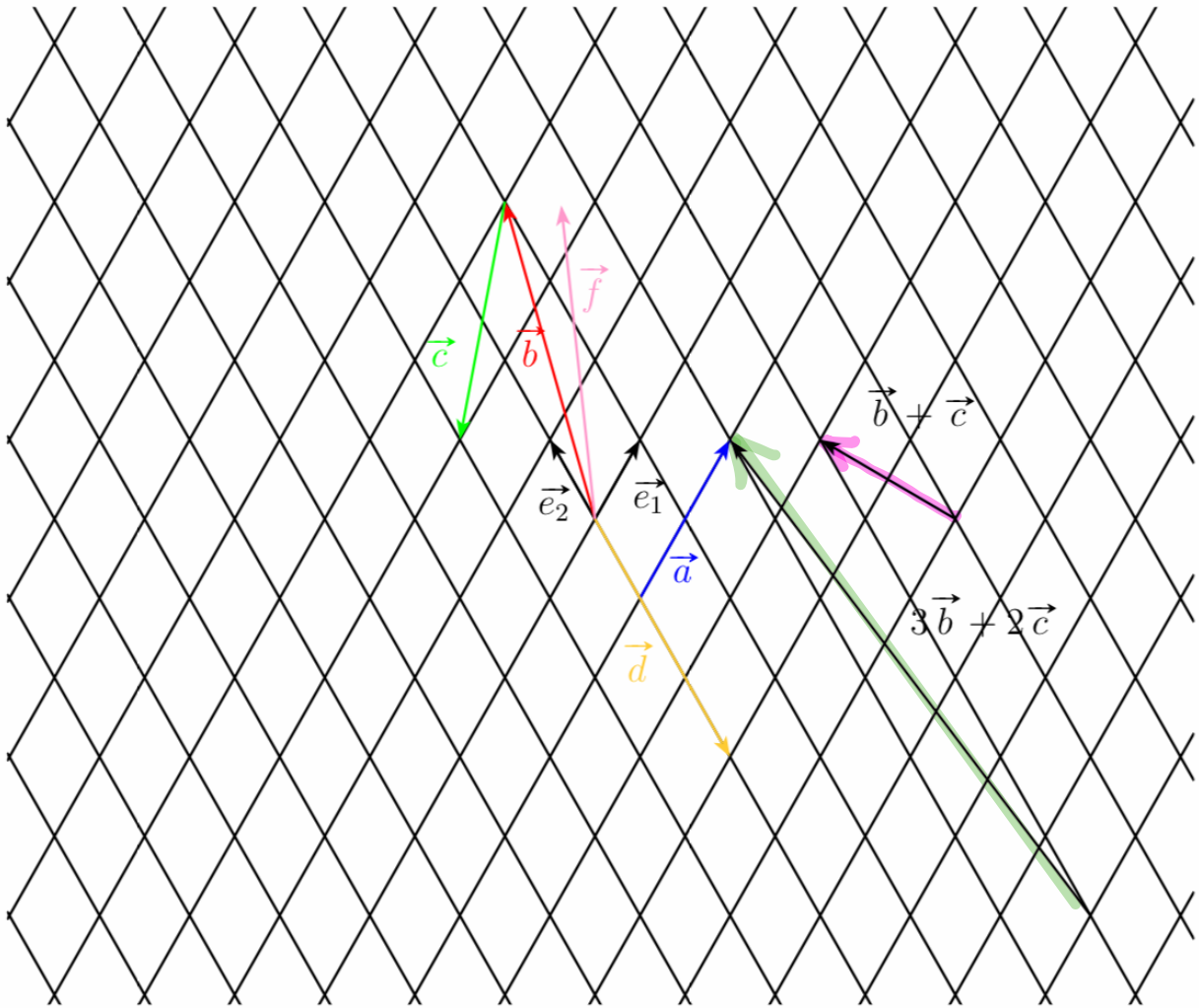
b) Mêmes questions, mais relativement à la base  $\mathfrak{B}_2 = (\overrightarrow{AD}; \overrightarrow{AM})$

a)  $\overrightarrow{AB} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$ ,  $\overrightarrow{AD} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$ ,  $\overrightarrow{AM} = \begin{pmatrix} \frac{1}{2} \\ 0 \end{pmatrix}$ ,  $\overrightarrow{AQ} = \begin{pmatrix} 0 \\ \frac{1}{2} \end{pmatrix}$ ,  $\overrightarrow{AN} = \begin{pmatrix} 1 \\ \frac{1}{2} \end{pmatrix}$ ,  
 $\overrightarrow{AP} = \begin{pmatrix} \frac{1}{2} \\ 1 \end{pmatrix}$ ,  $\overrightarrow{AO} = \begin{pmatrix} \frac{1}{2} \\ \frac{1}{2} \end{pmatrix}$ ,  $\overrightarrow{OB} = \begin{pmatrix} \frac{1}{2} \\ -\frac{1}{2} \end{pmatrix}$ ,  $\overrightarrow{QP} = \begin{pmatrix} \frac{1}{2} \\ \frac{1}{2} \end{pmatrix}$ ,  $\overrightarrow{CM} = \begin{pmatrix} -\frac{1}{2} \\ -1 \end{pmatrix}$ .

b)  $\overrightarrow{AB} = \begin{pmatrix} 0 \\ 2 \end{pmatrix}$ ,  $\overrightarrow{AD} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$ ,  $\overrightarrow{AM} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$ ,  $\overrightarrow{AQ} = \begin{pmatrix} \frac{1}{2} \\ 0 \end{pmatrix}$ ,  $\overrightarrow{AN} = \begin{pmatrix} \frac{1}{2} \\ 2 \end{pmatrix}$ ,  
 $\overrightarrow{AP} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$ ,  $\overrightarrow{AO} = \begin{pmatrix} \frac{1}{2} \\ 1 \end{pmatrix}$ ,  $\overrightarrow{OB} = \begin{pmatrix} -\frac{1}{2} \\ 1 \end{pmatrix}$ ,  $\overrightarrow{QP} = \begin{pmatrix} \frac{1}{2} \\ 1 \end{pmatrix}$ ,  $\overrightarrow{CM} = \begin{pmatrix} -1 \\ -1 \end{pmatrix}$ .

# Ex 1.2.7

a)



b)  $\vec{b} + \vec{c} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ ,  $3\vec{b} + 2\vec{c} = \begin{pmatrix} -1 \\ 7 \end{pmatrix}$

### Ex 1.2.8

$$\begin{aligned} \text{a) } 3\vec{a} - 4\vec{b} + \vec{c} &= 3 \begin{pmatrix} 5 \\ -3 \end{pmatrix} - 4 \begin{pmatrix} 4 \\ -4 \end{pmatrix} + \begin{pmatrix} 1/2 \\ 0 \end{pmatrix} = \begin{pmatrix} 15 - 16 + 1/2 \\ -9 + 16 + 0 \end{pmatrix} \\ &= \begin{pmatrix} -1 + 1/2 \\ 7 \end{pmatrix} = \begin{pmatrix} -2/2 + 1/2 \\ 7 \end{pmatrix} = \underline{\underline{\begin{pmatrix} -1/2 \\ 7 \end{pmatrix}}} \end{aligned}$$

$$\begin{aligned} \text{b) } \vec{a} - 2\vec{b} + \frac{1}{2}\vec{c} &= \begin{pmatrix} 5 \\ -3 \end{pmatrix} - 2 \begin{pmatrix} 4 \\ -4 \end{pmatrix} + \frac{1}{2} \begin{pmatrix} 1/2 \\ 0 \end{pmatrix} = \begin{pmatrix} 5 - 8 + 1/4 \\ -3 + 8 + 0 \end{pmatrix} \\ &= \begin{pmatrix} -3 + 1/4 \\ 5 \end{pmatrix} = \begin{pmatrix} -12/4 + 1/4 \\ 5 \end{pmatrix} = \underline{\underline{\begin{pmatrix} -11/4 \\ 5 \end{pmatrix}}} \end{aligned}$$

$$\begin{aligned} \text{c) } -5\vec{a} - 3\vec{b} - 8\vec{c} &= -5 \begin{pmatrix} 5 \\ -3 \end{pmatrix} - 3 \begin{pmatrix} 4 \\ -4 \end{pmatrix} - 8 \begin{pmatrix} 1/2 \\ 0 \end{pmatrix} = \begin{pmatrix} -25 - 12 - 8/2 \\ 15 + 12 + 0 \end{pmatrix} \\ &= \begin{pmatrix} -37 - 4 \\ 27 \end{pmatrix} = \underline{\underline{\begin{pmatrix} -41 \\ 27 \end{pmatrix}}} \end{aligned}$$

### Ex 1.2.9

$$k\vec{a} + m\vec{b} = \vec{c} \Leftrightarrow k \begin{pmatrix} 2 \\ 4 \end{pmatrix} + m \begin{pmatrix} 3 \\ -9 \end{pmatrix} = \begin{pmatrix} 12 \\ -6 \end{pmatrix}$$

$$\begin{aligned} \Leftrightarrow \begin{cases} (1) & 2k + 3m = 12 \\ (2) & 4k - 9m = -6 \end{cases} \begin{array}{l} | \cdot 3 \\ | \cdot 1 \end{array} \Rightarrow \begin{array}{r} 6k + 9m = 36 \\ + \quad 4k - 9m = -6 \\ \hline 10k \quad \quad = 30 \\ \underline{\underline{k = 3}} \end{array} \end{aligned}$$

dans (1)

$$\Rightarrow 2 \cdot 3 + 3m = 12 \Leftrightarrow 6 + 3m = 12$$

$$\Leftrightarrow 3m = 6$$

$$\Leftrightarrow \underline{\underline{m = 2}}$$