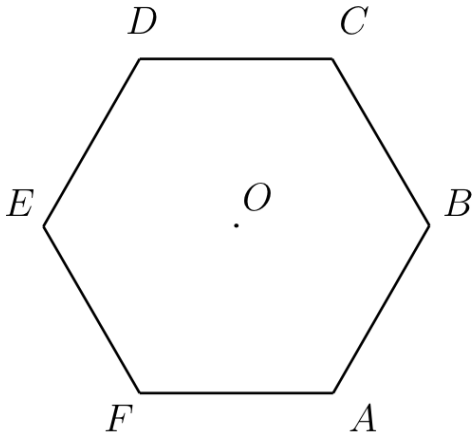
Ex 1.1.1

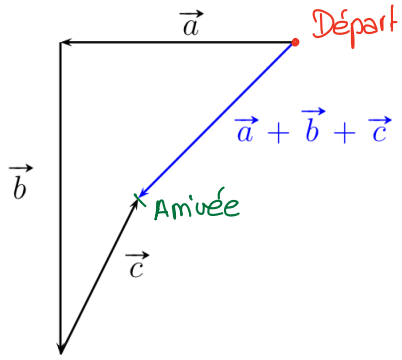


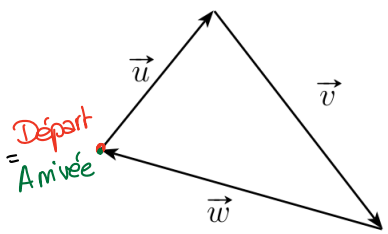
non nuls

18 vecteurs : $\overrightarrow{OA}$, $\overrightarrow{OB}$, $\overrightarrow{OC}$, $\overrightarrow{OD}$, $\overrightarrow{OE}$, $\overrightarrow{OF}$, $\overrightarrow{AC}$, $\overrightarrow{AD}$, $\overrightarrow{AE}$, $\overrightarrow{BE}$, $\overrightarrow{BF}$, $\overrightarrow{CA}$, $\overrightarrow{CF}$, $\overrightarrow{DA}$, $\overrightarrow{DB}$, $\overrightarrow{EB}$, $\overrightarrow{EC}$, $\overrightarrow{FC}$.

On peut encore ajouter le vecteur $\vec{0}$ (nul)

Ex 1.1.2

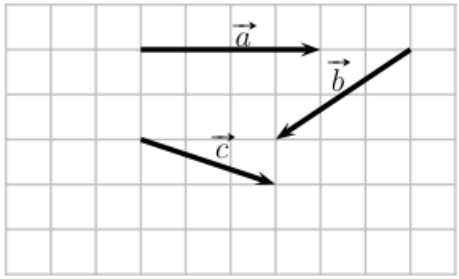




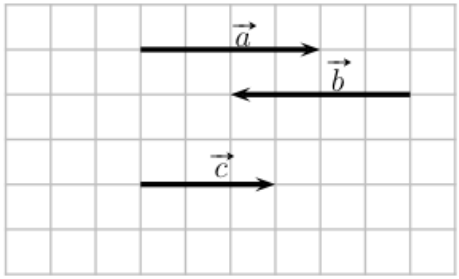
$$\vec{u}+\vec{v}+\vec{w}=\vec{0}$$

Ex 1.1.3

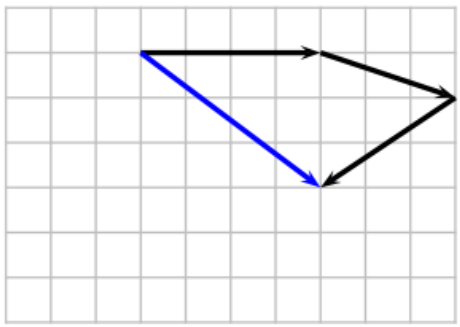
Cas 1

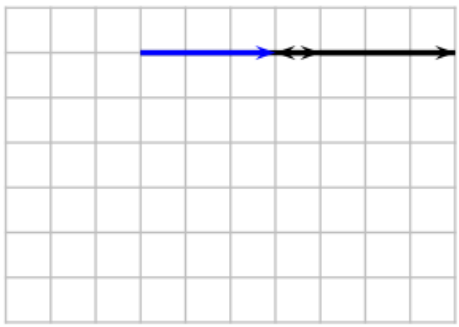


Cas 2

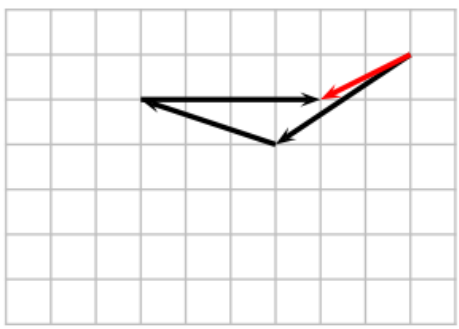


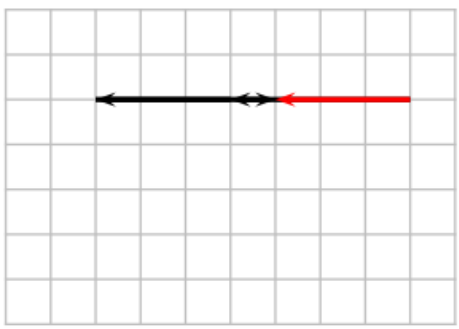
Le vecteur $\vec{a} + \vec{c} + \vec{b}$





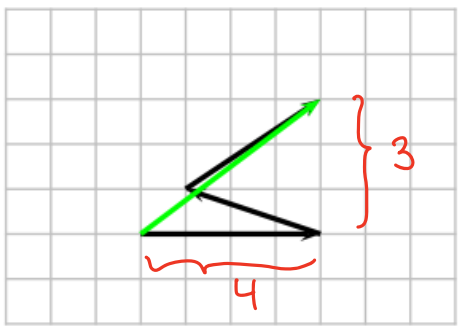
Le vecteur $\vec{b} - \vec{c} + \vec{a}$

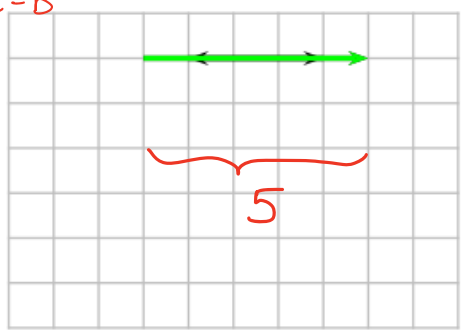




Le vecteur $\vec{a} - (\vec{c} + \vec{b})$

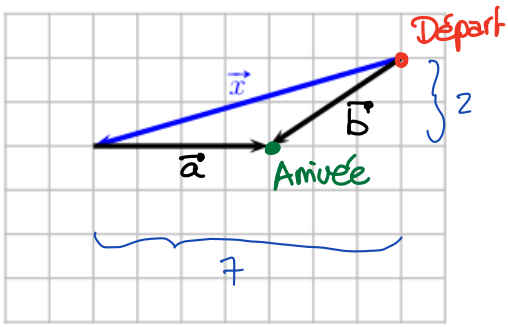
$\vec{a} - \vec{c} - \vec{b}$

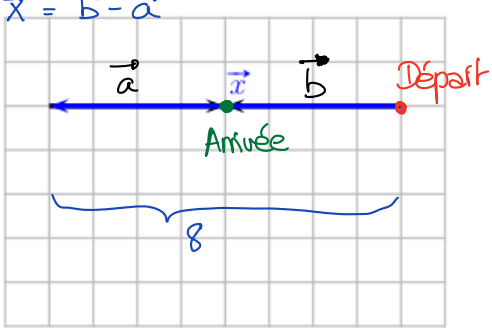




Le vecteur $\vec{x}$ tel que $\vec{x} + \vec{a} = \vec{b}$

$\vec{x} = \vec{b} - \vec{a}$





1.1.4

a) $\underbrace{\overrightarrow{AB}+\overrightarrow{BD}}_{\overrightarrow{AD}}+\overrightarrow{DC}=\overrightarrow{AD}+\overrightarrow{DC}=\overrightarrow{AC}$

b) $\underbrace{\overrightarrow{AD}+\overrightarrow{DC}}_{\overrightarrow{AC}}+\underbrace{\overrightarrow{DE}+\overrightarrow{EB}+\overrightarrow{BC}}_{\overrightarrow{DC}}=\overrightarrow{AC}+\overrightarrow{DC}$

c) $\overrightarrow{AC}\underbrace{-\overrightarrow{BD}}_{+\overrightarrow{DB}}\underbrace{-\overrightarrow{AB}}_{+\overrightarrow{BA}}=\underbrace{\overrightarrow{DB}+\overrightarrow{BA}+\overrightarrow{AC}}_{\overrightarrow{DC}}=\overrightarrow{DC}$

d) $\overrightarrow{DA}-\underbrace{(\overrightarrow{DB}+\overrightarrow{BC}+\overrightarrow{CD})}_{\overrightarrow{DD}=\vec{0}}=\overrightarrow{DA}$

e) $\overrightarrow{EC}\underbrace{-\overrightarrow{ED}}_{+\overrightarrow{DE}}+\overrightarrow{CB}\underbrace{-\overrightarrow{DB}}_{+\overrightarrow{BD}}=\underbrace{\overrightarrow{DE}+\overrightarrow{EC}+\overrightarrow{CB}+\overrightarrow{BD}}_{\overrightarrow{DD}=\vec{0}}=\vec{0}$

1.1.5

a) $\vec{a}=\overrightarrow{AB}+\underbrace{\overrightarrow{FG}}_{\overrightarrow{BC}}=\underbrace{\overrightarrow{AB}+\overrightarrow{BC}}_{\overrightarrow{AC}}=\overrightarrow{AC}$

b) $\vec{b}=\overrightarrow{AG}+\underbrace{\overrightarrow{CD}}_{\overrightarrow{GH}}=\underbrace{\overrightarrow{AG}+\overrightarrow{GH}}_{\overrightarrow{AH}}=\overrightarrow{AH}$

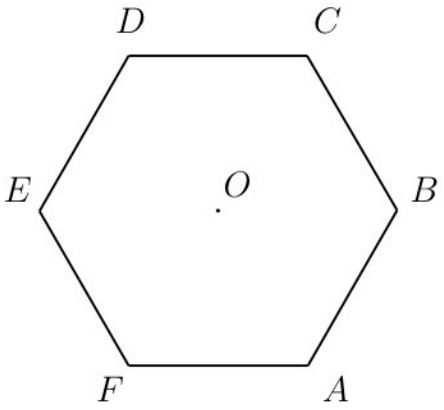
c) $\vec{c}=\underbrace{\overrightarrow{EB}}_{\overrightarrow{HC}}+\overrightarrow{CA}=\underbrace{\overrightarrow{HC}+\overrightarrow{CA}}_{\overrightarrow{HA}}=\overrightarrow{HA}$

d) $\vec{d}=\overrightarrow{EH}+\underbrace{\overrightarrow{DC}}_{\overrightarrow{HG}}+\overrightarrow{GA}=\underbrace{\overrightarrow{EH}+\overrightarrow{HG}+\overrightarrow{GA}}_{\overrightarrow{EA}}=\overrightarrow{EA}$

e) $\vec{e}=\overrightarrow{AH}+\underbrace{\overrightarrow{EB}}_{\overrightarrow{HC}}=\underbrace{\overrightarrow{AH}+\overrightarrow{HC}}_{\overrightarrow{AC}}=\overrightarrow{AC}$

f) $\vec{f}=\overrightarrow{AB}+\underbrace{\overrightarrow{CC}}_{\vec{0}}+\overrightarrow{BH}+\underbrace{\overrightarrow{GF}}_{\overrightarrow{HE}}=\underbrace{\overrightarrow{AB}+\overrightarrow{BH}+\overrightarrow{HE}}_{\overrightarrow{AE}}=\overrightarrow{AE}$

1.1.6



a) $\vec{a} = \overrightarrow{AB} + \underbrace{\overrightarrow{CD}}_{\overrightarrow{BO}} = \underbrace{\overrightarrow{AB} + \overrightarrow{BO}}_{\overrightarrow{AO}} = \overrightarrow{AO} = \overrightarrow{FE}$

b) $\vec{b} = \overrightarrow{AB} + \underbrace{\overrightarrow{FE}}_{\overrightarrow{BC}} = \underbrace{\overrightarrow{AB} + \overrightarrow{BC}}_{\overrightarrow{AC}} = \overrightarrow{AC}$

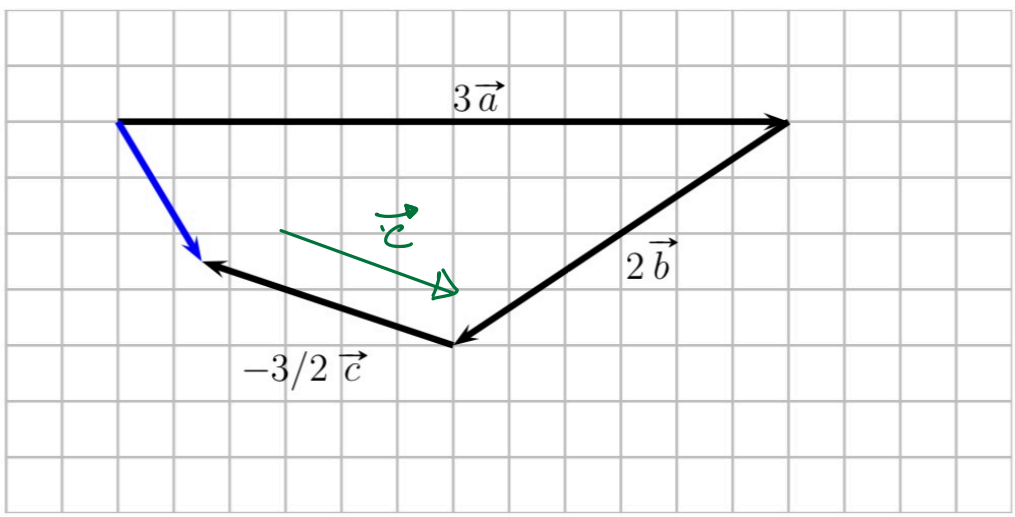
c) $\vec{c} = \overrightarrow{AC} \underbrace{-\overrightarrow{FE}}_{+\overrightarrow{EF}} = \overrightarrow{AC} + \underbrace{\overrightarrow{EF}}_{\overrightarrow{CB}} = \underbrace{\overrightarrow{AC} + \overrightarrow{CB}}_{\overrightarrow{AB}} = \overrightarrow{AB}$

d) $\vec{d} = \overrightarrow{EB} + \overrightarrow{DE} = \underbrace{\overrightarrow{DE} + \overrightarrow{EB}}_{\overrightarrow{DB}} = \overrightarrow{DB}$

e) $\vec{e} = \underbrace{\overrightarrow{FE}}_{\overrightarrow{AO}} + \underbrace{\overrightarrow{FE}}_{\overrightarrow{OD}} = \underbrace{\overrightarrow{AO} + \overrightarrow{OD}}_{\overrightarrow{AD}} = \overrightarrow{AD}$

f) $\vec{f} = \underbrace{\overrightarrow{FA} + \overrightarrow{AB} + \overrightarrow{BC}}_{\overrightarrow{FC}} + \underbrace{\overrightarrow{DD}}_{\vec{0}} = \overrightarrow{FC}$

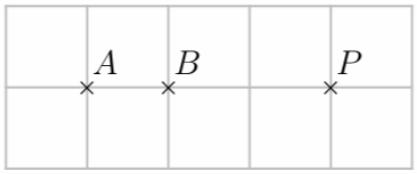
1.1.7



Ex 1.1.8

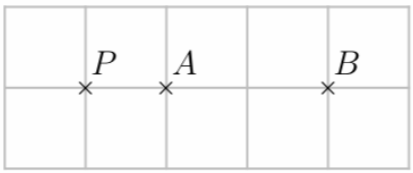
a) $\vec{AP} = 3\vec{AB}$

même origine
$\vec{AP}$ et $\vec{AB}$ même sens
$\|\vec{AP}\| = 3\|\vec{AB}\|$

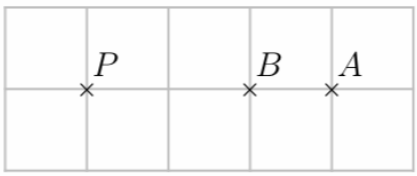


b) $\vec{AP} = \frac{1}{2}\vec{BA}$

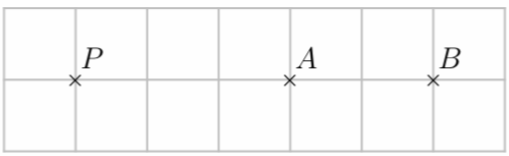
sens opposé
$\|\vec{AP}\| = \frac{1}{2}\|\vec{BA}\|$ ou $\|\vec{BA}\| = 2\|\vec{AP}\|$



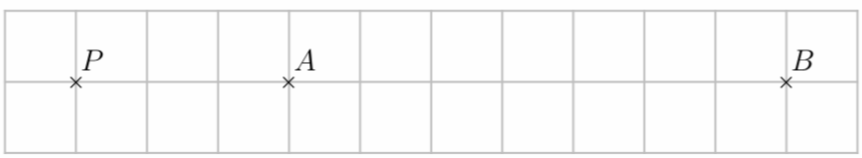
c) $\vec{PA} = -\frac{3}{2}\vec{BP} = \frac{3}{2}\vec{PB}$



d) $\vec{PA} = -\frac{3}{5}\vec{BP} = \frac{3}{5}\vec{PB}$

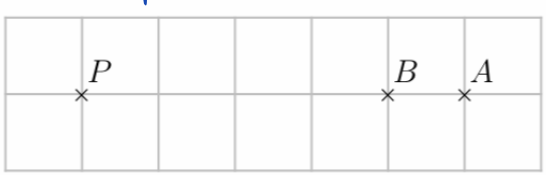


e) $\vec{PA} = \frac{3}{7}\vec{AB}$

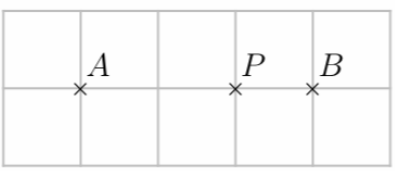


f) $\vec{AP} = \frac{5}{-4}\vec{PB} = -\frac{5}{4}\vec{PB} = \frac{5}{4}\vec{BP}$

ou $\vec{PA} = \frac{5}{4}\vec{PB}$



g) $\vec{PA} = -2\vec{PB} = 2\vec{BP}$



Ex 1.1.9

$$3(\vec{a}-2\vec{v})-6\vec{b} = -7\left(\frac{15}{7}\vec{v}-3\vec{b}\right)+12\vec{a}$$

$$3\vec{a}-6\vec{v}-6\vec{b} = -15\vec{v}+21\vec{b}+12\vec{a}$$

$$-6\vec{v}+15\vec{v} = 21\vec{b}+12\vec{a}-3\vec{a}+6\vec{b}$$

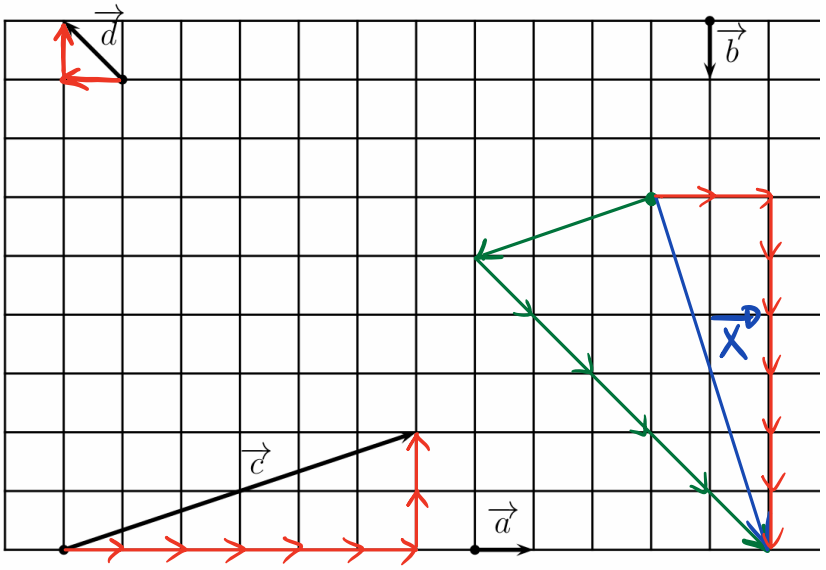
$$9\vec{v} = 9\vec{a}+27\vec{b}$$

$$\vec{v} = \vec{a}+3\vec{b}$$

Ex 1.1.11

a) $\vec{c} = 6\vec{a} - 2\vec{b}$

b) $\vec{d} = -\vec{a} - \vec{b}$



c) géométriquement : $\vec{x} = 2\vec{a} + 6\vec{b}$ (voir représentation ci-dessus)

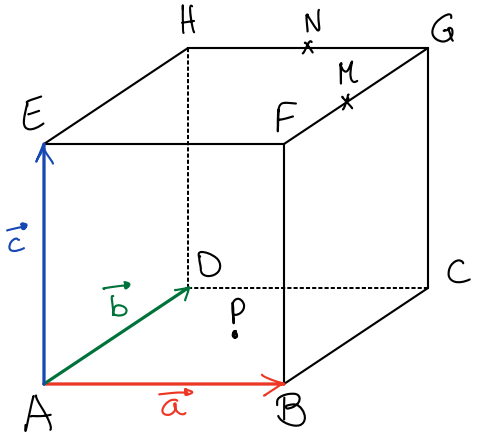
algébriquement : $\vec{x} = -\frac{1}{2}\vec{c} - 5\vec{d}$

$\overset{a) \text{ et } b)}{=} -\frac{1}{2}(6\vec{a} - 2\vec{b}) - 5(-\vec{a} - \vec{b})$

$= -3\vec{a} + \vec{b} + 5\vec{a} + 5\vec{b}$

$= 2\vec{a} + 6\vec{b}$

Ex 1.1.13



a) $\overrightarrow{EP} = \frac{1}{2}\vec{a} + \frac{1}{2}\vec{b} - \vec{c}$

b) $\overrightarrow{EM} = \vec{a} + \frac{1}{2}\vec{b}$

c) $\overrightarrow{EN} = \frac{1}{2}\vec{a} + \vec{b}$

d) $\overrightarrow{NM} = \frac{1}{2}\vec{a} - \frac{1}{2}\vec{b}$

e) $\overrightarrow{PN} = \frac{1}{2}\vec{b} + \vec{c}$

f) $\overrightarrow{NP} = -\frac{1}{2}\vec{b} - \vec{c}$

g) $\overrightarrow{PM} = \frac{1}{2}\vec{a} + \vec{c}$