# LDDR Niveau 1 : TE 1 Geometrie plan

1MG Level 1 **PLANE GEOMETRY** TEST

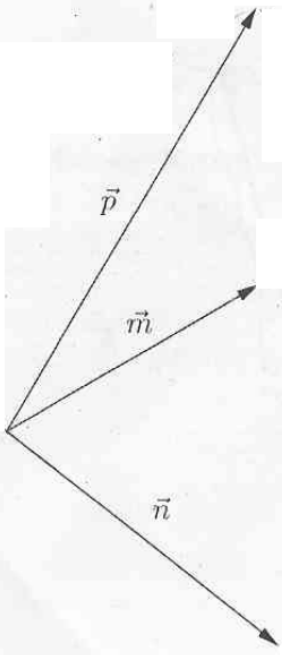
2017-05-12 80 mn Name:

**With calculator. Indicate your computations** **/ 40 pts**

**EXERCISE 1**

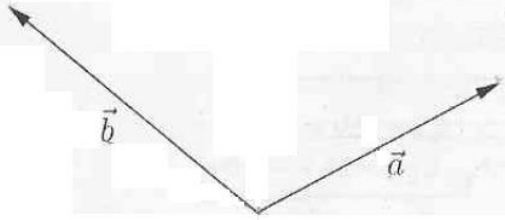
1) In $V_2$ with basis $(\vec{e_1}, \vec{e_2})$, we consider the vectors $\vec{a} = \begin{pmatrix} 6 \\ -4 \end{pmatrix}$, $\vec{b} = \begin{pmatrix} 10 \\ -15 \end{pmatrix}$ and $\vec{c} = \begin{pmatrix} 17 \\ -8 \end{pmatrix}$.
Decompose, by computation, the vector $\vec{c}$ in the basis $(\vec{a}; \vec{b})$.

2) Thanks to a drawing (here below), estimate as precisely as possible, the components of $\vec{p}$ in the basis $(\vec{m}, \vec{n})$.



3) Draw the following vectors, with clear constructions :

$\vec{c} = -0.5\vec{a} + \frac{4}{3}\vec{b}$ and $\vec{d} = -\sqrt{2}\,\vec{b}$. (*calculator not allowed*)




4) The point $B$ is such that $\overrightarrow{BC} = 2\,\overrightarrow{OA} - \overrightarrow{CO}$. Locate $B$ with a clear drawing.

**EXERCISE 2** [ 5 ]

We consider the points $A(3;7), B(10;-8)$ and $D(-2;4)$.

1) Determine $C$ so that $ABCD$ is a parallelogram.

2) Give the coordinates of the center of that parallelogram.

3) $D$ is the center of gravity of the triangle $ABE$. Compute the coordinates of $E$.

**EXERCISE 3** [ / ~~12~~ ]

1) For what value(s) of $k \in \mathbb{R}$ are $\vec{a} = \binom{k}{3}$ and $\vec{b} = \binom{2k+1}{6+k}$ linearly independent ?

2) Compute the coordinates of $B$ given that $(45;-54)$ is the midpoint of the **segment *AB*** and that $\overrightarrow{BA} = \binom{-8}{4}$.

3) Give the Cartesian equation **or** the parametric equations of the median through $C(5;2)$ of the **triangle *OCD***, with $D(12;-4)$.

4) $P'Q'R'$ are the midpoints of the sides of the **triangle *PQR***.
Compute the coordinates of the center of gravity of that triangle given the points $P(3;8)$ and $P'(9;-7)$.

**EXERCISE 4** **[ / 13 ]**

1) Fill the blanks and empty cells in the following table about **three lines.**
*You're not asked to write any computation.*

2) Compute the coordinates of the intersection point of the lines 2) and 3).

| | One point | A direction vector | Parametric equations | Cartesian equation | Slope-intercept equation |
|---|---|---|---|---|---|
| 1) | | | | | $y = 2x - 5$ |
| 2) | | | | $4x - 5y + 22 = 0$ | |
| 3) | $(-7; \dots)$ | $\begin{pmatrix} \dots \\ -15 \end{pmatrix}$ | $\begin{cases} x = 2 + \lambda \\ y = -5 + 3\lambda \end{cases}$ | | |