

$$\begin{aligned} & \cdot [G_2G_4] \quad [G_1G_3] \quad O \\ & \cdot G_4 \quad G_3 \\ & \cdot G_1G_2G_3G_4 \end{aligned} \quad \text{-(3)}$$

:05 •

$$\begin{aligned} & [AB] \quad I \quad O \quad ABCD \\ & \cdot \overline{BJ} = \frac{1}{3}\overline{BC} : [BC] \quad J \\ & \cdot (\overline{AB}, \overline{AD}) \quad \overline{IJ} \quad \overline{BD} \quad \text{-(1)} \\ & \cdot G \quad (IJ) \quad (BD) \quad \text{-(2)} \\ & \cdot J \quad I \quad G \quad \text{-(3)} \\ & \cdot (A, \overline{AB}, \overline{AD}) \quad G \quad \text{-(4)} \end{aligned}$$

:06 •

$$\begin{aligned} & \cdot [AB] \quad I \quad B \quad A \\ & : M'' \quad M' \quad (P) \quad M \\ & M'' = \text{bar} \{(A,1);(B,1);(M,-1)\} \quad M' = \text{bar} \{(A,-1);(B,1);(M,2)\} \\ & \cdot M' \quad M \quad \text{-(1)} \\ & \cdot M'' \quad M \quad \text{-(2)} \\ & (C) \quad M \quad M'' \quad M' \quad \text{-(3)} \\ & \cdot I \quad \text{التي مركزها A} \end{aligned}$$

:07 •

$$\begin{aligned} & (P) \quad C \quad B \quad A \\ & M \quad C' \quad B' \quad A' \quad (P) \quad M \\ & \cdot C \quad B \quad A \\ & \cdot M' \quad (CC') \quad (BB') \quad (AA') \quad \text{-(1)} \\ & \cdot ACAC' \quad BCB'C' \quad ABA'B' \quad \text{-(2)} \\ & \cdot M' \quad M \quad f \quad \text{-(3)} \end{aligned}$$

:01 •

$$\begin{aligned} & \cdot AB = 5 : (P) \quad B \quad A \\ & : K \quad G \quad \text{-(1)} \\ & \cdot K = \text{bar} \{(A,-1);(B,6)\} \quad G = \text{bar} \{(A,2);(B,3)\} \\ & : (P) \quad \text{-(2)} \\ & E_1 = \{M \in (P) / \|2\overline{MA} + 3\overline{MB}\| = 10\} \\ & E_2 = \{M \in (P) / \|2\overline{MA} + 3\overline{MB}\| = \|-\overline{MA} + 6\overline{MB}\|\} \\ & \cdot E_3 = \{M \in (P) / (2\overline{MA} + 3\overline{MB}) \cdot (-\overline{MA} + 6\overline{MB}) = 0\} \end{aligned}$$

:02 •

$$\begin{aligned} & : (P) \quad K \quad J \quad I \quad ABC \\ & J = \text{bar} \{(A,3);(C,4)\} \quad I = \text{bar} \{(A,3);(B,2)\} \\ & \cdot K = \text{bar} \{(B,2);(C,-4)\} \\ & \cdot J \quad I \quad K \quad \text{-(1)} \\ & \cdot (IJ) \quad K \quad K \quad J \quad I \quad \text{-(2)} \end{aligned}$$

:03 •

$$\begin{aligned} & : (P) \quad L \quad H \quad G \quad ABC \\ & L = \text{bar} \{(A,3);(C,1)\} \quad H = \text{bar} \{(A,-2);(B,1)\} \\ & \cdot L \quad H \quad G \quad L \quad H \quad \text{-(1)} \\ & \cdot L \quad H \quad G \quad L \quad H \quad G \quad \text{-(2)} \end{aligned}$$

:04 •

$$\begin{aligned} & \cdot a \quad O \quad ABCD \\ & : G_2 \quad G_1 \quad \text{-(1)} \\ & \cdot G_2 = \text{bar} \{(B,3);(C,4)\} \quad G_1 = \text{bar} \{(A,3);(B,4)\} \\ & : G_4 \quad G_3 \quad \text{-(2)} \\ & \cdot G_4 = \text{bar} \{(D,3);(A,4)\} \quad G_3 = \text{bar} \{(C,3);(D,4)\} \end{aligned}$$

Séries d'exercices sur la barycentre

:11 •

$AB = a$

M L K H M

(AB) (AC) (BC)

$MH + MK + ML = \frac{a\sqrt{3}}{2}$: - (1)

E (AC) (BC) M - (2)

M F (BC) (AB) M

$ME + MF + MG = a$: G (AB) (AC)

$\vec{j} = \frac{1}{a}\overrightarrow{BA}$ $\vec{i} = \frac{1}{a}\overrightarrow{BC}$: (B, \vec{i}, \vec{j}) (P) - (3)

$\{(A, MF); (B, ME); (C, MG)\}$

M

$M = \text{bar}\{(A, CE), (B, AG); (C, BF)\}$: - (4)

:12 •

$\gamma = AB$ $\beta = AC$ $\alpha = BC$: ABC

C I $[BC]$ \widehat{BAC}

D (AB) (AI)

$\frac{IB}{IC} = \frac{\gamma}{\beta}$: ADC - (1)

$I = \text{bar}\{(B, \beta); (C, \gamma)\}$: - (2)

\widehat{ACB} \widehat{ABC} K J - (3)

(C, γ) (B, β) (A, α) O $[AB]$ $[AC]$

$K = \text{bar}\{(A, \alpha); (B, \beta)\}$ $J = \text{bar}\{(A, \alpha); (C, \gamma)\}$:

O ملاقية في النقطة ABC - (4)

:08 •

$BC = 2$ $AB = AC = 3$: ABC

ABC H $[BC]$ A'

\widehat{BAC} θ $\cos \theta = \frac{7}{9}$: - (1)

B' (AC) B B' - (2)

C A

C B A هي مرجع النقط H - (3)

:09 •

(P) R Q G ABC

$Q = \text{bar}\{(A, 3); (C, 1)\}$ $G = \text{bar}\{(A, 3); (B, 1); (C, 1)\}$

$R = \text{bar}\{(A, 3); (B, 1)\}$

G (CR) (BQ) - (1)

G P A $[BC]$ P - (2)

\overrightarrow{PA} \overrightarrow{PG}

$[BC]$ (C) C B - (3)

(C) A G (Γ)

:10 •

(P) K J I ABC

$K = \text{bar}\{(B, -4); (C, 1)\}$ $J = \text{bar}\{(A, 1); (B, 2)\}$ $I = \text{bar}\{(A, 1); (C, 1)\}$

K J I - (1)

$[CJ]$ $[BI]$ $[AK]$ C' B' A' - (2)

\overrightarrow{AC} \overrightarrow{AB} $\overrightarrow{CC'}$ $\overrightarrow{BB'}$ $\overrightarrow{AA'}$

$(A'C')$ B' C' B' A' - (3)

:15 •
ABCD

- O [CD] [AB] I
- [BD] [AC]
- C J {(A,3);(B,-2)}
- $\vec{AK} = \frac{1}{4}\vec{AC}$: K B
- (1) -
- C B J (2) -
- C A K (3) -
- (CI) (BK) (AJ) (4) -
- (5) -
- $E = \left\{ M \in (P) / \left\| 3\vec{AM} - 2\vec{BM} \right\| = \left\| -2\vec{BM} + \vec{CM} \right\| \right\}$
- C A O h (6) -
- h B صورة B' أ
- D C I' بين I' = h(I) ب
- h D صورة D' ج

:13 •
B A

- k (P)
- $(\Gamma_k) = \left\{ M \in (P) / \frac{MA}{MB} = k \right\}$:
- (Γ_1) (1) -
- $k \in \mathbb{R}_+^* - \{1\}$ (2) -
- (P) J I $(\Gamma_k) = \left\{ M \in (P) / \vec{MI} \cdot \vec{MJ} = 0 \right\}$
- J = bar {(A,1);(B,-k)} I = bar {(A,1);(B,k)}
- (3) - تطبيق :
- $(\Sigma) = \left\{ M \in (P) / 3MA^2 + 2MB^2 = 7MA \times MB \right\}$:
- AB = 4 (P) B A

:14 •
ABCD

- O
- BD = 7cm AC = 6cm AB = 5cm
- J = bar {(B,5);(D,2)} I = bar {(A,3);(C,-1)} : J I
- $D = \text{bar} \{(A, \alpha); (B, \beta); (C, \gamma)\}$:
- (1) -
- (2) -
- (3) -
- $E_1 = \left\{ M \in (P) / \left\| 3\vec{MA} - \vec{MC} \right\| = \left\| \vec{MB} + \vec{MD} \right\| \right\}$
- $E_2 = \left\{ M \in (P) / \left\| \vec{MA} - \vec{MB} + \vec{MC} \right\| = \left\| \vec{AB} + \vec{AD} \right\| \right\}$
- {(A,-6);(B,5);(C,2);(D,2)} : K (4) -
- K J I