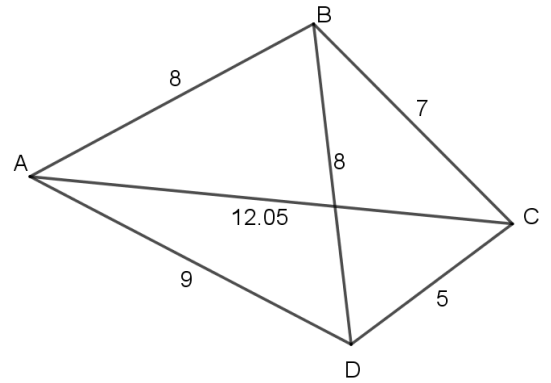


Exercice 4A.1 :

A partir des informations contenues sur la figure ci-contre, calculer :

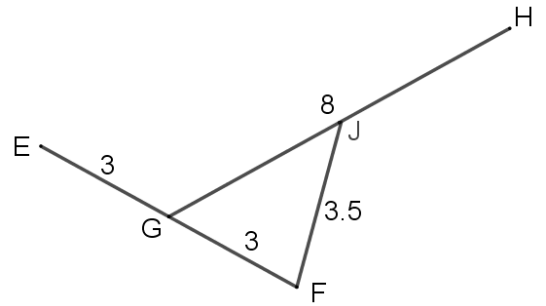
- $\overrightarrow{AB} \cdot \overrightarrow{BC}$
- $\overrightarrow{DA} \cdot \overrightarrow{DB}$
- $\overrightarrow{CA} \cdot \overrightarrow{BC}$
- $\overrightarrow{BA} \cdot \overrightarrow{DA}$
- $\overrightarrow{AB} \cdot \overrightarrow{CD}$



Exercice 4A.2 :

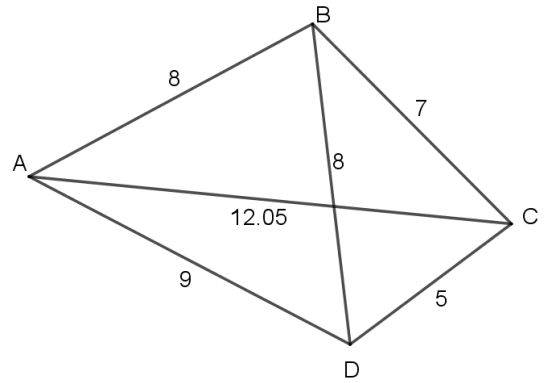
A partir des informations contenues sur la figure ci-contre, sachant que $HG = 8$, calculer :

- $\overrightarrow{HE} \cdot \overrightarrow{HF}$
- $\overrightarrow{FG} \cdot \overrightarrow{FH}$
- $HE^2 + HF^2$
- $FG^2 + FH^2$



Exercice 4A.1 :

A partir des informations contenues sur la figure ci-contre, calculer :



$$\begin{aligned} \overrightarrow{AB} \cdot \overrightarrow{BC} &= \frac{1}{2} \left(\|\overrightarrow{AB} + \overrightarrow{BC}\|^2 - \|\overrightarrow{AB}\|^2 - \|\overrightarrow{BC}\|^2 \right) \\ &= \frac{1}{2} \left(\|\overrightarrow{AC}\|^2 - \|\overrightarrow{AB}\|^2 - \|\overrightarrow{BC}\|^2 \right) \\ &= \frac{1}{2} (12,05^2 - 8^2 - 7^2) = 16,10125 \end{aligned}$$

$$\begin{aligned} \overrightarrow{DA} \cdot \overrightarrow{DB} &= \frac{1}{2} \left(\|\overrightarrow{DA}\|^2 + \|\overrightarrow{DB}\|^2 - \|\overrightarrow{DA} - \overrightarrow{DB}\|^2 \right) = \frac{1}{2} \left(\|\overrightarrow{DA}\|^2 + \|\overrightarrow{DB}\|^2 - \|\overrightarrow{DA} + \overrightarrow{BD}\|^2 \right) = \frac{1}{2} \left(\|\overrightarrow{DA}\|^2 + \|\overrightarrow{DB}\|^2 - \|\overrightarrow{BA}\|^2 \right) \\ &= \frac{1}{2} (9^2 + 8^2 - 8^2) = 40,5 \end{aligned}$$

$$\overrightarrow{CA} \cdot \overrightarrow{BC} = \frac{1}{2} \left(\|\overrightarrow{CA} + \overrightarrow{BC}\|^2 - \|\overrightarrow{CA}\|^2 - \|\overrightarrow{BC}\|^2 \right) = \frac{1}{2} \left(\|\overrightarrow{BA}\|^2 - \|\overrightarrow{CA}\|^2 - \|\overrightarrow{BC}\|^2 \right) = \frac{1}{2} (8^2 - 12,05^2 - 7^2) = -65,10125$$

$$\begin{aligned} \overrightarrow{BA} \cdot \overrightarrow{DA} &= \frac{1}{2} \left(\|\overrightarrow{BA}\|^2 + \|\overrightarrow{DA}\|^2 - \|\overrightarrow{BA} - \overrightarrow{DA}\|^2 \right) = \frac{1}{2} \left(\|\overrightarrow{BA}\|^2 + \|\overrightarrow{DA}\|^2 - \|\overrightarrow{BA} + \overrightarrow{AD}\|^2 \right) = \frac{1}{2} \left(\|\overrightarrow{BA}\|^2 + \|\overrightarrow{DA}\|^2 - \|\overrightarrow{BD}\|^2 \right) \\ &= \frac{1}{2} (8^2 + 9^2 - 8^2) = 40,5 \end{aligned}$$

$$\begin{aligned} \overrightarrow{AB} \cdot \overrightarrow{CD} &= \overrightarrow{AB} \cdot (\overrightarrow{CA} + \overrightarrow{AD}) = \overrightarrow{AB} \cdot \overrightarrow{CA} + \overrightarrow{AB} \cdot \overrightarrow{AD} = \overrightarrow{CA} \cdot \overrightarrow{AB} + \overrightarrow{AB} \cdot \overrightarrow{AD} \\ &= \frac{1}{2} \left(\|\overrightarrow{CA} + \overrightarrow{AB}\|^2 - \|\overrightarrow{CA}\|^2 - \|\overrightarrow{AB}\|^2 \right) + \frac{1}{2} \left(\|\overrightarrow{AB}\|^2 + \|\overrightarrow{AD}\|^2 - \|\overrightarrow{AB} - \overrightarrow{AD}\|^2 \right) \\ &= \frac{1}{2} \left(\|\overrightarrow{CB}\|^2 - \|\overrightarrow{CA}\|^2 - \|\overrightarrow{AB}\|^2 \right) + \frac{1}{2} \left(\|\overrightarrow{AB}\|^2 + \|\overrightarrow{AD}\|^2 - \|\overrightarrow{AB} + \overrightarrow{DA}\|^2 \right) \\ &= \frac{1}{2} (CB^2 - CA^2 - AB^2) + \frac{1}{2} (AB^2 + AD^2 - \|\overrightarrow{DB}\|^2) \\ &= \frac{1}{2} (7^2 - 12,05^2 - 8^2) + \frac{1}{2} (8^2 + 9^2 - 8^2) = -39,60125 \end{aligned}$$

Exercice 4A.2 :

A partir des informations contenues sur la figure ci-contre, sachant que $HG = 8$, calculer :

$$\overrightarrow{HE} \cdot \overrightarrow{HF} = HG^2 - \frac{1}{4} EF^2 = 8^2 - \frac{1}{4} \times 6^2 = 64 - \frac{36}{4} = 55$$

$$\overrightarrow{FG} \cdot \overrightarrow{FH} = FJ^2 - \frac{1}{4} GH^2 = 3,5^2 - \frac{1}{4} \times 8^2 = 12,25 - \frac{64}{4} = -3,75$$

$$HE^2 + HF^2 = 2HG^2 + \frac{EF^2}{2} = 2 \times 8^2 + \frac{6^2}{2} = 128 + 18 = 146$$

$$FG^2 + FH^2 = 2FJ^2 + \frac{GH^2}{2} = 2 \times 3,5^2 + \frac{8^2}{2} = 24,5 + 32 = 56,5$$

