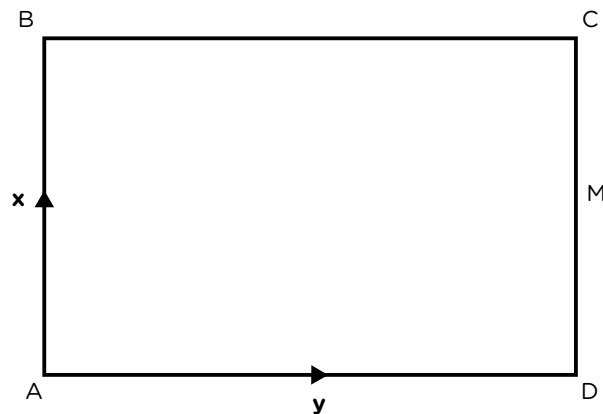


1. In the rectangle ABCD $\overrightarrow{AB} = \mathbf{x}$ and $\overrightarrow{AD} = \mathbf{y}$.
 M is the midpoint of CD.
 Find in terms of \mathbf{x} and \mathbf{y} :



a) \overrightarrow{AC}

Answer:

$$\begin{aligned}\overrightarrow{AC} &= \overrightarrow{AD} + \overrightarrow{DC} \\ &= \mathbf{y} + \mathbf{x}\end{aligned}$$

b) \overrightarrow{BD}

Answer:

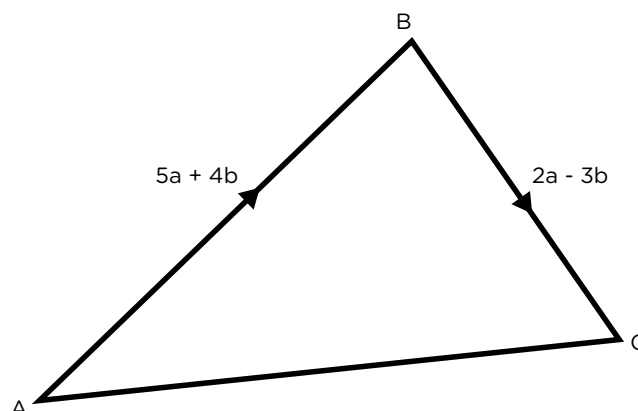
$$\begin{aligned}\overrightarrow{BD} &= \overrightarrow{BA} + \overrightarrow{AD} \\ &= -\mathbf{x} + \mathbf{y}\end{aligned}$$

c) \overrightarrow{AM}

Answer:

$$\begin{aligned}\overrightarrow{AM} &= \overrightarrow{AD} + \frac{1}{2} \overrightarrow{DC} \\ &= \mathbf{y} + \frac{1}{2} \mathbf{x}\end{aligned}$$

2. In the diagram $\overrightarrow{AB} = 5\mathbf{a} + 4\mathbf{b}$ and $\overrightarrow{BC} = 2\mathbf{a} - 3\mathbf{b}$.



Find \vec{AC} in terms of **a** and **b**.

Answer:

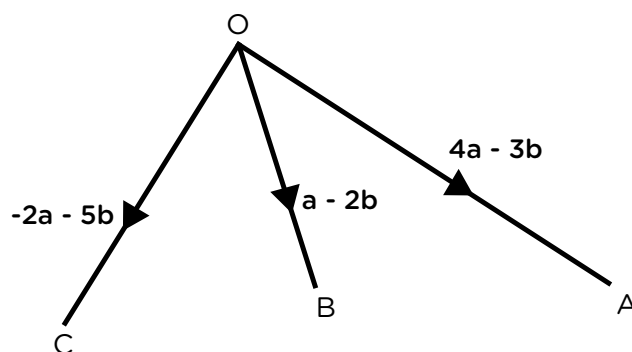
$$\begin{aligned}\vec{AC} &= \vec{AB} + \vec{BC} \\ &= 5a + 4b + 2a - 3b \\ &= 7a + b\end{aligned}$$

3. In the following diagram

$$\vec{OA} = 4a - 3b$$

$$\vec{OB} = a - 2b$$

$$\vec{OC} = -2a - 5b$$



(a) Find \vec{AB} in terms of **a** and **b**.

Answer:

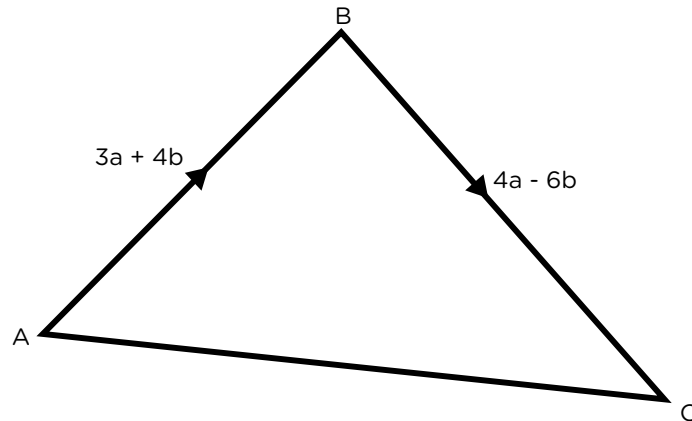
$$\begin{aligned}\vec{AB} &= \vec{AO} + \vec{OB} \\ &= -4a + 3b + a - 2b \\ &= -3a + b\end{aligned}$$

(b) Find \vec{AC} in terms of **a** and **b**.

Answer:

$$\begin{aligned}\vec{AC} &= \vec{AO} + \vec{OC} \\ &= -4a + 3b - 2a - 5b \\ &= -6a - 2b\end{aligned}$$

4. In the diagram $\overrightarrow{AB} = 3\mathbf{a} + 4\mathbf{b}$ and $\overrightarrow{BC} = 4\mathbf{a} - 6\mathbf{b}$.



- (a) Find \overrightarrow{AC} in terms of \mathbf{a} and \mathbf{b} .

Answer:

$$\begin{aligned}\overrightarrow{AC} &= \overrightarrow{AB} + \overrightarrow{BC} \\ &= 3\mathbf{a} + 4\mathbf{b} + 4\mathbf{a} - 6\mathbf{b} \\ &= 7\mathbf{a} - 2\mathbf{b}\end{aligned}$$

- (b) Knowing that M is the midpoint of BC find \overrightarrow{AM} in terms of \mathbf{a} and \mathbf{b} .

Answer:

$$\begin{aligned}\overrightarrow{AM} &= \overrightarrow{AB} + \frac{1}{2}\overrightarrow{BC} \\ &= 3\mathbf{a} + 4\mathbf{b} + 2\mathbf{a} - 3\mathbf{b} \\ &= 5\mathbf{a} + \mathbf{b}\end{aligned}$$