# Vectors

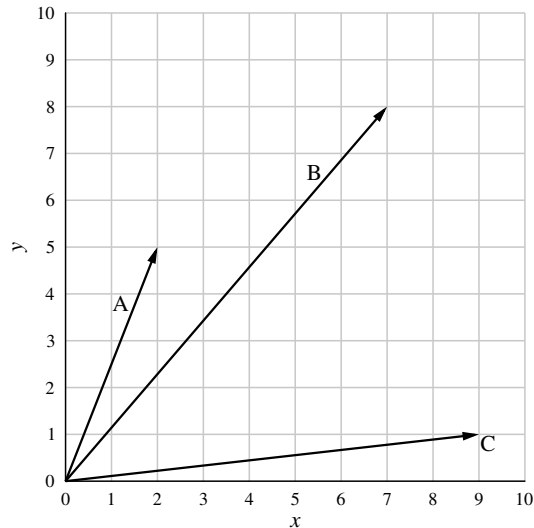**i**. **Below is a graph showing three vectors** $A, B, C$**.**



- Write each vector in column notation, relative to the origin.
- Calculate the vector **c** - **a**. Give your answer in column notation.
- Draw the vector $\begin{pmatrix} 8 \\ 3 \end{pmatrix}$ on the graph and label it D.

**ii**. **If a** $= \begin{pmatrix} 5 \\ -1 \end{pmatrix}$ **and b** $= \begin{pmatrix} 7 \\ 2 \end{pmatrix}$**, calculate the vector equal to:**

- **a** + **b**
- 3**a**
- **b** - **a**
- -5**b**

**iii**. **In a triangle** $ABC$**,** $M$ **is the midpoint of** $AC$**.** $N$ **is a point on** $BC$**, where** $BN : NC = 2 : 3$**.**

$$\vec{AC} = 2\mathbf{a} \text{ and } \vec{AB} = 3\mathbf{b}$$
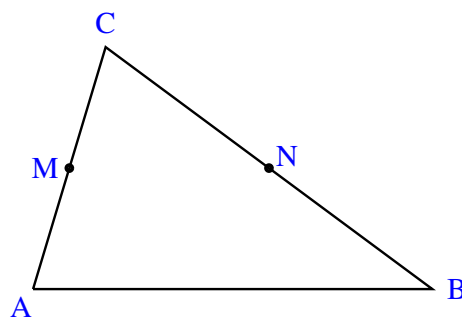


- Work out $\vec{MN}$ in terms of **a** and **b**. Give your answer in its simplest form.
- Use the answer to the first part to explain why $MN$ is not parallel to $AB$.