

## Section 1: Introduction to vectors

## Solutions to Exercise level 1

$$1. (i) \ 6\mathbf{i} + 3\mathbf{j} \text{ or } \begin{pmatrix} 6 \\ 3 \end{pmatrix}$$

$$(ii) \ -6\mathbf{i} - 5\mathbf{j} \text{ or } \begin{pmatrix} -6 \\ -5 \end{pmatrix}$$

2. Find the magnitude of each of these vectors.

$$(i) \ |3\mathbf{i} + 4\mathbf{j}| = \sqrt{3^2 + 4^2} = \sqrt{25} = 5$$

$$(ii) \ |3\mathbf{i} - 6\mathbf{j}| = \sqrt{3^2 + (-6)^2} = \sqrt{45} = 3\sqrt{5}$$

$$(iii) \ |-\mathbf{i} - \mathbf{j}| = \sqrt{(-1)^2 + (-1)^2} = \sqrt{2}$$

$$3. (i) \ \overrightarrow{AB} = \overrightarrow{OB} - \overrightarrow{OA} = \begin{pmatrix} 3 \\ 7 \end{pmatrix} - \begin{pmatrix} 4 \\ -1 \end{pmatrix} = \begin{pmatrix} -1 \\ 8 \end{pmatrix}$$

$$(ii) \ \overrightarrow{BA} = -\overrightarrow{AB} = -\begin{pmatrix} -1 \\ 8 \end{pmatrix} = \begin{pmatrix} 1 \\ -8 \end{pmatrix}$$

$$(iii) \ \overrightarrow{AC} = \overrightarrow{OC} - \overrightarrow{OA} = \begin{pmatrix} -2 \\ 3 \end{pmatrix} - \begin{pmatrix} 4 \\ -1 \end{pmatrix} = \begin{pmatrix} -6 \\ 4 \end{pmatrix}$$

$$(iv) \ \overrightarrow{CB} = \overrightarrow{OB} - \overrightarrow{OC} = \begin{pmatrix} 3 \\ 7 \end{pmatrix} - \begin{pmatrix} -2 \\ 3 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$$

$$4. (i) \ \mathbf{b} + 2\mathbf{a} = \begin{pmatrix} 2 \\ 5 \end{pmatrix} + 2\begin{pmatrix} 3 \\ -4 \end{pmatrix} \\ = \begin{pmatrix} 2 \\ 5 \end{pmatrix} + \begin{pmatrix} 6 \\ -8 \end{pmatrix} \\ = \begin{pmatrix} 8 \\ -3 \end{pmatrix}$$

## OCR AS Maths Vectors 1 Exercise

$$\begin{aligned} \text{(ii) } 2c - b &= 2 \begin{pmatrix} -1 \\ -3 \end{pmatrix} - \begin{pmatrix} 2 \\ 5 \end{pmatrix} \\ &= \begin{pmatrix} -2 \\ -6 \end{pmatrix} - \begin{pmatrix} 2 \\ 5 \end{pmatrix} \\ &= \begin{pmatrix} -4 \\ -11 \end{pmatrix} \end{aligned}$$

$$\begin{aligned} \text{(iii) } a - b + 3c &= \begin{pmatrix} 3 \\ -4 \end{pmatrix} - \begin{pmatrix} 2 \\ 5 \end{pmatrix} + 3 \begin{pmatrix} -1 \\ -3 \end{pmatrix} \\ &= \begin{pmatrix} 3 \\ -4 \end{pmatrix} - \begin{pmatrix} 2 \\ 5 \end{pmatrix} + \begin{pmatrix} -3 \\ -9 \end{pmatrix} \\ &= \begin{pmatrix} -2 \\ -18 \end{pmatrix} \end{aligned}$$