

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

Each answer shows the steps, then the **result**.

2.1

- $\begin{pmatrix} 4+1 \\ 2-3 \end{pmatrix} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$

2.2

- $\begin{pmatrix} 6 \\ -2 \end{pmatrix}$

2.3

$$\sqrt{6^2 + 8^2} = \sqrt{100} = 10$$

3.1

- $\begin{pmatrix} 5-1 \\ 2-6 \end{pmatrix} = \begin{pmatrix} 4 \\ -4 \end{pmatrix}$

3.2

- $\overrightarrow{AB} = \mathbf{b} - \mathbf{a} = \begin{pmatrix} 6 \\ 8 \end{pmatrix}$
- magnitude $\sqrt{6^2 + 8^2} = 10$

3.3

(a)

- $2\mathbf{a} = \begin{pmatrix} 6 \\ -2 \end{pmatrix}$
- $2\mathbf{a} - \mathbf{b} = \begin{pmatrix} 6 - (-2) \\ -2 - 4 \end{pmatrix} = \begin{pmatrix} 8 \\ -6 \end{pmatrix}$

(b)

- $|\mathbf{a}| = \sqrt{3^2 + (-1)^2}$
- $\sqrt{10} = 3.16$ to 2 d.p.

(c)

- $\overrightarrow{AC} = -\mathbf{a} + \mathbf{b}$
- in a parallelogram $\overrightarrow{OB} = \mathbf{a} + \mathbf{b}$

(d)

- $\overrightarrow{AB} = \mathbf{b}$ so $\overrightarrow{AM} = \frac{1}{2}\mathbf{b}$
- $\overrightarrow{OM} = \overrightarrow{OA} + \overrightarrow{AM} = \mathbf{a} + \frac{1}{2}\mathbf{b}$

$$\bullet = \begin{pmatrix} 3 \\ -1 \end{pmatrix} + \begin{pmatrix} -1 \\ 2 \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$$