Solutions

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

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

2.1

- $\sqrt{3^2 + 4^2} = \sqrt{25}$

$= \mathbf{5}$

2.2

- $\sqrt{(-5)^2 + 12^2} = \sqrt{169}$

$= \mathbf{13}$

2.3

- $\sqrt{6^2 + (-8)^2} = \sqrt{100}$

$= \mathbf{10}$

2.4

- $|\mathbf{d}| = \sqrt{(-7)^2 + (-24)^2} = \sqrt{625} = \mathbf{25}$

2.5

- $|\mathbf{e}| = \sqrt{2^2 + 5^2} = \sqrt{4 + 25}$

$= \sqrt{\mathbf{29}}$

3.1

(a)

- add the components separately

$$\begin{pmatrix} 3 \\ 2 \end{pmatrix}$$

(b)

- $\sqrt{3^2 + 2^2} = \sqrt{13}$

$= \sqrt{\mathbf{13}}$

- 13 has no square factor, so this is already exact

(c)

- $2\mathbf{a} = \begin{pmatrix} 8 \\ -6 \end{pmatrix}$, so $2\mathbf{a} - \mathbf{b} = \begin{pmatrix} 9 \\ -11 \end{pmatrix}$
- $\sqrt{81 + 121} = \sqrt{202}$

$= 14.212\ldots = \mathbf{14.2}$

3.2

- $k^2 + 8^2 = 17^2$
- $k^2 = 289 - 64 = 225$

$k = \mathbf{15}$

3.3

- $\overrightarrow{AB} = \begin{pmatrix} 7 - 1 \\ 10 - 2 \end{pmatrix} = \begin{pmatrix} 6 \\ 8 \end{pmatrix}$
- $|\overrightarrow{AB}| = \sqrt{6^2 + 8^2} = \sqrt{100}$

$= \mathbf{10}$

3.4

- $2\mathbf{p} - \mathbf{q} = \begin{pmatrix} 4 - (-1) \\ 6 - 4 \end{pmatrix} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$
- $|2\mathbf{p} - \mathbf{q}| = \sqrt{5^2 + 2^2} = \sqrt{29}$

$= 5.385\ldots = \mathbf{5.39}$

3.5

- $\mathbf{a} + \mathbf{b} = \begin{pmatrix} 3 + t \\ t - 1 \end{pmatrix}$, so $(3 + t)^2 + (t - 1)^2 = 26$
- $9 + 6t + t^2 + t^2 - 2t + 1 = 26$, so $2t^2 + 4t - 16 = 0$, i.e. $t^2 + 2t - 8 = 0$
- $(t + 4)(t - 2) = 0$
- $t > 0$, so $\boldsymbol{t = 2}$