

Exercise walk-through

Vectors ■ 4.8

eXercise

You must be able to

- find the **magnitude** 大小 of a **vector** 向量 $\langle a, b \rangle$
- add vectors and multiply by a scalar

Method — Vectors

A vector $\langle a, b \rangle$ has **magnitude** $\sqrt{a^2 + b^2}$ and a direction.

- add componentwise: $\langle a, b \rangle + \langle c, d \rangle = \langle a + c, b + d \rangle$;
- scalar multiple: $k\langle a, b \rangle = \langle ka, kb \rangle$.

Method — Example

$\langle 3, 4 \rangle$ has magnitude $\sqrt{9 + 16} = 5$.

Practice 2.1 ■ 1 mark

State the magnitude of $\langle a, b \rangle$.

Solution 2.1

Worked steps

$$\sqrt{a^2 + b^2} \quad \text{B1}.$$

Practice 2.2 ■ 1 mark

Add $\langle 1, 2 \rangle + \langle 3, 4 \rangle$.

Solution 2.2

Worked steps

 $\langle 4, 6 \rangle$ **B1**.

Practice 2.3 ■ 2 marks

Find the magnitude of $\langle 3, 4 \rangle$.

Solution 2.3

Worked steps

$$\sqrt{3^2 + 4^2} = \sqrt{25} = 5 \quad \text{M1} \quad \text{A1}.$$

Exam-style 3.1 ■ 1 mark

The magnitude of $\langle a, b \rangle$ is

A $a + b$

B $\sqrt{a^2 + b^2}$

C $a^2 + b^2$

D a/b

Solution 3.1

A $a + b$

B $\sqrt{a^2 + b^2}$



C $a^2 + b^2$

D a/b

Worked steps

B.

Exam-style 3.2 ■ 1 mark

$\langle 2, 1 \rangle + \langle 3, 5 \rangle$ equals

A $\langle 5, 6 \rangle$

B $\langle 6, 5 \rangle$

C $\langle 5, 5 \rangle$

D $\langle 6, 6 \rangle$

Solution 3.2

A $\langle 5, 6 \rangle$



B $\langle 6, 5 \rangle$

C $\langle 5, 5 \rangle$

D $\langle 6, 6 \rangle$

Worked steps

A.

Exam-style 3.3 ■ 1 mark

$$\vec{v} = \langle 6, 8 \rangle.$$

- (a) Find the magnitude.
- (b) Find $2\vec{v}$.
- (c) Find $\vec{v} + \langle 1, 0 \rangle$.

Solution 3.3

Worked steps

(a) $\sqrt{36 + 64} = 10$ **B1**. (b) $\langle 12, 16 \rangle$ **B1**. (c) $\langle 7, 8 \rangle$ **B1**.