AP PRECALCULUS • EXERCISE SHEET

4.8 Vectors

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

KEY WORDS magnitude 大小 • vector 向量

Objective

Build the skills to answer exam questions on **vectors**.

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

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ 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: $k\langle a, b\rangle = \langle ka, kb\rangle$.

■ Example

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

2 Practice

2.1 State the magnitude of $\langle a, b\rangle$. [1]

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

2.3 Find the magnitude of $\langle 3, 4\rangle$. [2]

3 Exam-style questions

3.1 The magnitude of $\langle a, b\rangle$ is [1]

- **A** $a + b$
- **B** $\sqrt{a^2+b^2}$
- **C** $a^2 + b^2$
- **D** a/b

3.2 $\langle 2, 1\rangle + \langle 3, 5\rangle$ equals [1]

- **A** $\langle 5, 6\rangle$
- **B** $\langle 6, 5\rangle$
- **C** $\langle 5, 5\rangle$
- **D** $\langle 6, 6\rangle$

3.3 $\vec{v} = \langle 6, 8\rangle$.

(a) Find the magnitude. [1]

(b) Find $2\vec{v}$. [1]

(c) Find $\vec{v} + \langle 1, 0\rangle$. [1]

Solutions

2.1 $\sqrt{a^2 + b^2}$.

2.2 $\langle 4, 6 \rangle$.

2.3 $\sqrt{3^2 + 4^2} = \sqrt{25} = 5$.

3.1 **B**.

3.2 **A**.

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