IGCSE PHYSICS • EXERCISE SHEET

1.1 Physical quantities and measurement

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

Objective

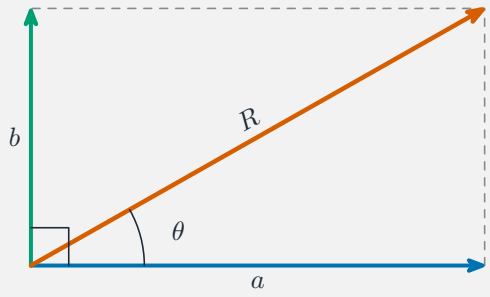
Build the skills to answer exam questions on **physical quantities and measurement** 物理量与测量—using instruments, measuring small quantities, and **scalars and vectors** 标量与矢量.

You must be able to:

- measure length, volume and time correctly (read the meniscus; avoid parallax)
- find a small length or short time by measuring many and dividing
- tell scalars from vectors and add two perpendicular vectors

1 Worked examples

Vectors at right angles



$R = \sqrt{a^2 + b^2}$

Two vectors at right angles add to a resultant R, the diagonal of the rectangle

- **scalar** = size only (distance, speed, mass, energy); **vector** = size **and** direction (force, velocity, momentum).
- two perpendicular vectors: $R = \sqrt{a^2 + b^2}$.
- **small quantity:** time 20 swings and divide by 20; measure 100 sheets and divide.

2 Practice

2.1 State the difference between a scalar and a vector. [1]

2.2 A student measures the time for 20 swings of a pendulum as 30 s. Find the period (time for one swing). [2]

3 Exam-style questions

3.1 Which is a vector quantity? [1]

- **A** mass
- **B** energy
- **C** velocity
- **D** temperature

3.2 Two forces of 3.0 N and 4.0 N act at right angles on a point.

(a) Find the magnitude of the resultant force. [2]

(b) State why a force is a vector. [1]

3.3 Describe how to measure the thickness of one sheet of paper accurately, using a ruler and a book. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **1.1 Physical quantities and measurement** past-paper sheet in the Library, or try these in **Practice mode**:

- 0625/21 N25 —Q1 (measurement)

- 0625/21 N25 —Q3 (measuring technique)
- 0625/22 N25 —Q1 (physical quantities)

Solutions

2.1 a scalar has size only; a vector has size **and** direction.

2.2 period $= \dfrac{30}{20} = 1.5$ s.

3.1 C. Velocity has both size and direction.

3.2 (a) $R = \sqrt{3.0^2 + 4.0^2} = \sqrt{25} = 5.0$ N.
(b) it has both a size and a direction.

3.3 measure the total thickness of a known large number of sheets (e.g. 100) with the ruler; divide the total thickness by the number of sheets.