

Class 9 Physics - Chapter 1 Notes

Physical Quantities and Measurement | Complete chapter notes with definitions, formulas and exam tips | Punjab Boards (PCTB)

What is Physics?

- Physics is the branch of science that deals with matter, energy and their interaction.
- Mechanics, heat, light, sound, electricity, magnetism and atomic physics are its main branches.
- A physical quantity is a quantity that can be measured, e.g. length, mass, time, temperature.
- Every measurement has two parts: a number (magnitude) and a unit.

Base and Derived Quantities

- Base quantities (7): length (m), mass (kg), time (s), temperature (K), electric current (A), amount of substance (mol), luminous intensity (cd).
- Derived quantities are expressed in terms of base quantities, e.g. speed (m/s), force (newton), area (m^2), volume (m^3).
- SI units are the internationally agreed system of units - always write the unit with every answer in board exams.

Prefixes (Important for MCQs)

- kilo (k) = 10^3 , hecto = 10^2 , deca = 10^1 , deci = 10^{-1} , centi (c) = 10^{-2} , milli (m) = 10^{-3} .
- micro = 10^{-6} , nano (n) = 10^{-9} , pico (p) = 10^{-12} , mega (M) = 10^6 , giga (G) = 10^9 .
- Example: 5 km = 5×10^3 m = 5000 m. 250 g = 0.25 kg.

Measuring Instruments

- Metre rule: range up to 1 m, least count 1 mm.
- Vernier calipers: measures internal, external diameter and depth; least count 0.1 mm (0.01 cm).
- Micrometer screw gauge: for very small thickness (wire, paper); least count 0.01 mm; works on the screw principle.
- Physical balance and electronic balance measure mass; stopwatch/clock measure time.
- Zero error: when the zero of the scale does not coincide at rest. Positive zero error is subtracted, negative is added.

Significant Figures

- All accurately known digits plus the first doubtful digit are significant figures.
- Leading zeros are never significant: 0.00450 has 3 significant figures (4, 5, trailing 0).
- Trailing zeros after a decimal point ARE significant. In 35.00 there are 4 significant figures.
- In multiplication/division, the answer keeps the least number of significant figures of the given values.

Exam Tips

- Numericals in this chapter are mostly on Vernier calipers and screw gauge readings - practise reading = main scale + (coinciding division $\times$ least count).
- Always correct zero error before reporting the final measurement.
- Learn the prefix table by heart - 2-3 MCQs come from it every year.

Quick Revision Table

Quantity	Unit / Value
Least count - Vernier calipers	0.1 mm = 0.01 cm
Least count - screw gauge	0.01 mm = 0.001 cm
1 km	1000 m
1 hour	3600 s
SI unit of temperature	Kelvin (K)
SI unit of current	Ampere (A)

Practice MCQs (answers at the end)

Q1. The SI unit of electric current is:

A. Volt **B.** Ampere **C.** Ohm **D.** Watt

Q2. The least count of a metre rule is:

A. 1 cm **B.** 1 mm **C.** 0.1 mm **D.** 0.01 mm

Q3. Micro prefix means:

A. 10^{-3} **B.** 10^{-6} **C.** 10^6 **D.** 10^{-9}

Q4. Which instrument measures the diameter of a wire best?

A. Metre rule **B.** Vernier calipers **C.** Screw gauge **D.** Tape

Q5. Significant figures in 0.07060 are:

A. 3 **B.** 4 **C.** 5 **D.** 6