

Physics

Original practice in 13 topic units, with explanations, worked examples and answer guidance. Use alongside the prescribed texts and syllabus.



13 practice units

78 tasks with answer guidance

Name / नाम: _____

Original selected-topic practice. Use alongside school lessons and the prescribed textbook. The contents define this book's scope.

CBSE course 042 · 2026–27 · Selected practice, not a complete syllabus or official examination paper.

UNIT 01 / 13 · LEARN & TRY

Measurement matters: dimensions and uncertainty

Name: _____ Date: _____

Goal: Use SI dimensions, significant figures and simple uncertainty propagation.

Learn

A measurement combines a numerical value with a unit and an uncertainty. Units tell other readers what was measured; dimensions describe the physical kind of quantity. Velocity has dimension LT^{-1} , while force has MLT^{-2} . A dimensionally consistent equation may be possible, but consistency alone cannot prove its numerical coefficient or physical validity. Significant figures communicate the precision of recorded values. When multiplying or dividing measurements, a result is normally reported to the fewest significant figures among the measured inputs. For a product or quotient, maximum fractional uncertainties add; for a power x^n , the fractional uncertainty is multiplied by $|n|$. Use these rules consistently rather than rounding every intermediate step. The uncertainties in this unit are stated maximum uncertainties, not statistical standard deviations. A useful report includes the quantity, unit, sensible rounding and an explanation of the largest source of uncertainty.

Worked example

A rectangle is (5.00 ± 0.05) cm by (2.00 ± 0.02) cm. Its area is $5.00 \times 2.00 = 10.0$ cm². Maximum fractional uncertainty is $0.05/5.00 + 0.02/2.00 = 0.020$, or 2%. Area uncertainty is $10.0 \times 0.020 = 0.2$ cm². Report (10.0 ± 0.2) cm², keeping the area and its uncertainty to consistent decimal places.

1. Write the dimensions of force. [1 marks]

2. Convert 72 km h^{-1} to m s^{-1} . [2 marks]

UNIT 01 · PRACTISE · 5–6

Measurement matters: dimensions and uncertainty

5. A measured radius has 2% maximum uncertainty. Find the percentage uncertainty in sphere volume. [2 marks]

6. Why can dimensional analysis not distinguish $v = at$ from $v = 2at$? [2 marks]

Explain one answer. Choose a question to revisit after a few days.

UNIT 01 · ANSWER GUIDANCE

Measurement matters: dimensions and uncertainty

1. $[F] = \text{MLT}^{-2}$ from force = mass $\times$ acceleration.
2. $72 \times 1000/3600 = 20 \text{ m s}^{-1}$.
3. No. ut has dimension L , but at has LT^{-1} . The uniformly accelerated expression uses a term proportional to at^2 .
4. The unrounded product is 3.304. With two significant figures, report 3.3.
5. $V \propto r^3$, so the approximate maximum relative uncertainty is $3 \times 2\% = 6\%$.
6. Both sides have dimensions LT^{-1} in both expressions. The dimensionless factor requires physical reasoning or measurement.

Teaching note

Dimension checking catches impossible equations but cannot determine a dimensionless constant.

Curriculum reference: https://cbseacademic.nic.in/web_material/CurriculumMain27/SecPart2/Physics_SecP2_2026-27.pdf

Selected practice; outcomes are publisher-defined. School practicals, projects and prescribed readings require separate preparation.