

AS Physics 9702

Unit 1 · Physical quantities and units

Original worksheet

Name: _____ Date: _____

Suggested marks: 76. Work through the questions over more than one study session if needed. Use additional paper for extended working and graph paper where requested.

Show equations, substitutions, units and reasoning. Use the constants specified in each question. The questions are original practice, not an official Cambridge examination or mark scheme.

Scope: Cambridge International AS Physics 9702, 2025–2027 learning outcomes. The published 2028–2030 AS scope has been checked separately and is substantively unchanged. Version: 11 October 2026.

U1-Q1 · 5 marks

A student writes “a laboratory bench has length 1.8” and estimates a 600 m walk to take 2 s.

(a) Explain what is missing from the length report. (b) Using a walking speed of about 1.5 m s^{-1} , estimate a sensible journey time. (c) State one reason the time should be treated as an estimate.

U1-Q2 · 8 marks

(a) Give the SI base unit for mass, length, time, current and thermodynamic temperature. (b) Starting from $F = ma$, pressure = F/A and energy = force $\times$ distance, express the newton, pascal and joule using base units.

U1-Q3 · 6 marks

A resistive force is modelled by $F = kv^2$, where v is speed. (a) Find the SI base units of k . (b) Test whether $v^2 = u^2 + 2as$ is homogeneous. (c) Explain why a homogeneous equation can still be wrong.

U1-Q4 · 10 marks

Write each value without its prefix, using the same underlying unit: (a) 7.0 ps; (b) 3.2 nm; (c) 8.5 μA ; (d) 42 mV; (e) 6.4 cm; (f) 3.0 dm; (g) 2.7 kN; (h) 4.5 MW; (i) 1.8 GHz; (j) 0.60 TW.

U1-Q5 · 5 marks

A polymer sample has mass 36.0 g and volume 30.0 cm^3 . Convert both readings into SI units and calculate its density in kg m^{-3} . Explain why 1 cm^3 is not 10^{-2} m^3 .

U1-Q6 · 7 marks

A micrometer reads +0.04 mm when fully closed. Measurements of a wire are 0.86, 0.87, 0.85, 0.86 and 0.86 mm. (a) Find the corrected mean diameter. (b) Identify the systematic error and evidence of random error. (c) Explain whether repeating the measurement removes the zero error and distinguish accuracy from precision.

U1-Q7 · 5 marks

The front and rear of an object are read as $(18.2 \pm 0.1) \text{ cm}$ and $(42.6 \pm 0.1) \text{ cm}$ on a ruler. Calculate its length, absolute uncertainty and percentage uncertainty. Explain why subtracting the readings does not justify subtracting their uncertainties.

U1-Q8 · 7 marks

A pendulum analysis uses $g = 4\pi^2 L/T^2$. $L = (0.800 \pm 0.002) \text{ m}$ and $T = (1.80 \pm 0.02) \text{ s}$. Treat π as exact. Calculate g , its percentage uncertainty and absolute uncertainty. Identify the measurement that contributes most uncertainty.

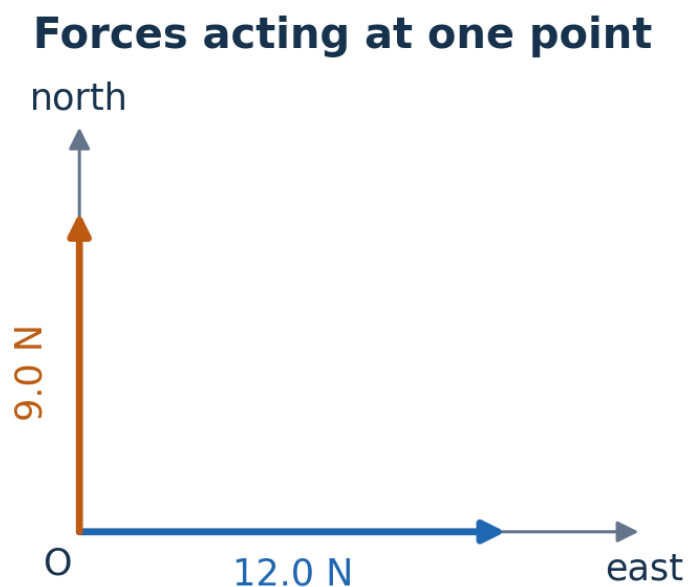
U1-Q9 · 4 marks

Classify energy, momentum, distance and acceleration as scalars or vectors. A cyclist travels around a circular track and returns to the start. Explain why the distance travelled is non-zero while displacement is zero.

U1-Q10 · 7 marks

Two forces act at a point: 12.0 N east and 9.0 N north. (a) Determine their resultant magnitude and direction. (b) Determine the force that would balance their resultant. (c) Describe a scale drawing that would verify the addition.

Figure for U1-Q10

**Construction space**

Choose and state your own scale.

Given-force diagram is schematic.

U1-Q11 · 6 marks

A drone changes velocity from 4.0 m s^{-1} east to 3.0 m s^{-1} west. Separately, a 20 N force acts 30° above the positive horizontal axis. (a) Find the drone's vector change of velocity. (b) Resolve the force horizontally and vertically. (c) Explain how to represent vector subtraction on a diagram.

U1-Q12 · 3 marks

Diagnostic multiple choice. A balance repeatedly reports 105.0 g for a calibrated 100.0 g mass, with very little scatter. Which description best fits? A: Accurate and precise. B: Accurate but imprecise. C: Precise but affected by a systematic error. D: Imprecise because the readings have a positive error. Choose one option and explain the distractors.

U1-Q13 · 3 marks

Diagnostic multiple choice. Which conversion is correct? A: $2.0 \text{ cm}^2 = 2.0 \times 10^{-2} \text{ m}^2$. B: $2.0 \text{ cm}^2 = 2.0 \times 10^{-4} \text{ m}^2$. C: $2.0 \text{ cm}^2 = 2.0 \times 10^2 \text{ m}^2$. D: $2.0 \text{ cm}^2 = 4.0 \times 10^{-4} \text{ m}^2$. Choose one option and explain the distractors.

Use with the full notes

[revisiontown.com/as-level-physics-notes-and-worksheets/](https://www.revisiontown.com/as-level-physics-notes-and-worksheets/)

Independent educational resource. Cambridge International does not produce or endorse this resource. Syllabus reference: official Cambridge Physics 9702 syllabus, AS topics 1-11 and Paper 3 practical assessment.