

Units, prefixes and reliable measurements

Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Test answers (mark scheme)

Marks are shown for each part. Method marks are given even when a final answer is wrong, as long as the working is clear, so always show your steps and give the unit.

Level: Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** GCSE WS, IGCSE 1.1

Question 1 SI base units (2 marks)

- a. **kilogram** (kg).
- b. **ampere**, symbol A.

Marking: 1 mark each.

Question 2 Prefixes (2 marks)

- a. $3.6 \text{ MHz} = \mathbf{3.6 \times 10^6 \text{ Hz}}$.
- b. $250 \times 10^{-6} \text{ m} = \mathbf{2.5 \times 10^{-4} \text{ m}}$.

Marking: 1 mark each; the standard form must have a from 1 up to (not including) 10.

Question 3 Standard form (2 marks)

- a. $\mathbf{8.3 \times 10^{-4} \text{ s}}$.
- b. $\mathbf{60\,200}$.

Marking: 1 mark each.

Question 4 Significant figures and reading (3 marks)

- a. **4** significant figures.
- b. **4.10**.
- c. **7.4 cm** (resolution 1 mm).

Marking: 1 mark each; 4.1 alone loses the mark in (b).

Question 5 Area of a field (3 marks)

Area = $24.5 \times 8.2 = 200.9 \text{ m}^2$. The width has 2 s.f., so the area is $\mathbf{2.0 \times 10^2 \text{ m}^2}$.

Marking: 1 mark for the product, 1 mark for rounding to 2 s.f., 1 mark for standard form with

the unit.

Question 6 Precision and accuracy (3 marks)

- a. **Student X**: the mean 50.0 g equals the true value.
- b. **Student Y**: the range is 0.1 g, against 0.2 g for X.
- c. A **systematic error** such as a zero error on the balance, which adds about 2 g to every reading.

Marking: 1 mark each part.

Question 7 Mean and uncertainty (3 marks)

Mean = $(2.31 + 2.35 + 2.29 + 2.33) \div 4 = 9.28 \div 4 = \mathbf{2.32\ s}$. Uncertainty = $(2.35 - 2.29) \div 2 = \mathbf{0.03\ s}$. Percentage = $0.03 \div 2.32 \times 100 = \mathbf{1.3\ \%}$.

Marking: 1 mark for the mean, 1 mark for the uncertainty, 1 mark for the percentage.

Question 8 Unit conversion (2 marks)

$72 \times 1000 \div 3600 = \mathbf{20\ m/s}$.

Marking: 1 mark for the method ($\times 1000$, $\div 3600$), 1 mark for 20 m/s.