

EXAM-DAY · 90-MIN REVISION CARD

Units and Measurements

Print this · Fold it · Carry to the exam-hall gate · Revise once · Then walk in.

FORMULAS & KEY RESULTS

7 SI base units: metre (m, length), kilogram (kg, mass), second (s, time), ampere (A, current), kelvin (K, temperature), mole (mol, amount), candela (cd, luminous intensity).

Absolute error of i-th reading: $\Delta a_i = |a_{\text{mean}} - a_i|$. Mean absolute error = $(\sum |\Delta a_i|)/n$.

Relative (fractional) error = $\Delta a_{\text{mean}} / a_{\text{mean}}$. Percentage error = $(\Delta a_{\text{mean}} / a_{\text{mean}}) \times 100\%$.

Sum / difference $Z = A \pm B \Rightarrow \Delta Z = \Delta A + \Delta B$ (absolute errors ADD).

Product / quotient $Z = AB$ or $A/B \Rightarrow \Delta Z/Z = \Delta A/A + \Delta B/B$ (relative errors ADD).

Powers $Z = A^p B^q / C^r \Rightarrow \Delta Z/Z = |p|(\Delta A/A) + |q|(\Delta B/B) + |r|(\Delta C/C)$.

Significant figures: all non-zero digits count; zeros between digits count; leading zeros never; trailing zeros count only with a decimal point.

Dimensional formulae: velocity $[LT^{-1}]$, acceleration $[LT^{-2}]$, force $[MLT^{-2}]$, work/energy $[ML^2T^{-2}]$, power $[ML^2T^{-3}]$, pressure $[ML^{-1}T^{-2}]$, momentum $[MLT^{-1}]$.

Gravitational constant G: from $F = GMm/r^2$, $[G] = M^{-1} L^3 T^{-2}$.

Principle of homogeneity: every term in a valid equation has identical dimensions.

TOP 5 PYQ PATTERNS

1 Maximum percentage error in $Z = A^a B^b / C^c$

3 marks · 90% of years

Multiply each % error by |exponent|, then ADD. Never subtract for a denominator term.

2 Check dimensional correctness of $v^2 = u^2 + 2as$

3 marks · 75% of years

Find dimensions of EACH whole term; show all equal L^2T^{-2} ; cite homogeneity + caveat.

3 Count significant figures and round the result

2 marks · 80% of years

Leading zeros never count; trailing zeros count only with a decimal point. Round to least-precise input.

4 Derive a relation by dimensions (e.g. $T = 2\pi\sqrt{l/g}$)

3 marks · 55% of years

Assume $T \propto l^a g^b m^c$, equate M,L,T powers, solve. State the 2π must be added separately.

5 Accuracy vs precision OR systematic vs random with example

2 marks · 60% of years

Accuracy = closeness to true value; precision = closeness of repeats. Give the fast-clock example.

90-MIN REVISION FLOW

0-15 min

Recite the 7 SI base units + their physical quantities. Then write the dimensional formulae of velocity, acceleration, force, work, power, pressure and G from memory.

15-30 min

Drill error propagation: for $Z = A^2 B / C^3$ with errors 1%, 2%, 1%, compute %error in Z (= $2+2+3 = 7\%$). Repeat with three different exponent sets.

30-45 min

Significant-figure rapid-fire: count s.f. in 0.00208, 6.032, 4.500, 2.30×10^4 , 100.0, then round 2.91×3.6 and $0.2467 + 1.2$ to correct s.f. / decimal places.

45-60 min

Dimensionally check $v^2 = u^2 + 2as$ and the SHM relation; then DERIVE $T = 2\pi\sqrt{l/g}$ by dimensions from scratch. State the 3 limitations of dimensional analysis aloud.

60-75 min

Take the 15-MCQ Quick Drill under a 20-minute timer. Target $\geq 12/15$.

75-90 min

Review every wrong answer, re-read the matching notes-slide, and re-state the rule you missed in one sentence. Done.

Confidence, not anxiety. You've practised this all year. Trust your steps. Don't change strategy on exam morning.
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