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PHYSICS · JEE MAIN

Units, Dimensions & Errors

Previous Year Questions with answers

282 questions · **192** papers · **2002–2026** · newest paper first

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What is in this PDF: every Units, Dimensions & Errors question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

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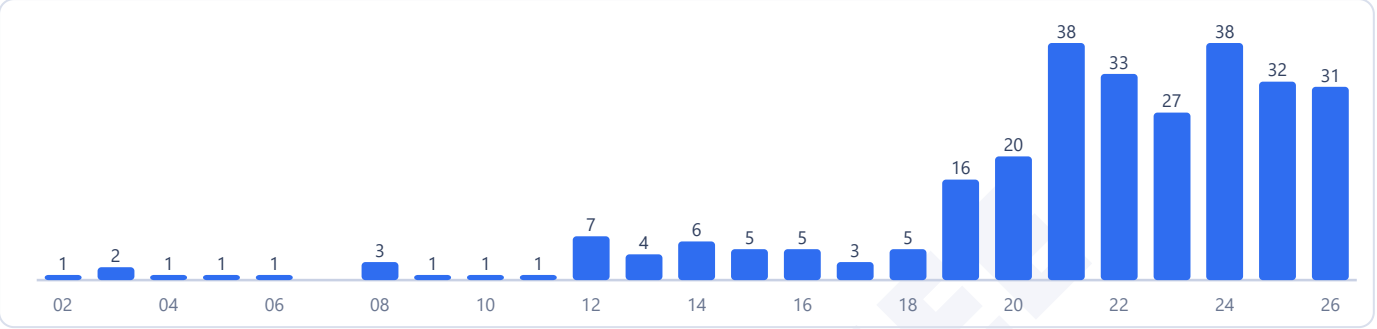
Chapter at a glance

5.1%	282	156 of 162	257 / 25
of Physics questions, 2019–2026	questions, 2002–2026	papers asked it, 2019–2026	MCQ / numerical, 2002–2026

Trend. Rising: 1.7 questions per paper in 2024–2026 against 1.3 in 2019–2023.

Questions per year



Counts are the questions we hold: 282 in 192 papers. No question in this chapter was found repeated across papers.

Most-asked topics in this chapter (2002–2026)



How often it comes up

Units,Dimensions & Errors serves as the starting gate of the Class 11 Physics syllabus and has become a major testing area in JEE Main. Across the papers we hold from 2019 to 2026, the chapter delivered **235 questions in 162 papers**, working out to **1.5 questions per paper**, and appeared in 156 of those 162 papers. That makes it the **4th largest of 29 Physics chapters** over that span, accounting for 5.1% of all Physics questions.

The chapter has grown significantly compared to earlier decades. In the AIEEE and early JEE Main years (2002 to 2018), it represented 3.5% of the Physics section; in the last three exam years (2024 to 2026), its share rose to 6.5%, producing 101 questions in 58 papers. The peak years in our collection were 2021 (38 questions in 26 papers) and 2024 (38 questions in 20 papers). Since 2019 there has been no year without it, featuring in 156 of the 162 papers we hold.

As Unit 1: Units and Measurements in NTA's Class 11 syllabus, it gives students an early boost because its tools apply across electrodynamics, modern physics, and mechanics.

Most-asked topics

Between 2019 and 2026, the questions distributed across four distinct topics:

- **Dimensional Analysis**: 118 questions. Over half the chapter, emphasizing dimensional formulas of derived quantities and consistency of algebraic equations.
- **Errors & Significant Figures**: 65 questions. Error propagation through fractional powers, absolute error bounds, and rounding rules.
- **Measuring Instruments**: 43 questions. Mechanical tools including vernier callipers and micrometer screw gauges with positive or negative zero errors.

- **Units & SI System**: 9 questions. Conversion factors, fundamental base units, and derived unit definitions.

Every one of these four areas appeared in 2026 papers, meaning a well-rounded review is essential.

What the questions look like

Dimensional analysis questions generally follow two main formats. In the first format, you are given an unfamiliar physical relationship, such as an altered fluid flow formula or an electromagnetic expression, and asked to find the dimensions of unknown coefficients using dimensional homogeneity. In the second format, questions ask you to match physical quantities, often combining thermal constants, magnetic permeability, and electrical permittivity, against their dimensional expressions in terms of mass, length, time, and electric current.

Error questions usually center on laboratory formulas. A typical problem presents a cylinder, pendulum, or electrical resistor where each measurement carries a stated percentage uncertainty. You take logarithmic differentials to relate fractional errors, taking care to multiply exponents and add absolute fractional uncertainties. Significant figure problems ask for the correct decimal representation after adding lengths or calculating density from mass and volume.

Measuring instruments problems evaluate practical laboratory skills. You will determine the least count of a vernier scale where n vernier divisions coincide with n - 1 main scale divisions, or calculate the true thickness of a wire using a screw gauge whose circular scale has an initial zero offset.

The chapter also contains a steady proportion of numerical-response problems: 25 of the 235 questions since 2019 had no options, requiring clean arithmetic without relying on option choices.

How to practise it

Begin by compiling a reference table of dimensional formulas for quantities outside basic mechanics. Focus on quantities that frequently recur in exam questions: Stefan's constant, universal gas constant, magnetic flux, self-inductance, and coefficient of viscosity. Derive each from a fundamental equation rather than memorizing bare powers.

Next, practise error propagation with powers and quotients. Train yourself to write the fractional error expression directly from the formula without intermediate steps, remembering that uncertainties always add in worst-case analysis. For significant figures, review the distinction between decimal places (used in addition and subtraction) and significant digits (used in multiplication and division).

For measuring instruments, draw the barrel and thimble scales of a screw gauge and the main and vernier jaws of calipers. Work through problems with negative zero error, ensuring you subtract the negative reading rather than adding it. Finish by timing yourself on mixed sets of recent questions.

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Q1 JEE Main 2026 · 8 Apr · Shift 2 MCQ

A new unit (α) of length is chosen such that it is equal to the speed of light in vacuum. What is the distance between Venus and Earth in terms of α units if light takes 6 min. 40 s to cover this distance ?

(A) $200\,\alpha$
(B) $400\,\alpha$
(C) $300\,\alpha$
(D) $500\,\alpha$

Answer: (B) $400\,\alpha$ · Official NTA final key

Q2 JEE Main 2026 · 8 Apr · Shift 2 MCQ

Consider the equation $H = \dfrac{x^p\,\epsilon^q\,E^r}{t^s}$

Where H = magnetic field; E = electric field, ϵ = permittivity, x = distance, t = time

The values of p, q, r and s respectively are :

(A) $1, 1, 1, 1$
(B) $-1, 1, 2, 1$
(C) $1, -1, -2, 1$
(D) $-1, -2, -2, 1$

Answer: (A) $1, 1, 1, 1$ · Official NTA final key

Q3 JEE Main 2026 · 6 Apr · Shift 1 MCQ

The density ρ of a uniform cylinder is determined by measuring its mass m, length l and diameter d. The measured values of m, l and d are 97.42 ± 0.02 g, 8.35 ± 0.05 mm and 20.20 ± 0.02 mm, respectively. Calculated percentage fractional error in ρ is _____.

(A) 0.63%
(B) 0.82%
(C) 0.72%
(D) 0.25%

Answer: (B) 0.82% · Official NTA final key

Q4 JEE Main 2026 · 6 Apr · Shift 1 MCQ

The potential energy of a particle changes with distance x from a fixed origin as $V = \dfrac{A\sqrt{x}}{x + B}$, where A and B are constant with appropriate dimensions. The dimensions of AB are _____.

(A) $[M^1L^{5/2}T^{-2}]$
(B) $[M^{3/2}L^{5/2}T^{-2}]$
(C) $[M^1L^2T^{-2}]$
(D) $[M^1L^{7/2}T^{-2}]$

Answer: (D) $[M^1L^{7/2}T^{-2}]$ · Official NTA final key

Q5 JEE Main 2026 · 6 Apr · Shift 2 MCQ

The percentage error in the calculated volume of a sphere, if there is 2% error in its diameter measurement, is _____.

(A) 1
(B) 2
(C) 6
(D) 8

Answer: (C) 6 · Official NTA final key

Q6 JEE Main 2026 · 6 Apr · Shift 2 MCQ

Match **List - I** with **List - II**.

List - I	List - II
A. Boltzmann constant	I. $[M^{-1}L^3T^{-2}]$
B. Stefan's constant	II. $[ML^2T^{-1}]$
C. Planck's constant	III. $[ML^2T^{-2}K^{-1}]$
D. Gravitational constant	IV. $[ML^0T^{-3}K^{-4}]$

Choose the **correct** answer from the options given below :

(A) A-I, B-II, C-III, D-IV
(B) A-IV, B-III, C-II, D-I
(C) A-III, B-IV, C-II, D-I
(D) A-II, B-I, C-IV, D-III

Answer: (C) A-III, B-IV, C-II, D-I · Official NTA final key

Q7 JEE Main 2026 · 5 Apr · Shift 1 MCQ

In a Vernier calipers, when both jaws touch each other, zero of the Vernier scale is shifted to the right of zero of the main scale and 7th Vernier division coincides with a main scale reading. If the value of 1 main scale division is 1 mm and there are 10 Vernier scale divisions, then the Vernier caliper has

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(A) 0.07 cm negative zero error
(B) 0.7 cm negative zero error
(C) 0.07 cm positive zero error
(D) 0.7 cm positive zero error

Answer: (C) 0.07 cm positive zero error · Official NTA final key

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Q8 JEE Main 2026 · 5 Apr · Shift 1 MCQ

L, C and R represents physical quantities inductance, capacitance and resistance respectively. The dimensional formula $\mathrm{M\,L^2\,T^{-4}\,A^{-2}}$ corresponds to _____.

(A) $\frac{R}{\sqrt{LC}}$
(B) $\frac{R}{LC}$
(C) $\frac{C}{\sqrt{LR}}$
(D) $\frac{1}{R}\sqrt{\frac{L}{C}}$

Answer: (A) $\frac{R}{\sqrt{LC}}$ · Official NTA final key

Q9 JEE Main 2026 · 5 Apr · Shift 2 MCQ

Match **List - I** with **List - II**.

List - I	List - II
A. Meter (L)	I. $\sqrt{\frac{hc}{G}}$
B. Second (S)	II. $\sqrt{\frac{Gh}{c^5}}$
C. Kilogram (M)	III. $\sqrt{\frac{K^2L^2c^3}{Gh}}$
D. Kelvin (K)	IV. $\sqrt{\frac{Gh}{c^3}}$

where h (Planck's constant), G (gravitational constant) and c (speed of light in vacuum) as fundamental units.

Choose the **correct** answer from the options given below :

(A) A-II, B-IV, C-I, D-III
(B) A-IV, B-II, C-I, D-III
(C) A-IV, B-I, C-II, D-III
(D) A-III, B-I, C-II, D-IV

Answer: (B) A-IV, B-II, C-I, D-III · Official NTA final key

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Q10 JEE Main 2026 · 5 Apr · Shift 2 MCQ

In an experiment to determine the resistance of a given wire using Ohm's law, the voltmeter and ammeter readings are noted as 10 V and 5 A, respectively. The least counts of voltmeter and ammeter are 500 mV and 200 mA, respectively. The estimated error in the resistance measurement is _____ Ω .

(A) 0.25
(B) 2
(C) 2.5
(D) 0.18

Answer: (D) 0.18 · Official NTA final key

Q11 JEE Main 2026 · 4 Apr · Shift 1 MCQ

In a screw gauge when the circular scale is given five complete rotations it moves linearly by 2.5 mm. If the circular scale has 100 divisions, the least count of screw gauge is _____ mm.

(A) 1×10^{-2}
(B) 1×10^{-3}
(C) 5×10^{-2}
(D) 5×10^{-3}

Answer: (D) 5×10^{-3} · Official NTA final key

Q12 JEE Main 2026 · 4 Apr · Shift 2 MCQ

Match the **LIST-I** with **LIST-II**

List-I	List-II
A. Planck's constant	I. $\mathrm{ML^2T^{-2}}$
B. Stopping potential	II. $\mathrm{T^{-1}}$
C. Work function	III. $\mathrm{ML^2T^{-1}}$
D. Threshold frequency	IV. $\mathrm{ML^2T^{-3}A^{-1}}$

Choose the *__correct__* answer from the options given below:

(A) A-III, B-IV, C-I, D-II
(B) A-I, B-II, C-III, D-IV
(C) A-IV, B-III, C-I, D-II
(D) A-I, B-IV, C-III, D-II

Answer: (A) A-III, B-IV, C-I, D-II · Official NTA final key

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Q13 JEE Main 2026 · 2 Apr · Shift 1 MCQ

The dimensional formula of $\frac{1}{2}\epsilon_o E^2$ (ϵ_o = permittivity of vacuum and E = electric field) is $\mathrm{M^aL^bT^c}$. The value of $2a - b + c =$ _____.

(A) 0
(B) 1
(C) -1
(D) 2

Answer: (B) 1 · Official NTA final key

Q14 JEE Main 2026 · 2 Apr · Shift 1 MCQ

The diameter of a wire measured by a screw gauge of least count 0.001 cm is 0.08 cm. The length measured by a scale of least count 0.1 cm is 150 cm. When a weight of 100 N is applied to the wire, the extension in length is 0.5 cm, measured by a micrometer of least count 0.001 cm. The error in the measured Young's modulus is $\alpha \times 10^9$ N/m^2. The value of α is _____.
(Ignore the contribution of the load to Young's modulus error calculation)

(A) 1.3
(B) 1.65
(C) 0.13
(D) 0.25

Answer: (B) 1.65 · Official NTA final key

Q15 JEE Main 2026 · 2 Apr · Shift 2 MCQ

Dimensions of universal gravitational constant (G) in terms of Planck's constant (h), distance (L), mass (M) and time (T) are _____.

(A) $[\mathrm{hTLM^{-2}}]$
(B) $[\mathrm{hT^{-1}LM^{-2}}]$
(C) $[\mathrm{hTL^2M^{-2}}]$
(D) $[\mathrm{h^{-1}T^{-1}LM^{-2}}]$

Answer: (B) $[\mathrm{hT^{-1}LM^{-2}}]$ · Official NTA final key

Q16 JEE Main 2026 · 2 Apr · Shift 2 MCQ

In a screw gauge the zero of main scale reference line coincides with the fifth division of the circular scale when two studs are in contact. There are 100 divisions in circular scale and pitch of screw gauge is 0.1 mm. When diameter of a sphere is measured, the reading of main scale is 5 mm and 50th division of circular scale coincides with the reference line of main scale. The diameter of sphere is _____ mm.

(A) 5.045
(B) 5.055
(C) 5.450
(D) 5.550

Answer: (A) 5.045 · Official NTA final key

Q17 JEE Main 2026 · 28 Jan · Shift 1 MCQ

When both jaws of vernier callipers touch each other, zero mark of the vernier scale is right to zero mark of main scale, 4th mark on vernier scale coincides with certain mark on the main scale. While measuring the length of a cylinder, observer observes 15 divisions on main scale and 5th division of vernier scale coincides with a main scale division. Measured length of cylinder is _____ mm. (Least count of Vernier calliper = 0.1 mm)

(A) 15.4
(B) 15.5
(C) 15.9
(D) 15.1

Answer: (D) 15.1 · Official NTA final key

Q18 JEE Main 2026 · 28 Jan · Shift 2 MCQ

The time period of a simple harmonic oscillator is $T = 2\pi\sqrt{\frac{k}{m}}$. Measured value of mass (m) of the object is 10 g with an accuracy of 10 mg and time for 50 oscillations of the spring is found to be 60 s using a watch of 2 s resolution. Percentage error in determination of spring constant (k) is _____ %.

(A) 7.60
(B) 6.76
(C) 3.43
(D) 3.35

Answer: (B) 6.76 · Official NTA final key

Q19 JEE Main 2026 · 28 Jan · Shift 2 MCQ

In an experiment, a set of reading are obtained as follows - 1.24 mm, 1.25 mm, 1.23 mm, 1.21 mm. The expected least count of the instrument used in recording these readings is _____ mm.

(A) 0.01
(B) 0.1
(C) 0.05
(D) 0.001

Answer: (A) 0.01 · Official NTA final key

Q20 JEE Main 2026 · 28 Jan · Shift 2 MCQ

Match **List - I** with **List - II**.

List - I	List - II
A. Coefficient of viscosity	I. $[ML^{-1}T^{-2}]$
B. Surface tension	II. $[ML^{2}T^{-2}]$
C. Pressure	III. $[ML^{0}T^{-2}]$
D. Surface energy	IV. $[ML^{-1}T^{-1}]$

Choose the **correct** answer from the options given below :

(A) A-I, B-III, C-II, D-IV
(B) A-IV, B-I, C-II, D-III
(C) A-IV, B-III, C-I, D-II
(D) A-I, B-II, C-IV, D-III

Answer: (C) A-IV, B-III, C-I, D-II · Official NTA final key

Q21 JEE Main 2026 · 24 Jan · Shift 1 MCQ

Match the **LIST-I** with **LIST-II**

List-I	List-II
A. Magnetic induction	I. $MLT^{-2}A^{-2}$
B. Magnetic flux	II. $ML^{2}T^{-2}A^{-2}$
C. Magnetic permeability	III. $ML^{0}T^{-2}A^{-1}$
D. Self inductance	IV. $ML^{2}T^{-2}A^{-1}$

Choose the *__correct__* answer from the options given below:

(A) A-III, B-IV, C-II, D-I
(B) A-I, B-III, C-IV, D-II
(C) A-IV, B-III, C-I, D-II
(D) A-III, B-IV, C-I, D-II

Answer: (D) A-III, B-IV, C-I, D-II · Official NTA final key

Q22 JEE Main 2026 · 24 Jan · Shift 2 MCQ

In a vernier callipers, 50 vernier scale divisions are equal to 48 main scale divisions. If one main scale division $= 0.05$ mm, then the least count of the vernier callipers is _____ mm.

(A) 0.02
(B) 0.005
(C) 0.002
(D) 0.05

Answer: (C) 0.002 · Official NTA final key

Q23 JEE Main 2026 · 23 Jan · Shift 1 MCQ

Four persons measure the length of a rod as 20.00 cm, 19.75 cm, 17.01 cm and 18.25 cm. The relative error in the measurement of average length of the rod is :

(A) 0.24
(B) 0.06
(C) 0.18
(D) 0.08

Answer: (B) 0.06 · Official NTA final key

Q24 JEE Main 2026 · 23 Jan · Shift 1 MCQ

In a screw gauge, the zero of the circular scale lies 3 divisions above the horizontal pitch line when their metallic studs are brought in contact. Using this instrument thickness of a sheet is measured. If pitch scale reading is 1 mm and the circular scale reading is 51 then the correct thickness of the sheet is _____ mm.

[Assume least count is 0.01 mm]

(A) 1.51
(B) 1.54
(C) 1.48
(D) 1.50

Answer: (B) 1.54 · Official NTA final key

Q25 JEE Main 2026 · 23 Jan · Shift 2 Numerical

A ball of radius r and density ρ dropped through a viscous liquid of density σ and viscosity η attains its terminal velocity at time t, given by $t = A\,\rho^a r^b \eta^c \sigma^d$, where A is a constant and a, b, c and d are integers. The value of $\frac{b+c}{a+d}$ is _____.

Numerical value type: the answer is a number.

Answer: 1. · Official NTA final key

Q26 JEE Main 2026 · 22 Jan · Shift 1 MCQ

Match the **LIST-I** with **LIST-II**

List-I	List-II
A. Spring constant	I. $ML^2T^{-2}K^{-1}$
B. Thermal conductivity	II. ML^0T^{-2}
C. Boltzmann constant	III. $ML^2T^{-3}A^{-2}$
D. Inductive reactance	IV. $MLT^{-3}K^{-1}$

Choose the **correct** answer from the options given below:

(A) A-II, B-IV, C-I, D-III
(B) A-I, B-IV, C-II, D-III
(C) A-II, B-I, C-IV, D-III
(D) A-III, B-II, C-IV, D-I

Answer: (A) A-II, B-IV, C-I, D-III · Official NTA final key

Q27 JEE Main 2026 · 22 Jan · Shift 2 MCQ

If ϵ, E and t represent the free space permittivity, electric field and time respectively, then the unit of $\frac{\epsilon E}{t}$ will be :

(A) A/m
(B) Am^2
(C) A/m^2
(D) Am

Answer: (C) A/m^2 · Official NTA final key

Q28 JEE Main 2026 · 21 Jan · Shift 1 MCQ

In an experiment the values of two spring constants were measured as $k_1 = (10 \pm 0.2)$ N/m and $k_2 = (20 \pm 0.3)$ N/m. If these springs are connected in parallel, then the percentage error in equivalent spring constant is :

(A) 1.33%
(B) 1.67%
(C) 2.33%
(D) 2.67%

Answer: (B) 1.67% · Official NTA final key

Q29 JEE Main 2026 · 21 Jan · Shift 1 MCQ

Consider a modified Bernoulli equation.

$$\left(\mathrm{P} + \frac{A}{Bt^2}\right) + \rho g(h + Bt) + \frac{1}{2}\rho V^2 = \text{constant}$$

If t has the dimension of time then the dimensions of A and B are _____, _____ respectively.

(A) $[ML^0T^{-1}]$ and $[M^0LT]$
(B) $[ML^0T^{-2}]$ and $[M^0LT^{-1}]$
(C) $[ML^0T^{-2}]$ and $[M^0LT^{-2}]$
(D) $[ML^0T^{-1}]$ and $[M^0LT^{-1}]$

Answer: (D) $[ML^0T^{-1}]$ and $[M^0LT^{-1}]$ · Official NTA final key

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Q30 JEE Main 2026 · 21 Jan · Shift 2 MCQ

Keeping the significant figures in view, the sum of the physical quantities 52.01 m, 153.2 m and 0.123 m is :

(A) 205.33 m
(B) 205.333 m
(C) 205 m
(D) 205.3 m

Answer: (D) 205.3 m · Official NTA final key

Q31 JEE Main 2026 · 21 Jan · Shift 2 MCQ

A spherical body of radius r and density σ falls freely through a viscous liquid having density ρ and viscosity η and attains a terminal velocity v_o. Estimated maximum error in the quantity η is : (Ignore errors associated with σ, ρ and g, gravitational acceleration)

(A) $2\left[\frac{\Delta r}{r}-\frac{\Delta v_o}{v_o}\right]$
(B) $2\left[\frac{\Delta r}{r}+\frac{\Delta v_o}{v_o}\right]$
(C) $\frac{2\Delta r}{r}+\frac{\Delta v_o}{v_o}$
(D) $2\frac{\Delta r}{r}-\frac{\Delta v_o}{v_o}$

Answer: (C) $\frac{2\Delta r}{r}+\frac{\Delta v_o}{v_o}$ · Official NTA final key

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Q32 JEE Main 2025 · 8 Apr · Shift 2 MCQ

A quantity Q is formulated as $X^{-2}Y^{+\frac{3}{2}}Z^{-\frac{2}{5}}$. X, Y and Z are independent parameters which have fractional errors of 0.1, 0.2 and 0.5, respectively in measurement. The maximum fractional error of Q is

(A) 0.6
(B) 0.7
(C) 0.1
(D) 0.8

Answer: (B) 0.7 · Key from source paper

Q33 JEE Main 2025 · 7 Apr · Shift 2 MCQ

Match List - I with List - II.

List - I	List - II
(A) Mass density	(I) $[ML^2T^{-3}]$
(B) Impulse	(II) $[MLT^{-1}]$
(C) Power	(III) $[ML^2T^0]$
(D) Moment of inertia	(IV) $[ML^{-3}T^0]$

Choose the correct answer from the options given below :

(A) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

(B) (A)-(IV), (B)-(II), (C)-(III), (D)-(I)

(C) (A)-(I), (B)-(III), (C)-(IV), (D)-(II)

(D) (A)-(IV), (B)-(II), (C)-(I), (D)-(III)

Answer: (D) (A)-(IV), (B)-(II), (C)-(I), (D)-(III) · Key from source paper

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Q34 JEE Main 2025 · 7 Apr · Shift 2 MCQ

The dimension of $\sqrt{\frac{\mu_0}{\epsilon_0}}$ is equal to that of : (μ_0 = Vacuum permeability and ϵ_0 = Vacuum permittivity)

(A) Capacitance

(B) Resistance

(C) Inductance

(D) Voltage

Answer: (B) Resistance · Key from source paper

Q35 JEE Main 2025 · 4 Apr · Shift 1 MCQ

In an electromagnetic system, the quantity representing the ratio of electric flux and magnetic flux has dimension of $M^PL^QT^RA^S$, where value of ' Q ' and ' R ' are

(A) $(-2, 2)$

(B) $(1, -1)$

(C) $(3, -5)$

(D) $(-2, 1)$

Answer: (B) $(1, -1)$ · Key from source paper

Q36 JEE Main 2025 · 4 Apr · Shift 2 MCQ

For the determination of refractive index of glass slab, a travelling microscope is used whose main scale contains 300 equal divisions equals to 15 cm. The vernier scale attached to the microscope has 25 divisions equals to 24 divisions of main scale. The least count (LC) of the travelling microscope is (in cm) :

(A) 0.002
(B) 0.0005
(C) 0.001
(D) 0.0025

Answer: (A) 0.002 · Key from source paper

Q37 JEE Main 2025 · 4 Apr · Shift 2 MCQ

In an electromagnetic system, a quantity defined as the ratio of electric dipole moment and magnetic dipole moment has dimension of $[M^P L^Q T^R A^S]$. The value of P and Q are :

(A) $-1, 1$
(B) $0, -1$
(C) $1, -1$
(D) $-1, 0$

Answer: (B) $0, -1$ · Key from source paper

Q38 JEE Main 2025 · 3 Apr · Shift 1 MCQ

A person measures mass of 3 different particles as 435.42g, 226.3 g and 0.125 g. According to the rules for arithmetic operations with significant figures, the addition of the masses of 3 particles will be.

(A) 661.8 g
(B) 661.84 g
(C) 661.845 g
(D) 662 g

Answer: (A) 661.8 g · Key from source paper

Q39 JEE Main 2025 · 3 Apr · Shift 1 MCQ

Match the LIST-I with LIST-II

List-I	List-II
A. Gravitational constant	I. $[LT^{-2}]$
B. Gravitational potential energy	II. $[L^2T^{-2}]$
C. Gravitational potential	III. $[ML^2T^{-2}]$
D. Acceleration due to gravity	IV. $[M^{-1}L^3T^{-2}]$

Choose the correct answer from the options given below:

(A) A-III, B-II, C-I, D-IV
(B) A-II, B-IV, C-III, D-I
(C) A-I, B-III, C-IV, D-II
(D) A-IV, B-III, C-II, D-I

Answer: (D) A-IV, B-III, C-II, D-I · Key from source paper

Q40 JEE Main 2025 · 3 Apr · Shift 2 MCQ

Match the LIST-I with LIST-II

List-I	List-II
A. Boltzmann constant	I. ML^2T^{-1}
B. Coefficient of viscosity	II. $MLT^{-3}K^{-1}$
C. Planck's constant	III. $ML^2T^{-2}K^{-1}$
D. Thermal conductivity	IV. $ML^{-1}T^{-1}$

Choose the correct answer from the options given below:

(A) A - III, B - II, C - I, D - IV
(B) A - III, B - IV, C - I, D - II
(C) A - III, B - IV, C - II, D – I
(D) A - II, B - III, C - IV, D - I

Answer: (B) A - III, B - IV, C - I, D - II · Key from source paper

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Q41 JEE Main 2025 · 3 Apr · Shift 2 Numerical

A physical quantity C is related to four other quantities p, q, r and s as follows

$C = \frac{pq^2}{r^3\sqrt{s}}$

The percentage errors in the measurement of p, q, r and s are $1\%, 2\%, 3\%$ and 2%, respectively. The percentage error in the measurement of C will be _____ $\%$.

Numerical value type: the answer is a number.

Answer: 15. · Key from source paper

Q42 JEE Main 2025 · 2 Apr · Shift 1 MCQ

The equation for real gas is given by $\left(P + \frac{a}{V^2}\right)(V - b) = RT$, where P, V, T and R are the pressure, volume, temperature and gas constant, respectively. The dimension of ab^{-2} is equivalent to that of :

(A) Planck's constant
(B) Compressibility
(C) Strain
(D) Energy density

Answer: (D) Energy density · Key from source paper

Q43 JEE Main 2025 · 2 Apr · Shift 1 MCQ

Match List - I with List - II.

List - I	List - II
(A) Coefficient of viscosity	(I) $[ML^0T^{-3}]$
(B) Intensity of wave	(II) $[ML^{-2}T^{-2}]$
(C) Pressure gradient	(III) $[M^{-1}LT^2]$
(D) Compressibility	(IV) $[ML^{-1}T^{-1}]$

Choose the correct answer from the options given below :

(A) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)
(B) (A)-(IV), (B)-(I), (C)-(II), (D)-(III)
(C) (A)-(IV), (B)-(II), (C)-(I), (D)-(III)
(D) (A)-(I), (B)-(IV), (C)-(III), (D)-(II)

Answer: (B) (A)-(IV), (B)-(I), (C)-(II), (D)-(III) · Key from source paper

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Q44 JEE Main 2025 · 2 Apr · Shift 2 MCQ

Given a charge q, current I and permeability of vacuum μ_o. Which of the following quantity has the dimension of momentum?

(A) qI/μ_o
(B) $q\mu_o/I$
(C) $q^2\mu_o I$
(D) $q\mu_o I$

Answer: (D) $q\mu_o I$ · Key from source paper

Q45 JEE Main 2025 · 2 Apr · Shift 2 MCQ

If μ_0 and ϵ_0 are the permeability and permittivity of free space, respectively, then the dimension of $\left(\frac{1}{\mu_0\epsilon_0}\right)$ is:

(A) T^2/L^2
(B) L/T^2
(C) T^2/L
(D) L^2/T^2

Answer: (D) L^2/T^2 · Key from source paper

Q46 JEE Main 2025 · 29 Jan · Shift 1 MCQ

The expression given below shows the variation of velocity (v) with time (t), $v = \mathrm{At}^2 + \frac{\mathrm{Bt}}{\mathrm{C}+\mathrm{t}}$. The dimension of ABC is :

(A) $\left[\mathrm{M}^0\,\mathrm{L}^1\,\mathrm{T}^{-3}\right]$
(B) $\left[\mathrm{M}^0\,\mathrm{L}^2\,\mathrm{T}^{-2}\right]$
(C) $\left[\mathrm{M}^0\,\mathrm{L}^1\,\mathrm{T}^{-2}\right]$
(D) $\left[\mathrm{M}^0\,\mathrm{L}^2\,\mathrm{T}^{-3}\right]$

Answer: (D) $\left[\mathrm{M}^0\,\mathrm{L}^2\,\mathrm{T}^{-3}\right]$ · Key from source paper

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Q47 JEE Main 2025 · 29 Jan · Shift 1 MCQ

The pair of physical quantities not having same dimensions is :

(A) Pressure and Young's modulus
(B) Surface tension and impulse
(C) Torque and energy
(D) Angular momentum and Planck's constant

Answer: (B) Surface tension and impulse · Key from source paper

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Q48 JEE Main 2025 · 29 Jan · Shift 2 MCQ

Match List - I with List - II.

List - I	List - II
(A) Young's Modulus	(I) $\mathrm{M\,L^{-1}\,T^{-1}}$
(B) Torque	(II) $\mathrm{M\,L^{-1}\,T^{-2}}$
(C) Coefficient of Viscosity	(III) $\mathrm{M^{-1}\,L^{3}\,T^{-2}}$
(D) Gravitational Constant	(IV) $\mathrm{M\,L^{2}\,T^{-2}}$

Choose the correct answer from the options given below :

(A) (A)-(I), (B)-(III), (C)-(II), (D)-(IV)

(B) (A)-(IV), (B)-(II), (C)-(III), (D)-(I)

(C) (A)-(II), (B)-(IV), (C)-(I), (D)-(III)

(D) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)

Answer: (C) (A)-(II), (B)-(IV), (C)-(I), (D)-(III) · Key from source paper

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Q49 JEE Main 2025 · 29 Jan · Shift 2 Numerical

A physical quantity Q is related to four observables a, b, c, d as follows : $\mathrm{Q} = \frac{ab^4}{cd}$ where, $a = (60 \pm 3)$ Pa; $b = (20 \pm 0.1)$m; $c = (40 \pm 0.2)\mathrm{Nsm}^{-2}$ and $d = (50 \pm 0.1)$m, then the percentage error in Q is $\frac{x}{1000}$, where $x =$ _____ .

Numerical value type: the answer is a number.

Answer: 7700. · Key from source paper

Q50 JEE Main 2025 · 28 Jan · Shift 1 Numerical

In a measurement, it is asked to find modulus of elasticity per unit torque applied on the system. The measured quantity has dimension of $\left[M^a L^b T^c\right]$. If $b = -3$, the value of c is _____

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q51 JEE Main 2025 · 28 Jan · Shift 1 Numerical

A tiny metallic rectangular sheet has length and breadth of 5 mm and 2.5 mm , respectively. Using a specially designed screw gauge which has pitch of 0.75 mm and 15 divisions in the circular scale, you are asked to find the area of the sheet. In this measurement, the maximum fractional error will be $\frac{x}{100}$ where x is _____ .

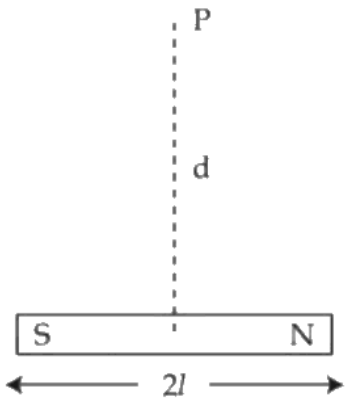
Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q52 JEE Main 2025 · 28 Jan · Shift 2 MCQ

see figure

Q26.



A bar magnet has total length $2l = 20$ units and the field point P is at a distance $\mathrm{d} = 10$ units from the centre of the magnet. If the relative uncertainty of length measurement is 1%, then uncertainty of the magnetic field at point P is :

(1) 4% (2) 15%

(3) 5% (4) 10%

(A) 4%

(B) 15%

(C) 5%

(D) 10%

Answer: (A) 4% · Key from source paper

Q53 JEE Main 2025 · 28 Jan · Shift 2 MCQ

Match List - I with List - II.

List - I	List - II
(A) Angular Impulse	(I) $[\mathrm{M}^0\,\mathrm{L}^2\,\mathrm{T}^{-2}]$
(B) Latent Heat	(II) $[\mathrm{M}\,\mathrm{L}^2\,\mathrm{T}^{-3}\,\mathrm{A}^{-1}]$
(C) Electrical resistivity	(III) $[\mathrm{M}\,\mathrm{L}^2\,\mathrm{T}^{-1}]$
(D) Electromotive force	(IV) $[\mathrm{M}\,\mathrm{L}^3\,\mathrm{T}^{-3}\,\mathrm{A}^{-2}]$

(A) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)

(B) (A)-(I), (B)-(III), (C)-(IV), (D)-(II)

(C) (A)-(III), (B)-(I), (C)-(II), (D)-(IV)

(D) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

Answer: (D) (A)-(III), (B)-(I), (C)-(IV), (D)-(II) · Key from source paper

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Q54 JEE Main 2025 · 24 Jan · Shift 1 MCQ

For an experimental expression $y = \frac{32.3 \times 1125}{27.4}$, where all the digits are significant. Then to report the value of y we should write

(A) $y = 1326.19$
(B) $y = 1330$
(C) $y = 1326.186$
(D) $y = 1326.2$

Answer: (B) $y = 1330$ · Key from source paper

Q55 JEE Main 2025 · 24 Jan · Shift 1 Numerical

The least count of a screw guage is 0.01 mm . If the pitch is increased by 75% and number of divisions on the circular scale is reduced by 50%, the new least count will be _____ $\times 10^{-3}$ mm

Numerical value type: the answer is a number.

Answer: 35. · Key from source paper

Q56 JEE Main 2025 · 23 Jan · Shift 1 MCQ

The position of a particle moving on x-axis is given by $x(t) = A\sin t + B\cos^2 t + Ct^2 + D$, where t is time. The dimension of $\frac{ABC}{D}$ is

(A) L^2T^{-2}
(B) L^2
(C) L
(D) $L^3\,\mathrm{T}^{-2}$

Answer: (A) L^2T^{-2} · Key from source paper

Q57 JEE Main 2025 · 23 Jan · Shift 1 MCQ

The electric flux is $\phi = \alpha\sigma + \beta\lambda$ where λ and σ are linear and surface charge density, respectively. $\left(\frac{\alpha}{\beta}\right)$ represents

(A) electric field
(B) area
(C) charge
(D) displacement

Answer: (D) displacement · Key from source paper

Q58 JEE Main 2025 · 23 Jan · Shift 2 MCQ

The energy of a system is given as $\mathrm{E(t)} = \alpha^3 \mathrm{e}^{-\beta t}$, where t is the time and $\beta = 0.3\ \mathrm{s}^{-1}$. The errors in the measurement of α and t are 1.2% and 1.6%, respectively. At $t = 5$ s, maximum percentage error in the energy is :

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(A) 6%
(B) 8.4%
(C) 11.6%
(D) 4%

Answer: (A) 6% · Key from source paper

Q59 JEE Main 2025 · 23 Jan · Shift 2 MCQ

Match List - I with List - II.

List - I	List - II
(A) Permeability of free space	(I) $[\mathrm{M\,L^2\,T^{-2}}]$
(B) Magnetic field	(II) $[\mathrm{M\,T^{-2}\,A^{-1}}]$
(C) Magnetic moment	(III) $[\mathrm{M\,L\,T^{-2}\,A^{-2}}]$
(D) Torsional constant	(IV) $[\mathrm{L^2\,A}]$

Choose the correct answer from the options given below :

(A) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)
(B) (A)-(III), (B)-(II), (C)-(IV), (D)-(I)
(C) (A)-(I), (B)-(IV), (C)-(II), (D)-(III)
(D) (A)-(II), (B)-(I), (C)-(III), (D)-(IV)

Answer: (B) (A)-(III), (B)-(II), (C)-(IV), (D)-(I) · Key from source paper

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Q60 JEE Main 2025 · 22 Jan · Shift 1 MCQ

If B is magnetic field and μ_0 is permeability of free space, then the dimensions of (B/μ_0) is

(A) $\mathrm{ML^2\,T^{-2}\,A^{-1}}$
(B) $\mathrm{MT^{-2}\,A^{-1}}$
(C) $\mathrm{L^{-1}\,A}$
(D) $\mathrm{LT^{-2}\,A^{-1}}$

Answer: (C) $\mathrm{L^{-1}\,A}$ · Key from source paper

Q61 JEE Main 2025 · 22 Jan · Shift 1 MCQ

Given below are two statements : Statement I : In a vernier callipers, one vernier scale division is always smaller than one main scale division. Statement II : The vernier constant is given by one main scale division multiplied by the number of vernier scale divisions. In the light of the above statements, choose the correct answer from the options given below.

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(A) Statement I is true but Statement II is false
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are false
(D) Both Statement I and Statement II are true

Answer: (C) Both Statement I and Statement II are false · Key from source paper

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Q62 JEE Main 2025 · 22 Jan · Shift 2 MCQ

Which one of the following is the correct dimensional formula for the capacitance in F ? M, L, T and C stand for unit of mass, length, time and charge,

(A) $[\mathrm{F}] = [\mathrm{C}^2\mathrm{M}^{-1}\mathrm{L}^{-2}\mathrm{T}^2]$
(B) $[\mathrm{F}] = [\mathrm{C}^2\mathrm{M}^{-2}\mathrm{L}^2\mathrm{T}^2]$
(C) $[\mathrm{F}] = [\mathrm{C}\mathrm{M}^{-2}\mathrm{L}^{-2}\mathrm{T}^{-2}]$
(D) $[\mathrm{F}] = [\mathrm{C}\mathrm{M}^{-1}\mathrm{L}^{-2}\mathrm{T}^2]$

Answer: (A) $[\mathrm{F}] = [\mathrm{C}^2\mathrm{M}^{-1}\mathrm{L}^{-2}\mathrm{T}^2]$ · Key from source paper

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Q63 JEE Main 2025 · 22 Jan · Shift 2 MCQ

The maximum percentage error in the measurment of density of a wire is [Given, mass of wire $= (0.60 \pm 0.003)$g radius of wire $= (0.50 \pm 0.01)$cm length of wire $= (10.00 \pm 0.05)$cm]

(A) 8
(B) 5
(C) 4
(D) 7

Answer: (B) 5 · Key from source paper

Q64 JEE Main 2024 · 9 Apr · Shift 1 MCQ

The dimensional formula of latent heat is :

(A) $[\mathrm{ML}^2\mathrm{T}^{-2}]$
(B) $[\mathrm{M}^0\mathrm{L}^2\mathrm{T}^{-2}]$
(C) $[\mathrm{MLT}^{-2}]$
(D) $[\mathrm{M}^\circ\mathrm{LT}^{-2}]$

Answer: (B) $[\mathrm{M}^0\mathrm{L}^2\mathrm{T}^{-2}]$ · Key from source paper

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Q65 JEE Main 2024 · 9 Apr · Shift 1 MCQ

One main scale division of a vernier caliper is equal to m units. If n^{th} division of main scale coincides with $(n+1)^{\mathrm{th}}$ division of vernier scale, the least count of the vernier caliper is :

(A) $\frac{n}{(n+1)}$
(B) $\frac{1}{(n+1)}$
(C) $\frac{m}{(n+1)}$
(D) $\frac{m}{n(n+1)}$

Answer: (C) $\frac{m}{(n+1)}$ · Key from source paper

Q66 JEE Main 2024 · 9 Apr · Shift 2 MCQ

The de-Broglie wavelength associated with a particle of mass m and energy E is $h/\sqrt{2mE}$. The dimensional formula for Planck's constant is :

(A) $[\mathrm{ML}^2\,\mathrm{T}^{-1}]$
(B) $[\mathrm{ML}^{-1}\,\mathrm{T}^{-2}]$
(C) $[\mathrm{MLT}^{-2}]$
(D) $[\mathrm{M}^2\,\mathrm{L}^2\,\mathrm{T}^{-2}]$

Answer: (A) $[\mathrm{ML}^2\,\mathrm{T}^{-1}]$ · Key from source paper

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Q67 JEE Main 2024 · 8 Apr · Shift 1 MCQ

In an expression $a \times 10^{\mathrm{b}}$;

(A) b is order of magnitude for $a \geq 5$
(B) b is order of magnitude for $a \leq 5$
(C) a is order of magnitude for $b \leq 5$
(D) b is order of magnitude for $5 < a \leq 10$

Answer: (B) b is order of magnitude for $a \leq 5$ · Key from source paper

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Q68 JEE Main 2024 · 8 Apr · Shift 1 MCQ

Young's modulus is determined by the equation given by $Y = 49000\,\frac{\mathrm{m}}{\mathrm{l}}\,\frac{\mathrm{dyn}}{\mathrm{cm}^2}$ where M is the mass and l is the extension of wire used in the experiment. Now error in Young modules (Y) is estimated by taking data from $M - l$ plot in graph paper. The smallest scale divisions are 5 g and 0.02 cm along load axis and extension axis respectively. If the value of M and l are 500 g and 2 cm respectively then percentage error of Y is :

(A) 0.5%
(B) 2%
(C) 0.02%
(D) 0.2%

Answer: (B) 2% · Key from source paper

Q69 JEE Main 2024 · 8 Apr · Shift 1 MCQ

The diameter of a sphere is measured using a vernier caliper whose 9 divisions of main scale are equal to 10 divisions of vernier scale. The shortest division on the main scale is equal to 1 mm. The main scale reading is 2 cm and second division of vernier scale coincides with a division on main scale. If mass of the sphere is 8.635 g, the density of the sphere is:

(A) $2.0\ \mathrm{g/cm^3}$
(B) $1.7\ \mathrm{g/cm^3}$
(C) $2.2\ \mathrm{g/cm^3}$
(D) $2.5\ \mathrm{g/cm^3}$

Answer: (A) $2.0\ \mathrm{g/cm^3}$ · Key from source paper

Q70 JEE Main 2024 · 8 Apr · Shift 2 MCQ

If ϵ_0 is the permittivity of free space and E is the electric field, then $\epsilon_0 E^2$ has the dimensions :

(A) $\left[M^{-1} L^{-3} T^4 A^2\right]$
(B) $\left[M L^2 T^{-2}\right]$
(C) $\left[M^{\circ} L^{-2} T A\right]$
(D) $\left[M L^{-1} T^{-2}\right]$

Answer: (D) $\left[M L^{-1} T^{-2}\right]$ · Key from source paper

Q71 JEE Main 2024 · 8 Apr · Shift 2 MCQ

Least count of a vernier caliper is $\frac{1}{20\,N}$ cm. The value of one division on the main scale is 1 mm. Then the number of divisions of main scale that coincide with N divisions of vernier scale is :

(A) $(2N - 1)$
(B) $\left(\frac{2N-1}{2N}\right)$
(C) $\left(\frac{2N-1}{2}\right)$
(D) $\left(\frac{2N-1}{20N}\right)$

Answer: (C) $\left(\frac{2N-1}{2}\right)$ · Key from source paper

Q72 JEE Main 2024 · 8 Apr · Shift 2 MCQ

There are 100 divisions on the circular scale of a screw gauge of pitch 1 mm. With no measuring quantity in between the jaws, the zero of the circular scale lies 5 divisions below the reference line. The diameter of a wire is then measured using this screw gauge. It is found that 4 linear scale divisions are clearly visible while 60 divisions on circular scale coincide with the reference line. The diameter of the wire is :

(A) 3.35 mm
(B) 4.65 mm
(C) 4.55 mm
(D) 4.60 mm

Answer: (C) 4.55 mm · Key from source paper

Q73 JEE Main 2024 · 6 Apr · Shift 1 MCQ

To find the spring constant (k) of a spring experimentally, a student commits 2% positive error in the measurement of time and 1% negative error in measurement of mass. The percentage error in determining value of k is :

(A) 5%
(B) 1%
(C) 3%
(D) 4%

Answer: (A) 5% · Key from source paper

Q74 JEE Main 2024 · 6 Apr · Shift 1 MCQ

Match List I with List II Choose the correct answer from the options given below:

LIST I		LIST II	
A.	Torque	I.	$[M^1L^1T^{-2}A^{-2}]$
B.	Magnetic field	II.	$[L^2A^1]$
C.	Magnetic moment	III.	$[M^1T^{-2}A^{-1}]$
D.	Permeability of free space	IV.	$[M^1L^2T^{-2}]$

(A) A-III, B-I, C-II, D-IV
(B) A-IV, B-II, C-III, D-I
(C) A-IV, B-III, C-II, D-I
(D) A-I, B-III, C-II, D-IV

Answer: (C) A-IV, B-III, C-II, D-I · Key from source paper

Q75 JEE Main 2024 · 6 Apr · Shift 1 MCQ

While measuring diameter of wire using screw gauge the following readings were noted. Main scale reading is 1 mm and circular scale reading is equal to 42 divisions. Pitch of screw gauge is 1 mm and it has 100 divisions on circular scale. The diameter of the wire is $\frac{x}{50}$ mm. The value of x is :

(A) 21
(B) 142
(C) 71
(D) 42

Answer: (C) 71 · Key from source paper

Q76 JEE Main 2024 · 6 Apr · Shift 2 MCQ

Given below are two statements : Statement (I) : Dimensions of specific heat is $[L^2T^{-2}K^{-1}]$. Statement (II) : Dimensions of gas constant is $[ML^2T^{-1}K^{-1}]$. In the light of the above statements, choose the most appropriate answer from the options given below.

(A) Both statement (I) and statement (II) are correct
(B) Statement (I) is correct but statement (II) is incorrect
(C) Both statement (I) and statement (II) are incorrect
(D) Statement (I) is incorrect but statement (II) is correct

Answer: (B) Statement (I) is correct but statement (II) is incorrect · Key from source paper

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Q77 JEE Main 2024 · 6 Apr · Shift 2 MCQ

In a vernier calliper, when both jaws touch each other, zero of the vernier scale shifts towards left and its 4th division coincides exactly with a certain division on main scale. If 50 vernier scale divisions equal to 49 main scale divisions and zero error in the instrument is 0.04 mm then how many main scale divisions are there in 1 cm ?

(A) 10
(B) 5
(C) 20
(D) 40

Answer: (C) 20 · Key from source paper

Q78 JEE Main 2024 · 5 Apr · Shift 1 MCQ

Time periods of oscillation of the same simple pendulum measured using four different measuring clocks were recorded as 4.62 s, 4.632 s, 4.6 s and 4.64 s. The arithmetic mean of these readings in correct significant figure is :

(A) 5 s
(B) 4.623 s
(C) 4.6 s
(D) 4.62 s

Answer: (C) 4.6 s · Key from source paper

Q79 JEE Main 2024 · 5 Apr · Shift 1 MCQ

If G be the gravitational constant and u be the energy density then which of the following quantity have the dimensions as that of the $\sqrt{uG}$:

(A) pressure gradient per unit mass
(B) Gravitational potential
(C) Energy per unit mass
(D) Force per unit mass

Answer: (D) Force per unit mass · Key from source paper

Q80 JEE Main 2024 · 5 Apr · Shift 2 MCQ

What is the dimensional formula of ab^{-1} in the equation $\left(P+\frac{a}{V^2}\right)(V-b)=RT$, where letters have their usual meaning.

(A) $[M^{-1}L^5T^3]$
(B) $[M^6L^7T^4]$
(C) $[ML^2T^{-2}]$
(D) $[M^0L^3T^{-2}]$

Answer: (C) $[ML^2T^{-2}]$ · Key from source paper

Q81 JEE Main 2024 · 5 Apr · Shift 2 MCQ

A vernier callipers has 20 divisions on the vernier scale, which coincides with 19th division on the main scale. The least count of the instrument is 0.1 mm. One main scale division is equal to _____ mm.

(A) 0.5
(B) 2
(C) 5
(D) 1

Answer: (B) 2 · Key from source paper

Q82 JEE Main 2024 · 4 Apr · Shift 1 MCQ

In an experiment to measure focal length (f) of convex lens, the least counts of the measuring scales for the position of object (u) and for the position of image (v) are Δu and Δv, respectively. The error in the measurement of the focal length of the convex lens will be:

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(A) $2f\left[\frac{\Delta u}{u}+\frac{\Delta v}{v}\right]$
(B) $\frac{\Delta u}{u}+\frac{\Delta v}{v}$
(C) $f^2\left[\frac{\Delta u}{u^2}+\frac{\Delta v}{v^2}\right]$
(D) $f\left[\frac{\Delta u}{u}+\frac{\Delta v}{v}\right]$

Answer: (C) $f^2\left[\frac{\Delta u}{u^2}+\frac{\Delta v}{v^2}\right]$ · Key from source paper

Q83 JEE Main 2024 · 4 Apr · Shift 1 MCQ

The equation of stationary wave is : $y=2a\sin\left(\frac{2\pi nt}{\lambda}\right)\cos\left(\frac{2\pi x}{\lambda}\right)$. Which of the following is NOT correct :

(A) The dimensions of n/λ is [T]
(B) The dimensions of n is $[\mathrm{LT}^{-1}]$
(C) The dimensions of x is [L]
(D) The dimensions of nt is [L]

Answer: (A) The dimensions of n/λ is [T] · Key from source paper

Q84 JEE Main 2024 · 4 Apr · Shift 2 MCQ

Applying the principle of homogeneity of dimensions, determine which one is correct, where T is time period, G is gravitational constant, M is mass, r is radius of orbit.

(A) $T^2=\frac{4\pi^2r^2}{GM}$
(B) $T^2=\frac{4\pi^2r}{GM^2}$
(C) $T^2=\frac{4\pi^2r^3}{GM}$
(D) $T^2=4\pi^2r^3$

Answer: (C) $T^2=\frac{4\pi^2r^3}{GM}$ · Key from source paper

Q85 JEE Main 2024 · 1 Feb · Shift 1 MCQ

The radius r, length l and resistance R of a metal wire was measured in the laboratory as

$r=0.35\pm0.05$ cm, $R=100\pm10$ ohm, $l=15\pm0.2$ cm

The percentage error in resistivity of the material of the wire is :

(A) 25.6%
(B) 39.9 %
(C) 37.3%
(D) 35.6 %

Answer: (B) 39.9 % · Key from source paper

Q86 JEE Main 2024 · 1 Feb · Shift 1 MCQ

The dimensional formula of angular impulse is :

(A) $[M\ L^{-2}T^{-1}]$
(B) $[M\ L^{2}\ T^{-2}]$
(C) $[M\ L\ T^{-1}]$
(D) $[M\ L^{2}\ T^{-1}]$

Answer: (D) $[M\ L^{2}\ T^{-1}]$ · Key from source paper

Q87 JEE Main 2024 · 1 Feb · Shift 1 MCQ

10 divisions on the main scale of a Vernier calliper coincide with 11 divisions on the Vernier scale. If each division on the main scale is of 5 units, the least count of the instrument is :

(A) $\frac{1}{2}$
(B) $\frac{10}{11}$
(C) $\frac{50}{11}$
(D) $\frac{5}{11}$

Answer: (D) $\frac{5}{11}$ · Key from source paper

Q88 JEE Main 2024 · 1 Feb · Shift 2 MCQ

Match List - I with List - II.

List - I (Number)	List - II (Signficant figure)
(A) 1001	(I) 3
(B) 010.1	(II) 4
(C) 100.100	(III) 5
(D) 0.0010010	(IV) 6

Choose the correct answer from the options given below:

(A) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)
(B) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)
(C) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)
(D) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

Answer: (C) (A)-(II), (B)-(I), (C)-(IV), (D)-(III) · Key from source paper

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Q89 JEE Main 2024 · 31 Jan · Shift 1 MCQ

If the percentage errors in measuring the length and the diameter of a wire are 0.1% each. The percentage error in measuring its resistance will be:

(A) 0.2%
(B) 0.3%
(C) 0.1%
(D) 0.144%

Answer: (B) 0.3% · Key from source paper

Q90 JEE Main 2024 · 31 Jan · Shift 1 MCQ

A force is represented by $F = ax^2 + bt^{\frac{1}{2}}$, where $x =$ distance and $t =$ time. The dimensions of $\frac{b^2}{a}$ are :

(A) $[ML^3\,T^{-3}]$
(B) $[MLT^{-2}]$
(C) $[ML^{-1}\,T^{-1}]$
(D) $[ML^2\,T^{-3}]$

Answer: (A) $[ML^3\,T^{-3}]$ · Key from source paper

Q91 JEE Main 2024 · 31 Jan · Shift 2 MCQ

Consider two physical quantities A and B related to each other as $E = \frac{B - x^2}{At}$ where E, x and t have dimensions of energy, length and time respectively. The dimension of AB is

(A) $L^{-2}M^1T^0$
(B) $L^2M^{-1}T^1$
(C) $L^{-2}M^1T^1$
(D) $L^0M^{-1}T^1$

Answer: (B) $L^2M^{-1}T^1$ · Key from source paper

Q92 JEE Main 2024 · 31 Jan · Shift 2 MCQ

The measured value of the length of a simple pendulum is 20 cm with 2 mm accuracy. The time for 50 oscillations was measured to be 40 seconds with 1 second resolution. From these measurements, the accuracy in the measurement of acceleration due to gravity is $N\%$. The value of N is:

(A) 4
(B) 8
(C) 6
(D) 5

Answer: (C) 6 · Key from source paper

Q93 JEE Main 2024 · 30 Jan · Shift 1 MCQ

Match List-I with List-II.

List-I	List-II

A. Coefficient of viscosity	I. $[\mathrm{ML}^2\,\mathrm{T}^{-2}]$
B. Surface Tension	II. $[\mathrm{ML}^2\,\mathrm{T}^{-1}]$
C. Angular momentum	III. $[\mathrm{ML}^{-1}\,\mathrm{T}^{-1}]$
D. Rotational kinetic energy	IV. $[\mathrm{ML}^0\,\mathrm{T}^{-2}]$

(A) A-II, B-I, C-IV, D-III
(B) A-I, B-II, C-III, D-IV
(C) A-III, B-IV, C-II, D-I
(D) A-IV, B-III, C-II, D-I

Answer: (C) A-III, B-IV, C-II, D-I · Key from source paper

Q94 JEE Main 2024 · 30 Jan · Shift 2 MCQ

If mass is written as $m = kc^P G^{-1/2}\, h^{1/2}$, then the value of P will be : (Constants have their usual meaning with k a dimensionless constant)

(A) $\frac{1}{2}$
(B) $\frac{1}{3}$
(C) 2
(D) $-\frac{1}{3}$

Answer: (A) $\frac{1}{2}$ · Key from source paper

Q95 JEE Main 2024 · 30 Jan · Shift 2 MCQ

If 50 Vernier divisions are equal to 49 main scale divisions of a travelling microscope and one smallest reading of main scale is 0.5 mm the Vernier constant of travelling microscope is:

(A) 0.1 mm
(B) 0.1 cm
(C) 0.01 cm
(D) 0.01 mm

Answer: (D) 0.01 mm · Key from source paper

Q96 JEE Main 2024 · 29 Jan · Shift 1 MCQ

The resistance $R = \frac{V}{I}$, where $V = (200 \pm 5)$ V and $I = (20 \pm 0.2)$ A, the percentage error in the measurement of R is :

(A) 3.5%
(B) 7%
(C) 3%
(D) 5.5%

Answer: (A) 3.5% · Key from source paper

Q97 JEE Main 2024 · 29 Jan · Shift 2 MCQ

A physical quantity Q is found to depend on quantities a, b, c by the relation $Q = \frac{a^4 b^3}{c^2}$. The percentage error in a, b and c are 3%, 4% and 5% respectively. Then, the percentage error in Q is:

(A) 66%
(B) 43%
(C) 34%
(D) 14%

Answer: (C) 34% · Key from source paper

Q98 JEE Main 2024 · 27 Jan · Shift 1 MCQ

Given below are two statements:

Statement (I) : Planck's constant and angular momentum have the same dimensions.

Statement (II) : Linear momentum and moment of force have the same dimensions.

In light of the above statements, choose the correct answer from the options given below :

(A) Statement I is true but Statement II is false
(B) Both Statement I and Statement II are false
(C) Both Statement I and Statement II are true
(D) Statement I is false but Statement II is true

Answer: (A) Statement I is true but Statement II is false · Key from source paper

Q99 JEE Main 2024 · 27 Jan · Shift 1 MCQ

Identify the physical quantity that cannot be measured using spherometer :

(A) Radius of curvature of concave surface
(B) Specific rotation of liquids
(C) Thickness of thin plates
(D) Radius of curvature of convex surface

Answer: (B) Specific rotation of liquids · Key from source paper

Q100 JEE Main 2024 · 27 Jan · Shift 2 MCQ

The equation of state of a real gas is given by $P + \frac{a}{V^2}(V - b) = RT$, where P, V and T are pressure, volume and temperature respectively and R is the universal gas constant. The dimensions of $\frac{a}{b^2}$ is similar to that of :

(A) PV
(B) P
(C) RT
(D) R

Answer: (B) P · Key from source paper

Q101 JEE Main 2024 · 27 Jan · Shift 2 MCQ

Given below are two statements: one is labelled as Assertion(A) and the other is labelled as Reason (R).

Assertion (A) : In Vernier calliper if positive zero error exists, then while taking measurements, the reading taken will be more than the actual reading.

Reason (R) : The zero error in Vernier Calliper might have happened due to manufacturing defect or due to rough handling.

In the light of the above statements, choose the correct answer from the options given below :

(A) Both (A) and (R) are correct and (R) is the correct explanation of (A)
(B) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(C) (A) is true but (R) is false
(D) (A) is false but (R) is true

Answer: (B) Both (A) and (R) are correct but (R) is not the correct explanation of (A) · Key from source paper

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Q102 JEE Main 2023 · 15 Apr · Shift 1 MCQ

The speed of a wave produced in water is given by $v = \lambda^a g^b \rho^c$. Where λ, g and ρ are wavelength of wave, acceleration due to gravity and density of water respectively. The values of a, b and c respectively, are

(A) 1, -1, 0
(B) $\frac{1}{2}$, 0, $\frac{1}{2}$
(C) 1, 1, 0
(D) $\frac{1}{2}$, $\frac{1}{2}$, 0

Answer: (D) $\frac{1}{2}$, $\frac{1}{2}$, 0 · Key from source paper

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Q103 JEE Main 2023 · 13 Apr · Shift 1 MCQ

A body of mass (5 ± 0.5) kg is moving with a velocity of (20 ± 0.4) m s^{-1}. Its kinetic energy will be

(A) (1000 ± 0.14) J
(B) (500 ± 0.14) J
(C) (500 ± 140) J
(D) (1000 ± 140) J

Answer: (D) (1000 ± 140) J · Key from source paper

Q104 JEE Main 2023 · 13 Apr · Shift 2 MCQ

In the equation $X + \frac{a}{Y^2}[Y - b] = RT$, X is pressure, Y is volume, R is universal gas constant and T is temperature. The physical quantity equivalent to the ratio $\frac{a}{b}$ is:

(A) Pressure gradient
(B) Energy
(C) Impulse
(D) Coefficient of viscosity

Answer: (B) Energy · Key from source paper

Q105 JEE Main 2023 · 12 Apr · Shift 1 MCQ

Match List I with List II
List-I
A. Spring constant
B. Angular speed
C. Angular momentum
D. Moment of Inertia
List-II
I. $[T^{-1}]$
II. $[MT^{-2}]$
III. $[ML^2]$
IV. $[ML^2T^{-1}]$
Choose the correct answer from the options given below:

(A) A-I, B-III, C-II, D-IV
(B) A-IV, B-I, C-III, D-II
(C) A-II, B-I, C-IV, D-III
(D) A-II, B-III, C-I, D-IV

Answer: (C) A-II, B-I, C-IV, D-III · Key from source paper

Q106 JEE Main 2023 · 11 Apr · Shift 1 MCQ

Given below are two statements :
Statement I : Astronomical unit (Au), Parsec (Pc) and Light year (ly) are units for measuring astronomical distances.

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Statement II : Au < Parsec (Pc) < ly

In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Both Statements I and Statements II are incorrect

(B) Statements I is correct but Statements II is incorrect

(C) Both Statements I and Statements II are correct

(D) Statements I is incorrect but Statements II is correct

Answer: (B) Statements I is correct but Statements II is incorrect · Key from source paper

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Q107 JEE Main 2023 · 11 Apr · Shift 2 MCQ

If force (F), velocity (V) and time (T) are considered as fundamental physical quantity, then dimensional formula of density will be :

(A) FV^4T^{-6}

(B) $FV^{-4}T^{-2}$

(C) $F^2V^{-2}T^6$

(D) $FV^{-2}T^2$

Answer: (B) $FV^{-4}T^{-2}$ · Key from source paper

Q108 JEE Main 2023 · 10 Apr · Shift 1 MCQ

A physical quantity P is given as $P = \frac{a^2b^3}{c\sqrt{d}}$. The percentage error in the measurement of a, b, c and d are 1%, 2%, 3% and 4% respectively. The percentage error in the measurement of quantity P will be

(A) 13%

(B) 16%

(C) 12%

(D) 14%

Answer: (A) 13% · Key from source paper

Q109 JEE Main 2023 · 10 Apr · Shift 2 MCQ

In an experiment with vernier callipers of least count 0.1 mm, when two jaws are joined together the zero of vernier scale lies right to the zero of the main scale and 6th division of vernier scale coincides with the main scale division. While measuring the diameter of a spherical bob, the zero of vernier scale lies in between 3.2 cm and 3.3 cm marks and 4th division of vernier scale coincides with the main scale division. The diameter of bob is measured as

(A) 3.22 cm
(B) 3.18 cm
(C) 3.26 cm
(D) 3.25 cm

Answer: (B) 3.18 cm · Key from source paper

Q110 JEE Main 2023 · 8 Apr · Shift 1 MCQ

A cylindrical wire of mass (0.4 ± 0.01) g has length (8 ± 0.04) cm and radius (6 ± 0.03) mm. The maximum error in its density will be

(A) 3.5%
(B) 5%
(C) 1%
(D) 4%

Answer: (D) 4% · Key from source paper

Q111 JEE Main 2023 · 8 Apr · Shift 1 MCQ

Dimension of $\frac{1}{\mu_0 \varepsilon_0}$ should be equal to

(A) $\mathrm{L\,T^{-1}}$
(B) $\mathrm{T^2\,L^{-2}}$
(C) $\mathrm{L^2\,T^{-2}}$
(D) $\mathrm{T\,L^{-1}}$

Answer: (C) $\mathrm{L^2\,T^{-2}}$ · Key from source paper

Q112 JEE Main 2023 · 8 Apr · Shift 2 MCQ

Match List I with List II

List I	List II
A. Torque	I. $\mathrm{M\,L^{-2}\,T^{-2}}$
B. Stress	II. $\mathrm{M\,L^{2}\,T^{-2}}$
C. Pressure gradient	III. $\mathrm{M\,L^{-1}\,T^{-1}}$
D. Coefficient of viscosity	IV. $\mathrm{M\,L^{-1}\,T^{-2}}$

Choose the correct answer from the options given below :

(A) A-II, B-I, C-IV, D-III
(B) A-IV, B-II, C-III, D-I
(C) A-II, B-IV, C-I, D-III
(D) A-III, B-IV, C-I, D-II

Answer: (C) A-II, B-IV, C-I, D-III · Key from source paper

Q113 JEE Main 2023 · 6 Apr · Shift 1 MCQ

Two resistance are given as $R_1 = (10 \pm 0.5)\ \Omega$ and $R_2 = (15 \pm 0.5)\ \Omega$. The percentage error in the measurement of equivalent resistance when they are connected in parallel is

(A) 6.33
(B) 2.33
(C) 5.33
(D) 4.33

Answer: (D) 4.33 · Key from source paper

Q114 JEE Main 2023 · 1 Feb · Shift 1 MCQ

$P + \frac{a}{V^2}V - b = RT$ represents the equation of state of some gases. Where P is the pressure, V is the volume, T is the temperature and a, b, R are the constants. The physical quantity, which has dimensional formula as that of $\frac{b^2}{a}$, will be :

(A) Bulk modulus
(B) Modulus of rigidity
(C) Compressibility
(D) Energy density

Answer: (C) Compressibility · Key from source paper

Q115 JEE Main 2023 · 1 Feb · Shift 2 MCQ

If the velocity of light c, universal gravitational constant G and planck's constant h are chosen as fundamental quantities. The dimensions of mass in the new system is:

(A) $\left[h^{\frac{1}{2}}c^{\frac{1}{2}}G^{1}\right]$
(B) $h^{1}c^{1}G^{-1}$
(C) $\left[h^{-\frac{1}{2}}c^{\frac{1}{2}}G^{\frac{1}{2}}\right]$
(D) $\left[h^{\frac{1}{2}}c^{\frac{1}{2}}G^{-\frac{1}{2}}\right]$

Answer: (D) $\left[h^{\frac{1}{2}}c^{\frac{1}{2}}G^{-\frac{1}{2}}\right]$ · Key from source paper

Q116 JEE Main 2023 · 31 Jan · Shift 1 MCQ

If R, X_L and X_C represent resistance, inductive reactance and capacitive reactance. Then which of the following is dimensionless:

(A) RX_LX_C
(B) $\frac{R}{\sqrt{X_LX_C}}$
(C) $\frac{R}{X_LX_C}$
(D) $R\frac{X_L}{X_C}$

Answer: (B) $\frac{R}{\sqrt{X_LX_C}}$ · Key from source paper

Q117 JEE Main 2023 · 31 Jan · Shift 2 MCQ

Match List I with List II

List I
A Angular momentum
B Torque
C Stress
D Pressure gradient

List II
I $[\mathrm{ML}^2\,\mathrm{T}^{-2}]$
II $[\mathrm{ML}^{-2}\,\mathrm{T}^{-2}]$
III $[\mathrm{ML}^2\,\mathrm{T}^{-1}]$
IV $[\mathrm{ML}^{-1}\,\mathrm{T}^{-2}]$

Choose the correct answer from the options given below :

(A) A-I, B-IV, C-III, D-II
(B) A-III, B-I, C-IV, D-II
(C) A-II, B-III, C-IV, D-I
(D) A-IV, B-II, C-I, D-III

Answer: (B) A-III, B-I, C-IV, D-II · Key from source paper

Q118 JEE Main 2023 · 30 Jan · Shift 1 MCQ

Electric field in a certain region is given by $\vec{E} = \frac{A}{x^2}\hat{i} + \frac{B}{y^3}\hat{j}$. The SI unit of A and B are :

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(A) N m^3 C^{-1}; N m^2 C^{-1}
(B) N m^2 C^{-1}; N m^3 C^{-1}
(C) N m^3 C; N m^2 C
(D) N m^2 C; N m^3 C

Answer: (B) N m^2 C^{-1}; N m^3 C^{-1} · Key from source paper

Q119 JEE Main 2023 · 30 Jan · Shift 1 Numerical

In an experiment for estimating the value of focal length of converging mirror, image of an object placed at 40 cm from the pole of the mirror is formed at distance 120 cm from the pole of the mirror. These distances are measured with a modified scale in which there are 20 small divisions in 1 cm. The value of error in measurement of focal length of the mirror is $\frac{1}{K}$ cm. The value of K is _____.

Numerical value type: the answer is a number.

Answer: 32. · Key from source paper

Q120 JEE Main 2023 · 30 Jan · Shift 1 Numerical

In a screw gauge, there are 100 divisions on the circular scale and the main scale moves by 0.5 mm on a complete rotation of the circular scale. The zero of circular scale lies 6 divisions below the line of graduation when two studs are brought in contact with each other. When a wire is placed between the studs, 4 linear scale divisions are clearly visible while 46th division the circular scale coincide with the reference line. The diameter of the wire is _____ $\times 10^{-2}$ mm.

Numerical value type: the answer is a number.

Answer: 220. · Key from source paper

Q121 JEE Main 2023 · 30 Jan · Shift 2 MCQ

Match List I with List II

List I
A Torque
B Energy density
C Pressure gradient
D Impulse

List II
I $kg\ m^{-1}\ s^{-2}$
II $kg\ m\ s^{-1}$
III $kg\ m^{-2}\ s^{-2}$
IV $kg\ m^{2}\ s^{-2}$

Choose the correct answer from the options given below :

(A) A-IV, B-III, C-I, D-II
(B) A-I, B-IV, C-III, D-II
(C) A-IV, B-I, C-II, D-III
(D) A-IV, B-I, C-III, D-II

Answer: (D) A-IV, B-I, C-III, D-II · Key from source paper

Q122 JEE Main 2023 · 29 Jan · Shift 1 MCQ

Match List I with List II :

List-I (Physical Quantity) | List-II (Dimensional Formula)

A Pressure gradient | I $[\mathrm{M^0L^2T^{-2}}]$
B Energy density | II $[\mathrm{M^1L^{-1}T^{-2}}]$
C Electric Field | III $[\mathrm{M^1L^{-2}T^{-2}}]$
D Latent heat | IV $[\mathrm{M^1L^1T^{-3}A^{-1}}]$

Choose the correct answer from the options given below :

(A) A-III, B-II, C-I, D-IV
(B) A-II, B-III, C-IV, D-I
(C) A-III, B-II, C-IV, D-I
(D) A-II, B-III, C-I, D-IV

Answer: (C) A-III, B-II, C-IV, D-I · Key from source paper

Q123 JEE Main 2023 · 29 Jan · Shift 2 Numerical

In an experiment of measuring the refractive index of a glass slab using travelling microscope in physics lab, a student measures real thickness of the glass slab as $5.25\ \mathrm{mm}$ and apparent thickness of the glass slab at $5.00\ \mathrm{mm}$. Travelling microscope has 20 divisions in one cm on main scale and 50 divisions on Vernier scale is equal to 49 divisions on main scale. The estimated uncertainty in the measurement of refractive index of the slab is $\frac{x}{10} \times 10^{-3}$, where x is _____.

Numerical value type: the answer is a number.

Answer: 41. · Key from source paper

Q124 JEE Main 2023 · 29 Jan · Shift 2 MCQ

The equation of a circle is given by $x^2 + y^2 = a^2$, where a is the radius. If the equation is modified to change the origin other than $(0, 0)$, then find out the correct dimensions of A and B in a new equation :
$(x - At)^2 + \left(y - \frac{t}{B}\right)^2 = a^2$
The dimensions of t is given as $[\mathrm{T^{-1}}]$

(A) $A = [\mathrm{L}^{-1}\mathrm{T}]$, $B = [\mathrm{LT}^{-1}]$
(B) $A = [\mathrm{LT}]$, $B = [\mathrm{L}^{-1}\mathrm{T}^{-1}]$
(C) $A = [\mathrm{L}^{-1}\mathrm{T}^{-1}]$, $B = [\mathrm{LT}^{-1}]$
(D) $A = [\mathrm{L}^{-1}\mathrm{T}^{-1}]$, $B = [\mathrm{LT}]$

Answer: (B) $A = [\mathrm{LT}]$, $B = [\mathrm{L}^{-1}\mathrm{T}^{-1}]$ · Key from source paper

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Q125 JEE Main 2023 · 25 Jan · Shift 1 MCQ

Match List I with List II

List - I
A Surface tension
B Pressure
C Viscosity
D Impulse

List - II
I. $\mathrm{kg\,m^{-1}\,s^{-1}}$
II. $\mathrm{kg\,m\,s^{-1}}$
III. $\mathrm{kg\,m^{-1}\,s^{-2}}$
IV. $\mathrm{kg\,s^{-2}}$

Choose the correct answer from the options given below:

(A) A-IV, B-III, C-II, D-I
(B) A-IV, B-III, C-I, D-II
(C) A-III, B-IV, C-I, D-II
(D) A-II, B-I, C-III, D-IV

Answer: (B) A-IV, B-III, C-I, D-II · Key from source paper

Q126 JEE Main 2023 · 25 Jan · Shift 2 MCQ

Match List I with List II

List	List II
A. Young's Modulus (Y)	I. $[\mathrm{ML^{-1}\,T^{-1}}]$
B. Co-efficient of Viscosity (η)	II. $[\mathrm{ML^{2}\,T^{-1}}]$
C. Planck's Constant (h)	III. $[\mathrm{ML^{-1}\,T^{-2}}]$
D. Work Function (ϕ)	IV. $[\mathrm{ML^{2}\,T^{-2}}]$

Choose the correct answer from the options given below:

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(A) A-II, B-III, C-IV, D-I
(B) A-III, B-I, C-II, D-IV
(C) A-I, B-III, C-IV, D-II
(D) A-I, B-II, C-III, D-IV

Answer: (B) A-III, B-I, C-II, D-IV · Key from source paper

Q127 JEE Main 2023 · 24 Jan · Shift 1 MCQ

Match List I with List II:

List I	List II
A. Planck's constant (h)	I. $[\mathrm{M^1L^2T^{-2}}]$
B. Stopping potential (V_s)	II. $[\mathrm{M^1L^1T^{-1}}]$
C. Work function (ϕ)	III. $[\mathrm{M^1L^2T^{-1}}]$
D. Momentum (p)	IV. $[\mathrm{M^1L^2T^{-3}A^{-1}}]$

Choose the correct answer from the options given below:

(A) A - III, B - I, C - II, D - IV
(B) A - III, B - IV, C - I, D - II
(C) A - II, B - IV, C - III, D - I
(D) A - I, B - III, C - IV, D - II

Answer: (B) A - III, B - IV, C - I, D - II · Key from source paper

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Q128 JEE Main 2023 · 24 Jan · Shift 2 MCQ

The frequency (ν) of an oscillating liquid drop may depend upon radius (r) of the drop, density (ρ) of liquid and the surface tension (s) of the liquid as: $\nu = r^a \rho^b s^c$. The values of a, b and c respectively are

(A) $\left(-\frac{3}{2}, -\frac{1}{2}, \frac{1}{2}\right)$
(B) $\left(-\frac{3}{2}, \frac{1}{2}, \frac{1}{2}\right)$
(C) $\left(\frac{3}{2}, \frac{1}{2}, -\frac{1}{2}\right)$
(D) $\left(\frac{3}{2}, -\frac{1}{2}, \frac{1}{2}\right)$

Answer: (A) $\left(-\frac{3}{2}, -\frac{1}{2}, \frac{1}{2}\right)$ · Key from source paper

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Q129 JEE Main 2022 · 29 Jul · Shift 1 MCQ

Given below are two statements: One is labelled as Assertion (A) and other is labelled as Reason (R)
Assertion (A) : Time period of oscillation of a liquid drop depends on surface tension (S), if density of the liquid is ρ and radius of the drop is r, then $T = K\sqrt{\frac{\rho r^3}{S^{\frac{3}{2}}}}$ is dimensionally correct, where K is dimensionless.
Reason (R) : Using dimensional analysis we get R.H.S. having different dimension than that of time period. In the light of above statements, choose the correct answer from the options given below.

(A) Both (A) and (R) are true and (R) is the correct explanation of (A)
(B) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(C) (A) is true but (R) is false
(D) (A) is false but (R) is true

Answer: (D) (A) is false but (R) is true · Key from source paper

Q130 JEE Main 2022 · 29 Jul · Shift 1 MCQ

A travelling microscope has 20 divisions per cm on the main scale while its Vernier scale has total 50 divisions and 25 Vernier scale divisions are equal to 24 main scale divisions, what is the least count of the travelling microscope ?

(A) 0.001 cm
(B) 0.002 mm
(C) 0.002 cm
(D) 0.005 cm

Answer: (C) 0.002 cm · Key from source paper

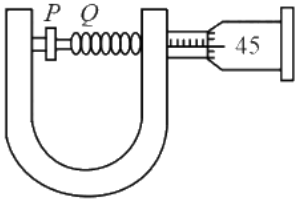
Q131 JEE Main 2022 · 29 Jul · Shift 1 MCQ

In an experiment to find out the diameter of wire using screw gauge, the following observation were noted:

(see the figure above)

(a) Screw moves 0.5 mm on main scale in one complete rotation
(b) Total divisions on circular scale = 50
(c) Main scale reading is 2.5 mm
(d) 45th division of circular scale is in the pitch line
(e) Instrument has 0.03 mm negative error Then the diameter of wire is :

Q20. In an experiment to find out the diameter of wire using screw gauge, the following observation were noted:



(a) Screw moves 0.5 mm on main scale in one complete rotation
(b) Total divisions on circular scale $= 50$
(c) Main scale reading is 2.5 mm
(d) 45th division of circular scale is in the pitch line
(e) Instrument has 0.03 mm negative error Then the diameter of wire is :
(1) 2.92 mm
(2) 2.54 mm
(3) 2.98 mm
(4) 3.45 mm

(A) 2.92 mm
(B) 2.54 mm
(C) 2.98 mm
(D) 3.45 mm

Answer: (C) 2.98 mm · Key from source paper

Q132 JEE Main 2022 · 29 Jul · Shift 2 MCQ

Match List I with List II.
List I: (A) Torque, (B) Stress, (C) Latent Heat, (D) Power
List II: (I) $\mathrm{Nms^{-1}}$, (II) $\mathrm{Jkg^{-1}}$, (III) Nm, (IV) $\mathrm{Nm^{-2}}$
Choose the correct answer from the options given below:

(A) A - III, B - II, C - I, D - IV
(B) A - III, B - IV, C - II, D - I
(C) A - IV, B - I, C - III, D - II
(D) A - II, B - III, C - I, D - IV

Answer: (B) A - III, B - IV, C - II, D - I · Key from source paper

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Q133 JEE Main 2022 · 28 Jul · Shift 1 MCQ

The dimensions of $\frac{B^2}{\mu_0}$ will be
(if μ_0: permeability of free space and B : magnetic field)

(A) $\mathrm{ML^2\,T^{-2}}$
(B) $\mathrm{MLT^{-2}}$
(C) $\mathrm{ML^{-1}T^{-2}}$
(D) $\mathrm{MLL^{-2}A^{-1}}$

Answer: (C) $\mathrm{ML^{-1}T^{-2}}$ · Key from source paper

Q134 JEE Main 2022 · 28 Jul · Shift 2 MCQ

Consider the efficiency of Carnot's engine is given by $\eta = \frac{\alpha\beta}{\sin\theta}\log_e\frac{\beta x}{kT}$, where α and β are constants. If T is temperature, k is Boltzman constant, θ is angular displacement and x has the dimensions of length. Then, choose the incorrect option.

(A) Dimensions of β is same as that of force.
(B) Dimensions of $\alpha^{-1}x$ is same as that of energy.
(C) Dimensions of $\eta^{-1}\sin\theta$ is same as that of $\alpha\beta$
(D) Dimensions of α is same as that of β

Answer: (D) Dimensions of α is same as that of β · Key from source paper

Q135 JEE Main 2022 · 28 Jul · Shift 2 · Numerical

In an experiment to find acceleration due to gravity (g) using simple pendulum, time period of $0.5\ \mathrm{s}$ is measured from time of 100 oscillation with a watch of $1\ \mathrm{s}$ resolution. If measured value of length is $10\ \mathrm{cm}$ known to $1\ \mathrm{mm}$ accuracy. The accuracy in the determination of g is found to be $x\%$. The value of x is

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q136 JEE Main 2022 · 27 Jul · Shift 1 · MCQ

A torque meter is calibrated to reference standards of mass, length and time each with 5% accuracy. After calibration, the measured torque with this torque meter will have net accuracy of

(A) 15%
(B) 25%
(C) 75%
(D) 5%

Answer: (B) 25% · Key from source paper

Q137 JEE Main 2022 · 27 Jul · Shift 1 · Numerical

The one division of main scale of vernier callipers reads 1 mm and 10 divisions of Vernier scale is equal to 9 divisions on main scale. When the two jaws of the instrument touch each other the zero of the Vernier lies to the right of zero of the main scale and its fourth division coincides with a main scale division. When a spherical bob is tightly placed between the two jaws, the zero of the Vernier scale lies in between 4.1 cm and 4.2 cm and 6th Vernier division coincides with a main scale division. The diameter of the bob will be _____ 10^{-2} cm.

Numerical value type: the answer is a number.

Answer: 412. · Key from source paper

Q138 JEE Main 2022 · 27 Jul · Shift 2 · MCQ

An expression of energy density is given by $u = \frac{\alpha}{\beta}\sin\left(\frac{\alpha x}{kt}\right)$, where α, β are constants, x is displacement, k is Boltzmann constant and t is the temperature. The dimensions of β will be

(A) $[\mathrm{ML}^2\ \mathrm{T}^{-2}\theta^{-1}]$
(B) $[\mathrm{M}^0\mathrm{L}^2\mathrm{T}^{-2}]$
(C) $[\mathrm{M}^0\mathrm{L}^0\mathrm{T}^0]$
(D) $[\mathrm{M}^0\mathrm{L}^2\mathrm{T}^0]$

Answer: (D) $[\mathrm{M}^0\mathrm{L}^2\mathrm{T}^0]$ · Key from source paper

Q139 JEE Main 2022 · 26 Jul · Shift 1 MCQ

A screw gauge of pitch 0.5 mm is used to measure the diameter of uniform wire of length 6.8 cm, the main scale reading is 1.5 mm and circular scale reading is 7. The calculated curved surface area of wire to appropriate significant figures is
[Screw gauge has 50 divisions on the circular scale]

(A) $6.8\ \text{cm}^2$
(B) $3.4\ \text{cm}^2$
(C) $3.9\ \text{cm}^2$
(D) $2.4\ \text{cm}^2$

Answer: (B) $3.4\ \text{cm}^2$ · Key from source paper

Q140 JEE Main 2022 · 26 Jul · Shift 1 Numerical

In an experiment of determine the Young's modulus of wire of a length exactly 1 m, the extension in the length of the wire is measured as 0.4 mm with an uncertainty of ± 0.02 mm when a load of 1 kg is applied. The diameter of the wire is measured as 0.4 mm with an uncertainty of ± 0.01 mm. The error in the measurement of Young's modulus (ΔY) is found to be $x \times 10^{10}\ \text{N m}^{-2}$. The value of x is _____ .

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q141 JEE Main 2022 · 26 Jul · Shift 2 MCQ

In a Vernier Caliper 10 divisions of Vernier scale is equal to the 9 divisions of main scale. When both jaws of Vernier calipers touch each other, the zero of the Vernier scale is shifted to the left of zero of the main scale and 4th Vernier scale division exactly coincides with the main scale reading. One main scale division is equal to 1 mm. While measuring diameter of a spherical body, the body is held between two jaws. It is now observed that zero of the Vernier scale lies between 30 and 31 divisions of main scale reading and 6th Vernier scale division exactly. coincides with the main scale reading. The diameter of the spherical body will be:

(A) $3.02\ \text{cm}$
(B) $3.06\ \text{cm}$
(C) $3.10\ \text{cm}$
(D) $3.20\ \text{cm}$

Answer: (C) $3.10\ \text{cm}$ · Key from source paper

Q142 JEE Main 2022 · 25 Jul · Shift 1 MCQ

If momentum P, area A and time T are taken as fundamental quantities, then the dimensional formula for coefficient of viscosity is

(A) $\mathrm{PA^{-1}T^{0}}$
(B) $\mathrm{PAT^{-1}}$
(C) $\mathrm{PA^{-1}T}$
(D) $\mathrm{PA^{-1}T^{-1}}$

Answer: (A) $\mathrm{PA^{-1}T^{0}}$ · Key from source paper

Q143 JEE Main 2022 · 25 Jul · Shift 1 MCQ

Which of the following physical quantities have the same dimensions?

(A) Electric displacement $\vec{D}$ and surface charge density
(B) Displacement current and electric field
(C) Current density and surface charge density
(D) Electric potential and energy

Answer: (A) Electric displacement $\vec{D}$ and surface charge density · Key from source paper

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Q144 JEE Main 2022 · 25 Jul · Shift 2 MCQ

The maximum error in the measurement of resistance, current and time for which current flows in an electrical circuit are 1%, 2% and 3% respectively. The maximum percentage error in the detection of the dissipated heat will be:

(A) 2
(B) 4
(C) 6
(D) 8

Answer: (D) 8 · Key from source paper

Q145 JEE Main 2022 · 29 Jun · Shift 1 MCQ

In van dar Wall equation $\left[P+\frac{a}{V^2}\right][V-b]=RT$; P is pressure, V is volume, R is universal gas constant and T is temperature. The ratio of constants $\frac{a}{b}$ is dimensionally equal to :

(A) $\frac{P}{V}$
(B) $\frac{V}{P}$
(C) PV
(D) PV^3

Answer: (C) PV · Key from source paper

Q146 JEE Main 2022 · 29 Jun · Shift 2 Numerical

The Vernier constant of Vernier callipers is $0.1\ \text{mm}$ and it has zero error of $(-0.05\ \text{cm})$. While measuring diameter of a sphere, the main scale reading is $1.7\ \text{cm}$ and coinciding vernier division is 5 . The corrected diameter will be _____ $\times 10^{-2}\ \text{cm}$.

Numerical value type: the answer is a number.

Answer: 180. · Key from source paper

Q147 JEE Main 2022 · 28 Jun · Shift 1 MCQ

Assertion A: Product of Pressure (P) and time (t) has the same dimension as that of coefficient of viscosity.

Reason: Coefficient of viscosity $= \dfrac{\text{Force}}{\text{Velocity gradient}}$

(A) Both A and R true, and R is correct explanation of A.

(B) Both A and R are true but R is NOT the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

Answer: (C) A is true but R is false. · Key from source paper

Q148 JEE Main 2022 · 28 Jun · Shift 2 MCQ

Velocity (v) and acceleration (a) in two systems of units 1 and 2 are related as $v_2 = \frac{n}{m^2}v_1$ and $a_2 = \frac{a_1}{mn}$ respectively. Here m and n are constants. The relations for distance and time in two systems respectively are

(A) $\frac{n^3}{m^3}L_1 = L_2$ and $\frac{n^2}{m}T_1 = T_2$

(B) $L_1 = \frac{n^4}{m^2}L_2$ and $T_1 = \frac{n^2}{m}T_2$

(C) $L_1 = \frac{n^2}{m}L_2$ and $T_1 = \frac{n^4}{m^2}T_2$

(D) $\frac{n^2}{m}L_1 = L_2$ and $\frac{n^4}{m^2}T_1 = T_2$

Answer: (A) $\frac{n^3}{m^3}L_1 = L_2$ **and** $\frac{n^2}{m}T_1 = T_2$ · Key from source paper

Q149 JEE Main 2022 · 28 Jun · Shift 2 Numerical

A student in the laboratory measures thickness of a wire using screw gauge. The readings are $1.22\ \text{mm}, 1.23\ \text{mm}, 1.19\ \text{mm}$ and $1.20\ \text{mm}$. The percentage error is $\frac{x}{121}\%$. The value of x is _____ .

Numerical value type: the answer is a number.

Answer: 150. · Key from source paper

Q150 JEE Main 2022 · 27 Jun · Shift 1 MCQ

A silver wire has a mass $(0.6 \pm 0.006)\text{g}$, radius $(0.5 \pm 0.005)\ \text{mm}$ and length $(4 \pm 0.04)\ \text{cm}$. The maximum percentage error in the measurement of its density will be

(A) 7%
(B) 3%
(C) 4%
(D) 6%

Answer: (C) 4% · Key from source paper

Q151 JEE Main 2022 · 27 Jun · Shift 2 MCQ

The distance of the Sun from earth is 1.5×10^{11} m and its angular diameter is $2000''$ when observed from the earth. The diameter of the Sun will be

(A) 2.45×10^{10} m
(B) 1.45×10^{10} m
(C) 1.45×10^{9} m
(D) 0.14×10^{9} m

Answer: (C) 1.45×10^{9} m · Key from source paper

Q152 JEE Main 2022 · 27 Jun · Shift 2 MCQ

The SI unit of a physical quantity is Pascal - sec. The dimensional formula of this quantity will be

(A) ML^2T^{-1}
(B) $M^{-1}L^3T^0$
(C) $ML^{-1}T^{-1}$
(D) $ML^{-1}T^{-2}$

Answer: (C) $ML^{-1}T^{-1}$ · Key from source paper

Q153 JEE Main 2022 · 27 Jun · Shift 2 MCQ

If L, C and R are the self inductance, capacitance and resistance respectively, which of the following does not have the dimension of time?

(A) $\sqrt{LC}$
(B) $\frac{L}{R}$
(C) CR
(D) $\frac{L}{C}$

Answer: (D) $\frac{L}{C}$ · Key from source paper

Q154 JEE Main 2022 · 26 Jun · Shift 1 MCQ

An expression for a dimensionless quantity P is given by $P = \frac{\alpha}{\beta}\log_e\left(\frac{kT}{\beta x}\right)$; where α and β are constants, x is distance; k is Boltzmann constant and T is the temperature. Then the dimensions of α will be

(A) $[M^0L^{-1}T^0]$
(B) $[ML^0T^{-2}]$
(C) $[MLT^{-2}]$
(D) $[ML^2T^{-2}]$

Answer: (C) $[MLT^{-2}]$ · Key from source paper

Q155 JEE Main 2022 · 26 Jun · Shift 1 Numerical

In a vernier callipers, each cm on the main scale is divided into 20 equal parts. If tenth vernier scale division coincides with nineth main scale division. Then the value of vernier constant will be _____ $\times 10^{-2}$ mm

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q156 JEE Main 2022 · 26 Jun · Shift 2 MCQ

The dimension of mutual inductance is

(A) $ML^2T^{-2}A^{-1}$
(B) $ML^2T^{-2}A^{-2}$
(C) $ML^2T^{-3}A^{-1}$
(D) $ML^2T^{-3}A^{-2}$

Answer: (B) $ML^2T^{-2}A^{-2}$ · Key from source paper

Q157 JEE Main 2022 · 26 Jun · Shift 2 Numerical

A travelling microscope is used to determine the refractive index of a glass slab. If 40 divisions are there in $1\ \text{cm}$ on main scale and 50 Vernier scale divisions are equal to 49 main scale divisions, then least count of the travelling microscope is _____ $\times 10^{-6}\ \text{m}$.

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q158 JEE Main 2022 · 25 Jun · Shift 1 MCQ

If $Z = \frac{A^2B^3}{C^4}$, then the relative error in Z will be

(A) $\frac{2\Delta A}{A} + \frac{3\Delta B}{B} + \frac{4\Delta C}{C}$
(B) $\frac{\Delta A}{A} + \frac{\Delta B}{B} + \frac{\Delta C}{C}$
(C) $\frac{2\Delta A}{A} + \frac{3\Delta B}{B} - \frac{4\Delta C}{C}$
(D) $\frac{\Delta A}{A} + \frac{\Delta B}{B} - \frac{\Delta C}{C}$

Answer: (A) $\frac{2\Delta A}{A} + \frac{3\Delta B}{B} + \frac{4\Delta C}{C}$ · Key from source paper

Q159 JEE Main 2022 · 25 Jun · Shift 2 Numerical

For $z = a^2x^3y^{\frac{1}{2}}$, where 'a' is a constant. If percentage error in measurement of 'x' and 'y' are $4\%$and 12%, respectively, then the percentage error for 'z' will be _____ $\%$.

Numerical value type: the answer is a number.

Answer: 18. · Key from source paper

Q160 JEE Main 2022 · 24 Jun · Shift 1 MCQ

Identify the pair of physical quantities which have different dimensions:

(A) Wave number and Rydberg's constant
(B) Stress and Coefficient of elasticity
(C) Coercivity and Magnetisation
(D) Specific heat capacity and Latent heat

Answer: (D) Specific heat capacity and Latent heat · Key from source paper

Q161 JEE Main 2022 · 24 Jun · Shift 2 MCQ

Identify the pair of physical quantities that have same dimensions:

(A) Velocity gradient and decay constant
(B) Angular frequency and angular momentum
(C) Wave number and Avogadro number
(D) Wein's constant and Stephan's constant

Answer: (A) Velocity gradient and decay constant · Key from source paper

Q162 JEE Main 2021 · 1 Sep · Shift 2 MCQ

A student determined Young's Modulus of elasticity using the formula $Y = \frac{MgL^3}{4bd^3\delta}$. The value of g is taken to be 9.8 m s^{-2} without any significant error, his observations are as following.
Physical Quantity | Least count of the Equipment used for measurement | Observed Value
Mass (M) | 1 g | 2 kg
Length of bar (L) | 1 mm | 1 m
Breadth of bar (b) | 0.1 mm | 4 cm
Thickness of bar (d) | 0.01 mm | 0.4 cm
Depression (δ) | 0.01 mm | 5 mm
Then the fractional error in the measurement of Y is :

(A) 0.155
(B) 0.0083
(C) 0.083
(D) 0.0155

Answer: (D) 0.0155 · Key from source paper

Q163 JEE Main 2021 · 1 Sep · Shift 2 MCQ

Two resistors $R_1 = (4 \pm 0.8)\ \Omega$ and $R_2 = (4 \pm 0.4)\ \Omega$ are connected in parallel. The equivalent resistance of their parallel combination will be :

(A) $(4 \pm 0.4)\ \Omega$
(B) $(2 \pm 0.4)\ \Omega$
(C) $(4 \pm 0.3)\ \Omega$
(D) $(2 \pm 0.3)\ \Omega$

Answer: (D) $(2 \pm 0.3)\ \Omega$ · Key from source paper

Q164 JEE Main 2021 · 31 Aug · Shift 1 MCQ

Which of the following equations is dimensionally incorrect?
Where t =time, h =height, s =surface tension, θ =angle, ρ =density , a, r =radius, g = the acceleration due to gravity, V =volume, p =pressure, W =work done, τ =torque, ϵ =permittivity, E =electric field, J =current density, L =length.

(A) $W = \tau\theta$
(B) $V = \frac{\pi p a^4}{8\eta L}$
(C) $h = \frac{2s\cos\theta}{\rho r g}$
(D) $J = \epsilon\frac{\partial E}{\partial t}$

Answer: (B) $V = \frac{\pi p a^4}{8\eta L}$ · Key from source paper

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Q165 JEE Main 2021 · 31 Aug · Shift 1 MCQ

Match List - I with List - II.
List - I
a Torque
b Impulse
c Tension
d Surface Tension
List - II
i MLT^{-1}
ii MT^{-2}
iii $\mathrm{ML}^2\ \mathrm{T}^{-2}$

iv MLT^{-2}

Choose the most appropriate answer from the option given below :

(A) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

(B) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

(C) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

(D) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

Answer: (B) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii) · Key from source paper

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Q166 JEE Main 2021 · 31 Aug · Shift 2 MCQ

If velocity V time T and force F are chosen as the base quantities, the dimensions of the mass will be :

(A) FVT^{-1}

(B) $FT^{-1}V^{-1}$

(C) $FT^2\ V$

(D) FTV^{-1}

Answer: (D) FTV^{-1} · Key from source paper

Q167 JEE Main 2021 · 31 Aug · Shift 2 Numerical

The diameter of a spherical bob is measured using a vernier callipers. 9 divisions of the main scale, in the vernier callipers, are equal to 10 divisions of vernier scale. One main scale division is 1 mm. The main scale reading is 10 mm and 8th division of vernier scale was found to coincide exactly with one of the main scale division. If the given vernier callipers has positive zero error of 0.04 cm, then the radius of the bob is _____ $\times 10^{-2}$ cm.

Numerical value type: the answer is a number.

Answer: 52. · Key from source paper

Q168 JEE Main 2021 · 27 Aug · Shift 1 MCQ

If E and H represents the intensity of electric field and magnetizing field respectively, then the unit of $\frac{E}{H}$ will be:

(A) joule

(B) ohm

(C) newton

(D) mho

Answer: (B) ohm · Key from source paper

Q169 JEE Main 2021 · 27 Aug · Shift 1 MCQ

Which of the following is not a dimensionless quantity?

(A) Power factor
(B) Quality factor
(C) Permeability of free space (μ_0)
(D) Relative magnetic permeability (μ_r)

Answer: (C) Permeability of free space (μ_0) · Key from source paper

Q170 JEE Main 2021 · 27 Aug · Shift 1 MCQ

A huge circular arc of length 4.4 ly subtends an angle 4s at the centre of the circle. How long it would take for a body to complete 4 revolution if its speed is 8 AU per second?
Given : 1 ly $= 9.46 \times 10^{15}$ m
1 AU $= 1.5 \times 10^{11}$ m

(A) 3.5×10^{6} s
(B) 4.5×10^{10} s
(C) 4.1×10^{8} s
(D) 7.2×10^{8} s

Answer: (B) 4.5×10^{10} **s** · Key from source paper

Q171 JEE Main 2021 · 27 Aug · Shift 2 MCQ

Match List-(I) with List-(II).
List-(I)
a $\mathrm{R_H}$ (Rydberg constant)
b h (Planck's constant)
c μ_B (Magnetic field energy density)
d η (coefficient of viscosity)
List-(II)
i $\mathrm{kg\ m^{-1}\ s^{-1}}$
ii $\mathrm{kg\ m^{2}\ s^{-1}}$
iii $\mathrm{m^{-1}}$
iv $\mathrm{kg\ m^{-1}\ s^{-2}}$
Choose the most appropriate answer from the options given below:

(A) (a) – (iv), (b) – (ii), (c) – (i), (d) – (iii)
(B) (a) – (ii), (b) – (iii), (c) – (iv), (d) – (i)
(C) (a) – (iii), (b) – (ii), (c) – (iv), (d) – (i)
(D) (a) – (iii), (b) – (ii), (c) – (i), (d) – (iv)

Answer: (C) (a) – (iii), (b) – (ii), (c) – (iv), (d) – (i) · Key from source paper

EdLoop JEE

Q172 JEE Main 2021 · 27 Aug · Shift 2 MCQ

If force (F), length (L) and time (T) are taken as the fundamental quantities. Then what will be the dimension of density:

(A) $[\mathrm{FL}^{-4}\,\mathrm{T}^{2}]$
(B) $[\mathrm{FL}^{-3}\,\mathrm{T}^{3}]$
(C) $[\mathrm{FL}^{-3}\,\mathrm{T}^{2}]$
(D) $[\mathrm{FL}^{-5}\,\mathrm{T}^{2}]$

Answer: (A) $[\mathrm{FL}^{-4}\,\mathrm{T}^{2}]$ · Key from source paper

Q173 JEE Main 2021 · 26 Aug · Shift 1 MCQ

If E, L, M and G denote the quantities as energy, angular momentum, mass and constant of gravitation respectively, then the dimensions of P in the formula $P = EL^2M^{-5}G^{-2}$ are:

(A) $[\mathrm{M}^{1}\mathrm{L}^{1}\mathrm{T}^{-2}]$
(B) $[\mathrm{M}^{0}\mathrm{L}^{1}\mathrm{T}^{0}]$
(C) $[\mathrm{M}^{-1}\mathrm{L}^{-1}\mathrm{T}^{2}]$
(D) $[\mathrm{M}^{0}\mathrm{L}^{0}\mathrm{T}^{0}]$

Answer: (D) $[\mathrm{M}^{0}\mathrm{L}^{0}\mathrm{T}^{0}]$ · Key from source paper

Q174 JEE Main 2021 · 26 Aug · Shift 1 MCQ

In a Screw Gauge, fifth division of the circular scale coincides with the reference line when the ratchet is closed. There are 50 divisions on the circular scale, and the main scale moves by $0.5\ \mathrm{mm}$ on a complete rotation. For a particular observation the reading on the main scale is $5\ \mathrm{mm}$ and the 20th division of the circular scale coincides with reference line. Calculate the true reading.

(A) $5.20\ \mathrm{mm}$
(B) $5.00\ \mathrm{mm}$
(C) $5.15\ \mathrm{mm}$
(D) $5.25\ \mathrm{mm}$

Answer: (C) $5.15\ \mathrm{mm}$ · Key from source paper

Q175 JEE Main 2021 · 26 Aug · Shift 2 MCQ

Match List - I with List - II :
List - I
a Magnetic induction
b Magnetic flux
c Magnetic permeability
d Magnetization
List - II

i $\mathrm{ML^2\,T^{-2}\,A^{-1}}$
ii $\mathrm{M^0\,L^{-1}\,A}$
iii $\mathrm{MT^{-2}\,A^{-1}}$
iv $\mathrm{MLT^{-2}\,A^{-2}}$
Choose the most appropriate answer from the options given below :

(A) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i)
(B) (a) - (iii), (b) - (i), (c) - (iv), (d) - (ii)
(C) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)
(D) (a) - (ii), (b) - (i), (c) - (iv), (d) - (iii)

Answer: (B) (a) - (iii), (b) - (i), (c) - (iv), (d) - (ii) · Key from source paper

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Q176 JEE Main 2021 · 26 Aug · Shift 2 Numerical

The acceleration due to gravity is found up to an accuracy of 4% on a planet. The energy supplied to a simple pendulum of known mass m to undertake oscillations of time period T is being estimated. If time period is measured to an accuracy of 3%, the accuracy to which E is known as _____$\%$

Numerical value type: the answer is a number.

Answer: 14. · Key from source paper

Q177 JEE Main 2021 · 27 Jul · Shift 1 MCQ

Assertion A : If in five complete rotations of the circular scale, the distance travelled on the main scale of the screw gauge is $5\ \mathrm{mm}$ and there are 50 total divisions on a circular scale, then the least count is $0.001\ \mathrm{cm}$.
Reason R :
$\mathrm{Least\ Count} = \frac{\mathrm{Pitch}}{\mathrm{Total\ divisions\ on\ circular\ scale}}$
In the light of the above statements, choose the most appropriate answer from the options given below.

(A) A is not correct but R is correct.
(B) Both A and R are correct and R is the correct explanation of A.
(C) A is correct but R is not correct.
(D) Both A and R are correct and R is NOT the correct explanation of A.

Answer: (A) A is not correct but R is correct. · Key from source paper

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Q178 JEE Main 2021 · 27 Jul · Shift 2 MCQ

A physical quantity y is represented by the formula $y = m^2 r^{-4} g^x l^{-\frac{3}{2}}$ If the percentage errors found in y, m, r, l and g are 18, 1, 0.5, 4 and p respectively, then find the value of x and p.

(A) 5 and ± 2

(B) 4 and ± 3

(C) $\frac{16}{3}$ and $\pm\frac{3}{2}$

(D) 8 and ± 2

Answer: (C) $\frac{16}{3}$ and $\pm\frac{3}{2}$ · Key from source paper

Q179 JEE Main 2021 · 27 Jul · Shift 2 MCQ

Match List I with List II.

List-I: a Capacitance, C; b Permittivity of free space, ε_0; c Permeability of free space, μ_0; d Electric field, E

List-II: i $M^1L^1T^{-3}A^{-1}$; ii $M^{-1}L^{-3}T^4A^2$; iii $M^{-1}L^{-2}T^4A^2$; iv $M^1L^1T^{-2}A^{-2}$

Choose the correct answer from the options given below

(A) (a) $\rightarrow$ (iii), (b) $\rightarrow$ (ii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (i)

(B) (a) $\rightarrow$ (iii), (b) $\rightarrow$ (iv), (c) $\rightarrow$ (ii), (d) $\rightarrow$ (i)

(C) (a) $\rightarrow$ (iv), (b) $\rightarrow$ (ii), (c) $\rightarrow$ (iii), (d) $\rightarrow$ (i)

(D) (a) $\rightarrow$ (iv), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (ii), (d) $\rightarrow$ (i)

Answer: (A) (a) $\rightarrow$ (iii), (b) $\rightarrow$ (ii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (i) · Key from source paper

Q180 JEE Main 2021 · 25 Jul · Shift 1 Numerical

Student A and student B used two screw gauges of equal pitch and 100 equal circular divisions to measure the radius of a given wire. The actual value of the radius of the wire is 0.322 cm. The absolute value of the difference between the final circular scale readings observed by the students A and B is _____.

[Figure shows position of reference O when jaws of screw gauge are closed]

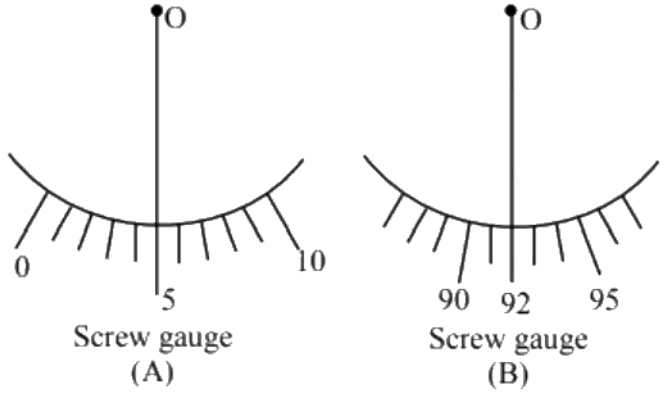
Given pitch $= 0.1$ cm.

(see the figure above)

Q30. Student A and student B used two screw gauges of equal pitch and 100 equal circular divisions to measure the radius of a given wire. The actual value of the radius of the wire is 0.322 cm. The absolute value of the difference between the final circular scale readings observed by the students A and B is _____.

[Figure shows position of reference O when jaws of screw gauge are closed]

Given pitch $= 0.1$ cm.



Numerical value type: the answer is a number.

Answer: 13. · Key from source paper

Q181 JEE Main 2021 · 25 Jul · Shift 2 MCQ

The force is given in terms of time t and displacement x by the equation $F = A\cos Bx + C\sin Dt$
The dimensional formula of $\frac{AD}{B}$ is:

(A) $\left[\mathrm{M^0\ L\ T^{-1}}\right]$
(B) $\left[\mathrm{ML^2\ T^{-3}}\right]$
(C) $\left[\mathrm{M^1\ L^1\ T^{-2}}\right]$
(D) $\left[\mathrm{M^2\ L^2\ T^{-3}}\right]$

Answer: (B) $\left[\mathrm{ML^2\ T^{-3}}\right]$ · Key from source paper

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Q182 JEE Main 2021 · 22 Jul · Shift 1 Numerical

Three students S_1, S_2 and S_3 perform an experiment for determining the acceleration due to gravity (g) using a simple pendulum. They use different lengths of pendulum and record time for different number of oscillations. The observations are as shown in the table.
Student No. | Length of pendulum (cm) | Number of oscillations (n) | Total time for n oscillations (s) | Time period (s)

1. | 64.0 | 8 | 128.0 | 16.0
2. | 64.0 | 4 | 64.0 | 16.0
3. | 20.0 | 4 | 36.0 | 9.0

(Least count of length $= 0.1\ \mathrm{m}$, least count for time $= 0.1\ \mathrm{s}$)
If E_1, E_2 and E_3 are the percentage errors in g for students 1, 2 and 3, respectively, then the minimum percentage error is obtained by student no _____ .

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q183 JEE Main 2021 · 20 Jul · Shift 1 MCQ

The entropy of any system is given by,
$S = \alpha^2\beta\ln\left[\frac{\mu kR}{J\beta^2} + 3\right]$
where α and β are the constants. μ, J, k and R are number of moles, mechanical equivalent of heat, Boltzmann's constant and gas constant, respectively.
$\left[\text{Take } S = \frac{dQ}{T}\right]$
Choose the incorrect option from the following:

(A) α and J have the same dimensions.
(B) S, β, k and μR have the same dimensions.
(C) S and α have different dimensions.
(D) α and k have the same dimensions.

Answer: (D) α and k have the same dimensions. · Key from source paper

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Q184 JEE Main 2021 · 20 Jul · Shift 2 MCQ

If time (t), velocity (v), and angular momentum (l) are taken as the fundamental units. Then the dimension of mass (m) in terms of t, v and l is:

(A) $\left[t^{-1}v^{1}l^{-2}\right]$
(B) $\left[t^{1}v^{2}l^{-1}\right]$
(C) $\left[t^{-2}v^{-1}l^{1}\right]$
(D) $\left[t^{-1}v^{-2}l^{1}\right]$

Answer: (D) $\left[t^{-1}v^{-2}l^{1}\right]$ · Key from source paper

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Q185 JEE Main 2021 · 18 Mar · Shift 1 MCQ

The time period of a simple pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$. The measured value of the length of the pendulum is $10\ \text{cm}$ known to a $1\ \text{mm}$ accuracy. The time for 200 oscillations of the pendulum is found to be 100 second using a clock of 1s resolution. The percentage accuracy in the determination of g using this pendulum is x. The value of x to the nearest integer is:-

(A) 2%
(B) 3%
(C) 5%
(D) 4%

Answer: (B) 3% · Key from source paper

Q186 JEE Main 2021 · 18 Mar · Shift 1 MCQ

In the experiment of Ohm's law, a potential difference of $5.0\ \text{V}$ is applied across the end of a conductor of length $10.0\ \text{cm}$ and diameter of $5.00\ \text{mm}$. The measured current in the conductor is $2.00\ \text{A}$. The maximum permissible percentage error in the resistivity of the conductor is :-

(A) 3.9
(B) 8.4
(C) 7.5
(D) 3.0

Answer: (A) 3.9 · Key from source paper

Q187 JEE Main 2021 · 18 Mar · Shift 2 Numerical

The radius of a sphere is measured to be (7.50 ± 0.85) cm. Suppose the percentage error in its volume is x. The value of x, to the nearest x, is _____ .

Numerical value type: the answer is a number.

Answer: 34. · Key from source paper

Q188 JEE Main 2021 · 17 Mar · Shift 1 MCQ

The vernier scale used for measurement has a positive zero error of $0.2\ \mathrm{mm}$. If while taking a measurement it was noted that 0 on the vernier scale lies between $8.5\ \mathrm{cm}$ and $8.6\ \mathrm{cm}$. Vernier coincidence is 6, then the correct value of measurement is cm.
(least count$= 0.01\ \mathrm{cm}$)

(A) $8.36\ \mathrm{cm}$
(B) $8.54\ \mathrm{cm}$
(C) $8.58\ \mathrm{cm}$
(D) $8.56\ \mathrm{cm}$

Answer: (B) $8.54\ \mathrm{cm}$ · Key from source paper

Q189 JEE Main 2021 · 17 Mar · Shift 2 Numerical

Suppose you have taken a dilute solution of oleic acid in such a way that its concentration becomes $0.01\ \mathrm{cm}^3$ of oleic acid per cm^3 of the solution. Then you make a thin film of this solution (monomolecular thickness) of area $4\ \mathrm{cm}^2$ by considering 100 spherical drops of radius $\left(\frac{3}{40\pi}\right)^{\frac{1}{3}} \times 10^{-3}\ \mathrm{cm}$. Then the thickness of oleic acid layer will be $x \times 10^{-14}\ \mathrm{m}$. Where x is _____.

Numerical value type: the answer is a number.

Answer: 25. · Key from source paper

Q190 JEE Main 2021 · 16 Mar · Shift 1 MCQ

One main scale division of a vernier callipers is $a\ \mathrm{cm}$ and n^{th} division of the vernier scale coincide with $(n-1)^{\mathrm{th}}$ division of the main scale. The least count of the callipers in mm is :

(A) $\frac{10na}{(n-1)}$
(B) $\frac{10a}{(n-1)}$
(C) $\frac{(n-1)}{10n}$
(D) $\frac{10a}{n}$

Answer: (D) $\frac{10a}{n}$ · Key from source paper

Q191 JEE Main 2021 · 16 Mar · Shift 1 Numerical

The resistance $R = \frac{V}{I}$, where $V = (50 \pm 2)\mathrm{V}$ and $I = (20 \pm 0.2)\mathrm{A}$. The percentage error in R is $x\%$. The value of x to the nearest integer is _____.

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q192 JEE Main 2021 · 16 Mar · Shift 2 MCQ

In order to determine the Young's Modulus of a wire of radius $0.2\ \text{cm}$ (measured using a scale of least count $= 0.001\ \text{cm}$) and length $1\ \text{m}$ (measured using a scale of least count $= 1\ \text{mm}$), a weight of mass $1\ \text{kg}$ (measured using a scale of least count $= 1\ \text{g}$) was hanged to get the elongation of $0.5\ \text{cm}$ (measured using a scale of least count $0.001\ \text{cm}$). What will be the fractional error in the value of Young's Modulus determined by this experiment?

(A) 0.14%
(B) 0.9%
(C) 9%
(D) 1.4%

Answer: (D) 1.4% · Key from source paper

Q193 JEE Main 2021 · 26 Feb · Shift 1 MCQ

In a typical combustion engine the workdone by a gas molecule is given by $W = \alpha^2\beta e^{\frac{-\beta x^2}{kT}}$, where x is the displacement, k is the Boltzmann constant and T is the temperature. If α and β are constants, dimensions of α will be:

(A) $[\text{MLT}^{-2}]$
(B) $[\text{M}^2\text{LT}^{-2}]$
(C) $[\text{MLT}^{-1}]$
(D) $[\text{M}^0\text{LT}^0]$

Answer: (D) $[\text{M}^0\text{LT}^0]$ · Key from source paper

Q194 JEE Main 2021 · 26 Feb · Shift 2 MCQ

If C and V represent capacity and voltage respectively then what are the dimensions of λ where $C/V = \lambda$?

(A) $[\text{M}^{-2}\,\text{L}^{-4}\,\text{I}^3\,\text{T}^7]$
(B) $[\text{M}^{-2}\,\text{L}^{-3}\,\text{I}^2\,\text{T}^6]$
(C) $[\text{M}^{-1}\,\text{L}^{-3}\,\text{I}^{-2}\,\text{T}^{-7}]$
(D) $[\text{M}^{-3}\,\text{L}^{-4}\,\text{I}^3\,\text{T}^7]$

Answer: (A) $[\text{M}^{-2}\,\text{L}^{-4}\,\text{I}^3\,\text{T}^7]$ · Key from source paper

Q195 JEE Main 2021 · 25 Feb · Shift 1 MCQ

Match List - I with List - II :
List - I

(a) h (Planck's constant)
(b) E (kinetic energy)
(c) V (electric potential)
(d) P (linear momentum)
List - II
(i) $[\mathrm{ML T^{-1}}]$
(ii) $[\mathrm{ML^2\ T^{-1}}]$
(iii) $[\mathrm{ML^2\ T^{-2}}]$
(iv) $[\mathrm{ML^2\ I^{-1}\ T^{-3}}]$
Choose the correct answer from the options given below:

(A) (a) $\rightarrow$ (ii), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (i)
(B) (a) $\rightarrow$ (i), (b) $\rightarrow$ (ii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (iii)
(C) (a) $\rightarrow$ (iii), (b) $\rightarrow$ (ii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (i)
(D) (a) $\rightarrow$ (iii), (b) $\rightarrow$ (iv), (c) $\rightarrow$ (ii), (d) $\rightarrow$ (i)

Answer: (A) (a) $\rightarrow$ (ii), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (i) · Key from source paper

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Q196 JEE Main 2021 · 25 Feb · Shift 1 MCQ

The pitch of the screw gauge is $1\ \mathrm{mm}$ and there are 100 divisions on the circular scale. When nothing is put in between the jaws, the zero of the circular scale lies 8 divisions below the reference line. When a wire is placed between the jaws, the first linear scale division is clearly visible while 72nd division on circular scale coincides with the reference line. The radius of the wire is

(A) $1.64\ \mathrm{mm}$
(B) $0.82\ \mathrm{mm}$
(C) $0.90\ \mathrm{mm}$
(D) $1.80\ \mathrm{mm}$

Answer: (B) $0.82\ \mathrm{mm}$ · Key from source paper

Q197 JEE Main 2021 · 25 Feb · Shift 2 MCQ

If e is the electronic charge, c is the speed of light in free space and h is Planck's constant, the quantity $\frac{1}{4\pi\varepsilon_0}\frac{|e|^2}{hc}$ has dimensions of :

(A) $[\mathrm{ML T^0}]$
(B) $[\mathrm{M^0\ L^0\ T^0}]$
(C) $[\mathrm{ML T^{-1}}]$
(D) $[\mathrm{L C^{-1}}]$

Answer: (B) $[\mathrm{M^0\ L^0\ T^0}]$ · Key from source paper

Q198 JEE Main 2021 · 24 Feb · Shift 1 MCQ

The work done by a gas molecule in an isolated system is given by, $W = \alpha\beta^2 e^{-\frac{x^2}{\alpha kT}}$, where x is the displacement, k is the Boltzmann constant and T is the temperature. α and β are constants. Then the dimensions of β will be:

(A) $\mathrm{M^2\ L\ T^2}$
(B) $\mathrm{ML^2\ T^{-2}}$
(C) $\mathrm{MLT^{-2}}$
(D) $\mathrm{M^0\ L\ T^0}$

Answer: (C) $\mathrm{MLT^{-2}}$ · Key from source paper

Q199 JEE Main 2021 · 24 Feb · Shift 2 MCQ

The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{L}{g}}$. Measured value of L is $1.0\ \mathrm{m}$ from meter scale having a minimum division of $1\ \mathrm{mm}$ and time of one complete oscillation is $1.95\ \mathrm{s}$ measured from stopwatch of $0.01\ \mathrm{s}$ resolution. The percentage error in the determination of g will be:

(A) 1.03%
(B) 1.33%
(C) 1.30%
(D) 1.13%

Answer: (D) 1.13% · Key from source paper

Q200 JEE Main 2020 · 6 Sep · Shift 1 MCQ

A screw gauge has 50 divisions on its circular scale. The circular scale is 4 units ahead of the pitch scale marking, prior to use. Upon one complete rotation of the circular scale, a displacement of $0.5\ \mathrm{mm}$ is noticed on the pitch scale. The nature of zero error involved and the lest count of the screw gauge, are respectively:

(A) Negative, $2\mu m$
(B) Positive $10\mu\mathrm{m}$
(C) Positive $0.1\mathrm{mm}$
(D) Positive, $0.1\mu\mathrm{m}$

Answer: (B) Positive $10\mu\mathrm{m}$ · Key from source paper

Q201 JEE Main 2020 · 6 Sep · Shift 1 Numerical

The density of a solid metal sphere is diameter. The maximum error in the density of the sphere is $\left(\frac{x}{100}\right)\%$. If the relative errors in measuring the mass and the diameter are 6.0% and 1.5% respectively, the value of x is $-$

Numerical value type: the answer is a number.

Answer: 1050. · Key from source paper

Q202 JEE Main 2020 · 6 Sep · Shift 2 MCQ

A student measuring the diameter of a pencil of circular cross-section with the help of a vernier scale records the following four readings 5.50 mm, 5.55 mm, 5.34 mm, 5.65 mm. The average of these four reading is 5.5375 mm and the standard deviation of the data is 0.07395 mm. The average diameter of the pencil should therefore be recorded as :

(A) $(5.5375 \pm 0.0739)\ \text{mm}$
(B) $(5.5375 \pm 0.0740)\ \text{mm}$
(C) $(5.538 \pm 0.074)\ \text{mm}$
(D) $(5.54 \pm 0.07)\ \text{mm}$

Answer: (D) $(5.54 \pm 0.07)\ \text{mm}$ · Key from source paper

Q203 JEE Main 2020 · 5 Sep · Shift 1 MCQ

A physical quantity z depends on four observables a, b, c and d, as $z = \frac{a^2 b^{2/3}}{\sqrt{c} d^3}$. The percentage of error in the measurement of a, b, c and d are 2%, 1. 5%, 4% and 2. 5% respectively. The percentage of error in z is :

(A) 25%
(B) 5%
(C) 5%
(D) 5%

Answer: (D)

1. 5%

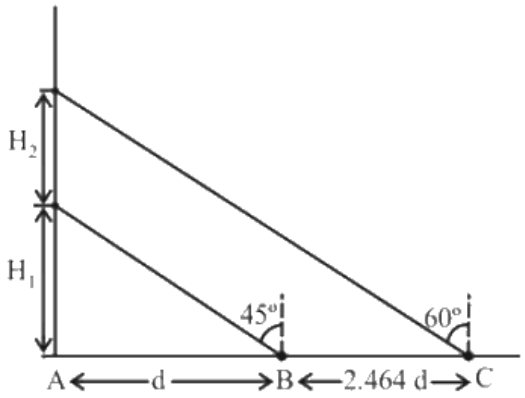
· Key from source paper

Q204 JEE Main 2020 · 5 Sep · Shift 1 MCQ

A balloon is moving up in air vertically above a point A on the ground. When it is a height h_1, a girl standing at a distance d (point B) from A (see figure) sees it at an angle 45° with respect to the vertical. When the balloon climbs up a further height h_2, it is seen at an angle 60° with respect to the vertical if the girl moves further by a distance 2. 464 d (point C). Then the height h_2 is (given tan 30° = 0. 5774):

(see the figure above)

Q2. A balloon is moving up in air vertically above a point A on the ground. When it is a height h_1, a girl standing at a distance d (point B) from A (see figure) sees it at an angle 45° with respect to the vertical. When the balloon climbs up a further height h_2, it is seen at an angle 60° with respect to the vertical if the girl moves further by a distance 2.464 d (point C). Then the height h_2 is (given $\tan 30^\circ = 0.5774$):



(1) $1.464\ d$
(2) $0.732\ d$
(3) $0\ .464\ d$
(4) d

(A) 464 d
(B) 732 d
(C) 0 .464 d
(D) d

Answer: (D) d · Key from source paper

Q205 JEE Main 2020 · 5 Sep · Shift 1 MCQ

Assume that the displacement (s) of air is proportional to the pressure difference (Δp) created by a sound wave. Displacement (s) further depends on the speed of sound (v), density of air(ρ) and the frequency (f). If $\Delta p \sim 10\ Pa, v \sim 300\ m/s, \rho \sim 1\ kg/m^3\ f \sim 1000 Hz$, then s will be of the order of (take the multiplicative constant to be 1)

(A) $\frac{3}{100}$ mm
(B) 10 mm
(C) $\frac{1}{10}$ mm
(D) 1 mm

Answer: (A) $\frac{3}{100}$ mm · Key from source paper

Q206 JEE Main 2020 · 5 Sep · Shift 2 MCQ

The quantities $x = \frac{1}{\sqrt{\mu_0 \epsilon_0}}, y = \frac{E}{B}$ and $z = \frac{l}{CR}$ are defined where C-capacitance, R-Resistance, ℓ-length, E-Electric field, B-magnetic field and $\in 0$, $\mu 0$, -free space permittivity and permeability respectively. Then:

(A) x, y and z have the same dimension.
(B) Only x and z have the same dimension
(C) Only x and y have the same dimension
(D) Only y and z have the same dimension.

Answer: (A) x, y and z have the same dimension. · Key from source paper

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Q207 JEE Main 2020 · 4 Sep · Shift 1 MCQ

Dimensional formula for thermal conductivity is (here K denotes the temperature):

(A) $MLT^{-2}K$
(B) $MLT^{-2}K^{-2}$
(C) $MLT^{-3}K$
(D) $MLT^{-3}K^{-1}$

Answer: (D) $MLT^{-3}K^{-1}$ · Key from source paper

Q208 JEE Main 2020 · 4 Sep · Shift 2 MCQ

A quantity x is given by $\left(IFv^2/WL^4\right)$ in terms of moment of inertia I, force F, velocity v, work W and length L. The dimensional formula for x is same as that of :

(A) planck's constant
(B) force constant
(C) energy density
(D) coefficient of viscosity

Answer: (C) energy density · Key from source paper

Q209 JEE Main 2020 · 3 Sep · Shift 1 MCQ

Using screw gauge of pitch $0.1\ \text{cm}$ and 50 divisions on its circular scale, the thickness of an object is measured. It should correctly be recorded as,

(A) $2.121\ \text{cm}$
(B) $2.124\ \text{cm}$
(C) $2.125\ \text{cm}$
(D) $2.123\ \text{cm}$

Answer: (B) $2.124\ \text{cm}$ · Key from source paper

Q210 JEE Main 2020 · 3 Sep · Shift 2 MCQ

Amount of solar energy received on the earth's surface per unit area per unit time is defined a solar constant. Dimension of solar constant is:

(A) $\mathrm{ML^2T^{-2}}$
(B) $\mathrm{ML^0T^{-3}}$
(C) $\mathrm{M^2L^0T^{-1}}$
(D) $\mathrm{MLT^{-2}}$

Answer: (B) $\mathrm{ML^0T^{-3}}$ · Key from source paper

Q211 JEE Main 2020 · 2 Sep · Shift 1 MCQ

If speed V, area A and force F are chosen as fundamental units, then the dimension of Young's modulus will be :

(A) $\mathrm{FA^2V^{-1}}$
(B) $\mathrm{FA^2V^{-3}}$
(C) $\mathrm{FA^2V^{-2}}$
(D) $\mathrm{FA^{-1}V^0}$

Answer: (D) $\mathrm{FA^{-1}V^0}$ · Key from source paper

Q212 JEE Main 2020 · 2 Sep · Shift 1 MCQ

The least count of the main scale of a vernier calipers is $1\ \mathrm{mm}$. Its vernier scale is divided into 10 divisions and coincide with 9 divisions of the main scale. When jaws are touching each other, the 7th division of the vernier scale coincides with a division of the main scale and the zero of vernier scale is lying right side of the zero of the main scale. When this vernier is used to measure the length of the cylinder the zero of the vernier scale between $3.1\ \mathrm{cm}$ and $3.2\ \mathrm{cm}$ and 4th VSD coincides with the main scale division. The length of the cylinder is (VSD is vernier scale division)

(A) $3.2\ \mathrm{cm}$
(B) $3.21\ \mathrm{cm}$
(C) $3.07\ \mathrm{cm}$
(D) $2.99\ \mathrm{cm}$

Answer: (C) $3.07\ \mathrm{cm}$ · Key from source paper

Q213 JEE Main 2020 · 2 Sep · Shift 2 MCQ

If momentum(P), area (A) and time (T) are taken to be the fundamental quantities then the dimensional formula for energy is :

(A) $[\mathrm{P^2\,AT^{-2}}]$
(B) $[\mathrm{PA^{-1}}\,T^{-1}]$
(C) $[\mathrm{PA^{1/2}\,T^{-1}}]$
(D) $[P^{1/2}\,\mathrm{AT^{-1}}]$

Answer: (C) $[\mathrm{PA^{1/2}\,T^{-1}}]$ · Key from source paper

Q214 JEE Main 2020 · 9 Jan · Shift 1 MCQ

A quantity f is given by $f = \sqrt{\frac{hc^5}{G}}$ where c is speed of light, G univasal (sic) gravitational constant and h is the Planck's constant. Dimension of f is that of:

(A) area
(B) energy
(C) momentum
(D) volume

Answer: (B) energy · Key from source paper

Q215 JEE Main 2020 · 9 Jan · Shift 1 MCQ

If the screw on a screw-gauge is given six rotations, it moves by $3mm$ on the main scale. If there are 50 divisions on the circular scale the least count of the screw gauge is:

(A) 0.001cm
(B) 0.02m
(C) 0.01cm
(D) 0.001mm

Answer: (A) 0.001cm · Key from source paper

Q216 JEE Main 2020 · 9 Jan · Shift 2 MCQ

For the four sets of three measured physical quantities as given below. Which of the following options is correct?
(i) $A_1 = 24.36, B_1 = 0.0724, C_1 = 256.2$
(ii) $A_2 = 24.44, B_2 = 16.082, C_2 = 240.2$
(iii) $A_3 = 25.2, B_3 = 19.2812, C_3 = 236.183$
(iv) $A_4 = 25, B_4 = 236.191, C_4 = 19.5$

(A) $A_4 + B_4 + C_4 < A_1 + B_1 + C_1 < A_3 + B_3 + C_3 < A_2 + B_2 + C_2$
(B) $A_1 + B_1 + C_1 = A_2 + B_2 + C_2 = A_3 + B_3 + C_3 = A_4 + B_4 + C_4$
(C) $A_1 + B_1 + C_1 < A_2 + B_2 + C_2 = A_3 + B_3 + C_3 < A_4 + B_4 + C_4$
(D) $A_1 + B_1 + C_1 < A_3 + B_3 + C_3 < A_2 + B_2 + C_2 < A_4 + B_4 + C_4$

Answer: (C) $A_1 + B_1 + C_1 < A_2 + B_2 + C_2 = A_3 + B_3 + C_3 < A_4 + B_4 + C_4$ · Key from source paper

Q217 JEE Main 2020 · 8 Jan · Shift 1 MCQ

The dimension of stopping potential V_0 in photoelectric effect in units of Planck's constant ' h ', speed of light ' c ' and Gravitational constant ' G ' and ampere A is:

(A) $h^{\frac{1}{3}}G^{\frac{2}{3}}c^{\frac{1}{3}}A^{-1}$
(B) $h^{0}c^{5}G^{-1}A^{-1}$
(C) $h^{-\frac{2}{3}}c^{-\frac{1}{3}}G^{\frac{4}{3}}A^{-1}$
(D) $h^{2}G^{\frac{3}{2}}c^{\frac{1}{3}}A^{-1}$

Answer: (B) $h^{0}c^{5}G^{-1}A^{-1}$ · Key from source paper

Q218 JEE Main 2020 · 8 Jan · Shift 2 MCQ

A simple pendulum is being used to determine the value of gravitational acceleration g at a certain place. The length of the pendulum is $25.0\ \text{cm}$ and a stopwatch with $1\ \text{s}$ resolution measures the time taken for 40 oscillations to be $50\ \text{s}$. The accuracy in g is:

(A) 5.40%
(B) 3.40%
(C) 4.40%
(D) 2.40%

Answer: (C) 4.40% · Key from source paper

Q219 JEE Main 2020 · 7 Jan · Shift 2 MCQ

Given, B is magnetic field induction, and μ_0 is the magnetic permeability of vacuum. The dimension of $\frac{B^2}{2\mu_0}$ is:

(A) MLT^{-2}
(B) $\text{ML}^{2}\text{T}^{-1}$
(C) $\text{ML}^{2}\text{T}^{-2}$
(D) $\text{ML}^{-1}\text{T}^{-2}$

Answer: (D) $\text{ML}^{-1}\text{T}^{-2}$ · Key from source paper

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Q220 JEE Main 2019 · 12 Apr · Shift 1 MCQ

Which of the following combinations has the dimension of electrical resistance (ϵ_0 is the permittivity of vacuum and μ_0 is the permeability of vacuum)?

(A) $\frac{\epsilon_0}{\mu_0}$
(B) $\sqrt{\frac{\epsilon_0}{\mu_0}}$
(C) $\frac{\mu_0}{\epsilon_0}$
(D) $\sqrt{\frac{\mu_0}{\epsilon_0}}$

Answer: (D) $\sqrt{\frac{\mu_0}{\epsilon_0}}$ · Key from source paper

Q221 JEE Main 2019 · 12 Apr · Shift 2 MCQ

The number density of molecules of a gas depends on their distance r from the origin as, $n(r) = n_0 e^{-\alpha r^4}$. Then the numer of molecules is proportional to:

(A) $n_0\alpha^{-3}$
(B) $\sqrt{n_0}\,\alpha^{\frac{1}{2}}$
(C) $n_0\alpha^{\frac{-3}{4}}$
(D) $n_0\alpha^{\frac{1}{4}}$

Answer: (C) $n_0\alpha^{\frac{-3}{4}}$ · Key from source paper

Q222 JEE Main 2019 · 10 Apr · Shift 2 MCQ

In the formula $X = 5YZ^2$, X and Z have dimensions of capacitance and magnetic field, respectively. What are the dimensions of Y in SI units?

(A) $\mathrm{M}^{-1}\,\mathrm{L}^{-2}\,\mathrm{T}^{4}\,\mathrm{A}^{2}$
(B) $\mathrm{M}^{-2}\,\mathrm{L}^{0}\,\mathrm{T}^{-4}\,\mathrm{A}^{-2}$
(C) $\mathrm{M}^{-2}\,\mathrm{L}^{-2}\,\mathrm{T}^{6}\,\mathrm{A}^{3}$
(D) $\mathrm{M}^{-3}\,\mathrm{L}^{-2}\,\mathrm{T}^{8}\,\mathrm{A}^{4}$

Answer: (D) $\mathrm{M}^{-3}\,\mathrm{L}^{-2}\,\mathrm{T}^{8}\,\mathrm{A}^{4}$ · Key from source paper

Q223 JEE Main 2019 · 9 Apr · Shift 1 MCQ

In the density measurement of a cube, the mass and edge length are measured as (10.00 ± 0.10) kg and (0.10 ± 0.01) m, respectively. The error in the measurement of density is:

(A) 0.31
(B) 0.10
(C) 0.07
(D) 0.01

Answer: (A) 0.31 · Key from source paper

Q224 JEE Main 2019 · 9 Apr · Shift 2 MCQ

The area of a square is 5.29 cm^2. The area of 7 such squares taking into account the significant figures is:

(A) 37.03 cm^2
(B) 37.030 cm^2
(C) 37.0 cm^2
(D) 37 cm^2

Options (1) or (3) were accepted. More than one answer was accepted. · Key from source paper

EdLoop JEE

Q225 JEE Main 2019 · 8 Apr · Shift 1 MCQ

In SI units, the dimensions of $\sqrt{\frac{\epsilon_0}{\mu_0}}$ is:

(A) $\mathrm{AT^2M^{-1}L^{-1}}$
(B) $\mathrm{A^2T^3M^{-1}L^{-2}}$
(C) $\mathrm{A^{-1}TML^3}$
(D) $\mathrm{AT^{-3}ML^{3/2}}$

Answer: (B) $\mathrm{A^2T^3M^{-1}L^{-2}}$ · Key from source paper

Q226 JEE Main 2019 · 8 Apr · Shift 2 MCQ

In a simple pendulum experiment for determination of acceleration due to gravity (g), time taken for 20 oscillations is measures by using a watch of 1 second least count. The mean value of time taken comes out to be 30 s. The length of the pendulum is measured by using a meter scale of least count 1 mm and the value obtained is 55.0 cm. The percentage error in the determination of g is close to

(A) 0.2%
(B) 6.8%
(C) 3.5%
(D) 0.7%

Answer: (B) 6.8% · Key from source paper

Q227 JEE Main 2019 · 8 Apr · Shift 2 MCQ

If Surface tension (S), Moment of Inertia (I) and Planck's constant (h), were to be taken as the fundamental units, the dimensional formula for linear momentum would be:

(A) $\mathrm{S^{1/2}I^{1/2}h^0}$
(B) $\mathrm{S^{1/2}I^{3/2}h^{-1}}$
(C) $\mathrm{S^{3/2}I^{1/2}h^0}$
(D) $\mathrm{S^{1/2}I^{1/2}h^{-1}}$

Answer: (A) $\mathrm{S^{1/2}I^{1/2}h^0}$ · Key from source paper

Q228 JEE Main 2019 · 12 Jan · Shift 1 MCQ

The least count of the main scale of a screw gauge is 1 mm. The minimum number of divisions on its circular scale required to measure 5 μm diameter of a wire is:

(A) 50
(B) 100
(C) 500
(D) 200

Answer: (D) 200 · Key from source paper

Q229 JEE Main 2019 · 12 Jan · Shift 2 MCQ

Let L, R, C and V represent inductance, resistance, capacitance and voltage, respectively. The dimension of $\frac{L}{RCV}$ in SI units will be:

(A) $[LTA]$
(B) $[A^{-1}]$
(C) $[LT^2]$
(D) $[LA^{-2}]$

Answer: (B) $[A^{-1}]$ · Key from source paper

Q230 JEE Main 2019 · 11 Jan · Shift 1 MCQ

The force of interaction between two atoms is given by $F = \alpha\beta \exp\left(-\frac{x^2}{\alpha kT}\right)$; where x is the distance, k is the Boltzmann constant and T is temperature and α and β are two constants. The dimensions of β is:

(A) $M^0\ L^2\ T^{-4}$
(B) M^2LT^{-4}
(C) MLT^{-2}
(D) $M^2\ L^2\ T^{-2}$

Answer: (B) M^2LT^{-4} · Key from source paper

Q231 JEE Main 2019 · 11 Jan · Shift 2 MCQ

If speed (V), acceleration (A) and force (F) are considered as fundamental units, the dimension of Young's modulus will be :

(A) $V^{-2}\ A^2\ F^{-2}$
(B) $V^{-2}\ A^2\ F^2$
(C) $V^{-4}\ A^{-2}\ F$
(D) $V^{-4}\ A^2\ F$

Answer: (D) $V^{-4}\ A^2\ F$ · Key from source paper

Q232 JEE Main 2019 · 10 Jan · Shift 1 MCQ

The density of a material in SI units is $128\ kg\ m^{-3}$. In certain units in which the unit of length is $25\ cm$ and the unit of mass is $50g$, the numerical value of density of the material is:

(A) 410
(B) 16
(C) 40
(D) 640

Answer: (C) 40 · Key from source paper

Q233 JEE Main 2019 · 10 Jan · Shift 2 MCQ

The diameter and height of a cylinder are measured by a meter scale to be $12.6 \pm 0.1\ cm$ and $34.2 \pm 0.1\ cm$, respectively. What will be the value of its volume in appropriate significant figures?

(A) $4264 \pm 81 cm^3$
(B) $4264.4 \pm 81.0\ cm^3$
(C) $4260 \pm 80\ cm^3$
(D) $4300 \pm 80\ cm^3$

Answer: (C) $4260 \pm 80\ cm^3$ · Key from source paper

Q234 JEE Main 2019 · 9 Jan · Shift 2 MCQ

Expression for time in terms of G (universal gravitational constant), h (Planck constant) and c (speed of light) is proportional to:

(A) $\sqrt{\frac{Gh}{c^3}}$
(B) $\sqrt{\frac{hc^5}{G}}$
(C) $\sqrt{\frac{Gh}{c^5}}$
(D) $\sqrt{\frac{c^3}{Gh}}$

Answer: (C) $\sqrt{\frac{Gh}{c^5}}$ · Key from source paper

Q235 JEE Main 2019 · 9 Jan · Shift 2 MCQ

The pitch and the number of divisions, on the circular scale, for a given screw gauge are $0.5\ \text{mm}$ and 100 respectively. When the screw gauge is fully tightened without any object, the zero of its circular scale lies 3 divisions below the mean line.
The readings of the main scale and the circular scale, for a thin sheet, are $5.5\ \text{mm}$ and 48 respectively, the thickness of this sheet is:

(A) $5.755\ mm$
(B) $5.740\ mm$
(C) $5.725\ mm$
(D) $5.950\ mm$

Answer: (C) $5.725\ mm$ · Key from source paper

Q236 JEE Main 2018 · 16 Apr · Online MCQ

The percentage errors in quantities P, Q, R and S are 0.5%, 1%, 3% and 1.5% respectively in the measurement of a physical quantity $A = \frac{P^3Q^2}{\sqrt{R}\,S}$. The maximum percentage error in the value of A will be:

(A) $6.5\ \%$
(B) $7.5\ \%$
(C) $6.0\ \%$
(D) $8.5\ \%$

Answer: (A) $6.5\ \%$ · Key from source paper

Q237 JEE Main 2018 · 15 Apr · Shift 1 MCQ

The relative error in the determination of the surface area of a sphere is α. Then the relative error in the determination of its volume is

(A) $\frac{2}{3}\alpha$
(B) $\frac{2}{3}\alpha$
(C) $\frac{3}{2}\alpha$
(D) α

Answer: (C) $\frac{3}{2}\alpha$ · Key from source paper

Q238 JEE Main 2018 · 15 Apr · Shift 1 MCQ

In a screw gauge, 5 complete rotations of the screw cause it to move a linear distance of $0.25\ \text{cm}$. There are 100 circular scale divisions. The thickness of a wire measured by this screw gauge gives a reading of 4 main scale divisions and 30 circular scale divisions. Assuming negligible zero error, the thickness of the wire is:

(A) $0.0430\ \text{cm}$
(B) $0.3150\ \text{cm}$
(C) $0.4300\ \text{cm}$
(D) $0.2150\ \text{cm}$

Answer: (D) $0.2150\ \text{cm}$ · Key from source paper

Q239 JEE Main 2018 · 15 Apr · Shift 2 MCQ

The characteristic distance at which quantum gravitational effects are significant, the Planck length, can be determined from a suitable combination of the fundamental physical constants G, h and c. Which of the following correctly gives the Planck length?

(A) $\mathrm{G}^2\mathrm{hc}$

(B) $\left(\frac{\mathrm{Gh}}{\mathrm{c}^3}\right)^{\frac{1}{2}}$

(C) $\mathrm{G}^{\frac{1}{2}}\mathrm{h}^2\mathrm{c}$

(D) \mathrm{G}\left(\mathrm{h^2c^3}

Answer: (B) $\left(\frac{\mathrm{Gh}}{\mathrm{c}^3}\right)^{\frac{1}{2}}$ · Key from source paper

Q240 JEE Main 2018 · 8 Apr · Offline MCQ

The density of a material, in the shape of a cube, is determined by measuring three sides of the cube and its mass. If the relative errors in measuring the mass and length are 1.5% and 1%, respectively, the maximum error in determining the density is:

(A) $6\ \%$

(B) $2.5\ \%$

(C) $3.5\ \%$

(D) $4.5\ \%$

Answer: (D) $4.5\ \%$ · Key from source paper

Q241 JEE Main 2017 · 9 Apr · Online MCQ

A physical quantity P is described by the relation $P = a^{\frac{1}{2}}b^2c^3d^{-4}$. If the relative errors in the measurement of a, b, c and d respectively, are 2%, 1%, 3% and 5%. Then the relative error in P will be:

(A) 12%

(B) 8%

(C) 25%

(D) 32%

Answer: (D) 32% · Key from source paper

Q242 JEE Main 2017 · 8 Apr · Online MCQ

Time (T), velocity (C) and angular momentum (h) are chosen as fundamental quantities instead of mass, length and time. In terms of these, the dimensions of mass would be:

(A) $[\mathrm{M}] = [\mathrm{T}^{-1}\mathrm{C}^{-2}\mathrm{h}]$
(B) $[\mathrm{M}] = [\mathrm{T}^{-1}\mathrm{C}^{2}\mathrm{h}]$
(C) $[\mathrm{M}] = [\mathrm{T}^{-1}\mathrm{C}^{-2}\mathrm{h}^{-1}]$
(D) $[\mathrm{M}] = [\mathrm{TC}^{-2}\mathrm{h}]$

Answer: (A) $[\mathrm{M}] = [\mathrm{T}^{-1}\mathrm{C}^{-2}\mathrm{h}]$ · Key from source paper

Q243 JEE Main 2017 · 2 Apr · Offline MCQ

The following observations were taken for determining surface tension T of water by capillary method:
diameter of capillary, $D = 1.25 \times 10^{-2}\ \mathrm{m}$
rise of water, $h = 1.45 \times 10^{-2}\ \mathrm{m}$
Using $g = 9.80\ \mathrm{m\,s^{-2}}$ and the simplified relation $T = \frac{rhg}{2} \times 10^{3}\ \mathrm{N\,m^{-1}}$ the possible error in surface tension is closest to:

(A) 10%
(B) 0.15%
(C) 1.5%
(D) 2.4%

Answer: (C) 1.5% · Key from source paper

Q244 JEE Main 2016 · 10 Apr · Online MCQ

A thin $1\ \mathrm{m}$ long rod has a radius of $5\ \mathrm{mm}$. A force of $50\pi \times 10^{3}\ \mathrm{N}$ is applied at one end to determine its Young's modulus. Assume that the force is exactly known. If the least count in the measurement of all lengths is $0.01\ \mathrm{mm}$, which of the following statements is false?

(A) The maximum value of Y that can be determined is $2 \times 10^{14}\ \mathrm{N\,m^{-2}}$.
(B) $\frac{\Delta Y}{Y}$ gets minimum contribution from the uncertainty in the length.
(C) $\frac{\Delta Y}{Y}$ gets its maximum contribution from the uncertainty in strain.
(D) The figure of merit is the largest for the length of the rod.

Answer: (A) The maximum value of Y that can be determined is $2 \times 10^{14}\ \mathrm{N\,m^{-2}}$. · Key from source paper

Q245 JEE Main 2016 · 10 Apr · Online MCQ

A, B, C, and D are four different physical quantities having different dimensions. None of them is dimensionless. But we know that the equation $AD = C\ln(BD)$ holds true. Then which of the combination is not a meaningful quantity?

(A) $\frac{C}{BD} - \frac{A^2D^2}{C}$
(B) $A^2 - B^2C^2$
(C) $\frac{A}{B} - C$
(D) $\frac{A^2 - AC}{D}$

Answer: (D) $\frac{A^2 - AC}{D}$ · Key from source paper

Q246 JEE Main 2016 · 9 Apr · Online MCQ

In the following I refers to current and other symbols have their usual meaning. Choose the option that corresponds to the dimensions of electrical conductivity:

(A) $\mathrm{M^{-1}L^{-3}T^{3}I}$
(B) $\mathrm{M^{-1}L^{-3}T^{3}I^{2}}$
(C) $\mathrm{M^{-1}L^{3}T^{3}I}$
(D) $\mathrm{ML^{-3}T^{-3}I^{2}}$

Answer: (B) $\mathrm{M^{-1}L^{-3}T^{3}I^{2}}$ · Key from source paper

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Q247 JEE Main 2016 · 3 Apr · Offline MCQ

A student measures the time period of 100 oscillations of a simple pendulum four times. The data set is 90 s, 91 s, 95 s and 92 s. If the minimum division in the measuring clock is 1 s, then the reported mean time should be:

(A) 92 ± 1.8 s
(B) 92 ± 3 s
(C) 92 ± 2 s
(D) 92 ± 5.0 s

Answer: (C) 92 ± 2 s · Key from source paper

Q248 JEE Main 2016 · 3 Apr · Offline MCQ

A screw gauge with a pitch of 0.5 mm and a circular scale with 50 divisions is used to measure the thickness of a thin sheet of aluminium. Before starting the measurement, it is found that when the two jaws of the screw gauge are brought in contact, the 45th division coincides with the main scale line and that the zero of the main scale is barely visible. What is the thickness of the sheet if the main scale reading is 0.5 mm and the 25th division coincides with the main scale line?

(A) 0.70 mm
(B) 0.50 mm
(C) 0.75 mm
(D) 0.80 mm

Answer: (D) 0.80 mm · Key from source paper

Q249 JEE Main 2015 · 11 Apr · Online MCQ

A beaker contains a fluid of density $\rho\ \frac{\text{kg}}{\text{m}^3}$, specific heat $S\ \frac{\text{J}}{\text{kg}^\circ\text{C}}$ and viscosity η. The beaker is filled up to height h. To estimate the rate of heat transfer per unit area $\left(\frac{\dot{Q}}{A}\right)$ by convection when beaker is put on a hot plate, a student proposes that it should depend on η, $\left(\frac{S\Delta\theta}{h}\right)$ and $\left(\frac{1}{\rho g}\right)$ when $\Delta\theta$ (in°C) is the difference in the temperature between the bottom and top of the fluid. In that situation the correct option for $\left(\frac{\dot{Q}}{A}\right)$ is:

(A) $\left(\frac{S\Delta\theta}{h}\right)\eta$
(B) $\eta\left(\frac{S\Delta\theta}{h}\right)\left(\frac{1}{\rho g}\right)$
(C) $\left(\frac{S\Delta\theta}{\eta h}\right)\left(\frac{1}{\rho g}\right)$
(D) $\frac{S\Delta\theta}{\eta h}$

Answer: (A) $\left(\frac{S\Delta\theta}{h}\right)\eta$ · Key from source paper

Q250 JEE Main 2015 · 11 Apr · Online MCQ

If electronic charge e, electron mass m, speed of light in vacuum c and Planck's constant h are taken as fundamental quantities, the permeability of vacuum μ_0 can be expressed in units of:

(A) $\left(\frac{mc^2}{he^2}\right)$
(B) $\left(\frac{h}{me^2}\right)$
(C) $\left(\frac{hc}{me^2}\right)$
(D) $\left(\frac{h}{ce^2}\right)$

Answer: (D) $\left(\frac{h}{ce^2}\right)$ · Key from source paper

Q251 JEE Main 2015 · 10 Apr · Online MCQ

If the capacitance of a nanocapacitor is measured in terms of a unit u, made by combining the electronic charge e, Bohr radius a_0, Planck's constant h and speed of light c then

(A) $u = \frac{e^2a_0}{hc}$
(B) $u = \frac{hc}{e^2a_0}$
(C) $u = \frac{e^2c}{ha_0}$
(D) $u = \frac{e^2h}{ca_0}$

Answer: (A) $u = \frac{e^2a_0}{hc}$ · Key from source paper

Q252 JEE Main 2015 · 10 Apr · Online MCQ

Diameter of a steel ball is measured using a Vernier calipers which has divisions of 0.1 cm on its main scale (MS) and 10 divisions of its Vernier scale (VS) match 9 divisions on the main scale. Three such measurements for a ball are given as:
S.No. MS (cm) VS divisions

1. 0.5 8
2. 0.5 4
3. 0.5 6

If the zero error is - 0.03 cm, then mean corrected diameter is:

(A) 0.53 cm
(B) 0.56 cm
(C) 0.59 cm
(D) 0.52 cm

Answer: (C) 0.59 cm · Key from source paper

Q253 JEE Main 2015 · 4 Apr · Offline MCQ

The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{l}{g}}$. Measured value of l is $20.0\ \text{cm}$, known to $1\ \text{mm}$ accuracy and time for 100 oscillations of the pendulum is found to be $90\ \text{s}$ using a wristwatch of $1\ \text{s}$ resolution. The accuracy in the determination of g is

(A) 5%
(B) 4%
(C) 3%
(D) 1%

Answer: (C) 3% · Key from source paper

Q254 JEE Main 2014 · 19 Apr · Online MCQ

Match List-I (Event) with List-II (Order of the time interval for the happening of the event) and select the correct option from the options given below the lists.
List-I
(a) The rotation period of earth
(b) Revolution period of earth
(c) Period of a light wave
(d) Period of a sound wave
List-II
(i) $10^5\ \text{s}$
(ii) $10^7\ \text{s}$
(iii) $10^{-15}\ \text{s}$
(iv) $10^{-3}\ \text{s}$

(A) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
(B) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)
(C) (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)
(D) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

Answer: (A) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv) · Key from source paper

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Q255 JEE Main 2014 · 12 Apr · Online MCQ

From the following combinations of physical constants (expressed through their usual symbols) the only combination, that would have the same value in different systems of units, is:

(A) $\frac{ch}{2\pi\varepsilon_o^2}$
(B) $\frac{e^2}{2\pi\varepsilon_o G m_e^2}$
(C) $\frac{\mu_o\varepsilon_o}{c^2}\frac{G}{he^2}$
(D) $\frac{2\pi\sqrt{\mu_o\varepsilon_o}}{ce^2}\frac{h}{G}$

Answer: (B) $\frac{e^2}{2\pi\varepsilon_o G m_e^2}$ · Key from source paper

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Q256 JEE Main 2014 · 11 Apr · Online MCQ

In terms of resistance R and time T, the dimensions of ratio $\frac{\mu}{\varepsilon}$ of the permeability μ and permittivity ε is:

(A) $[\mathrm{RT}^{-2}]$
(B) $[\mathrm{R}^2\,\mathrm{T}^{-1}]$
(C) $[\mathrm{R}^2]$
(D) $[\mathrm{R}^2\,\mathrm{T}^2]$

Answer: (C) $[\mathrm{R}^2]$ · Key from source paper

Q257 JEE Main 2014 · 9 Apr · Online MCQ

An experiment is performed to obtain the value of acceleration due to gravity g by using a simple pendulum of length L. In this experiment time for 100 oscillations is measured by using a watch of 1 second least count and the value is 90.0 seconds. The length L is measured by using a meter scale of least count 1 mm and the value is 20.0 cm. The error in the determination of g would be :

(A) 4.4%
(B) 2.27%
(C) 1.7%
(D) 2.7%

Answer: (D) 2.7% · Key from source paper

Q258 JEE Main 2014 · 6 Apr · Offline MCQ

The current voltage relation of diode is given by $I = (e^{1000\,V/T} - 1)$ mA, where the applied voltage V is in volts and the temperature T is in degree Kelvin. If a student makes an error measuring ± 0.01 V while measuring the current of 5 mA at 300 K, what will be the error in the value of current in mA ?

(A) 0.2 mA
(B) 0.02 mA
(C) 0.5 mA
(D) 0.05 mA

Answer: (A) 0.2 mA · Key from source paper

Q259 JEE Main 2014 · 6 Apr · Offline MCQ

A student measured the length of a rod and wrote it as 3.50 cm. Which instrument did he use to measure it ?

(A) A meter scale
(B) A vernier calliper where the 10 divisions in vernier scale matches with 9 division in main scale and main scale has 10 divisions in 1 cm
(C) A screw gauge having 100 divisions in the circular scale and pitch as 1 mm
(D) A screw gauge having 50 divisions in the circular scale and pitch as 1 mm

Answer: (B) A vernier calliper where the 10 divisions in vernier scale matches with 9 division in main scale and main scale has 10 divisions in 1 cm · Key from source paper

Q260 JEE Main 2013 · 25 Apr · Online MCQ

A metal sample carrying a current along X$-$ axis with density $\mathrm{J_x}$ is subjected to a magnetic field $\mathrm{B_z}$ (along z$-$ axis). The electric field $\mathrm{E_y}$ developed along Y-axis is directly proportional to $\mathrm{J_x}$ as well as $\mathrm{B_z}$. The constant of proportionality has SI unit.

(A) $\frac{m^2}{A}$
(B) $\frac{m^3}{As}$
(C) $\frac{m^2}{As}$
(D) $\frac{As}{m^3}$

Answer: (B) $\frac{m^3}{As}$ · Key from source paper

Q261 JEE Main 2013 · 23 Apr · Online MCQ

If the time period t of the oscillation of a drop of liquid of density d, radius r, vibrating under surface tension s is given by the formula $t = \sqrt{r^{2b} s^c d^{a/2}}$. It is observed that the time period is directly proportional to $\sqrt{\frac{d}{s}}$. The value of b should therefore be :

(A) $\frac{3}{4}$
(B) $\sqrt{3}$
(C) $\frac{3}{2}$
(D) $\frac{2}{3}$

Answer: (C) $\frac{3}{2}$ · Key from source paper

Q262 JEE Main 2013 · 22 Apr · Online MCQ

The dimensions of angular momentum, latent heat and capacitance are, respectively.

(A) $\mathrm{ML^2T^1A^2}$, $\mathrm{L^2T^{-2}}$, $\mathrm{M^{-1}L^{-2}T^2}$
(B) $\mathrm{ML^2T^{-2}}$, $\mathrm{L^2T^2}$, $\mathrm{M^{-1}L^{-2}T^4A^2}$
(C) $\mathrm{ML^2T^{-1}}$, $\mathrm{L^2T^{-2}}$, $\mathrm{ML^2TA^2}$
(D) $\mathrm{ML^2T^{-1}}$, $\mathrm{L^2T^{-2}}$, $\mathrm{M^{-1}L^{-2}T^4A^2}$

Answer: (D) $\mathrm{ML^2T^{-1}}$, $\mathrm{L^2T^{-2}}$, $\mathrm{M^{-1}L^{-2}T^4A^2}$ · Key from source paper

Q263 JEE Main 2013 · 7 Apr · Offline MCQ

Let $[\in_0]$ denote the dimensional formula of the permittivity of vacuum. If M = mass, L = length, T = time and A = electric current, then :

(A) $[\in_0] = [\mathrm{M^{-1}L^2T^{-1}A^{-2}}]$
(B) $[\in_0] = [\mathrm{M^{-1}L^2T^{-1}A}]$
(C) $[\in_0] = [\mathrm{M^{-1}L^{-3}T^2A}]$
(D) $[\in_0] = [\mathrm{M^{-1}L^{-3}T^4A^2}]$

Answer: (D) $[\in_0] = [\mathrm{M^{-1}L^{-3}T^4A^2}]$ · Key from source paper

Q264 AIEEE 2012 · 26 May · Online MCQ

The electrical resistance R of a conductor of length l and area of cross section a is given by $R = \frac{\rho l}{a}$ where 'ρ' is the electrical resistivity. What is the dimensional formula for electrical conductivity 'σ' which is reciprocal of resistivity?

(A) $[M^{-1}L^{-3}T^3A^2]$
(B) $[ML^{-3}T^{-3}A^2]$
(C) $[ML^3T^{-3}A^{-2}]$
(D) $[M^{-2}L^3T^2A^{-1}]$

Answer: (A) $[M^{-1}L^{-3}T^3A^2]$ · Key from source paper

Q265 AIEEE 2012 · 19 May · Online MCQ

The amount of heat produced in an electric circuit depends upon the current (I), resistance (R) and time (t). If the error made in the measurements of the above quantities are $2\%, 1\%$ and 1% respectively then the maximum possible error in the total heat produced will be

(A) 1%
(B) 2%
(C) 6%
(D) 3%

Answer: (C) 6% · Key from source paper

Q266 AIEEE 2012 · 19 May · Online MCQ

N divisions on the main scale of a vernier calliper coincide with $(N+1)$ divisions of the vernier scale. If each division of main scale is ' a ' units, then the least count of the instrument is

(A) a
(B) $\frac{a}{N}$
(C) $\frac{N}{N+1} \times a$
(D) $\frac{a}{N+1}$

Answer: (D) $\frac{a}{N+1}$ · Key from source paper

Q267 AIEEE 2012 · 12 May · Online MCQ

A student measured the diameter of a wire using a screw gauge with the least count 0.001 cm and listed the measurements. The measured value should be recorded as

(A) 5.3200 cm
(B) 5.3 cm
(C) 5.32 cm
(D) 5.320 cm

Answer: (D) 5.320 cm · Key from source paper

Q268 AIEEE 2012 · 7 May · Online MCQ

Given that K = energy, V = velocity, T = time. If they are chosen as the fundamental units, then what is dimensional formula for surface tension?

(A) $[KV^{-2}T^{-2}]$
(B) $[K^2V^2T^{-2}]$
(C) $[K^2V^{-2}T^{-2}]$
(D) $[KV^2T^2]$

Answer: (A) $[KV^{-2}T^{-2}]$ · Key from source paper

Q269 AIEEE 2012 · Offline MCQ

Resistance of a given wire is obtained by measuring the current flowing in it and the voltage difference applied across it. If the percentage errors in the measurement of the current and the voltage difference are 3% each, then error in the value of resistance of the wire is

(A) 6%
(B) zero
(C) 1%
(D) 3%

Answer: (A) 6% · Key from source paper

Q270 AIEEE 2012 · Offline MCQ

A spectrometer gives the following reading when used to measure the angle of a prism. Main scale reading: 58.5 degree Vernier scale reading : 09 divisions Given that 1 division on main scale corresponds to 0.5 degree. Total divisions on the vernier scale is 30 and match with 29 divisions of the main scale. The angle of the prism from the above data

(A) 58.59°
(B) 58.77°
(C) 58.65°
(D) 59°

Answer: (C) 58.65° · Key from source paper

Q271 AIEEE 2011 MCQ

A screw gauge gives the following reading when used to measure the diameter of a wire. Main scale reading : 0 mm Circular scale reading : 52 divisions Given that 1 mm on main scale corresponds to 100 divisions of the circular scale. The diameter of wire from the above date (sic) is :

(A) 0.052 cm
(B) 0.026 cm
(C) 0.005 cm
(D) 0.52 cm

Answer: (A) 0.052 cm · Key from source paper

Q272 AIEEE 2010 MCQ

The respective number of significant figures for the numbers 23.023, 0.0003 and 2.1×10^{-3} are

(A) 5, 1, 2
(B) 5, 1, 5
(C) 5, 5, 2
(D) 4, 4, 2

Answer: (A) 5, 1, 2 · Key from source paper

Q273 AIEEE 2009 MCQ

In an experiment the angles are required to be measured using an instrument. 29 divisions of the main scale exactly coincide with the 30 divisions of the vernier scale. If the smallest division of the main scale is half-a-degree ($= 0.5^\circ$), then the least count of the instrument is

(A) one minute
(B) half minute
(C) one degree
(D) half degree

Answer: (A) one minute · Key from source paper

Q274 AIEEE 2008 MCQ

The dimension of magnetic field in M, L, T and C (Coulomb) is given as

(A) $\mathrm{MLT^{-1}C^{-1}}$
(B) $\mathrm{MT^{2}C^{-2}}$
(C) $\mathrm{MT^{-1}C^{-1}}$
(D) $\mathrm{MT^{-2}C^{-1}}$

Answer: (C) $\mathrm{MT^{-1}C^{-1}}$ · Key from source paper

Q275 AIEEE 2008 MCQ

A body of mass $m = 3.513\ \mathrm{kg}$ is moving along the x-axis with a speed of $5.00\ \mathrm{ms^{-1}}$. The magnitude of its momentum is recorded as

(A) $17.6\ \mathrm{kg\ ms^{-1}}$
(B) $17.565\ \mathrm{kg\ ms^{-1}}$
(C) $17.56\ \mathrm{kg\ ms^{-1}}$
(D) $17.57\ \mathrm{kg\ ms^{-1}}$

Answer: (A) $17.6\ \mathrm{kg\ ms^{-1}}$ · Key from source paper

Q276 AIEEE 2008 MCQ

Two full turns of the circular scale of a screw gauge cover a distance of 1 mm on its main scale. The total number of divisions on the circular scale is 50 . Further, it is found that the screw gauge has a zero error of -0.03 mm while measuring the diameter of a thin wire, a student notes the main scale reading of 3 mm and the number of circular scale divisions in line with the main scale as 35 . The diameter of the wire is

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(A) 3.32 mm
(B) 3.73 mm
(C) 3.67 mm
(D) 3.38 mm

Answer: (D) 3.38 **mm** · Key from source paper

Q277 AIEEE 2006 MCQ

Which of the following units denotes the dimensions $\mathrm{ML}^2/\mathrm{Q}^2$, where Q denotes the electric charge?

(A) Weber (Wb)
(B) $\mathrm{Wb/m}^2$
(C) Henry (H)
(D) $\mathrm{H/m}^2$

Answer: (C) Henry (H) · Key from source paper

Q278 AIEEE 2005 MCQ

Out of the following pair, which one does NOT have identical dimensions is

(A) angular momentum and Planck's constant
(B) impulse and momentum
(C) moment of inertia and moment of a force
(D) work and torque

Answer: (C) moment of inertia and moment of a force · Key from source paper

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Q279 AIEEE 2004 MCQ

Which one of the following represents the correct dimensions of the coefficient of viscosity?

(A) $\mathrm{ML}^{-1}\mathrm{T}^{-2}$
(B) MLT^{-1}
(C) $\mathrm{ML}^{-1}\mathrm{T}^{-1}$
(D) $\mathrm{ML}^{-2}\mathrm{T}^{-2}$

Answer: (C) $\mathrm{ML}^{-1}\mathrm{T}^{-1}$ · Key from source paper

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Q280 AIEEE 2003 MCQ

Dimension of $\frac{1}{\mu_0 \varepsilon_0}$, where symbols have their usual meaning, are

(A) $[\mathrm{L}^{-1}\,\mathrm{T}]$
(B) $[\mathrm{L}^{-2}\,\mathrm{T}^{2}]$
(C) $[\mathrm{L}^{2}\,\mathrm{T}^{-2}]$
(D) $[\mathrm{LT}^{-1}]$

Answer: (C) $[\mathrm{L}^{2}\,\mathrm{T}^{-2}]$ · Key from source paper

Q281 AIEEE 2003 MCQ

The physical quantities not having same dimensions are

(A) torque and work
(B) momentum and Planck's constant
(C) stress and Young's modulus
(D) speed and $(\mu_0\varepsilon_0)^{-1/2}$

Answer: (B) momentum and Planck's constant · Key from source paper

Q282 AIEEE 2002 MCQ

Identify the pair whose dimensions are equal

(A) torque and work
(B) stress and energy
(C) force and stress
(D) force and work

Answer: (A) torque and work · Key from source paper

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