

Unit dimensions and Measurement

1. The physical quantities not having same dimensions are
 (a) Speed and $(\mu_0 \epsilon_0)^{-1/2}$ (b) Torque and work
 (c) Momentum and Planck's constant (d) Stress and Young's modulus
2. The dimensional formula for Boltzmann's constant is
 (a) $[ML^2T^{-2}\theta^{-1}]$ (b) $[ML^2T^{-2}]$ (c) $[ML^0T^{-2}\theta^{-1}]$ (d) $[ML^{-2}T^{-1}\theta^{-1}]$
3. Which of the following quantities is dimensionless
 (a) Gravitational constant (b) Planck's constant (c) Power of a convex lens (d) None of these
4. Which of the two have same dimensions
 (a) Force and strain (b) Force and stress
 (c) Angular velocity and frequency (d) Energy and strain
5. The dimensions of pressure is equal to
 (a) Force per unit volume (b) Energy per unit volume (c) Force (d) Energy
6. Identify the pair whose dimensions are equal
 (a) Torque and work (b) Stress and energy (c) Force and stress (d) Force and work
7. The dimensional formula for impulse is
 (a) MLT^{-2} (b) MLT^{-1} (c) ML^2T^{-1} (d) M^2LT^{-1}
8. The dimensions of universal gravitational constant are
 (a) $M^{-2}L^2T^{-2}$ (b) $M^{-1}L^3T^{-2}$ (c) $ML^{-1}T^{-2}$ (d) ML^2T^{-2}
9. How many wavelength of Kr^{86} are there in one metre
 (a) 1553164.13 (b) 1650763.73 (c) 652189.63 (d) 2348123.73
10. Light year is a unit of
 (a) Time (b) mass (c) Distance (d) Energy
11. The period of oscillation of a simple pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$ where l is about 100 cm and is known to 1mm accuracy. The period is about 2s. The time of 100 oscillations is measured by a stop watch of least count 0.1 s. The percentage error in g is
 (a) 0.1% (b) 1% (c) 0.2% (d) 0.8%
12. The percentage errors in the measurement of mass and speed are 2% and 3% respectively. How much will be the maximum error in the estimation of the kinetic energy obtained by measuring mass and speed
 (a) 11% (b) 8% (c) 5% (d) 1%
13. While measuring the acceleration due to gravity by a simple pendulum, a student makes a positive error of 1% in the length of the pendulum and a negative error of 3% in the value of time period. His percentage error in the measurement of g by the relation $g = 4\pi^2(l/T^2)$ will be
 (a) 2% (b) 4% (c) 7% (d) 10%
14. The random error in the arithmetic mean of 100 observations is x ; then random error in the arithmetic mean of 400 observations would be
 (a) $4x$ (b) $\frac{1}{4}x$ (c) $2x$ (d) $\frac{1}{2}x$
15. The radius of a sphere is (5.3 ± 0.1) cm. The percentage error in its volume is
 (a) $\frac{0.1}{5.3} \times 100$ (b) $3 \times \frac{0.1}{5.3} \times 100$ (c) $\frac{0.1 \times 100}{3.53}$ (d) $3 + \frac{0.1}{5.3} \times 100$