

Chapter	1 Measurements	Class	1 st Year	Subject	Physics
---------	----------------	-------	----------------------	---------	---------

Give Short Answers of the Following Questions

1. What are base units and derived units? Give some examples of both these units.

Ans. Base Units: The minimum number of those physical quantities in terms of which other physical quantities can be defined are called base quantities. The units of these base quantities are called base units.

Examples: meter, kilogram, second, ampere, kelvin, candela, mole.

Derived Units: The SI units for measuring all other physical quantities are derived from the base and supplementary units, such units are called derived units.

Examples: newton, joule, watt, coulomb, ampere, radian, steradian etc.

2. How many significant figures should be retained in the following?

(i) Multiplying or dividing several numbers

(ii) Adding or subtracting numbers

Ans. (i) Multiplying or dividing several numbers:

The result should retain the same number of significant figures as the number with the least significant figures.

(ii) Adding or subtracting numbers:

The result should retain as many decimal places as the least precise number in the given data.

3. How is the Vernier scale related to the main scale of a Vernier Callipers?

What is meant by L.C. of the Vernier Callipers?

Ans. The Vernier scale is a secondary scale that slides along the main scale to allow more precise measurements. It is designed such that a certain number of its divisions match a different number of divisions on the main scale. The difference gives rise to the least count (L.C.) of the instrument.

Least Count (L.C.): The smallest measurement which can be measured with the help of Vernier calliper is called its least count or Vernier constant.

4. Write the following numbers in scientific notation. (a) 143.7 (b) 206.4×10^2

Ans. (a) 143.7: In scientific notation it can be written as 1.437×10^2

(b) 206.4×10^2 : In scientific notation it can be written as 2.064×10^4

5. Write the following numbers using correct prefixes: (a) 580×10^2 g (b) 0.45×10^{-5} s

Ans. (a) 580×10^2 g: Using correct prefixes, it can be written as

$$580 \times 10^2 \text{ g} = 580 \times 10^3 \text{ g} = 58 \text{ kg}$$

(b) 0.45×10^{-5} s: Using correct prefixes, it can be written as

$$0.45 \times 10^{-5} = 0.45 \times 10^{-5} \text{ s} = 4.5 \mu\text{s}$$

6. Kinetic energy of a body of mass m moving with speed v is given by $\frac{1}{2} mv^2$. What are the dimensions of kinetic energy?

Ans. K.E. = $\frac{1}{2} mv^2$

Chapter	1 Measurements	Class	1 st Year	Subject	Physics
---------	----------------	-------	----------------------	---------	---------

Mass (m) has dimensions [M]

Velocity (v) has dimension $[LT^{-1}]^2$

Then K.E. = [M] $[LT^{-1}]^2$

$$= [M] [L^2 T^{-2}]$$

This is the dimensional formula of energy or work.

7. How many significant figures are there in the following measurements?

Ans. (i) 37 km: km has 2 significant figures

(ii) 0.002953 m: 0.002953 m has 4 significant figures

(iii) 7.50034 cm: 7.50034 cm has 6 significant figures

(iv) 200.0 m: 200.0 m has 4 significant figures

8. Write the dimension of : (i) Plank's constant (ii) Angular velocity

Ans. (i) Plank's constant (h)

(ii) Angular velocity (ω)

As, $E = hf \rightarrow h = \frac{E}{f}$

As $\omega = \frac{\Delta\theta}{\Delta t}$

So,

So,

$$\text{Dimension of } h = \frac{\text{Dimension of Energy}}{\text{Dimension of frequency}}$$

$$\text{Dimension of } \omega = \frac{\text{Dimension of angular displacement}}{\text{Dimension of time}}$$

$$[h] = \frac{[E]}{[f]}$$

$$[\omega] = \frac{[\theta]}{[t]}$$

$$[h] = \frac{[ML^2T^{-2}]}{[T^{-1}]}$$

$$[\omega] = \frac{\text{no dimension}}{[T]} \because \text{Plane angle is dimension}$$

$$[h] = [ML^2T^{-1}]$$

$$[\omega] = [T^{-1}]$$