PHYSICS – VIII- PART- 2

Measurements and Units

Mass

* **Mass of a substance is the measure of the quantity of matter contained in it.**

***The basic unit of mass is kilogram. Its symbol is kg.**

SMALLER UNITS OF MASS

1. milligram (mg)

* **One kilogram is divided in to 1000000 equal parts, the mass of each part is one milligram.**

$$1\ mg = 1/1000000\ kg = 1/10^{6}\ kg = 10^{-6}\ kg$$

2. gram (g)

* **One kilogram is divided in to 1000 equal parts, the mass of each part is one gram.**

$$1\ g = 1/1000\ kg = 1/10^{3}\ kg = 10^{-3}kg$$

BIGGER UNITS OF MASS

1. quintal

1 quintal = 100 kg = 10^2 kg

2. tonne

1 tonne = 1000 kg = 10^3 kg

TIME

* **The basic unit of time is second. Its symbol is s.**
* **One second is 1/86400 part of an average solar day.**

Solar day

A day or a solar day is the time period from one noon to the next noon.

1 minute = 60 s
1 hour = 60 minute = 60 x 60 = 3600 s
1 day = 24 hour = 24 x 60 x 60 = 86400 s
1 year = 365 day = 365 x 24 x 60 x 60 = 31536000 s

Fundamental units

You are now familiar with the units of length, mass and time. There are some quantities which are not related to one another and cannot be expressed using other quantities. Such quantities are fundamental quantities. The units of the fundamental quantities are the Fundamental Units. The system based on these fundamental units is the International System of Units. Its short form is SI Units.

Sl. No.	Fundamental quantities	Basic SI Units	
		Name	Symbol
1	Length	metre	m
2	Mass	kilogram	kg
3	Time	second	s
4	Electric Current	ampere	A
5	Temperature	kelvin	K
6	Amount of Substance	mole	mol
7	Luminous Intensity	candela	cd

Derived Units

*** Units which are expressed in terms of fundamental units or those units which are dependent on fundamental units are derived units.**

Eg. Area, Volume, Density...

1. Area

Area = length × breadth

Unit of area = unit of length × unit of breadth = m × m = m^2

*** Let's try to find the area of a classroom of length 5 m and breadth 4 m**

Area = length × breadth = 5 m × 4 m = 20 m2

salient features of SI units.

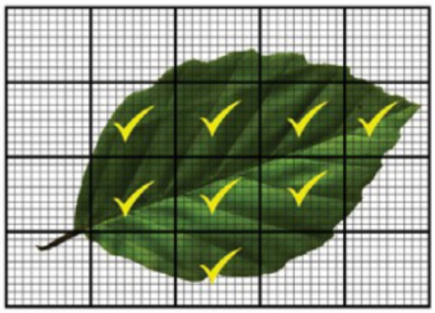
* Unified units

* Internationally accepted

* Adequate to express all physical quantities.

Area of a leaf

Let's find out the area of a leaf. Take the leaf and place it on a graph paper and trace the outer edges using a pencil. After removing the leaf, examine the graph paper and complete the table given below.



(a) Number of complete squares	
(b) Number of squares having half or more	
(c) Total number of squares (a+b)	

The total number of squares will be the approximate area of the leaf

Approximate area of the leaf = ... cm^2

2.Volume

Volume = length × breadth × height

Unit of volume = unit of length × unit of breadth × unit of height
= m × m × m = m^3 (cubic metre)

*** What is the volume of a block of length 0.2 m, breadth 0.01 m and height 0.05 m?**

Volume = length × breadth × height

= 0.2 x 0.01 x 0.05 = 0.0001 m

3.Density

(mass/volume) or mass per unit volume of a substance is referred to as its density.

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$\text{Unit of density} = \frac{\text{unit of mass}}{\text{unit of volume}} = \text{kg} / \text{m}^3$$

The rules to be followed while writing units

1, The symbols of units are normally written using small letters in the English alphabet. eg. m (metre), s (second), kg (kilogram).

2, But there are certain occasions on which capital letters of the English alphabet are used as symbols. The units named after persons are written like this.

Name of person	Physical quantity	unit	symbol
Alessandro Volta	Potential difference	volt	V
Blaise Pascal	Pressure	pascal	Pa
Sir Isaac Newton	Force	newton	N

3, While writing the names of units never use capital letters.

eg. kelvin (correct) Kelvin (wrong)

newton (correct) Newton (wrong)

4, Never use the plural form for symbols.

eg . 10 kg (correct) 10 kgs (wrong)

75 cm (correct) 75 cms (wrong)