

# Measurement

- Measurement is one of the most useful processes in science and in our daily life. Without actual measurements, we cannot make correct judgments about a given object. It is not always easy to find out the length, area, volume or mass of different objects just by looking at them.
- For the sake of uniformity, scientists all over the world have accepted certain standard units for measuring different quantities. For example,

Quantity	Standard Unit
Length	Meter
Mass	Kilogram
Time	Second

- Standard unit of length : Metre
- Meaning of length : Metre can be used as a unit to measure the length of a room, the height of a tree or a building or length and breadth of a playground.
- Short form of standard unit : m
- Other standard units : 10 millimeters (mm) = 1 centimeter (cm)  
: 100 cm = 1 meter (m)  
: 1000 m = 1 Kilometer (Km)
- Standard unit of area :  $\text{Metre}^2$
- Meaning of area : Area is the measure of surface of an object
- Short form of standard unit :  $\text{m}^2$
- Another unit of standard unit : 1 acre =  $100\text{m}^2$   
: 1 hectare = 100 acre =  $1000\text{m}^2$
- Standard unit of volume :  $\text{Metre}^3$  or cubic meter
- Meaning of volume : The space occupied by an object is called its volume. The space available in a container is called its capacity. In fact, the capacity of a container is its inner volume.
- Short form of standard unit :  $\text{m}^3$
- Other standard units : When the object is small, instead of considering  $\text{m}^3$  as a unit, we may consider  $\text{cm}^3$  or  $\text{dm}^3$  as a unit. These are read as cubic centimetre and cubic decimetre, respectively.
- The volume of liquids like milk, kerosene and petrol is measured in litres or millilitres (ml)  
1 litre (l) = 0.001 cubic meter  
1000 ml = 1 litre (l)  
1 ml =  $1\text{ cm}^3$
- Standard unit of mass : Kilogram
- Meaning of mass : The mass is the measure of the quantity of matter in an object.
- Short form of standard unit : kg
- Other standard units (small mass) : Gram and milligram

100 gram (g)	=	0.1 kilogram
1000 milligram (mg)	=	1 gram
(large quantities) – 100 kg	=	100000 grams/ 1 quintal
10 quintals	=	1 tonnes

- Temperature is measured in degree Celsius. It is written as  $^{\circ}$ . A thermometer has two standard markings. To make the standard marking on a thermometer, two fixed points are required.
  - (i) Lower fixed point: It is the temperature of melting ice.
  - (ii) Upper fixed point: It is the temperature of steam of boiling water.
- The clinical thermometer used by doctors does not have the markings from  $0^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ . It cannot, therefore, be used to measure the temperature of ice or boiling water. It can measure only a short range of temperatures from about  $35^{\circ}\text{C}$  to  $42^{\circ}\text{C}$ . It is graduated likewise because the temperature of the human body does not vary beyond these temperatures. The temperature of a normal human body is  $37^{\circ}\text{C}$ .
- The standard unit of time all over the world is second. Time for longer events is expressed in larger units. The larger units of time are minute, hour and day.

60 seconds (s)	=	1 minutes (min)
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60 minutes (min)	=	1 hour (h)
24 hours	=	1 day

- Months and years are also units of time to express longer time intervals.