1 MEASUREMENT AND UNITS

	Situation	Physical Quantity
1	Measuring the depth of a pit	Length
2	Measuring the weight of vegetables	Mass
3	Taking measurements by a tailor	length
4	Using a stopwatch in a race	time
5	Measuring blood pressure	pressure
6	Measuring body heat	temperature

Fundamental quantities are quantities that exist independently and cannot be expressed in terms of other quantities.
Eg: length,height,mass,time etc.

Quantities that can be expressed in terms of fundamental quantities are derived quantities.
Eg: area,volume,density etc.
A physical quantity is expressed by a number indicating its value followed by its unit.
A unit is a standardized reference accepted universally to measure a physical quantity.

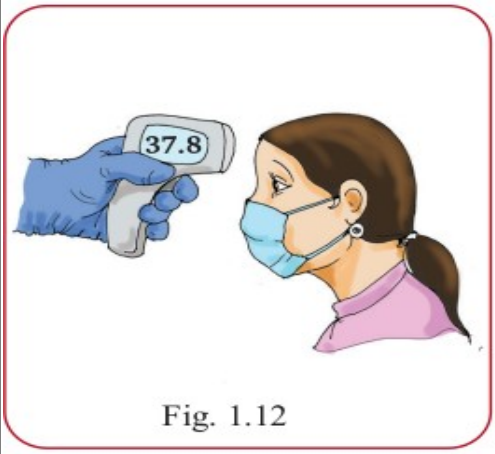


Fig. 1.12

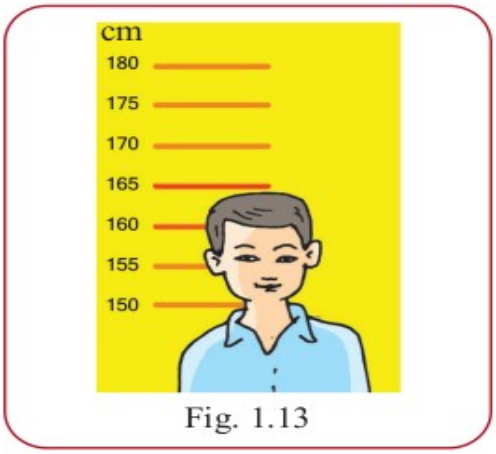


Fig. 1.13

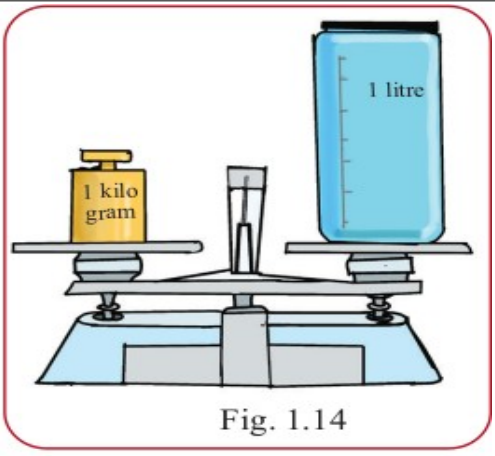


Fig. 1.14

Situation	Physical Quantity	Numerical Value	Unit	Mode of marking measurements
Fig. 1.12	Temperature	37.8	Celsius	37.8°C
Fig. 1.13	height	165	cm	165cm
Fig. 1.14	mass	1	kg	1kg

In the past, different units were used for measurement and recording in each region. For example, units like the foot, cubit and hand span were used locally to measure length.

Different units are required for the same physical quantity in various contexts. Larger units are used for larger quantities and smaller units for smaller quantities.

The SI unit of length is metre. Its symbol is 'm'.

1 metre	=	...100....	centimetre
1 centimetre	=	.....10.....	millimetre
1 metre	=	....1000....	millimetre

1 kilometre = ..1000.. metre

The amount of matter contained in a substance is its mass.
The unit of mass is the kilogram. Its symbol is ‘kg’.
Milligram and gram are the smaller units of mass. 1 gram = 1000 milligrams.

Unit	Relation to kilograms
Milligram	1 kilogram = 1000000 milligram
Gram	1 kilogram = 1000 gram
Quintal	1 quintal = 100 kilogram
Tonne	1 tonne = 1000 kilogram

The SI unit of time is the second. Its symbol is ‘s’.

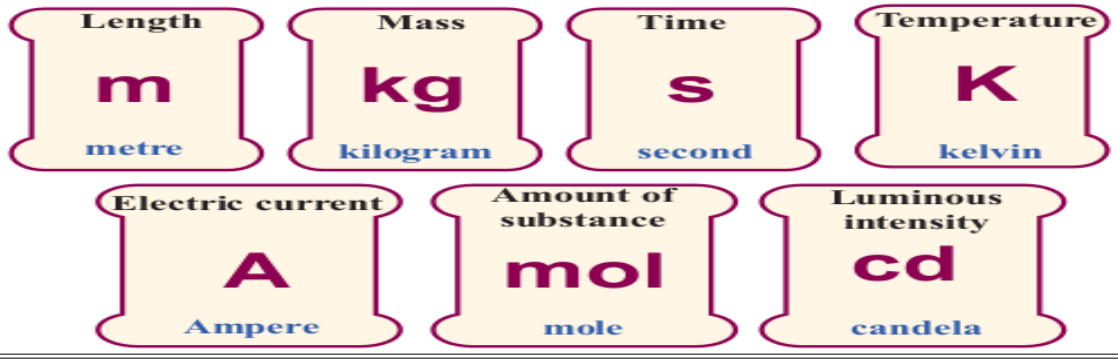
Unit	Relationship with second
Minute	1 minute = ...60..... second
Hour	1 hour = ...3600..... second

The SI unit of volume is cubic metre. It’s symbol is m^3.
1 litre = 1000 cm^3
1 litre = ...1000...millilitre.

The mass of a substance per unit volume is called its density.

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Note the fundamental units and their symbols given below.



characteristics of SI units?

They are standardised units.

They are internationally accepted.

Units of all other quantities can be expressed in terms of these units.

Physical Quantity	Correct method	Incorrect method	Rule
Force	N	n	The symbols of the units formed from the names of individuals should be written using uppercase of the English alphabet.
Length	60 cm is the length of the desk.	60 cm. is the length of the desk.	No full stop or comma should be used after the symbol. They can be used at the end of the sentence.
	The length of the desk is 60cm.	The length of the desk is 60cm	
Energy	N.m N m	Nm	A full stop/space should be used between the units formed as multiples of units.

The smallest value that can be measured using an instrument is called its least count.

1. Identify the odd one out in each group and explain common features of the others.

I	a) Kilogram	b) Kilometre	c) Second	d) Mole
II	a) Time	b) Area	c) Mass	d) Electric current
III	a) Metre	b) Kilogram	c) Second	d) Degree Celsius

1)Kilometre,All others (Kilogram, Second, Mole) are **SI base units**. Kilometre is a **derived unit** .

11)Area,Time, Mass, and Electric current are **fundamental quantities** in the SI system, whereas **Area** is a **derived quantity**.

111)Degree Celsius, Metre, Kilogram, and Second are **SI base units**, whereas **Degree Celsius** is a **derived unit.**

2. Different units of length are given below. Fill in the table below.

Unit	Relationship with metre
Kilometre	1 km = ...1000..... metre
Millimetre	1 m = ...1000..... millimetre
Centimetre	.....100..... cm = 1 m

3. Convert the following measurements to SI units without changing their values.

a) 2000 g b) 1 h c) 1.5 km d) 200 cm

a)2 kg b)3600 s c)1500 m d)2m

4. Different units of mass are given below. Arrange them in the ascending order of their values.

a) Kilogram b) Milligram c) Quintal d) Gram

b) Milligram < d) Gram < a) Kilogram < c) Quintal