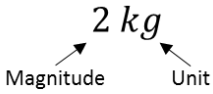
PHYSICAL QUANTITIES AND UNITS

Physical quantities

- In physics, a physical quantity is **any physical property that can be quantified**, that is, be measured using numbers. Examples of physical quantities are mass, amount of substance, length, time, temperature, electric current, light intensity, force, velocity, density, and many others.

- A physical quantity is made up of magnitude and unit.



- Types of physicsl quantities are Fundamental quantities and Derived quantities.

- Fundamental Quantities : Fundamental quantities are those that are defined directly by the process of measurement only. They are not defined in terms of other quantities; their units are not defined in terms of other units. For example mass, length, time , temperature, electric current, amount of substance and luminous intensity..

- Derived quantities : The quantities, which can be expressed in terms of the fundamental quantities are called derived quantities. For example volume, velocity, Pressure etc.

Base units

- Base units are the fundamental units of measurements. The following are base units;

Quantity		Base Units	
Name	Symbol	Name	Symbol
Mass	**m**	**Kilogram**	**kg**
Length	**l**	**Meter**	**m**
Time	**t**	**Second**	**s**
Temperature	**T**	**Kelvin**	**K**
Electric Current	**I**	**Ampere**	**A**
Amount of substance	**n**	**mole**	**mol**
Luminous intensity	**I_v**	**candela**	**cd**

- All units (not above) can be broken down to base units.
- Homogeneity can be used to prove equations.
- An equation is homogenous if base units on left hand side are the same as base units on right hand side.
- This may not work every time due to the fact that it does not take pure numbers into account (E_k formula) .

Multiples and Submultiples

Multiples	Prefix	Symbol
10^3	Kilo	**k**
10^6	Mega	**M**
10^9	Giga	**G**
10^{12}	Tera	**T**

Submultiples	Prefix	Symbol
10^{-3}	Milli	**m**
10^{-6}	Micro	μ
10^{-9}	Nano	**n**
10^{-12}	Pico	**p**

Estimations

Mass of a person	**70 kg**
Height of a person	**1.5 m**
Walking speed	**1 m/s**
Speed of a car on the motorway	**30 m/s**
Volume of a can of a drink	**300 cm^3**
Density of water	**1000 kgm^{-3}**
Density of air	**1kgm^{-3}**
Weight of an apple	**1 N**
Current in a domestic appliance	**13 A**
e.m.f of a car battery	**12 V**
Hearing range	**20 Hz to 20,000 Hz**
Young's Modulus of a material	**Something × 10^{11}**

Scalar and Vector

- **Scalar:** Scalar quantitiy have magnitude only, cannot be -ve. Eg; speed, mass, energy, distance etc.

- **Vector:** Vector quantitiy have magnitude and direction, can be -ve. Eg; velocity, force, momentum, moment, displacement etc.