Unit and Dimension

Physical Quantity

A physical quantity is a property of a material or system that can be quantified by measurement.

-It is of 2 types.

1) **Fundamental quantity:-**

physical quantities are a set of suitably choosen independent observable which are defined operationally.

ex. mass, length, time

2) **Derived:-**

The physical quantities which are defined interms of physical quantity.

ex Velocity, Acceleration, Force etc.

S.I unit physical quantity	S.I unit	symbol
1) ~~Length~~ Mass	kilogram	kg.
2) Length	metre	m
3) Time	second	s
4) Electric current	Ampere	A
5) Temperature	kelvin	k
6) ~~Cand~~ o		
6) Luminous Intensity	Candela	cd
7) Amount of Substance	mole	mol.

Metric Prefix

Prefix	Power of 10	Symbol
deci	10^{-1}	d
Conti	10^{-2}	C
milli	10^{-3}	m
micro	10^{-6}	μ (mu)
nano	10^{-9}	n
pico	10^{-12}	P
femto	10^{-15}	F
atto	10^{-18}	a

Power of 10	prefix	Symbol
10^{1}	Deca	D
10^{2}	Hecto	H
10^{3}	kilo	K
10^{6}	mega	M
10^{9}	Giga	G
10^{12}	Tera	T
10^{15}	peta	P
10^{18}	Exa	E

* Momentum, P = mass x velocity

$= [M^1 L^0 T^0] \times [M^0 L^1 T^{-1}]$

$= [M^1 L^1 T^{-1}]$

* force = ma

$= [M^1 L^0 T^0] \times [M^0 L^1 T^{-2}]$

$= [M^1 L^1 T^{-2}]$

* Work = force x distance

$= [M^1 L^1 T^{-2}] \times [M^0 L^1 T^0]$

$= [M^1 L^2 T^{-2}]$

* Power = W/t

$= \frac{[M^1L^2T^{-2}]}{[M^0L^0T^1]}$

$= [M^1L^2T^{-3}]$

* Kinetic energy = $\frac{1}{2}mv^2$

$= [M^1L^0T^0] \times [M^0L^1T^{-1}]^2$

$= [M^1L^0T^0] \times [M^0L^2T^{-2}]$

$= [M^1L^2T^{-2}]$

* potential energy = mgh / mah

$= [M^1] [M^0L^1T^{-2}] [L^1]$

$= [M^1L^2T^{-2}]$

* pressure = force / area

$= \frac{[M^1L^1T^{-2}]}{[M^0L^2T^0]}$

$= [M^1L^{-1}T^{-2}]$

* Angle = $[M^0L^0T^0]$
* Impulse, $I = Ft$

$= [M^1L^1T^{-2}] [T]$

$= [M^1L^1T^{-1}]$

* Work and energy are having same dimensional formula.
* Dimesional formula of momentum and Impulse are same.
* Angle is a dimensionless quantity.

Properties of unit

A unit must possess the following properties.

1) It should be invariable (can't be changed)
2) It should be easily available for comparision with various measurement.
3) It should be convenient in size.

Fundamental Quantities

For the study of physics we need 7 fundamental quantities.:-

1) mass
2) Length
3) Time
4) Electric Current
5) Temperature
6) Luminosity
7) Amount of substance.

System of Unit

1) C.G.S System (Gaussian System)

- It is a system of measurement in which the fundamental units of the measurement of length, mass and time are taken as 1cm, 1gm and 1sec respectively.

* This system contain many derived units which are small in size.