

CONCEPT MAP

Physical World and Measurement

Nature of physical laws : Some special physical quantities remain constant in time.

- Law of conservation of energy
- Law of conservation of linear momentum
- Law of conservation of angular momentum
- Law of conservation of charge

Physical quantity	Dimensional formula	S.I. unit
Area	$[M^0L^2T^0]$	m^2
Volume	$[M^0L^3T^0]$	m^3
Density	$[ML^{-3}T^0]$	$kg\ m^{-3}$
Frequency	$[M^0L^0T^{-1}]$	s^{-1} or Hz (hertz)
Speed/Velocity	$[M^0LT^{-1}]$	m/s
Acceleration	$[M^0LT^{-2}]$	m/s^2
Force	$[MLT^{-2}]$	N (newton)
Work	$[ML^2T^{-2}]$	J (joule)
Energy	$[ML^2T^{-2}]$	J
Power	$[ML^2T^{-3}]$	W (watt)

Dimensions : The dimensions of physical quantity are the powers (or exponents) to which the base quantities are raised to represent that quantity.

Dimensional Formula : The expression which represents the dimensions of a physical quantity.

Dimensional Equation : An equation obtained by equating a physical quantity with its dimensional formula.

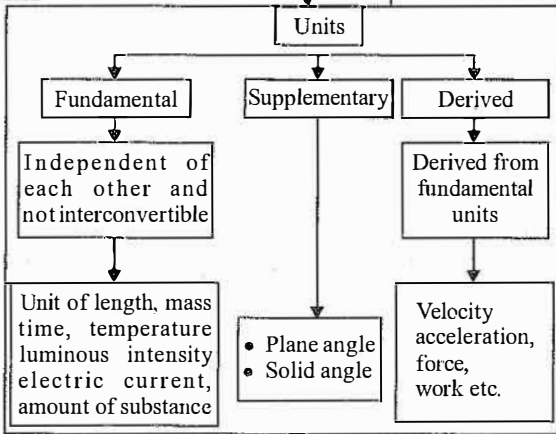
Dimensional Analysis : It is to determine if an equation is dimensionally correct.

Fundamental forces in nature

- Gravitational force
- Weak nuclear force
- Electromagnetic force
- Strong nuclear force

Physics : It is the branch of science that deals with the study of nature and natural phenomena.

Error in Measurement : The difference in the true value and the measured value of a quantity is called error of measurement



Types of Errors

- Systematic errors
- Random errors
- Gross errors

Significant Figures : In the measured value of a physical quantity, the digits about the correctness of which we are sure plus the last digit which is doubtful, are called the significant figures.

MKS System	CGS System	FPS System	SI Units
(i) Length m (metre)	(i) Length cm (centimetre)	(i) Length ft (foot)	It is an extended form of MKS system. It includes four more fundamental units (in addition to three basic units) which represent fundamental quantities in electricity, magnetism, heat and light.
(ii) Mass kg (kilogram)	(ii) Mass g (gram)	(ii) Mass (pound)	
(iii) Time s (second)	(iii) Time s (second)	(iii) Time s (second)	

Absolute Error :
 $\Delta a_n = a_{\text{mean}} - a_n$

Mean Absolute Error
 $a = a_{\text{mean}} \pm \Delta a_{\text{mean}}$

Relative/Fractional Error :
 $\Delta a = \frac{\text{mean absolute error}}{\text{mean value}} = \frac{\Delta a_{\text{mean}}}{a_{\text{mean}}}$

Percentage Error :
 $\Delta a = \frac{\Delta a_{\text{mean}}}{a_{\text{mean}}} \times 100\%$

S. No.	Physical quantity	Name of the unit	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
Supplementary quantities			
8.	Plane angle	radian	rad
9.	Solid angle	steradian	sr