MIND MAP

Units and Dimension

System of Units

	Length	Mass	Time
CGS	Centimetre	Gram	Second
FPS	Foot	Pound	Second
MKS	Metre	Kilogram	Second

Fundamental Quantities

	SI unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Temperature	Kelvin	K
Electric Current	Ampere	A
Luminous Intensity	Candela	cd
Amount of Substance	mole	mol

Plane angle

$$\text{Plane Angle} = \frac{\text{Arc Length}}{\text{Radius}}$$

$$\text{Solid Angle} = \frac{\text{Area}}{(\text{Radius})^2}$$

	SI unit	Symbol
Plane Angle	radian	rad
Solid Angle	Steradian	sr

Applications of Dimensions

1. Principle of Homogeneity

Only same type of physical quantities can be added or subtracted $x = A + B$ $x = A - B$

$[x] = [A] = [B]$

2. Conversion of Units

$n_1u_1 = n_2u_2 = n_3u_3$

nu = constant

When unit become smaller, numerical value increase.

3. To derive relationship between physical quantities

Limits of Dimensions

1. The relation derived from this method gives no information about the dimensionless constants.
2. The dimensional quantity to be derived must be of multiplication type. We cannot derive relations if addition or subtractions are involved.
3. This method is not applicable when unknown variables are more than equations present.

A physical quantity is expressed as

$n\ u$

Numerical Value — Unit

Derived Quantities

Quantities which can be derived from fundamental quantities.

Dimensions

Quantity	Dimension Symbol
Length	L
Mass	M
Time	T
Temperature	θ, K
Electric Current	I, A
Amount of Substance	mol
Luminous Intensity	cd

- ✓ Angles and trigonometric functions are dimensionless quantity
- ✓ All exponents are dimensionless.
- ✓ Logarithmic functions and it's arguments are dimensionless

★★★ Dimensionally correct equation may or may not be correct but dimensionally incorrect equation must be incorrect.