# Class : 11th Physics
# Chapter- 2 : Units and Measurements

**System of units**
Set of fundamental and derived units
CGS – Centimeter, Gram, Second
FPS – Foot, Pound, Second
MKS– Metre, Kilogram, Second S.I - System International (Internationally accepted)

**Derived Units**
* The units which are derived from fundamental units are called derived units.
* Physical quantities like speed acceleration have derived units like m/s, $m/s^2$

**Fundamental Units**
Mass, length, time, temperature, electric current, luminous intensity and amount of substance have fundamental units. Kilogram, metre, second, Kelvin, ampere, candela and mol respectively.

**Supplementary Units**
Quantities plane angle and solid angle have radian and steradian as units

**Properties**
Universal acceptance Non perishable
Well defined
Does not change with time

* Comparison with a certain internationally accepted reference standard is called unit
* Reference standard use to measure physical quantities.

**Types**

**Multiplication or Division**
If $Z = A/B$
$$\frac{\Delta Z}{Z} = \left(\frac{\Delta A}{A}\right) + \left(\frac{\Delta B}{B}\right)$$

**Sum of Difference**
$$\pm\Delta Z = \pm\Delta A \pm \Delta B$$

**Unit**

**Units and Measurements**

**Measure Quantity raised to the power**
If $Z = A^p \times B^q / C^r$
$$\frac{\Delta Z}{Z} = p\left(\frac{\Delta A}{A}\right) + q\left(\frac{\Delta B}{B}\right) + r\left(\frac{\Delta C}{C}\right)$$

**Combination of Errors in**

**Error = True Value – Measured Value**

**Measurement**

**Types**

**Absolute Errror**
$$\Delta a_n = a_n - a_{mean}$$
$$a_{mean} = \frac{a_1 + a_2 + \ldots\ldots + a_n}{n}$$

**Relative Errror**
$$= \frac{\Delta a_{mean}}{a_{mean}}$$
$$\Delta a_{mean} = \frac{\left(|\Delta a_1| + |\Delta a_2| + \ldots + |\Delta a_n|\right)}{n}$$

**Percentage Errror**
$$\delta a = \frac{\Delta a_{mean}}{a_{mean}} \times 100$$

**Significant Figures**
All non-zero digits
All zero between two non-zero digits
If the number is less than 1, the zero(s) on the right of decimal point but to the left of the non-digit zero are not significant.
Terminal or trailing zero (s) in a number without a decimal point are not significant
e.g ln 020342.010
Here 20342.01 are significant

**Dimensions of Physical Quantities**
Expression which shows how and which of the base quantities represent the dimensions of a physical quantity is called dimension formula.
e.g:- Force = $[MLT^{-2}]$

**Precision**
Limit of resolution of quantity measured.

**Accuracy**
Closeness of the measured value to the true value