Types of Vector.

(1) **Zero or null vector:**A vector whose magnitude is zero is called zero or null vector and it is represented by $\vec{O}$.
The initial and terminal points of the directed line segment representing zero vector are coincident and its direction is arbitrary.

(2) **Unit vector:**A vector whose modulus is unity, is called a unit vector. The unit vector in the direction of a vector $\mathbf{a}$ is denoted by $\hat{\mathbf{a}}$, read as "*a cap*". Thus, $|\hat{\mathbf{a}}| = 1$.

$$\hat{\mathbf{a}} = \frac{\mathbf{a}}{|\mathbf{a}|} = \frac{\text{Vector } a}{\text{Magnitude of } a}$$

Note: Unit vectors parallel to x-axis, y-axis and z-axis are denoted by **i**, **j** and **k** respectively.
Two unit vectors may not be equal unless they have the same direction.

(3) **Like and unlike vectors:** Vectors are said to be like when they have the same sense of direction and unlike when they have opposite directions.

(4) **Collinear or parallel vectors:** Vectors having the same or parallel supports are called collinear vectors.

(5) **Co-initial vectors:** Vectors having the same initial point are called *co-initial vectors*.

(6) **Co-planar vectors:** A system of vectors is said to be coplanar, if their supports are parallel to the same plane.

Note: Two vectors having the same initial point are always coplanar but such three or more vectors may or may not be coplanar.

(7) **Coterminous vectors:** Vectors having the same terminal point are called *coterminous vectors*.

(8) **Negative of a vector:** The vector which has the same magnitude as the vector $\mathbf{a}$ but opposite direction, is called the negative of $\mathbf{a}$ and is denoted by $-\mathbf{a}$. Thus, if $\overrightarrow{PQ} = \mathbf{a}$, then $\overrightarrow{QP} = -\mathbf{a}$.

(9) **Reciprocal of a vector:** A vector having the same direction as that of a given vector $\mathbf{a}$ but magnitude equal to the reciprocal of the given vector is known as the reciprocal of $\mathbf{a}$ and is denoted by $\mathbf{a}^{-1}$. Thus, if $|\mathbf{a}| = a, |\mathbf{a}^{-1}| = \frac{1}{a}$

Note: A unit vector is self-reciprocal.

(10) **Localized and free vectors:**A vector which is drawn parallel to a given vector through a specified point in space is called a localized vector. For example, a force acting on a rigid body is a localized vector as its effect depends on the line of action of the force. If the value of a vector depends only on its length and direction and is independent of its position in the space, it is called a free vector.

(11) **Position vectors:**The vector $\overrightarrow{OA}$ which represents the position of the point *A* with respect to a fixed point *O* (called origin) is called position vector of the point *A*. If (*x*, *y*, *z*) are co-ordinates of the point *A*, then $\overrightarrow{OA} = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$.

(12) **Equality of vectors:**Two vectors $\mathbf{a}$ and $\mathbf{b}$ are said to be equal, if

(i) $|\mathbf{a}| = |\mathbf{b}|$

(ii) They have the same or parallel support and

(iii) The same sense.