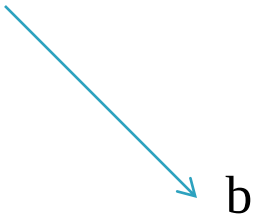
VECTORS

- Definition : The quantity that has magnitude as well as direction is called Vector.



- Position Vector: Consider a point P in space, having coordinates (x, y, z) with respect to the origin O (0, 0, 0). Then, the vector having O and P as its initial and terminal points respectively, is known as the Position Vector of the point P with respect to O.

Types Of Vectors

- **Unit Vector :** A vector whose magnitude is unity (i.e., 1) is called a Unit Vector.
- **Co-initial Vectors :** Two or more vectors having same initial points are called Co-initial Vectors.
- **Collinear Vectors :** Two or more vectors are said to be collinear if they are parallel to the same line, irrespective of their magnitudes and directions.
- **Equal Vectors :** Two vectors a and b are said to be equal, if they have the same magnitude direction regardless of the positions of their initial points, and written as vectors a = b.
- **Negative of a Vector :** A vector whose magnitude is same as that of a given vector, but direction is opposite to that of it, is known as negative of the given vector.

Equation Of A Straight LINE :

- The equation of a straight line is $y = mx + c$.

  where m = slope, c = intercept.

  $m = (y2 – y1)/(x2 – x1)$.

Example :

1. Find the slope of a line that passes through the points (1,3) and (-2, 4).

Sol: we substitute the y and x values in formula slope m.

$$m = (4 – 3)/(-2 – 1) = - 1/3$$

The slope is -1/3

Planes

- A plane is surface with no thickness.
- Length and Width makes a plane.

Distance Between a Point and a Plane:

- Plane is given as Ax + By + Cz + D = 0.
- The distance from P = (x1, y1, z1) to the plane.

$$d = \frac{|Ax1 + By1 + Cz1 + D|}{\sqrt{A^2 + B^2 + C^2}}$$

Equation Of a Plane Passing Through a Point.

- The equation of a plane passing through (x1, y1, z1) is given by :

$$A(x - x1) + B(y - y1) + C(z - z1) = 0$$

where A, B, C are the direction ratios of normal to the plane.