

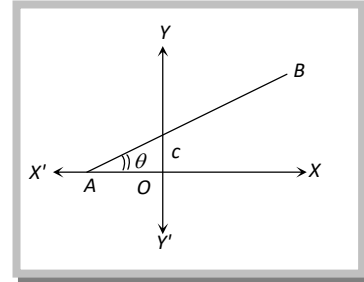
Equations of Straight line in Different forms.

(1) **Slope form:** Equation of a line through the origin and having slope m is $y = mx$.

(2) **One point form or Point slope form:** Equation of a line through the point (x_1, y_1) and having slope m is $y - y_1 = m(x - x_1)$.

(3) **Slope intercept form:** Equation of a line (non-vertical) with slope m and cutting off an intercept c on the y -axis is $y = mx + c$.

The equation of a line with slope m and the x -intercept d is $y = m(x - d)$



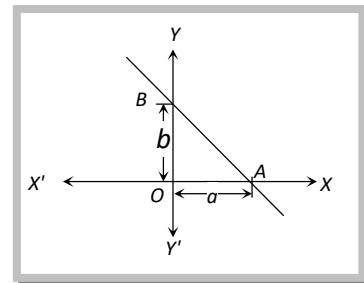
(4) **Intercept form:** If a straight line cuts x -axis at A and the y -axis at B then OA and OB are known as the intercepts of the line on x -axis and y -axis respectively.

The intercepts are positive or negative according as the line meets with positive or negative directions of the coordinate axes.

In the figure, $OA = x$ -intercept, $OB = y$ -intercept.

Equation of a straight line cutting off intercepts a and b on x -axis and y -axis

respectively is $\frac{x}{a} + \frac{y}{b} = 1$.



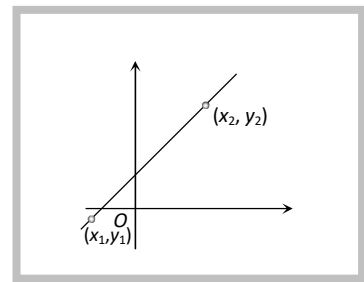
Note: If given line is parallel to X axis, then X -intercept is undefined.

□ If given line is parallel to Y axis, then Y -intercept is undefined.

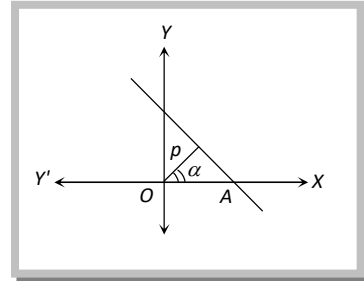
(5) **Two point form:** Equation of the line through the points $A(x_1, y_1)$ and $B(x_2, y_2)$ is

$(y - y_1) = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$. In the determinant form it gives as:

$$\begin{vmatrix} x & y & 1 \\ x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \end{vmatrix} = 0 \text{ is the equation of line.}$$



(6) **Normal or perpendicular form:** The equation of the straight line upon which the length of the perpendicular from the origin is p and this perpendicular makes an angle α with x -axis is $x \cos \alpha + y \sin \alpha = p$.



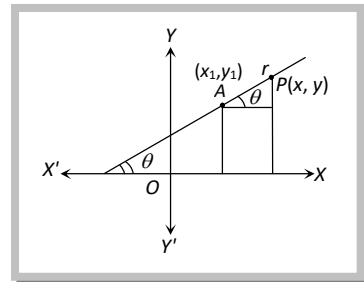
(7) **Symmetrical or parametric or distance form of the line:** Equation of a line passing through (x_1, y_1) and making an angle θ with the positive direction of x -axis is

$$\frac{x - x_1}{\cos \theta} = \frac{y - y_1}{\sin \theta} = r,$$

Where r is the distance between the point $P(x, y)$ and $A(x_1, y_1)$.

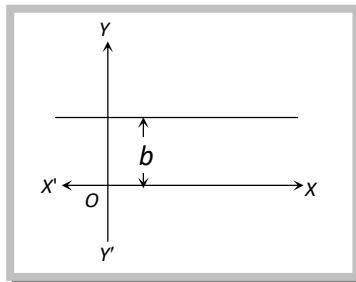
The coordinates of any point on this line may be taken as

$(x_1 + r \cos \theta, y_1 + r \sin \theta)$, known as parametric co-ordinates, ' r ' is called the parameter.



Note: Equation of x -axis $\Rightarrow y = 0$

Equation a line parallel to x -axis (or perpendicular to y -axis) at a distance ' b ' from it $\Rightarrow y = b$



Equation of y -axis $\Rightarrow x = 0$

Equation of a line parallel to y -axis (or perpendicular to x -axis) at a distance ' a ' from it $\Rightarrow x = a$

