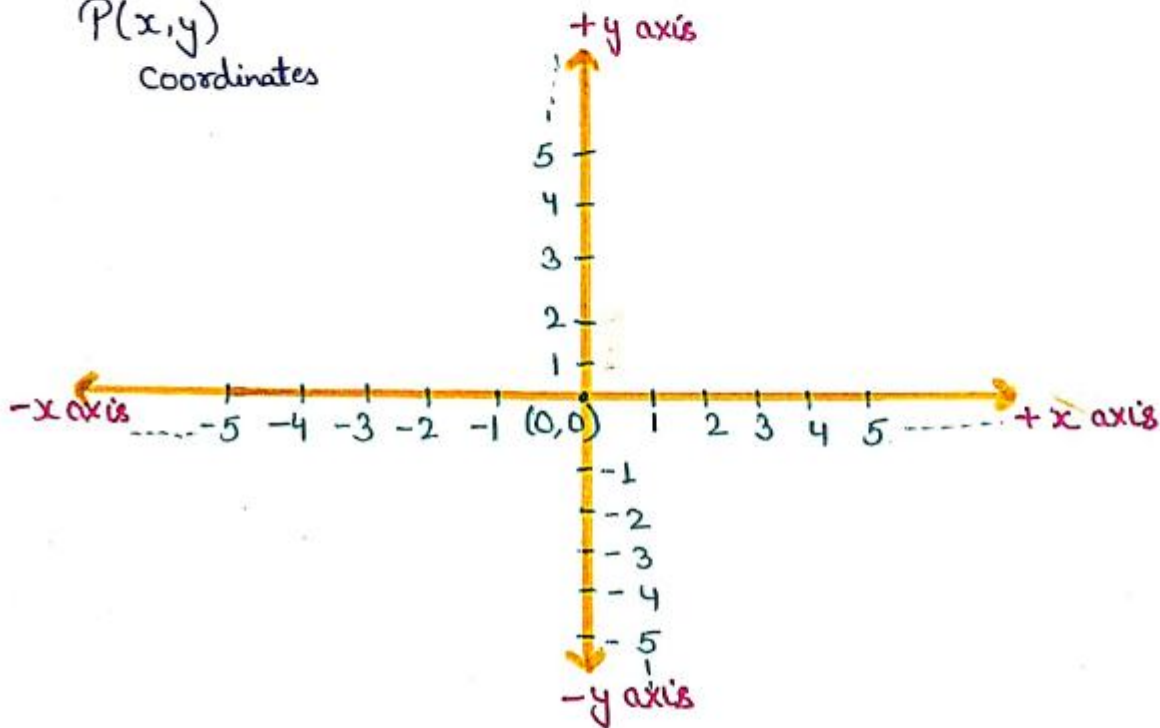


COORDINATE GEOMETRY

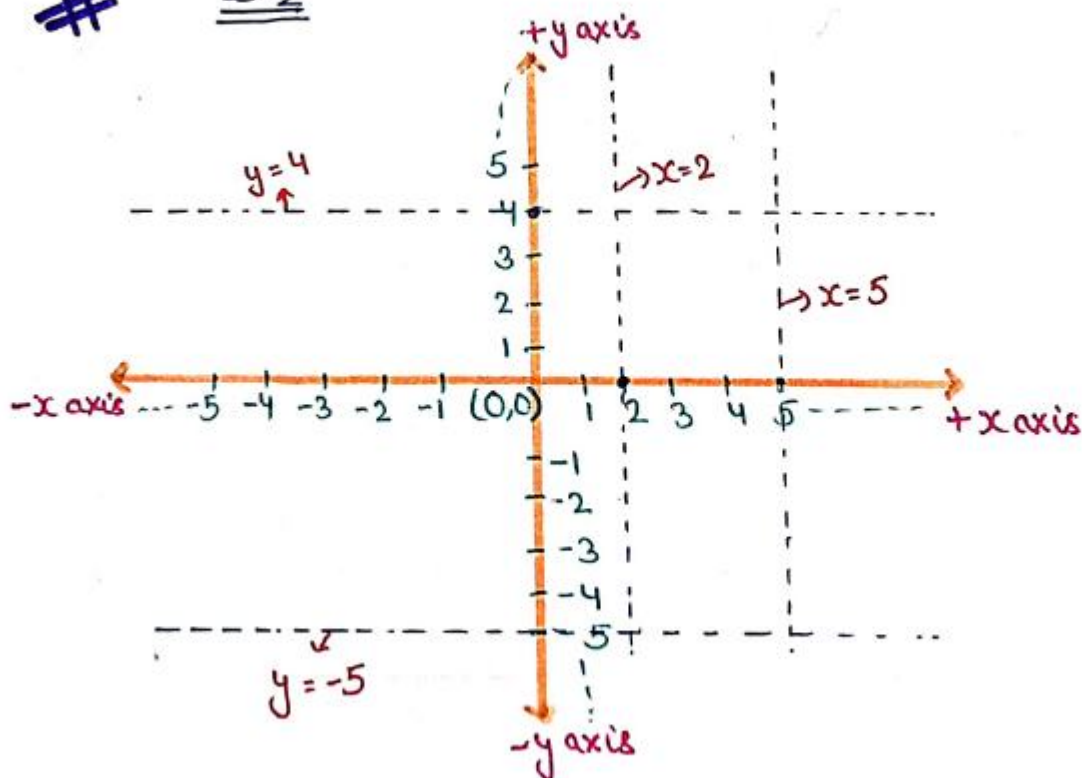
* COORDINATE :- Points which are used to locate the position.
 $P(x, y)$ coordinates

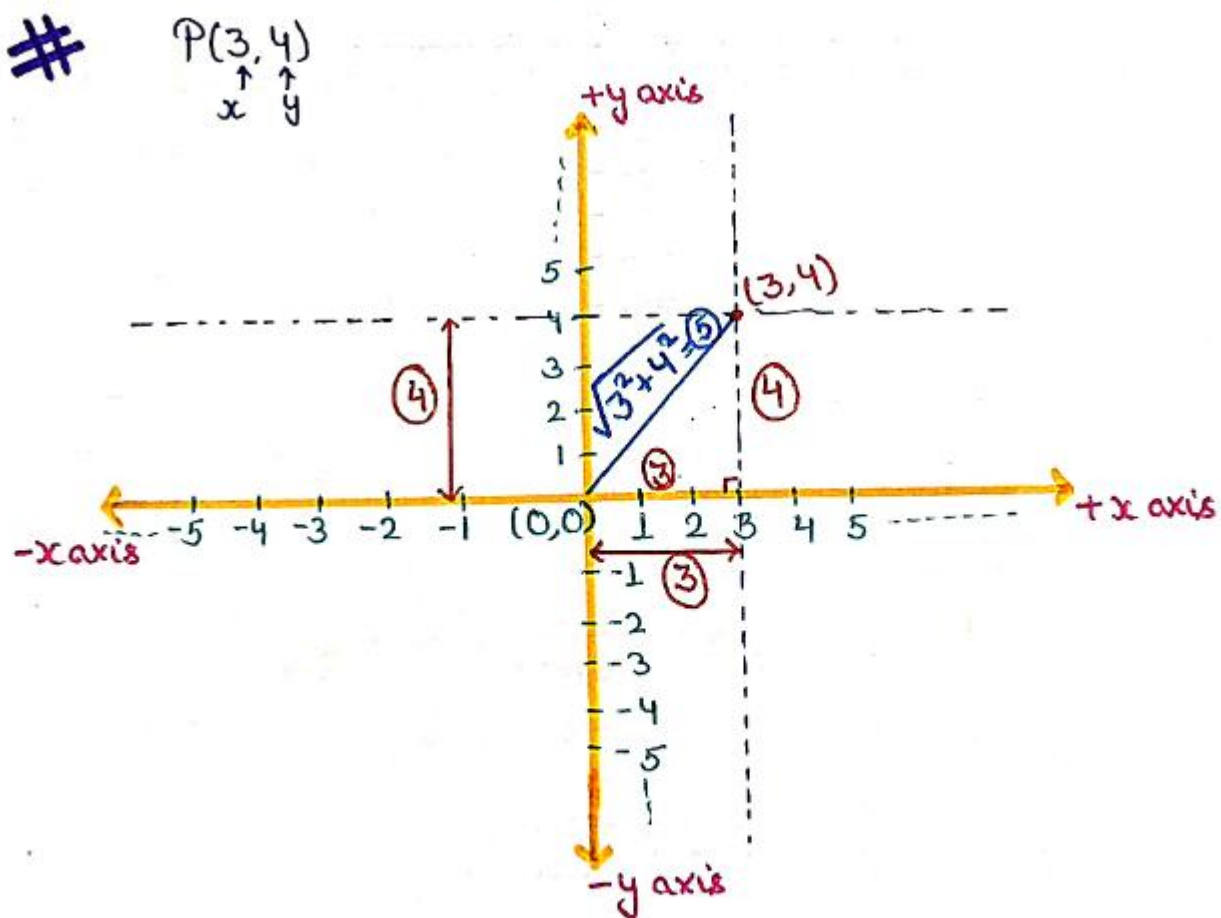
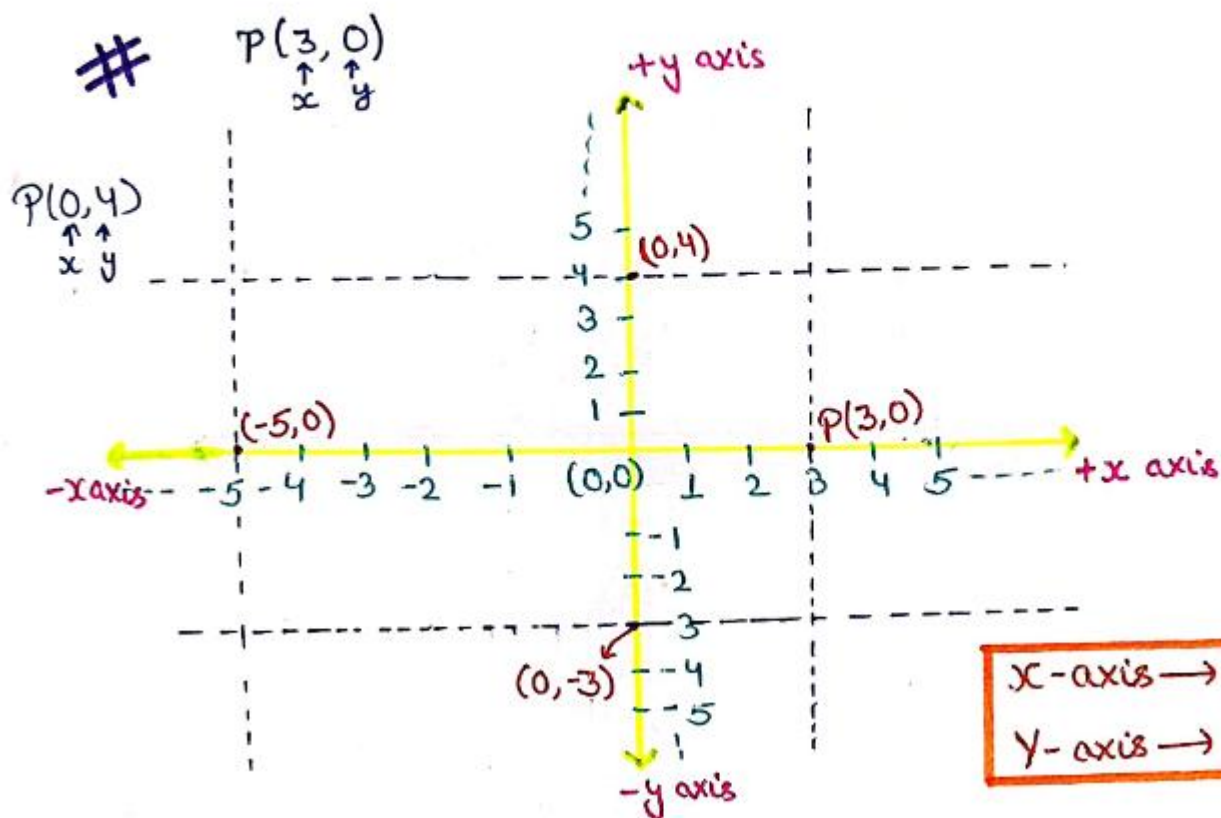
$P(x, y)$
 Coordinates



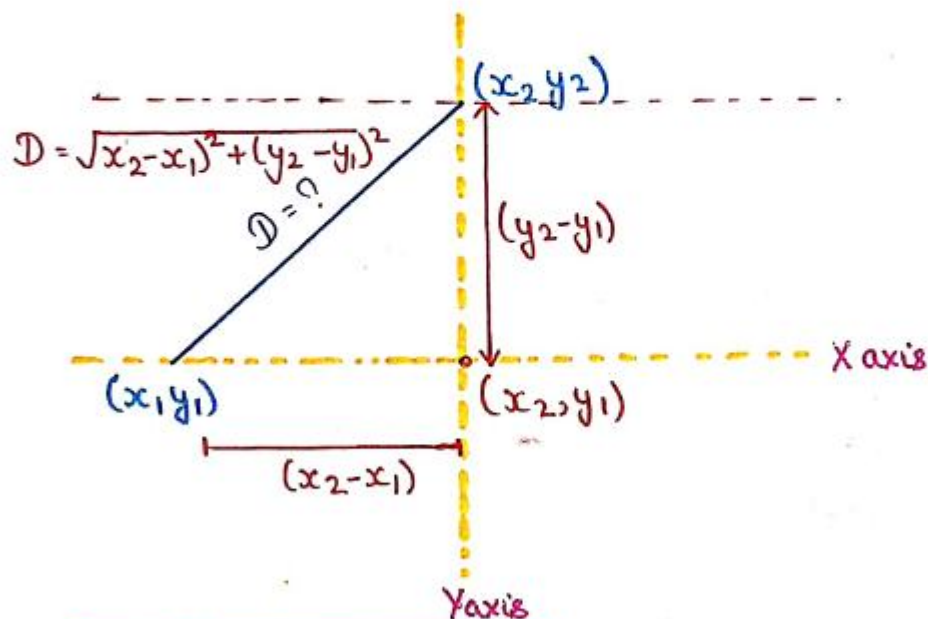
#

$x=2$





DISTANCE BETWEEN TWO POINTS OF A LINE



$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

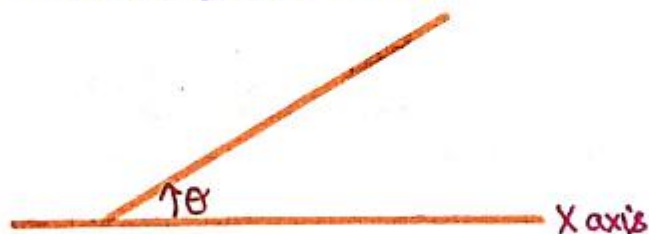
Ex:- $P(3, 7)$ $P(2, 5)$
 $\begin{matrix} x_1 & y_1 & & x_2 & y_2 \end{matrix}$
 $D = ?$

$$\sqrt{(2-3)^2 + (5-7)^2}$$

$$\sqrt{1^2 + 2^2}$$

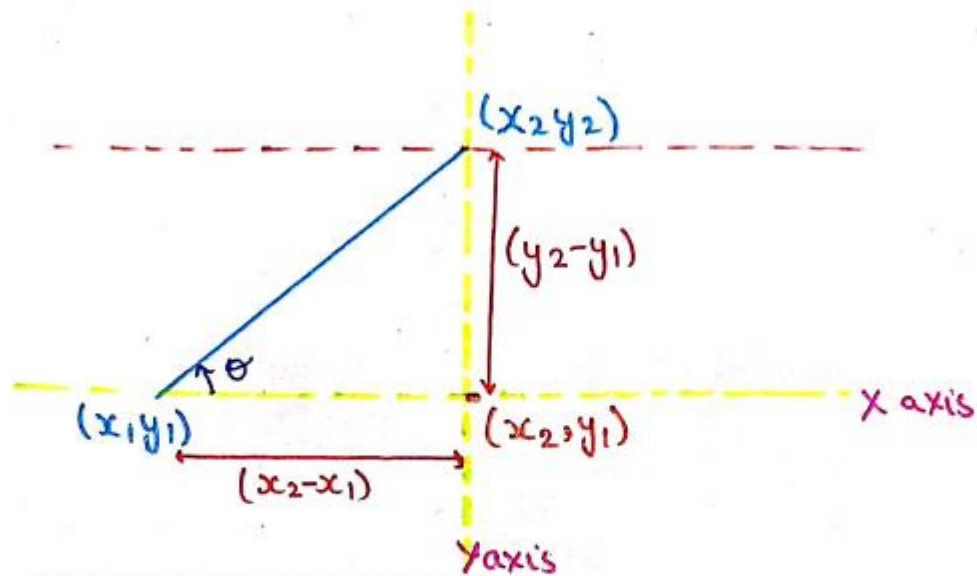
$$D = \sqrt{5}$$

SLOPE (प्रवणता) (m)



X-axis से anticlockwise direction में जो angle बनता है।
 angle = θ

$$(m) \text{ Slope} = \tan \theta$$



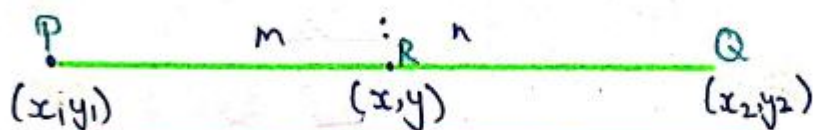
$$m = \tan \theta = \frac{y_2 - y_1}{x_2 - x_1}$$

Ex:- $P(3, 4)$. $P(5, 7)$
 $\begin{matrix} x_1 & y_1 & & x_2 & y_2 \end{matrix}$

Slope = ?

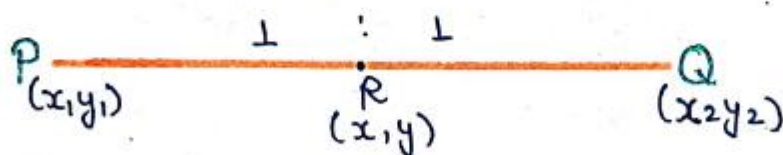
$$m = \tan \theta = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 4}{5 - 3} = \frac{3}{2}$$

SECTION FORMULA



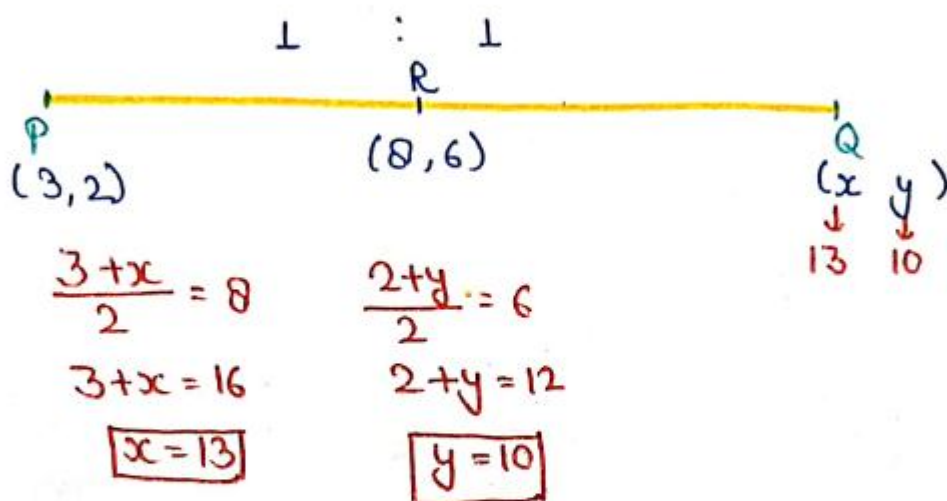
$$(x, y) = \left[\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right]$$

MID POINT FORMULA



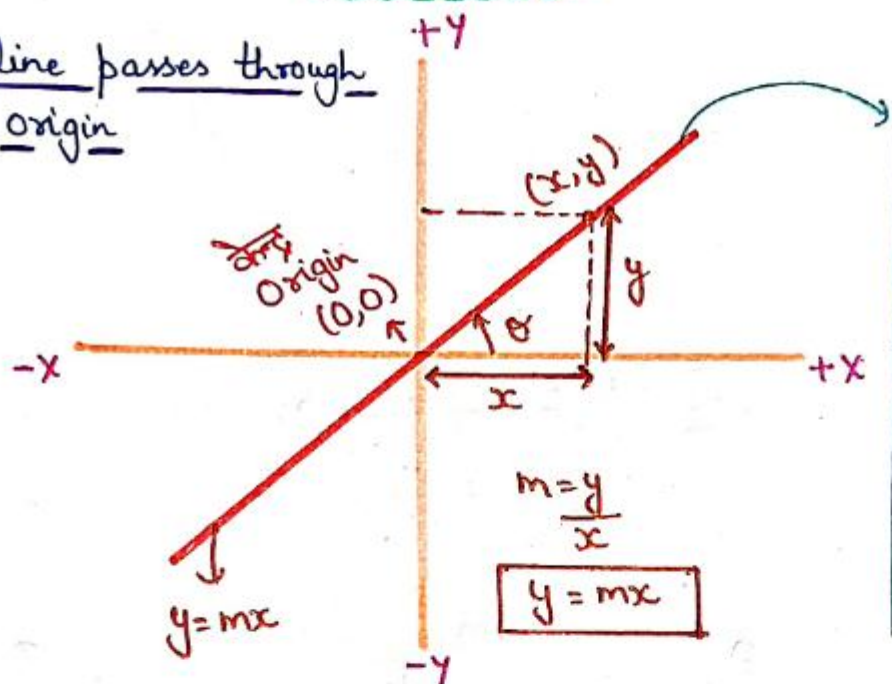
$$x, y = \left[\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right]$$

Ex:-



LINE (रेखा)

When a line passes through origin



$$ax + by + c = 0$$

$$(0, 0)$$

$$ax \cdot 0 + by \cdot 0 + c = 0$$

$$\boxed{c = 0}$$

$$ax + by = 0$$

$$y = \left(\frac{-a}{b} \right) x$$

Slope

Q $3x + 5y + k - 5 = 0$
line passes through origin
 $k = ?$

Sol:

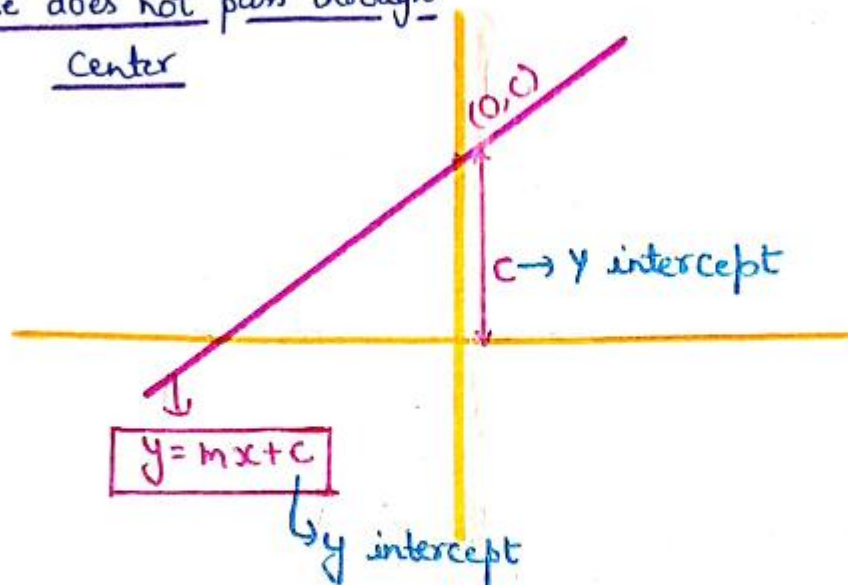
$$3x + 5y + \underbrace{k - 5}_0 = 0$$

$$k - 5 = 0$$

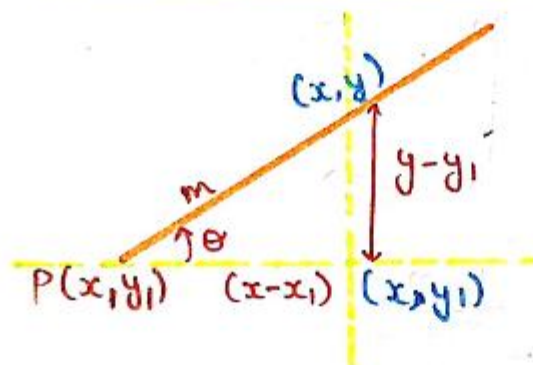
$$\boxed{k = 5}$$

Constant term = 0

If line does not pass through center



If slope of line & coordinates of one point given.



$$\text{Slope} = m = \frac{y - y_1}{x - x_1}$$

$$y - y_1 = m(x - x_1)$$

Ex:-

$$m = 5$$

$$A(3, 4)$$

$$x_1 \quad y_1$$

$$y - y_1 = m(x - x_1)$$

$$y - 4 = 5(x - 3)$$

$$y - 4 = 5x - 15$$

$$y - 5x - 4 + 15 = 0$$

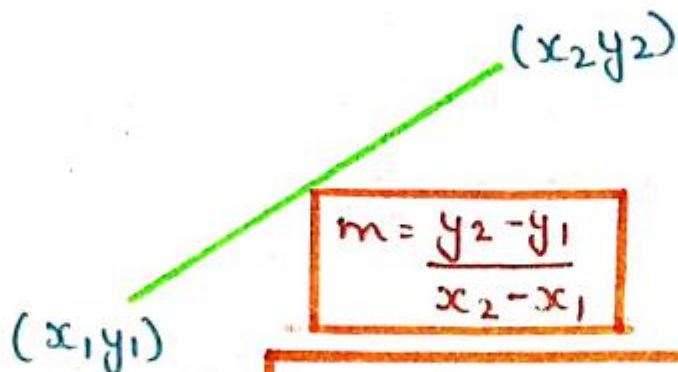
$$y - 5x + 11 = 0$$

$$-5x + y + 11 = 0$$

$$5x - y - 11 = 0$$

$$ax + by + c = 0$$

If Coordinates of Two points Given



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1} (x - x_1)$$

* General eqⁿ

$$ax + by + c = 0$$

$$by = -ax - c$$

$$y = -\frac{a}{b}x - \frac{c}{b}$$

$$y = mx + c$$

Compare

$$\text{Slope (m)} = -\frac{a}{b}$$

$$\text{Slope} = -\frac{\left[\text{Coefficient of } x \right]}{\left[\text{Coefficient of } y \right]}$$

Ex:- $5x + 4y + 9 = 0$

$$m = ?$$

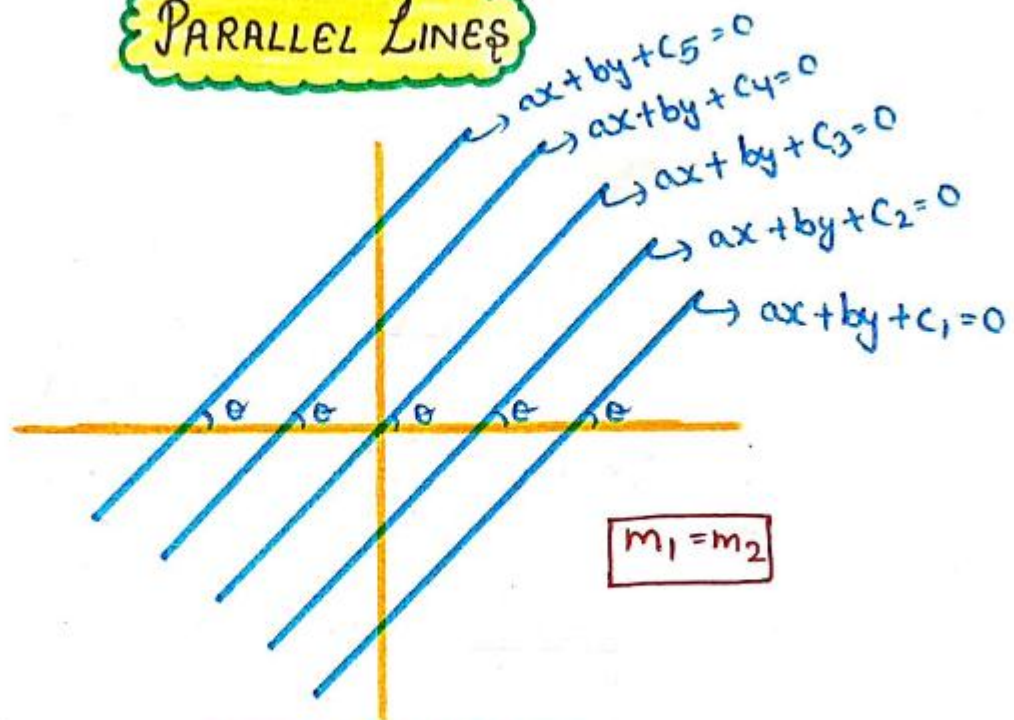
$$m = -\frac{5}{4}$$

Ex:- $3x - 2y + 4 = 0$

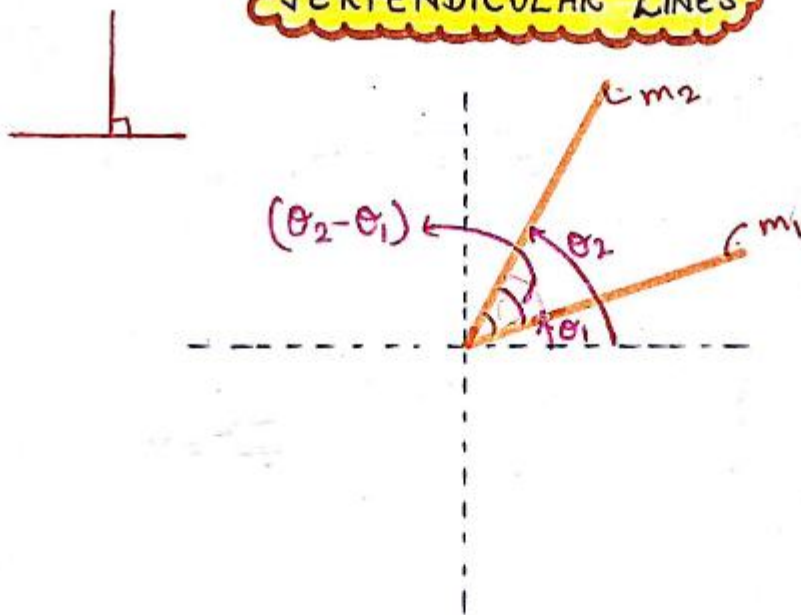
$$m = ?$$

$$m = \frac{+3}{+2} = \frac{3}{2}$$

PARALLEL LINES



PERPENDICULAR LINES



$$\tan(\theta_2 - \theta_1) = \frac{\tan \theta_1 - \tan \theta_2}{1 + \tan \theta_1 \tan \theta_2} = \frac{m_1 - m_2}{1 + m_1 m_2}$$

$$\tan(\theta_2 - \theta_1) = \frac{m_1 - m_2}{1 + m_1 m_2}$$

If lines are $\perp$ then
angle = 90°

$$\theta_2 - \theta_1 = 90^\circ$$

$\tan 90^\circ = \text{Not defined}$
 $\left[\frac{1}{0}\right]$

$$1 + m_1 m_2 = 0$$

$$m_1 m_2 = -1$$

$$m_2 = -\frac{1}{m_1}$$

$$m_1 = -\frac{a}{b} \quad \underline{\text{Ex:}} \quad ax + by + c = 0 \quad \text{--- ①}$$

$$m_2 = +\left(+\frac{b}{a}\right) \quad bx - ay + c = 0 \quad \text{--- ②}$$

$$\begin{array}{l} b \rightarrow x \text{ coeff} \\ a \rightarrow y \text{ coeff} \end{array}$$

1 & 2 are $\perp$ or

$$ax - by + c = 0$$

$$bx + ay + c = 0$$