

Foundation Batch



MATHS

Coordinate Geometry

LIVE



निर्देशांक ज्यामिति

Coordinate Geometry

↳ Points which are used to locate the position.

$P(x, y) \rightarrow$ coordinates

$P(x, y)$
Coordinates

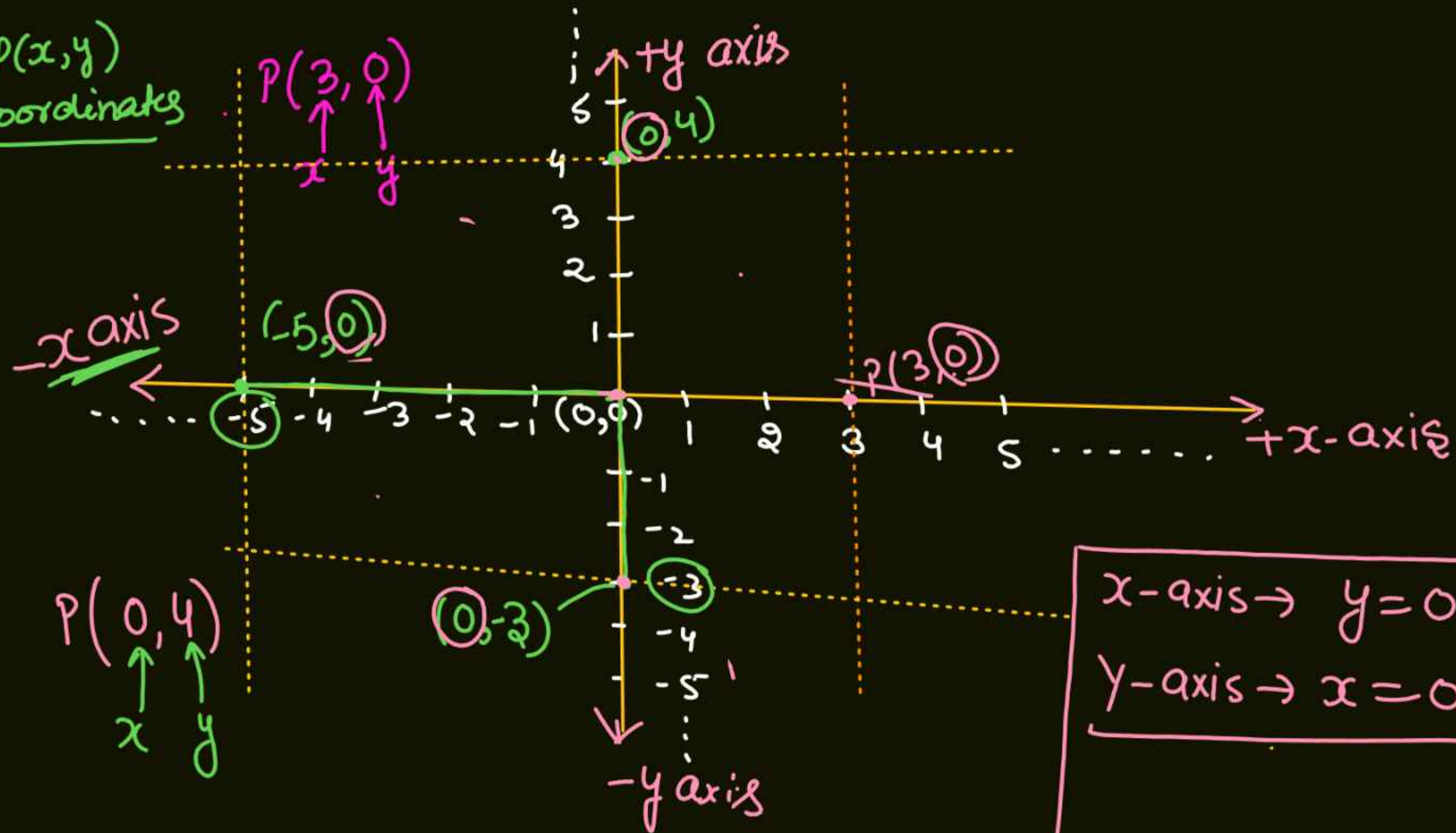
$x=2$

$y=4$

$-x$ axis



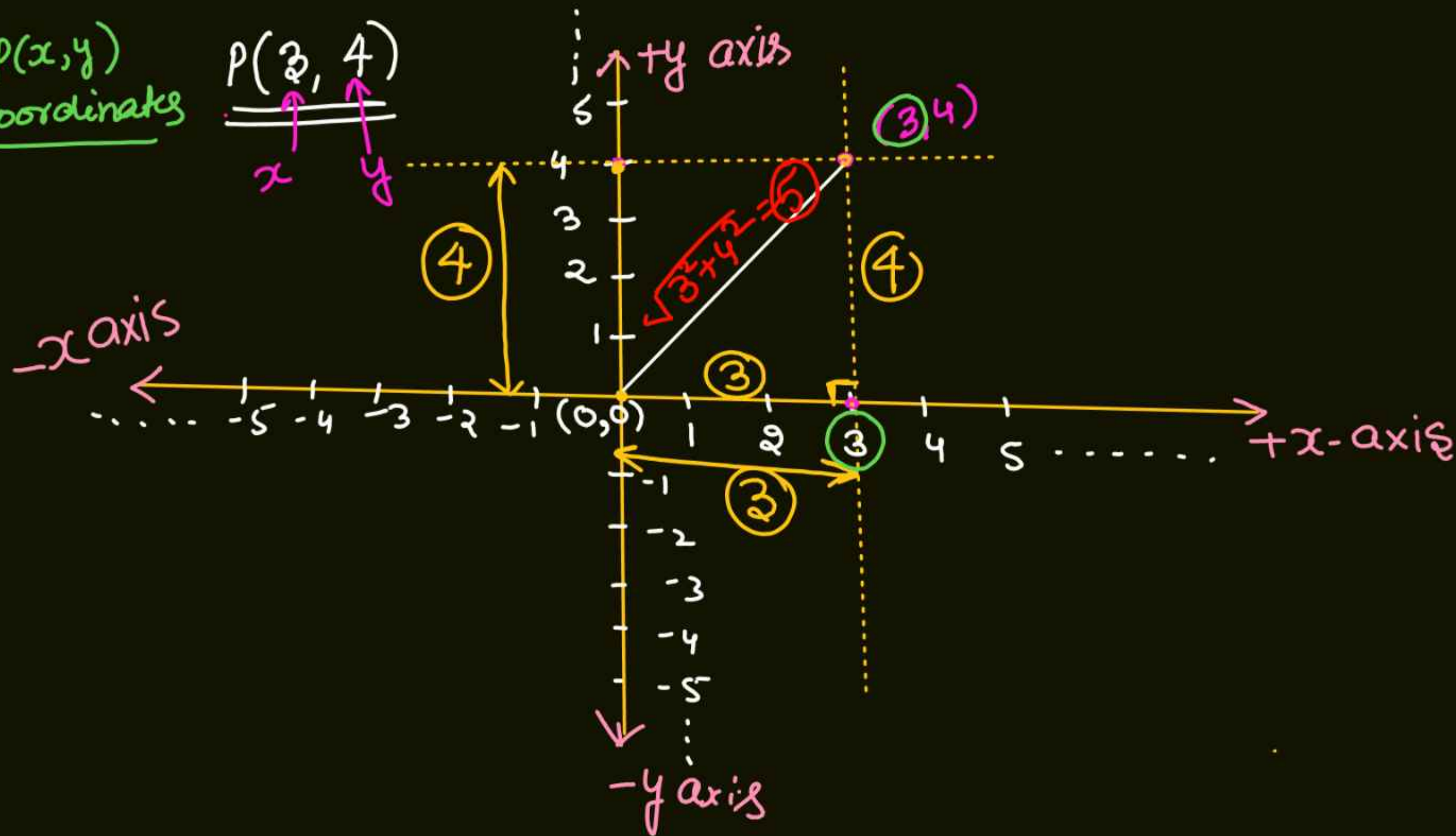
$P(x, y)$
Coordinates



x -axis $\rightarrow y=0$
 y -axis $\rightarrow x=0$

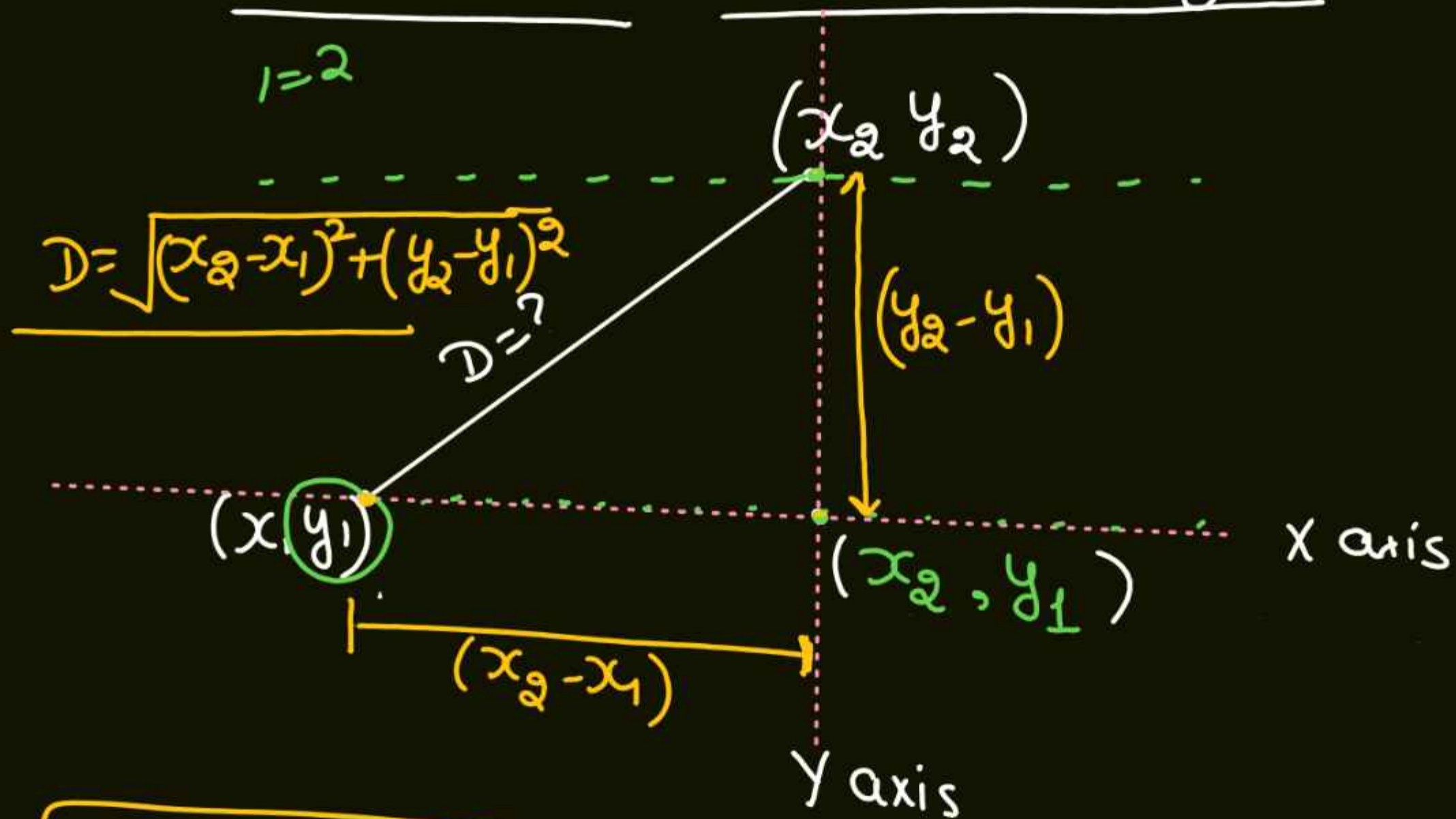
$P(x, y)$
Coordinates

$P(3, 4)$
 x y



Distance between two points & line.

$1=2$



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

$D = ?$

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

ex.

$$P \begin{pmatrix} 3, & 7 \\ x_1 & y_1 \end{pmatrix}$$

$$P \begin{pmatrix} 2, & 5 \\ x_2 & y_2 \end{pmatrix}$$

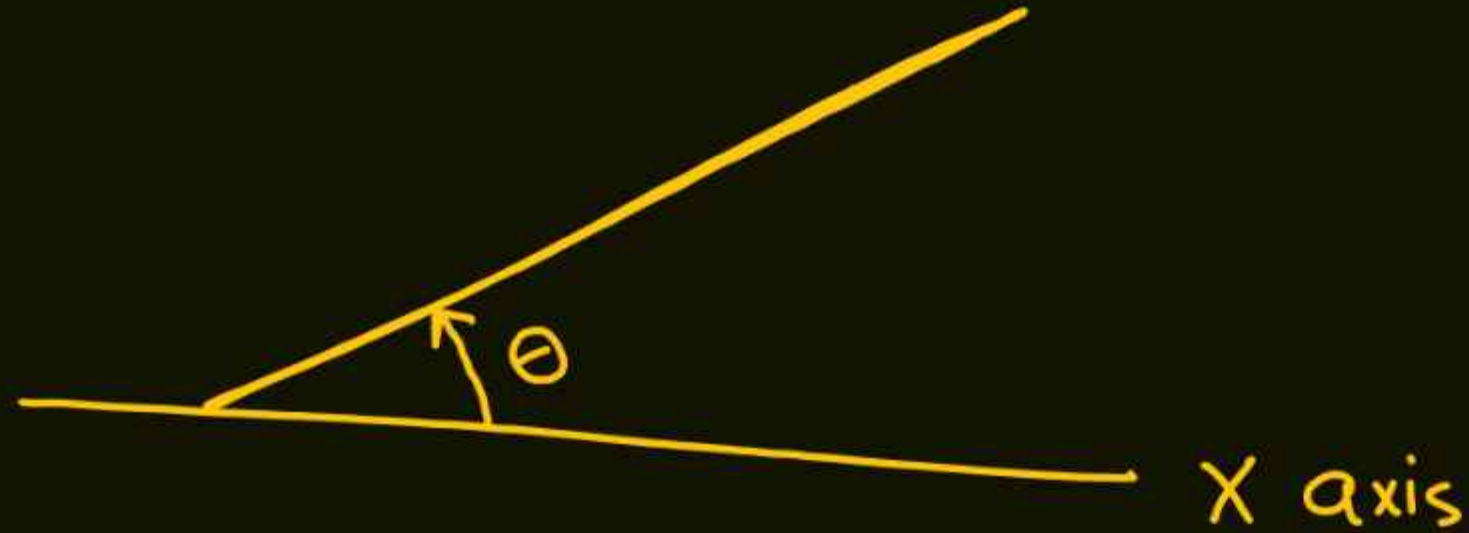
$$D = ?$$

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

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

$$D = \underline{\underline{\sqrt{5}}}$$

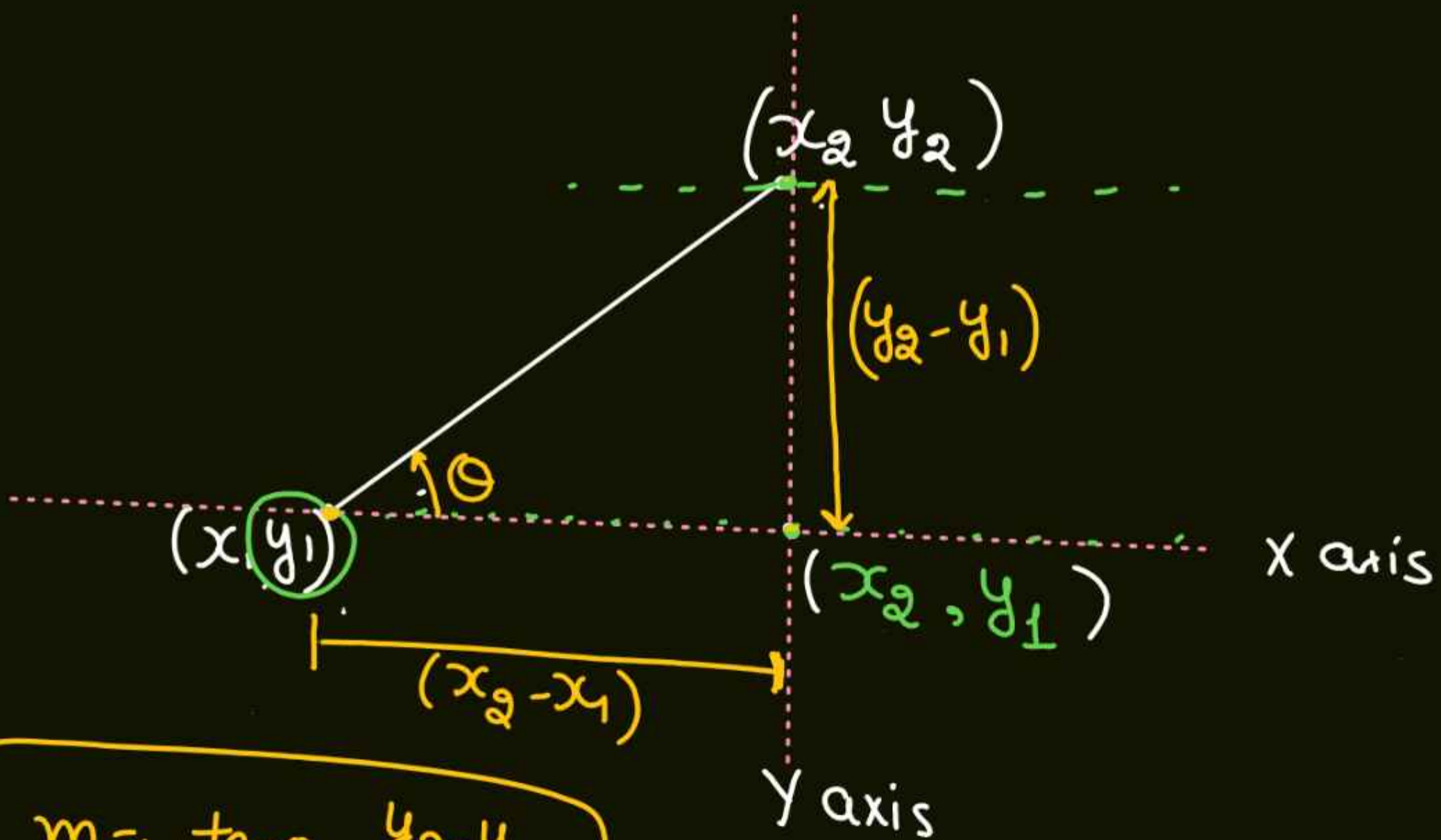
SLOPE (प्रवणता) (m)



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

$$\text{Angle} = \theta$$

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



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

ex.

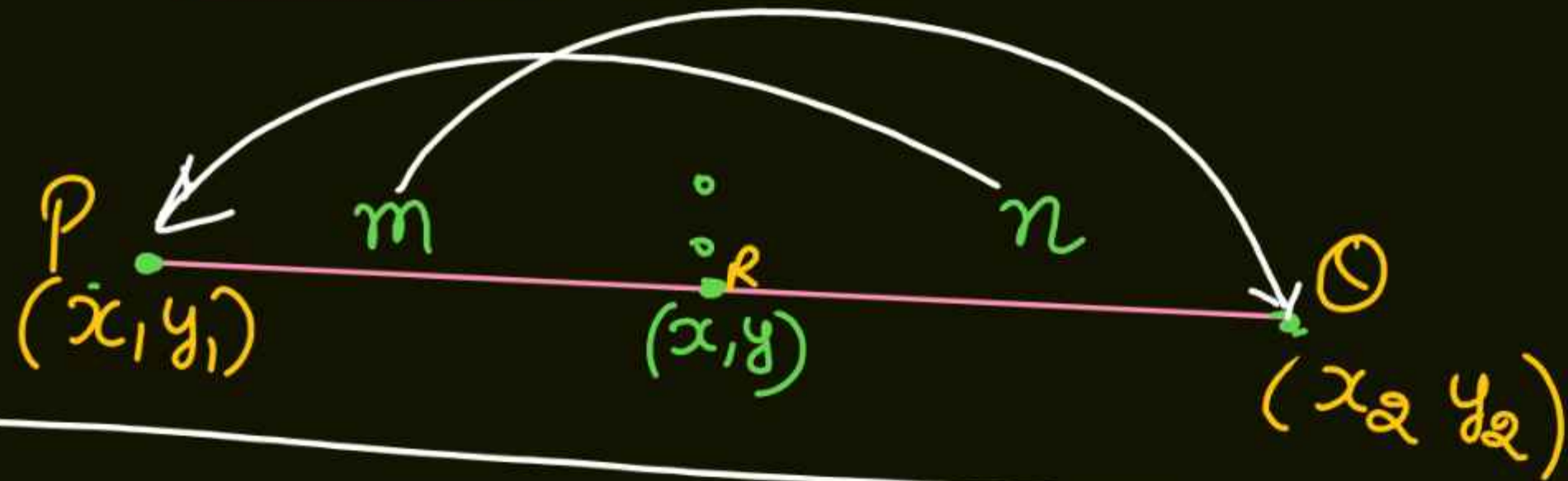
$$P(\underset{x_1}{3}, \underset{y_1}{4})$$

$$P(\underset{x_2}{5}, \underset{y_2}{7})$$

Slope = ?

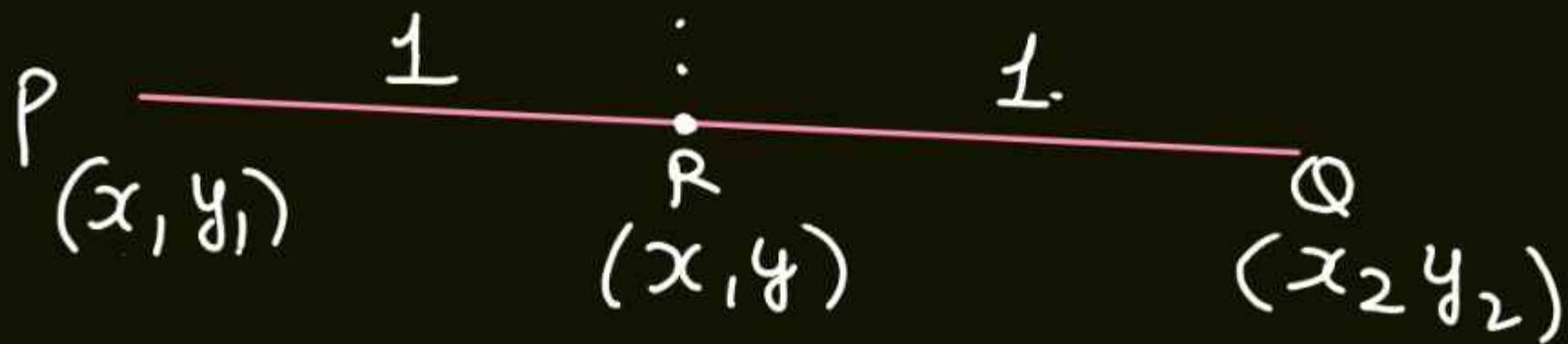
$$m = \text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 4}{5 - 3} = \frac{3}{2}$$

★ # SECTION FORMULA.

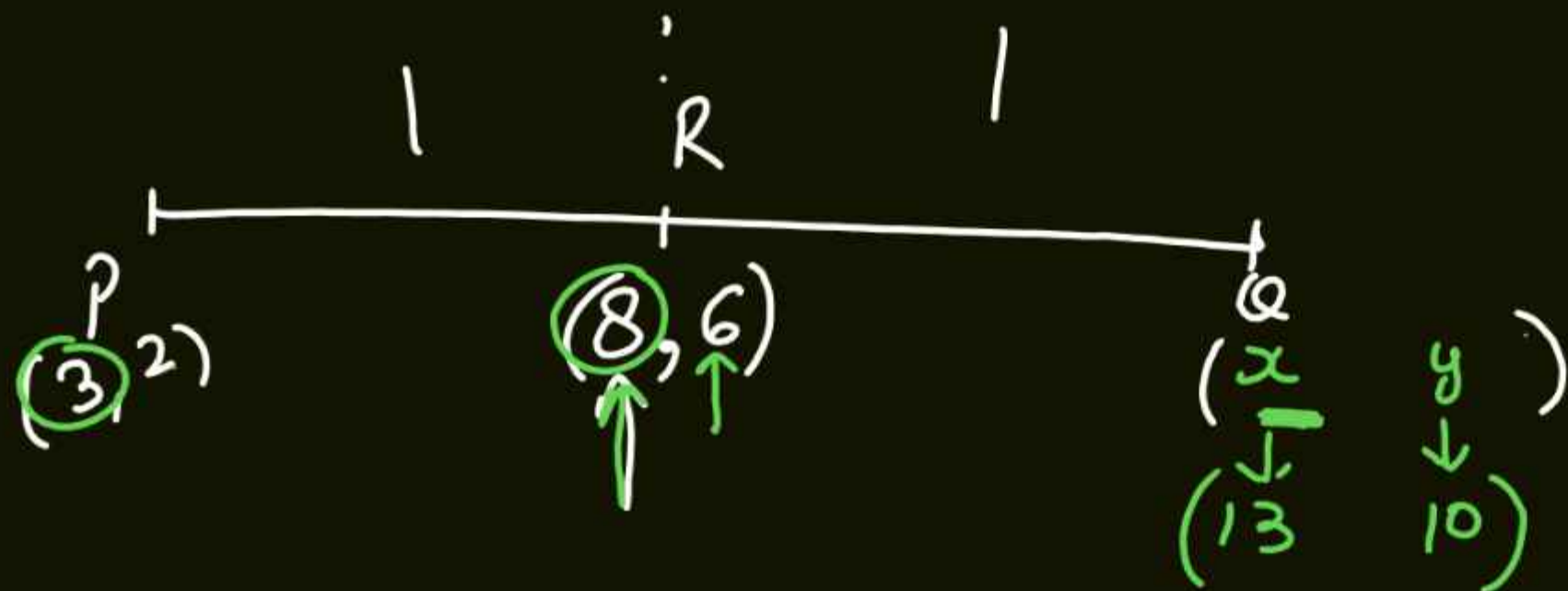


$$(x, y) = \left[\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right]$$

Mid point formula.



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



$$\frac{3+x}{2} = 8$$

$$3+x=16$$

$$x=13$$

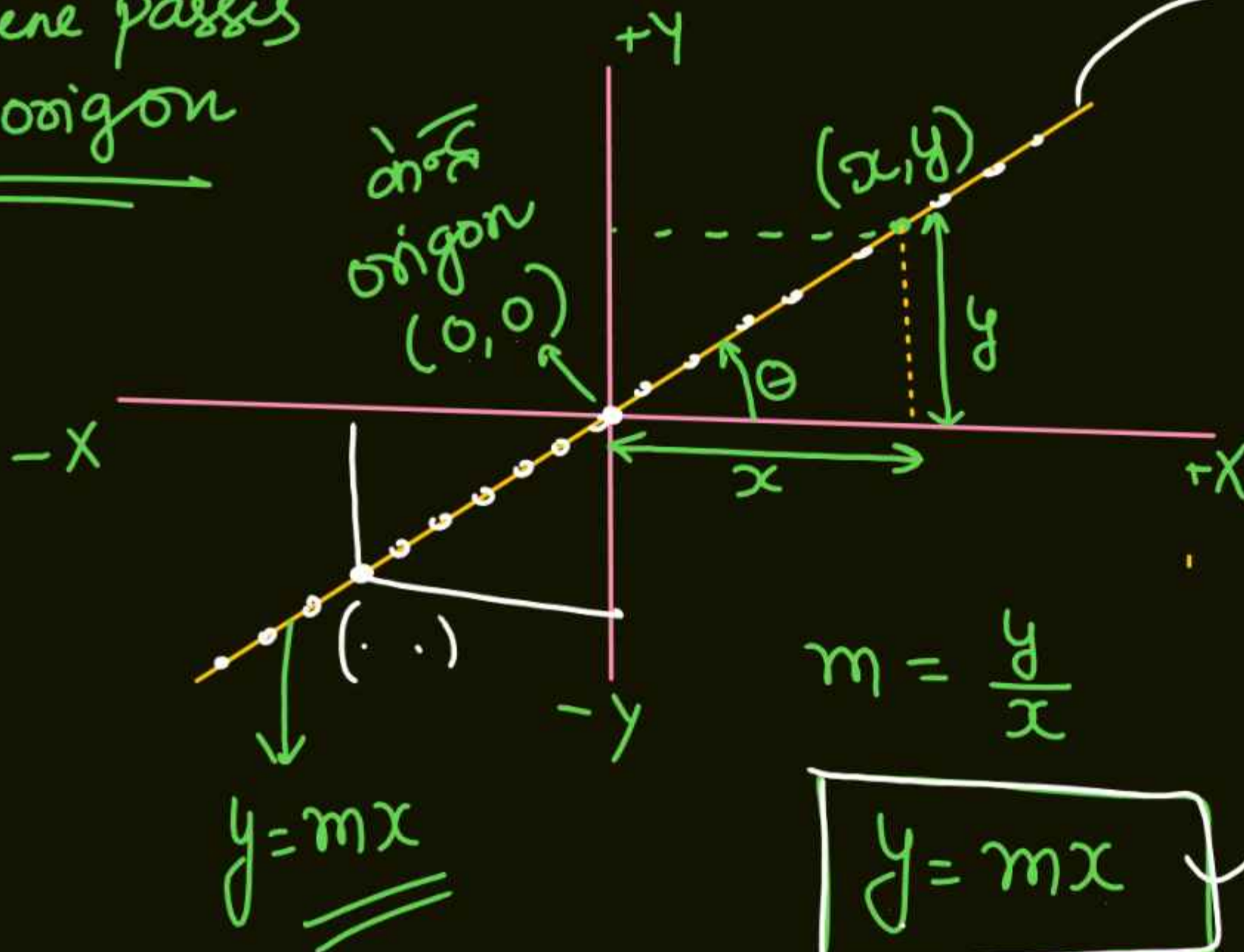
$$\frac{2+y}{2} = 6$$

$$2+y=12$$

$$y=10$$

LINE (रेखा)

When a line passes through origin



$$m = \frac{y}{x}$$

$$y = mx$$

$$ax + by + c = 0$$

(0, 0)

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

$$c = 0$$

Imp.

$$ax + by = 0$$

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

Slope

Q

$$3x + 5y + k - 5 = 0$$

line passes through origin

$$k = ?$$

Sol.

$$\underline{3x} + \underline{5y} + \textcircled{k-5} = 0$$

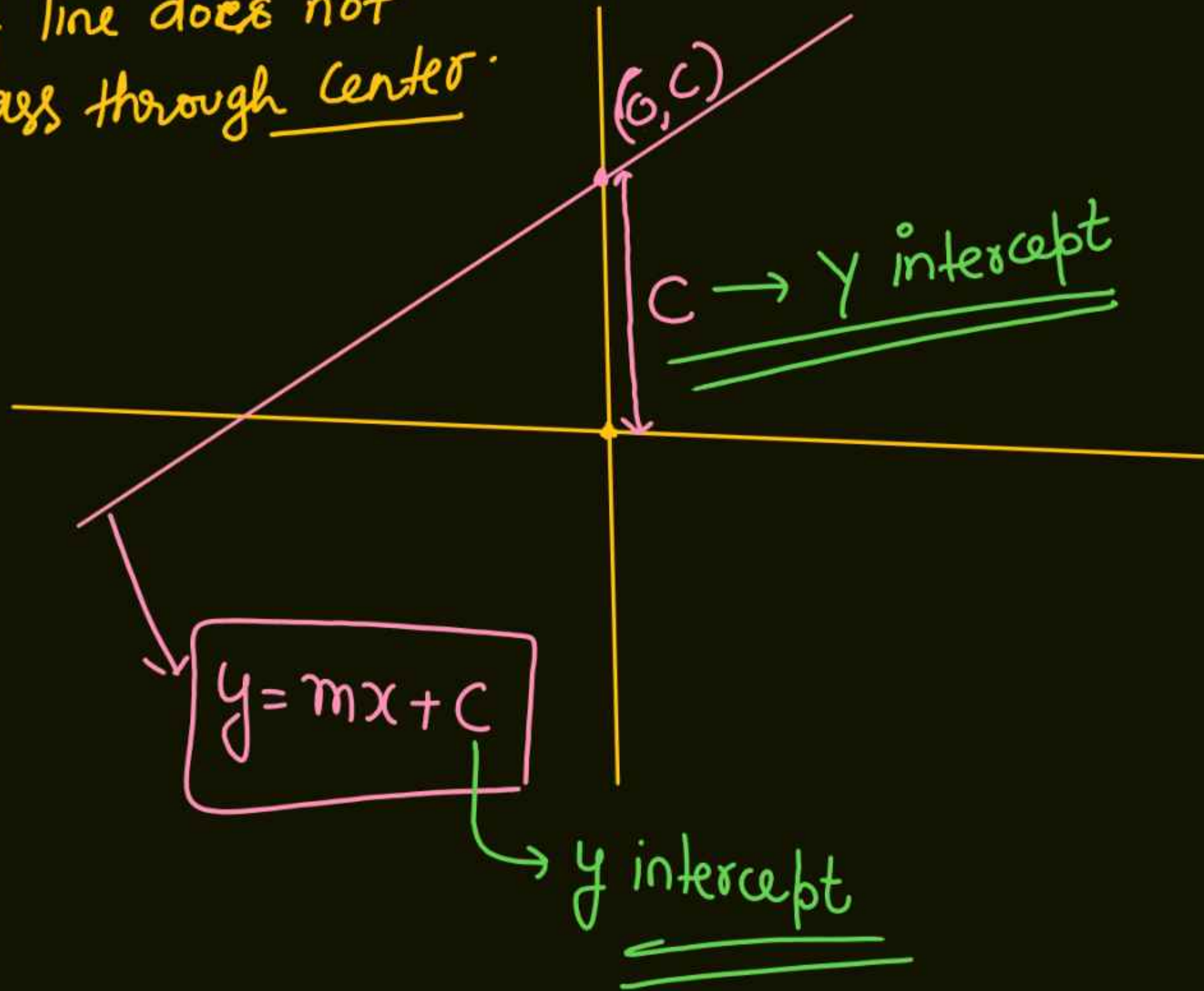
0

Constant term = 0

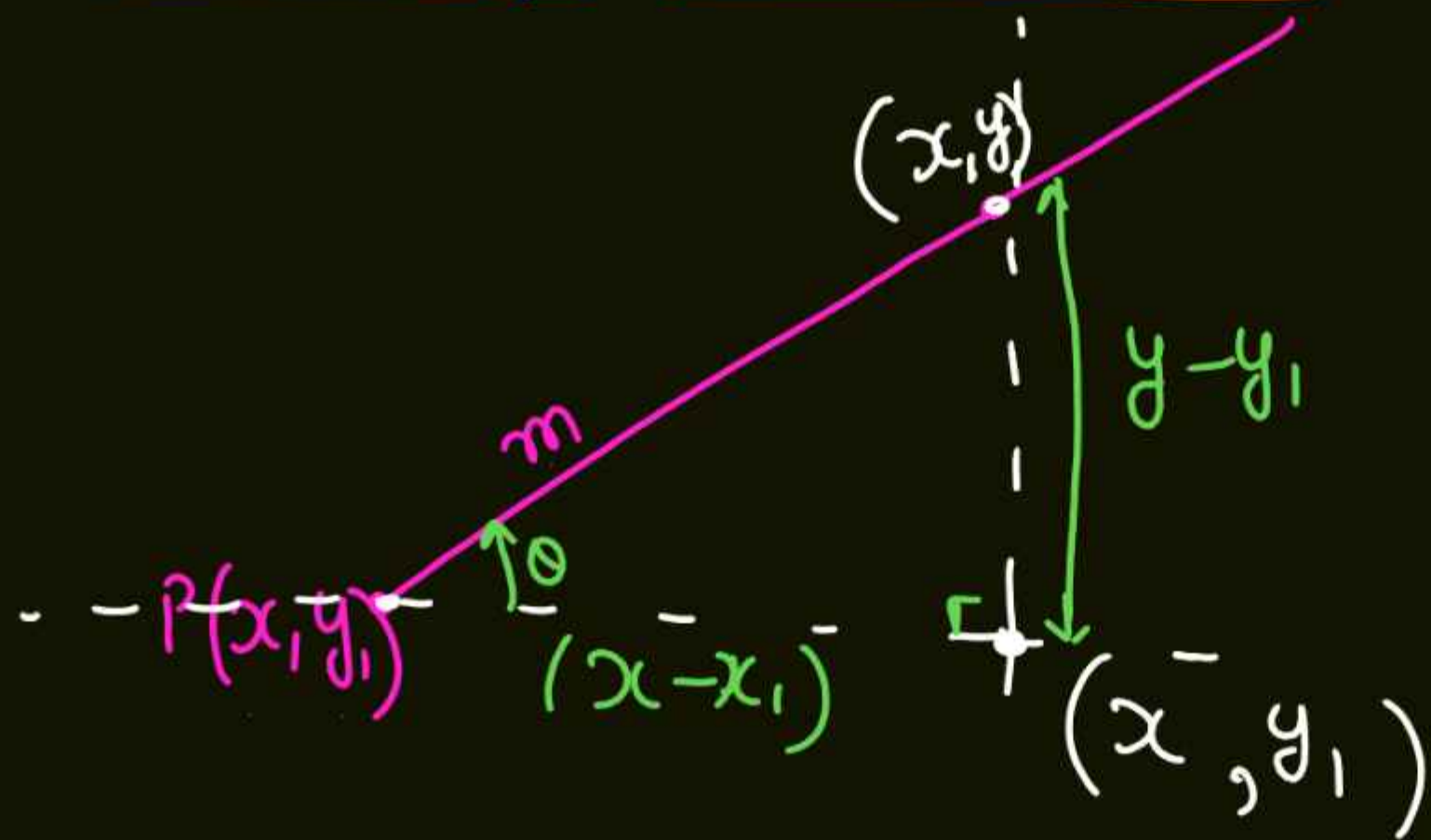
$$k - 5 = 0$$

$$\boxed{k = 5}$$

If line does not
pass through center.

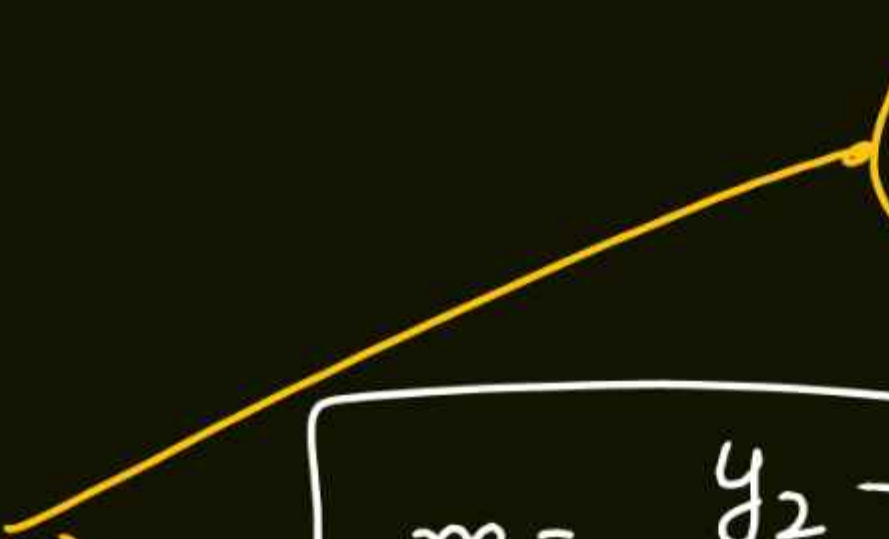


If Slope of line & Coordinates of
one point given



$$\text{Slope} = m = \frac{y - y_1}{x - x_1} \Rightarrow \boxed{y - y_1 = m(x - x_1)}$$

If Coordinates of two points given

(x_1, y_1)  (x_2, y_2)

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

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

General eqⁿ

$$ax + by + c = 0$$

y intercept

$$= -\frac{c}{a}$$

$$by = -ax - c$$

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

$$y = mx + c$$

Compare

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

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

$$5x + 4y + 9 = 0$$

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

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

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

ex.

$$m=5$$

$$A(3, 4)$$

x_1 y_1

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

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

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

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

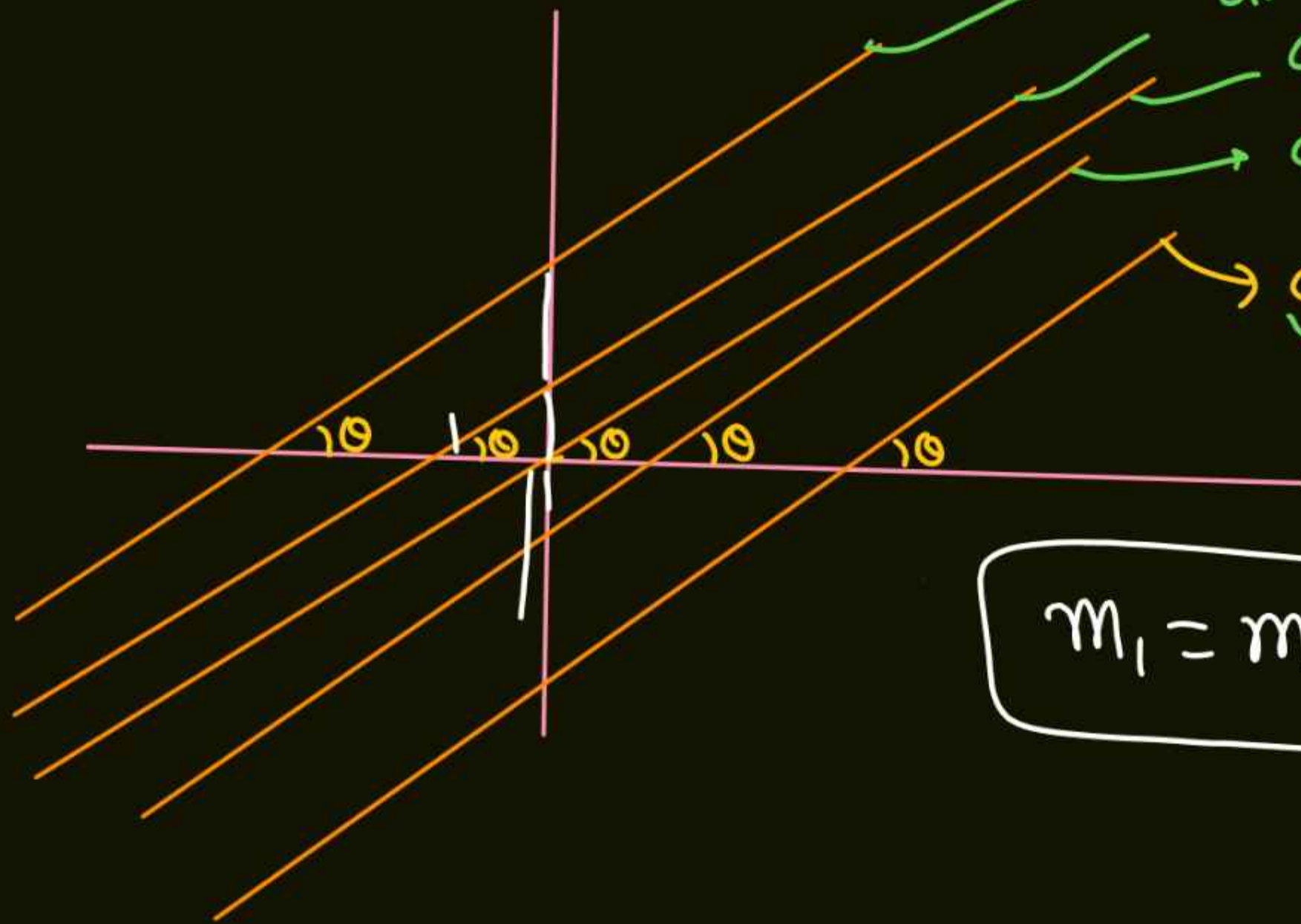
$$y - 5x + 11 = 0$$

$$ax + by + c = 0$$

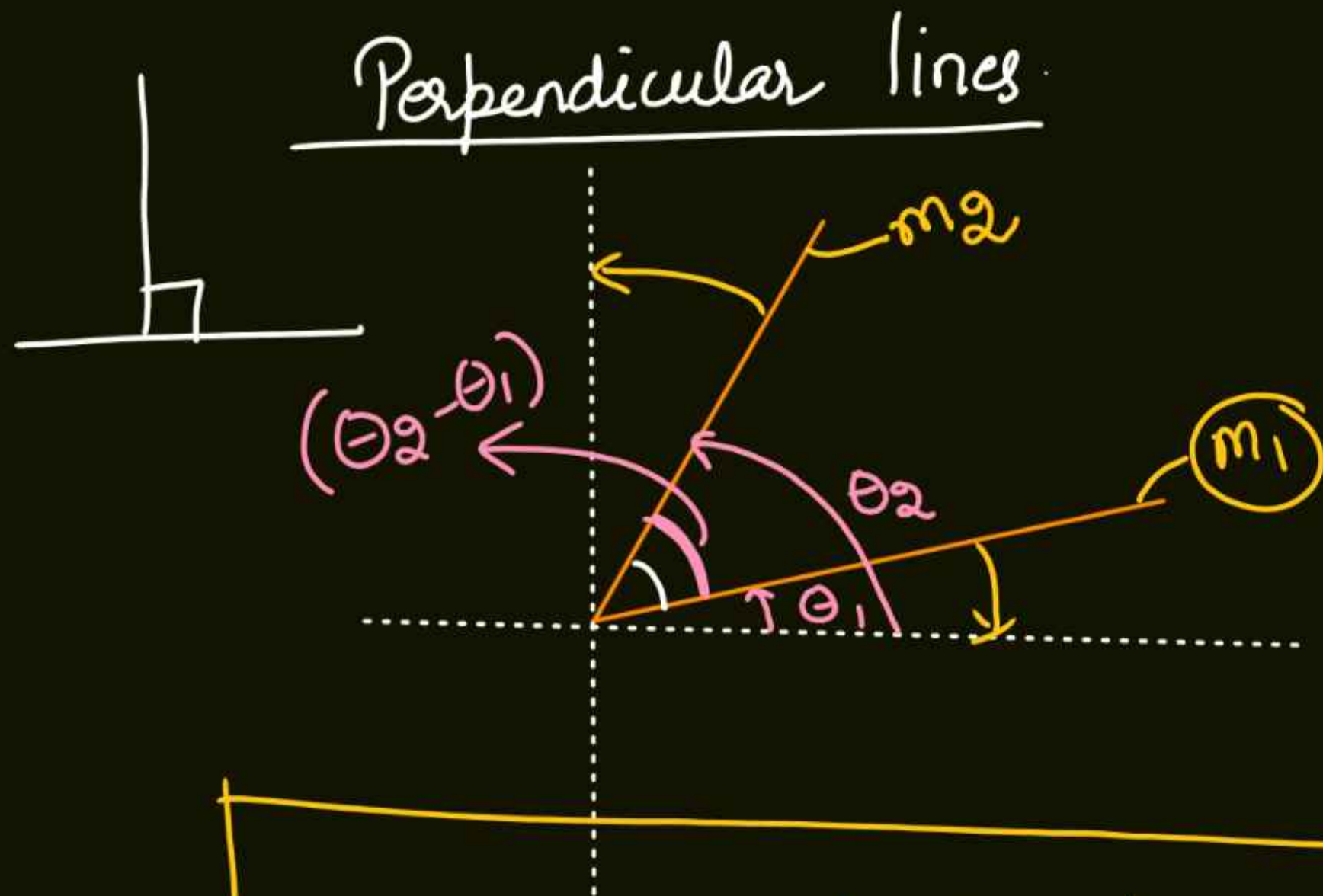
$$-5x + y + 11 = 0$$

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

Parallel lines



$$m_1 = m_2$$



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

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

If lines are $\perp$
angle = 90°

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

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

$$1 + m_1 m_2 = 0$$

$$m_1 m_2 = -1$$

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

$$m_1 = -\frac{a}{b}$$

$$ax + by + c = 0 \quad \text{--- ①}$$

$$bx - ay + c = 0 \quad \text{--- ②}$$

$$m_2 = +\left(\frac{+b}{a}\right)$$

$\left(\frac{b}{a}\right)$ $\xrightarrow{\text{ } x \text{ coeff}}$
 $\left(\frac{b}{a}\right)$ $\xrightarrow{\text{ } y \text{ coeff}}$

① & ② are $\perp$

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

$$bx + ay + c = 0$$