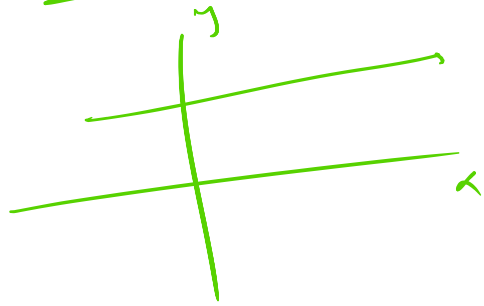
various form of Equation of a Line

Horizontal



Q Find eq^n $\parallel^r$ to axes passes through $(-2, 3)$

↓

x, y

$$y = mx + c \quad \text{——— (1)}$$

$$(2)\quad y - y_0 = m(x - x_0) + C$$

$c = 0$
$c = ?$

$y = 3$, $\boxed{x = -2}$

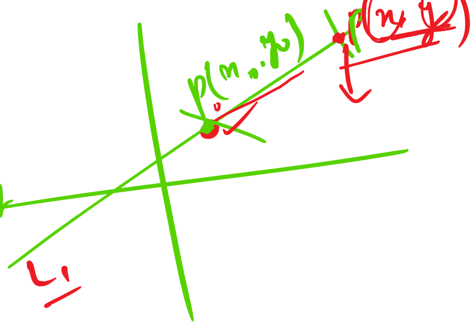
1 point

1 point

point - slope form

general formula two point

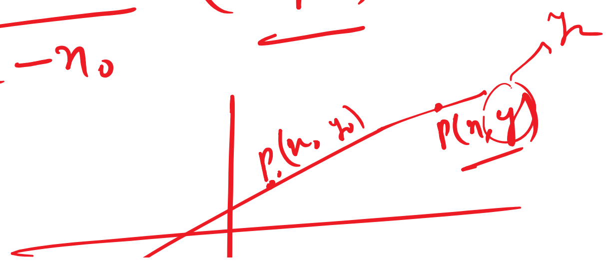
$$\tan\theta = m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{——— (1)}$$



point slope

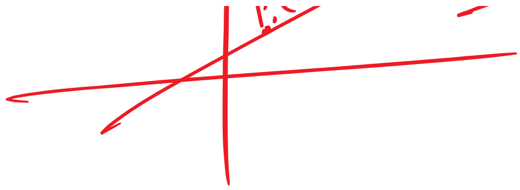
$P(x_0, y_0)$, $P_2(x, y)$

$$m = \frac{y - y_0}{x - x_0} \quad (\text{slope})$$



$y - y_0$

$$m = \frac{y - y_0}{x - x_0}$$



$$\cancel{y = mx + c}$$

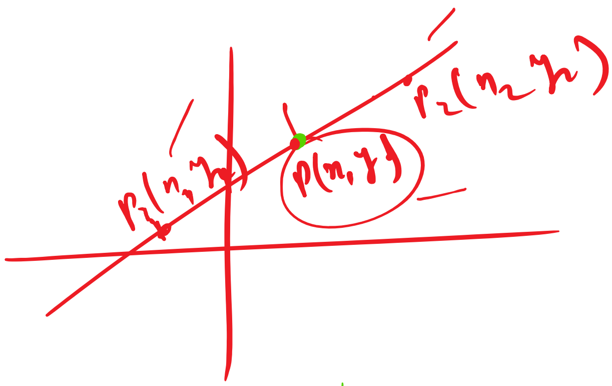
(1) $\boxed{y - y_0 = m(x - x_0)}$ → point slope

$P(x_0, y_0)$ — (1)

let $p(x, y)$ point on the line

$$m = \frac{y - y_0}{x - x_0} \Rightarrow \boxed{y - y_0 = m(x - x_0)}$$

Two-point



Two point

Colinear

Colin

slope of line

(I) $\frac{y - y_1}{x - x_1} = m_1$, $m_2 = \frac{y_2 - y}{x_2 - x}$

(II) $m_3 \Rightarrow \frac{y_2 - y_1}{x_2 - x_1}$

$$m_1 = m_3 \quad \text{— ① (colinear)}$$

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

$$\boxed{y-y_1 = m(x-x_1)}$$

Two point

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

Q write eqn $P_1(1,-1)$ & $P_2(3,5)$

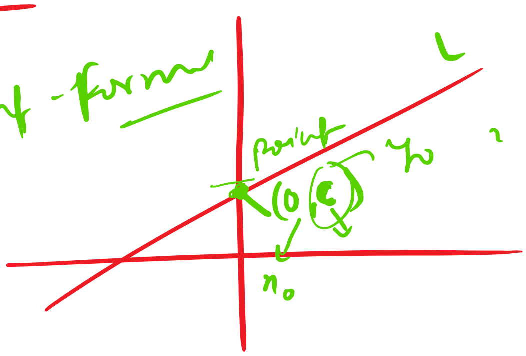
$$y-3x+4=0$$

Slope - intercept form

Case ①

$$\boxed{y = mx + c}$$

point-form



$$y - c = m(x-0)$$

y-intercept

$$\boxed{y = mx + c}$$

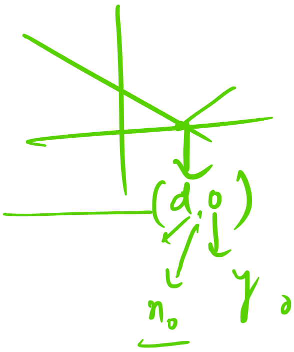
② $$\boxed{y-y_0 = m(x-x_0)}$$

Two point

m Two m

① $\boxed{y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)}$

Case (ii) x-axis intercept 'd'



why y

$y - y_0 = m(x - x_0)$

$y - 0 = m(x - d)$

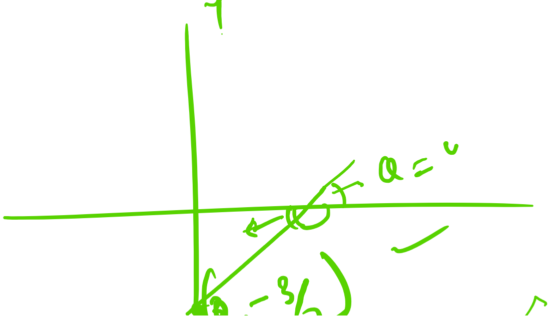
$\boxed{y = m(x - d)}$

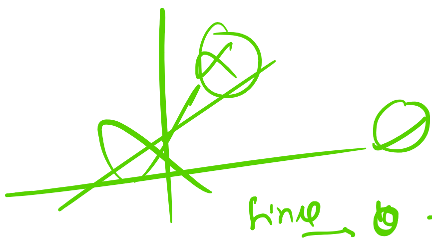
x-intercept

$\tan\theta = \frac{1}{2}$ (i)

θ is inclination

(i) y-intercept $= \left(-\frac{3}{2}\right)$ (ii) $x \to y$





$\tan\theta = \frac{1}{2}$

sinθ → 0 $\frac{1}{2}$ $\frac{\sqrt{3}}{2}$ 1

cosθ → 1 $\frac{\sqrt{3}}{2}$ $\frac{1}{2}$ 0 fig

$(0, -3/2)$

$P_1(0, -3/2)$

point

general

$$\boxed{y - y_1 = m(x - x_1)}$$

$\tan\theta = \frac{1}{2}$

$\theta = \tan^{-1}\left(\frac{1}{2}\right)$

1.107 rad

$1.107 \times \frac{180}{3.14}$

63.435

(i) $y + \frac{3}{2} = m(x - 0)$

$y = \frac{1}{2}x - \frac{3}{2}$

$$\boxed{2y = x - 3}$$

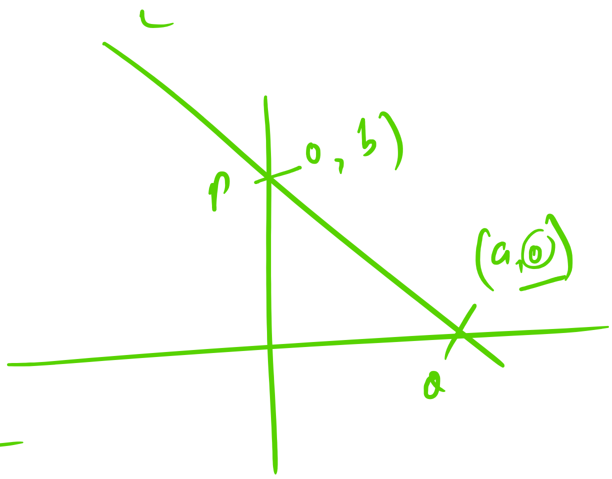
(ii) $2y = x - 4$

90

Carry

$(8, 9)$

intercept form



this general for

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

$$y - 0 = \frac{b - 0}{0 - a}(x - a)$$

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

$\frac{bx}{-a}$ -

$$\frac{y}{b} = -\frac{x}{a} + 1$$

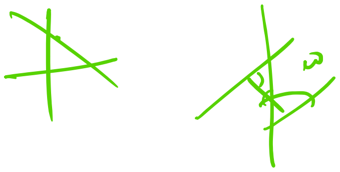
$$\boxed{\frac{y}{b} + \frac{x}{a} = 1}$$

$-a$

$$\boxed{\frac{y}{b} + \frac{x}{a} = 1}$$

$$\boxed{\frac{y}{b} + \frac{x}{a} = 1}$$

$$\boxed{\frac{y}{b} + \frac{x}{a} - 1 = 0}$$



Normal Form

(i) length of ⊥ (normal) from origin to the line

(ii) Angle which normal makes with the positive direction of x-axis.

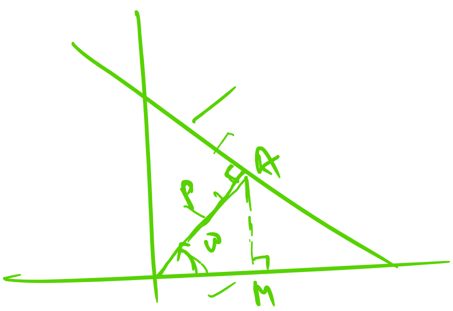
polar

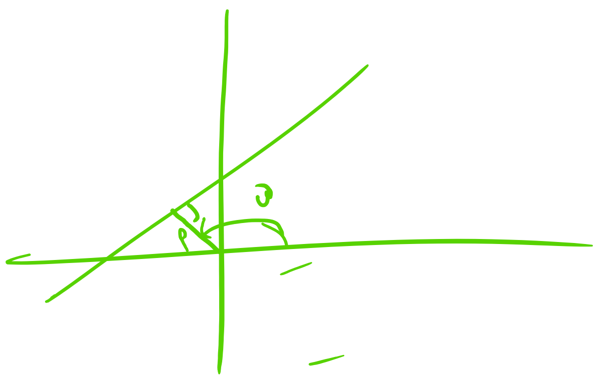
cartesian

$$\boxed{y - p\sin\omega = -\frac{\cos\omega}{\sin\omega}\left(x - p\cos\omega\right)}$$

$$\boxed{x\cos\omega + y\sin\omega = p}$$

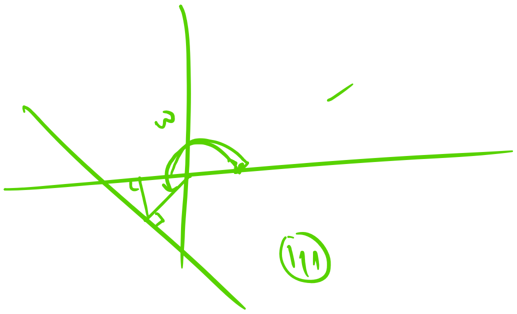
new

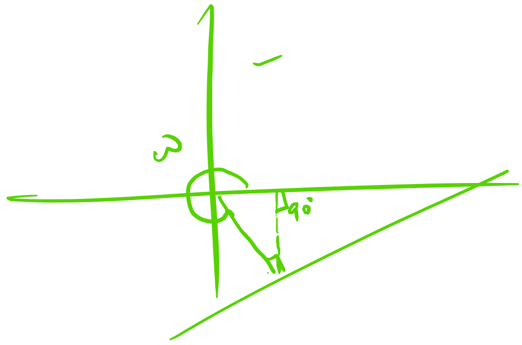


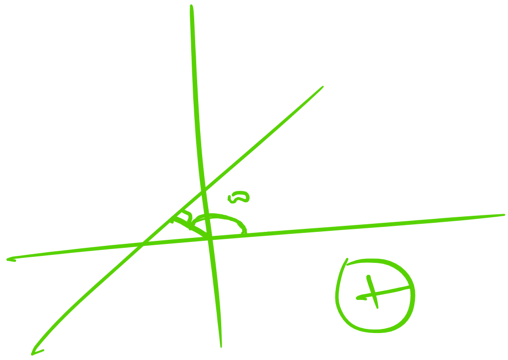


1)

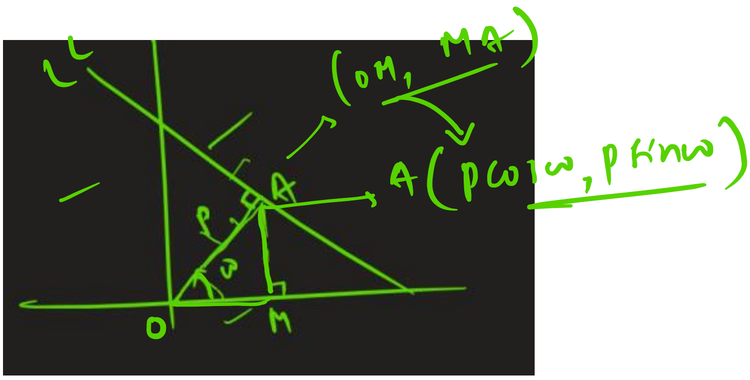
ii)







in each case



$\boxed{OM = p\cos\omega}$

$MA = p\sin\omega$

$L \perp OA$ perpendicular

$(\because m_1 m_2 = -1)$

slope of the line $L = -\dfrac{1}{\text{slope } OA}$

inverse

$$\boxed{\text{slope of } L = -\frac{1}{\tan\omega} = -\frac{\cos\omega}{\sin\omega}}$$

$m_L \cdot m_{OA} = -1$

$$y - p\sin\omega = -\frac{\cos\omega}{\sin\omega}\left(x - p\cos\omega\right)$$

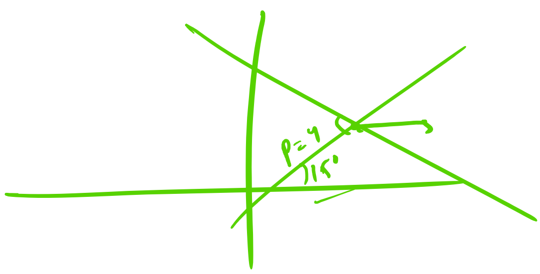
$$y\sin\omega - p\sin^2\omega = -x\cos\omega + p\cos^2\omega$$

$$y\sin\omega + x\cos\omega = p\,(\underbrace{\cos^2\omega + \sin^2\omega}_{1})$$

$$\boxed{y\sin\omega + x\cos\omega = p}$$

$$\boxed{Y = mX + C}$$

eq^n of line whose normal dist (p) from origin ~~∠ → ω~~ is 4 unit and ∠ → 15° +ve axis

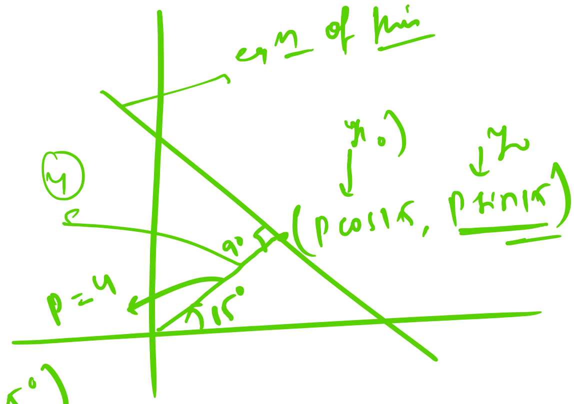


Q eq^n of line whose ($\perp^r$) dist from (0,0) is 4 unit & ∠ which it makes normal

Q eq^n of line whose $\perp^r$ dist from $(0,0)$ is 4 unit & $\angle$ which it makes normal to line is 15° with +ve x-axis

$$y - y_0 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_0)$$

$\tan 15^\circ$



$$y - p\sin 15 = \tan 15^\circ (x - p\cos 15^\circ)$$

$\frac{\sin 15}{\cos}$

$$y\sin 15 + x\cos 15 = 4$$

$$y\,\frac{\sqrt{3}-1}{2\sqrt{2}} + x\,\frac{\sqrt{3}+1}{2\sqrt{2}} = 4 \rightarrow$$