

$$y = ax + b \Rightarrow \text{slope} = m = a$$

نقطة 244
L1

The slope through two points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$

$$\text{is } m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Exp Find slope of the line passes through

L_1 (1) $(-2, 1)$ and $(4, 3)$

$$m_1 = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 1}{4 - (-2)} = \frac{2}{6} = \frac{1}{3}$$

L_2 (2) $(-1, 2)$ and $(5, 4)$

$$m_2 = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 2}{5 - (-1)} = \frac{2}{6} = \frac{1}{3}$$

$L_1 \parallel L_2$

L_1 is parallel to L_2 iff $m_1 = m_2$

$$(L_1 \parallel L_2) \Leftrightarrow m_1 = m_2$$

L_1 is perpendicular to L_2 iff $m_1 m_2 = -1$

L_1 is perpendicular to L_2 iff $m_1 m_2 = -1$
(normal)

$$L_1 \perp L_2 \Leftrightarrow m_1 m_2 = -1$$

L_3
③ $(0, 2)$ and $(1, -1)$

$$m_3 = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 2}{1 - 0} = \frac{-3}{1} = -3$$

Exp ① Is $L_2 \perp L_3$? Yes

check $m_2 \cdot m_3 \stackrel{?}{=} -1$

$$\frac{1}{3} \cdot -3 = -1 \checkmark$$

② Is $L_1 \perp L_3$? Yes

check $m_1 \cdot m_3 \stackrel{?}{=} -1$

$$\frac{1}{3} \cdot -3 = -1 \checkmark$$

Exp $L_1: x + y = 5$

$L_2: y - x = 5$

① Is $L_1 \perp L_2$?

Yes

② Is $L_2 \parallel L_2$?

$$\begin{array}{l}
 L_2: y - x = 5 \\
 L_3: y = x \\
 L_1: x + y = 5
 \end{array}$$

$m_3 = 1$ $\rightarrow$ check $m_3 \stackrel{?}{=} m_2$ Yes $1 = 1$ ✓

$$\boxed{y = 5 - x} \Rightarrow m_1 = -1$$

$$L_2: y - x = 5$$

$$\boxed{y = x + 5} \Rightarrow m_2 = 1$$

check $m_1 \cdot m_2 \stackrel{?}{=} -1$
 $(-1)(1) = -1$ ✓

$$L_1: y = 5 - x$$

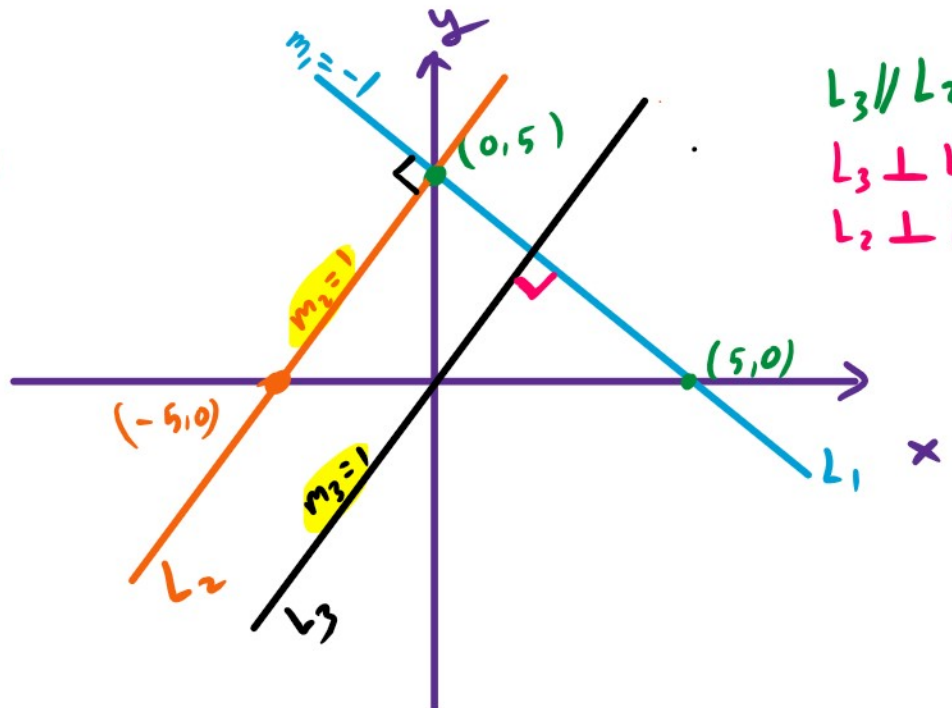
x-intercept $(5, 0)$
 y-intercept $(0, 5)$

$$L_2: \boxed{y = x + 5}$$

x-intercept $(-5, 0)$
 y-intercept $(0, 5)$

$$L_3: y = x$$

$(0, 0)$
 $(2, 2)$



$L_3 \parallel L_2$
 $L_3 \perp L_1$
 $L_2 \perp L_1$

Q. How to find the equation of the line whose slope m and passes through

114. whose slope m and passes through the point (x_1, y_1)

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

solve for y

Exp Find the equation of line passes through $(1, -2)$ and

① slope is 2

$$y - y_1 = m(x - x_1)$$
$$\Rightarrow y - -2 = 2(x - 1)$$
$$y + 2 = 2x - 2$$

$$y = 2x - 4$$

خط بيكون موازي لمحور x

② slope is 0

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

$$y - -2 = 0(x - 1)$$

$$y + 2 = 0$$

$$y = -2$$

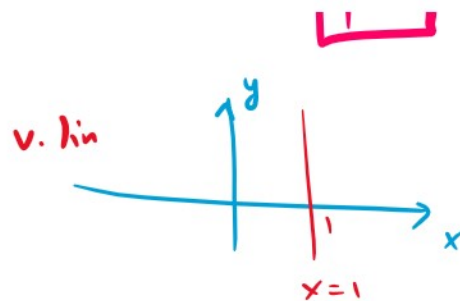
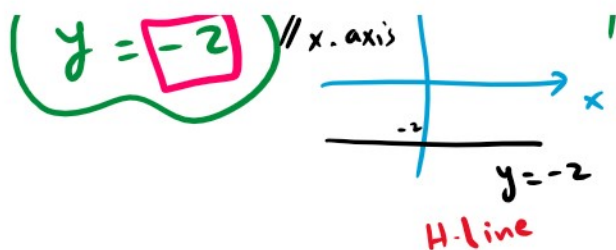
// x-axis



③ slope is undefined

line // y-axis

$$x = 1$$



Exp Find line equation through the points
 $(x_1, y_1), (2, 4)$

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

$$y - 1 = \frac{3}{2}(x - 0)$$

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

$$\Rightarrow y = \frac{3}{2}x + 1$$

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

$$= \frac{4 - 1}{2 - 0} = \frac{3}{2}$$

Exp Find eq. of line whose
 x-intercept -3 and y-intercept 5

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

$$y - 0 = \frac{5}{3}(x - (-3))$$

$$(x_1, y_1), (0, 5)$$

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 0}{0 - (-3)}$$

$$= \frac{5}{3}$$

$$= \frac{5}{3}$$

$$y = \frac{5}{3}x + 5$$

Exp write equation of line pass (x_1, y_1) and parallel the line

$$12x + 4y = 1$$

$$y - y_1 = m_1(x - x_1)$$

نفس الميل
 $m = -3$

$$y - 3 = -3(x - 1)$$

$$y - 3 = -3x - 3$$

$+3$

$$y = -3x$$

$$-12x$$

$$\frac{4y}{4} = \frac{1 - 12x}{4}$$

$$y = \frac{1}{4} - 3x$$

$$m_2 = -3$$

Exp

perpendicular

$$m_1 m_2 = -1$$

$$m_1(-3) = -1$$

-3

$$m_1 = \frac{1}{3}$$

$$y - y_1 = m_1 (x - x_1)$$

$$y - 3 = \frac{1}{3} (x - -1)$$

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

$$\frac{3 \cdot 3}{3 \cdot 1} + \frac{1}{3}$$

$$\frac{9}{3} + \frac{1}{3}$$

$$\frac{10}{3}$$

$$y = \frac{x}{3} + \frac{10}{3}$$

توحيد المقامات

$$\text{Exp} \quad \frac{y-3}{(y-5)^2} - \frac{y-2}{y^2-y-5}$$

$$\frac{(y+1)}{(y+1)} \frac{y-3}{(y-5)^2} - \frac{y-2}{(y-5)(y+1)} \frac{(y-5)}{(y-5)}$$

$$\frac{(y+1)(y-3)}{(y+1)(y-5)^2} - \frac{(y-2)(y-5)}{(y+1)(y-5)^2}$$

LCD
least Common
Denominator

$$\frac{y^2 - 3y + y - 3 - [y^2 - 5y - 2y + 10]}{(y+1)(y-5)^2}$$

$$\frac{y-50}{(y+1)(y-5)^2}$$

$$\frac{-2y-3+7y-10}{(y+1)(y-5)^2}$$

$$\frac{-13+5y}{(y+1)(y-5)^2}$$

