<u>Series of lines - Examples</u>

<u>Example 1:</u>

L1: passes through points (-2, -9) and (7, 0). *(x1, y1)* *(x2, y2)*

L2: is perpendicular to y= $-\frac{1}{3}$x-7 and passes through (-1, -10).

L3: has a slope a=9, and a y-intercept of -7.

Find the equation of L4.

<u>Line 1</u>

① $a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 9}{7 - 2} = \frac{9}{9} = 1$

② $y = 1x + b$
$0 = 1(7) + b$
$0 = 7 + b$
$-7 = b$

$\boxed{y = 1x - 7}$

<u>Line 2</u>

① $a: -\frac{1}{3} \rightarrow \frac{3}{1} = 3$

② $y = 3x + b$
$-10 = 3(-1) + b$
$+3 \quad -10 = -3 + b$
$-7 = b$
$y = 3x - 7$

<u>Line 3</u>

① $a = 9$

② $b? (0, -7)$
$b = -7$
$y = 9x - 7$

$y = 9(0) + b$
$-7 = b$

$L_4: y = 27x - 7$

Example 2:

L1: has slope a=2 and passes through (7, 13).

L2: has an x-intercept of 1/2 and a y-intercept of -2.

L3: is parallel to y=6x+3 and passes through (3, 15).

Find the equation of L5.

① $\underline{L_1:}$

$a = 2$

$y = ax + b$

$13 = 2(7) + b$

$13 = 14 + b$

$b = -1$

$y = 2x - 1$

② $\underline{L_2:}$

$(\overset{x_1 \ y_1}{0.5, 0}) \quad (\overset{x_2 \ y_2}{0, -2})$

$a = \dfrac{-2-0}{0-0.5} = \dfrac{-2}{-0.5} = 4$

$b = -2$

$y = 4x - 2$

③ $\underline{L_3:}$

$a = 6$

$15 = 6(3) + b$

$15 = 18 + b$

$b = -3$

$y = 6x - 3$

④ $\underline{L_5?}$

1) $y = 2x - 1$

2) $y = 4x - 2$

3) $y = 6x - 3$

4) $y = 8x - 4$

5) $y = 10x - 5$

Example 3:

L1: passes through (0, 2) and the solution of:

$(3,8)$

$$\begin{cases} y = 4x-4 \\ y = 3x-1 \end{cases} \longrightarrow$$

$4x-4 = 3x-1$
$x = 3$
$y = 3(3)-1 = 8$

L2: has a y-intercept of 4 and is perpendicular to $y = \frac{1}{2}x-3$.

L3: has a slope a=-6, and passes through the midpoint of segment AB, where A(-2, 15) and B(4, -11).

Find the equation of L4.

1) L_1:

$a = \frac{8-2}{3-0} = \frac{6}{3} = 2$

$b = 2$

$y = 2x + 2$

2) L_2:

$a: \frac{1}{2} \rightarrow -2$

$b = 4$ (y-int.)

$y = -2x + 4$

3) Midpoint:

$\left(\frac{-2+4}{2}, \frac{15+-11}{2} \right)$

$\left(\frac{2}{2}, \frac{4}{2} \right)$

$(1, 2)$

4) L_3:

$a = -6$

$y = -6x + b$

$\quad 2 = -6(1) + b$ $+6$

$b = 8$

$y = -6x + 8$

5) L_4:

1) $y = 2x + 2$ ⟩ ×2

2) $y = -2x + 4$ ⟩ ×2

3) $y = -6x + 8$ ⟩ +2

4) $y = -10x + 16$