

Name: _____

Date: _____

Equation of a Line	
Slope-Intercept Form $y = mx + b$ ↑ slope ← y-int	Slope-Point Form $y - y_1 = m(x - x_1)$ ← slope goes through (x_1, y_1)
General Form $ax + by + c = 0$ $a \in \mathbb{N}$, $b, c \in \mathbb{Z}$	Standard Form $ax + by = c$ $a \in \mathbb{N}$, $b, c \in \mathbb{Z}$
Slope $\text{slope} = m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$	

Warmup Classify each equation as being in the form:

- Slope-Intercept,
- General,
- Slope-Point form,
- Standard, or
- If the equation is none of these write "none."

$2x + 7y + 9 = 0$ General	$y - 9 = \frac{4}{5}(x + 2)$ slope - point	$3x + \frac{8}{7}y - 10 = 0$ none
$x + 9 = y$ slope - intercept	$(y + 3) = 5(x - 7)$ slope - point	$y = -\frac{4}{5}x^3 - 9$ none
$y = -\frac{8}{9}x + 13$ slope - intercept	$-4y + 3x = 9$ none	$x + 15 = \frac{3}{4}(y - 9)$ none

Example Find the equation of a line with slope $-\frac{7}{9}$ and y-intercept of 12.

$$y = -\frac{7}{9}x + 12$$

Slope-intercept
 $y = mx + b$

Example Find the equation of a line with a slope of $\frac{3}{5}$ through the point (2,8).

$$y - 8 = \frac{3}{5}(x - 2)$$

x_1, y_1 slope-point
 $y - y_1 = m(x - x_1)$

Example Find the equation of a line through (5, -20) and (40, 50).

$$m = \frac{50 - (-20)}{40 - 5}$$

$$= \frac{70}{35} = 2$$

$$\textcircled{1} y + 20 = 2(x - 5)$$

$$\textcircled{2} y - 50 = 2(x - 40)$$

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

Example A line has a slope of -5 and a x-intercept of $\frac{5}{2}$. Find the equation of the line. Write your final equation in slope-intercept form.

$$y - 0 = -5\left(x - \frac{5}{2}\right)$$

$$\left(\frac{5}{2}, 0\right)$$

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

$$y = -5\left(x - \frac{5}{2}\right)$$

$$y = -5x + \frac{25}{2}$$

slope-intercept

Example A line has the same slope as the line $2x + 9y - 39 = 0$ and the same y-intercept as

$y - 8 = \frac{3}{4}(x - 16)$. Find the equation of the line.

$\textcircled{1}$ Slope.

$$\left(\frac{39}{2}, 0\right) \text{ x-int (y=0)}$$

$$\left(0, \frac{39}{9}\right) \text{ y-int (x=0)}$$

$$m = \frac{\frac{39}{9} - 0}{0 - \frac{39}{2}} = \frac{39/9}{-39/2} = \frac{39}{9} \cdot \frac{-2}{39}$$

$$= -\frac{2}{9}$$

$\textcircled{2}$ y-int (x=0)

$$y - 8 = \frac{3}{4}(0 - 16)$$

$$y - 8 = \frac{3}{4}(-16)$$

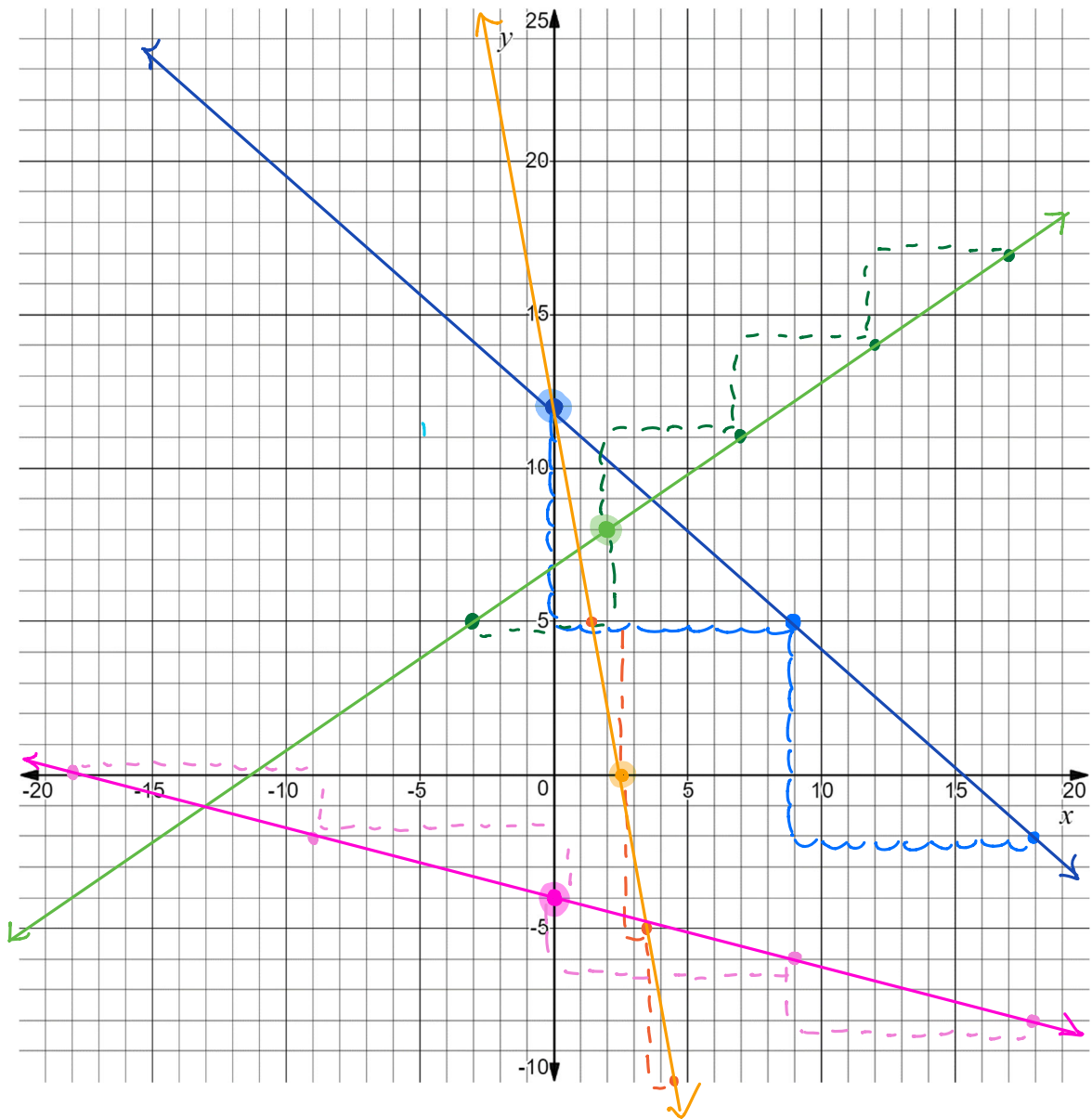
$$y - 8 = -12$$

$$+8 \quad +8$$

$$y = -4$$

$\textcircled{3}$ Equation: $y = -\frac{2}{9}x - 4$

Example Graph all the lines that you found on the previous page.



$$y = -\frac{7}{9}x + 12$$

$$y - 8 = \frac{3}{5}(x - 2)$$

$$y - 0 = -5\left(x - \frac{5}{2}\right)$$

$$y = -\frac{2}{9}x - 4$$