3.5 Graph Using Slope-Intercept Form

Starting point for graphing

$$y = mx + b$$

slope   y-intercept

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

up 2
right 3

$$m = \frac{rise}{run}$$

(0,1)

2 3
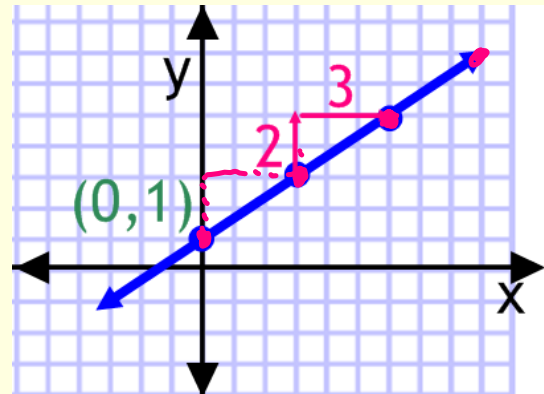
Example 1 $y = mx + b$

Identify the slope and y-intercept
of the line with the given equations.

m y-Int

a) $y = -4x + 5$

$m = -4$

$y\text{-int} = 5$

b) $2x - y = 8$ Solve for y.

$-2x \qquad -2x$

$\dfrac{-y}{-1} = \dfrac{-2x}{-1} + \dfrac{8}{-1}$
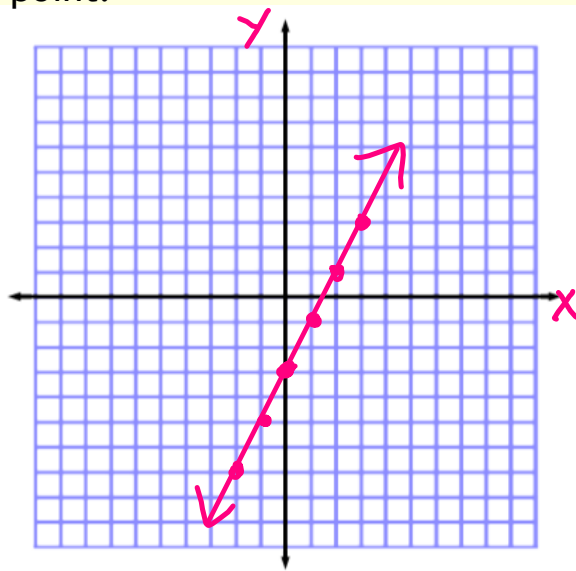
$y = 2x - 8$

$m = 2$

$y\text{-int} = -8$

Example 2

$$y = mx + b$$

Graph the equation -4x + 2y = -6.

a) First rewrite the equation in slope-intercept form. Solve for y.
b) Identify the slope and y-intercept.
c) Plot the y-intercept.
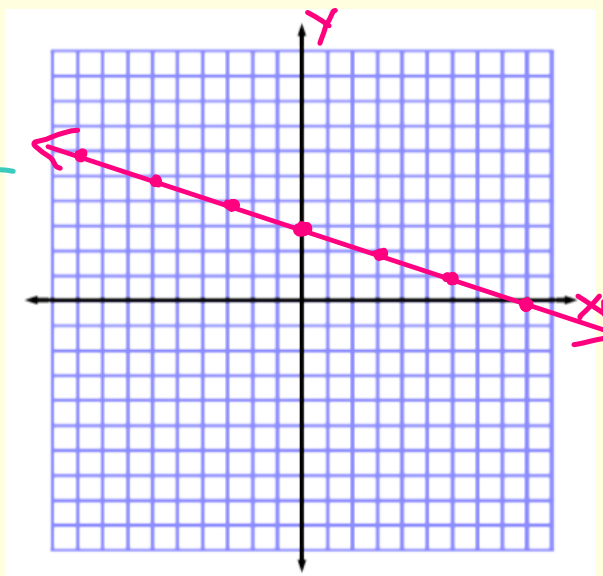d) Use the slope to locate another point.

$$-4x + 2y = -6$$
$$+4x \qquad\qquad +4x$$
$$\frac{2y}{2} = \frac{4x}{2} - \frac{6}{2}$$
$$y = 2x - 3$$

$$m = \frac{2}{1} \quad \begin{array}{l} up\ 2 \\ right\ 1 \end{array}$$

$$y\text{-int} = -3$$

Example 3

Graph the equation x + 3y = 9.

$$+x + 3y = 9$$
$$-x \qquad\qquad -x$$
$$\frac{3y}{3} = \frac{-1x}{3} + \frac{9}{3}$$
$$y = -\frac{1}{3}x + 3$$

$$\frac{-1}{3} \begin{array}{l} down\ 1 \\ right\ 3 \end{array}$$

$$\frac{1}{-3} \begin{array}{l} up\ 1 \\ left\ 3 \end{array}$$

$$m = -\frac{1}{3}$$

$$y\text{-int} = 3$$

Example 4
Graph the equation -5x - 4y + 2 = 0

$$-5x \,\widehat{(-4y)} + 2 = 0$$

$$\underline{+4y \qquad\qquad +4y}$$

$$\frac{-5x}{4} \quad + \frac{2}{4} = \frac{4y}{4}$$

$$-\frac{5}{4}x + \frac{1}{2} = y$$

$$m = -\frac{5}{4} \quad \begin{array}{l} \frac{-5}{4} \text{ down 5} \\ \text{right 4} \\ \frac{5}{-4} \text{ up 5} \\ \text{left 4} \end{array}$$

$$y\text{-int} = \frac{1}{2} \text{ or } 0.5$$
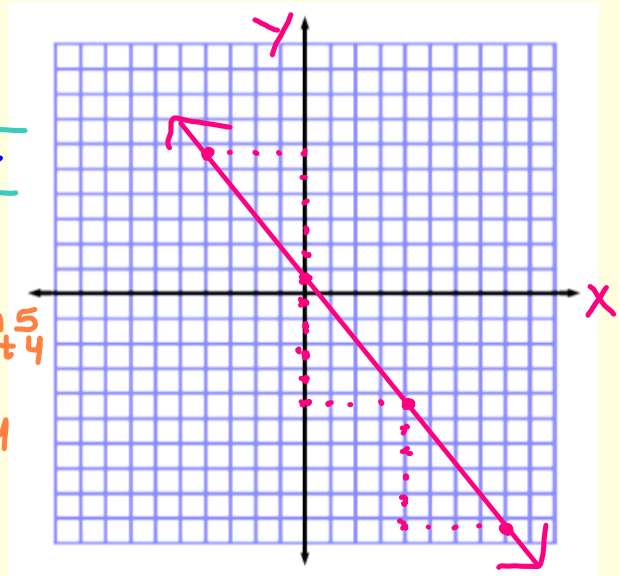
Example 5
You can use a laser or inkjet printer to print an 18-page report. The laser printer prints 6 pages/min and the inkjet printer prints 4.5 pages/min. The models give the number of pages left to print after t minutes.

laser: p = -6t + 18 ⟶ m = $\frac{-6}{1}$ $\begin{array}{l}\text{down 6}\\\text{right}\end{array}$ y-int = 18

inkjet: p = -4.5t + 18 ⟶ m = $\frac{-9}{2}$ $\begin{array}{l}\text{down}\\\text{right}\end{array}$ y-int = 18

p = -9/2t + 18

a) Graph both models in the same coordinate plane.
b) How many minutes do you save using the laser printer?
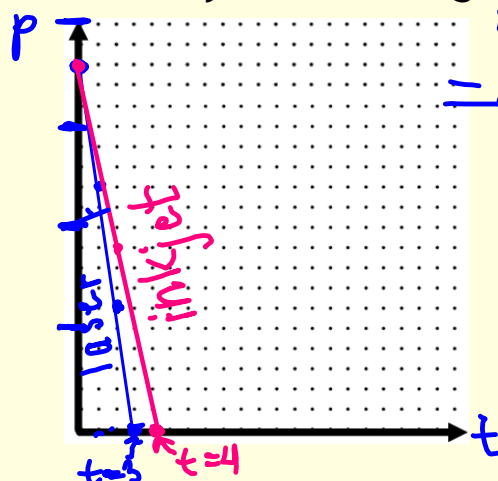
4 min (inkjet)
− 3 min (laser)
1 min. saved

p

laser   inkjet

t = 3   t = 4

t

Two lines in the same plane are **parallel** if they do not intersect.
Parallel lines have the **same slope**.
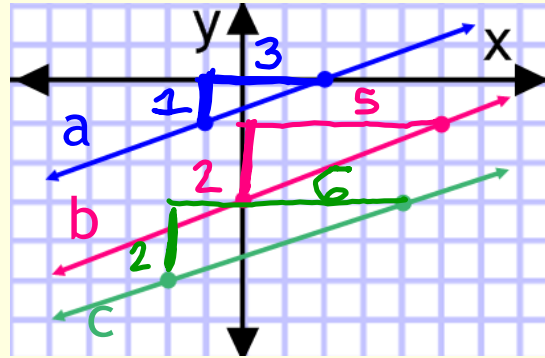
Example 6   different y-intercepts

Determine which of the lines are parallel.
Explain your reasoning.

line a : $m = \dfrac{1}{3}$

line b : $m = \dfrac{2}{5}$

line c : $m - \dfrac{2}{6} = \dfrac{1}{3}$

line a & line c are parallel
b/c they have same slope

Example 7
Tell whether the graphs of the two equations
are parallel lines. Explain your reasoning.
Then graph to check your answer.

$2x + 3y = -8$

$\dfrac{-2x \qquad -2x}{\quad}$

$\dfrac{3y}{3} = \dfrac{-2x}{3} - \dfrac{8}{3}$

$y = -\dfrac{2}{3}x - \dfrac{8}{3}$

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

$m = -\dfrac{2}{3}$

y-int = $-2\dfrac{2}{3}$

$\dfrac{6y}{6} = \dfrac{-4x}{6} + \dfrac{1}{6}$

$y = -\dfrac{2}{3}x + \dfrac{1}{6}$

$m = -\dfrac{2}{3}$

y-int = $\dfrac{1}{6}$

lines are
parallel