

Chapter 4:

In the slope-intercept form, $y = mx + b$,

m is the slope of the line and

b is the y-intercept.

Officially, the y-intercept point is $(0, b)$

Identify the slope and the y-intercept of the line, and use them to graph the line.

33. $y = 3x - 5$

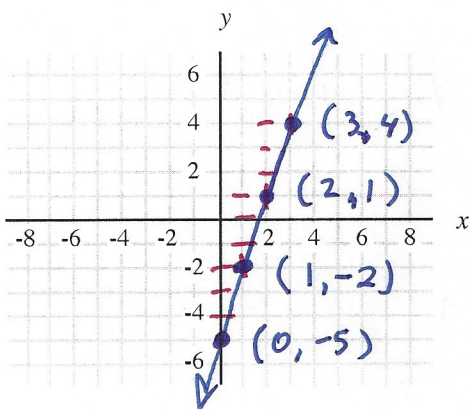
$m = 3 = \frac{3}{1} = \frac{\text{rise}}{\text{run}}$

y-intercept point is $(0, -5)$

1. plot $(0, -5)$

2. $\frac{\text{rise}}{\text{run}} = \frac{\text{up } 3}{\text{right } 1}$

3. use slope to find new points.



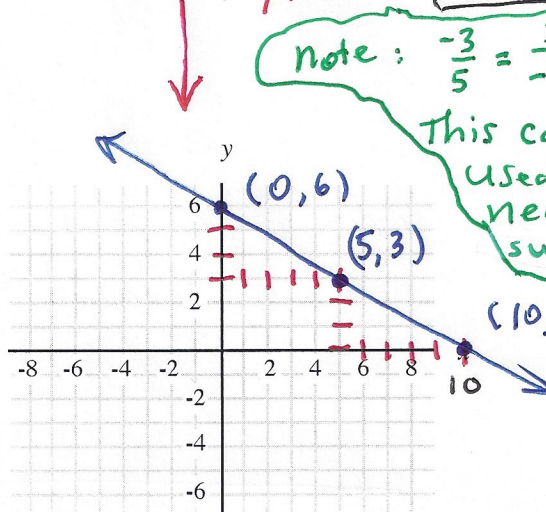
34. $y = -\frac{3}{5}x + 6$

$m = -\frac{3}{5} = \frac{\text{down } 3}{\text{right } 5}$

y-int. pt: $(0, 6)$

1. plot $(0, 6)$

2. $\frac{\text{rise}}{\text{run}} = \frac{\text{down } 3}{\text{right } 5}$



note: $-\frac{3}{5} = \frac{3}{-5} = \frac{\text{up } 3}{\text{left } 5}$
This can also be used to find new points, such as $(-5, 9)$

Use the slope formula to find the slope of the line that passes through the given points. Simplify, if possible.

Slope formula for two points (x_1, y_1) and (x_2, y_2)

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

35. $(7, -4)$ and $(1, 6)$

36. $(-10, -8)$ and $(2, 10)$

Here I use a technique introduced in the middle of Sec. 4.4.

#35 $(7, -4)$
 $(1, 6)$
 $m = \frac{-4 - 6}{7 - 1} = \frac{-10}{6}$
 $m = -\frac{5}{3}$

#36 $(2, 10)$
 $(-10, -8)$
 $m = \frac{10 - (-8)}{2 - (-10)} = \frac{10 + 8}{2 + 10}$
 $m = \frac{18}{12}$
 $m = \frac{3}{2}$

To find the equation of a line, $y = mx + b$, we must know the slope of the line and at least one point.

Find the equation of the line that passes through the given points.

37. (0, 8) and (-6, -8)

First find the slope:

$$\begin{array}{l} (-6, -8) \\ (0, 8) \\ \leftarrow \begin{array}{l} \text{rise} \\ \text{run} \end{array} \rightarrow \\ m = \frac{-8 - 8}{-6 - 0} = \frac{-16}{-6} = +\frac{8}{3} \end{array}$$

Note: One of the points is actually the y-intercept point, (0, 8), so the value of b is 8:

$$y = \frac{8}{3}x + 8$$

38. (-10, 6) and (0, -9)

Slope: (-10, 6)

(0, -9)

$$\begin{array}{l} \leftarrow \begin{array}{l} \text{rise} \\ \text{run} \end{array} \rightarrow \\ m = \frac{6 - (-9)}{-10 - 0} = \frac{6 + 9}{-10} \\ m = \frac{15}{-10} = -\frac{3}{2} \end{array}$$

y-int. point is given: (0, -9)
So $b = -9$:

$$y = -\frac{3}{2}x - 9$$

For each you are given the slope of a line and a point on the line. Use the information to find the y-intercept, b, and write the equation of the line.

39. x, y (-2, 13); $m = -3$

Start with $y = mx + b$ and plug in values:

$$\begin{array}{l} \textcircled{\#39} \\ y = mx + b \\ 13 = -3 \cdot (-2) + b \\ 13 = 6 + b \\ \underline{-6 = -6} \\ 7 = b \end{array}$$

So,

$$y = -3x + 7$$

40. x, y (-12, -8); $m = \frac{5}{6}$

In #39-40, we are given the slope, m, but not the y-int. point,

so we must use the given point to help us find b.

$$\begin{array}{l} \textcircled{\#40} \\ y = mx + b \\ -8 = \frac{5}{6} \cdot \frac{-12}{1} + b \\ -8 = \frac{5}{1} \cdot \frac{-2}{1} + b \\ -8 = -10 + b \\ \underline{+10 = +10} \end{array}$$

So,

$$y = \frac{5}{6}x + 2$$