



Unit 6: Lesson 03

Graphing a line given a point and a slope Slope-intercept form of a linear function

To graph a line given a point and a slope,

- Plot the point.
- Use the slope to identify the **rise** and **run** (**run is always positive**).
- Starting at the plotted point, move to the right by an amount equal to the run.
- Continue moving up (if the rise is positive), or down (if the rise is negative) and plot a new point.
- Draw a line connecting the two points. When drawing the line, show arrow heads on both ends.

The arrow heads indicates that the line continues forever (**infinitely**) in both directions.

Example 1: Identify the rise and run when the slope is 3.

$$m = \frac{3}{1} \begin{array}{l} \rightarrow \text{rise} \\ \rightarrow \text{run} \end{array}$$

$$\begin{array}{l} \text{rise} = 3 \\ \text{run} = 1 \end{array}$$

Example 2: Identify the rise and run when the slope is $-\frac{4}{3}$.

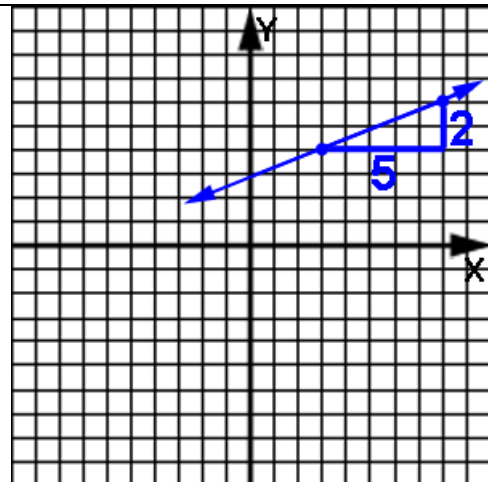
$$m = -\frac{4}{3} \begin{array}{l} \rightarrow \text{rise} \\ \rightarrow \text{run} \end{array}$$

$$\begin{array}{l} \text{rise} = -4 \\ \text{run} = 3 \end{array}$$

Example 3: Graph the line passing through (3, 4) and having a slope of 2/5.

$$m = \frac{2}{5} = \frac{\text{rise}}{\text{run}}$$

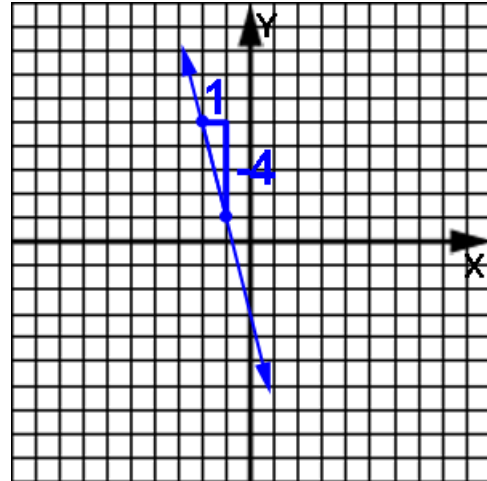
$$\begin{array}{l} \text{rise} = 2 \\ \text{run} = 5 \end{array}$$



Example 4: Graph the line passing through $(-2, 5)$ and having a slope of -4 .

$$m = -4 = \frac{-4}{1} \Rightarrow \begin{array}{l} \text{rise} \\ \text{run} \end{array}$$

$$\begin{array}{l} \text{rise} = -4 \\ \text{run} = 1 \end{array}$$



Slope-intercept form of a linear function:

$$y = mx + b$$

where m is the slope of the line, and

b is the y-intercept (where the line crosses the y-axis).

Example 5: Identify the slope (m) and the y-intercept (b) in the linear function $y = -8x - 4$.

$$\begin{array}{l} y = -8x - 4 \\ y = mx + b \\ \hline m = -8 \quad b = -4 \end{array}$$

Example 6: Identify the slope (m) and the y-intercept (b) in the linear function $f(x) = x + 4$.

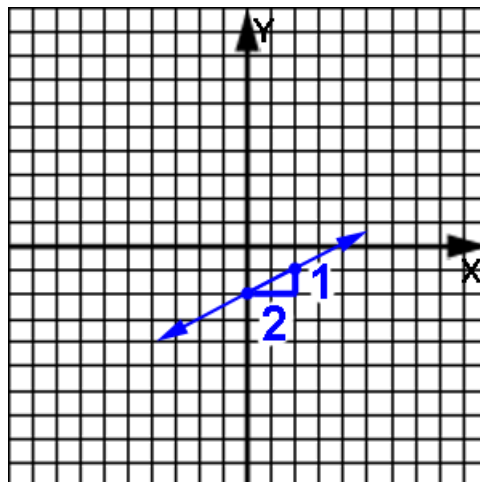
$$\begin{array}{l} f(x) = x + 4 \\ y = 1x + 4 \\ y = mx + b \\ \hline m = 1 \quad b = 4 \end{array}$$

When we are given the y-intercept (b) of a linear function, we are really being given the point $(0, b)$.

Therefore, being given a **slope and y-intercept** is equivalent to being given a **slope and a point**.

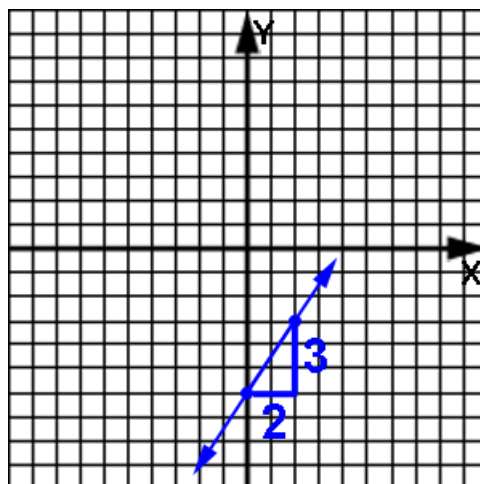
Example 7: Graph the linear function having a y-intercept of -2 and a slope of $\frac{1}{2}$.

$$m = \frac{1}{2} \begin{array}{l} \xrightarrow{\text{rise}} \\ \xrightarrow{\text{run}} \end{array}$$



Example 8: Graph the linear function $y = \frac{3}{2}x - 6$.

$$m = \frac{3}{2} \begin{array}{l} \xrightarrow{\text{rise}} \\ \xrightarrow{\text{run}} \end{array}$$



Assignment:

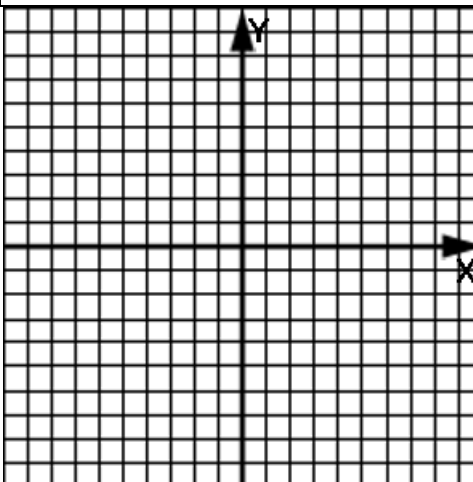
1. Identify the rise and run when the slope is -4.

2. Identify the rise and run when the slope is $7/5$.

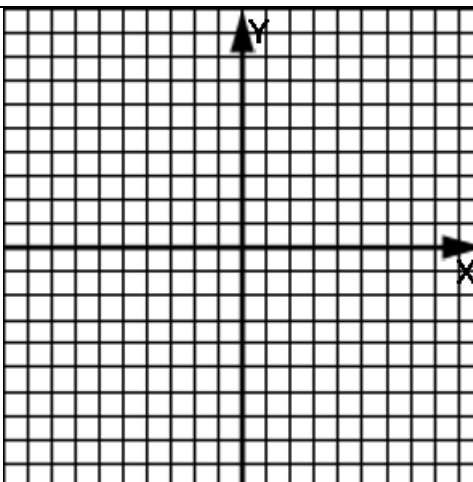
3. Identify the rise and run of the slope of a line having this equation:
 $y = x - 19$

4. Identify the rise and run of the slope of a line having this equation:
 $f(x) = .75x + 2$

5. Graph the line passing through $(-2, -4)$ and having a slope of $6/5$.



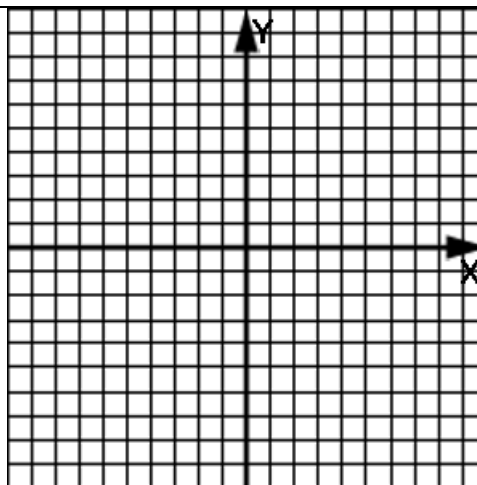
6. Graph the line passing through the origin and having a slope of $-7/2$.



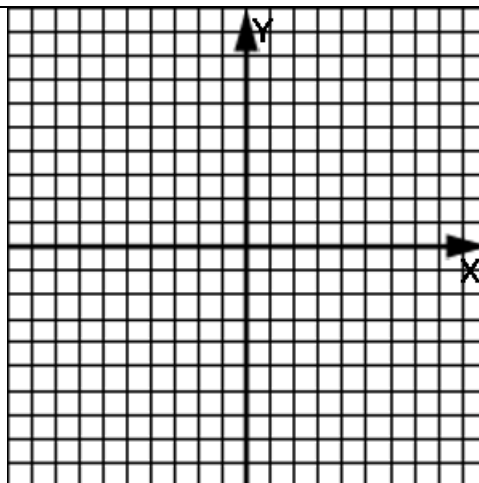
7. Identify the slope and y-intercept of the linear function $f(x) = 8x + 9$.

8. Identify the slope and y-intercept of the linear function $y = -.5x - 18$.

9. Graph the line given by $y = 4x - 1$.

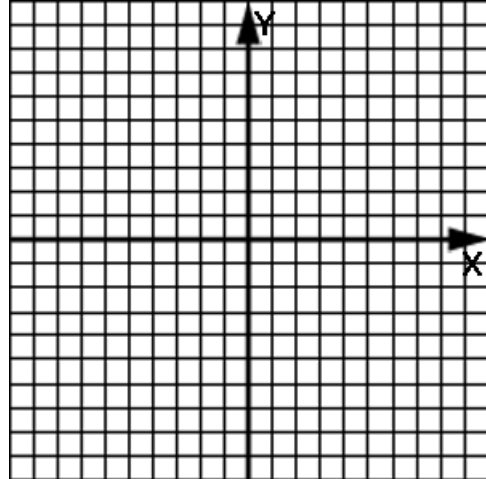


10. Graph the line given by $y = mx + b$ where $m = -3/8$ and $b = 6$.



*11. Which quadrants does the line given by $y = 4x - 9$ touch?

12. Graph the line whose y-intercept is -5 and whose slope is -3.



13. Which quadrants does the line of problem 10 touch?

14. What is the slope and y-intercept of the linear function given by:

$$y = -8 + 2x$$