

## Section 6.2

### Properties of Linear Functions

#### The Intercepts of a Function and Equations

The x-intercept is the point where the equation or function intercepts the x axis.

The y-intercept is the point where the equation or function intercepts the y-axis

Find the intercepts of a linear equation

#### Example 1

Find the x-intercept and y-intercept of each equation.

$$y = \frac{3}{5}x + 2$$

*Find the y – int*

$$\text{Let } x = 0$$

$$y = \frac{3}{5}(0) + 2 = 0 + 2 = 2$$

*Find the x – int*

$$\text{Let } y = 0$$

$$0 = \frac{3}{5}x + 2$$

$$0 - 2 = \frac{3}{5}x + 2 - 2$$

$$-2 = \frac{3}{5}x$$

$$-2 \cdot \frac{5}{3} = \frac{5}{3} \cdot \frac{3}{5}x$$

$$\Rightarrow x = -\frac{10}{3}$$

## Example 2

Find the intercept of the given equation

$$4x - 3y = 12$$

*Find the y-int*

*Let  $x = 0$*

$$4(0) - 3y = 12$$

$$-3y = 12$$

$$\frac{-3y}{-3} = \frac{12}{-3}$$

$$y = -4$$

*Find the x-int*

*Let  $y = 0$*

$$4x - 3(0) = 12$$

$$4x = 12$$

$$\frac{4x}{4} = \frac{12}{4}$$

$$x = 3$$

## The slope of a line

### Slope

$$(\text{Slope}) m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

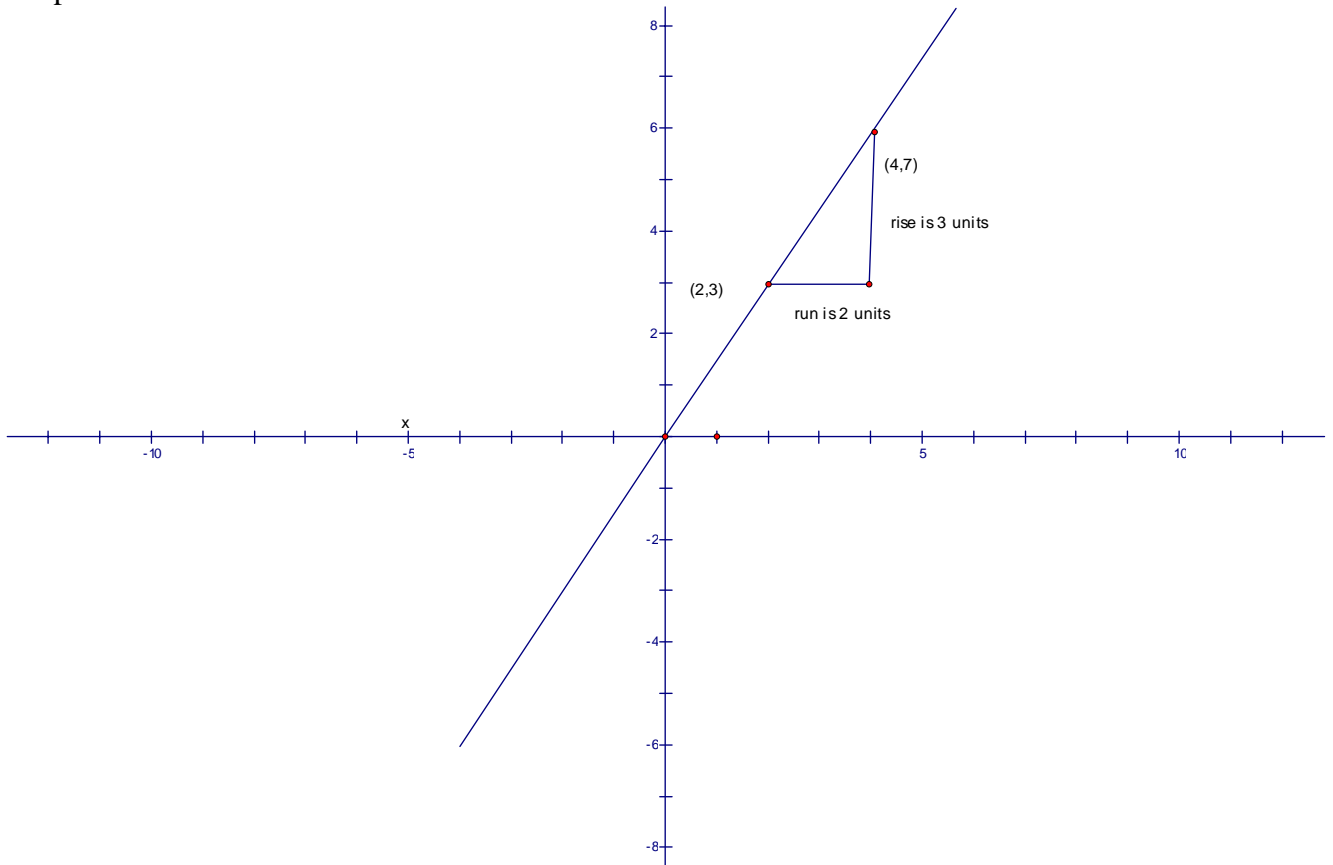
### Example 3

Find the slope between the given points

1) (2,3) and (4,6)

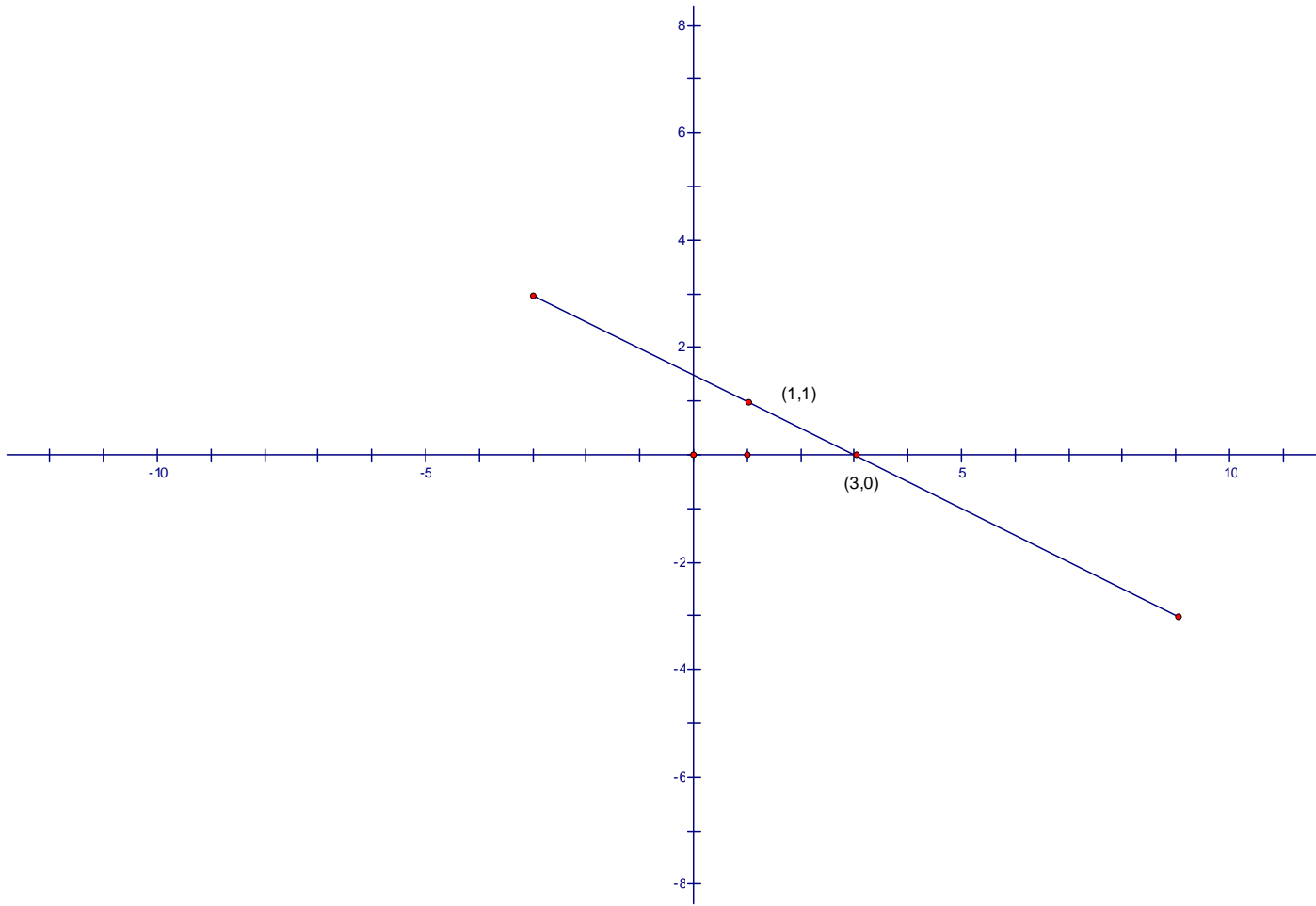
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 3}{4 - 2} = \frac{3}{2}$$

Graph



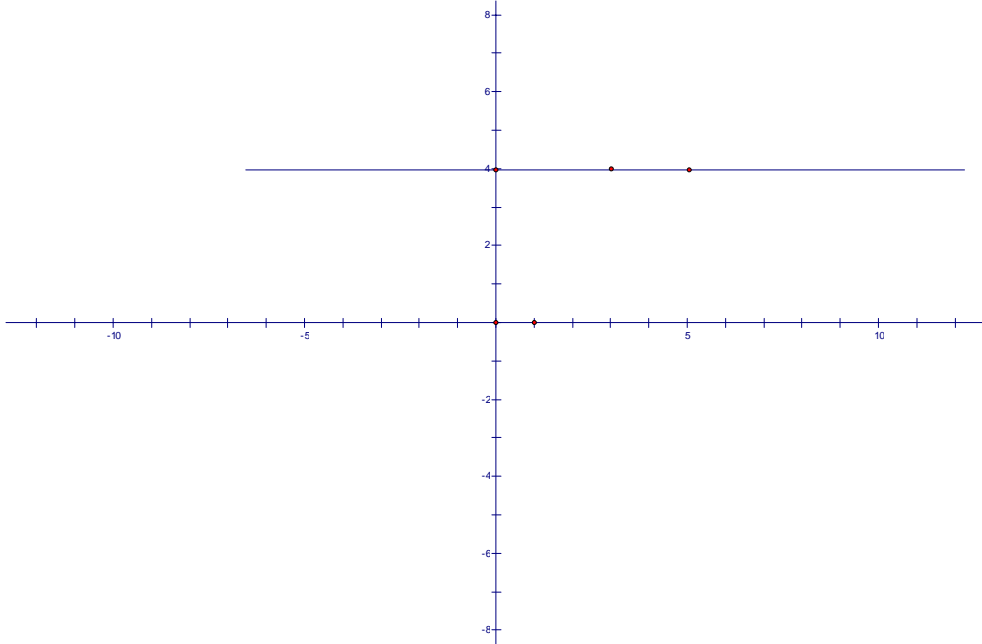
2) (1,1) and (3,0)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 1}{3 - 1} = -\frac{1}{2}$$



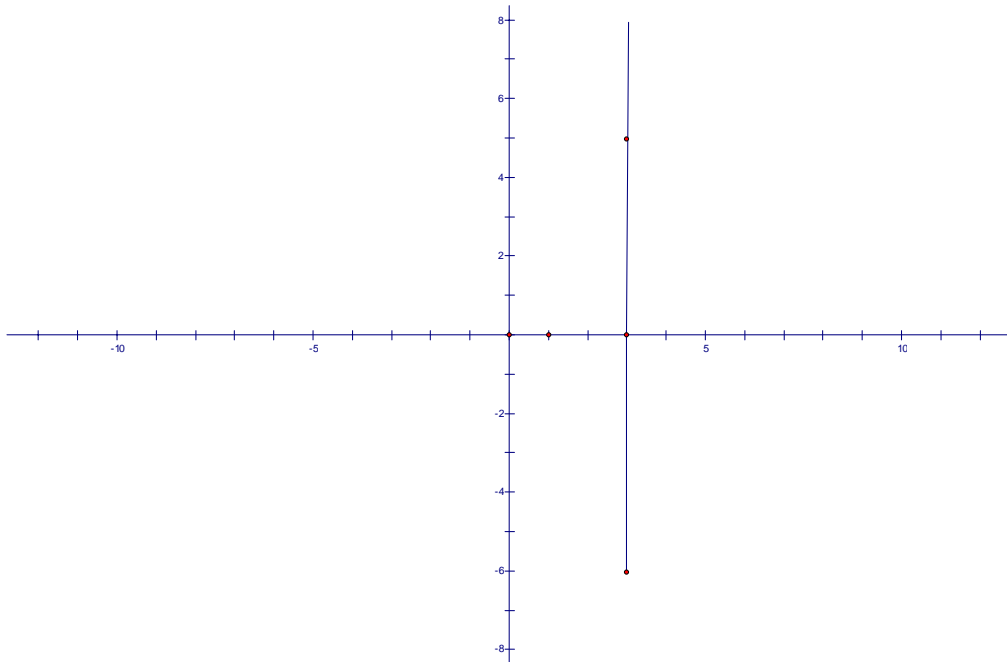
3) (3,4) and (5,4)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 4}{5 - 3} = \frac{0}{2} = 0$$



c) (3,5) and (3,8)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 5}{3 - 3} = \frac{3}{0}$$



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**Slope-intercept form of an equation**

$$y = mx + b$$

$$m = \text{slope}$$

$$b = \text{y-intercept}$$

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**Example 5**

Find the slope and y-intercept, given the equation of the line.

$$2x + y = 40$$

$$2x - 2x + y = -2x + 40$$

$$y = -2x + 40$$

$$m = -2, b = 40$$

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**Example 6**

Write the equation of the line that passes through the given points. (Use the equation to graph the line. (-3,-4) and (1,4))

$$\text{Find the slope first: } m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - (-4)}{1 - (-3)} = \frac{8}{4} = 2$$

Next, use the point slope formula and write answer in slope-intercept form with the either point (-3,-4) and (1,4). This example use the point (1,4)

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

$$y - 4 = 2(x - 1)$$

$$y - 4 = 2x - 2$$

$$y - 4 + 4 = 2x - 2 + 4$$

$$y = 2x + 2$$

$$m = 2, b = 2$$

