LESSON 3.3
NOTES

GOAL
Graph a linear equation using intercepts.

Vocabulary
The *x*-coordinate of a point where a graph crosses the *x*-axis is an **x-intercept.**

The *y*-coordinate of a point where a graph crosses the *y*-axis is a **y-intercept.**

Key Concept
To graph a linear equation, make a table of appropriate *x*-values, find the corresponding *y*-values, plot
the points from the table, and connect them. All points on the graph of a linear equation are solutions
of the equation. A solution of an equation in two variables, *x* and *y*, is an ordered pair (*x*, *y*) that produces a true statement when the values of *x* and *y* are substituted into the equation.
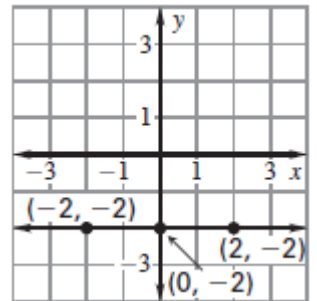
Common Student Errors
• Graphing horizontal and vertical lines incorrectly

  Tip Plot points to figure out whether the line is horizontal or vertical.

Example: $y = -2$

$0x + 1y = -2$

(-2, -2) (0,-2) (2, -2)

EXAMPLE 1

Find the intercepts of the graph of an equation

Find the *x*-intercept and the *y*-intercept of the graph of $7x - 3y = 21$.

Solution

To find the *x*-intercept, substitute 0 for *y* and solve for *x*.

$7x - 3y = 21$ Write original equation.

$7x - 3(0) = 21$ Substitute 0 for *y*.

$x = \dfrac{21}{7} = 3$ Solve for *x*.

To find the *y*-intercept, substitute 0 for *x* and solve for *y*.

$7x - 3y = 21$ Write original equation.

$7(0) - 3y = 21$ Substitute 0 for *x*.

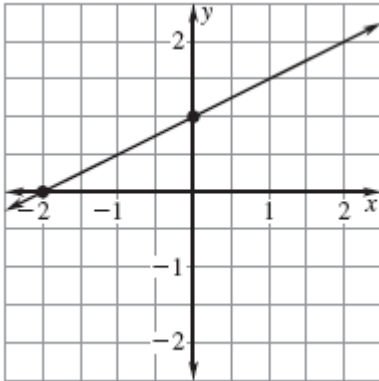$y = \dfrac{21}{-3} = -7$ Solve for *y*.

The *x*-intercept is 3. The *y*-intercept is –7.

EXAMPLE 2
<u>**Use a graph to find the intercepts**</u>

Identify the *x*-intercept and *y*-intercept of the graph.

Solution
To find the *x*-intercept, look to see where the graph crosses the *x*-axis. The *x*-intercept is –
–2. To find the *y*-intercept, look to see where the graph crosses the *y*-axis. The *y*-intercept
1.

EXAMPLE 3
<u>**Use intercepts to graph an equation**</u>

Graph 3*x* + 2*y* = 6. Label the points where the line crosses the axis.
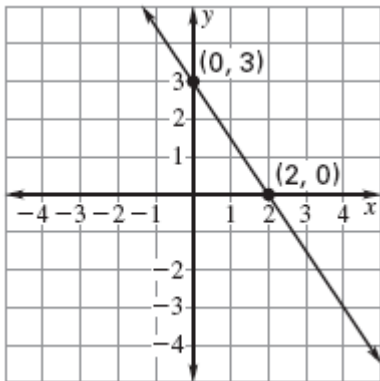
Solution

STEP 1
Find the intercepts.

$$3x + 2y = 6 \qquad\qquad 3x + 2y = 6$$
$$3x + 2(0) = 6 \qquad\qquad 3(0) + 2y = 6$$
$$x = 2 \leftarrow x\,\text{intercept} \qquad y = 3 \leftarrow y^-$$
$$\text{intercept}$$

STEP 2
Plot the points that correspond to the intercepts. The *x*-intercept is 2, so plot and label the
point (2, 0). The *y*-intercept is 3, so plot and label the point (0, 3).

STEP 3
**Connect** the points by drawing a line through them.

CHECK
You can check the graph of the equation by using a third point. When $x = 4$, $y = -3$, so the ordered pair $(4, -3)$ is a third solution of the equation. You can see that $(4, -3)$ lies on the graph, so the graph is correct.

Exercises for Examples 1, 2, and 3

Find the *x*-intercept and the *y*-intercept of the graph of the equation.

1. $-4x + 3y = 24$
2. $5x - y = 15$
3. $y = \dfrac{1}{5} x - 3$
4. Graph $x - \dfrac{1}{2} y = 1$. Label the point where the line crosses the axis.

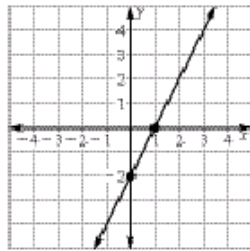5. Identify the x-intercept and y-intercept of the graph.
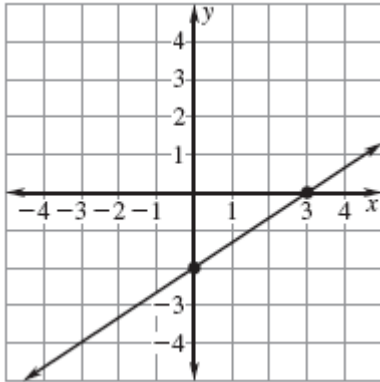
Answer Key

Lesson 3.3

Study Guide

1 *x*-intercept: −6; *y*-intercept: 8
2 *x*-intercept: 3; *y*-intercept: −15
3 *x*-intercept: 15; y-intercept: −3
4

5 *x*-int: 3; *y*-int: −2