

# 3.4

## Learning Target: Understand how to write and graph linear functions.

- I can graph equations of horizontal and vertical lines.
- I can graph linear equations in standard form using intercepts.
- I can write and analyze linear equations that model/fit data.

Write the meaning of each vocabulary term.

standard form -  $Ax + By = C$  All lines can be written in this form (even vertical!)  
 capital letters  $\uparrow$   $A, B, C$  are real numbers - where  $A + B$  cannot both be zero. Used to be  $A, B + C$  had to be integers.

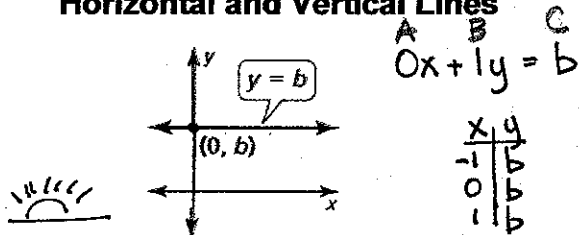
x-intercept - the x-coordinate of the point where the graph crosses the x-axis. It occurs when  $y = 0$ .

y-intercept - the y-coordinate of the point where the graph crosses the y-axis. It occurs when  $x = 0$ .

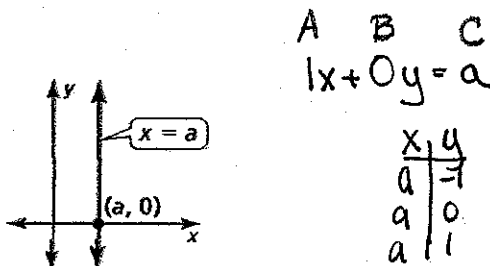
### Core Concepts

$$Ax + By = C$$

#### Horizontal and Vertical Lines



The graph of  $y = b$  is a horizontal line.  
 The line passes through the point  $(0, b)$ .

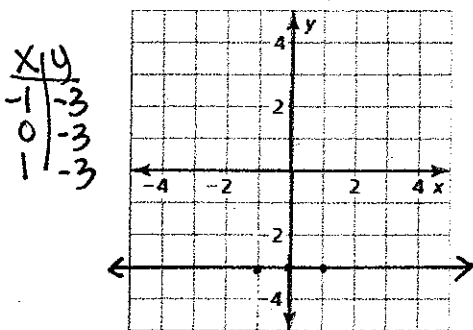


The graph of  $x = a$  is a vertical line.  
 The line passes through the point  $(a, 0)$ .

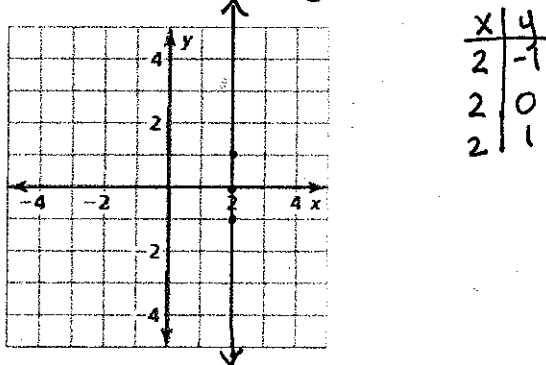
### Practice

In Exercises 1 and 2, graph the linear equation.

1.  $y = -3$        $0x + 1y = -3$



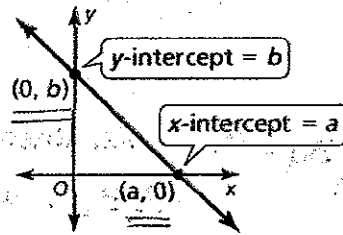
2.  $x = 2$        $1x + 0y = 2$



**3.4 Notetaking with Vocabulary (continued)**

**Using Intercepts to Graph Equations** - Use when line in  $Ax + By = C$

The **x-intercept** of a graph is the **x-coordinate** of a point where the graph crosses the **x-axis**. It occurs when  $y = 0$ .



The **y-intercept** of a graph is the **y-coordinate** of a point where the graph crosses the **y-axis**. It occurs when  $x = 0$ .

To graph the linear equation  $Ax + By = C$ , find the intercepts and draw the line that passes through the two intercepts.

- To find the **x-intercept**, let  $y = 0$  and solve for  $x$ .
- To find the **y-intercept**, let  $x = 0$  and solve for  $y$ .

**Practice**

In Exercises 3–5, find the **x-** and **y-intercepts** of the graph of the linear equation.

3.  $3x + 4y = 12$

4.  $-x - 4y = 16$

5.  $5x - 2y = -30$

$$\begin{array}{r|l} x & y \\ \hline \text{x int. } 4 & 0 \\ \text{y int. } 0 & 3 \end{array}$$

x int. let  $y = 0$   
 $3x + 4(0) = 12$

$\frac{3x}{3} = \frac{12}{3}$

$x = 4$

y-int. let  $x = 0$

$3(0) + 4y = 12$

$4y = 12$

$y = 3$

$(4, 0)$

$(0, 3)$

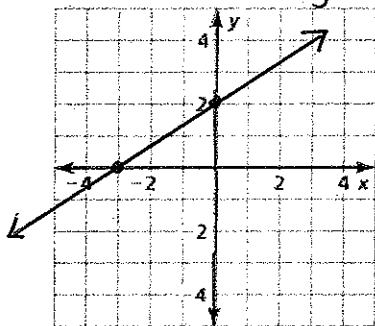
### 3.4 Notetaking with Vocabulary (continued)

In Exercises 6 and 7, use intercepts to graph the linear equation. Label the points corresponding to the intercepts.

6.  $-8x + 12y = 24$   
 x-int. let  $y = 0$   
 $-8x = 24$   
 $x = -3$   
 y-int. let  $x = 0$   $12y = 24$   
 $y = 2$

$$\begin{array}{r|l} x & y \\ -3 & 0 \\ \hline 0 & 2 \end{array}$$

$(-3, 0)$   
 $(0, 2)$



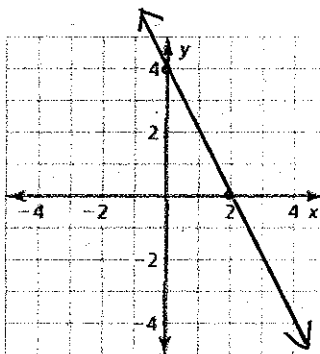
7.  $2x + y = 4$

$$2x = 4$$

$$x = 2$$

$$y = 4$$

$$\begin{array}{r|l} x & y \\ 2 & 0 \\ \hline 0 & 4 \end{array}$$



8. The school band is selling sweatshirts and baseball caps to raise \$9000 to attend a band competition. Sweatshirts cost \$25 each and baseball caps cost \$10 each. The equation  $25x + 10y = 9000$  models this situation, where  $x$  is the number of sweatshirts sold and  $y$  is the number of baseball caps sold.

$$\begin{array}{r|l} x & y \\ 360 & 0 \\ \hline 0 & 900 \end{array}$$

x-int let  $y = 0$   
 $25x + 10(0) = 9000$   
 $25x = 9000$   
 $x = 360$

a. Find and interpret the intercepts. If you don't sell any caps, you must sell 360 sweatshirts. If you don't sell any sweatshirts, you must sell 900 caps.

y-int. let  $x = 0$   
 $25(0) + 10y = 9000$   
 $10y = 9000$   
 $y = 900$

b. If 258 sweatshirts are sold, how many baseball caps are sold?  
 $25(258) + 10y = 9000$   
 $6450 + 10y = 9000$   
 $10y = 2550$   
 $y = 255$

