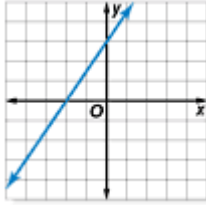


## Lesson 8-3

### Example 1 Find Intercepts From Graphs

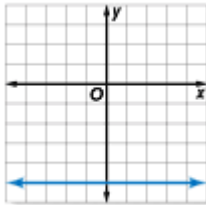
State the  $x$ -intercept and the  $y$ -intercept of each line.

a.



The graph crosses the  $x$ -axis at  $(-2, 0)$ . The  $x$ -intercept is  $-2$ . The graph crosses the  $y$ -axis at  $(0, 3)$ . The  $y$ -intercept is  $3$ .

b.



The graph does not cross the  $x$ -axis. There is no  $x$ -intercept. The graph crosses the  $y$ -axis at  $(0, -5)$ . The  $y$ -intercept is  $-5$ .

### Example 2 Find Intercepts from Equations

Find the  $x$ -intercept and the  $y$ -intercept for the graph of  $y = 2x + 4$ .

To find the  $x$ -intercept, let  $y = 0$ .

$y = 2x + 4$	Write the equation.
$0 = 2x + 4$	Replace $y$ with $0$ .
$0 - 4 = 2x + 4 - 4$	Subtract $4$ from each side.
$-4 = 2x$	Simplify.
$\frac{-4}{2} = \frac{2x}{2}$	Divide each side by $2$ .
$-2 = x$	Simplify.

The  $x$ -intercept is  $-2$ . So, the graph crosses the  $x$ -axis at  $(-2, 0)$ .

To find the  $y$ -intercept, let  $x = 0$ .

$y = 2x + 4$	Write the equation.
$y = 2(0) + 4$	Replace $x$ with $0$ .
$y = 4$	Simplify.

The  $y$ -intercept is  $4$ . So, the graph crosses the  $y$ -axis at  $(0, 4)$ .

**Example 3 Use Intercepts to Graph Equations**  
**Graph  $x + y = -3$  using the  $x$ - and  $y$ -intercepts.**

**Step 1**

Find the  $x$ -intercept.

$x + y = -3$	Write the equation.
$x + 0 = -3$	Let $y = 0$ .
$x = -3$	Simplify.

The  $x$ -intercept is  $-3$ , so the graph passes through  $(-3, 0)$ .

**Step 2**

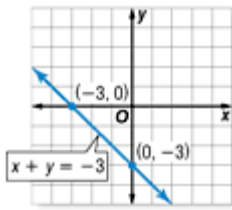
Find the  $y$ -intercept.

$x + y = -3$	Write the equation.
$0 + y = -3$	Let $x = 0$ .
$y = -3$	Simplify.

The  $y$ -intercept is  $-3$ , so the graph passes through  $(0, -3)$ .

**Step 3**

Graph the points at  $(-3, 0)$  and  $(0, -3)$  and draw a line through them.



**CHECK** Choose some other point on the line and determine whether its ordered pair is a solution of  $x + y = -3$ .

#### Example 4 Intercepts of Real-World Data

**BANKING** Suppose that the balance in a bank account can be described by the equation  $y = -125x + 1000$  where  $x$  represents the number of years after the account was opened and  $y$  represents the account balance.

a. Use the intercepts to graph the equation.

**Step 1** Find the  $x$ -intercept.

$$\begin{aligned}y &= -125x + 1000 \\0 &= -125x + 1000 \\0 - 1000 &= -125x + 1000 - 1000 \\-1000 &= -125x \\\frac{-1000}{-125} &= \frac{-125x}{-125} \\8 &= x\end{aligned}$$

Write the equation.

Replace  $y$  with 0.

Subtract 1000 from each side.

Simplify.

Divide each side by  $-125$ .

The  $x$ -intercept is 8.

**Step 2** Find the  $y$ -intercept.

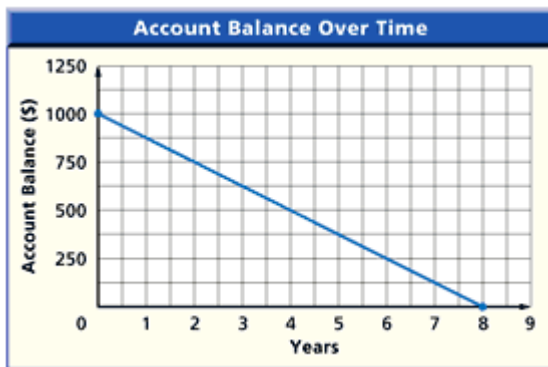
$$\begin{aligned}y &= -125x + 1000 \\y &= -125(0) + 1000 \\y &= 1000\end{aligned}$$

Write the equation.

Replace  $x$  with 0.

The  $y$ -intercept is 1000.

**Step 3** Plot the points with coordinates (8, 0) and (0, 1000). Then draw a line through the points.



b. Describe what the intercepts mean.

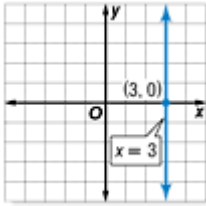
The  $x$ -intercept 8 means that 8 years after the account is opened, the balance will be \$0. The  $y$ -intercept 1000 means that at the time the account is opened, the balance is \$1000.

**Example 5 Horizontal and Vertical Lines**

**Graph each equation using the  $x$ - and  $y$ -intercepts.**

**a.  $x = 3$**

Note that  $x = 3$  is the same as  $x + 0y = 3$ . The  $x$ -intercept is 3 and there is no  $y$ -intercept.



**b.  $y = -5$**

Note that  $y = -5$  is the same as  $0x + y = -5$ . The  $y$ -intercept is  $-5$  and there is no  $x$ -intercept.

