

## Skill Check:

rewrite in slope int. form

$$3x - 2y = 4$$

## Chapter 5-1 Solving Systems of linear equations by graphing

System of  
linear equations

is a set of 2 or more linear equations  
in the same variables.

ex.

$$x + y = 7$$

$$2x - 3y = -11$$

## Example 1

### Checking solutions

a.  $(2, 5)$ ;  $x + y = 7$  Equation 1  
 $2x - 3y = -11$  Equation 2

b.  $(-2, 0)$ ;  $y = -2x - 4$  Equation 1  
 $y = x + 4$  Equation 2

a. Substitute 2 for  $x$  and 5 for  $y$  in each equation.

Equation 1

$$x + y = 7$$

$$2 + 5 \stackrel{?}{=} 7$$

$$7 = 7 \quad \checkmark$$

Equation 2

$$2x - 3y = -11$$

$$2(2) - 3(5) \stackrel{?}{=} -11$$

$$-11 = -11 \quad \checkmark$$



▶ Because the ordered pair  $(2, 5)$  is a solution of each equation, it is a solution of the linear system.

b. Substitute  $-2$  for  $x$  and  $0$  for  $y$  in each equation.

Equation 1

$$y = -2x - 4$$

$$0 \stackrel{?}{=} -2(-2) - 4$$

$$0 = 0 \quad \checkmark$$

Equation 2

$$y = x + 4$$

$$0 \stackrel{?}{=} -2 + 4$$

$$0 \neq 2 \quad \times$$

▶ The ordered pair  $(-2, 0)$  is a solution of the first equation, but it is not a solution of the second equation. So,  $(-2, 0)$  is *not* a solution of the linear system.

## Example 2 Solving by graphing

Solve the system of linear equations by graphing.

$$y = -2x + 5 \quad \text{Equation 1}$$

$$y = 4x - 1 \quad \text{Equation 2}$$

① slope =  $-\frac{2}{1}$   
y-int = 5

② slope =  $\frac{4}{1}$   
y-int = -1

### SOLUTION

**Step 1** Graph each equation.

**Step 2** Estimate the point of intersection.  
The graphs appear to intersect at (1, 3).

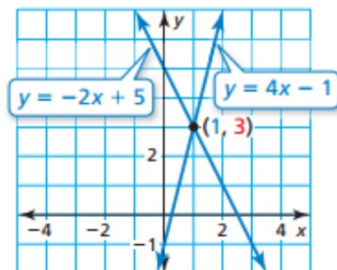
**Step 3** Check your point from Step 2.

Equation 1

$$\begin{aligned} y &= -2x + 5 \\ 3 &\stackrel{?}{=} -2(1) + 5 \\ 3 &= 3 \quad \checkmark \end{aligned}$$

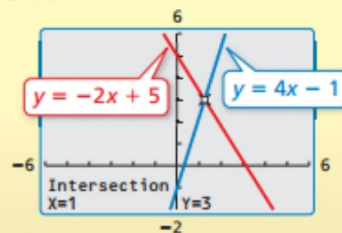
Equation 2

$$\begin{aligned} y &= 4x - 1 \\ 3 &\stackrel{?}{=} 4(1) - 1 \\ 3 &= 3 \quad \checkmark \end{aligned}$$



► The solution is (1, 3).

### Check



Solve the system of linear equations by graphing.

3.  $y = x - 2$

$y = -x + 4$

4.  $y = \frac{1}{2}x + 3$

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

5.  $2x + y = 5$

$3x - 2y = 4$

### Solving Real-Life Problems

#### EXAMPLE 3 Modeling with Mathematics

A roofing contractor buys 30 bundles of shingles and 4 rolls of roofing paper for \$1040. In a second purchase (at the same prices), the contractor buys 8 bundles of shingles for \$256. Find the price per bundle of shingles and the price per roll of roofing paper.

$$30x + 4y = 1040$$

$$8x = 256$$

### SOLUTION

- Understand the Problem** You know the total price of each purchase and how many of each item were purchased. You are asked to find the price of each item.
- Make a Plan** Use a verbal model to write a system of linear equations that represents the problem. Then solve the system of linear equations.
- Solve the Problem**

**Words**  $30 \cdot \text{Price per bundle} + 4 \cdot \text{Price per roll} = 1040$

$$8 \cdot \text{Price per bundle} + 0 \cdot \text{Price per roll} = 256$$

**Variables** Let  $x$  be the price (in dollars) per bundle and let  $y$  be the price (in dollars) per roll.

**System**  $30x + 4y = 1040$  Equation 1  
 $8x = 256$  Equation 2

**Step 1** Graph each equation. Note that only the first quadrant is shown because  $x$  and  $y$  must be positive.

**Step 2** Estimate the point of intersection. The graphs appear to intersect at  $(32, 20)$ .

**Step 3** Check your point from Step 2.

Equation 1                      Equation 2  
 $30x + 4y = 1040$                        $8x = 256$

$$30(32) + 4(20) \stackrel{?}{=} 1040 \qquad 8(32) \stackrel{?}{=} 256$$

$$1040 = 1040 \quad \checkmark \qquad 256 = 256 \quad \checkmark$$

