

## 5.2 ~~Quick Quiz~~ Practice

Solve the system of linear equations by substitution.

1.  $x = 5 - y$   
 $2x + 5y = 4$

$$2(5 - y) + 5y = 4$$

$$10 - 2y + 5y = 4$$

$$10 + 3y = 4$$

$$\begin{array}{r} 10 + 3y = 4 \\ -10 \quad -10 \\ \hline \end{array}$$

$$\frac{3y}{3} = \frac{-6}{3}$$

$$y = -2$$

$$x = 5 - y$$

$$x = 5 - (-2)$$

$$x = 7$$

(7, -2)

(7, -2)

2.  $x - y = -2$   
 $3x - y = 2$

$$x = -2 + y$$

$$3(-2 + y) - y = 2$$

$$-6 + 3y - y = 2$$

$$-6 + 2y = 2$$

$$\begin{array}{r} -6 + 2y = 2 \\ +6 \quad +6 \\ \hline 2y = 8 \\ \frac{2y}{2} = \frac{8}{2} \end{array}$$

$$y = 4$$

$$x = -2 + 4$$

$$x = 2$$

(2, 4)

3. There are a total of 124 students in the band. There are 12 more boys than girls in the band. Write a system of linear equations that represents this situation. How many boys and how many girls are in the band?

$$x + y = 124$$

$$x = 12 + y$$

$$x = 56 + 12$$

$$x = 68$$

$x = \text{boys}$   
 $y = \text{girls}$

68 boys  
56 girls

$$12 + y + y = 124$$

$$12 + 2y = 124$$

$$\begin{array}{r} 12 + 2y = 124 \\ -12 \quad -12 \\ \hline \end{array}$$

$$\frac{2y}{2} = \frac{112}{2}$$

$$y = 56$$

# 5.1 Quick Quiz

1. Tell whether the ordered pair  $(-2, -2)$  is a solution of the system of linear equations.

$$2x - y = -2 \quad \checkmark$$

$$x - 2y = 2 \quad \checkmark$$

$$2(-2) - (-2) = -2$$

$$-4 + 2 = -2$$

$$-2 - 2(-2) = 2$$

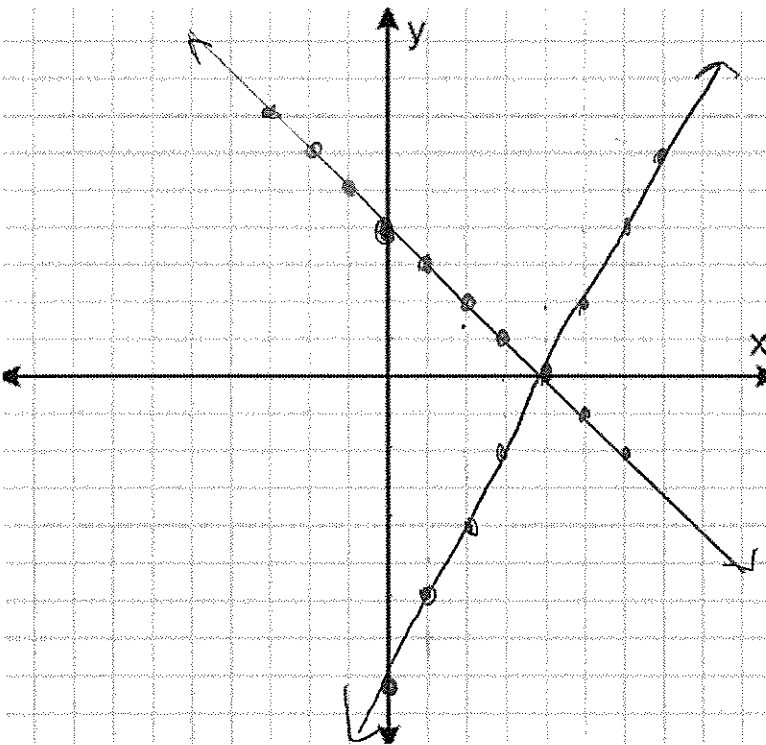
$$-2 + 4 = 2 \quad \checkmark$$

Yes

2. Solve the system of linear equations by graphing.

$$y = -x + 4$$

$$y = 2x - 8$$



$(4, 0)$

3. Rob has 14 pens and markers. He has six more markers than pens. How many of each item does Rob have?

$$x + y = 14$$

$$y = x + 6$$

$$x = \text{pens}$$

$$y = \text{markers}$$

4 pens  
10 markers

$$x + x + 6 = 14$$

$$2x + 6 = 14$$

$$-6 -6$$

$$2x = 8$$

$$x = 4$$

Name: hey ;)

Date: \_\_\_\_\_

### 5.3 Solving Systems of Linear Equations By Elimination

Essential Question: How can you use elimination to solve a system of linear equations?

Step 1: Multiply, if necessary, one or both equations by a constant so that at least one pair of like terms has the same or opposite coefficients.

Step 2: Add or subtract the equations to eliminate one of the variables.

Step 3: Solve the resulting equation.

Step 4: Substitute the value from Step 3 into one of the original equations to solve for the other variable.

#### EXAMPLE 1

#### Solving a System of Linear Equations by Elimination

Solve the system of linear equations by elimination.

$$\begin{array}{r} 3x + 2y = 4 \\ + \quad 3x - 2y = -4 \\ \hline \end{array}$$

$$\begin{array}{r} 6x = 0 \\ \frac{6}{6} \quad \frac{0}{6} \\ x = 0 \end{array}$$

Equation 1

Equation 2

$$\begin{array}{r} 3(0) + 2y = 4 \\ 2y = 4 \\ \frac{2y}{2} = \frac{4}{2} \\ y = 2 \end{array}$$

$$\boxed{(0, 2)}$$

#### EXAMPLE 2

#### Solving a System of Linear Equations by Elimination

Solve the system of linear equations by elimination.

$$\begin{array}{r} -10x + 3y = 1 \\ -2(-5x - 6y = 23) \end{array}$$

Equation 1

Equation 2

$$\begin{array}{r} -10x + 3y = 1 \\ + \quad 10x + 12y = -46 \\ \hline 15y = -45 \\ \frac{15y}{15} = \frac{-45}{15} \\ y = -3 \end{array}$$

$$\begin{array}{r} -5x - 6(-3) = 23 \\ -5x + 18 = 23 \\ -18 \quad -18 \\ -5x = 5 \\ \frac{-5x}{-5} = \frac{5}{-5} \\ x = -1 \end{array}$$

$$\boxed{(-1, 3)}$$

\*  
Substitute into  
ORIGINAL  
Equation

Example 2b

$$5x + 8y = 1$$

$$-2x + 2 = 3y$$

$$+2x$$

$$+2x$$

\* 1st Get them lined up

$$a = 3y + 2x$$

\* Multiply ALL of the equation

$$\begin{array}{r}
 2(5x + 8y = 1) \\
 -5(2x + 3y = 2) \\
 \hline
 10x + 16y = 2 \\
 -10x - 15y = -10 \\
 \hline
 y = -8
 \end{array}$$

$$(13, -8)$$

$$-2x + 2 = -24$$

$$-2 \quad -2$$

$$\frac{-2x}{-2} = \frac{-26}{-2}$$

$$x = 13$$

### Solving Real-Life Problems

#### EXAMPLE 3

#### Modeling with Mathematics

A business with two locations buys seven large delivery vans and five small delivery vans. Location A receives five large vans and two small vans for a total cost of \$235,000. Location B receives two large vans and three small vans for a total cost of \$160,000. What is the cost of each type of van?

L = large S = small

$$\begin{array}{r}
 -3(5L + 2S = 235,000) \\
 2(2L + 3S = 160,000) \\
 \hline
 -15L - 6S = -705,000 \\
 4L + 6S = 320,000 \\
 \hline
 -11L = -385,000 \\
 -11 \quad -11 \\
 \hline
 L = 35,000
 \end{array}$$

$$\begin{array}{l}
 \text{Large: } \$35,000 \\
 \text{Small: } \$30,000
 \end{array}$$

$$5L + 2S = 235,000$$

$$5(35,000) + 2S = 235,000$$

$$175,000 + 2S = 235,000$$

$$-175,000 \quad -175,000$$

$$\frac{2S}{2} = \frac{60,000}{2}$$

$$S = 30,000$$