

Solve. Check your solution.

1. $4x = 12$

$$\frac{4}{4} \frac{4x}{4} = \frac{12}{4}$$

$$x = 3$$

3. $6 + 2w = -2$

$$-6 \quad -6$$

$$2w = -8$$

$$w = -4$$

5. $x - 4 = -6$

$$+4 \quad +4$$

$$x = -2$$

2. $3 = 5x - 7$

$$+7 \quad +7$$

$$10 = 5x \quad x = 2$$

4. $5a + 19 = -1$

$$-19 \quad -19$$

$$5a = -20$$

$$a = -4$$

6. $1 = 9 + 4a$

$$-9 \quad -9$$

$$-8 = 4a$$

$$-2 = a$$

Warm Up

Write and solve an equation to answer the question.

1. The temperature at 6 A.M. was 19°F . The temperature at 2 P.M. was 25°F . How many degrees did the temperature rise?

2. The length of a garden is 2 times its width. If the length of the garden is 10.4 feet, what is its width?

3. The remaining amount in an account is \$499 more than the balance was 3 years ago. The current balance of the account is \$5,697. What was the balance 3 years ago?

Cumulative Warm Up

Essential Question

How can you use substitution to solve a system of linear equations?

Essential Question

• Solve equations for a single variable

• Follow correct order of operations

• Watch signs

• Word problem review

• Look for key words

• Build equations

• Make sure answer makes sense.

Work with a partner. Solve each system of linear equations using two methods.

Method 1 Solve for x first.

Solve for x in one of the equations. Substitute the expression for x into the other equation to find y . Then substitute the value of y into one of the original equations to find x .

Method 2 Solve for y first.

Solve for y in one of the equations. Substitute the expression for y into the other equation to find x . Then substitute the value of x into one of the original equations to find y .

Is the solution the same using both methods? Explain which method you would prefer to use for each system.

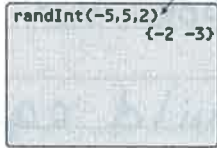
a. $x + y = -7$ b. $x - 6y = -11$ c. $4x + y = -1$
 $-5x + y = 5$ $3x + 2y = 7$ $3x - 5y = -18$

Exploration 1

Work with a partner.

a. Write a random ordered pair with integer coordinates. One way to do this is to use a graphing calculator. The ordered pair generated at the right is $(-2, -3)$.

Choose two random integers between -5 and 5 .



b. Write a system of linear equations that has your ordered pair as its solution.

c. Exchange systems with your partner and use one of the methods from Exploration 1 to solve the system. Explain your choice of method.

Exploration 2

Core Concept

Solving a System of Linear Equations by Substitution

- Step 1 Solve one of the equations for one of the variables.
- Step 2 Substitute the expression from Step 1 into the other equation and solve for the other variable.
- Step 3 Substitute the value from Step 2 into one of the original equations and solve.

Core Concept

walk through steps for substitution

Solve the system of linear equations by substitution.

$y = -2x - 9$ Equation 1

$6x - 5y = -19$ Equation 2

$$y = -2x - 9$$

$$y = -2(4) - 9$$

$$y = +8 - 9$$

$$y = -1$$

$$6x - 5(-2x - 9) = -19$$

$$6x + 10x + 45 = -19$$

$$16x = -64$$

$$x = -4$$

$(-4, -1)$

Example 1

Solved for a single variable
Substitute into the equation

Solve the system of linear equations by substitution.

Check your solution.

1. $y = 3x + 14$ 2. $3x + 2y = 0$ 3. $x = 6y - 7$
 $y = -4x$ $y = \frac{1}{2}x - 1$ $4x + y = -3$

$$3x + 14 = -4x$$

$$14 = -7x$$

$$-2 = x$$

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

$$y = 8$$

$(-2, 8)$

$$3x + 2(\frac{1}{2}x - 1) = 0$$

$$3x + x - 2 = 0$$

$$4x = 2$$

$$x = \frac{2}{4} = \frac{1}{2}$$

$$y = \frac{1}{2}x - 1$$

$$y = \frac{1}{2}(\frac{1}{2}) - 1$$

$$y = \frac{1}{4} - 1$$

$$y = -\frac{3}{4}$$

$(\frac{1}{2}, -\frac{3}{4})$

Monitoring Progress 1-3

$$4(6y - 7) + y = -3$$

$$24y - 28 + y = -3$$

$$25y = 25$$

$$y = 1$$

$$x = 6(1) - 7$$

$$x = 6 - 7$$

$$x = -1$$

$(-1, 1)$

Solve the system of linear equations by substitution.

$-x + y = 3$ Equation 1 $y = x + 3$
 $3x + y = -1$ Equation 2

$$3x + x + 3 = -1$$

$$4x + 3 = -1$$

$$4x = -4$$

$$x = -1$$

$(-1, 2)$

$$3(-1) + y = -1$$

$$-3 + y = -1$$

$$y = 2$$

Example 2

Solve the system of linear equations by substitution. Check your solution.

$$4. \begin{cases} x + y = -2 \\ -3x + y = 6 \end{cases}$$

$$5. \begin{cases} -x + y = -4 \\ 4x - y = 10 \end{cases}$$

$$6. \begin{cases} 2x - y = -5 \\ 3x - y = 1 \end{cases}$$

$$7. \begin{cases} x - 2y = 7 \\ 3x - 2y = 3 \end{cases}$$

Monitoring Progress 4-7

A drama club earns \$1040 from a production. A total of 64 adult tickets and 132 student tickets are sold. An adult ticket costs twice as much as a student ticket. Write a system of linear equations that represents this situation. What is the price of each type of ticket?

$$\begin{aligned} 64x + 132y &= 1040 \\ x &= 2y \end{aligned}$$

Example 3

8. There are a total of 64 students in a drama club and a yearbook club. The drama club has 10 more students than the yearbook club. Write a system of linear equations that represents this situation. How many students are in each club?

$$\begin{aligned} x + y &= 64 \\ y &= x + 10 \end{aligned}$$

Monitoring Progress 8

* Student practice *

• word problem practice

• Setup

• Solve

• does it make sense?

Exit Ticket: Solve the system by substitution and by graphing.

$$y = 3x + 1$$

$$y = x + 3$$

Closure

