Simplify.

1. $7x - 7x$

   0

2. $5y - (-11y)$

   $5y + 11y$

   $16y$

3. $-11a - 16a$

   $-27a$

4. $-11xy - 18xy$

   $-29xy$

5. $-\frac{1}{3}x + \frac{1}{2}x$

   $-\frac{2}{6}x + \frac{3}{6}x$

   $\frac{1}{6}x$

6. $2x - 6x - 2x$

   $-4x - 2x$

   $-6x$

Warm Up

* Review: combine like terms
- watch signs
- check variables to make sure you have like terms.

Write the sentence as an absolute value inequality.
Then solve the inequality.

1. A number is greater than 5 units from 1.
2. A number is less than 8 units from 4.
3. Half a number is at least 4 units from 15.
4. Triple a number is no more than 9 units from 0.

Cumulative Warm Up

* Student practice
  - set up from word problems

Essential Question

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

Essential Question

- Multiple methods to solve:
  - Graphing
  - Substitution
  - Elimination

Work with a partner. You purchase a drink and a sandwich for \$4.50. Your friend purchases a drink and five sandwiches for \$16.50. You want to determine the price of a drink and the price of a sandwich.

a. Let x represent the price (in dollars) of one drink. Let y represent the price (in dollars) of one sandwich. Write a system of equations for the situation. Use the following verbal model.

Number of drinks · Price per drink + Number of sandwiches · Price per sandwich = Total price

Label one of the equations Equation 1 and the other equation Equation 2.

b. Subtract Equation 1 from Equation 2. Explain how you can use the result to solve the system of equations. Then find and interpret the solution.

Exploration 1

* Student work

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

Method 1 Subtract. Subtract Equation 2 from Equation 1. Then use the result to solve the system.

Method 2 Add. Add the two equations. Then use the result to solve the system.

Is the solution the same using both methods?
Which method do you prefer?

a. $3x - y = 6$	**b.** $2x + y = 6$	**c.** $x - 2y = -7$
$3x + y = 0$	$2x - y = 2$	$x + 2y = 5$

Exploration 2

Work with a partner.

$2x + y = 7$ Equation 1

$x + 5y = 17$ Equation 2

a. Can you eliminate a variable by adding or subtracting the equations as they are? If not, what do you need to do to one or both equations so that you can?

b. Solve the system individually. Then exchange solutions with your partner and compare and check the solutions.

Exploration 3

Core Concept

Solving a System of Linear Equations by Elimination

Step 1 Multiply, if necessary, one or both equations by a constant so 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 and solve for the other variable.

Core Concept

· walk through steps

· multiple ways to solve

· Choose variables that will help to keep your numbers smaller.

Solve the system of linear equations by elimination.

$3x + 2y = 4$ Equation 1

$3x - 2y = -4$ Equation 2

$6x = 0$

$x = 0$

$3(0) + 2y = 4$

$2y = 4$

$y = 2$

$(0, 2)$

Example 1

· If you have a variable term that is opposite and when added would equal 0, use that for elimination

Solve the system of linear equations by elimination.

(2) $-10x + 3y = 1$ Equation 1

$-5x - 6y = 23$ Equation 2

$-20x + 6y = 2$

$-5x - 6y = 23$

$-25x = 25$

$x = -1$

$-5(-1) - 6y = 23$

$5 - 6y = 23$

$-5 \qquad -5$

$-6y = 18$

$y = -3$

$(-1, -3)$

Example 2

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

1. $3x + 2y = 7$
   $-3x + 4y = 5$

2. $x - 3y = 24$
   $3x + y = 12$

3. $x + 4y = 22$
   $4x + y = 13$

Monitoring Progress 1-3

* Student practice *

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?

$(-3)\quad 5x + 2y = 235{,}000$
$(2)\quad 2x + 3y = 160{,}000$

$-15x - 6y = -705{,}000$
$4x + 6y = 320{,}000$
$-11x = -385{,}000$
$x = 35{,}000$

Example 3

· you can eliminate for either x or y - try to think of which variable is easier

$2(35{,}000) + 3y = 160{,}000$
$70{,}000 + 3y = 160{,}000$
$3y = 90{,}000$
$y = 30{,}000$

large = $35,000
small = $30,000

4. Solve the system in Example 3 by eliminating x.

$(-2)\quad 5x + 2y = 235{,}000$
$(5)\quad 2x + 3y = 160{,}000$

$-10x - 4y = -470{,}000$
$10x + 15y = 800{,}000$
$11y = 330{,}000$
$y = 30{,}000$

Monitoring Progress 4

$2x + 3(30{,}000) = 160{,}000$
$2x + 90{,}000 = 160{,}000$
$2x = 70{,}000$
$x = 35{,}000$

large = $35,000
small = $30,000

Example/Non-Example: Students have learned to solve systems of linear equations by graphing, substitution, and elimination. Although any linear system can be solved by any of the three methods, the approach selected usually depends on what the system looks like. For each of the three methods, have partners write a system that they would (example) and would not (nonexample) solve using that method. When presented, listen for justification of why students would or would not use that method for the system written. Give feedback as needed.

Closure