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| <b>Focus Standards:</b> | 8.EE.B.5 | Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. <i>For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.</i>   |
|                         | 8.EE.C.8 | Analyze and solve pairs of simultaneous linear equations.<br>a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.<br>b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. <i>For example, <math>3x + 2y = 5</math> and <math>3x + 2y = 6</math> have no solution because <math>3x + 2y</math> cannot simultaneously be 5 and 6.</i><br>c. Solve real-world and mathematical problems leading to two linear equations in two variables. <i>For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.</i> |

**Student Outcomes**

- Students learn the elimination method for solving a system of linear equations.
- Students use properties of rational numbers to find a solution to a system, if it exists, through computation using substitution and elimination methods.

## Classwork

**Example 1** Use what you noticed about adding equivalent expressions to solve the following system by elimination.

$$\begin{cases} 6x - 5y = 21 \\ 2x + 5y = -5 \end{cases}$$

## Example 2

Solve the following system by elimination.

$$\begin{cases} -2x + 7y = 5 \\ 4x - 2y = 14 \end{cases}$$

### Example 3

Solve the following system by elimination.

$$\begin{cases} 7x - 5y = -2 \\ 3x - 3y = 7 \end{cases}$$

### Exercises

Each of the following systems has a solution. Determine the solution to the system by eliminating one of the variables. Verify the solution using the graph of the system.

1. 
$$\begin{cases} 6x - 7y = -10 \\ 3x + 7y = -8 \end{cases}$$

2. 
$$\begin{cases} x - 4y = 7 \\ 5x + 9y = 6 \end{cases}$$

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

**Problem Set** - Determine the solution, if it exists, for each system of linear equations. Verify your solution on the coordinate plane.

1. 
$$\begin{cases} \frac{1}{2}x + 5 = y \\ 2x + y = 1 \end{cases}$$

2. 
$$\begin{cases} 9x + 2y = 9 \\ -3x + y = 2 \end{cases}$$

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

4. 
$$\begin{cases} 8x + 5y = 19 \\ -8x + y = -1 \end{cases}$$

5. 
$$\begin{cases} x + 3 = y \\ 3x + 4y = 7 \end{cases}$$

6. 
$$\begin{cases} y = 3x + 2 \\ 4y = 12 + 12x \end{cases}$$

7. 
$$\begin{cases} 4x - 3y = 16 \\ -2x + 4y = -2 \end{cases}$$

8. 
$$\begin{cases} 2x + 2y = 4 \\ 12 - 3x = 3y \end{cases}$$



9. 
$$\begin{cases} y = -2x + 6 \\ 3y = x - 3 \end{cases}$$

10. 
$$\begin{cases} y = 5x - 1 \\ 10x = 2y + 2 \end{cases}$$

11. 
$$\begin{cases} 3x - 5y = 17 \\ 6x + 5y = 10 \end{cases}$$

12. 
$$\begin{cases} y = \frac{4}{3}x - 9 \\ y = x + 3 \end{cases}$$

13. 
$$\begin{cases} 4x - 7y = 11 \\ x + 2y = 10 \end{cases}$$

14. 
$$\begin{cases} 21x + 14y = 7 \\ 12x + 8y = 16 \end{cases}$$