

# Assignment

## Write

Explain how you would combine the two equations to solve for  $x$  and  $y$ . Use the following terms in your explanation: *linear combination* and *additive inverses*.

$$3x + 2y = -25$$

$$x - 4y = 5$$

## Remember

You can use the linear combinations method to solve a system of equations by adding two equations together, resulting in an equation with one variable. You can then determine the value of that variable and use it to determine the value of the other variable.

## Practice

- The two high schools, Jefferson Hills East and Jefferson Hills West, are taking field trips to the state capital. A total of 408 students from Jefferson Hills East will be going in 3 vans and 6 buses. A total of 516 students from Jefferson Hills West will be going in 6 vans and 7 buses. Each van has the same number of passengers and each bus has the same number of passengers.
  - Write a system of equations that represents this problem situation. Let  $x$  represent the number of students in each van, and let  $y$  represent the number of students in each bus.
  - How are the equations in the system the same? How are they different?
  - Describe the first step needed to solve the system using the linear combinations method. Identify the variable that will be eliminated as well as the variable that will be solved for when you add the equations.
  - Solve the system of equations using the linear combinations method. Show your work.
  - Interpret the solution of the linear system in terms of the problem situation.
  - Check your solution algebraically.
- Solve each system of linear equations.

a. 
$$\begin{cases} 3x + y = 9 \\ 7x + y = 32 \end{cases}$$

b. 
$$\begin{cases} 5x - 8y = 25 \\ -x + 4y = -8 \end{cases}$$

c. 
$$\begin{cases} \frac{2}{3}x + \frac{1}{4}y = 18 \\ \frac{1}{6}x - \frac{3}{8}y = -6 \end{cases}$$

d. 
$$\begin{cases} 5x + 4y = -14 \\ 3x + 6y = 6 \end{cases}$$

## Stretch

Use linear combinations to solve the given system of three equations in three variables. Show your work.

$$\begin{cases} 3x + y + 3z = -2 \\ 6x + 2y + 9z = 5 \\ -2x - y - z = 3 \end{cases}$$

## Review

- The drama department sold a total of 360 tickets to their Friday and Saturday night shows. They sold three times as many tickets for Saturday's show than for Friday's show.
  - Write a system of equations to represent this scenario.
  - Graph the system of equations on a coordinate plane.
  - How many tickets were sold for Friday? Saturday? Is there more than one solution?
  - Justify algebraically that your solution is correct.
- Analyze the data in the table.
  - Write the equation of the regression line for the data.
  - Predict the population after 20 years. Round your answer to the nearest whole number.

Number of years	Population
1	240
2	360
3	280
5	500
6	625
7	830
8	720
9	813
10	900