

NAME \_\_\_\_\_

**Module 10** Solving Systems of Linear Equations and Inequalities**Lesson 3** Solving Systems of Linear Equations by Substitution

 independent practice

Solve each system of linear equations using the substitution method.

1. 
$$\begin{cases} 4x + 3y = 4 \\ 2x - 7 = y \end{cases}$$

**(2.5, -2)**

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

 **$(2, \frac{1}{2})$** 

3. 
$$\begin{cases} h = -0.75j \\ 2h - 4j = 16.5 \end{cases}$$

**(2.25, -3)**

4. 
$$\begin{cases} 5x = 4y \\ 3x + y = 17 \end{cases}$$

**(4, 5)**

5. 
$$\begin{cases} y = x \\ x + y = 0 \end{cases}$$

**(0, 0)**

6. 
$$\begin{cases} y = 10 - x \\ y = x + 2 \end{cases}$$

**(4, 6)**

7. 
$$\begin{cases} 5f = 9d - 12 \\ f = \frac{9}{5}d + 12 \end{cases}$$

**No solution**

8. 
$$\begin{cases} b = 3\left(1 - \frac{2a}{3}\right) \\ 4a + 2b = 12 \end{cases}$$

**No solution**

9. 
$$\begin{cases} p - \frac{1}{2}q = 2 \\ q = 2p - 4 \end{cases}$$

**An infinite number of solutions**

Solve.

10. The sum of two positive, odd integers is 38. One of the numbers is eight more than the other number. What are the two numbers?

**The numbers are 15 and 23.**

11. One number is five less than seven times another. The sum of the two numbers is -29. Find the numbers.

**The numbers are -3 and -26.**

12. Jim has 60 cents in his pocket in dimes and nickels. If he has three more dimes than nickels, how many of each does Jim have in his pocket?

**Jim has 5 dimes and 2 nickels in his pocket.**

13. Susan spent \$7.15 for popcorn and soda at the movies. If the popcorn was four times the price of the soda, how much did each cost?

**The popcorn was \$5.72, and the soda was \$1.43.**

14. The high school marching band has 136 members. If the girls outnumber the boys by 18, how many boys are in the band?

**There are 59 boys in the band.**

15. Josh scored 25 points in the finals of the basketball tournament. If he had twice as many 2-point baskets as 1-point free throws, how many baskets did he make?

**Josh made 10 baskets.**

## Journal

1. When solving a system of two linear equations, what situation makes the method of substitution easier to use?
2. Compare and contrast the three methods for solving systems of equations.
3. What is the graph of a system of linear equations? How does finding the solution on a graph differ from finding the solution by other methods?
4. Why is it important to know more than one method for solving systems of equations?
5. Which method for solving systems of equations would be best for solving the following system of linear equations? Justify your choice.

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

## Cumulative Review

Evaluate each expression below, using the functions  $f(x) = x^2 - 5x + 14$ ,  $g(x) = 3x + 2$ , and  $h(x) = -x^3 + 2x - 1$ .

- |  |  |
|--|--|
| 1. $f(0)$ <b>14</b>                              | 2. $h(3)$ <b>-22</b>                     |
| 3. $g(1)$ <b>5</b>                               | 4. $f(g(1))$ <b>14</b>                   |
| 5. $h(3) + 2f(0)$ <b>6</b>                       | 6. $h(2) - 5f(-2)$ <b>-145</b>           |
| 7. $f(-2)$ <b>28</b>                             | 8. $g(a^2)$ <b><math>3a^2 + 2</math></b> |
| 9. $g(f(a))$ <b><math>3a^2 - 15a + 44</math></b> | 10. $g(f(2))$ <b>26</b>                  |

### Possible Journal Responses

1. A substitute value is easier to find when the coefficient of at least one of the variables is one.
2. Methods for solving systems of linear equations include graphing, elimination and substitution. All three methods are useful for finding solutions under certain circumstances. If the solutions are integers and the equations are written in slope intercept form, graphing is a good way to solve the system. If at least one of the variables in one of the equations is already isolated, this system is ready to solve using the substitution method. When the equations in the system are in standard form and the variables have coefficients other than one, the best method for solving would be elimination. If the equations in the system require rearrangement before solving, the best method for solving the system would depend upon the ease in which the equations could be converted to standard form or slope-intercept form and the algebra skills of the solver.
3. The graph of a system of linear equations is a pair of lines. Finding the solution to the system on the graph is a matter of locating the point of intersection of the two lines and recording the coordinates, which requires no algebraic manipulation. Finding the solution to the system by substitution or elimination requires algebraic manipulation of the equations in the system.
4. It is necessary to know more than one method for solving systems of linear equations to be able to efficiently solve the system regardless of the arrangement of the equations.
5. Answers will vary based upon student's preference. Check justifications carefully.