



Lesson Check

Do you know HOW?

Solve each system using substitution. Check your solution.

1. $4y = x$
 $3x - y = 70$

2. $-2x + 5y = 19$
 $3x - 4 = y$

Tell whether the system has *one solution*, *infinitely many solutions*, or *no solution*.

3. $y = 2x + 1$
 $4x - 2y = 6$

4. $-x + \frac{1}{2}y = 13$
 $x + 15 = \frac{1}{2}y$

5. **Talent Show** In a talent show of singing and comedy acts, singing acts are 5 min long and comedy acts are 3 min long. The show has 12 acts and lasts 50 min. How many singing acts and how many comedy acts are in the show?

Do you UNDERSTAND? MATHEMATICAL PRACTICES

6. **Vocabulary** When is the substitution method a better method than graphing for solving a system of linear equations?

For each system, tell which equation you would first use to solve for a variable in the first step of the substitution method. Explain your choice.

7. $-2x + y = -1$
 $4x + 2y = 12$

8. $2.5x - 7y = 7.5$
 $6x - y = 1$

Tell whether each statement is *true* or *false*. Explain.

9. When solving a system using substitution, if you obtain an identity, then the system has no solution.

10. You cannot use substitution to solve a system that does not have a variable with a coefficient of 1 or -1 .



Practice and Problem-Solving Exercises MATHEMATICAL PRACTICES

A Practice

Solve each system using substitution. Check your answer.

See Problems 1 and 2.

11. $x + y = 8$
 $y = 3x$

12. $2x + 2y = 38$
 $y = x + 3$

13. $x + 3 = y$
 $3x + 4y = 7$

14. $y = 8 - x$
 $7 = 2 - y$

15. $y = -2x + 6$
 $3y - x + 3 = 0$

16. $3x + 2y = 23$
 $\frac{1}{2}x - 4 = y$

17. $y - 2x = 3$
 $3x - 2y = 5$

18. $4x = 3y - 2$
 $18 = 3x + y$

19. $2 = 2y - x$
 $23 = 5y - 4x$

20. $4y + 3 = 3y + x$
 $2x + 4y = 18$

21. $7x - 2y = 1$
 $2y = x - 1$

22. $4y - x = 5 + 2y$
 $3x + 7y = 24$

23. **Theater Tickets** Adult tickets to a play cost \$22. Tickets for children cost \$15. Tickets for a group of 11 people cost a total of \$228. Write and solve a system of equations to find how many children and how many adults were in the group. See Problem 3.

24. **Transportation** A school is planning a field trip for 142 people. The trip will use six drivers and two types of vehicles: buses and vans. A bus can seat 51 passengers. A van can seat 10 passengers. Write and solve a system of equations to find how many buses and how many vans will be needed.

25. **Geometry** The measure of one acute angle in a right triangle is four times the measure of the other acute angle. Write and solve a system of equations to find the measures of the acute angles.

Tell whether the system has *one solution*, *infinitely many solutions*, or *no solution*.

See Problem 4.

26. $y = \frac{1}{2}x + 3$
 $2y - x = 6$

27. $6y = -5x + 24$
 $2.5x + 3y = 12$

28. $x = -7y + 34$
 $x + 7y = 32$

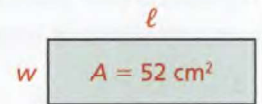
29. $5 = \frac{1}{2}x + 3y$
 $10 - x = 6y$

30. $17 = 11y + 12x$
 $12x + 11y = 14$

31. $1.5x + 2y = 11$
 $3x + 6y = 22$

B Apply

32. **Geometry** The rectangle shown has a perimeter of 34 cm and the given area. Its length is 5 more than twice its width. Write and solve a system of equations to find the dimensions of the rectangle.



33. **Writing** What would your first step be in solving the system below? Explain.

$$\begin{aligned} 1.2x + y &= 2 \\ 1.4y &= 2.8x + 1 \end{aligned}$$

34. **Coins** You have \$3.70 in dimes and quarters. You have 5 more quarters than dimes. How many of each type of coin do you have?

35. **Error Analysis** Describe and correct the error at the right in finding the solution of the following system:

$$\begin{aligned} 7x + 5y &= 14 \\ x + 8y &= 21 \end{aligned}$$

~~Step 1~~ $x + 8y = 21$
 $x = 21 - 8y$

~~Step 2~~ $x + 8y = 21$
 $(21 - 8y) + 8y = 21$
 $21 = 21$

~~The system has infinitely many solutions.~~

36. **Art** An artist is going to sell two sizes of prints at an art fair. The artist will charge \$20 for a small print and \$45 for a large print. The artist would like to sell twice as many small prints as large prints. The booth the artist is renting for the day costs \$510. How many of each size print must the artist sell in order to break even at the fair?

37. **Think About a Plan** At a certain high school, 350 students are taking an algebra course. The ratio of boys to girls taking algebra is 33 : 37. How many more girls are taking algebra than boys?

- How can you write a system of equations to model the situation?
- Which equation will you solve for a variable in the first step of solving the system? Why?
- How can you interpret the solution in the context of the problem?

38. a. **Compare and Contrast** Using a graph, how can you tell when a system of linear equations has no solution?

b. Using substitution, how can you tell when a system of linear equations has no solution?

c. How can you tell by looking at a table of values if two lines will intersect in one point, no points, or an infinite number of points?

39. **Fireworks** A pyrotechnician plans for two fireworks to explode together at the same height in the air. They travel at speeds shown at the right. Firework B is launched 0.25 s before Firework A. How many seconds after Firework B launches will both fireworks explode?

