## Writing Exercises

1. What does it mean to be a solution to a system of two equations?
2. Describe how to solve a system of linear equations graphically.
3. Explain why a point common to both lines is a solution to a system of linear equations.
4. Explain why algebraic methods for solving systems of equations are important.
5. What types of applied problems can be solved using systems of equations?
6. Based on the graphical method, how many solutions are possible for any system of two linear equations?

## Computational Exercises

For Exercises 7–12, decide whether or not the given points are solutions to the system of equations.

7. $3x - y = 5$
   $x + 2y = 11$          (3, 4), (5, 10)

8. $2x + 4y = 4$
   $x - 3y = -8$          (4, −1), (−2, 2)

9. $6x + 7y = 24$
   $-2x + y = 2$          $(11, -6), \left(\frac{1}{2}, 3\right)$

10. $7x - 3y = 12$
    $-4x - 6y = -12$      $\left(2, \frac{2}{3}\right), (3, 3)$

11. $\frac{3}{4}x + 6y = 32$
    $x + \frac{1}{5}y = \frac{367}{15}$     $\left(24, \frac{7}{3}\right), \left(-16, \frac{10}{3}\right)$

12. $\frac{20}{3}x - \frac{25}{8}y = 18$
    $5x - \frac{3}{4}y = \frac{759}{100}$     $\left(\frac{147}{4}, 6\right), \left(1, -\frac{259}{75}\right)$

For Exercises 13–20, solve each system by graphing.

13. $2x - y = 14$
    $x = y + 7$

14. $x - 3y = 6$
    $4x + 3y = 9$

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

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

17. $4x + 3y = 2$
    $3x + 5y = -4$

18. $x + 2y = 0$
    $2x - y = 0$

19. $2y = 3 - 2x$
    $6x + 6y = 10$

20. $3x - 5y = -2$
    $10y - 6x = 4$

For Exercises 21–32, solve each system by substitution.

21. $x + y = 0$
    $x - 2y + 9 = 0$

22. $x = 2 - y$
    $3x - 2y = 1$

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

24. $x + 2y = 11$
    $2x - y = 7$

25. $2x - 3y = 1$
    $x = y + 2$

26. $2x + 3y = -1$
    $x = y - 13$

27. $4x + 3y = 24$
    $3x + 5y = 22$

28. $-8x + 2y = -32$
    $4x - 3y = 26$

29. $3x = 5y + 16$
    $5y - 3x = -16$

30. $-5x + y = 10$
    $20x - 4y = -40$

31. $x + 2y = 6$
    $-3x - 6y = 18$

32. $4x - y = 7$
    $-16x + 4y = 2$

For Exercises 33–44, solve each system by addition.

33. $3x = 2y + 10$
    $9y = 3x - 7$

34. $5x - y = 10$
    $x - 2y = 18$

35. $3x + 4y = 2$
    $y - x = -3$

36. $-3y + x = -6$
    $5x - 15y = 45$

37. $5x - 2y = 11$
    $15x - 6y = 33$

38. $-x = -2y + 11$
    $x + 3y = 14$

39. $-3x - 6y = -24$
    $4x + 8y = 32$

40. $4 + 2x = 6y$
    $5x - 4y = 12$

41. $2x - 3y = -2$
    $5x = 2y - 9$

42. $5x - 15y = 6$
    $-3x + 9y = -6$

70. On one website, each music video is a certain price and each movie is a certain price. Stan bought 10 music videos and 3 movies and spent $105. Steve went to the same website and bought 12 music videos and 2 movies and spent $94. How much does each item cost?

71. A Student Government Association sold carnations for $5 each for Valentine's Day and they sold green bagels for $3 each for St. Paddy's Day. They sold 800 items for $2,800. How many carnations were sold and how many bagels were sold?

72. A cabinetmaker needs 200 feet of two kinds of wood. Poplar sells for $10 per 8-foot board and mahogany sells for $12 per 8-foot board. Before taxes, the total amount he spent to get the proper type and amount of wood is $288.75. How many feet does the cabinet maker need of each type of wood? He's allowed to buy part of a board.

73. At a bookstore, Janie picked out three paperbacks that were all the same price and two hardcover books that were each the same price, and she thought she'd be spending $55.96 for the entire purchase before taxes. When she got to the register, she found out that the paperbacks were all 10% off and the hardcover books were all 5% off, so she ended up spending $51.96 before taxes. What is the sale price of the paperbacks and what is the sale price of the hardcover books?

74. On a 7-hour trip home for winter break, Marta was forced to drive on a stretch of highway that had a lot of construction. At first, she had to go 65 miles per hour for a certain amount of time, but then she was able to go 75 miles per hour for the rest of the trip, and in total she drove 485 miles. Assuming she made no stops, how long did she drive 65 miles per hour and how long did she drive 75 miles per hour?

43. $\frac{1}{3}x + \frac{1}{2}y = 18$

$\frac{1}{2}x - \frac{1}{4}y = 8$

44. $x - \frac{1}{2}y = -\frac{25}{6}$

$\frac{1}{3}x + \frac{1}{4}y = -\frac{5}{12}$

49. $3x - 5y = 5$
$5x - 7y = 1$

54. $2x - 3.1y = 8.4$
$6x + y = -8$

50. $x = 3y + 2$
$x + 3y = 14$

55. $\frac{2}{3}x + y = -2$

$\frac{1}{5}x - 3y = \frac{36}{5}$

*For Exercises 45–56, solve each system by any method; state whether the system is consistent, inconsistent, or dependent; and give the solution.*

45. $4x + y = 2$
$7x + 3y = 1$

46. $8x - 2y = -2$
$3x - 5y = 4$

47. $x - 6y = 19$
$2x + 7y = 0$

48. $4x - y = 11$
$7x + 3y = 14$

51. $4x - y = 3$
$8x - 2y = 6$

52. $y = 4x + 7$
$-12x + 3y = -11$

53. $0.06x + 0.2y = 0.22$
$2x - 5y = 16$

56. $x + \frac{1}{4}y = 5$

$\frac{1}{2}x + 2y = \frac{35}{2}$

## Applications in Our World

57. Lane works two part-time jobs while trying to break into the music business: one at Starbucks, the other in a campus computer lab. He puts 10% of his earnings from Starbucks into a savings account at Wachovia bank, and 20% into a savings account at the university credit union. He also puts 30% of his check from the campus job into the Wachovia account, and 40% into the credit union account. Every week the deposit into Wachovia is $127, and the deposit into the credit union is $184. The rest goes into his checking account. How much does Lane make per week at each job, and how much goes into checking?

58. A grocer mixes coffee that sells for $6.40 a pound with coffee that sells for $10.80 a pound. If she wants to have 30 pounds of coffee to sell at $9.04 a pound, how many pounds of each would she have to use?

59. A tour company in Chicago charges $38 for adults to take its famous architectural boat tour (and I hear it's worth every penny). The price for kids is $22. An evening cruise with 92 passengers brought in $3,160 in ticket fares. How many kids and how many adults took the cruise?

60. Two groups of students bought airline tickets to go to a conference. One group bought three tickets from Delta and two tickets from United, and their total was $800 before taxes and fees. The other group bought one ticket from Delta and four tickets from United, and their total was $850 before taxes and fees. How much does a ticket cost for each airline?

61. In preparation for a reality chef competition, the producer went to one market and got boneless chicken for $4.53 per pound and steak for $8.28 per pound. She then went to another market since the first one was now out of the meat she needed, and she got the same amount of chicken and steak, but at this market, the chicken was $5.72 per pound and the steak was $7.54 per pound. At the first market, she spent $144.66 and at the second market she spent $147.68. How many pounds of chicken and steak did she buy at both places?

62. A candy store owner mixes spearmint candy selling for $0.99 a pound with cinnamon candy selling for $0.89 a pound. If there are 10 pounds of the mixture selling for $0.94 per pound, how many pounds of each type were mixed together?

63. At a fast food restaurant, three chicken sandwiches and two large orders of French fries cost $8.87, and five chicken sandwiches and four large orders of French fries cost $15.55. How much does each item cost?

64. Jamaal plans to invest $2,400 from his tax return. (Good year for Jamaal!) Part will be invested at 9% and part at 6%, and he hopes to make $189 in interest after one year. How much will be invested at each rate?

65. At a school concert, student tickets cost $5.00 and general admission tickets for nonstudents were $8.00. If the total revenue was $3,034 and 500 tickets were sold, how many students attended the concert? How many general admission tickets were sold?

66. At a flea market, Joe bought some DVDs and CDs. The CDs sold for $5.00 each, and the DVDs sold for $3.00 each. If the total cost of the items was $78.00 and the total number of products sold was 18, find how many of each item Joe bought.

67. At a thrift store, all tops are the same price and all pairs of pants are the same price. Stacy buys three tops and five pairs of pants for $42 and her friend Lacy buys one top and two pairs of pants for $16. How much does the thrift store charge for a top and for a pair of pants?

68. On a game show, two numbers are selected at random from a box. Twice the smaller number less the larger number is −7. Four times the smaller number and twice the larger number is 54. What are the two numbers pulled from the box?

69. For an upcoming concert, one lawn seat and one general admission seat costs $38. A group of five bought the only tickets left, and they got three general admission tickets and two lawn seats for $98. How much does a general admission ticket cost?