

## 5.2 Exercises

### Concept Check

**Fill-in-the-Blank.** Complete each sentence using information found in this section.

1. If 0 is substituted for  $x$  in a linear equation and the resulting equation is solved for  $y$ , the result will be the \_\_\_-intercept.
2. If 0 is substituted for  $y$  in a linear equation and the resulting equation is solved for  $x$ , the result will be the \_\_\_-intercept.
3. The solution set for linear equations is a/an \_\_\_\_\_ set of ordered pairs.
4. The standard form of a linear equation is \_\_\_\_\_.
5. The graph of every linear equation is a/an \_\_\_\_\_.
6. The graph of a line is determined by \_\_\_ points.

**True/False.** Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

7. The  $y$ -intercept is the point where a line crosses the  $y$ -axis.
8. The terms ordered pair and point are used interchangeably.
9. A horizontal line does not have a  $y$ -intercept.
10. All  $x$ -intercepts correspond to an ordered pair of the form  $(0, y)$ .

### Practice

Use your knowledge of  $y$ -intercepts and  $x$ -intercepts to match each of the following equations with its graph.

1.  $4x + 3y = 12$

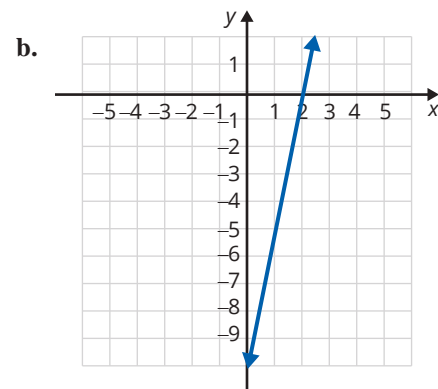
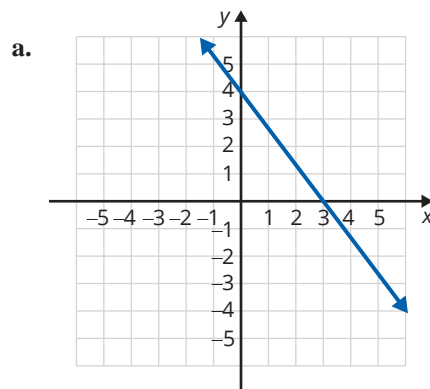
2.  $4x - 3y = 12$

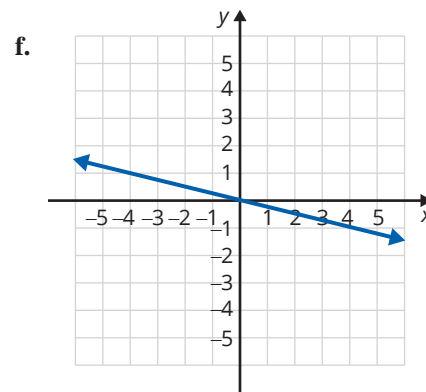
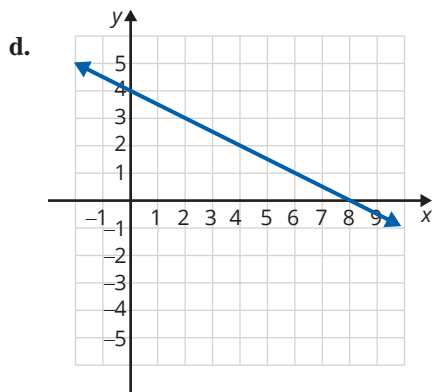
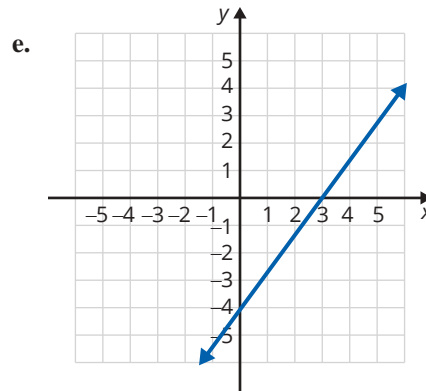
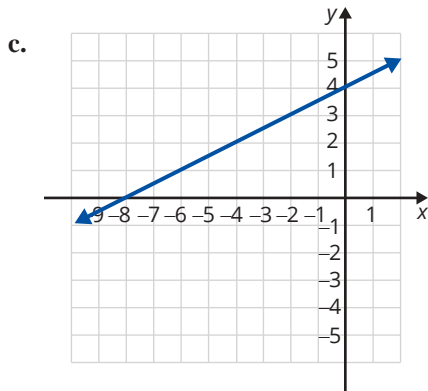
3.  $x + 2y = 8$

4.  $-x + 2y = 8$

5.  $x + 4y = 0$

6.  $5x - y = 10$





Graph each linear equation by locating at least two ordered pairs that satisfy the given equation. See Examples 1 through 3.

- |                    |                    |                             |
|--------------------|--------------------|-----------------------------|
| 7. $x + y = 3$     | 19. $y + 1 = 0$    | 30. $5x - 3y = -1$          |
| 8. $x + y = 4$     | 20. $y = 4x + 4$   | 31. $5x - 2y = 7$           |
| 9. $y = x$         | 21. $y = x + 2$    | 32. $y - 3 = 1$             |
| 10. $2y = x$       | 22. $x - 4 = -1$   | 33. $3x + 4y = 7$           |
| 11. $2x + y = 0$   | 23. $3y = 2x - 4$  | 34. $\frac{2}{3}x - y = 4$  |
| 12. $x = 1$        | 24. $y = -3$       | 35. $x + \frac{3}{4}y = 6$  |
| 13. $3x + 2y = 0$  | 25. $4x = 3y + 8$  | 36. $2x + \frac{1}{2}y = 3$ |
| 14. $2x + 3y = 7$  | 26. $3x + 5y = 6$  | 37. $y + 2 = 3$             |
| 15. $x + 2 = 0$    | 27. $2x + 7y = -4$ | 38. $\frac{2}{5}x - 3y = 5$ |
| 16. $4x + 3y = 11$ | 28. $2x + 3y = 1$  | 39. $5x = y + 2$            |
| 17. $3x - 4y = 12$ | 29. $x + 5 = 6$    | 40. $4x = 3y - 5$           |
| 18. $2x - 5y = 10$ |                    |                             |

Graph each linear equation by locating the  $x$ -intercept and the  $y$ -intercept. See Examples 4 through 6.

41.  $x + y = 6$

42.  $x + y = 4$

43.  $x - 2y = 8$

44.  $x - 3y = 6$

45.  $4x + y = 8$

46.  $x + 3y = 9$

47.  $x - 4y = -6$

48.  $x - 6y = 3$

49.  $y = 4x - 10$

50.  $y = 2x - 9$

51.  $3x - 2y = 6$

52.  $5x + 2y = 10$

53.  $2x + 3y = 12$

54.  $3x + 7y = -21$

55.  $3x - 7y = -21$

56.  $3x + 2y = 15$

57.  $5x + 3y = 7$

58.  $2x + 3y = 5$

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

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

61.  $\frac{2}{3}x - 3y = 4$

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

63.  $\frac{1}{2}x - \frac{3}{4}y = 6$

64.  $\frac{2}{3}x + \frac{4}{3}y = 8$

## Applications

Solve.

65. The amount of potassium in a clear bottle of a popular sports drink declines over time when exposed to the UV lights found in most grocery stores. The amount of potassium in a container of this sports drink is given by the equation  $y = -30x + 360$ , where  $y$  represents the mg of potassium remaining after  $x$  days on the shelf. Find both the  $x$ -intercept and  $y$ -intercept, and interpret the meaning of each in the context of this problem.
66. Mr. Adler has found that the grade each student gets in his Introductory Algebra course directly correlates with the amount of time spent doing homework and is represented by the equation  $y = 7x + 30$ , where  $y$  represents the numerical score the student receives on an exam (out of 100 points) after spending  $x$  hours per week doing homework. Find the  $y$ -intercept and interpret its meaning in this context.
67. Barbara's Bombtastic Bakery is donating cookies to a charity bake sale. The bakery decides to donate chocolate chip cookies and peanut butter cookies by the dozen, and they want to donate a total of 30 dozen cookies. To determine the possible combinations, the bakery uses the equation  $C + P = 30$ , where  $C$  is the number of dozens of chocolate chip cookies and  $P$  is the number of dozens of peanut butter cookies.
- Find the intercepts of the given equation.
  - Graph the equation using the intercepts.
  - Are there any solutions to the equation that do not make sense in the context of the problem? Explain why.
  - If Barbara's Bombtastic Bakery decides to donate 16 dozen peanut butter cookies, how many dozen chocolate chip cookies will be donated?

68. Ibuprofen can be given to a child to treat a fever. For a fever lower than  $102.5^{\circ}\text{F}$ , the recommended dosage is 2.2 milligrams per pound of body weight. This can be modeled by the equation  $D = 2.2w$ , where  $D$  is the dosage of ibuprofen in milligrams and  $w$  is the weight of the child in pounds.
- Create a table to determine several coordinate pairs that satisfy the equation.
  - Graph the equation using the coordinate pairs from part a.
  - Are there any solutions from the graph that do not make sense in the context of the problem? Explain why.
  - How much ibuprofen should be given to a child that weighs 45 pounds?
69. Mason purchased a card game for \$20. The 5-card expansion packs cost \$1 per pack. Mason wants to keep track of how much money he spends on the game, so he creates the equation  $C = 20 + 1n$ , where  $C$  is the total cost in dollars and  $n$  is the number of expansion packs purchased.
- Create a table to determine several coordinate pairs that satisfy the equation.
  - Graph the equation using the coordinate pairs from part a.
  - Are there any solutions from the graph that do not make sense in the context of the problem? Explain why.
  - If Mason buys 37 expansion packs, what will the total cost be?

## Writing & Thinking

70. Explain, in your own words, why it is sufficient to find the  $x$ -intercept and  $y$ -intercept to graph a line (assuming that they are not the same point).
71. Explain, in your own words, how you can determine if an ordered pair is a solution to an equation.