

Applications

1. **a.** Sam needs to rent a car for a one-week trip in Oregon. He is considering two companies. A+ Auto Rental charges \$175 plus \$0.10 per mile. Zippy Auto Rental charges \$220 plus \$0.05 per mile. Write an equation relating the rental cost for each company to the miles driven.
- b.** Graph the equations.
- c.** Under what circumstances is the rental cost the same for both companies? What is that cost?
- d.** Under what circumstances is renting from Zippy cheaper than renting from A+?
- e.** Suppose Sam rents a car from A+ and drives it 225 miles. What is his rental cost?



2. Maggie lives 1,250 meters from school. Ming lives 800 meters from school. Both girls leave for school at the same time. Maggie walks at an average speed of 70 meters per minute, while Ming walks at an average speed of 40 meters per minute. Maggie's route takes her past Ming's house.

a. Write equations that show Maggie and Ming's distances from school t minutes after they leave their homes.

Answer parts (b)–(d) by writing and solving equations or inequalities.

- b.** When, if ever, will Maggie catch up with Ming?
- c.** How long will Maggie remain behind Ming?
- d.** At what times is the distance between the two girls less than 20 meters?

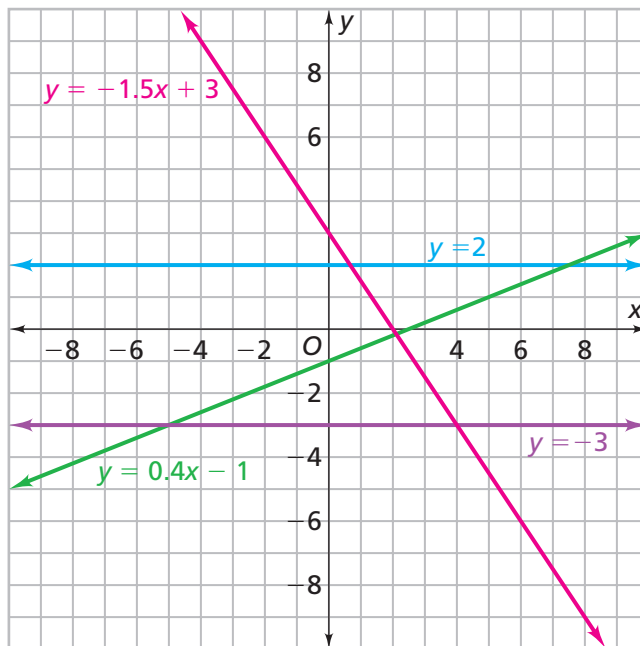
For Exercises 3–6, graph the system of equations and estimate the point of intersection. Then use symbolic reasoning to check whether your estimate is accurate.

3. $y = 2x + 4$ and $y = \frac{1}{2}x - 2$ 4. $y = x + 5$ and $y = -3x + 3$
 5. $y = 3$ and $y = 6x - 3$ 6. $x = 2$ and $y = -\frac{2}{5}x + 4$
7. Suppose s and t are two numbers and that $s > t$. Decide whether each inequality must be true.
- a. $s + 15 > t + 15$ b. $s - (-22) > t - (-22)$
 c. $s \times 0 > t \times 0$ d. $\frac{s}{-6} > \frac{t}{-6}$
 e. $\frac{s}{6} > \frac{t}{6}$ f. $s \times -3 < t \times -4$

For Exercises 8–11, solve the inequality. Then, graph the solution on a number line.

8. $12 < 7x - 2$ 9. $2x + 12 > 32$
 10. $4x - 17 \leq 31$ 11. $-16x - 12 > 14 - 10x$

12. Use these graphs to estimate solutions for the inequalities and equations in parts (a)–(f). Then, use symbolic reasoning to check your estimates.



- a. $0.4x - 1 > 2$ b. $0.4x - 1 > -3$
 c. $-1.5x + 3 > 2$ d. $-1.5x + 3 < -3$
 e. $-1.5x + 3 = 0.4x - 1$ f. $-1.5x + 3 > 0.4x - 1$

Go Online
 PHSchool.com
 For: Multiple-Choice Skills
 Practice
 Web Code: apa-7254

Connections

Calculate the y -value for the given x -value.

13. $y = 3x + 2$ when $x = -2$

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

15. $y = \frac{1}{2}x - 4$ when $x = 24$

16. $y = -5x - 7$ when $x = \frac{3}{15}$

17. $y = \frac{2}{3}x - 12$ when $x = -18$

18. $y = -\frac{1}{4}x - \frac{3}{4}$ when $x = -6$

Write an equation for the line satisfying the given conditions.

19. slope = 2, y -intercept = -3

20. slope = -4 , passes through $(0, 1.5)$

21. passes through $(-2, 1)$ and $(4, -3)$

22. passes through $(4, 0)$ and $(0, 3)$

Identify the slope, x -intercept, and y -intercept of the line.

23. $y = 7x - 3$

24. $y = -3x + 4$

25. $y = \frac{2}{3}x + 12$

26. $y = -\frac{1}{4}x - 5$

27. $y = \frac{3}{4} - 17x$

28. $y = -\frac{3}{5}(x + 10)$

For Exercises 29–34, copy each pair of expressions. Insert $<$, $>$, or $=$ to make a true statement.

29. $-18 \div -3$ \blacksquare $-24 \div -4$

30. $1,750(-12)$ \blacksquare $(1,749)(-12)$

31. $5(18 - 24)$ \blacksquare $90 - (-120)$

32. $-8(-5)$ \blacksquare $(-7)(-5)$

33. $4(-3 - (-7))$ \blacksquare $4(-3) - 4(-7)$

34. $-5(-4)^2$ \blacksquare $-4(-5)^2$

35. Write an equation or inequality that tells whether each point is inside, outside, or on the circle with a radius of 10 and centered at $(0, 0)$.

a. $(6, 8)$

b. $(7, 7)$

c. $(-7, -7)$

d. $(-6, 8)$

e. $(-7, 8)$

f. $(-7, -8)$

Copy each pair of fractions. Insert $<$, $>$, or $=$ to make a true statement.

36. $\frac{6}{8}$ \blacksquare $\frac{-18}{24}$

37. $\frac{6}{8}$ \blacksquare $\frac{7}{9}$

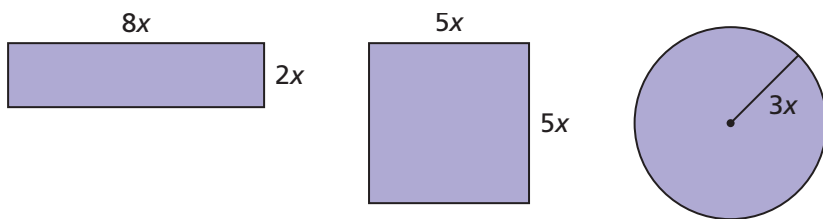
38. $\frac{6}{8}$ \blacksquare $\frac{-7}{9}$

39. $\frac{6}{8}$ \blacksquare $\frac{-18}{-24}$

40. $\frac{6}{8}$ \blacksquare $\frac{-7}{-9}$

41. $\frac{8}{6}$ \blacksquare $\frac{-9}{-7}$

42. Use these figures for parts (a)–(f). Insert $<$, $=$, or $>$ to make true statements.



- perimeter of square ■ perimeter of rectangle
 - area of square ■ area of rectangle
 - perimeter of square ■ circumference of circle
 - area of square ■ area of circle
 - perimeter of rectangle ■ circumference of circle
 - area of rectangle ■ area of circle
43. The gender of a newborn child is nearly equally likely to be a boy or a girl. Consider the patterns likely to occur in a family with three children.

Copy parts (a)–(d). Insert $<$, $=$, or $>$ to make true statements.

- $P(\text{all boys})$ ■ $P(\text{all girls})$
- $P(\text{exactly one boy})$ ■ $P(\text{exactly 2 girls})$
- $P(\text{BGB})$ ■ $P(\text{BBG})$
- $P(\text{two boys and one girl})$ ■ $P(\text{all girls})$



- 44. Multiple Choice** If $w = 3x + c$, what is the value of x ?
- A.** 3 **B.** $\frac{w - c}{3}$ **C.** $w - c$ **D.** $\frac{w + c}{3}$
- 45.** Suppose $\frac{a}{b}$ and $\frac{c}{d}$ are two non-zero fractions and $\frac{a}{b} < \frac{c}{d}$.
- a.** Give an example of values of $a, b, c,$ and d that satisfy $\frac{a}{b} < \frac{c}{d}$ and also $\frac{b}{a} < \frac{d}{c}$.
- b.** Give an example of values of $a, b, c,$ and d that satisfy $\frac{a}{b} < \frac{c}{d}$ and also $\frac{b}{a} > \frac{d}{c}$.
- 46. Multiple Choice** Which equation's graph is perpendicular to the graph of $y = 2.5x + 4$?
- F.** $y = 2.5x$ **G.** $y = 0.4x$ **H.** $y = -0.4x$ **J.** $y = -2.5x$
- 47. Multiple Choice** For which set of points is one point the midpoint of the segment joining the other two points?
- A.** (0, 0), (5, 6), (10, 3) **B.** (0, 3), (2, 6), (-2, 0)
- C.** (4, 6), (8, 12), (16, 24) **D.** (2, 0), (2, 6), (2, -3)
- 48.** Use a table or graph of $y = 5(2^x)$ to estimate the solution of the inequality $5(2^x) > 1,000$.
- 49.** Use a table or graph of $y = x^2 - x - 6$ to estimate the solution of the inequality $x^2 - x - 6 < 0$.

For Exercises 50–55, write the equation in factored form. Then, use the equation to find the x - and y -intercepts for the graph of the equation.

- 50.** $y = x^2 + 4x$ **51.** $y = x^2 + 4x + 4$ **52.** $y = x^2 + 3x - 10$
- 53.** $y = x^2 - 8x + 16$ **54.** $y = x^2 - 4$ **55.** $y = x^2 + 4x + 3$
- 56. Multiple Choice** Which expression is the factored form of $1x + 2x + 6$?
- F.** $3x + 6$ **G.** $2(x + 3)$ **H.** $3(x + 2)$ **J.** $3(x + 6)$

Extensions

- 57.** In parts (a)–(d), find values of x that satisfy the given conditions. Then, graph the solution on a number line.
- $x + 7 < 4$ or $x + 3 > 9$ (That is, find the x -values that satisfy one inequality or the other or both.)
 - $3x + 4 < 13$ and $12 < 6x$ (That is, find x -values that satisfy both inequalities.)
 - $5x - 6 > 2x + 18$ or $-3x + 5 > 8x - 39$
 - $-11x - 7 < -7x + 33$ and $9 + 2x > 11x$
- 58.** Suppose m and n are positive whole numbers and $m < n$. Tell whether each statement is always true.
- $2^m < 2^n$
 - $m^2 < n^2$
 - $0.5^m < 0.5^n$
 - $\frac{1}{m} < \frac{1}{n}$
- 59.** Solve these quadratic inequalities.
- $5x^2 + 7 \leq 87$
 - $5x^2 + 7 > 87$
- 60.** Solve these exponential inequalities.
- $2(3^x) - 8 < 46$
 - $2(3^x) - 8 > 10$

Hint:

Use a graph or table of $y = 5x^2 + 7$ for Exercise 59, and a graph or table of $y = 2x(3^x) - 8$ for Exercise 60, to estimate the solutions. Then adapt the reasoning used to solve linear inequalities to check the accuracy of your estimates.