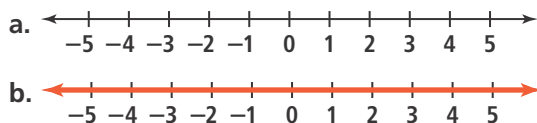# PRACTICE & PROBLEM SOLVING

UNDERSTAND

10. Construct Arguments Let a, b, and c be real numbers, $c \neq 0$. Show that each of the following statements is true.

a. If $a > b$ and $c < 0$, then $ca < cb$.

b. If $a > b$ and $c < 0$, then $\frac{a}{c} < \frac{b}{c}$.

11. Use Structure For each of the graphs below, write an inequality that the graph represents. Explain your reasoning.

a.
$$\begin{array}{c}\longleftarrow\!\!+\!\!+\!\!+\!\!+\!\!+\!\!+\!\!+\!\!+\!\!+\!\!+\!\!\longrightarrow\\ {-5}\ {-4}\ {-3}\ {-2}\ {-1}\ \ 0\ \ 1\ \ 2\ \ 3\ \ 4\ \ 5\end{array}$$

b.
$$\begin{array}{c}\longleftarrow\!\!+\!\!+\!\!+\!\!+\!\!+\!\!+\!\!+\!\!+\!\!+\!\!+\!\!\longrightarrow\\ {-5}\ {-4}\ {-3}\ {-2}\ {-1}\ \ 0\ \ 1\ \ 2\ \ 3\ \ 4\ \ 5\end{array}$$

12. Construct Arguments Describe and correct the error a student made when solving the inequality shown.

$3x - 1 > 5$

$3x - 1 + 1 > 5 + 1$ Add 1 to each side.

$3x > 6$ Simplify.

$\frac{3x}{3} < \frac{6}{3}$ Divide each side by 3.

$x < 2$ Simplify.

✗

13. Mathematical Connections Jake's solution to the equation $-4(2x - 3) = 36$ is shown.

$$-4(2x - 3) = 36$$
$$-8x + 12 = 36$$
$$-8x + 12 - 12 = 36 - 12$$
$$-8x = 24$$
$$\frac{-8x}{-8} = \frac{24}{-8}$$
$$x = -3$$

How is the solution to $-4(2x - 3) > 36$ similar to and different from the solution shown?

14. Higher Order Thinking Suppose each side of the inequality $a - b < 0$ is multiplied by c.

a. If $c < 0$ and $c(a - b) > 0$, write an inequality to represent the relationship between a and b.

b. If $c < 0$, is $c(a - b)$ always greater than 0? Explain your reasoning.

PRACTICE

Solve each inequality and graph the solution.
SEE EXAMPLES 1 AND 4

15. $x + 9 > 15$

16. $-\frac{1}{5}x > -10$

17. $5x + 15 \leq -10$

18. $-0.3x < 6$

19. $6x \geq -0.3$

20. $-3x > 15$

21. $\frac{1}{4}x > \frac{1}{2}$

22. $x - 8.4 \leq 2.3$

23. $2.1x \geq 6.3$

24. $-2.1x + 2.1 < 6.3$

25. $-\frac{3}{8}x - 20 + 2x > 6$

26. $\frac{2}{3}x + 14 - 3x > -7$

27. $0.5x - 4 - 2x \leq 2$

28. $4x + 1 + 2x \geq 5$

Match each inequality to the graph that represents its solution. Explain your reasoning. SEE EXAMPLE 1

29. $-2(3x - 1) > 20$

A.
$$\begin{array}{c}\longleftarrow\!\!\!\!+\!\!\!\!\!\!\oplus\!\!\!\!\!\!\!\!\longrightarrow\\ \ \ \ 0\ \ \ \ \ 3\end{array}$$

30. $2(1 - 3x) < 20$

B.
$$\begin{array}{c}\longleftarrow\!\!\!\!\!\!\oplus\!\!\!\!+\!\!\!\!\longrightarrow\\ \ {-3}\ \ \ \ \ 0\end{array}$$

31. $-2(1 - 3x) > 16$

C.
$$\begin{array}{c}\longleftarrow\!\!\!\!+\!\!\!\!\!\!\oplus\!\!\!\!\longrightarrow\\ \ \ \ 0\ \ \ \ \ 3\end{array}$$

32. $2(3x - 1) < 16$

D.
$$\begin{array}{c}\longleftarrow\!\!\!\!\!\!\oplus\!\!\!\!+\!\!\!\!\longrightarrow\\ \ {-3}\ \ \ \ \ 0\end{array}$$

Solve each inequality. SEE EXAMPLE 2

33. $2x + 5 < 3x + 4$

34. $2(7x - 2) > 9x + 6$

**Solve each inequality and tell whether it has infinitely many or no solutions.** SEE EXAMPLE 3

35. $\frac{3}{4}x + \frac{3}{4} - \frac{1}{2}x \geq -1$

36. $\frac{1}{4}x + 3 - \frac{7}{8}x < -2$

37. $-5(2x + 1) < 24$

38. $4(3 - 2x) \geq -4$

39. $7.2x + 6 \leq 2.4x$

40. $-2x - 5 \geq 3x - 25$

41. $2x + 12 > 2(x + 6)$

42. $0.5x + 8 < 2x - 4$

A solution is graphed for each inequality below. Describe the changes that need to be made, if any, to each graph. SEE EXAMPLE 3

43. $3x - 24 \leq -2(2x - 30)$

$$\begin{array}{c}\longleftarrow\!\!\!\!\!\!\oplus\!\!\!\!\longrightarrow\\ \ \ \ 0\ \ \ \ \ 12\end{array}$$

44. $-2(x - 5) \geq -2x + 10$

$$\begin{array}{c}\longleftarrow\!\!\!\!\!\!\bullet\!\!\!\!+\!\!\!\!\longrightarrow\\ \ {-5}\ \ \ \ \ 0\end{array}$$

PRACTICE & PROBLEM SOLVING

Practice   Tutorial

Mixed Review Available Online

APPLY

45. Make Sense and Persevere Luke and Aisha are traveling on the same road, in the same direction. Luke is driving at a rate of 50 mi/h, and Aisha is driving at a rate of 55 mi/h. Write and solve an inequality to find when Aisha will be ahead of Luke on the highway. Let x represent time in hours.
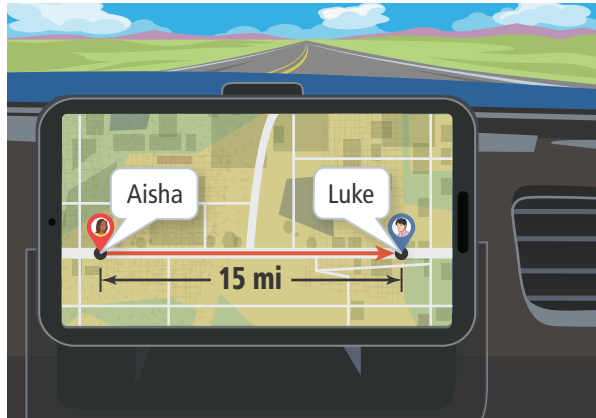
46. Make Sense and Persevere An office manager is selecting a water delivery service. Acme H_2O charges a $15 fee and $7.50 per 5-gallon jug. Best Water charges a $24 fee and $6.00 per 5-gallon jug. How many 5-gallon jugs will the office have to buy each month for the cost of Best Water to be less than that of Acme H_2O?

47. Model With Mathematics Charlie can spend up to $8 on lunch. He wants to buy a tuna sandwich, a bottle of apple juice, and x pounds of potato salad. Write and solve an inequality to find the possible numbers of pounds of potato salad he can buy.

| Tuna Sandwich $4.25 | Potato Salad $4.00/lb | Apple Juice $2.25 |
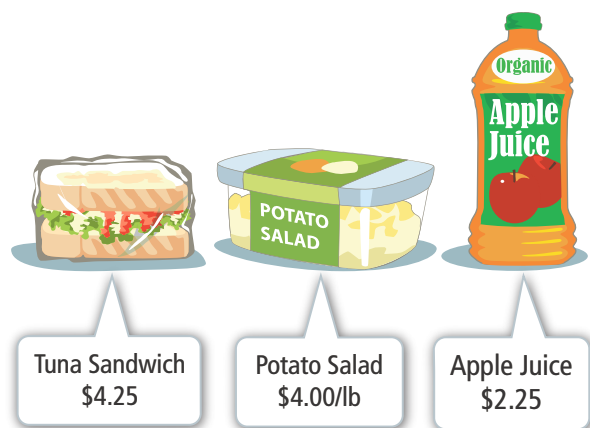
ASSESSMENT PRACTICE

48. Match each inequality with the equivalent inequality.

A. $-\frac{1}{2}x > -\frac{3}{2}$ **I.** $x < 3$

B. $\frac{1}{2}x > \frac{3}{2}$ **II.** $x > 3$

C. $\frac{3}{2}x > \frac{1}{2}$ **III.** $x > \frac{1}{3}$

D. $-\frac{3}{2}x > -\frac{1}{2}$ **IV.** $x < \frac{1}{3}$

49. SAT/ACT Which of the following is the solution of $0.125x + 1 - 0.25x < -3$?

Ⓐ $x < -0.5$

Ⓑ $x < 0.5$

Ⓒ $x > 0.5$

Ⓓ $x < 32$

Ⓔ $x > 32$

50. Performance Task Students have organized a three-day walkathon to raise money for charity. The average walking speeds of four participants are given in the table below.

Name	Walking Speed (mi/h)
Elijah	3.2
Aubrey	3
Mercedes	2.4
Steve	3.5

Part A Write and solve an inequality to determine how many hours it would take Steve to walk at least 21 mi on Day 1.

Part B At the beginning of Day 2, Mercedes is 2 mi ahead of Elijah. Write and solve an inequality to determine the hours x when Elijah will be behind Mercedes.

Part C At the beginning of Day 3, Elijah starts walking at the marker for Mile 42, and Aubrey starts walking at the marker for Mile 42.5. Write and solve an inequality to determine the hours when Elijah is ahead of Aubrey.

LESSON 1-5 Solving Inequalities in One Variable   **35**