

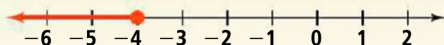
3-1 Inequalities and Their Graphs

Quick Review

A **solution of an inequality** is any number that makes the inequality true. You can indicate all the solutions of an inequality on the graph. A closed dot indicates that the endpoint is a solution. An open dot indicates that the endpoint is *not* a solution.

Example

What is the graph of $x \leq -4$?



Exercises

Graph each inequality.

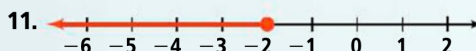
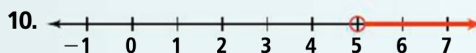
6. $x > 5$

7. $h \leq -1$

8. $10 \geq p$

9. $r < 3.2$

Write an inequality for each graph.



3-4 Solving Multi-Step Inequalities

Quick Review

When you solve inequalities, sometimes you need to use more than one step. You need to gather the variable terms on one side of the inequality and the constant terms on the other side.

Example

What are the solutions of $3x + 5 > -1$?

$$3x + 5 > -1$$

$$3x > -6 \quad \text{Subtract 5 from each side.}$$

$$x > -2 \quad \text{Divide each side by 3.}$$

Exercises

Solve each inequality.

29. $4k - 1 \geq -3$

30. $6(c - 1) < -18$

31. $3t > 5t + 12$

32. $-\frac{6}{7}y - 6 \geq 42$

33. $4 + \frac{x}{2} > 2x$

34. $3x + 5 \leq 2x - 8$

35. $13.5a + 7.4 \leq 85.7$

36. $42w > 2(w + 7)$

37. **Commission** A salesperson earns \$200 per week plus a commission equal to 4% of her sales. This week her goal is to earn no less than \$450. Write and solve an inequality to find the amount of sales she must have to reach her goal.

3-6 Compound Inequalities

Quick Review

Two inequalities that are joined by the word *and* or the word *or* are called **compound inequalities**. A solution of a compound inequality involving *and* makes both inequalities true. A solution of an inequality involving *or* makes either inequality true.

Example

What are the solutions of $-3 \leq z - 1 < 3$?

$$-3 \leq z - 1 < 3$$

$$-2 \leq z < 4 \quad \text{Add 1 to each part of the inequality.}$$

Exercises

Solve each compound inequality.

42. $-2 \leq d + \frac{1}{2} < 4\frac{1}{2}$

43. $0 < -8b \leq 12$

44. $2t \leq -4$ or $7t \geq 49$

45. $5m < -10$ or $3m > 9$

46. $-1 \leq a - 3 \leq 2$

47. $9.1 > 1.4p \geq -6.3$

48. **Climate** A town's high temperature for a given month is 88°F and the low temperature is 65°F . Write a compound inequality to represent the range of temperatures for the given month.

3-7 Absolute Value Equations and Inequalities

Quick Review

Solving an equation or inequality that contains an absolute value expression is similar to solving other equations and inequalities. You will need to write two equations or inequalities using positive and negative values. Then solve the equations.

Example

What is the solution of $|x| - 7 = 3$?

$$|x| - 7 = 3$$

$$|x| = 10 \quad \text{Add 7 to each side.}$$

$$x = 10 \text{ or } x = -10 \quad \text{Definition of absolute value}$$

Exercises

Solve each equation or inequality. If there is no solution, write *no solution*.

49. $|y| = 3$

50. $|n + 2| = 4$

51. $4 + |r + 2| = 7$

52. $|x + 3| = -2$

53. $|5x| \leq 15$

54. $|3d + 5| < -2$

55. $|2x - 7| - 1 > 0$

56. $4|k + 5| > 8$

57. **Manufacturing** The ideal length of a certain nail is 20 mm. The actual length can vary from the ideal by at most 0.4 mm. Find the range of acceptable lengths of the nail.