

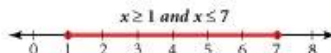
To solve an inequality involving *and*, find the values of the variable that satisfy *both* inequalities. This is shown in Example 4.

EXAMPLE 4 Solve $2x + 1 \geq 3$ and $3x - 4 \leq 17$. Graph the solution.

SOLUTION

$$\begin{array}{lcl} 2x + 1 \geq 3 & \text{and} & 3x - 4 \leq 17 \\ 2x \geq 2 & & 3x \leq 21 \\ x \geq 1 & & x \leq 7 \end{array}$$

The solution is all values of x between 1 and 7 inclusive.



TRY THIS Solve $-2x + 5 \geq 3$ and $x - 5 > -12$. Graph the solution.

The solution $x \geq 1$ and $x \leq 7$ in Example 4 can also be written as $1 \leq x \leq 7$. In general, the compound statement $x > a$ and $x < b$, where $a < b$, can be written as $a < x < b$.

CHECKPOINT ✓ What is another way to express the statement $x < 3$ and $x > -4$?

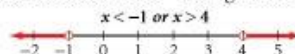
When you solve a compound inequality involving *or*, find those values of the variable that satisfy *at least one* of the inequalities. This is shown in Example 5.

EXAMPLE 5 Solve $5x + 1 > 21$ or $3x + 2 < -1$. Graph the solution.

SOLUTION

$$\begin{array}{lcl} 5x + 1 > 21 & \text{or} & 3x + 2 < -1 \\ 5x > 20 & & 3x < -3 \\ x > 4 & & x < -1 \end{array}$$

The solution is all values of x less than -1 or greater than 4 .



TRY THIS Solve $2x \leq 5$ or $7x + 1 > 36$. Graph the solution.

Exercises

Communicate

- Describe the steps you would take to graph $7x - 7 > 0$ on a number line.
- How does the graph of $7x - 7 > 0$ differ from the graph of $7x - 7 \geq 0$ from the graph of $7x - 7 < 0$?
- Is $x < 16$ equivalent to $-x < -16$? Explain.
- How can you express “ x is nonnegative” by using an inequality?

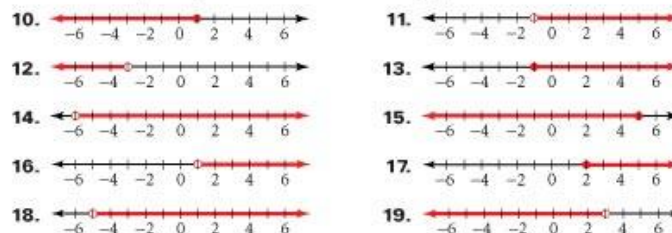
Guided Skills Practice


- Solve $3x + 1 < 13$. (EXAMPLE 1)
- Solve $q + 4 < 4q - 11$. Graph the solution on a number line. (EXAMPLE 2)
- ACADEMICS** Connor's homework average in English class is 92. The test average is $\frac{3}{4}$ of the final grade, and the homework average is $\frac{1}{4}$ of the final grade. What test average does Connor need in order to have a final grade of at least 80? (EXAMPLE 3)
- Solve $3x - 7 \geq -13$ and $2x + 3 < 15$. Graph the solution. (EXAMPLE 4)
- Solve $2x + 4 \geq -10$ or $4x - 6 > 14$. Graph the solution. (EXAMPLE 5)

APPLICATION

Practice and Apply

Write an inequality that describes each graph.



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for Exercises 20–49

Solve each inequality, and graph the solution on a number line.

- | | | |
|----------------------------|---------------------------------|--------------------------------|
| 20. $5x > 10$ | 21. $35x > 70$ | 22. $-5x > 10$ |
| 23. $-35x > 70$ | 24. $-5x > -10$ | 25. $-35x > -70$ |
| 26. $s - 2 > 10$ | 27. $y + 5 < -3$ | 28. $3x + 7 < 31$ |
| 29. $2x - 3 \geq 19$ | 30. $\frac{1}{2}d - 1 \geq -15$ | 31. $\frac{1}{5}x - 2 \leq 28$ |
| 32. $-2x > 14$ | 33. $-5x \leq 30$ | 34. $-x + 8 < 41$ |
| 35. $-5x - 15 > 60$ | 36. $-10 < -5x$ | 37. $-81 \leq -9x$ |
| 38. $\frac{-x}{3} \geq 10$ | 39. $\frac{-t}{32} < 2$ | 40. $-6(p + 4) < 12$ |
| 41. $6 - (4x - 3) \geq 8$ | 42. $4y - 12 > 7y - 15$ | 43. $8a - 11 < 4a + 9$ |
| 44. $3(4x - 5) < 8x + 3$ | 45. $6(x - 9) \geq 21 + x$ | 46. $-4x - 3 < -6x - 17$ |
| 47. $-x + 5 \geq -4x - 7$ | 48. $2(x - 5) < -4(3x + 2)$ | 49. $-5(3x + 2) \geq 4(x - 1)$ |
- Graph each compound inequality on a number line.

a. $x > -4$ and $x < 2$	b. $x > -4$ and $x > 2$
c. $x > -4$ or $x < 2$	d. $x > -4$ or $x > 2$
 - Graph each compound inequality on a number line.

a. $x < -4$ and $x < 2$	b. $x < -4$ and $x > 2$
c. $x < -4$ or $x < 2$	d. $x < -4$ or $x > 2$

Graph the solution of each compound inequality on a number line.

52. $n + 4 < 16$ and $n - 3 > 12$ 53. $y - 2 < 4$ and $y + 4 > 7$
54. $s + 7 > 4$ or $s - 2 < 2$ 55. $x + 8 < 5$ or $x - 1 > 3$
56. $x + 9 \leq 5$ and $4x \geq 12$ 57. $5y \geq 15$ and $y + 8 \geq 2$
58. $c - 8 \leq 2$ or $6c \geq -18$ 59. $x + 9 \leq 5$ or $4x \geq 12$
60. $5a + 12 < 2$ and $5a - 12 < 3$ 61. $3t + 5 > 11$ and $4t - 1 < 15$
62. $-9x > -81$ and $2(x + 6) > -4$ 63. $-5d < 40$ and $4(d - 3) < -8$
64. $20 - 3x \geq 11$ or $-4x \leq -20$ 65. $14 - 3x \leq 2$ or $5 - 4x \geq 17$
66. $5 - 2b > -3$ or $-3(b - 3) < -6$ 67. $-6x - 11 < 13$ or $3(x + 2) \leq -9$
68. $\frac{1}{2}(x + 9) \leq -3$ and $-10 < -5x$ 69. $\frac{4m}{3} + 5 > 2$ and $4 \leq -2(m - 3) - 7$
70. $2x < 7x - 10$ or $8x \leq 3x - 15$ 71. $2x - 7 < 5x + 8$ or $\frac{1}{2}(16 - 4x) \geq 0$

CHALLENGE

72. Solve $-2a \leq 3x + a < 10a$ for x .

APPLICATIONS

73. **FUND-RAISING** A charity is planning to raffle off a new car donated by a local car dealer. The charity wants to raise at least \$70,000. It expects to sell at least 1250 tickets and to spend \$5000 promoting the raffle. Find the possible ticket prices, p , by solving the inequality below.

$$1250p - 5000 \geq 70,000$$

HEALTH One study has found that people who reduced their fat intake to less than 20% of their total calories suffered fewer headaches. [Source: Loma Linda University School of Public Health, CA]

74. Write and solve an inequality to find the total number of calories consumed by people in this study before they reduced their fat intake to 324 fat calories.
75. Write and solve an inequality to find the number of fat calories consumed by someone in this study who consumed a total of 1850 calories before reducing the fat intake.

APPLICATION

- 76. BUSINESS** The money earned, or *revenue* R , from selling x units of a product is $R = 54x$. The cost of producing x units is $C = 40x + 868$. In order to make a profit, the revenue must be greater than the cost.
- Write and solve an inequality in one variable that describes this relationship between revenue and cost.
 - How many units of the product must be sold in order to make a profit?
 - Graph the solution on a number line.

 **Look Back**

Find the slope of each line. (LESSON 1.2)

77. $y + 2x = 3$

78. $3x - y = 6$

79. $x - 3y = -8$

80. $2x - 4y = 3(x - y) + 7$

Write the equation in slope-intercept form of a line that passes through the given points. (LESSON 1.3)

81. (1, 2) and (3, -1)

82. (5, -2) and (-4, -9)

83. (8, -30) and (-1, -6)

APPLICATIONS

- 84. TRAVEL** Michelle finds that after 4 hours of driving at a constant speed, she is 220 miles from her starting point. After 6 more hours, she is 550 miles from her starting point. Write an equation in slope-intercept form for the distance traveled, d , in miles in terms of the elapsed time, t , in hours.

(LESSON 1.3)

- 85. GOVERNMENT** In order to determine how people feel about a school-bond proposal, a public opinion poll is taken. Of a sample of 300 registered voters, 240 favor the bond proposal. If the number of people who favor the bond proposal is directly proportional to the number of registered voters, how many of the 75,000 registered voters favor the bond proposal?

(LESSON 1.4)

CONNECTION

Calculator button indicates that a graphics calculator is recommended.

- 86. STATISTICS** Enter the data from the table below in a graphics calculator. (LESSON 1.5)

x	1.0	1.3	1.5	1.6	1.8	1.9	2.0	2.2	2.3	2.5
y	58	47	50	39	40	35	41	31	34	36

- Create a scatter plot, identify the correlation as positive or negative, and find the equation of the least-squares line.
- Use the equation of the least-squares line that you found in part a to predict the value of y when x is 2.8.

Solve each literal equation for the indicated variable. (LESSON 1.6)

87. $A = p + prt$ for t

88. $SA = 2ab + 2ac + 2bc$ for a

 **Look Beyond**

89. What two real numbers have an absolute value of 4?