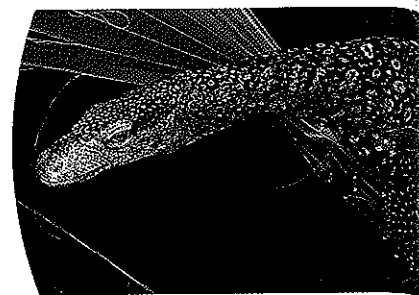


**EXAMPLE 7** Write and use a compound inequality

**BIOLOGY** A monitor lizard has a temperature that ranges from  $18^{\circ}\text{C}$  to  $34^{\circ}\text{C}$ . Write the range of temperatures as a compound inequality. Then write an inequality giving the temperature range in degrees Fahrenheit.



Monitor lizard

**Solution**

The range of temperatures  $C$  can be represented by the inequality  $18 \leq C \leq 34$ . Let  $F$  represent the temperature in degrees Fahrenheit.

$$18 \leq C \leq 34$$

Write inequality.

$$18 \leq \frac{5}{9}(F - 32) \leq 34$$

Substitute  $\frac{5}{9}(F - 32)$  for  $C$ .

$$32.4 \leq F - 32 \leq 61.2$$

Multiply each expression by  $\frac{9}{5}$ , the reciprocal of  $\frac{5}{9}$ .

$$64.4 \leq F \leq 93.2$$

Add 32 to each expression.

► The temperature of the monitor lizard ranges from  $64.4^{\circ}\text{F}$  to  $93.2^{\circ}\text{F}$ .

**USE A FORMULA**

In Example 7, use the temperature formula

$$C = \frac{5}{9}(F - 32).$$

**GUIDED PRACTICE** for Examples 5, 6, and 7

Solve the inequality. Then graph the solution.

9.  $-1 < 2x + 7 < 19$

10.  $-8 \leq -x - 5 \leq 6$

11.  $x + 4 \leq 9$  or  $x - 3 \geq 7$

12.  $3x - 1 < -1$  or  $2x + 5 \geq 11$

13. **WHAT IF?** In Example 7, write a compound inequality for a lizard whose temperature ranges from  $15^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ . Then write an inequality giving the temperature range in degrees Fahrenheit.

**1.6 EXERCISES****HOMEWORK KEY**

○ = WORKED-OUT SOLUTIONS on p. WS2 for Exs. 13, 25, and 55

★ = STANDARDIZED TEST PRACTICE Exs. 2, 15, 36, 56, and 59

**SKILL PRACTICE**

1. **VOCABULARY** Copy and complete: The set of all points on a number line that represent solutions of an inequality is called the ? of the inequality.

2. ★ **WRITING** The first transformation on page 42 can be written as follows:

If  $a$ ,  $b$ , and  $c$  are real numbers and  $a > b$ , then  $a + c > b + c$ .

Write similar statements for the other transformations listed on page 42.

**EXAMPLE 1**

on p. 41  
for Exs. 3–10

**GRAPHING INEQUALITIES** Graph the inequality.

3.  $x > 4$

4.  $x < -1$

5.  $x \leq -5$

6.  $x \geq 3$

7.  $6 \geq x$

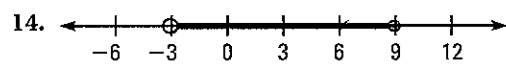
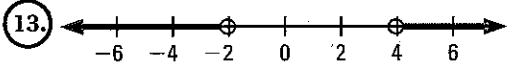
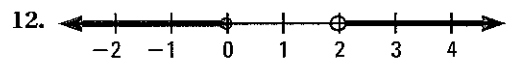
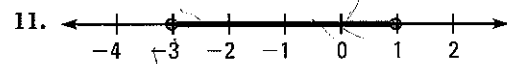
8.  $-2 < x$

9.  $x \geq -3.5$

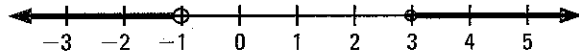
10.  $x < 2.5$

**EXAMPLE 2**  
on p. 41  
for Exs. 11–21

**WRITING COMPOUND INEQUALITIES** Write the compound inequality that is represented by the graph.



15. **★ MULTIPLE CHOICE** What compound inequality is graphed below?



- (A)  $-1 < x < 3$                       (B)  $x \leq -1$  or  $x > 3$   
(C)  $x < -1$  or  $x \geq 3$                       (D)  $x > -1$  or  $x \leq 3$

**GRAPHING COMPOUND INEQUALITIES** Graph the compound inequality.


16.  $2 \leq x \leq 5$                       17.  $-3 < x < 4$                       18.  $5 \leq x < 10$   
19.  $x < 0$  or  $x > 2$                       20.  $x \leq -1$  or  $x > 1$                       21.  $x > -2$  or  $x < -5$


**EXAMPLES 3 and 4**  
on pp. 42–43  
for Exs. 22–35

**SOLVING INEQUALITIES** Solve the inequality. Then graph the solution.

22.  $x + 4 > 10$                       23.  $x - 3 \leq -5$                       24.  $4x - 8 \geq -4$   
25.  $15 - 3x > 3$                       26.  $11 + 8x \geq 7$                       27.  $4 + \frac{3}{2}x \leq 13$   
28.  $2x - 6 > 3 - x$                       29.  $4x + 14 < 3x + 6$                       30.  $5 - 8x \leq 19 - 10x$   
31.  $21x + 7 < 3x + 16$                       32.  $18 + 2x \leq 9x + 4$                       33.  $2(x - 4) > 4x + 6$

**ERROR ANALYSIS** Describe and correct the error in solving the inequality.

34. 
$$\begin{aligned} 2x + 8 &\leq 6x - 4 \\ -4x &\leq -12 \\ x &\leq 3 \end{aligned}$$
 

35. 
$$\begin{aligned} 10 + 3x &> 5x \\ 10 &< 2x \\ 5 &< x \end{aligned}$$
 

36. **★ OPEN-ENDED MATH** Write two different inequalities of the form  $ax + b > c$  that have a solution of  $x > 5$ .

**EXAMPLE 5**  
on p. 43  
for Exs. 37–42

**“AND” COMPOUND INEQUALITIES** Solve the inequality. Then graph the solution.

37.  $-5 < x + 1 < 4$                       38.  $2 \leq x - 3 \leq 6$                       39.  $-3 < 4 - x \leq 3$   
40.  $2 < 3x - 1 \leq 6$                       41.  $-4 \leq 2 + 4x < 0$                       42.  $0 \leq \frac{3}{4}x + 3 \leq 4$

**EXAMPLE 6**  
on p. 43  
for Exs. 43–48

**“OR” COMPOUND INEQUALITIES** Solve the inequality. Then graph the solution.

43.  $x + 1 < -3$  or  $x - 2 > 0$                       44.  $x - 4 \leq -6$  or  $x + 2 > 5$   
45.  $2x - 3 \leq -4$  or  $3x + 1 \geq 4$                       46.  $2 + 3x < -13$  or  $4 + 2x > 7$   
47.  $0.3x - 0.5 < -1.7$  or  $0.4x \geq 2.4$                       48.  $-x - 4 \geq 1$  or  $2 - 5x \leq -8$


**CHALLENGE** Solve the inequality. If there is no solution, write *no solution*. If the inequality is always true, write *all real numbers*.

49.  $2(x - 4) > 2x + 1$                       50.  $4x - 5 \leq 4(x + 2)$                       51.  $2(3x - 1) > 3(2x + 3)$


## PROBLEM SOLVING

**EXAMPLE 3**  
on p. 42  
for Exs. 52–53

52. **SWIMMING** You have budgeted \$100 to improve your swimming over the summer. At your local pool, it costs \$50 to join the swim association and \$5 for each swim class. Write and solve an inequality to find the possible numbers of swim classes you can attend within your budget.

 for problem solving help at classzone.com

53. **VIDEO CONTEST** You and some friends have raised \$250 to help make a video for a contest. You need \$35 to buy videotapes. It costs \$45 per day to rent the video camera. Write and solve an inequality to find the possible numbers of days you can rent the video camera.

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54. **WAKEBOARDING** What you wear when you wakeboard depends on the air temperature. Copy and complete the table by writing an inequality for each temperature range. Assume each range includes the lower temperature but not the higher temperature. (The first inequality has been written for you.)

Temperature	Gear	Inequality
60°F to 65°F	Full wetsuit	$60 \leq T < 65$
65°F to 72°F	Full leg wetsuit	?
72°F to 80°F	Wetsuit trunks	?
80°F or warmer	No special gear	?

55. **BOTANY** In Olympic National Park in Washington, different plants grow depending on the elevation, as shown in the diagram. Assume each range includes the lower elevation but not the higher elevation.



- a. Write an inequality for elevations in the lowland zone.
  - b. Write an inequality for elevations in the alpine and subalpine zones combined.
  - c. Write an inequality for elevations *not* in the montane zone.
56. ★ **MULTIPLE CHOICE** Canoe rental costs \$18 for the first two hours and \$3 per hour after that. You want to canoe for more than 2 hours but can spend no more than \$30. Which inequality represents the situation, where  $t$  is the total number of hours you can canoe?
- (A)  $18 + t \leq 30$ 
(B)  $18 + 3t \leq 30$
- (C)  $18 + 3(t + 2) \leq 30$ 
(D)  $18 + 3(t - 2) \leq 30$

**EXAMPLE 7**

on p. 44  
for Exs. 57–58

57. **LAPTOP COMPUTERS** A computer manufacturer states that its laptop computer can operate within a temperature range of  $50^{\circ}\text{F}$  to  $95^{\circ}\text{F}$ . Write a compound inequality for the temperature range. Then rewrite the inequality in degrees Celsius.
58. **MULTI-STEP PROBLEM** On a certain highway, there is a minimum speed of 45 miles per hour and a maximum speed of 70 miles per hour.
- Write a compound inequality for the legal speeds on the highway.
  - Write a compound inequality for the illegal speeds on the highway.
  - Write each compound inequality from parts (a) and (b) so that it expresses the speeds in kilometers per hour. ( $1 \text{ mi} \approx 1.61 \text{ km}$ )
59. **★ EXTENDED RESPONSE** A math teacher announces that grades will be calculated by adding 65% of a student's homework score, 15% of the student's quiz score, and 20% of the student's final exam score. All scores range from 0 to 100 points.
- Write Inequalities** Write an inequality for each student that can be used to find the possible final exam scores that result in a grade of 85 or better.
  - Solve** Solve the inequalities from part (a).
  - Interpret** For which students is a grade of 85 or better possible? *Explain.*
60. **CHALLENGE** You are shopping for single-use cameras to hand out at a party. The daylight cameras cost  $\$2.75$  and the flash cameras cost  $\$4.25$ . You must buy exactly 20 cameras and you want to spend between  $\$65$  and  $\$75$ , inclusive. Write and solve a compound inequality for this situation. Then list all the solutions that involve whole numbers of cameras.

Name	Homework	Quiz	Exam
Amy	84	80	$w$
Brian	80	100	$x$
Clara	75	95	$y$
Dan	80	90	$z$

**MIXED REVIEW****PREVIEW**

Prepare for  
Lesson 1.7  
in Exs. 61–68.

Find the mean of the two numbers. (p. 1005)

61. 9, 15

62. 21, 63

63. 80, 120

64. 163, 124

65. 116, 135

66. 327, 525

67.  $5, \frac{9}{4}$

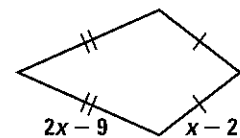
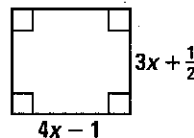
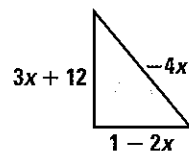
68.  $\frac{3}{4}, \frac{1}{6}$

Solve for  $x$ . Then find the length of each side of the figure. (p. 18)

69. Perimeter = 19

70. Perimeter = 34

71. Perimeter = 50



Look for a pattern in the table. Then write an equation that represents the table. (p. 34)

72.

$x$	0	1	2	3
$y$	12	20	28	36

73.

$x$	0	1	2	3
$y$	425	325	225	125

49.  $1\frac{2}{3}$  51. 6; 15, 8, 15, 8 53. 2; 6, 6, 3 55. 4 57. 2  
59. 4 61. 2.9 63. no solution 65. all real numbers

67.  $x = \frac{d-b}{a-c}$ ;  $a = c$  and  $b \neq d$ ;  $a = c$  and  $b = d$

1.3 Problem Solving (pp. 23-24) 69. 3 h 71. 9 h

73. a.  $3c + 2g = 8$  b.  $2\frac{1}{4}$ ;  $\frac{1}{2}$ ;  $2\frac{5}{12}$ ;  $\frac{1}{4}$  75. 18 min

1.4 Skill Practice (pp. 30-31) 1. formula 3.  $\ell = \frac{A}{w}$

5 mm 5.  $h = \frac{2A}{b_1 + b_2}$ ; 6 cm 7.  $y = 26 - 3x$ ; 5

9.  $y = -\frac{6}{5}x + \frac{31}{5}$ ; 11 11.  $y = \frac{3}{2}x - \frac{21}{2}$ ; -3

13.  $y = \frac{7}{4}x - \frac{11}{4}$ ; 6 17. The variable  $y$  should only appear on one side of the equation, not both;

$4y - xy = 9$ ,  $y(4 - x) = 9$ ,  $y = \frac{9}{4-x}$  19.  $h = \frac{S}{\pi r} - k$ ;

about 4.96 cm 21.  $y = \frac{40 + 3x}{x}$ ; 11 23.  $y = \frac{16x + 28}{3x}$ ;

$7\frac{2}{3}$  25.  $y = \frac{15}{1-2x}$ ; 5 27. Method 1:  $y = \frac{5}{3}x - 3$ ,

$y = \frac{5}{3} \cdot 2 - 3$ ,  $y = \frac{1}{3}$ ; Method 2:  $15 \cdot 2 - 9y = 27$ ,

$30 - 9y = 27$ ,  $-9y = -3$ ,  $y = \frac{1}{3}$ ; *Sample answer:*

Method 1 is more efficient because it is already solved for  $y$ .

29.  $z = \frac{x+y}{xy-1}$  31.  $z = \frac{xy}{xy-y-x}$

1.4 Problem Solving (pp. 31-32) 33.  $d = \frac{C}{\pi}$ ; about 36 in.

35.  $C = \frac{5}{9}(F - 32)$ ;  $10^\circ\text{C}$  37.  $R = 80c + 150d$ ;

$d = \frac{R - 80c}{150}$ ; 80 designer tuxedos; 160 designer tuxedos; 240 designer tuxedos

39.  $V = \frac{\ell^2 w}{4\pi}$ ;  $V = \frac{w^2 \ell}{4\pi}$

1.5 Skill Practice (pp. 37-38) 1. verbal model

3. 0.5 h 5. 90 mi 7. 54 ft 9. 20 m 11.  $y = 4x + 11$

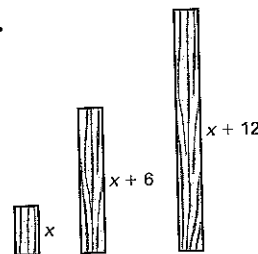
13.  $y = 46 - 10x$  17.  $4x + 9 = 12$ , 0.75 ft 19. The pattern shows the output is decreased by 10 each time; an equation that represents the table is

$y = 75 - 10x$ . 23.  $y = 7x - 16$

1.5 Problem Solving (pp. 38-39) 25. 3.75 km/min

27.  $y = 1.5x + 15$ ; no; the bamboo shoot will eventually slow its growth rate and stop growing.

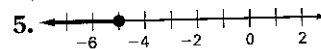
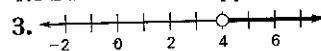
29.



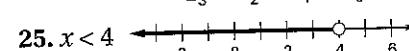
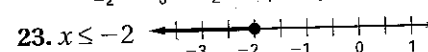
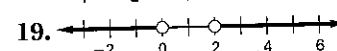
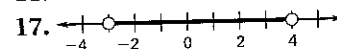
$3x + 18 = 72$ ,  
18 in., 24 in., 30 in.

31.  $40x + 7(20 - x) = 404$ ; 8 boxes of books, 12 boxes of clothes 33. about 4.07 in.

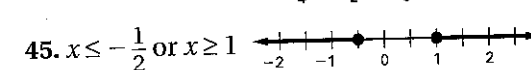
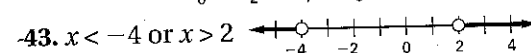
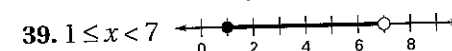
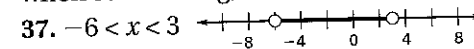
1.6 Skill Practice (pp. 44-45) 1. graph



11.  $-3 \leq x \leq 1$  13.  $x < -2$  or  $x > 4$



35. The inequality symbol should not be reversed when subtracting;  $10 > 2x$ ,  $5 > x$ .



49. no solution 51. no solution

1.6 Problem Solving (pp. 46-47) 53.  $45x + 35 \leq 250$ ,

$x \leq 4\frac{7}{9}$  days; 4 or fewer days 55. a.  $0 \leq e < 500$

b.  $1400 \leq e < 2429$  c.  $0 \leq e < 500$  or  $1400 \leq e < 2429$   
57.  $50 \leq F \leq 95$ ;  $10 \leq C \leq 35$

59. a. Amy:  $0.65(84) + 0.15(80) + 0.2w \geq 85$ ,

Brian:  $0.65(80) + 0.15(100) + 0.2x \geq 85$ , Clara:

$0.65(75) + 0.15(95) + 0.2y \geq 85$ , Dan:  $0.65(80) +$

$0.15(90) + 0.2z \geq 85$  b.  $w \geq 92$ ;  $x \geq 90$ ;  $y \geq 110$ ;  $z \geq 97.5$

c. Amy, Brian, and Dan. *Sample answer:* It is impossible to score over 100 points on a test, so Clara will not be able to achieve a grade of 85 or better.

1.6 Problem Solving Workshop (p. 49)

1.  $y = -35x + 200$ ;  $x > 20$  3.  $x \geq \$7000$

1.7 Skill Practice (pp. 55-56) 1. An apparent solution that must be rejected because it does not satisfy the original equation. 3. solution 5. not a solution 7. solution