

3. Practice

Assignment Guide

1 Objective

A B Core 1-17, 29-35, 38-40

C Extension 51-52

2 Objective

A B Core 18-28, 36-37, 41-50

C Extension 53-55

Standardized Test Prep 56-61

Mixed Review 62-69

6 EXAMPLE Real-World Connection

Quality Control The plans for a gear assembly specify a length of 13.48 cm with a tolerance of ± 0.03 cm. A machinist finds that the part is now 13.67 cm long. By how much should the machinist decrease the length?

Relate minimum length \leq final length \leq maximum length

Define Let x = number of centimeters to remove.

Write $13.48 - 0.03 \leq 13.67 - x \leq 13.48 + 0.03$

$$\begin{aligned} 13.45 &\leq 13.67 - x \leq 13.51 && \text{Simplify.} \\ -0.22 &\leq -x \leq -0.16 && \text{Subtract 13.67.} \\ 0.22 &\geq x \geq 0.16 && \text{Multiply by } -1. \end{aligned}$$

- The machinist must remove at least 0.16 cm and no more than 0.22 cm.

- 6** The plans for a circular plastic part in a medical instrument require a diameter of 1.5 in. with a tolerance of ± 0.2 in. A machinist finds that the diameter is now 1.73 in. By how much should the machinist decrease the diameter?
by at least 0.03 in., but by no more than 0.43 in.

$$\begin{aligned} \text{min} &\leq \text{final} \leq \text{max} \\ 1.5 - 0.2 &\leq 1.73 - x \leq 1.5 + 0.2 \end{aligned}$$

For more practice, see **Extra Practice**.

EXERCISES

Practice and Problem Solving

Practice by Example

Examples 1 and 2
(page 27)

Solve each inequality. Graph the solution. 1-10. See margin p. 28 for graphs. 11-13. See back of book for graphs.

1. $-12 \geq 24x$ $x \leq -\frac{1}{2}$ 2. $-7k < 63$ $k > -9$ 3. $8a - 15 > 73$ $a > 11$

4. $57 - 4t \geq 13$ $t \leq 11$ 5. $-18 - 5y \geq 52$ $y \leq -14$

6. $14 - 4y \geq 38$ $y \leq -6$ 7. $4(x + 3) \leq 44$ $x \leq 8$

8. $2(m - 3) + 7 < 21$ $m < 10$ 9. $4(n - 2) - 6 > 18$ $n > 8$

10. $9(x + 2) > 9(x - 3)$ 11. $6x - 13 < 6(x - 2)$
All real numbers are solutions. **All real numbers are solutions.**
 12. $-6(2x - 10) + 12x \leq 180$ 13. $-7(3x - 7) + 21x \geq 50$
All real numbers are solutions. **no solutions**

Example 3
(page 28)

Solve each problem by writing an inequality.

14. The length of a picture frame is 3 in. greater than the width. The perimeter is less than 52 in. Describe the dimensions of the frame. **The width is less than 11.5 in., and the length is 3 in. greater than the width.**

15. The lengths of the sides of a triangle are in the ratio 5 : 6 : 7. Describe the length of the longest side if the perimeter is not more than 54 cm. **The longest side is less than 21 cm.**

16. Find the lesser of two consecutive integers with a sum greater than 16. **The smaller number is an integer greater than or equal to 8.**

17. A company estimates that 1% of the computer chips produced in its plant are defective. How many chips must the company make and test in order to be able to ship at least 4500 nondefective chips? **4546 or more chips**

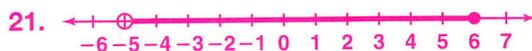
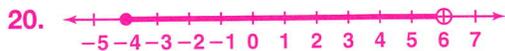
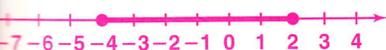
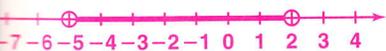
Example 4
(page 28)

Solve each compound inequality. Graph the solution. 18-21. See margin for graphs.

18. $2x > -10$ and $9x < 18$ $-5 < x < 2$ 19. $3x \geq -12$ and $8x \leq 16$ $-4 \leq x \leq 2$

20. $6x \geq -24$ and $9x < 54$ $-4 \leq x < 6$ 21. $7x > -35$ and $5x \leq 30$ $-5 < x \leq 6$

Lesson 1-4 Solving Inequalities 29



Enrichment 1-4

Reteaching 1-4

Practice 1-4

Practice 1-4 Solving Inequalities

- Solve each inequality. Graph the solution.**
- $16 - 4 \leq 36$
 - $2(m + 3) + 1 > 23$
 - $7 - 13n + 11 \leq 2$
 - $-6 \leq 21$
 - $\frac{5}{3}(4 + 5) \geq \frac{7}{3}$
 - $25n - 13n + 40 \leq 52 + 4$
 - $8(-5) \geq 36$
 - $6 - x \geq 7x + 3$
 - $10 - x \geq -23 + 4$

- Solve each compound inequality. Graph the solution.**
- $-9 \leq 4x + 3 \leq 11$
 - $16 \leq 32$ or $-5x \leq -40$
 - $9x \leq 54$ and $-4x \leq 32$
 - $6(x + 2) \geq 24$ or $5x + 10 \leq 15$
 - $14 > 3x - 1$ or -10
 - $4 \leq 1 - 3x \leq 7$
 - $5x - 11 \leq -4$ or $2x - 11 \geq 4$
 - $3x - 8 \geq -8$ and $3x - 5 \leq 1$

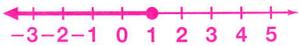
- Solve each problem by writing an inequality.**
- A salesperson earns \$350 per week plus 10% of her weekly sales. Find the sales necessary for the salesperson to earn at least \$800 in one week.
 - The length of a rectangular yard is 50 ft, and its perimeter is less than 170 ft. Describe the width of the yard.
 - Ned is two years older than his sister Maria. The sum of their ages is greater than 32. Describe Maria's age.
 - A research team estimates that 30% of their questionnaires will not be returned. How many questionnaires should they mail out in order to be reasonably certain that at least 750 will be returned?
- Solve each problem by writing a compound inequality.**
- Watermelons cost \$30 per pound at a local market. Kent's watermelon cost between \$400 and \$500. What are the possible weights of his watermelons?
 - How much must a carpenter cut off a 48-inch board if the length must be 40 ± 0.25 inches?
 - A concrete slab requires between 10 and 12 yd^3 of concrete. If 25 yd^3 of concrete can be poured each hour, how long will it take to pour the slab?

Algebra 2 Chapter 1 Lesson 1-4 Practice

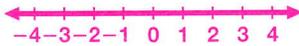
4. Assess

Lesson Quiz 1-4

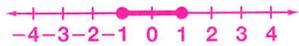
1. Solve $-2(x - 3) \geq 4$. Graph the solution. $x \leq 1$



2. Solve $-5(4 - x) < 5x$. Graph the solution. **all real numbers**



3. Graph the solution of $3x + 4 \geq 1$ and $-2x + 7 \geq 5$.



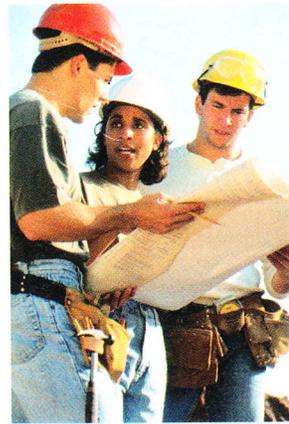
4. A copper wire is to have a length of 16 cm with a tolerance of ± 0.02 cm. How much must be trimmed from a wire that is 18 cm long for it to meet specifications? **at least 1.98 cm and no more than 2.02 cm**

Example 5 (page 28)

Example 6 (page 29)

B Apply Your Skills

35. **Answers may vary. Sample: Mario has a coin collection that consists of dimes and nickels. There are half as many dimes as nickels. There are no more than 60 coins in the collection. Describe the collection.**



Real-World Connection

Careers To bid on a job, a construction contractor must consider all the costs of running a business as well as the costs of materials and labor.

45. **All real numbers are solutions.**
47. **All real numbers are solutions.**

Solve each compound inequality. Graph the solution. See margin for graphs.

22. $4x < 16$ or $12x > 144$ $x < 4$ or $x > 123$. $3x \geq 3$ or $9x < 54$
24. $8x > -32$ or $-6x \leq 48$ $x \geq -8$
25. $9x \leq -27$ or $4x \geq 36$
 $x \leq -3$ or $x \geq 9$

Solve each problem by writing a compound inequality.

26. A baker needs between 40 lb and 50 lb of a flour-sugar mixture that contains ten times as much flour as sugar. What are the possible weights of flour the baker can use? **between about 36.4 lb and 45.5 lb flour**
27. Between 15,000 yd³ and 16,000 yd³ of earth must be trucked away from a construction site. The trucks can remove 1000 yd³ per day, and 10,500 yd³ already been removed. How many days are needed? **between 4½ and 5½**
28. By how much should a machinist decrease the length of a rod that is 4.70 cm long if the length must be 4.5 ± 0.02 cm? **between 0.26 cm and 0.30 cm**

Solve each inequality. Graph the solution. See margin for graphs.

29. $2 - 3z \geq 7(8 - 2z) + 12$ $z \geq 6$
30. $17 - 2y \leq 5(7 - 3y) - 15$ $y \leq 2$
31. $\frac{2}{3}(x - 12) \leq x + 8$ $x \geq -48$
32. $\frac{3}{5}(x - 12) > x - 24$ $x < 42$
33. $3[4x - (2x - 7)] < 2(3x - 5)$ **no solutions**
34. $6[5y - (3y - 1)] \geq 4(3y - 1)$ **All real numbers are solutions**

35. **Writing** Write a problem that can be solved using the inequality $x + 0.5x \leq 5$.
36. **Geometry** The sum of the lengths of any two sides of a triangle is greater than the length of the third side. In $\triangle ABC$, $BC = 4$ and $AC = 8 - AB$. Write an inequality for AB . **$2 < AB < 6$**

37. **Construction** A contractor estimated that her expenses for a construction project would be between \$700,000 and \$750,000. She has already spent \$496,000. How much more can she spend and remain within her estimate? **between \$204,000 and \$254,000**
38. a. **Error Analysis** Suppose a classmate writes $y \leq 20$ as the solution of $\frac{1}{2}(y - 16) \geq y + 2$. Prove that your classmate's answer is wrong by choosing a number that is less than 20. Choose a number that makes the computation true.
b. Solve $\frac{1}{2}(y - 16) \geq y + 2$. a. See margin p. 31.
b. $y \leq -20$

Justifying Steps Justify each step by identifying the property used.

39. $3x \leq 4(x - 1) - 8$
 $3x \leq 4x - 4 - 8$ **Dist. Prop.**
 $3x \leq 4x - 12$ **arithmetic**
 $-x \leq -12$ **Subt. Prop. of Ineq.**
 $x \geq 12$ **Mult. Prop. of Ineq.**
40. $\frac{1}{2}(y + 3) > \frac{1}{3}(4 - y)$ **Mult. P.**
 $\frac{3}{2}(y + 3) > 2(4 - y)$ **of Ineq.**
 $3y + 9 > 8 - 2y$ **Dist. Prop.**
 $5y + 9 > 8$ **Add. Prop. of Ineq.**
 $5y > -1$ **Subt. Prop. of Ineq.**
 $y > -0.2$ **Div. Prop.**

Solve each compound inequality. Graph the solutions.

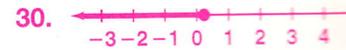
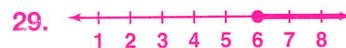
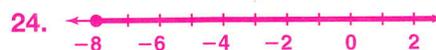
41. $-6 < 2x - 4 < 12$ $-1 < x < 8$
42. $11 < 3y + 2 < 20$ $3 < y < 6$
43. $-18 > 4x - 3 > -15$ **no solutions**
44. $36 \geq 1 - 5z > -21$ $-7 \leq z < 7.4$
45. $5a - 4 > 16$ or $3a + 2 < 17$
46. $6b + 3 < 15$ or $4b - 2 > 10$
 $b < 2$ or $b > 3$
47. $6c \leq 18$ or $-5c \leq 15$
48. $8d < -64$ and $5d > 25$
no solutions
49. $4x \leq 12$ or $-7x \leq 21$
All real numbers are solutions.
50. $15x > 30$ and $18x < -36$
no solutions

Alternative Assessment

Students work in pairs. They use masking tape to create a number line from -10 to 10 on a desk. Each student places his or her pencil above the number line, using the tip of the pencil as an arrowhead, indicating a single inequality such as $x \geq 3$. Pencils can point in the same or opposite direction and may or may not have an overlapping region. Each group switches stations and writes down two compound inequalities, one inequality assuming that the pencils represent a conjunction and the other assuming a disjunction. Students graph both inequalities and create problems that result in the solution sets represented by the graphs. Students discuss the results.

30 Chapter 1 Tools of Algebra

pages 29-31 Exercises



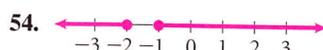
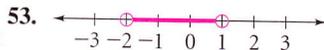
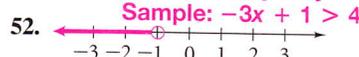
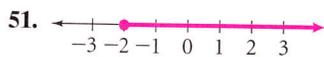
Challenge

Answers may vary.
Sample: $2x - 7 \geq -11$

Answers may vary.
Sample: $-9 < 5x + 1 < 6$

Answers may vary.
Sample: $2x + 4 \leq 0$ or $-3x - 3 \leq 0$

Open-Ended Write an inequality with a solution that matches the graph. At least two steps should be needed to solve your inequality. **Answers may vary.**



55. **Critical Thinking** Consider the compound inequality $x < 8$ and $x > a$.
- Are there any values of a such that all real numbers are solutions of the compound inequality? If so, what are they? **no**
 - Are there any values of a such that no real numbers are solutions of the compound inequality? If so, what are they? **yes; values of a that are 8 or greater**
 - Repeat parts (a) and (b) for the compound inequality $x < 8$ or $x > a$.
 - yes; values of a that are less than 8**
 - no**

FCAT Practice

Multiple Choice

56. Which of the following statements are true? **C**
- $-(-6) = 6$ and $-(-4) > -4$
 - $-(-4) < 4$ or $-10 > 10 - 10$
 - $5 + 6 = 11$ or $9 - 2 = 11$
 - $17 > 2$ or $6 < 9$
57. What is the solution of the inequality $8 - 3x < -3(1 + x) + 1$? **B**
- A. all real numbers B. no real numbers C. $x > \frac{2}{3}$ D. $x < -\frac{11}{6}$
58. What is the solution of the compound inequality $2 < 2(x + 4) < 18$? **H**
- F. all real numbers G. no real numbers H. $-3 < x < 5$ I. $-4 < x < 5$
59. What is the solution of the compound inequality $\frac{x}{2} - 4 > 0$ or $\frac{x}{2} + 1 < 0$? **D**
- A. all real numbers B. no real numbers
C. $x > 6$ or $x < 0$ D. $x > 8$ or $x < -2$

FCAT Online
FCAT Format quiz at
www.PHSchool.com
Web Code: aga-0104

Short Response

60. What is the maximum number of 3- to 5-min songs that fill a 90-min CD? What is the minimum number? Explain your reasoning. **See margin.**

Extended Response

61. Fill each box with the word *and* or *or*, so that the solution of one compound inequality is *all real numbers* and the solution of the other is *no real numbers*. Justify each step of your solution. **See back of book.**

$$x + 5 > 0 \quad \boxed{} \quad x - 3 < 0 \quad x + 5 < 0 \quad \boxed{} \quad x + 5 > 0$$

Mixed Review

Lesson 1-3

Solve each equation. Check your answers.

62. $7x - 6(11 - 2x) = 10$ **4**

64. $4y - \frac{1}{10} = 3y + \frac{4}{5} \frac{9}{10}$

63. $10x - 7 = 2(13 + 5x)$ **no solution**

65. $0.4x + 1.18 = -3.1(2 - 0.01x)$ **-20**

Lesson 1-2

Simplify each expression.

66. $(2a - 4) + (5a + 9)$ **$7a + 5$**

68. $\frac{1}{3}(b + 12) - \frac{1}{4}(b + 12)$ **$\frac{b + 12}{12}$**

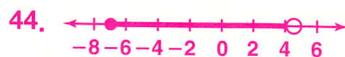
67. $3(x + 3y) - 5(x - y)$ **$-2x + 14y$**

69. $0.4(k - 0.1)^2 + 0.5(3.3 - k)$
 $1.61 - 0.1k$

Lesson 1-4 Solving Inequalities 31



0 makes $y \leq 20$ true, but it does not make $\frac{1}{2}(y - 16) \geq y + 2$ true.



FCAT Practice

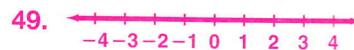
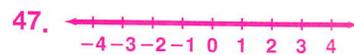
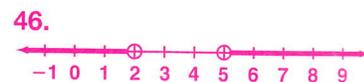
Resources

For additional practice with a variety of test item formats:

- FCAT Practice, p. 51
- FCAT Strategies, p. 46
- FCAT Daily Practice and Strategies Transparencies

Error Prevention

Exercise 56 Remind students that a compound statement that uses *and* is true only when both component statements are true. A compound statement that uses *or* is true if at least one of the component statements is true.



60. [2] The maximum number of songs can be recorded when the songs are short, so the maximum number of songs is

$$\frac{90 \text{ min}}{3 \text{ min per song}} = 30$$

songs; the minimum number of songs can be recorded when the songs are long, so the minimum number of songs is

$$\frac{90 \text{ min}}{5 \text{ min per song}} = 18$$

songs. [1] provides 30 and 18 but not the explanation