

wish to preteach some of the key
ed in this chapter. Particularly for
Language Learners (ELL),
ng the vocabulary before the
or lesson begins gives students a
rt into understanding the new
. Writing new words on poster
ointing to the words as you say
en displaying the poster for a
f time is a useful technique.

- value (p. 56)
- inverse (p. 66)
- p. 102)
- p. 95)
- s (p. 95)
- p. 103)
- ate (p. 59)
- property (p. 62)
- ce (p. 71)
- tive properties (p. 89)
- 102)
- oms (p. 102)
- f a number (p. 59)
- ity (p. 55)
- s (p. 54)
- of a sum property
- 34)
- al number (p. 86)
- icative inverse (p. 82)
- icative property of zero
- 78)
- ve integers (p. 54)
- tes (p. 54)
- heses (p. 95)
- e integers (p. 54)
- ty of -1 (p. 93)
- ty of additive
- erses (p. 66)
- ty of multiplicative
- erses (p. 82)
- nt (p. 81)
- al numbers (p. 59)
- umbers (p. 61)
- ocal (p. 82)
- ting decimal (p. 86)
- nating decimal (p. 86)
- (p. 90)
- em (p. 102)

What You'll Learn in Chapter 2

- How to use integers and rational numbers to model real situations
- How to add, subtract, multiply, and divide rational numbers and how to use these operations in solving problems
- How to use the distributive property to simplify algebraic expressions
- How to apply the properties of numbers, axioms and theorems, to algebraic expressions

CHAPTER 2

Skills & Concepts You Need for Chapter 2

1-2 Simplify.

1. $\frac{12}{27}$ 2. $\frac{a}{4ab}$ 3. $\frac{13xy}{xy}$ 4. $\frac{18cd}{15d}$

1-3 Evaluate.

5. $(4n)^2$ for $n = 2$ 6. p^1 for $p = 24$ 7. $3x^3$ for $x = 2$

1-5 Multiply.

8. $5(a + b + d)$ 9. $11(w + 4)$ 10. $7(3z + y + 2)$

1-5 Factor.

11. $45 + 9y$ 12. $3a + 12b$ 13. $4x + 10 + 8y$

1-5 Collect like terms.

14. $5x + 3y + 2x$ 15. $b^2 + 3a + 4b^2$ 16. $5t + 2 + 3t + 7$

Solve for the given replacement set.

17. $4x + 2 = 30$ {3, 5, 7} 18. $8a = 4$ {0.5, 5, 50}

Skills & Concepts You Need for Chapter 2

1. $\frac{4}{9}$
2. $\frac{1}{4b}$
3. 13
4. $\frac{6c}{5}$
5. 64
6. 24
7. 24
8. $5a + 5b + 5d$
9. $11w + 44$
10. $21z + 7y + 14$

11. $9(5 + y)$
12. $3(a + 4b)$
13. $2(2x + 5 + 4y)$
14. $7x + 3y$
15. $5b^2 + 3a$
16. $8t + 9$
17. {7}
18. {0.5}

2-1 Exercises



Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

A Name the integer that is suggested by each situation.

- In one game Carlos lost 12 marbles.
- Jana won 5 marbles in her first game.
- The temperature Wednesday was 18° above zero.
- Ramona has a debt of \$17.
- Jane's business had a profit of \$2500 in one week.
- The Dead Sea, between Jordan and Israel, is 1299 feet below sea level.
- On Friday, Vicki withdrew \$125 from her savings account.
- Terry's bowling team won by 34 pins.
- In foreign trade, the U.S. had an excess of \$3 million.

Write a true sentence using $<$ or $>$.

- | | | | |
|----------------------|---------------------|---------------------|-----------------------|
| 10. $5 \square 0$ | 11. $9 \square 0$ | 12. $-9 \square 5$ | 13. $8 \square -8$ |
| 14. $-6 \square 6$ | 15. $0 \square -7$ | 16. $-8 \square -5$ | 17. $-4 \square -3$ |
| 18. $-5 \square -11$ | 19. $-3 \square -4$ | 20. $-6 \square -5$ | 21. $-10 \square -14$ |

Find the absolute value.

- | | | | |
|---------------|---------------|--------------|----------------|
| 22. $ -3 $ | 23. $ -7 $ | 24. $ 10 $ | 25. $ 11 $ |
| 26. $ 0 $ | 27. $ -4 $ | 28. $ -24 $ | 29. $ 325 $ |
| 30. $ -125 $ | 31. $ 5.5 $ | 32. $ -4.2 $ | 33. $ -120.2 $ |
| 34. $ 755 $ | 35. $ -340 $ | 36. $ -5.8 $ | 37. $ -0.3 $ |
| 38. $ 12.75 $ | 39. $ -0.07 $ | 40. $ -80 $ | 41. $ -3.75 $ |

B

Evaluate.

- | | | |
|---------------------------------|------------------------------|----------------------------|
| 42. $ -5 + -6 $ | 43. $ 17 + -17 $ | 44. $ 12 \cdot -3 $ |
| 45. $ -5 \cdot -6 \cdot 0 $ | 46. $ -3 \cdot -7 + -4 $ | 47. $ 8 \cdot -2 - 5 $ |

Write the following integers in order from least to greatest.

- 13, -12, 5, -17
- 23, 4, 0, -17
- 24, -26, -18, -32, -5, -16
- 15, -24, -5, -16, 12, -13, -14

Evaluate each expression.

- $|x| + 24$ for $x = -7$
- $|t| - 15$ for $t = -36$

3. PRACTICE/ASSESS

LESSON QUIZ

What integer is suggested by each situation?

- The temperature is 60° above zero.
60
- Dorealea lost 2 pounds.
-2
- The hole was 20 feet deep.
-20
- The tree grew 5 feet.
5

Insert either $<$ or $>$ to make a statement.

- $4 \square 9$
- $-8 \square 7$
- $-14 \square -20$
- $-12 \square -10$
- $9 \square -2$

Find the absolute value.

- $|-9|$
- $|12|$

Assignment Guide

To provide flexible scheduling, this lesson can be split into parts:

- ▼ Core 1-9
Extension 57
- ▼ Core 10-21
Extension 48-51
- ▼ Core 22-47, 52-56
Extension 58-72

Use Mixed Review to maintain skills.

Exercises

- | | | | |
|--------------|---------|-----------|------------------------|
| 1. -12 | 14. $<$ | 28. 24 | 42. 11 |
| 2. 5 | 15. $>$ | 29. 325 | 43. 34 |
| 3. 18 | 16. $<$ | 30. 125 | 44. 36 |
| 4. -17 | 17. $<$ | 31. 5.5 | 45. 0 |
| 5. 2500 | 18. $>$ | 32. 4.2 | 46. 25 |
| 6. -1299 | 19. $>$ | 33. 120.2 | 47. 11 |
| 7. -125 | 20. $<$ | 34. 755 | 48. -17, -12, 5, 13 |
| 8. 34 | 21. $>$ | 35. 340 | 49. -23, -17, 0, 4 |
| 9. 3,000,000 | 22. 3 | 36. 5.8 | 50. -32, -26, -24, -16 |
| 10. $>$ | 23. 7 | 37. 0.3 | 51. -24, -16, -14, -11 |
| 11. $>$ | 24. 10 | 38. 12.75 | 52. 31 |
| 12. $<$ | 25. 11 | 39. 0.07 | 53. 21 |
| 13. $>$ | 26. 0 | 40. 80 | |
| | 27. 4 | 41. 3.75 | |

54. $|a| + |b|$ for $a = -5$ and $b = -12$
 55. $2|x| + |y|$ for $x = 8$ and $y = 15$
 56. $3a - |b| + |c|$ for $a = 5, b = -4, c = -12$
 57. **Critical Thinking** Find the next three numbers in each pattern by thinking about integers and the number line.
 a. 13, 9, 5, 1, _____, _____, _____
 b. 6, 5, 3, 0, _____, _____, _____
 c. -3, -5, -8, -12, _____, _____, _____
 d. -1, -3, -4, -7, _____, _____, _____

TEST PREP Compare the boxed quantity in column A with the boxed quantity in column B. Choose the best answer.

- A. The quantity in column A is greater.
 B. The quantity in column B is greater.
 C. The two quantities are equal.
 D. The relationship cannot be determined with the information supplied.

| | column A | column B | | column A | column B |
|-----|----------|----------|-----|----------|----------|
| 58. | 5.3 | 5.3 | 59. | -3.1 | -3.1 |
| 60. | 0 | 0 | 61. | 2.7 | - 2.7 |
| 62. | x | x | 63. | x | - x |

Challenge

Use $<$, $>$, or $=$ to write a true sentence.

64. $|-3| \square 5$ 65. $2 \square |-4|$ 66. $-2 \square |-1|$ 67. $0 \square |0|$
 68. $|-5| \square |-2|$ 69. $|4| \square |-7|$ 70. $|x| \square -1$ 71. $|-8| \square |8|$
 72. List in order from least to greatest. $7^1, -5, |-6|, 4, |3|, -100, 0, 1, \frac{14}{4}$

Mixed Review

- Collect like terms. 73. $6m + 11m + 4m$ 74. $\frac{1}{2}a + \frac{1}{2}a$
 75. $8x^2 + 3x^2 + 7x$ 76. $4c^2 + 7c + 2c^2$ 1-5
 Factor. 77. $4m + 24c$ 78. $7b + 14$ 79. $14x + 28y + 7$ 1-5
 Solve for the given replacement set. 80. $y + 3 = 42$ {14, 39, 45}
 81. $w + 3911 = 4272$ {361, 7183, 8183} 82. $14t = 42$ {2, 3, 28}
 83. $c + 9.7 = 12.4$ {2.7, 3.3, 22.1} 84. $2.6n = 7.8$ {3, 5.2, 10.4} 1-7
Mental Math 85. $x - 4 = 18$ 86. $c - 25 = 30$
 87. $y - 80 = 10$ 88. $\frac{a}{4} = 20$ 89. $\frac{x}{10} = 2.4$ 90. $\frac{d}{7} = 20$ 1-7

58 Chapter 2 Integers and Rational Numbers

Exercises

54. 17
 55. 31
 56. 23
 57. a. -3, -7, -11
 b. -4, -9, -15
 c. -17, -23, -30
 d. -11, -18, -29 (Ans. may vary)
 58. C
 59. B
 60. C
 61. A
 62. D
 63. D
 64. $<$
 65. $<$
 66. $<$
 67. $=$
 68. $>$
 69. $<$
 70. $>$
 71. $=$
 72. -100, -5, 0, 1, $|3|$, $\frac{14}{4}$, 4, $|-6|$, 7^1

Mixed Review

73. $21m$
 74. a
 75. $11x^2 + 7x$

76. $6c^2 + 7c$
 77. $4(m + 6c)$
 78. $7(b + 2)$
 79. $7(2x + 4y + 1)$
 80. {39}
 81. {361}
 82. {3}
 83. {2.7}
 84. {3}
 85. $x = 22$
 86. $c = 55$
 87. $y = 90$
 88. $a = 80$
 89. $x = 24$
 90. $d = 140$

If you are unfamiliar with the format as 58-63, you may wish to direct pages 425 and 426.

10 $-\frac{2}{3} \square -\frac{5}{8}$

$-\frac{16}{24} \square -\frac{15}{24}$ Find a common denominator. $-\frac{2}{3} = -\frac{16}{24}$ $-\frac{5}{8} = -\frac{15}{24}$

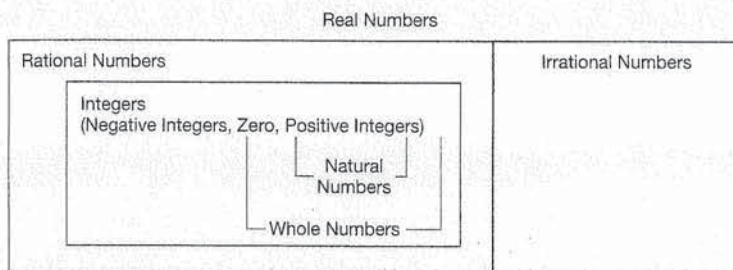
$-\frac{16}{24} < -\frac{15}{24}$ $-\frac{16}{24}$ is farther to the left on the number line than $-\frac{15}{24}$.

$-\frac{2}{3} < -\frac{5}{8}$

Try This Use either $<$ or $>$ to write a true sentence.

i. $4.62 \square 4.26$ j. $-3.11 \square -3.22$ k. $\frac{5}{6} \square \frac{7}{8}$ l. $-\frac{2}{3} \square -\frac{4}{5}$

Rational numbers are part of a larger set of numbers called the **real numbers**. Real numbers also include irrational numbers, about which you will learn more in Chapter 11. The diagram below shows the relationships among these sets of numbers.



2-2 Exercises

A Show that each number can be written as the ratio of two integers.

1. 14 2. -7 3. 4.2 4. 1.5
 5. -0.5 6. -0.03 7. 3.444 8. -5.333
 9. -0.68 10. -4 11. $7\frac{1}{2}$ 12. $1\frac{2}{3}$

Graph each rational number.

13. $\frac{10}{3}$ 14. $-\frac{17}{5}$ 15. -4.3 16. 6.4

17. **TEST PREP** To which sets of numbers does $-\frac{10}{2}$ belong?

- I. Integers II. Rational numbers III. Whole numbers
 a. I only b. II only c. I and II d. II and III

Try This

- i. $>$
 j. $>$
 k. $<$
 l. $>$

Exercises

1. $\frac{14}{1}$
 2. $-\frac{7}{1}$
 3. $\frac{42}{10}$ or $\frac{21}{5}$
 4. $\frac{15}{10}$ or $\frac{3}{2}$

5. $-\frac{5}{10}$ or $-\frac{1}{2}$
 6. $-\frac{3}{100}$
 7. $\frac{3444}{1000}$ or $\frac{861}{250}$
 8. $-\frac{5333}{1000}$
 9. $-\frac{68}{100}$ or $-\frac{17}{25}$
 10. $-\frac{4}{1}$
 11. $\frac{15}{2}$
 12. $\frac{5}{3}$



Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

3. PRACTICE/ASSESS

LESSON QUIZ

Graph each rational number



Insert either $<$ or $>$ to make a statement.

4. $4.7 \square 3.5$ $4.7 > 3.5$
 5. $-2.5 \square -1.6$ $-2.5 < -1.6$
 6. $\frac{2}{3} \square \frac{5}{6}$ $\frac{2}{3} < \frac{5}{6}$
 7. $-\frac{3}{7} \square -\frac{4}{5}$ $-\frac{3}{7} > -\frac{4}{5}$

Show that each number can be written as a ratio.

8. 14 $\frac{14}{1}$ 9. 1.7 $\frac{17}{10}$
 10. -3.17 $-\frac{317}{100}$

Assignment Guide

To provide flexible scheduling, this lesson can be split into parts.

- ▼ Core 1-12 Extension 17, 41
- ▼ Core 13-16
- ▼ Core 18-29 Extension 30-40

Use Mixed Review to maintain

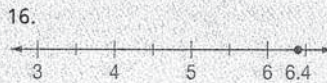
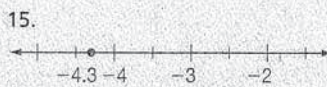
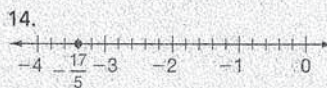
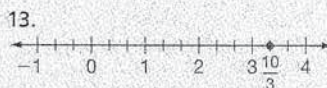
Try This

- i. $>$
 j. $>$
 k. $<$
 l. $>$

Exercises

1. $\frac{14}{1}$
 2. $-\frac{7}{1}$
 3. $\frac{42}{10}$ or $\frac{21}{5}$
 4. $\frac{15}{10}$ or $\frac{3}{2}$

5. $-\frac{5}{10}$ or $-\frac{1}{2}$
 6. $-\frac{3}{100}$
 7. $\frac{3444}{1000}$ or $\frac{861}{250}$
 8. $-\frac{5333}{1000}$
 9. $-\frac{68}{100}$ or $-\frac{17}{25}$
 10. $-\frac{4}{1}$
 11. $\frac{15}{2}$
 12. $\frac{5}{3}$



17. c

Use either $<$ or $>$ to write a true sentence.

18. $2.14 \square 1.24$ 19. $-3.3 \square -2.2$ 20. $7.075 \square 7.750$
 21. $-14.5 \square 0.011$ 22. $17.2 \square -1.67$ 23. $-345 \square -354$
 24. $-12.88 \square -13$ 25. $-14.34 \square -17.88$ 26. $-0.606 \square -0.660$
 27. $\frac{4}{10} \square -\frac{1}{2}$ 28. $-\frac{5}{12} \square -\frac{3}{8}$ 29. $-\frac{5}{3} \square -\frac{7}{5}$

30. **Mathematical Reasoning** Show that $\frac{1}{3} > 0.33$ and that $-\frac{1}{3} < -0.33$.

B

The **density property** of rational numbers states that between any two rational numbers, there is another rational number. Find a number between the following pairs of numbers.

31. $\frac{1}{2}, \frac{1}{4}$ 32. $\frac{1}{5}, \frac{2}{5}$ 33. $0.45, 0.46$ 34. $0.012, 0.013$

Write these rational numbers in order from least to greatest.

35. $\frac{3}{8}, \frac{7}{8}, \frac{1}{8}, -\frac{4}{8}, \frac{5}{8}, -\frac{8}{8}$ 36. $\frac{6}{5}, -\frac{4}{5}, -\frac{2}{5}, \frac{4}{5}, -\frac{7}{5}, -\frac{1}{5}$
 37. $\frac{4}{5}, \frac{4}{3}, \frac{4}{8}, \frac{4}{6}, \frac{4}{9}, \frac{4}{2}$ 38. $-\frac{2}{3}, \frac{1}{2}, -\frac{3}{4}, -\frac{5}{6}, \frac{3}{8}, \frac{1}{6}$

39. **Critical Thinking** Find five ways the numbers 2, 3, 4, 5, and 7 can be placed in the boxes to make a true statement.

$$\frac{\square}{\square} > \frac{\square}{\square}$$

Challenge

40. **Mathematical Reasoning** Show that for positive numbers $a, b, c,$ and $d,$ if $\frac{a}{b} < \frac{c}{d},$ then $ad < cb.$ (Hint: Find a common denominator.)
 41. **Reasoning** Is the following generalization always, sometimes, or never true? $\frac{a}{b} = \frac{a+c}{b+c},$ where $b \neq 0$ and $c \neq 0.$ Explain.

Mixed Review

- Write as an algebraic expression. 42. 11 less than m
 43. y divided among x 44. the sum of 9 and t 45. 4 times w $l-6$
 Find the absolute value. 46. $|0.06|$ 47. $|-2.3|$ 48. $|-41|$ $2-1$
 Solve. 49. $y + \frac{3}{5} = \frac{4}{5}$ 50. $a - \frac{1}{7} = \frac{6}{7}$ 51. $x + \frac{2}{3} = \frac{5}{6}$
 52. $\frac{a}{7} = 8$ 53. $\frac{c}{6} = 12$ 54. $\frac{y}{4} = 32$ 55. $\frac{y}{3} = 7 + \frac{1}{3}$ $l-7$
Mental Math Evaluate. 56. $D = r \cdot k$ for $r = 45$ and $k = 3$ 57. $A = bh$ for $b = 10.2$ and $h = 5$ 58. $P = 2w + 2l$ for $w = 17$ and $l = 2.5$ $l-1$

Exercises

18. $>$
 19. $<$
 20. $<$
 21. $<$
 22. $>$
 23. $>$
 24. $>$
 25. $>$
 26. $>$
 27. $>$
 28. $<$
 29. $<$

30. $\frac{1}{3} \approx 0.333 > 0.330$
 $= 0.33$
 $-\frac{1}{3} \approx -0.333 < -0.330$
 $= -0.33$
 31. $\frac{3}{8}$
 32. $\frac{3}{10}$
 33. 0.455
 34. 0.0125
 35. $-\frac{8}{8}, -\frac{4}{8}, \frac{1}{8}, \frac{3}{8}, \frac{5}{8}, \frac{7}{8}$
 36. $-\frac{7}{5}, -\frac{4}{5}, -\frac{2}{5}, -\frac{1}{5}, \frac{4}{5}, \frac{6}{5}$
 37. $\frac{4}{9}, \frac{4}{8}, \frac{4}{6}, \frac{4}{5}, \frac{4}{3}, \frac{4}{2}$
 38. $-\frac{5}{6}, -\frac{3}{4}, -\frac{2}{3}, \frac{1}{6}, \frac{3}{8}, \frac{1}{2}$

39. Answers may vary.
 $\frac{2}{3} > \frac{4}{7}, \frac{3}{2} > \frac{5}{7}, \frac{3}{2} > \frac{4}{5}, \frac{4}{5} > \frac{2}{7}, \frac{7}{2} > \frac{5}{4}$
 40. $\frac{a}{b} < \frac{c}{d}$
 $\frac{ad}{bd} < \frac{cb}{bd}$
 $\therefore ad < cb$
 41. Sometimes; true when $a = b.$

Mixed Review

42. $m - 11$
 43. $\frac{y}{x}$
 44. $9 + t$
 45. $4w$
 46. 0.06
 47. 2.3
 48. 41
 49. $\frac{1}{5}$
 50. 1
 51. $\frac{1}{6}$
 52. 56
 53. 72
 54. 128
 55. 22
 56. 135
 57. 51
 58. 39

ACTICE/ASSESS

QUIZ

7

(-4)

+ (-4.1)

$-\frac{7}{8}$

$-\frac{1}{2}$

$(-\frac{5}{6})$

$(-\frac{5}{6}) = -\frac{7}{6}$

$7 + (-6) + 8$

$(-6) + 7 + 8$

$0 + 15 = 5$

$+ 8 + (-16) + (-9)$

$+ (-16) + (-9) + 8$

$7 + 8 = -29$

additive inverse of each.

additive inverse is 14.

additive inverse is $-\frac{7}{3}$.

$-x$ when x is -4 .

$l) = 4$

mp rose 500 ft, fell 700 ft, fell

ft, and rose 300 ft. How much did

or fall all together?

$(-7) + (-13) + 3$

$+ 3 + (-7) + (-13)$

$+ (-20) = -12$

l 1200 feet.

what number x is $-x$ equal to x ?

$= 0$

Assignment Guide

provide flexible scheduling, this
n can be split into parts.

ore 1-8

ntension 51-53, 70

ore 9-34, 57-63

ntension 55-56, 72-75

ore 35-50, 64-69

ntension 54, 71, 76

Mixed Review to maintain skills.



Extra Help On the Web

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examples at the Prentice
Hall Web site.
www.phschool.com

Try This Solve.

- y. Rico carried the ball six times in the third quarter of a football game. Here are his gains and losses: 11-yd gain, 4-yd loss, 6-yd loss, 5-yd gain, 8-yd gain, 2-yd loss. What was the total number of yards he gained (or lost)?

2-3 Exercises

A

Add using a number line.

1. $-9 + 2$ 2. $2 + (-5)$ 3. $-10 + 6$ 4. $8 + (-3)$
5. $-8 + 8$ 6. $6 + (-6)$ 7. $-3 + (-5)$ 8. $-4 + (-6)$

Add without using a number line.

9. $-7 + 0$ 10. $-13 + 0$ 11. $0 + (-27)$
12. $0 + (-35)$ 13. $17 + (-17)$ 14. $-15 + 15$
15. $-17 + (-25)$ 16. $-24 + (-17)$ 17. $-14 + (-29)$
18. $-\frac{5}{8} + \frac{1}{4}$ 19. $-\frac{5}{6} + \frac{2}{3}$ 20. $-\frac{3}{7} + (-\frac{2}{5})$
21. $-\frac{5}{8} + (-\frac{1}{3})$ 22. $-\frac{3}{5} + (-\frac{2}{15})$ 23. $-\frac{5}{9} + (-\frac{1}{18})$

24. $-44 + (-\frac{3}{8}) + 95 + (-\frac{5}{8})$

25. $\frac{-3}{12} + \frac{3}{18} + \frac{-7}{6} + 2$

26. $24 + 3.1 + (-44) + (-8.2) + 63$

27. $-17 + 28 + (-12) + (-20.5) + 16.5$

28. $24 + (-36) + 75 + (-75) + 82 + (-63)$

29. $98 + (-54) + 113 + (-998) + 44 + (-612) + (-18) + 334$

30. $-455 + (-123) + 1026 + (-919) + 213 + 111 + (-874)$

Estimation Which of the two numbers is greater? Use estimation to decide.

31. $14 + (-36)$ or $14 + (-35)$ 32. $-32 + (-9)$ or $-32 + (-8)$
33. $-\frac{3}{5} + \frac{2}{5}$ or $-\frac{3}{5} + \frac{3}{5}$ 34. $-16 + 9$ or $-16 + (-9)$

Find the additive inverse of each.

35. 24 36. -64 37. -9 38. $\frac{7}{2}$ 39. -26.9 40. 48.2

Find $-x$ when x is

41. 9 42. -26 43. $-\frac{14}{3}$ 44. $\frac{1}{328}$ 45. 0.101 46. 0

Try This

y. 12 yd gained

Exercises

1. -7
2. -3
3. -4
4. 5
5. 0
6. 0
7. -8
8. -10
9. -7
10. -13

11. -27
12. -35
13. 0
14. 0
15. -42
16. -41
17. -43
18. $-\frac{3}{8}$
19. $-\frac{1}{6}$
20. $-\frac{29}{35}$
21. $-\frac{23}{24}$
22. $-\frac{11}{15}$

23. $-\frac{11}{18}$
24. 50
25. $\frac{3}{4}$
26. 37.9
27. -5
28. 7
29. -1093
30. -1021
31. $14 + (-35)$
32. $-32 + (-8)$
33. $-\frac{3}{5} + \frac{3}{5}$
34. $-16 + 9$

35. -24
36. 64
37. 9
38. $-\frac{7}{2}$
39. 26.9
40. -48.2
41. -9
42. 26
43. $\frac{14}{3}$
44. $-\frac{1}{328}$
45. -0.101
46. 0

Find $-(-x)$ when x is

47. -65 48. 29 49. $\frac{5}{3}$ 50. -9.1

Mathematical Reasoning Use *sometimes*, *always*, or *never* to make the statement true.

51. The sum of two negative numbers is ? positive.
 52. The sum of two positive numbers is ? positive.
 53. The sum of a positive and a negative number is ? positive.
 54. The additive inverse of a number is ? negative.
 55. The sum of two numbers is ? greater than either number.
 56. The sum of two numbers is ? less than either number.

Solve.

57. The barometric pressure at Omaha was 1012 millibars (mb). The pressure dropped 6 mb, then it rose 3 mb. After that it dropped 14 mb and then rose 4 mb. What was the pressure then?
 58. In a football game, the quarterback attempted passes with the following results. Find the total gain (or loss).

| | |
|------------|--------------------------------------|
| first try | 13-yd gain |
| second try | incomplete |
| third try | 12-yd loss (tackled behind the line) |
| fourth try | 21-yd gain |
| fifth try | 14-yd loss |

59. The average attendance at a soccer game last year was 1755 people. The table below shows the attendance for each game this year compared to last year's average. By how much was the total attendance for all 6 games above or below last year's?

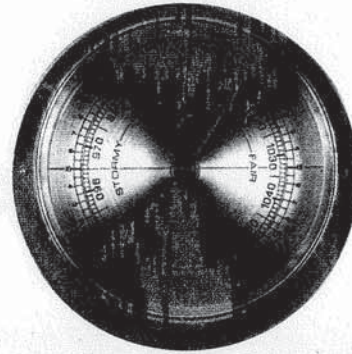
| Game 1 | Game 2 | Game 3 | Game 4 | Game 5 | Game 6 |
|--------|--------|--------|--------|--------|--------|
| +357 | -144 | -250 | +347 | +420 | -188 |

60. The business class kept a record of the change in a stock market for a period of 5 weeks. After 5 weeks, how many points had the market gained or lost?

| Week 1 | Week 2 | Week 3 | Week 4 | Week 5 |
|--------------|--------------|------------|--------------|------------|
| down 120 pts | down 150 pts | up 350 pts | down 100 pts | up 180 pts |

61. In a board game, Alice started with \$1475. After these transactions how much did Alice have?

| | |
|--------------------------------|------|
| purchased properties | 1700 |
| collected rents | 1640 |
| purchased houses | 900 |
| passed start (collected money) | 1200 |



Barometric pressure is also measured in inches of mercury (the length of a column of mercury that is supported by the atmosphere). A pressure of 1012 mb is equivalent to 29.88 in. of mercury. How many inches of mercury are equivalent to 999 mb?

Exercises

- | | |
|-------------------|---------------------------|
| 47. -65 | 58. 8-yd gain |
| 48. 29 | 59. 542 above last year's |
| 49. $\frac{5}{3}$ | 60. Up 160 points |
| 50. -9.1 | 61. \$1715 |
| 51. never | |
| 52. always | |
| 53. sometimes | |
| 54. sometimes | |
| 55. sometimes | |
| 56. sometimes | |
| 57. 999 mb | |
- Photo caption: 29.50 in. of mercury

62. The table below shows the profits and losses of a company over a six-year period. Find the total profit or loss for this period of time.

| Year | Profit or loss (\$) |
|------|---------------------|
| 1994 | +32,056 |
| 1995 | -2,925 |
| 1996 | +81,429 |
| 1997 | -19,365 |
| 1998 | -13,875 |
| 1999 | +384 |

63. Francine received an allowance of \$5.00, bought a pen for \$0.59, gave \$1.75 to Pat, made \$10.50 baby sitting, and spent \$6.75 at a movie. How much did she have left?

B

64. For what numbers x is $-x$ negative?
 65. For what numbers x is $-x$ positive?

Mathematical Reasoning Tell whether the sum is *positive*, *negative*, or *zero*. Explain your answers.

66. n is positive, m is negative. $n + (-m)$ is _____.
 67. n is positive, m is negative. $-n + m$ is _____.
 68. $n = m$, n and m are negative. $-n + (-m)$ is _____.
 69. $n = m$, n and m are negative. $n + (-m)$ is _____.
 70. Name the largest negative integer.
 71. **Write a Convincing Argument** Write an argument to convince a classmate that $-(-n) = n$.

Challenge

Solve.

72. $x + x = 0$
 73. $x + (-5) = x$
 74. $3y + (-2) = 7$
 75. $x + (-5) = 16$
 76. Does $x - y = x + (-y)$ for all numbers x and y ?

Mixed Review

- Solve. 77. $2.6n = 6.24$ 78. $w - 1.07 = 3.24$ 79. $7r = 84$ 1-7
 Use either $<$ or $>$ to write a true sentence. 80. $-9 \square 2$
 81. $-4 \square -6$ 82. $-1 \square 0$ 83. $3.62 \square 3.26$ 84. $0 \square 0.001$ 2-1
 Find the absolute value. 85. $|2|$ 86. $|-4|$ 87. $|-2.03|$ 88. $|0|$ 2-1
 89. Each of the members of Miss Odell's class read 8 books. If the class read 104 books in all, how many members are in the class? 1-10

Exercises

62. 77,704 profit
 63. \$6.41
 64. When x is positive
 65. When x is negative
 66. Positive; n is positive and $-m$ is positive, so their sum is positive.
 67. Negative; $-n$ is negative and m is negative, so their sum is negative.
 68. Positive; $-n$ is positive and $-m$ is positive, so their sum is positive.

69. Zero; $-m$ is the additive inverse of n , so their sum is zero.
 70. -1
 71. Answers may vary, but should include the idea that since $-n + n = 0$, the additive inverse of $-n$ is n .
 72. 0
 73. No value
 74. 3
 75. 21
 76. Yes

Mixed Review

77. 2.4
 78. 4.31
 79. 12
 80. $<$
 81. $>$
 82. $<$
 83. $>$
 84. $<$
 85. 2
 86. 4
 87. 2.03
 88. 0
 89. 13

illing is digging a well. The level at the surface is 112 feet sea level. They drill down t. How far below sea level is tom of the well? l level is 112. ll depth is -250. (-250) = -138 tom of the well is 138 ft sea level.



Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site. www.phschool.com

NRICHMENT

quares with Integers

of the integers -4, -3, -2, -1, and 4 exactly once to fill in a hree table so that all the rows, and diagonals add up to 0. Get started by drawing the table ng a -1 in the top left-hand d a 3 in the bottom left-hand ote that answers for magic ay vary.

| | | |
|----|----|----|
| -1 | 4 | -3 |
| -2 | 0 | 2 |
| 3 | -4 | 1 |

ACTICE/ASSESS

QUIZ

ubtract.

- 9 - 4
- + 3 - 8
- 5 - 18
- (-3)
- 3 = 15
- (- $\frac{2}{3}$)
- $\frac{6}{9} + \frac{2}{3}$
- $\frac{6}{9} + \frac{6}{9} = 0$
- (-5) + 3 - 9
- 1 + 5 + 3 - 9
- 2 - 9 = 13
- (-5x) + 4x + 3
- 6 + 3 + 5x + 4x
- 3 + 9x
- temperature was -12° at dusk
- fell to -23° at midnight. How
- h and in what direction did the
- perature change?
- 3 - (-12)
- 23 + 12 = -11
- ell 11°.

Try This Solve.

- 1. Juan has saved \$35 toward a new stereo system. The total cost of the system is \$125. How much more money does Juan need?

2-4 Exercises

A

Subtract using a number line.

- 1. 3 - 7
- 2. 4 - 9
- 3. 0 - 7
- 4. 0 - 10
- 5. 5 - (-2)
- 6. -6 - (-8)
- 7. -10 - (-10)
- 8. -8 - (-8)

Subtract.

- 9. 7 - 7
- 10. 0.9 - 0.9
- 11. 7 - (-7)
- 12. 4 - (-4)
- 13. 8 - (-3)
- 14. -7 - 4
- 15. -6 - 8
- 16. 6 - (-10)
- 17. -4 - (-9)
- 18. 15 - (-6)
- 19. 0 - 5
- 20. 0 - 0.6
- 21. -51 - (-2)
- 22. -39 - (-41)
- 23. -79 - 114
- 24. -197 - 216
- 25. 0 - (-500)
- 26. 500 - (-1000)
- 27. -2.8 - 0
- 28. 6.04 - 1.1
- 29. 7 - 10.53
- 30. 8 - (-9.3)
- 31. $\frac{1}{6} - \frac{2}{3}$
- 32. $-\frac{3}{8} - (-\frac{1}{2})$
- 33. $\frac{12}{5} - \frac{12}{5}$
- 34. $-\frac{4}{7} - (-\frac{10}{7})$
- 35. $-\frac{7}{10} - \frac{10}{15}$
- 36. $-\frac{4}{18} - (-\frac{2}{9})$
- 37. $\frac{1}{13} - \frac{1}{12}$
- 38. $-\frac{1}{7} - (-\frac{1}{6})$

Simplify.

- 39. 18 - (-15) - 3 - (-5) + 2
- 40. 22 - (-18) + 7 + (-42) - 27
- 41. -31 + (-28) - (-14) - 17
- 42. -43 - (-19) - (-21) + 25
- 43. -34 - 28 + (-33) - 44
- 44. 39 + (-88) - 29 - (-83)
- 45. 84 + (-99) + 44 - (-18) - 43
- 46. -5 - (-3x) + 3x + 4x - (-12)
- 47. 14 + (-5x) + 2x - (-32)
- 48. 13x - (-2x) + 45 - (-21)
- 49. 8x - (-2x) - 14 - (-5x) + 53
- 50. **Error Analysis** A student claims that -12 - (-3) equals -15. How would you convince the student that the answer is incorrect?

Try This

1. \$90

Exercises

- 1. -4
- 2. -5
- 3. -7
- 4. -10
- 5. 7
- 6. 2
- 7. 0
- 8. 0
- 9. 0
- 10. 0
- 11. 14
- 12. 8
- 13. 11
- 14. -11
- 15. -14
- 16. 16
- 17. 5
- 18. 21
- 19. -5
- 20. -0.6
- 21. -49
- 22. 2
- 23. -193
- 24. -413

- 25. 500
- 26. 1500
- 27. -2.8
- 28. 4.94
- 29. -3.53
- 30. 17.3
- 31. $-\frac{1}{2}$
- 32. $\frac{1}{8}$
- 33. 0
- 34. $\frac{6}{7}$
- 35. $-\frac{41}{30}$
- 36. 0

- 37. $-\frac{1}{156}$
- 38. $\frac{1}{42}$
- 39. 37
- 40. -22
- 41. -62
- 42. 22
- 43. -139
- 44. 5
- 45. 4
- 46. 10x + 7
- 47. -3x + 46
- 48. 15x + 66
- 49. 15x + 39

Solve.

51. Mrs. Kang has \$619.46 in her checking account. She wrote a check for \$950.00. By how much did she overdraw her checking account?
52. Omar had \$137.40 in his checking account. He wrote a check for \$225.20. By how much has he overdrawn his checking account?
53. On a winter night the temperature dropped from -5°C to -12°C . How many degrees did the temperature drop?
54. The temperature at 6 P.M. was 5°C . At 9 P.M. the temperature had dropped to -5°C . How many degrees did the temperature fall?
55. There are 47 females in the band. If there is a total of 163 band members, how many males are in the band?
56. Sarah had a balance of \$45 in her checking account. She wrote two checks totaling \$12. How much money does she have in her checking account now?
57. The lowest point in Africa is Lake Assal, which is 156 m below sea level. The lowest point in South America is the Valdes Peninsula, which is 40 m below sea level. How much lower is Lake Assal than the Valdes Peninsula?
58. The deepest point in the Pacific Ocean is the Marianas Trench, which is 10,415 m deep. The deepest point in the Atlantic Ocean is the Puerto Rico Trench, which is 8,648 m deep. How much deeper is the Marianas Trench than the Puerto Rico Trench?

TEST PREP Compare the boxed quantity in column A with the boxed quantity in column B. Choose the best answer.

- A. The quantity in column A is greater.
- B. The quantity in column B is greater.
- C. The two quantities are equal.
- D. The relationship cannot be determined with the information supplied.

| | column A | column B | | column A | column B |
|-----|-----------|-----------|-----|--------------|--------------|
| 59. | $10 - 1$ | $10 - 5$ | 60. | $10 - (-1)$ | $10 - (-5)$ |
| 61. | $-10 - 1$ | $-10 - 5$ | 62. | $-10 - (-1)$ | $-10 - (-5)$ |
| 63. | $x - 1$ | $x - 5$ | 64. | $x - (-1)$ | $x - (-5)$ |

B

65. Evaluate each expression using the values from the table.

| a | b | x | y | z |
|---|----|------|-----|---|
| 5 | -8 | -2.3 | 4.1 | 0 |

- a. $(a + x) - b$
- b. $z - (b - x)$
- c. $(x - y) + (a - b)$
- d. $(y - x) - (b - a)$
- e. $b - |x - a|$
- f. $|x| - a - (|b| + y)$



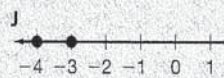
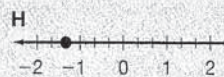
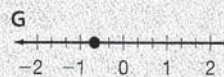
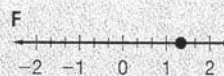
Practice Multiple Choice

Choose the best answer.

1. Evaluate $|a| - |b|$ when $a = -15$ and $b = 8$.

- A -23
- B 7
- C -7
- D 23

2. Which graph shows $-\frac{4}{3}$ on a number line?



1. B; Algebra 3.0
2. H; Algebra 2.0

Assignment Guide

To provide flexible scheduling, this lesson can be split into parts.

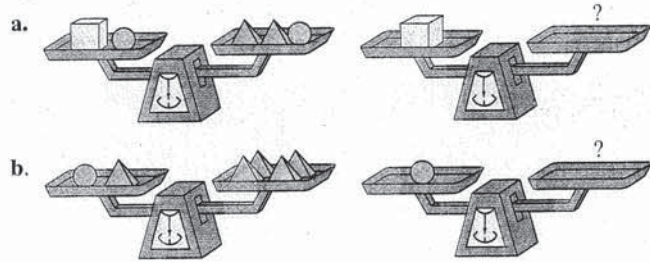
- ▼ Core 1-8, 50, 53-56
Extension 59-64, 66
- ▼ Core 9-49, 51-52, 57-58
Extension 65, 67-76

Use Mixed Review to maintain skills.

Exercises

50. Sample answer: If 12 red counters represent -12 and you remove 3 of them to represent subtracting -3 , the result is 9 red counters which represent -9 .
51. \$330.54
52. \$87.80
53. 7°
54. 10°
55. 116 males
56. \$33
57. 116 m
58. 1767 m
59. A
60. B
61. A
62. B
63. A
64. B
65. a. 10.7
b. 5.7
c. 6.6
d. 19.4
e. -15.3
f. -14.8

66. **Critical Thinking** Study the first scale and then add items to the right side of the second scale so it will balance.



Challenge

Mathematical Reasoning If a statement is not true for all integers m and n , give a counterexample.

67. $n - 0 = 0 - n$
 68. $0 - n = n$
 69. If $m \neq n$, then $m - n \neq 0$.
 70. If $m = -n$, then $m + n = 0$.
 71. If $m + n = 0$, then m and n are additive inverses.
 72. If $m - n = 0$, then $m = -n$.
 73. Do the commutative and associative properties hold for subtraction of integers?
 74. Simplify $-[-(-5)]$ and $-[-[-(-5)]]$. Give a rule for determining the sign of expressions like these, which involve any number of negative signs.
 75. Is $a - 1 \leq a$ for all, some, or no rational numbers? Explain.
 76. Does $|a| \cdot (b + c) = |a| \cdot b + |a| \cdot c$ for all integers a, b , and c ?





Self-Test On the Web

Check your progress. Look for a self-test at the Prentice Hall Web site. www.phschool.com

Mixed Review

- Evaluate. 77. $(n + 3)^2$ for $n = 4$ 78. $(3n)^3 - 100$ for $n = 2$
 79. t^4 for $t = 3$ 80. n^5 for $n = 2$ 81. $9y^3$ for $y = 3$
 82. m^3 for $m = 0$ 83. $3t^2 + 6$ for $t = 2$ 84. $2|m|$ for $m = -3$ 1-3
Mental Math Solve. 85. $3y = 3$ 86. $\frac{a}{2} = 4$ 87. $4y = 1$ 1-7
 Combine like terms.
 88. $3x + 5x^2 + 5x + 2x^2$ 89. $2a + 3b + 4c + 5b$ 1-5
 Factor. 90. $3c^2 + 5c$ 91. $6x + 24y - 18z$ 92. $6m + 9p$ 1-5

Exercises

66. a. 
 b. 
 67. False; $3 - 0 \neq 0 - 3$
 68. False; $0 - 3 \neq 3$
 69. True
 70. True
 71. True
 72. False; $3 - 3 = 0, 3 \neq -3$
 73. No

74. $-[-(-5)] = -5$
 $-[-[-(-5)]] = 5$
 A term with an even number of negative signs is positive. A term with an odd number of negative signs is negative.
 75. All; $a - 1$ is to the left of a on the number line.
 76. Yes

Mixed Review

77. 49
 78. 116
 79. 81

80. 32
 81. 243
 82. 0
 83. 18
 84. 6
 85. $y = 1$
 86. $a = 8$
 87. $y = \frac{1}{4}$
 88. $7x^2 + 8x$
 89. $2a + 8b + 4c$
 90. $c(3c + 5)$
 91. $6(x + 4y - 3z)$
 92. $3(2m + 3p)$

2-5 Exercises



Extra Help
On the Web

Look for worked-out examples at the Prentice Hall Web site.
www.phschool.com

A

Multiply.

1. $-8 \cdot 2$
2. $-2 \cdot 5$
3. $-7 \cdot 6$
4. $-9 \cdot 2$
5. $8(-3)$
6. $9(-5)$
7. $-9 \cdot 8$
8. $-10 \cdot 3$
9. $-8(-2)$
10. $-2(-5)$
11. $-7(-6)$
12. $-9(-2)$
13. $15(-8)$
14. $-12(-10)$
15. $-14(17)$
16. $-13(-15)$
17. $-25(-48)$
18. $39(-43)$
19. $-3.5(-28)$
20. $97(2.1)$
21. $\frac{1}{5}\left(\frac{-2}{9}\right)$
22. $-\frac{3}{5}\left(-\frac{2}{7}\right)$
23. $-7(-21)(13)$
24. $-14 \cdot 34 \cdot 12$
25. $-4(-1.8)(7)$
26. $-8(-1.3)(-5)$
27. $-\frac{1}{9}\left(\frac{-2}{3}\right)\left(\frac{5}{7}\right)$
28. $-\frac{7}{2}\left(\frac{-5}{7}\right)\left(\frac{3}{5}\right)$
29. $4(-4)(-5)(-12)$
30. $-2(-3)(-4)(-5)$
31. $0.07(-7)(6)(-6)$
32. $80(-0.8)(-90)(-0.09)$
33. $-\frac{5}{6}\left(\frac{1}{8}\right)\left(-\frac{3}{7}\right)\left(-\frac{1}{7}\right)$
34. $\frac{4}{5}\left(\frac{-2}{3}\right)\left(-\frac{15}{7}\right)\left(\frac{1}{2}\right)$
35. $(-14)(-27)(0)$
36. $7(-6)(5)(-4)(3)(-2)(1)(0)$
37. $0.02(-4)(1.3)$
38. $-5.1(0.03)(-1.1)$

B

Simplify.

39. $-6[(-5) + (-7)]$
40. $7[(-16) + 9]$
41. $-3[(-8) + (-6)]\left(-\frac{1}{7}\right)$
42. $8[17 - (-3)]\left(-\frac{1}{4}\right)$
43. $-(3^5) \cdot [-(2^3)]$
44. $4(2^4) \cdot [-(3^3)] \cdot 6$
45. $(-2)^5$
46. $(-1)^{23}$

Evaluate for $x = -2$, $y = -4$, and $z = 5$.

47. $xy + z$
48. $-4y + 3x + z$
49. $-6(3x - 5y) + z$
50. $(-9z)(-5x)(-7y)$
51. $y(x^4) - z$
52. $3z^2 - xy$

53. **Critical Thinking** Find a pair of integers with a product of -84 and a sum of 5 .

54. **TEST PREP** Which of these numbers is the least?

- A. $-1.08\left(-\frac{4}{3}\right)$ B. $-1.08\left(\frac{4}{3}\right)$ C. $-1.08\left(-\frac{2}{3}\right)$ D. $-1.08\left(\frac{2}{3}\right)$

3. PRACTICE/ASSESS

LESSON QUIZ

Multiply.

1. $-7 \cdot 6$
 -42
2. $8 \cdot (-7)$
 -56
3. $(-9)(-10)$
 90
4. $\left(-\frac{1}{7}\right)\left(-\frac{3}{4}\right)$
 $\left(\frac{1}{7}\right)\left(\frac{3}{4}\right) = \frac{3}{28}$
5. $5 \cdot (-3)(-2)(4)$
 $-15 \cdot (-2)(4)$
 $= 30 \cdot 4 = 120$
6. $(-13)(-35) \cdot 0$
 0

Assignment Guide

- ▼ Core 1–54
Extension 55–59

Use Mixed Review to maintain sk

Exercises

- | | | | |
|------------|----------------------|----------------------|---------------|
| 1. -16 | 14. 120 | 28. -1 | 42. -40 |
| 2. -10 | 15. -238 | 29. -960 | 43. 1944 |
| 3. -42 | 16. 195 | 30. 120 | 44. $-10,368$ |
| 4. -18 | 17. 1200 | 31. 17.64 | 45. -32 |
| 5. -24 | 18. -1677 | 32. -518.4 | 46. -1 |
| 6. -45 | 19. 98 | 33. $-\frac{5}{784}$ | 47. 13 |
| 7. -72 | 20. 203.7 | 34. $\frac{4}{7}$ | 48. 15 |
| 8. -30 | 21. $\frac{-2}{45}$ | 35. 0 | 49. -79 |
| 9. 16 | 22. $\frac{6}{35}$ | 36. 0 | 50. $-12,600$ |
| 10. 10 | 23. 1911 | 37. -0.104 | 51. -69 |
| 11. 42 | 24. -5712 | 38. 0.1683 | 52. 67 |
| 12. 18 | 25. 50.4 | 39. 72 | 53. $12, -7$ |
| 13. -120 | 26. -52 | 40. -49 | 54. B |
| | 27. $\frac{10}{189}$ | 41. -6 | |

Challenge

55. What must be true of m and n if $-mn$ is positive?
56. What must be true of m and n if $-mn$ is negative?
57. For any rational numbers a and b , is it *sometimes*, *always*, or *never* true that $|ab| = |-a||-b|$? Explain.
58. What must be true of x if $x(x - 2) < 0$?
59. What must be true of z if $|z| \cdot z < 0$?

Mixed Review

- Add or subtract. 60. $4 - 9$ 61. $3 - (-1)$ 62. $0 + (-4)$
63. $-8 + 8$ 64. $6 - (-2)$ 65. $-37 + 52$ 66. $67 + (-8)$ 2-3, 2-4
Use $<$, $>$, or $=$ to write a true sentence. 67. $-1.01 \square -1$
68. $2.5 \square -2.4$ 69. $\frac{7}{2} \square 4$ 70. $|-3| \square |3|$ 2-1
Factor. 71. $4x + 10 + 8y$ 72. $10a + 15b + 5$ 1-5
Evaluate. 73. $3x^3$ for $x = 2$. 74. $5x^3$ for $x = 1$ 1-3

Subsets of the Rational Numbers

We can use the diagram on page 61 and set notation to write subsets of the rational numbers. Consider these sets:

Natural numbers or positive integers

$$N = \{1, 2, 3, \dots\}$$

Whole numbers

$$W = \{0, 1, 2, 3, \dots\}$$

Integers

$$I = \{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$$

Consider these definitions: Each number in a set is called an element or member of the set. The symbol \in is read "is an element of." We write: $-3 \in I$. Set A is a subset of set B if every element of set A is an element of set B . The symbol \subset is read "is a subset of." We write: $A \subset B$.

The following are true statements.

$N \subset W$ The natural numbers are a subset of the whole numbers.

$W \subset I$ The whole numbers are a subset of the integers.

$I \subset R$ (rational numbers) The integers are a subset of the rational numbers.

- Write at least five subset statements using the sets shown in the diagram on page 61.
- The empty set or null set, symbolized \emptyset , is a set with no elements. Is \emptyset a subset of the rational numbers?

80 Chapter 2 Integers and Rational Numbers

Exercises

55. Either m or n is negative and the other is positive.
56. Both m and n are positive or both are negative.
57. Always; for all values of a and b , $|ab| \geq 0$, $|-a| \geq 0$, and $|-b| \geq 0$. Both sides of the given equation equal $|a| \cdot |b|$.
58. $0 < x < 2$
59. $z < 0$

Mixed Review

60. -5
61. 4
62. -4
63. 0
64. 8
65. 15
66. 59
67. $<$
68. $>$
69. $<$
70. $=$
71. $2(2x + 5 + 4y)$
72. $5(2a + 3b + 1)$

73. 24

74. 5

Subsets of the Rational Numbers

- Answers may vary.
- Yes

PRACTICE/ASSESS

ON QUIZ

e.
 $2 \div -7 = -\frac{2}{7}$
 $\frac{8}{2} = 4$
 $\frac{1}{5} = 0.2$
 the reciprocal.

$\frac{3}{7} \cdot \frac{17}{13}$
 $2 \cdot \frac{1}{4.2}$
 $-18 \cdot -\frac{1}{18}$
 $\frac{3}{7} \cdot -\frac{7}{3}$
 Write each division as multiplication.

$3 \cdot \frac{1}{7}$
 $\div \frac{2}{7} \cdot \frac{1}{3} \cdot \frac{7}{2}$
 e.
 $\frac{2}{7} \div -\frac{3}{5}$
 $\frac{2}{7} \cdot -\frac{5}{3}$
 $\frac{2}{7} \cdot \frac{5}{3} = \frac{10}{21}$

Assignment Guide

To provide flexible scheduling, this lesson can be split into parts.

Core 1–15, 52–57

Extension 68, 70–71,
Terminating and Repeating
Decimals 1–9

Core 16–31

Extension 58–61, 66–67, 69, 72–73

Core 32–51

Extension 62–65

Use Mixed Review to maintain skills.



Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.

www.phschool.com

EXAMPLES Divide.

$$\begin{aligned} \mathbf{12} \quad \frac{4}{3} \div \left(-\frac{9}{7}\right) &= \frac{4}{3} \left(-\frac{7}{9}\right) \\ &= -\frac{4 \cdot 7}{3 \cdot 9} = -\frac{28}{27} \end{aligned}$$

$$\mathbf{13} \quad -27.9 \div (-3) = \frac{-27.9}{-3} = 9.3$$

Try This Divide.

v. $-\frac{3}{5} \div \left(-\frac{12}{11}\right)$ w. $-\frac{8}{5} \div \frac{2}{3}$ x. $-64.8 \div 4$ y. $78.6 \div (-3)$

2-6 Exercises

A

Divide. Check your answer.

- | | | |
|-----------------------|----------------------|-----------------------|
| 1. $36 \div (-6)$ | 2. $\frac{28}{-7}$ | 3. $\frac{-16}{8}$ |
| 4. $-22 \div (-2)$ | 5. $\frac{-48}{-12}$ | 6. $-63 \div (-9)$ |
| 7. $\frac{-50}{25}$ | 8. $-100 \div (-50)$ | 9. $\frac{-200}{8}$ |
| 10. $-108 \div 9$ | 11. $\frac{-63}{-7}$ | 12. $\frac{200}{-25}$ |
| 13. $(-300) \div (0)$ | 14. $\frac{75}{5}$ | 15. $\frac{0}{-5}$ |

Find the reciprocal. Recall that all variables represent nonzero rational numbers.

- | | | | |
|--------------------|---------------------|---------------------|----------------------|
| 16. $\frac{15}{7}$ | 17. $\frac{3}{8}$ | 18. $\frac{47}{13}$ | 19. $-\frac{31}{12}$ |
| 20. 13 | 21. -10 | 22. 0.3 | 23. -0.4 |
| 24. $1\frac{1}{2}$ | 25. $2\frac{2}{3}$ | 26. $\frac{p}{q}$ | 27. $\frac{s}{t}$ |
| 28. $\frac{1}{4y}$ | 29. $\frac{-1}{8a}$ | 30. $\frac{2a}{3b}$ | 31. $\frac{-4y}{3x}$ |

Rewrite each division as multiplication.

- | | | | |
|-------------------------|-----------------------------|----------------------|-------------------------|
| 32. $3 \div 19$ | 33. $4 \div (-9)$ | 34. $\frac{6}{-13}$ | 35. $-\frac{12}{41}$ |
| 36. $\frac{13.9}{-1.5}$ | 37. $\frac{x}{\frac{1}{y}}$ | 38. $\frac{3x+4}{5}$ | 39. $\frac{5a-b}{5a+b}$ |

Try This

- v. $\frac{11}{20}$
 w. $-\frac{12}{5}$
 x. -16.2
 y. -26.2

Exercises

1. -6
 2. -4
 3. -2
 4. 11
 5. 4
 6. 7

7. -2
 8. 2
 9. -25
 10. -12
 11. 9
 12. -8
 13. None

14. 15
 15. 0
 16. $\frac{7}{15}$
 17. $\frac{8}{3}$
 18. $\frac{13}{47}$

19. $-\frac{12}{31}$
 20. $\frac{1}{13}$
 21. $-\frac{1}{10}$
 22. $\frac{10}{3}$
 23. $-\frac{5}{2}$
 24. $\frac{2}{3}$
 25. $\frac{3}{8}$
 26. $\frac{q}{p}$
 27. $\frac{t}{s}$
 28. 4y

29. -8a
 30. $\frac{3b}{2a}$
 31. $-\frac{3x}{4y}$
 32. $3\left(\frac{1}{19}\right)$
 33. $4\left(\frac{-1}{9}\right)$
 34. $6\left(-\frac{1}{13}\right)$
 35. $-12\left(\frac{1}{41}\right)$
 36. $13.9\left(-\frac{1}{1.5}\right)$
 37. $x \cdot y$

Divide.

40. $\frac{3}{4} \div (-\frac{2}{3})$ 41. $\frac{7}{8} \div (-\frac{1}{2})$ 42. $-\frac{5}{4} \div (-\frac{3}{4})$
 43. $-\frac{5}{9} \div (-\frac{5}{6})$ 44. $-\frac{2}{7} \div (-\frac{4}{9})$ 45. $-\frac{3}{5} \div (-\frac{5}{8})$
 46. $-44.1 \div (-6.3)$ 47. $-42.3 \div 0$ 48. $0 \div -2.5$
 49. $-\frac{1}{3} \div \frac{1}{3}$ 50. $-\frac{1}{4} \div \frac{1}{2}$ 51. $-\frac{5}{6} \div \frac{3}{4}$

TEST PREP

Compare the boxed quantity in column A with the boxed quantity in column B. Choose the best answer.

- A. The quantity in column A is greater.
 B. The quantity in column B is greater.
 C. The two quantities are equal.
 D. The relationship cannot be determined with the information supplied.

| | column A | column B | | column A | column B |
|-----|------------------|-----------------|-----|-------------------|------------------|
| 52. | $\frac{20}{10}$ | $\frac{20}{5}$ | 53. | $\frac{-20}{10}$ | $\frac{-20}{5}$ |
| 54. | $\frac{20}{-10}$ | $\frac{20}{-5}$ | 55. | $\frac{-20}{-10}$ | $\frac{-20}{-5}$ |
| 56. | $\frac{x}{10}$ | $\frac{x}{5}$ | 57. | $\frac{x}{-10}$ | $\frac{x}{-5}$ |

B

Simplify.

58. $\frac{(-9)(-8) + (-3)}{25}$ 59. $\frac{-3(-9) + 7}{-4}$ 60. $\frac{(-2)^7}{(-4)^2}$ 61. $\frac{(-3)^4}{-9}$
 62. $5\frac{3}{7} \div 4\frac{2}{5}$ 63. $\frac{10}{7} \div 1\frac{3}{4}$ 64. $2\frac{2}{3} \div \frac{40}{15}$ 65. $\frac{(-4)^3}{(-8)^3}$

66. Use a calculator to find the reciprocal of -10.5 .
 67. Use a calculator to find the reciprocal of 4.2 .
 68. What should happen if you enter a number on a calculator and press the reciprocal key twice? Why?
 69. **Critical Thinking** Is it possible for a number to be its own reciprocal? Explain.

Challenge

Write a Convincing Argument Write a convincing argument or give a counterexample.

70. Is division of rational numbers commutative? That is, does $a \div b = b \div a$ for all rational numbers a and b ?
 71. Is division of rational numbers associative? That is, does $(a \div b) \div c = a \div (b \div c)$ for all rational numbers a , b , and c ?
 72. Is it possible for the additive inverse of a number to be its reciprocal?



Practice Multiple Choice

Choose the best answer.

1. What is the opposite of this product?
 $(\frac{2}{3})(-5)(-6)(\frac{4}{15})$
 A -16
 B $\frac{5}{15}$
 C 16
 D $-\frac{120}{8}$
2. What is the reciprocal of this expression?
 $(-\frac{7}{8}) \div (\frac{5}{9})$
 F $\frac{40}{63}$
 G $\frac{63}{40}$
 H $-\frac{63}{40}$
 J $-\frac{40}{63}$

1. A; Algebra 1.0, 2.0
 2. J; Algebra 1.0, 2.0

Exercises

38. $\frac{1}{5}(3x + 4)$
 39. $(5a - b)(\frac{1}{5a + b})$
 40. $-\frac{9}{8}$
 41. $-\frac{7}{4}$
 42. $\frac{5}{3}$
 43. $\frac{2}{5}$
 44. $\frac{9}{14}$
 45. $\frac{24}{25}$
 46. 7
 47. None
 48. 0
 49. -1
 50. $-\frac{1}{2}$
 51. $-\frac{10}{9}$
 52. B
 53. A
 54. A
 55. B
 56. D
 57. D
 58. $\frac{69}{25}$

59. $-\frac{17}{2}$
 60. -8
 61. -9
 62. $\frac{95}{77}$
 63. $\frac{40}{49}$
 64. 1
 65. $\frac{1}{8}$
 66. $-0.095238095238 \dots$
 67. 0.238095238
 68. You get the original number.
 69. Yes, this is true for 1 and also for -1 .

70. No, $\frac{4}{2} \neq \frac{2}{4}$.
 71. No, $(12 \div 6) \div 2 = 2 \div 2 = 1$ but $12 \div (6 \div 2) = 12 \div 3 = 4$.
 72. No. A reciprocal has the same sign the number. (Zero has no reciproc.

Math the Mathematics

ROUNDING AND REPEATING

Calculator is useful for converting fractions to decimals. If calculators are available, it should be noted that calculators round off the last digit. Decimal conversion for $\frac{3}{11}$ is shown on many calculators as 0.272727... Point out to students that this is the decimal answer and that 27 is the decimal part. (They may need a few problems without the calculator to be convinced.)

73. Are both $\frac{b}{a}$ and $\frac{1}{(\frac{a}{b})}$ reciprocals of a nonzero rational number $\frac{a}{b}$?

Mixed Review

- Simplify. 74. $6 + (-3) - 5 - (-9)$ 75. $12 - 7 - (-4) + (-2)$
 76. $9 + (11) + (-8) - 4$ 77. $8 + (-15) - 4 - (-18)$ 2-3, 2-4
 Write as an algebraic expression. 78. 5 more than t 79. twice m
 80. 36 divided among y 81. x less than 25 82. m times n 1-1
 Solve. 83. $12 = 24p$ 84. $20n = 5$ 85. $42x = 14$ 86. $3 = 6y$ 1-7

Terminating and Repeating Decimals

We have learned that a rational number can be expressed as the ratio of two integers. A rational number can also be expressed as either a **terminating decimal** or a **repeating decimal**. When we divide the integer a by the integer b in the rational number $\frac{a}{b}$, the resulting decimal will either terminate or repeat.

$$\frac{3}{8} = 0.375$$

The decimal ends or terminates in the thousandths place.

$$\frac{3}{11} = 0.272727\dots = 0.\overline{27}$$

The digits 27 repeat. We use a bar to indicate which digits repeat.

A decimal that neither terminates nor repeats, such as 2.3533533353335... names an **irrational number**.

Exercises

Write as a decimal. If the decimal repeats, use a bar for the repeating decimal part.

1. $\frac{4}{11}$ 2. $\frac{7}{20}$ 3. $\frac{23}{9}$ 4. $\frac{5}{18}$ 5. $\frac{4}{9}$ 6. $\frac{2}{13}$

To find the decimal equivalent to $\frac{1}{7}$, you can divide 1 by 7. Several steps of the long division are shown at the right. In the first three subtractions, the remainders are 1, 3, and 2.

7. Continue the long division to find a repeating pattern of remainders. How many digits are in this pattern?
 8. What repeating decimal equals $\frac{1}{7}$? How many digits repeat?
 9. **Write a Convincing Argument** What is the greatest number of digits that can repeat in the repeating decimal for $\frac{1}{17}$? Explain.

$$\begin{array}{r} 0.14 \\ 7 \overline{)1.00} \\ \underline{0} \\ 10 \\ \underline{7} \\ 30 \\ \underline{28} \\ 2 \end{array}$$

Exercises

73. Yes; $\frac{1}{(\frac{a}{b})} \cdot \frac{(\frac{b}{a})}{(\frac{b}{a})} = \frac{(\frac{b}{a})}{1} = \frac{b}{a}$

Mixed Review

74. 7
 75. 7
 76. 8
 77. 7
 78. $t + 5$
 79. $2m$
 80. $\frac{36}{y}$
 81. $25 - x$

82. mn

83. $\frac{1}{2}$
 84. $\frac{1}{4}$
 85. $\frac{1}{3}$
 86. $\frac{1}{2}$

Terminating and Repeating Decimals

1. $0.\overline{36}$
 2. 0.35
 3. $2.\overline{5}$
 4. $0.\overline{27}$
 5. $0.\overline{4}$

6. $0.\overline{153846}$

7. There are 6 numbers in the repeating pattern of remainders: 1, 3, 2, 6, 4, 5, ...
 8. $0.\overline{142857}$, 6 digits repeat
 9. For the divisor 17, the 16 possible remainders are 1, 2, ..., 16. As soon as any remainder repeats, the digits in the quotient repeat. So there can be no more than 16 digits in the quotient that repeat.

We can collect like terms by using the distributive property of multiplication over addition or subtraction to factor.

EXAMPLES Collect like terms.

13 $2k + 7k = (2 + 7)k = 9k$

14 $2x + 3y - 5x - 2y = 2x - 5x + 3y - 2y$
 $= (2 - 5)x + (3 - 2)y$ Factoring
 $= -3x + y$

15 $3x - x = (3 - 1)x = 2x$

16 $x - 0.24x = 1 \cdot x - 0.24x = (1 - 0.24)x = 0.76x$

17 $x - 6x = 1 \cdot x - 6x = (1 - 6)x = -5x$

Try This Collect like terms.

k. $6x - 3x$

l. $7y - y$

m. $m - 0.44m$

n. $5x + 4y - 2x - y$

o. $3x - 7x - 11 + 8y - 4 - 13y$

2-7 Exercises

A

Multiply.

1. $7(x - 2)$

3. $-7(y - 2)$

5. $-9(-5x - 6y + 8)$

7. $-4(x - 3y - 2z)$

9. $3.1(-1.2x + 3.2y - 1.1)$

11. $\frac{2}{3}(3a - 6b + 9)$

13. $-\frac{4}{5}\left(-\frac{1}{2}x + \frac{2}{3}y - 1\right)$

2. $5(x - 8)$

4. $-9(y - 7)$

6. $-7(-2x - 5y + 9)$

8. $8(2x - 5y - 8z)$

10. $-2.1(-4.2x - 4.3y - 2.2)$

12. $\frac{1}{2}(4c + 5d - 6)$

14. $-\frac{7}{8}\left(\frac{2}{3}x - \frac{1}{2}y - 8\right)$

Factor.

15. $8x - 24$

18. $24 - 6m$

21. $ax - 7a$

24. $cx + cy - cz$

16. $-10x - 50$

19. $8x + 10y - 22$

22. $by - 9b$

25. $\frac{3}{4}x - \frac{1}{4}y - \frac{1}{4}$

17. $32 - 4y$

20. $-9a + 6b - 15$

23. $ax - ay - az$

26. $\frac{2}{3}x - \frac{1}{3}y + \frac{1}{3}$

3. PRACTICE/ASSESS

LESSON QUIZ

Multiply.

1. $8(a - 3)8a - 24$

2. $-2(x - 7)$
 $-2x - (-2)7$
 $= -2x + 14$

3. $4(3z - 2w)12z - 8w$

4. $-7(3x - 2y - w)$
 $-21x + 14y + 7w$

Factor.

5. $7x - 21y7(x - 3y)$

6. $af - ag - ah a(f - g - h)$

Collect like terms.

7. $9x - 2x + x(9 - 2 + 1)x = 8$

8. $3a - 7b - 2a + 12b$

$3a - 2a - 7b + 12b$
 $= (3 - 2)a + (-7 + 12)b$
 $= a + 5b$

Assignment Guide

To provide flexible scheduling, lesson can be split into parts.

▼ Core 1-14

Extension 53-59

▼ Core 15-26

▼ Core 27-52

Use Mixed Review to maintain s



Extra Help On the Web

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Try This

k. $3x$

l. $6y$

m. $0.56m$

n. $3x + 3y$

o. $-4x - 5y - 15$

Exercises

1. $7x - 14$

2. $5x - 40$

3. $-7y + 14$

4. $-9y + 63$

5. $45x + 54y - 72$

6. $14x + 35y - 63$

7. $-4x + 12y + 8z$

8. $16x - 40y - 64z$

9. $-3.72x + 9.92y - 3.41$

10. $8.82x + 9.03y + 4.62$

11. $2a - 4b + 6$

12. $2c + \frac{5}{2}d - 3$

13. $\frac{2}{5}x - \frac{8}{15}y + \frac{4}{5}$

14. $-\frac{7}{12}x + \frac{7}{16}y + 7$

15. $8(x - 3)$

16. $-10(x + 5)$ or $10(-x - 5)$

17. $4(8 - y)$

18. $6(4 - m)$

19. $2(4x + 5y - 11)$

20. $-3(3a - 2b + 5)$ or
 $3(-3a + 2b - 5)$

21. $a(x - 7)$

22. $b(y - 9)$

23. $a(x - y - z)$

24. $c(x + y - z)$

25. $\frac{1}{4}(3x - y - 1)$

26. $\frac{1}{3}(2x - y + 1)$

Exercises

7. $4x, 3z$
 8. $8x, -1.4y$
 9. $7x, 8y, -9z$
 10. $8a, 10b, -18c$
 11. $12x, -13.2y, \frac{5}{8}z, -4.5$
 12. $3ab, -4cd$
 13. $-2x$
 14. $-8t$
 15. $5n$
 16. $-16y$
 17. $4x + 2y$
 18. $12y - 3z$
 19. $7x + y$
 20. $11a + 5b$
 21. $0.8x + 0.5y$
 22. $2.6a + 1.4b$

What are the terms of each expression?

27. $4x + 3z$
 28. $8x - 1.4y$
 29. $7x + 8y - 9z$
 30. $8a + 10b - 18c$
 31. $12x - 13.2y + \frac{5}{8}z - 4.5$
 32. $3ab - 4cd$
- Collect like terms.
33. $x - 3x$
 34. $9t - 17t$
 35. $6n - n$
 36. $y - 17y$
 37. $9x + 2y - 5x$
 38. $8y - 3z + 4y$
 39. $11x + 2y - 4x - y$
 40. $13a + 9b - 2a - 4b$
 41. $2.7x + 2.3y - 1.9x - 1.8y$
 42. $6.7a + 4.3b - 4.1a - 2.9b$
 43. $5y - 3x - 7y$
 44. $13m + 5m - 3n - 18m$
 45. $-8t + p + 4p - t$
 46. $q + q + q + 5p$
 47. $17a - 17b - 17c + 15a$
 48. $6m - 3.5n + 2.5m - 7n$
 49. $5.5d - 1.2a + 3d + 4.2a$
 50. $17z + 3x - 2y + y - 5z - 3x$
 51. $\frac{1}{5}x + \frac{4}{5}y + \frac{2}{5}x - \frac{1}{5}y$
 52. $\frac{7}{8}x + \frac{5}{8}y + \frac{1}{8}x - \frac{3}{8}y$

B

Write as an algebraic expression.

53. eight times the difference of x and y
 54. nine times the difference of y and z , increased by $3z$
 55. three times the sum of a and b , decreased by $7a$
 56. the total cost if you buy x cassette tapes at \$2.95 on Monday and y cassettes at the same price on Wednesday
 57. **Critical Thinking** For all rational numbers a, b , and c , does $a \cdot (b - c) = a - (b \cdot c)$? Explain.

Challenge

58. If the temperature is C degrees Celsius, it is $\frac{9}{5}C + 32$ degrees Fahrenheit. What is the Fahrenheit temperature if the Celsius temperature drops 5° ?
 59. Jill has 5420 shares of a stock that she bought at $41\frac{1}{8}$. The stock is now worth $37\frac{3}{4}$. Show two ways of determining how much she has lost. Solve.

Mixed Review

- Find the reciprocal. 60. $\frac{2}{15}$ 61. $-\frac{6}{11}$ 62. 4 63. $\frac{1}{3c}$ 2-6
 Simplify. 64. $11 - |-3| + (-9) - 16$ 65. $4x - (-9x) - x$ 1-5, 2-3, 2-4
 Calculate. 66. $\frac{4}{5}(\frac{2}{3})$ 67. $-\frac{3}{8}(\frac{1}{2})$ 68. $\frac{2}{3} \div -\frac{1}{2}$ 69. $\frac{4}{5} \div \frac{2}{3}$ 2-5, 2-6

43. $-2y - 3x$
 44. $-3n$
 45. $-9t + 5p$
 46. $3q + 5p$
 47. $32a - 17b - 17c$
 48. $8.5m - 10.5n$
 49. $8.5d + 3a$
 50. $12z - y$
 51. $\frac{3}{5}x + \frac{3}{5}y$
 52. $x + \frac{1}{4}y$
 53. $8(x - y)$
 54. $9(y - z) + 3z$ or $9y - 6z$
 55. $3(a + b) - 7a$ or $3b - 4a$

56. $2.95(x + y)$
 57. No; $1 \cdot (3 - 2) = 1$,
 $1 - (3 \cdot 2) = -5$
 58. $\frac{9}{5}(C - 5) + 32$ or $\frac{9}{5}C + 23$
 59. $5420(41\frac{1}{8} - 37\frac{3}{4})$ or
 $5420(41\frac{1}{8}) - 5420(37\frac{3}{4})$;
 $\$18,292.50$
 62. $\frac{1}{4}$
 63. $3c$
 64. -17
 65. $12x$
 66. $\frac{8}{15}$
 67. $-\frac{3}{16}$
 68. $-\frac{4}{3}$
 69. 2

Mixed Review

60. $\frac{15}{2}$
 61. $-\frac{11}{6}$

ACTICE/ASSESS

QUIZ

each additive inverse without parentheses.

$$(c + 7) - 4x - 7$$

$$6a + 3b - 7c$$

$$-3b + 7c$$

$$-(2y - 1)$$

$$-2y + 1$$

$$3y + 1$$

$$(c + 2) - (-2x - 3)$$

$$+ 2 + 2x + 3$$

$$5x + 2x + 2 + 3$$

$$3x + 5$$

$$-(5 - 3)$$

$$-2 = 1$$

$$+ 4) + 1] - (x - 5)$$

$$+ 12 + 1] - x + 5$$

$$x + 12 + 1 - x + 5$$

$$x - x + 12 + 1 + 5$$

$$x + 18$$

Assignment Guide

Provide flexible scheduling, this section can be split into parts.

Core 1-12

Extension 47

Core 13-30

Extension 41-44

Core 31-40

Extension 45-46, 48-51

Mixed Review to maintain skills.



**Extra Help
On the Web**

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www.phschool.com

EXAMPLES Simplify.

$$\begin{aligned} 12 \quad & 4(2 + 3) - \{7 - [4 - (8 + 5)]\} \\ & = 4 \cdot 5 - \{7 - [4 - 13]\} \\ & = 20 - \{7 - [-9]\} \\ & = 20 - 16 \\ & = 4 \end{aligned}$$

Working with innermost parentheses first
Computing $4 \cdot 5$ and $4 - 13$
Computing $7 - [-9]$

$$\begin{aligned} 13 \quad & [5(x + 2) - 3x] - [3(y + 2) - 7(y - 3)] \\ & = [5x + 10 - 3x] - [3y + 6 - 7y + 21] \\ & = [2x + 10] - [-4y + 27] \\ & = 2x + 10 + 4y - 27 \\ & = 2x + 4y - 17 \end{aligned}$$

Working with innermost parentheses first
Collecting like terms

Try This Simplify.

- l. $[9 - (6 + 4)]$ m. $3(4 + 2) - [7 - [4 - (6 + 5)]]$
n. $[3(4 + 2) + 2x] - [4(y + 2) - 3(y - 2)]$

2-8 Exercises

A

Rename each additive inverse without parentheses.

- | | |
|------------------------|------------------------|
| 1. $-(2x + 7)$ | 2. $-(3x + 5)$ |
| 3. $-(5x - 8)$ | 4. $-(6x - 7)$ |
| 5. $-(4a - 3b + 7c)$ | 6. $-(5x - 2y - 3z)$ |
| 7. $-(6x - 8y + 5)$ | 8. $-(8x + 3y + 9)$ |
| 9. $-(3x - 5y - 6)$ | 10. $-(6a - 4b - 7)$ |
| 11. $-(-8x - 6y - 43)$ | 12. $-(-2a + 9b - 5c)$ |

Simplify.

- | | |
|-------------------------------------|--------------------------------|
| 13. $9x - (4x + 3)$ | 14. $7y - (2y + 9)$ |
| 15. $2a - (5a - 9)$ | 16. $11n - (3n - 7)$ |
| 17. $2x + 7x - (4x + 6)$ | 18. $3a + 2a - (4a + 7)$ |
| 19. $2x - 4y - 3(7x - 2y)$ | 20. $3a - 7b - 1(4a - 3b)$ |
| 21. $15x - y - 5(3x - 2y + 5z)$ | 22. $4a - b - 4(5a - 7b + 8c)$ |
| 23. $(3x + 2y) - (5x - 4y)$ | 24. $(-6a - b) - (4b + a)$ |
| 25. $6m - n - 4m - (5n - m)$ | 26. $7p - (q + 8p) - 5p + 3q$ |
| 27. $-(7u - 8v) - (8v - 7u)$ | 28. $7m + 8n - (4n - 5m) + n$ |
| 29. $5a - 3b - (-6b + 4a) - (-b)$ | |
| 30. $-(-4x - 3y) - 6y + 3x - x - y$ | |

Try This

- l. -1
m. 4
n. $2x - y + 4$

Exercises

- | | | |
|--------------------|------------------------|----------------|
| 1. $-2x - 7$ | 9. $-3x + 5y + 6$ | 23. $-2x + 6y$ |
| 2. $-3x - 5$ | 10. $-6a + 4b + 7$ | 24. $-7a - 5b$ |
| 3. $-5x + 8$ | 11. $8x + 6y + 43$ | 25. $3m - 6n$ |
| 4. $-6x + 7$ | 12. $2a - 9b + 5c$ | 26. $-6p + 2q$ |
| 5. $-4a + 3b - 7c$ | 13. $5x - 3$ | 27. 0 |
| 6. $-5x + 2y + 3z$ | 14. $5y - 9$ | 28. $12m + 5n$ |
| 7. $-6x + 8y - 5$ | 15. $-3a + 9$ | 29. $a + 4b$ |
| 8. $-8x - 3y - 9$ | 16. $8n + 7$ | 30. $6x - 4y$ |
| | 17. $5x - 6$ | |
| | 18. $a - 7$ | |
| | 19. $-19x + 2y$ | |
| | 20. $-a - 4b$ | |
| | 21. $9y - 25z$ | |
| | 22. $-16a + 27b - 32c$ | |

Simplify.

31. $[9 - 2(5 - 4)]$ 32. $[6 - 5(8 - 4)]$
33. $8[7 - 6(4 - 2)]$ 34. $10[7 - 4(7 - 5)]$
35. $[4(9 - 6) + 11] - [14 - (6 + 4)]$
36. $[7(8 - 4) + 16] - [15 - (7 + 3)]$
37. $[10(x + 3) - 4] + [2(x - 1) + 6]$
38. $[9(x + 5) - 7] + [4(x - 12) + 9]$
39. $[7(x + 5) - 19] - [4(x - 6) + 10]$
40. $[6(x + 4) - 12] - [5(x - 8) + 11]$

B

Find an equivalent expression for each of the following by enclosing the last three terms in parentheses preceded by a minus sign.

41. $x - y - a - b$ 42. $6y + 2x + 3a + c$
43. $6m + 3n - 5m + 4b$ 44. $3q - 2p + 4q - 5$

Simplify.

45. $3a + 4 - \{-2 - [-3 - (a - 1)]\}$
46. $2s + 2 - \{-3 - [2 - (3 - s)]\}$
47. **Critical Thinking** If $-(a + b)$ is $-a + (-b)$, what should be the sum of $(a + b)$ and $-a + (-b)$? Show that your answer is correct.

Challenge

Simplify.

48. $z - [2z - [3z - (4z - 5z) - 6z] - 7z] - 8z$
49. $\{x - [f - (f - x)] + [x - f]\} - 3x$
50. $x - \{x - 1 - [x - 2 - (x - 3 - \{x - 4 - [x - 5 - (x - 6)]\})]\}$
51. A bar, or vinculum, can be used as a grouping symbol. Simplify the following.
 $\{y - [y + (3 - y)] - \overline{y + 1}\} + 5y$

Mixed Review

Factor. 52. $3x + 12y$ 53. $2a - 6b + 12$ 54. $an + 2a$ 2-7

Evaluate for $x = 3$, $y = 2$, and $z = 5$. 55. $2x^3$ 56. $-3z^2$

57. $6x + 2y^4$ 58. $2x^2 + 3z$ 59. $x + 2y - 3z$ 1-4

Calculate. 60. $\frac{2}{3} + \frac{1}{4} - (-\frac{3}{8})$ 61. $\frac{1}{2}(\frac{4}{5}) + (\frac{5}{6})(-\frac{2}{3})$ 2-3, 2-4

Collect like terms. 62. $8b + 7b + b$ 63. $x^2 + x + x^2$ 1-5

Write as an algebraic expression. 64. a number squared plus 3

65. five less than three times a number 1-1

Exercises

31. 7
32. -14
33. -40
34. -10
35. 19
36. 39
37. $12x + 30$
38. $13x - 1$
39. $3x + 30$
40. $x + 41$
41. $x - (y + a + b)$
42. $6y - (-2x + 3a - c)$
43. $6m - (-3n + 5m - 4b)$

44. $3q - (2p - 4q + 5)$
45. $2a + 4$
46. $3s + 4$
47. 0; $a + b + (-a) + (-b) =$
 $a + (-a) + b + (-b) = 0$
48. $-4z$
49. $-2x - f$
50. $x - 3$
51. $5y - 4$

Mixed Review

52. $3(x + 4y)$
53. $2(a - 3b + 6)$
54. $a(n + 2)$

55. 54
56. -75
57. 50
58. 33
59. -8
60. $\frac{31}{24}$
61. $-\frac{7}{45}$
62. $16b$
63. $2x^2 + x$
64. $x^2 + 3$
65. $3x - 5$

Try This

h. Complete the following proof by supplying the missing reasons.

| Statement | Reason |
|------------------------------------|-------------------------------------|
| 1. $a(b + c + d) = a[(b + c) + d]$ | 1. Associative property of addition |
| 2. $= a(b + c) + ad$ | 2. |
| 3. $= ab + ac + ad$ | 3. |
| 4. $a(b + c + d) = ab + ac + ad$ | 4. Transitive property of equality |

The next theorem was stated on page 78 as the multiplication property of zero.

Theorem

For any rational number a , $a \cdot 0 = 0$.

Try This

i. Complete the following proof by supplying the missing reasons.

| | |
|-------------------------------------|------------------------------------|
| 1. $a \cdot 0 = a \cdot 0 + 0$ | 1. Additive identity |
| 2. $= a \cdot 0 + a + (-a)$ | 2. Additive inverse |
| 3. $= a \cdot 0 + a \cdot 1 + (-a)$ | 3. Multiplicative identity |
| 4. $= a(0 + 1) + (-a)$ | 4. |
| 5. $= a \cdot 1 + (-a)$ | 5. Additive identity |
| 6. $= a + (-a)$ | 6. |
| 7. $= 0$ | 7. |
| 8. $a \cdot 0 = 0$ | 8. Transitive property of equality |

2-10 Exercises

A

Which axiom guarantees each statement?

- | | |
|-----------------------------|--------------------------------|
| 1. $a + b = b + a$ | 2. $(a + b) + c = c + (a + b)$ |
| 3. $x(y + z) = xy + xz$ | 4. $3(b + c) = 3b + 3c$ |
| 5. $y + [x + (-x)] = y + 0$ | 6. $3x(x + 2) = 3x^2 + 6x$ |
| 7. $-(x - 3) = -x + 3$ | 8. $6x - 3y = 3(2x - y)$ |

Which axiom or property guarantees the truth of each statement?

- | | |
|---|---------------------------------------|
| 9. $(a \cdot b)c = a(b \cdot c)$ | 10. $(a + b) \cdot 1 = a + b$ |
| 11. $17(2b + 1) = 34b + 17$ | 12. $(2a + 3b) + 19 = 19 + (3b + 2a)$ |
| 13. $\frac{1}{x} \cdot \frac{1}{y} \cdot (x + y) = 1$ | 14. $-(a + b) + (a + b) = 0$ |

2-10 Number Properties and Proofs 105

Try This

- h. 2. Distributive property
3. Distributive property
i. 4. Distributive property
6. Multiplicative identity
7. Additive inverses

Exercises

1. Commutative property of addition
2. Commutative property of addition
3. Distributive property of multiplication over addition

4. Distributive property of multiplication over addition
5. Additive inverses
6. Distributive property of multiplication over addition
7. Additive inverses
8. Distributive property of multiplication over subtraction
9. Associative property of multiplication
10. Multiplicative identity
11. Distributive property of multiplication over addition
12. Commutative property of addition
13. Multiplicative inverse
14. Additive inverse

3. PRACTICE/ASSESS

LESSON QUIZ

Which axioms, properties, or definitions guarantee that these are true?

- $3(x + a) = 3x + 3a$
Distributive property
- $7 + (3 + x) = (7 + 3) + x$
Associative for addition
- $(x + 3) \cdot \frac{1}{x + 3} = 1$
Inverse for multiplication
- $u(vw) = (uv)w$
Associative for multiplication
- $(ax - 2) + [-(ax - 2)] = 0$
Inverse for addition
- $x - 7 = x - 7$
Reflexive property of equality
- $x = a$ and $a = 3$, thus $x = 3$
Transitive property of equality
- $-1 \cdot a + (a + (-a)) = (-1 \cdot a + a) + (-a)$
Associative for addition
- $2y + u = 7x + 3$, therefore $7x + 3 = 2y + u$
Symmetric property of equality
- $x - y = x + (-y)$
Definition of subtraction

Assignment Guide

To provide flexible scheduling, this lesson can be split into parts.

- ▼ Core 1-8
- ▼ Core 9-22
- ▼ Core 23-25
Extension 26, 27

Use Mixed Review to maintain skills.



Extra Help On the Web

Look for worked-out examples at the Prentice Hall Web site.

www.phschool.com



Practice Multiple Choice

Choose the best answer.

1. Which property guarantees the truth of this statement?
 $-3(7x + 5y - 4)$
 $= -21x - 15y + 12$

- A Closure property of addition
 B Identity property of multiplication
 C Distributive property
 D Associative property of multiplication

2. Which operation should be done first to simplify this expression?
 $123 - [18 - (14 + 7)]$

- F $232 - 18$
 G $14 + 7$
 H $18 - 7$
 J $18 - 14$

Which axiom or property guarantees the truth of each statement?

15. $3x(y + z) = 3x(y + z)$ 16. $\frac{1}{x} \cdot x = 1$. Thus $1 = \frac{1}{x} \cdot x$
 17. $4ab = 4ab$ 18. $5(a + b) = (a + b)5$

Are the sets closed for addition, subtraction, multiplication, and division (except by 0)? If not, give counterexamples.

19. whole numbers 20. rational numbers 21. integers

Complete the following proof by supplying the missing reasons.

22. Property of -1 . For any number a , $-1 \cdot a = -a$.

- | | |
|--|------------------------------------|
| 1. $-1 \cdot a = -1 \cdot a + 0$ | 1. |
| 2. $= -1 \cdot a + (a + (-a))$ | 2. Additive inverse |
| 3. $= (-1 \cdot a + a) + (-a)$ | 3. |
| 4. $= (-1 \cdot a + 1 \cdot a) + (-a)$ | 4. Multiplicative identity |
| 5. $= (-1 + 1) \cdot a + (-a)$ | 5. |
| 6. $= 0 \cdot a + (-a)$ | 6. Additive inverse |
| 7. $= 0 + -a$ | 7. |
| 8. $= -a$ | 8. |
| 9. $-1 \cdot a = -a$ | 9. Transitive property of equality |

B
Write a Convincing Argument Write a convincing argument or give a counterexample.

23. The set of whole numbers is *closed* for addition. The set of even numbers $\{0, 2, 4, 6, 8, 10, \dots\}$ consists of numbers of the form $2a$ where a is a whole number. Is the set of even numbers closed for addition?
 24. Is the set of odd whole numbers $\{1, 3, 5, 7, 9, \dots\}$ closed for addition?
 25. The set of whole numbers is closed for multiplication. The set $\{0, 3, 6, 9, 12, \dots\}$ consists of numbers of the form $3a$ where a is a whole number. Is this set closed for multiplication?

Challenge

26. Prove that for any rational numbers a and b , $(-a)b = -ab$.
 27. Prove the inverse of a sum property: For any rational numbers a and b , $-(a + b) = -a + (-b)$. (Hint: Use the property of -1 and the distributive property).

Mixed Review

- Write an equation. 28. A roll of film costs \$4.80 and developing costs \$8.35. What is the total cost for each of the 36 prints? $2 \cdot 9$
 Factor. 29. $16a - 48$ 30. $8y - 10 + 12x$ 31. $45 - 15n$ $2 \cdot 7$
 Collect like terms. 32. $6a + 9c - 8a$ 33. $7 + 8c - 25c + 2$ $1 \cdot 5$

1. C; Algebra 1.0, 1.1
 2. G; Algebra 1.0

| 26. Statement | Reason |
|---------------------------------|--|
| 1. $(-a)b$ $= (-1 \cdot a)b$ | Property of -1 |
| 2. $= -1(ab)$ | Associative property of multiplication |
| 3. $= -ab$ | Property of -1 |
| 4. $(-a)b$ $= -ab$ | Transitive property of equality |

| 27. Statement | Reason |
|--------------------------------|---------------------------------|
| 1. $-(a + b)$ $= -1(a + b)$ | Property of -1 |
| 2. $= -1(a) + -1(b)$ | Distributive property |
| 3. $= -a + (-b)$ | Property of -1 |
| 4. $-(a + b)$ $= -a + (-b)$ | Transitive property of equality |

Mixed Review

28. $c = \frac{4.80 + 8.35}{36}$
 29. $16(a - 3)$
 30. $2(4y - 5 + 6x)$
 31. $15(3 - n)$
 32. $9c - 2a$
 33. $9 - 17c$

2

Chapter Wrap Up

2-1

The set of **integers** consists of the **positive integers**, the **negative integers**, and zero. Numbers that are the same distance from 0, but on opposite sides of 0 on the number line, are called **opposites**. For any two numbers on the number line, the one farther to the right is greater. The **absolute value** of a number is its distance from 0 on the number line.

Name the integer suggested by each situation.

1. Tanya's mom owes \$25.
2. Keiko deposited \$50 in her savings account.

Find the absolute value.

3. $|-38|$
4. $|91|$
5. $|-0.02|$

2-2

A **rational number** can be expressed as the ratio of two integers, $\frac{a}{b}$, where $b \neq 0$. There is a point on the number line for every rational number. The number is called the **coordinate** of the point, and the point is the **graph** of the number.

Graph each rational number on a number line.

6. -2.5
7. $\frac{4}{3}$
8. $-\frac{16}{5}$

Use $<$ or $>$ to write a true sentence.

9. $-2.5 \square -4.5$
10. $-\frac{2}{3} \square -\frac{1}{10}$
11. $-\frac{1}{2} \square \frac{3}{5}$

Show that each number can be written as the ratio of two integers.

12. -4.2
13. $1\frac{3}{5}$
14. -8

2-3

To add two positive numbers or two negative numbers, add the absolute values; the sum has the same sign as each addend. To add a positive number and a negative number, subtract the absolute values; the sum has the same sign as the addend with the greater absolute value. Number pairs whose sum is 0 are called **additive inverses**.

Add.

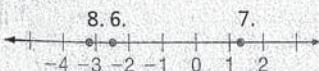
15. $-6 + (-13)$
16. $\frac{3}{4} + (-\frac{9}{4})$
17. $-3.9 + 7.4$
18. $6 + (-9) + (-8) + 7$
19. $-3.8 + 5.1 + (-12) - (-4.3)$

Key Terms

absolute value (p. 56)
 additive inverse (p. 66)
 axiom (p. 102)
 braces (p. 95)
 brackets (p. 95)
 closed (p. 103)
 coordinate (p. 59)
 density property (p. 62)
 difference (p. 71)
 distributive properties (p. 89)
 field (p. 102)
 field axioms (p. 102)
 graph of a number (p. 59)
 inequality (p. 55)
 integers (p. 54)
 inverse of a sum property (p. 94)
 irrational number (p. 86)
 multiplicative inverse (p. 82)
 multiplicative property of zero (p. 78)
 negative integers (p. 54)
 opposites (p. 54)
 parentheses (p. 95)
 positive integers (p. 54)
 property of -1 (p. 93)
 property of additive inverses (p. 66)
 property of multiplicative inverses (p. 82)
 quotient (p. 81)
 rational numbers (p. 59)
 real numbers (p. 61)
 reciprocal (p. 82)
 repeating decimal (p. 86)
 terminating decimal (p. 86)
 theorem (p. 102)

Chapter 2 Wrap Up

1. -25
2. $+50$
3. 38
4. 91
5. 0.02



9. $>$
10. $<$
11. $<$
12. $-\frac{42}{10}$

13. $\frac{8}{5}$
14. $-\frac{8}{1}$
15. -19
16. $-\frac{6}{4}$ or $-\frac{3}{2}$
17. 3.5
18. -4
19. -6.4



Internet Activity On the Web

Look for extension problems for this chapter at the Prentice Hall Web site. www.phschool.com

Find the additive inverse of each.

20. 27

21. -7.45

22. $-\frac{7}{3}$

23. Find $-x$ when x is -34 .

24. Find $-(-x)$ when x is 5.

25. On a first, second, and third down a football team had these gains and losses: a 5-yd gain, a 12-yd loss, and a 15-yd gain. Find the total number of yards gained or lost.

2-4

To subtract a rational number, add its inverse. When addition and subtraction occur several times, use the rule for subtracting rational numbers to make them all additions.

Subtract.

26. $5 - 7$

27. $-7 - (-3)$

28. $-\frac{9}{10} - \frac{1}{2}$

Simplify.

29. $13 - 4 + 8 - (-2)$

30. $4y - 19 - (-7y) + 3$

31. An airplane is 2500 ft above the rim of the Grand Canyon at a point where the Grand Canyon is 1500 ft deep. How high is the plane above the floor of the canyon?

32. Mr. Jones had a balance of \$89.00 in his checking account. He wrote a check for \$105.95. By how much has he overdrawn his checking account?

2-5

When you multiply a positive number and a negative number, the product is negative. When you multiply two negative numbers or two positive numbers, the product is positive. The product of 0 and a rational number is 0.

Multiply.

33. $6(-4)$

34. $\frac{2}{3}(-\frac{3}{7})$

35. $3(-7)(-2)(5)$

2-6

When you divide a positive number by a negative number or a negative number by a positive number, the quotient is negative. When you divide two negative numbers, the quotient is positive. Two numbers are **multiplicative inverses** or **reciprocals** if their product is 1. To divide by a rational number, multiply by its reciprocal.

Divide.

36. $21 \div (-7)$

37. $\frac{-45}{-9}$

38. $-\frac{7}{8} \div \frac{5}{4}$

Chapter 2 Wrap Up

20. -27

21. 7.45

22. $\frac{7}{3}$

23. 34

24. 5

25. 8 yd gain

26. -2

27. -4

28. $-\frac{14}{10}$ or $-\frac{7}{5}$

29. 19

30. $11y - 16$

31. 4000 ft

32. \$16.95

33. -24

34. $-\frac{2}{7}$

35. 210

36. -3

37. 5

38. $-\frac{7}{10}$

2-7

The **distributive property of multiplication over subtraction** is used to multiply and factor algebraic expressions and to collect like terms.

Multiply.

39. $2(6x - 1)$ 40. $-7(1 + 4x)$ 41. $-3(2a - 3b + c)$

Factor.

42. $9a - 9$ 43. $8x - 32y - 8$ 44. $42z - 21x + 7$

Collect like terms.

45. $5x + 3x - x$ 46. $5a - 3a$ 47. $8m - 6m + 6$

2-8

The property of -1 states that $-1 \cdot a = -a$. The property of -1 and the distributive property allow us to rename the inverse of a sum as the sum of the inverses, $-(a + b) = -a + -b$.

Rename each additive inverse without parentheses.

48. $-(x + 7)$ 49. $-(7a + 12b + c)$ 50. $-(6 - z)$

When an expression contains more than one grouping symbol, you must do the computation in the innermost grouping symbols first.

Simplify.

51. $3a - (8a + 3)$ 52. $7x - 5 - (10x - 4)$
53. $a - 5(a + b)$ 54. $3p - 4(8p - 3)$

Simplify.

55. $[12 - (8 + 3)]$ 56. $15 - [9 - (11 + 4)]$

2-9

Write an equation is a powerful strategy for many of the problems you will encounter while studying algebra. You should use the Problem-Solving Guideline, Develop and carry out a PLAN, when you need to write an equation.

Which equation(s) can be used to solve the problem?

57. A dozen roses cost \$30. How much does each rose cost?

Let r = the cost of one rose.

(A) $\frac{30}{12} = r$ (B) $30 - r = 12$ (C) $12r = 30$

Write an equation that could be used to solve the problem.

58. A professional baseball player made \$1,289,196 for the 1999 baseball season. His team played 162 games in the season. How much did the player make per game?

Chapter 2 Wrap Up

39. $12x - 2$
40. $-7 - 28x$
41. $-6a + 9b - 3c$
42. $9(a - 1)$
43. $8(x - 4y - 1)$
44. $7(6z - 3x + 1)$
45. $7x$
46. $2a$
47. $2m + 6$
48. $-x - 7$
49. $-7a - 12b - c$
50. $-6 + z$
51. $-5a - 3$
52. $-3x - 1$
53. $-4a - 5b$
54. $-29p + 12$
55. 1
56. 21
57. (A) or (C)
58. $162a = 1,289,170$

2 Chapter Assessment

Assessment Item Analysis

| Item | Lesson |
|------|--------|
| 4 | 2-1 |
| 10 | 2-2 |
| -16 | 2-3 |
| -23 | 2-4 |
| -26 | 2-5 |
| -35 | 2-6 |
| -44 | 2-7 |
| -52 | 2-8 |
| -55 | 2-9 |

Name the integer suggested by each situation.

- Ed lost 16 points in a card game.
- The highest points on the Grand Canyon are 9000 ft above sea level.

Find the absolute value.

- $|6.5|$
- $|-105.5|$

Graph each rational number on a number line.

- $\frac{9}{2}$
- -2.5

Use $>$ or $<$ to write a true sentence.

- $-3.2 \square 1.2$
- $-\frac{3}{4} \square -\frac{5}{8}$

Show that each number can be written as the ratio of two integers.

- -3.5
- $2\frac{1}{3}$

Add.

- $3.1 + (-4.7)$
- $-\frac{3}{5} + (-\frac{4}{5})$
- $-8 + 4 + (-7) + 3$

Find the additive inverse of each.

- $\frac{2}{3}$
- -1.4

- Wendy had \$43 in her savings account. She withdrew \$25. Then she made a deposit of \$30. How much money does she have in her savings account now?

Subtract.

- $\frac{1}{3} - \frac{2}{3}$
- $2 - (-8)$
- $3.2 - 5.7$

Simplify.

- $6 + 7 - 4 - (-3)$
- $3y + 16 - (-4y) + 7$
- On a winter night the temperature dropped from 5°C to -7°C . How many degrees did the temperature drop?
- Your total assets are \$170. You borrow \$300 to go on vacation. What is your net worth now?

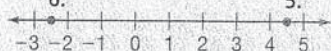
Multiply.

- $4(-12)$
- $(-\frac{1}{2})(-\frac{3}{8})$
- $5(-4)(-6)(2)$

110 Chapter 2 Integers and Rational Numbers

Chapter 2 Assessment

- 16
- +9000
- 6.5
- 105.5
- 6.
- $<$
- $<$
- $-\frac{35}{10}$
- $\frac{7}{3}$
- 1.6



- $-\frac{7}{5}$
- 8
- $-\frac{2}{3}$
- 1.4
- \$48
- $-\frac{1}{3}$
- 10
- 2.5
- 12
- $7y + 23$
- 12°
- \$130
- 48
- $\frac{3}{16}$
- 240

Divide.

27. $-35 \div 7$

28. $\frac{-54}{-9}$

29. $\frac{-125}{25}$

Find the reciprocal.

30. $-\frac{8}{7}$

31. $-\frac{24}{7}$

32. $3y$

Divide.

33. $\frac{4}{9} \div \left(\frac{-7}{3}\right)$

34. $\frac{-15}{\frac{1}{x}}$

35. $\frac{-3}{5} \div \left(-\frac{5}{6}\right)$

Multiply.

36. $-7(x + 3)$

37. $\left(\frac{5}{3}\right)(x - 2y + z)$

38. $-7(-3a - 2b - 8)$

Factor.

39. $4x - 12$

40. $4a + 12b - 16$

41. $\frac{2x}{3} - \frac{y}{3}$

Collect like terms.

42. $-5x - 6x + 4x$

43. $q + t - 2t + q$

44. $4m - m + 3$

Multiply.

45. $(-1)(-21)$

46. $-1 \cdot 17$

Rename each additive inverse without parentheses.

47. $-(y - 8)$

48. $-(2a + 5b - c)$

Simplify.

49. $5n - (2n + m)$

50. $4x - 3(y + 2x)$

51. $50 - [12 - (16 + 5)]$

52. $6(9 - 4) - [10 - (6 + 8)]$

Which equation(s) can be used to solve the problem?

53. Saturnina got a 92 on the Chapter 2 test. That was 9 more points than she got on the Chapter 1 test. What was her score on the Chapter 1 test?

(A) $n - 92 = 9$

(B) $n = 92 + 9$

(C) $n + 9 = 92$

Write an equation that can be used to solve the problem.

54. A museum took in \$3456 from 576 patrons. What was the price of admission to the museum?

55. Marta rode her bike 57 miles in two days. She rode 31 miles the first day. How far did she ride the second day?

Chapter 2 Assessment

27. -5

28. 6

29. -5

30. $-\frac{7}{8}$

31. $-\frac{7}{24}$

32. $\frac{1}{3y}$

33. $-\frac{4}{21}$

34. $-15x$

35. $\frac{18}{25}$

36. $-7x - 21$

37. $\frac{5}{3}x - \frac{10}{3}y + \frac{5}{3}z$

38. $21a + 14b + 56$

39. $4(x - 3)$

40. $4(a + 3b - 4)$

41. $\frac{1}{3}(2x - y)$

42. $-7x$

43. $2q - t$

44. $3m + 3$

45. 21

46. -17

47. $-y + 8$

48. $-2a - 5b + c$

49. $3n - m$

50. $-2x - 3y$

51. 59

52. 34

53. C

54. $576p = 3456$ or $p = \frac{3456}{576}$

55. $d + 31 = 57$ or $d = 57 - 31$