Chapter 2

2.1 Skill Practice **1.** real numbers **3.** 2 **5.** -3 **7.** 14
9. ± 50 **11.** -15 **13.** ± 13 **15.** 3 **17.** -2 **19.** -9
21. 14 **25.** $-\sqrt{12}$: real number, irrational number,
-3.7: real number, rational number, $\sqrt{9}$: real number,
rational number, integer, whole number, 2.9:
real number, rational number; $-3.7, -\sqrt{12}, 2.9, \sqrt{9}$
27. $\sqrt{8}$: real number, irrational number, $-\frac{2}{5}$: real
number, rational number, -1: real number,
rational number, integer, 0.6: real number, rational
number, $\sqrt{6}$: real number, irrational number; -1,
$-\frac{2}{5}, 0.6, \sqrt{6}, \sqrt{8}$ **29.** -8.3: real number, rational
number, $-\sqrt{80}$: real number, irrational number, $-\frac{17}{2}$:
real number, rational number, -8.25: real number,
rational number, $-\sqrt{100}$: real number, rational
number, integer; $-\sqrt{100}, -\sqrt{80}, -\frac{17}{2}, -8.3, -8.25$
31. If a number is a real number, then it is an
irrational number; false. *Sample answer:* 3 is a real
number and a rational number. **33.** If a number is
an irrational number, then it is not a whole number;
true. **35.** 2 **37.** -42 **39.** 63 **41.** B

2.1 Problem Solving **45.** 60 in. **47.** 35 ft **49.** 2.2
ft **51. a.** 144 tiles **b.** 16 ft. *Sample answer:* If the
homeowner can buy 144 tiles that
are each 256 square inches, then the total area is
(144 tiles)(256 square inches per tile) = 36,864 square
inches. Divide 36,864 square inches by 144 square
inches to find the number of square feet, 256 square
feet. If the area of the square is 256 square feet, take
the square root of 256 to find the side length, 16 feet.

Extension **1.** Let x and y be two rational numbers.
By definition $x = \frac{a}{b}$ and $y = \frac{c}{d}$ where a, b, c, and d are
integers with $b \neq 0$ and $d \neq 0$; $xy = \frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$.
Because the set of integers is closed under the
operation of multiplication, the expressions ac and
bd are both integers. Therefore, the product xy is
equal to the ratio of two integers. So by definition,
this product is a rational number. **3.** Let x be a
rational number and y be an irrational number.
By definition, $x = \frac{a}{b}$ where a and b are integers with
$b \neq 0$. Now assume that the sum $x + y$ is a rational
number. Therefore $x + y$ can be written as the
quotient of integers c and d with $d \neq 0$;
$x + y = \frac{c}{d}; \frac{a}{b} + y = \frac{c}{d}; \frac{a}{b} + y - \frac{a}{b} = \frac{c}{d} - \frac{a}{b}; y = \frac{bc - ad}{bd}$.
Because the set of integers is closed under the
operations of subtraction and multiplication,
the expression $bc - ad$ is an integer. So by

definition $\frac{bc - ad}{bd}$ is a rational number, which
means that y must be rational. But y is an irrational
number, meaning the assumption that $x + y$
is rational must be false. Therefore, $x + y$ is an
irrational number.

2.2 Skill Practice **1.** inverse operations **3.** 3 **5.** 5
7. -3 **9.** 7 **11.** 17 **13.** 4 **17.** 4 **19.** 6 **21.** -15
23. 15 **25.** 48 **27.** 22 **29.** The student multiplied x
by 100 to produce a number with a decimal part
identical to the decimal part of x. When the student
subtracted, the result was a whole number.
35. -2.05 **37.** $\frac{5}{8}$ **39.** 0.06 **41.** 96 **43.** 12 **45.** -56
47. $\frac{3}{5}$ **49.** $54 = 12x$; 4.5 in.

2.2 Problem Solving **53.** 1046.6 ft **55.** 11 ft
57. a. $\frac{4}{7}x = 200$ **b.** Plants; if you solve the
equation in part (a) you find that there are
350 species of birds.
59. a.

t	d
1	6.5
2	13
3	19.5
4	26
5	32.5

b.
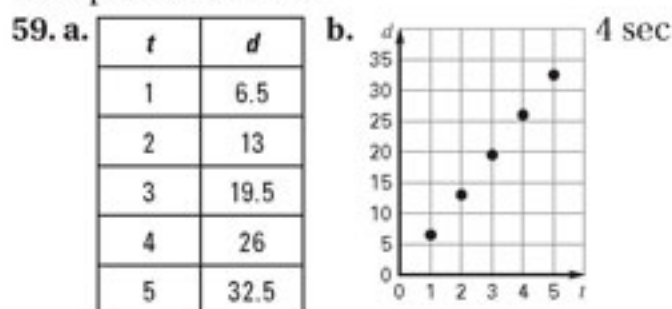
4 sec

c. $26 = 6.5t$; 4 sec **61. a.** 171 hits **b.** 215 hits **c.** No; if
Mueller had fewer hits than Wells but had a higher
batting average, he must have had fewer at bats
than Wells.

2.3 Skill Practice **1.** like terms **3.** 4 **5.** 2 **7.** -3
9. 6 **11.** 40 **13.** 18 **15.** 4 **17.** 9 **19.** -4
23. The division of $-2x + x$ by -2 is done incorrectly.
Sample answer: If like terms are combined as the first
step, the second line would be $-x = 10$ and the final
result would be $x = -10$. **25.** $y = 2x + 4$; -7 **27.** 4
29. 5 **31.** 0.5 **33.** 15.9 **35.** 6.9

2.3 Problem Solving **37.** 28 classes **39.** 5 half-side
advertisements **41.** Yes; the equation $\$542 = \$50 +$
$6x$ gives the monthly cost of a guitar that costs $542.
Solving the equation gives $x = \$82$ per month, so you
can afford the guitar. **43. a.** $y = 12x$
b.

x (hours)	Marissa	Ryan	Total
1	5	7	12
2	10	14	24
3	15	21	36
4	20	28	48
5	25	35	60

c.

about 4.5 h
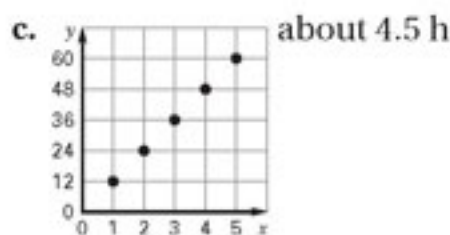
2.3 Problem Solving Workshop
1. 7 players **3.** 4 chairs

2.4 Skill Practice **1.** $\frac{5}{3}$ **3.** 3 **5.** 6 **7.** -2 **9.** -8
11. -8 **13.** 4 **15.** -9 **17.** -19 **19.** 12 **21.** -2
23. -9 **25.** -3 times -6 is 18, not -18; $5x - 3x + 18 = 2$, $2x + 18 = 2$, $2x = -16$, $x = -8$. **27.** 2 **29.** 3 **31.** -5
33. 2 **35.** 9.5 in., 6 in.; if you use the perimeter formula $P = 2\ell + 2w$ and substitute $3.5 + w$ for ℓ, the solution is $w = 6$.

2.4 Problem Solving **39.** 0.75 ft **41. a.** 34 mo **b.** 307 ft
per mo **c.** After the work crews merged; before the work crews merged they were working at a rate of $115 + 137 = 252$ feet per month, and after merging at a rate of 307 feet per month.

2.5 Skill Practice **1.** identity **3.** -2 **5.** -4 **7.** -7 **9.** 8
11. -4 **13.** -3 **17.** *Sample answer:* Distribute the 3 to get $6z - 15 = 2z + 13$, then subtract $2z$ from each side to get $4z - 15 = 13$, next add 15 to each side to get $4z = 28$, finally divide each side by 4 to get $z = 7$. **19.** 2 **21.** -7 **23.** no solution **25.** no solution
27. The 3 was not distributed to both terms; $3x + 15 = 3x + 15$, $15 = 15$, so the equation is an identity.
29. *Sample answer:* $5x + 4 = 5x$; the number $5x$ cannot be equal to 4 more than itself. **31.** 2 **33.** -4
35. 6 **37.** identity **39.** 2 **41.** 10 **43.** identity **45.** 60

2.5 Problem Solving **49.** 9 nights **51.** about 4 yr
53. a. $23.4t = 24(t - 0.3)$; 12 sec **b.** about 4.4 sec
c. No; it would take 12 seconds for the sheepdog to catch up to the collie and it only takes 4.4 seconds for the collie to complete the last leg.

2.5 Spreadsheet Activity **1.** 2 **3.** 4

Extension **1.** Subt. Prop. of Equality; Add. Prop. of
Equality; Div. Prop. of Equality **3.** $5x - 10 = -40$ (Given); $5x = -30$ (Add. Prop. of Equality); $x = -6$ (Div. Prop. of Equality) **5.** $5 - x = 17$ (Given); $-x = 12$ (Subt. Prop. of Equality); $x = -12$ (Div. Prop. of Equality) **7.** $19 - 2x = -17$ (Given); $-2x = -36$ (Subt. Prop. of Equality); $x = 18$ (Div. Prop. of Equality)
9. $5(3x - 20) = -10$ (Given); $15x - 100 = -10$ (Dist. Prop.); $15x = 90$ (Add. Prop. of Equality); $x = 6$ (Div. Prop. of Equality) **11.** $2(-x - 5) = 12$ (Given); $-2x - 10 = 12$ (Dist. Prop.); $-2x = 22$ (Add. Prop. of

Equality); $x = -11$ (Div. Prop. of Equality) **13.** $13 - x = -2(x + 3)$ (Given); $13 - x = -2x - 6$ (Dist. Prop.); $13 + x = -6$ (Add. Prop. of Equality); $x = -19$ (Subt. Prop. of Equality) **15.** In the initial step, x should have been subtracted from each side, not added. The second line should be $6x = 24$ and its reason should be the Subtraction Property of Equality. The third line should then begin with $x = 4$.

2.6 Skill Practice **1.** ratios **3.** no; 7 to 9
5. yes **7.** $\frac{6}{5}$ **9.** 22 **11.** 48 **13.** 15 **15.** 40 **17.** 12
21. Multiply each side by 6, not $\frac{1}{6}$; $6 \cdot \frac{3}{4} = 6 \cdot \frac{x}{6}$, $4\frac{1}{2} = x$. **23.** $\frac{3}{8} = \frac{x}{32}$; 12 **25.** $\frac{x}{4} = \frac{8}{16}$; 2 **27.** $\frac{b}{10} = \frac{7}{2}$; 35
29. $\frac{12}{18} = \frac{d}{27}$; 18 **31.** 1.8 **33.** 2.4 **35.** 4 **37.** 4 **39.** 2
41. 3.5 **43.** Yes. *Sample answer:* $\frac{3}{6} = \frac{4}{8}$

2.6 Problem Solving **45.** $\frac{2}{145}$ **47.** $\frac{2}{5}$ **49.** $\frac{1}{2}$
51. 45 goals **53. a.** $\frac{10}{23}$ **b.** 110 lift tickets
c. 40 snowboarders

2.7 Skill Practice **1.** cross product **3.** 6 **5.** 24 **7.** 1
9. -49 **11.** 2 **13.** 12 **17.** Use the cross products property to multiply 4 by x and 16 by 3; $4 \cdot x = 3 \cdot 16$, $4x = 48$, $x = 12$. **19.** 15 **21.** 10 **23.** 5.5 **25.** -3.4
27. 4.2 **29.** -5.9 **31. a.** Multiplication property of equality **b.** Multiply **c.** Simplify

2.7 Problem Solving **33.** 5 c **35.** 90 km **37.** 7.5 km
39. 17.728 m **41.** 80 yd; find the actual length of the field by using the ratio 1 in. : 20 yd, then use that number to find the width of the soccer field by using the ratio 3 : 2.

2.8 Skill Practice **1.** literal equation **3.** $x = \frac{c}{b - a}$; -2
5. $x = bc - a$; 9 **7.** $x = a(c - b)$; 28 **9.** b should have been subtracted from both sides, not added; $ax = -b$, $x = -\frac{b}{a}$. **11.** $y = 7 - 2x$ **13.** $4 - 3x = y$
15. $2 + \frac{6}{7}x = y$ **17.** $\frac{9}{5}x - 6 = y$ **19.** $y = \frac{1}{2}x + \frac{1}{3}$
21. $h = \frac{S - 2B}{P}$ **25.** $y = 18 - 5x$ **27.** $\ell = \frac{S}{\pi r} - r$;
13.03 cm **29.** *Sample answer:* You
want to find how long it will take to drive 150 miles if you drive at an average rate of 55 miles per hour.

2.8 Problem Solving **33. a.** $x = \frac{C - 25}{12}$
b. 10 nights; 13 nights; 15 nights **35.** Divide each side by the total bill, b, to get $\frac{a}{b} = p\%$.

Selected Answers

Chapter Review 1. scale drawing **3.** If you collect like terms you get $10x = 10x$, so any value of x will make it true. **5.** Subtract $6x$ from each side, then divide each side by -2 **7.** -6 **9.** ± 15 **11.** -7
13. 17 **15.** $-\sqrt{4}, -0.3, 0, 1.25, \sqrt{11}$ **17.** 13 **19.** -15
21. -36 **23.** 2 **25.** 18 **27.** 5 **29.** 2 **31.** -6 **33.** 14 **35.** 1
37. -4 **39.** 1 **41.** -4 **43.** -5 **45.** identity **47.** 7
49. 26 **51.** 15 **53.** 2.5 gal **55.** 2.5 **57.** -4 **59.** -13
61. $y = \dfrac{-x}{7}$ **63.** $y = \dfrac{1}{5}x + 4$

Chapter 2
Extra Practice

1. -6 **3.** 80 **5.** 12 **7.** -13 **9.** 16 **11.** -12 **13.** 9

15. 52 **17.** 6 **19.** 8 **21.** -35 **23.** 3 **25.** -6 **27.** -1

29. 2 **31.** 3 **33.** $-\dfrac{1}{2}$ **35.** 56 **37.** 16 **39.** $\dfrac{5}{7} = \dfrac{15}{x}$; 21

41. $\dfrac{g}{9} = \dfrac{16}{12}$; 12 **43.** 14 **45.** 8 **47.** 4 **49.** -2

51. $x = \dfrac{c + b}{a}$; 5 **53.** $y = -5x + 10$ **55.** $y = -4x + 2$