Chapter 2: Expressions and Equations

Terminology for the Four Operations, p. 40

1.

numbers	sum	difference	product	quotient
a. 50 and 2	52	48	100	25
b. 5 and 3	8	2	15	5/3 or 1 2/3

2.

numbers/letters	sum	difference	product	quotient
a. x and 6	$x + 6$	$x - 6$	$6x$	$\dfrac{x}{6}$
b. z and w	$z + w$	$z - w$	wz	$\dfrac{z}{w}$

Notice that when variables are multiplied, they are written in alphabetical order. That is why the product of z and w is best written as wz; however zw is acceptable since this has not been taught at this point. See page 55 in the text.

3.
a. the product of 5 and T $5 - T$ 29   **e.** the difference of T and 5

b. the quotient of 5 and T $T - 5$ $\dfrac{T}{5}$ **f.** the sum of T and 5

c. the product of 6 and 5   30   5T   **g.** the sum of 5, 15, and 9

d. the quotient of T and 5 $5 \div T$ $T + 5$ **h.** the difference of 5 and T

4.

Statement	Equation
a. The quotient is 5, the divisor is 8, the dividend is <u>40</u>.	$40 \div 8 = 5$
b. The subtrahend is <u>30</u>, the difference is 15, and the minuend is 45.	$45 - 30 = 15$
c. The factors are 5, 6, and 8, and the product is <u>240</u>.	$5 \cdot 6 \cdot 8 = 240$
d. The addends are 7, 8, and <u>85</u>, and the sum is 100.	$7 + 8 + 85 = 100$

5. a. Answers will vary. Please check the student's work.
   Examples: $5 \cdot 6 \cdot 0 = 0$ or $0 \cdot 2 \cdot 250 = 0$ or $65 \cdot 0 \cdot 12 = 0$
   Any numbers can be used as long as at least one of the three factors is zero.

   b. Answers will vary. For example: $120 \div 40 = 3$ or $120 \div 120 = 1$ or $120 \div 9 = 13$ R3.
   The divisor will need to be more than 8 (because $120 \div 8 = 15$).

   c. Answers will vary. For example: $2 + 2 + 2 + 2 = 8$; $1 + 2 + 3 + 2 = 8$; $1 + 1 + 1 + 1 = 4$; $0 + 0 + 0 + 8 = 8$

6. Subtract the difference from the minuend and you will find the subtrahend.

   a. $56 - \underline{37} = 19$

   b. $4{,}203 - 3650 = 553$

7. Divide the dividend by the quotient, and you will find the divisor..

   a. $\dfrac{56}{\underline{8}} = 7$

   b. $\dfrac{535}{\underline{107}} = 5$

8. Divide the product solved by the known factor and you will find the missing factor.

   a. $\underline{12} \cdot 8 = 96$

   b. $7 \cdot \underline{418} = 2{,}926$

Terminology for the Four Operations, cont.

9. a. $7y$ b. $S + 7$ c. $\dfrac{5s}{8}$ d. $x - 9$

   e. $190 + r$ f. $8d$ g. $9 - x$ h. $n - 14$

10. a. $\dfrac{2x - 1}{3}$ b. $(5 + x)^3$ c. $5(x + 2)$ d. $8(4 + x + 2)$

   e. $2(10 - s)$ f. $\dfrac{y}{y + 4}$ g. $\dfrac{x + 4}{x^2}$

11. a. $7s + 6$ b. $4s - 9$ c. $\dfrac{5 + x}{5 - x}$ d. $(6 - x)^2$ e. $(5 - m)^2$

   f. $\dfrac{w^2}{w - 1}$ g. $100 - p^2$ h. $7 - x$ i. $x^2 + 100$

Puzzle corner:
a. 7, 8, 9. The next higher cube after 504 is $8^3 = 512$, so 8 is the middle number. The others are one higher and one lower: $7 \cdot 8 \cdot 9 = 504$.
b. The sum 621 divided by 3 gives the "average" number 207, so the others are one less and one more: 206, 207, 208.

The Order of Operations, p. 44

1. a. $100 - (50 - 50) = 100$ b. $200 \div (10 + 10) + 5 = 15$ c. $(50 + 50) \cdot 4 - 10 = 390$

2.

a. $\dfrac{64}{8} \cdot 4 = 32$	b. $\dfrac{64}{8 \cdot 4} \cdot 2 = 4$	c. $4 \cdot \dfrac{8}{4} \cdot 2 = 16$
d. $\dfrac{64}{8 \cdot 4} = 2$	e. $\dfrac{64}{8} \cdot 4 \cdot 2 = 64$	f. $\dfrac{4 \cdot 8}{4 \cdot 2} = 4$

3.

a. $150 + 2 \cdot 10 = 170$	b. $5^2 \cdot 2^3 = 200$	c. $3^2 \cdot (150 + 900) \div 3 = 3{,}150$
d. $\dfrac{12 + 9}{4 + 1} = 4\ 1/5$	e. $\dfrac{5^2}{3^2} = 2\ 7/9$	f. $\dfrac{2^3}{8} + 10^3 = 1001$
g. $(6 + 6)^2 \cdot (15 - 5)^2 = 14{,}400$	h. $40 + 80 \div 2 \cdot 4 - 15 = 185$	i. $\dfrac{7^2}{7} \cdot 7 = 49$

4. a. $20{,}000 - 7 \cdot 500 = 16{,}500$
   b. $6 \cdot 70 + 5 \cdot 120 = 1{,}020$

5. a. $2^7 + 5^3 = 128 + 125 = 253$
   b. $5 \cdot 100^3 - 2 \cdot 10^5 = 5{,}000{,}000 - 200{,}000 = 4{,}800{,}000$

6. a. $(3.2 + 5.3) \cdot 2 = 17$ or $2 \cdot (3.2 + 5.3) = 17$ b. $(190 - 50) \div 5 = 28$

   c. $100 - (40 - 5) = 65$ d. $(2 \cdot 5)^3 = 1{,}000$

   e. $\dfrac{5}{3^3} = 5/27$ f. $2(10 - 4) + 3(5 + 8) = 51$

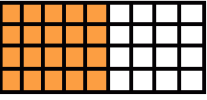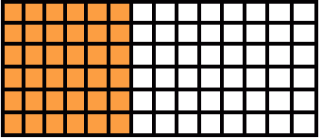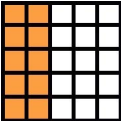   g. $\dfrac{61 - 30}{5^2} = 31/25 = 1\ 6/25$ h. $6^2 - 7 = 29$

7. a. $5 \cdot 10¢ + 15 \cdot 1¢ + 2 \cdot 25¢ + 7 \cdot 50¢ = 465¢$
   b. $(64 - 15) \cdot 2 = 98$. Henry has 98 marbles.
   c. $5 \cdot 20 - 9 \cdot 2 = 82$. The colored area is 82 square units.
   d. $5 \cdot 5 - 2 \cdot 2 = 21$. The colored area is 21 square units.

15

1.

a. $7 \cdot 99 = 7 \cdot (100 - 1)$ $= 700 - 7 = \underline{693}$	b. $4 \cdot 999 = 4 \cdot (1{,}000 - 1)$ $= \underline{4{,}000} - 4 = 3{,}996$
c. $5 \cdot 104 = 5 \cdot (\underline{100} + \underline{4})$ $= \underline{500 + 20} = 520$	d. $5 \cdot 998 = 5 \cdot (\underline{1{,}000} - \underline{2})$ $= \underline{5{,}000} - 10 = 4{,}990$
e. $6 \cdot 98 = 6 \cdot (100 - 2)$ $= \underline{600} - 12 = 588$	f. $7 \cdot 2030 = 7 \cdot (\underline{2{,}000} + \underline{30})$ $= \underline{14{,}000} + 210 = 14{,}210$

2.

a.

Total area: $\underline{3} \cdot (\underline{6} + \underline{4})$
The areas of the two rectangles:
$\underline{3} \cdot \underline{6}$ and $\underline{3} \cdot \underline{4}$

b.

Total area: $\underline{4} \cdot (\underline{5} + \underline{4})$
The areas of the two rectangles:
$\underline{4} \cdot \underline{5}$ and $\underline{4} \cdot \underline{4}$

c.

Total area: $\underline{6} \cdot (\underline{6} + \underline{8})$
The areas of the two rectangles:
$\underline{6} \cdot \underline{6}$ and $\underline{6} \cdot \underline{8}$

d.

Total area: $\underline{5} \cdot (\underline{2} + \underline{3})$
The areas of the two rectangles:
$\underline{5} \cdot \underline{2}$ and $\underline{5} \cdot \underline{3}$

3. a. 80 is the partial product of
10 times 8. (10 from 16 and
8 from 78)

700 is the partial product of
10 times 70 (10 from 16 and
70 from 78).

b.

		5	6
	x	8	4
		2	4
	2	0	0
	4	8	0
4	0	0	0
4	7	0	4

c.

		1	7
	x	9	5
		3	5
		5	0
	6	3	0
	9	0	0
1	6	1	5

4.

a. $29 \cdot 17$

$29 \cdot 17 = 20 \cdot 10 + 20 \cdot 7$
$+ 9 \cdot 10 + 9 \cdot 7$
$= 200 + 140 + 90 + 63 = 493$

b. $75 \cdot 36$

$75 \cdot 36 = 70 \cdot 30 + 70 \cdot 6$
$+ 5 \cdot 30 + 5 \cdot 6$
$= 2{,}100 + 420 + 150 + 30 = 2{,}700$

Multiplying and Dividing in Parts, cont.

5.

a. $\dfrac{80}{2} + \dfrac{12}{2} = 40 + 6 = 46$	b. $\dfrac{350}{5} + \dfrac{15}{5} = 70 + 3 = 73$	c. $\dfrac{400}{4} - \dfrac{12}{4} = 100 - 3 = 97$
d. $\dfrac{9,300}{3} - \dfrac{60}{3} = 3,100 - 20 = 3,080$	e. $\dfrac{350}{7} + \dfrac{21}{7} - \dfrac{7}{7} = 50 + 3 - 1 = 52$	f. $\dfrac{900}{9} - \dfrac{18}{9} = 100 - 2 = 98$
g. $\dfrac{22 \text{ ft}}{2} + \dfrac{9 \text{ in}}{2} = 11 \text{ ft } 4.5 \text{ in}$	h. $\dfrac{40 \text{ kg}}{5} + \dfrac{750 \text{ g}}{5} = 8 \text{ kg} + 150 \text{ g}$	i. $\dfrac{12 \text{ L}}{4} + \dfrac{600 \text{ ml}}{4} = 3 \text{ L } 150 \text{ ml}$

6. a. 206   b. 203   c. 103   d. 201   e. 502

7.

a. $\dfrac{15}{5} + \dfrac{4}{5} = 3\dfrac{4}{5}$	b. $\dfrac{44}{11} + \dfrac{7}{11} = 4\dfrac{7}{11}$
c. $\dfrac{6}{7} + \dfrac{70}{7} = 10\dfrac{6}{7}$	d. $\dfrac{420}{6} + \dfrac{2}{6} = 70\dfrac{2}{6}$
e. $\dfrac{240}{4} + \dfrac{12}{4} + \dfrac{3}{4} = 60 + 3 + \dfrac{3}{4} = 63\dfrac{3}{4}$	f. $\dfrac{2}{9} + \dfrac{36}{9} + \dfrac{270}{9} = 4 + 30 + \dfrac{2}{9} = 34\dfrac{2}{9}$

8. a. 100 3/4   b. 303 2/3   c. 1,004 4/5
   d. 20 1/4   e. 42 1/3   f. 60 5/6

9. a. 20 kg 9 3/10 g   b. 3 m 2/5 cm   c. 1 ft 7/10 in
   d. 9 ft 1 4/5 in   e. 6 m 2.5 cm   f. 16 gal 1 1/3 qt or 16 1/3 gal

10. One way: Two quarts and 10 ounces equal 64 oz + 10 oz = 74 oz. Then, 74 oz ÷ 4 = 18 1/2 ounces per person.

Another way: Two quarts divided among 4 people is half a quart or one pint (16 oz) for each. Ten ounces divided among 4 people is 10 oz/4 = 2 ½ oz per person. So each of the four people gets 1 pint plus 2 ½ oz, or 16 + 2 ½ = 18 ½ ounces.

11. a. 7 ÷ 14 = 1/2   b. 7 ÷ 21 = 1/3   c. 80 ÷ 11 = 7 3/11
    d. 6/8 + 3 + 30 = 33 6/8   e. 117 ÷ 4 = 29 1/4   f. 100 ÷ 30 = 3 1/3

Puzzle corner:

a. $\dfrac{250 - 3}{10} = 25 - \dfrac{3}{10}$ b. $\dfrac{11 - 3}{5} = 2\dfrac{1}{5} - \dfrac{3}{5}$

Expressions, p. 51

1.

a. $80/9 = 8 \ 8/9$	b. $27 - 15 = 12$	c. $10,000 \div 100 = 100$
d. $1,000 - 600 = 400$	e. $(1/9) \times 81 - 4 = 9 - 4 = 5$	f. $6,000 \div 500 = 12$

2.

Variable	Expression $100 - x^2$	Value
$x = 3$	$100 - 3^2 = 100 - 9$	91
$x = 4$	$100 - 4^2 = 100 - 16$	84
$x = 5$	$100 - 5^2 = 100 - 25$	75
$x = 6$	$100 - 6^2 = 100 - 36$	64
$x = 7$	$100 - 7^2 = 100 - 49$	51

Expressions, cont.

3. a. $2 \times 5 + 18 = 10 + 18 = 28$ b. $\dfrac{35}{5} \times 13 = 7 \times 13 = 91$

   c. $5 \times 9 = 45$ d. $\dfrac{3}{5} \times 25 = 15$

4. a. $80 - 14 - 5 = 61$ b. $80 - (14 - 5) = 71$
   c. $80 + 14 + 5 = 99$ d. $80 - (14 + 5) = 61$

5. a. 4a and 4d had the same value.
   b. Yes. The values for 4a and 4d are the same even using different numbers.
   c. Yes, they are equivalent expressions

6. a. $30(s - 300)$ b. $\dfrac{35 + x}{7}$ c. $y - \dfrac{200}{40}$

7. a. $30(1200 - 300) = 27{,}000$ b. $\dfrac{35 + 42}{7} = 11$ c. $800 - \dfrac{200}{40} = 795$

8. a. $V = (4 \text{ cm})^3 = 64 \text{ cm}^3$ b. $V = (½ \text{ in})^3 = 1/8 \text{ in}^3$

9. Cost $= \dfrac{\$3.25 \times 380}{22} = \$56.14$

10. a. $10p$ b. $(1/5)S$ or $S/5$ c. $2m + 1.50n$ d. $p + q$ e. $\dfrac{p + q}{2}$

11. a. The first 3 expressions are equivalent.
   b. The first and third expressions are equivalent ($2x/6$ and $x/3$).

Writing and Simplifying Expressions 1: Length and Perimeter, p. 54

1. a. $5x$ b. $2x + 2y$ c. $3n + m$
   d. $3z + 8$ e. $2q + x + 3$ f. $2z + 2x + y + 9$

2. a. $2x + 8$ b. $2x + 2y$
   c. $6s$ d. $4y$
   e. $a + b + 7$ f. $2s + 2t + 3$

3. a. $3x + x = 4x$ b. $2z + 7 + 12 = 2z + 19$
   c. $4p - 2p = 2p$ d. $4x + 11 - 2x = 2x + 11$

4.

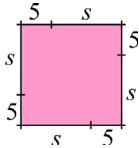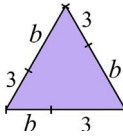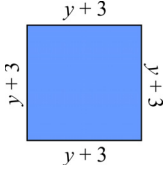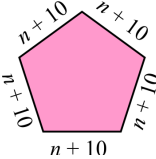|	
a. $5c + 2$	b. $3p + 2r$
c. $3x + 7$	d. $2x + 3z + 4$ or $3z + 2x + 4$
e. $3m + q + s$	f. $2y + 13$
g. $7c$	h. $6p$
i. $5d$	j. $9x$
k. $4x + 5$ or $5 + 4x$	l. $9a + 2 - 7x$ or $9a - 7x + 2$

5.
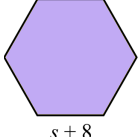
a. c^3	b. $4x^2$
c. $30x$	d. $2xz$
e. $45ab$	f. $4y + 8$
g. $c^2 + 16$	h. $32r - 14$
i. $280wx$	j. $3p^3$
k. $60w^4$	l. $r^2 - 9$

More on Writing and Simplifying Expressions, p. 57

1.

Expression	the terms in it	coefficient(s)	Constants
$4a + 5b$	$4a$ and $5b$	4, 5	none
$300y$	$300y$	300	none
$11x + 5$	$11x$ and 5	11	5
$x + 12y + 9$	x, $12y$, and 9	1, 12	9
$p \cdot 9$	$p \cdot 9$	9	none
$8x^4y^3 + 10$	$8x^4y^3$ and 10	8	10
$\dfrac{11}{26}p$	$\dfrac{11}{26}p$	$\dfrac{11}{26}$	none

2. a. $x^2 + \dfrac{1}{2}$

   b. $2a + 6b + 7$ or $6a + 2b + 7$

3.

a. $4(5 + s)$ and $4s + 20$

b. $3(b + 3)$ and $3b + 9$

c. $4(y + 3)$ and $4y + 12$

d. $5(n + 10)$ and $5n + 50$

e. $6(s + 8)$ and $6s + 48$

f. $4(2x + 1)$ and $8x + 4$

4. a. $4(a + 20)$ b. $5m$ c. $20p$ d. $v - 15$ e. $p - \$5$ f. $5(p - \$3)$

5.

Expression	Like terms, if any	Constants
$15x + 12z + 9z$	$12z$ and $9z$	none
$10 + 10y + 30y$	$10y$ and $30y$	10
$p \cdot 9 + 2$	none	2
$8a - 2a + 10 + b + 7b$	$8a$ and $2a$; b and $7b$	10
$8y + 7x + 6 + 15y - 2x$	$8y$ and $15y$; $7x$ and $2x$	6

6. a. $9x + 8$ b. $13z^2$
   c. $3m + 12n$ d. $5x + 23y + 6$
   e. $10m^2 + 9$ f. not possible to simplify

7. 5.0 gallons equals 18.9 liters.

8. a. $3 + 2(\frac{1}{2}) = 4$ b. $2(3 + \frac{1}{2}) = 7$

9. a. $s + s + s$, $3s$, and $2s + s$
   b. $2y + 2x$ and $y + y + x + x$

Writing and Simplifying Expressions 2: Area, p. 60

Teaching box: Its perimeter is $2(l + w)$.

1. a. $A = 3x \cdot 4x = 12 \cdot x \cdot x = 12x^2$ b. $A = 5y \cdot 3y = 15 \cdot y \cdot y = 15y^2$
   c. $A = 5x \cdot x = 5 \cdot x \cdot x = 5x^2$ d. $A = 2b \cdot 7b = 14b \cdot b = 14b^2$

2. a. $A = 12x^2$ $P = 16x$ b. $A = 3x^2$ $P = 8x$
   c. $A = 9s^2$ $P = 12s$ d. $A = 8a^2$ $P = 12a$

3. a. $A = 28c^2$ $P = 22c$ b. $A = 80x^2$ $P = 36x$

4. a. $A = 14x^2$ $P = 18x$ b. $A = 19x^2$ $P = 20x$

5. a. $A = 19x^2$ $P = 26x$ b. $A = 24x^2$ $P = 22x$ c. $A = 40b^2$ $P = 32b$
   d. $A = 43b^2$ $P = 28b$ e. $A = 51a^2$ $P = 36a$ f. $A = 51a^2$ $P = 36a$

6. a. $A = 20x^2$
   b. $A = 500$ cm^2
   c. $A = 2,000$ cm^2
   d. No. It is quadruple (four times as much).

7. a. $A = 51a^2$ $P = 36a$
   b. 72 in
   c. 144 in
   d. yes
   e. $51 \cdot 2^2 = 204$ sq. in. and $51 \cdot 4^2 = 816$ sq. in.   No, the area was quadruple (four times as much).

8. a. $3b$ b. $6a$

9. a. $6c$ b. $6b$

10. The length of each side is $2y$.

11. The other side is $8s$.

12. a. $81r^2$
    b. $40a$
    c. Ava's age is $S - 3$.
    d. The more expensive shoes cost $p + \$10$.   e. $5(p + \$10)$

13. a. $M = \dfrac{24.0}{1.60934} \approx 14.9$ miles
    b. You would multiply the number of miles by 1.60934.

The Distributive Property, p. 65

1.

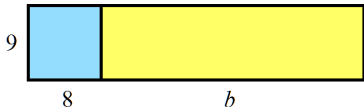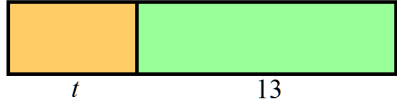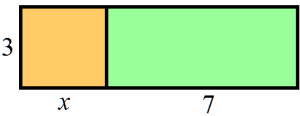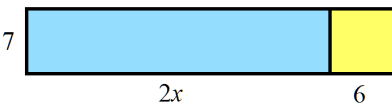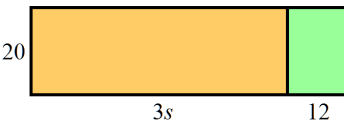|	
a. $3(90 + 5) = 3 \cdot 90 + 3 \cdot 5 = 270 + 15 = 285$	b. $7(50 + 6) = 7 \cdot 50 + 7 \cdot 6 = 350 + 42 = 392$
c. $4(a + b) = 4 \cdot a + 4 \cdot b = 4a + 4b$	d. $2(x + 6) = 2 \cdot x + 2 \cdot 6 = 2x + 12$
e. $7(y + 3) = 7 \cdot y + 7 \cdot 3 = 7y + 21$	f. $10(s + 4) = 10 \cdot s + 10 \cdot 4 = 10s + 40$
g. $s(6 + x) = s \cdot 6 + s \cdot x = 6s + sx$	h. $x(y + 3) = x \cdot y + x \cdot 3 = xy + 3x$
i. $8(5 + b) = 8 \cdot 5 + 8 \cdot b = 40 + 8b$	j. $9(5 + c) = 9 \cdot 5 + 9 \cdot c = 45 + 9c$

2.

a. $3(a + b + 5) = 3a + 3b + 15$	b. $8(5 + y + r) = 40 + 8y + 8r$
c. $4(s + 5 + 8) = 4s + 52$	d. $3(10 + c + d + 2) = 36 + 3c + 3d$

The Distributive Property, cont.

3.

a. $2(3x + 5) = 6x + 10$	b. $7(7a + 6) = 49a + 42$
c. $5(4a + 8b) = 20a + 40b$	d. $2(4x + 3y) = 8x + 6y$
e. $3(9 + 10z) = 27 + 30z$	f. $6(3x + 4 + 2y) = 18x + 24 + 12y$
g. $11(2c + 7a) = 22c + 77a$	h. $8(5 + 2a + 3b) = 40 + 16a + 24b$

4.

a. $9(8 + b)$ and
   $9 \cdot 8 + 9 \cdot b = 72 + 9b$

b. $s(t + 13)$ and
   $s \cdot t + s \cdot 13 = st + 13s$

c. $3(x + 7)$ and
   $3 \cdot x + 3 \cdot 7 = 3x + 21$

d. $7(2x + 6)$ and
   $7 \cdot 2x + 7 \cdot 6 = 14x + 42$

e. $6(4t + 3s)$ and
   $6 \cdot 4t + 6 \cdot 3s = 24t + 18s$

f. $20(3s + 12)$ and
   $20 \cdot 3s + 20 \cdot 12 = 60s + 240$

5. a. 3   b. 7   c. 9   d. z e. 6   f. 6

6. a. 6   b. 3   c. 2   d. 3

7. a. 3   b. 7   c. 2   d. 5   e. $2x$ f. $3x$ g. $4y$ h. $5t + s$

8. $7(2x + 3) = 14x + 21$

9. One side would be $3x + 1$.

10.

a. $6x + 6 = 6(x + 1)$	b. $8y + 16 = 8(y + 2)$
c. $15x + 45 = 15(x + 3)$	d. $4w + 40 = 4(w + 10)$
e. $6x + 30 = 6(x + 5)$	f. $8x + 16y + 48 = 8(x + 2y + 6)$

11.

a. $8x + 4 = 4(2x + 1)$	b. $15x + 10 = 5(3x + 2)$
c. $24y + 8 = 8(3y + 1)$ or $2(12y + 4)$ or $4(6y + 2)$	d. $6x + 3 = 3(2x + 1)$
e. $42y + 14 = 7(6y + 2)$ or $2(21y + 7)$	f. $32x + 24 = 8(4x + 3)$ or $2(16x + 12)$
g. $27y + 9 = 3(9y + 3)$ or $9(3y + 1)$	h. $55x + 22 = 11(5x + 2)$
i. $36y + 12 = 3(12y + 4)$ or $4(9y + 3)$ or $2(18y + 6)$ or $6(6y + 2)$	j. $36x + 9z + 27 = 3(12x + 3z + 9)$ or $9(4x + 1z + 3)$

The Distributive Property, cont.

12. Its side is $12x + 4$.

Puzzle corner: $10,300 \div 600 = \$17.17$ per item.

Equations, p. 69

1. a. equation   b. expression   c. equation   d. expression   e. expression

2. b. Equation: $\underline{100 - x = 35}$ Solution: $\underline{x = 65}$
   c. Equation: $\underline{3x = 63}$ Solution: $\underline{x = 21}$
   d. Equation: $\underline{x \div 7 = 12}$ Solution: $\underline{x = 84}$
   e. Equation: $\underline{x - 19 = 394}$ Solution: $\underline{x = 413}$
   f. Equation: $\underline{60 \div x = 12}$ Solution: $\underline{x = 5}$

3. a. No.
   b. Yes.

4. a. The roots are 3 and 6: $3^2 + 18 - 9 \cdot 3 = 0$ and $6^2 + 18 - 9 \cdot 6 = 0$.
   b. The root is 5: $3 \cdot 5 - 5 = 2 \cdot 5$.

5. The number 2 makes the equation true: $\dfrac{2 + 6}{2 + 2} = 2$

6. Answers will vary. Please check the students' work. For example: $\dfrac{6x}{2} = 33$ or $x^2 - 88 = 33$ or $x + 20 = 31$.

7.

Item	p	$(4/5)p$
a bottle of water	$1	$0.80
a pair of socks	$2	$1.60
a sandwich	$5	$4.00
a ball	$10	$8.00
a toy	$45	$36.00

8. a. $x = 15$
   b. $y = 12$
   c. $z = 35$

9.

a. $54 + x = 990$ $\mid -54$ $54 + x - 54 = 990 - 54$ $x = 936$	b. $x + 5.6 = 12.9$ $\mid -5.6$ $x + 5.6 - 5.6 = 12.9 - 5.6$ $x = 7.3$
c. $x - 120 = 137$ $\mid +120$ $x - 120 + 120 = 137 + 120$ $x = 257$	d. $w - 98 = 89$ $\mid +98$ $w - 98 + 98 = 89 + 98$ $w = 187$
e. $156 + s = 1,082$ $\mid -156$ $156 + s - 156 = 1,082 - 156$ $s = 926$	f. $t + 77 = 208$ $\mid -77$ $t + 77 - 77 = 208 - 77$ $t = 131$

Equations, cont.

10.

a.	b.
$5x = 350 \quad \vert \div 5$	$10x = 17 \quad \vert \div 10$
$\dfrac{5x}{5} = \dfrac{350}{5}$	$\dfrac{10x}{10} = \dfrac{17}{10}$
$x = 70$	$x = 1.7$

c.	d.
$7a = 2.8 \quad \vert \div 7$	$\dfrac{x}{51} = 4 \quad \vert \times 51$
$\dfrac{7a}{7} = \dfrac{2.8}{7}$	$\dfrac{x}{51} \cdot 51 = 4 \cdot 51$
$a = 0.4$	$x = 204$

e.	f.
$\dfrac{x}{9} = 60 \quad \vert \times 9$	$\dfrac{x}{100} = 1.2 \quad \vert \times 100$
$\dfrac{x}{9} \cdot 9 = 60 \cdot 9$	$\dfrac{x}{100} \cdot 100 = 1.2 \cdot 100$
$x = 540$	$x = 120$

More Equations, p. 73

1.

a.	b.	c.
$2y + 5y = 49$	$10x - 8x = 42$	$7a + 2a - 5a = 52$
$7y = 49 \quad \vert \div 7$	$2x = 42 \quad \vert \div 2$	$4a = 52 \quad \vert \div 4$
$y = 7$	$x = 21$	$a = 13$

2.

a.	b.	c.
$y \div 400 = 6 + 2$	$z - 220 = 3 \cdot 100$	$8x = 501 + 59$
$y \div 400 = 8 \quad \vert \times 400$	$z - 220 = 300 \quad \vert + 220$	$8x = 560 \quad \vert \div 8$
$y = 3{,}200$	$z = 520$	$x = 70$

3.

a.	b.	c.
$2x + 3x = 29 - 14$	$7c - c = 3 \cdot 80$	$14x - 6x + 2x = 5 \cdot 40$
$5x = 15 \quad \vert \div 5$	$6c = 240 \quad \vert \div 6$	$10x = 200 \quad \vert \div 10$
$x = 3$	$c = 40$	$x = 20$

4. a. $9y + 10$ b. $4a^2$

c. $28s + 9$ d. $3x + 10y$

e. $7mn + 12$ f. $14w + 3x + 15y$

5. a. $5n = 485$; $n = 97$. There are 97 nickels.

b. $25b = \$112.50$; $b = \$4.50$. One bucket costs $4.50.

c. $89 - 16\tfrac{1}{2} = a$; $a = 72\tfrac{1}{2}$. Ann will be 72 ½ years old when Elizabeth is 89.

d. $s^2 = 169$; $s = 13$. One side of the square is 13 feet long.

6.

a.	b.	c.
$2x + 5 = 27$ $\quad$ │ -5	$3x - 8 = 34$ $\quad$ │ $+8$	$7x + 5 = 54$ $\quad$ │ -5
$2x + 5 - 5 = 27 - 5$	$3x - 8 + 8 = 34 + 8$	$7x + 5 - 5 = 54 - 5$
$2x = 22$ $\quad$ │ $\div 2$	$3x = 42$ $\quad$ │ $\div 3$	$7x = 49$ $\quad$ │ $\div 7$
$x = 11$	$x = 14$	$x = 7$

7.

```
 ←———— 567 ————→          ←———— 832 ————→
 | x | x | x | x | x | 32 |   | x | x | x | 85 |
```

a.	b.
$5x + 32 = 567$ $\quad$ │ -32	$3x + 85 = 832$ $\quad$ │ -85
$5x + 32 - 32 = 567 - 32$	$3x + 85 - 85 = 832 - 85$
$5x = 535$ $\quad$ │ $\div 5$	$3x = 747$ $\quad$ │ $\div 3$
$x = 107$	$x = 249$

8.

a.	b.	c.
$2(x + 5) = 24$	$3(x - 4) = 36$	$7(x + 8) = 63$
$2x + 10 = 24$ │ -10	$3x - 12 = 36$ │ $+12$	$7x + 56 = 63$ │ -56
$2x = 14$ │ $\div 2$	$3x = 48$ │ $\div 3$	$7x = 7$ │ $\div 7$
$x = 7$	$x = 16$	$x = 1$
OR	OR	OR
a. $2(x + 5) = 24$ │ $\div 2$	b. $3(x - 4) = 36$ │ $\div 3$	c. $7(x + 8) = 63$ │ $\div 7$
$x + 5 = 12$ │ -5	$x - 4 = 12$ │ $+4$	$x + 8 = 9$ │ -8
$x = 7$	$x = 16$	$x = 1$
d. $5(2x + 1) = 45$	e. $3(4x - 3) = 51$	f. $3(2x + 7) = 63$
$10x + 5 = 45$ │ -5	$12x - 9 = 51$ │ $+9$	$6x + 21 = 63$ │ -21
$10x = 40$ │ $\div 10$	$12x = 60$ │ $\div 12$	$6x = 42$ │ $\div 6$
$x = 4$	$x = 5$	$x = 7$
OR	OR	OR
d. $5(2x + 1) = 45$ │ $\div 5$	e. $3(4x - 3) = 51$ │ $\div 5$	f. $3(2x + 7) = 63$ │ $\div 3$
$2x + 1 = 9$ │ -1	$4x - 3 = 17$ │ $+3$	$2x + 7 = 21$ │ -7
$2x = 8$ │ $\div 2$	$4x = 20$ │ $\div 4$	$2x = 14$ │ $\div 2$
$x = 4$	$x = 5$	$x = 7$

9.

p	*New Price*	*p*	*New Price*	*p*	*New Price*
$24,200	$16,251.17	$17,500	$11,751.88	$36,400	$24,443.91

10. a. $8(b + 3)$

    b. $t - 3s + 5$