Answers to Unit 4

SECTION 1 Pages 121–122

Example 2 $125\% = 125\left(\frac{1}{100}\right) = \frac{125}{100} = 1\frac{1}{4}$

$125\% = 125(0.01) = 1.25$

Example 4 $16\frac{2}{3}\% = 16\frac{2}{3}\left(\frac{1}{100}\right) = \frac{50}{3}\left(\frac{1}{100}\right) = \frac{1}{6}$

Example 6 $0.5\% = 0.5(0.01) = 0.005$

Example 8 $0.043 = 0.043(100\%) = 4.3\%$

Example 10 $2.57 = 2.57(100\%) = 257\%$

Example 12 $\frac{5}{9} = \frac{5}{9}(100\%) = \frac{500}{9}\% \approx 55.6\%$

Example 14 $\frac{9}{16} = \frac{9}{16}(100\%) = \frac{900}{16}\% = 56\frac{1}{4}\%$

Pages 123–124

1. $\frac{3}{4}$; 0.75 **3.** $\frac{1}{2}$; 0.50 **5.** $\frac{16}{25}$; 0.64 **7.** $1\frac{1}{4}$; 1.25 **9.** $\frac{19}{100}$; 0.19 **11.** $\frac{1}{20}$; 0.05 **13.** $4\frac{1}{2}$; 4.50 **15.** $\frac{2}{25}$; 0.08

17. $\frac{1}{9}$ **19.** $\frac{1}{8}$ **21.** $\frac{5}{16}$ **23.** $\frac{1}{400}$ **25.** $\frac{23}{400}$ **27.** $\frac{1}{16}$ **29.** 0.073 **31.** 0.158 **33.** 0.003 **35.** 0.0915

37. 0.1823 **39.** 0.0015 **41.** 15% **43.** 5% **45.** 17.5% **47.** 115% **49.** 62% **51.** 316.5%

53. 0.8% **55.** 6.5% **57.** 54% **59.** 33.3% **61.** 45.5% **63.** 87.5% **65.** 166.7% **67.** 128.6%

69. 34% **71.** $37\frac{1}{2}\%$ **73.** $35\frac{5}{7}\%$ **75.** $18\frac{3}{4}\%$ **77.** 125% **79.** $155\frac{5}{9}\%$

SECTION 2 Pages 125–126

Example 2

$$P \times B = A$$
$$P(60) = 27$$
$$P(60)\left(\frac{1}{60}\right) = 27\left(\frac{1}{60}\right)$$
$$P = 0.45$$

The percent is 45%.

Example 4

Strategy To find the percent of defective wheel bearings, solve the basic percent equation using $A = 6$ and $B = 200$. The percent is unknown.

Solution

$$P \times B = A$$
$$P(200) = 6$$
$$P(200)\left(\frac{1}{200}\right) = 6\left(\frac{1}{200}\right)$$
$$P = 0.03$$

3% of the wheel bearings were defective.

Example 6

Strategy To find the percent decrease, solve the basic percent equation using $B = 2500$ and $A = 500$. The percent is unknown.

Solution

$$P \times B = A$$
$$P(2500) = 500$$
$$P(2500)\left(\frac{1}{2500}\right) = 500\left(\frac{1}{2500}\right)$$
$$P = 0.2$$

The percent decrease is 20%.

Page 127

1. 24% **3.** 7.2 **5.** 400 **7.** 9 **9.** 25% **11.** 5 **13.** 200% **15.** 400 **17.** 7.7 **19.** 200 **21.** 400 **23.** 20 **25.** 80.34%

Page 128

1. 20% of the total budget is for materials. **3.** 6.4 gal of the gasoline are used efficiently. **5.** The value of the car today is \$4000. **7.** The percent decrease is 40%. **9.** There were 270,000 take-offs and landings last year. **11.** 28.75% $\left(\text{or } 28\frac{3}{4}\%\right)$ of the people voted in the election.

SECTION 3 Pages 129–130

Example 2

Strategy Given: $C = \$40$
$S = \$60$
Unknown: r
Use the equation $S = C + rC$.

Solution
$$S = C + rC$$
$$60 = 40 + 40r$$
$$20 = 40r$$
$$0.5 = r$$
The markup rate is 50%.

Example 4

Strategy Given: $R = \$27.60$
$S = \$20.70$
Unknown: r
Use the equation $S = R - rR$.

Solution
$$S = R - rR$$
$$20.70 = 27.60 - 27.60r$$
$$-6.90 = -27.60r$$
$$0.25 = r$$
The discount rate is 25%.

Pages 131–132

1. The selling price is \$16.20. **3.** The cost is \$50. **5.** The markup rate is 60%. **7.** The selling price is \$3.05. **9.** The markup rate is 75%. **11.** The markup rate is 56.25%. **13.** The sale price is \$22.40. **15.** The regular price is \$32.50. **17.** The discount rate is 25%. **19.** The regular price is \$300. **21.** The discount rate is 26%. **23.** The discount rate is 23.3%.

SECTION 4 Pages 133–134

Example 2

Strategy

▷ Additional amount: x

Principal	Rate	Interest
5000	0.08	0.08(5000)
x	0.14	$0.14x$
$5000 + x$	0.11	$0.11(5000 + x)$

▷ The sum of the interest earned by the two investments equals the interest earned on the total investment.

Solution
$$0.08(5000) + 0.14x = 0.11(5000 + x)$$
$$400 + 0.14x = 550 + 0.11x$$
$$400 + 0.03x = 550$$
$$0.03x = 150$$
$$x = 5000$$
\$5000 more must be invested at 14%.

Pages 135–136

1. The amount invested at 8% is \$2000. The amount invested at 12% is \$3000. **3.** \$6000 more must be invested at 10%. **5.** The amount invested at 12% is \$2500. The amount invested at 20% is \$1500. **7.** \$2500 was deposited in the 12% account. **9.** \$8000 more must be invested at 8%. **11.** The amount invested at 7.5% is \$15,000. The amount invested at 11.25% is \$10,000. **13.** The total amount invested is \$24,000. **15.** The total amount to be invested is \$50,000.

SECTION 5

Pages 137–140

Example 2

Strategy

▷ Pounds of \$.55 fertilizer: x

	Amount	Cost	Value
\$.80 fertilizer	20	\$.80	0.80(20)
\$.55 fertilizer	x	\$.55	$0.55x$
\$.75 fertilizer	$20 + x$	\$.75	$0.75(20 + x)$

▷ The sum of the values before mixing equals the value after mixing.

Solution

$$0.80(20) + 0.55x = 0.75(20 + x)$$
$$16 + 0.55x = 15 + 0.75x$$
$$16 - 0.20x = 15$$
$$-0.20x = -1$$
$$x = 5$$

5 lb of the \$.55 fertilizer must be added.

Example 4

Strategy

▷ Liters of water: x

	Amount	Percent	Quantity
Water	x	0	$0x$
12%	5	0.12	5(0.12)
8%	$x + 5$	0.08	$0.08(x + 5)$

▷ The sum of the quantities before mixing is equal to the quantity after mixing.

Solution

$$0x + 5(0.12) = 0.08(x + 5)$$
$$0.60 = 0.08x + 0.40$$
$$0.20 = 0.08x$$
$$2.5 = x$$

The pharmacist adds 2.5 L of water to the 12% solution to get an 8% solution.

Pages 141–144

1. To make the mixture, 60 lb of the \$2.50 hamburger and 20 lb of the \$3.10 hamburger were used. **3.** 16 oz of pure gold must be used. **5.** The selling price of the mixture is \$2.75 per pound. **7.** 25 gal of cranberry juice should be mixed with 75 gal of apple juice. **9.** 36 lb of walnuts must be used. **11.** The selling price of the mixture is \$3.70 per pound. **13.** 17.25 lb of the \$4.20 cheese must be used. **15.** 1500 bushels of soybeans and 3500 bushels of corn were used. **17.** The selling price is \$3 per ounce. **19.** 1.5 L of the \$80 face cream must be used. **21.** 40 gal of the 21% butterfat and 20 gal of the 15% butterfat must be used. **23.** 10 g of pure acid must be used. **25.** The percent concentration of the resulting solution is 20%. **27.** 40 L of the 85% maple syrup must be mixed with 110 L of pure maple syrup. **29.** 20 lb of oats must be added. **31.** The percent concentration of sugar in the mixture is 44%. **33.** 300 lb of 20% polyester should be woven with 300 lb of 50% polyester. **35.** 20 lb of the 40% wheat flour were used. **37.** The 300-pound alloy contains 10% tin. **39.** 16.67 oz of the 5% solution should be mixed with 33.33 oz of the 8% solution.

SECTION 6 Pages 145–146

Example 2

Strategy

▷ Rate of the first train: r
Rate of the second train: $2r$

	Rate	Time	Distance
1st train	r	3	$3r$
2nd train	$2r$	3	$3(2r)$

▷ The sum of the distances traveled by each train equals 288 mi.

Solution

$3r + 3(2r) = 288$
$3r + 6r = 288$
$9r = 288$
$r = 32$
$2r = 2(32) = 64$

The first train is traveling at 32 mph.
The second train is traveling at 64 mph.

Example 4

Strategy

▷ Time spent flying out: t
Time spent flying back: $5 - t$

	Rate	Time	Distance
Out	150	t	$150t$
Back	100	$5 - t$	$100(5 - t)$

▷ The distance out equals the distance back.

Solution

$150t = 100(5 - t)$
$150t = 500 - 100t$
$250t = 500$
$t = 2$ (The time out was 2 h.)

The distance $= 150t = 150(2) = 300$ mi.

The parcel of land was 300 mi away.

Pages 147–148

1. The first cyclist is riding at a rate of 8 mph. The second cyclist is riding at a rate of 16 mph. **3.** In 2 h the cabin cruiser will be alongside the motorboat. **5.** The distance to the resort is 150 mi. **7.** The length of the track is 120 m. **9.** The car overtakes the cyclist 48 mi from the starting point. **11.** For 3 h the car traveled at 45 mph, and for 2 h the car traveled at 30 mph. **13.** The average speed on the winding road was 32 mph. **15.** The corporate offices are 120 mi from the airport. **17.** The car is traveling at 50 mph. **19.** The cyclists will meet after 1.5 $\left(\text{or } 1\frac{1}{2}\right)$ h.

SECTION 7 Pages 149–150

Example 2

Strategy

▷ Width of the rectangle: w
Length of the rectangle: $w + 3$
▷ Use the equation for the perimeter of a rectangle.

Solution

$2l + 2w = p$
$2(w + 3) + 2w = 34$
$2w + 6 + 2w = 34$
$4w + 6 = 34$
$4w = 28$
$w = 7$

The width of the rectangle is 7 m.

Example 4

Strategy

▷ Measure of the first angle: $2x$
Measure of the second angle: x
Measure of the third angle: $x - 4$
▷ Use the equation $A + B + C = 180°$.

Solution

$A + B + C = 180$
$2x + x + (x - 4) = 180$
$4x - 4 = 180$
$4x = 184$
$x = 46$

$2x = 2(46) = 92$

$x - 4 = 46 - 4 = 42$

The measure of the first angle is 92°.
The measure of the second angle is 46°.
The measure of the third angle is 42°.

Pages 151–152

1. The length is 15 m. The width is 10 m. **3.** The length is 100 cm. The width is 25 cm. **5.** The lengths of the sides are 4 m, 4 m, and 2 m. **7.** The width is 8 m. The length is 13 m. **9.** The measures of the sides are 20 cm, 40 cm, and 50 cm. **11.** The length is 14.48 m. The width is 13.64 m. **13.** The measure of each angle is 60°. **15.** The measure of each angle is 45°. **17.** The measure of the angles are 42°, 42°, and 96°. **19.** The measures of the angles are 30°, 60°, and 90°. **21.** The measures of the angles are 37°, 111°, and 32°. **23.** The measures of the angles are 38°, 76°, and 66°.

SECTION 8

Pages 153–156

Example 2

Strategy

▷ First consecutive integer: n

Second consecutive integer: $n + 1$

Third consecutive integer: $n + 2$

▷ The sum of the three integers is -6.

Solution

$$n + (n + 1) + (n + 2) = -6$$
$$3n + 3 = -6$$
$$3n = -9$$
$$n = -3$$

$n + 1 = -3 + 1 = -2$

$n + 2 = -3 + 2 = -1$

The three consecutive integers are -3, -2, and -1.

Example 4

Strategy

▷ Number of dimes: x

Number of nickels: $4x$

Number of quarters: $x + 5$

Coin	Number	Value	Total Value
Dime	x	10	$10x$
Nickel	$4x$	5	$5(4x)$
Quarter	$x + 5$	25	$25(x + 5)$

▷ The sum of the total values of each denomination of coin equals the total value of all the coins (675 cents).

Solution

$$10x + 5(4x) + 25(x + 5) = 675$$
$$10x + 20x + 25x + 125 = 675$$
$$55x + 125 = 675$$
$$55x = 550$$
$$x = 10$$

$4x = 4(10) = 40$

$x + 5 = 10 + 5 = 15$

The bank contains 10 dimes, 40 nickels, and 15 quarters.

Example 6

Strategy

▷ The number of years ago: x

	Present age	Past age
Half dollar	25	$25 - x$
Dime	15	$15 - x$

▷ At a past age, the half dollar was twice as old as the dime.

Solution

$25 - x = 2(15 - x)$
$25 - x = 30 - 2x$
$25 + x = 30$
$x = 5$

Five years ago the half dollar was twice as old as the dime.

Pages 157–160

1. The integers are 15, 16, and 17. **3.** The integers are 20, 22, and 24. **5.** The integers are 15, 17, and 19. **7.** The integers are 4 and 6. **9.** The integers are 3 and 5. **11.** The integers are -8, -7, and -6. **13.** The integers are 11, 13, and 15. **15.** The integers are -1, 1, and 3. **17.** The coin purse contains 12 nickels and 4 dimes. **19.** Eight 15¢ stamps and two 25¢ stamps were sold. **21.** There are 15 dimes and 20 quarters in the bank. **23.** There were 6 twenty-dollar bills and 3 ten-dollar bills. **25.** There are 5 pennies in the bank. **27.** There are fifteen 2¢ stamps, seven 5¢ stamps, and fourteen 7¢ stamps in the collection. **29.** There are 30 nickels, 15 dimes, and 33 quarters in the bank. **31.** In 7 years the autographed first edition will be three times as old as the reprint. **33.** The present age of the nickel is 16 years and the present age of the dime is 40 years. **35.** In 25 years, the crystal vase will be three times as old as the porcelain vase. **37.** Sixty-five years ago the butterchurn was twice the age of the ice box. **39.** The present age of the antique is 47 years, and the present age of the replica is 2 years. **41.** The oil painting is 17 years old and the watercolor is 3 years old. **43.** The 5¢ coin is 4 years old, and the 10¢ coin is 8 years old.

REVIEW/TESTS
Pages 161–162

1.1a $\frac{3}{5}$; 0.60 **1.1b** $\frac{5}{8}$ **1.2a** 37.5% **1.2b** $87\frac{1}{2}\%$ **2.1a** 6.4 **2.1b** 125% **2.2** The value of the computer last year was \$3000. **3.1** The cost is \$200. **3.2** The discount rate is 20%. **4.1** \$5000 should be invested at 10%, and \$2000 should be invested at 15%. **5.1** The merchant should use 8 lb of the \$7 coffee and 4 lb of the \$4 coffee. **5.2** 20 gal of the 15% solution must be used. **6.1** The first plane is traveling at a rate of 225 mph. The second plane is traveling at a rate of 125 mph. **7.1** The length is 14 m. The width is 5 m. **7.2** The measures of the angles are 48°, 33°, and 99°. **8.1** The integers are 5, 7, and 9. **8.2** There are 15 nickels and 35 quarters in the bank. **8.3** In 10 years the 5¢ stamp will be three times the age of the 20¢ stamp.

Pages 163–164

1.1a a **1.1b** b **1.2a** c **1.2b** b **2.1a** a **2.1b** a **2.2** d **3.1** d **3.2** c **4.1** d **5.1** c **5.2** a **6.1** b **7.1** c **7.2** b **8.1** c **8.2** a **8.3** a