



# Answers to Practice Problems

## Chapter 1

1.1  $x + x + 10 = 20$

$$x = 5$$

$$x + 10 = 15$$

The pieces are 5 and 15 in.

1.2 The pieces are 3, 4, and 5 ft.

1.3 The pieces are 3 and 6 ft.

1.4 The pieces are called  $x$ ,  $2x$ , and  $2x + 10$ .

They are 14, 28, and 38 in.

1.5  $x + x + 50\%x = 275$

$$2.5x = 275$$

$$x = 110$$

$$1.5x = 165$$

The ropes are 110 and 165 yards.

1.6 Elsa is 14 years old and Thor is 21 years old.

1.7 The grandmother is 84 years old.

- 1.8 If Jessica is  $x$ , the mother  $x + 28$ , and the grandmother  $2(x + 28)$   
 $x + x + 28 + 2(x + 28) = 100$   
 $x = 4$   
 The grandmother is  $2(4 + 28) = 64$  years old.
- 1.9  $E = 3L \quad \rightarrow 2E - 3L = 0$   
 $E + L = 65 \quad \rightarrow 3E + 3L = 195$   
 $5E = 195$   
 $E = 39$   
 $L = 65 - 39 = 26$   
 Answer: Eric is 39 years old and Lucas is 26 years old.
- 1.10 Michael is 12 years old.
- 1.11 The number is 26.
- 1.12 The sun rose at 7:48 a.m.
- 1.13 The water level was 67.2 ft.
- 1.14 The population was 503.
- 1.15 Joan weighted 133 lbs.
- 1.16  $-6 > -10$
- 1.17  $x \geq 18$
- 1.18  $x \geq 8$
- 1.19 7, 9, 11, 13, 15
- 1.20 -6, -4, -2
- 1.21 -2, -1, 0, 1, 2
- 1.22 The first integer is 10.
- 1.23 The product of 6 and 8 is 48.
- 1.24 Call the integers  $x$ ,  $x + 2$  and  $x + 4$   
 $6x = 5(x + 2)$   
 $x = 10$   
 The largest integer is 14.
- 1.24 The integers are 45, 46, 47, and 48.

1.26 Call the integers  $x, x + 2, x + 4$ .

$$3x = x + 2 + x + 4$$

The integers are 6, 8, and 10.

1.27 The first odd integer is 7.

1.28 The even integers are 4, 6, and 8.

1.29 Call the integers  $x$  and  $x + 1$

$$x(x + 1) = 20$$

$$x^2 + x - 20 = 0$$

$$(x + 5)(x - 4) = 0$$

$$x + 5 = 0$$

$$x = -5$$

Reject:  $x$  is a positive integer

$$x - 4 = 0$$

$$x = 4$$

$$x + 1 = 5$$

The consecutive positive integers are 4 and 5.

1.30  $x(x + 4) = 5$

$$x = -5 \qquad x = 1$$

$$x + 4 = -1 \qquad x + 4 = 5$$

The numbers are  $-5$  and  $-1$  or  $1$  and  $5$ .

1.31 The integers are  $-5$  and  $-3$  or  $3$  and  $5$ .

1.32 The numbers are  $9$  and  $27$  or  $-9$  and  $-27$ .

1.33 The numbers are  $-22$  and  $-20$  or  $20$  and  $22$ .

## Chapter 2

2.1  $1/300$

2.2  $9/200$  or  $0.045$

2.3  $0.00006$

2.4  $0.017$

2.5  $4$

2.6  $300$

2.7  $0.1875$

- 2.8 525
- 2.9 0.4
- 2.10 12%
- 2.11 0.56%
- 2.12 1200%
- 2.13 80%
- 2.14  $66\frac{2}{3}\%$  or 66.67%
- 2.15 50,000%
- 2.16 25%
- 2.17 6350
- 2.18 1050
- 2.19 80%
- 2.20 \$700
- 2.21 \$120
- 2.22 350
- 2.23 \$80
- 2.24 \$3000
- 2.25 \$11.50
- 2.26 2.88%
- 2.27 50%
- 2.28 15.5%
- 2.29 16.4%
- 2.30 \$265,000
- 2.31 \$31.50
- 2.32 5%
- 2.33 5%
- 2.34 \$127.50
- 2.35 \$200.60
- 2.36 \$100

- 2.37 \$180
- 2.38 15.33%
- 2.39 90¢
- 2.40 Both cost the same: \$200.
- 2.41 You pay \$42; the order does not matter.
- 2.42 \$153
- 2.43 \$89.76
- 2.44 12.2%
- 2.45 653
- 2.46 a) 2%    b) 2 years
- 2.47 6%
- 2.48 \$501.88
- 2.49 \$502.85
- 2.50 \$21,333.33
- 2.51 \$7.67
- 2.52  $1000 + 1000(10\%)(1/12) = 1008.33$   
 $1008.33 + 1008.33(10\%)(1/12) = 1016.73$   
 $1016.73 + 1016.73(10\%)(1/12) = 1025.20$   
 $1025.20 - 1000 = 25.20$   
Answer: The interest was \$25.20.
- 2.53  $500(1 + 2\% \div 12)^{12} = 510.09$   
Answer: \$510.09 - \$500 = \$10.09
- 2.54  $700(1 + 1.5\% \div 365)^{365} = 710.58$   
Answer: \$710.58
- 2.55  $12,000(1 + 12\%)^4 = 18,882.23$   
 $18,882.33 - 12,000 = 6,882.23$   
Answer: Barbara owes \$6,882.23.
- 2.56  $6800(1 + x\%)^5 = 10,000$   
 $(1 + x\%)^5 = 1.4706$   
Replace  $x$  by 6, 7, 8, 9 until you get a true statement.  
 $(1 + 8\%)^5 = 1.4693$ , which is approximately 1.47.

- 2.57 Day-to-Day:  $1500(1+0.5\%)^3 = 1522.61$   
 Interest =  $1522.61 - 1500 = 22.61$   
 Credit Union:  $1500(1 + 2.72\% \div 4)^{12} = 1627.08$   
 Interest =  $1627.08 - 1500 = 127.08$   
 $127.08 - 22.61 = 104.47$   
 Answer: The Credit Union pays \$104.47 more.
- 2.58 Bought:  $100 \times \$10 = \$1000$   
 Sold:  $100 \times \$12.05 = \$1205$   
 Dividend:  $4 \times \$1.25 = \$5.00$   
 Earnings:  $\$1205 + \$5.00 - \$1000 = \$210$   
 Jim's profit was \$210.
- 2.59 a)  $7 \times 10 \times 15 = \$1050$   
 b)  $10 \times 100 = \$1000$   
 c)  $15/50 = 30\%$
- 2.60 Cost + mark-up \$70  
 Selling price: 0.85 of \$70 = \$59.50  
 Profit: \$9.50
- 2.61 Cost:  $60/1.2 = 50$   
 Selling price 0.8 of 50 = 40  
 The selling piece is \$40.

## Chapter 3

- 3.1 If Elsa is  $x$ , then Thor is  $x + 7$ .  
 Equation:  $x + x + 7 = 35$   
 Elsa is 14 years old and Thor is 21 years old.
- 3.2 I am  $x$  and my father is  $x + 41$ .  
 $x + 41 - 8 = 3(x + 5)$   
 $x = 9$  **I am 9 years old.**
- 3.3
- |        | Today | 5 years ago |
|--------|-------|-------------|
| Lyn    | $x$   | $x - 5$     |
| Father | $4x$  | $4x - 5$    |
- $4x - 5 = 7(x - 5)$   
 $x = 10$  Lyn is 10 years old.

- 3.4  $E + C + F = 61$   
 $E = C + 5$   
 $F = 6C$   
 $C + 5 + C + 6C = 61$   
 $8C = 56$   
 $C = 7$  Carl is 7 years old.
- 3.5 In  $x$  years:  $6 + x + 3 + x + 1 + x = 0.8(40 + x)$   
 $3x + 10 = 32 + 0.8x$   
 $2.2x = 22$   
 $x = 10$  In 10 years.
- 3.6 Eva is 44 years old.
- 3.7 Susan is 12 years old and Jack is 15 years old.
- 3.8 If Carla is  $x$ , then Glenn is  $x + 6$  years old.  
 $2(x + 6) + x = 57$   
 $x = 15$   $x + 6 = 21$   
Carla is 15 years old and Glenn is 21 years old.
- 3.9 Mary is 18 years old and Chris is 11 years old.
- 3.10  $5R - 3S = S$   
 $R = S - 2$   
Sig is 10 years old and Ray is 8 years old.
- 3.11  $A + V = 15$   
 $V = 1/2 A \rightarrow 2V = A$   
 $2V + V = 15$   
 $3V = 15$   
 $V = 5$  Victor is 5 and Adam is 10 years old.
- 3.12 Ina, Mina, and Mo are 24, 36, and 42 years old.
- 3.13 If Mark is  $x$  and Mindy is  $y$ ,  
then  $x + y = 84$  and  $3x = 4y$ .  
Mark is 48 years old and Mindy is 36 years old.
- 3.14 Jim and Jon are  $3x$  and  $7x$ , respectively.  
 $4(3x) = 7x + 40$   
 $x = 8$   
Jim is  $3(8) = 24$  years old.  
Jon is  $7(8) = 56$  years old.

- 3.15 David is 8 years old.
- 3.16 The mother is now 38 years old.
- 3.17 Ellen is 10 years old.
- 3.18 John is 9 and Ed is 17 years old.
- 3.19 Ginger is 8 years old.
- 3.20 Bev is  $x$  and Ron is  $x + 6$ .  

$$2(x + 10) + 1 = 3(x - 3)$$

$$x = 30$$
 Bev is 30 and Ron is 36 years old.
- 3.21 Phil is 27 years old. Reject  $-27$  because an age cannot be negative.
- 3.22 Ronald is 20 and Liz is 22 years old. Reject the negative answers.
- 3.23 The older daughter is 23 years old.
- 3.24 The first perfect square is  $45^2 = 2025$ . The mathematician will be 45 years old in 2025. In 2006 she will be  $2025 - 2006 = 19$  years younger or  $45 - 19 = 26$ . The mathematician will be 26 years old in 2006.
- 3.25  $S = L + 5$   
 $L^2 + 2S = 58$   
 $L^2 + 2L - 48 = 0$   
 $(L + 8)(L - 6) = 0$   
 $L = -8$  Reject  
 $L = 6$  Lucy is 6 years old.

## Chapter 4

- 4.1 40 \$3.85 stamps and 10 80¢ stamps
- 4.2 20 nickels and 40 dimes
- 4.3 32 nickels and 14 dimes
- 4.4 25 quarters and 2 dimes



$$4.5 \quad 20\%x + 50\%(80) = (80 + x)45\%$$

$$20x + 50(80) = (80 + x)45$$

$$x = 16$$

16 liters of the 20% solution

$$4.6 \quad \begin{array}{rclcl} 60 \text{ oz} & 20\% & 60(20\%) \\ x \text{ oz} & 100\% & 100x\%x \\ 60 + x & 40\% & (60 + x)40\% \end{array}$$

$$60(20\%) + 100\%x = (60 + x)40\%$$

Multiply by 100:

$$60(20) + 100x = (60 + x)40$$

$$x = 20$$

Add 20 oz. pure acid.

4.7 The punch has 19% (rounded) of pomegranate juice.

4.8 5 liters of water

4.9 3 liters of water

4.10 67 quarts (rounded)

4.11 Add 3.5 liters of water.

4.12 60 g of nickel

$$4.13 \quad \begin{array}{rclcl} 300 \text{ g} & 14\text{-c} & 300(14) \\ x \text{ g} & 24\text{-c} & 24x \\ 300 + x & 18\text{-c} & 18(300 + x) \end{array}$$

$$300(14) + 24x = 18(300 + x)$$

$$x = 200$$

Add 200 g pure gold.

4.14 A chicken has 2 legs and a sheep has 4 legs.

$$\text{Total number of heads: } x + y = 22$$

$$\text{Total number of legs: } 2x + 4y = 58$$

Solve the system of equations:

$$x = 15 \text{ and } y = 7$$

There are 15 chickens and 7 sheep.

4.15 Selma has 60 \$10 bills.

4.16 There were 7 \$20 bills.

$$4.17 \quad 2x + 3(x - 50) = 1450$$

$$x = 320$$

An adult ticket was \$320.

$$4.18 \quad 5g + 8c = 170$$

$$7g + 4c = 130$$

$$g = 10$$

$$c = 15$$

The gum cost 10¢ and the chocolate cost 15¢.

$$4.19 \quad 40 \text{ regular hours} + 7 \text{ hours overtime} = \$390$$

$$42 \text{ regular hours} + 8 \text{ hours overtime} = \$416$$

Kelly's overtime rate is \$10 per hour.

	Amount	Percent	Interest
CD	$x$	1.20%	$1.2x\%$
Bonds	$3000 - x$	3%	$\frac{3\%(3000 - x)}{\$72}$

$$1.2x\% + 3\%(3000 - x) = 72$$

Multiply both sides by 100:

$$1.2x + 9000 - 3x = 7200$$

$$x = 1000$$

$$3000 - 1000 = 2000$$

Paul invested \$2000 in bonds.

## Chapter 5

$$5.1 \quad 5 \text{ min.} : 60 \text{ min.} = 1:12$$

$$5.2 \quad 3x + 4x = 21$$

$$x = 3$$

$$3x = 9$$

$$4x = 12$$

The pieces are 9 and 12 in.

$$5.3 \quad 3 \text{ women} + 7 \text{ men} = 10 \text{ total}$$

$$7/10 \text{ of } 4680 \text{ men} = 3276$$

$$3/10 \text{ of } 4680 \text{ women} = 1404$$

There were 3276 men and 1404 women.

5.4 16 students + 1 professor = 17 total

$$1/17 \text{ of } 3400 = 200$$

200 professors at the game.

5.5 8 women, 20 people, 12 men

$$\text{Men: women} = 12:8 = 3:2$$

The ratio of men to women is 3:2.

5.6 462 miles

$$5.7 \quad \frac{48}{6} = \frac{256}{x}$$

$$x = 32$$

The cost is 32¢.

5.8 9 in.

5.9 20

5.10 100 times

$$5.11 \quad \frac{x}{6} = \frac{48}{8}$$

$$x = 36$$

The flagpole is 36 ft. tall.

5.12 42 in.

5.13 3/4 lb.

5.14 18 cups

5.15 1/2 pint

5.16 4.5 ft.

5.17 13 5/6 years

5.18 80 servings

5.19 80 square yards

5.20 1760 yards

5.21 5 lbs. peaches

2 2/9 cups apricot jam

5.22  $1296 \text{ in.}^2$

5.23	Unit	Teaspoons	Tablespoons	Cups	Pints	Quarts
	1 tsp.			1/48	1/96	1/192
	1 Tbsp.					1/64
	1 pint	96	32			

5.24  $25 \text{ Tbsp.} = 25/16 \text{ cups} = 1 \frac{9}{16} \text{ cups}$

5.25 7 cans

5.26 14 Tbsp. are left.

5.27  $3 \frac{1}{8} \text{ pints}$

5.28 4500 g

5.29 380 cm

5.30 80 m

5.31 3.890 kg

5.32 1.5 dm

5.33  $1.50 \text{ cm}^2$

5.34  $5 \text{ mm}^2$

5.35  $75 \text{ cm}^2$

5.36  $3000 \text{ dm}^3$

5.37  $5000 \text{ cm}^3$

5.38 50 cL

5.39 3 dm

5.40 20 small units

5.41  $0.15 \text{ m} \times 0.12 \text{ m} = 15 \text{ cm} \times 12 \text{ cm}$

5.42  $100 \times 125 \text{ mm} = 12500 \text{ mm} = 12.5 \text{ m}$

5.43  $3 \times 200 \text{ mm} = 600 \text{ mm} = 60 \text{ cm}$

5.44  $1 \text{ cup} = 1/4 \text{ quarts} = 0.946 \text{ L} / 4 = 9.46 \text{ dL} / 4 = 2.4 \text{ dL}$   
(rounded)

5.45  $3.4 \text{ kg} = 7.48 \text{ lb.}$

$51 \text{ cm} = 20 \text{ in.}$

- 5.46 3.57 oz.  
 5.47 29.9 in.  
 5.48 11.6¢  
 5.49 5mm/sec.  
 5.50 40 km/hr.  
 5.51 \$1.17  
 5.52 1640 ft.  
 5.53 a) -40 b) 32 c) 50 d) 212  
 5.54 a) -40 b) -23 c) 0 d) 100  
 5.55 The babysitter thought that the temperature was measured in Celsius degrees, not in Fahrenheit.  
 100 °C = 212 °F, the temperature of boiling water!

## Chapter 6

- 6.1 4 mph  
 6.2 They meet after 2 hours, 30 miles from Carl's house.  
 6.3 The speeds are 50 and 60 mph.  
 6.4
- |      | R                                       | T         | D       |
|------|---|-----------|---------|
| Up   | $3.3/5 \text{ mph} = 0.66 \text{ mph}$  | 5 hr.     | 3.3 mi. |
| Down | $3.3/1.5 \text{ mph} = 2.2 \text{ mph}$ | 1 1/2 hr. | 3.3 mi. |
- The difference between the rates is 1.54 mph.
- 6.5 Total trip: 400 miles  
 $200/45 \text{ hr.} = 4.4 \text{ hr.}$   
 $200/55 \text{ hr.} = 3.6 \text{ hr.}$   
 Total time: 8 hours  
 Average speed:  $400/8 \text{ mph} = 50 \text{ mph}$
- 6.6 The car went on the dirt road for 1 hour.  
 6.7 They met after  $1 \frac{2}{7}$  hour or 1 hour 17 min.  
 The time is then 11:57.

6.8		R	T	D
	Old	$r$	$d/r$	$d$
	New	$1.2r$	$9/12 d/r$	$0.9d$

The new time is  $3/4$  of the old time, or 25% shorter.

- 6.9 Rate in still water: 6 mph  
Rate of current: 2 mph
- 6.10 Speed in still air: 525 mph  
Speed of wind: 75 mph

6.11 2 hours

6.12 40 minutes

$$6.13 \quad \frac{2}{3} + \frac{2}{x} = 1$$

$$x = 6$$

It takes Jonas 6 hours to do the job alone.

6.14		R	T	W
	A + B	$1/12$	8 hr.	$8/12$
	C	$1/x$	8 hr.	$8/x$
	A + B + C	$1/8$	8 hr.	1

$$8/12 + 8/x = 1$$

$$x = 24$$

Alternate solution:

$$1/12 + 1/x = 1/8$$

$$2x + 24 = 3x$$

$$x = 24$$

It would take Carl 24 hours to do the job alone.

6.15 120 minutes

- 6.16 3 R 17 cars 10 min.  
1 R  $17/(30)$  cars/min.  
14 R  $14(17)/30$  cars/min.  
14 R  $14(17)45/30$  cars/min.  
14 robots can assemble 357 cars.

6.17 20 minutes

6.18 3 hours

6.19  $x/12 - x/30 = 1$

$$x = 20$$

It takes 20 minutes.

## Chapter 7

7.1	Mean	a) 5	b) 8 (rounded)	c) -4 (rounded)
	Median	6	8	-4
	Mode	1 and 7	8	-5
	Range	8	4	7

7.2  $\frac{12 \times 25 + 13 \times 20}{26} = \frac{560}{25} = 22.4$

7.3 23 (rounded)

7.4 24 (rounded)

7.5 34.5

7.6 The shape of the bar graph and frequency polygon will depend on the frequency of heads you obtain.

7.7	Mean	38.3
	Median	37
	Mode	none
	Range	52

7.8	Mean	7.8
	Median	8
	Mode	8
	Range	4

7.9	Frequency	Distribution
	0	2
	1	5
	2	6
	3	3
	4	2
	5	1
	6	1

- Mean 2.25  
 Median 2  
 Range 6
- 7.10 Mean 5.7  
 Median 5.5  
 Mode 5
- 7.11 a) Salaries for teachers  $\frac{52\% \times 4.3}{709}$  mil. = \$3154  
 b) Upkeep of buildings  $\frac{26\% \times 4.3}{709}$  mil. = \$1577
- 7.12 Men + Women over 65: 1,543,332  
 Total population: 8,837,496  
 $\frac{1,543,332}{8,837,496} \times 360^\circ = 63^\circ$
- 7.13 a) \$125,000      b) \$75,000
- 7.14 a)  $\frac{15}{60} = \frac{1}{4}$     b)  $\frac{20}{60} = \frac{1}{3}$     c)  $\frac{5}{60} = \frac{1}{12}$
- 7.15  $6/10 = 3/5$ , or 0.6
- 7.16 Total number of minutes in 24 hours: 1440 minutes.  
 Equal digits: 1.11, 2.22, 3.33, 4.44, 5.55, 11.11.  
 11.11 occurs once, the others twice during 24 hours.  
 Probability:  $11/1440 = 0.0076$  or 0.76%
- 7.17  $1/52$
- 7.18  $6/52 = 3/26$ , or 11.53%
- 7.19 a)  $1/6$     b)  $3/6 = 1/2$     c)  $2/6 = 1/3$     d) 0
- 7.20 a)  $1/8$     b)  $3/8$     c)  $1/8$
- 7.21 a)  $\frac{25}{84}$     b)  $\frac{40}{84} = \frac{10}{21}$     c)  $\frac{29}{84}$
- 7.22 3:3 = 1:1



$$7.23 \quad 3:3 = 1:1$$

$$7.24 \quad \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$$

$$7.25 \quad 30\% \times 30\% = 9\%$$

$$7.26 \quad \frac{1}{6} \times \frac{3}{6} = \frac{1}{12}$$

$$7.27 \quad \frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$$

$$7.28 \quad a) \frac{2}{9} \times \frac{2}{9} = \frac{4}{81} \quad b) \frac{2}{9} \times \frac{1}{8} = \frac{1}{36}$$

$$7.29 \quad \frac{7}{25} + \frac{10}{25} = \frac{17}{25}$$

$$7.30 \quad \frac{4}{52} + \frac{4}{52} = \frac{8}{52} = \frac{2}{13}$$

$$7.31 \quad \frac{1}{6} + \frac{3}{6} = \frac{4}{6} = \frac{2}{3}$$

$$7.32 \quad \frac{6}{36} + \frac{3}{36} - \frac{1}{36} = \frac{8}{36} = \frac{2}{9}$$

$$7.33 \quad \frac{3}{6} + \frac{1}{6} + \frac{1}{6} - \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$$

$$7.34 \quad \frac{1}{6} \left( \frac{1}{6} + \frac{1}{6} \right) = \frac{1}{6} \times \frac{1}{3} = \frac{1}{18}$$

$$7.35 \quad 534 \times 216 = 115,344 \text{ dates}$$

$$7.36 \quad (3)(3)(3) = 27$$

$$7.37 \quad 5 \times 4 \times 3 \times 2 \times 1 = 120 \text{ ways}$$

- 7.38  $(2)(3)(2)(1) = 12$   
 7.39  $(3)(2)(1)(1) = 6$   
 7.40 CIRCLE has 6 letters but 2 are the same.  
 The number of arrangements is  $6!/2! = 360$   
 7.41  $\{2, 4, 6, \dots\}$   
 7.42 a) the empty set  $\{ \}$  or  $\emptyset$   
 b)  $\{1, 2, 3, 4, 5, 6, 8\}$   
 7.43 36 students are taking German.  
 7.44 14 people could both sing and dance.  
 7.45 20 cars have both an airbag and a car phone.

## Chapter 8

- | 8.1 | Complementary | Supplementary |
|-----|---------------|---------------|
| a)  | $45^\circ$    | $135^\circ$   |
| b)  | $60^\circ$    | $150^\circ$   |
| c)  | $0^\circ$     | $90^\circ$    |
| d)  | $23^\circ$    | $113^\circ$   |
| e)  | $15^\circ$    | $105^\circ$   |
- 8.2  $w = 7 \text{ cm} = 14 \text{ cm}$   
 8.3  $w = 7 \text{ units}$        $l = 13 \text{ units}$   
 8.4  $w = 13 \text{ cm}$        $l = 18 \text{ cm}$   
 8.5 20 in.  
 8.6  $l = 4.5 \text{ in.}$        $w = 3 \text{ in.}$   
 8.7 14.4 in.  
 8.8 13 cm, 26 cm, and 21 cm  
 8.9 36 in.  
 8.10  $20.25 \text{ in.}^2$   
 8.11  $x^2 = (x + 2)(x - 1)$   
 $x = 2$   
 The area is  $4 \text{ in.}^2$

$$\begin{aligned}
 8.12 \quad & 2x + 2y = 24 \\
 & 3x \times 2y = 160 + xy \\
 & \quad xy = 32 \\
 & \quad y = 12 - x \\
 & x(12 - x) = 32 \\
 & x^2 - 12x + 32 = 0 \\
 & (x - 8)(x - 4) = 32 \\
 & \quad x = 8 \qquad x = 4 \\
 & \quad y = 4 \qquad y = 8
 \end{aligned}$$

The sides are 4 in. and 8 in.

$$8.13 \text{ Area of rectangle: } 11.2 \times 6 = 67.2$$

$$\frac{67.2 - 64}{64} = 5\%$$

The area is 5% larger.

$$8.14 \text{ 8 in.}$$

$$8.15 \quad \frac{5b}{2} = 30$$

$$b = 12 \text{ inches}$$

$$8.16 \text{ 10 units}$$

$$8.17 \text{ 25 units}$$

$$8.18 \text{ The area is 6 in.}^2$$

$$3b/2 = 6$$

$$b = 4$$

This is a right triangle with the legs 3 in. and 4 in.

$$8.19 \quad \sqrt{65 - 49} = \sqrt{16} = 4$$

The missing leg is 4 units.

$$8.20 \quad \sqrt{20^2 - 8^2} = \sqrt{336} = 18.3$$

The ladder is 18.3 feet up on the wall.

$$8.21 \quad A = 80^\circ \qquad B = 40^\circ \qquad C = 60^\circ$$

8.22  $A = 90^\circ$

8.23  $3x + 5x + 52 = 180$

$$x = 16$$

$$3(16) = 48$$

$$5(16) = 80$$

The angles are  $48^\circ$  and  $80^\circ$ .

8.24  $A + B = 156$

$$A = C$$

$$A + B + C = 180$$

$$\text{Angle } B = 132^\circ$$

8.25  $x = 10$

8.26  $x = 4.5$

8.27 The sides are 15 and 18 cm.

8.28 The tree is 36 ft.

8.29  $12/9 = 4/3$

The area is  $1 \frac{1}{3} \text{ in.}^2$

8.30  $r = 10$

8.31  $\pi \cdot 1.5 \cdot 2 = 3\pi$  cm or about 9.4 cm

8.32 
$$A = \frac{1}{2}\pi\left(\frac{3}{2}\right)^2 = \frac{9}{8}\pi \text{ in.}^2 = 3.5 \text{ in.}^2$$

$$P = \frac{1}{2}3\pi + 3 = 1.5\pi + 3 \text{ in.} = 7.7 \text{ in.}$$

The area is approximately  $3.5 \text{ in.}^2$  and the perimeter is 7.7 inches.

8.33  $R = 5/8$  in.

$$r = 3/8 \text{ in.}$$

The area of the ring is  $R^2 - r^2$ .

The area is  $\pi/4$  sq. in. or  $0.79 \text{ in.}^2$ .

8.34  $142 \text{ in.}^2$

8.35  $600 \text{ in.}^2$

8.36  $204.48 \text{ in.}^2$

- 8.37  $60p + 2(9p) = 78p$   
The total surface area is  $78\pi$  in.<sup>2</sup>, or  
 $245$  in.<sup>2</sup>.
- 8.38  $125$  cm<sup>3</sup>
- 8.39  $25\pi h = 290$   
 $h = 3.7$  cm (approximately)
- 8.40  $\pi(4)(7) = 28\pi$  or  $88$   
 $88$  in.<sup>3</sup>
- 8.41 a)  $0.39$  b)  $0.47$  c)  $1.43$
- 8.42 a)  $30^\circ$  b)  $45^\circ$
- 8.43  $\sin 30^\circ = x/20$   
 $x = 10$
- 8.44  $\tan \alpha = 5/5$   
 $\alpha = 45$   
The angle is  $45^\circ$
- 8.45  $\tan 60 = x/20$   
 $x = 34.6$   
The length of the flagpole is  $34.6$  ft.
- 8.46  $A$  is on the  $+y$ -axis  
 $B$  is on the  $-x$ -axis  
 $C$  is the origin where the axes cross  
 $D$  is in the IV quadrant  
 $E$  is in the II quadrant  
 $F$  is in the III quadrant
- 8.47 When the  $x$ -numbers are equal, the line between points  
is vertical.  
When the  $y$ -numbers are equal, the line is horizontal.
- 8.48 a)  $4$  b)  $2$
- 8.49 a)  $5$  b)  $6$
- 8.50  $\sqrt{9+16} = 5$
- 8.51  $\sqrt{36+9} = \sqrt{45}$

8.52  $10 \times 3 / 2 = 15$

15 square units

8.53  $(13 - 5)(6 - 2) = 8(4) = 32$

32 square units

8.54 Use the example as a model.

The rectangle is 70.

The triangles are 2, 6, 12, 13.5.

The polygon is 36.5 square units.