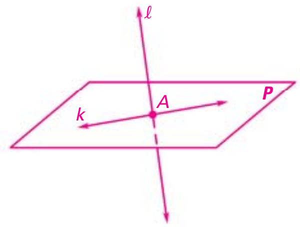
Selected Answers

Chapter 1

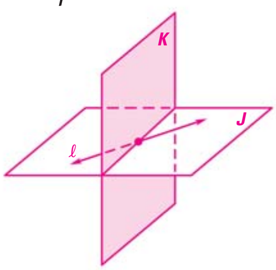
1.1 Skill Practice (pp. 5–7) **1. a.** point Q **b.** line segment MN **c.** ray ST **d.** line FG **3.** $\overleftrightarrow{QW}$, line g **5.** *Sample answer:* points R, Q, S; point T **7.** Yes; through any three points not on the same line, there is exactly one plane. **9.** $\overrightarrow{VY}$, $\overrightarrow{VX}$, $\overrightarrow{VZ}$, $\overrightarrow{VW}$ **11.** $\overrightarrow{WX}$

15. *Sample:*

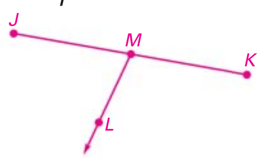


17. point R **19.** $\overleftrightarrow{RS}$ **21.** yes; yes

23. *Sample:*



25. *Sample:*



27. on the line **29.** not on the line **31.** on the line

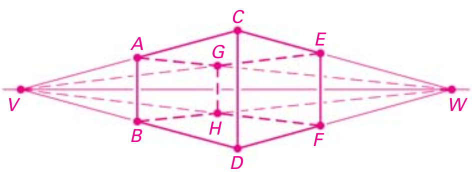
33. 

ray

35. 

segment

1.1 Problem Solving (pp. 7–8) **41.** intersection of a line and a plane **43.** Four points are not necessarily coplanar; no; three points determine a unique plane. **45. a–c.**



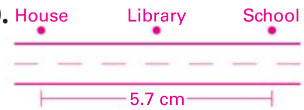
1.2 Skill Practice (pp. 12–13) **1.** $\overline{MN}$ means segment MN while MN is the length of $\overline{MN}$. **3.** 2.1 cm **5.** 3.5 cm **7.** 44 **9.** 23 **11.** 13 **13.** congruent **15.** not congruent **17.** 7 **19.** 9 **21.** 10 **23.** 20 **25.** 30 **29.** $(3x - 16) + (4x - 8) = 60$; 12; 20, 40

1.2 Problem Solving (pp. 13–14)
33. a. 1883 mi **b.** about 50 mi/h
35. a. *Sample:*

b. 21 ft

1.3 Skill Practice (pp. 19–20) **1.** Distance Formula **3.** $10\frac{1}{4}$ in. **5.** 26 cm **7.** $4\frac{3}{4}$ in. **9.** $2\frac{3}{8}$ in. **11.** 10 **13.** 1 **15.** 70 **17.** (5, 5) **19.** (1, 4) **21.** $\left(1\frac{1}{2}, -1\right)$ **23.** $\left(\frac{m}{2}, \frac{n}{2}\right)$; when x_2 and y_2 are replaced by zero in the Midpoint Formula and x_1 and y_1 are replaced by m and n the result is $\left(\frac{m}{2}, \frac{n}{2}\right)$. **25.** $(-3, 10)$ **27.** (4, 8) **29.** $(-18, 22)$ **31.** 4.5 **33.** 5.7 **35.** 7; $-\frac{1}{2}$ **37.** 40; 5 **39.** 9; $-3\frac{1}{2}$
43. $AB = 3\sqrt{5}$, $CD = 2\sqrt{10}$; not congruent
45. $JK = 8\sqrt{2}$, $LM = \sqrt{130}$; not congruent

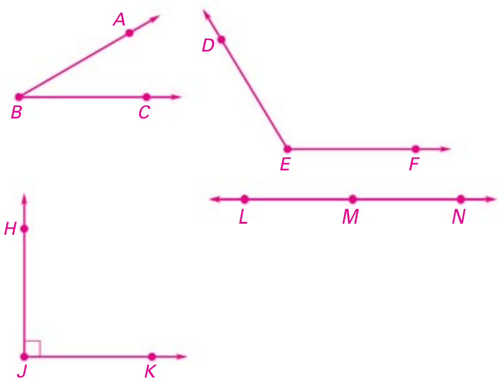
1.3 Problem Solving (pp. 21–22)
49.



2.85 km

51. objects B and D; objects A and C **53. a.** 191 yd **b.** 40 yd **c.** About 1.5 min; find the total distance, about 230 yards, and divide by 150 yards per minute.

1.4 Skill Practice (pp. 28–31)
1. *Sample:*

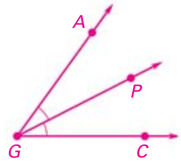


3. $\angle ABC$, $\angle B$, $\angle CBA$; B, $\overrightarrow{BA}$, $\overrightarrow{BC}$ **5.** $\angle MTP$, $\angle T$, $\angle PTM$; T, $\overrightarrow{TM}$, $\overrightarrow{TP}$ **7.** straight **9.** right **11.** 90°; right **13.** 135°; obtuse **15–19.** Sample answers are given. **15.** $\angle BCA$; right **17.** $\angle DFB$; straight **19.** $\angle CDB$; acute **23.** 65° **25.** 55° **29.** $m\angle XWY = 104°$, $m\angle ZWY = 52°$

SELECTED ANSWERS

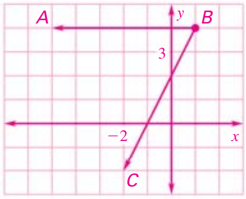
31. $m\angle XWZ = 35.5°$, $m\angle YWZ = 35.5°$ **33.** 38° **35.** 142° **37.** 53°

39. If a ray bisects $\angle AGC$ its vertex must be at point G. *Sample:*



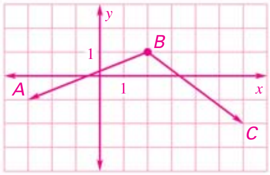
41. 80° **43.** 75°; both angle measures are 5° less.

45.



Acute. *Sample answer:* (−2, 0)

47.

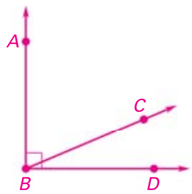


Obtuse. *Sample answer:* (2, 0)

1.4 Problem Solving (pp. 31–32) **51.** 34° **53. a.** 112° **b.** 56° **c.** 56° **d.** 56° **55.** *Sample answer:* acute: $\angle ABG$, obtuse: $\angle ABC$, right: $\angle DGE$, straight: $\angle DGF$ **57.** about 140° **59.** about 62° **61.** about 107°

1.5 Skill Practice (pp. 38–40)

1.

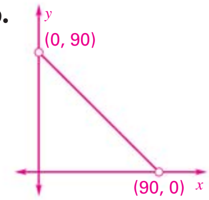


No. *Sample answer:* Any two angles whose angle measures add up to 90° are complementary, but they do not have to have a common vertex and side.

3. adjacent **5.** adjacent **7.** $\angle GLH$ and $\angle HLJ$, $\angle GLJ$ and $\angle JLK$ **9.** 69° **11.** 85° **13.** 25° **15.** 153° **17.** 135°, 45° **19.** 54°, 36° **21.** linear pair **23.** vertical angles **25.** linear pair **27.** neither **29.** The angles are complementary so they should be equal to 90°; $x + 3x = 90°$, $4x = 90$, $x = 22.5$. **31.** 10, 35 **33.** 55, 30 **35.** Never; a straight angle is 180°, and it is not possible to have a supplement of an angle that is 180°. **37.** Always; the sum of complementary angles is 90°, so each angle must be less than 90°, making them acute. **39.** 71°, 19° **41.** 68°, 22° **43.** 58°, 122°

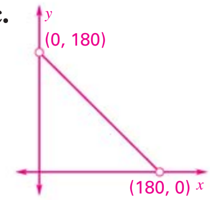
1.5 Problem Solving (pp. 40–41) **47.** neither **49–51.** Sample answers are given. **49.** $\angle FGB$, $\angle BGC$ **51.** $\angle AGE$, $\angle EGD$ **53.** *Sample answer:* Subtract 90° from $m\angle FGB$. **55. a.** $y_1 = 90 - x$, $0 < x < 90$; $y_2 = 180 - x$, $0 < x < 180$; the measure of the complement must be less than 90° and the measure of its supplement must be less than 180°.

55. b.



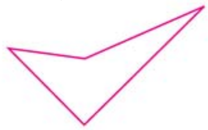
$0 < y_1 < 90$

c.

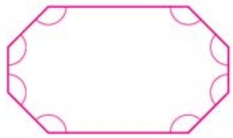


$0 < y_2 < 180$

1.6 Skill Practice (pp. 44–46) **1.** n is the number of sides of a polygon. **3.** polygon; concave **5.** polygon; convex **9.** Pentagon; regular; it has 5 congruent sides and angles. **11.** Triangle; neither; the sides and/or the angles are not all congruent. **13.** Quadrilateral; equiangular; it has 4 sides and 4 congruent angles. **15.** 8 in. **17.** 3 ft **19.** sometimes **21.** never **23.** never **25.** *Sample:*



27. *Sample:*



29. 1

1.6 Problem Solving (pp. 46–47) **33.** triangle; regular **35.** octagon; regular **39.** 105 mm; each side of the button is 15 millimeters long, so the perimeter of the button is 15(7) = 105 millimeters. **41. a.** 3 **b.** 5 **c.** 6 **d.** 8

1.7 Skill Practice (pp. 52–54) **1.** *Sample answer:* The diameter is twice the radius. **3.** (52)(9) must be divided by 2; $\frac{52(9)}{2} = 234$ ft^2. **5.** 22.4 m, 29.4 m^2 **7.** 180 yd, 1080 yd^2 **9.** 36 cm, 36 cm^2 **11.** 84.8 cm, 572.3 cm^2 **13.** 76.0 cm, 459.7 cm^2

15.

59.3 cm, 280.4 cm^2

17. 12.4 **21.** 1.44 **23.** 8,000,000 **25.** 3,456 **27.** 14.5 m **29.** 4.5 in. **31.** 6 in., 3 in. **33.** Octagon; dodecagon; the square has 4 sides, so a polygon with the same side length and twice the perimeter would have to have 2(4) = 8 sides, an octagon; a polygon with the same side length and three times the perimeter would have to have 4(3) = 12 sides, a dodecagon. **35.** $\sqrt{346}$ in. **37.** $5\sqrt{42}$ km

1.7 Problem Solving (pp. 54–56) **41.** 1350 yd^2; 450 ft **43. a.** 15 in. **b.** 6 in.; the spoke is 21 inches long from the center to the tip, and it is 15 inches from the center to the outer edge, so 21 − 15 = 6 inches is the length of the handle.

45. a. 106.4 m^2 **b.** 380 rows, 175 columns. *Sample answer:* The panel is 1520 centimeters high and each module is 4 centimeters so there are $1520 \div 4 = 380$ rows; the panel is 700 centimeters wide and each module is 4 centimeters therefore there are $700 \div 4 = 175$ columns.

1.7 Problem Solving Workshop (p. 57)
1. 2.4 h **3.** \$26,730

Chapter Review (pp. 60–63) **1.** endpoints **3.** midpoint **5.** *Sample answer:* points P, Y, Z **7.** $\overrightarrow{YZ}$, $\overrightarrow{YX}$ **9.** 1.2 **11.** 7 **13.** 16 **15.** 8.6; (3.5, 3.5) **17.** 16.4; (5, −0.5) **19.** 5 **21.** 162°; obtuse **23.** 7° **25.** 88° **27.** 124° **29.** 168° **31.** 92°, 88°; obtuse **33.** Quadrilateral; equiangular; it has four congruent angles but its four sides are not all congruent. **35.** 21 **37.** 14 in., 11.3 $in.^2$ **39.** 5 m

Algebra Review (p. 65) **1.** 6 **3.** −2 **5.** $1\frac{1}{2}$ **7.** 4 **9.** −11 **11.** 17 people

Chapter 2

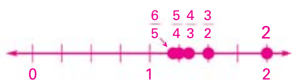
2.1 Skill Practice (pp. 75–76) **1.** *Sample answer:* A guess based on observation

3.

7. The numbers are 4 times the previous number; 768. **9.** The rate of decrease is increasing by 1; −6. **11.** The numbers are increasing by successive multiples of 3; 25. **13.** even

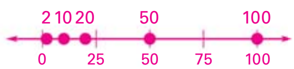
15. *Sample answer:* $(3 + 4)^2 = 7^2 = 49 \neq 3^2 + 4^2 = 9 + 16 = 25$ **17.** *Sample answer:* $3 \cdot 6 = 18$ **19.** To be true, a conjecture must be true for all cases. **21.** $y = 2x$

23. Previous numerator becomes the next denominator while the numerator is one more than the denominator; $\frac{6}{5}$.



25. 0.25 is being added to each number; 1.45.

27. Multiply the first number by 10 to get the second number, take half of the second number to get the third number, and repeat the pattern; 500.



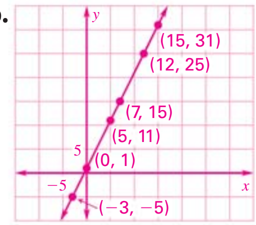
29. $r > 1$; $0 < r < 1$; raising numbers greater than one by successive natural numbers increases the result while raising a number between 0 and 1 by successive natural numbers decreases the result.

2.1 Problem Solving (pp. 77–78) **33.** *Sample answer:* The number of e-mail messages will increase in 2004; the number of e-mail messages has increased for the past 7 years.

35. a.

x	y
−3	−5
0	1
5	11
7	15
12	25
15	31

b.



c. Double the value of x and add 1 to the result, $y = 2x + 1$. **37. a.** sum, two **b.** 144, 233, 377 **c.** *Sample answer:* spiral patterns on the head of a sunflower

2.2 Skill Practice (pp. 82–84) **1.** converse **3.** If $x = 6$, then $x^2 = 36$. **5.** If a person is registered to vote, then they are allowed to vote. **7.** If an angle is a right angle, then its angle measure is 90°; if an angle measures 90°, then it is a right angle; if an angle is not a right angle, then it does not measure 90°; if an angle does not measure 90°, then it is not a right angle. **9.** If $3x + 10 = 16$, then $x = 2$; if $x = 2$, then $3x + 10 = 16$; if $3x + 10 \neq 16$, then $x \neq 2$; if $x \neq 2$, then $3x + 10 \neq 16$.

11. False. *Sample:*

13. False. *Sample answer:* $m\angle ABC = 60°$, $m\angle GEF = 120°$ **15.** False. *Sample answer:* 2 **17.** False; there is no indication of a right angle in the diagram. **19.** An angle is obtuse if and only if its measure is between 90° and 180°. **21.** Points are coplanar if and only if they lie on the same plane. **23.** good definition **27.** If $-x > -6$, then $x < 6$; true. **29.** *Sample answer:* If the dog sits, she gets a treat.

2.2 Problem Solving (pp. 84–85) **31.** true **33.** Find a counterexample. *Sample answer:* Tennis is a sport but the participants do not wear helmets. **35.** *Sample answer:* If a student is a member of the Jazz band, then the student is a member of the Band but not the Chorus. **37.** no

2.3 Skill Practice (pp. 90–91) **1.** Detachment **3.** *Sample answer:* The door to this room is closed. **5.** $-15 < -12$ **7.** If a rectangle has four equal side lengths, then it is a regular polygon. **9.** If you play the clarinet, then you are a musician. **11.** The sum is even; the sum of two even integers is even; $2n$ and $2m$ are even, $2n + 2m = 2(m + n)$, $2(n + m)$ is even.

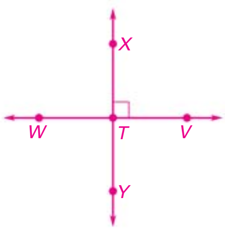
SELECTED ANSWERS

13. Linear pairs are not the only pairs of angles that are supplementary; angles *C* and *D* are supplementary, the sum of their measures is 180°.

2.3 Problem Solving (pp. 91–93) **17.** You will get a raise if the revenue is greater then its cost. **19.** is **21.** Deductive; laws of logic were used to reach the conclusion. **23.** $2n + (2n + 1) = (2n + 2n) + 1 = 4n + 1$, which is odd. **25.** True; since the game is not sold out, Arlo goes and buys a hot dog. **27.** False; Mia will buy popcorn.

Extension (p. 95) **1.** $\sim q \rightarrow \sim p$ **3.** Polygon *ABCDE* is not equiangular and not equilateral. **5.** Polygon *ABCDE* is equiangular and equilateral if and only if it is a regular polygon. **7.** No; it is false when the hypothesis is true while the conclusion is false.

2.4 Skill Practice (pp. 99–100) **1.** line perpendicular to a plane **3.** Postulate 5 **5. a.** If three points are not collinear, then there exists exactly one plane that contains all three points. **b.** If there is a plane, then three noncollinear points exist on the plane; if three points are collinear, then there does not exist exactly one plane that contains all three; if there is not exactly one plane containing three points then the three points are collinear. **c.** contrapositive
7. *Sample answer:* Lines *p* and *q* intersecting in point *H*
9. *Sample:*

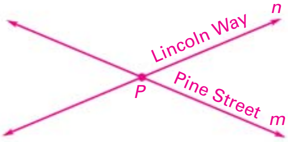


no; $\overline{XY}$ does not necessarily bisect $\overline{WV}$.

11. False. *Sample answer:* Consider a highway with two houses on the right side and one house on the left. **13.** False. *Sample answer:* Consider any pair of opposite sides of a rectangular prism.
15. false **17.** false **19.** true **21.** true **23.** false
25. *Sample:*

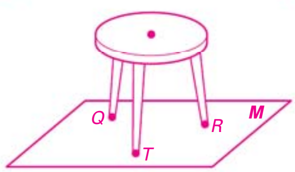
Postulate 5

Sample:



Postulate 7

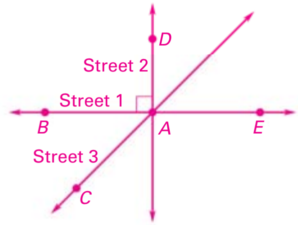
Sample:



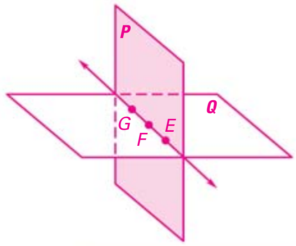
Postulate 8

27. *Sample answer:* Postulate 9 guarantees three noncollinear points on a plane while Postulate 5 guarantees that through any two there exist exactly one line therefore there exists at least one line in the plane.

2.4 Problem Solving (pp. 101–102) **31.** Postulate 7 **33.** *Sample answer:* A stoplight with a red, yellow, and green light. **35.** *Sample answer:* A line passing through the second row of the pyramid. **37.** *Sample answer:* The person at the top and the two people at each end of the bottom row.
39. a. *Sample:*

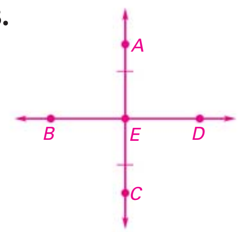


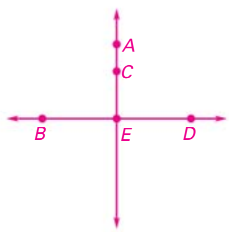
b. Building A **c.** right angle **d.** No; since $\angle CAE$ is obtuse, Building E must be on the east side of Building A. **e.** Street 1
41. They must be collinear. *Sample:*



They must be noncollinear. *Sample:*

43.





2.5 Skill Practice (pp. 108–109) **1.** Reflexive Property of Equality for Angle Measure **3.** Subtraction Property of Equality, Addition Property of Equality, Division Property of Equality

7. $4x + 9 = 16 - 3x$	Given
$7x + 9 = 16$	Addition Property of Equality
$7x = 7$	Subtraction Property of Equality
$x = 1$	Division Property of Equality

9. $3(2x + 11) = 9$	Given
$6x + 33 = 9$	Distributive Property
$6x = -24$	Subtraction Property of Equality
$x = -4$	Division Property of Equality

11. $44 - 2(3x + 4) = -18x$	Given
$44 - 6x - 8 = -18x$	Distributive Property
$36 - 6x = -18x$	Simplify.
$36 = -12x$	Addition Property of Equality
$-3 = x$	Division Property of Equality

13. $2x - 15 - x = 21 + 10x$	Given
$x - 15 = 21 + 10x$	Simplify.
$-15 = 21 + 9x$	Subtraction Property of Equality
$-36 = 9x$	Subtraction Property of Equality
$-4 = x$	Division Property of Equality

15. $5x + y = 18$	Given
$y = 18 - 5x$	Subtraction Property of Equality

17. $12 - 3y = 30x$	Given
$-3y = 30x - 12$	Subtraction Property of Equality
$y = \frac{30x - 12}{-3}$	Division Property of Equality
$y = -10x + 4$	Simplify.

19. $2y + 0.5x = 16$	Given
$2y = -0.5x + 16$	Subtraction Property of Equality
$y = \frac{-0.5x + 16}{2}$	Division Property of Equality
$y = -0.25x + 8$	Simplify.

21. $20 + CD$ **23.** AB, CD **25.** $m\angle 1 = m\angle 3$ **27.** *Sample answer:* Look in the mirror and see your reflection; 12 in. = 1 ft, so 1 ft = 12 in.; 10 pennies = 1 dime and 1 dime = 2 nickels, so 10 pennies = 2 nickels.

29. $AD = CB$	Given
$DC = BA$	Given
$AC = AC$	Reflexive Property of Equality
$AD + DC = CB + DC$	Addition Property of Equality
$AD + DC = CB + BA$	Substitution
$AD + DC + AC = CB + BA + AC$	Addition Property of Equality

2.5 Problem Solving (pp. 110–111)

31. $P = 2\ell + 2w$	Given
$P - 2w = 2\ell$	Subtraction Property of Equality
$\frac{P - 2w}{2} = \ell$	Division Property of Equality

length: 16.5 m

33. Row 1: Marked in diagram; Row 2: Substitute $m\angle GHF$ for 90°; Row 3: Angle Addition Postulate; Row 4: Substitution Property of Equality; Row 5: $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 1$; Substitution Property of Equality; Row 6: Subtract $m\angle 1$ from both sides. **35.** 116°

2.6 Skill Practice (pp. 116–117) **1.** A theorem is a statement that can be proven; a postulate is a rule that is accepted without proof. **3.** 3. Substitution; 4. $AC = 11$ **5.** $\overline{SE}$ **7.** $\angle J, \angle L$ **9.** Reflexive Property of Congruence **11.** Reflexive Property of Equality **13.** The reason is the Transitive Property of Congruence not the Reflexive Property of Congruence.

15. 

17. Equation	**Explanation**	**Reason**
$\overline{QR} \cong \overline{PQ}$, $\overline{RS} \cong \overline{PQ}$	Write original statement.	Given
$2x + 5 = 10 - 3x$	Marked in diagram.	Transitive Property of Congruent Segments
$5x + 5 = 10$	Add $3x$ to each side.	Addition Property of Equality
$5x = 5$	Subtract 5 from each side.	Subtraction Property of Equality
$x = 1$	Divide each side by 5.	Division Property of Equality

19. A proof is deductive reasoning because it uses facts, definitions, accepted properties, and laws of logic.

2.6 Problem Solving (pp. 118–119) **21.** 2. Definition of angle bisector; 4. Transitive Property of Congruence

23. Statements	Reasons
1. $2AB = AC$	1. Given
2. $AC = AB + BC$	2. Segment Addition Postulate
3. $2AB = AB + BC$	3. Transitive Property of Segment Equality
4. $AB = BC$	4. Subtraction Property of Equality

25. Statements	Reasons
1. A is an angle.	1. Given
2. $m\angle A = m\angle A$	2. Reflexive Property of Equality
3. $\angle A \cong \angle A$	3. Definition of congruent angles

SELECTED ANSWERS

27. Equiangular; the Transitive Property of Congruent Angles implies $m\angle 1 = m\angle 3$, so all angle measures are the same.

29. a.

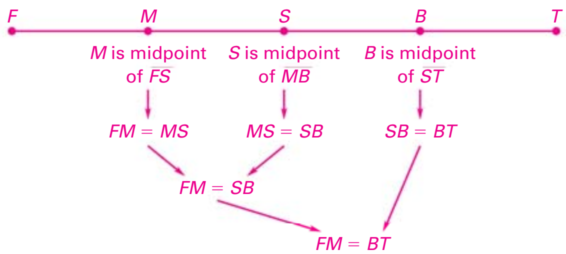
b. Given: $\overline{RS} \cong \overline{CF}$, $\overline{SM} \cong \overline{MC} \cong \overline{FD}$, Prove: $\overline{RM} \cong \overline{CD}$

c.

Statements	Reasons
1. $\overline{RS} \cong \overline{CF}$, $\overline{SM} \cong \overline{MC} \cong \overline{FD}$	1. Given
2. $RS + SM = RM$	2. Segment Addition Postulate
3. $CF + FD = CD$	3. Segment Addition Postulate
4. $CF + FD = RM$	4. Substitution Property of Equality
5. $FM = BT$	5. Transitive Property of Segment Congruence
6. $RM = CD$	6. Definition of congruent segments

2.6 Problem Solving Workshop (p. 121) **1. a.** *Sample answer:* The logic used is similar; one uses segment length and the other uses segment congruence. **b.** *Sample answer:* Both the same; the logic is similar.

3.



Statements	Reasons
1. M is halfway between F and S; S is halfway between M and B; B is halfway between S and T.	1. Given
2. M is the midpoint of $\overline{FS}$; S is the midpoint of $\overline{MB}$; B is the midpoint of $\overline{ST}$.	2. Definition of midpoint
3. $FM = MS$, $MS = SB$, $SB = BT$	3. Definition of midpoint
4. $FM = SB$	4. Transitive Property of Equality
5. $FM = BT$	5. Transitive Property of Equality

5. a. *Sample answer:* The proof on page 114 is angle congruence while this one is segment congruence. **b.** *Sample answer:* If $\overline{FG} \cong \overline{DE}$ is the second statement, the reason would have to be Symmetric Property of Segment Congruence and that is what is being proven and you cannot use a property that you are proving as a reason in the proof.

2.7 Skill Practice (pp. 127–129) **1.** vertical **3.** $\angle MSN$ and $\angle PSQ$, $\angle NSP$ and $\angle QSR$; indicated in diagram, Congruent Complements Theorem **5.** $\angle FGH$ and $\angle WXZ$; Right Angles Congruence Theorem **7.** Yes; perpendicular lines form right angles. **9.** 168°, 12°, 12° **11.** 118°, 118°, 62° **13.** $x = 13$, $y = 20$ **15.** *Sample answer:* It was assumed that $\angle 1$ and $\angle 3$, and $\angle 2$ and $\angle 4$ are linear pairs, but they are not; $\angle 1$ and $\angle 4$, and $\angle 2$ and $\angle 3$ are not vertical angles and are not congruent. **17.** 30° **19.** 27° **21.** 58° **23.** true **25.** false **27.** true **29.** 140°, 40°, 140°, 40° **31.** $\angle FGH$ and $\angle EGH$; Definition of angle bisector **33.** *Sample answer:* $\angle CEB$ and $\angle DEB$; Right Angle Congruence Theorem

2.7 Problem Solving (pp. 129–131)

37. 1. Given; 2. Definition of complementary angles; 3. $m\angle 1 + m\angle 2 = m\angle 1 + m\angle 3$; 4. $m\angle 2 = m\angle 3$; 5. Definition of congruent angles

39.

Statements	Reasons
1. $\overline{JK} \perp \overline{JM}$, $\overline{KL} \perp \overline{ML}$, $\angle J \cong \angle M$, $\angle K \cong \angle L$	1. Given
2. $\angle J$ and $\angle L$ are right angles.	2. Definition of perpendicular lines
3. $\angle M$ and $\angle K$ are right angles.	3. Right Angle Congruence Theorem
4. $\overline{JM} \perp \overline{ML}$ and $\overline{JK} \perp \overline{KL}$	4. Definition of perpendicular lines

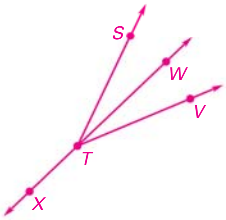
41.

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are complementary; $\angle 3$ and $\angle 2$ are complementary.	1. Given
2. $m\angle 1 + m\angle 2 = 90°$, $m\angle 3 + m\angle 2 = 90°$	2. Definition of complementary angles
3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	3. Transitive Property of Equality
4. $m\angle 1 = m\angle 3$	4. Subtraction Property of Equality
5. $\angle 1 \cong \angle 3$	5. Definition of congruent angles

43.

Statements	Reasons
1. $\angle QRS$ and $\angle PSR$ are supplementary.	1. Given
2. $\angle QRS$ and $\angle QRL$ are a linear pair.	2. Definition of linear pair
3. $\angle QRS$ and $\angle QRL$ are supplementary.	3. Definition of linear pair
4. $\angle QRL$ and $\angle PSR$ are supplementary.	4. Congruent Supplements Theorem

45. a.



b. $\angle STV$ is bisected by $\overrightarrow{TW}$, and $\overrightarrow{TX}$ and $\overrightarrow{TW}$ are opposite rays, $\angle STX \cong \angle VTX$

c.

Statements	Reasons
1. $\angle STV$ is bisected by $\overrightarrow{TW}$; $\overrightarrow{TX}$ and $\overrightarrow{TW}$ are opposite rays.	1. Given
2. $\angle STW \cong \angle VTW$	2. Definition of angle bisector
3. $\angle VTW$ and $\angle VTX$ are a linear pair; $\angle STW$ and $\angle STX$ are a linear pair.	3. Definition of linear pair
4. $\angle VTW$ and $\angle VTX$ are supplementary; $\angle STW$ and $\angle STX$ are supplementary.	4. Definition of linear pair
5. $\angle STW$ and $\angle VTX$ are supplementary.	5. Substitution
6. $\angle STX \cong \angle VTX$	6. Congruent Supplements Theorem

Chapter Review (pp. 134–137) **1.** theorem **3.** $m\angle A = m\angle C$ **5.** *Sample answer:* $\frac{-10}{-2} = 5$ **7.** Yes. *Sample answer:* This is the definition for complementary angles. **9.** $\angle B$ measures 90°. **11.** The sum of two odd integers is even. *Sample answer:* $7 + 1 = 8$; $2n + 1$ and $2m + 1$ are odd, but their sum $(2n + 1) + (2m + 1) = 2m + 2n + 2 = 2(m + n + 1)$ is even.

15.

$15x + 22 = 7x + 62$	Given
$8x + 22 = 62$	Subtraction Property of Equality
$8x = 40$	Subtraction Property of Equality
$x = 5$	Division Property of Equality

17.

$5x + 2(2x - 23) = -154$	Given
$5x + 4x - 46 = -154$	Distributive Property
$9x - 46 = -154$	Simplify.
$9x = -108$	Addition Property of Equality
$x = -12$	Division Property of Equality

19. Reflexive Property of Congruence

21.

$\angle A \cong \angle B$, $\angle B \cong \angle C$	Given
$m\angle A = m\angle B$, $m\angle B = m\angle C$	Definition of angle congruence
$m\angle A = m\angle C$	Transitive Property of Equality
$\angle A \cong \angle C$	Definition of angle congruence

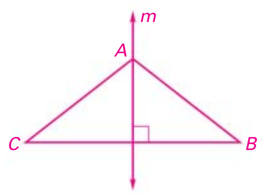
23. 123°, 57°, 123°

Algebra Review (p. 139) **1.** $\frac{x^2}{4}$ **3.** $m + 7$ **5.** $\frac{k + 3}{-2k + 3}$ **7.** 2 **9.** $\frac{x - 2}{2x - 1}$ **11.** $-6\sqrt{5}$ **13.** $\pm 8\sqrt{2}$ **15.** $12\sqrt{6}$ **17.** $20\sqrt{2}$ **19.** $100\sqrt{2}$ **21.** 25 **23.** $\sqrt{13}$

Chapter 3

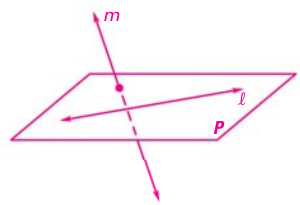
3.1 Skill Practice (pp. 150–151) **1.** transversal **3.** $\overleftrightarrow{AB}$ **5.** $\overleftrightarrow{BF}$ **7.** $\overleftrightarrow{MK}$, $\overleftrightarrow{LS}$ **9.** No. *Sample answer:* There is no arrow indicating they are parallel. **11.** $\angle 1$ and $\angle 5$, $\angle 3$ and $\angle 7$, $\angle 2$ and $\angle 6$, $\angle 4$ and $\angle 8$ **13.** $\angle 1$ and $\angle 8$, $\angle 2$ and $\angle 7$ **15.** $\angle 1$ and $\angle 8$ are not in corresponding positions. $\angle 1$ and $\angle 8$ are alternate exterior angles.

17. 1 line

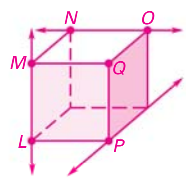


19. consecutive interior **21.** alternate exterior **23.** corresponding

25. never



27. sometimes



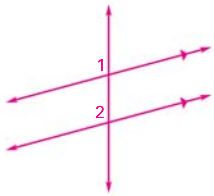
29. $\angle CFJ$, $\angle HJG$ **31.** $\angle DFC$, $\angle CJH$

SELECTED ANSWERS

3.1 Problem Solving (pp. 151–152) **35.** skew **39.** The adjacent interior angles are supplementary thus the measure of the other two angles must be 90°. **41.** false

3.2 Skill Practice (pp. 157–158)

1. *Sample:*



5. 110°; Alternate Exterior Angles Theorem **7.** 63°; Consecutive Interior Angles Theorem

9. Corresponding Angles Postulate **11.** Alternate Interior Angles Theorem **13.** Alternate Exterior Angles Theorem **15.** Alternate Exterior Angles Theorem **17.** $m\angle 1 = 150°$, Corresponding Angles Postulate; $m\angle 2 = 150°$, Vertical Angles Congruence Theorem **19.** $m\angle 1 = 122°$, $m\angle 2 = 58°$; Alternate Interior Angles Theorem, Consecutive Interior Angles Theorem **21.** *Sample answer:* $\angle 1 \cong \angle 4$ by the Alternate Exterior Angles Theorem; $\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$ by Vertical Angles Congruence Theorem, Alternate Interior Angles Theorem, and the Transitive Property of Angle Congruence. **23.** $m\angle 1 = 90°$, supplementary to the right angle by the Consecutive Interior Angles Theorem; $m\angle 3 = 65°$, it forms a linear pair with the angle measuring 115°; $m\angle 2 = 115°$, supplementary to $\angle 3$ by the Consecutive Interior Angles Theorem **25.** *Sample answer:* $\angle BAC$ and $\angle DCA$, $\angle DAC$ and $\angle BCA$ **27.** 45, 85 **29.** 65, 60 **31.** 13, 12

3.2 Problem Solving (pp. 159–160)

37.

Statements	Reasons
1. $p \parallel q$	1. Given
2. $\angle 1 \cong \angle 3$	2. Corresponding Angles Postulate
3. $\angle 3 \cong \angle 2$	3. Vertical Angles Congruence Theorem
4. $\angle 1 \cong \angle 4$	4. Transitive Property of Angle Congruence

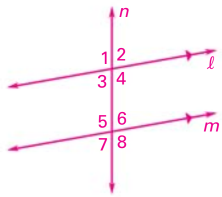
39. a. yes; $\angle 1$ and $\angle 4$, $\angle 1$ and $\angle 5$, $\angle 1$ and $\angle 8$, $\angle 4$ and $\angle 5$, $\angle 4$ and $\angle 8$, $\angle 5$ and $\angle 8$, $\angle 3$ and $\angle 2$, $\angle 3$ and $\angle 7$, $\angle 3$ and $\angle 6$, $\angle 2$ and $\angle 7$, $\angle 2$ and $\angle 6$, $\angle 7$ and $\angle 6$; yes; $\angle 1$ and $\angle 3$, $\angle 1$ and $\angle 2$, $\angle 1$ and $\angle 6$, $\angle 1$ and $\angle 7$, $\angle 2$ and $\angle 4$, $\angle 2$ and $\angle 5$, $\angle 2$ and $\angle 8$, $\angle 3$ and $\angle 4$, $\angle 3$ and $\angle 8$, $\angle 3$ and $\angle 5$, $\angle 5$ and $\angle 6$, $\angle 5$ and $\angle 7$, $\angle 6$ and $\angle 8$, $\angle 7$ and $\angle 8$. **b.** *Sample answer:* The transversal stays parallel to the floor.

41.

Statements	Reasons
1. $n \parallel p$	1. Given
2. $\angle 1 \cong \angle 3$	2. Corresponding Angles Postulate
3. $\angle 3$ and $\angle 2$ are supplementary.	3. Definition of linear pair
4. $\angle 1$ and $\angle 2$ are supplementary.	4. Substitution

3.3 Skill Practice (pp. 165–167)

1. *Sample:*



3. 40 **5.** 15 **7.** 60 **9.** The student believes that $x = y$ but there is no indication that they are equal.

11. yes; Alternate Exterior Angles Converse **13.** yes; Corresponding Angles Converse **15.** yes; Vertical Angles Congruence Theorem, Corresponding Angles Converse **17. a.** $m\angle DCG = 115°$, $m\angle CGH = 65°$ **b.** They are consecutive interior angles. **c.** yes; Consecutive Interior Angles Converse **19.** yes; Consecutive Interior Angles Converse **21.** no **25.** *Sample answer:* $\angle 1 \cong \angle 4$ therefore $\angle 4$ and $\angle 7$ are supplementary. Lines j and k are parallel by the Consecutive Interior Angles Converse. **27. a.** 1 line **b.** infinite number of lines **c.** 1 plane

3.3 Problem Solving (pp. 167–169) **29.** Alternate Interior Angles Converse Theorem **31.** substitution, Definition of supplementary angles, Consecutive Interior Angles Theorem **33.** Yes. *Sample answer:* 1st is parallel to 2nd by the Corresponding Angles Converse Postulate. 2nd is parallel to 3rd by the Alternate Exterior Angles Converse Theorem. 3rd is parallel to 4th by the Alternate Interior Angles Converse Theorem. They are all parallel by the Transitive Property of Parallel Lines.

35.

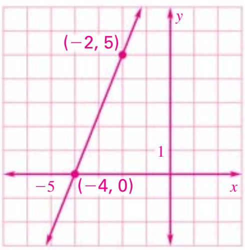
Statements	Reasons
1. $a \parallel b$, $\angle 2 \cong \angle 3$	1. Given
2. $\angle 2$ and $\angle 4$ are supplementary.	2. Consecutive Interior Angles Theorem
3. $\angle 3$ and $\angle 4$ are supplementary.	3. Substitution
4. $c \parallel d$	4. Consecutive Interior Angles Converse Theorem

37. You are given that $\angle 3$ and $\angle 5$ are supplementary. By the Linear Pair Postulate, $\angle 5$ and $\angle 6$ are also supplementary. So $\angle 3 \cong \angle 6$ by the Congruent Supplements Theorem. By the converse of the Alternate Interior Angles Theorem, $m \parallel n$.

39. a. *Sample answer:* Corresponding Angles Converse Theorem **b.** Slide the triangle along a fixed horizontal line and use the edge that forms the 90° angle to draw vertical lines. **40–44.** Sample answers are given. **41.** Vertical Angles Congruence Theorem followed by the Consecutive Interior Angles Converse Theorem **43.** Vertical Angles Congruence Theorem followed by the Corresponding Angles Converse Postulate

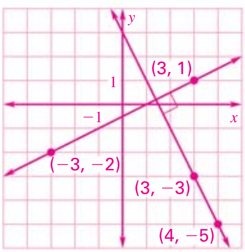
3.4 Skill Practice (pp. 175–176) **1.** The slope of a nonvertical line is the ratio of vertical change (rise) to horizontal change (run) between any two points on the line. **7.** $\frac{1}{2}$ **9.** 0 **11.** Slope was computed using $\frac{\text{run}}{\text{rise}}$, it should be $\frac{\text{rise}}{\text{run}}$; $m = \frac{3}{4}$. **13.** Perpendicular; the product of their slopes is -1. **15.** Perpendicular; the product of their slopes is -1.

17.

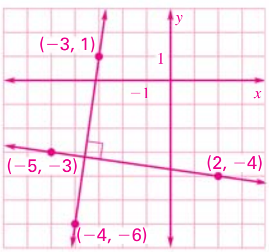


19. line 2 **21.** line 1

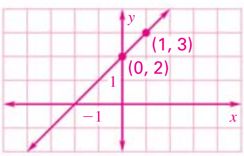
23. -2



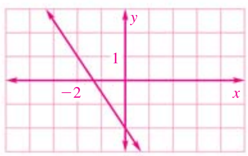
25. 7



27.

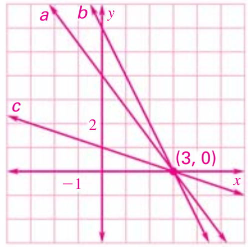


29.



3.4 Problem Solving (pp. 176–178) **33.** $\frac{2}{3}$

35. line b; line c. *Sample:*



37. a.

Horizontal Distance	50	100	150	200	250	300	350
Height	29	58	87	116	145	174	203
Horizontal Distance	**400**	**450**	**500**	**550**	**600**	**650**	**700**
Height	232	261	290	319	348	377	406

406 ft

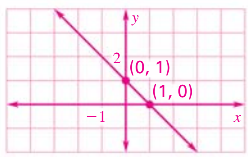
b. $\frac{29}{50}$

c. $\frac{144}{271}$; Duquesne

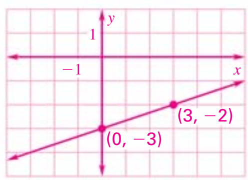
39. \$1150 per year **41. a.** 1985 to 1990. *Sample answer:* about 2 million people per year **b.** 1995 to 2000. *Sample answer:* about 3 million people per year **c.** *Sample answer:* There was moderate but steady increase in attendance for the NFL over the time period of 1985–2000.

3.5 Skill Practice (pp. 184–186) **1.** The point of intersection on the y-axis when graphing a line.
3. $y = \frac{4}{3}x - 4$ **5.** $y = -\frac{3}{2}x - \frac{1}{2}$ **7.** $y = \frac{3}{2}x - \frac{3}{2}$
11. $y = 3x + 2$ **13.** $y = -\frac{5}{2}x$ **15.** $y = -\frac{11}{5}x - 12$
17. $y = 4x - 16$ **19.** $y = -\frac{2}{3}x - \frac{22}{3}$ **21.** $y = 7$
23. $y = -2x - 1$ **25.** $y = \frac{1}{5}x + \frac{37}{5}$ **27.** $y = -\frac{5}{2}x - 4$
31. $y = -\frac{3}{7}x + \frac{4}{7}$ **33.** $y = \frac{1}{2}x + 2$ **35.** $y = -\frac{5}{3}x - \frac{40}{3}$

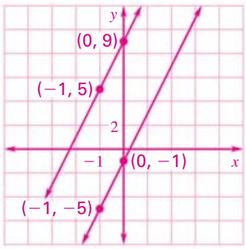
37.



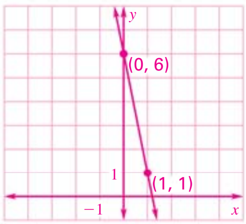
39.



45. To find the x-intercept, let $y = 0$, $5x - 3(0) = -15$, $x = -3$, $(-3, 0)$. To find the y-intercept, let $x = 0$, $5(0) - 3y = -15$, $y = 5$, $(0, 5)$. **47.** $y = 0.5x + 7$ and $-x + 2y = -5$ **49.** 4, 4; $y = -x + 4$ **51.** -20, 10; $y = \frac{1}{2}x + 10$

53. 

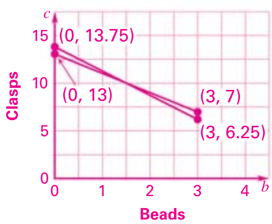
none

55. 

infinitely many

57. 4

3.5 Problem Solving (pp. 186–187) **61.** $y = 2.1x + 2000$; slope: gain in weight per day, y-intercept: starting weight before the growth spurt **63.** $2x + 3y = 24$; A: cost of a small slice, B: cost of a large slice, C: amount of money you can spend **65. a.** $2b + c = 13$, $5b + 2c = 27.50$

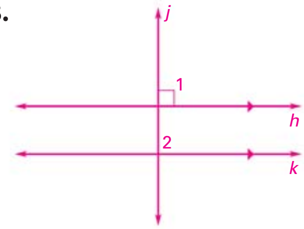
b. 

c. *Sample answer:* It's where the number of packages of beads and the number of packages of clasps would be the same for both girls.

3.5 Problem Solving Workshop (p. 189) **1.** 27 h **3.** 115 buttons **5.** *Sample answer:* In each case an equation modeling the situation was solved.

3.6 Skill Practice (pp. 194–195) **1.** $\overline{AB}$; it's $\perp$ to the parallel lines. **3.** If two sides of two adjacent acute angles are perpendicular, then the angles are complementary. **5.** 25° **7.** 52° **9.** Since the two angles labeled $x°$ form a linear pair of congruent angles, $t \perp n$; since the two lines are perpendicular to the same line, they are parallel to each other. **11.** *Sample answer:* Draw a line. Construct a second line perpendicular to the first line. Construct a third line perpendicular to the second line. **13.** There is no information to indicate that $y \parallel z$ or $y \perp x$. **15.** 13 **17.** 33 **19.** Lines f and g; they are perpendicular to line d. **23.** 4.1 **27.** 2.5

3.6 Problem Solving (pp. 196–197) **29.** Point C; the shortest distance is the length of the perpendicular segment. **31.** Definition of linear pair; $m\angle 1 + m\angle 2 = 180°$; Definition of angle congruence; Division Property of Equality; $\angle 1$ is a right angle; Definition of perpendicular.

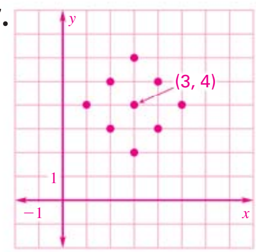
33. 

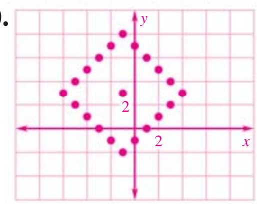
Given $h \parallel k$, $j \perp h$

Prove $j \perp k$

Statements	Reasons
1. $h \parallel k$, $j \perp h$	1. Given
2. $\angle 1 \cong \angle 2$	2. Corresponding Angles Postulate
3. $\angle 1$ is a right angle.	3. $\perp$ lines intersect to form 4 right angles
4. $m\angle 1 = 90°$	4. Definition of right angle
5. $m\angle 2 = 90°$	5. Definition of angle congruence
6. $\angle 2$ is a right angle.	6. Definition of right angle
7. $j \perp k$	7. Definition of perpendicular lines

Extension (p. 199) **1.** 6 **3.** 16 **5.** 2

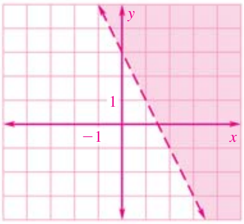
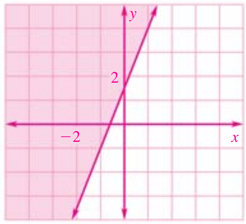
7. 

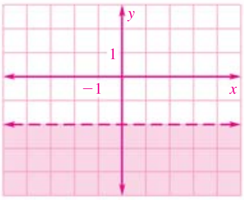
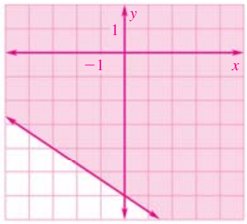
9. 

11. (1, 0) **13.** (10, 4)

Chapter Review (pp. 202–205) **1.** skew lines **3.** $\angle 5$ **5.** $\angle 6$ **7.** standard form **9.** $\overleftrightarrow{NR}$ **11.** $\overleftrightarrow{JN}$ **13.** $m\angle 1 = 54°$, vertical angles; $m\angle 2 = 54°$, corresponding angles **15.** $m\angle 1 = 135°$, corresponding angles; $m\angle 2 = 45°$, supplementary angles **17.** 13, 132 **19.** 35°. *Sample answer:* $\angle 2$ and $\angle 3$ are complementary, $\angle 1$ and $\angle 2$ are corresponding angles for two parallel lines cut by a transversal. **21.** 133 **23.** perpendicular **25. a.** $y = 6x - 19$ **b.** $y = -\frac{1}{6}x - \frac{1}{2}$ **27.** 3.2

Algebra Review (p. 207)

1. 
3. 

5. 
7. 

9. 6 mo **11.** after 100 min

Cumulative Review (pp. 212–213) **1.** 28, 56 **3.** acute **5.** acute **7.** 40 in., 84 in.^{2} **9.** 15.2 yd, 14.44 yd^2 **11.** Each number is being multiplied by $\frac{1}{4}$; $\frac{1}{2}$. **13.** $x = 4$ **15.** The musician is playing a string instrument.

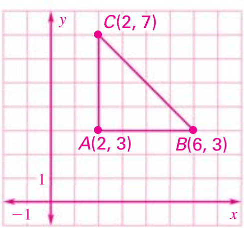
17.

Equation	**Reason**
$-4(x + 3) = -28$	Given
$x + 3 = 7$	Division Property of Equality
$x = 4$	Subtraction Property of Equality

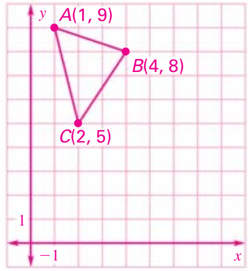
19. 29 **21.** $x = 9$, $y = 31$ **23.** $x = 101$, $y = 79$ **25.** 0 **27.** 2 **29. a.** $y = -x + 10$ **b.** $y = x + 14$ **31.** Yes; if two lines intersect to form a linear pair of congruent angles, then the lines are perpendicular. **33.** *Sample answer:* parallel and perpendicular lines **35.** 89 mi **37.** If you want the lowest television prices, then come see Matt's TV Warehouse; if you want the lowest television prices; come see Matt's TV Warehouse. **39.** Yes. *Sample answer:* Transitive Property of Congruence of Segments

Chapter 4

4.1 Skill Practice (pp. 221–222) **1.** C **3.** F **5.** B **7.** No; in a right triangle, the other two angles are complementary so they are both less than 90°. **9.** equilateral, equiangular

11. 

isosceles; right triangle

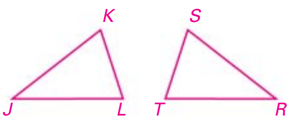
13. 

scalene; not a right triangle

15. 30; right **17.** 92° **19.** 158° **21.** 50° **23.** 50° **25.** 40° **27.** $m\angle P = 45°$, $m\angle Q = 90°$, $m\angle R = 45°$ **29.** Isosceles does not guarantee the third side is congruent to the two congruent sides; so if $\triangle ABC$ is equilateral, then it is isosceles as well. **33.** 118, 96 **35.** 26, 64 **37.** 35, 37

4.1 Problem Solving (pp. 223–224) **41.** 2 in.; 60°; in an equilateral triangle all sides have the same length $\left(\frac{6}{3}\right)$. In an equiangular triangle the angles always measure 60°. **45.** 115° **47.** 65° **49. a.** $2\sqrt{2x} + 5\sqrt{2x} + 2\sqrt{2x} = 180$ **b.** 40°, 100°, 40° **c.** obtuse **51.** *Sample answer:* They both reasoned correctly but their initial plan was incorrect. The measure of the exterior angle should be 150°.

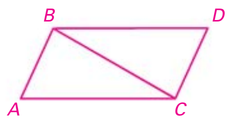
4.2 Skill Practice (pp. 228–229)

1. 

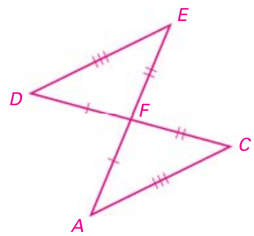
$\overline{JK} \cong \overline{RS}$, $\overline{KL} \cong \overline{ST}$, $\overline{JL} \cong \overline{RT}$, $\angle J \cong \angle R$, $\angle K \cong \angle S$, $\angle L \cong \angle T$

3. $\angle A$ and $\angle D$, $\angle C$ and $\angle F$, $\angle B$ and $\angle E$, $\overline{AB}$ and $\overline{DE}$, $\overline{AC}$ and $\overline{DF}$, $\overline{BC}$ and $\overline{EF}$. *Sample answer:* $\triangle CAB \cong \triangle FDE$. **5.** 124° **7.** 8 **9.** $\triangle ZYX$ **11.** $\triangle XYZ \cong \triangle ZWX$; all corresponding sides and angles are congruent. **13.** $\triangle BAG \cong \triangle CDF$; all corresponding sides and angles are congruent. **15.** 20 **17.** Student still needs to show that corresponding sides are congruent. **19.** 3, 1

4.2 Problem Solving (pp. 230–231) **23.** Reflexive Property of Congruent Triangles **25.** length, width, and depth

27. 

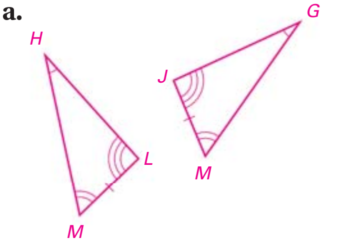
Yes; alternate interior angles are congruent.

29. no


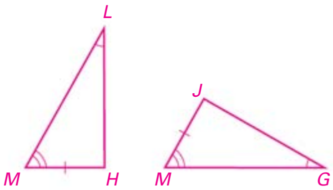
31. a. Corresponding parts of congruent figures are congruent. **b.** They are supplementary to two congruent angles and therefore are congruent. **c.** *Sample answer:* All right angles are congruent. **d.** Yes; all corresponding parts of both triangles are congruent.

4.2 Problem Solving Workshop (p. 232)

1. a.



b.



4.3 Skill Practice (pp. 236–237) **1.** corresponding angles **3.** corresponding sides **5.** not true; $\triangle RST \cong \triangle PQT$ **7.** true; SSS **9.** congruent **11.** congruent **13.** Stable; the figure has diagonal support with fixed side lengths. **15.** Stable; the figure has diagonal support with fixed side lengths. **19.** Not congruent; the congruence statement should read $\triangle ABC \cong \triangle FED$.

4.3 Problem Solving (pp. 238–239) **23.** Gate 1. *Sample answer:* Gate 1 has a diagonal support that forms two triangles with fixed side lengths, and these triangles cannot change shape. Gate 2 is not stable because that gate is a quadrilateral which can take many different shapes.

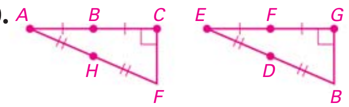
25. Statements	Reasons
1. $\overline{WX} \cong \overline{VZ}$, $\overline{WY} \cong \overline{VY}$, $\overline{YZ} \cong \overline{YX}$	1. Given
2. $\overline{WV} \cong \overline{VW}$	2. Reflexive Property of Congruence
3. $WY = VY$, $YZ = YX$	3. Definition of segment congruence
4. $WY + YZ = VY + YZ$	4. Addition Property of Equality
5. $WY + YZ = VY + YX$	5. Substitution Property of Equality
6. $WZ = VX$	6. Segment Addition Postulate
7. $\overline{WZ} \cong \overline{VX}$	7. Definition of segment congruence
8. $\triangle VWX \cong \triangle WVZ$	8. SSS

27. Statements	Reasons
1. $\overline{FM} \cong \overline{FN}$, $\overline{DM} \cong \overline{HN}$, $\overline{EF} \cong \overline{GF}$, $\overline{DE} \cong \overline{HG}$	1. Given
2. $MN = NM$	2. Reflexive Property of Equality
3. $FM = FN$, $DM = HN$, $EF = GF$	3. Definition of segment congruence
4. $EF + FN = GF + FN$, $DM + MN = HN + MN$	4. Addition Property of Equality
5. $EF + FN = GF + FM$, $DM + MN = HN + NM$	5. Substitution Property of Equality
6. $EN = GM$, $DN = HM$	6. Segment Addition Postulate
7. $\overline{EN} \cong \overline{GM}$, $\overline{DN} \cong \overline{HM}$	7. Definition of segment congruence
8. $\triangle DEN \cong \triangle HGM$	8. SSS

29. Only one triangle can be created from three fixed sides.

4.4 Skill Practice (pp. 243–244) **1.** included **3.** $\angle XYW$ **5.** $\angle ZWY$ **7.** $\angle XYZ$ **9.** not enough **11.** not enough **13.** enough **17.** *Sample answer:* $\triangle STU$, $\triangle RVU$; they are congruent by SAS.

19.



HL

21. SAS **23.** Yes; they are congruent by the SAS Congruence Postulate. **25.** $\overline{AC} \cong \overline{DF}$ **27.** $\overline{BC} \cong \overline{EF}$ **29.** Because $\overline{RM} \perp \overline{PQ}$, $\angle RMQ$ and $\angle RMP$ are right angles and thus are congruent. $\overline{QM} \cong \overline{MP}$ and $\overline{MR} \cong \overline{MR}$. It follows that $\triangle RMP \cong \triangle RMQ$ by SAS.

4.4 Problem Solving (pp. 245–246) **31.** SAS **33.** Two sides and the included angle of one sail need to be congruent to the corresponding sides and angle of the second sail; the two sails need to be right triangles with congruent hypotenuses and one pair of congruent corresponding legs.

35. Statements	Reasons
1. $\overline{PQ}$ bisects $\angle SPT$, $\overline{ST} \cong \overline{TP}$	1. Given
2. $\angle SPQ \cong \angle TPQ$	2. Definition of angle bisector
3. $\overline{PQ} \cong \overline{PQ}$	3. Reflexive Property of Congruence
4. $\triangle SPQ \cong \triangle TPQ$	4. SAS

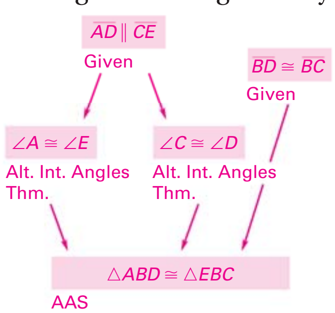
37.

Statements	Reasons
1. $\overline{JM} \cong \overline{LM}$	1. Given
2. $\angle KJM$ and $\angle KLM$ are right angles.	2. Given
3. $\triangle JKM$ and $\triangle LKM$ are right triangles.	3. Definition of right triangle
4. $\overline{KM} \cong \overline{KM}$	4. Reflexive Property of Congruence
5. $\triangle JKM \cong \triangle LKM$	5. HL

4.5 Skill Practice (pp. 252–253) **1.** *Sample answer:* A flow proof shows the flow of a logical argument. **3.** yes; AAS **5.** yes; ASA **9.** $\angle F$, $\angle L$ **11.** $\angle AFE \cong \angle DFB$ by the Vertical Angles Theorem. **13.** $\angle EDA \cong \angle DCB$ by the Corresponding Angles Postulate. **15.** No; there is no AAA postulate or theorem. **17.** No; the segments that are congruent are not corresponding sides. **19.** yes; the SAS Congruence Postulate **21. a.** $\overline{BC}$ and $\overline{AD}$ are parallel with $\overline{AC}$ being a transversal. The Alternate Interior Angles Theorem applies. **b.** $\overline{AB}$ and $\overline{CD}$ are parallel with $\overline{AC}$ being a transversal. The Alternate Interior Angles Theorem applies. **c.** Using parts 21a, 21b, and the fact that $\overline{AC} \cong \overline{CA}$, it can be shown they are congruent by ASA.

4.5 Problem Solving (pp. 254–255) **23.** Two pairs of angles and an included pair of sides are congruent. The triangles are congruent by SAS.

25.

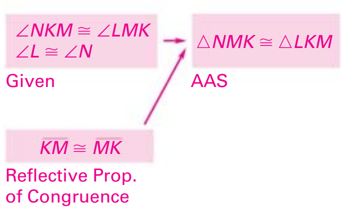


27. AAS **29.** Since all right angles are congruent the two triangles are congruent by either AAS, if the side is not included, or ASA if it is the included side.

31.

Statements	Reasons
1. $\overline{AK} \cong \overline{CJ}$, $\angle BJK \cong \angle BKJ$, $\angle A \cong \angle C$	1. Given
2. $\triangle ABK \cong \triangle CBJ$	2. ASA

33.



4.6 Skill Practice (pp. 259–260) **1.** congruent **3.** $\triangle CBA$, $\triangle CBD$; SSS **5.** $\triangle JKM$, $\triangle LKM$; HL **7.** $\triangle JNH$, $\triangle KLG$; AAS **9.** The angle is not the included angle; the triangles cannot be said to be congruent. **11.** Show $\triangle NML \cong \triangle PQL$ by AAS since $\angle NLM \cong \angle PLQ$ by the Vertical Angles Congruence Theorem. Then use the Corresponding Parts of Congruent Triangles Theorem. **13.** 20, 120, ± 6 **15.** Show $\triangle KFG \cong \triangle HGF$ by AAS, which gives you $\overline{HG} \cong \overline{KF}$. This along with $\angle FJK \cong \angle GJH$ by vertical angles gives you $\triangle FJK \cong \triangle GJH$, therefore $\angle 1 \cong \angle 2$. **17.** Show $\triangle STR \cong \triangle QTP$ by ASA using the givens and vertical angles STR and QTP. Since $\overline{QP} \cong \overline{SR}$ you now have $\triangle QSP \cong \triangle SQR$, which gives you $\angle PST \cong \angle RQT$. This along with vertical angles PTS and RTQ gives you $\triangle PTS \cong \triangle RTQ$ which gives you $\angle 1 \cong \angle 2$. **19.** Show $\triangle KNP \cong \triangle MNP$ by SSS. Now $\angle KPL \cong \angle MPL$ and $\overline{PL} \cong \overline{PL}$ leads to $\triangle LKP \cong \triangle LMP$ which gives you $\angle 1 \cong \angle 2$. **21.** The triangles are congruent by SSS.

23.

Statements	Reasons
1. $\angle T \cong \angle U$, $\angle Z \cong \angle X$, $\overline{YZ} \cong \overline{YX}$	1. Given
2. $\triangle TYZ \cong \triangle UYX$	2. AAS
3. $\angle TYZ \cong \angle UYX$	3. Corr. parts of $\cong$ ⚠ are $\cong$.
4. $m\angle TYZ = m\angle UYX$	4. Definition of angle congruence
5. $m\angle TYW + m\angle WYZ = m\angle TYZ$, $m\angle TYW + m\angle VYX = m\angle UYX$	5. Angle Addition Postulate
6. $m\angle TYW + m\angle WYZ = m\angle TYW + m\angle VYX$	6. Transitive Property of Equality
7. $m\angle WYZ = m\angle VYX$	7. Subtraction Property of Equality
8. $\angle WYZ \cong \angle VYX$	8. Definition of angle congruence

4.6 Problem Solving (pp. 261–263)

29.

Statements	Reasons
1. $\overline{PQ} \parallel \overline{VS}$, $\overline{QU} \parallel \overline{ST}$, $\overline{PQ} \cong \overline{VS}$	1. Given
2. $\angle QPU \cong \angle SVT$, $\angle QUP \cong \angle STV$	2. Corresponding Angles Postulate
3. $\triangle PQU \cong \triangle VST$	3. AAS
4. $\angle Q \cong \angle S$	4. Corr. parts of $\cong$ ⚠ are $\cong$.

33. No; the given angle is not an included angle. **35.** Yes; $\angle BDA \cong \angle BDC$, $\overline{AD} \cong \overline{CD}$ and $\overline{BD} \cong \overline{BD}$. By SAS, $\triangle ABD \cong \triangle CBD$. By Corr. parts of $\cong$ ⚠ are $\cong$, $\overline{AB} \cong \overline{BC}$.

SELECTED ANSWERS

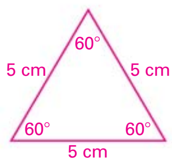
37.

Statements	Reasons
1. $\overline{MN} \cong \overline{KN}$, $\angle PMN \cong \angle NKL$	1. Given
2. $\angle MNP \cong \angle KNL$	2. Vertical Angles Congruence Theorem
3. $\triangle PMN \cong \triangle LKN$	3. ASA
4. $\overline{MP} \cong \overline{KL}$, $\angle MPJ \cong \angle KLQ$	4. Corr. parts of $\cong$ $\triangle$s are $\cong$.
5. $\overline{MJ} \cong \overline{PN}$, $\overline{KQ} \cong \overline{LN}$	5. Given in diagram
6. $\angle KQL$ and $\angle MJP$ are right angles.	6. Theorem 3.9
7. $\angle KQL \cong \angle MJP$	7. Right Angles Congruence Theorem
8. $\triangle MJP \cong \triangle KQL$	8. AAS
9. $\angle 1 \cong \angle 2$	9. Corr. parts of $\cong$ $\triangle$s are $\cong$.

4.7 Skill Practice (pp. 267–268) **1.** The angle formed by the legs is the vertex angle. **3.** *A*, *D*; Base Angles Theorem **5.** $\overline{CD}$, $\overline{CE}$; Converse of Base Angles Theorem **7.** 12 **9.** 60° **11.** 20 **13.** 8 **15.** 39, 39 **17.** 45, 5 **21.** There is not enough information to find *x* or *y*. We need to know the measure of one of the vertex angles. **23.** 16 ft **25.** 39 in. **27.** possible **29.** possible **31.** $\triangle ABD \cong \triangle CDB$ by SAS making $\overline{BA} \cong \overline{BC}$ by Corresponding parts of congruent triangles are congruent. **33.** 60, 120; solve the system $x + y = 180$ and $180 + 2x - y = 180$. **35.** 50°, 50°, 80°; 65°, 65°, 50°; there are two distinct exterior angles. If the angle is supplementary to the base angle, the base angle measures 50°. If the angle is supplementary to the vertex angle, then the base angle measures 65°.

4.7 Problem Solving (pp. 269–270)

39.



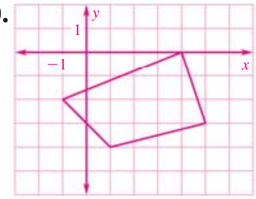
41. a. $\angle A$, $\angle ACB$, $\angle CBD$, and $\angle CDB$ are congruent and $\overline{BC} \cong \overline{CB}$ making $\triangle ABC \cong \triangle BCD$ by AAS. **b.** $\triangle ABC$, $\triangle BCD$, $\triangle CDE$, $\triangle DEF$, $\triangle EFG$ **c.** $\angle BCD$, $\angle CDE$, $\angle DEF$, $\angle EFG$

43. If a triangle is equilateral it is also isosceles, using these two facts it can be shown that the triangle is equiangular.

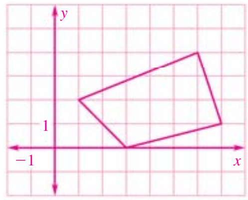
47. Yes; $m\angle ABC = 50°$ and $m\angle BAC = 50°$. The Converse of Base Angles Theorem guarantees that $\overline{AC} \cong \overline{BC}$ making $\triangle ABC$ isosceles. **49.** *Sample answer:* Choose point $P(x, y) \neq (2, 2)$ and set $PT = PU$. Solve the equation $\sqrt{x^2 + (y-4)^2} = \sqrt{(x-4)^2 + y^2}$ and get $y = x$. The point (2, 2) is excluded because it is a point on $\overleftrightarrow{TU}$.

4.8 Skill Practice (pp. 276–277) **1.** Subtract one from each *x*-coordinate and add 4 to each *y*-coordinate. **3.** translation **5.** reflection **7.** no

9.

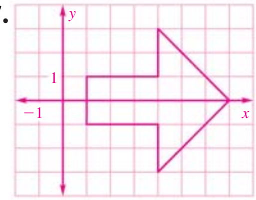


11.



13. $(x, y) \to (x - 4, y - 2)$ **15.** $(x, y) \to (x + 2, y - 1)$

17.



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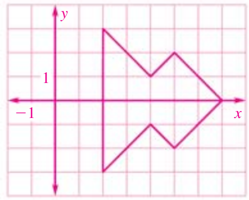

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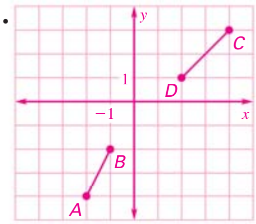
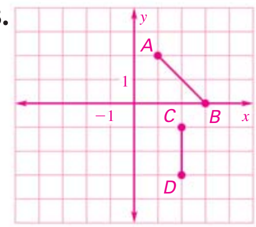


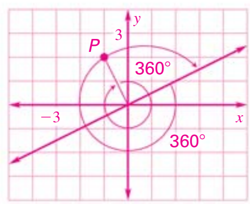
not a rotation

23.



not a rotation

25. Yes; take any point or any line and rotate 360°.



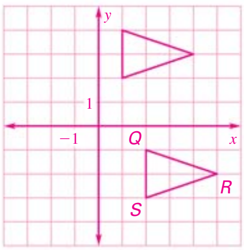
27. (3, 4) **29.** (2, 3) **31.** (13, −5) **33.** $\overline{UV}$ **35.** $\triangle DST$

SELECTED ANSWERS

4.8 Problem Solving (pp. 278–279) **39.** 90° clockwise, 90° counterclockwise **41. a.** $(x, y) \to (x - 1, y + 2)$ **b.** $(x, y) \to (x + 2, y - 1)$ c. No; the translation needed does not match a knight's move.

Chapter Review (pp. 282–285) **1.** equiangular **3.** An isosceles triangle has at least two congruent sides while a scalene triangle has no congruent sides. **5.** $\angle P$ and $\angle L$, $\angle Q$ and $\angle M$, $\angle R$ and $\angle N$; $\overline{PQ}$ and $\overline{LM}$, $\overline{QR}$ and $\overline{MN}$, $\overline{RP}$ and $\overline{NL}$ **7.** 120° **9.** 60° **11.** 60° **13.** 18 **15.** true; SSS **17.** true; SAS **19.** $\angle F$, $\angle J$ **21.** Show $\triangle ACD$ and $\triangle BED$ are congruent by AAS, which makes $\overline{AD}$ congruent to $\overline{BD}$. $\triangle ABD$ is then an isosceles triangle, which makes $\angle 1$ and $\angle 2$ congruent. **23.** Show $\triangle QVS$ congruent to $\triangle QVT$ by SSS, which gives us $\angle QSV$ congruent to $\angle QTV$. Using vertical angles and the Transitive Property you get $\angle 1$ congruent to $\angle 2$. **25.** 20

27.



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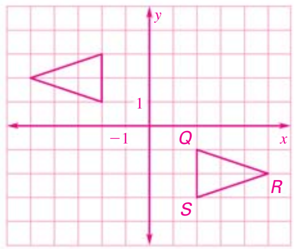
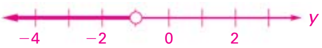


Algebra Review (p. 287)

1. $x > 2$

3. $x \leq -9$

5. $y < -1$



7. $k \geq -\frac{12}{5}$

9. $x < -\frac{5}{2}$

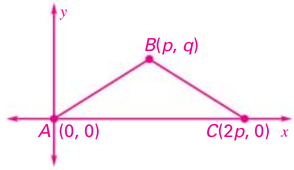
11. $n \geq -3$

13. 2, 8 **15.** 0, 8 **17.** $-\frac{7}{3}$, 3 **19.** −0.8, 3.4 **21.** $-\frac{1}{3}$, 1 **23.** −5, 14 **25.** $-\frac{6}{5}$, 2 **27.** $\frac{7}{3}$, 5

Chapter 5

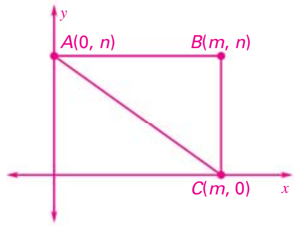
5.1 Skill Practice (pp. 298–299) **1.** midsegment **3.** 13 **5.** 6 **7.** $\overline{XZ}$ **9.** $\overline{JX}$, $\overline{KL}$ **11.** $\overline{YL}$, $\overline{LZ}$ **13.** (0, 0), (7, 0), (0, 7) **15.** *Sample answer:* (0, 0), (2*m*, 0), (*a*, *b*) **17.** (0, 0), (*s*, 0), (*s*, *s*), (0, *s*) **19.** *Sample answer:* (0, 0), (*r*, 0), (0, *s*)

21.



$AB = \sqrt{p^2 + q^2}$, $\frac{q}{p}$, $\left(\frac{p}{2}, \frac{p}{2}\right)$; $BC = \sqrt{p^2 + q^2}$, $-\frac{q}{p}$, $\left(\frac{3p}{2}, \frac{q}{2}\right)$; $CA = 2p$, 0, $(p, 0)$; no; yes; it's not a right triangle because none of the slopes are negative reciprocals and it is isosceles because two of the sides have the same measure.

23.



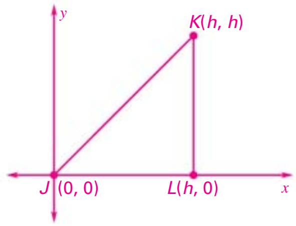
$AB = m$, 0, $\left(\frac{m}{2}, \frac{n}{2}\right)$, $BC = n$, 0, $\left(m, \frac{n}{2}\right)$, $CA = \sqrt{m^2 + n^2}$, $-\frac{n}{m}$, $\left(\frac{m}{2}, \frac{n}{2}\right)$; yes; no; one side is vertical and one side is horizontal thus the triangle is a right triangle. It is not isosceles since none of the sides have the same measure.

25. 13 **27.** You don't know that $\overline{DE}$ and $\overline{BC}$ are parallel. **29.** $(0, k)$. *Sample answer:* Since $\triangle OPQ$ and $\triangle RSQ$ are right triangles with $\overline{OP} \cong \overline{RS}$ and $\overline{PQ} \cong \overline{SQ}$, the triangles are congruent by SAS. **33.** $GE = \frac{1}{2}DB$, $EF = \frac{1}{2}BC$, area of $\triangle EFG = \frac{1}{2}\left[\frac{1}{2}DB\left(\frac{1}{2}BC\right)\right] = \frac{1}{8}(DB)(BC)$, area of $\triangle BCD = \frac{1}{2}(DB)(BC)$.

5.1 Problem Solving (pp. 300–301) **35.** 10 ft **37.** The coordinates of *W* are (3, 3) and the coordinates of *V* are (7, 3). The slope of $\overline{WV}$ is 0 and the slope of $\overline{OH}$ is 0 making $\overline{WV} \parallel \overline{OH}$. $WV = 4$ and $OH = 8$ thus $WV = \frac{1}{2}OH$. **39.** 16. *Sample answer: DE* is half the length of $\overline{FG}$ which makes $FG = 8$. *FG* is half the length of $\overline{AC}$ which makes $AC = 16$. **41.** *Sample answer:* You already know the coordinates of *D* are (q, r) and can show the coordinates of *F* are $(p, 0)$ since $\left(\frac{2p + 0}{2}, \frac{0 + 0}{2}\right) = (p, 0)$. The slope of $\overline{DF}$ is $\frac{r - 0}{q - p} = \frac{r}{q - p}$ and the slope of $\overline{BC}$ is $\frac{2r - 0}{2q - 2p} = \frac{r}{q - p}$ making them parallel. $DF = \sqrt{(q - p)^2 + r^2}$ and $BC = \sqrt{(2q - 2p)^2 + (2r)^2} = 2\sqrt{(q - p)^2 + r^2}$ making $DF = \frac{1}{2}BC$. **43. a.** $\frac{1}{2}$ **b.** $\frac{5}{4}$ **c.** $\frac{19}{8}$ **45.** *Sample answer:* $\triangle ABD$ and $\triangle CBD$ are congruent right isosceles triangles with $A(0, p)$, $B(0, 0)$, $C(p, 0)$ and $D\left(\frac{p}{2}, \frac{p}{2}\right)$. $AB = p$, $BC = p$, and $\overline{AB}$ is a vertical line and $\overline{BC}$ is a horizontal line, so $\overline{AB} \perp \overline{BC}$. By definition, $\triangle ABC$ is a right isosceles triangle.

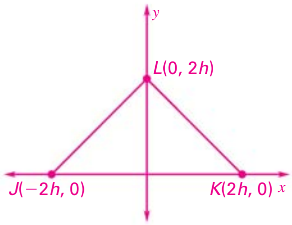
5.1 Problem Solving Workshop (p. 302) **1.** The slopes of $\overline{AC}$ and $\overline{BC}$ are negative reciprocals of each other, so $\overline{AC} \perp \overline{BC}$ making $\angle C$ a right angle; $AC = h\sqrt{2}$ and $BC = h\sqrt{2}$ making $\triangle ABC$ isosceles.

3. a.



$JL = LK = h$ and $\overline{JL}$ is a horizontal line and $\overline{LK}$ is a vertical line, so $\overline{JL} \perp \overline{LK}$; $h\sqrt{2}$, $\left(\frac{h}{2}, \frac{h}{2}\right)$.

b.

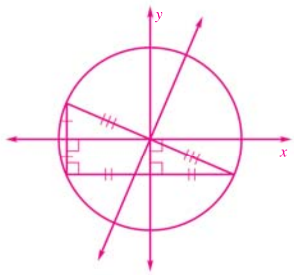


$JL = LK = 2h\sqrt{2}$ and the slope of $\overline{JL} = 1$ and the slope of $\overline{LK} = -1$, so $\overline{JL} \perp \overline{LK}$; $4h$, $(0, 0)$.

5. *Sample answer:* $PQRS$ with $P(0, 0)$, $Q(0, m)$, $R(n, m)$, and $S(n, 0)$. $PR = QS = \sqrt{m^2 + n^2}$ making $\overline{PR} \cong \overline{QS}$.

5.2 Skill Practice (pp. 306–307) **1.** circumcenter **3.** 15 **5.** 55 **7.** yes **11.** 35 **13.** 50 **15.** Yes; the Converse of the Perpendicular Bisector Theorem guarantees L is on $\overleftrightarrow{JP}$. **17.** 11

19. *Sample:*



21. Always; congruent sides are created.

5.2 Problem Solving (pp. 308–309) **25.** Theorem 5.4 shows you that you can find a point equidistant from three points by using the perpendicular bisectors of the sides of the triangle formed by the three points.

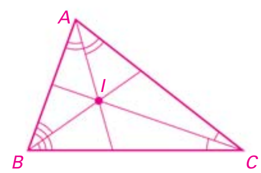
27.

Statements	Reasons
1. $CA = CB$	1. Given
2. Draw $\overleftrightarrow{PC} \perp \overline{AB}$ through point C.	2. Perpendicular Postulate
3. $\overline{CA} \cong \overline{CB}$	3. Definition of segment congruence
4. $\overline{CP} \cong \overline{CP}$	4. Reflexive Property of Segment Congruence
5. $\angle CPA$ and $\angle CPB$ are right angles.	5. Definition of $\perp$ lines
6. $\triangle CPA$ and $\triangle CPB$ right triangles.	6. Definition of right triangle
7. $\triangle CPA \cong \triangle CPB$	7. HL
8. $\overline{PA} \cong \overline{PB}$	8. Corr. parts of $\cong$ $\triangle$s are $\cong$.
9. C is on the perpendicular bisector of $\overline{AB}$.	9. Definition of perpendicular bisector

5.3 Skill Practice (pp. 313–314) **1.** bisector **3.** 20° **5.** 9 **7.** No; you don't know that $\angle BAD \cong \angle CAD$. **9.** No; you don't know that $\overline{HG} \cong \overline{HF}$, $\overline{HF} \perp \overrightarrow{EF}$, or $\overline{HG} \perp \overrightarrow{EG}$. **11.** No; you don't know that $\overline{HF} \perp \overrightarrow{EF}$, or $\overline{HG} \perp \overrightarrow{EG}$. **13.** 4 **15.** No; the segments with length x and 3 are not perpendicular to their respective rays. **17.** Yes; $x = 7$ using the Angle Bisector Theorem. **19.** 9 **21.** GD is not the perpendicular distance from G to $\overline{CE}$. The same is true about GF; the distance from G to each side of the triangle is the same. **25.** 0.5

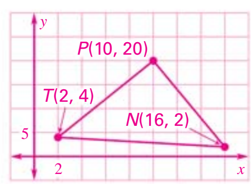
5.3 Problem Solving (pp. 315–316)

29. at the incenter of the pond



31. a. Equilateral; 3; the angle bisector would also be the perpendicular bisector. **b.** Scalene; 6; each angle bisector would be different than the corresponding perpendicular bisector.

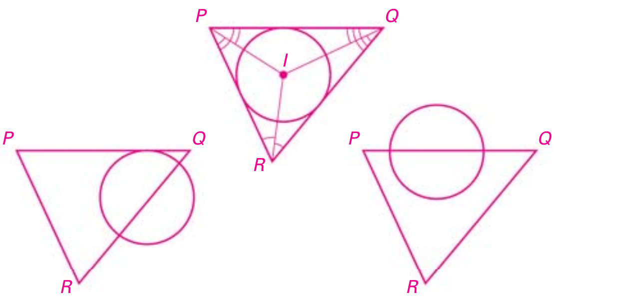
33. perpendicular bisectors;



(10, 10); 100 yd; about 628 yd

35. Statements	Reasons
1. $\angle BAC$ with D interior, $\overline{DB} \perp \overrightarrow{AC}$, $\overline{DC} \perp \overrightarrow{AC}$, $\overline{DB} = \overline{DC}$	1. Given
2. $\angle ABD$ and $\angle ACD$ are right angles.	2. Definition of perpendicular
3. $\triangle ABD$ and $\triangle ACD$ are right triangles.	3. Definition of right triangle
4. $\overline{DB} \cong \overline{DC}$	4. Definition of segment congruence
5. $\overline{AD} \cong \overline{AD}$	5. Reflexive Property of Segment Congruence
6. $\triangle ABD \cong \triangle ACD$	6. HL
7. $\angle BAD \cong \angle CAD$	7. Corr. parts of $\cong$ ⊿s are $\cong$.
8. $\overrightarrow{AD}$ bisects $\angle BAC$.	8. Definition of angle bisector

37. a. Use the Concurrency of Angle Bisectors of Triangle Theorem; if you move the circle to any other spot it will extend into the walkway.

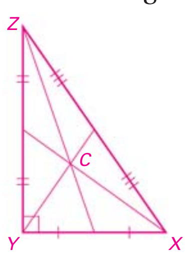


b. Yes; the incenter will allow the largest tent possible.

5.4 Skill Practice (pp. 322–323)

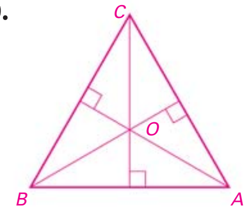
1. circumcenter: when it is an acute triangle, when it is a right triangle, when it is an obtuse triangle; incenter: always, never, never; centroid: always, never, never; orthocenter: when it is an acute triangle, when it is a right triangle, when it is an obtuse triangle **3.** 12 **5.** 10 **9.** (3, 2)

11.

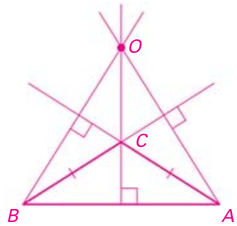


13. no; no; yes **15.** no; yes; no **17.** altitude **19.** median **21.** perpendicular bisector, angle bisector, median, altitude **23.** 6, 22°; $\triangle ABD \cong \triangle CBD$ by HL, use Corr. parts of $\cong$ ⊿s are $\cong$. **25.** 3 **27.** $\frac{3}{2}$

29.



31.

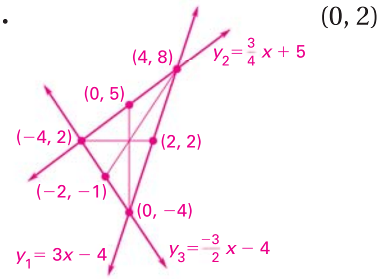


33. $\frac{5}{2}$ **35.** 4

5.4 Problem Solving (pp. 324–325)

37. B; it is the centroid of the triangle. **39.** about 12.3 in.^{2}; median

41.

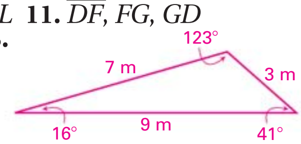


43. b. Their areas are the same. **c.** They weigh the same; it means the weight of $\triangle ABC$ is evenly distributed around its centroid.

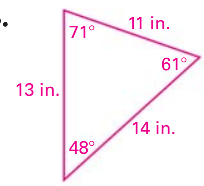
5.5 Skill Practice (pp. 331–332)

1. $\angle A$, $\overline{BC}$; $\angle B$, $\overline{CA}$; $\angle C$, $\overline{AB}$ **3.** *Sample answer:* The longest side is opposite the largest angle. The shortest side is opposite the smallest angle. **5.** *Sample answer:* The longest side is opposite the obtuse angle and the two angles with the same measure are opposite the sides with the same length. **7.** $\overline{XY}$, $\overline{YZ}$, $\overline{ZX}$ **9.** $\angle J$, $\angle K$, $\angle L$ **11.** $\overline{DF}$, $\overline{FG}$, $\overline{GD}$

13.



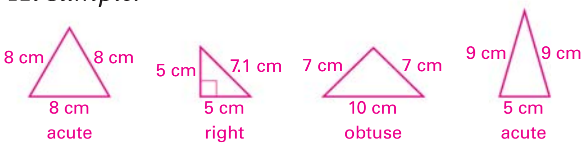
15.



17. No; 3 + 6 is not greater than 9. **19.** yes **21.** 7 in. $< x <$ 17 in. **23.** 6 ft $< x <$ 30 ft **25.** 16 in. $< x <$ 64 in. **27.** $\angle A$ and $\angle B$ are the nonadjacent interior angles to $\angle 1$ thus by the Exterior Angle Inequality Theorem $m\angle 1 = m\angle A + m\angle B$, which guarantees $m\angle 1 > m\angle A$ and $m\angle 1 > m\angle B$. **29.** The longest side is not opposite the largest angle. **31.** yes; $\angle Q$, $\angle P$, $\angle R$ **33.** $2 < x < 15$ **35.** $\angle WXY$, $\angle Z$, $\angle ZXY$, $\angle WYX$ and $\angle ZYX$, $\angle W$; $\angle ZYX$ is the largest angle in $\triangle ZYX$ and $\angle WYX$ is the middle sized angle in $\triangle WXY$ making $\angle W$ the largest angle. $m\angle WXY + m\angle W = m\angle Z + m\angle ZXY$ making $\angle WXY$ the smallest.

SELECTED ANSWERS

5.5 Problem Solving (pp. 333–334) **37.** $m\angle P < m\angle Q$, $m\angle P < m\angle R$; $m\angle Q = m\angle R$ **39. a.** The sum of the other two side lengths is less than 1080. **b.** No; the sum of the distance from Granite Peak to Fort Peck Lake and Granite Peak to Glacier National Park must be more than 565. **c.** $d > 76$ km, $d < 1054$ km **d.** The distance is less than 489 kilometers.
41. *Sample:*



43. *Sample answer:* 3, 4, 17; 2, 5, 17; 4, 4, 16
45. $1\frac{1}{4}$ mi $\le d \le 2\frac{3}{4}$ mi; if the locations are collinear then the distance could be $1\frac{1}{4}$ miles or $2\frac{3}{4}$ miles. If the locations are not collinear then the distance must be between $1\frac{1}{4}$ miles and $2\frac{3}{4}$ miles because of the Triangle Inequality Theorem.

5.6 Skill Practice (pp. 338–339) **1.** You temporarily assume that the desired conclusion is false and this leads to a logical contradiction. **3.** > **5.** < **7.** = **11.** Suppose xy is even. **13.** $\angle A$ could be a right angle. **15.** The Hinge Theorem is about triangles not quadrilaterals. **17.** $x > \frac{1}{2}$ **19.** Using the Converse of the Hinge Theorem $\angle NRQ > \angle NRP$. Since $\angle NRQ$ and $\angle NRP$ are a linear pair $\angle NRQ$ must be obtuse and $\angle NRP$ must be acute.

5.6 Problem Solving (pp. 340–341) **23.** E, A, D, B, C **25. a.** It gets larger; it gets smaller. **b.** KM **c.** *Sample answer:* Since $NL = NK = NM$ and as $m\angle LNK$ increases KL increases and $m\angle KNM$ decreases as KM decreases, you have two pair of congruent sides with $m\angle LNK$ eventually larger than $m\angle KNM$. The Hinge Theorem guarantees KL will eventually be larger than KM. **27.** Prove: If x is divisible by 4, then x is even. Proof: Since x is divisible by 4, $x = 4a$. When you factor out a 2, you get $x = 2(2a)$ which is in the form $2n$, which implies x is an even number; you start the same way by assuming what you are to prove is false, then proceed to show this leads to a contradiction.

Chapter Review (pp. 344–347) **1.** midpoint **3.** B **5.** C **7.** 45 **9.** BA and BC, DA and DC **11.** 25 **13.** 15 **15.** $(-2, 4)$ **17.** 3.5 **19.** 4 in. $< \ell <$ 12 in. **21.** 8 ft $< \ell <$ 32 ft **23.** $\overline{LM}$, $\overline{MN}$, $\overline{LN}$; $\angle N$, $\angle L$, $\angle M$ **25.** > **27.** C, B, A, D

Algebra Review (p. 349) **1. a.** $\frac{3}{1}$ **b.** $\frac{1}{4}$ **3.** $\frac{5}{4}$ **5.** 9% decrease **7.** about 12.5% increase **9.** 0.25% decrease **11.** 84%; 37.8 h **13.** 107.5%; 86 people

Chapter 6

6.1 Skill Practice (pp. 360–361) **1.** means: n and p, extremes: m and q **3.** 4 : 1 **5.** 600 : 1 **7.** $\frac{7}{1}$ **9.** $\frac{24}{5}$ **11.** $\frac{5 \text{ in.}}{15 \text{ in.}}; \frac{1}{3}$ **13.** $\frac{320 \text{ cm}}{1000 \text{ cm}}; \frac{8}{25}$ **15.** $\frac{5}{2}$ **17.** $\frac{4}{3}$ **19.** 8, 28 **21.** 20°, 70°, 90° **23.** 4 **25.** 42 **27.** 3 **29.** 3 **31.** 6 **33.** 16 **35.** $5\sqrt{2}$ **37.** The unit conversion should be $\frac{1 \text{ ft}}{12 \text{ in.}}$; $\frac{8 \text{ in.}}{3 \text{ ft}} \cdot \frac{1 \text{ ft}}{12 \text{ in.}} = \frac{8}{36} = \frac{2}{9}$. **39.** $\frac{12}{5}$ **41.** $\frac{4}{3}$ **43.** $\frac{7}{11}$ **45.** ± 6 **47.** Obtuse; since the angles are supplementary, $x + 4x = 180$. Find $x = 36$, so the measure of the interior angle is 144°. **49.** 9 **51.** 5 **53.** 72 in., 60 in. **55.** 45, 30

6.1 Problem Solving (pp. 362–363) **57.** 18 ft, 15 ft, 270 ft^2; 270 tiles; \$534.60 **59.** 9 cups, 1.8 cups, 7.2 cups **61.** about 189 hits **63.** All three ratios reduce to 4 : 3. **65.** 600 Canadian dollars **67.** $\frac{a}{b} = \frac{c}{d}$, $b \ne 0$, $d \ne 0$; $\frac{a}{b} \cdot bd = \frac{c}{d} \cdot bd$; $ad = cb$; $ad = bc$

6.2 Skill Practice (pp. 367–368) **1.** scale drawing **3.** $\frac{x}{y}$ **5.** $\frac{y+15}{15}$ **7.** true **9.** true **11.** 10.5 **13.** about 100 yd **15.** 4 should have been added to the second fraction instead of 3; $\frac{a+3}{3} = \frac{c+4}{4}$. **17.** $\frac{49}{3}$

6.2 Problem Solving (pp. 368–370) **23.** 1 in. : $\frac{1}{3}$ mi **25.** about 8 mi **27.** about 0.0022 mm **29.** 48 ft

31.
$$\begin{aligned} \frac{a}{b} &= \frac{c}{d} \\ \frac{a}{b} \cdot bd &= \frac{c}{d} \cdot bd \\ ad &= cb \\ ad \cdot \frac{1}{ac} &= cb \cdot \frac{1}{ac} \\ \frac{d}{c} &= \frac{b}{a} \end{aligned}$$

33.
$$\begin{aligned} \frac{a}{b} &= \frac{c}{d} \\ \frac{a}{b} + 1 &= \frac{c}{d} + 1 \\ \frac{a}{b} + \frac{b}{b} &= \frac{c}{d} + \frac{d}{d} \\ \frac{a+b}{b} &= \frac{c+d}{d} \end{aligned}$$

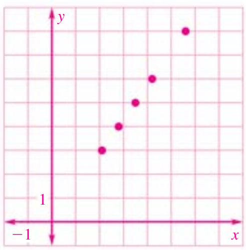
35.
$$\begin{aligned} \frac{a+c}{b+d} &= \frac{a-c}{b-d} \\ (a+c)(b-d) &= (a-c)(b+d) \\ ab - ad + bc - cd &= ab + ad - bc - cd \\ -ad + bc &= ad - bc \\ -2ad &= -2bc \\ ad &= bc \\ \frac{a}{b} &= \frac{c}{d} \end{aligned}$$

SELECTED ANSWERS

6.3 Skill Practice (pp. 376–377) **1.** congruent, proportional **3.** $\angle A \cong \angle L$, $\angle B \cong \angle M$, $\angle C \cong \angle N$; $\frac{AB}{LM} = \frac{BC}{MN} = \frac{CA}{NL}$ **5.** $\angle H \cong \angle W$, $\angle J \cong \angle X$, $\angle K \cong \angle Y$, $\angle L \cong \angle Z$; $\frac{HJ}{WX} = \frac{JK}{XY} = \frac{KL}{YZ} = \frac{LH}{ZW}$ **7.** similar; $RSTU \sim WXYZ$, $\frac{2}{1}$ **9.** $\frac{5}{2}$ **11.** 85, 34 **13.** The larger triangle's perimeter was doubled but should have been halved; perimeter of B = 14. **15.** always **17.** never **19.** altitude, 24 **21.** $10\frac{2}{3}$ in., $13\frac{1}{3}$ in. **23.** $\frac{11}{5}$ **25.** $17\frac{3}{5}$ **27.** No; in similar triangles corresponding angles are congruent.

6.3 Problem Solving (pp. 378–379) **31.** No; the lengths are not proportional. **33. a.** 2.8, 4.2, 5.6, 2.1

b.

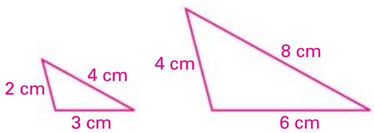


yes **c.** $y = \frac{10}{7}x$; $\frac{10}{7}$; they are the same.

35. Yes; if $\ell = w$ then the larger and smaller image would be similar. *Sample answer:* Let $\ell = 8$, $w = 8$, and $a = 4$; $\frac{w}{w+a} = \frac{8}{12} = \frac{2}{3}$, $\frac{\ell}{\ell + a} = \frac{8}{12} = \frac{2}{3}$. **37. a.** They have the same slope. **b.** $\angle BOA \cong \angle DOC$ by the Vertical Angles Theorem. $\angle OBA \cong \angle ODC$ by the Alternate Interior Angles Theorem. $\angle BAO \cong \angle DCO$ by the Alternate Interior Angles Theorem.**c.** $(-3, 0)$, $(0, 4)$, $(6, 0)$, $(0, -8)$; $AO = 3$, $OB = 4$, $BA = 5$, $CO = 6$, $OD = 8$, $DC = 10$ **d.** Since corresponding angles are congruent and the ratios of corresponding sides are all the same the triangles are similar.

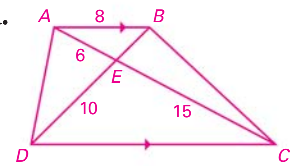
6.4 Skill Practice (pp. 384–385) **1.** similar **3.** $\triangle FED$ **5.** 15, y **7.** 20 **9.** similar; $\triangle FGH \sim \triangle DKLJ$ **11.** not similar **13.** similar; $\triangle YZX \sim \triangle YWU$ **15.** The AA Similarity Postulate is for triangles, not quadrilaterals. **17.** 5 should be replaced by 9, which is the length of the corresponding side of the larger triangle. *Sample answer:* $\frac{4}{9} = \frac{6}{x}$.

19. *Sample:*



21. (10, 0) **23.** (24, 0)

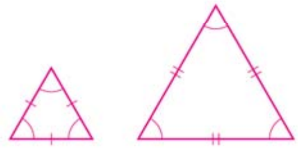
25. a.



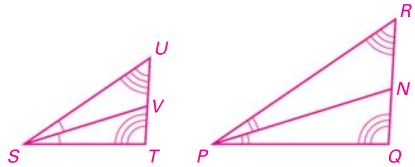
b. *Sample answer:* $\angle ABE$ and $\angle CDE$, $\angle BAE$ and $\angle DCE$ **c.** $\triangle ABE$ and $\triangle CDE$, $\triangle ABE \sim \triangle CDE$ **d.** 4, 20

27. Yes; either $m\angle X$ or $m\angle Y$ could be 90°, and the other angles could be the same. **29.** No; since $m\angle J + m\angle K = 85°$ then $m\angle L = 95°$. Since $m\angle X + m\angle Z = 80°$ then $m\angle X = 100°$ and thus neither $\angle X$ nor $\angle Z$ can measure 95°.

6.4 Problem Solving (pp. 386–387) **31.** about 30.8 in. **33.** The measure of all angles in an equilateral triangle is 60°. *Sample:*

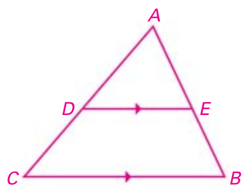


35.



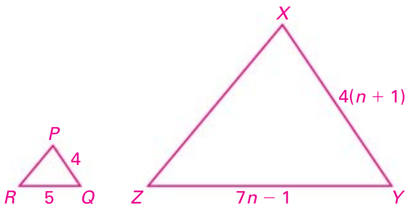
Since $\triangle STU \sim \triangle PQR$ you know that $\angle T \cong \angle Q$ and $\angle UST \cong \angle RPQ$. Since $\overline{SV}$ bisects $\angle TSU$ and $\overline{PN}$ bisects $\angle QPR$ you know that $\angle USV \cong \angle VST$ and $\angle RPN \cong \angle NPQ$ by definition of angle bisector. You know that $m\angle USV + m\angle VST = m\angle UST$ and $m\angle RPN + m\angle NPQ = m\angle RPQ$, therefore, $2m\angle VST = 2m\angle NPQ$ using the Substitution Property of Equality. You now have $\angle VST \cong \angle NPQ$, which makes $\triangle VST \sim \triangle NPQ$ using the AA Similarity Postulate. From this you know that $\frac{SV}{PN} = \frac{ST}{PQ}$.

37. a. *Sample:*

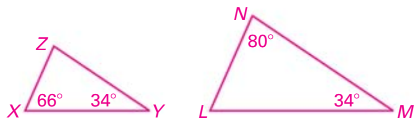


b. $m\angle ADE = m\angle ACB$ and $m\angle AED = m\angle ABC$ **c.** $\triangle ADE \sim \triangle ACB$ **d.** *Sample answer:* $\frac{AD}{AC} = \frac{AE}{AB} = \frac{DE}{CB} = \frac{1}{2}$ **e.** The measures of the angles change, but the equalities remain the same. The lengths of the sides change, but they remain proportional; yes; the triangles remain similar by the AA Similarity Postulate.

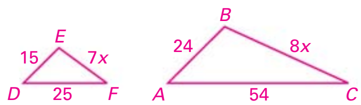
6.5 Skill Practice (pp. 391–393) **1.** $\frac{AC}{PX} = \frac{CB}{XQ} = \frac{AB}{PQ}$ **3.** $\frac{18}{12} = \frac{15}{10} = \frac{12}{8}; \frac{3}{2}$ **5.** $\triangle RST$ **7.** similar; $\triangle FDE \sim \triangle XWY$; 2 : 3
9. 3



11. $\triangle ABC \sim \triangle DEC$; $\angle ACB \cong \angle DCE$ by the Vertical Angles Congruence Theorem and $\frac{AC}{DC} = \frac{BC}{EC} = \frac{3}{2}$. The triangles are similar using the SAS Similarity Theorem. **13.** *Sample answer:* The triangle correspondence is not listed in the correct order; $\triangle ABC \sim \triangle RQP$.
15.



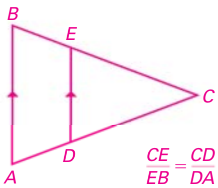
They are similar by the AA Similarity Postulate.
17.



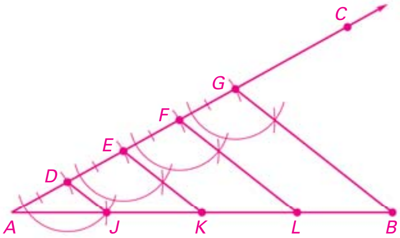
They are not similar since the ratio of corresponding sides is not constant.
19. 45° **21.** 24 **23.** $16\sqrt{2}$

6.5 Problem Solving (pp. 393–395) **29.** The triangle whose sides measure 4 inches, 4 inches, and 7 inches is similar to the triangle whose sides measure 3 inches, 3 inches, and 5.25 inches. **31.** $\angle CBD \cong \angle CAE$
33. a. AA Similarity Postulate **b.** 75 ft **c.** 66 ft
35. *Sample answer:* Given that D and E are midpoints of $\overline{AB}$ and $\overline{BC}$ respectively the Midsegment Theorem guarantees that $\overline{AC} \parallel \overline{DE}$. By the Corresponding Angles Postulate $\angle A \cong \angle BDE$ and so $\angle BDE$ is a right angle. Reasoning similarly $\overline{AB} \parallel \overline{EF}$. By the Alternate Interior Angles Congruence Theorem $\angle BDE \cong \angle DEF$. This makes $\angle DEF$ a right angle that measures 90°.

6.6 Skill Practice (pp. 400–401)
1. If a line parallel to one side of a triangle intersects the other two sides then it divides the two sides proportionally.

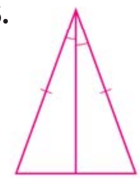


3. 9 **5.** Parallel; $\frac{8}{5} = \frac{12}{7.5}$ so the Converse of the Triangle Proportionality Theorem applies. **7.** Parallel; $\frac{20}{18} = \frac{25}{22.5}$ so the Converse of the Triangle Proportionality Theorem applies. **9.** 10 **11.** 1 **15.** 9 **17.** $a = 9$, $b = 4$, $c = 3$, $d = 2$
19. a–b. See figure in part (c).
c.



Theorem 6.6 guarantees that parallel lines divide transversals proportionally. Since $\frac{AD}{DE} = \frac{DE}{EF} = \frac{EF}{FG} = 1$ implies $\frac{AJ}{JK} = \frac{JK}{KL} = \frac{KL}{LB} = 1$ which means $AJ = JK = KL = LB$.

6.6 Problem Solving (pp. 402–403) **21.** 350 yd
23. Since $k_1 \parallel k_2 \parallel k_3$, $\angle FDA \cong \angle CAD$ and $\angle CDA \cong \angle FAD$ by the Alternate Interior Angles Congruence Theorem. $\triangle ACD \sim \triangle DFA$ by the AA Similarity Postulate. Let point G be at the intersection of $\overline{AD}$ and $\overline{BE}$. Using the Triangle Proportionality Theorem $\frac{CB}{BA} = \frac{DG}{GA}$ and $\frac{DE}{EF} = \frac{DG}{GA}$. Using the Transitive Property of Equality $\frac{CB}{BA} = \frac{DE}{EF}$.
25.

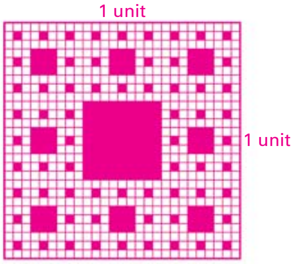


The ratio of the lengths of the other two sides is 1 : 1 since in an isosceles triangle these two sides are congruent.

27. Since $\overline{XW} \parallel \overline{AZ}$, $\angle XZA \cong \angle WXZ$ using the Alternate Interior Angles Congruence Theorem. This makes $\triangle AXZ$ isosceles because it is shown that $\angle A \cong \angle WXZ$ and by the Converse of the Base Angles Theorem, $AX = XZ$. Since $\overline{XW} \parallel \overline{AZ}$ using the Triangle Proportionality Theorem you get $\frac{YW}{WZ} = \frac{XY}{AX}$. Substituting you get $\frac{YW}{WX} = \frac{XY}{XZ}$.

6.6 Problem Solving Workshop (p. 405)
1. a. 270 yd **b.** 67.5 yd **3.** 4.5 mi/h **5.** 5.25, 7.5

Extension (p. 407) **1.** 3 : 1. *Sample answer:* It's one unit longer; each of the three edges went from measuring one unit to four edges each measuring $\frac{1}{3}$ of a unit.

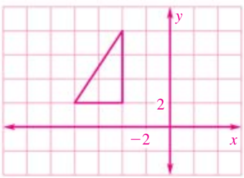
3. a. 

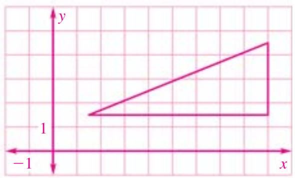
b. *Sample answer:* The upper left square is simply a smaller version of the whole square.

c.

Stage	Number of colored squares	Area of 1 colored square	Total Area
0	0	0	0
1	1	$\frac{1}{9}$	$\frac{1}{9}$
2	8	$\frac{1}{81}$	$\frac{17}{81}$
3	64	$\frac{1}{729}$	$\frac{217}{729}$

6.7 Skill Practice (pp. 412–413) **1.** similar

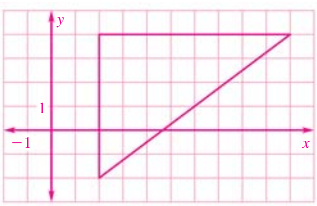
3. 

5. 

9. reduction; $\frac{1}{2}$ **11.** enlargement; 3 **15.** The figures are not similar. **17.** reflection **19.** 2; $m = 4$, $n = 5$

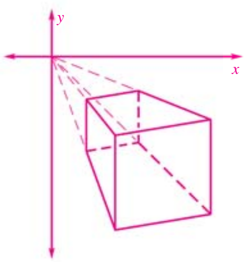
6.7 Problem Solving (pp. 414–415)

25. 24 ft by 12 ft **27.** $\frac{5}{2}$

29. a. 

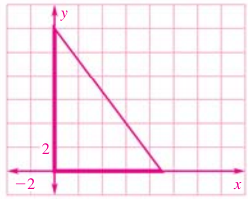
b. $\frac{2}{3}$; they are the same. **c.** $\frac{4}{9}$; it's the square of the scale factor.

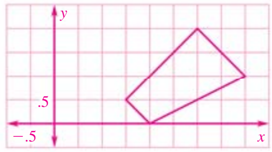
31. Perspective drawings use converging lines to give the illusion that an object is three dimensional. Since the back of the drawing is similar to the front, a dilation can be used to create this illusion with the vanishing point as the center of dilation.



33. The slope of $\overline{PQ}$ is $\frac{d-b}{c-a}$ and the slope of $\overline{XY}$ is $\frac{kd-kb}{kc-ka} = \frac{k(d-b)}{k(c-a)} = \frac{d-b}{c-a}$. Since the slopes are the same, the lines are parallel.

Chapter Review (pp. 418–421) **1.** dilation **3.** In a ratio two numbers are compared. In a proportion two ratios are set equal to one another. *Sample answer:* $\frac{2}{4}, \frac{6}{10} = \frac{3}{5}$ **5.** 45°, 45°, 90° **7.** $\frac{20}{3}$ **9.** similar; $ABCD \sim EFGH$, $\frac{4}{3}$ **11.** 68 in. **13.** The Triangle Sum Theorem tells you that $m\angle D = 60°$ so $\angle A \cong \angle D$ and it was given that $\angle C \cong \angle F$ which gives you $\triangle ABC \sim \triangle DEF$ using the AA Similarity Postulate. **15.** Since $\frac{4}{8} = \frac{3.5}{7}$ and the included angle, $\angle C$, is congruent to itself, $\triangle BCD \sim \triangle ACE$ by the SAS Similarity Theorem. **17.** not parallel

19. 

21. 

Algebra Review (p. 423) **1.** ± 10 **3.** $\pm\sqrt{17}$ **5.** $\pm\sqrt{10}$ **7.** $\pm 2\sqrt{5}$ **9.** $\pm 3\sqrt{2}$ **11.** $\frac{\sqrt{15}}{5}$ **13.** $\frac{\sqrt{21}}{2}$ **15.** $\frac{1}{10}$ **17.** $\frac{\sqrt{2}}{2}$

Cumulative Review (pp. 428–429) **1. a.** 33° **b.** 123° **3. a.** 2° **b.** 92°

5.	$3x - 19 = 47$	Given
	$3x = 66$	Addition Property of Equality
	$x = 22$	Division Property of Equality
7.	$-5(x + 2) = 25$	Given
	$x + 2 = -5$	Division Property of Equality
	$x = -7$	Subtraction Property of Equality

9. Alternate Interior Angles Theorem **11.** Corresponding Angles Postulate **13.** Linear Pair Postulate **15.** 78°, 78°, 24°; acute **17.** congruent; $\triangle ABC \cong \triangle CDA$, SSS Congruence Theorem **19.** not congruent **21.** 8 **23.** similar; $\triangle FCD \sim \triangle FHG$, SAS Similarity Theorem **25.** not similar **27. a.** $y = 59x + 250$ **b.** The slope is the monthly membership and the y-intercept is the initial cost to join the club. **c.** \$958 **29.** *Sample answer:* Since $\overline{BC} \parallel \overline{AD}$, you know that $\angle CBD \cong \angle ADB$ by the Alternate Interior Angles Theorem. $\overline{BD} \cong \overline{BD}$ by the Reflexive Property of Segment Congruence and with $\overline{BC} \cong \overline{AD}$ given, then $\triangle BCD \cong \triangle DAB$ by the SAS Congruence Theorem. **31.** 43 mi < d < 397 mi

Chapter 7

7.1 Skill Practice (pp. 436–438) **1.** Pythagorean triple **3.** 130 **5.** 58 **7.** In Step 2, the Distributive Property was used incorrectly; $x^2 = 49 + 576$, $x^2 = 625$, $x = 25$.

SELECTED ANSWERS

9. about 9.1 in. **11.** 120 m^2 **13.** 48 cm^2 **15.** 40 **19.** 15, leg **21.** 52, hypotenuse **23.** 21, leg **25.** $11\sqrt{2}$

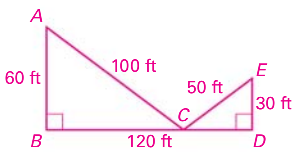
7.1 Problem Solving (pp. 438–439) **31.** about 127.3 ft **33.** *Sample answer:* The longest side of the triangle is opposite the largest angle, which in a right triangle is the right angle.

35. a–b.

BC	*AC*	*CE*	*AC* + *CE*
10	60.8	114.0	174.8
20	63.2	104.4	167.6
30	67.1	94.9	162
40	72.1	85.4	157.6
50	78.1	76.2	154.3
60	84.9	67.1	152
70	92.2	58.3	150.5
80	100	50	150
90	108.2	42.4	150.6
100	116.6	36.1	152.7
110	125.3	31.6	156.9
120	134.2	30	164.2

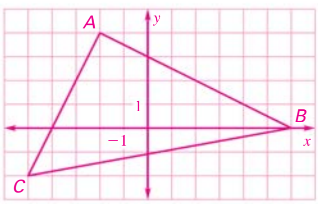
150 ft

c.



7.2 Skill Practice (pp. 444–445) **1.** hypotenuse **3.** right triangle **5.** not a right triangle **7.** right triangle **9.** right triangle **11.** right triangle **13.** right triangle **15.** yes; acute **17.** yes; obtuse **19.** yes; right **21.** no **23.** yes; obtuse

27.

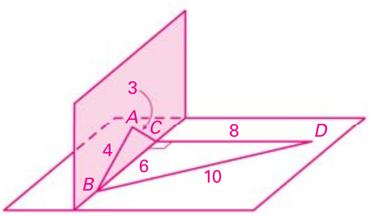


right

29. right **31.** < **33.** $8 < x < 12$

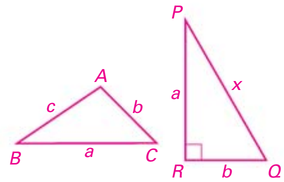
7.2 Problem Solving (pp. 445–447) **35.** Measure diagonally across the painting and it should be about 12.8 inches. **37. a.** 5 **b.** $3^2 + 4^2 = 5^2$ therefore $\triangle ABC$ is a right triangle.

c. *Sample:*



39. a. yes; $12^2 + 16^2 = 20^2$ **b.** no; $9^2 + 12^2 \neq 18^2$ **c.** No; if the car was not in an accident, the angles should form a right triangle.

41. Given: In $\triangle ABC$, $c^2 > a^2 + b^2$, where c is the length of the longest side.
Prove: $\triangle ABC$ is obtuse.



Statements	Reasons
1. In $\triangle ABC$, $c^2 > a^2 + b^2$ where c is the length of the longest side. In $\triangle PQR$, $\angle R$ is a right angle.	1. Given
2. $a^2 + b^2 = x^2$	2. Pythagorean Theorem
3. $c^2 > x^2$	3. Substitution
4. $c > x$	4. A property of square roots
5. $m\angle R = 90°$	5. Definition of a right angle
6. $m\angle C > m\angle R$	6. Converse of the Hinge Theorem
7. $m\angle C > 90°$	7. Substitution Property
8. $\angle C$ is an obtuse angle.	8. Definition of an obtuse angle
9. $\triangle ABC$ is an obtuse triangle.	9. Definition of an obtuse triangle

43. $\triangle ABC \sim \triangle DEC$, $\angle BAC$ is 90°, so $\angle EDC$ must also be 90°.

7.3 Skill Practice (pp. 453–454) **1.** similar **3.** $\triangle FHG \sim \triangle HEG \sim \triangle FEH$ **5.** about 53.7 ft **7.** about 6.7 ft **9.** $\triangle QSR \sim \triangle STR \sim \triangle QTS$; RQ **11.** *Sample answer:* The proportion must compare corresponding parts, $\frac{v}{z} = \frac{z}{w + v}$ **13.** about 6.7 **15.** about 45.6 **17.** about 6.3 **21.** 3 **23.** $x = 9$, $y = 15$, $z = 20$ **25.** right triangle; about 6.7 **27.** 25, 12

7.3 Problem Solving (pp. 455–456) **29.** about 1.1 ft **31.** 15 ft; no, but the values are very close **33. a.** $\overline{FH}$, $\overline{GF}$, $\overline{EF}$; each segment has a vertex as an endpoint and is perpendicular to the opposite side. **b.** $\sqrt{35}$ **c.** about 35.5

37.

Statements	Reasons
1. $\triangle ABC$ is a right triangle; $\overline{CD}$ is the altitude to $\overline{AB}$.	1. Given
2. $\triangle ABC \sim \triangle CBD$	2. Theorem 7.5
3. $\frac{AB}{CB} = \frac{BC}{BD}$	3. Definition of similar figures
4. $\triangle ABC \sim \triangle ACD$	4. Theorem 7.5
5. $\frac{AB}{AC} = \frac{AC}{AD}$	5. Definition of similar figures

7.4 Skill Practice (pp. 461–462) **1.** an isosceles right triangle **3.** $7\sqrt{2}$ **5.** 3 **7.** 2; 4 in. **9.** $x = 3$, $y = 6$

11.

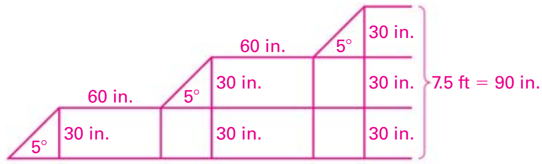
a	7	11	$5\sqrt{2}$	6	$\sqrt{5}$
b	7	11	$5\sqrt{2}$	6	$\sqrt{5}$
c	$7\sqrt{2}$	$11\sqrt{2}$	10	$6\sqrt{2}$	$\sqrt{10}$

13. $x = \frac{15}{2}\sqrt{3}$, $y = \frac{15}{2}$ **15.** $p = 12$, $q = 12\sqrt{3}$ **17.** $t = 4\sqrt{2}$, $u = 7$ **21.** The hypotenuse of a 45°-45°-90° triangle should be $x\sqrt{2}$, if $x = \sqrt{5}$, then the hypotenuse is $\sqrt{10}$. **23.** $f = \frac{20\sqrt{3}}{3}$, $g = \frac{10\sqrt{3}}{3}$ **25.** $x = 4$, $y = \frac{4\sqrt{3}}{3}$

7.4 Problem Solving (pp. 463–464) **27.** 5.5 ft **29.** *Sample answer:* Method 1. Use the Angle-Angle Similarity postulate, because by definition of an isosceles triangle, the base angles must be the same and in a right isosceles triangle, the angles are 45°. Method 2. Use the Side-Angle-Side Similarity Theorem, because the right angle is always congruent to another right angle and the ratio of sides of an isosceles triangle will always be the same. **31.** $10\sqrt{3}$ in. **33. a.** 45°-45°-90° for all triangles **b.** $\frac{3\sqrt{2}}{2}$ in. $\times$ $\frac{3\sqrt{2}}{2}$ in. **c.** 1.5 in. $\times$ 1.5 in.

7.5 Skill Practice (pp. 469–470) **1.** the opposite leg, the adjacent leg **3.** $\frac{24}{7}$ or 3.4286, $\frac{7}{24}$ or 0.2917 **5.** $\frac{12}{5}$ or 2.4, $\frac{5}{12}$ or 0.4167 **7.** 7.6 **9.** 6; 6; they are the same. **11.** $4\sqrt{3}$; $4\sqrt{3}$; they are the same. **13.** Tangent is the ratio of the opposite and the adjacent side, not adjacent to hypotenuse; $\frac{80}{18}$. **15.** You need to know: that the triangle is a right triangle, which angle you will be applying the ratio to, and the lengths of the opposite side and the adjacent side to the angle. **19.** 15.5 **21.** 77.4 **23.** 60.6 **25.** 27.6 **27.** 60; 54 **29.** 82; 154.2

7.5 Problem Solving (pp. 471–472) **31.** 555 ft **33.** about 33.4 ft **35.** $\tan A = \frac{a}{b}$, $\tan B = \frac{b}{a}$; the tangent of one acute angle is the reciprocal of the other acute angle; complementary. **37. a.** 29 ft **b.** 3 ramps and 2 landings;

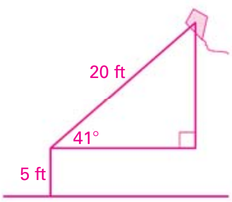


c. 96 ft

7.6 Skill Practice (pp. 477–478) **1.** the opposite leg, the hypotenuse **3.** $\frac{4}{5}$ or 0.8, $\frac{3}{5}$ or 0.6 **5.** $\frac{28}{53}$ or 0.5283, $\frac{45}{53}$ or 0.8491 **7.** $\frac{3}{5}$ or 0.6, $\frac{4}{5}$ or 0.8 **9.** $\frac{1}{2}$ or 0.5, $\frac{\sqrt{3}}{2}$ or 0.8660 **11.** $a = 14.9$, $b = 11.1$ **13.** $s = 17.7$, $r = 19.0$ **15.** $m = 6.7$, $n = 10.4$ **17.** The triangle must be a right triangle, and you need either an acute angle measure and the length of one side or the lengths of two sides of the triangle. **19.** 3.0 **21.** 20.2 **23.** 12; $\frac{2\sqrt{2}}{2}$ or 0.9428, $\frac{1}{3}$ or 0.3333 **25.** 3; $\frac{\sqrt{5}}{5}$ or 0.4472, $\frac{2\sqrt{5}}{5}$ or 0.8944 **27.** 33; $\frac{56}{65}$ or 0.8615, $\frac{33}{65}$ or 0.5077 **31.** about 18 cm

7.6 Problem Solving (pp. 479–480) **33.** about 36.9 ft

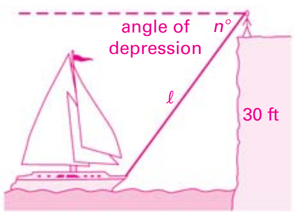
35. a.



b. About 18.1 ft; the height that the spool is off the ground has to be added.

37. Both; since different angles are used in each ratio, both the sine and cosine relationships can be used to correctly answer the question.

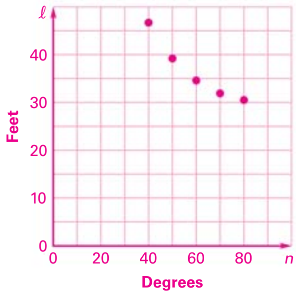
39. a.



b.

$n°$	40°	50°	60°	70°	80°
ℓ (ft)	46.7	39.2	34.6	31.9	30.5

c.



d. *Sample answer:* 60 ft

7.6 Problem Solving Workshop (p. 482) **1.** about 8.8 ft, about 18 ft **3.** The cosine ratio is the adjacent side over the hypotenuse, not opposite over adjacent; $\cos A = \frac{7}{25}$. **5.** $\cos 34° = \frac{x}{17}$, $\tan 34° = \frac{9.5}{x}$, $x^2 + 9.5^2 = 17^2$

7.7 Skill Practice (pp. 485–487) **1.** angles, sides **3.** 33.7° **5.** 74.1° **7.** 53.1° **11.** $N = 25°$, $NP \approx 21.4$, $NQ \approx 23.7$ **13.** $A \approx 36.9°$, $B \approx 53.1°$, $AC = 15$ **15.** $G \approx 29°$, $J \approx 61°$, $HJ = 7.7$ **17.** $D \approx 29.7°$, $E \approx 60.3°$, $ED \approx 534$ **19.** Since an angle was given, the $\sin^{-1}$ should not have been used; $\sin 36 = \frac{7}{WX}$. **21.** 30° **23.** 70.7° **25.** 45° **27.** 11° **31.** 45°; 60°

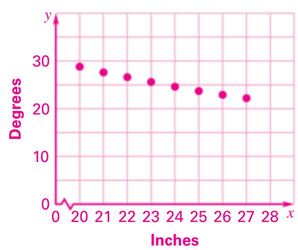
7.7 Problem Solving (pp. 487–489) **35.** about 59.7° **37.** $\tan^{-1} \frac{BC}{AC}$. *Sample answer:* The information needed to determine the measure of A was given if you used the tangent ratio, this will make the answer more accurate since no rounding has occurred.

39. a.

x (in.)	20	21	22	23
y (°)	28.8°	27.6°	26.6°	25.6°

x (in.)	24	25	26	27
y (°)	24.6°	23.7°	22.9°	22.2°

b.



c. *Sample answer:* The longer the rack, the closer to 20° the angle gets.

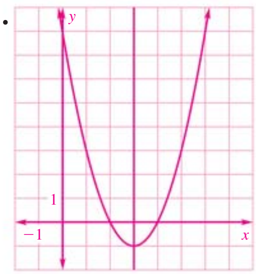
41. a. 38.4 ft **b.** about 71.2 ft **c.** about 48.7 ft **d.** About 61.7°, about 51.7°; neither; the sides are not the same, so the triangles are not congruent, and the angles are not the same, so the triangles are not similar. **e.** I used tangent because the height and the distance along the ground form a tangent relationship for the angle of elevation.

Extension (p. 491) **1.** $C = 66°$, $a = 4.4$, $c = 8.3$ **3.** $B = 81.8°$, $C = 47.2°$, $b = 22.9$ **5.** $A = 58.2°$, $B = 85.6°$, $C = 36.2°$ **7.** about 10 blocks

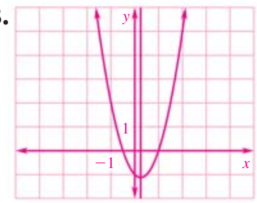
Chapter Review (pp. 494–497) **1.** $a^2 + b^2 = c^2$ **3.** *Sample answer:* The difference is your perspective on the situation. The angle of depression is the measure from your line of sight down, and the angle of elevation is the measure from your line of sight up, but if you construct the parallel lines in any situation, the angles are alternate interior angles and are congruent by Theorem 3.1. **5.** $2\sqrt{34}$ **7.** acute **9.** right **11.** right **13.** 13.5 **15.** $2\sqrt{10}$ **17.** 9 **19.** $6\sqrt{2}$ **21.** $16\sqrt{3}$ **23.** about 5.7 ft **25.** 9.3 **27.** $\frac{3}{5} = 0.6$, $\frac{4}{5} = 0.8$ **29.** $\frac{55}{73} = 0.7534$, $\frac{48}{73} = 0.6575$ **31.** $L = 53°$, $ML = 4.5$, $NL = 7.5$ **33.** 50°, 40°, 50°; about 6.4, about 8.4, about 13.1

Algebra Review (p. 499)

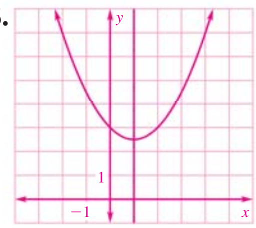
1.



3.



5.

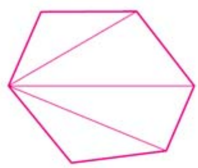


7. −2, 3
9. no solution
11. no solution
13. 0, 8
15. 2, 4
17. −5

Chapter 8

8.1 Skill Practice (pp. 510–511)

1. *Sample:*



3. 1260° **5.** 2520° **7.** quadrilateral **9.** 13-gon **11.** 117 **13.** $88\frac{1}{3}$ **15.** 66

17. The sum of the measures of the exterior angles of any convex n-gon is always 360°; the sum of the measures of the exterior angles of an octagon is the same as the sum of the measures of the exterior angles of a hexagon. **19.** 108°, 72° **21.** 176°, 4° **23.** The interior angle measures are the same in both pentagons and the ratio of corresponding sides would be the same. **25.** 40

SELECTED ANSWERS

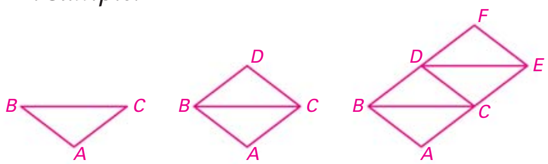
8.1 Problem Solving (pp. 512–513) **29.** 720° **31.** 144°; 36° **33.** In a pentagon draw all the diagonals from one vertex. Observe that the polygon is divided up into three triangles. Since the sum of the measures of the interior angles of each triangle is 180° the sum of the measures of the interior angles of the pentagon is $(5 - 2) \cdot 180° = 3 \cdot 180° = 540°$.
35. *Sample answer:* In a convex n-gon the sum of the measures of the n interior angles is $(n - 2) \cdot 180°$ using the Polygon Interior Angles Theorem. Since each of the n interior angles form a linear pair with their corresponding exterior angles you know that the sum of the measures of the n interior and exterior is angles $180°n$. Subtracting the sum of the interior angle measures from the sum of the measures of the linear pairs $(180°n - [(n - 2) \cdot 180°])$ you get 360°.
37. a.

Polygon	Number of sides	Number of triangles	Sum of measures of interior angles
Quadrilateral	4	2	$2 \cdot 180° = 360°$
Pentagon	5	3	$3 \cdot 180° = 540°$
Hexagon	6	4	$4 \cdot 180° = 720°$
Heptagon	7	5	$5 \cdot 180° = 900°$

b. $s(n) = (n - 2) \cdot 180°$; the table shows that the number of triangles is two less than the number of sides.

8.2 Skill Practice (pp. 518–519) **1.** A parallelogram is a quadrilateral with both pairs of opposite sides parallel; opposite sides are congruent, opposite angles are congruent, consecutive angles are supplementary, and the diagonals bisect each other. **3.** $x = 9, y = 15$ **5.** $a = 55$ **7.** $d = 126, z = 28$ **9.** 129° **11.** 61° **13.** $a = 3, b = 10$ **15.** $x = 4, y = 4$ **17.** $\overline{BC}$; opposite sides of a parallelogram are congruent. **19.** $\angle DAC$; alternate interior angles are congruent. **21.** 47°; consecutive angles of a parallelogram are supplementary and alternate interior angles are congruent. **23.** 120°; $\angle EJF$ and $\angle FJG$ are a linear pair. **25.** 35°; Triangle Sum Theorem **27.** 130°; sum of the measures of $\angle HGE$ and $\angle EGF$. **31.** 26°, 154° **33.** 20, 60°; $UV = TS = QR$ using the fact that opposite sides are congruent and the Transitive Property of Equality. $\angle TUS \cong \angle VSU$ using the Alternate Interior Angles Congruence Theorem and $m\angle TSU = 60°$ using the Triangle Sum Theorem. **35.** *Sample answer:* In a parallelogram opposite angles are congruent. $\angle A$ and $\angle C$ are opposite angles but not congruent.

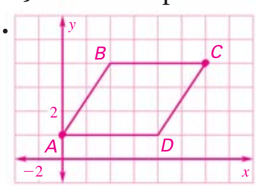
8.2 Problem Solving (pp. 520–521) **39. a.** 3 in. **b.** 70° **c.** It decreases; it gets longer; the sum of the measures of the interior angles always is 360°. As $m\angle Q$ increases so does $m\angle S$ therefore $m\angle P$ must decrease to maintain the sum of 180°. As $m\angle Q$ decreases $m\angle P$ increases moving Q farther away from S.
41. *Sample:*



Since $\triangle ABC \cong \triangle DCB$ you know $\angle ACB \cong \angle DBC$ and $\angle ABC \cong \angle DCB$. Using the Alternate Interior Angles Converse $\overline{BD} \parallel \overline{AC}$ and $\overline{AB} \parallel \overline{CD}$ thus making $ABDC$ a parallelogram; if two more triangles are positioned the same as the first, you can line up the pair of congruent sides and form a larger parallelogram because both pairs of alternate interior angles are congruent. Using the Alternate Interior Angles Converse, opposite sides are parallel. **43.** *Sample answer:* Given that $PQRS$ is a parallelogram you know that $\overline{QR} \parallel \overline{PS}$ with $\overline{QP}$ a transversal. By definition and the fact that $\angle Q$ and $\angle P$ are consecutive interior angles they are supplementary using the Consecutive Interior Angles Theorem. $x° + y° = 180°$ by definition of supplementary angles.

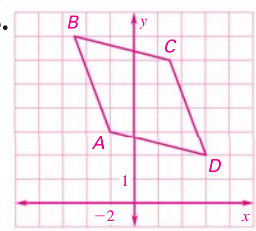
8.3 Skill Practice (pp. 526–527) **1.** The definition of a parallelogram is that it is a quadrilateral with opposite pairs of parallel sides. Since $\overline{AB}$, $\overline{CD}$ and $\overline{AD}$, $\overline{BC}$ are opposite pairs of parallel sides the quadrilateral $ABCD$ is a parallelogram. **3.** The congruent sides must be opposite one another. **5.** Theorem 8.7 **7.** Since both pairs of opposite sides of $JKLM$ always remain congruent, $JKLM$ is always a parallelogram and $\overline{JK}$ remains parallel to $\overline{ML}$. **9.** 8

11.



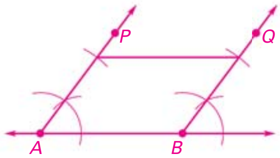
Sample answer: $AB = CD = 5$ and $BC = DA = 8$

13.

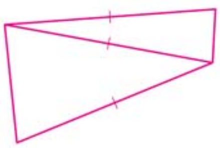


Sample answer: $AB = CD = 5$ and $BC = DA = \sqrt{65}$

15. *Sample answer:* Show $\triangle ADB \cong \triangle CBD$ using the SAS Congruence Postulate. This makes $\overline{AD} \cong \overline{CB}$ and $\overline{BA} \cong \overline{CD}$ using corresponding parts of congruent triangles are congruent. **17.** *Sample answer:* Show $\overline{AB} \parallel \overline{DC}$ by the Alternate Interior Angles Converse, and show $\overline{AD} \parallel \overline{BC}$ by the Corresponding Angles Converse. **19.** 114 **21.** 50
23. $PQRS$ is a parallelogram if and only if $\angle P \cong \angle R$ and $\angle Q \cong \angle S$. **25.** $(-3, 2)$; since $\overline{DA}$ must be parallel and congruent to $\overline{BC}$ use the slope and length of $\overline{BC}$ to find point D by starting at point A. **27.** $(-5, -3)$; since $\overline{DA}$ must be parallel and congruent to $\overline{BC}$ use the slope and length of $\overline{BC}$ to find point D by starting at point A.
29. *Sample answer:* Draw a line passing through points A and B. At points A and B construct $\overrightarrow{AP}$ and $\overrightarrow{BQ}$ such that the angle each ray makes with the line is the same. Mark off congruent segments starting at A and B along $\overrightarrow{AP}$ and $\overrightarrow{BQ}$ respectively. Draw the line segment joining these two endpoints.

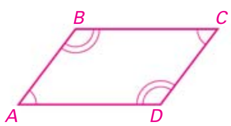


8.3 Problem Solving (pp. 528–529) **31. a.** $EFJK$, $FGHJ$, $EGHK$; in each case opposite pairs of sides are congruent. **b.** Since $EGHK$ is a parallelogram, opposite sides are congruent. **33.** Alternate Interior Angles Congruence Theorem, Reflexive Property of Segment Congruence, Given, SAS, Corr. Parts of $\cong \triangle$ are $\cong$, Theorem 8.7
35.

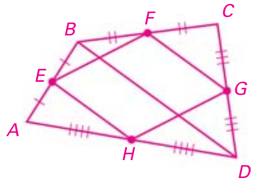


The opposite sides that are not marked in the given diagram are not necessarily the same length.

37. In a quadrilateral if consecutive angles are supplementary then the quadrilateral is a parallelogram; in $ABCD$ you are given $\angle A$ and $\angle B$, $\angle C$ and $\angle B$ are supplementary which gives you $m\angle A = m\angle C$. Also $\angle B$ and $\angle C$, $\angle C$ and $\angle D$ are supplementary which give you $m\angle B = m\angle D$. So $ABCD$ is a parallelogram by Theorem 8.8.



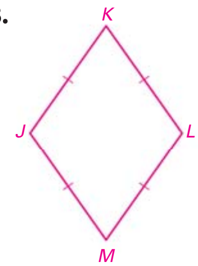
39. It is given that $\overline{KP} \cong \overline{MP}$ and $\overline{JP} \cong \overline{LP}$ by definition of segment bisector. $\angle KPL \cong \angle MPJ$ and $\angle KPJ \cong \angle MPL$ since they are vertical angles. $\triangle KPL \cong \triangle MPJ$ and $\triangle KPJ \cong \triangle MPL$ by the SAS Congruence Postulate. Using corresponding parts of congruent triangles are congruent, $\overline{KJ} \cong \overline{ML}$ and $\overline{JM} \cong \overline{LK}$. Using Theorem 8.7, $JKLM$ is a parallelogram.
41. *Sample answer:* Consider the diagram.



$\overline{FG}$ is the midsegment of $\triangle CBD$ and therefore is parallel to $\overline{BD}$ and half of its length. $\overline{EH}$ is the midsegment of $\triangle ABD$ and therefore is parallel to $\overline{BD}$ and half of its length. This makes $\overline{EH}$ and $\overline{FG}$ both parallel and congruent. Using Theorem 8.9, $EFGH$ is a parallelogram.

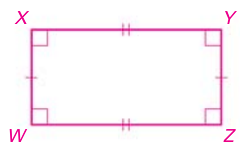
8.3 Problem Solving Workshop (p. 531) **1.** The slope of $\overline{AB}$ and $\overline{CD}$ is $\frac{2}{5}$ and the slope of $\overline{BC}$ and $\overline{DA}$ is -1. $ABCD$ is a parallelogram by definition. **3.** No; the slope of the line segment joining Newton to Packard is $\frac{1}{3}$ while the slope of the line segment joining Riverdale to Quarry is $\frac{2}{7}$. **5.** $\overline{PQ}$ and $\overline{QR}$ are not opposite sides. $\overline{PQ}$ and $\overline{RS}$ are opposite sides, so they should be parallel and congruent. The slope of $\overline{PQ} = \frac{4-2}{3-2} = 2$. The slope of $\overline{RS} = \frac{5-4}{6-3} = \frac{1}{3}$. They are not parallel, so $PQRS$ is not a parallelogram.

8.4 Skill Practice (pp. 537–539) **1.** square
3–8.



3. Sometimes; $JKLM$ would need to be a square. **5.** Always; in a rhombus all four sides are congruent. **7.** Sometimes; diagonals are congruent if the rhombus is a square.

9–14.

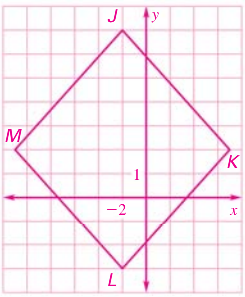


9. Always; in a rectangle all interior angles measure 90°. **11.** Sometimes; adjacent sides are congruent if the rectangle is a square. **13.** Sometimes; diagonals are perpendicular if the rectangle is a square.
15. Square; the quadrilateral has four congruent sides and angles. **17.** Rhombus. *Sample answer:* The fourth angle measure is 40°, meaning that both pairs of opposite sides are parallel. So the figure is a parallelogram with two consecutive sides congruent. But this is only possible if the remaining two sides are also congruent, so the quadrilateral is a rhombus.
19. rectangle, square **21.** rhombus, square
23. parallelogram, rectangle, rhombus, square
25. $7x - 4$ is not necessarily equal to $3x + 14$;

$(7x - 4) + (3x + 4) = 90$, $x = 9$. **27.** Rectangle; $JKLM$ is a quadrilateral with four right angles; $x = 10$, $y = 15$. **29.** Parallelogram; $EFGH$ is a quadrilateral with opposite pairs of sides congruent; $x = 13$, $y = 2$. **33.** $90°$ **35.** 16 **37.** 12 **39.** $112°$ **41.** 5 **43.** about 5.6

45. $45°$ **47.** 1 **49.** $\sqrt{2}$

51.

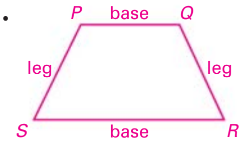


Rhombus; four congruent sides and opposite sides are parallel; $4\sqrt{106}$.

8.4 Problem Solving (pp. 539–540) **55.** Measure the diagonals. If they are the same it is a square. **57.** If a quadrilateral is a rhombus, then it has four congruent sides; if a quadrilateral has four congruent sides, then it is a rhombus; the conditional statement is true since a quadrilateral is a parallelogram and a rhombus is a parallelogram with four congruent sides; the converse is true since a quadrilateral with four congruent sides is also a parallelogram with four congruent sides making it a rhombus. **59.** If a quadrilateral is a square, then it is a rhombus and a rectangle; if a quadrilateral is a rhombus and a rectangle, then it is a square; the conditional statement is true since a square is a parallelogram with four right angles and four congruent sides; the converse is true since a rhombus has four congruent sides and the rectangle has four right angles and thus a square follows. **61.** Since $WXYZ$ is a rhombus the diagonals are perpendicular, making $\triangle WVX$, $\triangle WVZ$, $\triangle YVX$, and $\triangle YVZ$ right triangles. Since $WXYZ$ is a rhombus $\overline{WX} \cong \overline{XY} \cong \overline{YZ} \cong \overline{ZW}$. Using Theorem 8.11 $\overline{WV} \cong \overline{YV}$ and $\overline{ZV} \cong \overline{XV}$. Now $\triangle WVX \cong \triangle WVZ \cong \triangle YVX \cong \triangle YVZ$. Using corresponding parts of congruent triangles are congruent, you now know $\angle WVZ \cong \angle WVX$ and $\angle YVZ \cong \angle YVX$ which implies $\overline{WY}$ bisects $\angle ZWX$ and $\angle XYZ$. Similarly $\angle VZW \cong \angle VZY$ and $\angle VXW \cong \angle VXY$. This implies $\overline{ZX}$ bisects $\angle WZY$ and $\angle YXW$. **63.** *Sample answer:* Let rectangle $ABCD$ have vertices $(0, 0)$, $(a, 0)$, (a, b), and $(0, b)$ respectively. The diagonal $\overline{AC}$ has a length of $\sqrt{a^2 + b^2}$ and diagonal $\overline{BD}$ has a length of $\sqrt{a^2 + b^2}$. $AC = BD = \sqrt{a^2 + b^2}$.

8.5 Skill Practice (pp. 546–547)

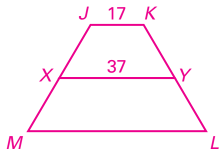
1.



3. trapezoid **5.** not a trapezoid **7.** $130°$, $50°$, $150°$ **9.** $118°$, $62°$, $62°$

11. Trapezoid; $\overline{EF} \parallel \overline{HG}$ since they are both perpendicular to $\overline{EH}$. **13.** 14 **15.** 66.5 **17.** Only one pair of opposite angles in a kite is congruent. In this case $m\angle B = m\angle D = 120°$; $m\angle A + m\angle B + m\angle C + m\angle D = 360°$, $m\angle A + 120° + 50° + 120° = 360°$, so $m\angle A = 70°$. **19.** $80°$ **21.** $WX = XY = 3\sqrt{2}$, $YZ = ZW = \sqrt{34}$ **23.** $XY = YZ = 5\sqrt{5}$, $WX = WZ = \sqrt{461}$ **25.** 2 **27.** 2.3

29.

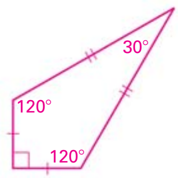


57

33. A kite or a general quadrilateral are the only quadrilaterals where a point on a line containing one of its sides can be found inside the figure.

8.5 Problem Solving (pp. 548–549)

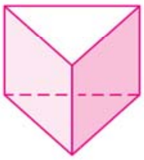
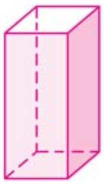
35. *Sample:*

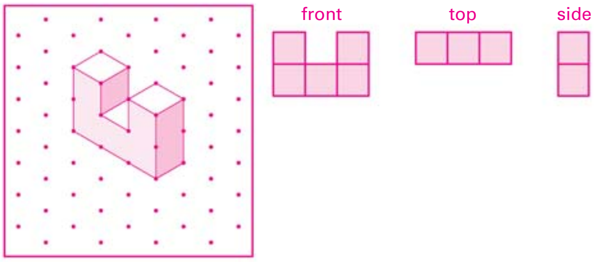


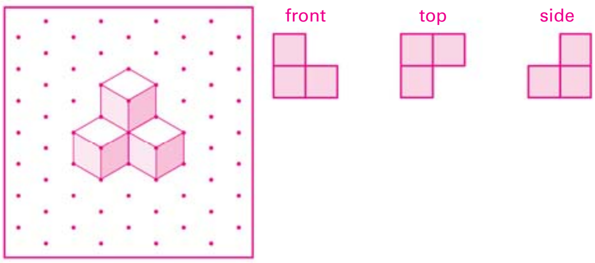
37. Since $\overline{BC} \parallel \overline{AE}$ and $\overline{AB} \parallel \overline{EC}$, $ABCE$ is a parallelogram which makes $\overline{AB} \cong \overline{EC}$. Using the Transitive Property of Segment Congruence, $\overline{CE} \cong \overline{CD}$ making $\triangle ECD$ isosceles. Since $\triangle ECD$ is isosceles $\angle D \cong \angle CED$. $\angle A \cong \angle CED$ using the Corresponding Angles Congruence Postulate, therefore $\angle A \cong \angle D$ using the Transitive Property of Angle Congruence. $\angle CED$ and $\angle CEA$ form a linear pair and therefore are supplementary. $\angle A$ and $\angle ABC$, $\angle CEA$ and $\angle ECB$ are supplementary since they are consecutive pairs of angles in a parallelogram. Using the Congruent Supplements Theorem $\angle B \cong \angle C$ ($\angle ECB$). **39.** Given $JKLM$ is an isosceles trapezoid with $\overline{KL} \parallel \overline{JM}$ and $\overline{JK} \cong \overline{LM}$. Since pairs of base angles are congruent in an isosceles trapezoid $\angle JKL \cong \angle MLK$. Using the Reflexive Property of Segment Congruence $\overline{KL} \cong \overline{KL}$. $\triangle JKL \cong \triangle MLK$ using the SAS Congruence Postulate. Using corresponding parts of congruent triangles are congruent, $\overline{JL} \cong \overline{KM}$.

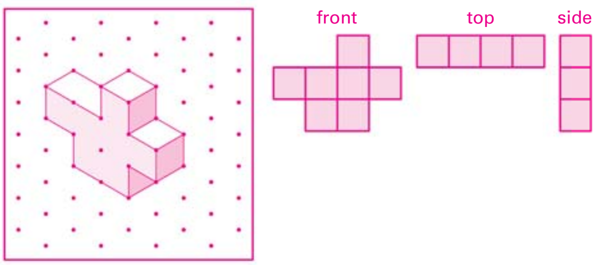
41. Given $ABCD$ is a kite with $\overline{AB} \cong \overline{CB}$ and $\overline{AD} \cong \overline{CD}$. Using the Reflexive Property of Segment Congruence, $\overline{BD} \cong \overline{BD}$ and $\overline{ED} \cong \overline{ED}$. Using the SSS Congruence Postulate, $\triangle BAD \cong \triangle BCD$. Using corresponding parts of congruent triangles are congruent, $\angle CDE \cong \angle ADE$. Using the SAS Congruence Postulate, $\triangle CDE \cong \triangle ADE$. Using corresponding parts of congruent triangles are congruent, $\angle CED \cong \angle AED$. Since $\angle CED$ and $\angle AED$ are congruent and form a linear pair, they are right angles. This makes $\overline{AC} \perp \overline{BD}$.

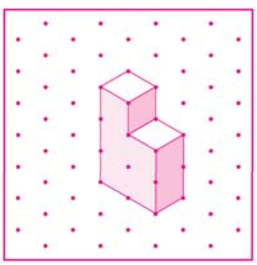
Extension (p. 551)

1.  **3.** 

5. 

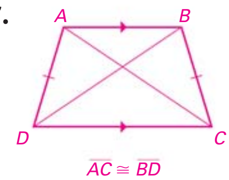
7. 

9. 

11. 

8.6 Skill Practice (pp. 554–555) **1.** isosceles trapezoid

	Property	Parallelogram	Rectangle	Rhombus	Square	Kite	Trapezoid
3.	All sides are ≅.			✘	✘		
5.	Both pair of opp. sides are ∥.	✘	✘	✘	✘		
7.	All ∡ are ≅.		✘		✘		
9.	Diagonals are ⊥.			✘	✘	✘	
11.	Diagonals bisect each other.	✘	✘	✘	✘		

15. Trapezoid; there is one pair of parallel sides.
17. 

isosceles trapezoid

19. No; $m\angle F = 109°$ which is not congruent to $\angle E$. **21.** Kite; it has two pair of consecutive congruent sides. **23.** Rectangle; opposite sides are parallel with four right angles. **25. a.** rhombus, square, kite **b.** Parallelogram, rectangle, trapezoid; two consecutive pairs of sides are always congruent and one pair of opposite angles remain congruent. **27.** *Sample answer:* $m\angle B = 60°$ or $m\angle C = 120°$; then $\overline{AB} \parallel \overline{DC}$ and the base angles would be congruent. **29.** No; if $m\angle JKL = m\angle KJM = 90°$, $JKLM$ would be a rectangle. **31.** Yes; $JKLM$ has one pair of non-congruent parallel sides with congruent diagonals.

8.6 Problem Solving (pp. 556–557) **33.** trapezoid **35.** parallelogram **37.** Consecutive interior angles are supplementary making each interior angle 90°. **39. a.** Using the definition of a regular hexagon, $\overline{UV} \cong \overline{VQ} \cong \overline{RS} \cong \overline{ST}$ and $\angle V \cong \angle S$. Using the SAS Congruence Postulate, $\triangle QVU \cong \triangle RST$ and is isosceles. **b.** Using the definition of a regular hexagon, $\overline{QR} \cong \overline{RT}$. Using corresponding parts of congruent triangles are congruent, $\overline{QU} \cong \overline{RT}$. **c.** Since $\angle Q \cong \angle R \cong \angle T \cong \angle U$ and $\angle VUQ \cong \angle VQU \cong \angle STR \cong \angle SRT$, you know that $\angle UQR \cong \angle QRT \cong \angle RTU \cong \angle TUQ$ by the Angle Addition Postulate; 90°. **d.** Rectangle; there are 4 right angles and opposite sides are congruent.

Chapter Review (pp. 560–563) **1.** midsegment **3.** if the trapezoid has a pair of congruent base angles or if the diagonals are congruent **5.** A **7.** 24-gon; 165°

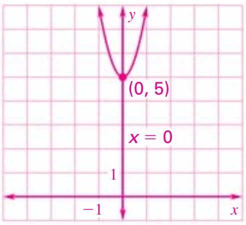
9. 82 **11.** 40°; the sum of the measures of the exterior angles is always 360°, and there are nine congruent external angles in a nonagon. **13.** $c = 6$, $d = 10$

15.

17. 100°, 80°; solve $5x + 4x = 180$ for x. **19.** 3 **21.** rectangle; 9, 5 **23.** 79°, 101°, 101° **25.** Rhombus; since all four sides are the same it is a rhombus. There are no known right angles. **27.** Parallelogram; since opposite pairs of sides are congruent it is a parallelogram. There are no known right angles.

Algebra Review (p. 565)

1.



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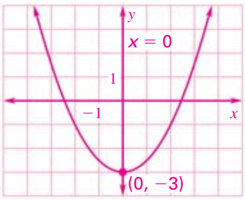

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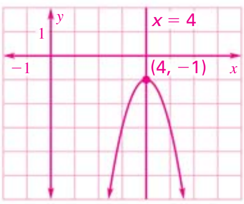

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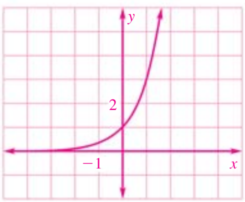

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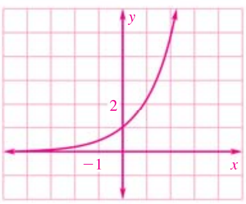

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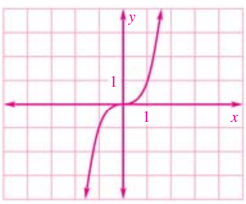

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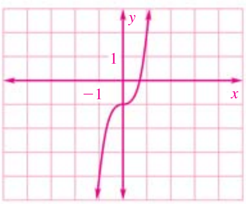

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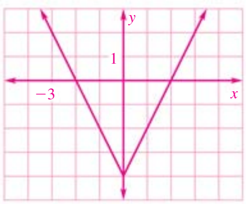
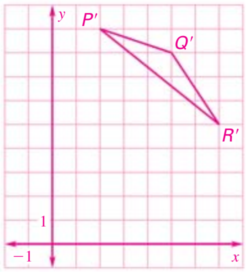


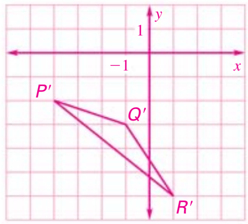
Chapter 9

9.1 Skill Practice (pp. 576–577) **1.** vector, direction **3.** $A'(-6, 10)$ **5.** $C(5, -14)$

7.

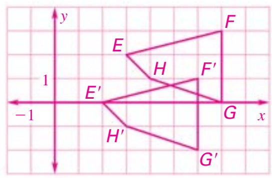


9.



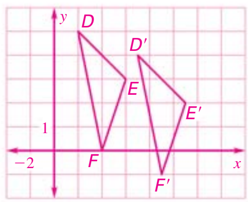
11. $(x, y) \to (x - 5, y + 2)$; $AB = A'B' = \sqrt{13}$, $AC = A'C' = 4$, and $BC = B'C' = \sqrt{5}$. $\triangle ABC \cong \triangle A'B'C'$ using the SSS Congruence Postulate.

13. The image should be 1 unit to the left instead of right and 2 units down instead of up.

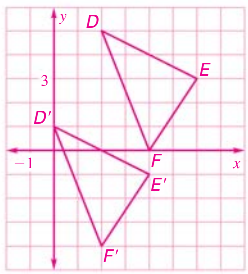


15. $\overrightarrow{CD}$, $\langle 7, -3\rangle$ **17.** $\overrightarrow{JP}$, $\langle 0, 4\rangle$ **19.** $\langle -1, 2\rangle$ **21.** $\langle 0, -11\rangle$ **23.** The vertical component is the distance from the ground up to the plane entrance.

25. $D'(7, 4)$, $E'(11, 2)$, $F'(9, -1)$



27. $D'(0, 1)$, $E'(4, -1)$, $F'(2, -4)$



29. $a = 35$, $b = 14$, $c = 5$ **31. a.** $Q'(-1, -5)$, $R'(-1, 2)$, $S'(2, 2)$, $T'(2, -5)$; 21, 21 **b.** The areas are the same; the area of an image and its preimage under a translation are the same.

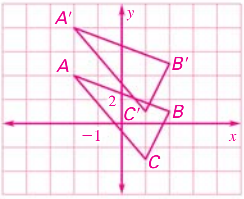
9.1 Problem Solving (pp. 578–579) **33.** $(x, y) \to (x + 6, y)$, $(x, y) \to (x, y - 4)$, $(x, y) \to (x + 3, y - 4)$, $(x, y) \to (x + 6, y - 4)$ **35.** $\langle 1, 2\rangle$ **37.** $\langle -4, -2\rangle$ **39.** $\langle 3, 1\rangle$ **41.** $\langle 22, 5\rangle$; about 22.6 km **43. a.** 5 squares to the right followed by 4 squares down. **b.** $2\sqrt{41}$ mm **c.** about 0.523 mm/sec **45. a.** The graph is 4 units lower. **b.** The graph is 4 units to the right.

9.2 Skill Practice (pp. 584–585) **1.** elements

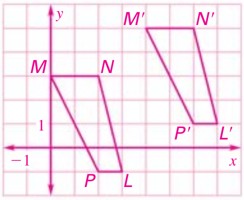
3. $\begin{bmatrix} -1 & 2 & 6 \\ -2 & 2 & 1 \end{bmatrix}$ **5.** $\begin{array}{cccc} B & C & D & E \end{array}$ $\begin{bmatrix} 2 & 6 & 5 & -1 \\ 2 & 1 & -1 & -2 \end{bmatrix}$ **7.** $\begin{bmatrix} 12 & 7 \end{bmatrix}$

9. $\begin{bmatrix} 16 & 9 \\ 0 & 0 \\ -5 & -3 \end{bmatrix}$ **11.** $\begin{bmatrix} -13 & -4 \\ -12 & 16 \end{bmatrix}$

13. $\begin{array}{ccc} A' & B' & C' \end{array}$ $\begin{bmatrix} -2 & 2 & 1 \\ 8 & 5 & 1 \end{bmatrix}$



15. $\begin{array}{cccc} L' & M' & N' & P' \end{array}$ $\begin{bmatrix} 7 & 4 & 6 & 6 \\ 1 & 5 & 5 & 1 \end{bmatrix}$



19. $\begin{bmatrix} -6.9 \end{bmatrix}$ **21.** $\begin{bmatrix} -4 & 15.2 \\ -32.3 & -43.4 \end{bmatrix}$ **23.** $\begin{bmatrix} 38 \\ 36 \end{bmatrix}$

25. *Sample answer:* $\begin{bmatrix} -2 & 1 \\ 0 & 4 \end{bmatrix}$, $\begin{bmatrix} 1 & 1 \\ 2 & 1 \end{bmatrix}$; $\begin{bmatrix} 0 & -1 \\ 8 & 4 \end{bmatrix}$

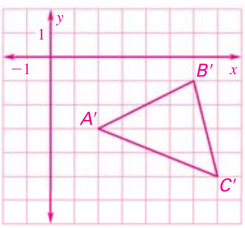
27. $\begin{array}{cccc} A & B & C & D \end{array}$ $\begin{bmatrix} -7 & 0 & 0 & -7 \\ 3 & 3 & -1 & -1 \end{bmatrix}$ **29.** $a = 8$, $b = -20$, $c = 20$, $m = 21$, $n = -1$, $v = -7$, $w = 12$; the sum of the corresponding elements on the left equals the corresponding elements on the right; $(21, -1)$, $(20, -9)$, $(-8, 13)$.

9.2 Problem Solving (pp. 586–587) **31.** Lab 1: \$840, Lab 2: \$970 **33. a.** $AB = BA$ **b.** $\begin{bmatrix} -3 & 15 \\ -14 & 30 \end{bmatrix}$, $\begin{bmatrix} 25 & -7 \\ 10 & 2 \end{bmatrix}$, $AB \neq BA$ **c.** Matrix multiplication is not commutative.

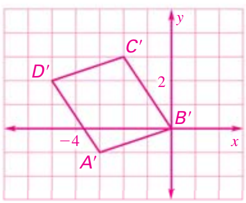
35. $\begin{bmatrix} 2 & 36 \\ 16 & 68 \end{bmatrix}$, $\begin{bmatrix} 2 & 36 \\ 16 & 68 \end{bmatrix}$; the Distributive Property holds for matrices.

9.3 Skill Practice (pp. 593–594) **1.** a line which acts like a mirror to reflect an image across the line

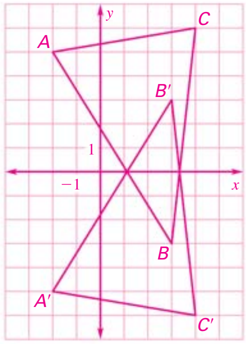
3.



5.



13.

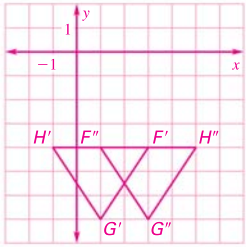


15. $\begin{array}{ccc} A & B & C \end{array}$ $\begin{bmatrix} 1 & 4 & 3 \\ 2 & 2 & -2 \end{bmatrix}$; $\begin{array}{ccc} A' & B' & C' \end{array}$ $\begin{bmatrix} -1 & -4 & -3 \\ 2 & 2 & -2 \end{bmatrix}$

17. $\begin{array}{ccc} A & B & C \end{array}$ $\begin{bmatrix} -4 & 3 & 2 \\ -2 & 1 & -3 \end{bmatrix}$; $\begin{array}{ccc} A' & B' & C' \end{array}$ $\begin{bmatrix} 4 & -3 & -2 \\ -2 & 1 & -3 \end{bmatrix}$

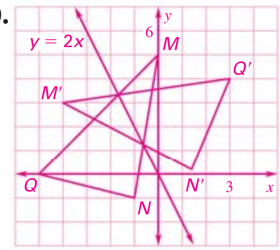
19. $(5, 0)$ **21.** $(-4, 0)$

23.



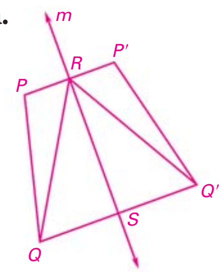
25. The order is reversed. **27.** $y = 3x - 4$

29.



9.3 Problem Solving (pp. 595–596) **31.** Case 4 **33.** Case 1

35. a.

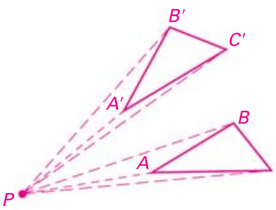


Given a reflection in m maps P to P' and Q to Q'. Using the definition of a line of reflection $\overline{QS} \cong \overline{Q'S}$ and $\angle QSR \cong \angle Q'SR$. Using the Reflexive Property of Segment Congruence, $\overline{RS} \cong \overline{RS}$. Using the SAS Congruence Postulate, $\triangle RSQ \cong \triangle RSQ'$.

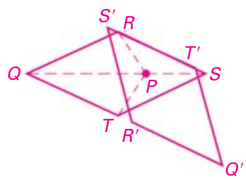
b. Using corresponding parts of congruent triangles are congruent, $\overline{RQ} \cong \overline{RQ'}$. Using the definition of a line of reflection $\overline{PR} \cong \overline{P'R}$. Since $\overline{PP'}$ and $\overline{QQ'}$ are both perpendicular to m, they are parallel. Using the Alternate Interior Angles Theorem, $\angle SQ'R \cong \angle P'RQ'$ and $\angle SQR \cong \angle PRQ$. Using corresponding parts of congruent triangles are congruent, $\angle SQ'R \cong \angle SQR$. Using the Transitive Property of Angle Congruence, $\angle P'RQ' \cong \angle PRQ$. $\triangle PRQ \cong \triangle P'RQ'$ using the SAS Congruence Postulate. Using corresponding parts of congruent triangles are congruent, $\overline{PQ} \cong \overline{P'Q'}$ which implies $PQ = P'Q'$. **37.** Given a reflection in m maps P to P' and Q to Q'. Also, P lies on m, and $\overline{PQ}$ is not perpendicular to m. Draw $\overline{Q'Q}$ intersecting m at point R. Using the definition of line of reflection m is the perpendicular bisector of $\overline{Q'Q}$ which implies $\overline{Q'R} \cong \overline{QR}$, $\angle Q'RP' \cong \angle QRP$, and P and P' are the same point. Using the Reflexive Property of Segment Congruence, $\overline{RP} \cong \overline{RP}$. Using the SAS Congruence Postulate, $\triangle Q'RP' \cong \triangle QRP$. Using corresponding parts of congruent triangles are congruent, $\overline{Q'P'} \cong \overline{QP}$ which implies $Q'P' = QP$.
39. a. (3, 5) **b.** (0, 6); (−1, 4) **c.** In every case point C bisects each line segment.

9.4 Skill Practice (pp. 602–603) **1.** a point which a figure is turned about during a rotation transformation **3.** Reflection; the horses are reflected across the edge of the stream which acts like a line of symmetry. **5.** Translation; the train moves horizontally from right to left. **7.** A

9.

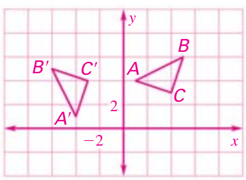


11.

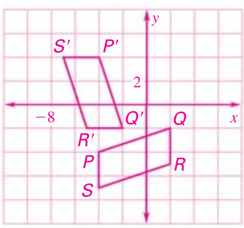


13. $J'(-1, -4)$, $K'(-5, -5)$, $L'(-7, -2)$, $M'(-2, -2)$

15. $\begin{array}{ccc} A' & B' & C' \end{array}$
$\begin{bmatrix} -4 & -6 & -3 \\ 1 & 5 & 4 \end{bmatrix}$

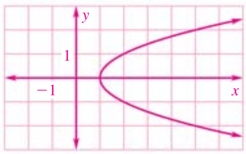


17. $\begin{array}{cccc} P' & Q' & R' & S' \end{array}$
$\begin{bmatrix} -4 & -2 & -5 & -7 \\ 4 & -2 & -2 & 4 \end{bmatrix}$



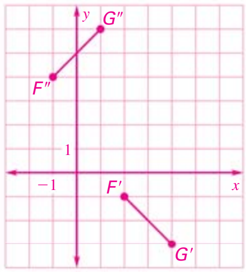
19. The rotation matrix should be first;
$\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}\begin{bmatrix} -1 & 2 \\ 1 & 3 \end{bmatrix}$. **25.** (−3, 2, 0)

9.4 Problem Solving (pp. 604–605) **29.** 270°; the line segment joining A' to the center of rotation is perpendicular to the line segment joining A to the center of rotation. **31.** 120°; the line segment joining A' to the center of rotation is rotated $\frac{1}{3}$ of a circle from the line segment joining A to the center of rotation.
33. a rotation about a point, Angle Addition Postulate, Transitive, Addition, $\triangle RPQ \cong \triangle R'PQ'$, Corr. Parts of $\cong \triangle$ are $\cong$, definition of segment congruence
35. Given a rotation about P maps Q to Q' and R to R'. P and R are the same point. Using the definition of rotation about a point P, $PQ = PQ'$ and P, R, and R' are the same point. Substituting R for P on the left and R' for P on the right side, you get $RQ = R'Q'$.
37. a.

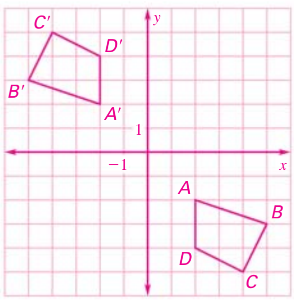


b. 270°
c. No; the image does not pass the vertical line test.

39.

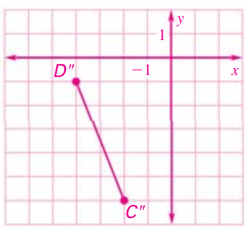


9.4 Problem Solving Workshop (p. 606)
1.



3. Since they are rotating in opposite directions they will each place you at 90° below your reference line.
5. The x-coordinate is now −4; the y-coordinate is now 3.

9.5 Skill Practice (pp. 611–613) **1.** parallel
3.



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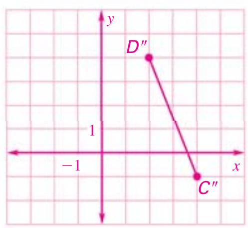
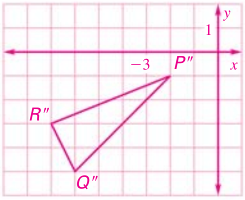


SELECTED ANSWERS

7.



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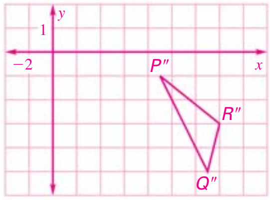

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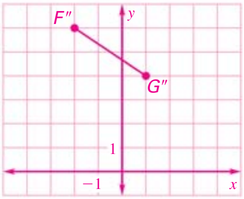
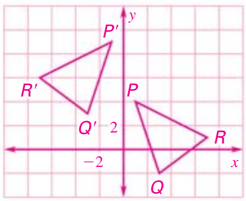


yes **13.** $(x, y) \rightarrow (x + 5, y + 1)$ followed by a rotation of 180° about the origin. **15.** $\triangle A''B''C''$ **17.** *Sample answer:* $\overline{AA'}$, $\overline{AA''}$

19. yes; definition of reflection of a point over a line **21.** 30°

23.

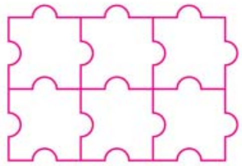
$$\begin{array}{ccc} P' & Q' & R' \\ \end{array}$$
$$\begin{bmatrix} -1 & -3 & -7 \\ 9 & 3 & 6 \end{bmatrix}$$



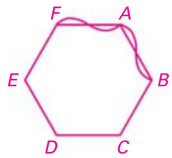
9.5 Problem Solving **(pp. 613–615)** **27.** *Sample answer:* $(x, y) \rightarrow (x + 9, y)$, reflected over a horizontal line that separates the left and right prints **31.** reflection **33.** translation **35.** Use the Rotation Theorem followed by the Reflection Theorem. **37.** Given a reflection in ℓ maps $\overline{JK}$ to $\overline{J'K'}$, a reflection in m maps $\overline{J'K'}$ to $\overline{J''K''}$, $\ell \parallel m$ and the distance between ℓ and m is d. Using the definition of reflection ℓ is the perpendicular bisector of $\overline{KK'}$ and m is perpendicular bisector of $\overline{K'K''}$. Using the Segment Addition Postulate, $KK' + K'K'' = KK''$. It follows that $\overline{KK'}$ is perpendicular to ℓ and m. Using the definition of reflection the distance from K to ℓ is the same as the distance from ℓ to K' and the distance from K' to m is the same as the distance from m to K''. Since the distance from ℓ to K' plus the distance from K' to m is d, it follows that $K'K'' = 2d$. **39. a.** translation and a rotation **b.** One transformation is not followed by the second. They are done simultaneously.

Extension **(pp. 617–618)** **1.** yes; regular **3.** yes; not regular **5. a.** 360°; the sum of the angle measures at any vertex is 360°. **b.** The sum of the measures of the interior angles is 360°.

7. *Sample:*



9. a.



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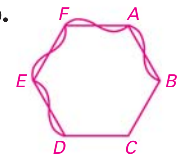
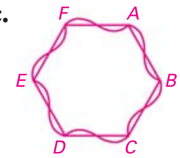
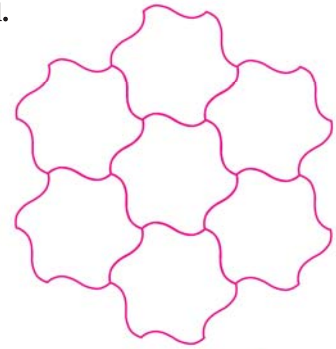


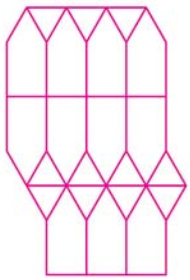
c.



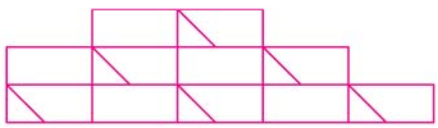
d.



11. *Sample:*



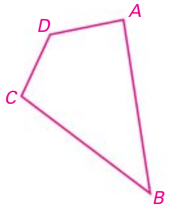
13. *Sample:*



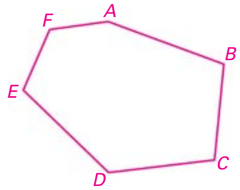
15. translation **17.** rotations

9.6 Skill Practice **(pp. 621–623)** **1.** If a figure has rotational symmetry it is the point about which the figure is rotated. **3.** 1 **5.** 1 **7.** yes; 72° or 144° about the center **9.** no **11.** Line symmetry, rotational symmetry; there are four lines of symmetry, two passing through the outer opposite pairs of leaves and two passing through the inner opposite pairs of leaves; 90° or 180° about the center. **15.** There is no rotational symmetry; the figure has 1 line of symmetry but no rotational symmetry.

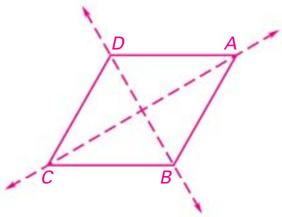
17. *Sample:*



19. *Sample:*



21. *Sample:*



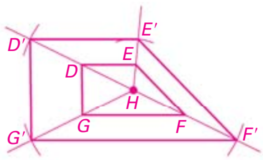
23. No; what's on the left and right of the first line would have to be the same as what's on the left and right of the second line which is not possible. **25.** 5

9.6 Problem Solving (pp. 623–624) **27.** no line symmetry, rotational symmetry of 180° about the center of the letter *O*. **29.** It has a line of symmetry passing horizontally through the center of each *O*, no rotational symmetry. **31.** 22.5° **33.** 15° **35. a.** line symmetry and rotational symmetry **b.** planes, *z*-axis

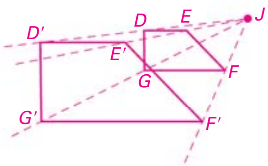
9.7 Skill Practice (pp. 629–630) **1.** a real number

3. $\frac{7}{3}$; enlargement; 8 **5.** $\frac{3}{2}$; enlargement; 10

7.

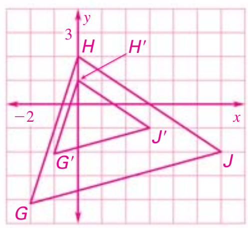


9.

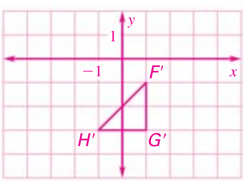


15. $\begin{bmatrix} 12 & 28 & 16 \\ 0 & 36 & -4 \end{bmatrix}$ **17.** $\begin{bmatrix} 0 & 27 & 18 \\ -9 & 63 & 0 \end{bmatrix}$

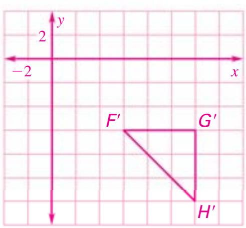
19. $\begin{array}{c} \begin{array}{ccc} G' & H' & J' \end{array} \\ \begin{bmatrix} -1 & 0 & 3 \\ -2 & 1 & -1 \end{bmatrix} \end{array}$



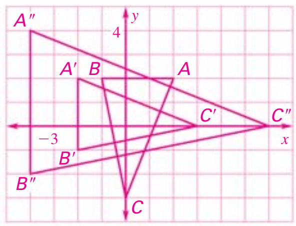
21.



23.



27. *Sample:*



No; the result is the same.

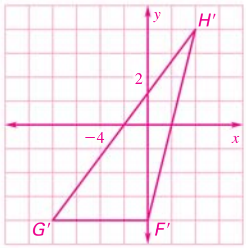
31. No; the ratio of the lengths of corresponding sides is not the same.

9.7 Problem Solving (pp. 631–632) **33.** 300 mm

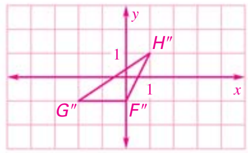
35. 940 mm **37. a.** $\frac{6}{1}$ **b.** 10.5 in.

39. a. $\begin{array}{c} \begin{array}{ccc} F & G & H \end{array} \\ \begin{bmatrix} 0 & 4 & -2 \\ 2 & 2 & -2 \end{bmatrix} \end{array}; \begin{array}{c} \begin{array}{ccc} F' & G' & H' \end{array} \\ \begin{bmatrix} 0 & -8 & 4 \\ -4 & -4 & 4 \end{bmatrix} \end{array}$

b.



c. $\begin{array}{c} \begin{array}{ccc} F'' & G'' & H'' \end{array} \\ \begin{bmatrix} 0 & -2 & 1 \\ -1 & -1 & 1 \end{bmatrix} \end{array}$



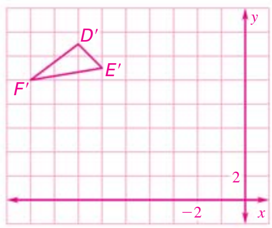
d. A reflection in both the *x*-axis and *y*-axis occurs as well as dilation. **41.** It's the center point of the dilation.

Chapter Review (pp. 636–639) **1.** isometry

3. Count the number of rows, *n*, and the number of columns, *m*. The dimensions are $n \times m$.

Sample answer: $\begin{bmatrix} 2 & 0 & 3 \\ -1 & 4 & 7 \end{bmatrix}$ is 2×3. **5.** A

7.



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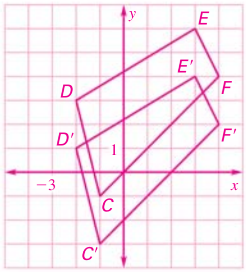
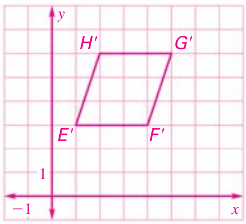
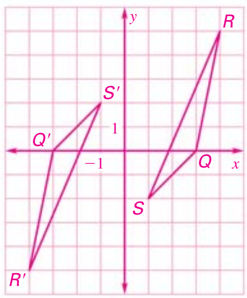
9. $\begin{array}{cccc} D' & E' & F' & G' \end{array}$ $\begin{bmatrix} -2 & 3 & 4 & -1 \\ 1 & 4 & 2 & -3 \end{bmatrix}$



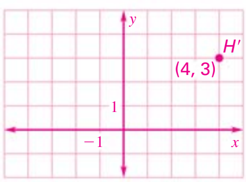
11.



13. $\begin{array}{ccc} Q' & R' & S' \end{array}$ $\begin{bmatrix} -3 & -4 & -1 \\ 0 & -5 & 2 \end{bmatrix}$

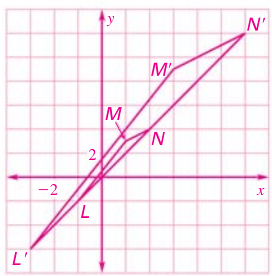


15.



17. line symmetry, no rotational symmetry; one **19.** line symmetry, rotational symmetry; two, 180° about the center

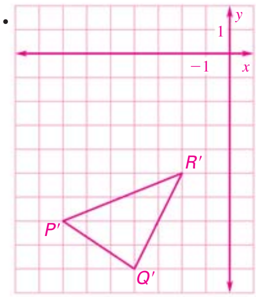
21. $\begin{array}{ccc} L' & M' & N' \end{array}$ $\begin{bmatrix} -3 & 3 & 6 \\ -6 & 9 & 12 \end{bmatrix}$



Algebra Review (p. 641) **1.** $x^2 + x - 6$ **3.** $x^2 - 16$ **5.** $49x^2 + 84x + 36$ **7.** $4x^2 - 1$ **9.** $2x^2 + 3xy + y^2$ **11.** 3, 4 **13.** $-2, -\frac{1}{4}$ **15.** $\frac{-1 \pm \sqrt{29}}{2}$ **17.** $\frac{-11 \pm \sqrt{105}}{2}$

Cumulative Review (pp. 646–647) **1.** neither **3.** $x = 4$ **5.** $y = \frac{1}{2}x - 2$ **7.** $\overline{QP} \cong \overline{SR}$ **9.** altitude **11.** median **13.** triangle; right **15.** not a triangle **17.** triangle; right **19.** Rectangle; the diagonals are congruent and they bisect each other; 5, 3.

21.

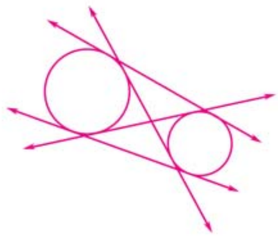


23. $\angle 4, \angle 5, \angle 7$ **25.** 132° **27.** about 105 mi **29.** about \$7.69 **31.** translations

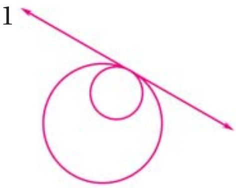
Chapter 10

10.1 Skill Practice (pp. 655–657) **1.** diameter **3.** G **5.** C **7.** F **9.** B **11.** $\overline{AB}$ is not a secant it is a chord; the length of chord $\overline{AB}$ is 6. **13.** 6, 12

15. 4



17. 1



19. not tangent; $9^2 + 15^2 \neq 18^2$ **21.** 10 **23.** 10.5 **25.** $\sqrt{2}$ **27.** external **31.** They will be parallel if they are tangent to opposite endpoints of the same diameter; lines perpendicular to the same line are parallel. **33.** No; no; no matter what the distance the external point is from the circle there will always be two tangents.

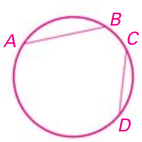
10.1 Problem Solving (pp. 657–658) **35.** radial spokes **37.** 14,426 mi **39. a.** Since R is exterior to $\odot Q$, $QR > QP$. **b.** Since $\overline{QR}$ is perpendicular to line m it must be the shortest distance from Q to line m, thus $QR < QP$. **c.** It was assumed $\overline{QP}$ was not perpendicular to line m but $\overline{QR}$ was perpendicular to line m. Since R is outside of $\odot Q$ you know that $QR > QP$ but Exercise 39b tells you that $QR < QP$ which is a contradiction. Therefore, line m is perpendicular to $\overline{QP}$. **41.** Given $\overline{SR}$ and $\overline{ST}$ are tangent to $\odot P$. Construct $\overline{PR}$, $\overline{PT}$, and $\overline{PS}$. Since $\overline{PR}$ and $\overline{PT}$ are radii of $\odot P$, $\overline{PR} \cong \overline{PT}$. With $\overline{PS} \cong \overline{PS}$, using the HL Congruence Theorem $\triangle RSP \cong \triangle TSP$. Using corresponding parts of congruent triangles are congruent, $\overline{SR} \cong \overline{ST}$.

10.2 Skill Practice (pp. 661–662) **1.** congruent **3.** minor arc; 70° **5.** minor arc; 135° **7.** minor arc; 115° **9.** major arc; 245° **13.** Not congruent; they are arcs of circles that are not congruent. **15.** You can tell that the circles are congruent since they have the same radius $\overline{CD}$. **19.** *Sample answer:* 15°, 185°

10.2 Problem Solving (p. 663) **23.** 18°

10.3 Skill Practice (pp. 667–668) **1.** *Sample answer:* Point Y bisects $\overset{\frown}{XZ}$ if $\overset{\frown}{XY} \cong \overset{\frown}{YZ}$. **3.** 75° **5.** 8 **7.** 5; use Theorem 10.5 and solve $5x - 6 = 2x + 9$. **9.** 5; use Theorem 10.6 and solve $18 = 5x - 7$. **11.** $\frac{7}{3}$; use Theorem 10.6 and solve $4x + 1 = x + 8$.
13. $\overline{JH}$ bisects $\overline{FG}$ and $\overset{\frown}{FG}$; Theorem 10.5. **17.** You don't know that $\overline{AC} \perp \overline{DB}$ therefore you can't show $\overset{\frown}{BC} \cong \overset{\frown}{CD}$.
19. Diameter; the two triangles are congruent using the SAS Congruence Postulate which makes $\overline{AB}$ the perpendicular bisector of $\overline{CD}$. Use Theorem 10.4.
21. Using the facts that $\triangle APB$ is equilateral which makes it equiangular and that $m\overset{\frown}{AC} = 30°$ you can conclude that $m\angle APD = m\angle BPD = 30°$. You now know that $m\overset{\frown}{BC} = 30°$ which makes $\overline{AC} \cong \overline{BC}$. $\triangle APD \cong \triangle BPD$ using the SAS Congruence Postulate since $\overline{BP} \cong \overline{AP}$ and $\overline{PD} \cong \overline{PD}$. Using corresponding parts of congruent triangles are congruent, $\overline{AD} \cong \overline{BD}$. Along with $\overline{DC} \cong \overline{DC}$ you have $\triangle ADC \cong \triangle BDC$ using the SSS Congruence Postulate. **23.** From the diagram $m\overset{\frown}{AC} = m\overset{\frown}{CB}$ and $m\overset{\frown}{AB} = x°$, so you know that $m\overset{\frown}{AC} + m\overset{\frown}{CB} + x° = 360°$. Replacing $m\overset{\frown}{CB}$ by $m\overset{\frown}{AC}$ and solving for $m\overset{\frown}{AC}$ you get $m\overset{\frown}{AC} = \frac{360° - x°}{2}$. This along with the fact that all arcs have integral measure implies that x is even.

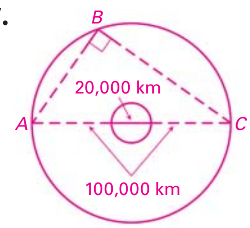
10.3 Problem Solving (pp. 669–670) **25.** $\overline{AB}$ should be congruent to $\overline{BC}$. **27.** Given $\overline{AB} \cong \overline{CD}$. Since $\overline{PA}$, $\overline{PB}$, $\overline{PC}$, and $\overline{PD}$ are radii of $\odot P$, they are congruent. Using the SSS Congruence Postulate, $\triangle PCD \cong \triangle PAB$. Using corresponding parts of congruent triangles are congruent, $\angle CPD \cong \angle APB$. With $m\angle CPD = m\angle APB$ and the fact they are both central angles you now have $m\overset{\frown}{CD} = m\overset{\frown}{AB}$ which leads to $\overset{\frown}{CD} \cong \overset{\frown}{AB}$.
29. a.



longer chord
b. The length of a chord in a circle increases as the distance from the center of the circle to the chord decreases.
c. Given radius r and real numbers a and b such that $r > a > b > 0$. Let a be the distance from one chord to the center of the circle and b be the distance from a second chord to the center of the circle. Using the Pythagorean Theorem the length of the chord a units away from the center is $2\sqrt{r^2 - a^2}$ and the length of the chord b units away from the center is $\sqrt{r^2 - b^2}$. Using properties of real numbers $\sqrt{r^2 - b^2} > \sqrt{r^2 - a^2}$. **31.** Given $\overline{QS}$ is perpendicular bisector of $\overline{RT}$ in $\odot L$. Suppose L is not on $\overline{QS}$. Since $\overline{LT}$ and $\overline{LR}$ are radii of the circle they are congruent. With $\overline{PL} \cong \overline{PL}$ you now have $\triangle RLP \cong \triangle TLP$ using the SSS Congruence Postulate. $\angle RPL$ and $\angle TPL$ are now congruent and they form a linear pair. This makes them right angles and leads to $\overline{QL}$ being perpendicular to $\overline{RT}$. Using the Perpendicular Postulate, L must be on $\overline{QS}$ and thus $\overline{QS}$ must be a diameter.

10.4 Skill Practice (pp. 676–677) **1.** inscribed **3.** 42° **5.** 10° **7.** 120° **9.** The measure of the arcs add up to 370°; change the measure of $\angle Q$ to 40° or change the measure of $\overset{\frown}{QS}$ to 90°. **11.** $\angle JMK$, $\angle JLK$ and $\angle LKM$, $\angle LJM$ **13.** $x = 100$, $y = 85$ **15.** $a = 20$, $b = 22$
17. a. 36°; 180° **b.** about 25.7°; 180° **c.** 20°; 180°
19. 90° **21.** Yes; opposite angles are 90° and thus are supplementary. **23.** No; opposite angles are not supplementary. **25.** Yes; opposite angles are supplementary.

10.4 Problem Solving (pp. 677–679)
27.



220,000 km

29. Double the length of the radius. **31.** Given $\angle B$ inscribed in $\odot Q$. Let $m\angle B = x°$. Point Q lies on $\overline{BC}$. Since all radii of a circle are congruent, $\overline{AQ} \cong \overline{BQ}$. Using the Base Angles Theorem, $\angle B \cong \angle A$ which implies $m\angle A = x°$. Using the Exterior Angles Theorem, $m\angle AQC = 2x°$ which implies $m\overset{\frown}{AC} = 2x°$. Solving for x, you get $\frac{1}{2}m\overset{\frown}{AC} = x°$. Substituting you get $\frac{1}{2}m\overset{\frown}{AC} = m\angle B$. **33.** Given: $\angle ABC$ is inscribed in $\odot Q$. Point Q is in the exterior of $\angle ABC$; Prove: $m\angle ABC = \frac{1}{2}m\overset{\frown}{AC}$; construct the diameter $\overline{BD}$ of $\odot Q$ and show $m\angle ABD = \frac{1}{2}m\overset{\frown}{AD}$ and $m\angle CBD = \frac{1}{2}m\overset{\frown}{CD}$. Use the Arc Addition Postulate and the Angle Addition Postulate to show $m\angle ABD - m\angle CBD = m\angle ABC$. Then use substitution to show $2m\angle ABC = m\overset{\frown}{AC}$.

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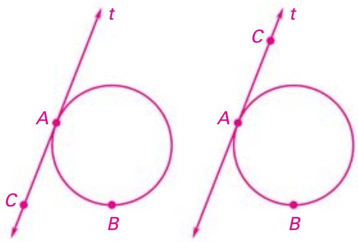
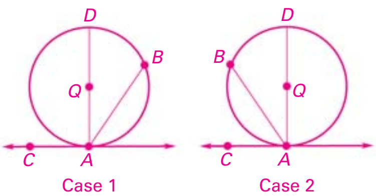
35. Case 1: Given: $\odot D$ with inscribed $\triangle ABC$ where $\overline{AC}$ is a diameter of $\odot D$; Prove $\triangle ABC$ is a right triangle; let E be a point on $\overset{\frown}{AC}$. Show that $m\overset{\frown}{AEC} = 180°$ and then that $m\angle B = 90°$. Case 2: Given: $\odot D$ with inscribed $\triangle ABC$ with $\angle B$ a right angle; Prove: $\overline{AC}$ is a diameter of $\odot D$; using the Measure of an Inscribed Angle Theorem, show that $m\overset{\frown}{AC} = 180°$. **39.** yes

10.5 Skill Practice (pp. 683–684) **1.** outside **3.** 130° **5.** 130° **7.** 115 **9.** 90 **11.** 56 **15.** $m\angle LPJ \le 90°$; if $\overrightarrow{PL}$ is perpendicular to $\overline{KJ}$ at K, then $m\angle LPJ = 90°$, otherwise it would measure less than 90°.
17. 120°, 100°, 140°
19. a.



b. $m\overset{\frown}{AB} = 2m\angle BAC$, $m\overset{\frown}{AB} = 2(180 - m\angle BAC)$
c. when $\overline{AB}$ is perpendicular to line t at point A

10.5 Problem Solving (pp. 685–686) **23.** 50° **25.** about 2.8° **27.** Given $\overleftrightarrow{CA}$ tangent to $\odot Q$ at A and diameter $\overline{AB}$. Using Theorem 10.1, $\overline{AB}$ is perpendicular to $\overleftrightarrow{CA}$. It follows that $m\angle CAB = 90°$. This is half of 180°, which is $m\overset{\frown}{AB}$; Case 1: the center of the circle is interior to $\angle CAB$, Case 2: the center of the circle is exterior to $\angle CAB$.



Construct diameter $\overline{AD}$. Case 1: Let B be a point on the left semicircle. Use Theorem 10.1 to show $m\angle CAB = 90°$. Use the Angle Addition Postulate and the Arc Addition Postulate to show that $m\angle CAD = \frac{1}{2}m\overset{\frown}{AB}$. Case 2: Let B be a point on the right semicircle. Prove similarly to Case 1.

10.6 Skill Practice (pp. 692–693) **1.** external segment **3.** 5 **5.** 4 **7.** 6 **9.** 12 **11.** 4 **13.** 5 **15.** 1 **17.** 18

10.6 Problem Solving (pp. 694–695)
21.

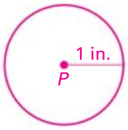
Statements	Reasons
1. Two intersecting chords in the same circle.	1. Given
2. Draw $\overline{AC}$ and $\overline{BD}$.	2. Two points determine a line.
3. $\angle ACD \cong \angle ABD$, $\angle CAB \cong \angle CDB$	3. Theorem 10.8
4. $\triangle ACE \sim \triangle DEB$	4. AA Similarity Postulate
5. $\frac{EA}{ED} = \frac{EC}{EB}$	5. If two triangles are similar, then the ratios of corresponding sides are equal.
6. $EA \cdot EB = EC \cdot ED$	6. Cross Products Property

23. Given a secant segment containing the center of the circle and a tangent segment sharing an endpoint outside of a circle. Draw $\overline{AC}$ and $\overline{AD}$. $\angle ADC$ is inscribed, therefore $m\angle ADC = \frac{1}{2}m\overset{\frown}{AC}$. $\angle CAE$ is formed by a secant and a tangent, therefore $m\angle CAE = \frac{1}{2}m\overset{\frown}{AC}$. This implies $\angle ADC \cong \angle CAE$. $\angle E \cong \angle E$, therefore $\triangle AEC \sim \triangle DEC$ using the AA Similarity Postulate. Using corresponding sides of similar triangles are proportional, $\frac{EA}{EC} = \frac{ED}{EA}$. Cross multiplying you get $EA^2 = EC \cdot ED$. **25.** Given $\overline{EB}$ and $\overline{ED}$ are secant segments. Draw $\overline{AD}$ and $\overline{BC}$. Using the Measure of an Inscribed Angle Theorem, $m\angle B = \frac{1}{2}m\overset{\frown}{AC}$ and $m\angle D = \frac{1}{2}m\overset{\frown}{AC}$ which implies $m\angle B \cong m\angle D$. Using the Reflexive Property of Angle Congruence, $\angle E \cong \angle E$. Using the AA Similarity Postulate, $\triangle BCE \sim \triangle DAE$. Using corresponding sides of similar triangles are proportional, $\frac{EA}{EC} = \frac{ED}{EB}$. Cross multiplying you get $EA \cdot EB = EC \cdot ED$.
27. a. 60° **b.** Using the Vertical Angles Theorem, $\angle ACB \cong \angle FCE$. Since $m\angle CAB = 60°$ and $m\angle EFD = 60°$, then $\angle CAB \cong \angle EFD$. Using the AA Similarity Postulate, $\triangle ABC \sim \triangle FEC$. **c.** $\frac{y}{3} = \frac{x+10}{6}$; $y = \frac{x+10}{2}$ **d.** $y^2 = x(x + 16)$ **e.** 2, 6 **f.** Since $\frac{CE}{CB} = \frac{2}{1}$, let $CE = 2x$ and $CB = x$. Using Theorem 10.14, $2x^2 = 60$ which implies $x = \sqrt{30}$ which implies $CE = 2\sqrt{30}$.

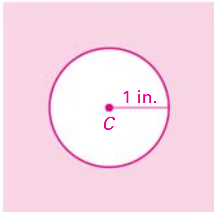
10.6 Problem Solving Workshop (p. 696) **1.** $2\sqrt{13}$ **3.** $\frac{24}{5}$

Extension (p. 698)

1.

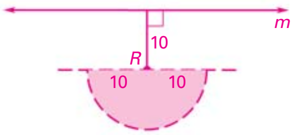


3.

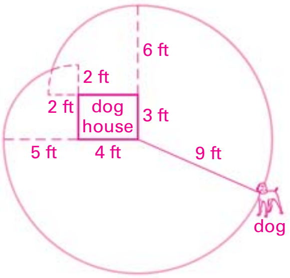


5. The locus of points consists of two points on line ℓ each 3 centimeters away from P.

7. The locus of points consists of a semicircle centered at R with a radius of 10 centimeters. The diameter bordering the semicircle is 10 centimeters from line k and parallel to line k.

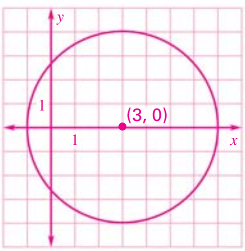


9.

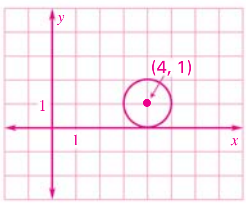


10.7 Skill Practice (pp. 702–703) **1.** center, radius **3.** $x^2 + y^2 = 4$ **5.** $x^2 + y^2 = 400$ **7.** $(x - 50)^2 + (y - 50)^2 = 100$ **9.** $x^2 + y^2 = 49$ **11.** $(x - 7)^2 + (y + 6)^2 = 64$ **13.** $(x - 3)^2 + (y + 5)^2 = 49$ **15.** If (h, k) is the center of a circle with a radius r, the equation of the circle should be $(x - h)^2 + (y - k)^2 = r^2$; $(x + 3)^2 + (y + 5)^2 = 9$. **17.** $x^2 + y^2 = 36$ **19.** $(x + 3)^2 + (y - 5)^2 = 25$

21.

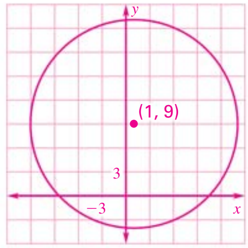


23.



27. circle; $x^2 + (y - 3)^2 = 4$ **29.** circle; $x^2 + (y + 2)^2 = 17$ **31.** secant **33.** secant

10.7 Problem Solving (pp. 703–705) **37.** $x^2 + y^2 = 5.76$, $x^2 + y^2 = 0.09$ **39.** $(x - 3)^2 + y^2 = 49$ **41.** The height (or width) always remains the same as the figure is rolled on its edge. **43. a.** (1, 9), 13 **b.** $(x - 1)^2 + (y - 9)^2 = 169$



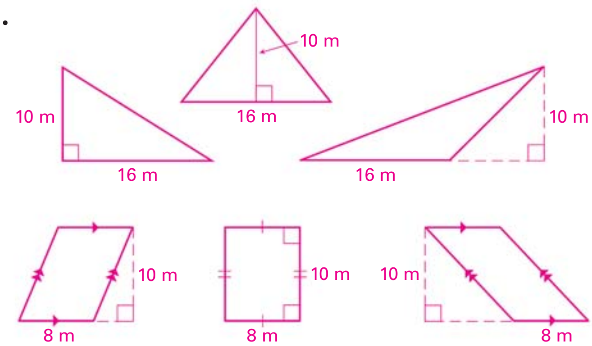
Chapter Review (pp. 708–711) **1.** diameter **3.** The measure of the central angle and the corresponding minor arc are the same. The measure of the major arc is 360° minus the measure of the minor arc. **5.** C **7.** 2 **9.** 12 **11.** 60° **13.** 80° **15.** 65° **17.** $c = 28$ **19.** $q = 100$, $r = 20$ **21.** 16 **23.** $10\frac{2}{3}$ ft **25.** $(x - 8)^2 + (y - 6)^2 = 36$ **27.** $x^2 + y^2 = 81$ **29.** $(x - 6)^2 + (y - 21)^2 = 16$ **31.** $(x - 10)^2 + (y - 7)^2 = 12.25$

Algebra Review (p. 713) **1.** $6x^2(3x^2 + 1)$ **3.** $3r(3r - 5s)$ **5.** $2t(4t^3 + 3t - 5)$ **7.** $y^3(5y^3 - 4y^2 + 2)$ **9.** $3x^2y(2x + 5y^2)$ **11.** $(y - 3)(y + 2)$ **13.** $(z - 4)^2$ **15.** $(5b - 1)(b - 3)$ **17.** $(5r - 9)(5r + 9)$ **19.** $(x + 3)(x + 7)$ **21.** $(y + 3)(y - 2)$ **23.** $(x - 7)(x + 7)$

Chapter 11

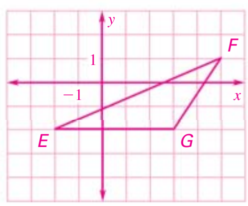
11.1 Skill Practice (pp. 723–724) **1.** bases, height **3.** 28 units^2 **5.** 225 units^2 **7.** 216 units^2 **9.** $A = 10(16) = 160$ units^2 or $A = 8(20) = 160$ units^2; the results are the same. **11.** 7 is not the base of the parallelogram; $A = bh = 3(4) = 12$ units^2. **13.** 30 ft, 240 ft^2 **15.** 70 cm, 210 cm^2 **17.** 23 ft **19.** 4 ft, 2 ft

21.



23. 364 cm^2 **25.** 625 in.^{2} **27.** 52 in.^{2}

29.



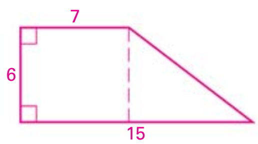
7.5 units^2

11.1 Problem Solving (pp. 725–726) **37.** 30 min; 86.4 min **39.** No; 2 inch square; the area of a square is side length squared, so $2^2 = 4$. **41.** 23 cm × 34 cm; 611 cm^2; 171 cm^2 **43.** Opposite pairs of sides are congruent making *XYZW* a parallelogram. The area of the parallelogram is *bh*, and since the parallelogram is made of two congruent triangles, the area of one triangle, $\triangle XYW$, is $\frac{1}{2}bh$. **45.** The base and the height are not necessarily side lengths of the parallelogram; yes; no; if the base and height represent a rectangle, then the perimeter is 20 ft^2, the greatest possible perimeter cannot be determined from the given data.

Extension (p. 728) **1.** Precision depends on the greatest possible error while accuracy depends on the relative error. *Sample answer:* Consider a target, if you are consistently hitting the same area, that is precision, if you hit the bull's eye, that is accuracy. **3.** 1 m; 0.5 m **5.** 0.0001 yd; 0.00005 yd **7.** about 1.8% **9.** about 0.04% **11.** This measurement is more accurate if you are measuring small items, if you are measuring large items, this would not be very accurate. **13.** 18.65 ft is more precise; 18.65 ft is more accurate. **15.** 3.5 ft is more precise; 35 in. is more accurate.

11.2 Skill Practice (pp. 733–734) **1.** height **3.** 95 $units^2$ **5.** 31 $units^2$ **7.** 1500 $units^2$ **9.** 189 $units^2$ **11.** 360 $units^2$ **13.** 13 is not the height of the trapezoid; $A = \frac{1}{2}(12)(14 + 19)$, $A = 198\ cm^2$. **17.** 20 m **19.** 10.5 $units^2$ **21.** 10 $units^2$ **23.** 5 cm and 13 cm **25.** 168 $units^2$ **27.** 67 $units^2$ **29.** 42 $units^2$

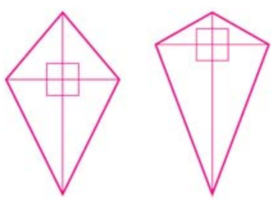
31.



38 units, 66 $units^2$

11.2 Problem Solving (pp. 735–736)

35. 20 mm^2;



37. a. right triangle and trapezoid **b.** 103,968 ft^2; 11,552 yd^2 **39.** If the kite in the activity were a rhombus, the results would be the same.

41. $A_{\triangle PSR} = \frac{1}{2}\left(\frac{1}{2}d_1\right)d_2$ and $A_{\triangle PQR} = \frac{1}{2}\left(\frac{1}{2}d_1\right)d_2$

$A_{\triangle PSR} = \frac{1}{4}d_1d_2$ and $A_{\triangle PQR} = \frac{1}{4}d_1d_2$

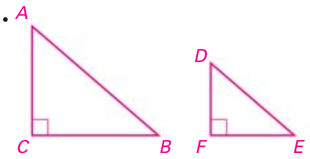
$A_{PQRS} = A_{\triangle PQR} + A_{\triangle PSR}$

$A_{PQRS} = \frac{1}{4}d_1d_2 + \frac{1}{4}d_1d_2$

$A_{PQRS} = \frac{1}{2}d_1d_2$

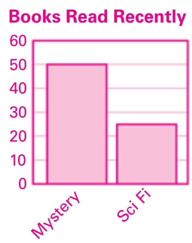
11.3 Skill Practice (pp. 740–741)

1.



$\triangle ABC \sim \triangle DEF$ tells you that the sides in the same position are proportional. *AB* is proportional to *DE* because the sides are both the hypotenuse of their respective triangle and are listed in the same order in the similarity statement. **3.** 6 : 11, 36 : 121 **5.** 1 : 3, 1 : 9; 18 ft^2 **7.** 7 : 9, 49 : 81; about 127 $in.^2$ **9.** 7 : 4 **11.** 11 : 12 **13.** 8 cm **15.** The ratio of areas is 1 : 4, so the ratio of side lengths is 1 : 2; $ZY = 2(12) = 24$. **17.** 175 ft^2; 10 ft, 5.6 ft **19.** Sometimes; this is only true when the side length is 2. **21.** Sometimes; only when the octagons are also congruent will the perimeters be the same. **23.** AA Similarity Postulate; $\frac{10}{35} = \frac{2}{7}$ is the ratio of side lengths, so the ratio of areas is 4 : 49.

11.3 Problem Solving (pp. 742–743) **27.** 15 ft **31.** There were twice as many mysteries read but the area of the mystery bar is 4 times the area of the science fiction bar giving the impression that 4 times as many mysteries were read.



33. a. $\triangle ACD \sim \triangle AEB$, $\triangle BCF \sim \triangle DEF$; AA Similarity Postulate **b.** *Sample answer:* 100 : 81 **c.** $\frac{10}{9} = \frac{20}{10 + x}$, $180 = 100 + 10x$, $x = 8$ OR $20(9) = (10 + x)(10)$, $180 = 100 + 10x$, $x = 8$

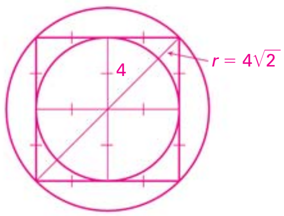
11.3 Problem Solving Workshop (p. 744) **1.** 18 in. **3.** $s\sqrt{2}$

11.4 Skill Practice (pp. 749–751) **1.** arc length of $\overset{\frown}{AB}$, 360° **3.** about 37.70 in. **5.** about 10.03 ft **7.** 14 m **9.** about 31.42 units **11.** about 4.19 cm **13.** about 3.14 ft **15.** 300° **17.** 150° **19.** about 20.94 ft **21.** about 50° **23.** about 8.58 units **25.** about 21.42 units **27.** 6π **29.** $r = \frac{C}{2\pi}$; $d = \frac{C}{\pi}$; $r = 13$, $d = 26$ **31. a.** twice as large **b.** twice as large

11.4 Problem Solving (pp. 751–752) **35.** 21 feet 8 inches represents the circumference of the tree, so if you divide by π, you will get the diameter; about 7 ft. **37.** about 2186.55 in. **39.** 7.2°; 28,750 mi

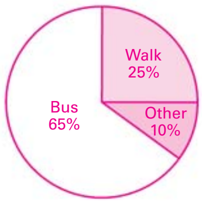
Extension (p. 754) **1.** Equator and longitude lines; latitude lines; the equator and lines of longitude have the center of Earth as the center. Lines of latitude do not have the center of Earth as the center. **3.** If two lines intersect then their intersection is exactly 2 points. **5.** 4π

11.5 Skill Practice (pp. 758–759) **1.** sector **3.** 25π in.^{2}; 78.54 in.^{2} **5.** 132.25π cm^2; 415.48 cm^2 **7.** about 7 m **9.** 52 cm **11.** about 52.36 in.^{2} **13.** about 937.31 m^2 **15.** about 66.04 cm^2 **17.** about 7.73 m^2 **21.** about 57.23 in. **23.** about 66.24 in. **25.** about 27.44 in. **27.** about 33.51 ft^2 **29.** about 1361.88 cm^2 **31.** about 7.63 m **33.** For any two circles the ratio of their circumferences is equal to the ratio of their corresponding radii; for any two circles, if the length of their radii is in the ratio of $a:b$, then the ratio of their areas is $a^2:b^2$; all circles are similar, so you do not need to include similarity in the hypothesis.

35. 

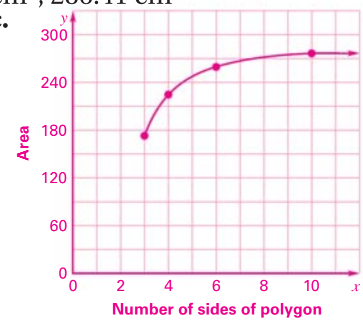
2 : 1

11.5 Problem Solving (pp. 760–761)
37. about 314.16 mi^2 **39. a.** The data is in percentages. **b.** bus: 234°, walk: 90°, other: 36°



c. bus: $\frac{13}{20}\pi r^2$, walk: $\frac{1}{4}\pi r^2$, other: $\frac{1}{10}\pi r^2$ **41. a.** old: about 370.53 mm, new: 681.88 mm; about 84%

11.6 Skill Practice (pp. 765–766) **1.** F **3.** 6.8 **5.** Divide 360° by the number of sides of the polygon. **7.** 20° **9.** 51.4° **11.** 22.5° **13.** 135° **15.** about 289.24 units^2 **17.** 7.5 is not the measure of a side length, it is the measure of the base of the triangle, it needs to be doubled to become the measure of the side length; $A = \frac{1}{2}a \cdot ns$, $A = \frac{1}{2}(13)(6)(15) = 585$ units^2. **19.** about 122.5 units, about 1131.8 units^2 **21.** 63 units, about 294.3 units^2 **23.** apothem, side length; special right triangles or trigonometry; about 392 units^2 **25.** side length; Pythagorean Theorem or trigonometry; about 204.9 units^2 **27.** about 79.6 units^2 **29.** about 1.4 units^2 **31.** True; since the radius is the same, the circle around the n-gons is the same but more and more of the circle is covered as the value of n increases. **33.** False; the radius can be equal to the side length as it is in a hexagon.

11.6 Problem Solving (pp. 767–768) **37.** 1.2 cm, about 4.8 cm^2; about 1.6 cm^2 **39.** 15.5 in.^{2}; 25.8 in.^{2} **41.** $\frac{360}{6} = 60$, so the central angle is 60°. All of the triangles are of the same side length, r, and therefore all six triangles have a vertex on the center with central angle 60° and side lengths r.
43. Because P is both the incenter and circumcenter of $\triangle ABC$ and letting E be the midpoint of $\overline{AB}$, you can show that $\overline{BD}$ and $\overline{CE}$ are both medians of $\triangle ABC$ and they intersect at P. By the Concurrency of Medians of a Triangle Theorem, $BP = \frac{2}{3}BD$ and $CP = \frac{2}{3}CE$. Using algebra, show that $2PD = CP$.
45. a. About 141.4 cm^2; square: about 225 cm^2, pentagon: about 247.7 cm^2, hexagon: about 259.9 cm^2, decagon: about 277 cm^2; the area is getting larger with each larger polygon. **b.** about 286.22 cm^2, 286.41 cm^2
c. 

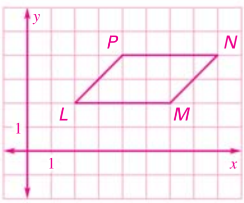
circle; about 286.5 cm^2

11.7 Skill Practice (pp. 774–775) **1.** 0, 1 **3.** $\frac{5}{8}$, 0.625, 62.5% **5.** $\frac{3}{8}$, 0.375, 37.5% **7.** $AD + DE = AE$, so $\frac{5}{8} + \frac{3}{8} = 1$ **9.** $\frac{1}{4}$ or 25% **11.** There is more than a semicircle in the rectangle, so you need to take the area of the rectangle minus the sum of the area of the semicircle and the area of a small rectangle located under the semicircle that has dimensions of 10×2;
$$\frac{10(7) - \left(\frac{1}{2}\pi(5)^2 + 10(2)\right)}{7(10)} = \frac{70 - (12.5\pi + 20)}{70} \approx 0.153$$
or about 15.3%. **13.** $\frac{43}{90}$ or about 47.8% **15.** The two triangles are similar by the AA Similarity Postulate and the ratio of sides is the same; 7 : 14 or 1 : 2, so the ratio of the areas is 1 : 4. **17.** $\frac{2}{7}$ **19.** 1 **21.** $\frac{1}{9}$ or 11.1%; find the area of the whole figure, $\frac{1}{2}(14)(12) = 84$ which is the denominator of the fraction. The top triangle is similar to the whole figure by the AA Similarity Postulate, so use proportions to find the base of the small triangle to be $4\frac{2}{3}$. Since the height

of the small triangle is 4, the area is $9\frac{1}{3}$, which is the numerator of the fraction. **25.** about 82.7% **27.** 100%, 50%

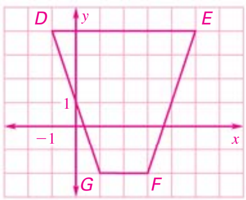
11.7 Problem Solving (pp. 776–777) **31. a.** $\frac{2}{5}$ or 40% **b.** $\frac{3}{5}$ or 60% **33.** $\frac{1}{6}$ or about 16.7%
35. The probability stays the same; the sector takes up the same percent of the area of the circle regardless of the length of the radius. *Sample answer:* Let the central angle be 90° and the radius be 2 units. The probability for that sector is $\frac{\frac{4\pi}{4}}{4\pi} = \frac{1}{4}$. Let the radius be doubled. The probability is $\frac{\frac{16\pi}{4}}{16\pi} = \frac{1}{4}$. **37. a.** $\frac{1}{81}$ or 1.2% **b.** about 2.4% **c.** about 45.4%

Chapter Review (pp. 780–783) **1.** two radii of a circle **3.** XZ **5.** 60 units^2 **7.** 448 units^2
9.



8 units^2

11.



24 units^2

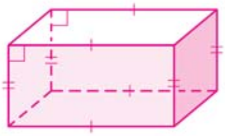
13. 10 : 13, 100 : 169, 152.1 cm^2 **15.** about 30 ft **17.** about 26.09 units **19.** about 17.72 in.^{2} **21.** about 39.76 in., about 119.29 in.^{2} **23.** $\frac{4}{7}$ **25.** about 76.09%

Algebra Review (p. 785) **1.** $d = \left(\frac{14.25}{1.5}\right)(2)$; 19 mi
3. $29.50 + 0.25m = 32.75$; 13 min
5. $18000(1 - 0.1)^5 = A$; \$10,628.82
7. $0 = -16t^2 + 47t + 6$; about 3.06 sec

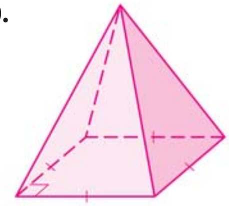
Chapter 12

12.1 Skill Practice (pp. 798–799) **1.** tetrahedron, 4 faces; hexahedron or cube, 6 faces; octahedron, 8 faces; dodecahedron, 12 faces; icosahedron, 20 faces
3. Polyhedron; pentagonal pyramid; the solid is formed by polygons and the base is a pentagon.
5. Not a polyhedron; the solid is not formed by polygons.

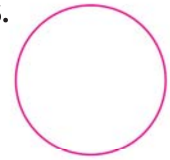
7.



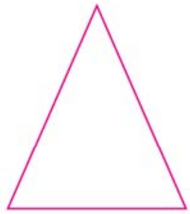
9.



11. 8 **13.** 24 **15.** 4, 4, 6 **17.** 5, 6, 9 **19.** 8, 12, 18 **21.** A cube has six faces, and "hexa" means six. **23.** convex
25.



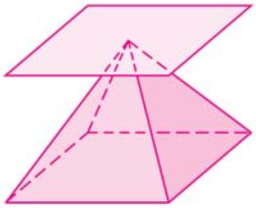
circle **27.**



triangle

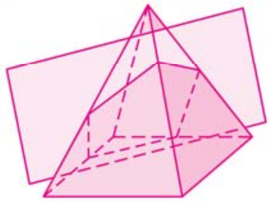
29. The concepts of edge and vertex are confused; the number of vertices is 4, and the number of edges is 6.

12.1 Problem Solving (pp. 800–801) **35.** 18, 12
37. square **39.** Tetrahedron; no; you cannot have a different number of faces because of Euler's Theorem. **41. a.** trapezoid
b. Yes. *Sample:*



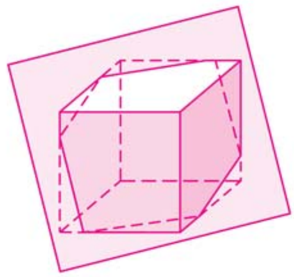
c. square

d. Yes. *Sample:*



43. no
45. no

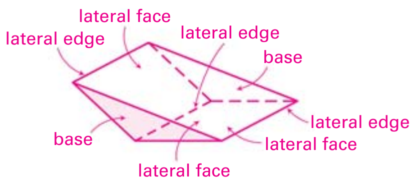
47. Yes. *Sample:*



49. a. It will increase the number of faces by 1, the number of vertices by 2, and the number of edges by 3. **b.** It will increase the number of faces by 1, the number of vertices by 2 and the number of edges by 3. **c.** It will not change the number of faces, vertices, or edges. **d.** It will increase the number of faces by 3, the number of vertices by 6, and the number of edges by 9.

12.2 Skill Practice (pp. 806–808)

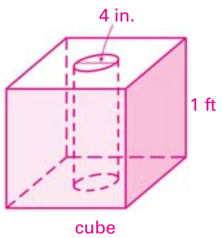
1.



3. 150.80 in.^{2} **5.** 27,513.6 ft^2 **7.** 196.47 m^2 **9.** 14.07 in.^{2} **11.** 804.25 in.^{2} **13.** 9 yd **15.** 10.96 in. **19.** 1119.62 in.^{2}

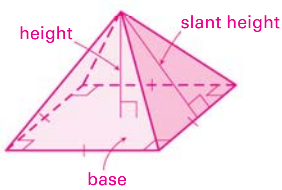
12.2 Problem Solving (pp. 808–809) **23. a.** 360 in.^{2} **b.** There is overlap in some of the sides of the box. **c.** *Sample answer:* It is easier to wrap a present if you have some overlap of wrapping paper.
27. a. 54 units^2 **b.** 52 units^2 **c.** When the red cubes are removed, inner faces of the cubes remaining replace the area of the red cubes that are lost. When the blue cubes are removed, there are still 2 faces of the blue cubes whose area is not replaced by inner faces of the remaining cubes. Therefore, the area of the solid after removing blue cubes is 2 units^2 less than the solid after removing red cubes.

29. 989.66 in.^{2}



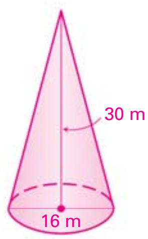
12.3 Skill Practice (pp. 814–815)

1.

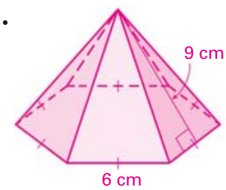


3. 40 cm^2
5. 580 ft^2
7. 672.5 mm^2

9. The height of the pyramid is used rather than the slant height; $S = 6^2 + \frac{1}{2}(24)(5) = 96$ ft^2. **11.** 12.95 in.^{2}
13. 238.76 in.^{2}
15. 226.73 ft^2
19. 981.39 m^2



21. 255.53 cm^2



23. 164.05 in.^{2}
25. 27.71 cm^2

12.3 Problem Solving (pp. 816–817) **27.** 96 in.^{2}
29. square pyramid; 98.35 cm^2
31. a. Given: $\overline{AB} \perp \overline{AC}$; $\overline{DE} \perp \overline{DC}$
Prove: $\triangle ABC \sim \triangle DEC$

Statements	Reasons
1. $\overline{AB} \perp \overline{AC}$; $\overline{DE} \perp \overline{DC}$	1. Given
2. $\angle BAC$ and $\angle EDC$ are right angles.	2. Definition of perpendicular
3. $\angle BAC \cong \angle EDC$	3. Right angles are congruent.
4. $\overleftrightarrow{AB} \parallel \overleftrightarrow{DE}$	4. If two lines are cut by a transversal so that corresponding angles are congruent, then the lines are parallel.
5. $\angle ABC \cong \angle DEC$	5. Corresponding Angles Postulate
6. $\triangle ABC \sim \triangle DEC$	6. AA Similarity Postulate

b. 5, $\frac{3}{2}$, $\frac{5}{2}$ **c.** larger cone: 24π units^2, smaller cone: 6π units^2; the small cone has 25% of the surface area of the large cone. **33.** about 24.69 mi^2

12.4 Skill Practice (pp. 822–824) **1.** cubic units **5.** 18 units^3 **7.** 175 in.^{3} **9.** 2630.55 cm^3 **11.** 314.16 in.^{3} **13.** The radius should be squared; $V = \pi r^2 h = \pi(4^2)(3) = 48\pi$ ft^3. **15.** 10 in. **17.** 8 in. **19.** 821.88 ft^3 **23.** 12.65 cm **25.** 2814.87 ft^3

12.4 Problem Solving (pp. 824–825) **29. a.** 720 in.^{3} **b.** 720 in.^{3} **c.** They are the same. **31.** 159.15 ft^3 **33. a.** 4500 in.^{3} **b.** 150 in.^{3} **c.** 10 rocks

12.4 Problem Solving Workshop (p. 827)
1. a. about 56.55 in.^{3} **b.** about 56.55 in.^{3}
3. $r = \frac{R\sqrt{2}}{2}$ **5.** about 7.33 in.^{3}

12.5 Skill Practice (pp. 832–833) **1.** A triangular prism is a solid with two bases that are triangles and parallelograms for the lateral faces while a triangular pyramid is a solid with a triangle for a base and triangles for lateral faces.

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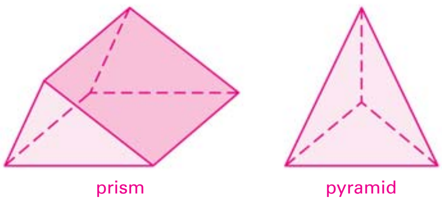
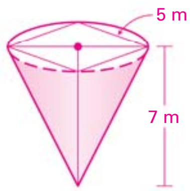
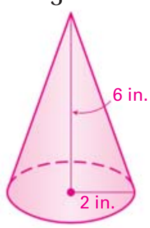


3. 50 cm^3 **5.** 13.33 $in.^3$ **7.** 6 $in.^3$ **9.** The slant height is used in the volume formula instead of the height; $V = \frac{1}{3}\pi(9^2)(12) = 324\pi \approx 1018$ ft^3. **13.** 6 in.
15. 3716.85 ft^3 **17.** 987.86 cm^3 **19.** 8.57cm
21. 833.33 $in.^3$ **23.** 16.70 cm^3 **25.** 26.39 yd^3
27.



about 91.63 m^3

12.5 Problem Solving (pp. 834–836) **29. a.** 201 $in.^3$ **b.** 13.4 $in.^3$ **31.** 3; since the cone and cylinder have the same radius and height, the volume of the cone will be $\frac{1}{3}$ the volume of the cylinder.
33.



23.70 $in.^3$

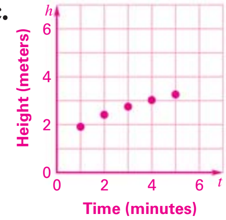
35. a. The volume doubles. **b.** The volume is multiplied by 4. **c.** If you replace the height h by $2h$ in the volume formula, it will multiply the volume by 2. If you replace the side length s by $2s$ in the volume formula, it will multiply the volume by 4 because $(2s)^2 = 4s^2$. **37.** about 77.99 $in.^3$

39. a. $V_{cone} = \frac{1}{3}Bh = \frac{1}{3}\pi r^2 \cdot h = \frac{\pi\left(\frac{1}{2}h\right)^2 \cdot h}{3} = \frac{\pi h^3}{12}$, where B is the area of the base of the cone, r is the radius, and h is the height

b.

Time (min)	Height h (m)
1	1.90
2	2.40
3	2.74
4	3.02
5	3.25

c.



No; the points of the graph do not lie in a straight line.

41. a. $h_1 = \frac{r_1 h_2}{r_2 - r_1}$ **b.** $V = \frac{\pi r_2^{\,2}(h_1 + h_2)}{3} - \frac{\pi r_1^{\,2} h_1}{3} =$

$\frac{\pi r_2^{\,2}(h_1 + h_2)}{3} - \frac{\pi r_1^{\,2} h_1}{3}$

12.6 Skill Practice (pp. 842–843) **1.** $S = 4\pi r^2$, $V = \frac{4}{3}\pi r^3$, where r is the radius of the sphere **3.** 201.06 ft^2
5. 1052.09 m^2 **7.** 4.8 in. **9.** about 144.76 $in.^2$
11. about 7359.37 cm^2 **13.** 268,082.57 mm^3
15. The radius should be cubed; $V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(8)^3 = 682.67\pi \approx 2144.66$ ft^3. **17.** 2.80 cm **19.** 6 ft
21. 247.78 $in.^2$, 164.22 $in.^3$ **23.** 358.97 cm^2, 563.21 cm^3
25. 13 in.; 676π $in.^2$; $\frac{8788}{3}\pi$ $in.^3$ **27.** 21 m; 42π m; 1764π m^2

12.6 Problem Solving (pp. 844–845) **31.** about 98,321,312 mi^2 **33. a.** 8.65 $in.^3$ **b.** 29.47 $in.^3$ **35. a.** about 80,925,856 mi^2, about 197,359,487 mi^2 **b.** about 41% **37.** 324π $in.^2$, 972π $in.^3$

12.7 Skill Practice (pp. 850–852) **1.** They are the same type of solid and corresponding linear measures have the same ratio. **3.** Not similar; the corresponding dimensions are not in the same ratio. **5.** Similar; each corresponding ratio is 3 : 4. **9.** about 166.67 m^2, about 127.21 m^3 **11.** The volumes are related by the third power; $\frac{500\pi}{\text{Volume of B}} = \frac{1^3}{4^3}$. **13.** 1 : 3 **15.** 4 : 3
17. 1 : 4 **19.** about 341.94 ft^2, about 502.65 ft^3
21. about 370.96 $in.^2$, about 73.58 $in.^3$ **23.** $r = 3$ ft, $h = 6$ ft; $r = 8$ ft; $h = 16$ ft

12.7 Problem Solving (pp. 852–853) **25.** about 8.04 fl oz
27. 27 fl oz **29. a.** large orange: about 33.51 $in.^3$, small orange: about 17.16 $in.^3$ **b.** The ratio of the volumes is the cube of the ratio of diameters.
c. large orange: 3.75 in., small orange: 2.95 in.
d. The ratio of surface area multiplied by the ratio of the corresponding diameters equals the ratio of the volumes. **31. a.** 144 in. **b.** 3920.4 $in.^2$ **c.** 1.5 $in.^3$
33. About 11.5 kg; the ratio of the small snowball to the medium snowball is 5 : 7, so the ratio of their volumes is $5^3 : 7^3$. Solve $\frac{5^3}{7^3} = \frac{1.2}{x}$ to find the weight of the middle ball. Similarly, find the weight of the large ball.

Chapter Review (pp. 857–860) **1.** sphere **3.** 12 **5.** 36 **7.** 791.68 ft^2 **9.** 9 m **11.** 14.29 cm **13.** 11.34 m^3 **15.** 27.53 yd^3 **17.** 12 $in.^2$ **19.** 272.55 m^3 **21.** 1008π m^2; 4320π m^3

Cumulative Review (pp. 866–867) **1.** 75 **3.** 16 **5.** 4 **7.** Both pairs of opposite angles are congruent. **9.** The diagonals bisect each other. **11.** 45 **13.** about 36.35 $in.^2$ **15.** about 2.28 m^2 **17.** 131.05 $in.^2$, 80.67 $in.^3$ **19.** (4, 2) **21. a.** $(x+2)^2+(y-4)^2 \le 36$ **b.** (2, 0): yes, because it is a solution to the inequality; (3, 9): no, because it is not a solution to the inequality; $(-6, -1)$: no, because it is not a solution to the inequality; $(-6, 8)$: yes, because it is a solution to the inequality; $(-7, 5)$: yes, because it is a solution to the inequality. **23. a.** 70.69 $in.^2$, 42.41 $in.^3$ **b.** about 25.45 $in.^3$

Skills Review Handbook

Operations with Rational Numbers (p. 869) **1.** 11 **3.** -15 **5.** -24 **7.** 0.3 **9.** 11.6 **11.** -4.9 **13.** -13.02 **15.** 29.2 **17.** $-\frac{13}{12}$ **19.** $\frac{6}{7}$ **21.** $-\frac{11}{12}$ **23.** $\frac{17}{18}$

Simplifying and Evaluating Expressions (p. 870) **1.** 33 **3.** -1 **5.** 36 **7.** 2.8 **9.** -6 **11.** $25x$ **13.** -36 **15.** -15 **17.** 15 **19.** 1 **21.** $-\frac{6}{5}$ **23.** $\frac{3}{4}$

Properties of Exponents (p. 871) **1.** 25 **3.** $\frac{1}{16}$ **5.** 78,125 **7.** 7^{32} **9.** a^4 **11.** $\frac{5a^5}{b^4}$ **13.** $\frac{81}{n^4}$ **15.** m^2 **17.** $16x^6y^2$ **19.** $\frac{b^2}{5a^3c}$ **21.** $8x$ **23.** $\frac{a^5}{7b^4c}$ **25.** $30x^3y$ **27.** $\frac{3a^{14}}{5b^2c^8}$

Using the Distributive Property (p. 872) **1.** $3x+21$ **3.** $40n-16$ **5.** $-x-6$ **7.** $12x^2-8x+16$ **9.** $-5x^2$ **11.** $2n+5$ **13.** $5h^3+5h^2$ **15.** 10 **17.** $\frac{9}{10}a$ **19.** $3n+4$ **21.** $2a^2+6a-76$ **23.** $3x^2-10x+5$ **25.** $4a^2+2ab-1$

Binomial Products (p. 873) **1.** $a^2-11a+18$ **3.** $t^2+3t-40$ **5.** $25a^2+20a+4$ **7.** $4c^2+13c-12$ **9.** $z^2-16z+64$ **11.** $2x^2+3x+1$ **13.** $4x^2-9$ **15.** $6d^2+d-2$ **17.** $k^2-2.4k+1.44$ **19.** $-z^2+36$ **21.** $5y^2+9y-32$ **23.** $3x^2-17$

Radical Expressions (p. 874) **1.** ± 10 **3.** $\pm\frac{1}{2}$ **5.** no square roots **7.** ± 0.9 **9.** 11 **11.** $-3\sqrt{11}$ **13.** $2\sqrt{5}$ **15.** $3\sqrt{7}$ **17.** $4\sqrt{5}$ **19.** $210\sqrt{2}$ **21.** 137 **23.** 30 **25.** 8 **27.** $2\sqrt{6}$

Solving Linear Equations (p. 875) **1.** 31 **3.** -6 **5.** 39 **7.** 23.2 **9.** 18 **11.** 1 **13.** $\frac{7}{2}$ **15.** -1 **17.** 20 **19.** 16 **21.** -1 **23.** 7 **25.** 6.75 **27.** -0.82 **29.** -4 **31.** $\frac{5}{2}$ **33.** $-\frac{2}{5}$ **35.** $\frac{1}{2}$

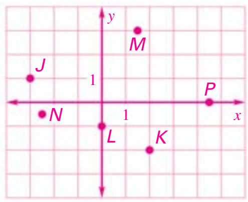
Solving and Graphing Linear Inequalities (p. 876)

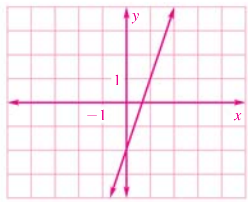
1. $x < 7$ 

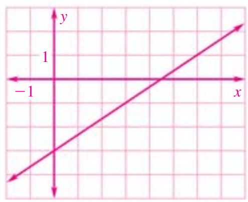
3. $n \le 4$ 

Solving Formulas (p. 877) **1.** $s=\frac{P}{4}$ **3.** $\ell=\frac{V}{wh}$ **5.** $b=\frac{2A}{h}$ **7.** $w=\frac{P}{2}-\ell$ **9.** $C=\frac{5}{9}(F-32)$ **11.** $h=\frac{S-2\pi r^2}{2\pi r}$ **13.** $y=-2x+7$ **15.** $y=3x+2$ **17.** $y=\frac{5}{4}x$ **19.** $y=62-15$

Graphing Points and Lines (p. 878) **1.** (3, 1) **3.** (0, 2) **5.** $(3, -3)$

7–12. 

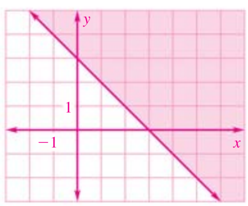
13. 

15. 

Slope and Intercepts of a Line (p. 879) **1.** $\frac{3}{2}$, x-intercept -2, y-intercept 3 **3.** 0, no x-intercept, y-intercept -2 **5.** x-intercept 3, y-intercept -15 **7.** x-intercept 3, y-intercept 3 **9.** x-intercept 2, y-intercept -6 **11.** x-intercept 0, y-intercept 0

Systems of Linear Equations (p. 880) **1.** (2, 1) **3.** $(4, -1)$ **5.** $(6, -3)$ **7.** $(-1, -4)$ **9.** (3, 2) **11.** $(-1, -5)$ **13.** $(-5, 1)$ **15.** $(0.5, -2)$

Linear Inequalities (p. 881)

1. 

3. 

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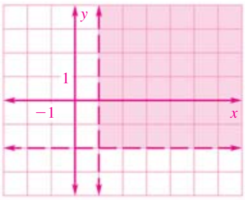
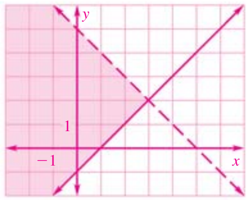
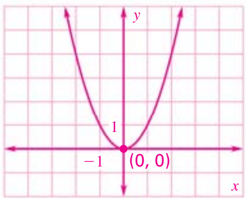
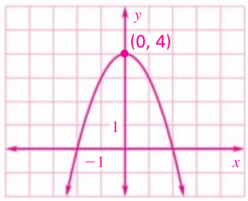
9. 

11. 

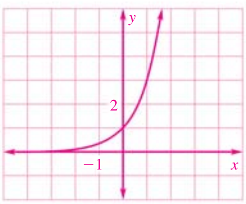
Quadratic Equations and Functions (p. 883) **1.** ± 12 **3.** -3 **5.** 0 **7.** -1 **9.** no real solutions **11.** $\pm\frac{\sqrt{5}}{3}$

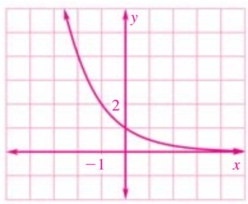
13. 

15. 

25. $-5, -1$ **27.** -3 **29.** $\frac{-7 \pm \sqrt{33}}{2}$ **31.** -2 **33.** $\frac{1 \pm \sqrt{31}}{5}$ **35.** no real solutions **37.** $\frac{1 \pm \sqrt{61}}{6}$ **39.** $\pm\sqrt{5}$

Functions (p. 884)

1. 

3. 

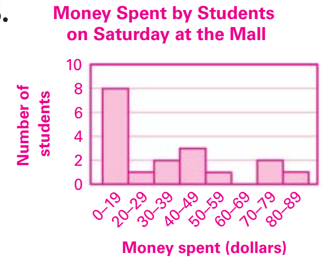
9. $y = x^2$ **11.** $y = 12x$; \$72; 35 h

Problem Solving with Percents (p. 885) **1.** 24 questions **3.** yes **5.** 20% **7.** 500 residents **9.** about 50%

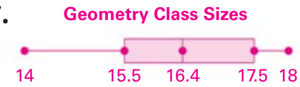
Converting Measurements and Rates (p. 886) **1.** 5 **3.** 3 **5.** 3.2 **7.** 160 **9.** 63,360 **11.** 576 **13.** 3,000,000 **15.** 6.5 **17.** 1020 **19.** 5104 **21.** 5280 **23.** 90,000,000

Mean, Median, and Mode (p. 887) **1.** The mean or the median best represent the given data because all of the values are close to these measures. **3.** The median or the mode best represent the data because all of the values are close to these measures. **5.** The median best represents the data because all of the values are close to this measure. **7.** The mean best represents the data because all of the values are close to this measure.

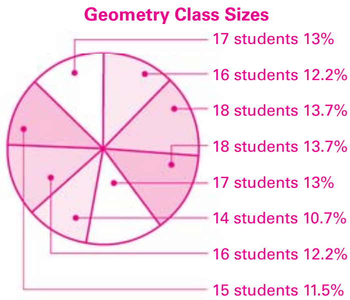
Displaying Data (p. 889) **1.** Line graph; this type of graph shows change over time and this is what the storeowner wants to evaluate. **3.** Histogram; this displays data in intervals.

5. 

The data is put into intervals; \$0–\$19.

7. 

The box-and-whisker plot shows how the class sizes relate to each other.



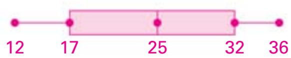
The circle graph shows how each class size contributes to the total number of students enrolled in Geometry.

9.

Stem	Leaves
1	2 3 5 5 6 8 8 9
2	4 5 5 6
3	0 0 2 2 3 5 5 6 7
4	
5	
6	
7	2

Key: 1|2 = 12

12, 72, 25.5, 18, 33

11. 

The data is more closely related to the mean and median in the new box-and-whisker plot than before dropping the two highest ages.

Sampling and Surveys (p. 890) **1.** Biased sample; the sample is unlikely to represent the entire population of students because only students at a soccer game are asked which day they prefer. **3.** Biased sample; the sample is biased because only people with e-mail can respond. **5.** The sample and the question are random.

Counting Methods (p. 892) **1.** 15 outfits **3.** 1,679,616 passwords **5.** 125,000 combinations **7.** 756 combinations **9.** 24 ways

Probability (p. 893) **1.** dependent; $\frac{33}{95} \approx 0.347$ or about 34.7% **3.** dependent; $\frac{1}{20} = 0.05$ or 5% **5.** dependent; $\frac{1}{8} = 0.125$ or 12.5%

Problem Solving Plan and Strategies (p. 895) **1.** \$205 **3.** 4 **5.** 14 aspen and 7 birch, 16 aspen and 8 birch, or 18 aspen and 9 birch **7.** 24 pieces

Extra Practice

Chapter 1 (pp. 896–897) **1.** *Sample answer:* A, F, B; $\overleftrightarrow{AB}$ **3.** *Sample answer:* $\overrightarrow{FA}$, $\overrightarrow{FB}$ **5.** *Sample answer:* $\overleftrightarrow{AB}$ **7.** 43 **9.** 26 **11.** 28 **13.** $(3x - 7) + (3x - 1) = 16$; $x = 4$; $AB = 5$, $BC = 11$; not congruent **15.** $(4x - 5) + (2x - 7) = 54$; $x = 11$; $AB = 39$, $BC = 15$; not congruent **17.** $(3x - 7) + (2x + 5) = 108$; $x = 22$; $AB = 59$, $BC = 49$; not congruent **19.** $\left(-4\frac{1}{2}, 1\right)$ **21.** (1, 1) **23.** (5.1, −8.05) **25.** 10 **27.** 34 **29.** 20 **31.** 104° **33.** 88° **35.** adjacent angles **37.** vertical angles, supplementary **39.** *Sample answer:* $\angle ACE$, $\angle BCF$ **41.** polygon; concave **43.** Not a polygon; part of the figure is not a line segment. **45.** *DFHKB*, pentagon; *ABCDEFGHJK*, decagon **47.** 13 cm **49.** 11 m **51.** about 13.4 units, 4 units^2

Chapter 2 (pp. 898–899) **1.** Add 6 for the next number, then subtract 8 for the next number; 11. **3.** no pattern **5.** Each number is $\frac{1}{3}$ of the previous number; $\frac{1}{81}$. **7.** *Sample answer:* $-8 - (-5) = -3$ **9.** *Sample answer:* $m\angle A = 90°$ **11.** If-then form: if a figure is a square, then it is a four-sided regular polygon; Converse: if a figure is a four-sided regular polygon, then it is a square; Inverse: if a figure is not a square, then it is not a four-sided regular polygon; Contrapositive: if a figure is not a four-sided regular polygon, then it is not a square. **13.** true **15.** If two coplanar lines are not parallel, then they form congruent vertical angles. **17.** might **19.** true **21.** false **23.** true

25.

$4x + 15 = 39$	Write original equation.
$4x = 24$	Subtraction Property of Equality
$x = 6$	Division Property of Equality

27.

$2(-7x + 3) = -50$	Write original equation.
$-14x + 6 = -50$	Distributive Property
$-14x = -56$	Subtraction Property of Equality
$x = 4$	Division Property of Equality

29.

$13(2x - 3) - 20x = 3$	Write original equation.
$26x - 39 - 20x = 3$	Distributive Property
$6x - 39 = 3$	Simplify.
$6x = 42$	Addition Property of Equality
$x = 7$	Division Property of Equality

31. $m\angle JKL$, $m\angle ABC$; Transitive Property of Equality **33.** $m\angle XYZ$; Reflexive Property of Equality

21.

Statements	Reasons
1. $\overline{XY} \cong \overline{YZ} \cong \overline{ZX}$	1. Given
2. $XY = YZ = ZX$	2. Definition of congruence for segments
3. Perimeter of $\triangle XYZ = XY + YZ + ZX$	3. Perimeter formula
4. Perimeter of $\triangle XYZ = XY + XY + XY$	4. Substitution
5. Perimeter of $\triangle XYZ = 3 \cdot XY$	5. Simplify.

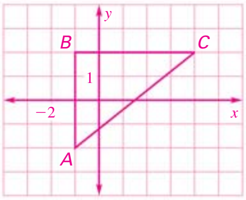
37. 23° **39.** 90°

41.

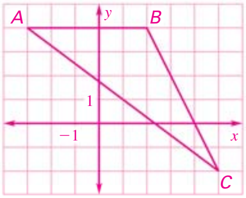
Statements	Reasons
1. $\angle UKV$ and $\angle VKW$ are complements.	1. Given
2. $m\angle UKV + m\angle VKW = 90°$	2. Definition of complementary angles
3. $\angle UKV \cong \angle XKY$, $\angle VKW \cong \angle YKZ$	3. Vertical angles are congruent.
4. $m\angle UKV = m\angle XKY$, $m\angle VKW = m\angle YKZ$	4. Definition of angle congruence
5. $m\angle YKZ + m\angle XKY = 90°$	5. Substitution
6. $\angle YKZ$ and $\angle XKY$ are complements.	6. Definition of complementary angles

Chapter 3 (pp. 900–901) **1.** corresponding **3.** consecutive interior **5.** corresponding **7.** $\angle HLM$ and $\angle MJC$ **9.** $\angle FKL$ and $\angle AML$ **11.** $\overleftrightarrow{BG}$ and $\overleftrightarrow{CF}$ **13.** 68°, 112°; $m\angle 1 = 68°$ because if two parallel lines are cut by a transversal, then the alternate interior angles are congruent, $m\angle 2 = 112°$ because it is a linear pair with $\angle 1$. **15.** 9, 1 **17.** 25, 19 **19.** Yes; if two lines are cut by a transversal so that a pair of consecutive interior angles are supplementary, then the lines are parallel. **21.** Yes; if two lines are cut by a transversal so that alternate interior angles are congruent, then the lines are parallel. **23.** Yes; if two lines are cut by a transversal so that a pair of consecutive interior angles are supplementary, then the lines are parallel. **25.** Neither; the slopes are not equal and they are not opposite reciprocals. **27.** Line 2 **29.** Line 1 **31.** $y = \frac{2}{3}x + 2$ **33.** $y = -2x$ **35.** $y = x + 10$ **37.** $y = \frac{2}{5}x + \frac{38}{5}$ **39.** 69° **41.** 73° **43.** 38° **45.** 1. Given; 2. $\angle ABC$ is a right angle.; 3. Definition of right angle; 4. $\overrightarrow{BD}$ bisects $\angle ABC$.; 5. Definition of angle bisector; 6. $m\angle ABD$, $m\angle DBC$; 7. Substitution Property of Equality; 8. $m\angle ABD$; 9. Simplify; 10. Division Property of Equality

Chapter 4 (pp. 902–903)

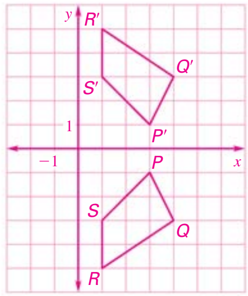
1. 

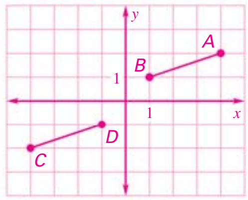
scalene; right triangle

3. 

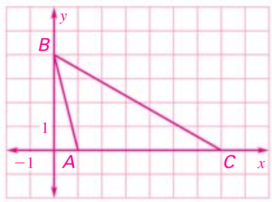
scalene; not a right triangle

5. 58; acute **7.** $\triangle DFG \cong \triangle FDE$; SAS Congruence Postulate or ASA Congruence Postulate
9. $STWX \cong UTWV$; all pairs of corresponding angles and sides are congruent. **11.** 7 **13.** No; a true congruence statement would be $\triangle JKM \cong \triangle LKM$.
15. congruent **17.** $\triangle XUV \cong \triangle VWX$; since $\overline{XV} \cong \overline{XV}$, with the givens you can use the HL Congruence Theorem. **19.** $\triangle HJL \cong \triangle KLJ$; use alternate interior angles to get $\angle HJL \cong \angle JLK$. Since $\overline{JL} \cong \overline{JL}$, with the given you can use the SAS Congruence Postulate.
21. yes; AAS Congruence Theorem **23.** Yes; use the ASA Congruence Postulate. **25.** State the givens from the diagram, and state that $\overline{AC} \cong \overline{AC}$ by the Reflexive Property of Congruence. Then use the SAS Congruence Postulate to prove $\triangle ABC \cong \triangle CDA$, and state $\angle 1 \cong \angle 2$ because corresponding parts of congruent triangles are congruent.
27. State the givens from the diagram and state that $\overline{SR} \cong \overline{SR}$ by the Reflexive Property of Congruence. Then use the Segment Addition Postulate to show that $\overline{PR} \cong \overline{US}$. Use the SAS Congruence Postulate to prove $\triangle QPR \cong \triangle TUS$, and state $\angle 1 \cong \angle 2$ because corresponding parts of congruent triangles are congruent. **29.** $AB = DE = \sqrt{26}$; $AC = DF = \sqrt{41}$; $BC = EF = \sqrt{17}$; $\triangle ABC \cong \triangle DEF$ by the SSS Congruence Postulate, and $\angle A \cong \angle D$ because corresponding parts of congruent triangles are congruent. **31.** $x = 6$, $y = 48$ **33.** $x = 2$
35. $x = 28$, $y = 29$

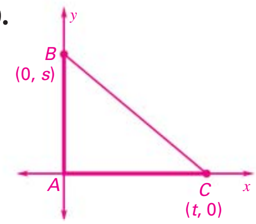
37. 

39. 

yes; 180°

Chapter 5 (pp. 904–905) **1.** $\overline{AB}$ **3.** $\overline{AC}$ **5.** LC, AL
7. *Sample answer:* 

$A(1, 0)$, $B(0, 4)$, $C(7, 0)$

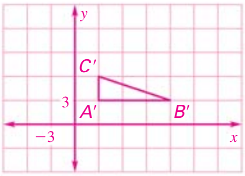
9. 

$A(0, 0)$, $B(0, s)$, $C(t, 0)$

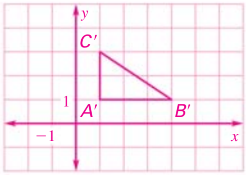
11. 14 **13.** 12 **15.** 24 **17.** yes **19.** 15 **21.** No; there is not enough information. **23.** Yes; $x = 17$ by the Angle Bisector Theorem. **25.** 17 **27.** 8 **29.** angle bisector
31. perpendicular bisector **33.** perpendicular bisector and angle bisector **35.** $\overline{JK}$, $\overline{LK}$, $\overline{JL}$, $\angle L$, $\angle J$, $\angle K$
37. 1 in. $< \ell <$ 17 in. **39.** 6 in. $< \ell <$ 12 in.
41. 2 ft $< \ell <$ 10 ft **43.** $>$ **45.** $>$ **47.** $=$ **49.** $>$ **51.** $<$

Chapter 6 (pp. 906–907) **1.** 20°, 60°, 100° **3.** 36°, 54°, 90°
5. 4 **7.** 10 **9.** −10 **11.** 10 **13.** 6 **15.** 12 **17.** $\frac{y}{9}$ **19.** 4
21. similar; $RQPN \sim STUV$, 11 : 20 **23.** 3 : 1
25. $\triangle PQR$: 90, $\triangle LMN$: 30 **27.** angle bisector, 7
29. not similar **31.** Similar; $\triangle JKL \sim \triangle NPM$; since $\overline{JK} \parallel \overline{NP}$ and $\overline{KL} \parallel \overline{PM}$, $\angle J \cong \angle PNM$ and $\angle L \cong \angle PMN$ by the Corresponding Angles Postulate. Then the triangles are similar by the AA Similarity Postulate.
33. Since $\frac{KH}{TS} = \frac{KJ}{TR} = \frac{HJ}{SR} = \frac{3}{5}$, $\triangle KHJ \sim \triangle TSR$ by the SSS Similarity Theorem. **35.** $x = 3$, $y = 8.4$

37.



39.

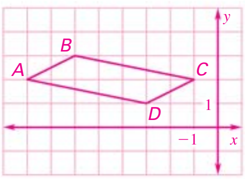


41. enlargement; 1 : 3

Chapter 7 (pp. 908–909) **1.** 50 **3.** 60 **5.** 240 ft^2 **7.** right triangle **9.** not a right triangle **11.** right triangle **13.** triangle; acute **15.** not a triangle **17.** triangle; acute **19.** $\triangle ADB \sim \triangle BDC \sim \triangle ABC$; DB **21.** $\triangle PSQ \sim \triangle QSR \sim \triangle PQR$; RP **23.** 2 **25.** 4.8 **27.** 9.7 **29.** $g = 9$, $h = 9\sqrt{3}$ **31.** $m = 5\sqrt{3}$, $n = 10$ **33.** $v = 20$, $w = 10$ **35.** $\frac{3}{5}$, 0.6; $\frac{5}{3}$, 1.6667 **37.** 6.1 **39.** 16.5 **41.** $x = 12.8$, $y = 15.1$ **43.** $x = 7.5$, $y = 7.7$ **45.** $x = 16.0$, $y = 16.5$ **47.** $GH = 9.2$, $m\angle G = 49.4°$, $m\angle H = 40.6°$

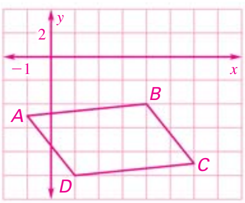
Chapter 8 (pp. 910–911) **1.** 112 **3.** 117 **5.** 68 **7.** 120°, 60° **9.** about 158.8°, about 21.2° **11.** $a = 5$, $b = 5$ **13.** $a = 117°$, $b = 63°$ **15.** $a = 7$, $b = 3$ **17.** $\angle XYV$ **19.** YV **21.** ZX

23.



$\overline{AB} \parallel \overline{DC}$, $\overline{AD} \parallel \overline{BC}$

25.

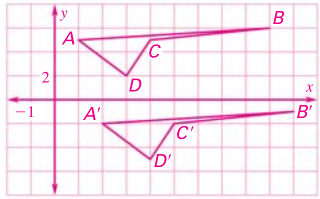


$\overline{AB} \parallel \overline{DC}$, $\overline{AD} \parallel \overline{BC}$

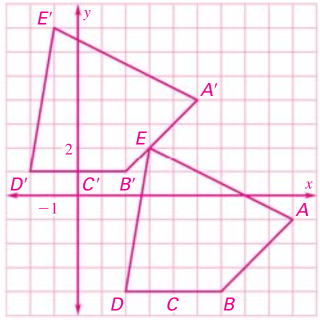
27. Show $\angle QPR \cong \angle SRP$ making $\angle SPQ \cong \angle QRS$. You now have opposite pairs of angles congruent which makes the quadrilateral a parallelogram. **29.** Square; since the quadrilateral is both a rectangle and rhombus it is a square. **31.** Rectangle; since the quadrilateral is a parallelogram with congruent diagonals it is a rectangle. **33.** 90° **35.** 25 **37.** 0.4 **39.** 98° **41.** Parallelogram; the diagonals bisect one another. **43.** Rhombus; it is a parallelogram with perpendicular diagonals. **45.** Isosceles trapezoid; it has one pair of parallel opposite sides and congruent base angles. **47.** Kite; it has consecutive pairs of congruent sides and perpendicular diagonals. **49.** Trapezoid; it has one pair of parallel sides.

Chapter 9 (pp. 912–913) **1.** $(x, y) \rightarrow (x + 4, y - 2)$; $AB = A'B'$, $BC = B'C'$, $AC = A'C'$ **3.** $\langle -10, 7\rangle$ **5.** $\langle -4, 5\rangle$ **7.** $\begin{bmatrix} 5 \\ 11 \end{bmatrix}$ **9.** $\begin{bmatrix} -4 & -31 \\ 64 & 67 \end{bmatrix}$

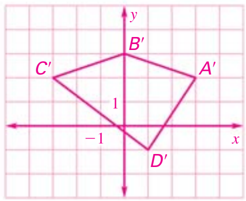
11. $\begin{bmatrix} 2 & 10 & 5 & 4 \\ -2 & -1 & -2 & -5 \end{bmatrix}$



13. $\begin{bmatrix} 5 & 2 & 0 & -2 & -1 \\ 4 & 1 & 1 & 1 & 7 \end{bmatrix}$

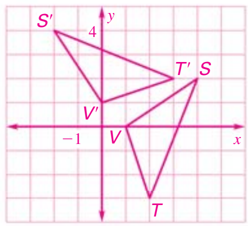


15.

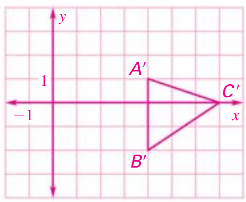


17. $A'(1, 2)$, $B'(2, -4)$, $C'(0, -1)$
19. $A'(-1, 2)$, $B'(-1, 5)$, $C'(2, 6)$, $D'(3, 3)$, $E'(1, -1)$

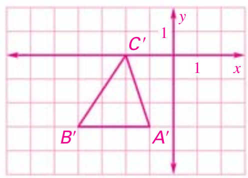
21. $\begin{array}{c} \begin{array}{ccc} S' & T' & V' \end{array} \\ \begin{bmatrix} -2 & 3 & 0 \\ 4 & 2 & 1 \end{bmatrix} \end{array}$



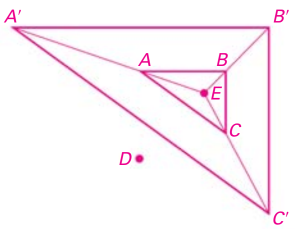
23.

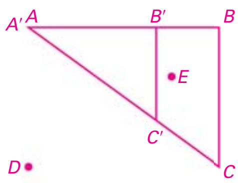


25.

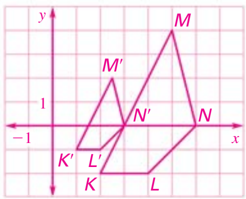


27. 88° **29.** Line symmetry, rotational symmetry; the figure has two lines of symmetry, one line passing horizontally through the center of the circle and the other passing vertically through the center of the circle; it has rotational symmetry of 180°. **31.** Line symmetry, no rotational symmetry; the figure has one line of symmetry passing vertically through the center of the rectangle; it does not have rotational symmetry.

33. 

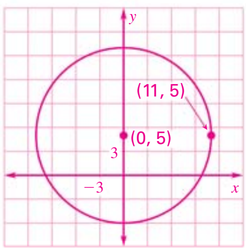
35. 

39. $\begin{array}{c} \begin{array}{cccc} K' & L' & M' & N' \end{array} \\ \begin{bmatrix} 1 & 2 & \frac{5}{2} & 3 \\ -1 & -1 & 2 & 0 \end{bmatrix} \end{array}$



Chapter 10 (pp. 914–915)

1. *Sample answer:* $\overline{KF}$ **3.** *Sample answer:* $\overleftrightarrow{CD}$ **5.** *Sample answer: K* **7.** $\overline{GH}$ **9.** $\frac{8}{3}$ **11.** 12 **13.** 4 **15.** minor arc; 30° **17.** minor arc; 105° **19.** minor arc; 105° **21.** 310° **23.** 130° **25.** 115° **27.** 45° **29.** $\overparen{AB} \cong \overparen{DE}$ using Theorem 10.3. **31.** $x = 90°$, $y = 50°$ **33.** $x = 25$, $y = 22$ **35.** $x = 7$, $y = 14$ **37.** 45 **39.** 55 **41.** 3 **43.** 2 **45.** 2 **47.** 3 **49.** $x^2 + (y + 2)^2 = 16$ **51.** $(x - m)^2 + (y - n)^2 = h^2 + k^2$

53. 

Chapter 11 (pp. 916–917)

1. 143 units^2 **3.** 56.25 units^2 **5.** 60 cm, 150 cm^2 **7.** 5 **9.** 0.8 **11.** 22 units^2 **13.** 70 units^2 **15.** 72 units^2 **17.** 13.5 units^2 **19.** 10 : 9 **21.** $2\sqrt{2} : 1$ **23.** 14 m **25.** about 15.71 units **27.** about 28.27 units **29.** about 4.71 m **31.** about 2.09 in. **33.** 9π in.^{2}; 28.27 in.^{2} **35.** 100π ft^2; 314.16 ft^2 **37.** about 9.82 in.^{2} **39.** about 42.76 ft^2 **41.** 45° **43.** 18° **45.** 54 units, $81\sqrt{3}$ units^2 **47.** 27 units, about 52.61 units^2 **49.** about 58.7% **51.** 30% **53.** 3.75%

Chapter 12 (pp. 918–919)

1. Polyhedron; pentagonal prism; it is a solid bounded by polygons. **3.** Polyhedron; triangular pyramid; it is a solid bounded by polygons. **5.** 6 faces **7.** 156.65 cm^2 **9.** 163.36 cm^2 **11.** 4285.13 in.^{2} **13.** 10 in. **15.** 14 ft **17.** 16.73 cm^2 **19.** 103.67 in.^{2} **21.** 678.58 yd^2 **23.** 1960 cm^3 **25.** 2 cm **27.** 5.00 in. **29.** 173.21 ft^3 **31.** 6107.26 in.^{3} **33.** 12.66 ft^3 **35.** 40.72 in.^{2}, 24.43 in.^{3} **37.** 589.65 cm^2, 1346.36 cm^3 **39.** 3848.45 mm^2, 22,449.30 mm^3 **41.** 1661.90 ft^2, 6370.63 ft^3 **43.** 216 ft^2, 216 ft^3 **45.** 1 : 3