

Chapter 1

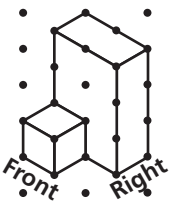
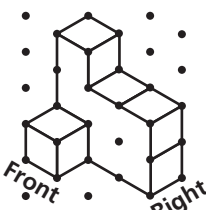
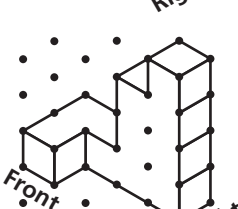
Practice 1-1

1. 47, 53 2. 1.00001, 1.00001 3. 42, 54 4. -64, 128
5. 22, 29 6. 63.5, 63.75 7. Sample: 2 or 3 8. 51 or 49
9. 6 or 8 10. A or AA 11. D or G 12. Y or A
13. any hexagon 14. circle with 8 equally spaced diameters
15. a 168.75° angle 16. 21 hand-shakes 17. $h = \frac{n(n-1)}{2}$
18. 34 19. Sample: The farther out you go, the closer the ratio gets to a number that is approximately 0.618.
20. 0, 1, 1, 2, 3, 5, 8, 13

Guided Problem Solving 1-1

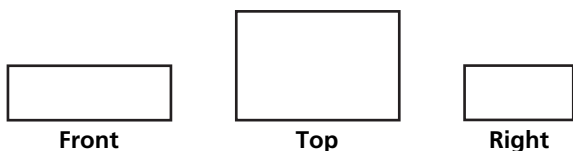
1. The pattern is easier to visualize. 2. The graph will go up.
3. Use Years for the horizontal axis. 4. Use Number of Stations for the vertical axis. 5. increasing 6. greater
7. Yes. Since the number of stations increases steadily from 1950 to 2000, we can be confident that the number of stations in 2010 will be greater than in 2000. 8. Patterns are necessary to reach a conclusion through inductive reasoning. 9. (any list of numbers without a pattern would apply) 2,435; 16,439; 16,454; 3,765; 210,564

Practice 1-2

1. 
2. 
3. 
4.

1	1	1
1	1	1

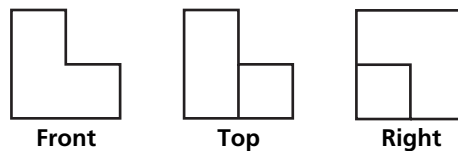
Front Right



5.

2	
2	1

Front Right



6.

1
1
3

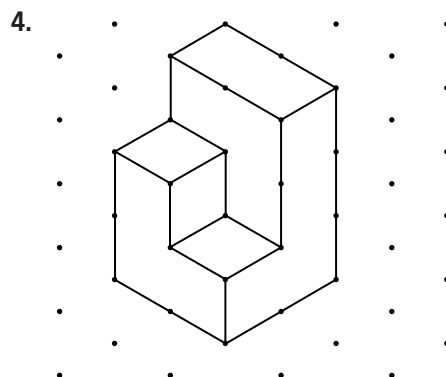
Front Right

Front Top Right

7. A, C, D 8. C 9. D 10. B 11. A

Guided Problem Solving 1-2

1. They represent three-dimensional objects on a two-dimensional surface. 2. nine 3. See the figure in 4, below.



5. Yes. It is similar to the foundation drawing, except there are no numbers. 6. no

7.

Top

Front Right

8. Yes.

9.

4	2
3	1

Practice 1-3

1. $\overleftrightarrow{AC}$ 2. any two of the following: ABD , DBC , CBE , ABE , ECD , ADE , ACE , ACD 3. Points E , B , and D are collinear. 4. yes 5. yes 6. no 7. no 8. yes 9. no

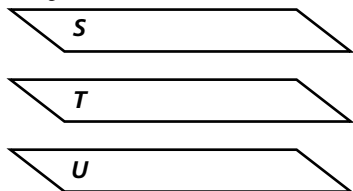
10. yes 11. yes 12. yes 13. no 14. yes 15. yes
 16. $\overleftrightarrow{G}$ 17. $\overleftrightarrow{LM}$ 18. $\overleftrightarrow{PN}$ 19. the empty set 20. $\overleftrightarrow{KP}$
 21. $\overleftrightarrow{M}$ 22. Sample: plane ABD 23. Sample: plane ABC
 24. $\overleftrightarrow{AB}$ 25. yes 26. no 27. yes 28. the empty set
 29. no 30. yes 31. yes

Guided Problem Solving 1-3

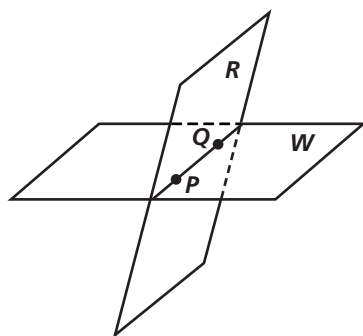
1. Collinear points lie on the same line. 2. Answers may vary. (Some people might note that the y -coordinate of two of the points is the same so that the third point must have the same y -coordinate to be collinear. Since it does not, the points are not collinear.) 3. horizontal 4. No. 5. No. 6. All points must have the same y -coordinate, -3 . 7. No. 8. $\left(1, -\frac{1}{2}\right)$

Practice 1-4

1. true 2. false 3. true 4. false 5. false 6. false
 7. $\overleftrightarrow{JK}$, $\overleftrightarrow{HG}$ 8. $\overleftrightarrow{EH}$ 9. any three of the following pairs: $\overleftrightarrow{EF}$ and $\overleftrightarrow{JH}$; $\overleftrightarrow{EF}$ and $\overleftrightarrow{GK}$; $\overleftrightarrow{HG}$ and $\overleftrightarrow{JE}$; $\overleftrightarrow{HG}$ and $\overleftrightarrow{FK}$; $\overleftrightarrow{JK}$ and $\overleftrightarrow{EH}$; $\overleftrightarrow{JK}$ and $\overleftrightarrow{FG}$; $\overleftrightarrow{EJ}$ and $\overleftrightarrow{FG}$; $\overleftrightarrow{EH}$ and $\overleftrightarrow{FK}$; $\overleftrightarrow{JE}$ and $\overleftrightarrow{KG}$; $\overleftrightarrow{EH}$ and $\overleftrightarrow{KG}$; $\overleftrightarrow{JH}$ and $\overleftrightarrow{KF}$; $\overleftrightarrow{JH}$ and $\overleftrightarrow{GE}$ 10. planes A and B 11. planes A and C ; planes B and C 12. planes A and C 13. planes B and C 14. Sample: $\overleftrightarrow{EG}$ 15. 6 16. $\overleftrightarrow{EF}$ and $\overleftrightarrow{ED}$ or $\overleftrightarrow{EG}$ and $\overleftrightarrow{ED}$ 17. $\overleftrightarrow{FE}$, $\overleftrightarrow{FD}$ 18. $\overleftrightarrow{GF}$, $\overleftrightarrow{GD}$ 19. yes 20. Sample:



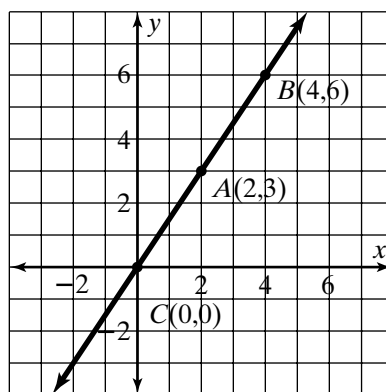
21. Sample:



Guided Problem Solving 1-4

1. Opposite rays are two collinear rays with the same endpoint. 2. a line 3-4. See graph in Exercise 5 answer.

5. Answers may vary. Sample: $(0, 0)$ (Answers will be coordinates (x, y) , where $y = \frac{3}{2}x$, $x < 2$.)



6. yes 7. $L(4, 2)$

Practice 1-5

1. 4 2. 12 3. 20 4. 6 5. 22 6. -10 or 6 7. -1 or 1
 8. 3; 4; no 9. 6; 6; yes 10. C or -2 11. 15 12. 31
 13. 14 14. $x = 11\frac{2}{3}$; $AB = 31$; $BC = 31$ 15. $x = 35\frac{2}{3}$;
 $AB = 103$; $BC = 103$

Guided Problem Solving 1-5

1. $\overline{AD} \cong \overline{DC}$ 2. $AD = DC$ 3. Segment Addition Postulate.
 4. Since $AD = DC$, $AC = 2(AD)$. 5. $AC = 2(12) = 24$
 6. $y = 15$ 7. $DC = AD = 12$ 8. Answers may vary.
 9. $ED = 11$, $DB = 11$, $EB = 22$

Practice 1-6

1. any three of the following: $\angle O$, $\angle MOP$, $\angle POM$, $\angle 1$
 2. $\angle AOB$ 3. $\angle EOC$ 4. $\angle DOC$ 5. 51 6. 90
 7. 17 8. 107 9. 141 10. 68 11. $\angle ABD$, $\angle DBE$, $\angle EBF$,
 $\angle DBF$, $\angle FBC$ 12. $\angle ABF$, $\angle DBC$ 13. $\angle ABE$, $\angle EBC$
 14. $x = 5$; 8; 21; 13 15. $x = 9$; 85; 35; 120

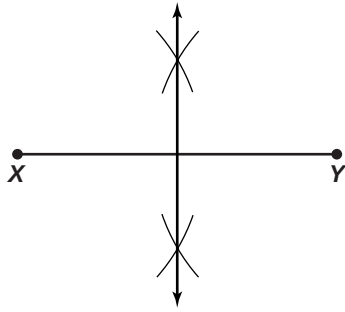
Guided Problem Solving 1-6

1. Angle Addition Postulate 2. supplementary angles
 3. $m\angle RQS + m\angle TQS = 180$ 4. $(2x + 4) + (6x + 20) = 180$
 5. $x = 19.5$ 6. $m\angle RQS = 43$; $m\angle TQS = 137$ 7. The sum
 of the angle measures should be 180; $m\angle RQS + m\angle TQS =$
 $43 + 137 = 180$. 8a. $x = 11$ 8b. $m\angle AOB = 17$;
 $m\angle COB = 73$

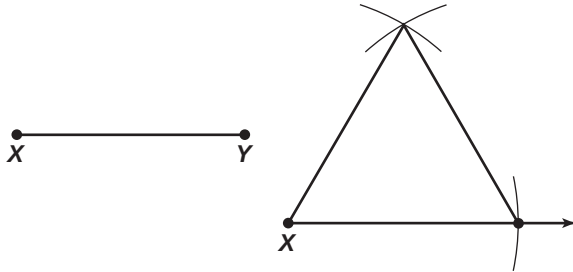
Practice 1-7



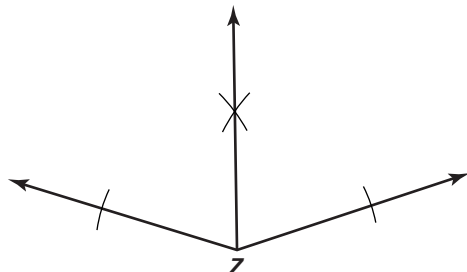
2.



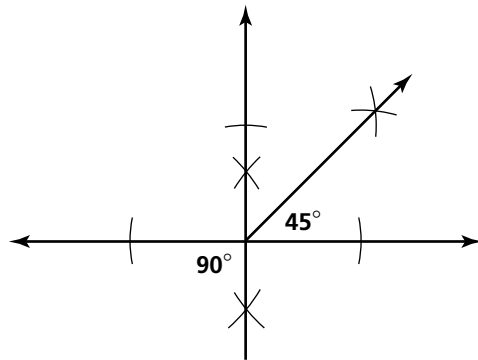
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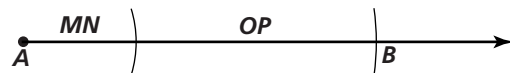
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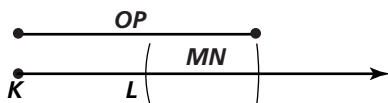
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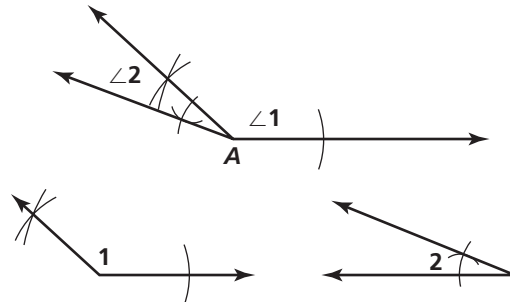
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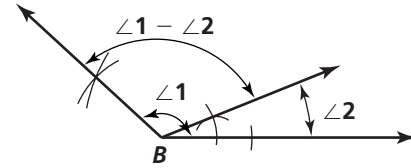
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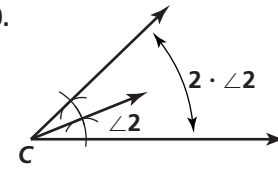
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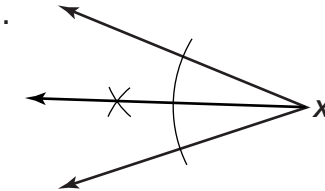
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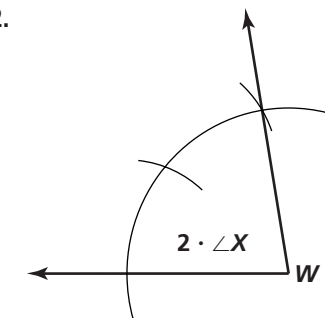
10.



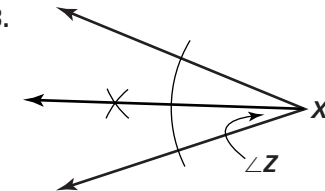
11.



12.



13.



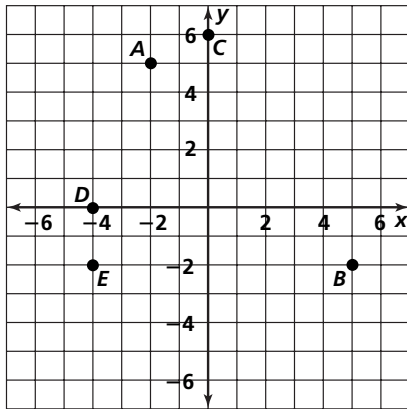
14. true 15. false 16. false 17. true 18. true
19. false 20. true

Guided Problem Solving 1-7

1. $\angle DBC \cong \angle ABC$ 2. complementary angles
3. $\angle CBD$ 4. $m\angle CBD = m\angle CBA = 41$
5. $m\angle ABD = m\angle CBA + m\angle CBD = 41 + 41 = 82$
6. $m\angle ABE + m\angle CBA = 90$
 $m\angle ABE + 41 = 90$
 $m\angle ABE = 49$
7. $m\angle DBF = m\angle ABE = 49$ 8. Answers may vary. Sample:
The sum of the measures of the complementary angles should be 90 and the sum of the measures of the supplementary angles should be 180. 9. $m\angle CBD = 21$, $m\angle FBD = 69$,
 $m\angle CBA = 21$, and $m\angle EBA = 69$

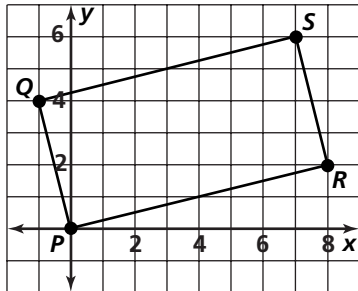
Practice 1-8

1.-5.



6. $5\sqrt{2} \approx 7.1$ 7. $2\sqrt{17} \approx 8.2$ 8. 12 9. 8 10. 12
 11. $\sqrt{26} \approx 5.1$ 12. (5, 5) 13. $(\frac{1}{2}, 1)$ 14. $(10\frac{1}{2}, -5)$
 15. $(-2\frac{1}{2}, 6)$ 16. $(-0.3, 3.4)$ 17. $(2\frac{7}{8}, -\frac{5}{8})$ 18. (5, -2)
 19. (4, 10) 20. (-3, 4) 21. yes; $AB = BC = CD = DA = 6$ 22. $\sqrt{401} \approx 20.025$

23.



24. ≈ 24.7 25. (3.5, 3)

Guided Problem Solving 1-8

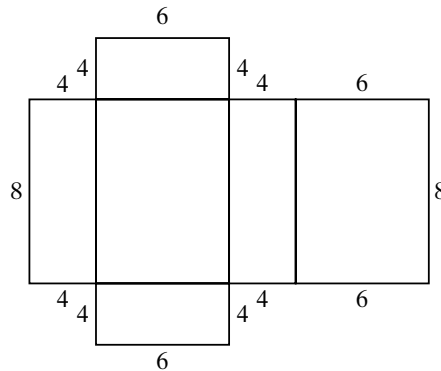
1. Distance Formula 2. The distance d between two points $A(x_1, y_1)$ to $B(x_2, y_2)$ is $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.
 3. No; the differences are opposites but the squares of the differences are the same.
 4. $XY = \sqrt{(5 - (-6))^2 + (-2 - 9)^2}$ 5. To the nearest tenth, $XY = 15.6$ units. 6. To the nearest tenth, $XZ = 12.0$ units. 7. Z is closer to X. 8. The results are the same; e.g., $XY = \sqrt{(-6 - 5)^2 + (9 - (-2))^2} = \sqrt{242}$, or about 15.6 units, as before.
 9. $YZ = \sqrt{(17 - (-6))^2 + (-3 - 9)^2} = \sqrt{673}$; to the nearest tenth, $YZ = 25.9$ units. To the nearest tenth, $XY + YZ + XZ = 53.5$ units.

Practice 1-9

1. 792 in.^2 2. 3240 in.^2 3. 2.4 m^2 4. 32π 5. 16π
 6. 7.8π 7. $26 \text{ cm}; 42 \text{ cm}^2$ 8. $46 \text{ cm}; 42 \text{ cm}^2$ 9. $29 \text{ in.}; 42 \text{ in.}^2$ 10. $40 \text{ ft}; 51 \text{ ft}^2$ 11. $40 \text{ m}; 99 \text{ m}^2$ 12. $40 \text{ m}; 91 \text{ m}^2$
 13. 68; 285 14. $26\frac{2}{3}$ 15. 30; 44 16. 156.25π
 17. $10,000\pi$ 18. $\frac{\pi}{16}$ 19. 48; 28 20. 36 21. 26; 13

Guided Problem Solving 1-9

1. six 2. It is a two-dimensional pattern you can fold to form a three-dimensional object. 3. rectangles
 4.



5. 208 in.^2 6. They are equal. 7. 208 in.^2 8. Answers will vary. Sample: $2(4 \cdot 6) + 2(4 \cdot 8) + 2(6 \cdot 8)$; the results are the same, 208 in.^2 9. $6(7^2) = 294 \text{ in.}^2$

1A: Graphic Organizer

1. Tools of Geometry 2. Answers may vary. Sample: patterns and inductive reasoning; measuring segments and angles; basic constructions; and the coordinate plane 3. Check students' work.

1B: Reading Comprehension

1. Answer may vary. Sample: $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$, $\overleftrightarrow{EF} \parallel \overleftrightarrow{GH}$, $\overline{JK} \cong \overline{LM}$, $\overline{JL} \cong \overline{KM}$, $m\angle AJF + m\angle FJK = 180^\circ$, $\angle HKB \cong \angle KMD$, $\overline{DN} \perp \overline{CD}$ 2. Points A, M, and S are collinear. 3. $\overleftrightarrow{AB}$, $\overleftrightarrow{HI}$, and $\overleftrightarrow{LN}$ intersect at point M. 4. a

1C: Reading/Writing Math Symbols

1. Line BC is parallel to line MN. 2. Line CD
 3. Line segment GH 4. Ray AB 5. The length of segment XY is greater than the length of segment ST.
 6. $MN = XY$ 7. $GH = 2(KL)$ 8. $\overline{ST} \perp \overline{UV}$
 9. plane ABC $\parallel$ plane XYZ 10. $\overline{AB} \parallel \overline{DE}$

1D: Visual Vocabulary Practice

1. parallel planes 2. Segment Addition Postulate
 3. supplementary angles 4. opposite rays 5. isometric drawing 6. perpendicular lines 7. foundation drawing
 8. right angle 9. congruent sides

1E: Vocabulary Check

Net: A two-dimensional pattern that you can fold to form a three-dimensional figure.

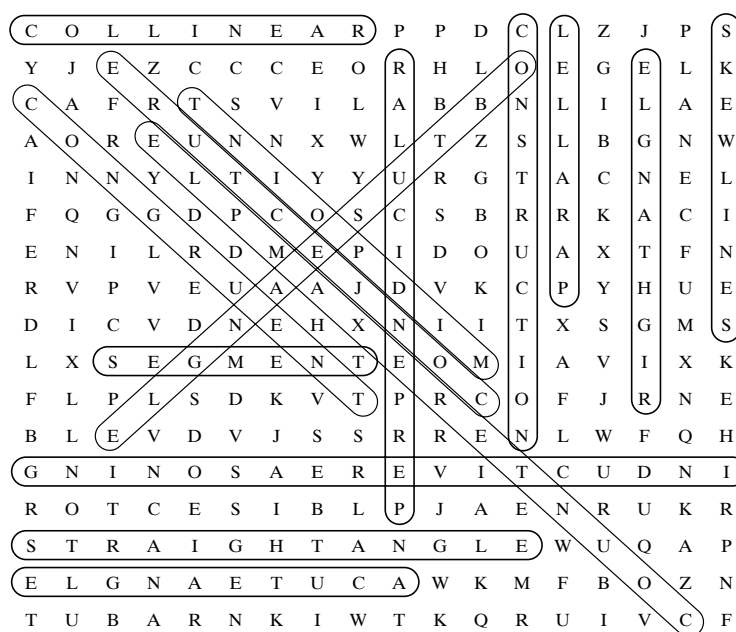
Conjecture: A conclusion reached using inductive reasoning.

Collinear points: Points that lie on the same line.

Midpoint: A point that divides a line segment into two congruent segments.

Postulate: An accepted statement of fact.

1F: Vocabulary Review Puzzle



Chapter 2

Practice 2-1

- Sample: It is 12:00 noon on a rainy day.
- Sample: The car will not start because of a dead battery.
- Sample: 6
- If you are strong, then you drink milk.
- If a rectangle is a square, then it has four sides the same length.
- If you are tired, then you did not sleep.
- If $x = 26$, then $x - 4 = 22$; true.
- If $x > 0$, then $|x| > 0$; true.
- If m is positive, then m^2 is positive; true.
- If $2y - 1 = 5$, then $y = 3$; true.
- If $x > 0$, then point A is in the first quadrant; false; $(4, -5)$ is in the fourth quadrant.
- If lines are parallel, then their slopes are equal; true.
- If you have a sibling, then you are a twin; false; a brother or sister born on a different day.
-

- Hypothesis: If you like to shop; conclusion: Visit Pigeon Forge outlets in Tennessee.
- Pigeon Forge outlets are good for shopping.
- If you visit Pigeon Forge outlets, then you like to shop.
- It is not necessarily true. People may go to Pigeon Forge outlets because the people they are with want to go there.
- Drinking Sustain makes you train harder and run faster.
- If you drink Sustain, then you will train harder and run faster.
- If you train harder and run faster, then you drink Sustain.

Guided Problem Solving 2-1

- Hypothesis: x is an integer divisible by 3.
- Conclusion: x^2 is an integer divisible by 3.
- Yes, it is true. Since 3 is a factor

of x , it must be a factor of $x \cdot x = x^2$.

- If x^2 is an integer divisible by 3 then x is an integer divisible by 3.
- The converse is false. Counterexamples may vary. Let $x^2 = 3$. Then $x = \sqrt{3}$, which is not an integer and is not divisible by 3.
- No. The conditional is true, so there is no such counterexample.
- No. By definition, a general statement is false if a counterexample can be provided.
- If $5x + 3 = 23$, then $x = 4$. The original statement and the converse are both true.

Practice 2-2

- Two angles have the same measure if and only if they are congruent.
- $2x - 5 = 11$ if and only if $x = 8$.
- The converse, "If $|n| = 17$, then $n = 17$," is not true.
- A figure has eight sides if and only if it is an octagon.
- If a whole number is a multiple of 5, then its last digit is either 0 or 5. If a whole number has a last digit of 0 or 5, then it is a multiple of 5.
- If two lines are perpendicular, then the lines form four right angles. If two lines form four right angles, then the lines are perpendicular.
- If you live in Texas, then you live in the largest state in the contiguous United States. If you live in the largest state in the contiguous United States, then you live in Texas.
- Sample: Other vehicles, such as trucks, fit this description.
- Sample: Other objects, such as spheres, are round.
- Sample: This is not specific enough; many numbers in a set could fit this description.
- Sample: Baseball also fits this definition.
- Sample: *Pleasing*, *smooth*, and *rigid* all are too vague.
- yes
- no
- yes

Guided Problem Solving 2-2

- A good definition is clearly understood, precise, and reversible.
- $\angle 3$ and $\angle 4$, $\angle 5$ and $\angle 6$
- No

4. They are not supplementary. 5. A linear pair has a common vertex, shares a common side, and is supplementary. 6. yes
7. yes; yes 8. linear pairs: $\angle 1$ and $\angle 2$, $\angle 3$ and $\angle 4$; not linear pairs: $\angle 1$ and $\angle 3$, $\angle 1$ and $\angle 4$, $\angle 2$ and $\angle 3$, $\angle 2$ and $\angle 4$

Practice 2-3

1. $\angle A$ and $\angle B$ are complementary. 2. Football practice is canceled for Monday. 3. $\triangle DEF$ is a right triangle. 4. If you liked the movie, then you enjoyed yourself. 5. If two lines are not parallel, then they intersect at a point. 6. If you vacation at the beach, then you like Florida. 7. not possible
8. Tamika lives in Nebraska. 9. not possible 10. It is not freezing outside. 11. Shannon lives in the smallest state in the United States. 12. On Thursday, the track team warms up by jogging 2 miles.

Guided Problem Solving 2-3

1. conditional; hypothesis 2. Yes 3. Beth will go.
4. Anita, Beth, Aisha, Ramon 5. No; only two students went.
6. Beth, Aisha, Ramon; no—only two went. 7. Aisha, Ramon
8. The answer is reasonable. It is not possible for another pair to go to the concert. 9. Ramon

Practice 2-4

1. $UT = MN$ 2. $m\angle QWR = 30$ 3. $SB = MN$
4. $y = 51$ 5. $\overline{JL}$ 6. Given; Addition Property of Equality; Division Property of Equality 7. Given; Addition; Subtraction Property of Equality; Multiplication Property of Equality; Division Property of Equality 8. Substitution 9. Substitution
10. Transitive Property of Equality 11. Symmetric Property of Congruence 12. Transitive Property of Congruence
13. Definition of Complementary Angles; 90; Substitution; $3x$; Simplify; $3x$, 84, Subtraction Property of Equality; 28, Division Property of Equality 14. Given; $(2x - 4)$, Substitution; $6x - 12$, Distributive Property; $-x$, Subtraction Property of Equality; 12, Multiplication Property of Equality

Guided Problem Solving 2-4

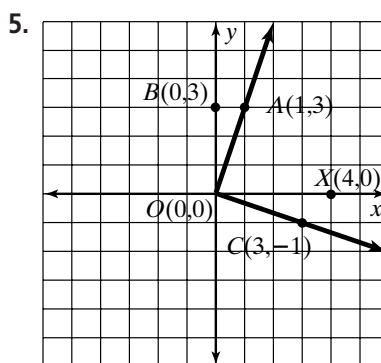
1. Angle Addition Postulate 2. Substitution Property of Equality; Simplify; Addition Property of Equality; Division Property of Equality 3. 40 4. yes; yes 5. 13; 13

Practice 2-5

1. 30 2. 15 3. 20 4. 6 5. 16 6. 9 7. $m\angle A = 135$; $m\angle B = 45$ 8. $m\angle A = 36$; $m\angle B = 144$ 9. $m\angle A = 75$; $m\angle B = 15$ 10. $m\angle A = 10$; $m\angle B = 80$
11. $m\angle PMO = 55$; $m\angle PMQ = 125$; $m\angle QMN = 55$
12. $m\angle BOD = m\angle COE = 90$; $m\angle BOC = m\angle COD = 45$; $m\angle AOB = m\angle DOE = 45$
13. $m\angle BWC = m\angle CWD$; $m\angle AWB + m\angle BWC = 180$; $m\angle CWD + m\angle DWA = 180$; $m\angle AWB = m\angle AWD$

Guided Problem Solving 2-5

1. 90 2. See graph in Exercise 5 answer. 3. on the positive y -axis 4. Answers may vary. B can be any point on the positive y -axis. Sample: $B(0, 3)$.



6. They are adjacent complementary angles. 7. Answers may vary. C can be any point on the line $y = -\frac{1}{3}x$, $x > 0$. Sample: $C(3, -1)$. 8. a right angle 9. Yes; their sum corresponds to the right angle formed by the positive x -axis and the positive y -axis. 10. Answers may vary. D can be any point on the negative x -axis, sample: $D(-4, 0)$

2A: Graphic Organizer

1. Reasoning and Proof 2. Answers may vary. Sample: conditional statements; writing biconditionals; converses; and using the Law of Detachment 3. Check students' work.

2B: Reading Comprehension

1. 42 degrees 2. 38 degrees 3. b

2C: Reading/Writing Math Symbols

1. Segment MN is congruent to segment PQ . 2. If p , then q .
3. The length of MN is equal to the length of PQ .
4. Angle XQV is congruent to angle RDC . 5. If q , then p .
6. The measure of angle XQV is equal to the measure of angle RDC . 7. p if and only if q . 8. $a \rightarrow b$ 9. $AB = MN$
10. $m\angle XYZ = m\angle RPS$ 11. $b \rightarrow a$ 12. $\overline{AB} \cong \overline{MN}$
13. $a \leftrightarrow b$ 14. $\angle XYZ \cong \angle RPS$

2D: Visual Vocabulary Practice

1. Law of Detachment 2. hypothesis 3. Distributive Property 4. Reflexive Property 5. Law of Syllogism
6. biconditional 7. conclusion 8. good definition
9. Symmetric Property

2E: Vocabulary Check

Truth value: "True" or "false" according to whether the statement is true or false, respectively

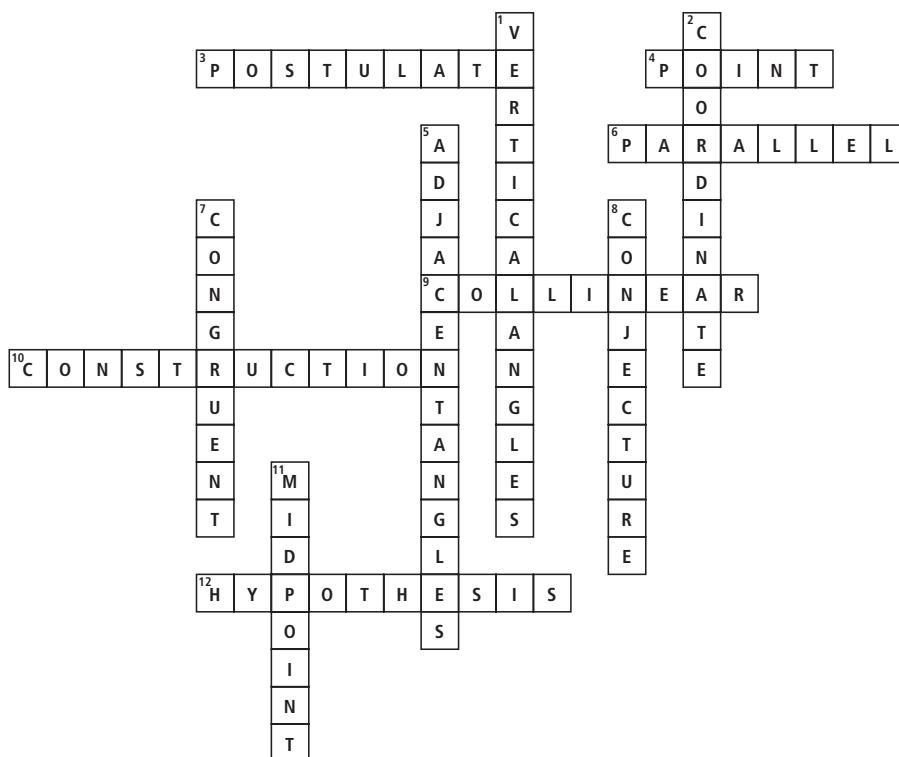
Hypothesis: The part that follows *if* in an *if-then* statement.

Biconditional: The combination of a conditional statement and its converse; it contains the words "if and only if."

Conclusion: The part of an *if-then* statement that follows *then*.

Conditional: An *if-then* statement.

2F: Vocabulary Review Puzzle



Chapter 3

Practice 3-1

- corresponding angles
- alternate interior angles
- same-side interior angles
- alternate interior angles
- same-side interior angles
- corresponding angles
- $\angle 1$ and $\angle 5$, $\angle 2$ and $\angle 6$, $\angle 3$ and $\angle 8$, $\angle 4$ and $\angle 7$
- $\angle 4$ and $\angle 6$, $\angle 3$ and $\angle 5$
- $\angle 4$ and $\angle 5$, $\angle 3$ and $\angle 6$
- $m\angle 1 = 100$, alternate interior angles; $m\angle 2 = 100$, corresponding angles or vertical angles
- $m\angle 1 = 75$, alternate interior angles; $m\angle 2 = 75$, vertical angles or corresponding angles
- $m\angle 1 = 135$, corresponding angles; $m\angle 2 = 135$, vertical angles
- $x = 103$; 77° , 103°
- $x = 24$; 12° , 168°
- $x = 30$; 85° , 85°
- Alternate Interior Angles Theorem
- Vertical angles are congruent
- Transitive Property of Congruence

Guided Problem Solving 3-1

- The top and bottom sides are parallel, and the left and right sides are parallel.
- The two diagonals are transversals, and also each side of the parallelogram is a transversal for the two sides adjacent to it.
- Corresponding angles, interior and exterior angles are formed.
- v , w and x ; By the Alternate Interior Angles Theorem, $v = 42$, $w = 25$ and $x = 76$.
- Answers may vary. Possible answer: By the Same-Side Interior Angles Theorem, $(w + 42) + (y + 76) = 180$. Since $w = 25$, $y = 37$. (The two y 's are equal by Theorem 3-1.)
- $w = 25$, $y = 37$, $v = 42$, $x = 76$; yes
- $v = 42$, $w = 35$, $x = 57$, $y = 46$

Practice 3-2

- same-side interior
- $\overleftrightarrow{QR}$
- $\overleftrightarrow{TS}$
- same-side interior
- Same-Side Interior Angles
- $\overleftrightarrow{TS}$
- 3-5
- l and m , Converse of Same-Side Interior Angles Theorem
- none
- $\overline{BC}$ and $\overline{AD}$, Converse of Same-Side Interior Angles Theorem
- $\overline{RT}$ and $\overline{HU}$, Converse of Corresponding Angles Postulate
- $\overline{BH}$ and $\overline{CI}$, Converse of Corresponding Angles Postulate
- a and b , Converse of Same-Side Interior Angles Theorem
- 43
- 90
- 38
- 100
- 70
- 48

Guided Problem Solving 3-2

- l and m
- transversals
- x
- the angles measuring $19x^\circ$ and $17x^\circ$
- 180°
- $17x^\circ$
- $180 - 19x = 17x$ or $19x + 17x = 180$
- $x = 5$
- With $x = 5$, $19x = 95$ and $17x = 85$
- $x = 6$

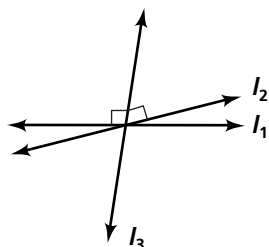
Practice 3-3

- True. Every avenue will be parallel to Founders Avenue, and therefore every avenue will be perpendicular to Center City Boulevard, and therefore every avenue will be perpendicular to any street that is parallel to Center City Boulevard.
- Not necessarily true. No information has been given about the spacing of the streets.
- True. The fact that one intersection is perpendicular, plus the fact that every street belongs to one of two groups of parallel streets, is enough to guarantee that all intersections are perpendicular.
- True. Opposite sides of each block must be of the same type (avenue

or boulevard), and adjacent sides must be of opposite type.

5. Not necessarily true. If there are more than three avenues and more than three boulevards, there will be some blocks bordered by neither Center City Boulevard nor Founders Avenue. 6. $a \perp e$ 7. $a \parallel e$ 8. $a \parallel e$ 9. $a \perp e$ 10. $a \perp e$ 11. $a \parallel e$ 12. If the number of $\perp$ statements is even, then $\ell_1 \parallel \ell_n$. If it is odd, then $\ell_1 \perp \ell_n$. 13. The proof can instead use alternate interior angles or alternate exterior angles (if the angles are congruent, the lines are parallel) or same-side interior or same-side exterior angles (if the angles are supplementary, the lines are parallel).

14. It is possible.



Guided Problem Solving 3-3

1. supplementary angles 2. right angle 3. Any one of the following: Postulate 3-1, or Theorem 3-1, 3-2, 3-3 or 3-4 4. 90 5. It is congruent; Postulate 3-1 6. 90 7. $a \perp c$ 8. It is true for any line parallel to b . 9. Yes. The point is that a transversal cannot be perpendicular to just one of two parallel lines. It has to be perpendicular to both, or else to neither.

Practice 3-4

1. 125 2. 69 3. 143 4. 129 5. 140 6. 136 7. $x = 35$; $y = 145$; $z = 25$ 8. $a = 55$; $b = 97$; $c = 83$ 9. $v = 118$; $w = 37$; $t = 62$ 10. 50 11. 88 12. $m\angle 3 = 22$; $m\angle 4 = 22$; $m\angle 5 = 88$ 13. 57.1 14. 136 15. $m\angle 1 = 33$; $m\angle 2 = 52$ 16. isosceles 17. obtuse scalene 18. right scalene 19. obtuse isosceles 20. equiangular equilateral

Guided Problem Solving 3-4

1. three 2. 180 3. right triangle 4. $z = 90$; Because it is given in the figure that $\overline{BD} \perp \overline{AC}$. 5. Theorem 3-12, the Triangle Angle-Sum Theorem 6. $x = 38$ 7. $y = 36$ 8. $\triangle ABD$ is a 36-54-90 right triangle. $\triangle BCD$ is a 38-52-90 right triangle. 9. 74 10. $\triangle ABC$ is a 52-54-74 acute triangle. 11. Yes, all three are acute angles, with $\angle ABC$ visibly larger than $\angle A$ and $\angle C$. 12. $\angle BCD$

Practice 3-5

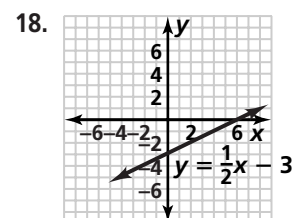
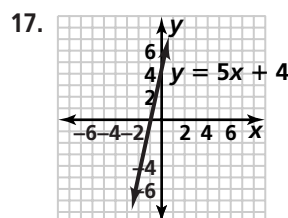
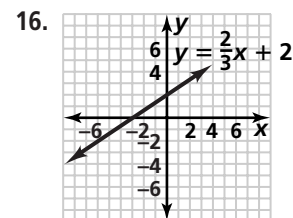
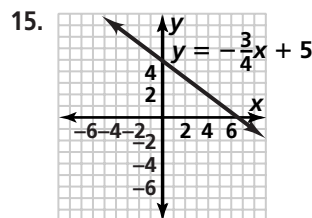
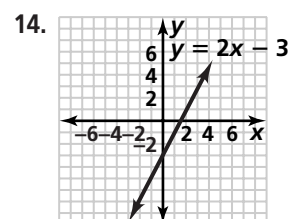
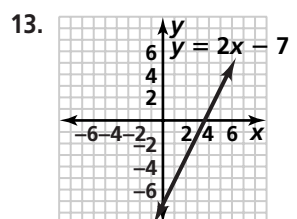
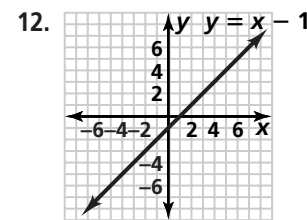
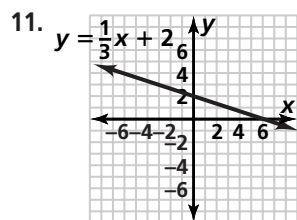
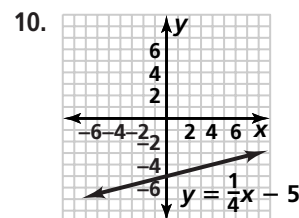
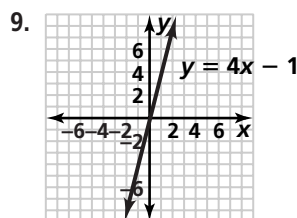
1. $x = 120$; $y = 60$ 2. $n = 51\frac{3}{7}$ 3. $a = 108$; $b = 72$ 4. 109 5. 133 6. 129 7. 129 8. 47 9. 127 10. 30 11. 150 12. 6 13. 5 14. 8 15. $BEDC$ 16. $\angle FAE$ 17. $\angle FAE$ and $\angle BAE$ 18. $ABCDE$ 19. 20

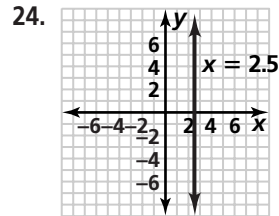
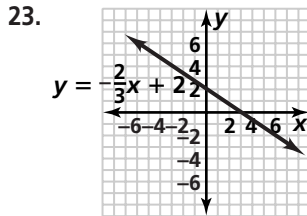
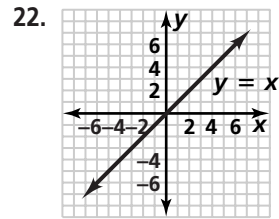
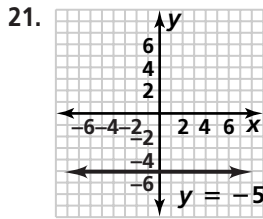
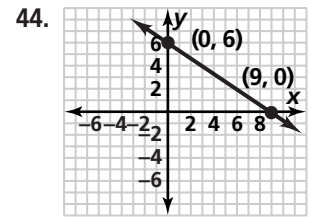
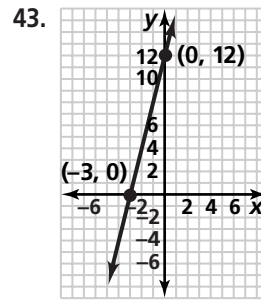
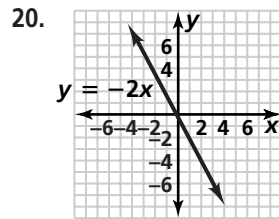
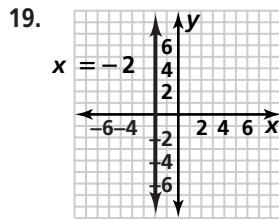
Guided Problem Solving 3-5

1. A theater stage, consisting of a large platform surrounding a smaller platform. The shapes in the bottom part of the figure may represent a ramp for actors to enter and exit. 2. The measures of angles 1 and 2 3. 8; octagon 4. $(8 - 2)180 = 1080$ degrees 5. 135 6. 45 7. Yes, angle 1 is an obtuse angle and angle 2 is an acute angle. 8. trapezoids 9. 360

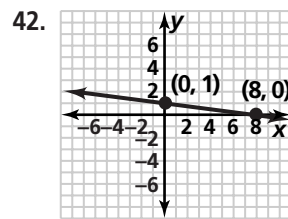
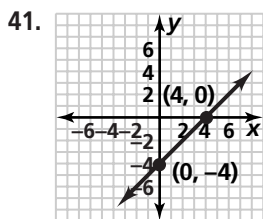
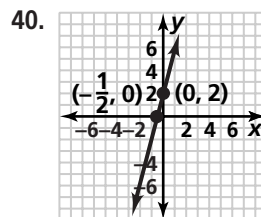
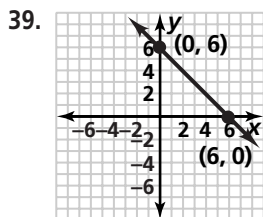
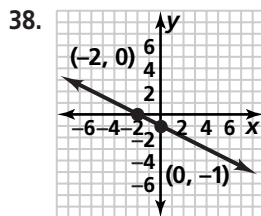
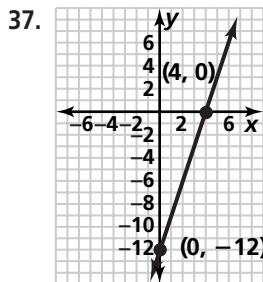
Practice 3-6

1. $y = \frac{1}{3}x - 7$ 2. $y = -2x + 12$ 3. $y = 7x - 18$ 4. $y = -\frac{1}{2}x - 3$ 5. $y = \frac{1}{6}x - \frac{3}{2}$ 6. $y = \frac{4}{5}x - 2$ 7. $y = 4x - 13$ 8. $y = -x + 6$



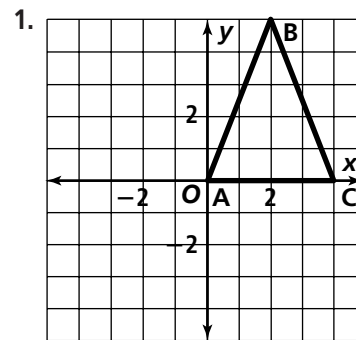


25. $y = -3x + 13$ 26. $y = x + 4$ 27. $y = \frac{1}{2}x - 3$
 28. $y = -\frac{1}{2}x - \frac{1}{2}$ 29. $y = 2x + 4$ 30. $y = \frac{1}{3}x + 4$
 31. $y = -\frac{1}{5}x - \frac{6}{5}$ 32. $y = -6x + 45$ 33. $x = 2$;
 $y = -11$ 34. $x = 0$; $y = 2$ 35. $x = -4$; $y = -4$
 36. $x = -1$; $y = 8$



- 45a. $m = \$0.10$ 45b. the amount of money the worker is paid for each box loaded onto the truck 45c. $b = \$3.90$
 45d. the base amount the worker is paid per hour
 46. $y = -\frac{2}{5}x + 8$

Guided Problem Solving 3-6

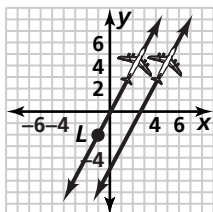


2. $m = \frac{y_2 - y_1}{x_2 - x_1}$ 3. $y - y_1 = m(x - x_1)$ 4. Slope of $\overleftrightarrow{AB} = \frac{5}{2}$; slope of $\overleftrightarrow{BC} = -\frac{5}{2}$. The absolute values of the slopes are the same, but one slope is positive and the other is negative. 5. Point-slope form: $y - 0 = \frac{5}{2}(x - 0)$; slope-intercept form: $y = \frac{5}{2}x$ 6. Point-slope form: $y - 5 = -\frac{5}{2}(x - 2)$ or $y - 0 = -\frac{5}{2}(x - 4)$; slope-intercept form: $y = -\frac{5}{2}x + 10$ 7. Of line $\overleftrightarrow{AB}$: $(0, 0)$; of line $\overleftrightarrow{BC}$: $(0, 10)$ 8. $\triangle ABC$ appears to be an isosceles triangle, which is consistent with a horizontal base and two remaining sides having slopes of equal magnitude and opposite sign. 9. Slope = 0; $y = 0$; y -intercept = $(0, 0)$ just as for line $\overleftrightarrow{AB}$ (they intersect on the y -axis).

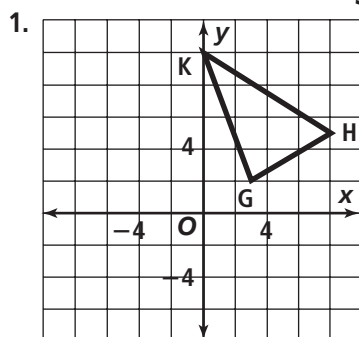
Practice 3-7

1. neither; $3 \neq \frac{1}{3}$, $3 \cdot \frac{1}{3} \neq -1$ 2. perpendicular; $\frac{1}{2} \cdot -2 = -1$ 3. parallel; $-\frac{2}{3} = -\frac{2}{3}$ 4. parallel; $-1 = -1$ 5. perpendicular; $y = 2$ is a horizontal line, $x = 0$ is a vertical line 6. parallel; $-\frac{1}{2} = -\frac{1}{2}$ 7. neither; $1 \neq \frac{1}{8}$, $1 \cdot \frac{1}{8} \neq -1$ 8. parallel; $-\frac{2}{3} = -\frac{2}{3}$ 9. perpendicular; $-1 \cdot 1 = -1$ 10. neither; $\frac{1}{2} \neq -\frac{5}{3}$, $\frac{1}{2} \cdot -\frac{5}{3} \neq -1$ 11. neither; $-\frac{2}{3} \neq -\frac{7}{12}$, $-\frac{2}{3} \cdot -\frac{7}{12} \neq -1$

12. neither; $6 \neq -\frac{1}{5}$, $6 \cdot -\frac{1}{5} \neq -1$
 13. neither; $\frac{9}{2} \neq 4$, $\frac{9}{2} \cdot 4 \neq -1$
 14. parallel; $\frac{1}{2} = \frac{1}{2}$ 15. $y = \frac{2}{3}x$
 16. $y = -\frac{4}{3}x + 24$
 17. $y = -x - 3$
 18. $y = \frac{3}{5}x + 6$
 19. $y = 0$
 20. $y = 2x - 4$
 21. $y = 2x$



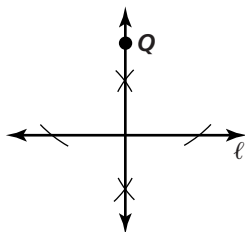
Guided Problem Solving 3-7



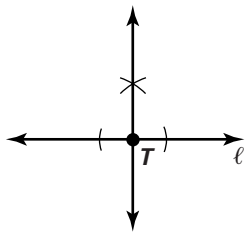
2. a right angle 3. $m_1 \cdot m_2 = -1$ 4. sides $\overline{GH}$ and $\overline{GK}$
 5. Slope of $\overline{GH} = \frac{3}{5}$; slope of $\overline{GK} = -\frac{8}{3}$
 6. Product = $-\frac{8}{5} \neq -1$. Sides $\overline{GH}$ and $\overline{GK}$ are not perpendicular. 7. $\triangle GHK$ has no pair of perpendicular sides. It is not a right triangle. 8. No 9. $\angle HGK$; approximately 80°
 10. Slope of $\overline{LM} = \frac{7}{2}$ and slope of $\overline{LN} = -\frac{2}{7}$. The product of the slopes is -1 , so $\overline{LM}$ and $\overline{LN}$ are perpendicular.

Practice 3-8

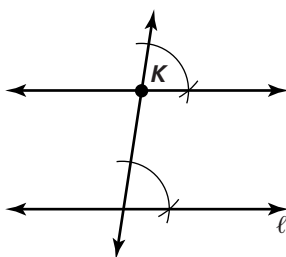
1.-3.



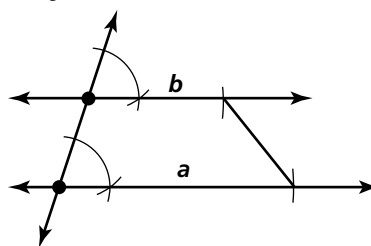
4.-6.



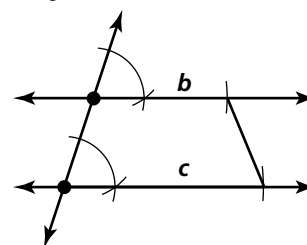
7.-9.



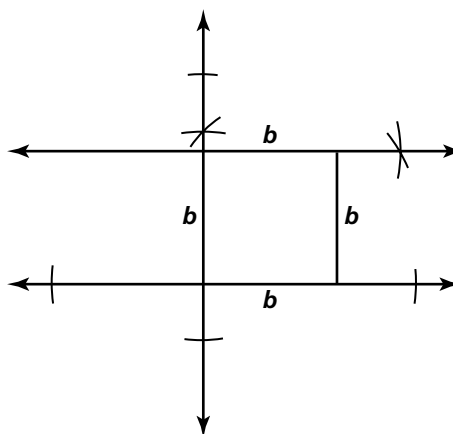
10. Sample:



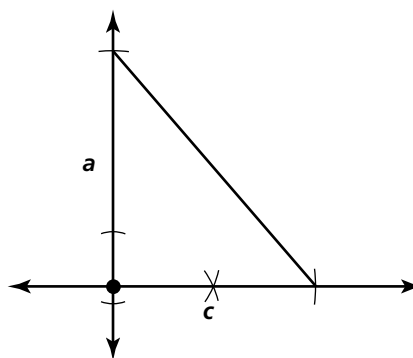
11. Sample:



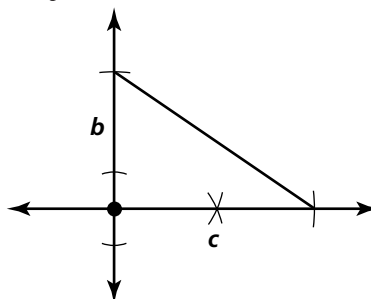
12.



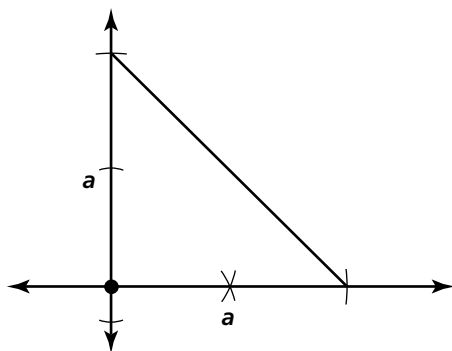
13.



14. Sample:

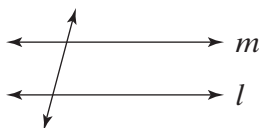


15.



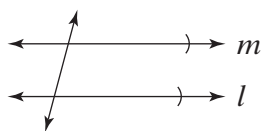
Guided Problem Solving 3-8

1. a line segment of length c 2. Construct a quadrilateral with one pair of parallel sides of length c , and then examine the other pair. 3. The procedure is given on p. 181 of the text.

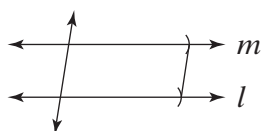


4. Adjust the compass to exactly span line segment c , end to end. Then tighten down the compass adjustment as necessary.

5.



6.



7. They appear to be both congruent and parallel. 8. The answers to Step 7 are confirmed. 9. yes; a parallelogram

3A: Graphic Organizer

1. Parallel and Perpendicular Lines 2. Answers may vary. Sample: properties of parallel lines; finding the measures of angles in triangles; classifying polygons; and graphing lines 3. Check students' work.

3B: Reading Comprehension

1. 14 spaces 2. 6 spaces 3. 60° 4. corresponding 5. \$7000; \$480 6. the width of the stalls, 10 ft 7. b

3C: Reading/Writing Math Symbols

1. $m \perp n$ 2. $m\angle 1 + m\angle 2 = 180$ 3. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ 4. $m\angle MNP + m\angle MNQ = 90$ 5. $\angle 3 \cong \angle EFD$ 6. Line 1 is parallel to line 2. 7. The measure of angle ABC is equal to the measure of angle XYZ .

8. Line AB is perpendicular to line DF . 9. Angle ABC and angle ABD are complementary. 10. Angle 2 is a right angle, or the measure of angle 2 is 90° . 11. Sample answer: $\overleftrightarrow{CB} \parallel \overleftrightarrow{GD}$, $m\angle BAF = m\angle GFA$

3D: Visual Vocabulary Practice/High-Use Academic Words

1. property 2. conclusion 3. describe 4. formula 5. measure 6. approximate 7. compare 8. contradiction 9. pattern

3E: Vocabulary Check

Transversal: A line that intersects two coplanar lines in two points.

Alternate interior angles: Nonadjacent interior angles that lie on opposite sides of the transversal.

Same-side interior angles: Interior angles that lie on the same side of a transversal between two lines.

Corresponding angles: Angles that lie on the same side of a transversal between two lines, in corresponding positions.

Flow proof: A convincing argument that uses deductive reasoning, in which arrows show the logical connections between the statements.

3F: Vocabulary Review

1. C 2. E 3. D 4. B 5. A 6. F 7. K 8. H 9. L 10. G 11. I 12. J

Chapter 4

Practice 4-1

1. $m\angle 1 = 110$; $m\angle 2 = 120$ 2. $m\angle 3 = 90$; $m\angle 4 = 135$ 3. $m\angle 5 = 140$; $m\angle 6 = 90$; $m\angle 7 = 40$; $m\angle 8 = 90$ 4. $\overline{CA} \cong \overline{JS}$, $\overline{AT} \cong \overline{SD}$, $\overline{CT} \cong \overline{JD}$ 5. $\angle C \cong \angle J$, $\angle A \cong \angle S$, $\angle T \cong \angle D$ 6. $\overline{WZ} \cong \overline{JM}$, $\overline{WX} \cong \overline{JK}$, $\overline{XY} \cong \overline{KL}$, $\overline{ZY} \cong \overline{ML}$ 7. $\angle W \cong \angle J$, $\angle X \cong \angle K$, $\angle Y \cong \angle L$, $\angle Z \cong \angle M$ 8. Yes; $\angle GHJ \cong \angle IHJ$ by Theorem 4-1 and by the Reflexive Property of $\cong$. Therefore, $\triangle GHJ \cong \triangle IHJ$ by the definition of $\cong$ triangles. 9. No; $\angle QSR \cong \angle TSV$ because vertical angles are congruent, and $\angle QRS \cong \angle TVS$ by Theorem 4-1, but none of the sides are necessarily congruent. 10a. Given 10b. Vertical angles are $\cong$. 10c. Theorem 4-1 10d. Given 10e. Definition of $\cong$ triangles

Guided Problem Solving 4-1

1. right triangles 2. $m\angle A = 45$, $m\angle B = m\angle L = 90$, and $AB = 4$ in. 3. $\triangle ABC$ is congruent to $\triangle KLM$ means corresponding sides and angles are congruent. 4. x and t 5. 45 6. $m\angle K = m\angle M = 45$ 7. $3x = 45$ 8. $x = 15$ 9. 4 10. $2t = 4$ 11. $t = 2$ 12. The angle measures indicate that the two triangles are isosceles right triangles. This matches the appearance of the figure. 13. $m\angle M = 60$

Practice 4-2

- $\triangle ADB \cong \triangle CDB$ by SAS
- not possible
- not possible
- $\triangle TUS \cong \triangle XWV$ by SSS
- not possible
- $\triangle DEC \cong \triangle GHF$ by SAS
- $\triangle MKL \cong \triangle KMJ$ by SAS
- $\triangle PRN \cong \triangle PRQ$ by SSS
- not possible
- $\angle C$
- $\overline{AB}$ and $\overline{BC}$
- $\angle A$ and $\angle B$
- $\overline{AC}$
- a. Given
- b. Reflexive Property of Congruence
- c. SAS Postulate

Statements	Reasons
1. $\overline{EF} \cong \overline{FG}$, $\overline{DF} \cong \overline{FH}$	1. Given
2. $\angle DFE \cong \angle HFG$	2. Vertical $\angle$ s are $\cong$.
3. $\triangle DFE \cong \triangle HFG$	3. SAS Postulate

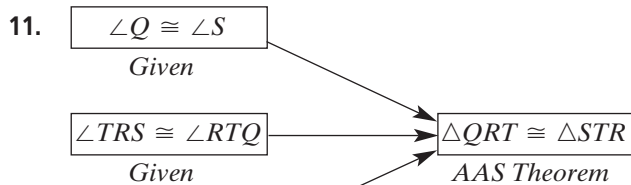
Guided Problem Solving 4-2

- $\overline{IS} \cong \overline{OS}$ and $\overline{SP}$ bisects $\angle ISO$.
- Prove whatever additional facts can be proven about $\triangle ISP$ and $\triangle OSP$, based on the given information.
- $\overline{IS} \cong \overline{OS}$
- $\angle ISP \cong \angle PSO$
- $\overline{SP}$
- $\triangle ISP \cong \triangle OSP$ by Postulate 4-2, the Side-Angle-Side (SAS) Postulate
- It does not matter. The Side-Angle-Side Postulate applies whether or not they are collinear.
- It does follow, because $\triangle ISP \cong \triangle OSP$ and because $\overline{IP}$ and $\overline{PO}$ are corresponding parts.

Practice 4-3

- not possible
- ASA Postulate
- AAS Theorem
- AAS Theorem
- not possible
- not possible
- ASA Postulate
- not possible
- AAS Theorem

Statements	Reasons
1. $\angle K \cong \angle M$, $\overline{KL} \cong \overline{ML}$	1. Given
2. $\angle JLK \cong \angle PLM$	2. Vertical $\angle$ s are $\cong$.
3. $\triangle JKL \cong \triangle PML$	3. ASA Postulate



- $\overline{BC} \cong \overline{EF}$
- $\angle KHJ \cong \angle HKG$ or $\angle KJH \cong \angle HGK$
- $\angle NLM \cong \angle NPQ$

Guided Problem Solving 4-3

- corresponding angles and alternate interior angles
- $\angle EAB$ and $\angle DBC$
- $\angle EBA$ and $\angle DCB$
- $\angle EAB$ and $\angle DBC$
- $\angle EAB \cong \angle DBC$, $\overline{AE} \cong \overline{BD}$, and $\angle E \cong \angle D$
- $\triangle AEB \cong \triangle BDC$ by Postulate 4-3, the Angle-Side-Angle (ASA) Postulate
- Yes; Theorem 4-2, the Angle-Angle-Side (AAS) Theorem; $\angle EBA \cong \angle DCB$
- No, because now there is no way to demonstrate a second pair of congruent sides, nor a second pair of congruent angles.

Practice 4-4

- $\overline{BD}$ is a common side, so $\triangle ADB \cong \triangle CDB$ by SAS, and $\angle A \cong \angle C$ by CPCTC.
- $\overline{FH}$ is a common side, so $\triangle FHE \cong \triangle HFG$ by ASA, and $\overline{HE} \cong \overline{FG}$ by CPCTC.
- $\triangle KLJ \cong \triangle PMN$ by ASA, so $\angle K \cong \angle P$ by CPCTC.
- $\overline{QS}$ is a common side, so $\triangle QTS \cong \triangle SRQ$ by AAS. $\angle QST \cong \angle SQR$ by CPCTC.
- $\overline{VX}$ is a common side, so $\triangle UVX \cong \triangle WVX$ by SSS, and $\angle U \cong \angle W$ by CPCTC.
- $\angle ZAY$ and $\angle CAB$ are vertical angles, so $\triangle ABC \cong \triangle AYZ$ by ASA. $\overline{ZA} \cong \overline{AC}$ by CPCTC.
- $\overline{EG}$ is a common side, so $\triangle DEG \cong \triangle FEG$ by SAS, and $\overline{FG} \cong \overline{DG}$ by CPCTC.
- $\angle JKH$ and $\angle LKM$ are vertical angles, so $\triangle HJK \cong \triangle MLK$ by AAS, and $\overline{JK} \cong \overline{KL}$ by CPCTC.
- $\overline{PR}$ is a common side, so $\triangle PNR \cong \triangle RQP$ by SSS, and $\angle N \cong \angle Q$ by CPCTC.
- First, show that $\angle ACB$ and $\angle ECD$ are vertical angles. Then, show $\triangle ABC \cong \triangle EDC$ by ASA. Last, show $\angle A \cong \angle E$ by CPCTC.
- First, show $\overline{FH}$ as a common side. Then, show $\triangle JFH \cong \triangle GHF$ by SAS. Last, show $\overline{FG} \cong \overline{JH}$ by CPCTC.

Guided Problem Solving 4-4

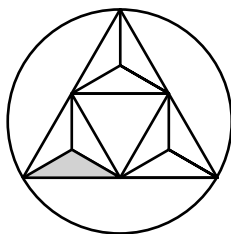
- A compass with a fixed setting was used to draw two circular arcs, both centered at point P but crossing ℓ in different locations, which were labeled A and B . The compass was used again, with a wider setting, to draw two intersecting circular arcs, one centered at A and one at B . The point at which the new arcs intersected was labeled C . Finally, line $\overleftrightarrow{CP}$ was drawn.
- Find equal lengths or distances and explain why $\overleftrightarrow{CP}$ is perpendicular to ℓ .
- $\triangle ACP$ and $\triangle BCP$
- $AP = BP$ and $AC = BC$
- $\triangle APC \cong \triangle BPC$, by Postulate 4-1, the Side-Side-Side (SSS) Postulate
- $\angle APC \cong \angle BPC$ by CPCTC
- Since $\angle APC \cong \angle BPC$, $m\angle APC = m\angle BPC$ and $m\angle APC + m\angle BPC = 180$, it follows that $m\angle APC = m\angle BPC = 90$.
- from the definition of perpendicular and the fact that $m\angle APC = m\angle BPC = 90$
- The distances do not matter, so long as $AP = BP$ and $AC = BC$. That is what is required in order that $\triangle APC \cong \triangle BPC$.
- Draw a line, and use the construction technique of the problem to construct a second line perpendicular to the first. Then do the same thing again to construct a third line perpendicular to the second line. The first and third lines will be parallel, by Theorem 3-10.

Practice 4-5

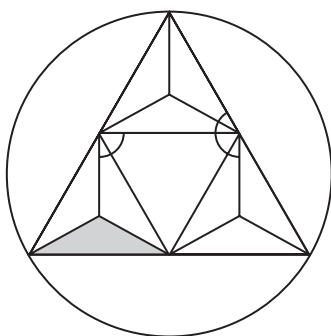
- $x = 35$; $y = 35$
- $x = 80$; $y = 90$
- $t = 150$
- $r = 45$; $s = 45$
- $x = 55$; $y = 70$; $z = 125$
- $a = 132$; $b = 36$; $c = 60$
- $x = 6$
- $a = 30$; $b = 30$; $c = 75$
- $z = 120$
- $\overline{AD}$; $\angle D \cong \angle F$
- $\overline{GA}$; $\angle ACG \cong \angle AGC$
- $\overline{KJ}$; $\angle KIJ \cong \angle KJI$
- $\overline{DC}$; $\angle CDE \cong \angle CED$
- $\overline{BA}$; $\angle ABJ \cong \angle AJB$
- $\overline{CB}$; $\angle BCH \cong \angle BHC$
- 130
- 65
- 130
- 90
- $x = 70$; $y = 55$
- $x = 70$; $y = 20$
- $x = 45$; $y = 45$

Guided Problem Solving 4-5

- One angle is obtuse. The other two angles are acute and congruent.
- Highlight an obtuse isosceles angle and find its angle measures, then find all the other angle measures represented in the figure.
- Possible answer:



- 60
 - 30, because the measure of each base angle is half the measure of an angle of the equilateral triangle.
 - 120° because the sum of the angles of the highlighted triangle must equal 180°.
 - The other measures are 90° and 150°.
- Examples:



- Yes; $3 \times 120 = 360$.
- Answers may vary.

Practice 4-6

1. Statements

- $\overline{AB} \perp \overline{BC}, \overline{ED} \perp \overline{FE}$
- $\angle B, \angle E$ are right $\angle$ s.

- $\overline{AC} \cong \overline{FD}, \overline{AB} \cong \overline{ED}$
- $\triangle ABC \cong \triangle DEF$

2. Statements

- $\angle P, \angle R$ are right $\angle$ s.
- $\overline{PS} \cong \overline{QR}$
- $\overline{SQ} \cong \overline{QS}$

- $\triangle PQS \cong \triangle RSQ$

- $\angle MJN$ and $\angle MJK$ are right $\angle$ s.

Perpendicular lines form right $\angle$ s.

$$\overline{MN} \cong \overline{MK}$$

Given

$$\overline{MJ} \cong \overline{MJ}$$

Reflexive Property of $\cong$

Reasons

- Given
- Perpendicular lines form right $\angle$ s.

- Given
- HL Theorem

Reasons

- Given
- Given
- Reflexive Property of $\cong$
- HL Theorem

$$\triangle MJN \cong \triangle MJK$$

HL Theorem

4.

$$\overline{GI} \cong \overline{JI}$$

Given

$$\overline{HI} \cong \overline{HI}$$

Reflexive Property of $\cong$

$$\triangle IHG \cong \triangle IJH$$

HL Theorem

$$\angle GHI \cong \angle JHI$$

Given

$$\angle GHI \text{ and } \angle JHI \text{ are right } \angle \text{s.}$$

Theorem 2-5

$$m\angle GHI + m\angle JHI = 180$$

Angle Addition Postulate

- $\overline{RS} \cong \overline{VW}$
- none
- $m\angle C$ and $m\angle F = 90$
- $\overline{GH} \cong \overline{JH}$
- $\overline{LN} \cong \overline{PR}$
- $\overline{ST} \cong \overline{UV}$ or $\overline{SV} \cong \overline{UT}$
- $m\angle A$ and $m\angle X = 90$
- $m\angle F$ and $m\angle D = 90$
- $\overline{GI} \perp \overline{JH}$

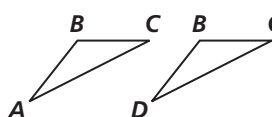
Guided Problem Solving 4-6

- Two congruent right triangles. Each one has a leg and a hypotenuse labeled with a variable expression.
- the values of x and y for which the triangles are congruent by HL
- The two shorter legs are congruent.
- $x = y + 1$
- The hypotenuses are congruent.
- $x + 3 = 3y$
- $x = 3; y = 2$
- $\frac{\text{hypotenuse}}{\text{shorter leg}} = 2$; yes, this matches the figure.
- The solution remains the same: $x = 3$ and $y = 2$. The reason is that one is still solving the same two equations, $x = y + 1$ and $x + 3 = 3y$.

Practice 4-7

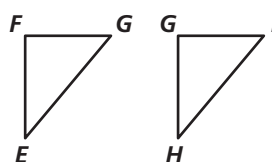
- $\triangle ZWX \cong \triangle YXW$; SAS
- $\triangle ABC \cong \triangle DCB$; ASA
- $\triangle EFG \cong \triangle FKH$; ASA
- $\triangle LNP \cong \triangle LMO$; SAS
- $\triangle ADF \cong \triangle BGE$; SAS
- $\triangle UVY \cong \triangle VUX$; ASA

7.



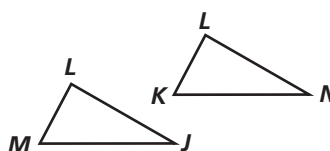
common side: $\overline{BC}$

8.



common side: $\overline{FG}$

9.



common angle: $\angle L$

10. Sample:

Statements

1. $\overline{AX} \cong \overline{AY}$
2. $\overline{CX} \perp \overline{AB}$, $\overline{BY} \perp \overline{AC}$
3. $m\angle CXA$ and $m\angle BYA = 90$
4. $\angle A \cong \angle A$

Reasons

1. Given
2. Given
3. Perpendicular lines form right $\angle$ s.
4. Reflexive Property of $\cong$

5. $\triangle BYA \cong \triangle CXA$

5. ASA Postulate

11. Sample: Because $\overline{FH} \cong \overline{GE}$, $\angle HFG \cong \angle EGF$, and $\overline{FG} \cong \overline{GF}$, then $\triangle FGE \cong \triangle GFH$ by SAS. Thus, $\overline{FE} \cong \overline{GH}$ by CPCTC and $\overline{EH} \cong \overline{HE}$, then $\triangle GEH \cong \triangle FHE$ by SSS.

Guided Problem Solving 4-7

1. The figure, a list of parallel and perpendicular pairs of sides, and one known angle measure, namely $m\angle A = 56$
2. nine 3. They are congruent and have equal measures.
4. $m\angle A = m\angle 1 = m\angle 2 = 56$ 5. $m\angle 4 = 90$
6. $m\angle 3 = 34$ 7. $m\angle DCE = 56$ 8. $m\angle 5 = 22$
9. $m\angle FCG = 90$ 10. $m\angle 6 = 34$ 11. $m\angle 7 = 34$, $m\angle 8 = 68$, and $m\angle 9 = 112$ 12. $m\angle 9 = 56 + 56 = 112$
13. $m\angle FIC = 180 - (m\angle 2 + m\angle 3) = 90$;
 $m\angle DHC = m\angle 4 = 90$; $m\angle FJC = 180 - m\angle 9 = 68$;
 $m\angle BIG = m\angle FIC = 90$

4A: Graphic Organizer

1. Congruent Triangles 2. Answers may vary. Sample: congruent figures; triangle congruence by SSS, SAS, ASA, and AAS; proving parts of triangles congruent; the Isosceles Triangle Theorem 3. Check students' work.

4B: Reading Comprehension

1. Yes. Using the Isosceles Triangle Theorem, $\angle W \cong \angle Y$. It is given that $\overline{WX} \cong \overline{YX}$ and $\overline{WU} \cong \overline{YV}$. Therefore $\triangle WUX \cong \triangle YVX$ by SAS. 2. There is not enough information. You need to know if $\overline{AC} \cong \overline{EC}$, if $\angle A \cong \angle E$, or if $\angle B \cong \angle D$. 3. a

4C: Reading/Writing Math Symbols

1. Angle-Angle-Side 2. triangle XYZ 3. angle PQR
4. line segment BD 5. line ST 6. ray WX 7. hypotenuse-leg 8. line 3 9. angle 6 10. Angle-Side-Angle

4D: Visual Vocabulary Practice

1. theorem 2. congruent polygons 3. base angle of an isosceles triangle 4. CPCTC 5. postulate 6. vertex angle of an isosceles triangle 7. corollary 8. base of an isosceles triangle 9. legs of an isosceles triangle

4E: Vocabulary Check

Angle: Formed by two rays with the same endpoint.

Congruent angles: Angles that have the same measure.

Congruent segments: Segments that have the same length.

Corresponding polygons: Polygons that have corresponding sides congruent and corresponding angles congruent.

CPCTC: An abbreviation for "corresponding parts of congruent triangles are congruent."

4F: Vocabulary Review Puzzle

1. postulate 2. hypotenuse 3. angle 4. vertex 5. side
6. leg 7. perpendicular 8. polygon 9. supplementary
10. parallel 11. corresponding

Chapter 5

Practice 5-1

- 1a. 8 cm 1b. 16 cm 1c. 14 cm 2a. 22.5 in. 2b. 15.5 in.
- 2c. 15.5 in. 3a. 9.5 cm 3b. 17.5 cm 3c. 14.5 cm
4. 17 5. 20.5 6. 7 7. $\frac{128}{19}$ 8. 42 9. 16.5 10a. 18
- 10b. 61 11. $\overline{GH} \parallel \overline{AC}$, $\overline{HI} \parallel \overline{BA}$, $\overline{GI} \parallel \overline{BC}$
12. $\overline{PR} \parallel \overline{YZ}$, $\overline{PQ} \parallel \overline{XZ}$, $\overline{XY} \parallel \overline{RQ}$

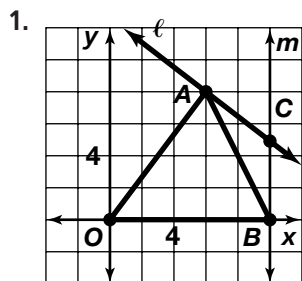
Guided Problem Solving 5-1

1. 30 units 2. The three sides of the large triangle are each bisected by intersections with the two line segments lying in the interior of the large triangle. 3. the value of x 4. They are called midsegments. 5. They are parallel, and the side labeled 30 is half the length of the side labeled x . 6. $x = 60$
7. Yes; the side labeled x appears to be about twice as long as the side labeled 30. 8. No. Those lengths are not fixed by the given information. (The triangle could be vertically stretched or shrunk without changing the lengths of the labeled sides.) All one can say is that the midsegment is half as long as the side it is parallel to.

Practice 5-2

1. $\overline{WY}$ is the perpendicular bisector of $\overline{XZ}$. 2. 4 3. 7.5
4. 9 5. right triangle 6. 5 7. 17 8. 17 9. equidistant
10. isosceles triangle 11. 3.5 12. 21 13. 21 14. right triangle 15. $\overline{JP}$ is the bisector of $\angle LJN$. 16. 9 17. 45
18. 45 19. 14 20. Sample: Point M lies on $\overline{JP}$. 21. right isosceles triangle

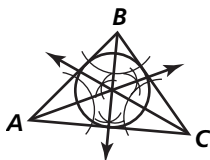
Guided Problem Solving 5-2



2. See answer to Step 1, above. 3. See answer to Step 1, above. 4. Plot a point and explain why it lies on the bisector of the angle at the origin. 5. line ℓ : $y = -\frac{3}{4}x + \frac{25}{2}$; line m : $x = 10$ 6. $C(10, 5)$ 7. $CA = CB = 5$; yes 8. Theorem 5-5, the Converse of the Angle Bisector Theorem 9. $m\angle AOC = m\angle BOC \approx 27$ 10. Draw ℓ , m , and C , then draw $\overline{OC}$. Since $OA = OB = 10$, it follows that $\triangle OAC \cong \triangle OBC$, by HL. Then $\overline{CA} \cong \overline{CB}$ and $\angle AOC \cong \angle BOC$ by CPCTC.

Practice 5-3

1. $(-2, 2)$ 2. $(4, 0)$ 3. $(2, 1)$ 4. Check students' work. The final result of the construction is shown.



5. altitude 6. median 7. none of these 8. perpendicular bisector 9. angle bisector 10. altitude 11a. $(2, 0)$ 11b. $(-2, -2)$ 12a. $(0, 0)$ 12b. $(3, -4)$ 13a. $(0, 0)$ 13b. $(0, 3)$

Guided Problem Solving 5-3

1. the figure and a proof with some parts left blank 2. Fill in the blanks. 3. $\overline{AB}$ 4. Theorem 5-2, the Perpendicular Bisector Theorem 5. $\overline{BC}$; $\overline{XC}$ 6. the Transitive Property of Equality 7. Perpendicular Bisector. (This converse is Theorem 5-3.) 8. The point of the proof is to demonstrate that n runs through point X . It would not be appropriate to show that fact as already given in the figure. 9. Nothing essential would change. Point X would lie outside $\triangle ABC$ (below $\overline{BC}$), but the proof would run just the same.

Practice 5-4

1. I and III 2. I and II 3. The angle measure is not 65. 4. Tina does not have her driver's license. 5. The figure does not have eight sides. 6. The restaurant is open on Sunday. 7. $\triangle ABC$ is congruent to $\triangle XYZ$. 8. $m\angle Y \leq 50$ 9a. If two triangles are not congruent, then their corresponding angles are not congruent; false. 9b. If corresponding angles are not congruent, then the triangles are not congruent; true. 10a. If you do not live in Toronto, then you do not live in Canada; false. 10b. If you do not live in Canada, then you do not live in

- Toronto; true. 11. Assume that $m\angle A \neq m\angle B$. 12. Assume that $TUVW$ is not a trapezoid. 13. Assume that $\overline{LM}$ does not intersect $\overline{NO}$. 14. Assume that $\triangle FGH$ is not equilateral. 15. Assume that it is not sunny outside. 16. Assume that $\angle D$ is obtuse. 17. Assume that $m\angle A \geq 90$. This means that $m\angle A + m\angle C \geq 180$. This, in turn, means that the sum of the angles of $\triangle ABC$ exceeds 180, which contradicts the Triangle Angle-Sum Theorem. So the assumption that $m\angle A \geq 90$ must be incorrect. Therefore, $m\angle A < 90$.

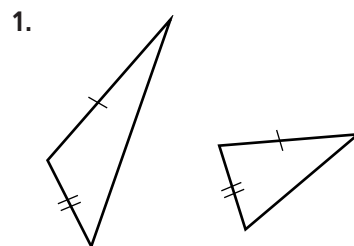
Guided Problem Solving 5-4

1. Ice is forming on the sidewalk in front of Toni's house. 2. Use indirect reasoning to show that the temperature of the sidewalk surface must be 32°F or lower. 3. The temperature of the sidewalk in front of Toni's house is greater than 32°F . 4. Water is liquid (ice does not form) above 32°F . 5. There is no ice forming on the sidewalk in front of Toni's house. 6. The result from Step 5 contradicts the information identified as given in Step 1. 7. The temperature of the sidewalk in front of Toni's house is less than or equal to 32°F . 8. If the temperature is above 32°F , water remains liquid. This is reliably true. Converse: If water remains liquid, the temperature is above 32°F . This is not reliably true. Adding salt will cause water to remain liquid even below 32°F . 9. Suppose two people are each the world's tallest person. Call them person A and person B. Then person A would be taller than everyone else, including B, but by the same token B would be taller than A. It is a contradiction for two people each to be taller than the other. So it is impossible for two people each to be the World's Tallest Person.

Practice 5-5

1. $\angle M$, $\angle N$ 2. $\angle C$, $\angle D$ 3. $\angle S$, $\angle Q$ 4. $\angle R$, $\angle P$ 5. $\angle A$, $\angle T$ 6. $\angle S$, $\angle A$ 7. yes; $4 + 7 > 8$, $7 + 8 > 4$, $8 + 4 > 7$ 8. no; $6 + 10 \not> 17$ 9. yes; $4 + 4 > 4$ 10. yes; $1 + 9 > 9$, $9 + 9 > 1$, $9 + 1 > 9$ 11. yes; $11 + 12 > 13$, $12 + 13 > 11$, $13 + 11 > 12$ 12. no; $18 + 20 \not> 40$ 13. no; $1.2 + 2.6 \not> 4.9$ 14. no; $8\frac{1}{2} + 9\frac{1}{4} \not> 18$ 15. no; $2.5 + 3.5 \not> 6$ 16. $\overline{BC}$, $\overline{AB}$, $\overline{AC}$ 17. $\overline{BO}$, $\overline{BL}$, $\overline{LO}$ 18. $\overline{RS}$, $\overline{ST}$, $\overline{RT}$ 19. $\angle D$, $\angle S$, $\angle A$ 20. $\angle N$, $\angle S$, $\angle J$ 21. $\angle R$, $\angle O$, $\angle P$ 22. $3 < x < 11$ 23. $8 < x < 26$ 24. $0 < x < 10$ 25. $9 < x < 31$ 26. $2 < x < 14$ 27. $13 < x < 61$

Guided Problem Solving 5-5



2. The side opposite the larger included angle is greater than the side opposite the smaller included angle. 3. The angle opposite the larger side is greater than the angle opposite the smaller side. 4. The opposite sides each have a length of nearly the sum of the other two side lengths. 5. The opposite sides are the same length. They are corresponding parts of triangles that are congruent by SAS.

5A: Graphic Organizer

1. Relationships Within Triangles 2. Answers may vary. Sample: midsegments of triangles; bisectors in triangles; concurrent lines, medians, and altitudes; and inverses, contrapositives, and indirect reasoning 3. Check students' work.

5B: Reading Comprehension

1. The width of the tar pit is 10 meters. 2. b

5C: Reading/Writing Math Symbols

1. L 2. F 3. O 4. G 5. A 6. I 7. M 8. H 9. E 10. K 11. B 12. D 13. N 14. J 15. C

5D: Visual Vocabulary Practice

1. median 2. negation 3. circumcenter 4. contrapositive 5. centroid 6. equivalent statements 7. incenter 8. inverse 9. altitude

5E: Vocabulary Check

Midpoint: A point that divides a line segment into two congruent segments.

Midsegment of a triangle: The segment that joins the midpoints of two sides of a triangle.

Proof: A convincing argument that uses deductive reasoning.

Coordinate proof: A proof in which a figure is drawn on a coordinate plane and the formulas for slope, midpoint, and distance are used to prove properties of the figure.

Distance from a point to a line: The length of the perpendicular segment from the point to the line.

5F: Vocabulary Review

1. altitude 2. line 3. median 4. negation 5. contrapositive 6. incenter 7. orthocenter 8. slope-intercept 9. exterior 10. obtuse 11. alternate interior 12. centroid 13. equivalent 14. right 15. parallel

Chapter 6

Practice 6-1

1. parallelogram 2. rectangle 3. quadrilateral 4. parallelogram, quadrilateral 5. kite, quadrilateral 6. rectangle, parallelogram, quadrilateral 7. trapezoid,

isosceles trapezoid, quadrilateral 8. square, rectangle, parallelogram, rhombus, quadrilateral 9. $x = 7$; $AB = BD = DC = CA = 11$ 10. $m = 9$; $s = 42$; $ON = LM = 26$; $OL = MN = 43$ 11. $f = 5$; $g = 11$; $FG = GH = HI = IF = 17$ 12. parallelogram 13. rectangle 14. kite 15. parallelogram

Guided Problem Solving 6-1

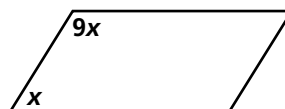
1. a labeled figure, which shows an isosceles trapezoid 2. The nonparallel sides are congruent. 3. the measures of the angles and the lengths of the sides 4. $m\angle G = c$ 5. $c + (4c - 20) = 180$ 6. 40 7. $m\angle D = m\angle G = 40$, $m\angle E = m\angle F = 140$ 8. $a - 4 = 11$ 9. 15 10. $DE = FG = 11$, $EF = 15$, $DG = 32$ 11. $40 + 40 + 140 + 140 = 360 = (4 - 2)180$ 12. $m\angle D = m\angle G = 39$, $m\angle E = m\angle F = 141$

Practice 6-2

1. 15 2. 32 3. 7 4. 8 5. 12 6. 9 7. 8 8. $3\frac{5}{8}$ 9. 54 10. 34 11. 54 12. 34 13. 100 14. 40; 140; 40 15. 70; 110; 70 16. 113; 45; 22 17. 115; 15; 50 18. 55; 105; 55 19. 61; 72; 108; 32 20. 32; 98; 50 21. 16 22. 35 23. 28 24. 4

Guided Problem Solving 6-2

1. the ratio of two different angle measures in a parallelogram 2. The consecutive angles are supplementary. 3.



4. the measures of the angles 5. The angles are supplementary angles, because they are consecutive. 6. $x + 9x = 180$ 7. 18 and 162 8. No; the lengths of the sides are irrelevant in this problem. 9. 30 and 150

Practice 6-3

1. no 2. yes 3. yes 4. no 5. yes 6. yes 7. $x = 2$; $y = 3$ 8. $x = 6$; $y = 3$ 9. $x = 64$; $y = 10$ 10. $x = 8$; the figure is a $\square$ because both pairs of opposite sides are congruent. 11. $x = 40$; the figure is not a $\square$ because one pair of opposite angles is not congruent. 12. $x = 25$; the figure is a $\square$ because the congruent opposite sides are $\parallel$ by the Converse of the Alternate Interior Angles Theorem. 13. Yes; the diagonals bisect each other. 14. No; the congruent opposite sides do not have to be $\parallel$. 15. No; the figure could be a trapezoid. 16. Yes; both pairs of opposite sides are congruent. 17. Yes; both pairs of opposite sides are $\parallel$ by the converse of the Alternate Interior Angles Theorem. 18. No; only one pair of opposite angles is congruent. 19. Yes; one pair of opposite sides is both congruent and $\parallel$. 20. No; only one pair of opposite sides is congruent.

Guided Problem Solving 6-3

1. a labeled figure, which shows a quadrilateral that appears to be a parallelogram 2. The consecutive angles are supplementary. 3. find values for x and y which make the quadrilateral a parallelogram 4. $m\angle A + m\angle D = 180$, so that $\angle A$ and $\angle D$ meet the requirements for same-side interior angles on the transversal of two parallel lines (Theorems 3-2 and 3-6). 5. $\angle B \cong \angle D$, by Theorem 6-2. 6. $3x + 10 + 5y = 180$; $8x + 5 = 5y$ 7. $x = 15$, $y = 25$ 8. $m\angle A = m\angle C = 55$ and $m\angle B = m\angle D = 125$, which matches the appearance of the figure. 9. $(3x + 10) + (8x + 5) = 180$; yes

Practice 6-4

1a. rhombus 1b. 72; 54; 54; 72 2a. rectangle 2b. 72; 36; 18; 144 3a. rectangle 3b. 37; 53; 106; 74 4a. rhombus 4b. 59; 90; 90; 59 5a. rectangle 5b. 60; 30; 60; 30 6a. rhombus 6b. 22; 68; 68; 90 7. Yes; the parallelogram is a rhombus. 8. Possible; opposite angles are congruent in a parallelogram. 9. Impossible; if the diagonals are perpendicular, then the parallelogram should be a rhombus, but the sides are not of equal length. 10. $x = 7$; $HJ = 7$; $IK = 7$ 11. $x = 7$; $HJ = 26$; $IK = 26$ 12. $x = 6$; $HJ = 25$; $IK = 25$ 13. $x = -3$; $HJ = 13$; $IK = 13$ 14a. 90; 90; 29; 29 14b. 288 cm^2 15a. 70; 90; 70; 70 15b. 88 in.^2 16a. 38; 90; 90; 38 16b. 260 m^2 17. possible 18. Impossible; because opposite angles are congruent and supplementary, for the figure to be a parallelogram they must measure 90, the figure therefore must be a rectangle.

Guided Problem Solving 6-4

1. A labeled figure, which shows a parallelogram. One angle is a right angle, and two adjacent sides are congruent. Algebraic expressions are given for the lengths of three line segments. 2. diagonals 3. Find the values of x and y . 4. It is a square. Theorem 6-1 and the fact that $\overline{AB} \cong \overline{AD}$ imply that all four sides are congruent. Theorems 3-11 and 6-2 plus the fact that $m\angle B = 90$ imply that all four angles are right angles. 5. congruent; bisect 6. $4x - y + 1 = (2x - 1) + (3y + 5)$; $2x - 1 = 3y + 5$ 7. $x = 7\frac{1}{2}$; $y = 3$ 8. It was not necessary to know $\overline{AB} \cong \overline{AD}$, but it was necessary to know $m\angle B = 90$. The key fact, which enables the use of Theorem 6-11 in addition to Theorem 6-3, is that $ABCD$ is a rectangle. It does not matter whether all four sides are congruent. 9. 40

Practice 6-5

1. 118; 62 2. 99; 81 3. 59; 121 4. 96; 84 5. 101; 79 6. 67; 113 7. $x = 4$ 8. $x = 16$; $y = 116$ 9. $x = 1$ 10. 105.5; 105.5 11. 90; 25 12. 118; 118 13. 90; 63; 63 14. 107; 107 15. 90; 51; 39 16. $x = 8$ 17. $x = 7$ 18. $x = 28$; $y = 32$

Guided Problem Solving 6-5

1. Isosceles trapezoid $ABCD$ with $\overline{AB} \cong \overline{DC}$ 2. $\angle B \cong \angle C$ and $\angle BAD \cong \angle D$ 3. $\overline{AB} \cong \overline{DC}$ is Given. $\overline{DC} \cong \overline{AE}$ because opposite sides of a parallelogram are congruent (Theorem 6-1). $\overline{AB} \cong \overline{AE}$ is from the Transitive Property of Congruency. 4. Isosceles; $\cong$; because base angles of an isosceles triangle are congruent. 5. $\angle 1 \cong \angle C$ because corresponding angles on a transversal of two parallel lines are congruent. 6. $\angle B \cong \angle C$ by the Transitive Property of Congruency. 7. $\angle BAD$ is a same-side interior angle with $\angle B$, and $\angle D$ is a same-side interior angle with $\angle C$. 8. This is not a problem, because for $AD > BC$ there is a similar proof with a line segment drawn from B to a point E lying on AD . 9. The two drawn segments can be shown to be congruent, and then one has two congruent right triangles by the HL Theorem. $\angle B \cong \angle C$ follows by CPCTC and $\angle BAD \cong \angle D$ because they are supplements of congruent angles.

Practice 6-6

1. $(1.5a, 2b)$; a 2. $(1.5a, b)$; $\sqrt{a^2 + 4b^2}$ 3. $(0.5a, 0)$; a 4. $(0.5a, b)$; $\sqrt{a^2 + 4b^2}$ 5. 0 6. 1 7. $-\frac{1}{2}$ 8. 2 9. $\frac{2b}{3a}$ 10. $-\frac{2b}{3a}$ 11. $\frac{2b}{3a}$ 12. $-\frac{2b}{3a}$ 13. $E(a, 3b)$; $I(4a, 0)$ 14. $O(3a, 2b)$; $M(3a, -2b)$; $E(-3a, -2b)$ 15. $D(4a, b)$; $I(3a, 0)$ 16. $T(0, 2b)$; $A(a, 4b)$; $L(2a, 2b)$ 17. $(-4a, b)$ 18. $(-b, 0)$

Guided Problem Solving 6-6

1. a rhombus with coordinates given for two vertices 2. A rhombus is a parallelogram with four congruent sides. 3. the coordinates of the other two vertices 4. They are the diagonals. 5. They bisect each other. 6. $W(-2r, 0)$, $Z(0, -2t)$ 7. No; neither Theorem 6-3 nor any other theorem or result would apply. 8. Slope of $\overline{WX} = 0$ and slope of $\overline{YZ}$ is undefined. This confirms Theorem 6-10, which says that the diagonals of a rhombus are perpendicular.

Practice 6-7

1a. $\frac{p}{q}$ 1b. $y = mx + b$; $q = \frac{p}{q}(p) + b$; $b = q - \frac{p^2}{q}$; $y = \frac{p}{q}x + q - \frac{p^2}{q}$ 1c. $x = r + p$ 1d. $y = \frac{p}{q}(r + p) + q - \frac{p^2}{q}$; $y = \frac{rp}{q} + \frac{p^2}{q} + q - \frac{p^2}{q}$; $y = \frac{rp}{q} + q$; intersection at $(r + p, \frac{rp}{q} + q)$ 1e. $\frac{r}{q}$ 1f. (r, q) 1g. $y = mx + b$; $q = \frac{r}{q}(r) + b$; $b = q - \frac{r^2}{q}$; $y = \frac{r}{q}x + q - \frac{r^2}{q}$ 1h. $y = \frac{r}{q}(r + p) + q - \frac{r^2}{q}$; $y = \frac{rp}{q} + \frac{r^2}{q} + q - \frac{r^2}{q}$; $y = \frac{rp}{q} + q$; intersection at $(r + p, \frac{rp}{q} + q)$ 1i. $(r + p, \frac{rp}{q} + q)$ 2a. $(-2a, 0)$ 2b. $(-a, b)$ 2c. $(-\frac{3a}{2}, \frac{b}{2})$ 2d. $\frac{b}{a}$ 3a. $(-4a, 0)$ 3b. $(-2a, 3a)$ 3c. $\frac{3}{2}$ 3d. $(2a, -a)$ 3e. $\frac{1}{2}$ 4. The coordinates for D are $(0, 2b)$. The coordinates for C are $(2a, 0)$. Given these coordinates, the lengths of $\overline{DC}$ and $\overline{HP}$ can be determined:

Geometry: All-In-One Answers Version A (continued)

$$DC = \sqrt{(2a - 0)^2 + (0 - 2b)^2} = \sqrt{4a^2 + 4b^2};$$

$$HP = \sqrt{(0 - 2a)^2 + (0 - 2b)^2} = \sqrt{4a^2 + 4b^2};$$

$$DC = HP, \text{ so } \overline{DC} \cong \overline{HP}.$$

Guided Problem Solving 6-7

- kite $DEFG$ with $DE = EF$ with the midpoint of each side identified
- A kite is a quadrilateral with two pairs of adjacent sides congruent and no opposite sides congruent.
- The midpoints are the vertices of a rectangle.
- $D(-2b, 2c)$, $G(0, 0)$
- $L(b, a + c)$, $M(b, c)$, $N(-b, c)$, $K(-b, a + c)$
- Slope of $\overline{KL} = \text{slope of } \overline{NM} = 0$, slopes of $\overline{KN}$ and $\overline{LM}$ are undefined
- Opposite sides are parallel; it is a rectangle.
- Adjacent sides are perpendicular.
- right angles
- Answers will vary. Example: $a = 3$, $b = 2$, $c = 2$ yields the points $D(-4, 4)$, $E(0, 6)$, $F(4, 4)$, $G(0, 0)$ with midpoints at $(-2, 2)$, $(-2, 5)$, $(2, 5)$, and $(2, 2)$. Connecting these midpoints forms a rectangle.
- Construct $\overline{DF}$ and $\overline{EG}$. Slope of $\overline{DF} = 0$, so $\overline{DF}$ is horizontal. Slope of $\overline{EG}$ is undefined, so $\overline{EG}$ is vertical.

6A: Graphic Organizer

- Quadrilaterals
- Answers may vary. Sample: classifying quadrilaterals; properties of parallelograms; proving that a quadrilateral is a parallelogram; and special parallelograms
- Check students' work.

6B: Reading Comprehension

- $\overline{QT} \cong \overline{SR}$, $\overline{QR} \cong \overline{ST}$, $\overline{QT} \parallel \overline{RS}$, $\overline{QR} \parallel \overline{TV}$
- No, it cannot be proven that $\triangle QTV \cong \triangle SRU$ because with

the given information, only one side and one angle of the two triangles can be proven to be congruent. Another side or angle is needed. If it were given that $QUSV$ is a parallelogram, then the proof could be made.

- All four sides are congruent.
- Yes. Since $\overline{EG} \cong \overline{EG}$ by the Reflexive Property, $\triangle EFG \cong \triangle EHG$ by SSS.
- b

6C: Reading/Writing Math Symbols

- $\overline{AH}$, $\overline{CH}$, or $\overline{BH}$
- $\overline{DG}$, $\overline{FG}$, or $\overline{EG}$
- G
- $\overline{DE}$
- rhombus
- rectangle
- square
- isosceles trapezoid

6D: Visual Vocabulary Practice/High-Use Academic Words

- solve
- deduce
- equivalent
- indirect
- equal
- analysis
- identify
- convert
- common

6E: Visual Vocabulary Check

Consecutive angles: Angles of a polygon that share a common side.

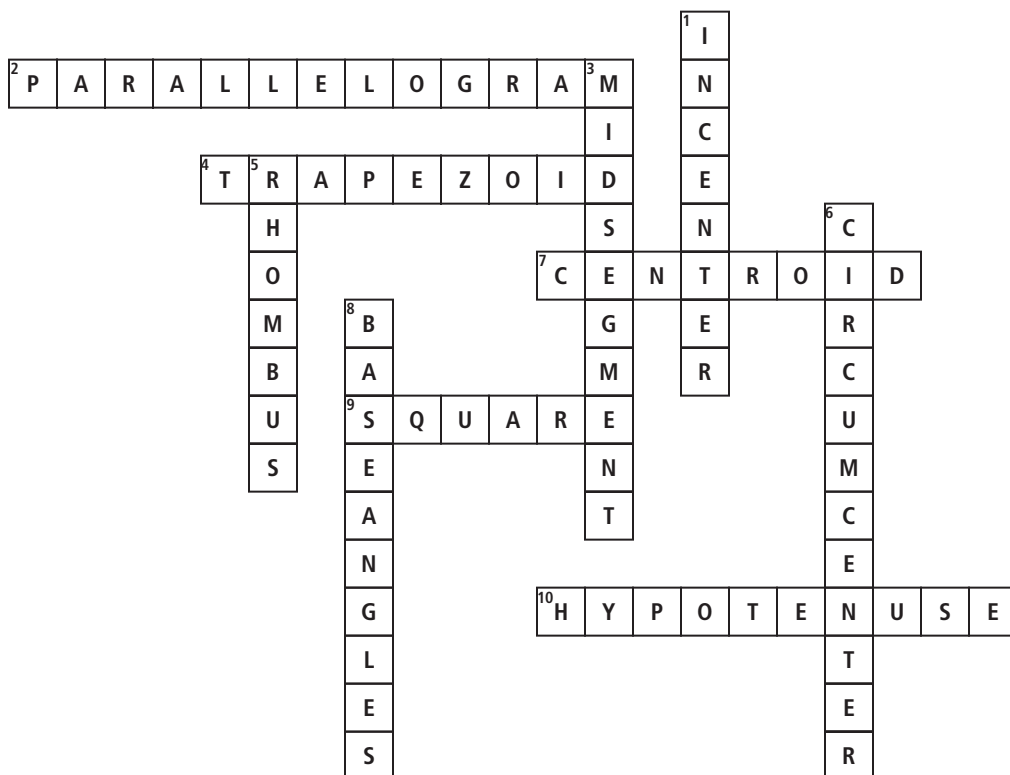
Kite: A quadrilateral with two pairs of congruent adjacent sides and no opposite sides congruent.

Parallelogram: A quadrilateral with two pairs of parallel sides.

Rhombus: A parallelogram with four congruent sides.

Trapezoid: A quadrilateral with exactly one pair of parallel sides.

6F: Vocabulary Review Puzzle



Chapter 7

Practice 7-1

1. 1 : 278 2. 18 ft by 10 ft 3. 18 ft by 14 ft 4. 18 ft by 16 ft
5. 8 ft by 8 ft 6. 3 ft by 10 ft 7. true 8. false 9. true
10. true 11. false 12. true 13. true 14. false 15. false
16. 12 17. 12 18. 33 19. $\frac{21}{5}$ 20. ± 8 21. $\frac{88}{3}$ 22. 6
23. $\frac{5}{2}$ 24. $-\frac{5}{2}$ 25. 14 : 5 26. 3 : 2 27. 12 : 7 28. $\frac{8}{3}$
29. $\frac{7}{13}$

Guided Problem Solving 7-1

1. ratios 2. $\frac{42}{42,000,000}$ or $\frac{1}{1,000,000}$ 3. the denominator
4. $\frac{x}{29,000} = \frac{1}{1,000,000}$ 5. Cross-Product Property 6. 0.029
7. 0.348 8. yes 9. 21.912

Practice 7-2

1. $\triangle ABC \sim \triangle XYZ$, with similarity ratio 2 : 1
2. $\triangle QMN \sim \triangle RST$, with similarity ratio 5 : 3
3. Not similar; corresponding sides are not proportional.
4. Not similar; corresponding angles are not congruent.
5. $\triangle ABC \sim \triangle KMN$, with similarity ratio 4 : 7
6. Not similar; corresponding sides are not proportional.
7. $\angle I$ 8. $\angle O$ 9. $\angle J$ 10. NO 11. LO 12. LO
13. 3.96 ft 14. 4.8 in. 15. 3.75 cm 16. 10 m 17. $\frac{2}{3}$
18. 53 19. $7\frac{1}{2}$ 20. $4\frac{1}{2}$ 21. 53 22. 37 23. 5

Guided Problem Solving 7-2

1. equal 2. $\frac{6.14}{2.61}$ 3. 2.61; 6.14 4. 19.3662; 19.2182 5. no
6. no 7. 2.3706; 2.3525 8. Since the quotients are not equal,
the ratios are not equal, and the bills are not similar
rectangles. 9. 4.045

Practice 7-3

1. $\angle AXB \cong \angle RXQ$ because vertical angles are $\cong$. $\angle A \cong \angle R$ (Given). Therefore $\triangle AXB \sim \triangle RXQ$ by the AA $\sim$ Postulate. 2. Because $\frac{MP}{LW} = \frac{PX}{WA} = \frac{XM}{AL} = \frac{3}{4}$, $\triangle MPX \sim \triangle LWA$ by the SSS $\sim$ Theorem. 3. $\angle QMP \cong \angle AMB$ because vertical $\angle$ s are $\cong$. Then, because $\frac{QM}{AM} = \frac{PM}{BM} = \frac{2}{1}$, $\triangle QMP \sim \triangle AMB$ by the SAS $\sim$ Theorem. 4. $\angle M \cong \angle A$ (Given). Because there are 180° in a triangle, $m\angle J = 130$, and $\angle J \cong \angle C$. So $\triangle MJN \sim \triangle ACB$ by the AA $\sim$ Postulate. 5. Because $AX = BX$ and $CX = RX$, $\frac{AX}{CX} = \frac{BX}{RX}$. $\angle AXB \cong \angle CXR$ because vertical angles are $\cong$. Therefore $\triangle AXB \sim \triangle CXR$ by the SAS $\sim$ Theorem. 6. Because $AB = BC = CA$ and $XY = YZ = ZX$, $\frac{AB}{XY} = \frac{BC}{YZ} = \frac{CA}{ZX}$. Then $\triangle ABC \sim \triangle XYZ$ by the SSS $\sim$ Theorem. 7. $\frac{15}{2}$ 8. $\frac{55}{4}$ 9. $\frac{48}{7}$ 10. $\frac{85}{3}$
11. $\frac{20}{3}$ 12. 36 13. 33 ft

Guided Problem Solving 7-3

1. no; N/A 2. yes; $\overline{WT}$, $\overline{RS}$ 3. It is a trapezoid. 4. They are congruent. 5. They are parallel. 6. They are congruent. 7. $\triangle RSZ$ and $\triangle TWZ$ 8. AA $\sim$ or Angle-Angle Similarity Postulate 9. No; there is only one pair of congruent angles. 10. yes; parallelogram, rhombus, rectangle, and square

Practice 7-4

1. 16 2. 8 3. $\sqrt{77}$ 4. $2\sqrt{11}$ 5. $10\sqrt{2}$ 6. $6\sqrt{5}$ 7. h
8. y 9. x 10. a 11. b 12. c 13. $x = 6; y = 6\sqrt{3}$
14. $x = 8\sqrt{3}; y = 4\sqrt{3}$ 15. $\frac{9}{2}$ 16. $x = 4\sqrt{5}; y = \sqrt{55}$
17. $x = \sqrt{3}; y = \sqrt{6}; z = \sqrt{2}$ 18. $x = 8; y = 2\sqrt{2}; z = 6\sqrt{2}$ 19. $2\sqrt{15}$ in.

Guided Problem Solving 7-4

1. $\triangle ABC, \triangle ACD, \triangle BCD$ 2. 1 3. 1; 1 4. 1 5. 1
6. 2; 1 7. 2 8. $\sqrt{2}$ 9. $\sqrt{2}$ 10. yes 11. no (This would require the Pythagorean Theorem.)

Practice 7-5

1. BE 2. EH 3. BC 4. JD 5. $\frac{JG}{JI}$ 6. BE 7. $\frac{16}{3}$
8. 4 9. 4 10. $\frac{25}{2}$ 11. $x = \frac{25}{9}; y = 4$ 12. $\frac{15}{4}$ 13. $x = 6; y = 6$ 14. $x = \frac{189}{5}; y = \frac{198}{5}$ 15. 2 16. 4 17. 10

Guided Problem Solving 7-5

1. parallel 2. $CE; BD$ 3. 6; 15 4. 90 5. yes 6. yes 7. The sides would not be parallel. 8. They are similar triangles.

7A: Graphic Organizer

1. Similarity 2. Answers may vary. Sample: ratios and proportions; similar polygons; proving triangles similar; and similarity in right triangles 3. Check students' work.

7B: Reading Comprehension

1. $\triangle DHB \sim \triangle ACB$ 2. AA similarity postulate
The triangles have two similar angles. 3. 1 : 2 4. 1 : 2
5. $\frac{DB}{AB} = \frac{HB}{CB}$ 6. 250 ft 7. a

7C: Reading/Writing Math Symbols

1. no 2. no 3. yes 4. no 5. yes 6. no 7. yes, AAS
8. yes, Hypotenuse-Leg Theorem 9. yes, SAS or ASA or AAS 10. not possible

7D: Visual Vocabulary Practice

1. Angle-Angle Similarity Postulate 2. golden ratio
3. Side-Side-Side Similarity Theorem 4. geometric mean
5. scale 6. Cross-Product Property 7. golden rectangle
8. simplest radical form 9. Side-Angle-Side Similarity Theorem

7E: Vocabulary Check

Similarity ratio: The ratio of lengths of corresponding sides of similar polygons.

Cross-Product Property: The product of the extremes of a proportion is equal to the product of the means.

Ratio: A comparison of two quantities by division.

Golden rectangle: A rectangle that can be divided into a square and a rectangle that is similar to the original rectangle.

Scale: The ratio of any length in a scale drawing to the corresponding actual length.

7F: Vocabulary Review

1. L 2. E 3. I 4. A 5. J 6. K 7. C 8. D 9. G 10. O
11. N 12. M 13. H 14. B 15. F

Chapter 8

Practice 8-1

1. $\sqrt{51}$ 2. $4\sqrt{7}$ 3. $2\sqrt{65}$ 4. $\sqrt{7}$ 5. $2\sqrt{21}$
6. $18\sqrt{2}$ 7. 46 in. 8. 78 ft 9. 279 cm 10. 19 m
11. acute 12. right 13. obtuse 14. right 15. obtuse
16. acute

Guided Problem Solving 8-1

1. the sum of the lengths of the sides 2. Pythagorean Theorem 3. 7 cm 4. $4 \text{ cm} \times 3 \text{ cm}$ 5. $c^2 = 4^2 + 3^2$ 6. 5
7. 12 cm 8. perimeter of rectangle = 14 cm; yes 9. Answers will vary; example: Draw a $4 \text{ cm} \times 3 \text{ cm}$ grid, copy the given figure, measure the lengths with a ruler, add them together.
10. 20 cm

Practice 8-2

1. $x = 2; y = \sqrt{3}$ 2. $a = 4.5; b = 4.5\sqrt{3}$ 3. $c = \frac{50\sqrt{3}}{3}; d = \frac{25\sqrt{3}}{3}$ 4. $8\sqrt{2}$ 5. $14\sqrt{2}$ 6. $\frac{28\sqrt{3}}{3}$ 7. 2
8. $x = 15; y = 15\sqrt{3}$ 9. $3\sqrt{2}$ 10. 42 cm 11. 5.9 in.
12. 10.4 ft, 12 ft 13. 170 in.^2 14. $w = \frac{10\sqrt{3}}{3}; x = 5;$
 $y = 5\sqrt{2}; z = \frac{5\sqrt{3}}{3}$ 15. $a = 4; b = 3$ 16. $p = 4\sqrt{3};$
 $q = 4\sqrt{3}; r = 8; s = 4\sqrt{6}$

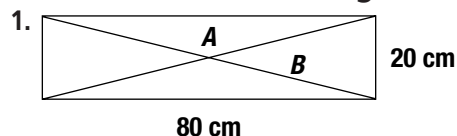
Guided Problem Solving 8-2

1. 30° - 60° - 90° triangle 2. l 3. h 4. $\sqrt{3}$ 5. $\frac{24}{\sqrt{3}}$ or $8\sqrt{3}$
6. 2 7. $\frac{48}{\sqrt{3}}$ or $16\sqrt{3}$ 8. 28 ft 9. 0.28 min 10. yes
11. 34 ft

Practice 8-3

1. $\tan E = \frac{3}{4}; \tan F = \frac{4}{3}$ 2. $\tan E = 1; \tan F = 1$
3. $\tan E = \frac{2}{5}; \tan F = \frac{5}{2}$ 4. 12.4 5. 31.0 6. 14.1 7. 7.1
8. 2.3 9. 6.4 10. 78.7 11. 26.6 12. 71.6 13. 39 14. 72
15. 27 16. 68 17. 39 18. 54

Guided Problem Solving 8-3



2. 180 3. $m\angle A = 2m\angle X$ 4. 90 5. base: 40 cm, height: 10 cm 6. 4 7. 4 8. 76 9. 152 10. 28 11. yes 12. 46

Practice 8-4

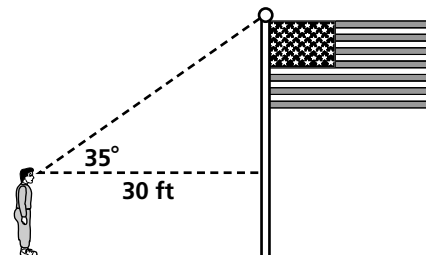
1. $\sin P = \frac{2\sqrt{10}}{7}; \cos P = \frac{3}{7}$ 2. $\sin P = \frac{4}{5}; \cos P = \frac{3}{5}$
3. $\sin P = \frac{12}{13}; \cos P = \frac{5}{13}$ 4. $\sin P = \frac{\sqrt{11}}{6}; \cos P = \frac{5}{6}$
5. $\sin P = \frac{\sqrt{2}}{2}; \cos P = \frac{\sqrt{2}}{2}$ 6. $\sin P = \frac{15}{17}; \cos P = \frac{8}{17}$
7. 64 8. 11.0 9. 7.0 10. 42 11. 7.8 12. 53
13. 6.6 14. 37 15. 11.0 16. 56 17. 11.5 18. 9.8

Guided Problem Solving 8-4

1. The sides are parallel. 2. sine 3. $\sin 30^\circ = \frac{w}{6}$ 4. 3.0
5. yes 6. cosine 7. $\cos x^\circ = \frac{3}{4}$ 8. 41 9. Answers may vary. Sample: $\cos 60^\circ \approx \frac{3}{6}; \sin 49^\circ \approx \frac{3}{4}$ 10. 5.2, 2.6

Practice 8-5

- 1a. angle of depression from the birds to the ship
1b. angle of elevation from the ship to the birds
1c. angle of depression from the ship to the submarine
1d. angle of elevation from the submarine to the ship
2a. angle of depression from the plane to the person
2b. angle of elevation from the person to the plane
2c. angle of depression from the person to the sailboat
2d. angle of elevation from the sailboat to the person
3. 116.6 ft 4. 84.8 ft 5. 46.7 ft 6. 31.2 yd 7. 127.8 m
8. 323.6 m
9a.



- 9b. 26 ft

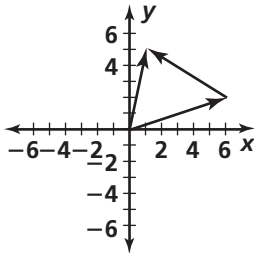
Guided Problem Solving 8-5

1. $\angle e = 1, \angle d = \angle 4$ 2. congruent 3. $m\angle e = m\angle d$
 4. $7x - 5 = 4(x + 7)$ 5. 11 6. 72 7. 72 8. yes
 9. 44, 44

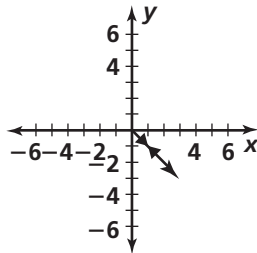
Practice 8-6

1. $\langle 46.0, 46.0 \rangle$ 2. $\langle -37.1, -19.7 \rangle$ 3. $\langle 89.2, -80.3 \rangle$
 4. 38.6 mi/h; 31.2° north of east 5. 134.5 m; 42.0° south of west
 6. 1.3 m/sec; 38.7° south of east 7. 55° north of east
 8. 20° west of south 9. 33° west of north 10a. $\langle 1, 5 \rangle$

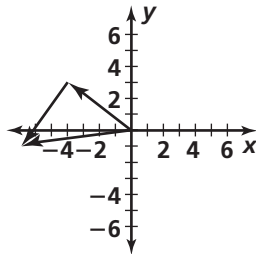
10b.



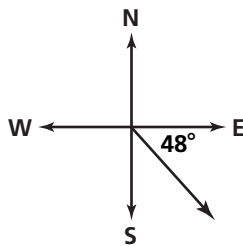
11a. $\langle 1, -1 \rangle$ 11b.



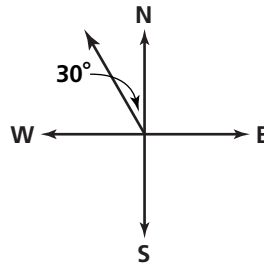
12a. $\langle -7, -1 \rangle$ 12b.



13. Sample:



14. Sample:



Guided Problem Solving 8-6

1. Check students' work. 2. $\frac{x}{100}, \frac{y}{100}$
 3. $100 \cos 30^\circ; 100 \sin 30^\circ$ 4. 86.6; 50 5. $\langle 86.6, 50 \rangle$
 6. $\langle 86.6, -50 \rangle$ 7. $\langle 173.2, 0 \rangle$ 8. 173; due east 9. yes
 10. 100; due east

8A: Graphic Organizer

1. Right Triangles and Trigonometry 2. Answers may vary. Sample: the Pythagorean Theorem; special right triangles; the tangent ratio; sine and cosine ratios; angles of elevation and depression; vectors 3. Check students' work.

8B: Reading Comprehension

1. A 2. J 3. B 4. J 5. B 6. B 7. b

8C: Reading/Writing Math Symbols

1. F 2. G 3. D 4. A 5. C 6. B 7. H 8. E
 9. $\sin^{-1} A = \frac{5}{12}$ 10. $\triangle ABC \sim \triangle XYZ$ 11. $m\angle A \approx 52^\circ$
 12. $\tan Z = \frac{7}{24}$

8D: Visual Vocabulary Practice

1. 30° - 60° - 90° triangle 2. inverse of tangent 3. congruent sides
 4. tangent 5. Pythagorean Theorem 6. hypotenuse
 7. 45° - 45° - 90° triangle 8. Pythagorean triple 9. obtuse triangle

8E: Vocabulary Check

Obtuse triangle: A triangle with one angle whose measure is between 90 and 180.

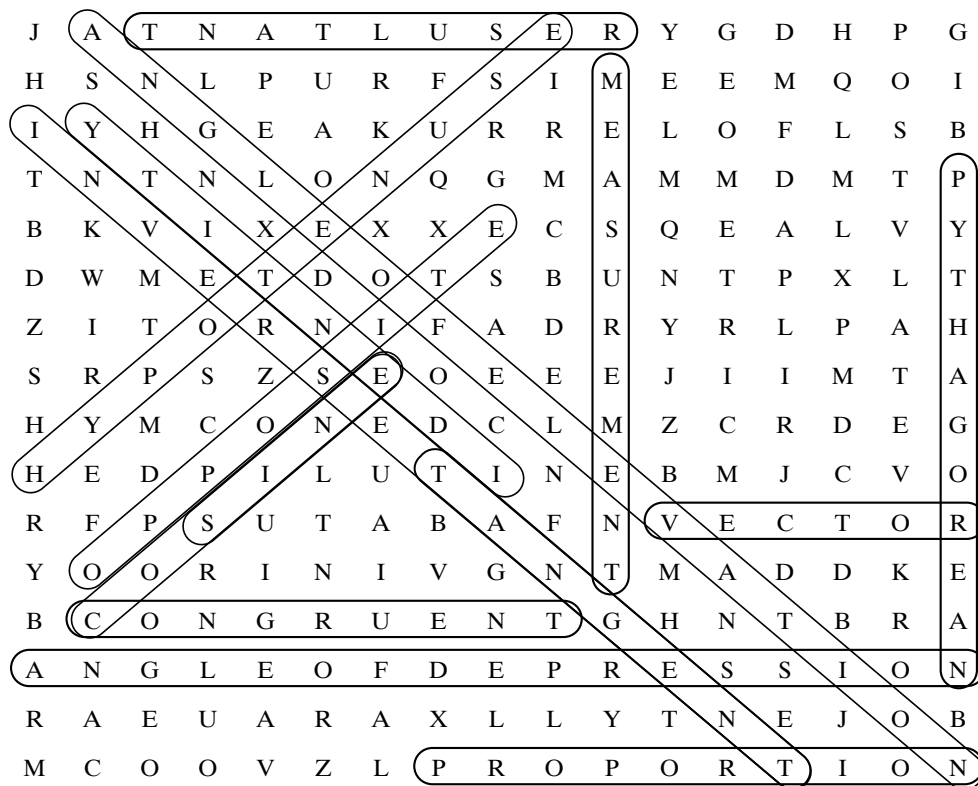
Isosceles triangle: A triangle that has at least two congruent sides.

Hypotenuse: The side opposite the right angle in a right triangle.

Right triangle: A triangle that contains one right angle.

Pythagorean triple: A set of three nonzero whole numbers a , b , and c that satisfy the equation $a^2 + b^2 = c^2$.

8F: Vocabulary Review Puzzle



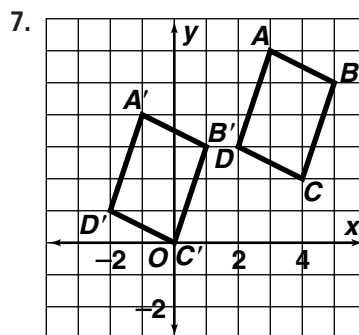
Chapter 9

Practice 9-1

1. No; the triangles are not the same size. 2. Yes; the hexagons are the same shape and size. 3. Yes; the ovals are the same shape and size. 4a. $\angle C'$ and $\angle F'$ 4b. $\overline{CD}$ and $\overline{C'D'}$, $\overline{DE}$ and $\overline{D'E'}$, $\overline{EF}$ and $\overline{E'F'}$, $\overline{CF}$ and $\overline{C'F'}$
- 5a. $\angle M'$ and $\angle N'$ 5b. $\overline{MN}$ and $\overline{M'N'}$, $\overline{NO}$ and $\overline{N'O'}$, $\overline{MO}$ and $\overline{M'O'}$
6. $(x, y) \rightarrow (x - 2, y - 4)$ 7. $(x, y) \rightarrow (x - 2, y - 2)$ 8. $(x, y) \rightarrow (x - 3, y - 1)$ 9. $(x, y) \rightarrow (x + 4, y - 2)$ 10. $(x, y) \rightarrow (x - 5, y + 1)$ 11. $(x, y) \rightarrow (x + 2, y + 2)$ 12. $W'(-2, 2)$, $X'(-1, 4)$, $Y'(3, 3)$, $Z'(2, 1)$
13. $J'(-5, 0)$, $K'(-3, 4)$, $L'(-3, -2)$ 14. $M'(3, -2)$, $N'(6, -2)$, $P'(7, -7)$, $Q'(4, -6)$ 15. $(x, y) \rightarrow (x + 4.2, y + 11.2)$ 16. $(x, y) \rightarrow (x + 13, y - 13)$ 17. $(x, y) \rightarrow (x, y)$ 18. $(x, y) \rightarrow (x + 3, y + 3)$ 19a. $P'(-3, -1)$ 19b. $P'(0, 8)$, $N'(-5, 2)$, $Q'(2, 3)$

Guided Problem Solving 9-1

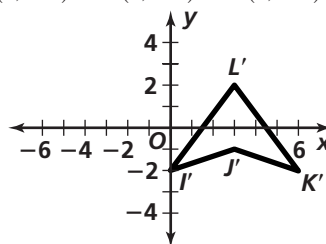
1. the four vertices of a preimage and one of the vertices of the image 2. Graph the image and preimage. 3. $C(4, 2)$ and $C'(0, 0)$ 4. $x = 4, y = 2, x + a = 0, y + b = 0$ 5. $a = -4$; $b = -2$; $(x, y) \rightarrow (x - 4, y - 2)$ 6. $A'(-1, 4)$, $B'(1, 3)$, $D'(-2, 1)$



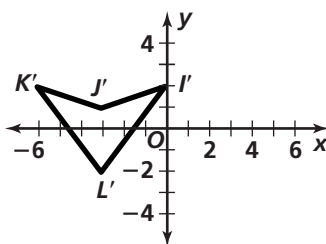
8. yes 9. $(x, y) \rightarrow (x + 1, y - 3)$, $A'(4, 3)$, $B'(6, 2)$, $D'(3, 0)$

Practice 9-2

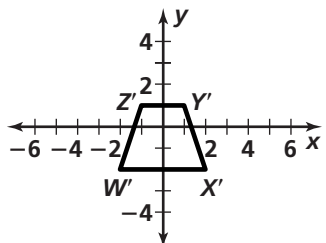
1. $(-3, -2)$ 2. $(-2, -3)$ 3. $(-1, -4)$
4. $(4, -2)$ 5. $(4, -1)$ 6. $(3, -4)$
- 7a.



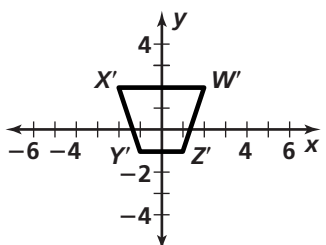
7b.



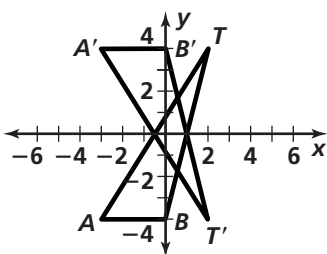
8a.



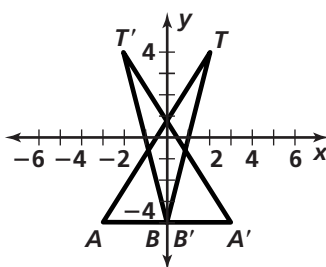
8b.



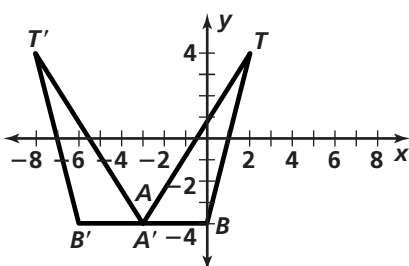
9.



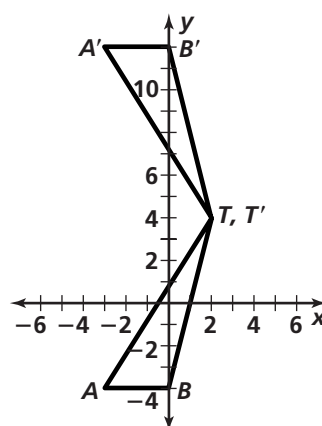
10.



11.



12.

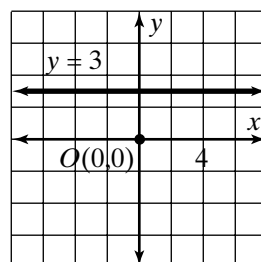


13. $(-6, 4)$ 14. $(-8, 0)$ 15. $(0, -12)$

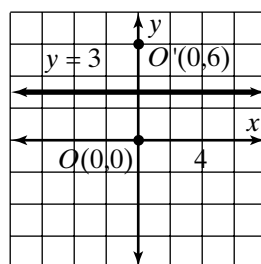
Guided Problem Solving 9-2

1. a point at the origin, and two reflection lines
2. A reflection is an isometry in which a figure and its image have opposite orientations.
3. the image after two successive reflections

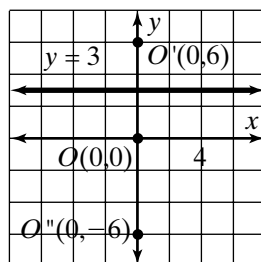
4.



5.



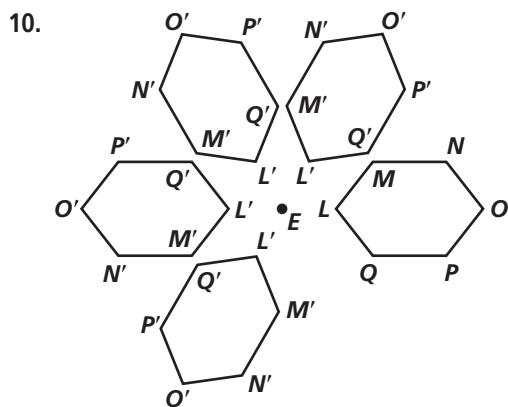
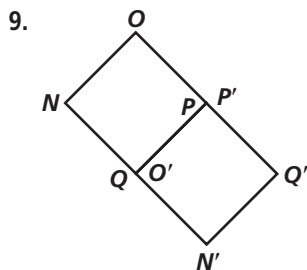
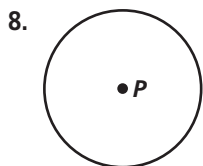
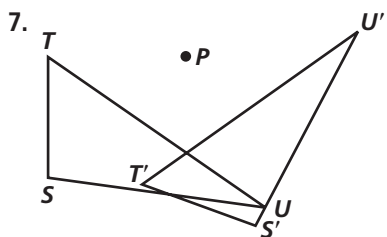
6.



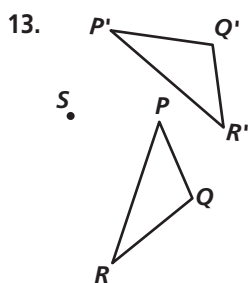
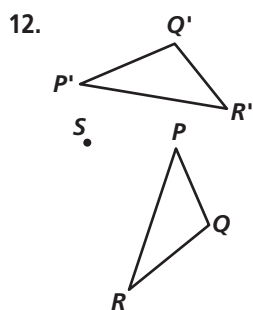
7. $(0, -6)$
8. Yes. The x -coordinate remains 0 throughout.
9. $O'(0, 0)$ and $O'(0, 6)$

Practice 9-3

1. I 2. I 3. I 4. $\overline{GH}$ 5. G 6. $\overline{ST}$



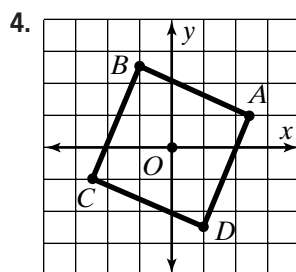
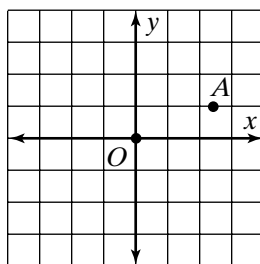
11. L'



Guided Problem Solving 9-3

1. The coordinates of point A, and three rotation transformations. It is assumed that the rotations are counterclockwise. 2. parallelogram, rhombus, square

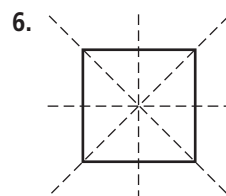
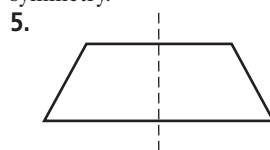
3. slope of $\overline{OA} = \frac{2}{5}$



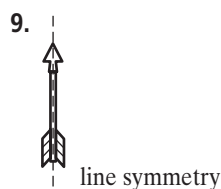
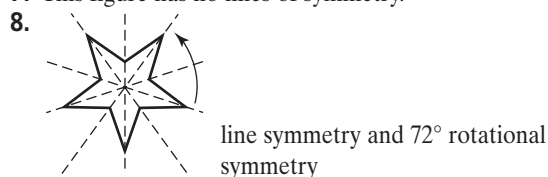
5. slope of $\overline{OB} = -\frac{5}{2}$; slope of $\overline{OC} = \frac{2}{5}$; slope of $\overline{OD} = -\frac{5}{2}$; the slopes of perpendicular line segments are negative reciprocals. 6. square 7. yes 8. $B(2, 7)$, $C(7, -2)$, $D(-2, -7)$

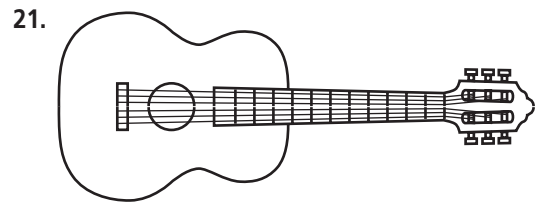
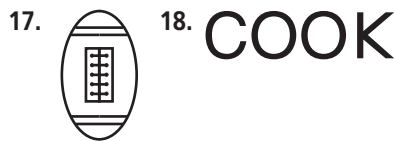
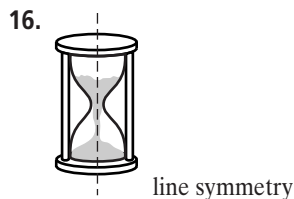
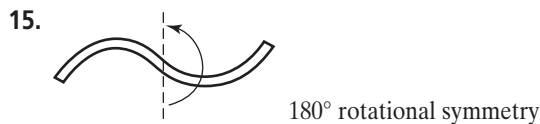
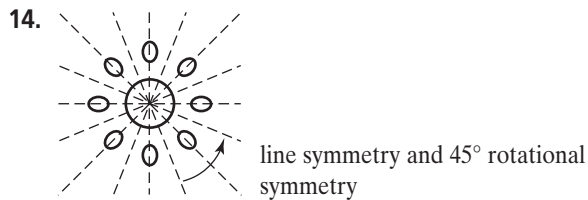
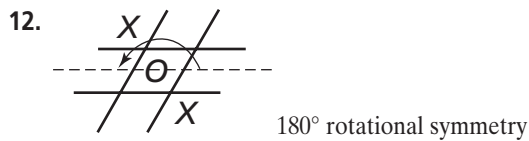
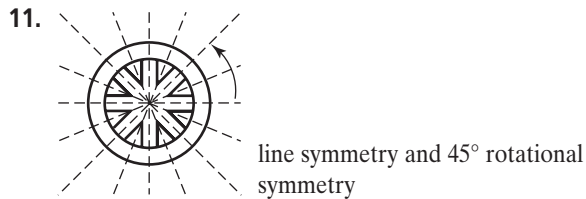
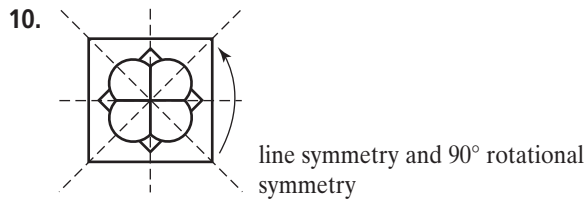
Practice 9-4

1. The helmet has reflectional symmetry. 2. The teapot has reflectional symmetry. 3. The hat has both rotational and reflectional symmetry. 4. The hairbrush has reflectional symmetry.



7. This figure has no lines of symmetry.



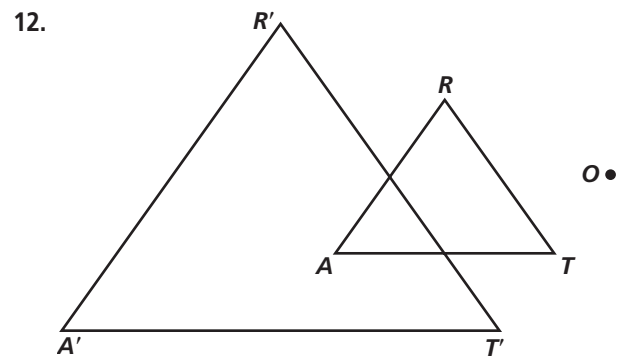
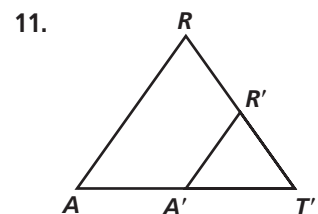
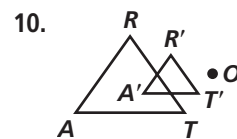


Guided Problem Solving 9-4

- the coordinates of one vertex of a figure that is symmetric about the y-axis
- Line symmetry is the type of symmetry for which there is a reflection that maps a figure onto itself.
- the coordinates of another vertex of the figure
- images (and preimages)
- reflection across the y-axis
- $(-3, 4)$
- Yes
- $(-6, 7)$

Practice 9-5

- $L'(-2, -2), M'(-1, 0), N'(2, -1), O'(0, -1)$
- $L'(-30, -30), M'(-15, 0), N'(30, -15), O'(0, -15)$
- $L'(-12, -12), M'(-6, 0), N'(12, -6), O'(0, -6)$
- $\frac{5}{3}$
- $\frac{1}{2}$
- 2
- yes
- no
- no



- $P'(-12, -12), Q'(-6, 0), R'(0, -6)$
- $P'(-\frac{1}{2}, \frac{1}{4}), Q'(1\frac{1}{4}, -\frac{1}{4}), R'(1\frac{3}{4}, 2)$
- $P'(-21, 6), Q'(3, 24), R'(-6, 6)$
- $P'(-2, 1), Q'(-1, 0), R'(0, 1)$

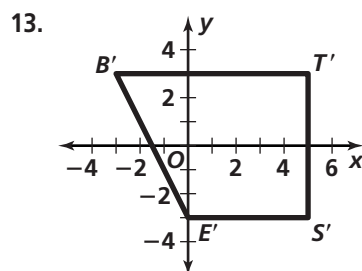
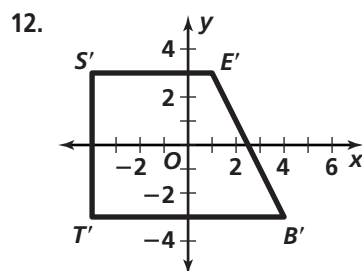
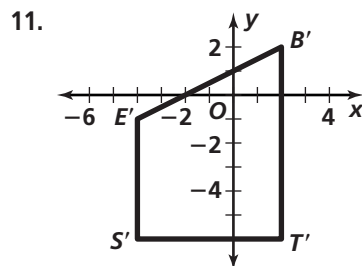
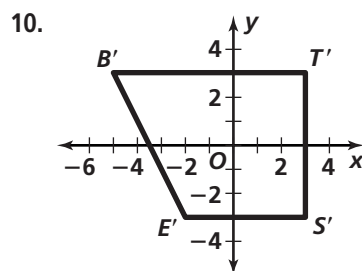
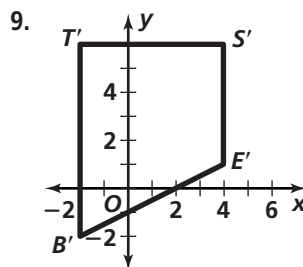
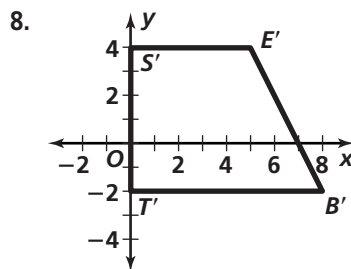
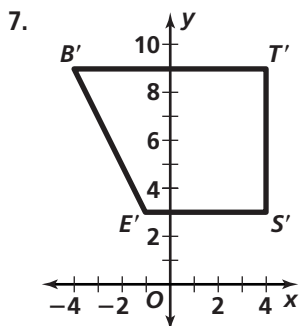
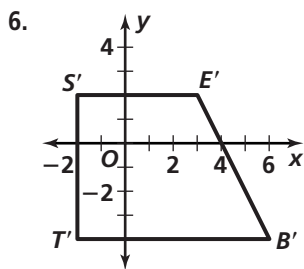
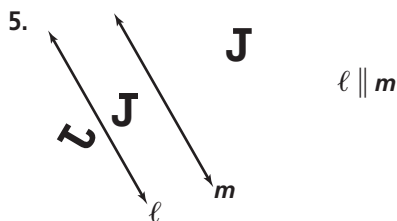
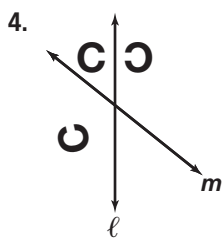
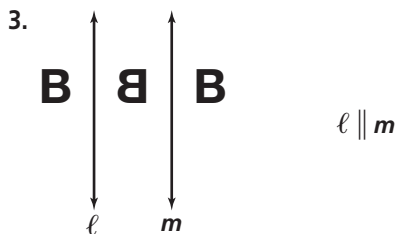
Guided Problem Solving 9-5

- A description of a square projected onto a screen by an overhead projector, including the square's area and the scale factor in relation to the square on the transparency.
- The scale factor of a dilation is the number that describes the size change from an original figure to its image.
- the area of the square on the transparency
- smaller; The scale factor $16 > 1$, so the dilation is an enlargement.
- $\frac{1}{16}, \frac{1}{16}$

6. $\frac{1}{256}$; Being $\frac{1}{16}$ as high and $\frac{1}{16}$ as wide, the square on the transparency has $\frac{1}{16} \times \frac{1}{16} = \frac{1}{256}$ times the area. 7. $\frac{3}{256} \text{ ft}^2$
8. The shape does not matter. Regardless of the shape, the figure is being enlarged by a factor of 16 in two directions, so that the screen image has $16 \times 16 = 256$ as large an area as the figure on the transparency. 9. 2520 ft^2

Practice 9-6

1. I. D II. C III. B IV. A 2. I. B II. A III. C IV. D

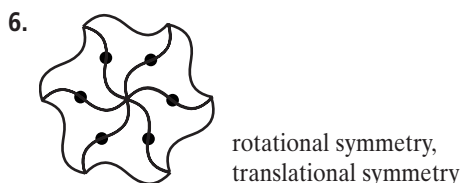
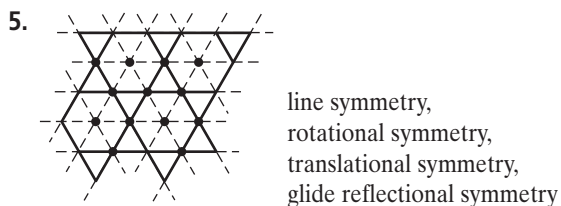
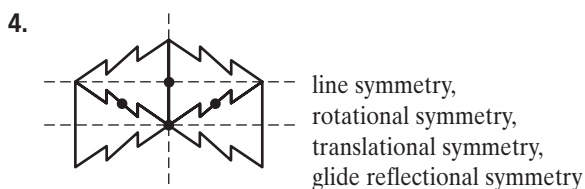
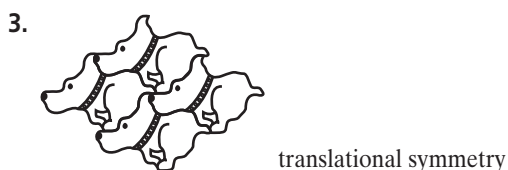
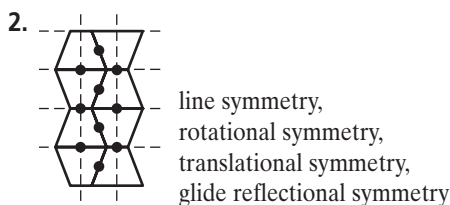
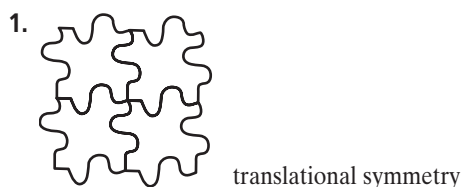


14. reflection 15. rotation 16. glide reflection
17. translation

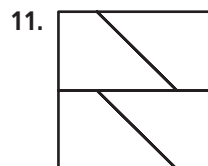
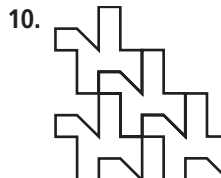
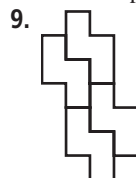
Guided Problem Solving 9-6

1. assorted triangles and a set of coordinate axes
2. a transformation
3. the transformation that maps one triangle onto another
4. They are congruent, which confirms that they could be related by one of the isometries listed. Corresponding vertices: E and P , D and Q , C and M .
5. counterclockwise; clockwise. The triangles have opposite orientations, so the isometry must be a reflection or glide reflection.
6. No; there is no reflection line that will work.
7. a glide reflection consisting of a translation $(x, y) \rightarrow (x + 11, y)$ followed by a reflection across line $y = 0$ (the x -axis)
8. Yes, both are horizontal.
9. 180° rotation with center $(-2\frac{1}{2}, 0)$

Practice 9-7



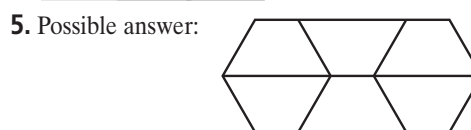
9.-11. Samples:



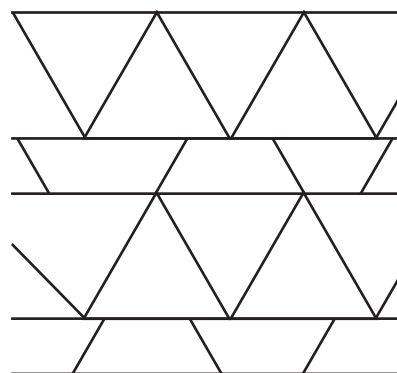
12. yes 13. yes 14. no 15. yes 16. no 17. no

Guided Problem Solving 9-7

1. two different-sized equilateral triangles and a trapezoid
2. A tessellation is a repeating pattern of figures that completely covers a plane, without gaps or overlaps.
3. Theorem 9-7 says that every quadrilateral tessellates. If the three polygons can be joined to form a quadrilateral (using each polygon at least once), that quadrilateral can be the basis of a tessellation.



6. Check students' work.
7. Answers may vary. Sample:



9A: Graphic Organizer

1. Transformations
2. Answers may vary. Sample: reflections; translations; compositions of reflections; and symmetry
3. Check students' work.

9B: Reading Comprehension

1. D 2. E, R, 5, and 20 3. The center of the county is the center of the square mile bounded by roads 12, 13, K and L. 4. C 5. 10 miles 6. a

9C: Reading/Writing Math Symbols

1. reflection; opposite 2. rotation; same 3. glide reflection; opposite 4. translation; same 5. rotation; same 6. translation; same

9D: Visual Vocabulary Practice/High-Use Academic Words

1. theorem 2. symbols 3. reduce 4. application 5. simplify 6. explain 7. characteristic 8. table 9. investigate

9E: Vocabulary Check

Transformation: A change in the position, size, or shape of a geometric figure.

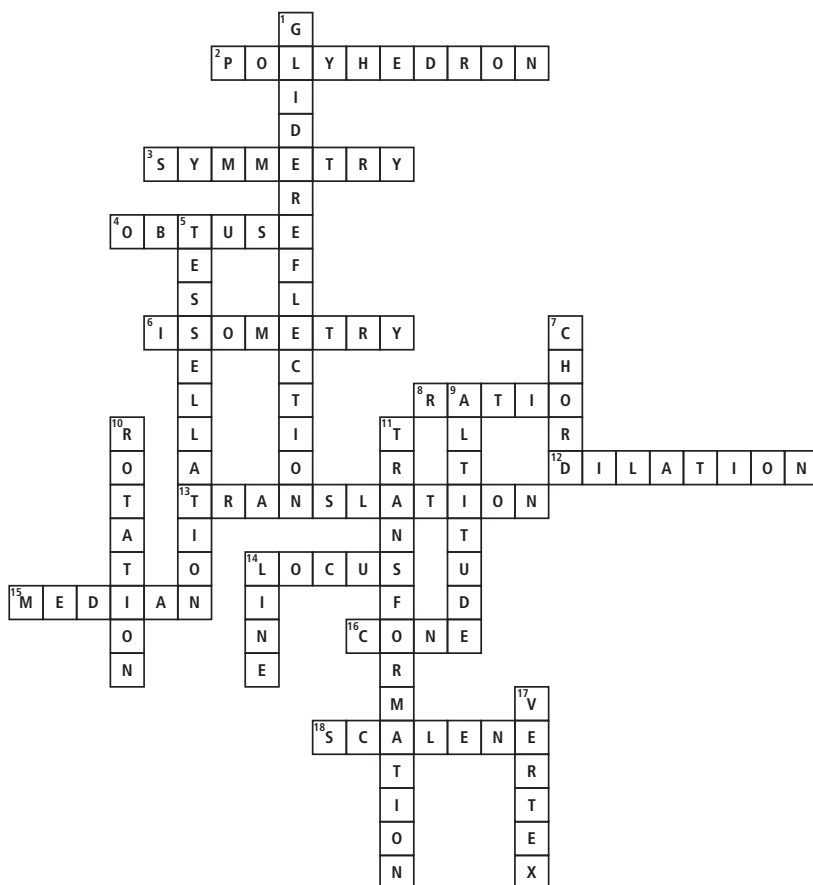
Preimage: The given figure before a transformation is applied.

Image: The resulting figure after a transformation is applied.

Isometry: A transformation in which an original figure and its image are congruent.

Composition: A transformation in which a second transformation is performed on the image of the first transformation.

9F: Vocabulary Review Puzzle



Chapter 10

Practice 10-1

1. 8 2. 8 3. 60 4. 240 5. 2.635 6. 1.92 7. 0.8125 8. 9 9. 1500 10. 8.75 11. 3.44 12. 7 13. 110 14. 30 15. 16 16. 119 17. 12 18. 48 19. 40 20. 56

Guided Problem Solving 10-1

1. $\frac{1}{2}bh$ 2. Check students' work; $B(7, 7)$ 3. a right angle 4. 7 5. $\overleftrightarrow{OA}$ 6. 7 7. 24.5 8. a square 9. 49 10. $\frac{1}{2}$ 11. 24.5 12. $\frac{1}{2}b^2$

Practice 10-2

1. 48 cm^2 2. 784 in.^2 3. 11.4 ft^2 4. 90 m^2 5. 2400 in.^2
6. 374 ft^2 7. 160 cm^2 8. 176.25 in.^2 9. 54 ft^2 10. 42.5
square units 11. $96\sqrt{3}$ square units 12. $36\sqrt{3}$ square
units 13. 45 cm^2 14. 226.2 in.^2 15. $49,500 \text{ m}^2$

Guided Problem Solving 10-2

1. $\frac{1}{2}h(b_1 + b_2)$ 2. 3; 4; 2 3. 9 4. no
5. yes 6. 3

Practice 10-3

1. $x = 7; y = 3.5\sqrt{3}$ 2. $a = 60; c = \frac{8\sqrt{3}}{3}; d = \frac{8\sqrt{3}}{3}$
3. $p = 4\sqrt{3}; q = 8; x = 30$ 4. $m\angle 1 = 45; m\angle 2 = 45;$
 $m\angle 3 = 90; m\angle 4 = 90$ 5. $m\angle 5 = 60; m\angle 6 = 30;$
 $m\angle 7 = 120$ 6. $m\angle 8 = 60; m\angle 9 = 30; m\angle 10 = 60$
7. $12\sqrt{3}$ 8. $36.75\sqrt{3}$ 9. $75\sqrt{3}$ 10. 120 in.^2
11. 137 in.^2 12. 97 in.^2

Guided Problem Solving 10-3

1. 10 2. The angles are all congruent and the sides are all
congruent. 3. 360 4. 36 5. bisects 6. 2 7. 18 8. 180
9. 72 10. 180 11. 30; 15; 75

Practice 10-4

1. 4:5; 16:25 2. 5:3; 25:9 3. 3:4; 9:16 4. 1:2
5. 9:5 6. 1:6 7. 8:3 8. $\frac{576}{5} \text{ in.}^2$ 9. $\frac{2700}{7} \text{ cm}^2$
10. $\frac{1152}{25} \text{ in.}^2$ 11. 2:3 12. 1:2 13. 2:5 14. 108 ft^2

Guided Problem Solving 10-4

1. scale 2. Check students' work. 3. Answers will vary.
Let a be the side opposite the 30° angle, b be the side opposite
the 50° angle, and c be the side corresponding to 200 yd. Then
 $a \approx 20 \text{ mm}$, $b \approx 30 \text{ mm}$ and $c \approx 40 \text{ mm}$. 4. $\frac{200 \text{ yd}}{40 \text{ mm}} = \frac{5 \text{ yd}}{1 \text{ mm}}$
5. $\approx 90 \text{ mm}$ 6. $\approx 16 \text{ mm}$ 7. $\approx 320 \text{ mm}^2$ 8. 450 9. 8000
10. yes 11. 16,000

Practice 10-5

1. 174.8 cm^2 2. 578 ft^2 3. 1250.5 mm^2 4. 192.6 m^2
5. 1131.4 in.^2 6. 419.2 cm^2 7. 324.9 in.^2 8. 162 cm^2
9. 37.6 m^2 10. 30.1 mi^2 11. 55.4 km^2 12. 357.6 in.^2
13. 9.7 mm^2 14. 384.0 in.^2 15. 54.5 cm^2 16. 9.1 ft^2
17. 80.9 m^2 18. 83.1 m^2 19. 65.0 ft^2 20. 119.3 ft^2
21. 8 m^2 22. 55.4 ft^2

Guided Problem Solving 10-5

1. subtract 2. 50 3. $\frac{1}{2}ap$ 4. 30 5. 4 6. $\frac{4}{\tan 30^\circ}$ 7. 166
8. 116 9. yes 10. 151

Practice 10-6

1. 32π 2. 16π 3. 7.8π 4. Samples: $\widehat{DFA}$, $\widehat{ABF}$
5. Samples: $\widehat{FE}$, $\widehat{FD}$ 6. Samples: $\widehat{FEB}$, $\widehat{EDA}$ 7. Samples:
 $\widehat{FE}$, $\widehat{ED}$ 8. $\angle ACB$ 9. $\angle FCD$ 10. 32 11. 43 12. 54
13. 39 14. 71 15. 90 16. 50 17. 220 18. 140 19. 220
20. 130 21. $6\pi \text{ in.}$ 22. $16\pi \text{ cm}$ 23. $\frac{9}{4}\pi \text{ m}$

Guided Problem Solving 10-6

1. 11; 2 2. 11; 3; 33 3. circumference; 2 4. 31 5. 26 6. 41
7. 105 8. 102 9. 3027.15

Practice 10-7

1. 49π 2. 21.2 3. $\frac{49}{6}\pi$ 4. $\frac{49}{6}\pi - 21.2$ 5. $\frac{1}{4}\pi$ or $\frac{\pi}{4}$ 6. $\frac{1}{8}$
7. $\frac{1}{16}\pi$ or $\frac{\pi}{16}$ 8. $\frac{\pi}{16} - \frac{1}{8}$ 9. 4π 10. $\frac{18}{5}\pi$ 11. $\frac{9}{8}\pi$ 12. $\frac{3}{2}\pi$
13. $\frac{15}{2}\pi$ 14. 6π 15. $\frac{63}{8}\pi$ 16. $\frac{25}{3}\pi$ 17. $\frac{\pi}{2}$ 18. 3
19. 2 20. 10

Guided Problem Solving 10-7

1. $\frac{m\widehat{AB}}{360} \cdot \pi r^2$ 2. 45 3. 25 4. 30 5. 27 6. a piece from
the outer ring 7. yes 8. a piece from the top tier

Practice 10-8

1. 8.7% 2. 10.9% 3. 15.3% 4. $\frac{3}{10}$ 5. $\frac{7}{10}$ 6. $\frac{2}{5}$ 7. $\frac{1}{10}$
8. 1 9. $\frac{1}{5}$ 10. 22.2% 11. 4.0% 12. 37.5% 13. 20%
14. 50% 15. 40% 16. $33\frac{1}{3}\%$

Guided Problem Solving 10-8

1. outcomes 2. event 3. $\overline{AF}$ 4. $\overline{FG}$ 5. $\overline{EG}$ 6. $\overline{AE}$;
Check students' work. 7. $\frac{2}{3}$ or about 67% 8. $\frac{2}{3}$ or about
67%; yes 9. $\frac{3}{5}$ or 60%

10A: Graphic Organizer

1. Area 2. Answers may vary. Sample: areas of
parallelograms and triangles; areas of trapezoids, rhombuses,
and kites; areas of regular polygons; perimeters and areas of
similar figures; trigonometry and area; circles and arcs; areas
of circles and sectors; geometric probability 3. Check
students' work.

10B: Reading Comprehension

1. E 2. J 3. B 4. G 5. A 6. I 7. D 8. C 9. H 10. F
11. $a^2 + b^2 = c^2$ 12. $m\widehat{AC} = 105^\circ$ 13. $\overleftrightarrow{MN} \parallel \overleftrightarrow{RS}$
14. $\sqrt{225} = 15$ 15. $\triangle JKL$ 16. $\widehat{XY} \cong \widehat{PQ}$
17. $\square ABCD$ 18. $4^2 = 16$ 19. b

10C: Reading/Writing Math Symbols

1. 2860 ft^2 2. $33\frac{1}{3} \text{ ft}^2$ 3. 86 bundles 4. $28\frac{2}{3}$ squares 5. \$9.00
6. \$27.00 7. 45 minutes 8. 21.5 hours 9. \$645 10. \$1419

10D: Visual Vocabulary Practice

1. area of a triangle
2. radius
3. altitude of a parallelogram
4. area of a trapezoid
5. area of a kite or rhombus
6. similarity ratio
7. apothem
8. perimeter (of an octagon)
9. height of a triangle

10E: Vocabulary Check

Semicircle: Half a circle.

Adjacent arcs: Arcs on the same circle with exactly one point in common.

Apothem: The distance from the center to the side of a regular polygon.

Circumference: The distance around a circle.

Concentric circles: Circles that lie on the same plane and have the same center.

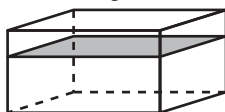
10F: Vocabulary Review Puzzle

1. adjacent arcs
 2. semicircle
 3. center
 4. arc length
 5. base
 6. circle
 7. central angle
 8. congruent arcs
 9. diameter
 10. major arc
 11. concentric circles
 12. minor arc
 13. Pythagorean triple
 14. radius
 15. apothem
 16. sector
 17. height
 18. circumference
- Highness, there is no royal road to geometry.

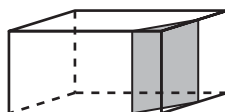
Chapter 11

Practice 11-1

1. 8
2. 5
3. 12
4. C
5. D
6. B
7. A
8. triangle
9. rectangle
10. rectangle
11. rectangle



12. rectangle



Guided Problem Solving 11-1

1. a two-dimensional network
2. Verify Euler's Formula for the network shown.
3. 4
4. 6; 9
5. $4 + 6 = 9 + 1$; This is true.
6. F becomes 3, V stays at 6, E becomes 8. Euler's Formula becomes $3 + 6 = 8 + 1$, which is still true.
7. $4 + 4 = 6 + 2$; This is true.

Practice 11-2

1. 62.8 cm^2
2. 552.9 ft^2
3. 226.2 cm^2
4. 113.1 m^2
5. 44.0 ft^2
6. 84.8 cm^2
- 7a. 320 m^2
- 7b. 440 m^2
- 8a. 576 in.^2
- 8b. 684 in.^2
- 9a. 216 mm^2
- 9b. 264 mm^2
- 10a. 48 cm^2
- 10b. 60 cm^2
- 11a. 1500 m^2
- 11b. 1800 m^2
- 12a. 2000 ft^2
- 12b. 2120 ft^2
13. $8\pi \text{ m}^2$
14. $94.5\pi \text{ cm}^2$
15. $290\pi \text{ ft}^2$

Guided Problem Solving 11-2

1. a picture of a box, with dimensions
2. the amount of cardboard the box is made of, in square inches
3. A front and a back, each $4 \text{ in.} \times 7\frac{1}{2} \text{ in.}$; a top and a bottom, each $4 \text{ in.} \times 1 \text{ in.}$; and one narrow side, $1 \text{ in.} \times 7\frac{1}{2} \text{ in.}$
4. Front and back: each 30 in.^2 ; top and bottom: each 4 in.^2 ; one narrow side: $7\frac{1}{2} \text{ in.}^2$
5. $75\frac{1}{2} \text{ in.}^2$
6. $75\frac{1}{2} \text{ in.}^2$ is about half a square foot ($1 \text{ ft}^2 = 144 \text{ in.}^2$), which is reasonable. The answer is an approximation because the solution did not consider the overlap of cardboard at the glued joints, nor does it factor in the trapezoid-shaped cutout in the front and back sides.
7. $3\frac{1}{2} \text{ in.}^2$

Practice 11-3

1. 64 m^2
2. 620 cm^2
3. 188 ft^2
4. $36\pi \text{ cm}^2$
5. $800\pi \text{ m}^2$
6. $300\pi \text{ in.}^2$
7. 109.6 m^2
8. 160.0 cm^2
9. 387.7 ft^2
10. 147.6 m^2
11. 118.4 cm^2
12. 668.2 ft^2

Guided Problem Solving 11-3

1. a solid consisting of a cylinder and a cone
2. the surface area of the solid
3. The top of the solid is a circular base of the cylinder, $A_1 = \pi r^2$. The side of the solid is the lateral area of the cylinder, $A_2 = 2\pi rh$. The bottom of the solid is the lateral area of the cone, $A_3 = \pi r\ell$.
4. $r = 5 \text{ ft}$; $h = 6 \text{ ft}$; $\ell = \sqrt{5^2 + 12^2} = 13 \text{ ft}$
5. Top: $A_1 = 78.5 \text{ ft}^2$; side: $A_2 = 188.5 \text{ ft}^2$; bottom: 204.2 ft^2
6. 471 ft^2
7. About 0.43, or a little less than half. This seems reasonable.
8. 628 ft^2

Practice 11-4

1. 1131.0 m^3
2. $94,247.8 \text{ cm}^3$
3. 7.1 in.^3
4. 1781.3 in.^3
5. 785.4 cm^3
6. 603.2 cm^3
7. 120 in.^3
8. 35 ft^3
9. 42 m^3
10. 1728 ft^3
11. 784 cm^3
12. 265 in.^3
13. 76 ft^3
14. 943 in.^3
15. 1152 m^3

Guided Problem Solving 11-4

1. dimensions for a layer of topsoil, and two options for buying the soil
2. which purchasing option is cheaper
3. $\frac{1}{3} \text{ ft}$
4. 1400 ft^3
5. 467 bags; \$1167.50
6. $1400 \text{ ft}^3 \approx 52 \text{ yd}^3$
7. \$1164 (or slightly less if the topsoil volume is not rounded up to the next whole number)
8. buying in bulk
9. The two costs are quite close. It makes sense that buying in bulk would be slightly cheaper for a good-sized backyard.
10. Buying topsoil by the bag would be less expensive because it would cost \$335 and in bulk would cost at least \$345.93.

Practice 11-5

1. $34,992 \text{ cm}^3$
2. 400 in.^3
3. $10,240 \text{ in.}^3$
4. 4800 yd^3
5. 150 m^3
6. 48 cm^3
7. 628.3 cm^3
8. 314.2 in.^3
9. 4955.3 m^3
10. 1415.8 in.^3
11. 1005.3 m^3
12. 18.8 ft^3
13. 20
14. 2
15. 6

Guided Problem Solving 11-5

1. a description of a plumb bob, with dimensions 2. the plumb bob's volume 3. equilateral; 2 cm 4. $a = \sqrt{3}$ cm; $B = 6\sqrt{3}$ cm² 5. Prism: $V_1 = 36\sqrt{3}$ cm³; pyramid: $V_2 = 6\sqrt{3}$ cm³; plum bob: $V \approx 73$ cm³ 6. $\frac{1}{7}$; this seems reasonable 7. 42 cm³

Practice 11-6

1. 2463.0 in.² 2. 6,157,521.6 m² 3. 12.6 cm² 4. 1256.6 m² 5. 50.3 ft² 6. 153.9 m² 7. 1436.8 mi³ 8. 268,082.6 cm³ 9. 7238.2 m³ 10. 14.1 cm³ 11. 2,572,354.6 cm³ 12. 904,810.7 yd³ 13. 546 ft² 14. 399 m² 15. 1318 cm² 16. 233 cm³ 17. 7124 cm³ 18. 5547 cm³ 19. 42 cm³

Guided Problem Solving 11-6

1. the diameter of a hailstone, along with its density compared to normal ice 2. the hailstone's weight 3. $V = \frac{4}{3}\pi r^3$ 4. 2.8 in. 5. 91.95 in.³ 6. 1.7 lb 7. The density of normal ice. This was given for comparison purposes only. 8. 0.01 oz

Practice 11-7

1. 7 : 9 2. 5 : 8 3. yes; 4 : 7 4. yes; 4 : 3 5. not similar 6. yes; 4 : 5 7. 125 cm³ 8. 256 in.³ 9. 432 ft³ 10. 25 ft² 11. 90 m² 12. 600 cm² 13. 54,000 lb 14. 16 lb

Guided Problem Solving 11-7

1. two different sizes for an image on a balloon, and the volume of air in the balloon for one of those sizes 2. the volume of air for the other size 3. The two sizes of the clown face have a ratio of 4 : 8, or 1 : 2. 4. 1 : 8 5. $108 \text{ in.}^3 \times 8 = 864 \text{ in.}^3$ 6. Yes, the two clown face heights are lengths, measured in inches (not in.² or in.³). 7. 351 cm³

11A: Graphic Organizer

1. Surface Area and Volume 2. Answers may vary. Sample: space figures and nets; space figures and drawing; surface areas; and volumes. 3. Check students' work.

11B: Reading Comprehension

1. Area = $\frac{1}{2}$ base times height; area of a triangle 2. slope = the difference of the y -coordinates divided by the difference of the x -coordinates; slope of the line between 2 points 3. a squared plus b squared equals c squared, the Pythagorean Theorem; the lengths of the sides of a right triangle 4. area = pi times radius squared; area of a circle 5. volume = pi times radius squared times height; volume of a cylinder 6. the sum of the x -coordinates of two points divided by 2, and the sum of the y -coordinates of two points divided by 2; midpoint of a line segment with endpoints (x_1, y_1) and (x_2, y_2) 7. circumference = two times pi times the radius; circumference of a circle 8. volume = one-third pi times radius squared times height; volume of a cone

9. distance equals the square root of the quantity of the sum of the square of the difference of the x -coordinates, squared, plus the difference of the y -coordinates, squared; the distance between two points (x_1, y_1) and (x_2, y_2) 10. area = one-half the height times the sum of base one plus base two; area of a trapezoid 11. a

11C: Reading/Writing Math Symbols

1. 527.8 in² 2. 136 ft²

11D: Visual Vocabulary Practice

1. prism 2. cross section 3. sphere 4. cylinder 5. cone 6. pyramid 7. polyhedron 8. altitude 9. base

11E: Vocabulary Check

Face: A surface of a polyhedron.

Edge: An intersection of two faces of a polyhedron.

Altitude: For a prism or cylinder, a perpendicular segment that joins the planes of the bases.

Surface area: For a prism, cylinder, pyramid, or cone, the sum of the lateral area and the areas of the bases.

Volume: A measure of the space a figure occupies.

11F: Vocabulary Review

1. polyhedron 2. edge 3. vertex 4. cross section 5. prism 6. altitude 7. right prism 8. slant height 9. cone 10. volume 11. sphere 12. hemispheres 13. similar figures 14. hypotenuse

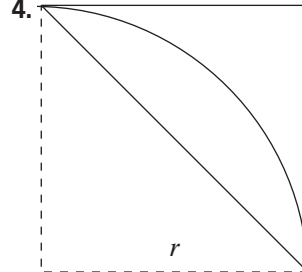
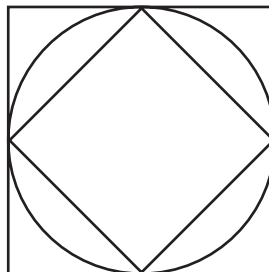
Chapter 12

Practice 12-1

1. 32 2. 50 3. $\frac{7}{2}$ 4. 15 5. $\sqrt{91}$ 6. 6 7. $\sqrt{634}$ 8. $\sqrt{901}$ 9. $4\sqrt{3}$ 10. circumscribed 11. inscribed 12. circumscribed 13. 24 cm 14. 28 in. 15. 52 ft

Guided Problem Solving 12-1

1. The area of one is twice the area of the other.
2. inscribed; circumscribed
- 3.



5. $2r$ 6. $4r^2$ 7. $\sqrt{2}r$ 8. $2r^2$ 9. $4r^2 = 2(2r^2)$: One area is double the other area. 10. yes 11. The same: The area of one circle is twice the area of the other circle.

Practice 12-2

1. $r = 13$; $m\widehat{AB} \approx 134.8$ 2. $r = 3\sqrt{5}$; $m\widehat{AB} \approx 53.1$
3. $r = \frac{\sqrt{41}}{2}$; $m\widehat{AB} \approx 102.7$ 4. 3 5. 4.5
6. 3 7. 20.8 8. 13.7 9. 8.5 10. $\angle Q \cong \angle T$;
 $\overline{PR} \cong \overline{SU}$ 11. $\angle A \cong \angle J$; $\widehat{BC} \cong \widehat{KL}$ 12. Construct
radii $\overline{OD}$ and $\overline{OB}$. $FD = EB$ because a diameter perpendicular to a chord bisects it, and chords $\widehat{CD}$ and $\widehat{AB}$ are congruent
(given). Then, by HL, $\triangle OEB \cong \triangle OFD$, and by CPCTC,
 $OE = OF$ 13. Because congruent arcs have congruent
chords, $AB = BC = CA$. Then, because an equilateral
triangle is equiangular, $m\angle ABC = m\angle BCA = m\angle CAB$.

Guided Problem Solving 12-2

1. perpendicular 2. bisects 3. 4; 3 4. right 5. radius
6. Pythagorean Theorem 7. 5 8. yes 9. 8; 4

Practice 12-3

1. $\angle A$ and $\angle D$; $\angle B$ and $\angle C$ 2. $\angle ADB$ and $\angle CDB$
3. $\angle ADB$ and $\angle CAD$ 4. 55 5. $x = 45$; $y = 50$;
 $z = 85$ 6. $x = 90$; $y = 70$ 7. 180 8. 70 9. $x = 120$;
 $y = 60$; $z = 60$ 10. $x = 120$; $y = 100$; $z = 140$
11. $x = 63$; $y = 63$; $z = 54$ 12. $x = 50$; $y = 80$; $z = 80$
- 13a. $m\widehat{AE} = 170$ 13b. $m\angle C = 85$ 13c. $m\angle BEC = 10$
- 13d. $m\angle D = 85$ 14a. $m\angle A = 90$ 14b. $m\angle B = 80$
- 14c. $m\angle C = 90$ 14d. $m\angle D = 100$

Guided Problem Solving 12-3

1. C 2. 180 3. a diameter 4. Check students' work.
5. Check students' work. 6. Check students' work.
7. Check students' work. 8. 90 9. Check students' work.

Practice 12-4

1. 87 2. 35 3. 45 4. 120 5. $x = 45$; $y = 50$; 6. 90;
 $y = 70$ 7. $x = 58$; $y = 58$; $z = 63$ 8. $x = 30$; $y = 66$
9. $x = 30$; $y = 30$; $z = 120$ 10. $x = 16$; $y = 52$
11. $x = 138$; $y = 111$; $z = 111$ 12. $x = 30$; $y = 60$
13. 10 14. 14.8 15. 4.7 16. 4 17. 3.2 18. 6

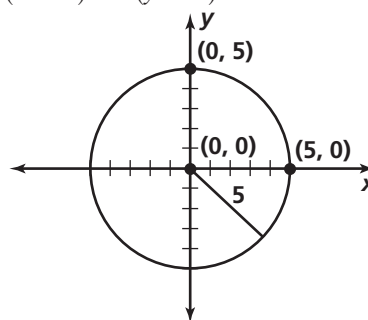
Guided Problem Solving 12-4

1. tangent 2. 360. 3. $\frac{1}{2}$ 4. 85 5. 2 6. 180 7. 95
8. 104; 86; 75 9. 360 10. yes; The sum of the measures of
the arcs should be 360. 11. Opposite angles are not
supplementary.

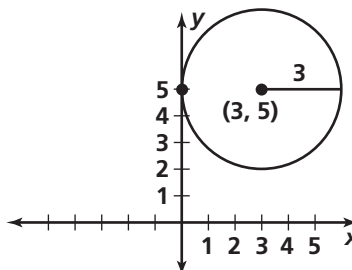
Practice 12-5

1. $C(0, 0)$, $r = 6$ 2. $C(2, 7)$, $r = 7$ 3. $C(-1, -6)$, $r = 4$
4. $C(-3, 11)$, $r = 2\sqrt{3}$ 5. $x^2 + y^2 = 49$
6. $(x - 4)^2 + (y - 3)^2 = 64$ 7. $(x - 5)^2 + (y - 3)^2 = 4$
8. $(x + 5)^2 + (y - 4)^2 = \frac{1}{4}$ 9. $(x + 2)^2 + (y + 5)^2 = 2$
10. $(x + 1)^2 + (y - 6)^2 = 5$ 11. $x^2 + y^2 = 4$

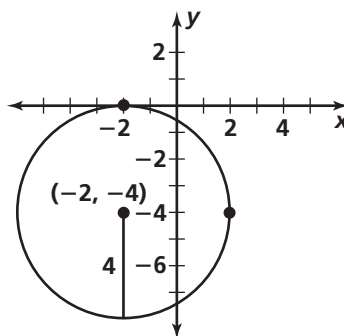
12. $(x + 3)^2 + (y - 3)^2 = 1$ 13. $x^2 + (y - 3)^2 = 16$
14. $(x - 7)^2 + (y + 2)^2 = 4$ 15. $x^2 + (y + 20)^2 = 100$
16. $(x + 4)^2 + (y + 6)^2 = 25$
- 17.



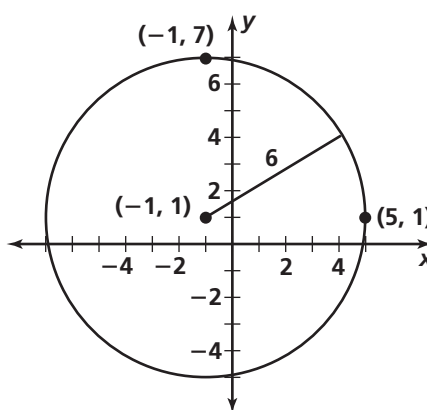
18.



19.



20.



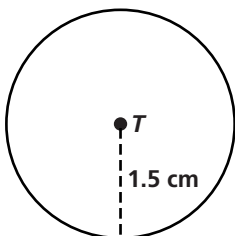
21. $x^2 + y^2 = 25$ 22. $(x - 5)^2 + (y - 9)^2 = 9$
23. $(x + 4)^2 + (y + 3)^2 = 61$
24. $(x - 7)^2 + (y + 2)^2 = 80$
25. $(x + 4)^2 + (y + 3)^2 = 4$
26. $(x - 4)^2 + (y - 1)^2 = 16$

Guided Problem Solving 12-5

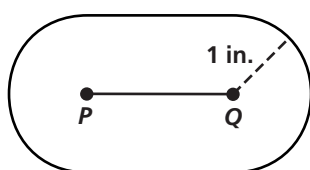
1. $(2, 2)$; 5 2. $\frac{4}{3}$ 3. They are perpendicular. 4. $-\frac{3}{4}$ 5. $\frac{39}{4}$
 6. $y = -\frac{3}{4}x + \frac{39}{4}$ 7. 13 8. $y = -\frac{3}{4}x + \frac{39}{4}$; yes
 9. x-intercept: $a = \frac{25}{3}$; y-intercept: $b = \frac{25}{4}$

Practice 12-6

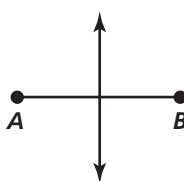
1.



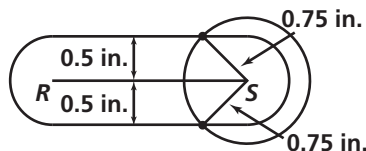
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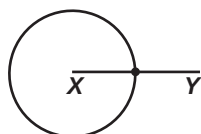
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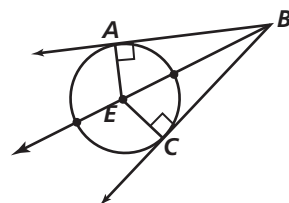
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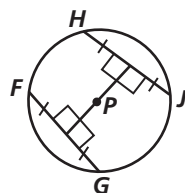
5.



6.

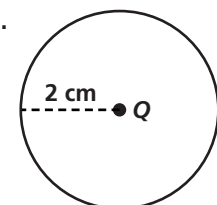


7.

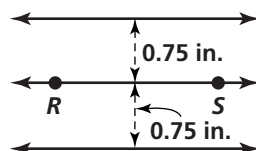


8. a third line parallel to the two given lines and midway between them 9. a sphere whose center is the given point and whose radius is the given distance 10. the points within, but not on, a circle of radius 1 in. centered at the given point

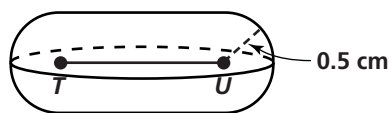
11.



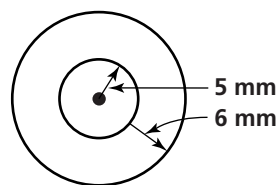
12.



13.



14.



Guided Problem Solving 12-6

1. a line 2. Check students' work. 3. They are perpendicular. 4. $-\frac{1}{2}$ 5. 2 6. the midpoint of $\overline{PQ}$ 7. $(3, 2)$
 8. -4 9. $y = 2x - 4$ 10. $(2, 0)$; yes 11. $y = \frac{1}{2}x + 2$

12A: Graphic Organizer

1. Circles 2. Answers may vary. Sample: tangent lines; chords and arcs; inscribed angles; and angle measures and segment lengths 3. Check students' work.

12B: Reading Comprehension

Answers may vary. Sample answers:

1. $\overline{AD}$, $\overline{CE}$ 2. $\overline{BF}$, $\overline{CD}$, $\overline{AD}$ 3. $\overline{HD}$ 4. $\overline{AH}$
 5. $\overline{AF}$, $\overline{AB}$, $\overline{BC}$ 6. $\overline{CDF}$, $\overline{DAB}$, $\overline{DAC}$ 7. $\overline{AC}$, $\overline{ED}$
 8. $\angle AOC$ 9. $\angle DCE$ 10. $\overline{DEA}$ 11. $\angle DAH$
 12. $\angle AGB$ 13. $\angle AHC$ 14. $\angle DCE$ 15. $\overline{AH}$ 16. a

12C: Reading/Writing Math Symbols

1. $\overline{BC} \perp \overline{DE}$ 2. $\overline{EF}$ is tangent to $\odot G$. 3. $\overline{WX} \cong \overline{ZY}$
 4. $\overline{AB} \perp \overline{XY}$ 5. $HM = 4$

12D: Visual Vocabulary Practice

1. tangent to a circle 2. standard form of an equation of a circle 3. secant 4. chord 5. circumscribed about
 6. intercepted arc 7. inscribed in 8. inscribed angle
 9. locus

12E: Vocabulary Check

Inscribed in: A circle inside a polygon with the sides of the polygon tangent to the circle.

Chord: A segment whose endpoints are on a circle.

Point of tangency: The single point of intersection of a tangent line and a circle.

Tangent to a circle: A line, segment, or ray in the plane of a circle that intersects the circle in exactly one point.

Circumscribed about: circle outside a polygon with the vertices of the polygon on the circle.

12F: Vocabulary Review

1. D 2. F 3. G 4. A 5. C 6. B 7. E 8. M 9. I
 10. L 11. N 12. H 13. K 14. J