CK-12 Foundation

CK-12 Geometry Second Edition Answer Key

Jordan

CK-12 Foundation is a non-profit organization with a mission to reduce the cost of textbook materials for the K-12 market both in the U.S. and worldwide. Using an open-content, web-based collaborative model termed the "FlexBook," CK-12 intends to pioneer the generation and distribution of high-quality educational content that will serve both as core text as well as provide an adaptive environment for learning, powered through the FlexBook Platform™.

Printed: May 13, 2011

flexbook
next generation textbooks

Author
Lori Jordan

Contents

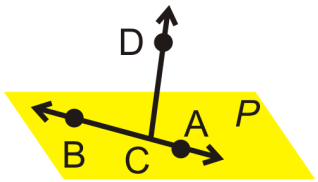
Chapter 1

Geometry - Second Edition, Chapter 1, Answer Key

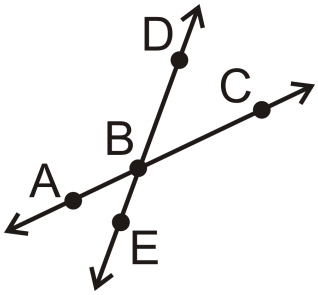
1.1 Geometry - Second Edition, Points, Lines, and Planes, Review Answers

For 1-5, answers will vary. One possible answer for each is included.

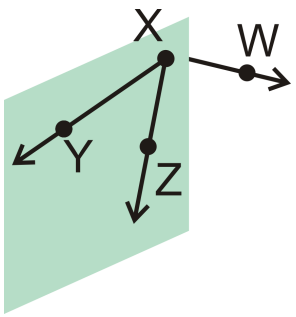
1.

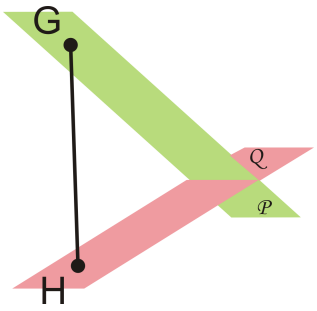


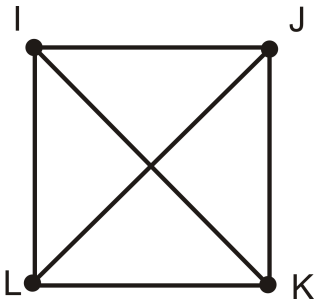
2.



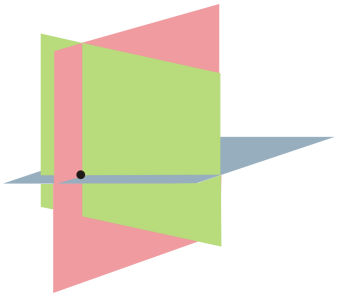
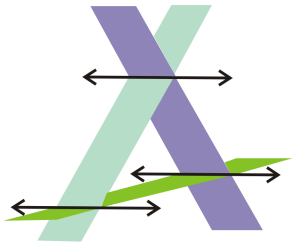
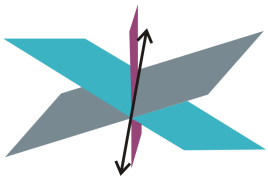
3.



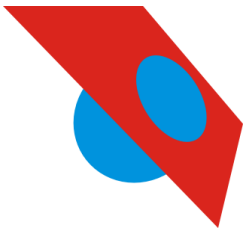
4. 

5. 

6. $\overleftrightarrow{WX}$, $\overleftrightarrow{YW}$, line m, $\overleftrightarrow{XY}$ and $\overleftrightarrow{WY}$.
7. Plane $\mathcal{V}$ or plane RST.
8. In addition to the pictures to the right, three planes may not intersect at all and can be parallel.

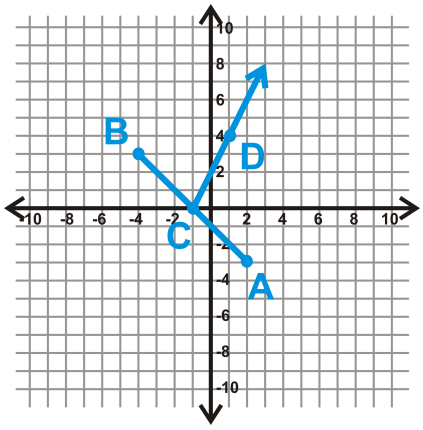
9. A circle.



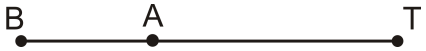
10. $\overrightarrow{PQ}$ intersects $\overleftrightarrow{RS}$ at point Q.
11. $\overrightarrow{AC}$ and $\overline{AB}$ are coplanar and point D is not.
12. Points E and H are coplanar, but their rays, $\overrightarrow{EF}$ and $\overrightarrow{GH}$ are non-coplanar.
13. $\overrightarrow{IJ}$, $\overrightarrow{IK}$, $\overrightarrow{IL}$, and $\overrightarrow{IM}$ with common endpoint I and J, K, L and M are non-collinear.
14. Always
15. Sometimes
16. Sometimes
17. Sometimes
18. Never
19. Always
20. Sometimes

21. Never
22. Always
23. Sometimes
24. #22: By definition, a point does not take up any space, it is only location.
    #25: The ray is never read "BA," the endpoint always is said first.
25. To make # 19 true, they must be three non-collinearpoints.
    For # 20, the two rays must lie on the same line, which it does not state.
    For # 24, four points could be coplanar, but you only need three points to make a plane, so the fourth point could be in another plane.
    For # 27, theorems can also be proven true by definitions and previously proven theorems.
26. The walls, ceiling and floor are all planes. When two of them intersect the intersection is a line (i.e. the ceiling and a wall). When two walls and either the ceiling or the floor intersect the intersection is a point.
27. The spokes on a wheel are segments. They intersect at a point.
28. Cities on a map are points and the distance between them can be found by measuring the segment connecting the points.

29-33.



1.2 Geometry - Second Edition, Segments and Distance, Review Answers

1. 1.625 in
2. 2.875 in
3. 3.7 cm
4. 8.2 cm
5. 2.75 in
6. 4.9 cm
7. 4.625 in
8. 8.7 cm
9. 

10. O would be halfway between L and T, so that $LO = OT = 8\ cm$
11. (a) 

    (b) $TA + AQ = TQ$

(c) $TQ = 15\ in$

12. (a) 

,

(b) $HM + MA = HA$

(c) $AM = 11\ cm$

13. $BC = 8\ cm$, $BD = 25\ cm$, and $CD = 17\ cm$

14. $FE = 8\ in$, $HG = 13\ in$, and $FG = 17\ in$

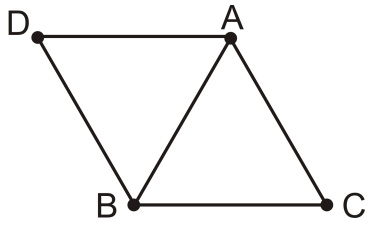
15. (a) $RS = 4$

(b) $QS = 14$

(c) $TS = 8$

(d) $TV = 12$

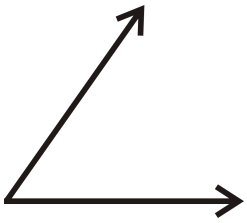
16. $x = 3$, $HJ = 21$, $JK = 12$, $HK = 33$
17. $x = 11$, $HJ = 52$, $JK = 79$, $HK = 131$
18. $x = 1$, $HJ = 2\frac{1}{3}$, $JK = 5\frac{2}{3}$, $HK = 8$
19. $x = 17$, $HJ = 27$, $JK = 153$, $KH = 180$
20. $x = 16$, $HJ = 7$, $JK = 15$, $KH = 22$
21. One possible answer.



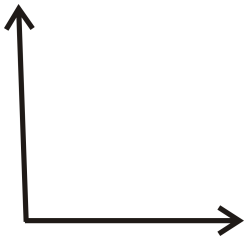
22. $|7 - (-6)| = 13$
23. $|-3-2| = 5$
24. $|0 - (-9)| = 9$
25. $|-4-1| = 5$
26. Answers vary, but hopefully most students found their heights to be between 7 and 8 heads.
27. Answers should include some reference to the idea that multiplying and dividing by ten (according to the prefixes) is much easier than keeping track of 12 inches in a ft, 3 ft in a yard, 5280 ft in a mile, etc.
28. Answers vary, but students should recognize that the pedometer is more likely to yield a false reading because a person's stride length varies. One possible way to minimize this error would be to average a person's stride length over a relatively long distance-i.e. count the number of steps taken in 100 m.
29. Answers vary. The cubit was the first recorded unit of measure and it was integral to the building of the Egyptian pyramids.
30. Students should comment on the "ideal" proportions found in the human face and how these correspond to our perception of beauty.

1.3 Geometry - Second Edition, Angles and Measurement, Review Answers

1. False, two angles could be 5° and 30°.
2. False, it is a straight angle.
3. True
4. True
5. False, you use a compass.
6. False, B is the vertex.
7. True
8. True
9. True
10. False, it is equal to the sum of the smaller angles within it.
11. Acute



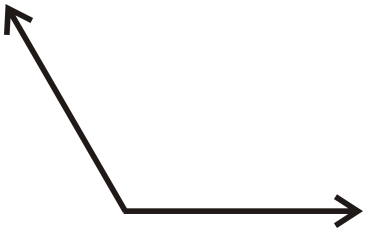
12. Obtuse



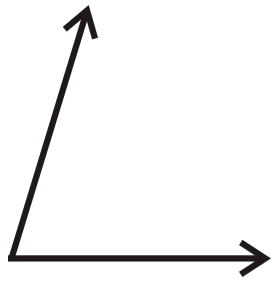
13. Obtuse

14. Acute

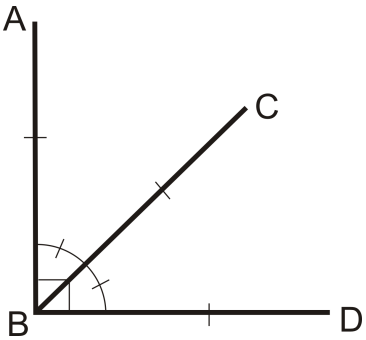
15. Obtuse

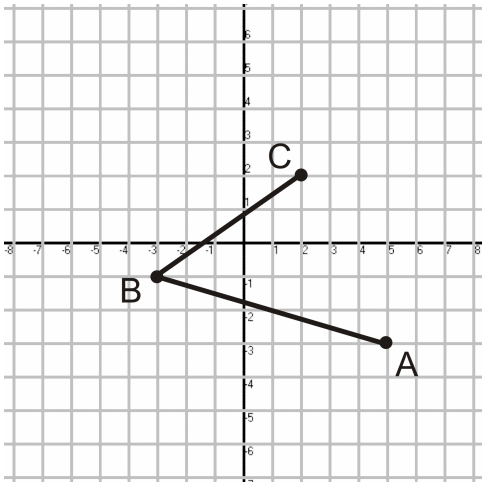


16. Acute

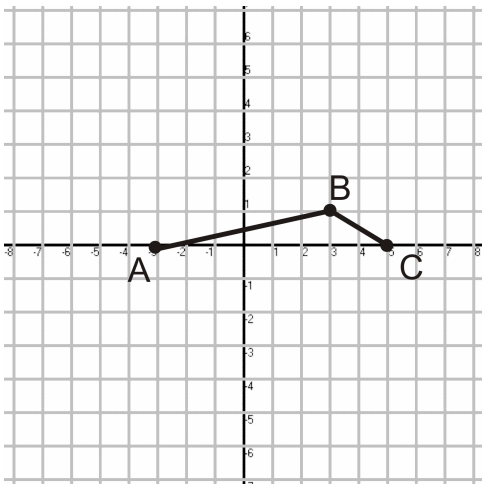


17 & 18: Drawings should look exactly like 12 and 16, but with the appropriate arc marks.

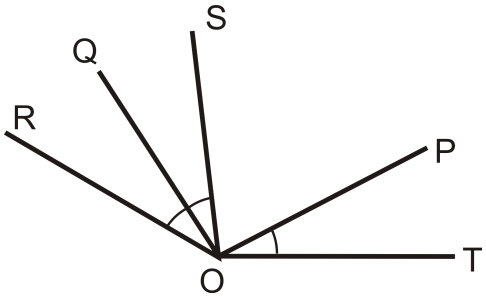
19. $40°$
20. $122°$
21. $18°$
22. $87°$
23. $AE = CD, ED = CB, m\angle EDC = 90°, m\angle EAC = m\angle ABC$
24. 

25. An interior point would be (2, 0).


26. An interior point would be (2, 0).

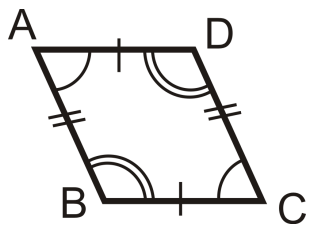


27.

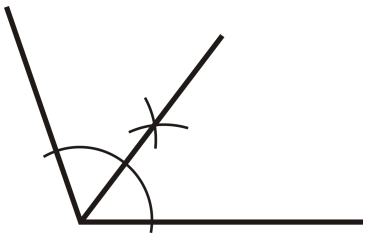


28. $m\angle QOP = 100°$
29. $m\angle QOT = 130°$
30. $m\angle ROQ = 30°$
31. $m\angle SOP = 70°$
32. $(x+7)° + (2x+19)° = 56°$
    $(3x+26)° = 56°$
    $3x° = 30°$
    $x = 10°$
33. $(4x-23)° + (4x-23)° = 130°$
    $(8x-46)° = 130°$
    $8x° = 176°$
    $x = 22°$
34. $(5x-13)° + 90° = (16x-55)°$
    $(5x-77)° = (16x-55)°$
    $22° = 11x°$
    $x = 2°$
35. $(x-9)° + (5x+1)° = (9x-80)°$
    $(6x-8)° = (9x-80)°$
    $72° = 3x°$
    $x = 24°$
36. Students should comment about the necessity to have a number of degrees in a line that is divisible by 30, 45, 60 and 90 degrees because these degree measures are prevalent in the study of geometrical figures. Basically, setting the measure of a straight line equal to 180 degrees allows us to have more whole number degree measures in common geometrical figures.

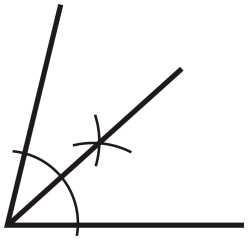
1.4 Geometry - Second Edition, Midpoints and Bisectors, Review Answers

1. 

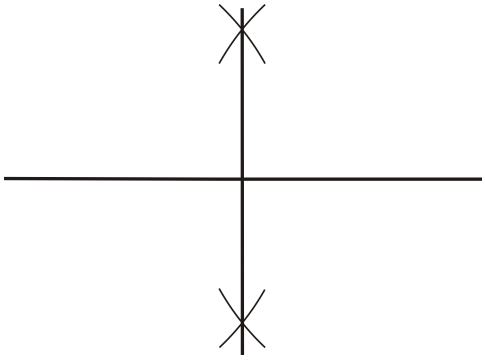
2. 12 in
3. 5 in
4. 5 in
5. 13 in
6. 90°
7. 10 in
8. 24 in
9. 90°
10. 8 triangles
11. $\overline{PS}$
12. $\overline{QT}, \overline{VS}$
13. 90°
14. 45°
15. bisector
16. bisector
17. $\overline{PU}$ is a segment bisector of $\overline{QT}$
18. 45°
19. $x = 9,\ y = 14°$
20. $x = 14°$
21. $x = 20°$
22. $d = 13°$
23. $x = 12$
24. $a = 22°,\ x = 12°$
25. 55° each



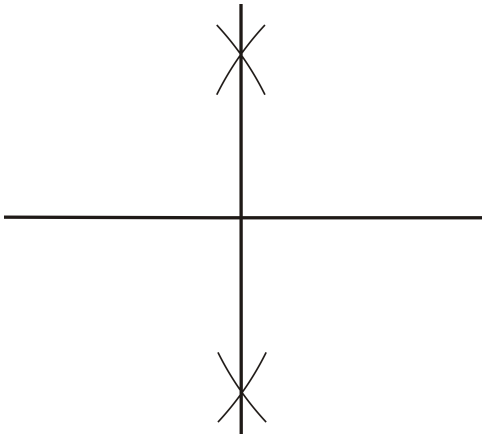
26. 37.5° each



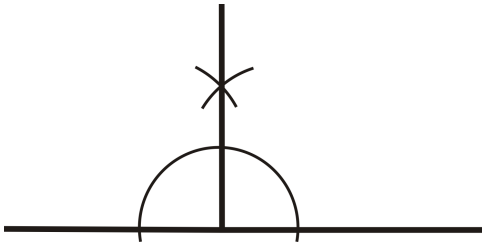
27. 3.5 cm each



28. 2 in each



29. You created a right, or 90° angle.

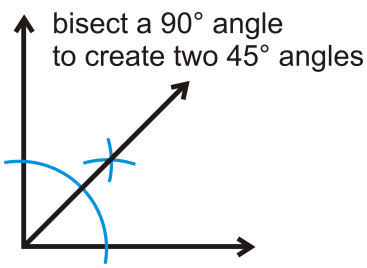


30. (3, -5)
31. (1.5, -6)
32. (5, 5)
33. (-4.5, 2)
34. (7, 10)
35. (6, 9)
36. This is incorrect. She should havewritten $AB = CD$ or $\overline{AB} \cong \overline{CD}$.
37. This formula will give the same answer.

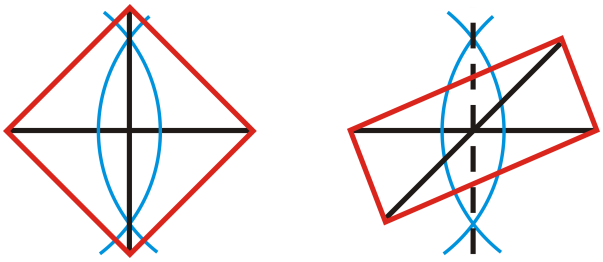
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = (m_x, m_y)$$
$$\frac{x_1 + x_2}{2} = m_x \quad \text{and} \quad \frac{y_1 + y_2}{2} = m_y$$
$$x_1 + x_2 = 2m_x \quad \text{and} \quad y_1 + y_2 = 2m_y$$
$$x_1 = 2m_x - x_2 \quad \text{and} \quad y_1 = 2m_y - y_2$$

For#34, $x_1 = 2(3) - (-1) = 7$

$y_1 = 2(6) - 2 = 10$

38. 

39. A square or a rectangle.



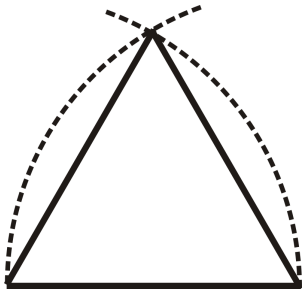
40. Midpoint could be used to determine where you might want to make a stop halfway through a trip (if using a map the longitude and latitude could be used in the formula for midpoint). We often want to find the middle of something-the middle of a wall to hang a picture, the middle of a room to divide it in half, etc.

1.5 Geometry - Second Edition, Angle Pairs, Review Answers

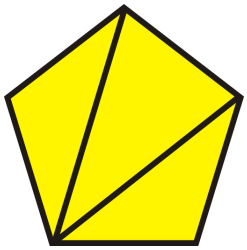
1. (a) 45°
   (b) 8°
   (c) 81°
   (d) $(90 - z)°$
2. (a) 135°
   (b) 62°
   (c) 148°
   (d) $(180 - x)°$
3. $\angle JNI$ and $\angle MNL$ (or $\angle INM$ and $\angle JNL$)
4. $\angle INM$ and $\angle MNL$ (or $\angle INK$ and $\angle KNL$)
5. $\angle INJ$and $\angle JNK$
6. $\angle INM$ and $\angle MNL$ (or $\angle INK$ and $\angle KNL$)
7. (a) 27°
   (b) 90°
   (c) 63°
   (d) 117°
8. Always
9. Sometimes
10. Never

11. Always
12. Always
13. Never
14. Sometimes
15. Always
16. $x = 7°$
17. $x = 34°$
18. $y = 13°$
19. $x = 17°$
20. $x = 15°$
21. $y = 9°$
22. $y = 8°$
23. $x = 10.5°$
24. $x = 4°$
25. $y = 3°$
26. $x = 67°,\ y = 30°$
27. $x = 38°,\ y = 25°$
28. $x = 15°,\ x = -4°$
29. $x = 11°,\ x = -2°$
30. $x = 3°,\ y = -5°$
31. $x = 11°,\ y = 7°$

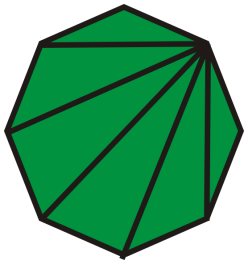
1.6 Geometry - Second Edition, Classifying Polygons, Review Answers

1. Acute scalene triangle
2. Equilateral and equiangular triangle
3. Right isosceles triangle.
4. Obtuse scalene triangle
5. Acute isosceles triangle
6. Obtuse isosceles triangle
7. No, there would be more than 180° in the triangle, which is impossible.
8. No, same reason as #7.
9. 
10. All the angles in an equilateral triangle must be equal. So, an equilateral triangle is also an equiangular triangle.
11. Concave pentagon
12. Convex octagon
13. Convex 17-gon
14. Convex decagon
15. Concave quadrilateral

16. Concave hexagon
17. A is not a polygon because the two sides do not meet at a vertex; B is not a polygon because one side is curved; C is not a polygon because it is not closed.
18. 2 diagonals



19. 5 diagonals



20. A dodecagon has twelve sides, so you can draw nine diagonals from one vertex.
21. The pattern is below

Table 1.1:

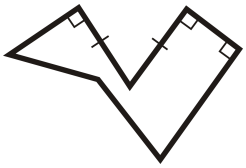
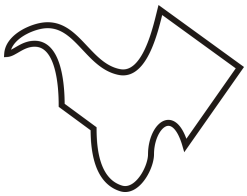
Number of sides	**Diagonals from one vertex**
3	0
4	1
5	2
6	3
7	4
8	5
9	6
10	7
11	8
12	9

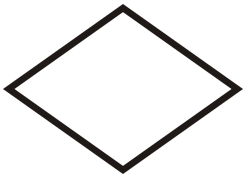
This shows us that the number diagonals from one vertex increase by one each time. So, for an $n-$gon, there are $(n-3)$ diagonals from one vertex.

22. Octagon has 20 total diagonals Nonagon has 27 total diagonals
    Decagon has 35 total diagonals
    Undecagon has 44 total diagonals
    Dodecagon has 54 total diagonals
    The pattern is 0, 2, 5, 9, 14, 20, 27, 35, 44, 54. To find the next term you would add one more than was added previously. For example, the next term you would add 11. The equation is $\frac{n(n-3)}{2}$.
23. Sometimes
24. Always

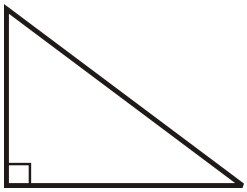
25. Always
26. Never
27. Always
28. Sometimes, a square is ALWAYS a quadrilateral.
29. Sometimes, you can draw AT MOST $n-3$ diagonals from one vertex.
30. Sometimes, a 5-point star is ALWAYS a decagon.

For questions 31-34 answers will vary.

31. 
32. 
33. 
34. a rhombus or diamond



35. This triangle is to scale.



36. Use #9 to help you. It is the same construction, but do not draw the third side.

1.7 Geometry - Second Edition, Chapter Review Answers

1. E
2. B
3. L
4. A
5. H
6. M

7. F
8. P
9. J
10. G
11. I
12. K
13. D
14. C
15. N

Chapter 2

Geometry - Second Edition, Chapter 2, Answer Key

2.1 Geometry - Second Edition, Inductive Reasoning, Review Answers

1. 9, 21
2. 20, 110
3. (a)

   (b) there are two more points in each star than its figure number.
   (c) $n + 2$
4. (a) 10;

   (b) 48
   (c) $2n$
5. $20, 23; 107; 3n + 2$
6. $-19, -24; -164; -5n + 11$
7. $64, 128; 34,359,738,368; 2^n$
8. $12, 1; -307; -11n + 78$
9. $-12, 0; -93$; odd terms: $-3n + 12$, even terms: $-4n$
10. $\frac{6}{7}, \frac{7}{8}; \frac{35}{36}; \frac{n}{n+1}$

11. $\frac{12}{23}, \frac{14}{27}; \frac{70}{139}; \frac{2n}{4n-1}$
12. $-13, 15; 71; (-1)^{n-1}(2n+1)$
13. $21, -25; -137; (-1)^n(4n-3)$
14. $\frac{1}{12}, \frac{-1}{14}; \frac{-1}{70}; \frac{(-1)^n}{2n}$
15. $8, 11; 73$; odd terms $2n+3$, even terms $2n+10$
16. $36, 49; 1225; n^2$
17. 38, 57; the amount that is added is increasing by two with each term.
18. 48, 67; the amount that is added is increasing by two with each term.
19. 216, 343; the term number cubed, n^3.
20. 8, 13; add the previous two terms together to get the current term.
21. There is a good change that Tommy will see a deer, but it is not definite. He is reasoning correctly, but there are other factors that might affect the outcome.
22. Maddie has experimented multiple times and recognized a pattern in her results. This is a good example of inductive reasoning.
23. Juan does not use inductive reasoning correctly. It is important that conclusions are based on multiple observations which establish a pattern of results. He only has one trial.
24. Answers vary-correct answers should include multiple experiments or trials which indicate a clear pattern for outcomes.
25. Answers vary.
26. $\frac{n(n+3)}{2}$
27. $\frac{(n+1)(n+2)}{2}$
28. $\frac{n(n+1)(n+2)}{2}$
29. Students should notice that the points are collinear. Thus, they could find the rule by finding the equation of the line using any two of the three points. The equation is $y = 5x - 2$.
30. The sequences in problems 5, 6 and 8 are of the same type. They can be modeled by linear equations because they have a constant "slope" or rate of change. In other words, the same value is added or subtracted each time to get the next term.

2.2 Geometry - Second Edition, Conditional Statements, Review Answers

1. Hypothesis: 5 divides evenly into x.
   Conclusion: x ends in 0 or 5.
2. Hypothesis: A triangle has three congruent sides.
   Conclusion: It is an equilateral triangle.
3. Hypothesis: Three points lie in the same plane.
   Conclusion: The three points are coplanar.
4. Hypothesis: $x = 3$.
   Conclusion: $x^2 = 9$.
5. Hypothesis: You take yoga.
   Conclusion: You are relaxed.
6. Hypothesis: You are a baseball player.
   Conclusion: You wear a hat.
7. Converse: If x ends in 0 or 5, then 5 divides evenly into x. *True.*
   Inverse: If 5 does not divide evenly into x, then x does not end in 0 or 5. *True.*
   Contrapositive: If x does not end in 0 or 5, then 5 does not divide evenly into it. *True*
8. Converse: If you are relaxed, then you take yoga. *False.* You could have gone to a spa.

Inverse: If you do not take yoga, then you are not relaxed. *False.* You can be relaxed without having had taking yoga. You could have gone to a spa.
Contrapositive: If you are not relaxed, then you did not take yoga. *True*

9. Converse: If you wear a hat, then you are a baseball player. *False.* You could be a cowboy or anyone else who wears a hat.
   Inverse: If you are not a baseball player, then you do not wear a hat. *False.* Again, you could be a cowboy.
   Contrapositive: If you do not wear a hat, then you are not a baseball player. *True*
10. If a triangle is equilateral, then it has three congruent sides. *True.* A triangle has three congruent sides if and only if it is equilateral.
11. If three points are coplanar, then they lie in the same plane. *True.* Three points lie in the same plane if and only if they are coplanar.
12. If $x^2 = 9$, then $x = 3$. *False.* x could also be -3.
13. If B is the midpoint of $\overline{AC}$, then $AB = 5$ and $BC = 5$. This is a true statement.
14. If $AB \neq 5$ and $BC \neq 5$, then B is not the midpoint of $\overline{AC}$. This is true.
15. If B is noncollinear with A and C.
16. If $AB \neq 5$ and $BC \neq 5$, then B is not the midpoint of $\overline{AC}$. It is the same as #14.
17. the original statement

$$p \rightarrow q$$
$$\sim p \rightarrow \sim q$$
$$\sim\sim p \rightarrow \sim\sim q$$
$$p \rightarrow q$$

18. the contrapositive

$$p \rightarrow q$$
$$\sim p \rightarrow \sim q$$
$$\sim q \rightarrow \sim p$$

19. the contrapositive

$$p \rightarrow q$$
$$q \rightarrow p$$
$$\sim q \rightarrow \sim p$$

20. the original statement

$$p \rightarrow q$$
$$\sim q \rightarrow \sim p$$
$$\sim\sim p \rightarrow \sim\sim q$$
$$p \rightarrow q$$

21. If a U.S. citizen can vote, then he or she is 18 or more years old.
    If a U.S. citizen is 18 or more years old, then he or she can vote.
22. If a whole number is prime, then it has exactly two distinct factors.
    If a whole number has exactly two distinct factors, then it is prime.
23. If points are collinear, then there is a line that contains the points.
    If there is a line that contains the points, then the points are collinear.
24. If $2x = 18$, then $x = 9$.
    If $x = 9$, then $2x = 18$.

25. (a) Yes.
    (b) No, x could equal -4.
    (c) No, again x could equal -4.
    (d) Yes.
26. (a) Yes.
    (b) Yes.
    (c) Yes.
    (d) Yes.
27. (a) Yes.
    (b) Yes.
    (c) Yes.
    (d) Yes.
28. (a) Yes.
    (b) No, $\angle ABC$ could be any value between 0 and 90 degrees.
    (c) No, again $\angle ABC$ could be any value between 0 and 90 degrees.
    (d) Yes.
29. Answers vary.
30. Answers vary.

2.3 Geometry - Second Edition, Deductive Reasoning, Review Answers

1. I am a smart person. Law of Detachment
2. No conclusion
3. If a shape is a circle, then we don't need to study it. Law of Syllogism.
4. You don't text while driving. Law of Contrapositive.
5. It is sunny outside. Law of Detachment.
6. You are not wearing sunglasses. Law of Contrapositive.
7. No conclusion.
8. If I go to the park, I will give my dog a bath. Law of Syllogism.
9. This is a sound argument, but it doesn't make sense because we know that circles exist. $p \rightarrow q$
   $q \rightarrow r$
   $r \rightarrow s$
   $s \rightarrow t$
   $\therefore p \rightarrow t$
10. $p \rightarrow q$
    p
    $\therefore q$
11. $p \rightarrow q$
    $\sim q$
    $\therefore \sim p$
12. If I need a new watch battery, then I go to the mall.
    If I go to the mall, then I will shop.
    If I shop, then I will buy shoes.
    Conclusion: If I need a new watch battery, then I will buy shoes.
13. If Anna's teacher gives notes, then Anna writes them down.
    If Anna writes down the notes, then she can do the homework.
    If Anna can do the homework, then she will get an A on the test.

If Anna gets an *A* on the test, her parents will take her out for ice cream.
Conclusion: If Anna's teacher gives notes, then Anna's parents will buy her ice cream.

14. Inductive; a pattern of weather was observed.
15. Deductive; Beth used a fact to determine what her sister would eat.
16. Deductive; Jeff used a fact about Nolan Ryan.
17. Either reasoning.
    Inductive; surfers observed patterns of weather and waves to determine when the best time to surf is.
    Deductive; surfers could take the given statement as a fact and use that to determine when the best time to surf is.
18. Inductive; observed a pattern.
19. Both-Inductive: Amani noticed a pattern of behavior. Deductive: Amani ruled out possible explanations until there was only one remaining.
20. Deductive: The detectives narrowed their field of suspects by eliminating those who couldn't have committed the crime.
21.

Table 2.1:

p	$\sim p$	$p \wedge \sim p$
T	F	F
F	T	F

22.

Table 2.2:

p	q	$\sim p$	$\sim q$	$\sim p \vee \sim q$
T	T	F	F	F
T	F	F	T	T
F	T	T	F	T
F	F	T	T	T

23.

Table 2.3:

p	q	$\sim q$	$q \vee \sim q$	$p \wedge (p \vee \sim q)$
T	T	F	T	T
T	F	T	T	T
F	T	F	T	F
F	F	T	T	F

24.

Table 2.4:

p	q	r	$\sim r$	$p \wedge q$	$(p \wedge q) \vee \sim r$
T	T	T	F	T	T
T	T	F	T	T	T
T	F	T	F	F	F
T	F	F	T	F	T
F	T	T	F	F	F
F	T	F	T	F	T
F	F	T	F	F	F
F	F	F	T	F	T

25.

Table 2.5:

p	q	r	$\sim q$	$\sim q \vee r$	$p \vee (\sim q \vee r)$
T	T	T	F	T	T
T	T	F	F	F	T
T	F	T	T	T	T
T	F	F	T	T	T
F	T	T	F	T	T
F	T	F	F	F	F
F	F	T	T	T	T
F	F	F	T	T	T

26.

Table 2.6:

p	q	r	$\sim r$	$q \vee \sim r$	$p \wedge (q \vee \sim r)$
T	T	T	F	T	T
T	T	F	T	T	T
T	F	T	F	F	F
T	F	F	T	T	T
F	T	T	F	T	F
F	T	F	T	T	F
F	F	T	F	F	F
F	F	F	T	T	F

27. There are two more T's in #24. We can conclude that parenthesis placement matters.
28. $p \vee q \vee r$ is always true except the one case when p, q, and r are all false.
29. True; Law of Syllogism
30. Not valid
31. True; Law of Contrapositive
32. Not valid

33. True; Law of Detachment
34. Not valid

2.4 Geometry - Second Edition, Algebraic and Congruence Properties, Review Answers

1. $3x + 11 = -16$
   $3x = -27$ Subtraction PoE
   $x = -9$ Division PoE
2. $7x - 3 = 3x - 35$
   $4x - 3 = -35$ Subtraction PoE
   $4x = -32$ Addition PoE
   $x = -8$ Division PoE
3. $\frac{2}{3}g + 1 = 19$
   $\frac{2}{3}g = 18$ Subtraction PoE
   $g = 27$ Multiplication PoE
4. $\frac{1}{2}MN = 5$
   $MN = 10$ Multiplication PoE
5. $5m\angle ABC = 540^\circ$
   $m\angle ABC = 108^\circ$ Division PoE
6. $10b - 2(b + 3) = 5b$
   $10b - 2b + 6 = 5b$ Distributive Property
   $8b + 6 = 5b$ Combine like terms
   $6 = -3b$ Subtraction PoE
   $-2 = b$ Division PoE
   $b = -2$ Symmetric PoE
7. $\frac{1}{4}y + \frac{5}{6} = \frac{1}{3}$
   $3y + 10 = 4$ Multiplication PoE (multiplied everything by 12)
   $3y = -6$ Subtraction PoE
   $y = -2$ Division PoE
8. $\frac{1}{4}AB + \frac{1}{3}AB = 12 + \frac{1}{2}AB$
   $3AB + 4AB = 144 + 6AB$ Multiplication PoE (multiplied everything by 12)
   $7AB = 144 + 6AB$ Combine like terms
   $AB = 144$ Subtraction PoE
9. $3 = x$
10. $12x - 32$
11. $x = 12$
12. $y + z = x + y$
13. $CD = 5$
14. $z + 4 = y - 7$
15. Yes, they are collinear. $16 + 7 = 23$
16. No, they are not collinear, $9 + 9 \neq 16$. I cannot be the midpoint.
17. $\angle NOP$ must be an obtuse angle because it is supplementary with 56°, meaning that $m\angle NOP$ is $180^\circ - 56^\circ = 124^\circ$. $90^\circ < 124^\circ < 180^\circ$, so by definition $\angle NOP$ is an obtuse angle.
18. $\cong \angle s$ have = measures; $m\angle ABC + m\angle GHI = m\angle DEF + m\angle GHI$; Substitution
19. M is the midpoint of $\overline{AN}$, N is the midpoint $\overline{MB}$; $AM = MN, MN = NB$; Transitive
20. $\angle BFE$ or $\angle BFG$
21. $\overleftrightarrow{EF} \perp \overleftrightarrow{BF}$

22. Yes, $EG = FH$ because $EF = GH$ and $EF + FG = EG$ and $FG + GH = FH$ by the Segment Addition Postulate. $FG = FG$ by the Reflexive Property and with substitution $EF + FG = EG$ and $FG + EF = FH$. Therefore, $EG = FH$ by the Transitive Property.
23. Not necessarily, G could slide along $\overline{EH}$.
24.

Table 2.7:

Statement	***Reason***
1. $\angle EBF \cong \angle HCG$	
$\angle ABE \cong \angle DCH$	Given
2. $m\angle EBF = m\angle HCG$	
m $\angle ABE = m\angle DCH$	$\cong$ angles have $=$ measures
3. $m\angle ABF = m\angle EBF + m\angle ABE$	
m $\angle DCG = m\angle HCG + m\angle DCH$	Angle Addition Postulate
4. $m\angle ABF = m\angle EBF + m\angle ABE$	
m $\angle DCG = m\angle EBF + m\angle ABE$	Substitution PoE
5. $m\angle ABF = m\angle DCG$	Transitive PoE
6. $\angle ABF \cong \angle DCG$	$\cong$ angles have $=$ measures

25.

Table 2.8:

Statement	***Reason***
1. $AB = CD$	Given
2. $BC = BC$	Reflexive PoE
3. $AB + BC = CD + BC$	Addition PoE
4. $AC = BD$	Segment Addition Postulate

26. No
27. No
28. Yes
29. Yes
30. No
31. No
32.

Table 2.9:

Statement	***Reason***
1. $\angle DAB$ is a right angle	Given
2. $m\angle DAB = 90°$	Definition of a right angle
3. $\overline{AC}$ bisects $\angle DAB$	Given
4. $m\angle DAC = m\angle BAC$	Definition of an angle bisector
5. $m\angle DAB = m\angle DAC + m\angle BAC$	Angle Addition Postulate

Table 2.9: (continued)

Statement	*Reason*
6. $m\angle DAB = m\angle BAC + m\angle BAC$	Substitution PoE
7. $m\angle DAB = 2m\angle BAC$	Combine like terms
8. $90^\circ = 2m\angle BAC$	Substitution PoE
9. $45^\circ = m\angle BAC$	Division PoE

33.

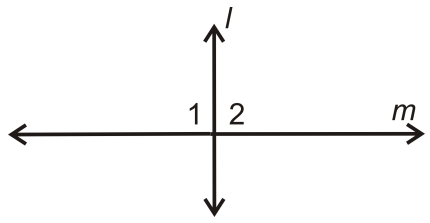


Table 2.10:

Statement	*Reason*
1. $\angle 1$ and $\angle 2$ form a linear pair $m\angle 1 = m\angle 2$	Given
2. $\angle 1$ and $\angle 2$ are supplementary	Linear Pair Postulate
3. $m\angle 1 + m\angle 2 = 180^\circ$	Definition of Supplementary
4. $m\angle 1 + m\angle 1 = 180^\circ$	Substitution
5. $2m\angle 1 = 180^\circ$	Simplify
6. $m\angle 1 = 90^\circ$	Division PoE
7. $\angle 1$ is a right angle	Definition of a right angle

2.5 Geometry - Second Edition, Proofs about Angle Pairs and Segments, Review Answers

1.

Table 2.11:

Statement	*Reason*
1. $\overline{AC} \perp \overline{BD}, \angle 1 \cong \angle 4$	Given
2. $m\angle 1 = m\angle 4$	$\cong$ angles have $=$ measures
3. $\angle ACB$ and $\angle ACD$ are right angles	$\perp$ lines create right angles
4. $m\angle ACB = 90^\circ$	
m $\angle ACD = 90^\circ$	Definition of right angles
5. $m\angle 1 + m\angle 2 = m\angle ACB$	
m $\angle 3 + m\angle 4 = m\angle ACD$	Angle Addition Postulate
6. $m\angle 1 + m\angle 2 = 90^\circ$	
m $\angle 3 + m\angle 4 = 90^\circ$	Substitution
7. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	Substitution

Table 2.11: (continued)

Statement	***Reason***
8. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 1$	Substitution
9. $m\angle 2 = m\angle 3$	Subtraction PoE
10. $\angle 2 \cong \angle 3$	$\cong$ angles have $=$ measures

2.

Table 2.12:

Statement	***Reason***
1. $\angle MLN \cong \angle OLP$	Given
2. $m\angle MLN = m\angle OLP$	$\cong$ angles have $=$ measures
3. $m\angle MLO = m\angle MLN + m\angle NLO$	
m $\angle NLP = m\angle NLO + m\angle OLP$	Angle Addition Postulate
4. $m\angle NLP = m\angle NLO + m\angle MLN$	Substitution
5. $m\angle MLO = m\angle NLP$	Substitution
6. $\angle NLP \cong \angle MLO$	$\cong$ angles have $=$ measures

3.

Table 2.13:

Statement	***Reason***
1. $\overline{AE} \perp \overline{EC}, \overline{BE} \perp \overline{ED}$	Given
2. $\angle BED$ is a right angle	$\perp$ lines create right angles
$\angle AEC$ is a right angle	
3. $m\angle BED = 90^\circ$	
m $\angle AEC = 90^\circ$	Definition of a right angle
4. $m\angle BED = m\angle 2 + m\angle 3$	
m $\angle AEC = m\angle 1 + m\angle 3$	Angle Addition Postulate
5. $90^\circ = m\angle 2 + m\angle 3$	
$90^\circ = m\angle 1 + m\angle 3$	Substitution
6. $m\angle 2 + m\angle 3 = m\angle 1 + m\angle 3$	Substitution
7. $m\angle 2 = m\angle 1$	Subtraction PoE
8. $\angle 2 \cong \angle 1$	$\cong$ angles have $=$ measures

4.

Table 2.14:

Statement	***Reason***
1. $\angle L$ is supplementary to $\angle M$ $\angle P$ is supplementary to $\angle O$ $\angle L \cong \angle O$	Given
2. $m\angle L = m\angle O$	$\cong$ angles have = measures
3. $m\angle L + m\angle M = 180°$ m $\angle P + m\angle O = 180°$	Definition of supplementary angles
4. $m\angle L + m\angle M = m\angle P + m\angle O$	Substitution
5. $m\angle L + m\angle M = m\angle P + m\angle L$	Substitution
6. $m\angle M = m\angle P$	Subtraction PoE
7. $\angle M \cong \angle P$	$\cong$ angles have = measures

5.

Table 2.15:

Statement	***Reason***
1. $\angle 1 \cong \angle 4$	Given
2. $m\angle 1 = m\angle 4$	$\cong$ angles have = measures
3. $\angle 1$ and $\angle 2$ are a linear pair $\angle 3$ and $\angle 4$ are a linear pair	Given (by looking at the picture) could also be Definition of a Linear Pair
4. $\angle 1$ and $\angle 2$ are supplementary $\angle 3$ and $\angle 4$ are supplementary	Linear Pair Postulate
5. $m\angle 1 + m\angle 2 = 180°$ m $\angle 3 + m\angle 4 = 180°$	Definition of supplementary angles
6. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	Substitution
7. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 1$	Substitution
8. $m\angle 2 = m\angle 3$	Subtraction PoE
9. $\angle 2 \cong \angle 3$	$\cong$ angles have = measures

6.

Table 2.16:

Statement	***Reason***
1. $\angle C$ and $\angle F$ are right angles	Given
2. $m\angle C = 90°, m\angle F = 90°$	Definition of a right angle
3. $90° + 90° = 180°$	Addition of real numbers
4. $m\angle C + m\angle F = 180°$	Substitution

7.

Table 2.17:

Statement	***Reason***
1. $l \perp m$	Given
2. $\angle 1$ and $\angle 2$ are right angles	$\perp$ lines create right angles.
3. $\angle 1 \cong \angle 2$	Right Angles Theorem

8.

Table 2.18:

Statement	***Reason***
1. $m\angle 1 = 90°$	Given
2. $\angle 1$ and $\angle 2$ are a linear pair	Definition of a linear pair
3. $\angle 1$ and $\angle 2$ are supplementary	Linear Pair Postulate
4. $m\angle 1 + m\angle 2 = 180°$	Definition of supplementary angles
5. $90° + m\angle 2 = 180°$	Substitution
6. $m\angle 2 = 90°$	Subtraction PoE

9.

Table 2.19:

Statement	***Reason***
1. $l \perp m$	Given
2. $\angle 1$ and $\angle 2$ make a right angle	$\perp$ lines create right angles
3. $m\angle 1 + m\angle 2 = 90°$	Definition of a right angle
4. $\angle 1$ and $\angle 2$ are complementary	Definition of complementary angles

10.

Table 2.20:

Statement	***Reason***
1. $l \perp m, \angle 2 \cong \angle 6$	Given
2. $m\angle 2 = m\angle 6$	$\cong$ angles have $=$ measures
3. $\angle 5 \cong \angle 2$	Vertical Angles Theorem
4. $m\angle 5 = m\angle 2$	$\cong$ angles have $=$ measures
5. $m\angle 5 = m\angle 6$	Transitive

11. $\angle AHM, \angle PHE$
12. $\overline{AM} \cong \overline{MG}, \overline{CP} \cong \overline{PE}, \overline{AH} \cong \overline{HE}, \overline{MH} \cong \overline{HP}, \overline{GH} \cong \overline{HC}$
13. $\angle AMH, \angle HMG$ and $\angle CPH, \angle HPE$
14. $\angle AHC$

15. $\angle MAH, \angle HAC$ and $\angle MGH, \angle HE$
16. $\overline{GC}$
17. $\overline{AE}, \overline{GC}$
18. $\angle AHM, \angle MHG$
19. $\angle AGH \cong \angle HE$
20. Given; $\cong$ angles have $=$ measures; $m\angle ACE = m\angle ACH + m\angle ECH$; $m\angle ACE = m\angle ACH + m\angle ACH$; Combine like terms; $\frac{1}{2}m\angle ACE = m\angle ACH; \overline{AC}$ is the angle bisector of $\angle ACH$; Definition of an angle bisector
21. 90°
22. 26°
23. 154°
24. 26°
25. 64°
26. 25°
27. 75°
28. 105°
29. 90°
30. 50°
31. 40°
32. 25°
33. 130°
34. 155°
35. 130°

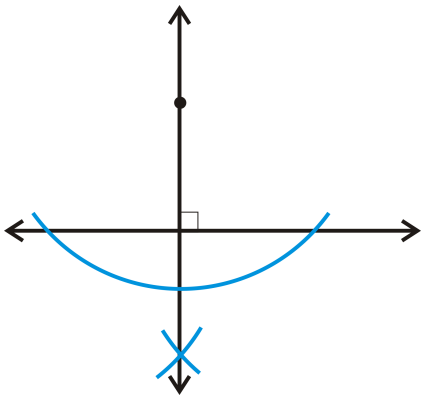
2.6 Chapter Review Answers

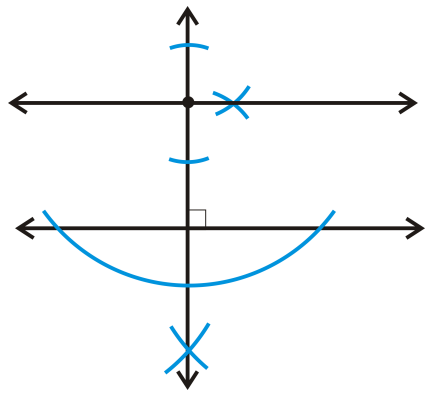
1. D
2. F
3. H
4. B
5. I
6. C
7. G
8. A
9. J
10. E

Chapter 3

Geometry - Second Edition, Chapter 3, Answer Key

3.1 Geometry - Second Edition, Lines and Angles, Review Answers

1. $\overline{AB}$ and $\overline{EZ}$, $\overline{XY}$ and $\overline{BW}$, among others
2. $\overline{AB} \parallel \overline{VW}$, among others
3. $\overline{BC} \perp \overline{BW}$, among others
4. one, $\overline{AV}$
5. one, $\overline{CD}$
6. $\angle 6$
7. $\angle 3$
8. $\angle 2$
9. $\angle 1$
10. $\angle 8$
11. $\angle 8$
12. $\angle 5$
13. $m\angle 3 = 55^\circ$ (vertical angles), $m\angle 1 = 125^\circ$ (linear pair), $m\angle 4 = 125^\circ$ (linear pair)
14. $m\angle 8 = 123^\circ$ (vertical angles), $m\angle 6 = 57^\circ$ (linear pair), $m\angle 7 = 57^\circ$ (linear pair)
15. No, we do not know anything about line m.
16. No, even though they look parallel, we cannot assume it.
17. 

18. 

19. Fold the paper so that the lines match up and the crease passes through the point you drew.
20. Same as number 19.
21. One way to do this is to use the edges of the ruler as guide lines. The sides of the ruler are parallel.
22. Use the ruler to draw a line. Turn the ruler perpendicular to the first line (make sure it is perpendicular by matching up a marking on the ruler to the original line. Use the ruler edge to draw the perpendicular line.
23. Parallel lines are evident in the veins of the leaves of ferns and the markings on some animals and insects. Parallel planes are illustrated by the surface of a body of water and the bottom.
24. Trees are usually perpendicular to the ground. Each leaf of a fern is perpendicular to the stem.
25. Some branches of trees are skew.
26. Any two equations in the form $y = b$, where b is a constant.
27. Any two equations in the form $x = b$, where b is a constant.
28. These two lines are parallel to each other.
29. slope of $\overleftrightarrow{AB}$ equals slope of $\overleftrightarrow{CD} = -\frac{6}{5}$; these lines are parallel
30. slope of $\overleftrightarrow{AB} = -\frac{5}{3}$, slope of $\overleftrightarrow{CD} = \frac{3}{5}$; these lines are perpendicular
31. It appears that the slopes of parallel lines are the same and the slopes of perpendicular lines are opposite reciprocals.
32. $y = 2x - 11$
33. $y = -\frac{3}{3}x + 2$
34. $y = -\frac{3}{2}x + 6$
35. $y = 4x - 5$

3.2 Geometry - Second Edition, Properties of Parallel Lines, Review Answers

1. Supplementary
2. Congruent
3. Congruent
4. Supplementary
5. Congruent
6. Supplementary
7. Supplementary
8. Same Side Interior
9. Alternate Interior
10. None
11. Same Side Interior
12. Vertical Angles

13. Corresponding Angles
14. Alternate Exterior
15. None
16. $\angle 1$, $\angle 3$, $\angle 6$, $\angle 9$, $\angle 11$, $\angle 14$, and $\angle 16$
17. $x = 70°$, $y = 90°$
18. $x = 15°$, $y = 40°$
19. $x = 9°$, $y = 26°$
20. $x = 21°$, $y = 17°$
21. $x = 25°$
22. $y = 18°$
23. $x = 20°$
24. $x = 31°$
25. $y = 12°$
26.

Table 3.1:

Statement	***Reason***
1. $l \parallel m$	Given
2. $\angle 1 \cong \angle 5$	*Corresponding Angles Postulate*
3. $m\angle 1 = m\angle 5$	$\cong$ angles have $=$ measures
4. $\angle 1$ *and* $\angle 3$ *are supplementary*	Linear Pair Postulate
5. $m\angle 1 + m\angle 3 = 180°$	Definition of Supplementary Angles
6. $m\angle 3 + m\angle 5 = 180°$	*Substitution PoE*
7. $\angle 3$ and $\angle 5$ are supplementary	*Definition of Supplementary Angles*

27.

Table 3.2:

Statement	***Reason***
1. $l \parallel m$	Given
2. $\angle 1 \cong \angle 5$	Corresponding Angles Postulate
3. $\angle 5 \cong \angle 8$	Vertical Angles Theorem
4. $\angle 1 \cong \angle 8$	Transitive PoC

28.

Table 3.3:

Statement	***Reason***
1. $l \parallel m$	Given
2. $\angle 4$ and $\angle 6$ are supplementary	Same Side Interior Angles Theorem
3. $m\angle 4 + m\angle 6 = 180°$	Definition of Supplementary Angles
4. $\angle 2 \cong \angle 6$, $\angle 4 \cong \angle 8$	Corresponding Angles Postulate
5. $m\angle 2 = m\angle 6$, $m\angle 4 = m\angle 8$	$\cong$ angles have $=$ measures

Table 3.3: (continued)

Statement	***Reason***
6. $m\angle 2 + m\angle 8 = 180°$	Substitution PoE
7. $\angle 2$ and $\angle 8$ are supplementary	Definition of Supplementary Angles

29.

Table 3.4:

Statement	***Reason***
1. $l \parallel m,\ s \parallel t$	Given
2. $\angle 4 \cong \angle 12$	Corresponding Angles Postulate
3. $\angle 12 \cong \angle 10$	Corresponding Angles Postulate
4. $\angle 4 \cong \angle 10$	Transitive PoC

30.

Table 3.5:

Statement	***Reason***
1. $l \parallel m,\ s \parallel t$	Given
2. $\angle 2 \cong \angle 13$	Alternate Exterior Angles Theorem
3. $\angle 13 \cong \angle 15$	Corresponding Angles Postulate
4. $\angle 2 \cong \angle 15$	Transitive PoC

31.

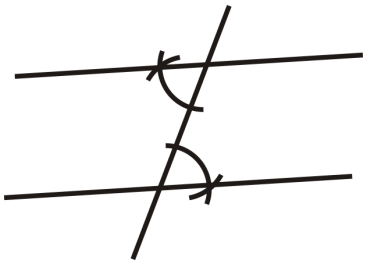
Table 3.6:

Statement	***Reason***
1. $l \parallel m, s \parallel t$	Given
2. $\angle 6 \cong \angle 9$	Alternate Interior Angles Theorem
3. $\angle 4 \cong \angle 7$	Vertical Angles Theorem
4. $\angle 6$ and $\angle 7$ are supplementary	Same Side Interior Angles
5. $\angle 9$ and $\angle 4$ are supplementary	Same Angle Supplements Theorem

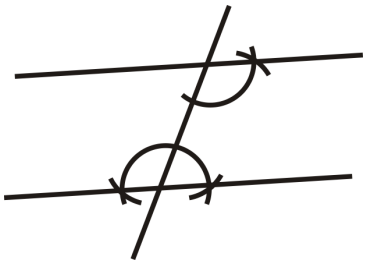
32. $m\angle 1 = 102°,\ m\angle 2 = 78°,\ m\angle 3 = 102°,\ m\angle 4 = 78°,\ m\angle 5 = 22°,\ m\angle 6 = 78°,\ m\angle 7 = 102°$
33. $x = 15°,\ y = 21°$
34. $x = 37°,\ y = 28°$
35. The Same Side Interior Angles Theorem says that two angles are supplementary, not congruent.

3.3 Geometry - Second Edition, Proving Lines Parallel, Review Answers

1. Start by copying the same angle as in Investigation 3-1, but place the copy where the alternate interior angle would be.



2. This question could be considered a "trick question," because you are still copying two congruent angles, not two supplementary ones, like asked. Indicate the consecutive interior angles with arc marks, but copy the adjacent angle to the one that was copied in # 14.



3. Given, $\angle 1 \cong \angle 3$, Given, $\angle 2 \cong \angle 3$, Corresponding Angles Theorem, Transitive Property
4. Given, $\angle 1 \cong \angle 3$, Given, $\angle 2 \cong \angle 3$, $l \parallel m$
5. Give, Converse of the Alternate Interior Angles Theorem, Given, Converse of the Alternate Interior Angles Theorem, Parallel Lines Property
6.

Table 3.7:

Statement	***Reason***
1. $m \perp l,\ n \perp l$	Given
2. $m\angle l = 90°,\ m\angle 2 = 90°$	Definition of Perpendicular Lines
3. $m\angle 1 = m\angle 2$	Transitive Property
4. $m \parallel n$	Converse of Corresponding Angles Theorem

7.

Table 3.8:

Statement	***Reason***
1. $\angle 1 \cong \angle 3$	Given
2. $m \parallel n$	Converse of Alternate Interior Angles Theorem
3. $m\angle 3 + m\angle 4 = 180°$	Linear Pair Postulate
4. $m\angle 1 + m\angle 4 = 180°$	Substitution

Table 3.8: (continued)

Statement	***Reason***
5. $\angle 1$ and $\angle 4$ are supplementary	Definition of Supplementary Angles

8.

Table 3.9:

Statement	***Reason***
1. $\angle 2 \cong \angle 4$	Given
2. $m \parallel n$	Converse of Corresponding Angles Theorem
3. $\angle 1 \cong \angle 3$	Alternate Interior Angles Theorem

9.

Table 3.10:

Statement	***Reason***
1. $\angle 2 \cong \angle 3$	Given
2. $m \parallel n$	Converse of Corresponding Angles Theorem
3. $\angle 1 \cong \angle 4$	Alternate Exterior Angles Theorem

10. none
11. yes, $AK \parallel LJ$ by Converse of Consecutive Interior Angles Theorem
12. yes, $LG \parallel KD$ by Converse of Corresponding Angles Theorem
13. none
14. none
15. yes, $AD \parallel GJ$ by Converse of Alternate Interior Angles Theorem
16. 58°
17. 73°
18. 107°
19. 58°
20. 49°
21. 107°
22. 49°
23. $x = 30^\circ$
24. $x = 15^\circ$
25. $x = 12^\circ$
26. $x = 26^\circ$
27. $x = 5^\circ$
28. Construction, the first and last lines are parallel. You might conjecture that two lines perpendicular to the same line are parallel to each other.
29. You could prove this using any of the converse theorems learned in this section because all four angles formed where the transversal intersects the two parallel lines are right angles. Thus, Alternate Interior Angles, Alternate Exterior Angles and Corresponding Angles are all congruent and the Same

Side Interior Angles are supplementary.

30. These two angles should be supplementary if the lines are parallel.

3.4 Geometry - Second Edition, Properties of Perpendicular Lines, Review Answers

1. 90°
2. 90°
3. 45°
4. 16°
5. 72°
6. 84°
7. 41°
8. 24°
9. 78°
10. 90°
11. 126°
12. 54°
13. 180°
14. $\perp$
15. not $\perp$
16. not $\perp$
17. $\perp$
18. 90°
19. 34°
20. 56°
21. 90°
22. 56°
23. 134°
24. 134°
25. 34°
26.

Table 3.11:

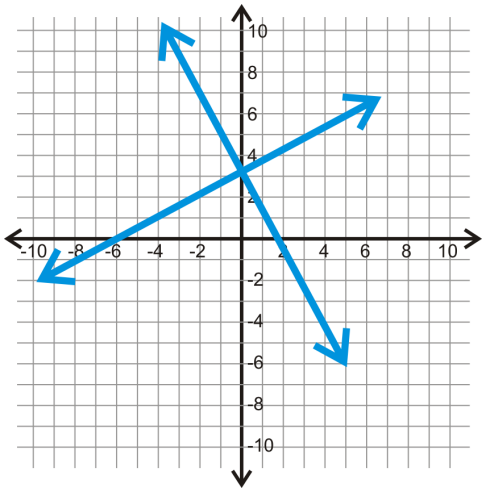
Statement	***Reason***
1. $l \perp m,\ l \perp n$	Given
2. $\angle 1$ and $\angle 2$ are right angles	Definition of perpendicular lines
3. $m\angle 1 = 90°,\ m\angle 2 = 90°$	Definition of right angles
4. $m\angle 1 = m\angle 2$	Transitive PoE
5. $\angle 1 \cong \angle 2$	$\cong$ angles have $=$ measures
6. $m \parallel n$	Converse of the Corresponding Angles Postulate

27. $x = 12°$
28. $x = 9°$
29. $x = 13.5°$
30. $x = 8°$

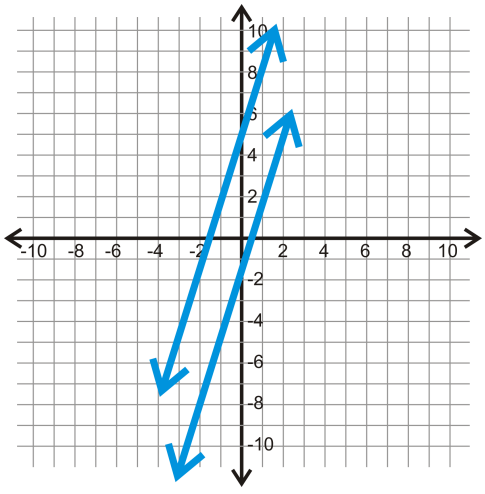
31. $x = 4°$
32. $x = 30°$

3.5 Geometry - Second Edition, Parallel and Perpendicular Lines in the Coordinate Plane, Review Answers

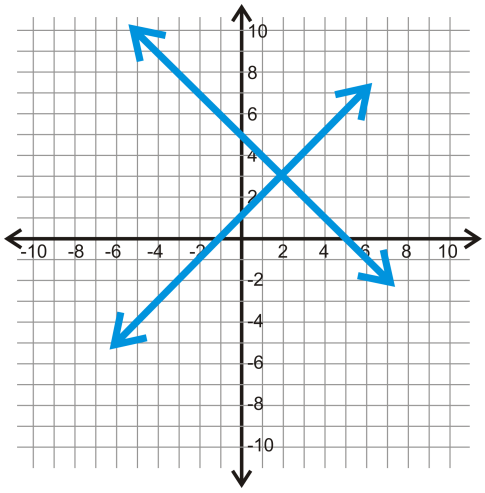
1. $\frac{1}{3}$
2. -1
3. $\frac{2}{7}$
4. -2
5. 4
6. undefined
7. Perpendicular



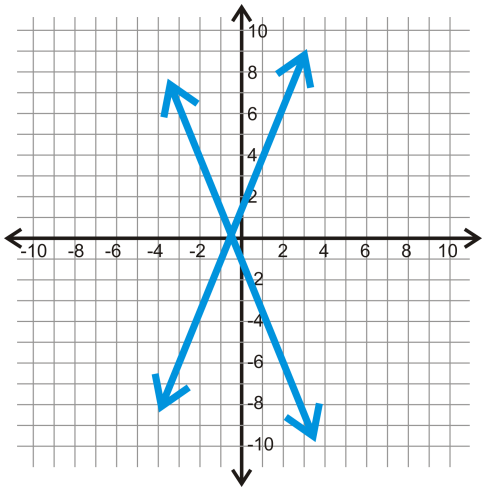
8. Parallel



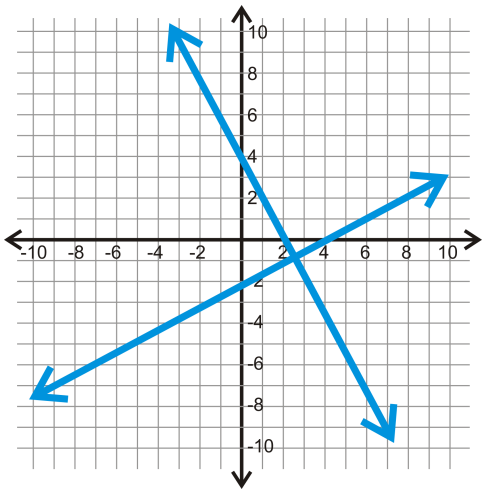
9. Perpendicular



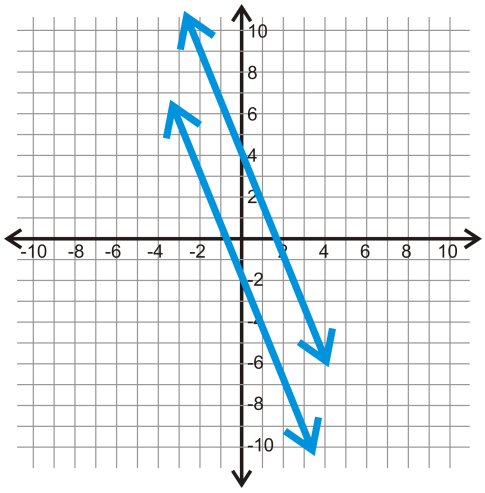
10. Neither



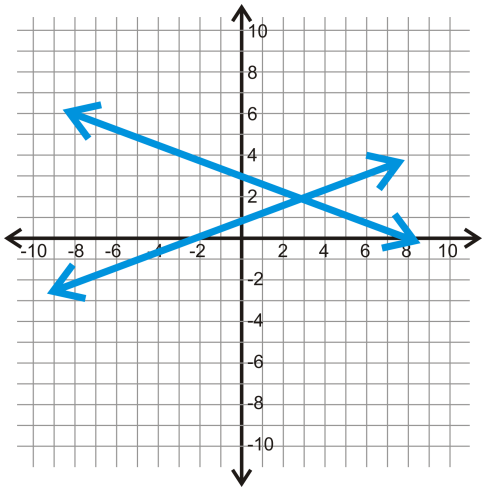
11. Perpendicular



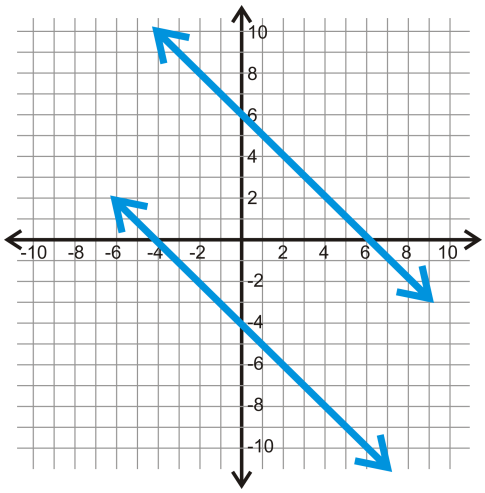
12. Parallel



13. Neither



14. Parallel



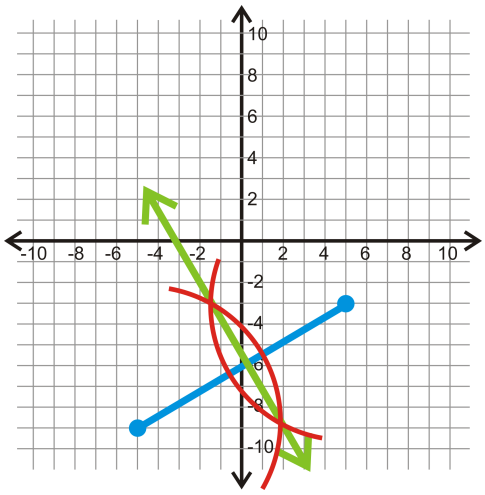
15. $y = -5x - 7$
16. $y = \frac{2}{3}x - 5$
17. $y = \frac{1}{4}x + 2$
18. $y = -\frac{3}{2}x + 1$
19. $y = 2x + 1$

20. $y = x - 10$
21. $y = -x - 4$
22. $y = -\frac{1}{3}x - 4$
23. $y = -\frac{2}{5}x + 7$
24. $x = -1$
25. $y = 8$
26. $y = -3x + 13$
27. Perpendicular
    $y = \frac{2}{3}x + 2$
    $y = -\frac{3}{2}x - 4$
28. Parallel
    $y = -\frac{1}{5}x + 7$
    $y = -\frac{1}{5}x - 3$
29. Perpendicular
    $y = x$
    $y = -x$
30. Neither
    $y = -2x + 2$
    $y = 2x - 3$
31. $\perp$: $y = -\frac{4}{3}x - 1$
    $\parallel$: $y = \frac{3}{4}x + 5\frac{1}{4}$
32. $\perp$: $y = 3x - 3$
    $\parallel$: $y = -\frac{1}{3}x + 7$
33. $\perp$: $y = 7$
    $\parallel$: $x = -3$
34. $\perp$: $y = x - 4$
    $\parallel$: $y = -x + 8$

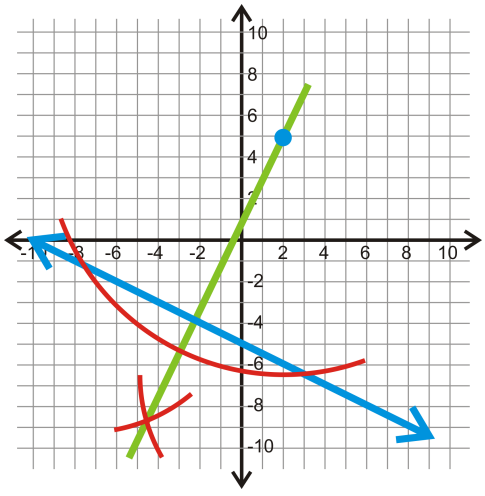
3.6 Geometry - Second Edition, The Distance Formula, Review Answers

1. 17.09 units
2. 19.20 units
3. 5 units
4. 17.80 units
5. 22.20 units
6. 14.21 units
7. 6.40 units
8. 9.22 units
9. 6.32 units
10. 6.71 units
11. 12 units
12. 7 units
13. 4.12 units
14. 18.03 units
15. 2.83 units
16. 7.81 units
17. 4 units

18. 9 units
19. 5.66 units
20. 9.49 units
21. 4.12 units
22. 4.47 units
23. $y = \frac{1}{2}x - 3$
24. $y = -3x + 5$
25. $y = -\frac{3}{2}x - 4$
26. $y = \frac{2}{5}x + 8$
27. (9, -4)
28. (8, -1)
29. $y = -\frac{5}{3}x - 6,\ (0,\ -6)$



30. $y = 2x + 1$



31. There are 12 possible answers: (-27, 9), (23, 9), (-2, -16), (-2, 34), (-17, -11), (-17, 29), (13, -11), (13, 29), (-22, 24), (-22, -6), (18, 24), and (18, -6)
32. 1. Graph the two lines.
    2. Determine the slope of a perpendicular line to the two lines.
    3. Use the slope from #2 to count from one line to the next to find a point on each line that is also on a perpendicular line.
    4. Determine coordinates of the points from #3.
    5. Plug the points from #4 into the distance formula and solve.

3.7 Chapter Review Answers

$m\angle 1 = 90^\circ$ $m\angle 2 = 118^\circ$ $m\angle 3 = 90^\circ$ $m\angle 4 = 98^\circ$
$m\angle 5 = 28^\circ$ $m\angle 6 = 118^\circ$ $m\angle 7 = 128^\circ$ $m\angle 8 = 52^\circ$
$m\angle 9 = 62^\circ$

Chapter 4

Geometry - Second Edition, Chapter 4, Answer Key

4.1 Geometry - Second Edition, Triangle Sums, Review Answers

1. 43°
2. 121°
3. 41°
4. 86°
5. 61°
6. 51°
7. 13°
8. 60°
9. 70°
10. 118°
11. 68°
12. 116°
13. 161°
14. 141°
15. 135°
16. $a = 68°,\ b = 68°,\ c = 25°,\ d = 155°,\ e = 43.5°,\ f = 111.5°$
17.

Table 4.1:

Statement	***Reason***
1. Triangle with interior and exterior angles.	Given
2. $m\angle 1 + m\angle 2 + m\angle 3 = 180°$	Triangle Sum Theorem
3. $\angle 3$ and $\angle 4$ are a linear pair, $\angle 2$ and $\angle 5$ are a linear pair, and $\angle 1$ and $\angle 6$ are a linear pair	Definition of a linear pair
4. $\angle 3$ and $\angle 4$ are supplementary, $\angle 2$ and $\angle 5$ are supplementary, and $\angle 1$ and $\angle 6$ are supplementary	Linear Pair Postulate
5. $m\angle 1 + m\angle 6 = 180°, m\angle 2 + m\angle 5 = 180°$	

Table 4.1: (continued)

Statement	*Reason*
m $\angle 3 + m\angle 4 = 180°$	Definition of supplementary angles
6. $m\angle 1 + m\angle 6 + m\angle 2 + m\angle 5 + m\angle 3 + m\angle 4 = 540°$	Combine the 3 equations from #5.
7. $m\angle 4 + m\angle 5 + m\angle 6 = 360°$	Subtraction PoE

18.

Table 4.2:

Statement	*Reason*
1. $\triangle ABC$ with right angle B	Given
2. $m\angle B = 90°$	Definition of a right angle
3. $m\angle A + m\angle B + m\angle C = 180°$	Triangle Sum Theorem
4. $m\angle A + 90° + m\angle C = 180°$	Substitution
5. $m\angle A + m\angle C = 90°$	Subtraction PoE
6. $\angle A$ and $\angle C$ are complementary	Definition of complementary angles

19. $x = 14°$
20. $x = 9°$
21. $x = 22°$
22. $x = 17°$
23. $x = 12°$
24. $x = 30°$
25. $x = 25°$
26. $x = 7°$
27. $x = \pm 8°$
28. $x = 17°$
29. $x = 11°$
30. $x = 7°$

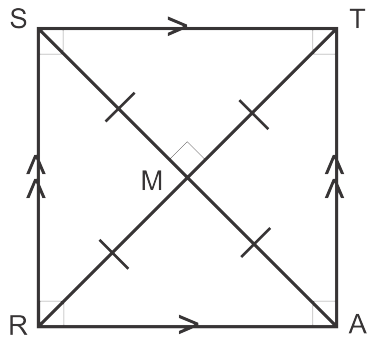
4.2 Geometry - Second Edition, Congruent Figures, Review Answers

1. $\angle R \cong \angle U, \angle A \cong \angle G, \angle T \cong \angle H, \overline{RA} \cong \overline{UG}, \overline{AT} \cong \overline{GH}, \overline{RT} \cong \overline{UH}$
2. $\angle B \cong \angle T, \angle I \cong \angle O, \angle G \cong \angle P, \overline{BI} \cong \overline{TO}, \overline{IG} \cong \overline{OP}, \overline{BG} \cong \overline{TP}$
3. Third Angle Theorem
4. 90°, they are congruent supplements
5. Reflexive, $\overline{FG} \cong \overline{FG}$
6. Angle Bisector
7. $\triangle FGI \cong \triangle FGH$
8. $\angle A \cong \angle E$ and $\angle B \cong \angle D$ by Alternate Interior Angles Theorem
9. Vertical Angles Theorem
10. No, we need to know if the other two sets of sides are congruent.
11. $\overline{AC} \cong \overline{CE}$ and $\overline{BC} \cong \overline{CD}$

12. $\triangle ABC \cong \triangle EDC$
13. Yes, $\triangle FGH \cong \triangle KLM$
14. No
15. Yes, $\triangle ABE \cong \triangle DCE$
16. No
17. $\triangle BCD \cong \triangle ZYX$
18. CPCTC
19. $m\angle A = m\angle X = 86°, m\angle B = m\angle Z = 52°, m\angle C = m\angle Y = 42°$
20. $m\angle A = m\angle C = m\angle Y = m\angle Z = 35°, m\angle B = m\angle X = 110°$
21. $m\angle A = m\angle C = 28°, m\angle ABE = m\angle DBC = 90°, m\angle D = m\angle E = 62°$
22. $m\angle B = m\angle D = 153°, m\angle BAC = m\angle ACD = 15°, m\angle BCA = m\angle CAD = 12°$
23.

Table 4.3:

Statement	***Reason***
1. $\angle A \cong \angle D, \angle B \cong \angle E$	Given
2. $m\angle A = m\angle D, m\angle B = m\angle E$	$\cong$ angles have $=$ measures
3. $m\angle A + m\angle B + m\angle C = 180°$	
m $\angle D + m\angle E + m\angle F = 180°$	Triangle Sum Theorem
4. $m\angle A + m\angle B + m\angle C = m\angle D + m\angle E + m\angle F$	Substitution PoE
5. $m\angle A + m\angle B + m\angle C = m\angle A + m\angle B + m\angle F$	Substitution PoE
6. $m\angle C = m\angle F$	Subtraction PoE
7. $\angle C \cong \angle F$	$\cong$ angles have $=$ measures

24. Transitive PoC
25. Reflexive PoC
26. Symmetric PoC
27. Reflexive PoC
28. $\triangle ABC$ is either isosceles or equiangular because the congruence statement tells us that $\angle A \cong \angle B$.
29. 

30. $\triangle SMR \cong \triangle SMT \cong \triangle TMA \cong \triangle AMR$ and $\triangle SRA \cong \triangle RAT \cong \triangle ATS \cong \triangle TSA$

4.3 Geometry - Second Edition, Triangle Congruence using SSS and SAS, Review Answers

1. Yes, $\triangle DEF \cong \triangle IGH$
2. No, $\overline{HJ}$ and $\overline{ED}$ are not congruent because they have different tic marks

3. No, the angles marked are not in the same place in the triangles.
4. Yes, $\triangle ABC \cong \triangle RSQ$
5. No, this is SSA, which is not a congruence postulate
6. No, one triangle is SSS and the other is SAS.
7. Yes, $\triangle ABC \cong \triangle FED$
8. Yes, $\triangle ABC \cong \triangle YXZ$
9. $\overline{AB} \cong \overline{EF}$
10. $\overline{AB} \cong \overline{HI}$
11. $\angle C \cong \angle G$
12. $\angle C \cong \angle K$
13. $\overline{AB} \cong \overline{JL}$
14. $\overline{AB} \cong \overline{ON}$
15.

Table 4.4:

Statement	***Reason***
1. $\overline{AB} \cong \overline{DC}, \overline{BE} \cong \overline{CE}$	Given
2. $\angle AEB \cong \angle DEC$	Vertical Angles Theorem
3. $\triangle ABE \cong \triangle ACE$	SAS

16.

Table 4.5:

Statement	***Reason***
1. $\overline{AB} \cong \overline{DC}, \overline{AC} \cong \overline{DB}$	Given
2. $\overline{BC} \cong \overline{BC}$	Reflexive PoC
3. $\triangle ABC \cong \triangle DCB$	SSS

17.

Table 4.6:

Statement	***Reason***
1. B is a midpoint of $\overline{DC}, \overline{AB} \perp \overline{DC}$	Given
2. $\overline{DB} \cong \overline{BC}$	Definition of a midpoint
3. $\angle ABD$ and $\angle ABC$ are right angles	$\perp$ lines create 4 right angles
4. $\angle ABD \cong \angle ABC$	All right angles are $\cong$
5. $\overline{AB} \cong \overline{AB}$	Reflexive PoC
6. $\triangle ABD \cong \triangle ABC$	SAS

18.

Table 4.7:

Statement	***Reason***
1. $\overline{AB}$ is an angle bisector of $\angle DAC$, $\overline{AD} \cong \overline{AC}$	Given
2. $\angle DAB \cong \angle BAC$	Definition of an Angle Bisector
3. $\overline{AB} \cong \overline{AB}$	Reflexive PoC
4. $\triangle ABD \cong \triangle ABC$	SAS

19.

Table 4.8:

Statement	***Reason***
1. B is the midpoint of $\overline{DC}, \overline{AD} \cong \overline{AC}$	Given
2. $\overline{DB} \cong \overline{BC}$	Definition of a Midpoint
3. $\overline{AB} \cong \overline{AB}$	Reflexive PoC
4. $\triangle ABD \cong \triangle ABC$	SSS

20.

Table 4.9:

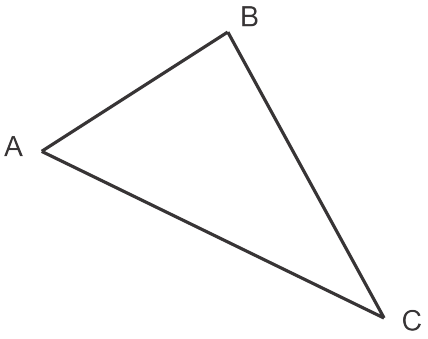
Statement	***Reason***
1. B is the midpoint of $\overline{DE}$ and $\overline{AC}$, $\angle ABE$ is a right angle	Given
2. $\overline{DB} \cong \overline{BE}, \overline{AB} \cong \overline{BC}$	Definition of a Midpoint
3. $m\angle ABE = 90°$	Definition of a Right Angle
4. $m\angle ABE = m\angle DBC$	Vertical Angle Theorem
5. $\triangle ABE \cong \triangle CBD$	SAS

21.

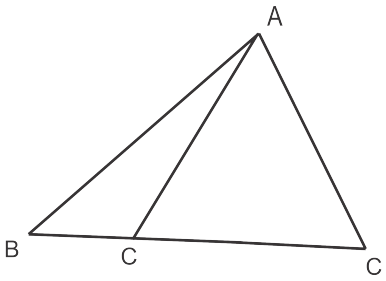
Table 4.10:

Statement	***Reason***
1. $\overline{DB}$ is the angle bisector of $\angle ADC$, $\overline{AD} \cong \overline{DC}$	Given
2. $\angle ADB \cong \angle BDC$	Definition of an Angle Bisector
3. $\overline{DB} \cong \overline{DB}$	Reflexive PoC
4. $\triangle ABD \cong \triangle CBD$	SAS

22. Yes
23. Yes
24. No
25. Yes
26. Check the measures of the three sides in your triangle with your ruler to make sure that they are 5cm, 3cm and 2cm. If you are having trouble, follow the directions in investigation 4-2 using these lengths.
27. Match up your construction with the original to see if they are the same.
28. Your triangle should look like this.



29 and 30. These are the two triangles you should create in these two problems.



4.4 Geometry - Second Edition, Triangle Congruence using ASA, AAS, and HL, Review Answers

1. Yes, AAS, $\triangle ABC \cong FDE$
2. Yes, ASA, $\triangle ABC \cong \triangle IHG$
3. No
4. No
5. Yes, SAS, $\triangle ABC \cong \triangle KLJ$
6. No
7. Yes, SAS, $\triangle RQP$
8. Yes, HL, $\triangle ABC \cong \triangle QPR$
9. Yes, SAS, $\triangle ABE \cong \triangle DBC$
10. No
11. No
12. Yes, ASA, $\triangle KLM \cong \triangle MNO$
13. Yes, SSS, $\triangle WZY \cong \triangle YXW$

14. Yes, AAS, $\triangle WXY \cong \triangle QPO$
15. $\angle DBC \cong \angle DBA$ because they are both right angles.
16. $\angle CDB \cong \angle ADB$
17. $\overline{DB} \cong \overline{DB}$
18.

Table 4.11:

Statement	***Reason***
1. $\overline{DB} \perp \overline{AC}$, $\overline{DB}$ is the angle bisector of $\angle CDA$	Given
2. $\angle DBC$ and $\angle ADB$ are right angles	Definition of perpendicular
3. $\angle DBC \cong \angle ADB$	All right angles are $\cong$
4. $\angle CDB \cong \angle ADB$	Definition of an angle bisector
5. $\overline{DB} \cong \overline{DB}$	Reflexive PoC
6. $\triangle CDB \cong \triangle ADB$	ASA

19. CPCTC
20. $\angle L \cong \angle O$ and $\angle P \cong \angle N$ by the Alternate Interior Angles Theorem
21. $\angle LMP \cong \angle NMO$ by the Vertical Angles Theorem
22.

Table 4.12:

Statement	***Reason***
1. $\overline{LP} \parallel \overline{NO}, \overline{LP} \cong \overline{NO}$	Given
2. $\angle L \cong \angle O, \angle P \cong \angle N$	Alternate Interior Angles Theorem
3. $\triangle LMP \cong \angle OMN$	ASA

23. CPCTC
24.

Table 4.13:

Statement	***Reason***
1. $\overline{LP} \parallel \overline{NO}, \overline{LP} \cong \overline{NO}$	Given
2. $\angle L \cong \angle O, \angle P \cong \angle N$	Alternate Interior Angles
3. $\triangle LMP \cong \angle OMN$	ASA
4. $\overline{LM} \cong \overline{MO}$	CPCTC
5. M is the midpoint of $\overline{PN}$.	Definition of a midpoint

25. $\angle A \cong \angle N$
26. $\angle C \cong \angle M$
27. $\overline{PM} \cong \overline{MN}$

28. $\overline{LM} \cong \overline{MO}$ or $\overline{LP} \cong \overline{NO}$
29. $\overline{UT} \cong \overline{FG}$
30. $\overline{SU} \cong \overline{FH}$
31.

Table 4.14:

Statement	***Reason***
1. $\overline{SV} \perp \overline{WU}$, T is the midpoint of $\overline{SV}$ and $\overline{WU}$	Given
2. $\angle STW$ and $\angle UTV$ are right angles	Definition of perpendicular
3. $\angle STW \cong \angle UTV$	All right angles are $\cong$
4. $\overline{ST} \cong \overline{TV}, \overline{WT} \cong \overline{TU}$	Definition of a midpoint
5. $\triangle STW \cong \triangle UTV$	SAS
6. $\overline{WS} \cong \overline{UV}$	CPCTC

32.

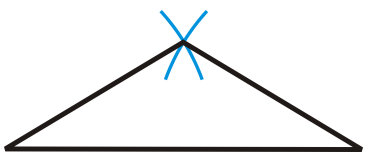
Table 4.15:

Statement	***Reason***
1. $\angle K \cong \angle T, \overline{EI}$ is the angle bisector of $\angle KET$	Given
2. $\angle KEI \cong \angle TEI$	Definition of an angle bisector
3. $\overline{EI} \cong \overline{EI}$	Reflexive PoC
4. $\triangle KEI \cong \triangle TEI$	AAS
5. $\angle KIE \cong \angle TIE$	CPCTC
6. $\overline{EI}$ is the angle bisector of $\angle KIT$	Definition of an angle bisector

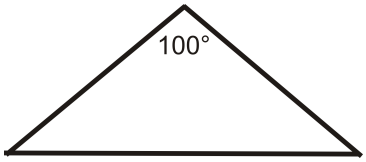
4.5 Geometry - Second Edition, Isosceles and Equilateral Triangles, Review Answers

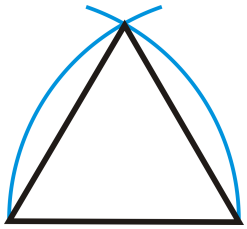
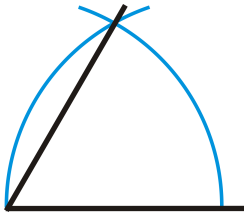
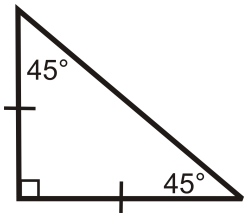
All of the constructions are drawn to scale with the appropriate arc marks.

1.



2.



3. 
4. 
5. 

6. $x = 10, y = 7$
7. $x = 14$
8. $x = 13°$
9. $x = 16°$
10. $x = 7°$
11. $x = 1$
12. $y = 3$
13. $y = 11°, x = 4°$
14. $x = 25°, y = 19°$
15. $x = 3, y = 8$
16. Yes, $\triangle ABC$ is isosceles. $\triangle ABD$ is congruent to $\triangle CBD$ by ASA. Therefore segments $\overline{AB}$ and $\overline{BC}$ are congruent by CPCTC. Or, $\angle A$ is congruent to $\angle C$ by third angles theorem and thus the triangle is isosceles by the converse of the Base Angles Theorem.
17. (a) $90°$
    (b) $30°$
    (c) $60°$
    (d) 2
18. Always
19. Sometimes
20. Sometimes
21. Never
22. Always
23. $a = 46°,\ b = 88°,\ c = 46°,\ d = 134°,\ e = 46°,\ f = 67°,\ g = 67°$
24.

Table 4.16:

Statement	***Reason***
1. Isosceles $\triangle CIS$, with base angles $\angle C$ and $\angle S$ $\overline{IO}$ is the angle bisector of $\angle CIS$	Given

Table 4.16: (continued)

Statement	***Reason***
2. $\angle C \cong \angle S$	Base Angles Theorem
3. $\angle CIO \cong \angle SIO$	Definition of an Angle Bisector
4. $\overline{IO} \cong \overline{IO}$	Reflexive PoC
5. $\triangle CIO \cong \triangle SIO$	ASA
6. $\overline{CO} \cong \overline{OS}$	CPCTC
7. $\angle IOC \cong \angle IOS$	CPCTC
8. $\angle IOC$ and $\angle IOS$ are supplementary	Linear Pair Postulate
9. $m\angle IOC = m\angle IOS = 90°$	Congruent Supplements Theorem
10. $\overline{IO}$ is the perpendicular bisector of $\overline{CS}$	Definition of a $\perp$ bisector (Steps 6 and 9)

25.

Table 4.17:

Statement	***Reason***
1. Equilateral $\triangle RST$ with $\overline{RT} \cong \overline{ST} \cong \overline{RS}$	Given
2. $\angle R \cong \angle S$	Base Angles Theorem
3. $\angle S \cong \angle T$	Base Angles Theorem
4. $\angle R \cong \angle T$	Transitive PoC
5. $\triangle RST$ is equilangular	Definition of an Equiangular $\triangle$

26.

Table 4.18:

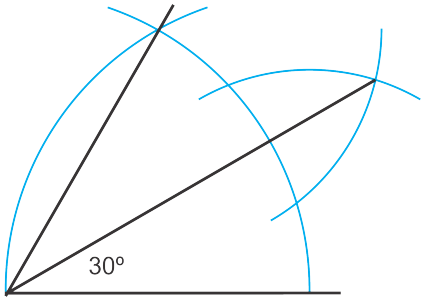
Statement	***Reason***
1. Isosceles $\triangle ICS$ with $\angle C$ and $\angle S$, $\overline{IO}$ is the perpendicular bisector of $\overline{CS}$	Given
2. $\angle C \cong \angle S$	Base Angle Theorem
3. $\overline{CO} \cong \overline{OS}$	Definition of a $\perp$ bisector
4. $m\angle IOC = m\angle IOS = 90°$	Definition of a $\perp$ bisector
5. $\triangle CIO \cong \triangle SIO$	ASA
6. $\angle CIO \cong \angle SIO$	CPCTC
7. $\overline{IO}$ is the angle bisector of $\angle CIS$	Definition of an Angle Bisector

27.

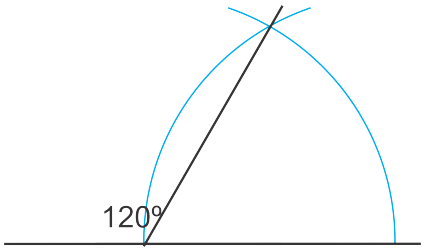
Table 4.19:

Statement	*Reason*
1. Isosceles $\triangle ABC$ with base angles $\angle B$ and $\angle C$, Isosceles $\triangle XYZ$ with base angles $\angle Y$ and $\angle Z, \angle C \cong \angle Z, \overline{BC} \cong \overline{YZ}$	Given
2. $\angle B \cong \angle C, \angle Y \cong \angle Z$	Base Angles Theorem
3. $\angle B \cong \angle Y$	Transitive PoC
4. $\triangle ABC \cong \triangle XYZ$	ASA

28. Bisect a 60° angle as shown.



29. Construct a 60° angle, then extend one side. The adjacent angle is 120°.



30. In investigations 3-2 and 3-3 you learned how to construct perpendiculars (i.e. 90° angles). You could make a 90° angle and copy your 30° onto it to make 120°. See investigation 1-2 for a review of copying an angle.
31. Method 1: Construct a 90° angle and bisect it. Method 2: Construct a 30° angle, bisect the 30° angle and copy the resulting 15° angle onto the original 30° to make a total of 45°.

4.6 Chapter 4 Review Answers

For 1-5, answers will vary.

1. One leg and the hypotenuse from each are congruent, $\triangle ABC \cong \triangle YXZ$
2. Two angles and the side between them, $\triangle ABC \cong EDC$
3. Two angles and a side that is NOT between them, $\triangle ABC \cong \triangle SRT$
4. All three sides are congruent, $\triangle ABC \cong \triangle CDA$
5. Two sides and the angle between them, $\triangle ABF \cong \triangle ECD$
6. Linear Pair Postulate
7. Base Angles Theorem
8. Exterior Angles Theorem
9. Property of Equilateral Triangles
10. Triangle Sum Theorem

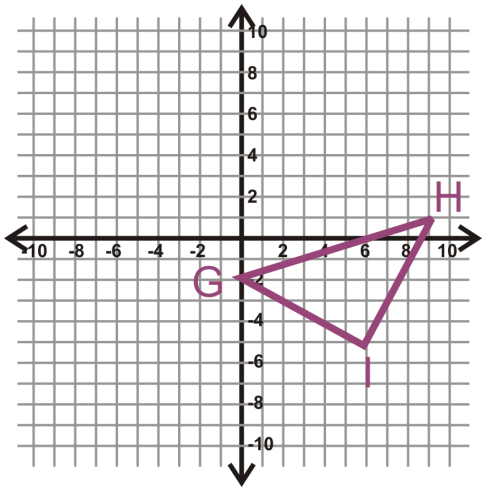
11. Equilateral Triangle Theorem
12. Property of an Isosceles Right Triangle

Chapter 5

Geometry - Second Edition, Chapter 5, Answer Key

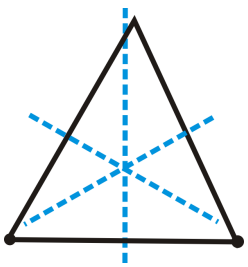
5.1 Geometry - Second Edition, Midsegments of a Triangle, Review Answers

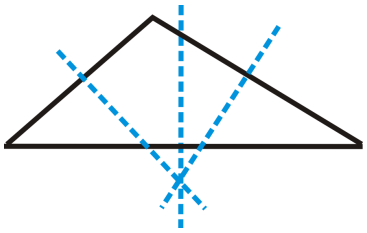
1. $RS = TU = 6$
2. $TU = 8$
3. $x = 5, TU = 10$
4. $x = 4$
5. No, we cannot say that the triangles are congruent. We do not know any angle measures.
6. $y = 18$
7. $x = 12$
8. $x = 5.5$
9. $x = 6$
10. $x = 14, y = 24$
11. $x = 6, z = 26$
12. $x = 5, y = 3$
13. $x = 1, z = 11$
14. (a) 53
    (b) 106
    (c) The perimeter of the larger triangle is double the perimeter of the midsegment triangle.
15. (7, 1), (3, 6), (1, 3)
16. (3, 6), (2, 2), (-5, -3)
17. (2, 2), (1, -2), (-1, 1)
18. (5, 0), (5, -4), (2, 0)
19. $GH = \frac{1}{3}, HI = 2, GI = -\frac{1}{2}$

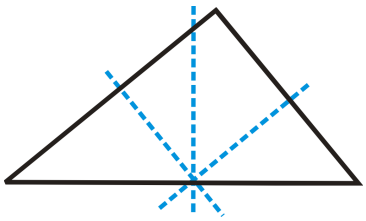
20. 

21. (3, 4), (15, -2), (-3, -8)
22. $GH = \sqrt{90} \approx 9.49$, Yes, GH is half of this side
23. (0, 3), (0, -5) and (-4, -1)
24. (-1, 4), (3, 4) and (5, -2)
25. (a) $M(0,3), N(-1,-2), O(-4,0)$;
    (b) slope of $\overline{MN}$ *and* $\overline{AC} = 5$, slope of $\overline{NO}$ *and* $\overline{AB} = -\frac{2}{3}$, and slope of $\overline{MO}$ *and* $\overline{BC} = \frac{3}{4}$;
    (c) $MN = \sqrt{26}$ *and* $AC = 2\sqrt{26}; NO = \sqrt{13}$ *and* $AC = 2\sqrt{13}; OM = 5$ *and* $BC = 10$.
26. (a) $M(1,3), N(5,2), O(2,1)$;
    (b) slope of $\overline{MN}$ *and* $\overline{AC} = -\frac{1}{4}$, slope of $\overline{NO}$ *and* $\overline{AB} = \frac{1}{2}$, and slope of $\overline{MO}$ *and* $\overline{BC} = -2$;
    (c) $MN = \sqrt{17}$ *and* $AC = 2\sqrt{17}; NO = \sqrt{10}$ *and* $AC = 2\sqrt{10}; OM = \sqrt{5}$ *and* $BC = 2\sqrt{5}$.
27. $L\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right), M\left(\frac{x_1+x_3}{2}, \frac{y_1+y_3}{2}\right)$
28. slope of $\overline{LM} = \frac{\frac{y_1+y_3}{2} - \frac{y_1+y_2}{2}}{\frac{x_1+x_3}{2} - \frac{x_1+x_2}{2}} = \frac{y_3-y_2}{x_3-x_2}$ = slope of $\overline{AT}$
29. length of
    $\overline{LM} = \sqrt{\left(\frac{x_1+x_3}{2} - \frac{x_1+x_2}{2}\right)^2 + \left(\frac{y_1+y_3}{2} - \frac{y_1+y_2}{2}\right)^2}$
    $= \sqrt{\left(\frac{x_3-x_2}{2}\right)^2 + \left(\frac{y_3-y_2}{2}\right)^2}$
    $= \sqrt{\frac{1}{4}(x_3-x_2)^2 + \frac{1}{4}(y_3-y_2)^2}$
    $= \frac{1}{2}\sqrt{(x_3-x_2)^2 + (y_3-y_2)^2} = \frac{1}{2}\,AT$
30. We have just proven algebraically that the midsegment (or segment which connects midpoints of sides in a triangle) is parallel to and half the length of the third side.

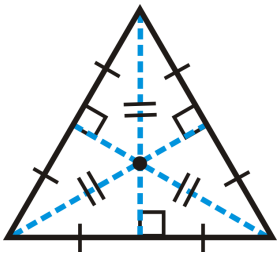
5.2 Geometry - Second Edition, Perpendicular Bisectors in Triangles, Review Answers

1. 

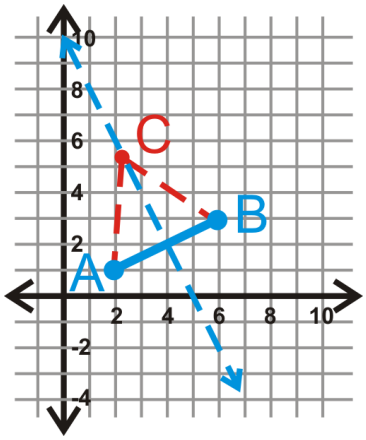
2. 

3. 

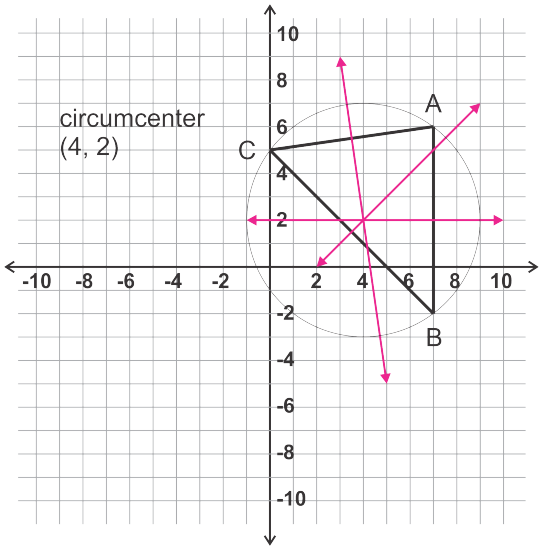
4. Yes, but for #2, the circumcenter is not within the triangle.
5. For acute triangles, the circumcenter is inside the triangle. For right triangles, the circumcenter is on the hypotenuse. For obtuse triangles, the circumcenter is outside the triangle.
6. By the definition of a perpendicular bisector, all three sides are bisected and therefore each half is congruent and all six triangles are right triangles. Then, by the definition of a circumcenter, the distance from it to each vertex is congruent (the hypotenuses of each triangle). Therefore, all 6 triangles are congruent by *HL*.



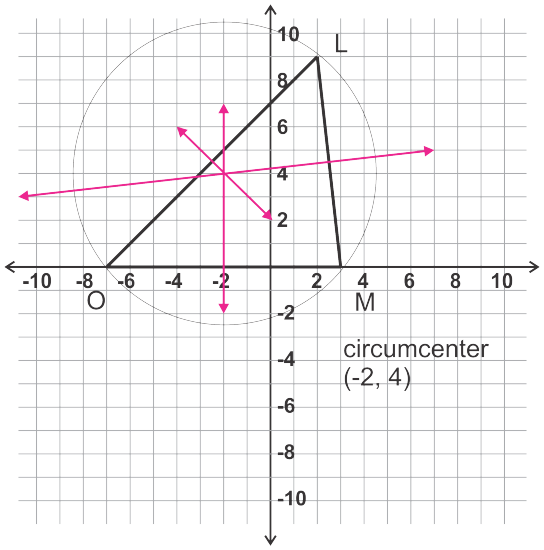
7. $x = 16$
8. $x = 8$
9. $x = 5$
10. $x = \frac{1}{2}$
11. $x = 31^\circ$
12. $x = 34$
13. (a) $AE = EB, AD = DB$
    (b) No, $AC \neq CB$
    (c) Yes, $AD = DB$
14. No, not enough information
15. No, we don't know if T is the midpoint of $\overline{XY}$.
16. $m = \frac{1}{2}$
17. (4, 2)
18. $y = -2x + 10$
19. $2\sqrt{5}$
20. C is going to be on the perpendicular bisector of $\overline{AB}$. In the picture, it is above $\overline{AB}$, but it also could be below $\overline{AB}$ on $y = -2x + 10$. $AB = 2\sqrt{5}$, so AC is also $2\sqrt{5}$. So, C will be $2\sqrt{5}$ units above or below $\overline{AB}$ on $y = -2x + 10$.



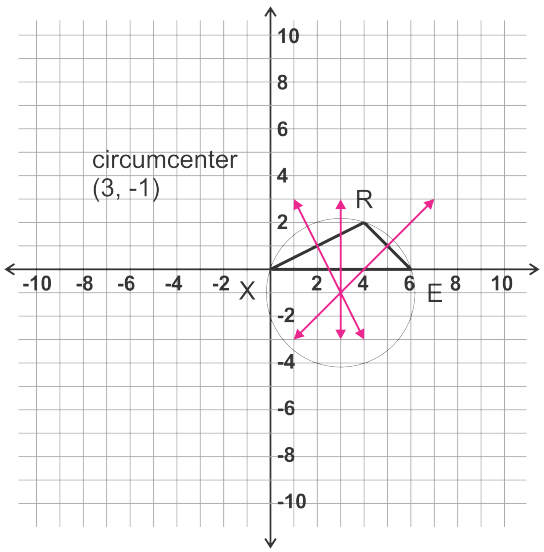
21-25. drawing



26.



27.



28. The perpendicular bisector of one side in a triangle is the set of all points equidistant from the endpoints of that side. When we find the perpendicular bisector of a second side, we find all the points equidistant from the endpoints of the second side (one of which is an endpoint of the first side as well). This means that the intersection of these two lines is equidistant from all three vertices of the triangle. The segments connecting this point (the circumcenter) to each vertex would be the radius of the circumscribed circle.
29. Fill in the blanks: There is exactly one circle which contains any three points.
30.

Table 5.1:

Statement	***Reason***
1. $\overleftrightarrow{CD}$ is the perpendicular bisector of $\overline{AB}$	Given
2. D is the midpoint of $\overline{AB}$	Definition of a perpendicular bisector
3. $\overline{AD} \cong \overline{DB}$	Definition of a midpoint
4. $\angle CDA$ and $\angle CDB$ are right angles	Definition of a perpendicular bisector
5. $\angle CDA \cong \angle CDB$	Definition of right angles
6. $\overline{CD} \cong \overline{CD}$	Reflexive PoC
7. $\triangle CDA \cong \triangle CDB$	SAS
8. $\overline{AC} \cong \overline{CB}$	CPCTC

31.

Table 5.2:

Statement	***Reason***
1. $\triangle ABC$ is a right isosceles triangle and $\overline{BD}$ is the $\perp$ bisector of $\overline{AC}$	Given
2. D is the midpoint of $\overline{AC}$	Definition of a perpendicular bisector
3. $\overline{AD} \cong \overline{DC}$	Definition of a midpoint
4. $\overline{AB} \cong \overline{BC}$	Definition of Isosceles Triangle

Table 5.2: (continued)

Statement	*Reason*
5. $\overline{BD} \cong \overline{BD}$	Reflexive Property of Congruence
6. $\triangle ABD$ and $\triangle CBD$ are congruent.	SSS

32. Since $\angle ABC$ is a right angle and $\angle ABD \cong \angle CBD$ (CPCTC), each must be 45°. Also, since $\angle ABC$ is a right angle and $\angle A \cong \angle C$, by Base Angles Theorem, $\angle A$ *and* $\angle C = 45°$. Therefore, by the converse of the Base Angles Theorem, $\triangle ABD$ and $\triangle CBD$ are isosceles.

5.3 Geometry - Second Edition, Angle Bisectors in Triangles, Review Answers

1-3. Construct the incenter using investigation 5-2.

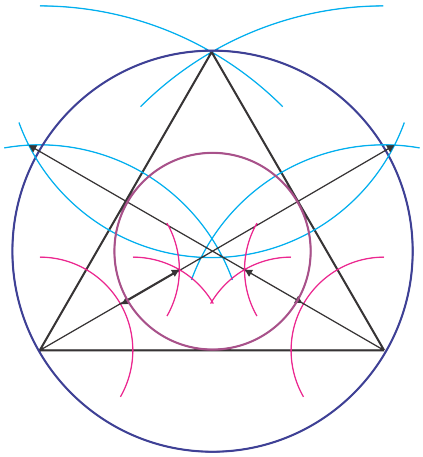
4. Yes, by definition, angle bisectors are on the interior of the angle. So, the incenter will be on the interior of all three angles, or inside the triangle.
5. They will be the same point.
6. $x = 6$
7. $x = 3$
8. $x = 8$
9. $x = 7$
10. $x = 9$
11. $x = 9$
12. No, the line segment must be perpendicular to the sides of the angle also.
13. No, it doesn't matter if the bisector is perpendicular to the interior ray.
14. Yes, the angles are marked congruent.
15. A is the incenter because it is on the angle bisectors.
    B is the circumcenter because it is equidistant to the vertices.
16. A is the circumcenter because it is equidistant to the vertices.
    B is the incenter because it is equidistant to the sides.
17.

Table 5.3:

Statement	*Reason*
1. $\overline{AD} \cong \overline{DC}$	Given
2. $\overrightarrow{BA} \perp \overline{AD}$ and $\overrightarrow{BC} \perp \overline{DC}$	The shortest distance from a point to a line is perpendicular.
3. $\angle DAB$ and $\angle DCB$ are right angles	Definition of perpendicular lines
4. $\angle DAB \cong \angle DCB$	All right angles are congruent
5. $\overline{BD} \cong \overline{BD}$	Reflexive PoC
6. $\triangle ABD \cong \triangle CBD$	HL
7. $\angle ABD \cong \angle DBC$	CPCTC
8. $\overrightarrow{BD}$ bisects $\angle ABC$	Definition of an angle bisector

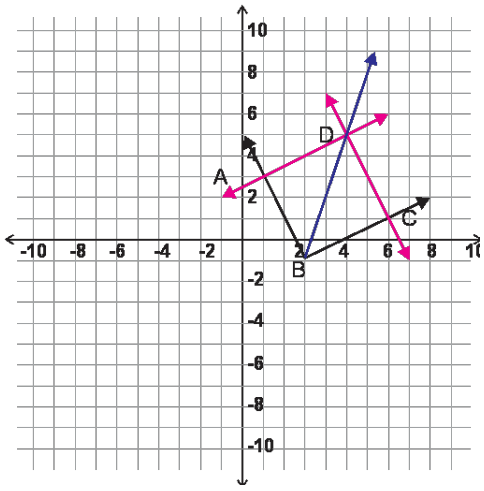
18. Incenter
19. Circumcenter
20. Circumcenter
21. Incenter

22-25. In an equilateral triangle the circumcenter and the incenter are the same point.



26. See diagram for 29-31.
27. slope of $\overrightarrow{BA}$ is -2 and slope of $\overrightarrow{BC}$ is $\frac{1}{2}$. The rays are perpendicular because their slopes are opposite reciprocals.
28. $AB = \sqrt{20} = 2\sqrt{5}$ and $BC = \sqrt{20} = 2\sqrt{5}$. They are congruent.

29-31.



32. $\overrightarrow{BD}$ is the angle bisector of $\angle ABC$. Since $\overline{AD} \perp \overline{AB}$ and $\overline{CD} \perp \overline{CB}$, $\triangle DAB$ and $\triangle DCB$ are right triangles. Since we have shown that $\overline{AB} \cong \overline{BC}$ and we know $\overline{BD} \cong \overline{BD}$ by the reflexive property, $\triangle DAB \cong \triangle DCB$ by HL. Thus, $\angle ABD \cong \angle CBD$ by CPCTC. Now we can conclude that $\overrightarrow{BD}$ is the angle bisector of $\angle ABC$ by definition of an angle bisector.

5.4 Geometry - Second Edition, Medians and Altitudes in Triangles, Review Answers

1-3. Use Investigation 5-3 to find the centroid.

4. The centroid will always be inside of a triangle because medians are always on the interior of a triangle.

5-7. Use Investigation 5-4 and 3-2 to find the orthocenter. For #6, the orthocenter will be outside of the triangle.

8. If a triangle is equilateral, then the incenter, circumcenter, orthocenter and centroid will all be the same point. This is because all of the sides are equal and all the angles are equal.
9. You only have to construct two lines for each point of concurrency. That is because any two lines intersect at one point. The fact that a third line intersects at this point does not change the location of the point.
10. $y = \frac{1}{2}x + 2$
11. $y = -3x - 3$
12. $y = -x + 4$
13. $y = \frac{1}{3}x - 5$
14. $GE = 10$
    $BE = 15$
15. $GF = 8$
    $CF = 24$
16. $AG = 20$
    $GD = 10$
17. $GC = 2x$
    $CF = 3x$
18. $x = 2, AD = 27$
19.

Table 5.4:

Statement	***Reason***
1. $\triangle ABC \cong \triangle DEF, \overline{AP}$ and $\overline{DO}$ are altitudes	Given
2. $\overline{AB} \cong \overline{DE}$	CPCTC
3. $\angle P$ and $\angle O$ are right angles	Definition of an altitude
4. $\angle P \cong \angle O$	All right angles are congruent
5. $\angle ABC \cong \angle DEF$	CPCTC
6. $\angle ABC$ and $\angle ABP$ are a linear pair $\angle DEF$ and $\angle DEO$ are a linear pair	Definition of a linear pair
7. $\angle ABC$ and $\angle ABP$ are supplementary $\angle DEF$ and $\angle DEO$ are supplementary	Linear Pair Postulate
8. $\angle ABP \cong \angle DEO$	Congruent Supplements Theorem
9. $\triangle APB \cong \triangle DOE$	AAS
10. $\overline{AP} \cong \overline{DO}$	CPCTC

20.

Table 5.5:

Statement	***Reason***
1. Isosceles $\triangle ABC$ with legs $\overline{AB}$ and $\overline{AC}$ $\overline{BD} \perp \overline{DC}$ and $\overline{CE} \perp \overline{BE}$	Given
2. $\angle DBC \cong \angle ECB$	Base Angles Theorem
3. $\angle BEC$ and $\angle CEB$ are right angles	Definition of perpendicular lines
4. $\angle BEC \cong \angle CEB$	All right angles are congruent
5. $\overline{BC} \cong \overline{BC}$	Reflexive PoC
6. $\triangle BEC \cong \triangle CDB$	AAS
7. $\overline{BD} \cong \overline{CE}$	CPCTC

21. $M(2, 5)$
22. $y = 2x + 1$
23. $N(1, -3)$
24. $y = -4x + 1$
25. intersection (0, 1)
26. Centroid
27. (1, -1)
28. (1, 3)
29. Midpoint of one side is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$, using the third vertex, the centroid is $\left(\frac{x_3+2\left(\frac{x_1+x_2}{2}\right)}{3}, \frac{y_3+2\left(\frac{y_1+y_2}{2}\right)}{3}\right) = \left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$.
30. (1, -5)

5.5 Geometry - Second Edition, Inequalities in Triangles, Review Answers

1. AB, BC, AC
2. BC, AB, AC
3. AC, BC, AB
4. $\angle B, \angle A, \angle C$
5. $\angle B, \angle C, \angle A$
6. $\angle C, \angle B, \angle A$
7. No, $6 + 6 < 13$
8. No, $1 + 2 = 3$
9. Yes
10. Yes
11. No, $23 + 56 < 85$
12. Yes
13. $1 < 3^{rd}$ side < 17
14. $11 < 3^{rd}$ side < 19
15. $12 < 3^{rd}$ side < 52
16. Both legs must be longer than 12

17. $0 < x < 10.\overline{3}$
18. $m\angle 1 > m\angle 2$ because $7 > 6$
19. IJ, IG, GJ, GH, JH
20. $m\angle 1 < m\angle 2, m\angle 3 > m\angle 4$
21. $a = b$
22. $a > b$
23. $a < b$
24. $d < a < e < c < b$
25. $a = b < d < e < c$
26. $x < 18$
27. $x > 3$
28. $m\angle C < m\angle B < m\angle A$ because $\overline{AB} < \overline{AC}$
29. SAS theorem doesn't apply here since the angle is not between the pair of congruent sides.
30. Since the median $\overline{AB}$ bisects the side $\overline{CT}, \overline{CB} \cong \overline{BT}$. By the reflexive property, $\overline{AB} \cong \overline{AB}$. If $\overline{CA} > \overline{AT}$, then we can use the SSS Inequality Theorem to conclude that $m\angle ABT < m\angle ABC$. Since $m\angle ABT$ and $m\angle ABC$ are also a linear pair and must be supplementary, the smaller angle must be acute. Hence, $\angle ABT$ is acute.

5.6 Geometry - Second Edition, Extension: Indirect Proof, Review Answers

Answers will vary. Here are some hints.

1. Assume n is odd, therefore $n = 2a + 1$.
2. Use the definition of an equilateral triangle to lead you towards a contradiction.
3. Remember the square root of a number can be negative or positive.
4. Use the definition of an isosceles triangle to lead you towards a contradiction.
5. If $x + y$ is even, then $x + y = 2n$, where n is any integer.
6. Use the Triangle Sum Theorem to lead you towards a contradiction.
7. With the assumption of the opposite of $AB + BC = AC$, these three lengths could make a triangle, thus making A, B, and C non-collinear.
8. If we assume that we have an even number of nickels, then the value of the coin collection must be a multiple of ten and we have a contradiction.
9. Assume that the last answer on the quiz is false. This implies that the fourth answer is true. If the fourth answer is true, then the one before it (the third answer) is false. However, this contradicts the fact that the third answer is true.
10. None. To prove this by contradiction, select each statement as the "true" statement and you will see that at least one of the other statements will also be true. If Charlie is right, then Rebecca is also right. If Larry is right, then Rebecca is right. If Rebecca is right, then Larry is right.

5.7 Chapter Review Answers

1. $\overline{BE}$
2. $\overline{AE}$
3. $\overline{AH}$
4. $\overline{CE}$
5. $\overline{AG}$

6. The point of concurrency is the circumcenter and use Investigation 5-1 to help you. The circle should pass through all the vertices of the triangle (inscribed triangle).
7. The point of concurrency is the incenter and use Investigation 5-2 to help you. The circle should touch all the sides of the triangle (inscribed circle).
8. The point of concurrency is the centroid and it is two-thirds of the median's length from the vertex (among other true ratios). It is also the balancing point of a triangle.
9. The point of concurrency is called the orthocenter. The circumcenter and the orthocenter can lie outside a triangle when the triangle is obtuse.
10. $x - 7 <$ third side $< 3x + 5$

Chapter 6

Geometry - Second Edition, Chapter 6, Answer Key

6.1 Geometry - Second Edition, Angles in Polygons, Review Answers

1.

Table 6.1:

# of sides	# of $\triangle s$ from one vertex	$\triangle s \times 180°$ (sum)	Each angle in a *regular* n–gon	Sum of the *exterior* angles
3	1	180°	60°	360°
4	2	360°	90°	360°
5	3	540°	108°	360°
6	4	720°	120°	360°
7	5	900°	128.57°	360°
8	6	1080°	135°	360°
9	7	1260°	140°	360°
10	8	1440°	144°	360°
11	9	1620°	147.27°	360°
12	10	1800°	150°	360°

2. 2340°
3. 3780°
4. 26
5. 20
6. 157.5°
7. 165°
8. 30°
9. 10°
10. 360°
11. 18

12. 30
13. 17
14. 24
15. 10
16. 11
17. $x = 60°$
18. $x = 90°, y = 20°$
19. $x = 35°$
20. $y = 115°$
21. $x = 105°$
22. $x = 51°, y = 108°$
23. $x = 70°, y = 70°, z = 90°$
24. $x = 72.5°, y = 107.5°$
25. $x = 90°, y = 64°$
26. $x = 52°, y = 128°, z = 123°$
27. larger angles are 135°
28. smallest angle is 36°
29. $x = 117.5°$
30. $180° - \frac{(n-2)180°}{n} = \frac{360°}{n}$
    $\frac{180°n - 180°n + 360}{n} = \frac{360°}{n}$
    $\frac{360°}{n} = \frac{360°}{n}$
31. $a = 120°,\ b = 60°,\ c = 48°,\ d = 60°,\ e = 48°,\ f = 84°,\ g = 120°,\ h = 108°,\ j = 96°$

6.2 Geometry - Second Edition, Properties of Parallelograms, Review Answers

1. $m\angle A = 108°, m\angle C = 108°, m\angle D = 72°$
2. $m\angle P = 37°, m\angle Q = 143°, m\angle D = 37°$
3. all angles are 90°
4. $m\angle E = m\angle G = (180 - x)°, m\angle H = x°$
5. $a = b = 53°$
6. $c = 6$
7. $d = 10,\ e = 14$
8. $f = 5,\ g = 3$
9. $h = 25°,\ j = 11°,\ k = 8°$
10. $m = 25°,\ n = 19°$
11. $p = 8,\ q = 3$
12. $r = 1,\ s = 2$
13. $t = 3,\ u = 4$
14. 96°
15. 85°
16. 43°
17. 42°
18. 12
19. 2
20. 64°
21. 42°
22. (2, 1), Find the midpoint of one of the diagonals since the midpoints are the same for both

23. slope of $\overline{EF}$ = slope of $\overline{GH} = \frac{1}{4}$; slope of $\overline{EH}$ = slope of $\overline{FG} = -\frac{5}{2}$; Slopes of opposite sides are the same, therefore opposite sides are parallel.
24. $EF = HG = \sqrt{17}$; $FG = EH = \sqrt{29}$; lengths of opposite sides are the same (congruent).
25. A quadrilateral in the coordinate plane can be show to be a parallelogram by showing any one of the three properties of parallelograms shown in questions 22-24.
26.

Table 6.2:

Statement	***Reason***
1. $ABCD$ is a parallelogram with diagonal $\overline{BD}$	Given
2. $\overline{AB} \parallel \overline{DC}$, $\overline{AD} \parallel \overline{BC}$	Definition of a parallelogram
3. $\angle ABD \cong \angle BDC$, $\angle ADB \cong \angle DBC$	Alternate Interior Angles Theorem
4. $\overline{DB} \cong \overline{DB}$	Reflexive PoC
5. $\triangle ABD \cong \triangle CDB$	ASA
6. $\angle A \cong \angle C$	CPCTC

27.

Table 6.3:

Statement	***Reason***
1. $ABCD$ is a parallelogram with diagonals $\overline{BD}$ and $\overline{AC}$	Given
2. $\overline{AB} \parallel \overline{DC}$, $\overline{AD} \parallel \overline{BC}$	Definition of a parallelogram
3. $\angle ABD \cong \angle BDC$, $\angle CAB \cong \angle ACD$	Alternate Interior Angles Theorem
4. $\overline{AB} \cong \overline{DC}$	Opposite Sides Theorem
5. $\triangle DEC \cong \triangle BEA$	ASA
6. $\overline{AE} \cong \overline{EC}$, $\overline{DE} \cong \overline{EB}$	CPCTC

28.

Table 6.4:

Statements	***Reasons***
1. $ABCD$ is a parallelogram	Given
2. $m\angle 1 = m\angle 3$ and $m\angle 2 = m\angle 4$	Opposite angles congruent in parallelogram
3. $m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = 360^\circ$	Sum of angles in quadrilateral is 360°
4. $m\angle 1 + m\angle 2 + m\angle 1 + m\angle 2 = 360^\circ$	Substitution
5. $2(m\angle 1 + m\angle 2) = 360^\circ$	Simplification
6. $m\angle 1 + m\angle 2 = 180^\circ$	Division POE

29. $w = 135^\circ$
30. $x = 16$
31. $y = 105^\circ$

32. $z = 60°$

6.3 Geometry - Second Edition, Proving Quadrilaterals are Parallelograms, Review Answers

1. No
2. Yes
3. Yes
4. Yes
5. No
6. No
7. Yes
8. No
9. Yes
10. Yes
11. No
12. No
13. $x = 5$
14. $x = 8°,\ y = 10°$
15. $x = 4,\ y = 3$
16. Yes
17. Yes
18. No
19.

Table 6.5:

Statement	***Reason***
1. $\angle A \cong \angle C,\ \angle D \cong \angle B$	Given
2. $m\angle A = m\angle C,\ m\angle D = m\angle B$	$\cong$ angles have $=$ measures
3. $m\angle A + m\angle B + m\angle C + m\angle D = 360°$	Definition of a quadrilateral
4. $m\angle A + m\angle A + m\angle B + m\angle B = 360°$	Substitution PoE
5. $2m\angle A + 2m\angle B = 360°$	
2m $\angle A + 2m\angle D = 360°$	Combine Like Terms
6. $m\angle A + m\angle B = 180°$	
m $\angle A + m\angle D = 180°$	Division PoE
7. $\angle A$ and $\angle B$ are supplementary	Definition of Supplementary Angles
$\angle A$ and $\angle D$ are supplementary	
8. $\overline{AD} \parallel \overline{BC},\ \overline{AB} \parallel \overline{DC}$	Consecutive Interior Angles Converse
9. $ABCD$ is a parallelogram	Definition of a Parallelogram

20.

Table 6.6:

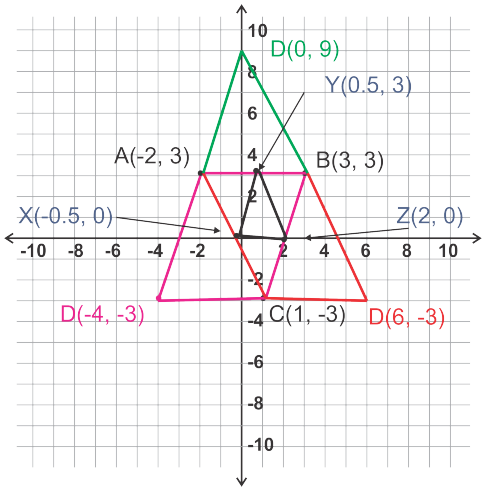
Statement	*Reason*
1. $\overline{AE} \cong \overline{EC}$, $\overline{DE} \cong \overline{EB}$	Given
2. $\angle AED \cong \angle BEC$	
$\angle DEC \cong \angle AEB$	Vertical Angles Theorem
3. $\triangle AED \cong \triangle CEB$	
$\triangle AEB \cong \triangle CED$	SAS
4. $\overline{AB} \cong \overline{DC}$, $\overline{AD} \cong \overline{BC}$	CPCTC
5. $ABCD$ is a parallelogram	Opposite Sides Converse

21.

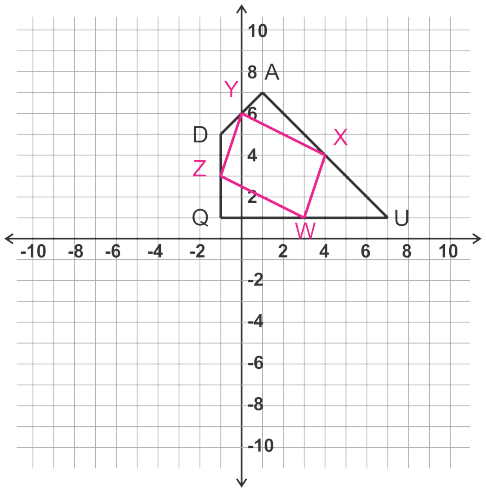
Table 6.7:

Statement	*Reason*
1. $\angle ADB \cong \angle CBD$, $\overline{AD} \cong \overline{BC}$	Given
2. $\overline{AD} \parallel \overline{BC}$	Alternate Interior Angles Converse
3. $ABCD$ is a parallelogram	Theorem 5-10

22. see graph
23. -2
24. $3\sqrt{5}$
25. see graph
26. The triangle is formed by the midsegments of the triangle formed when the parallelograms overlap. Four congruent triangles are formed within this center triangle, which is also congruent to the three outer triangles.



27. see graph



28. parallelogram
29. slope of $\overline{WX}$ = slope of $\overline{YZ} = 3$; slope of $\overline{XY}$ = slope of $\overline{ZW} = -\frac{1}{2}$ opposite sides parallel
30. midpoint of diagonal $\overline{YW}$ is (1.5, 3.5); midpoint of diagonal $\overline{XZ}$ is (1.5, 3.5); midpoints bisect each other
31. Each side of the parallelogram is parallel to the diagonal. For example, $\overline{XY} \parallel \overline{DU} \parallel \overline{ZW}$, so opposite sides are parallel. They are also half the length of the diagonal so opposite sides are congruent. Either proves that $WXYZ$ is a parallelogram.

6.4 Geometry - Second Edition, Rectangles, Rhombuses and Squares, Review Answers

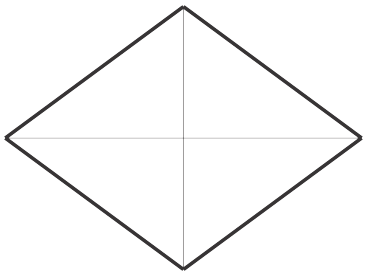
1. (a) 13
   (b) 26
   (c) 24
   (d) 10
   (e) 90°
2. (a) 12
   (b) 21.4
   (c) 11
   (d) 54°
   (e) 90°
3. (a) 90°
   (b) 90°
   (c) 45°
   (d) 45°
4. Rectangle, the diagonals bisect each other and are congruent.
5. Rhombus, all sides are congruent and the diagonals are perpendicular.
6. None
7. Parallelogram, the diagonals bisect each other.
8. Square, the diagonals bisect each other, are congruent, and perpendicular.
9. Rectangle, all angles are right angles.
10. None
11. Square, all the angles and sides are congruent.
12. Parallelogram, one set of sides are parallel and congruent.

13. Sometimes, with the figure is a square.
14. Always
15. Sometimes, when it is a square.
16. Always
17. Sometimes, when it is a square.
18. Never
19. Square
20. Rhombus
21. Rectangle
22. Parallelogram
23. *Answers will vary.* One possibility: Another way to determine if a quadrilateral is a square would be to find the length of all the sides using the distance formula. All sides must be equal. Then, find the slopes of each side. If the adjacent sides have perpendicular slopes, then the angles are all 90° and thus congruent.
24. $x = 10,\ w = 53°,\ y = 37°,\ z = 37°$
25. $x = 45°,\ y = 90°,\ z = 2\sqrt{2}$
26. $x = y = 13,\ w = z = 25°$
27.

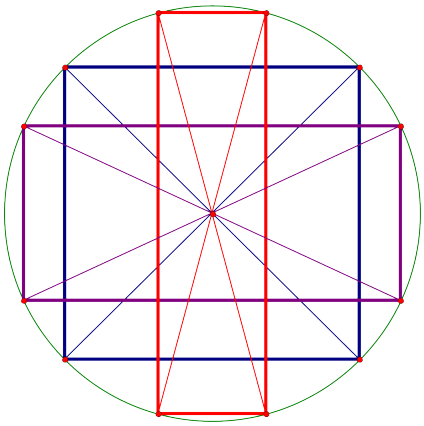
Table 6.8:

Statements	***Reasons***
1. $ABCD$ is a rectangle	1. Given
2. $\overline{BW} \cong \overline{WC},\ \overline{AY} \cong \overline{YD},\ \overline{BX} \cong \overline{XA},\ \overline{CZ} \cong \overline{ZD}$	2. Definition of a midpoint
3. $BD = AC$	3. Diagonals are congruent in a rectangle
4. $\overline{XY}$ is a midsegment in $\triangle ABD$ $\overline{ZY}$ is a midsegment in $\triangle ACD$ $\overline{XW}$ is a midsegment in $\triangle ABC$ $\overline{WZ}$ is a midsegment in $\triangle BCD$	4. Definition of a midsegment in a triangle
5. $XY = \frac{1}{2}BD = WZ$ and $XW = \frac{1}{2}AC = YZ$	5. Midsegment in a triangle is half the length of the parallel side.
6. $\frac{1}{2}BD = \frac{1}{2}AC$	6. Division POE
7. $XY = WZ = YZ = XW$	7. Substitution
8. $WXYZ$ is a rhombus	8. Definition of a rhombus

28. Answers may vary. The quadrilateral inscribed in the rhombus will always be a rectangle because the diagonals of a rhombus are perpendicular and the opposite sides of the inscribed quadrilateral will be parallel to the diagonals and thus perpendicular to one another.
29. Answers may vary. First, the square is a rhombus, the inscribed quadrilateral will be a rectangle (see problem 28). Second, the diagonals of the square are congruent so the sides of the inscribed quadrilateral will be congruent (see problem 27). Since the sides of the inscribed quadrilateral are perpendicular and congruent the parallelogram is a square.

30. 

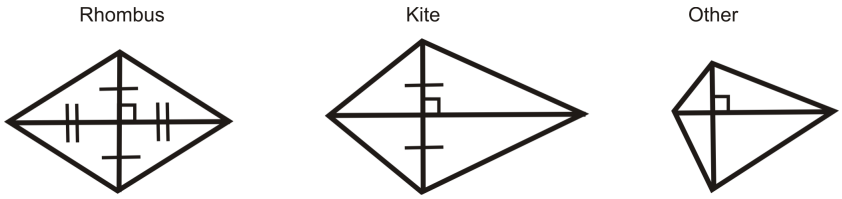
Start by drawing a segment 2 inches long. Construct the perpendicular bisector of this segment. Mark off points on the perpendicular bisector .75 inches from the point of intersection. Connect these points to the endpoint of your original segment.

31. 

There are an infinite number of rectangles with diagonals of length 3 inches. The picture to the left shows three possible rectangles. Start by drawing a segment 3 inches long. Construct the perpendicular bisector of the segment to find the midpoint. Anchor your compass at the midpoint of the segment and construct a circle which contains the endpoints of your segment (radius 1.5 inches). Now you can draw a second diameter to your circle and connect the endpoints to form a rectangle with diagonal length 3 inches.

6.5 Geometry - Second Edition, Trapezoids and Kites, Review Answers

1. (a) 55°
   (b) 125°
   (c) 90°
   (d) 110°
2. (a) 50°
   (b) 50°
   (c) 90°
   (d) 25°
   (e) 115°
3. No, if the parallel sides were congruent, then it would be a parallelogram. By the definition of a trapezoid, it can never be a parallelogram (exactly one pair of parallel sides).
4. Yes, the diagonals do not have to bisect each other.



5. Construct two perpendicular lines to make the diagonals. One diagonal is bisected, so measure an equal length on either side of the point of intersection on one diagonal. Mark this as two vertices. The other two vertices are on the other diagonal. Place them anywhere on this diagonal and connect the four points to create the kite. *Answers will vary.*
6. 33
7. 28
8. 8
9. 11
10. 37
11. 5
12. $x = 4$
13. $x = 5,\ y = \sqrt{73}$
14. $x = 11,\ y = 17$
15. $y = 5°$
16. $y = 45°$
17. $x = 12°,\ y = 8°$
18. parallelogram
19. square
20. kite
21. trapezoid
22. None
23. isosceles trapezoid
24. rectangle
25. rhombus
26.

Table 6.9:

Statement	***Reason***
1. $\overline{KE} \cong \overline{TE}$ and $\overline{KI} \cong \overline{TI}$	Given
2. $\overline{EI} \cong \overline{EI}$	Reflexive PoC
3. $\triangle EKI \cong \triangle ETI$	SSS
4. $\angle KES \cong \angle TES$ and $\angle KIS \cong \angle TIS$	CPCTC
5. $\overline{EI}$ is the angle bisector of $\angle KET$ and $\angle KIT$	Definition of an angle bisector

27.

Table 6.10:

Statement	***Reason***
1. $\overline{KE} \cong \overline{TE}$ and $\overline{KI} \cong \overline{TI}$	Given
2. $\triangle KET$ and $\triangle KIT$ are isosceles triangles	Definition of isosceles triangles

Table 6.10: (continued)

Statement	*Reason*
3. $\overline{EI}$ is the angle bisector of $\angle KET$ and $\angle KIT$	Theorem 6-22
4. $\overline{EI}$ is the perpendicular bisector of $\overline{KT}$	Isosceles Triangle Theorem
5. $\overline{KT} \perp \overline{EI}$	

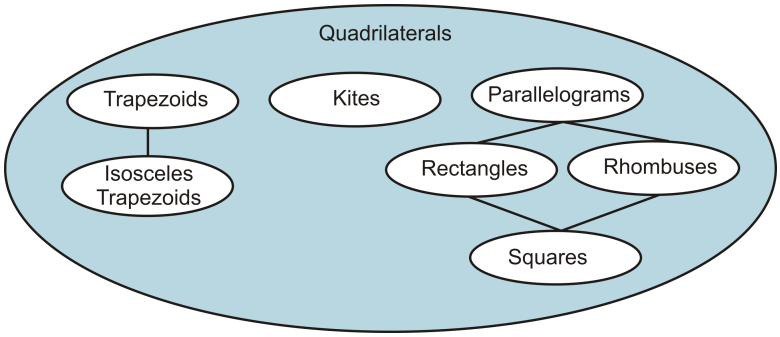
28.

Table 6.11:

Statement	*Reason*
1. $TRAP$ is an isosceles trapezoid with $\overline{TR} \parallel \overline{AP}$	Given
2. $\overline{TP} \cong \overline{RA}$	Definition of isosceles trapezoid
3. $\overline{AP} \cong \overline{AP}$	Reflexive PoC
4. $\angle TPA \cong \angle RAP$	Base angles congruent in isosceles trapezoid
5. $\triangle TPA \cong \triangle RAP$	SAS
6. $\overline{TA} \cong \overline{RP}$	CPCTC

29. The sides of the parallelogram inscribed inside a kite will be parallel to the diagonals because they are triangle midsegments. Since the diagonals in a kite are perpendicular, the sides of the parallelogram will be perpendicular as well. The diagonals in a kite are not congruent so only opposite sides of the parallelogram will be congruent and thus preventing the parallelogram from being a square.
30. Since the diagonals are congruent and the sides of the inscribed parallelogram are half the length of the diagonals they are parallel to (because they are triangle midsegments), they are all congruent. This makes the inscribed parallelogram a rhombus.

6.6 Chapter Review Answers



1. Never
2. Always
3. Always
4. Sometimes
5. Sometimes
6. Never
7. Always

8. Sometimes

Table 6.12:

	Opposite sides $\parallel$	**Diagonals bisect each other**	**Diagonals $\perp$**	**Opposite sides $\cong$**	**Opposite angles $\cong$**	**Diagonals $\cong$**
Trapezoid	**One set**	**No**	**No**	**No**	**No**	**No**
Isosceles Trapezoid	**One set**	**No**	**No**	**Non-parallel sides**	**No, base $\angle s \cong$**	**Yes**
Kite	**No**	**No**	**Yes**	**No**	**Non-vertex $\angle s$**	**No**
Parallelogram	**Both sets**	**Yes**	**No**	**Yes**	**Yes**	**No**
Rectangle	**Both sets**	**Yes**	**No**	**Yes**	**All $\angle s \cong$**	**Yes**
Rhombus	**Both sets**	**Yes**	**Yes**	**All sides $\cong$**	**Yes**	**No**
Square	**Both sets**	**Yes**	**Yes**	**All sides $\cong$**	**All $\angle s \cong$**	**Yes**

$a = 64°,\ b = 118°,\ c = 82°,\ d = 99°,\ e = 106°,\ f = 88°,\ g = 150°,\ h = 56°,\ j = 74°,\ k = 136°$

Chapter 7

Geometry - Second Edition, Chapter 7, Answer Key

7.1 Geometry - Second Edition, Ratios and Proportions, Review Answers

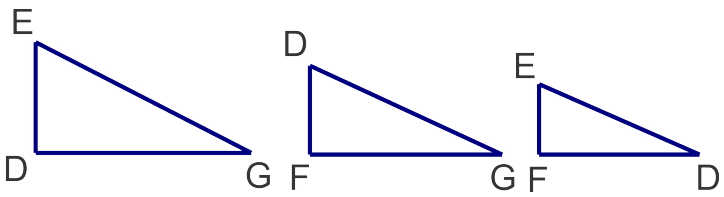
1. (a) 4:3
   (b) 5:8
   (c) 6:19
   (d) 6:8:5
2. 2:1
3. 1:3
4. 2:1
5. 1:1
6. 5:4:3
7. $x = 18°$, angles are $54°, 54°, 72°$
8. $x = 3; 9, 12, 15$
9. $x = 4; 12, 20$
10. $x = 16; 64, 112$
11. $X = 4; 20, 36$
12. $x = 4; 12, 44$
13. $\frac{a+b}{b} = \frac{c+d}{d}$
    $d(a+b) = b(c+d)$
    $ad + bd = bc + bd$
    $ad = bc$
14. $\frac{a-b}{b} = \frac{c-d}{d}$
    $d(a-b) = b(c-d)$
    $ad - bd = bc - bd$
    $ad = bc$
15. $x = 12$
16. $x = -5$
17. $y = 16$
18. $x = 12, -12$
19. $y = -21$

20. $z = 3.75$
21. $x = 13.9$ gallons
22. The president makes \$800,000, vice president makes \$600,000 and the financial officer makes \$400,000.
23. $1\frac{2}{3}$ cups water
24. 60 marshmallows; 6 cups miniatures
25. False
26. True
27. True
28. False
29. 28
30. 18
31. 7
32. 24

7.2 Geometry - Second Edition, Similar Polygons, Review Answers

1. True
2. False
3. False
4. False
5. True
6. True
7. False
8. True
9. $\angle B \cong \angle H, \angle I \cong \angle A, \angle G \cong \angle T, \frac{BI}{HA} = \frac{IG}{AT} = \frac{BG}{HT}$
10. $\frac{3}{5}$ or $\frac{5}{3}$
11. $HT = 35$
12. $IG = 27$
13. $57, 95, \frac{3}{5}$ or $\frac{5}{3}$
14. $m\angle E = 113^\circ, m\angle Q = 112^\circ$
15. $\frac{2}{3}$ or $\frac{3}{2}$
16. 12
17. 21
18. 6
19. No, $\frac{32}{26} \neq \frac{18}{12}$
20. Yes, $\triangle ABC \sim \triangle NML$
21. Yes, $ABCD \sim STUV$
22. Yes, $\triangle EFG \sim \triangle LMN$
23. $x = 12, y = 15$
24. 31
25. $x = 20, y = 7$
26. ≈ 14.6
27. $a \approx 7.4, b = 9.6$
28. $X = 6, y = 10.5$
29. 121
30. 1:3
31. $30u^2, 270u^2, 1 : 9$, this is the ratio of the lengths squared or $\left(\frac{1}{3}\right)^2$.

7.3 Geometry - Second Edition, Similarity by AA, Review Answers

1. $\triangle TRI$
2. TR, TI, AM
3. 12
4. 6
5. 6, 12
6. $\triangle ABE \sim \triangle CDE$ because $\angle BAE \cong \angle DCE$ and $\angle ABE \cong \angle CDE$ by the Alternate Interior Angles Theorem.
7. Answers will vary. One possibility: $\frac{AE}{CE} = \frac{BE}{DE}$
8. One possibility: $\triangle AED$ and $\triangle BEC$
9. $AC = 22.4$
10. Only two angles are needed because of the 3^{rd} Angle Theorem.
11. Congruent triangles have the same shape AND size. Similar triangles only have the same shape. Also, congruent triangles are always similar, but similar triangles are not always congruent.
12. Yes, right angles are congruent and solving for the missing angle in each triangle, we find that the other two angles are congruent as well.
13. $FE = \frac{3}{4}k$
14. $k = 16$
15. right, right, similar
16. Yes, $\triangle DEG \sim \triangle FDG \sim \triangle FED$
17. Yes, $\triangle HLI \sim \triangle HKJ$
18. No only vertical angles are congruent
19. Yes, they are $\perp$ to the same line.
20. Yes, the two right angles are congruent and $\angle OEC$ and $\angle NEA$ are vertical angles.
21. $x = 48\ ft.$
22. Yes, we can use the Pythagorean Theorem to find EA. $EA = 93.3\ ft.$
23. 70 ft
24. 29 ft 2 in
25. 24 ft
26. Answers will vary. Check your answer by considering whether or not it is reasonable.
27. 

28. $m\angle 1 + m\angle 2 = 90°$, therefore $m\angle GDF = m\angle 2$ and $m\angle EDF = \angle 1$. This shows that the three angles in each triangle are congruent to the three corresponding angles in each of the other triangles. Thus, they are all similar.
29. DF
30. GD
31. FE

7.4 Geometry - Second Edition, Similarity by SSS and SAS, Review Answers

1. Yes, SSS. The side lengths are proportional.
2. No. One is much larger than the other.
3. There are 2.2 cm in an inch, so that is the scale factor.
4. There is no need. With the A and A parts of ASA we have triangles with two congruent angles. The triangles are similar by AA.
5. $\triangle DFE$
6. DF, EF, DF
7. $DH = 7.5$
8. $\triangle DBE$
9. SAS
10. 27
11. AB, BE, AC
12. Yes, $\frac{7}{21} = \frac{8}{24}$. This proportion will be valid as long as $\overline{AC} \parallel \overline{DE}$.
13. Yes, $\triangle ABC \sim \triangle DFE$, SAS
14. No, the angle is not between the given sides
15. Yes, $\triangle ABC \sim \triangle DFE$, SSS
16. Yes, $\triangle ABE \sim \triangle DBC$, SAS
17. No, $\frac{10}{20} \neq \frac{15}{25}$
18. No, $\frac{24}{32} \neq \frac{16}{20}$
19. $x = 3$
20. $x = 6, y = 3.5$
21. The building is 10 ft tall.
22. The child's shadow is 105 inches long.
23. The side lengths are 15, 36, 39
24. The radio tower is 55 ft.
25. $AB = BC = \sqrt{11.25}, AC = 3, DE = EF = \sqrt{5}, DF = 2$
26. $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = \frac{3}{2}$
27. Yes, $\triangle ABC \sim \triangle DEF$ by SSS similarity.
28. slope of $\overline{CA}$ = slope of $\overline{LO}$ = undefined (vertical); slope of $\overline{AR}$ = slope of $\overline{OT} = 0$ (horizontal).
29. 90°, vertical and horizontal lines are perpendicular.
30. $TO = 6, OL = 8, CA = 4$ and $AR = 3; LO : CA = OT : AR = 2 : 1$
31. Yes, by SAS similarity.

7.5 Geometry - Second Edition, Proportionality Relationships, Review Answers

1. $\triangle ECF \sim \triangle BCD$
2. DF
3. CD
4. FE
5. DF, DB
6. 14.4
7. 21.6
8. 16.8

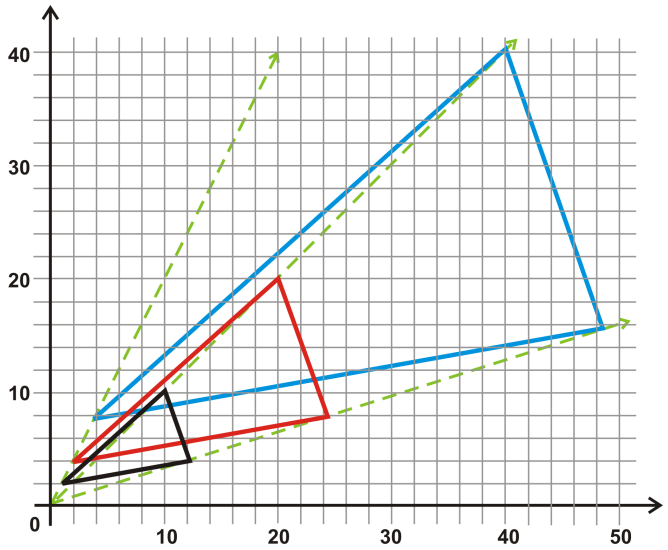
9. 45
10. The parallel sides are in the same ratio as the sides of the similar triangles, not the segments of the sides.
11. yes
12. no
13. yes
14. no
15. $x = 9$
16. $y = 10$
17. $y = 16$
18. $z = 4$
19. $x = 8$
20. $x = 2.5$
21. $a = 4.8, b = 9.6$
22. $a = 4.5, b = 4, c = 10$
23. $a = 1.8, b = \frac{7}{3}$
24. $x = 5, y = 7$
25. $\frac{3}{2}b$ or $1.5b$
26. $\frac{16}{5}a$ or $3.2a$
27. Casey mistakenly used the length of the angle bisector in the proportion rather than the other side length. The correct proportion is $\frac{5}{a} = \frac{7}{5}$, thus $a = \frac{25}{7}$.
28. The path will intersect the third side 2.25 m from the 3 m side and 3.75 m from the 5 m side.
29. $a = 42m$ and $b = 56m$
30. Blanks are in red.

Table 7.1:

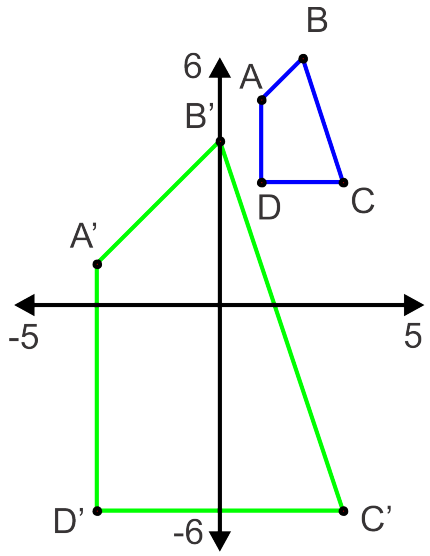
Statement	***Reason***
1. $\overrightarrow{AC}$ is the angle bisector of $\angle BAD$ X, A, B are collinear and $\overrightarrow{AC} \parallel \overleftrightarrow{XD}$	Given
2. $\angle BAC \cong \angle CAD$	Definition of an angle bisector
3. $\angle X \cong \angle BAC$	Corresponding Angles Postulate
4. $\angle CAD \cong \angle ADX$	Alternate Interior Angles Theorem
5. $\angle X \cong \angle ADX$	Transitive PoC
6. $\triangle XAD$ is isosceles	Base Angles Converse
7. $\overline{AX} \cong \overline{AD}$	Definition of an Isosceles Triangle
8. $AX = AD$	Congruent segments are also equal
9. $\frac{BA}{AX} = \frac{BC}{CD}$	Theorem 7-7
10. $\frac{BA}{AD} = \frac{BC}{CD}$	Substitution PoE

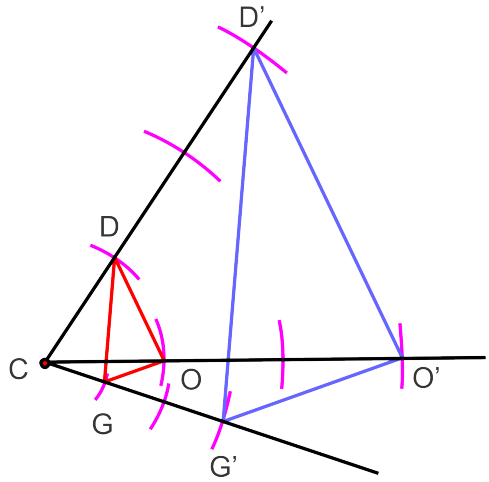
7.6 Geometry - Second Edition, Similarity Transformations, Review Answers

1. (2, 6)
2. (-8, 12)
3. (4.5, -6.5)

4. $k = \frac{3}{2}$
5. $k = 9$
6. $k = \frac{1}{2}$
7. 20, 26, 34
8. $2\frac{2}{3}, 3, 5$
9. $k = \frac{2}{5}$
10. $k = \frac{14}{11}$
11. original: 20, dilation: 80, ratio: 4:1
12. If $k = 1$, then the dilation is congruent to the original figure.
13. $A'(6, 12), B'(-9, 21), C'(-3, -6)$
14. $A'(9, 6), B'(-3, -12), C'(0, -7.5)$
15. 

16. $k = 2$
17. $A''(4, 8), B''(48, 16), C''(40, 40)$
18. $k = 2$
19. (a) $\sqrt{5}$
    (b) $\sqrt{5}$
    (c) $3\sqrt{5}$
    (d) $2\sqrt{5}$
    (e) $4\sqrt{5}$
20. (a) $5\sqrt{5}$
    (b) $10\sqrt{5}$
    (c) $20\sqrt{5}$
21. (a) $OA : OA' = 1 : 2$
    $AB : A'B' = 1 : 2$
    (b) $OA : OA'' = 1 : 4$
    $AB : A''B'' = 1 : 4$

22. 

23. $x = 3$
24. $y = 2x + 1$
25. (3, 7)
26. This point is the center of the dilation.
27. The scale factor is 3.
28. 

29. $\frac{D'O'}{DO} = 3$, $\frac{O'G'}{OG} = 3$ and $\frac{G'D'}{GD} = 3$.
30. 3
31. To dilate the original figure by a scale factor of 4 make one additional tick mark with your compass.
32. To dilate the original figure by a scale factor of $\frac{1}{2}$ construct the perpendicular bisectors of $\overline{CG}, \overline{CO}$ and $\overline{CD}$ to find the midpoints of the segments which will be your G', O' and D' respectively.

7.7 Geometry - Second Edition, Extension: Self-Similarity, Review Answers

1. 
2.

Table 7.2:

	Number of Segments	*Length of each Segment*	*Total Length of the Segments*
Stage 0	1	1	1
Stage 1	2	$\frac{1}{3}$	$\frac{2}{3}$
Stage 2	4	$\frac{1}{9}$	$\frac{4}{9}$
Stage 3	8	$\frac{1}{27}$	$\frac{8}{27}$
Stage 4	16	$\frac{1}{81}$	$\frac{16}{81}$
Stage 5	32	$\frac{1}{243}$	$\frac{32}{243}$

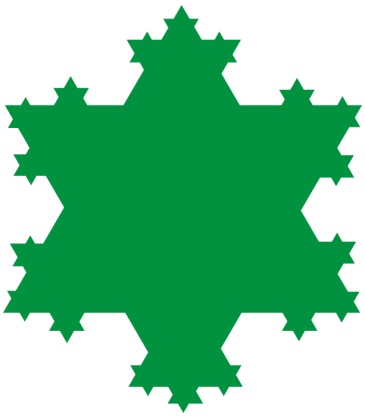
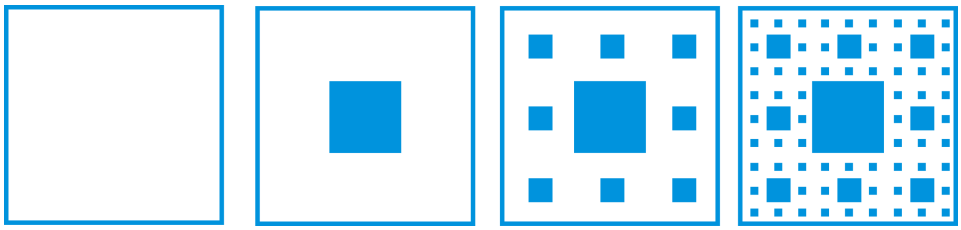
3. There will be 2^n segments.
4. The length of each segment will be $\frac{1}{3^n}$ units.
5. 
6. Number of edges: 192
   Edge length: $\frac{1}{27}$
   Perimeter: $\frac{192}{27}$
7. 
8.

Table 7.3:

	Stage 0	*Stage 1*	*Stage 2*	*Stage 3*
Color	0	1	9	73
No Color	1	8	64	512

9. Answers will vary. Many different flowers (roses) and vegetables (broccoli, cauliflower, and artichokes) are examples of fractals in nature.
10. Answers will vary.

7.8 Chapter Review Answers

1. (a) $x = 12$
   (b) $x = 14.5$
2. $x = 10°; 50°, 60°, 70°$
3. 3.75 gallons
4. yes
5. no
6. yes, AA
7. yes, SSS
8. no
9. yes
10. $A'(10.5, 3), B'(6, 13.5), C'(-1.5, 6)$
11. $x = 3$
12. $x = 1$
13. $z = 6$
14. $a = 5, b = 7.5$

Chapter 8

Geometry - Second Edition, Chapter 8, Answer Key

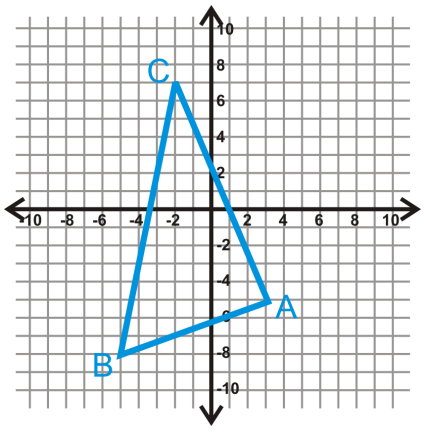
8.1 Geometry - Second Edition, The Pythagorean Theorem, Review Answers

1. $\sqrt{505}$
2. $9\sqrt{5}$
3. $\sqrt{799}$
4. 12
5. 10
6. $10\sqrt{14}$
7. 26
8. $3\sqrt{41}$
9. $\sqrt{x^2+y^2}$
10. $9\sqrt{2}$
11. yes
12. no
13. no
14. yes
15. yes
16. no
17. $20\sqrt{39}$
18. $14\sqrt{429}$
19. $\frac{17\sqrt{287}}{4}$
20. $4\sqrt{5}$
21. $\sqrt{493}$
22. $5\sqrt{10}$
23. 36.6×20.6
24. 33.6×25.2
25. $\frac{\sqrt{3}}{4}s^2$
26. $16\sqrt{3}$
27. $a^2+2ab+b^2$

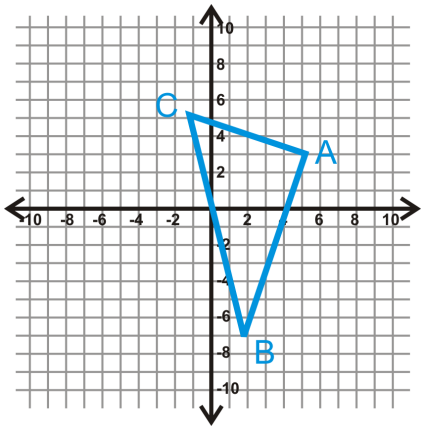
28. $c^2 + 4\left(\frac{1}{2}\right)ab = c^2 + 2ab$
29. $a^2 + 2ab + b^2 = c^2 + 2ab$, which simplifies to $a^2 + b^2 = c^2$
30. $\frac{1}{2}(a+b)(a+b) = \frac{1}{2}(a^2 + 2ab + b^2)$
31. $2\left(\frac{1}{2}\right)ab + \frac{1}{2}c = ab + \frac{1}{2}c$
32. $\frac{1}{2}(a^2 + 2ab + b^2) = ab + \frac{1}{2}c \Rightarrow a^2 + 2ab + b^2 = 2ab + c^2$, which simplifies to $a^2 + b^2 = c^2$

8.2 Geometry - Second Edition, Converse of the Pythagorean Theorem, Review Answers

1. (a) $c = 15$
   (b) $12 < c < 5$
   (c) $15 < c < 21$
2. (a) $a = 7$
   (b) $7 < a < 24$
   (c) $1 < c < 7$
3. It is a right triangle because 8, 15, 17 is a Pythagorean triple. The "x" indicates that this set is a multiple of 8, 15, 17.
4. right
5. no
6. right
7. acute
8. right
9. obtuse
10. right
11. acute
12. acute
13. right
14. obtuse
15. obtuse
16. acute



17. obtuse



18. One way is to use the distance formula to find the distances of all three sides and then use the converse of the Pythagorean Theorem. The second way would be to find the slope of all three sides and determine if two sides are perpendicular.
19. $c = 13$
20. $d = \sqrt{194}$
21. The sides of $\triangle ABC$ are a multiple of 3, 4, 5 which is a right triangle. $\angle A$ is opposite the largest side, which is the hypotenuse, making it 90°.
22.

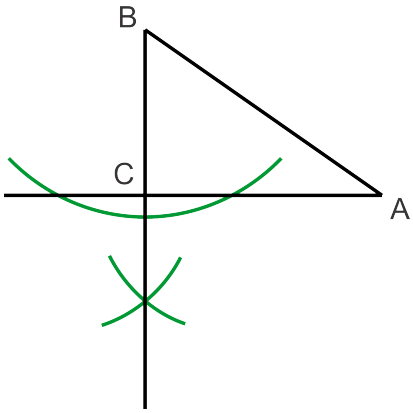
Table 8.1:

Statement	***Reason***
1. In $\triangle ABC, a^2 + b^2 < c^2$, and c is the longest side. In $\triangle LMN, \angle N$ is a right angle.	Given
2. $a^2 + b^2 = h^2$	Pythagorean Theorem
3. $c^2 > h^2$	Transitive PoE
4. $c > h$	Take the square root of both sides
5. $\angle C$ is the largest angle in $\triangle ABC$.	The largest angle is opposite the longest side.
6. $m\angle N = 90°$	Definition of a right angle
7. $m\angle C > m\angle N$	SSS Inequality Theorem
8. $m\angle C > 90°$	Transitive PoE
9. $\angle C$ is an obtuse angle.	Definition of an obtuse angle.
10. $\triangle ABC$ is an obtuse triangle.	Definition of an obtuse triangle.

23. right
24. obtuse
25. acute
26. (1, 5), (-2, -3)

27 and 28. answers vary, you can check your answer by plotting the points on graph paper and measuring with a protractor or using the distance formula to verify the appropriate inequality.

29 and 30. While your diagram may be different because your angle at A may be different, the construction should look something like this:



31. The sum of the angles in a triangle must be 180°, if $\angle C$ is 90°, then both $\angle A$ and $\angle B$ are acute.
32. You could construct a line perpendicular to $\overline{AB}$ through $\angle B$ (you will need to extend the segment beyond B to do the construction). Next, select any point on this perpendicular segment and call it C. By connecting A and C you will make $\triangle ABC$.

8.3 Geometry - Second Edition, Using Similar Right Triangles, Review Answers

1. $\triangle KML \sim \triangle JML \sim \triangle JKL$
2. $KM = 6\sqrt{3}$
3. $JK = 6\sqrt{7}$
4. $KL = 3\sqrt{21}$
5. $16\sqrt{2}$
6. $15\sqrt{7}$
7. $2\sqrt{35}$
8. $14\sqrt{6}$
9. $20\sqrt{10}$
10. $2\sqrt{102}$
11. $x = 12\sqrt{5}$
12. $y = 5\sqrt{5}$
13. $z = 9\sqrt{2}$
14. $x = 4$
15. $y = \sqrt{465}$
16. $z = 14\sqrt{5}$
17. $x = \frac{32}{5}, y = \frac{8\sqrt{41}}{5}, z = 2\sqrt{41}$
18. $x = 9, y = 3\sqrt{34}$
19. $x = \frac{9\sqrt{481}}{20}, y = \frac{81}{40}, z = 40$
20.

Table 8.2:

Statement	***Reason***
1. $\triangle ABD$ with $\overline{AC} \perp \overline{DB}$ and $\angle DAB$ is a right angle.	Given
2. $\angle DCA$ and $\angle ACB$ are right angles	Definition of perpendicular lines.

Table 8.2: (continued)

Statement	*Reason*
3. $\angle DAB \cong \angle DCA \cong \angle ACB$	All right angles are congruent.
4. $\angle D \cong \angle D$	Reflexive PoC
5. $\triangle CAD \cong \triangle ABD$	AA Similarity Postulate
6. $\angle B \cong \angle B$	Reflexive PoC
7. $\triangle CBA \cong \triangle ABD$	AA Similarity Postulate
8. $\triangle CAD \cong \triangle CBA$	Transitive PoC

21.

Table 8.3:

Statement	*Reason*
1. $\triangle ABD$ with $\overline{AC} \perp \overline{DB}$ and $\angle DAB$ is a right angle.	Given
2. $\triangle ABD \sim \triangle CBA \sim \triangle CAD$	Theorem 8-5
3. $\frac{BC}{AB} = \frac{AB}{DB}$	Corresponding sides of similar triangles are proportional.

22. 6.1%
23. 10.4%
24. 9.4%
25. ratios are $\frac{3}{1}$ and $\frac{9}{3}$, which both reduce to the common ratio 3. Yes, this is true for the next pair of terms since $\frac{27}{9}$ also reduces to 3.
26. geometric mean; geometric mean
27. 10
28. 20
29. 1
30.

Table 8.4:

Statement	*Reason*
1. $\frac{e}{a} = \frac{a}{d+e}$ and $\frac{d}{b} = \frac{b}{d+e}$	Theorem 8-7
2. $a^2 = e(d+e)$ and $b^2 = d(d+e)$	Cross-Multiplication Property
3. $a^2 + b^2 = e(d+e) + d(d+e)$	Combine equations from #2.
4. $a^2 + b^2 = (e+d)(d+e)$	Distributive Property
5. $c = d + e$	Segment Addition Postulate
6. $a^2 + b^2 = c^2$	Substitution PoE

8.4 Geometry - Second Edition, Special Right Triangles, Review Answers

1. $x\sqrt{2}$
2. $x\sqrt{3}, 2x$
3. $15\sqrt{2}$
4. $11\sqrt{2}$
5. 8
6. $90\sqrt{2}$ or 127.3 ft.
7. $a = 2\sqrt{2}, b = 2$
8. $c = 6\sqrt{2}, d = 12$
9. $e = f = 13\sqrt{2}$
10. $g = 10\sqrt{3}, h = 20$
11. $k = 8, j = 8\sqrt{3}$
12. $x = 11\sqrt{3}, y = 22\sqrt{3}$
13. $m = 9, n = 18$
14. $q = 14\sqrt{6}, p = 28\sqrt{3}$
15. $s = 9, t = 3\sqrt{3}$
16. $x = w = 9\sqrt{2}$
17. $a = 9\sqrt{3}, b = 18\sqrt{3}$
18. $p = 6\sqrt{15}, q = 6\sqrt{5}$
19. Yes, it's a 30-60-90 triangle.
20. No, it is not even a right triangle.
21. $16 + 6\sqrt{3}$
22. $8 + 8\sqrt{3}$
23. $x : x\sqrt{3}$
24. $4\sqrt{2}$ *in*
25. $\frac{3}{2}\sqrt{3}$ *in*
26. $\frac{25}{4}\sqrt{3}$ ft^2
27. $\frac{27}{2}\sqrt{3}$ in^2
28. 12
29. 3960 ft
30. $\frac{s}{2}\sqrt{3}$

8.5 Geometry - Second Edition, Tangent, Sine and Cosine, Review Answers

1. $\frac{d}{f}$
2. $\frac{f}{e}$
3. $\frac{f}{d}$
4. $\frac{d}{e}$
5. $\frac{d}{e}$
6. $\frac{f}{e}$
7. D, D
8. equal, complement
9. reciprocals

10. 0.4067
11. 0.7071
12. 28.6363
13. 0.6820
14. $\sin A = \frac{4}{5}, \cos A = \frac{3}{5}, \tan A = \frac{4}{3}$
15. $\sin A = \frac{\sqrt{2}}{2}, \cos A = \frac{\sqrt{2}}{2}, \tan A = 1$
16. $\sin A = \frac{1}{3}, \cos A = \frac{2\sqrt{2}}{3}, \tan A = \frac{\sqrt{2}}{4}$
17. $x = 9.37, y = 12.72$
18. $x = 14.12, y = 19.42$
19. $x = 20.84, y = 22.32$
20. $x = 19.32, y = 5.18$
21. $x = 5.85, y = 12.46$
22. $x = 20.89, y = 13.43$
23. $x = 435.86\ ft.$
24. $x = 56\ m$
25. 25.3 ft
26. 42.9 ft
27. 94.6 ft
28. 49 ft
29. 14 miles
30. The hypotenuse is the longest side in a right triangle. Since the sine and cosine ratios are each a leg divided by the hypotenuse, the denominator is always going to be greater than the numerator. This ensures a ratio that is less than 1.

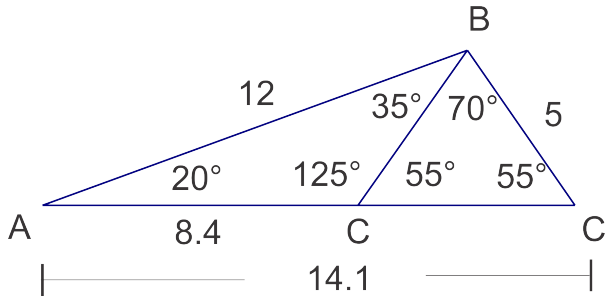
8.6 Geometry - Second Edition, Inverse Trigonometric Ratios, Review Answers

1. 33.7°
2. 31.0°
3. 44.7°
4. 39.4°
5. 46.6°
6. 36.9°
7. 34.6°
8. 82.9°
9. 70.2°
10. $m\angle A = 38°, BC = 9.38, AC = 15.23$
11. $AB = 4\sqrt{10}, m\angle A = 18.4°, m\angle B = 71.6°$
12. $BC = \sqrt{51}, m\angle A = 45.6, m\angle C = 44.4°$
13. $m\angle A = 60°, BC = 12, AC = 12\sqrt{3}$
14. $CB = 7\sqrt{5}, m\angle A = 48.2°, m\angle B = 41.8°$
15. $m\angle B = 50°, AC = 38.14, AB = 49.78$
16. You would use a trig ratio when given a side and an angle and the Pythagorean Theorem if you are given two sides and no angles.
17. 47.6°
18. 1.6°
19. 44.0°
20. $\frac{192}{11} ft \approx 17\ ft\ 5\ in; 54°$

21. $51°$
22. For problem 20: since the earth tilts on its axis, the position of the sun in the sky varies throughout the year for most places on earth. Thus, the angle at which the sun hits a particular object will vary at different times of the year. For problem 21: the water pressure in the hose will affect the path of the water, the more pressure, the longer the water will travel in a straight path before gravity causes the path of the water to arc and come back down towards the ground.
23. Tommy used $\frac{A}{O}$ instead of $\frac{O}{A}$ for his tangent ratio.
24. Tommy used the correct ratio in his equation here, but he used the incorrect angle measure he found previously which caused his answer to be incorrect. This illustrates the benefit of using given information whenever possible.
25. Tommy could have used Pythagorean Theorem to find the hypotenuse instead of a trigonometric ratio.
26. $\cos 50°$
27. $\sin 20°$
28. As the angle measures increase, the sine value increases.
29. As the angle measures increase, the cosine value decreases.
30. The sine and cosine values are between 0 and 1.
31. $\tan 85° = 11.43, \tan 89° = 57.29$, and $\tan 89.5° = 114.59$. As the tangent values get closer to $90°$, they get larger and larger. There is no maximum, the values approach infinity.
32. The sine and cosine ratios will always be less than one because the denominator of the ratios is the hypotenuse which is always longer than either leg. Thus, the numerator is always less than the denominator in these ratios resulting in a value less than one.

8.7 Geometry - Second Edition, Extension: Laws of Sines and Cosines, Review Answers

1. $m\angle B = 84°, a = 10.9, b = 13.4$
2. $m\angle B = 47°, a = 16.4, c = 11.8$
3. $m\angle A = 38.8°, m\angle C = 39.2°, c = 16.2$
4. $b = 8.5, m\angle A = 96.1°, m\angle C = 55.9°$
5. $m\angle A = 25.7°, m\angle B = 36.6, m\angle C = 117.7°$
6. $m\angle A = 81°, m\angle B = 55.4°, m\angle C = 43.6°$
7. $b = 11.8, m\angle A = 42°, m\angle C = 57°$
8. $b = 8.0, m\angle B = 25.2°, m\angle C = 39.8°$
9. $m\angle A = 33.6°, m\angle B = 50.7°, m\angle C = 95.7°$
10. $m\angle C = 95°, AC = 3.2, AB = 16.6$
11. $BC = 33.7, m\angle C = 39.3°, m\angle B = 76.7°$
12. $m\angle A = 42°, BC = 34.9, AC = 22.0$
13. $m\angle B = 105°, m\angle C = 55°, AC = 14.1$
14. $m\angle B = 35°, AB = 12, BC = 5$
15. Yes, BC would still be 5 units (see isosceles triangle below); the measures of $\angle C$ are supplementary as shown below.



8.8 Chapter Review Answers

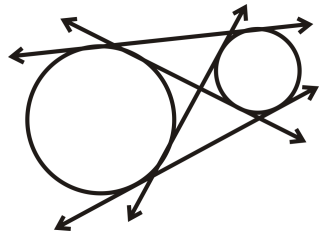
1. $BC = 4.4, AC = 10.0, m\angle A = 26°$
2. $AB = 5\sqrt{10}, m\angle A = 18.4°, m\angle B = 71.6°$
3. $BC = 6\sqrt{7}, m\angle A = 41.4°, m\angle C = 48.6°$
4. $m\angle A = 30°, AC = 25\sqrt{3}, BC = 25$
5. $BC = 7\sqrt{13}, m\angle A = 31°, m\angle B = 59°$
6. $m\angle B = 45°, AC = 32, AB = 32\sqrt{2}$
7. $m\angle B = 63°, BC = 19.1, AB = 8.7$
8. $m\angle C = 19°, AC = 22.7, AB = 7.8$
9. $BC = 4\sqrt{13}, m\angle B = 33.7°, m\angle C = 56.3°$
10. acute
11. right, Pythagorean triple
12. obtuse
13. right
14. acute
15. obtuse
16. $x = 2$
17. $x = 2\sqrt{110}$
18. $x = 6\sqrt{7}$
19. 2576.5 ft.
20. $x = 29.2°$
21. $AC = 16.1, m\angle A = 41.6°, m\angle C = 63.4°$
22. $m\angle A = 123.7°, m\angle B = 26.3°, m\angle C = 30°$

Chapter 9

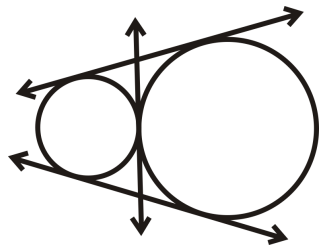
Geometry - Second Edition, Chapter 9, Answer Key

9.1 Geometry - Second Edition, Parts of Circles and Tangent Lines, Review Answers

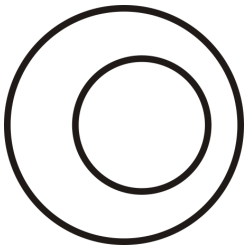
1. diameter
2. secant
3. chord
4. point of tangency
5. common external tangent
6. common internal tangent
7. center
8. radius
9. the diameter
10. 4 lines



11. 3 lines



12. none



13. radius of $\odot B = 4$, radius of $\odot C = 5$, radius of $\odot D = 2$, radius of $\odot E = 2$
14. $\odot D \cong \odot E$ because they have the same radius length.
15. 2 common tangents
16. $CE = 7$
17. $y = x - 2$
18. yes
19. no
20. yes
21. $4\sqrt{10}$
22. $4\sqrt{11}$
23. $x = 9$
24. $x = 3$
25. $x = 5$
26. $x = 8\sqrt{2}$
27. (a) Yes, by AA. $m\angle CAE = m\angle DBE = 90°$ and $\angle AEC \cong \angle BED$ by vertical angles.
    (b) $BC = 37$
    (c) $AD = 35$
    (d) $m\angle C = 53.1°$
28.

Table 9.1:

Statement	***Reason***
1. $\overline{AB}$ and $\overline{CB}$ with points of tangency at A and C. $\overline{AD}$ and $\overline{DC}$ are radii.	Given
2. $\overline{AD} \cong \overline{DC}$	All radii are congruent.
3. $\overline{DA} \perp \overline{AB}$ and $\overline{DC} \perp \overline{CB}$	Tangent to a Circle Theorem
4. $m\angle BAD = 90°$ and $m\angle BCD = 90°$	Definition of perpendicular lines
5. Draw $\overline{BD}$.	Connecting two existing points
6. $\triangle ADB$ and $\triangle DCB$ are right triangles	Definition of right triangles (Step 4)
7. $\overline{DB} \cong \overline{DB}$	Reflexive PoC
8. $\triangle ABD \cong \triangle CBD$	HL
9. $\overline{AB} \cong \overline{CB}$	CPCTC

29. (a) kite
    (b) center, bisects
30. $\overline{AT} \cong \overline{BT} \cong \overline{CT} \cong \overline{DT}$ by theorem 10-2 and the transitive property.
31. 9.23
32. $\frac{8}{\sqrt{3}}; \frac{8}{3\sqrt{3}}$
33. Since $\overleftrightarrow{AW}$ and $\overleftrightarrow{WB}$ both share point W and are perpendicular to $\overline{VW}$ because a tangent is perpendicular

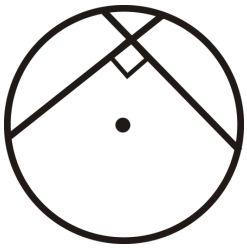
to the radius of the circle. Therefore A, B and W are collinear. $\overline{VT} \cong \overline{VW}$ because they are tangent segments to circle A from the same point, V, outside the circle. Similarly, $\overline{VW} \cong \overline{VU}$ because they are tangent segments to circle B from V. By the transitive property of congruence, $\overline{VT} \cong \overline{VU}$. Therefore, all three segments are congruent.

9.2 Geometry - Second Edition, Properties of Arcs, Review Answers

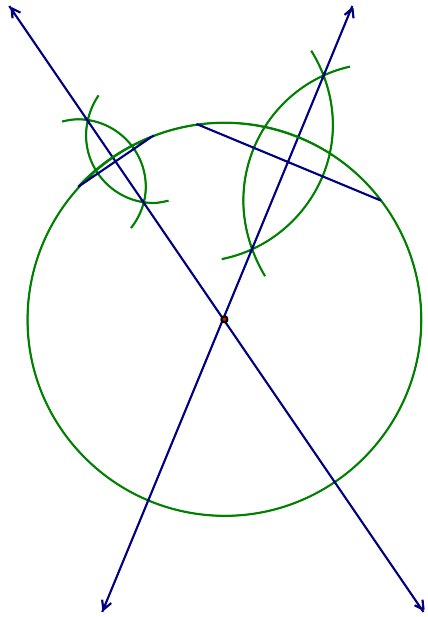
1. minor
2. major
3. semicircle
4. major
5. minor
6. semicircle
7. yes, $\widehat{CD} \cong \widehat{DE}$
8. 66°
9. 228°
10. yes, they are in the same circle with equal central angles
11. yes, the central angles are vertical angles, so they are equal, making the arcs equal
12. no, we don't know the measure of the corresponding central angles.
13. 90°
14. 49°
15. 82°
16. 16°
17. 188°
18. 172°
19. 196°
20. 270°
21. $x = 54°$
22. $x = 47°$
23. $x = 25°$
24. $\odot A \cong \odot B$
25. 62°
26. 77°
27. 139°
28. 118°
29. 257°
30. 319°
31. 75°
32. 105°
33. 68°
34. 105°
35. 255°
36. 217°

9.3 Geometry - Second Edition, Properties of Chords, Review Answers

1. No, see picture. The two chords can be congruent and perpendicular, but will not bisect each other.



2. $\overline{AC}$
3. $\widehat{DF}$
4. $\widehat{JF}$
5. $\overline{DE}$
6. $\angle HGC$
7. $\angle AGC$
8. $\overline{AG}, \overline{HG}, \overline{CG}, \overline{FG}, \overline{JG}, \overline{DG}$
9. 107°
10. 8°
11. 118°
12. 133°
13. 140°
14. 120°
15. $x = 64^\circ, y = 4$
16. $x = 8, y = 10$
17. $x = 3\sqrt{26}, y \approx 12.3$
18. $x = 9\sqrt{5}$
19. $x = 9, y = 4$
20. $x = 4.5$
21. $x = 3$
22. $x = 7$
23. $x = 4\sqrt{11}$
24. $m\widehat{AB} = 121.3^\circ$
25. $m\widehat{AB} = 112.9^\circ$
26. $\overline{BF} \cong \overline{FD}$ and $\widehat{BF} \cong \widehat{FD}$ by Theorem 10-5.
27. $\overline{CA} \cong \overline{AF}$ by Theorem 10-6.
28. $\overline{QS}$ is a diameter by Theorem 10-4.
29. a-c shown in the diagram below; d. it is the center; e. shown in the diagram; this construction is not done to scale and your chords might be in different places but this should give you an idea of what it should look like.



30. for $\overline{AB}$:
    (a) (1, 5)
    (b) $m = 0, \perp m$ is undefined
    (c) $x = 1$
    (d) for $\overline{BC}$:
        i. $\left(\frac{9}{2}, \frac{3}{2}\right)$
        ii. $m = 7, \perp m = -\frac{1}{7}$
        iii. $y = -\frac{1}{7}x + \frac{15}{7}$
    (e) Point of intersection (center of the circle) is (1, 2).
    (f) radius is 5 units
31. (a) 120°
    (b) 60°

9.4 Geometry - Second Edition, Inscribed Angles, Review Answers

1. 48°
2. 120°
3. 54°
4. 45°
5. 87°
6. 27°
7. 100.5°
8. 95.5°
9. 76.5°
10. 84.5°
11. 51°
12. 46°
13. $x = 180°, y = 21°$
14. $x = 60°, y = 49°$

15. $x = 30°, y = 60°$
16. $x = 72°, y = 92°$
17. $x = 200°, y = 100°$
18. $x = 68°, y = 99°$
19. $x = 93°, y = 97°$
20. $x = 10°$
21. $x = 24°$
22. $x = 74°, y = 106°$
23. $x = 35°, y = 35°$
24. $55°$
25. $70°$
26. $110°$
27. $90°$
28. $20°$
29. $90°$
30.

Table 9.2:

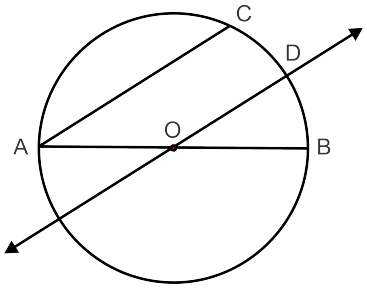
Statement	***Reason***
1. Inscribed $\angle ABC$ and diameter $\overline{BD}$ $m\angle ABE = x°$ and $m\angle CBE = y°$	Given
2. $x° + y° = m\angle ABC$	Angle Addition Postulate
3. $\overline{AE} \cong \overline{EB}$ and $\overline{EB} \cong \overline{EC}$	All radii are congruent
4. $\triangle AEB$ and $\triangle EBC$ are isosceles	Definition of an isosceles triangle
5. $m\angle EAB = x°$ and $m\angle ECB = y°$	Isosceles Triangle Theorem
6. $m\angle AED = 2x°$ and $m\angle CED = 2y°$	Exterior Angle Theorem
7. $m\widehat{AD} = 2x°$ and $m\widehat{DC} = 2y°$	The measure of an arc is the same as its central angle.
8. $m\widehat{AD} + m\widehat{DC} = m\widehat{AC}$	Arc Addition Postulate
9. $m\widehat{AC} = 2x° + 2y°$	Substitution
10. $m\widehat{AC} = 2(x° + y°)$	Distributive PoE
11. $m\widehat{AC} = 2m\angle ABC$	Subsitution
12. $m\angle ABC = \frac{1}{2}m\widehat{AC}$	Division PoE

31.

Table 9.3:

Statement	***Reason***
1. $\angle ACB$ and $\angle ADB$ intercept $\widehat{AB}$	1. Given
2. $m\angle ACB = \frac{1}{2}m\widehat{AB}$ m $\angle ADB = \frac{1}{2}m\widehat{AB}$	2. Inscribed Angle Theorem
3. $m\angle ACB = m\angle ADB$	3. Transitive Property
4. $\angle ACB \cong \angle ADB$	4. Definition of Congruence

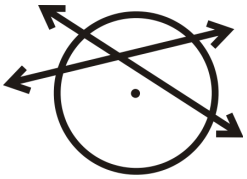
32. Since $\overline{AC} \parallel \overleftrightarrow{OD}, m\angle CAB = m\angle DOB$ by Corresponding Angles Postulate.



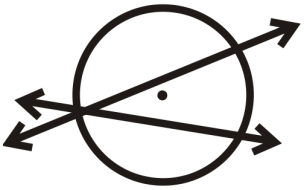
Also, $m\angle DOB = m\overset{\frown}{DB}$ and $m\angle CAB = \frac{1}{2}m\overset{\frown}{CB}$, so $m\overset{\frown}{DB} = \frac{1}{2}m\overset{\frown}{CB}$. This makes D the midpoint of $\overset{\frown}{CB}$.

9.5 Geometry - Second Edition, Angles of Chords, Secants, and Tangents, Review Answers

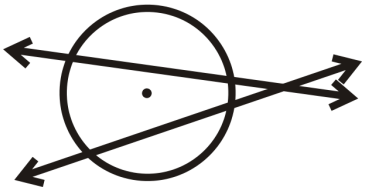
1. (a)



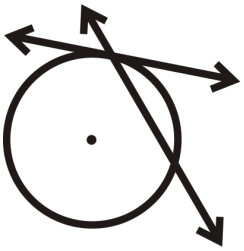
(b)



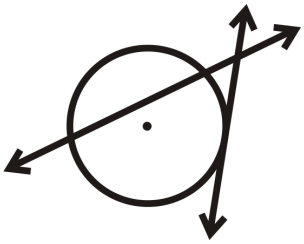
(c)



2. No, by definition a tangent line cannot pass through a circle, so it can never intersect with any line inside of one.
3. (a)

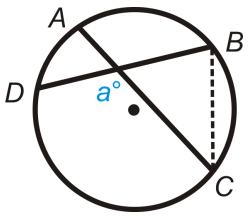


(b)



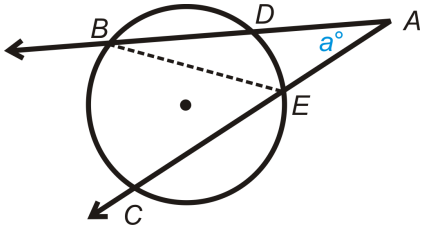
4. center, equal
5. inside, intercepted
6. on, half
7. outside, half
8. $x = 103°$
9. $x = 25°$
10. $x = 100°$
11. $x = 44°$
12. $x = 38°$
13. $x = 54.5°$
14. $x = 63°, y = 243°$
15. $x = 216°$
16. $x = 42°$
17. $x = 150°$
18. $x = 66°$
19. $x = 113°$
20. $x = 60, y = 40°, z = 80°$
21. $x = 60°, y = 25°$
22. $x = 35°, y = 55°$
23. $x = 75°$
24. $x = 45°$
25. $x = 35°, y = 35°$
26. $x = 60°$
27. $x = 47°, y = 78°$
28. $x = 84°, y = 156°$
29. $x = 10°$
30. $x = 3°$
31.

Table 9.4:

Statement	***Reason***
1. Intersecting chords $\overline{AC}$ and $\overline{BD}$.	Given
2. Draw $\overline{BC}$	Construction
	
3. $m\angle DBC = \frac{1}{2}m\widehat{DC}$	Inscribed Angle Theorem
4. $m\angle ACB = \frac{1}{2}m\widehat{AB}$	Inscribed Angle Theorem
5. $m\angle a = m\angle DBC + m\angle ACB$	Exterior Angle Theorem
6. $m\angle a = \frac{1}{2}m\widehat{DC} + \frac{1}{2}m\widehat{AB}$	Substitution

32.

Table 9.5:

Statement	*Reason*
1. Intersecting secants $\overrightarrow{AB}$ and $\overrightarrow{AC}$.	Given
2. Draw $\overline{BE}$.	Construction
	
3. $m\angle BEC = \frac{1}{2}m\widehat{BC}$	Inscribed Angle Theorem
4. $m\angle DBE = \frac{1}{2}m\widehat{DE}$	Inscribed Angle Theorem
5. $m\angle a + m\angle DBE = m\angle BEC$	Exterior Angle Theorem
6. $m\angle a = m\angle BEC - m\angle DBE$	Subtraction PoE
7. $m\angle a = \frac{1}{2}m\widehat{BC} - \frac{1}{2}m\widehat{DE}$	Substitution
8. $m\angle a = \frac{1}{2}\left(m\widehat{BC} - m\widehat{DE}\right)$	Distributive Property

9.6 Geometry - Second Edition, Segments of Chords, Secants, and Tangents, Review Answers

1. $x = 12$
2. $x = 1.5$
3. $x = 12$
4. $x = 7.5$
5. $x = 6\sqrt{2}$
6. $x = 10$
7. $x = 10$
8. $x = 8$
9. $x = 9$
10. $x = 22.4$
11. $x = 11$
12. $x = 20$
13. $x = \frac{120}{7} \approx 17.14$
14. $x = 4\sqrt{66}$
15. $x = 6$
16. $x = \sqrt{231}$
17. $x = 4\sqrt{42}$
18. $x = 10$
19. The error is in the set up. It should be $10 \cdot 10 = y \cdot (15 + y)$. The correct answer is $y = 5$.
20. 10 inches
21. $x = 7$
22. $x = 5$
23. $x = 3$
24. $x = 3$
25. $x = 8$

26. $x = 6$
27. $x = 2$
28. $x = 8$
29. $x = 2$
30. $x = 12, y = 3$

9.7 Geometry - Second Edition, Extension: Writing and Graphing the Equations of Circles, Review Answers

1. center: (-5, 3), radius = 4
2. center: (0, -8), radius = 2
3. center: (7, 10), radius = $2\sqrt{5}$
4. center: (-2, 0), radius = $2\sqrt{2}$
5. $(x-4)^2 + (y+2)^2 = 16$
6. $(x+1)^2 + (y-2)^2 = 7$
7. $(x-2)^2 + (y-2)^2 = 4$
8. $(x+4)^2 + (y+3)^2 = 25$
9. (a) yes
   (b) no
   (c) yes
10. $(x-2)^2 + (y-3)^2 = 52$
11. $(x-10)^2 + y^2 = 29$
12. $(x+3)^2 + (y-8)^2 = 200$
13. $(x-6)^2 + (y+6)^2 = 325$
14. a-d. $\perp$ bisector of $\overline{AB}$ is $y = -\frac{7}{24}x + \frac{37}{24}$, $\perp$ bisector of $\overline{BC}$ is $y = x + 8$
    (e) center of circle (-5, 3)
    (f) radius 25
    (g) $(x+5)^2 + (y-3)^2 = 625$
15. $(x-2)^2 + (y-2)^2 = 25$
16. $(x+3)^2 + (y-1)^2 = 289$

9.8 Chapter Review Answers

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

Chapter 10

Geometry - Second Edition, Chapter 10, Answer Key

10.1 Geometry - Second Edition, Triangles and Parallelograms, Review Answers

1. $A = 144\ in^2, P = 48\ in$
2. $A = 144\ cm^2, P = 50\ cm$
3. $A = 360\ m^2$
4. $A = 112\ u^2, P = 44\ u$
5. $A = 324\ ft^2, P = 72\ ft$
6. $P = 36\ ft$
7. $A = 36\ in^2$
8. $A = 210\ cm^2$
9. 6 m
10. Possible answers: $10 \times 6, 12 \times 4$
11. Possible answers: $9 \times 10, 3 \times 30$
12. If the areas are congruent, then the figures are congruent. We know this statement is false, #11 would be a counterexample.
13. $8\sqrt{2}\ cm$
14. $P \approx 54.9\ cm$
15. $A = 96\sqrt{2} \approx 135.8\ cm^2$
16. 15 in
17. $P \approx 74.3\ in$
18. $A = 180\ in^2$
19. $315\ units^2$
20. $90\ units^2$
21. $14\ units^2$
22. $407.5\ units^2$
23. $560\ units^2$
24. $30\ units^2$
25. $814\ units^2$
26. $72\ units^2$
27. $72\ units^2$

28. 24 acres
29. 6×4
30. 12×24
31. $h = 3\sqrt{3}, A = 9\sqrt{3}$
32. $h = 5\sqrt{3}, A = 25\sqrt{3}$
33. $h = \frac{x}{2}\sqrt{3}, A = \frac{x^2}{4}\sqrt{3}$
34. $x = 20\ ft, y = 60\ ft$
35. Perimeter is 16 units, Area is 15 square units

10.2 Geometry - Second Edition, Trapezoids, Rhombi, and Kites, Review Answers

1. If a kite and a rhombus have the same diagonal lengths the areas will be the same. This is because both formulas are dependent upon the diagonals. If they are the same, the areas will be the same too. This does not mean the two shapes are congruent, however.
2. $h(b_1) + 2\triangle s$
   $h(b_1) + 2\left(\frac{1}{2} \cdot h \cdot \frac{b_2 - b_1}{2}\right)$
   $hb_1 + \frac{h(b_2 - b_1)}{2}$
   $\frac{2hb_1 + hb_2 - hb_1}{2}$
   $\frac{hb_1 + hb_2}{2} = \frac{h}{2}(b_1 + b_2)$
3. $4\triangle s$
   $4 \cdot \frac{1}{2}\left(\frac{1}{2}d_1 \cdot \frac{1}{2}d_2\right)$
   $\frac{4}{8}d_1 \cdot d_2$
   $\frac{1}{2}d_1 d_2$
4. $2\triangle s + 2\triangle s$
   $2\left(\frac{1}{2} \cdot \frac{1}{2}d_1 \cdot x\right) + 2\left(\frac{1}{2} \cdot \frac{1}{2}d_1(d_2 - x)\right)$
   $\frac{1}{2}d_1 \cdot x + \frac{1}{2}d_1 d_2 - \frac{1}{2}d_1 x$
   $\frac{1}{2}d_1 d_2$
5. 160 $units^2$
6. 315 $units^2$
7. 96 $units^2$
8. 77 $units^2$
9. $100\sqrt{3}$ $units^2$
10. 84 $units^2$
11. 1000 $units^2$
12. 63 $units^2$
13. 62.5 $units^2$
14. $A = 480\ units^2$
    $P = 104\ units$
15. $A = 36\left(1 + \sqrt{3}\right)\ units^2$
    $P = 12\left(2 + \sqrt{2}\right)\ units$
16. $A = 108\ units^2$
    $P = 12\left(3 + \sqrt{2}\right)\ units$
17. $A = 5\sqrt{3}\left(5 + \sqrt{77}\right)\ units^2$
    $P = 52\ units$
18. $A = 396\sqrt{3}\ units^2$
    $P = 116\ units$

19. $A = 256\sqrt{5}$ *units*^{2}
    $P = 96$ *units*
20. $A = 12$ *units*^{2}
21. 24 *units*^{2}
22. Any two numbers with a product of 64 would work.
23. Any two numbers with a product of 108 would work.
24. 90 *units*^{2}
25. kite, 24 *units*^{2}
26. Trapezoid, 47.5 *units*^{2} *units*^{2}
27. rhombus, $12\sqrt{5}$ *units*^{2}
28. 8, 14
29. 9, 12
30. 192 *units*^{2}
31. (a) 200 ft^2
    (b) 400 ft^2
    (c) $\frac{1}{2}$
32. (a) 300 ft^2
    (b) 900 ft^2
    (c) $\frac{1}{3}$

10.3 Geometry - Second Edition, Areas of Similar Polygons, Review Answers

1. $\frac{9}{25}$
2. $\frac{1}{16}$
3. $\frac{49}{4}$
4. $\frac{36}{121}$
5. $\frac{1}{6}$
6. $\frac{2}{9}$
7. $\frac{7}{3}$
8. $\frac{5}{12}$
9. $\frac{1}{4}$
10. $\frac{1}{2}$
11. 5 *units*^{2}
12. 24 units
13. 100 cm
14. 468.75 cm^2
15. 96 *units*^{2}
16. 198 ft^2
17. 54 in
18. 32 units
19. $\frac{4}{9}$
20. $\frac{2}{3}$
21. Diagonals are 12 and 16. The length of the sides are $12\sqrt{2}$ and $16\sqrt{2}$.
22. Because the diagonals of these rhombi are congruent, the rhombi are actually squares.
23. $25\sqrt{2}$
24. 2.34 inches
25. Scale: $\frac{1}{192}$, length of model 5.44 inches

26. 27.5 by 20 cm, yes because the drawing is 10.8 by 7.87 inches
27. 9 by 6 inches
28. 10 by 14 inches
29. Baby Bella \$0.05, Mama Mia \$0.046, Big Daddy \$0.046, the Mama Mia or Big Daddy are the best deals.
30. 1.5 bottles, so she'll need to buy 2 bottles.

10.4 Geometry - Second Edition, Circumference and Arc Length, Review Answers

Table 10.1:

	diameter	*radius*	*Circumference*
1.	15	7.5	15π
2.	8	4	8π
3.	6	3	6π
4.	84	42	84π
5.	18	9	18π
6.	25	12.5	25π
7.	2	1	2π
8.	36	18	36π

9. $r = \frac{44}{\pi} in$
10. $C = 20\ cm$
11. 16
12. The diameter is the same length as the diagonals of the square.
13. $32\sqrt{2}$
14. 16π
15. 9π
16. 80π
17. 15π
18. $r = 108$
19. $r = 30$
20. $r = 72$
21. 120°
22. 162°
23. 15°
24. $40\pi \approx 125.7\ in.$
25. (a) $26\pi \approx 81.7\ in$
    (b) 775 complete rotations
26. The Little Cheese, 3.59:1; The Big Cheese, 3.49:1; The Cheese Monster, 3.14:1; Michael should buy The Little Cheese
27. 31 gumdrops
28. 18 in
29. 93 in
30. 30 ft

10.5 Geometry - Second Edition, Areas of Circles and Sectors, Review Answers

Table 10.2:

	radius	*Area*	*circumference*
1.	2	4π	4π
2.	4	16π	8π
3.	5	25π	10π
4.	12	144π	24π
5.	9	81π	18π
6.	$3\sqrt{10}$	90π	$6\sqrt{10}\pi$
7.	17.5	306.25π	35π
8.	$\frac{7}{\pi}$	$\frac{49}{\pi}$	14
9.	$\frac{30}{\pi}$	$\frac{900}{\pi}$	60
10.	$\frac{6}{\sqrt{\pi}}$	36	$12\sqrt{\pi}$

11. 54π
12. $1.041\overline{6}\pi$
13. 189π
14. $2.\overline{6}\pi - 4\sqrt{3}$
15. 33π
16. $20.25\pi - 40.5$
17. $8\sqrt{3}$
18. 2
19. 15
20. $120°$
21. $10°$
22. $198°$
23. 123.61
24. 292.25
25. 1033.58
26. 13.73
27. 21.21
28. 54.4
29. Square $\approx 10,000\ ft^2$; Circle $\approx 12,732\ ft^2$; the circle has more area.
30. 18 units
31. $40°$

10.6 Geometry - Second Edition, Area and Perimeter of Regular Polygons, Review Answers

1. radius
2. apothem
3. 6
4. equilateral

5. 10 cm
6. $5\sqrt{3}$ *cm*
7. 60 cm
8. $150\sqrt{3}$
9. $A = 384\sqrt{3}$
   $P = 96$
10. $A = 8\sqrt{2}$
    $P = 6.12$
11. $A = 68.26$
    $A = 72$
12. $A = 688.19$
    $P = 100$
13. $A = 73.47$
    $P = 15.45$
14. $A = 68.26$
    $P = 63$
15. 6.5
16. 12
17. $a = 11.01$
18. $a = 14.49$
19. 93.86, 94.15
20. $30\pi \approx 94.25$
21. The perimeter of the 40-gon is closer to the circumference because it is closer in shape to the circle. The more sides a polygon has, the closer it is to a circle.
22. 695.29, 703.96
23. $225\pi \approx 706.86$
24. The area of the 40-gon is closer to the area of the circle because it is closer in shape to the circle than the 20-gon.
25. Start with $\frac{1}{2}asn$. $n = 6$, so all the internal triangles are equilateral triangles with sides s. Therefore the apothem is $\frac{\sqrt{3}}{2}s$ from the 30-60-90 ratio. Plugging this in for n and a, we have $A = \frac{1}{2}\left(\frac{\sqrt{3}}{2}s\right)(s)(6)$. Reducing this we end up with $A = \frac{3\sqrt{3}}{2}s^2$.
26. (a) $\sin\left(\frac{x^\circ}{2}\right) = \frac{s}{2r}; \cos\left(\frac{x^\circ}{2}\right) = \frac{a}{r}$
    (b) $s = 2r\sin\left(\frac{x}{2}\right)$
    (c) $a = r\cos\left(\frac{x^\circ}{2}\right)$
    (d) $\frac{1}{2}\left(2r\sin\left(\frac{x^\circ}{2}\right)r\cos\left(\frac{x^\circ}{2}\right)\right) = r^2\sin\left(\frac{x^\circ}{2}\right)\cos\left(\frac{x^\circ}{2}\right)$
    (e) $nr^2\sin\left(\frac{x^\circ}{2}\right)\cos\left(\frac{x^\circ}{2}\right)$
    (f) $\frac{360^\circ}{n}$
27. 421.21 cm^2
28. 77.25 in^2
29. 195.23 cm^2
30. 153.44 in^2
31. polygon with 30 sides: 254.30 in^2; circle 254.47 in^2; They are very close, the more sides a regular polygon has the closer to a circle it becomes.
32. First, take $s = 2r\sin\left(\frac{x}{2}\right)$ and solve for r to get $= \frac{s}{2\sin\left(\frac{x^\circ}{2}\right)}$. Next, replace r in the formula to get $n\left(\frac{s}{2\sin\left(\frac{x^\circ}{2}\right)}\right)^2\sin\left(\frac{x^\circ}{2}\right)\cos\left(\frac{x^\circ}{2}\right)$. We can reduce this to $\frac{ns^2\cos\left(\frac{x^\circ}{2}\right)}{4\sin\left(\frac{x^\circ}{2}\right)}$.
33. 16055.49 cm^2

34. 4478.46 in^2

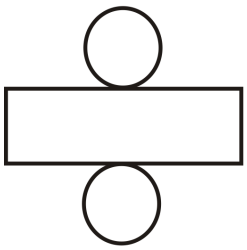
10.7 Chapter Review Answers

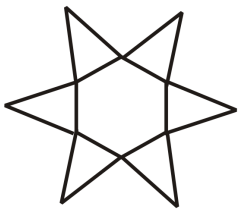
1. $A = 225$
   $P = 60$
2. $A = 198$
   $P = 58$
3. $A = 124.71$
   $P = 48$
4. $A = 139.36$
   $P = 45$
5. $A = 3000$
   $P = 232$
6. $A = 403.06$
   $P = 72$
7. 72
8. 154
9. $162\sqrt{3}$
10. $C = 34\pi$
    $A = 289\pi$
11. $C = 30\pi$
    $A = 225\pi$
12. 54 $units^2$
13. 1070.12
14. 1220.39
15. 70.06

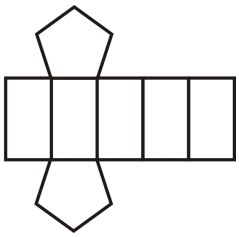
Chapter 11

Geometry - Second Edition, Chapter 11, Answer Key

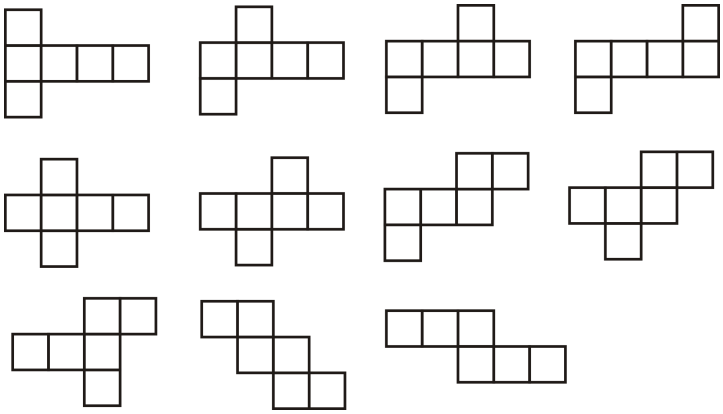
11.1 Geometry - Second Edition, Exploring Solids, Review Answers

1. $V = 8$
2. $F = 9$
3. $E = 30$
4. $F = 6$
5. $E = 6$
6. $V = 6$
7. $F = 9$
8. $V = 6$
9. Yes, hexagonal pyramid. $F = 7, V = 7, E = 12$
10. No, a cone has a curved face.
11. Yes, hexagonal prism. $F = 8, V = 12, E = 18$
12. No a hemisphere has a face.
13. Yes, trapezoidal prism. $F = 6, V = 8, E = 12$
14. Yes, concave decagonal prism. $F = 10, V = 16, E = 24$
15. Rectangle
16. Circle
17. Trapezoid
18. 

19. 

20. 

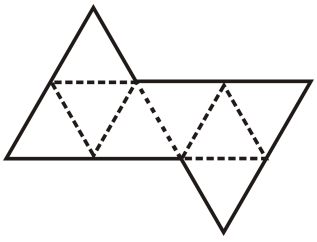
21. Regular Icosahedron
22. Decagonal Pyramid
23. Trapezoidal Prism
24. All 11 nets



25. The truncated icosahedron has 60 vertices, by Euler's Theorem.

$$F + V = E + 2$$
$$32 + V = 90 + 2$$
$$V = 60$$

26. regular tetrahedron
27. Use the construction directions from problem 26 to make an equilateral triangle with midsegments. Using one of the midpoints of the equilateral triangle as a vertex, construct another adjacent equilateral triangle with midsegments. Your result should look like the picture below.



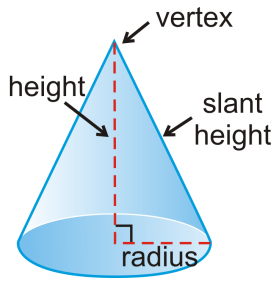
28. regular dodecahedron, $\frac{1}{3}$
29. 19
30. 1 red face, 8 yellow faces, 7 blue faces and 4 green faces

11.2 Geometry - Second Edition, Surface Area of Prisms and Cylinders, Review Answers

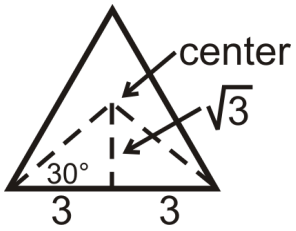
1. 9 $ft.^2$
2. 10,000 cm^2
3. triangles, $A = 6$
4. The rectangles are $3 \times 6, 4 \times 6$, and 6×5. Their areas are 18, 24, and 30.
5. 72
6. 84
7. Lateral surface area is the area of all the sides, total surface area includes the bases.
8. rectangle, $2\pi rh$
9. (a) 96 in^2
   (b) 192 in^2
10. 350π cm^2
11. 1606.4
12. 390.2
13. 486π
14. 182
15. 34π
16. 2808
17. $x = 8$
18. $x = 40$
19. $x = 25$
20. 60π in^2
21. 4100π cm^2
22. The height could be 1, 3, 5, or 15.
23. 4060 ft^2
24. 2940 ft^2
25. 5320 ft^2
26. 22 gal
27. $341
28. 5 in by $4\pi + 1$ $in, 20\pi + 5$ $in^2 \approx 67.83$ in^2
29. $x^2 - 16$ $in^2, x = 25$ in
30. $\frac{5}{2}x^2\pi, x = 8$

11.3 Geometry - Second Edition, Surface Area of Pyramids and Cones, Review Answers

1. vertex
2. y
3. lateral edge
4. w
5. z
6. t

7. 

8. $5\sqrt{10}$ *cm*
9. 15 in
10. To find the slant height, we need to find the distance from the center of the edge of the equilateral triangle. This distance is $\sqrt{3}$.



This is a picture of the base.
The slant height is $6^2 + \sqrt{3}^2 = l^2 \rightarrow l = \sqrt{39}$
11. 671
12. 135
13. 64
14. 1413.72
15. 360
16. 422.35
17. 1847.26
18. 896
19. 1507.96
20. 3, the lateral faces
21. $36\sqrt{3}$
22. $s^2\sqrt{3}$
23. 576; 321.53
24. 1159.25
25. 1152.23
26. 1473.76
27. 100.8°
28. 7
29. 24
30. 175π
31. 10 in
32. 13 in
33. 360 in^2

11.4 Geometry - Second Edition, Volume of Prisms and Cylinders, Review Answers

1. No, the volumes do not have to be the same. One cylinder could have a height of 8 and a radius of 4, while another could have a height of 22 and a radius of 2. Both have a surface area of 96π, but the volumes are not the same.
2. 960 cubes, yes this is the same as the volume.
3. 280 in^3
4. 4π in^3
5. 6 in
6. $r = 9$
7. 5
8. 36 $units^3$
9. (a) 64 in^3
   (b) 128 in^3
10. 882π cm^3
11. 3960
12. 902.54
13. 4580.44
14. 147
15. 50.27
16. 7776
17. $x = 7$
18. $x = 24$
19. $x = 32$
20. 294π in^3
21. 24000π cm^3
22. 75π m^3
23. $330,000$ $ft.^3$
24. $165,000$ $ft.^3$
25. $495,000$ $ft.^3$
26. 36891.56 cm^3
27. 15901.92 cm^3
28. $r = 3$ $cm, h = 12$ cm
29. 11 cm
30. 300.44 in^3

11.5 Geometry - Second Edition, Volume of Pyramids and Cones, Review Answers

Unless otherwise specified, all units are $units^3$.

1. 9680
2. 1280
3. 778.71
4. 3392.92
5. 400

6. 396.55
7. 5277.88
8. 128
9. 1884.96
10. 100.53
11. 113.10
12. 188.50
13. 42
14. 200
15. 1066.67
16. $9\sqrt{3}$
17. $2\sqrt{6}$
18. $18\sqrt{2}$
19. $\frac{1}{12}s^3\sqrt{2}$
20. Find the volume of one square pyramid then multiply it by 2.
21. $72\sqrt{3}$
22. $\frac{1}{3}s^3\sqrt{2}$
23. $h = 13.5\ in$
24. $h = 3.6\ cm$
25. $r = 3\ cm$
26. $112\ in^3$
27. $190.87\ cm^3$
28. $471.24\ cm^3$
29. $h = 9\ m, r = 6\ m$
30. 15 ft

11.6 Geometry - Second Edition, Surface Area and Volume of Spheres, Review Answers

1. No, all the cross sections must be circles because there are no edges.
2. $SA = 256\pi\ in^2$
   $V = \frac{2048}{3}\pi\ in^3$
3. $SA = 324\pi\ cm^2$
   $V = 972\pi\ cm^3$
4. $SA = 1600\pi\ ft^2$
   $V = \frac{32000}{3}\pi\ ft^3$
5. $SA = 16\pi\ m^2$
   $V = \frac{32}{3}\pi\ m^2$
6. $SA = 900\pi\ ft^2$
   $V = 4500\pi\ ft^3$
7. $SA = 1024\pi\ in^2$
   $V = \frac{16384}{3}\pi\ in^3$
8. $SA = 676\pi\ cm^2$
   $V = \frac{8788}{3}\pi\ cm^3$
9. $SA = 2500\pi\ yd^2$
   $V = \frac{62500}{3}\pi\ yd^3$
10. $r = 5.5\ in$
11. $r = 33\ m$

12. $V = \frac{4}{3}\pi\ ft^3$
13. $SA = 36\pi\ mi^2$
14. $r = 4.31\ cm$
15. $r = 7.5\ ft.$
16. $2025\pi\ cm^2$
17. $1900\pi\ units^2$
18. $4680\ ft^2$
19. $91.875\pi\ units^2$
20. $381703.51\ cm^3$
21. $7120.94\ units^3$
22. $191134.50\ ft^3$
23. $121.86\ units^3$
24. $h = \frac{20}{3}cm, SA = \frac{350\pi}{3}cm^2$
25. $21.21\ in^3$
26. $12\pi\ cm^3$, 19 minutes
27. (a) $SA = 2\pi r^2 + 2\pi rh$
    (b) $SA = 4\pi r^2$
    (c) $SA = 4\pi r^2$
    (d) They are the same. Think back to the explanation for the formula for the surface area of a sphere using the baseball-it is really the sum of the area of four circles. For the cylinder, the SA is the sum of the areas of the two circular bases and the lateral area. The lateral area is $2\pi rh$, when we replace h with r this part of the formula becomes the area of two more circles. That makes the total surface area of the cylinder equal to the area of four circles, just like the sphere.
28. (a) $24429\ in^3$
    (b) $732.87\ lbs$
    (c) 50 in
29. 25,132.74 miles
30. 201 million square miles
31. 268 billion cubic miles

11.7 Geometry - Second Edition, Exploring Similar Solids, Review Answers

1. No, $\frac{14}{10} \neq \frac{42}{35}$
2. Yes, the scale factor is 4:3.
3. Yes, the scale factor is 3:5.
4. No, the top base is not in the same proportion as the rest of the given lengths.
5. Yes, cubes have the same length for each side. So, comparing two cubes, the scale factor is just the ratio of the sides.
6. 1:16
7. 8:343
8. 125:729
9. 8:11
10. 5:12
11. 87.48π
12. The volume would be 4^3 or 64 times larger.
13. 4:9
14. 60 cm

15. 91125 m^3
16. 2:3
17. 4:9
18. $y = 8, x = h = 12$
19. $w = 4\sqrt{5}, z = 6\sqrt{5}$
20. $V_s = 170.67, V_l = 576$
21. $LA_s = 16\sqrt{5}, LA_l = 36\sqrt{5}$
22. Yes, just like the cubes spheres and hemispheres only have a radius to compare. So, all spheres and hemispheres are similar.
23. 49:144, 343:1728
24. $98\pi, 288\pi$
25. The ratio of the lateral areas is 49:144, which is the same as the ratio of the total surface area.
26. 9:25, about 2.78 times as strong
27. 27:125
28. Animal A, Animal B's weight is about 4.63 times the weight of animal A but his bones are only 2.78 times as strong.
29. 81 sq in
30. small \$0.216, large \$0.486
31. 8:27
32. The larger can for \$2.50 is a better deal. Using the cost of the canning material and the ratio of the volume of beans, the "equivalent" cost of producing the larger can is \$2.62. If we just use the volume of bean ratio (as a consumer would) the cost should be \$2.87. Both of these are higher than the \$2.50 price.

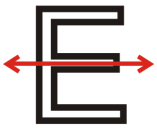
11.8 Chapter Review Answers

1. F
2. K
3. G
4. A
5. E
6. D
7. J
8. B
9. L
10. C
11. H
12. I
13. H
14. G
15. A
16. B
17. D
18. J
19. I
20. E
21. F
22. C

Chapter 12

Geometry - Second Edition, Chapter 12, Answer Key

12.1 Geometry - Second Edition, Exploring Symmetry, Review Answers

1. sometimes
2. always
3. always
4. never
5. sometimes
6. never
7. never
8. always
9. always
10. sometimes
11. a kite that is not a rhombus
12. a circle
13. an isosceles trapezoid
14. n
15. 
16. 
17. 

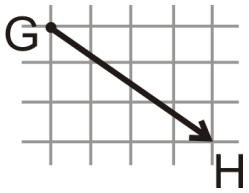
18. none

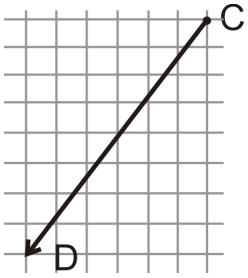
19. 

20. H is the only one with rotational symmetry, 180°.
21. line symmetry
22. rotational symmetry
23. line symmetry
24. line symmetry (horizontal)
25. rotational symmetry
26. 2 lines
27. 6 lines
28. 4 lines
29. 180°
30. $60°, 120°, 180°, 240°, 300°$
31. $90°, 180°, 270°$
32. none
33. $120°, 240°$
34. $40°, 80°, 120°, 160°, 200°, 240°, 280°, 320°$
35. 8 lines of symmetry; angles of rotation: $45°, 90°, 135°, 180°, 225°, 270°$, and $315°$
36. 3 line of symmetry; angles of rotation: $120°, 240°$
37. 1 line of symmetry; no rotational symmetry

12.2 Geometry - Second Edition, Translations and Vectors , Review Answers

1. A vector has direction and size, a ray is part of a line, so it has direction, but no size.
2. $A'(-1, -6)$
3. $B'(9, -1)$
4. $C(0, 6)$
5. $A''(4, -15)$
6. $D(7, 16)$
7. $A'''(9, -24)$
8. All four points are collinear.
9. $A'(-8, -14), B'(-5, -17), C'(-7, -5)$
10. $A'(5, -3), B'(8, -6), C'(6, 6)$
11. $A'(-6, -10), B'(-3, -13), C'(-5, -1)$
12. $A'(-11, 1), B'(-8, -2), C'(-10, 10)$
13. $(x, y) \rightarrow (x - 6, y + 2)$
14. $(x, y) \rightarrow (x + 9, y - 7)$
15. $(x, y) \rightarrow (x - 3, y - 5)$
16. $(x, y) \rightarrow (x + 8, y + 4)$

17. Using the distance formula, $AB = A'B' = \sqrt{5}, BC = B'C' = 3\sqrt{5}$, and $AC = A'C' = 5\sqrt{2}$.
18. $(x, y) \rightarrow (x - 8, y - 4)$
19. $\vec{GH} = \langle 6, 3 \rangle$
20. $\vec{KJ} = \langle -2, 4 \rangle$
21. $\vec{LM} = \langle 3, -1 \rangle$
22. 

23. 

24. 

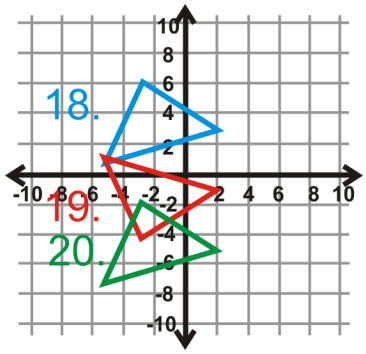
25. $D'(9, -9), E'(12, 7), F'(10, 14)$
26. $Q'(-9, -6), U'(-6, 0), A'(1, -9), D'(-2, -15)$
27. $\langle -3, 8 \rangle$
28. $\langle 9, -12 \rangle$
29. $\langle 0, -7 \rangle$
30. $(x, y) \rightarrow (x - 7, y + 2)$
31. $(x, y) \rightarrow (x + 11, y + 25)$
32. $(x, y) \rightarrow (x + 15, y - 9)$

12.3 Geometry - Second Edition, Reflections, Review Answers

1. d
2. p
3. (-3, 2), (-8, 4), (-6, 7), (-4, 7)
4. (-6, 4), (-2, 6), (-8, 8)
5. (2, 2), (8, 3), (6, -3)
6. (2, 6), (-6, 2), (4, -2)
7. (2, -2), (8, -6)
8. (2, -4), (-4, 2), (-2, -6)
9. (2, 3), (4, 8), (7, 6), (7, 4)
10. (4, 6), (6, 2), (8, 8)
11. (2, 4), (-4, 3), (-2, 9)
12. (-4, -14), (4, -10), (-6, -6)
13. (-2, -2), (-6, -8)
14. (-4, 2), (2, -4), (-6, -2)
15. $y = -2$

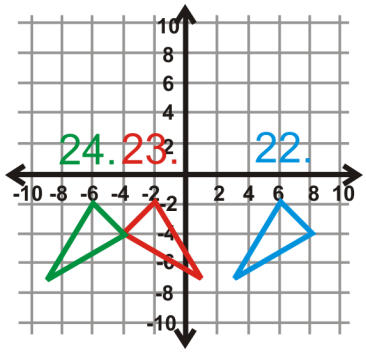
16. $y-$axis
17. $y = x$

18-20.



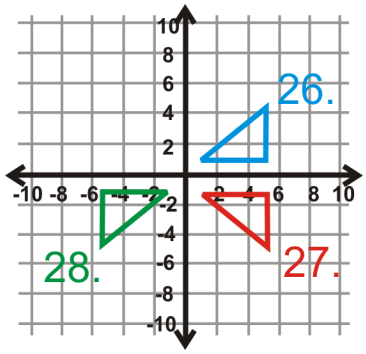
21. It is the same as a translation of 8 units down.

22-24.

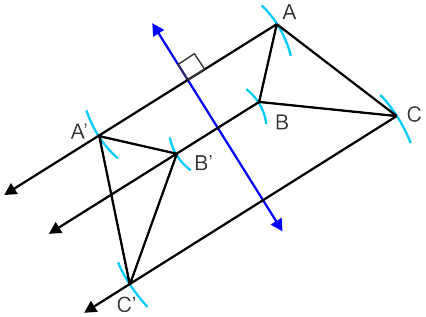


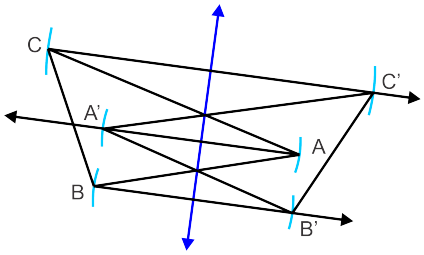
25. It is the same as a translation of 12 units to the left.

26-28.

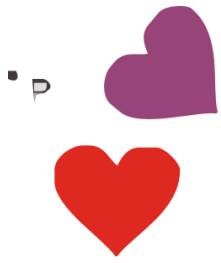


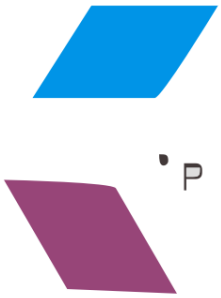
29. A ***rotation*** of 180°.
30.

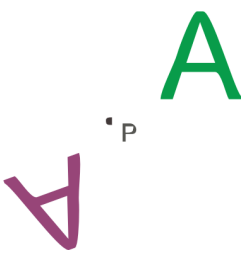


31. Perpendicular Bisector
32. 

12.4 Geometry - Second Edition, Rotations, Review Answers

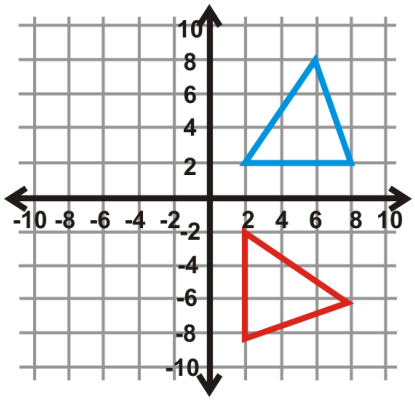
1. 

2. 

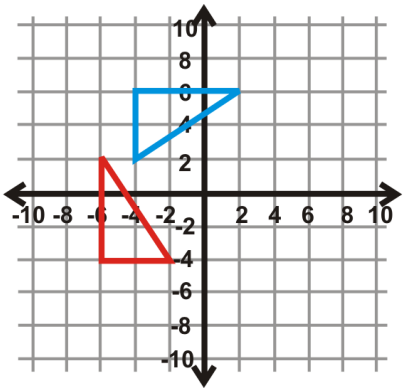
3. 

4. *d*
5. *d*, they are the same because the direction of the rotation does not matter.
6. 270°
7. 90°
8. Not rotating the figure at all; 0°
9. (-6, -2)
10. (-6, -4)
11. (2, -2) and (6, 4)

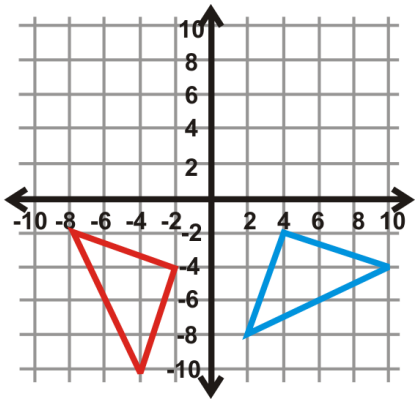
12.



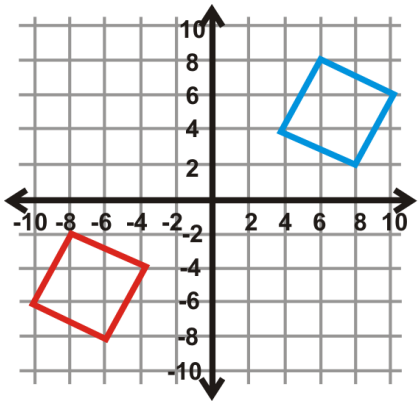
13.



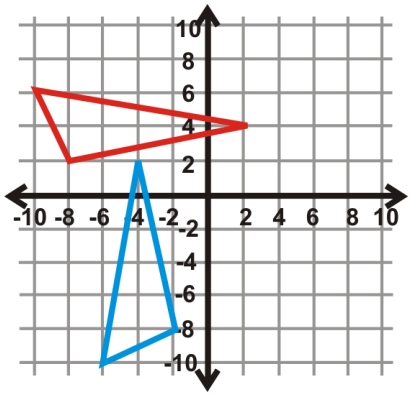
14.



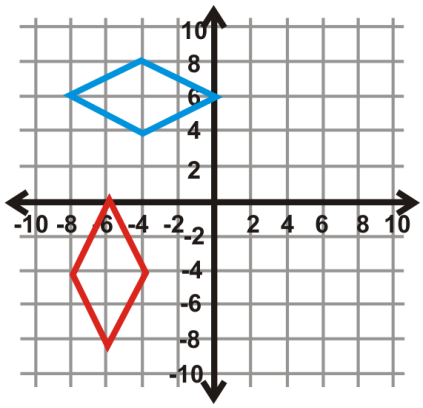
15.



16.

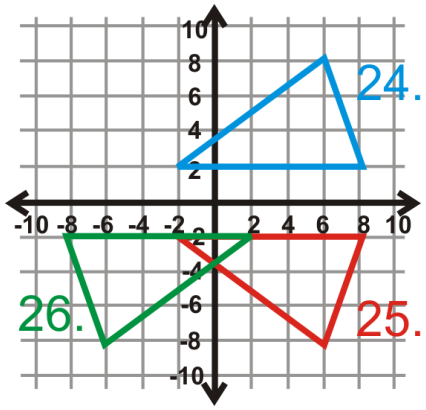


17.



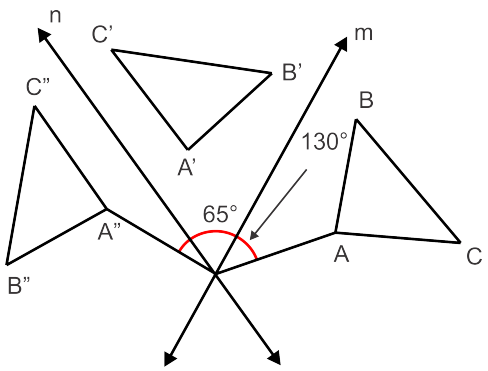
18. $x = 3$
19. $x = 4.5$
20. $x = 21$
21. 90°
22. 180°
23. 180°

24-26.



27. A ***rotation*** of 180°.

28-30.



31. Angle of rotation is double the angle between the lines.

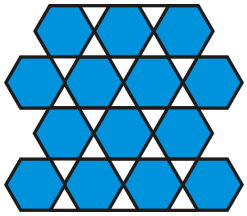
12.5 Geometry - Second Edition, Composition of Transformations, Review Answers

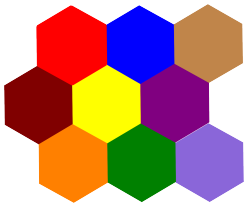
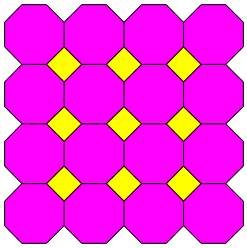
1. Every isometry produces a congruent figure to the original. If you compose transformations, each image will still be congruent to the original.
2. a translation
3. a rotation
4. (2, 2), (-2, -4), (0, -8), (4, -6)
5. $(x, y) \rightarrow (x + 6, -y)$
6. $(x, y) \rightarrow (x - 6, -y)$
7. No, because order does not matter.
8. (-2, -3), (-4, 2), (-9, -3)
9. $(x, y) \rightarrow (-x, y - 5)$
10. $(x, y) \rightarrow (-x, y + 5)$
11. (2, -10), (10, -6), (8, -4)
12. A translation of 12 units down.
13. $(x, y) \rightarrow (x, y + 12)$
14. This image is 12 units above the original.
15. $\#11 \rightarrow (x, y) \rightarrow (x, y - 12), \#14 \rightarrow (x, y) \rightarrow (x, y + 12)$, the 12's are in the opposite direction.
16. (-8, 2), (-6, 10), (-2, 8), (-3, 4)
17. A rotation of 270°
18. A rotation of 90°
19. It is in the 4^{th} quadrant and are 180° apart.
20. $\#16 \rightarrow (x, y) \rightarrow (y, -x), \#19 \rightarrow (x, y) \rightarrow (-y, x)$, the values have the opposite sign.
21. 14 units
22. 14 units
23. rotation, 180°
24. the origin
25. 166°
26. 122°
27. 315°
28. 31 units
29. $2(b - a)$, right
30. $2(b - a)$, left

12.6 Geometry - Second Edition, Extension: Tessellations, Review Answers

1-7. Yes, all quadrilaterals will tessellate.

8. Equilateral triangle, square, and regular hexagon.
9. Here is one possibility.



10. The figure is an equilateral concave hexagon.
11. 
12. 
13. Answers will vary.

12.7 Chapter Review Answers

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