Chapter 5 Answers

Practice 5-1

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

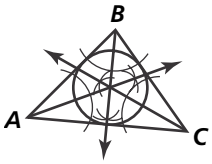
Practice 5-2

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

Practice 5-3

1. $(-2, 2)$ **2.** $(4, 0)$ **3.** $(2, 1)$

4. Check students' work. The final result of the construction is shown.



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

Practice 5-4

1. I and III **2.** I and II **3.** The angle measure is not 65. **4.** Tina does not have her driver's license. **5.** The figure does not have eight sides. **6.** The restaurant is open on Sunday. **7.** $\triangle ABC$ is congruent to $\triangle XYZ$. **8.** $m\angle Y \leq 50$ **9a.** If two triangles are not congruent, then their corresponding angles are not congruent; false. **9b.** If corresponding angles are not congruent, then the triangles are not congruent; true. **10a.** If you do not live in Toronto, then you do not live in Canada; false. **10b.** If you do not live in Canada, then you do not live in Toronto; true. **11.** Assume that $m\angle A \neq m\angle B$. **12.** Assume that $TUVW$ is not a trapezoid. **13.** Assume that $\overline{LM}$ does not intersect $\overline{NO}$. **14.** Assume that $\triangle FGH$ is not equilateral. **15.** Assume that it is not sunny outside. **16.** Assume that $\angle D$ is obtuse. **17.** Assume that $m\angle A \geq 90$. This means that $m\angle A + m\angle C \geq 180$. This, in turn, means that the sum of the angles of $\triangle ABC$ exceeds 180, which contradicts the Triangle Angle-Sum Theorem. So the assumption that $m\angle A \geq 90$ must be incorrect. Therefore, $m\angle A < 90$.

Practice 5-5

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

Reteaching 5-1

Triangles will vary.

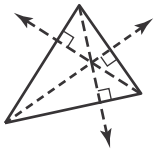
1a. $PQ = 8$ **1b.** $MN = 16$ **1c.** $YZ = 32$ **2a.** $NO = 2.5$ **2b.** $ST = 10$ **2c.** $UV = 20$ **3a.** $QR = 4$ **3b.** $ST = 8$ **3c.** $UV = 16$

Reteaching 5-2

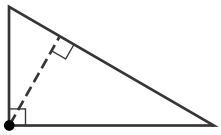
1. no **2.** yes **3.** yes **4.** no **5.** B **6.** C

Reteaching 5-3

1. Sample:



2. Sample:



Reteaching 5-4

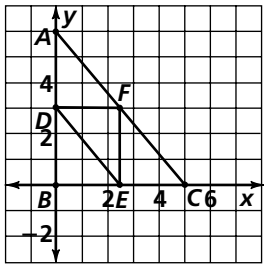
1. Step 1: B; Step 2: D; Step 3: F; Step 4: E; Step 5: A; Step 6: C **2.** Step 1: Assume $\overline{EF} \cong \overline{DE}$. Step 2: If $\overline{EF} \cong \overline{DE}$, then by the Isosceles Triangle Theorem, $\angle D \cong \angle F$. Step 3: But $\angle D \ncong \angle F$. Step 4: Therefore, $\overline{EF} \ncong \overline{DE}$.

Reteaching 5-5

1. Check students' work. The longest side will be opposite the largest angle. The shortest side will be opposite the smallest angle. **2.** largest: $\angle DEF$; smallest: $\angle DFE$ **3.** largest: $\angle PQR$; smallest: $\angle PRQ$ **4.** largest: $\angle ACB$; smallest: $\angle CBA$ **5.** longest: $\overline{DF}$; shortest: $\overline{FE}$ **6.** longest: $\overline{PQ}$; shortest: $\overline{RQ}$ **7.** longest: $\overline{SV}$; shortest: $\overline{ST}$

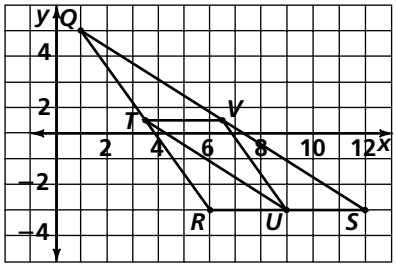
Enrichment 5-1

1., 5.



2. $D(0, 3)$ **3.** $E(2.5, 0)$ **4.** $F(2.5, 3)$
6. 3.75 square units **7.** They are equal. **8.** 1 : 4

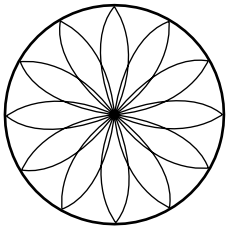
9., 13.



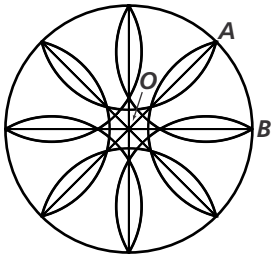
10. $T(3.5, 0.5)$ **11.** $U(9, -3)$ **12.** $V(6.5, 0.5)$
14. 21 square units **15.** 5.25 square units

Enrichment 5-2

1.–10. Check students' work.

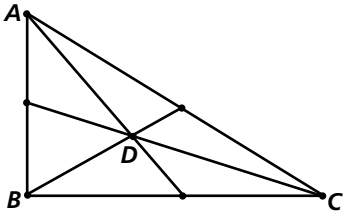


11. Check students' work. Give hint: $m\angle AOB = 45°$.



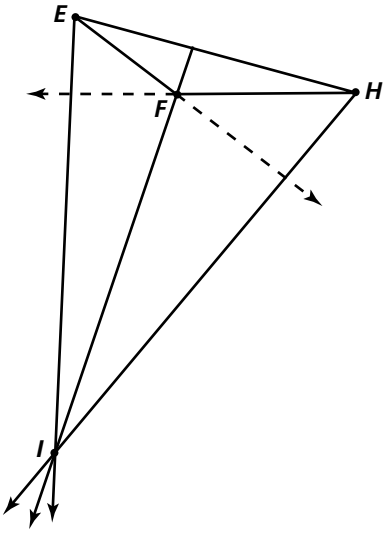
Enrichment 5-3

1.–2.



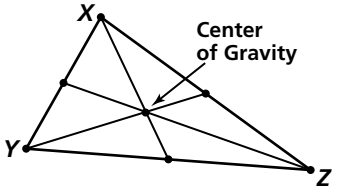
3. centroid **4.** interior **5.** It is not possible for the centroid to be on the exterior because all the medians are in the interior of the triangle.

6.



7. orthocenter **8.** It is possible for the orthocenter to be in the interior, the exterior, or on the triangle itself. Explanations may vary.

9.

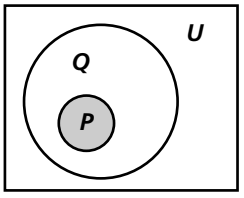


10. Check students' work. **11.** centroid

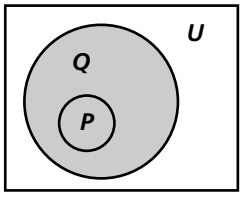
Enrichment 5-4

1. If a fish is a salmon, then it swims upstream. **2.** If a fish swims upstream, then it is a salmon. **3.** If a fish is not a salmon, then it does not swim upstream. **4.** If a fish does not swim upstream, then it is not a salmon. **5.** Exercises 1 and 4 **6.** the salmon **7.** the fish that swim upstream

8.



9.



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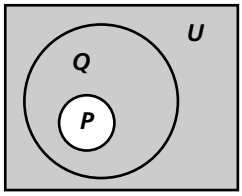
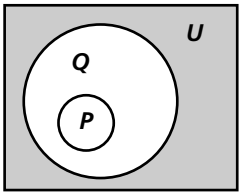


11.



12. If a quadrilateral is a rectangle, then the angles of the quadrilateral are congruent. **13.** If the angles of a quadrilateral are not congruent, then the quadrilateral is not a rectangle. **14.** If a quadrilateral is not a rectangle, then the angles of the quadrilateral are not congruent. **15.** All are true (12, 13, and 14). **16.** the contrapositive

Enrichment 5-5

1. U **2.** T **3.** F **4.** T **5.** U **6.** F **7.** T **8.** T **9.** T **10.** F **11.** T **12.** U **13.** T **14.** F **15.** F **16.** U **17.** T **18.** T

The name of the mathematician is THALES (thā′ lēz).

Chapter Project

Activity 1: Creating
isoceles; median, angle bisector, perpendicular bisector

Activity 2: Experimenting
Check students' work.

Activity 3: Designing
Check students' work.

✔ Checkpoint Quiz 1

1. angle bisector, since $\overline{TM} \cong \overline{NM}$ **2.** congruent, since $\overrightarrow{QM}$ is the angle bisector **3.** 20, since $\overline{TM} \cong \overline{NM}$ **4.** 6 **5.** 4 **6a.** 18 **6b.** 42 **7.** altitude **8.** congruent

✔ Checkpoint Quiz 2

1. Inv: If you don't eat bananas, then you will not be healthy. Contra.: If you are not healthy, then you don't eat bananas. **2.** Inv.: If a figure is not a triangle, then it does not have three sides. Contra.: If a figure does not have three sides, then it is not a triangle. **3.** Suppose that there are two obtuse angles in a triangle. This would mean that the sum of two angles of a triangle would exceed 180°. This contradicts the Triangle-Sum Theorem. Therefore, there can be only one obtuse angle in a triangle. **4.** Suppose that the temperature is below 32°F and it is raining. Because 32°F is the freezing point of water, any precipitation will be in the form of sleet, snow, or freezing rain. This contradicts the original statement. Therefore, the temperature must be above 32°F for it to rain. **5.** yes; $6 + 4 > 8, 8 + 6 > 4$ **6.** no; $2.6 + 4.1 \not> 6.7$ **7.** $\angle B, \angle C, \angle A$ **8.** $\angle D, \angle F, \angle E$

Chapter Test, Form A

1a. If a triangle does not have three congruent sides, then it is not equiangular; true. **1b.** If a triangle is not equiangular, then it does not have three congruent sides; true. **2a.** If an isosceles triangle is not obtuse, then the vertex angle is not obtuse; true. **2b.** If the vertex angle of an isosceles triangle is not obtuse, then the triangle is not obtuse; true. **3a.** If two lines are not parallel, then they intersect; false. **3b.** If two lines intersect, then they are not parallel; true. **4.** $x = 9.5$ **5.** $x = 5$ **6.** Sample: $\overline{EF} \cong \overline{HG}$ **7.** I and III **8.** II and III **9.** $\angle D, \angle B, \angle C$ **10.** $\angle B, \angle D, \angle C$ **11.** $\angle C, \angle D, \angle B$ **12.** C **13.** Sample: Assume that an equilateral triangle has a right angle. This means that one angle measures 90. This, in turn, means that each of the three angles is 90 because the triangle is equilateral and also equiangular. This means that the angle sum of the triangle is 270, contradicting the Triangle Angle-Sum Theorem. So the assumption that an equilateral triangle can have a right angle must be incorrect. Therefore, an equilateral triangle cannot have a right angle. **14.** Each leg must be greater than 5 units in length. **15.** 6; 30 **16.** on **17.** inside **18.** outside **19.** $\overline{AB}$ **20.** $\overline{XD}, \overline{XC}, \overline{XB}$ **21.** (5, 4) **22.** (1, −2) **23.** 2 **24.** 15 **25.** 24

Chapter Test, Form B

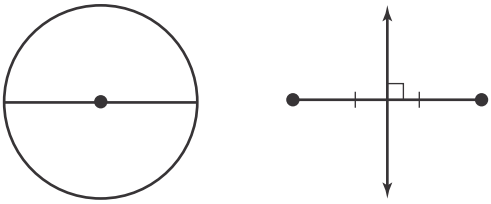
1a. If $m\angle A \neq 30$, then $\angle A$ is not acute; false **1b.** If $\angle A$ is not acute, then $m\angle A \neq 30$; true **2a.** If the compact disc costs $13 or more, then Jose will not buy it; false. **2b.** If Jose does not buy the compact disc, then it must cost $13 or more; true. **3a.** If two angles of a triangle are not complementary, then the third angle is not a right angle; true. **3b.** If the third angle of a triangle is not a right angle, then the other two angles are not complementary; true. **4.** $x = 22$ **5.** $x = 3$ **6.** Sample: $\overline{VW} \cong \overline{UX}$ **7.** II and III **8.** I and III **9.** $\angle B, \angle D, \angle C$ **10.** $\angle B, \angle C, \angle D$ **11.** $\angle D, \angle C, \angle B$ **12.** A **13.** Sample: Assume that a triangle has two right angles. The sum of these two angles then must be 180. When the third angle is added to the total, the angle sum of the triangle would be greater than 180, contradicting the Triangle Angle-Sum Theorem. Therefore, a triangle can have at most one right angle. **14.** Each leg must be greater than 8.5 units in length. **15.** 9; 37 **16.** outside **17.** inside **18.** on **19.** $\overline{BC}$ **20.** $\angle 3, \angle 1, \angle 2$ **21.** (5, 5) **22.** (−7, 2) **23.** 15 **24.** 30 **25.** 12

Alternative Assessment, Form C

TASK 1: Scoring Guide
Sample: Assume that Harold can create a triangular garden plot with sides of 6 ft, 6 ft, and 13 ft. Then a triangle is possible with sides 6, 6, and 13. But $6 + 6 \not> 13$, so by the Triangle Inequality Theorem, no such triangle exists. Therefore, the plan is impossible.

3 Student gives a clear and accurate explanation.
2 Student gives an explanation that contains minor inaccuracies.
1 Student gives an explanation that contains significant flaws in logical reasoning.
0 Student makes little or no attempt.

TASK 2: Scoring Guide
Sample: The locus of points in a plane equidistant from a single point forms a circle, as shown in the first figure. The locus of points in a plane equidistant from the endpoints of a segment forms a perpendicular bisector of the segment, as shown in the second figure.



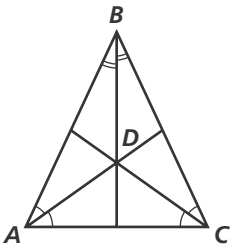
3 Student gives an accurate explanation and drawings.
2 Student gives a drawing or an explanation that contains minor errors.
1 Student gives an explanation or a drawing that contains significant errors.
0 Student makes little or no attempt.

TASK 3: Scoring Guide
Expressed as a conditional: If $\triangle ABC$ is an equilateral triangle with midpoints D, E, and F on sides $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$ respectively, then $\triangle DEF$ forms an equilateral triangle.

Sample: $\triangle DEF$ is an equilateral triangle. Each of $\triangle DEF$'s sides is exactly $\frac{1}{2}$ the corresponding side of $\triangle ABC$. If $\triangle ABC$'s sides are all the same length, then all of $\triangle DEF$'s sides are all the same length as well.

3 Student accurately states the conditional and the proof.
2 Student has minor errors in the statement of the conditional or in the proof.
1 Student gives a statement of conditional or a proof that contains significant errors.
0 Student makes little or no attempt.

TASK 4: Scoring Guide
Sample:

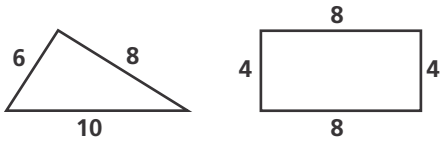


$\triangle ADC$ is isosceles. $\angle BAC = \angle BCA$ because $\triangle ABC$ is an isosceles triangle with $AB = BC$. The angle bisectors create two new angles at each vertex of $\triangle ABC$, each of which has a measure $\frac{1}{2}$ that of the angle bisected. Thus $m\angle DAC = \frac{1}{2}m\angle BAC$ and $m\angle DCA = \frac{1}{2}m\angle BCA$. Because $m\angle BAC = m\angle BCA$, $m\angle DAC = m\angle DCA$, which makes $\triangle ADC$ an isosceles triangle.

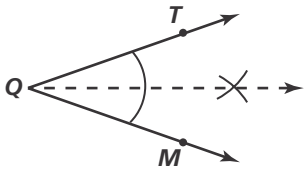
3 Student gives accurate answers and justification.
2 Student gives answers containing minor errors.
1 Student gives a justification containing major logical gaps.
0 Student makes little or no effort.

Cumulative Review

1. A **2.** B **3.** D **4.** C **5.** B **6.** B **7.** D
8. C **9.** D **10.** A **11.** A **12.** D **13.** B
14. A **15.** 24 **16.** 28 **17.** Sample: The principal is giving a student an award. **18.** Suppose that an equilateral triangle has an obtuse angle. Then one angle in the triangle has a measure greater than 90. But this contradicts the fact that in an equilateral triangle, the measure of each angle is 60. Therefore, the equilateral triangle does not have an obtuse angle.
19. Sample:



20. $(-1, 2)$
21.



22. $\angle C$, $\angle B$, $\angle A$