Answers for 5.2

For use with pages 306–309

5.2 Skill Practice

1. circumcenter

2. all points on the perpendicular bisector of $\overline{AB}$

3. 15 **4.** 30 **5.** 55

6. yes **7.** yes **8.** no

9. B

10. You don't know that $EC = DC$.

11. 35 **12.** 43

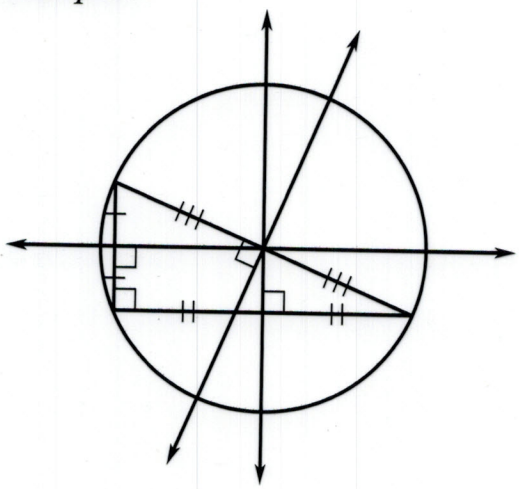
13. 50 **14.** 50

15. Yes; the Converse of the Perpendicular Bisector Theorem guarantees L is on $\overleftrightarrow{JP}$.

16. 9 **17.** 11

18. *Sample answer:* In the construction of the segment bisector four congruent triangles are created. In the process four pairs of congruent angles are formed which are right angles making the bisector perpendicular to the segment.

19. *Sample:*



20. Sometimes; a scalene triangle can be acute, right, or obtuse.

21. Always; congruent sides are created.

22. Sometimes; consider an equilateral triangle and a scalene triangle.

23. a–c.

Statements (Reasons)

1. P is a perpendicular bisector of $\overline{XZ}$ at Y; W and V lie in plane P. (Given)
2. $XW = ZW, XV = ZV$ (Perpendicular Bisector Theorem)
3. $\overline{XW} \cong \overline{ZW}, \overline{XV} \cong \overline{ZV}$ (Definition of segment congruence)
4. $\overline{WV} \cong \overline{WV}$ (Reflexive Property of Segment Congruence)
5. $\triangle VXW \cong \triangle VZW$ (SSS)
6. $\angle VXW \cong \angle VZW$ (Corr. Parts of $\cong$ $\triangle$s are $\cong$.)

5.2 Problem Solving

24. 59.6 m, 195.5 m; Perpendicular Bisector Theorem

25. Theorem 5.4 shows you that you can find a point equidistant from three points by using the perpendicular bisectors of the sides of the triangle formed by the three points.

26. Statements (Reasons)

1. $\overleftrightarrow{PC}$ is the perpendicular bisector of $\overline{AB}$. (Given)
2. $AP = BP, m\angle CPA = m\angle CPB = 90°$ (Definition of perpendicular bisector)
3. $\overline{AP} \cong \overline{BP}$ (Definition of segment congruence)
4. $\angle CPA \cong \angle CPB$ (Definition of angle congruence)
5. $\overline{CP} \cong \overline{CP}$ (Reflexive Property of Segment Congruence)
6. $\triangle CPA \cong \triangle CPB$ (SAS)
7. $\overline{CA} \cong \overline{CB}$ (Corr. parts of $\cong$ $\triangle$s are $\cong$.)
8. $CA = CB$ (Definition of segment congruence)

27. Statements (Reasons)

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

28. a. Find the intersection of the perpendicular bisectors of the triangle formed by the three points.

b. approximately (7, 6.5)

29. Check students' work; Perpendicular Bisector Theorem.

30. Midpoint of the hypotenuse. *Sample answer:* Right triangle with vertices $A(2a, 0)$, $B(0, 2b)$, and $C(0, 0)$; the midpoint of $\overline{AC}$ is $(a, 0)$ and midpoint of $\overline{BC}$ is $(0, b)$. The equation of the perpendicular bisectors of $\overline{AC}$ and $\overline{BC}$ are $x = a$ and $y = b$. These two lines intersect in the point (a, b) which is the midpoint of $\overline{AB}$.

31. Case 1:

Given: D, E, and B are collinear.

Prove: $\overline{AB} \cong \overline{BC}$

Statements (Reasons)

1. D, E, and B are collinear; $\overline{AD} \cong \overline{CD}$, $\overline{AE} \cong \overline{CE}$. (Given)
2. Draw $\overleftrightarrow{DB}$ containing point E. (Two points determine a line.)
3. $\overline{DE} \cong \overline{DE}$ (Reflexive Property of Segment Congruence)
4. $\triangle DAE \cong \triangle DCE$ (SSS)
5. $\angle AED \cong \angle CED$ (Corr. parts of $\cong$ $\triangle$s are $\cong$.)
6. $\angle AED$ and $\angle AEB$, $\angle CED$ and $\angle CEB$ are linear pairs. (Definition of linear pair)

31. (cont.)

7. $\angle AED$ and $\angle AEB$ are supplementary, $\angle CED$ and $\angle CEB$ are supplementary. (Linear Pair Postulate)
8. $\angle AEB \cong \angle CEB$ (Congruent Supplements Theorem)
9. $\overline{EB} \cong \overline{EB}$ (Reflexive Property of Segment Congruence)
10. $\triangle AEB \cong \triangle CEB$ (SAS)
11. $\overline{AB} \cong \overline{BC}$ (Corr. parts of $\cong$ $\triangle$ are $\cong$.)

Case 2: Given: $\overline{AB} \cong \overline{BC}$

Prove: D, E, and B are collinear.

Statements (Reasons)

1. Draw $\overline{DE}$, $\overline{EB}$, and $\overline{AC}$. (Two point determine a line.)
2. $\overline{AB} \cong \overline{BC}$, $\overline{AD} \cong \overline{CD}$, $\overline{AE} \cong \overline{CE}$ (Given)
3. $AB = CB$, $AD = CD$, $AE = CE$ (Definition of congruent segments)
4. B is on the perpendicular bisector of $\overline{AC}$, D is on the perpendicular bisector of $\overline{AC}$, E is on the perpendicular bisector of $\overline{AC}$. (Converse of the Perpendicular Bisector Theorem)
5. There exists only one line that is the perpendicular bisector of $\overline{AC}$, so B, D, and C are all on the same line. (Through a point not on a line, there exists only one line through the point perpendicular to the given line.)
6. D, E, and B are collinear. (Definition of collinear)

32. Statements (Reasons)

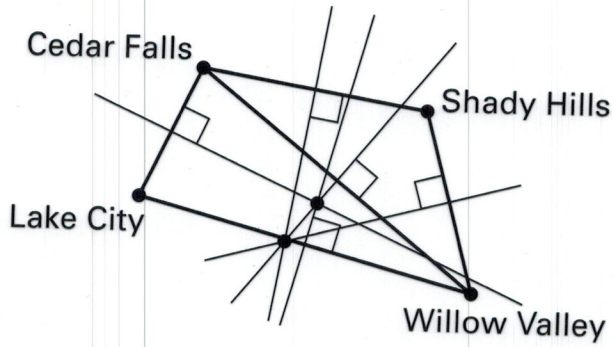
1. $PQRST$ is a regular polygon, $\overline{SV} \cong \overline{RV}$. (Given)
2. $\overline{TP} \cong \overline{QP}$, $\overline{TS} \cong \overline{QR}$ (Definition of regular polygon)
3. $\overline{PW} \cong \overline{PW}$, $\overline{PV} \cong \overline{PV}$ (Reflexive Property of Segment Congruence)
4. $VPTS \cong VPQR$ (Definition of congruent polygons)
5. $\angle TPW \cong \angle QPW$ (Corr. parts of $\cong$ polygons are $\cong$.)
6. $\triangle PWT \cong \triangle PWQ$ (SAS)
7. $\overline{TW} \cong \overline{QW}$ (Corr. parts of $\cong$ $\triangle$ are $\cong$.)
8. $\angle PWT \cong \angle PWQ$ are a linear pair. (Definition of linear pair)

32. (cont.)

9. $\overline{PV} \perp \overline{TQ}$ (If two lines intersect to form a linear pair of congruent angles, the lines are perpendicular.)

10. $\overline{PV}$ is the perpendicular bisector of $\overline{TQ}$. (Definition of perpendicular bisector)

33. No; unless the four points determine a rectangle there is no single point to locate the school so that it is equidistant from the four towns.



5.2 Mixed Review

34. ± 12 **35.** ± 8 **36.** $\pm 2\sqrt{7}$

37. 18; 158° **38.** 9; 90°

39. The numbers are decreasing by 5; 1.

40. The next number in the sequence is the previous one multiplied by 3; 162.

41. Starting with 3, zero is added to get 3, then one is added to get 4, then 2 is added to get 6, next add 3; 9.