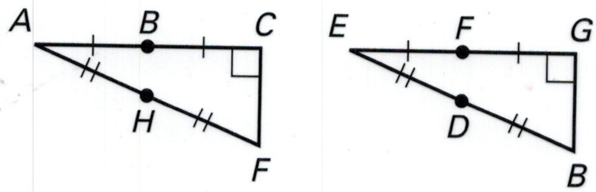
Answers for 4.4

For use with pages 243–248

4.4 Skill Practice

1. included
2. SAS requires two sides and the included angle of one triangle to be congruent to the corresponding two sides and the included angle of a second triangle. SSS requires that three sides of one triangle be congruent to the corresponding sides of a second triangle.
3. $\angle XYW$ **4.** $\angle WZY$ **5.** $\angle ZWY$
6. $\angle WXY$ **7.** $\angle XYZ$ **8.** $\angle XWZ$
9. not enough **10.** enough
11. not enough **12.** not enough
13. enough **14.** not enough
15. B
16. $\triangle BAD$, $\triangle DCB$. *Sample answer:* $\angle A \cong \angle C$ because they are both right angles, $\overline{AB} \cong \overline{CD}$ and $\overline{AD} \cong \overline{CB}$ because the sides of a square are congruent, therefore $\triangle BAD \cong \triangle DCB$ by SAS.
17. $\triangle STU$, $\triangle RVU$; $\overline{ST} \cong \overline{TU} \cong \overline{UV} \cong \overline{VR}$ and $\angle T \cong \angle V$ because it is a regular pentagon, therefore $\triangle STU \cong \triangle RVU$ by SAS.
18. $\triangle KMN$, $\triangle KLN$. *Sample answer:* $\overline{MK} \cong \overline{MN} \cong \overline{LN} \cong \overline{LK}$ since they are all radii of the same size circle. It is given that $\overline{MK} \perp \overline{MN}$ and $\overline{LK} \perp \overline{LN}$. $\angle KMN$ and $\angle KLN$ are right angles and since all right angles are congruent, $\angle KMN \cong \angle KLN$. Therefore $\triangle KMN \cong \triangle KLN$ by SAS.
19. HL;



20. not enough information
21. SAS **22.** HL
23. Yes; they are congruent by the SAS Congruence Postulate.
24. $\overline{YX}$ and $\overline{YW}$ should have the same length since it can be shown that $\triangle XZY \cong \triangle WZY$;
$4x + 6 = 5x - 1$,
$-x = -7, x = 7$.
25. $\overline{AC} \cong \overline{DF}$ **26.** $\overline{BA} \cong \overline{ED}$
27. $\overline{BC} \cong \overline{EF}$
28. Yes; they are congruent by SAS.

29. Because $\overline{RM} \perp \overline{PQ}$, $\angle RMQ$ and $\angle RMP$ are right angles and thus are congruent. $\overline{QM} \cong \overline{MP}$ and $\overline{MR} \cong \overline{MR}$. $\triangle RMP \cong \triangle RMQ$ by SAS.

30. Since $\angle DAC \cong \angle FAB$ the triangles are congruent by SAS.

4.4 Problem Solving

31. SAS **32.** SAS

33. Two sides and the included angle of one sail need to be congruent to two sides and the included angle of the second sail; the two sails need to be right triangles with congruent hypotenuses and one pair of congruent legs.

34. Definition of a right triangle; Given; $\overline{LM} \cong \overline{NM}$; HL

35. Statements (Reasons)

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

36. Statements (Reasons)

1. $\overline{VX} \cong \overline{XY}$, $\overline{XW} \cong \overline{YZ}$, $\overline{XW} \parallel \overline{YZ}$ (Given)
2. $\angle VXW \cong \angle XYZ$ (Corresponding Angles Postulate)
3. $\triangle VXW \cong \triangle XYZ$ (SAS)

37. Statements (Reasons)

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

38. Statements (Reasons)

1. D is the midpoint of $\overline{AC}$. (Given)
2. $\overline{BD} \perp \overline{AC}$ (Given in diagram)
3. $\angle BDA$ and $\angle BDC$ are right angles. (Definition of perpendicular lines)
4. $\angle BDA \cong \angle BDC$ (Right Angle Congruence Theorem)
5. $\overline{DA} \cong \overline{DC}$ (Definition of midpoint)
6. $\overline{BD} \cong \overline{BD}$ (Reflexive Property of Congruence)
7. $\triangle ABD \cong \triangle CBD$ (SAS)

39. D

40. Statements (Reasons)

1. $\overline{CR} \cong \overline{CS}$, $\overline{QC} \perp \overline{CR}$, $\overline{QC} \perp \overline{CS}$ (Given)
2. $\angle SCQ$ and $\angle RCQ$ are right angles. (Definition of perpendicular lines)
3. $\angle SCQ \cong \angle RCQ$ (Right Angle Congruence Theorem)
4. $\overline{QC} \cong \overline{QC}$ (Reflexive Property of Congruence)
5. $\triangle QCR \cong \triangle QCS$ (SAS)

41. Find the length of each side of the two triangles and show that pairs of corresponding sides have the same length and therefore are congruent.

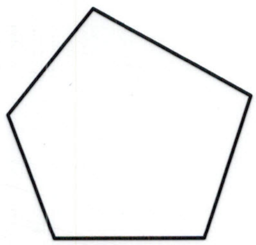
Statements (Reasons)

1. $\triangle OMP$, $\triangle NMP$ (Given)
2. $MO = 4\sqrt{2}$, $MN = 4\sqrt{2}$ (Distance formula)
3. $\overline{MO} \cong \overline{MN}$ (Definition of congruent segments)
4. $\overline{MP} \cong \overline{MP}$ (Reflexive Property of Congruence)
5. slope of $\overline{MP} = -1$, slope of $\overline{NO} = 1$ (Slope formula)
6. $\overline{MP} \perp \overline{NO}$ (Slopes of Perpendicular Lines Postulate)
7. $\angle OMP$ and $\angle NMP$ are right angles. (Definition of perpendicular lines)
8. $\angle OMP \cong \angle NMP$ (Right Angle Congruence Theorem)
9. $\triangle OMP \cong \triangle NMP$ (SAS)

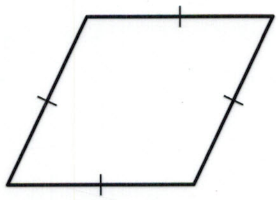
Sample answer: Both methods involve the use of the distance formula, with the first method involving calculating the lengths of all the sides of the two triangles. The second method also requires finding the slopes of two of the sides in order to show they are perpendicular and that right triangles are formed.

4.4 Mixed Review

42.



43.



44. $y = x - 4$

45. $y = -3x + 12$

46. $x = -4$

47. 5

48. 19

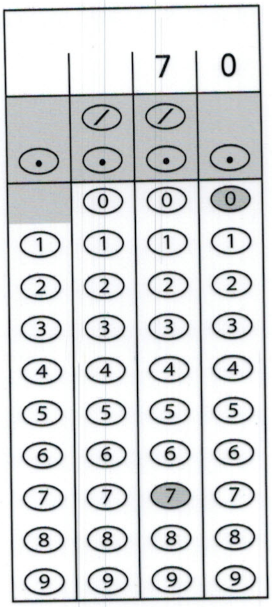
4.1–4.4 Mixed Review of Problem Solving

1. a. $\triangle ACE$ and $\triangle DCF$ are obtuse triangles, and $\triangle ECB$, $\triangle FCG$, $\triangle ABC$, and $\triangle DGC$ are acute triangles.

b. All triangles are scalene.

2. *Sample answer:* Using the distance formula it can be shown that $\triangle PQR \cong \triangle TRS$ by SSS.

3. 70°;



4. Yes; by the Segment Addition Postulate, $AB + BC = AC$, $FE + FG = EG$, $AH + GH = AG$, and $DE + CD = CE$. Since $\overline{CE} \cong \overline{AG}$ and $\overline{EG} \cong \overline{AC}$, $GH = CD$, and $BC = FG$ by the Definition of Congruent Segments and the Subtraction Property of Equality. Then $\triangle BCD \cong \triangle FGH$ by SAS.

5. a. Statements (Reasons)

1. $\overline{BG} \perp \overline{FH}$, $\overline{GF} \cong \overline{GH}$ (Given)
2. $\angle BGF$ and $\angle BGH$ are right angles. (Definition of perpendicular lines)
3. $\angle BGF \cong \angle BGH$ (Right Angle Congruence Theorem)
4. $\overline{BG} \cong \overline{BG}$ (Reflexive Property of Congruence)
5. $\triangle FGB \cong \triangle HGB$ (SAS)

b. yes;

<u>Statements (Reasons)</u>

1. $\overline{DF} \cong \overline{EH}$, $m\angle EHB = 25°$, $m\angle BFG = 65°$, $\overline{DF} \perp \overline{AG}$ at point F (Given)
2. $\triangle FGB \cong \triangle HGB$ (Problem 5a)
3. $\overline{FB} \cong \overline{HB}$ (Corr. parts of $\cong$ ⚠s are $\cong$.)
4. $\angle DFG$ is a right angle. (Definition of perpendicular lines)
5. $m\angle DFG = 90°$ (Definition of right angle)
6. $m\angle DFB + m\angle BFG = m\angle DFC$ (Angle Addition Postulate)
7. $m\angle DFB + 65° = 90°$ (Substitution Property of Equality)
8. $m\angle DFB = 25°$ (Subtraction Property of Equality)
9. $m\angle DFB = m\angle EHB$ (Transitive Property of Congruence)
10. $\angle DFB \cong \angle EHB$ (Definition of angle congruence)
11. $\triangle BDF \cong \triangle BEH$ (SAS)

6. 23;