Chapter 4 Answers

Practice 4-1

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

Practice 4-2

1. $\triangle ADB \cong \triangle CDB$ by SAS **2.** not possible **3.** not possible **4.** $\triangle TUS \cong \triangle XWV$ by SSS **5.** not possible **6.** $\triangle DEC \cong \triangle GHF$ by SAS **7.** $\triangle MKL \cong \triangle KMJ$ by SAS **8.** $\triangle PRN \cong \triangle PRQ$ by SSS **9.** not possible **10.** $\angle C$ **11.** $\overline{AB}$ and $\overline{BC}$ **12.** $\angle A$ and $\angle B$ **13.** $\overline{AC}$ **14a.** Given **14b.** Reflexive Property of Congruence **14c.** SAS Postulate

15.

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

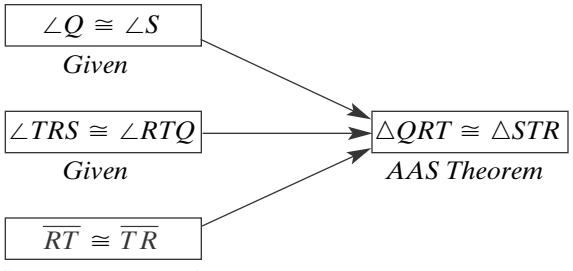
Practice 4-3

1. not possible **2.** ASA Postulate **3.** AAS Theorem
4. AAS Theorem **5.** not possible **6.** not possible
7. ASA Postulate **8.** not possible **9.** AAS Theorem

10.

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

11.



12. $\overline{BC} \cong \overline{EF}$

13. $\angle KHJ \cong \angle HKG$ or $\angle KJH \cong \angle HGK$

14. $\angle NLM \cong \angle NPQ$

Practice 4-4

1. $\overline{BD}$ is a common side, so $\triangle ADB \cong \triangle CDB$ by SAS, and $\angle A \cong \angle C$ by CPCTC. **2.** $\overline{FH}$ is a common side, so $\triangle FHE \cong \triangle HFG$ by ASA, and $\overline{HE} \cong \overline{FG}$ by CPCTC. **3.** $\triangle KLJ \cong \triangle PMN$ by ASA, so $\angle K \cong \angle P$ by CPCTC. **4.** $\overline{QS}$ is a common side, so $\triangle QTS \cong \triangle SRQ$ by AAS. $\angle QST \cong \angle SQR$ by CPCTC. **5.** $\overline{VX}$ is a common side, so $\triangle UVX \cong \triangle WVX$ by SSS, and $\angle U \cong \angle W$ by CPCTC. **6.** $\angle ZAY$ and $\angle CAB$ are vertical angles, so $\triangle ABC \cong \triangle AYZ$ by ASA. $\overline{ZA} \cong \overline{AC}$ by CPCTC. **7.** $\overline{EG}$ is a common side, so $\triangle DEG \cong \triangle FEG$ by SAS, and $\overline{FG} \cong \overline{DG}$ by CPCTC. **8.** $\angle JKH$ and $\angle LKM$ are vertical angles, so $\triangle HJK \cong \triangle MLK$ by AAS, and $\overline{JK} \cong \overline{KL}$ by CPCTC. **9.** $\overline{PR}$ is a common side, so $\triangle PNR \cong \triangle RQP$ by SSS, and $\angle N \cong \angle Q$ by CPCTC. **10.** First, show that $\angle ACB$ and $\angle ECD$ are vertical angles. Then, show $\triangle ABC \cong \triangle EDC$ by ASA. Last, show $\angle A \cong \angle E$ by CPCTC. **11.** First, show $\overline{FH}$ as a common side. Then, show $\triangle JFH \cong \triangle GHF$ by SAS. Last, show $\overline{FG} \cong \overline{JH}$ by CPCTC.

Practice 4-5

1. $x = 35; y = 35$ **2.** $x = 80; y = 90$ **3.** $t = 150$
4. $r = 45; s = 45$ **5.** $x = 55; y = 70; z = 125$
6. $a = 132; b = 36; c = 60$ **7.** $x = 6$
8. $a = 30; b = 30; c = 75$ **9.** $z = 120$
10. $\overline{AD}$; $\angle D \cong \angle F$ **11.** $\overline{GA}$; $\angle ACG \cong \angle AGC$
12. $\overline{KJ}$; $\angle KIJ \cong \angle KJI$ **13.** $\overline{DC}$; $\angle CDE \cong \angle CED$
14. $\overline{BA}$; $\angle ABJ \cong \angle AJB$ **15.** $\overline{CB}$; $\angle BCH \cong \angle BHC$
16. 130 **17.** 65 **18.** 130 **19.** 90
20. $x = 70; y = 55$ **21.** $x = 70; y = 20$
22. $x = 45; y = 45$

Practice 4-6

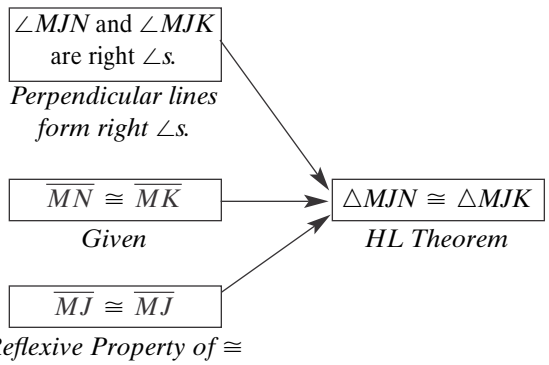
1.

Statements	*Reasons*
1. $\overline{AB} \perp \overline{BC}$, $\overline{ED} \perp \overline{FE}$	**1.** Given
2. $\angle B$, $\angle E$ are right $\angle$s.	**2.** Perpendicular lines form right $\angle$s.
3. $\overline{AC} \cong \overline{FD}$, $\overline{AB} \cong \overline{ED}$	**3.** Given
4. $\triangle ABC \cong \triangle DEF$	**4.** HL Theorem

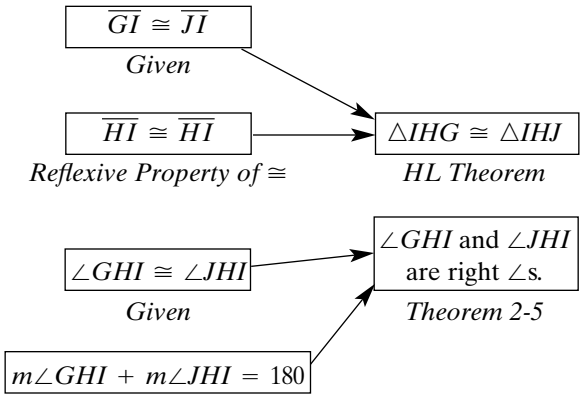
2.

Statements	*Reasons*
1. $\angle P$, $\angle R$ are right $\angle$s.	**1.** Given
2. $\overline{PS} \cong \overline{QR}$	**2.** Given
3. $\overline{SQ} \cong \overline{QS}$	**3.** Reflexive Property of $\cong$
4. $\triangle PQS \cong \triangle RSQ$	**4.** HL Theorem

3.



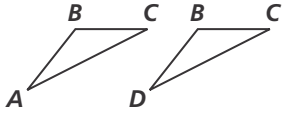
4.



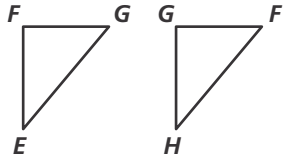
5. $\overline{RS} \cong \overline{VW}$ **6.** none **7.** $m\angle C$ and $m\angle F = 90$ **8.** $\overline{GH} \cong \overline{JH}$ **9.** $\overline{LN} \cong \overline{PR}$ **10.** $\overline{ST} \cong \overline{UV}$ or $\overline{SV} \cong \overline{UT}$ **11.** $m\angle A$ and $m\angle X = 90$ **12.** $m\angle F$ and $m\angle D = 90$ **13.** $\overline{GI} \perp \overline{JH}$

Practice 4-7

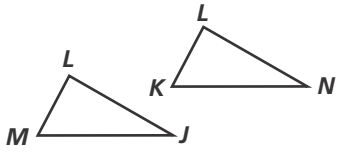
1. $\triangle ZWX \cong \triangle YXW$; SAS **2.** $\triangle ABC \cong \triangle DCB$; ASA
3. $\triangle EJG \cong \triangle FKH$; ASA **4.** $\triangle LNP \cong \triangle LMO$; SAS
5. $\triangle ADF \cong \triangle BGE$; SAS **6.** $\triangle UVY \cong \triangle VUX$; ASA
7. common side: $\overline{BC}$



8. common side: $\overline{FG}$



9. common angle: $\angle L$



10. Sample:

Statements	*Reasons*
1. $\overline{AX} \cong \overline{AY}$	**1.** Given
2. $\overline{CX} \perp \overline{AB}$, $\overline{BY} \perp \overline{AC}$	**2.** Given
3. $m\angle CXA$ and $m\angle BYA = 90$	**3.** Perpendicular lines form right ∠s.
4. $\angle A \cong \angle A$	**4.** Reflexive Property of ≅
5. $\triangle BYA \cong \triangle CXA$	**5.** ASA Postulate

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

Reteaching 4-1

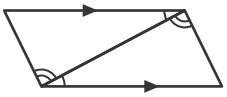
1. b **2.** c **3.** a **4.** 117 **5.** 119

Reteaching 4-2

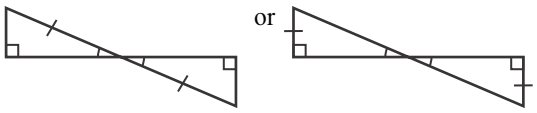
1.–2. Check students' work. **3.** SSS; $\triangle AEB \cong \triangle CDB$
4. SAS; $\triangle MNQ \cong \triangle ONP$ **5.** SSS; $\triangle PRQ \cong \triangle VUT$
6. SSS: $\triangle JMK \cong \triangle LMK$ **7.** SAS; $\triangle QSP \cong \triangle QSR$
8. SAS; $\triangle YTX \cong \triangle WXT$

Reteaching 4-3

1.



2. or



3. Check students' work. **4.** $\angle ABD \cong \angle CBD$
5. $\angle JMK \cong \angle LKM$ or $\angle JKM \cong \angle LMK$
6. $\overline{UZ} \cong \overline{YZ}$ **7.** $\overline{DY} \cong \overline{DO}$ **8.** $\angle P \cong \angle A$
9. $\angle CYL \cong \angle ALY$

Reteaching 4-4

1a. $\overline{QK} \cong \overline{QA}$; $\overrightarrow{QB}$ bisects $\angle KQA$ **1b.** definition of bisector **1c.** $\overline{BQ} \cong \overline{BQ}$ **1d.** SAS Postulate **1e.** CPCTC

2.

Statements	*Reasons*
1. $\overline{MN} \cong \overline{MP}$, $\overline{NO} \cong \overline{PO}$	**1.** Given
2. $\overline{MO} \cong \overline{MO}$	**2.** Reflexive Property of ≅
3. $\triangle MPO \cong \triangle MNO$	**3.** SSS Postulate
4. $\angle N \cong \angle P$	**4.** CPCTC

3.

Statements	*Reasons*
1. $\overline{ON}$ bisects $\angle JOH$, $\angle J \cong \angle H$	**1.** Given
2. $\angle JON \cong \angle HON$	**2.** Definition of bisector
3. $\overline{ON} \cong \overline{ON}$	**3.** Reflexive Property of ≅
4. $\triangle JON \cong \triangle HON$	**4.** AAS Theorem
5. $\overline{JN} \cong \overline{HN}$	**5.** CPCTC

Reteaching 4-5

1. Each angle is 60°. **2.** 120 **3.** 120 **4.** 50 **5.** 70
6. 60 **7.** 65 **8.** 115 **9.** 55 **10.** 120 **11.** 60

Reteaching 4-6

1. Sample: $RS = 1.3$ cm, $ST = 1.6$ cm, $QT = 2.5$ cm, $QR = 2.3$ cm; not congruent **2.** Sample: $NT = 2.3$ cm, $TG = 2.3$ cm, $AT = 1.9$ cm; $\triangle NAT \cong \triangle GAT$ **3.** Sample: $TO = 3.3$ cm, $TR = 2.8$ cm, $MO = 2.8$ cm; $\triangle TOM \cong \triangle OTR$ **4.** HL Theorem can be applied; $\triangle BDA \cong \triangle CAD$. **5.** HL Theorem cannot be applied. **6.** HL Theorem can be applied; $\triangle MUN \cong \triangle MLN$. **7.** HL Theorem can be applied; $\triangle THF \cong \triangle FET$ or $\triangle THF \cong \triangle TEF$. **8.** HL Theorem can be applied; $\triangle OKR \cong \triangle AHR$. **9.** HL Theorem cannot be applied.

Reteaching 4-7

1.

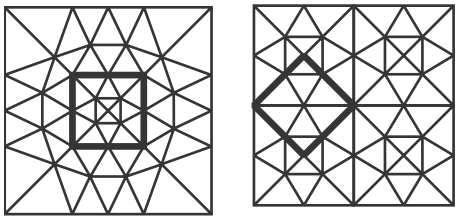
Statements	*Reasons*
1. $\angle PSR$ and $\angle PQR$ are right $\angle$s; $\angle QPR$ and $\angle SRP$	**1.** Given
2. $\angle PSR$ and $\angle PQR$	**2.** Right $\angle$s are congruent.
3. $\overline{PR} \cong \overline{PR}$	**3.** Reflexive Property of $\cong$
4. $\triangle QPR \cong \triangle SRP$	**4.** AAS Theorem
5. $\angle STR \cong \angle QTP$	**5.** Vertical $\angle$s are $\cong$.
6. $\overline{PQ} \cong \overline{RS}$	**6.** CPCTC
7. $\triangle STR \cong \triangle QTP$	**7.** AAS Theorem

2. Sample: Prove $\triangle MLP \cong \triangle QPL$ by the AAS Theorem. Then use CPCTC and vertical angles to show $\triangle MLN \cong \triangle QPN$ by the AAS Theorem. **3.** Sample: Prove $\triangle ACD \cong \triangle ECB$ by the SAS Postulate. Then use CPCTC and vertical angles to show $\triangle ABF \cong \triangle EDF$ by the AAS Theorem.

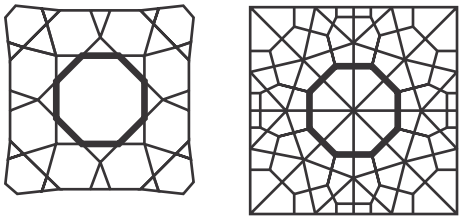
Enrichment 4-1

Check students' work. Samples shown.

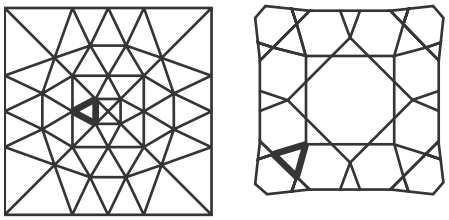
1.



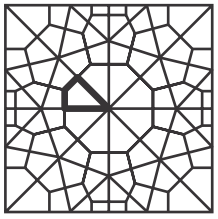
2.



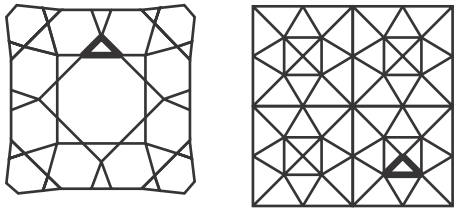
3.



4.



5.



Enrichment 4-2

1a. Definition of perpendicular lines **1b.** $\angle AKF \cong \angle GEL$ **1c.** SAS **2a.** Segment Addition Postulate **2b.** $\overline{LR} + \overline{RG} = \overline{TF} + \overline{TA}$ **2c.** $\overline{RG} \cong \overline{TA}$ **2d.** Alternate Interior Angles **2e.** Corresponding Angles **2f.** $\angle DAT \cong \angle JGR$ **2g.** SAS

Enrichment 4-3

1.–11. Check students' work. **2a.** ASA **2b.** The top angles are congruent because the fold bisected the right angles formed by the folds in steps 1 and 3. The corners of the paper are right angles; therefore, those angles are congruent. The included sides are congruent because the fold in step 1 found the midpoint of the width of the paper, thus creating two equal segments. **3a.** ASA **3b.** The top angles are congruent because the fold bisected the right angles formed by the folds in steps 1 and 2. The upper corners that became inside angles along the center line are right angles; therefore, those angles are congruent. The included sides are congruent because the fold in step 1 found the midpoint of the width of the paper, thus creating two equal segments. **4a.** The top angles are congruent because the fold bisected the right angles formed by the fold in step 1. The inside angles along the center line are right angles because the horizontal fold that formed them is perpendicular to the original fold in step 1. **4b.** The included sides are congruent because the fold in step 1 found the midpoint of the width of the paper, thus creating two equal segments. **8a.** ASA **8b.** The top angles are congruent because the fold bisected the right angles formed by the fold in step 7. The inside angles along the center line are congruent because of the Angle Addition Postulate. The included sides are congruent because the fold in step 7 found the midpoint of the width of the paper, thus creating two equal segments.

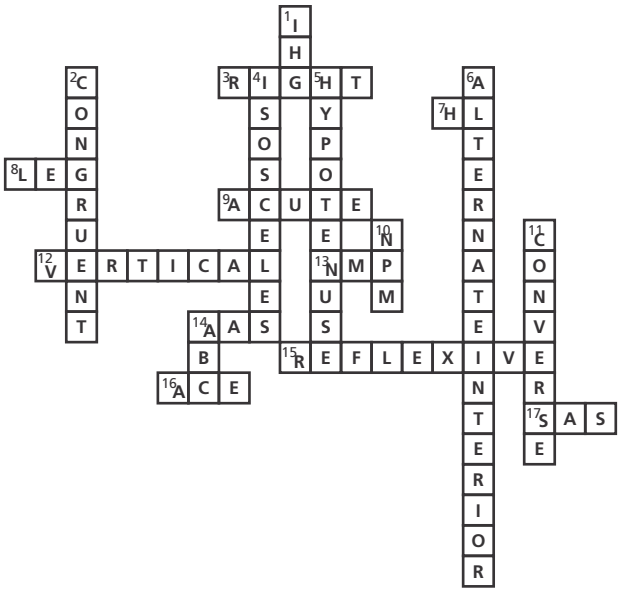
Enrichment 4-4

1. ABT **2.** ACT **3.** 45; 45; ABT; ACT **4.** 30; 30; ATB; ATC **5.** Reflexive Property of $\cong$ **6.** AAS Theorem **7.** CPCTC **8.** Definition of $\cong$ segments **9.** Definition of $\cong$ segments **10.** Definition of $\cong$ segments **11.** SSS Postulate **12.** CPCTC **13.** 60

Enrichment 4-5

1. 60	**2.** 60	**3.** 60	**4.** 70	**5.** 70	**6.** 40
7. 72	**8.** 72	**9.** 36	**10.** 30	**11.** 30	**12.** 120
13. 80	**14.** 80	**15.** 20	**16.** 80	**17.** 80	
18. 20	**19.** 41	**20.** 30	**21.** 109	**22.** 30	
23. 41	**24.** 109	**25.** 80	**26.** 80	**27.** 20	
28. 82	**29.** 82	**30.** 16	**31.** 75	**32.** 75	
33. 30	**34.** 40	**35.** 40	**36.** 100		

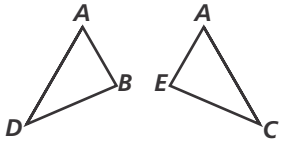
Enrichment 4-6



Enrichment 4-7

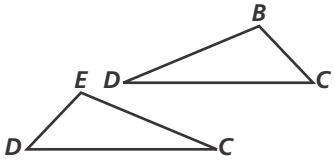
1. Sample: $\triangle ABD \cong \triangle AEC$

2. common angle: $\angle A$



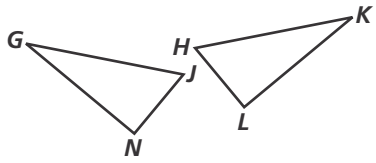
3. Sample: $\triangle DEC \cong \triangle CBD$

4. common side: $\overline{DC}$



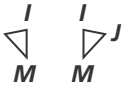
5. 8 **6.** Sample: $\triangle GNJ \cong \triangle KLH$

7.



8. Sample: $\triangle HIM \cong \triangle JIM$

9. common side: $\overline{IM}$



10. 4 **11.** 4 **12.** $\triangle PUV \cong \triangle TWV$ by AAS; $\triangle PSV \cong \triangle TQV$ by AAS; $\triangle PVW \cong \triangle TVU$ by SSS; $\triangle WQV \cong \triangle USV$ by AAS. **13.** 14 **14.** Check students' work. **15.** Check students' work.

Chapter Project

Activity 1: Modeling
triangle
Yes; the brace makes two rigid triangles.

Activity 2: Observing
Check students' work.

Activity 3: Investigating
tetrahedron
Sample: You could add in diagonals of the cube.
Check students' work.

Finishing the Project
Check students' work.

✔ Checkpoint Quiz 1

1. AAS **2.** SAS **3.** SSS **4.** not possible **5.** AAS **6.** not possible **7.** $\overline{LM} \cong \overline{TQ}$, $\overline{MN} \cong \overline{QR}$, $\overline{LN} \cong \overline{TR}$, $\angle L \cong \angle T$, $\angle M \cong \angle Q$, $\angle N \cong \angle R$ **8.** Alternate Interior Angles Theorem **9.** Alternate Interior Angles Theorem **10.** ASA

✔ Checkpoint Quiz 2

1. $\triangle ABC$, $\triangle ABD$ **2.** Hypotenuse-Leg Theorem **3.** CPCTC **4.** $\angle S \cong \angle Q$, $RQ \cong TS$, $\angle STR \cong \angle QRT$ **5a.** definition of a bisector **5b.** Reflexive **5c.** ASA **5d.** CPCTC **5e.** definition

Chapter Test, Form A

1. $x = 50; y = 65$ **2.** $a = 118; b = 62; c = 59$ **3.** HL **4.** not possible **5.** SAS **6.** AAS **7.** ASA **8.** SSS **9.** not possible **10.** SSS **11.** not possible **12.** Check students' work; $\angle J \cong \angle P$, $\angle K \cong \angle Q$, $\angle L \cong \angle R$, $\overline{JK} \cong \overline{PQ}$, $\overline{KL} \cong \overline{QR}$, $\overline{JL} \cong \overline{PR}$. **13.** B **14.** A **15.** C **16a.** Given **16b.** Given **16c.** Converse of Isosceles Triangle Theorem **16d.** SAS Postulate **16e.** CPCTC **16f.** Isosceles Triangle Theorem

17. Sample:

Statements	*Reasons*
1. $\overline{BD} \perp \overline{AC}$; D is midpoint of $\overline{AC}$	**1.** Given
2. $\angle BDC \cong \angle BDA$	**2.** Perpendicular lines form right $\angle$s.
3. $\overline{AD} \cong \overline{CD}$	**3.** Definition of midpoint
4. $\overline{BD} \cong \overline{BD}$	**4.** Reflexive Property of $\cong$
5. $\triangle BAD \cong \triangle BCD$	**5.** SAS Postulate
6. $\overline{BC} \cong \overline{BA}$	**6.** CPCTC

18. Sample: Given that X is the midpoint of $\overline{AD}$ and $\overline{BC}$, $\overline{AX} \cong \overline{DX}$ and $\overline{BX} \cong \overline{CX}$ by the definition of midpoint. $\angle AXB \cong \angle DXC$ because all vertical angles are congruent. $\triangle AXB \cong \triangle DXC$ by the SAS Postulate, and therefore $\overline{AB} \cong \overline{DC}$ by CPCTC.

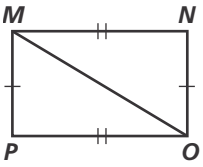
Chapter Test, Form B

1. $a = 56; b = 68; c = 112$ **2.** $x = 70; y = 40$
3. not possible **4.** AAS **5.** SSS **6.** HL
7. not possible **8.** SAS **9.** SAS **10.** ASA
11. not possible **12.** Check students' work; $\angle D \cong \angle G$, $\angle E \cong \angle H$, $\angle F \cong \angle I$, $\overline{DE} \cong \overline{GH}$, $\overline{EF} \cong \overline{HI}$, $\overline{DF} \cong \overline{GI}$. **13.** D **14.** C **15.** D **16a.** Given
16b. Given **16c.** Converse of Isosceles Triangle Theorem
16d. Given **16e.** Alternate Interior Angles Theorem
16f. Substitution **16g.** ASA Postulate **16h.** CPCTC
17. Sample:

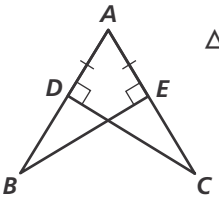
Statements	*Reasons*
1. $\overline{DG}$ and $\overline{FH}$ bisect each other.	**1.** Given
2. $\overline{DE} \cong \overline{GE}$, $\overline{HE} \cong \overline{FE}$	**2.** Definition of bisector
3. $\angle DEH \cong \angle GEF$	**3.** Vertical angles are $\cong$.
4. $\triangle DEH \cong \triangle GEF$	**4.** SAS Postulate
5. $\angle DHE \cong \angle GFE$	**5.** CPCTC
6. $\overline{DH} \parallel \overline{FG}$	**6.** Converse of Alternate Interior Angles Theorem

18. Sample: It is given that $\overline{LM} \cong \overline{NM}$ and $\angle L \cong \angle N$. $\overline{LO} \cong \overline{NO}$ by the converse of the Isosceles Triangle Theorem. $\triangle LOM \cong \triangle NOM$ by the SAS Postulate, and therefore $\angle 1 \cong \angle 2$ by CPCTC.

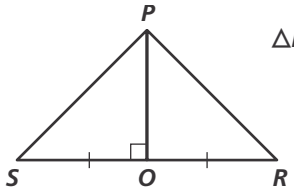
Alternative Assessment, Form C

TASK 1: Scoring Guide
Sample:
SSS: 

$\triangle MNO \cong \triangle OPM$

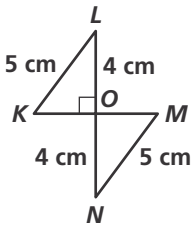
ASA: 

$\triangle ABE \cong \triangle ACD$

SAS: 

$\triangle POS \cong \triangle POR$

3 Student's figures and information are clear and accurate.
2 Student's figures and information contain minor errors or omissions.
1 Student's figures and information contain significant errors or omissions.
0 Student makes little or no attempt.

TASK 2: Scoring Guide
a. Sample:


b. Sample: Using the Pythagorean theorem, show that $KO = MO$. Then $\triangle KOL \cong \triangle MON$ by SAS Postulate or SSS Postulate.

3 Student's figures and explanation are accurate and clear.
2 Student's figures and explanation contain minor errors or omissions.
1 Student's figures and explanation contain significant errors or omissions.
0 Student makes little or no attempt.

TASK 3: Scoring Guide
Sample:

Statements	*Reasons*
1. $\overline{AE} \cong \overline{AD}$, $\angle B \cong \angle C$	**1.** Given
2. $\angle A \cong \angle A$	**2.** Reflexive Property of $\cong$
3. $\triangle ABD \cong \triangle ACE$	**3.** AAS Theorem
4. $\overline{AB} \cong \overline{AC}$	**4.** CPCTC
5. $\overline{EB} \cong \overline{DC}$	**5.** Segment Addition Postulate

3 Student gives a proof that is accurate and complete.
2 Student gives a proof that contains minor errors or omissions.
1 Student gives a proof that contains significant errors or omissions.
0 Student makes little or no attempt.

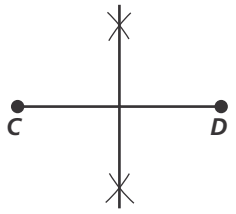
TASK 4: Scoring Guide
Sample: The SSS, ASA, and SAS Postulates are statements that are accepted as true without proof. The HL and AAS Theorems, on the other hand, can be proved true, using postulates, definitions, and previously proved theorems.

3 Student gives an explanation that is thorough and correct.
2 Student gives an explanation that is partially correct.
1 Student gives an explanation that lacks demonstrated understanding of the difference between a theorem and a postulate.
0 Student makes little or no attempt.

Cumulative Review

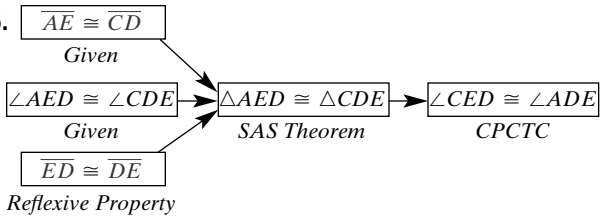
1. D **2.** B **3.** D **4.** C **5.** D **6.** B **7.** A
8. B **9.** C **10.** B **11.** A **12.** D

13.



14. $x = 102; y = 102$ **15.** c, e, a, b, d or e, c, a, b, d

16.



17. Sample: The alarm sounds if and only if there is smoke. If the alarm sounds, then there is smoke. If there is smoke, then the alarm sounds. **18.** AAA, SSA