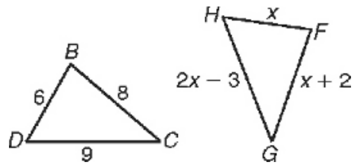
Name ______________________ Date ______________ Class______________

LESSON 5-4

SSS Triangle Congruence

Practice and Problem Solving: A/B

Use principles of congruence to answer Problems 1–3.



1. Show that $\triangle BCD$ is congruent to $\triangle FGH$ if $x = 6$.

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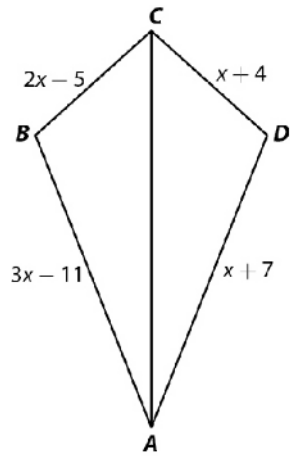

2. In the figure, $\overline{AB} \cong \overline{AD}$. Explain how you know that $\angle B \cong \angle D$.

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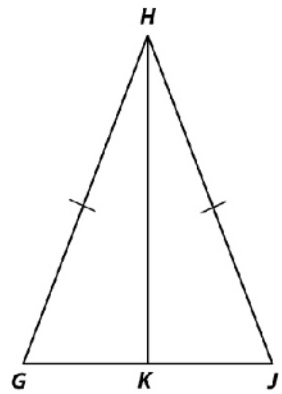
3. In the figure, *H* is equidistant from the endpoints of line segment $\overline{GJ}$. Leon said that means that $\overleftrightarrow{HK}$ is the perpendicular bisector of $\overline{GJ}$. Was he right? Explain your reasoning.



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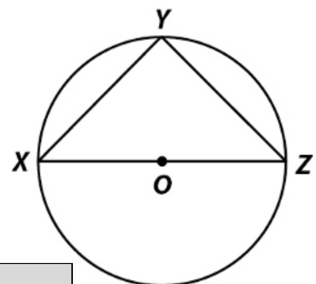
Use the figure at the right for the two-column proof.



4. Point *O* is the center of the circle. The chords $\overline{XY}$ and $\overline{ZY}$ are congruent. Fill in the missing statements and reasons to prove that $\angle X$ is congruent to $\angle Z$.

Given: Circle *O*, $\overline{XY} \cong \overline{ZY}$

Prove: $\angle X \cong \angle Z$

Statements	Reasons
1. $\overline{XY} \cong \overline{ZY}$	1.
2.	2.
3.	3. Reflexive property of congruence
4.	4.
5.	5.

4. Possible answer:

Statements	Reasons
1. $\overline{GH} \cong \overline{KL}$	1. Given
2. $\overline{GH} \parallel \overline{KL}$	2. Given
3. $\angle GHL \cong \angle KLH$	3. Opposite interior angles of parallel lines $\overline{GH}$ and $\overline{KL}$ and transversal $\overline{JF}$
4. $\overline{FL} \cong \overline{JH}$	4. Given
5. $FL + LH = FH = JH + LH = JL$	5. Segment addition
6. $\overline{FL} \cong \overline{JL}$	6. Definition of congruent segments
7. $\triangle FGH \cong \triangle JKL$	7. SAS Triangle Theorem

Practice and Problem Solving: Modified

1. $\angle P$
2. $\angle R$
3. $\angle Q$
4. $\angle N \cong \angle M$; $\overline{AF} \cong \overline{TB}$; $\overline{AN} \cong \overline{TM}$
5. Possible answer: For the SAS Congruence Theorem to apply, the 34° angle of each triangle must be included between two pairs of corresponding congruent sides.
6. $\angle A$ and $\angle T$
7. $\overline{FN}$ and $\overline{MB}$
8.

Statements	Reasons
1. $\overline{BA} \cong \overline{BD}$; $\overline{BE} \cong \overline{BC}$	1. Given
2. $\angle ABE \cong \angle DBC$	2. Vertical Angles Theorem
3. $\triangle ABE \cong \triangle DBC$	3. SAS

Reading Strategies

1. Not SAS
2. SAS
3. SAS

Success for English Learners

1. Since $\triangle KLM$ and $\triangle KNM$ share the side $\overline{KM}$, that side has to be the same. You could then apply SAS to $\overline{LK}$, $\angle LKM$, $\overline{KM}$ and $\overline{NK}$, $\angle NKM$, $\overline{KM}$.
2. Yes. Separating the triangles would not alter the lengths of the given congruent sides or change any of the angle measures.

LESSON 5-4

Practice and Problem Solving: A/B

1. $BD = FH = 6$, so $\overline{BD} \cong \overline{FH}$ by definition of $\cong$ segments. $BC = FG = 8$, so $\overline{BC} \cong \overline{FG}$ by definition of $\cong$ segments. $CD = GH = 9$, so $\overline{CD} \cong \overline{GH}$ by definition of $\cong$ segments. Therefore, $\triangle BCD \cong \triangle FGH$ by SSS.
2. Possible answer: Since $AB \cong AD$, $3x - 11 = x + 7$. Solving for x, $x = 9$. Substituting the value of x into the expressions gives $AB = AD = 16$ and $CB = CD = 13$. Finally, $CA = CA$. So, the triangles are congruent by the SSS Congruence Theorem, and $\angle B \cong \angle D$ by CPCTC.
3. Possible answer: No. There are only two pairs of congruent sides between the two triangles ($\overline{HG} \cong \overline{HJ}$; $\overline{HK} \cong \overline{HK}$), so the triangles are not necessarily congruent. Therefore it cannot be determined whether $\overline{GK} \cong \overline{JK}$, which would have to be true if $\overline{HK}$ is the perpendicular bisector of $\overline{GJ}$.

4.

Statements	Reasons
1. $\overline{XY} \cong \overline{ZY}$	1. Given
2. $\overline{XO} \cong \overline{ZO}$	2. Radii of a circle are congruent.
3. $\overline{YO} \cong \overline{YO}$	3. Reflexive property of congruence
4. $\triangle XYO \cong \triangle ZYO$	4. SSS Triangle Theorem
5. $\angle X \cong \angle Z$	5. CPCTC

Practice and Problem Solving: C

1. We know that $\overline{AK} \cong \overline{BK}$. Since *J* is the midpoint of $\overline{AB}$, $\overline{AJ} \cong \overline{BJ}$ by def. of midpoint. $\overline{JK} \cong \overline{JK}$ by Reflexive Property of ≅. So $\triangle AKJ \cong \triangle BKJ$ by SSS.
2. Yes; possible answer: The diagonal is the hypotenuse of an isosceles right triangle. The length of one side of the square (one leg of the triangle) can be found by using the Pythagorean Theorem, and knowing one side is enough to draw a specific square.
3. 540 sq ft
4.

Statements	Reasons
1. $\overline{AB} \cong \overline{EF}$; $\angle B \cong \angle F$; $\overline{BC} \cong \overline{FG}$	1. Given
2. $\triangle ABC \cong \triangle EFG$	2. SAS
3. $\overline{AC} \cong \overline{EG}$ and $\angle BCA \cong \angle FGE$	3. CPCTC
4. $\angle C \cong \angle G$	4. Given
5. $m\angle C = m\angle BCA + m\angle ACD$ $m\angle G = m\angle FGE + m\angle EGH$ $m\angle ACD = m\angle EGH$	5. Angle addition
6. $\angle D \cong \angle H$	6. Given
7. $\triangle ACD \cong \triangle EFG$	7. AAS
8. $\overline{CD} \cong \overline{GH}$ and $\overline{AD} \cong \overline{EH}$	8. CPCTC
9. $ABCD \cong EFGH$	9. All corresponding parts are congruent.

Practice and Problem Solving: Modified

1. $\overline{UV}$ and $\overline{XY}$; $\overline{VW}$ and $\overline{YZ}$; $\overline{WU}$ and $\overline{ZX}$
2. $\overline{CA}$ and $\overline{BU}$; $\overline{AR}$ and $\overline{UG}$; $\overline{RC}$ and $\overline{GB}$
3. $\triangle TUV \cong \triangle WXY$
4. $\triangle JKM \cong \triangle LKM$
5. $\triangle ABC \cong \triangle CDA$
6. $\triangle IFA \cong \triangle GFH$
7.

Statements	Reasons
1. $\overline{WX} \cong \overline{YX}$	1. Given
2. $\overline{WZ} \cong \overline{YZ}$	2. Definition of bisector
3. $\overline{XZ} \cong \overline{XZ}$	3. Reflexive Property of Congruence
4. $\triangle WXZ \cong \triangle YXZ$	4. SSS Triangle Theorem
5. $\angle W \cong \angle Y$	5. Congruent parts of congruent triangles are congruent.

Reading Strategies

1. Both compare sides of two triangles.
2. SAS compares both angles and sides of two triangles, while SSS compares only sides.
3. Yes
4. No
5. No
6. No

Success for English Learners

1. Yes, as long as the quadrilateral is a parallelogram. If it is not a parallelogram, then no.
2. Yes. The measures of the angles and the lengths of the sides are related.