Name ____ Date __________________ Class__________________

LESSON 5-3

SAS Triangle Congruence

Practice and Problem Solving: A/B

Use principles of triangle congruence to answer Problems 1 and 2.

1. If you know the leg lengths of two right triangles, can you tell whether they are congruent? Explain your answer.

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2. If two triangles have three pairs of congruent parts, will they always be congruent? Explain your answer.

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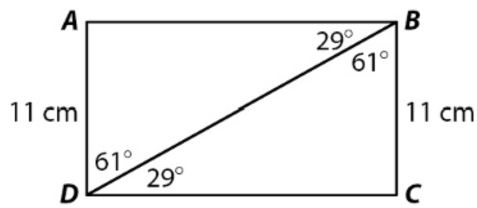
For Problems 3 and 4, use the figure at the right.



3. Explain how you know that $\triangle ABD \cong \triangle CBD$.

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4. Describe a sequence of two rigid motions that maps $\triangle ABD$ onto $\triangle CBD$.

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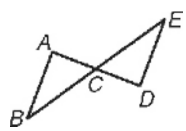
Use the figure at the right for the two-column proof.

5. The Hatfields and the McCoys are feuding over some land. Neither family will be satisfied unless the two triangular fields are exactly the same size. Point *C* is the midpoint of each of the intersecting segments. Write a two-column proof that will settle the dispute.



Given: *C* is the midpoint of $\overline{AD}$ and $\overline{BE}$.

Prove: $\triangle ABC \cong \triangle DEC$

Statements	Reasons
1. *C* is the ______________ of ______ and ______.	1. ________________________________
2. $AC = CD$, ______ = ______	2. Definition of ______________________
3. $\overline{AC} \cong \overline{CD}$, ______ ≅ ______	3. Definition of ______________________
4. $\angle ACB \cong \angle$______	4. ________________________________
5. ______ ≅ ______	5. ________________________________

7.

Statements	Reasons
1. $\angle IJK \cong \angle LMN$, $\angle IKJ \cong \angle LNM$	1. Given
2. $JK \cong MN$	2. Definition of a rectangle
3. $\triangle IJK \cong \triangle LMN$	3. ASA

Reading Strategies

1. congruent
2. not congruent

Success for English Learners

1. No, it would not. ASA works for triangles because there are only three angles, so knowing two of them is enough because it is known that all three angles always sum to 180°. Other shapes have more angles, so more would be needed.

LESSON 5-3

Practice and Problem Solving: A/B

1. Yes. The right angle of a right triangle is the included angle of the two legs. If both pairs of legs are congruent, the triangles are congruent by SAS.
2. No. If all three angle pairs are congruent the triangles will be similar but not necessarily congruent. If two pairs of sides are congruent and two non-included or non-corresponding angles are congruent, the triangles are not necessarily congruent.
3. Possible answer: Two sides and the included angle of $\triangle ABD$ ($\overline{AD}$, $\angle ADB$, $\overline{DB}$) are congruent respectively to two sides and the included angle of $\triangle CDB$ ($\overline{BC}$, $\angle CBD$, $\overline{DB}$), so the triangles are congruent by the SAS Triangle Theorem.
4. Possible answer: Rotate $\triangle ABD$ 180° around point *B*. Then translate $\triangle ABD$ down and left to map onto $\triangle CDB$.

5.

Statements	Reasons
1. *C* is the midpoint of $\overline{AD}$ and $\overline{BE}$.	1. Given
2. $AC = CD$, $BC = CE$	2. Definition of midpoint
3. $\overline{AC} \cong \overline{CD}$, $\overline{BC} \cong \overline{CE}$	3. Definition of congruent segments
4. $\angle ACB \cong \angle DCE$	4. Vertical Angles Theorem
5. $\triangle ABC \cong \triangle DEC$	5. SAS Triangle Theorem

Practice and Problem Solving: C

1. Possible answer: It is given that $\angle DOE \cong \angle FOE$. $DO \cong OF$ because both segments are radii of the same circle. $EO \cong EO$. So, $\triangle DOE \cong \triangle FOE$ by the SAS Triangle Theorem and $DE \cong EF$ by CPCTC.
2. Possible answer: Since *M* bisects *BD*, $x + 3 = 2x - 7$. Solving for x, $x = 10$. Substituting the value of x into the expressions gives $BD = 26$ and $AC = 26$. Since $AD = AD$ and $\angle BDA \cong \angle CAD$, the triangles are congruent by the SAS Triangle Theorem. So, by CPCTC, $\angle B \cong \angle C$.
3. $\overline{UT} \cong \overline{UR}$ because $\overline{QS}$ divides $\overline{RT}$ into two congruent segments, $\overline{QU} \cong \overline{QU}$. All the angles at the intersection of the diagonals measure 90° because the segments are perpendicular. Therefore, $\triangle QUR \cong \triangle QUT$ by SAS. Similarly, $\triangle RUS \cong \triangle TUS$