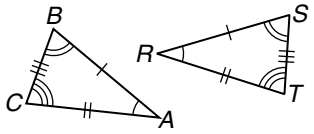
NAME _____ DATE _____ PERIOD _____

4-3 Study Guide and Intervention

Congruent Triangles

Corresponding Parts of Congruent Triangles

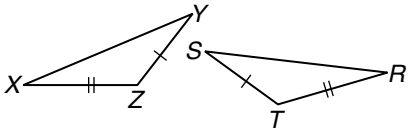
Triangles that have the same size and same shape are **congruent triangles**. Two triangles are congruent if and only if all three pairs of corresponding angles are congruent and all three pairs of corresponding sides are congruent. In the figure, $\triangle ABC \cong \triangle RST$.



Example **If $\triangle XYZ \cong \triangle RST$, name the pairs of congruent angles and congruent sides.**

$\angle X \cong \angle R, \angle Y \cong \angle S, \angle Z \cong \angle T$

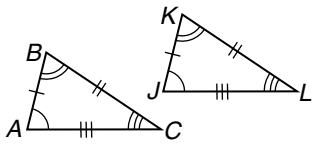
$\overline{XY} \cong \overline{RS}, \overline{XZ} \cong \overline{RT}, \overline{YZ} \cong \overline{ST}$



Exercises

Identify the congruent triangles in each figure.

1.



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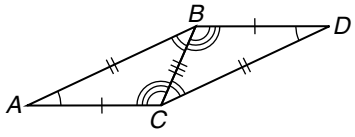

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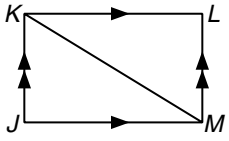
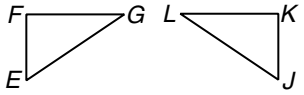


Name the corresponding congruent angles and sides for the congruent triangles.

4.



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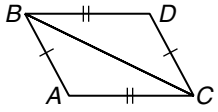

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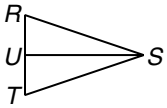


Lesson 4-3

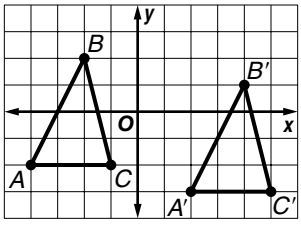
NAME _____ DATE _____ PERIOD _____

4-3 Study Guide and Intervention *(continued)*

Congruent Triangles

Identify Congruence Transformations If two triangles are congruent, you can slide, flip, or turn one of the triangles and they will still be congruent. These are called **congruence transformations** because they do not change the size or shape of the figure. It is common to use prime symbols to distinguish between an original $\triangle ABC$ and a transformed $\triangle A'B'C'$.

Example **Name the congruence transformation that produces $\triangle A'B'C'$ from $\triangle ABC$.**



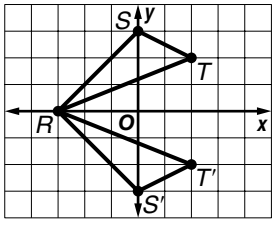
The congruence transformation is a slide.

$\angle A \cong \angle A'$; $\angle B \cong \angle B'$; $\angle C \cong \angle C'$;
$\overline{AB} \cong \overline{A'B'}$; $\overline{AC} \cong \overline{A'C'}$; $\overline{BC} \cong \overline{B'C'}$

Exercises

Describe the congruence transformation between the two triangles as a *slide*, a *flip*, or a *turn*. Then name the congruent triangles.

1.



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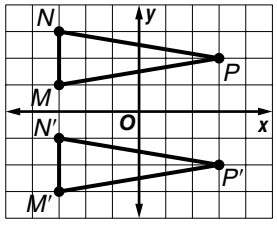

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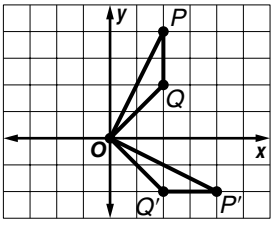

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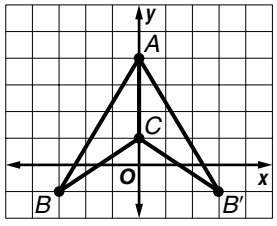

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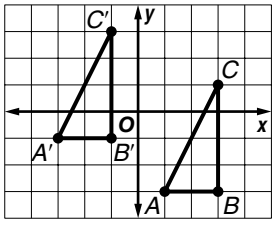

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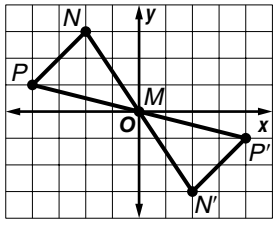


NAME _____ DATE _____ PERIOD _____

4-4 Study Guide and Intervention

Proving Congruence—SSS, SAS

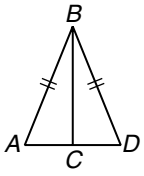
SSS Postulate You know that two triangles are congruent if corresponding sides are congruent and corresponding angles are congruent. The Side-Side-Side (SSS) Postulate lets you show that two triangles are congruent if you know only that the sides of one triangle are congruent to the sides of the second triangle.

SSS Postulate	If the sides of one triangle are congruent to the sides of a second triangle, then the triangles are congruent.

Example **Write a two-column proof.**

Given: $\overline{AB} \cong \overline{DB}$ and C is the midpoint of $\overline{AD}$.

Prove: $\triangle ABC \cong \triangle DBC$

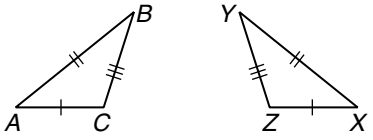


Statements	Reasons
1. $\overline{AB} \cong \overline{DB}$	**1.** Given
2. C is the midpoint of $\overline{AD}$.	**2.** Given
3. $\overline{AC} \cong \overline{DC}$	**3.** Definition of midpoint
4. $\overline{BC} \cong \overline{BC}$	**4.** Reflexive Property of $\cong$
5. $\triangle ABC \cong \triangle DBC$	**5.** SSS Postulate

Exercises

Write a two-column proof.

1.

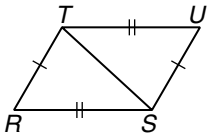


Given: $\overline{AB} \cong \overline{XY}, \overline{AC} \cong \overline{XZ}, \overline{BC} \cong \overline{YZ}$

Prove: $\triangle ABC \cong \triangle XYZ$

Statements	Reasons

2.



Given: $\overline{RS} \cong \overline{UT}, \overline{RT} \cong \overline{US}$

Prove: $\triangle RST \cong \triangle UTS$

Statements	Reasons

Lesson 4-4

NAME _____ DATE _____ PERIOD _____

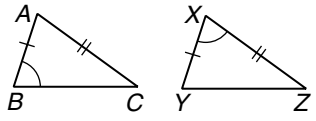
4-4 Study Guide and Intervention *(continued)*

Proving Congruence—SSS, SAS

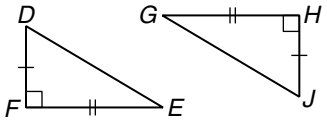
SAS Postulate Another way to show that two triangles are congruent is to use the Side-Angle-Side (SAS) Postulate.

SAS Postulate	If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the triangles are congruent.

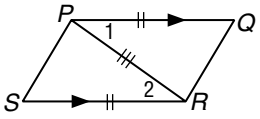
Example **For each diagram, determine which pairs of triangles can be proved congruent by the SAS Postulate.**

a. 

In $\triangle ABC$, the angle is not "included" by the sides $\overline{AB}$ and $\overline{AC}$. So the triangles cannot be proved congruent by the SAS Postulate.

b. 

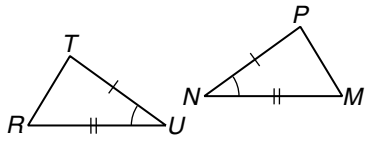
The right angles are congruent and they are the included angles for the congruent sides. $\triangle DEF \cong \triangle JGH$ by the SAS Postulate.

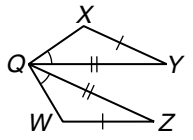
c. 

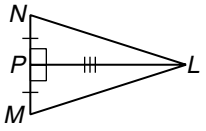
The included angles, $\angle 1$ and $\angle 2$, are congruent because they are alternate interior angles for two parallel lines. $\triangle PSR \cong \triangle RQP$ by the SAS Postulate.

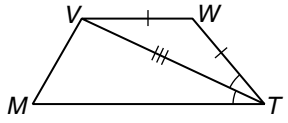
Exercises

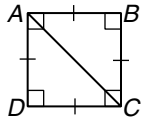
For each figure, determine which pairs of triangles can be proved congruent by the SAS Postulate.

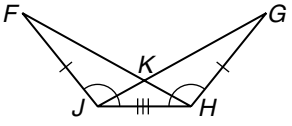
1. 

2. 

3. 

4. 

5. 

6. 

NAME _____ DATE _____ PERIOD _____

4-4 Skills Practice

Proving Congruence—SSS, SAS

Determine whether $\triangle ABC \cong \triangle KLM$ given the coordinates of the vertices. Explain.

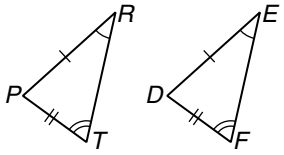
1. $A(-3, 3)$, $B(-1, 3)$, $C(-3, 1)$, $K(1, 4)$, $L(3, 4)$, $M(1, 6)$

2. $A(-4, -2)$, $B(-4, 1)$, $C(-1, -1)$, $K(0, -2)$, $L(0, 1)$, $M(4, 1)$

3. Write a flow proof.

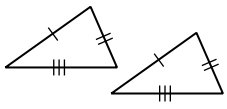
Given: $\overline{PR} \cong \overline{DE}$, $\overline{PT} \cong \overline{DF}$
$\angle R \cong \angle E$, $\angle T \cong \angle F$

Prove: $\triangle PRT \cong \triangle DEF$



Determine which postulate can be used to prove that the triangles are congruent. If it is not possible to prove that they are congruent, write *not possible*.

4.



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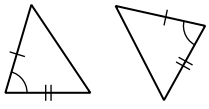

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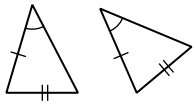


Lesson 4-4

NAME _____ DATE _____ PERIOD _____

4-4 Practice

Proving Congruence—SSS, SAS

Determine whether $\triangle DEF \cong \triangle PQR$ given the coordinates of the vertices. Explain.

1. $D(-6, 1)$, $E(1, 2)$, $F(-1, -4)$, $P(0, 5)$, $Q(7, 6)$, $R(5, 0)$

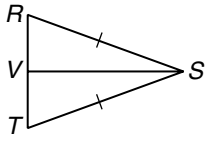
2. $D(-7, -3)$, $E(-4, -1)$, $F(-2, -5)$, $P(2, -2)$, $Q(5, -4)$, $R(0, -5)$

3. Write a flow proof.

Given: $\overline{RS} \cong \overline{TS}$

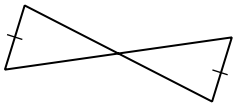
V is the midpoint of $\overline{RT}$.

Prove: $\triangle RSV \cong \triangle TSV$



Determine which postulate can be used to prove that the triangles are congruent. If it is not possible to prove that they are congruent, write *not possible*.

4.



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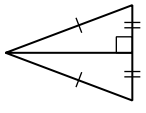

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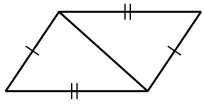

7. INDIRECT MEASUREMENT To measure the width of a sinkhole on his property, Harmon marked off congruent triangles as shown in the diagram. How does he know that the lengths $A'B'$ and AB are equal?