# Geometry Lesson 36

Objective: TSW use right triangle congruence theorems.

There are four ways to prove triangle congruence: by the SSS Postulate, SAS Postulate, ASA Postulate, or by the AAS Theorem. If a triangle is a right triangle however, there are several other ways to prove congruency.

Theorem 36-1: Leg-Angle (LA) Right Triangle Congruence Theorem - If a leg and an acute angle of right triangle are congruent to a leg and an acute angle of another right triangle, then the triangles are congruent.
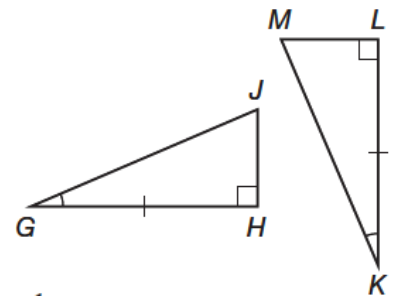**In the diagram, _____**
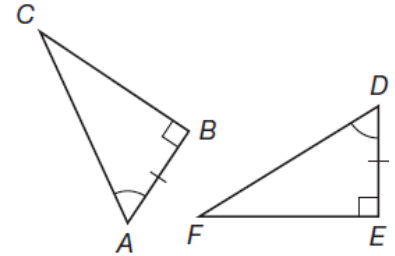
The Leg-Angle Right Triangle Congruence Theorem follows from the _____
Postulate and the _____ Theorem. Notice that in the diagram, marking the right angle shows that the triangles are also congruent by the _____ Postulate.
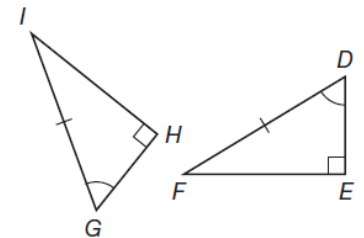
Example 1 Using the Leg-Angle Triangle Congruence Theorem
a. Use the LA Congruence Theorem to prove that ΔGHI and ΔKLM are congruent.
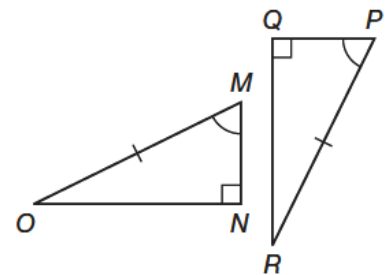   SOLUTION

Theorem 36-2: Hypotenuse-Angle (HA) Right Triangle Congruence Theorem - If the hypotenuse and an acute angle of one right triangle are congruent to the hypotenuse and an acute angle of another right triangle, then the triangles are congruent. In the diagram, _____

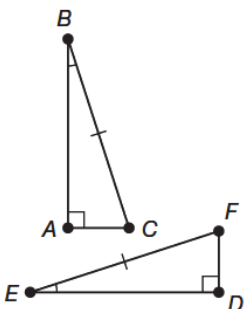Example 2 Using and Proving the Hypotenuse-Angle Triangle Congruence Theorem
a. Use the HA Congruence Theorem to prove that $\Delta MNO \cong \Delta PQR$.
    SOLUTION

b. Use a paragraph proof to prove the HA Triangle Congruence Theorem.
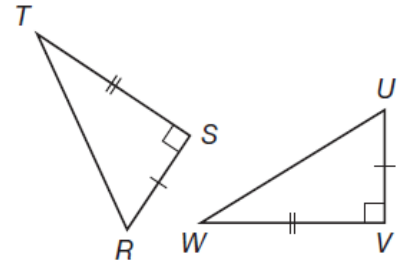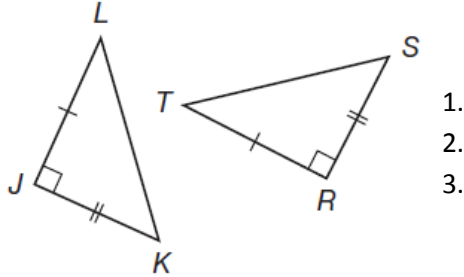   SOLUTION

Hint

Unless the question specifies, choose whichever proof method seems easiest. This paragraph proof is compact, but a two-column proof might be easier to follow.

Theorem 36-3: Leg-Leg (LL) Right Triangle Congruence Theorem - If the two legs of one right triangle are congruent to the two legs of another right triangle, then the triangles are congruent. In the diagram, _____

Example 3 Using the Leg-Leg Triangle Congruence Theorem
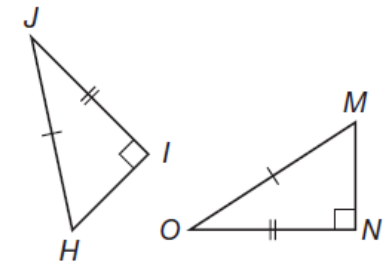Use the LL Congruence Theorem to prove that $\triangle JKL \cong \triangle RST$.

SOLUTION

Statements	Reasons
1.	
2.	
3.	

Theorem 36-4: Hypotenuse-Leg (HL) Right Triangle Congruence Theorem - If the hypotenuse and a leg of one right triangle are congruent to the hypotenuse and a leg of another right triangle, then the triangles are congruent. In the diagram, _____

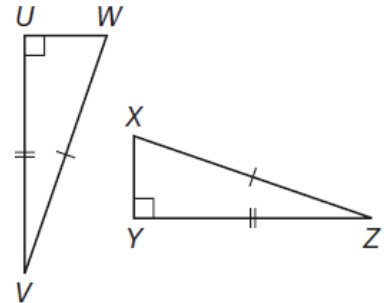Example 4 Using the Hypotenuse-Leg Congruence Theorem
a. In $\triangle UVW$ and $\triangle YZX$, $\angle U$ and $\angle Y$ are right angles. Use the HL Congruence Theorem to prove that $\triangle UVW \cong \triangle YZX$.

SOLUTION

Statements	Reasons
1.	
2.	
3.	

b. Prove the Hypotenuse-Leg Triangle Congruence Theorem.
Given: $\triangle ABC$ and $\triangle DEF$ are right triangles.
$\overline{AC} \cong \overline{FD}$ and $\overline{BC} \cong \overline{EF}$.
Prove: $\triangle ABC \cong DEF$

SOLUTION

Statements	Reasons
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
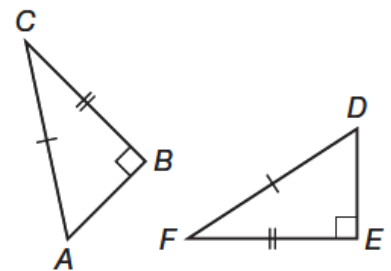
Example 5 Application: Engineering

Rachel must design a plastic cover to fit exactly over the metal plate shown below. The cover will contain a right angle. Rachel knows that she only needs to pick two other dimensions to make sure that the cover is congruent to the plate. List all the pairs of dimensions Rachel could use to ensure the cover is exactly the same size and shape as the metal plate. For each pair of dimensions, write which right triangle congruence theorem applies.
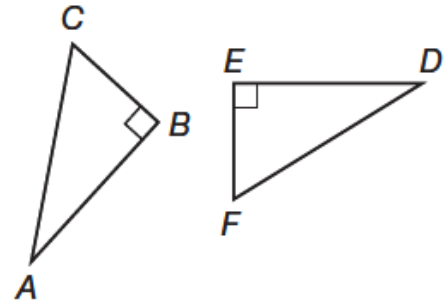
 SOLUTION
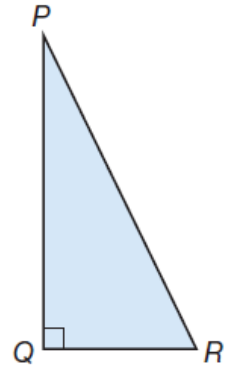
You Try!!!

Use the diagram to answer problems a through d.

 a. Suppose $\overline{AB} \cong \overline{DE}$ and $\angle A \cong \angle D$. Use the LA Triangle Congruence Theorem to prove that $\triangle ABC \cong \triangle DEF$.

 b. Suppose $\overline{AC} \cong \overline{DF}$ and $\angle A \cong \angle D$. Use the HA Triangle Congruence Theorem to prove that $\triangle ABC \cong \triangle DEF$.

 c. Suppose $\overline{AB} \cong \overline{DE}$ and $\overline{BC} \cong \overline{EF}$. Use the LL Triangle Congruence Theorem to prove that $\triangle ABC \cong \triangle DEF$.

 d. Suppose $\overline{AC} \cong \overline{DF}$ and $\overline{BC} \cong \overline{EF}$. Use the HL Congruence Theorem to prove that $\triangle ABC \cong \triangle DEF$.

 e. Engineering Refer to Example 5. Suppose Rachel provides PR = 14.2 centimeters and QR = 8.9 centimeters as dimensions for the plastic cover. In this case, which theorem proves that the cover will fit the metal plate?