5.5 SSS and HL Triangle Congruence

Theorem

Theorem 5.8 Side-Side-Side (SSS) Congruence Theorem

If three sides of one triangle are congruent to three sides of a second triangle, then the two triangles are congruent.

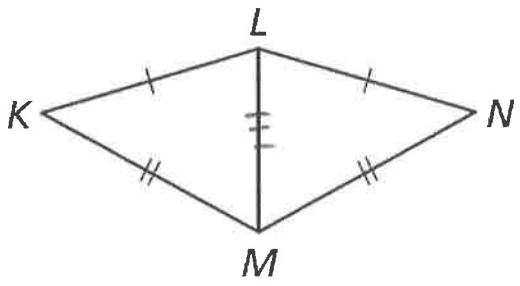
If $\overline{AB} \cong \overline{DE}$, $\overline{BC} \cong \overline{EF}$, and $\overline{AC} \cong \overline{DF}$, then $\triangle ABC \cong \triangle DEF$.

Essential Question

Write a proof.

Given $\overline{KL} \cong \overline{NL}$, $\overline{KM} \cong \overline{NM}$

Prove $\triangle KLM \cong \triangle NLM$



S	R
$\overline{KL} \cong \overline{NL}$, $\overline{KM} \cong \overline{NM}$	Given
$\overline{LM} \cong \overline{LM}$	Reflexive POC
$\triangle KLM \cong \triangle NLM$	SSS

Example 1

Explain why the bench with the diagonal support is stable, while the one without the support can collapse.

** The bench with the diagonal support forms triangles with fixed side lengths. Since a triangle with a certain set of side lengths can only be one shape, so the bench is stable. The bench without a diagonal support is not stable because there are many possible quadrilaterals with given side lengths. This is why you often see triangles used as the support for large structures such as buildings and bridges.

Determine whether the figure is stable. Explain your reasoning.

4. 

5. 

6. 

Example 2

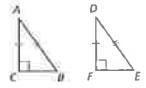
Link: University of Phoenix Stadium

Nov 16-2:39 PM

Theorem 5.9 Hypotenuse-Leg (HL) Congruence Theorem

If the hypotenuse and a leg of a right triangle are congruent to the hypotenuse and a leg of a second right triangle, then the two triangles are congruent.

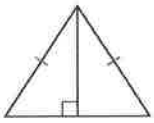
If $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$, and $m\angle C = m\angle F = 90°$, then $\triangle ABC \cong \triangle DEF$.



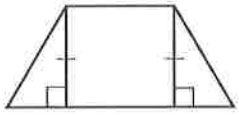
Proof Ex. 38, p. 470; *BigIdeasMath.com*

*** Only Works with Right Triangles ***

Determine if you can use the HL Congruence Theorem to prove the triangles congruent. If not, tell what else you need to know.

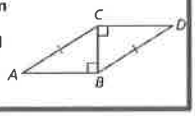
A. 

Yes

B. 

No, Need to know the hypotenuse's are ≅

Determine if you can use the HL Congruence Theorem to prove $\triangle ABC \cong \triangle DCB$. If not, tell what else you need to know.



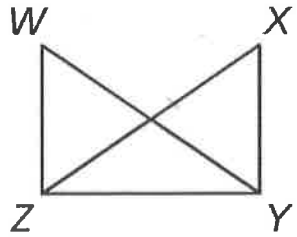
Yes

Theorem

Write a proof.

Given $\overline{WY} \cong \overline{XZ}$, $\overline{WZ} \perp \overline{ZY}$, $\overline{XY} \perp \overline{ZY}$

Prove $\triangle WYZ \cong \triangle XZY$

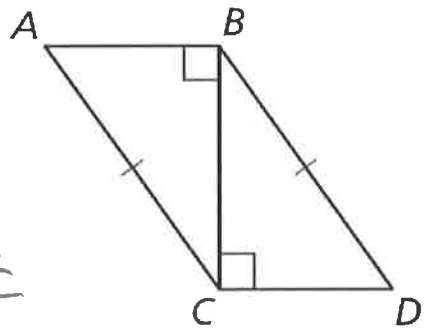


S	R
$\overline{WY} \cong \overline{XZ}$, $\overline{WZ} \perp \overline{ZY}$	> Given
$\overline{XY} \perp \overline{ZY}$	Def. of ⊥
$\angle WZY$ and $\angle XYZ$ are right $\angle$'s	
$\overline{YZ} \cong \overline{YZ}$	Reflexive POC
$\triangle WYZ \cong \triangle XZY$	HL

Example 3

Given: $\overline{AC} \cong \overline{BD}$, $\overline{AB} \perp \overline{BC}$, $\overline{CD} \perp \overline{BC}$

Prove: $\triangle ABC \cong \triangle DCB$.



S	R
$\overline{AC} \cong \overline{BD}$	Given
$\overline{AB} \perp \overline{BC}$, $\overline{CD} \perp \overline{BC}$	Given
$\angle ABC$ and $\angle BCD$ are right $\angle$'s	Def. of $\perp$
$\overline{BC} \cong \overline{BC}$	Reflexive POC
$\triangle ABC \cong \triangle DCB$	HL

Monitoring Progress 7-8

Homework:

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Closure