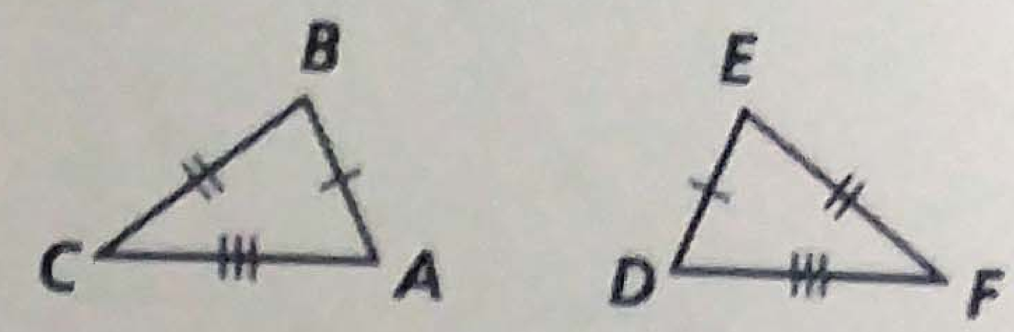
Geometry 5.5 Notes: Side-Side-Side Triangle Congruence / HL Triangle Congruence

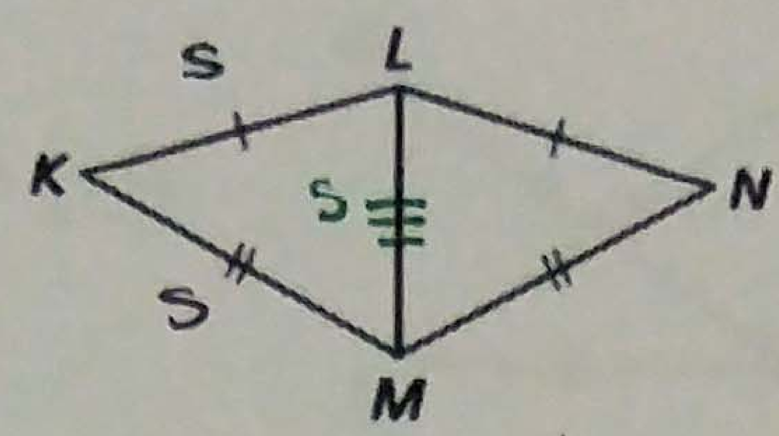
Side-Side-Side Congruence Theorem (SSS ≅ **)**

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



Using the SSS≅ Theorem

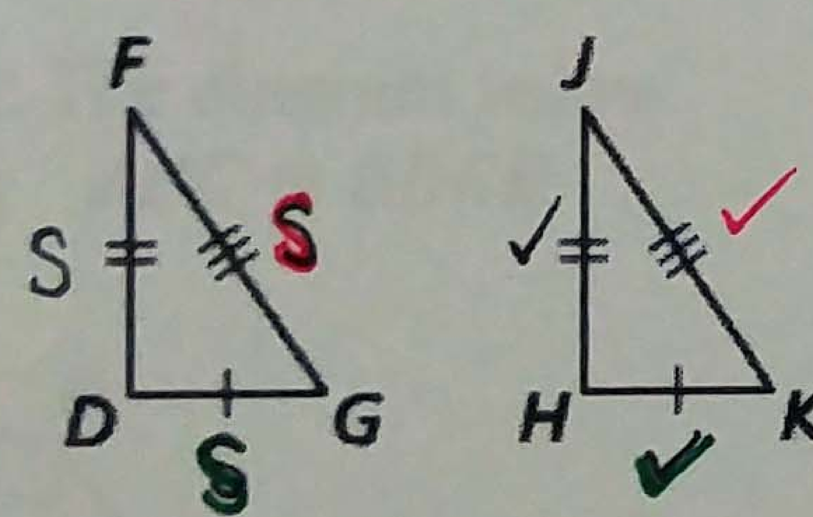
1. Write a two-column proof.
   Given: $\overline{KL} \cong \overline{NL}$, $\overline{KM} \cong \overline{NM}$
   Prove: $\Delta KLM \cong \Delta NLM$



Statements	Reasons
1. $\overline{KL} \cong \overline{NL}$, $\overline{KM} \cong \overline{NM}$	1. GIVEN
2. $\overline{LM} \cong \overline{LM}$	2. REFL. PROP. ≅
3. $\Delta KLM \cong \Delta NLM$	3. SSS ≅

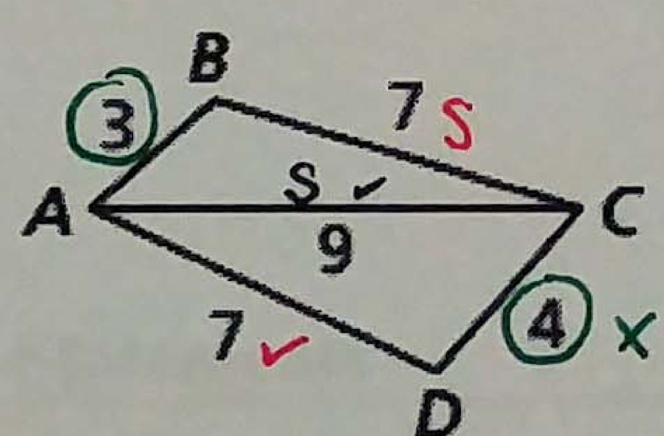
2. Determine whether the congruence statement is true. Explain your reasoning.

a. $\Delta DFG \cong \Delta HJK$



YES BY SSS ≅

b. $\Delta ACB \cong \Delta CAD$

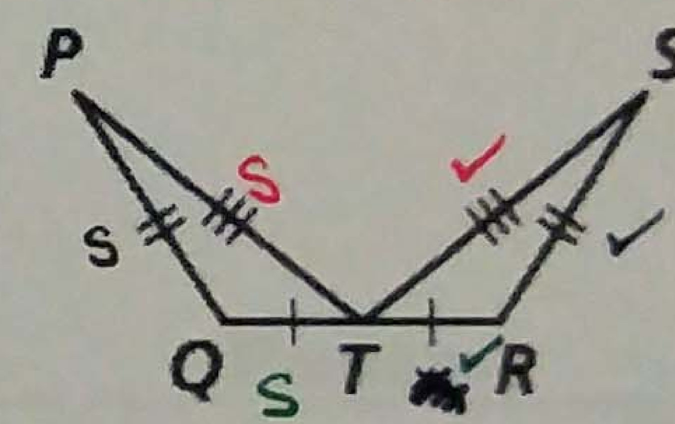


3 ≠ 4

AB ≇ CD

NO!

c. $\Delta QPT \cong \Delta RST$



YES BY SSS ≅

★ BUT $\Delta QPT \cong \Delta RTS$ DOES NOT WORK. LETTER ORDER MATTERS.

You know that SAS≅ and SSS≅ are valid methods for proving that triangles are congruent. What about SSA≅?

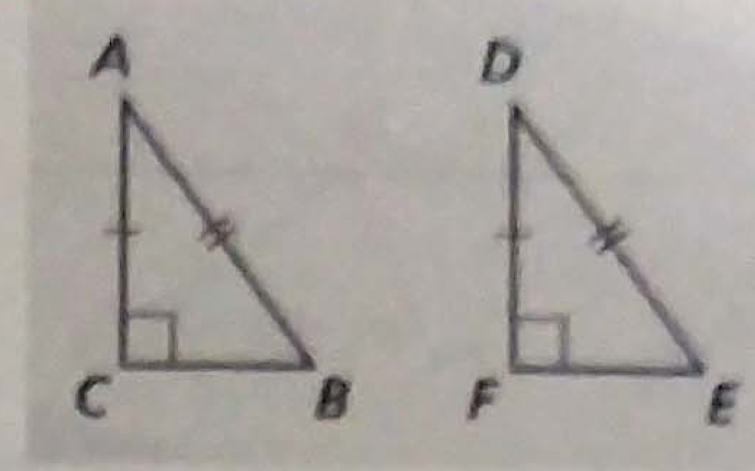
IN GENERAL, SSA ≅ DOES NOT WORK.

e SSA≅ is not valid in general, there is, a special case for RIGHT TRIANGLES.

Hypotenuse-Leg Congruence Theorem (HL ≅ **)** OR "RSS≅"

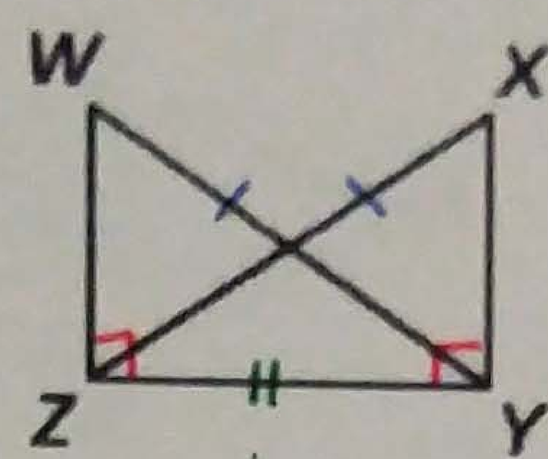
the hypotenuse and a leg of a right triangle are congruent to the potenuse and a leg of the second right triangle, then the two triangles are congruent.

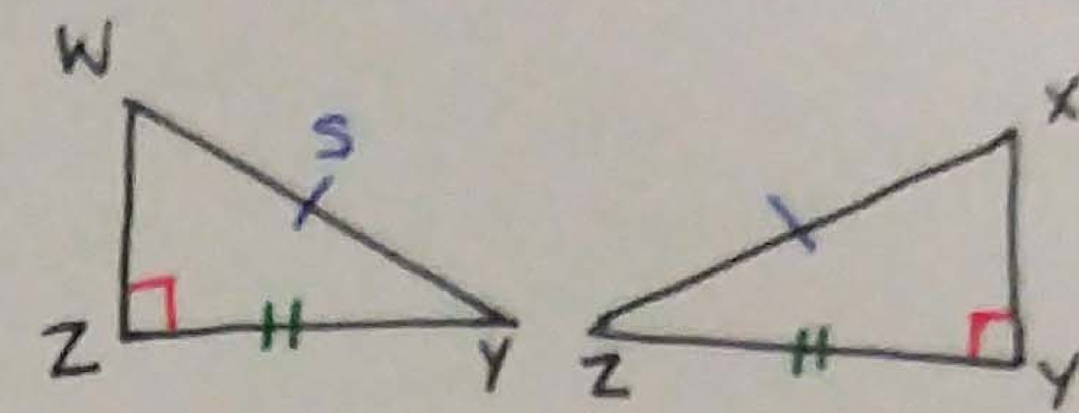
Hint: Think "90°-Side-Side" or "Right-Side-Side"



Using HL≅

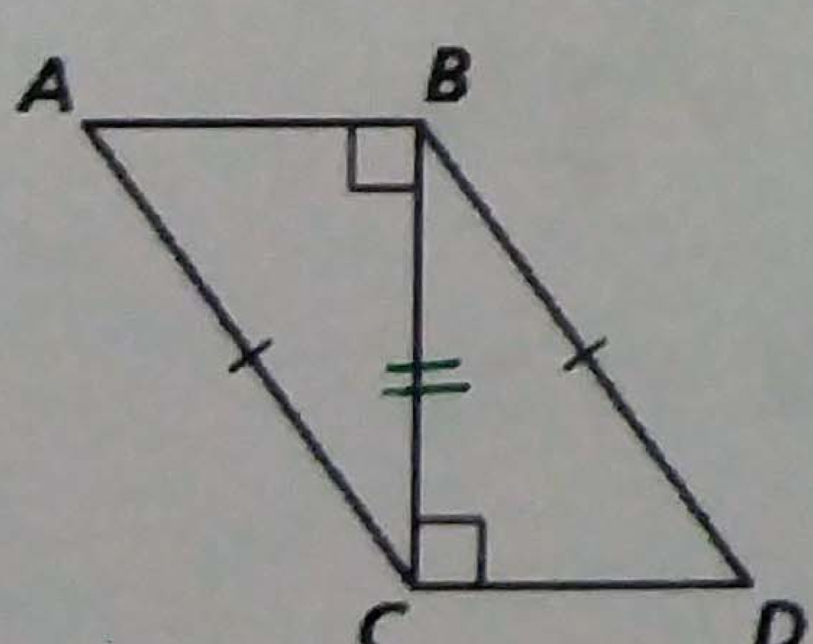
3. **Given**: $\overline{WY} \cong \overline{XZ}$, $\overline{WZ} \perp \overline{ZY}$, $\overline{XY} \perp \overline{ZY}$
Prove: $\Delta WYZ \cong \Delta XZY$





Statements	Reasons
1. $\overline{WY} \cong \overline{XZ}$ $\overline{WZ} \perp \overline{ZY}$ $\overline{XY} \perp \overline{ZY}$	1. GIVEN
2. ∠WZY IS A RT. ∠ ∠XYZ IS A RT. ∠	2. IF ⊥ → RT. ∠
3. ΔWZY IS A RT. Δ ΔXYZ IS A RT. Δ	3. IF RT ∠ IN A Δ → RT. Δ
4. $\overline{ZY} \cong \overline{ZY}$	4. REFL. PROP. ≅
5. ΔWYZ ≅ ΔXZY	5. HL ≅ (OR RSS ≅)

4. **Given**: The diagram below
Prove: $\Delta ABC \cong \Delta DCB$



Statements	Reasons
1. $\overline{AC} \cong \overline{BD}$ ∠ABC IS A RT. ∠ ∠BCD IS A RT. ∠	1. GIVEN (DIAGRAM)
2. ΔABC IS A RT. Δ ΔBCD IS A RT. Δ	2. IF RT. ∠ IN Δ → RT. Δ
3. $\overline{BC} \cong \overline{BC}$	3. REFL. PROP. ≅
4. ΔABC ≅ ΔDCB	4. HL ≅ (OR RSS ≅)