

# **SECTION 4.5: OTHER METHODS OF PROVING TRIANGLES CONGRUENT**

Standards:

2.0 - Students write geometric proofs, including proofs by contradiction

4.0 - Students prove basic theorems involving congruence and similarity.

5.0 - Students prove that triangles are congruent or similar and they are able to use the concept of congruent parts of congruent triangles are congruent.

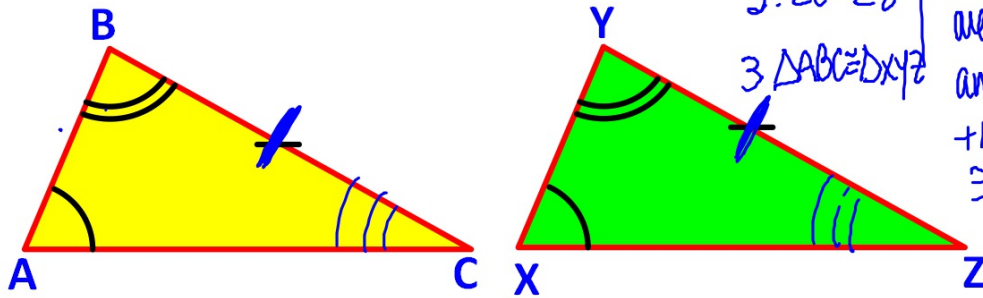
# PROOF QUIZ #2

**REMEMBER**

## **SSS, ASA, SAS Postulates**

## AAS THEOREM

If 2 angles and 1 non-included side of 1 triangle is  $\cong$  to 2 angles and 1 non-included side of another triangle, then the two triangles are  $\cong$



$\triangle ABC \cong \triangle XYZ$  by AAS

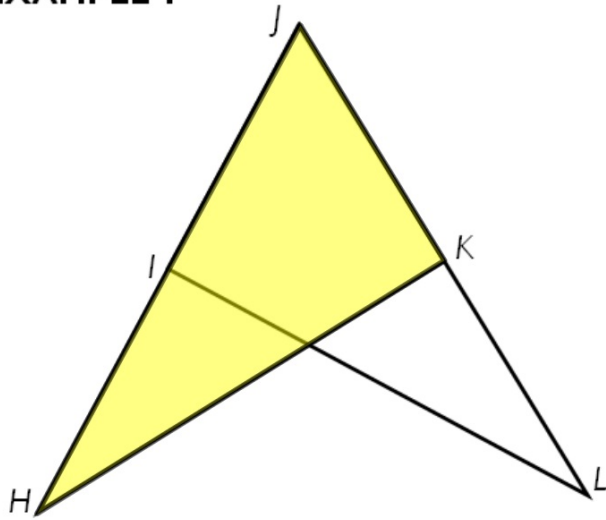
$$\begin{array}{l} 1. \angle A \cong \angle X \\ \angle B \cong \angle Y \\ \overline{BC} \cong \overline{YZ} \end{array} \quad \left| \begin{array}{l} 1. \text{ GIVEN} \end{array} \right.$$

2.  $\angle C \cong \angle Z$  | 2. if 2  $\angle$ s in one  $\triangle$  are  $\cong$  to 2  $\angle$ s in another  $\triangle$  then + the 3<sup>rd</sup>  $\angle$ s are  $\cong$  also

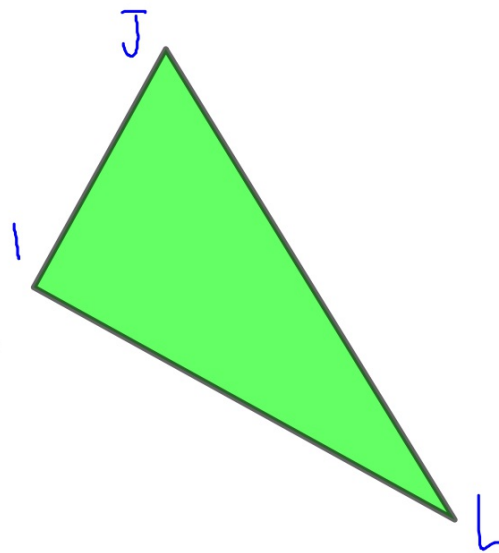
$$3. \triangle ABC \cong \triangle XYZ$$

3. ASA post.

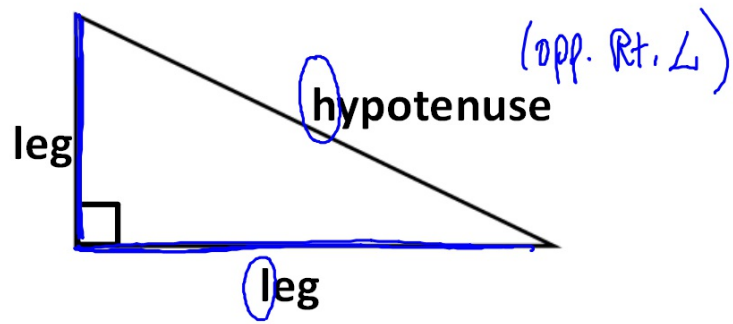
**EXAMPLE I**



**Split up overlapping triangles.**



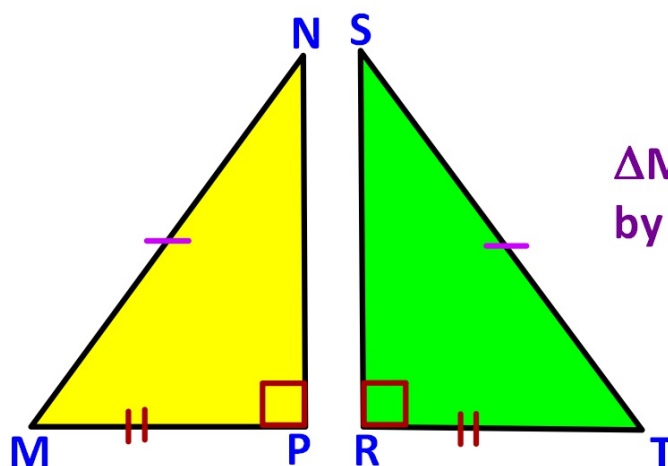
**RIGHT TRIANGLES**



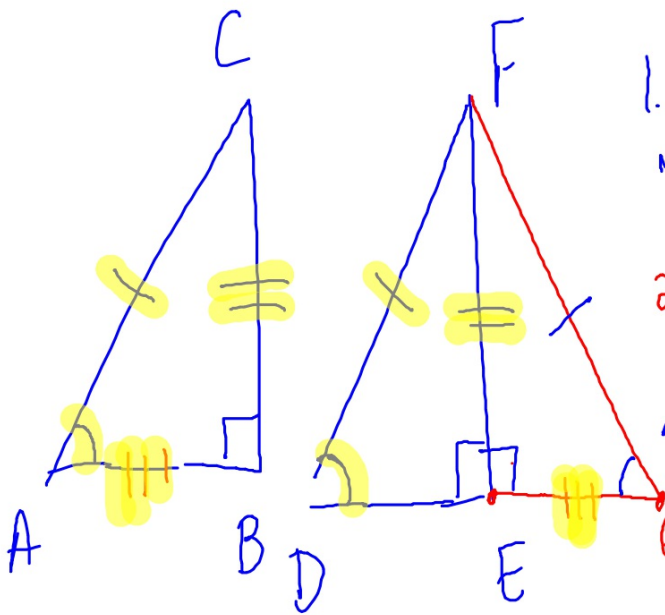
## HL THEOREM

(only works for proving Right  $\Delta$ 's ~~★~~ ~~★~~)

If the hypotenuse and a leg of a right triangle is  $\cong$  to the corresponding parts of another right triangle, then the  $\Delta$ s are  $\cong$



$\triangle MNP \cong \triangle TSR$   
by HL



1.  $AC = DF$
- $m\angle B = m\angle E = 90$
- $CB = FE$

2. Draw  $\triangle GEF$   
such that  $AB = EG$

3.  $\angle FEG = 90$

4.  $\triangle ABC \cong \triangle GEF$

5.  $FG = AC$

6.  $FG = DF$

7.  $\angle D = \angle G$

8.  $\angle G = \angle A$

9.  $\angle D = \angle A$

1. GIVEN

2. Through any 2  
pts there exists  
one line

3. Angle Add Post  
Shortcut

4. SAS post.

5. CPCTC

6. SUB

7. ITT

8. CPCTC

9. SUB

10.  $\triangle ABC = \triangle DEF$

10. AAS Th.

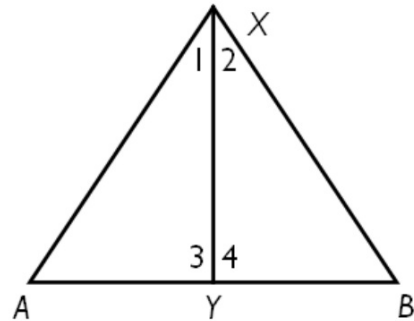
**ALL TRIANGLES:**      **SSS, ASA, SAS, AAS**

**RIGHT TRIANGLES:**      **HL**

Given:  $\overline{XY} \perp \overline{AB}$ ;  $\overline{XA} \cong \overline{XB}$

Prove:  $\angle 1 \cong \angle 2$

Proof:



STATEMENTS	REASONS
① $\overline{XY} \perp \overline{AB}$ ; $\overline{XA} \cong \overline{XB}$	① Given
② $m\angle 3 = 90$ ; $m\angle 4 = 90$	② Def of perp lines
③ $\triangle AXY$ and $\triangle BXY$ are rt $\triangle$ s	③ Def of rt $\triangle$
④ $\overline{XY} \cong \overline{XY}$	④ reflexive
⑤ $\triangle AXY \cong \triangle BXY$	⑤ HL
⑥ $\angle 1 \cong \angle 2$	⑥ CPCTC