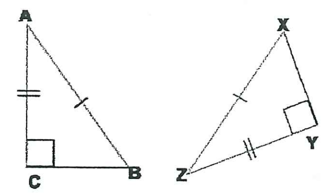
Geometry **Ch. 4.5 Notes - Triangle Congruence Day 2 (HL, ASA, AAS)** **Monday Nov 30, 2015**

Hypotenuse Leg (HL): a special case of (Side-Side-Angle) SSA

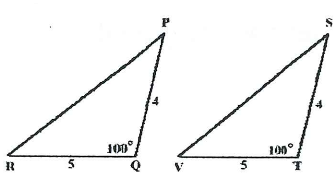
In a ________________ triangle, you can find the measure of the third side if you know the measures of the other 2 sides by using the ____. Thus, creating a special case of SSA known as ____. If the ____________________ and a _____________ of one right triangle are ____________________ to the ____________________ and a _____________ of another right triangle, then the two triangles are ____________________________.

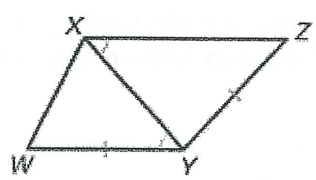


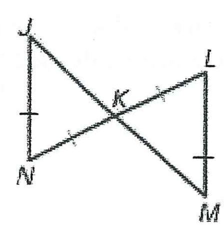
- Since the hypotenuse and leg of the right triangles are congruent, then $\Delta ABC \cong \Delta ZXY$ by the **Hypotenuse Leg (HL) Theorem.**
- Since $\Delta ABC \cong \Delta ZXY$ are congruent by Hypotenuse-Leg (HL) Theorem, then ______________, ______________, and ____________________ because ____.

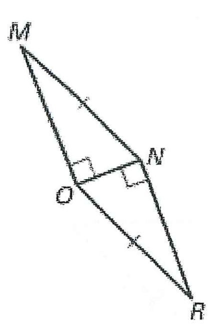
RECAP			
Side–Side–Side (SSS)		**Angle–Angle–Angle (AAA)**	
Side–Angle–Side (SAS)		**Side– Side– Angle (SSA or ASS)**	
Hypotenuse–Leg (HL)			

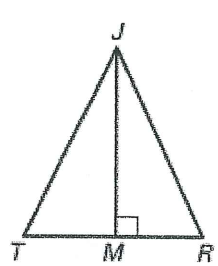
Examples: Determine if the triangles are congruent or not. If so, list the reason and a congruence statement. Also, list the congruent corresponding parts.

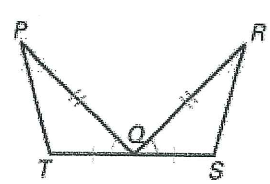
1. 

2. 

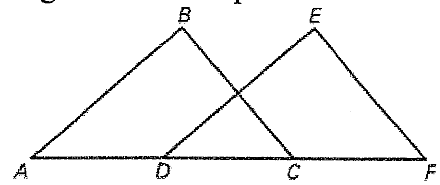
3. 

4. 

5. 

6. 

State the third congruence that must be given to prove that ΔABC ≅ ΔFED using the indicated postulate or theorem.



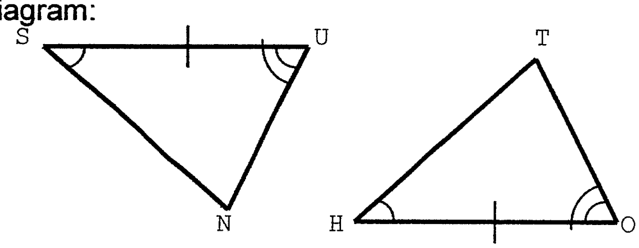
7. Given: $\overline{BC} \cong \overline{ED}$, $\overline{AC} \cong \overline{FD}$, ________ ≅ ________ using SAS.

8. Given: $\overline{AB} \cong \overline{FE}$, $\overline{AC} \cong \overline{FD}$, ________ ≅ ________ using SSS.

9. Given: $\overline{BC} \cong \overline{ED}$, ∠B is a right angle and ∠B ≅ ∠E, ________ ≅ ________ using HL.

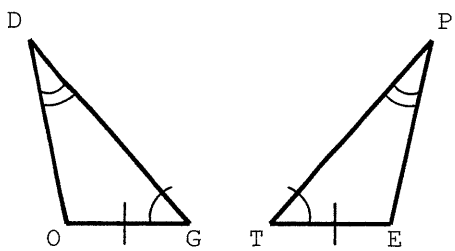
Angle-Side-Angle Congruence Postulate (ASA ≅ Postulate): If two angles and the ______________ side of one triangle are congruent with two angles and the included side of another triangle, then the triangles are congruent.

Diagram:



Angle-Angle-Side Congruence Theorem (AAS ≅ Theorem): If two ____________ and a non-included side of one triangle are congruent with two angles and the non-included side of a second triangle, then the two triangles are congruent.

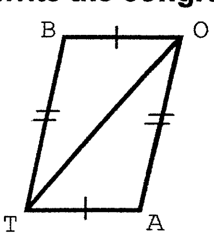
Diagram:



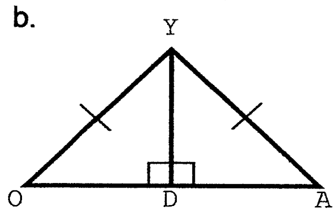
Remember, SSA ≅ and AAA ≅ are **NOT** a valid ways to prove triangles congruent.

Example 10: Determine if there is enough information given in the figures to have two triangles congruent. If so, **write the congruence statement** and **name the postulate or theorem used**.

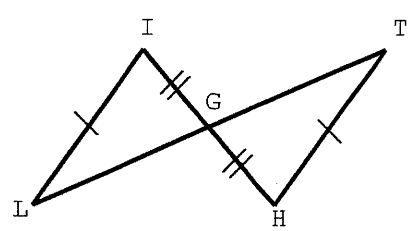
a.



b.



c.



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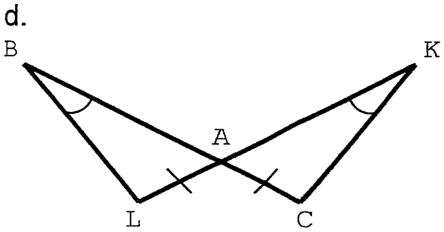
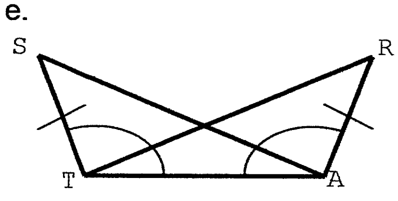
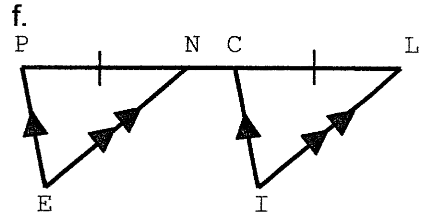


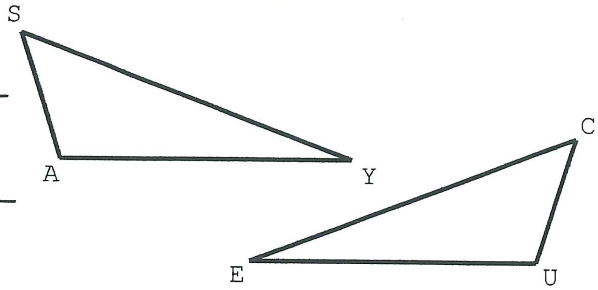
e.



f.



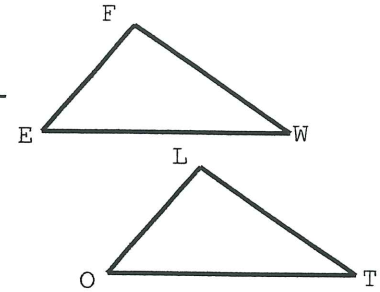
Example 11: State the third congruence that is needed to prove that $\triangle SAY \cong \triangle CUE$ using the indicated postulate or theorem.



a. GIVEN: $\overline{SA} \cong \overline{CU}$, $\overline{SY} \cong \overline{CE}$, and ________ ≅ ________
Use the SSS ≅ Postulate.

b. GIVEN: $\angle A \cong \angle U$, $\angle Y \cong \angle E$, and ________ ≅ ________
Use the AAS ≅ Theorem.

Example 12: State the third congruence that is needed to prove that □FEW ≅ □LOT using the indicated postulate or theorem.



a. GIVEN: $\angle F$ is a right angle, $\angle F \cong \angle L$, $\overline{FE} \cong \overline{LO}$, and ________ ≅ ________
Use the HL ≅ Theorem.

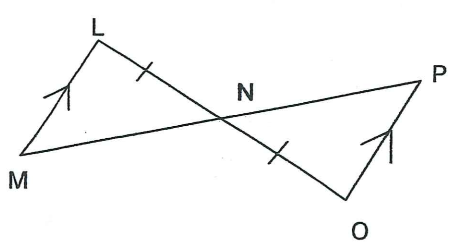
b. GIVEN: $\overline{EW} \cong \overline{OT}$, $\angle E \cong \angle O$, and ________ ≅ ________
Use the ASA ≅ Postulate.

Example 13: Tell whether you can use the given information to determine whether □MUG and Δ□TEA are congruent. *Explain* your reasoning. It might help to draw the given information.

a. $\overline{MU} \cong \overline{TE}$, $\angle M \cong \angle T$, $\angle G \cong \angle A$

b. $\overline{MU} \cong \overline{TA}$, $\overline{UG} \cong \overline{TE}$, $\angle U \cong \angle T$

Example 14: Proving Triangles are Congruent



Given: $\overline{LM} \parallel \overline{OP}$, $\overline{LN} \cong \overline{NO}$
Prove: $\triangle MNL \cong \triangle PNO$

Statements	Reasons
1.	1. Given
2.	2. Given
3.	3.
4.	4.
5.	5.

Analytic Geometry

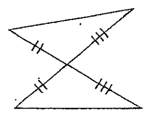
Name______________________________

Triangle congruence

Date______________ Period____

State if the two triangles are congruent. If they are, state how you know.

1)



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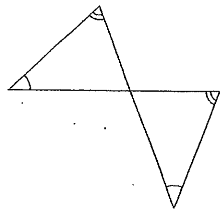

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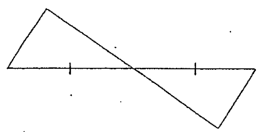

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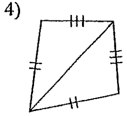

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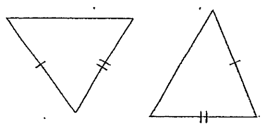

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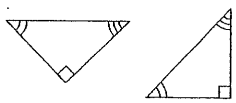

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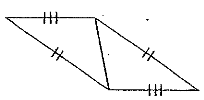

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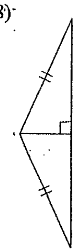

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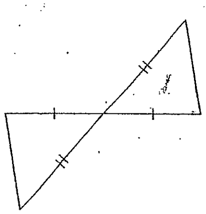

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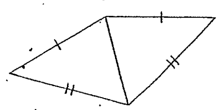
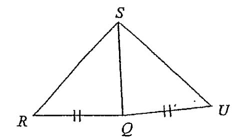
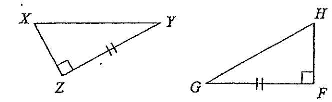


State what additional information is required in order to know that the triangles are congruent for the reason given.

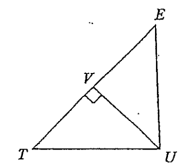
11) SSS



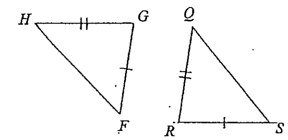
12) HL



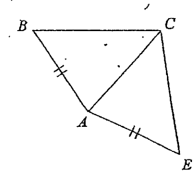
13) HL



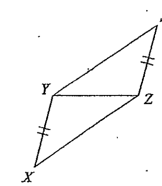
14) SAS



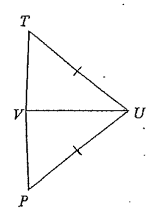
15) SSS



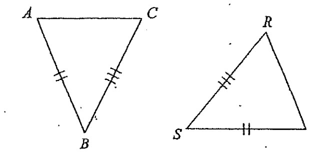
16) SAS



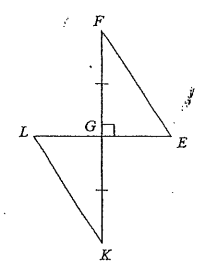
17) SAS



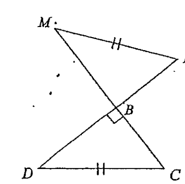
18) SSS



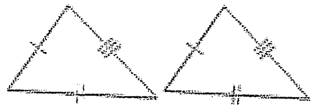
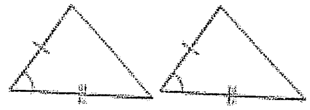
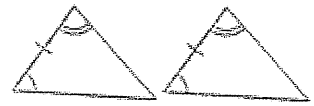
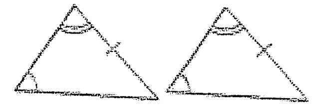
19) HL



20) HL



Ch. 4.5 Proving Triangle Congruence (ASA, AAS)

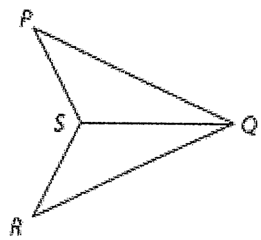
SSS	SAS	ASA	AAS
			
Three pairs of corresponding sides are congruent.	Two pairs of corresponding sides and their included angles are congruent.	Two pairs of corresponding angles and their included sides are congruent.	Two pairs of corresponding angles and the corresponding nonincluded sides are congruent.

Example 1 Use ASA to Prove Triangles Congruent

Write a two-column proof.

Given: $\overline{QS}$ bisects $\angle PQR$;
$\angle PSQ \cong \angle RSQ$.

Prove: $\triangle PQS \cong \triangle RQS$



Proof:

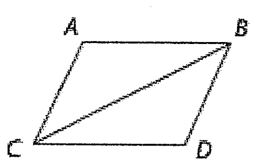
Statements	Reasons

PROOF **Write the specified type of proof.**

1. two-column proof

Given: $\overline{CB}$ bisects $\angle ABD$ and $\angle ACD$.

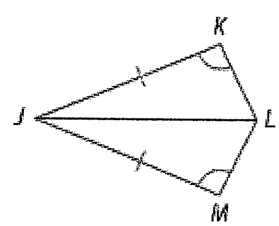
Prove: $\triangle ABC \cong \triangle DBC$



3. paragraph proof

Given: $\angle K \cong \angle M$, $\overline{JK} \cong \overline{JM}$,
$\overline{JL}$ bisects $\angle KLM$.

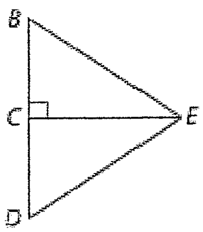
Prove: $\triangle JKL \cong \triangle JML$



PROOF **Write a paragraph proof.**

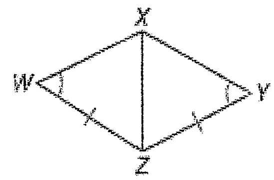
6. Given: $\overline{CE}$ bisects $\angle BED$; $\angle BCE$ and $\angle ECD$ are right angles.

Prove: $\triangle ECB \cong \triangle ECD$



7. Given: $\angle W \cong \angle Y$, $\overline{WZ} \cong \overline{YZ}$, $\overline{XZ}$ bisects $\angle WZY$.

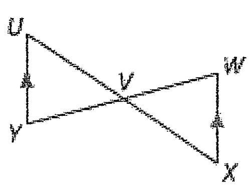
Prove: $\triangle XWZ \cong \triangle XYZ$



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

9. Given: V is the midpoint of $\overline{YW}$; $\overline{UY} \parallel \overline{XW}$.

Prove: $\triangle UVY \cong \triangle XVW$



10. Given: $\overline{MS} \cong \overline{RQ}$, $\overline{MS} \parallel \overline{RQ}$

Prove: $\triangle MSP \cong \triangle RQP$