

# Geometry

Proving Triangles Congruent



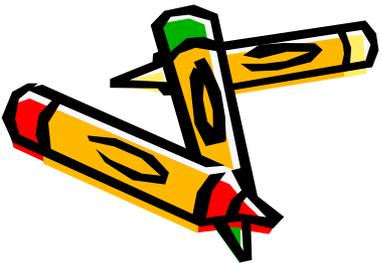
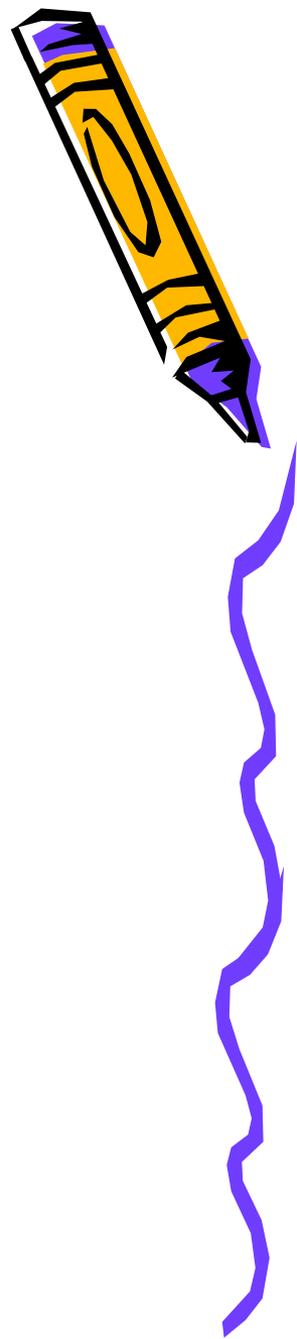
# Congruent Triangles

- Congruent Triangles:  
Two triangles are congruent if and only if their corresponding parts are congruent
- CPCTC:  
Corresponding Parts of Congruent  
Triangles are Congruent

These statements are used interchangeably

AND

Congruence statements must name the points in corresponding order.



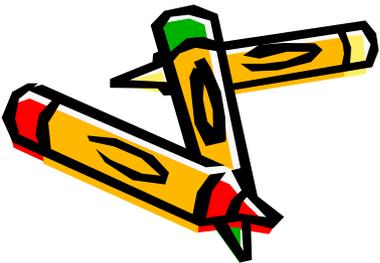
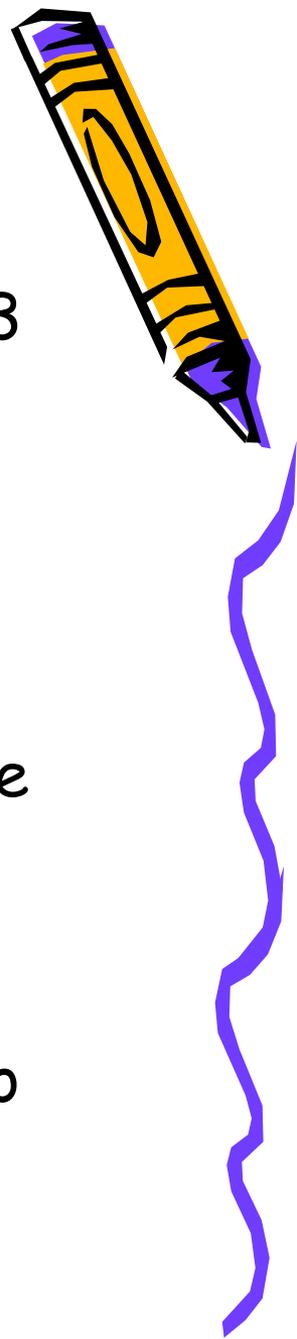
# Congruent Triangles

Do we need to know all 3 sides, and all 3 angles, in order to determine that two triangles are congruent?

or

Can we determine that two triangles are congruent with less information?

What is the minimum amount of information needed to determine if two triangles are congruent?

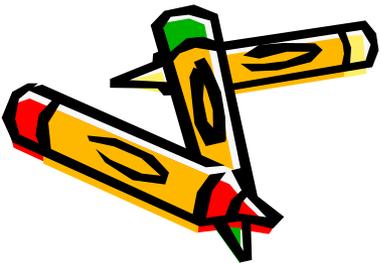
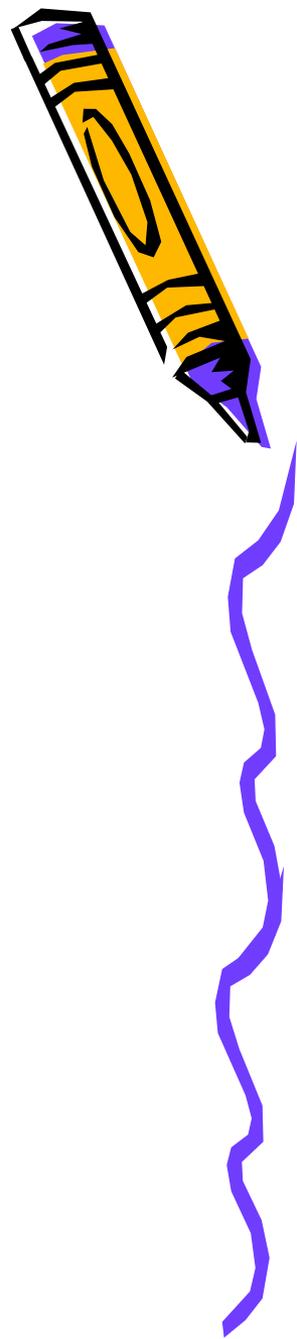


# Congruent Triangles

There are several ways to determine if two triangles are congruent.

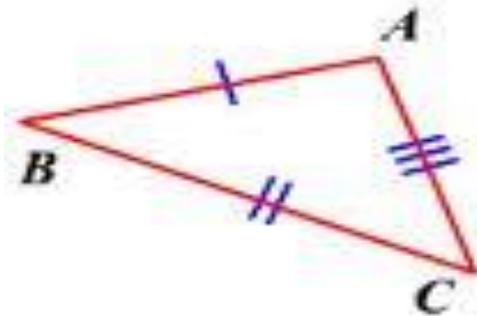
Each requires its own minimum set of information.

The name of each theorem is critical, and represents the information required, as well as, where that information appears in the picture.

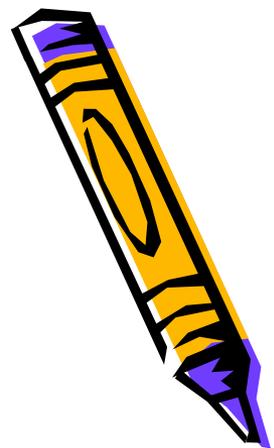
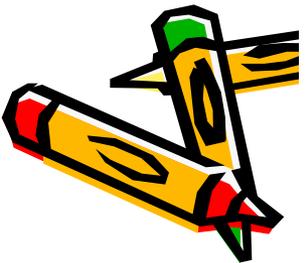
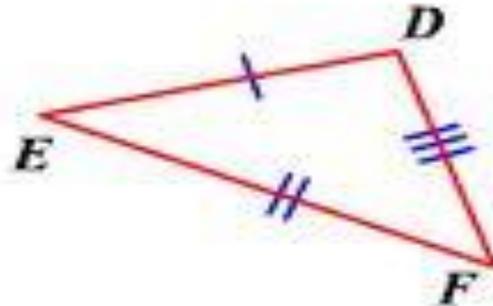


# SSS (side-side-side)

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

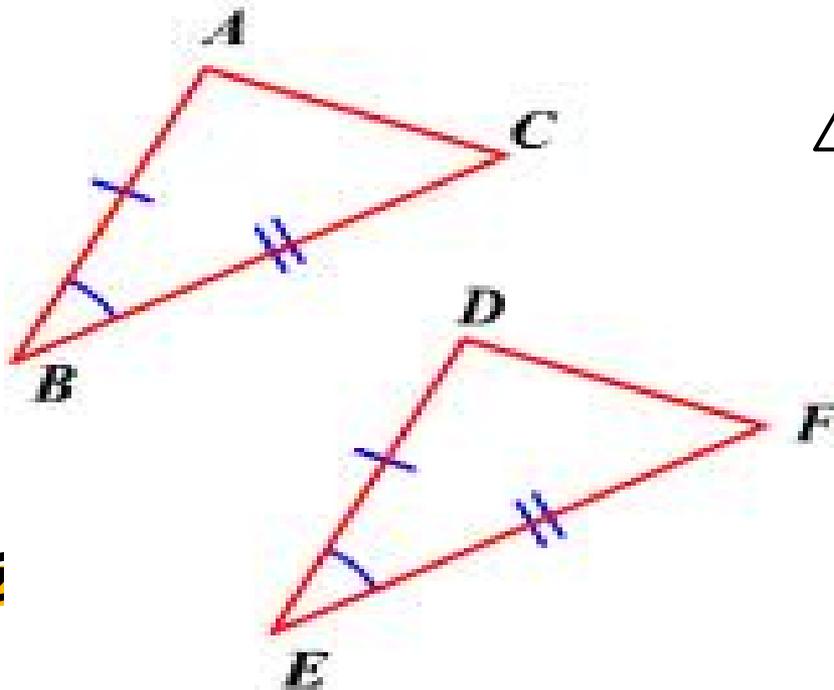


$$\triangle BAC \cong \triangle EDF$$

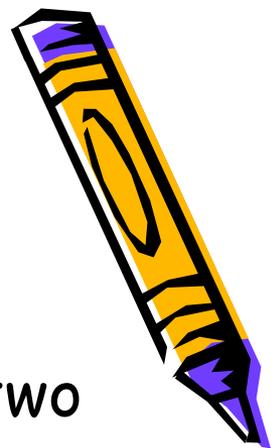


# SAS (side-angle-side)

If two sides and the included angle (the angle between them) of one triangle are congruent to two sides and the included angle of another triangle, then the triangles are congruent.

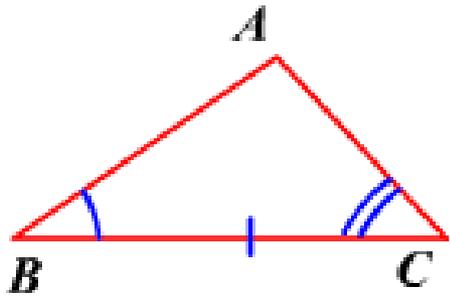


$$\triangle BAC \cong \triangle EDF$$

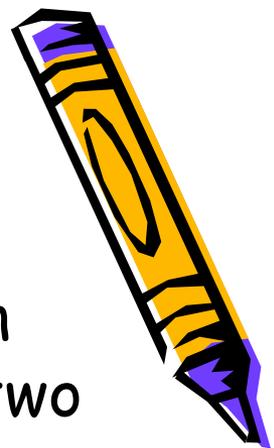
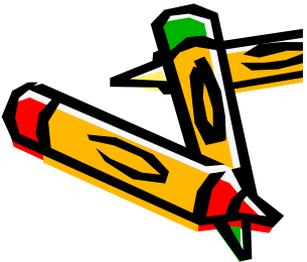
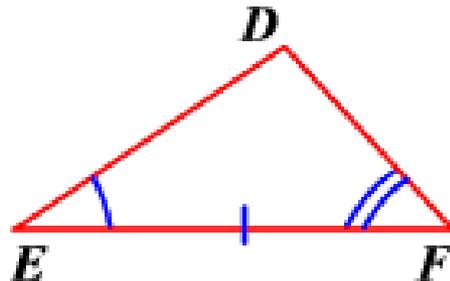


# ASA (angle-side-angle)

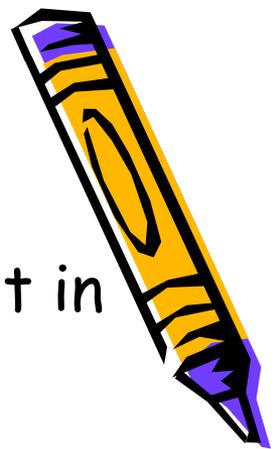
If two angles and the included side (the side in between them) of one triangle are congruent to two angles and the included side of another triangle, then the triangles are congruent.



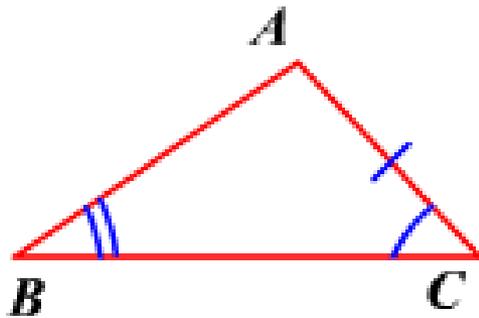
$$\triangle BAC \cong \triangle EDF$$



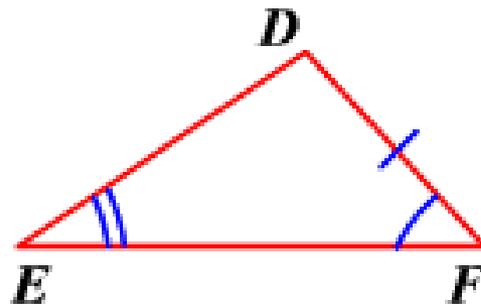
# AAS (angle-angle-side)



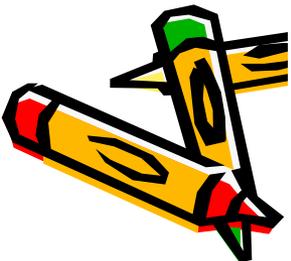
If two angles and a non-included side (a side not in between them) of one triangle are congruent to two angles and the corresponding non-included side of another triangle, then the two triangles are congruent.



$$\triangle BAC \cong \triangle EDF$$

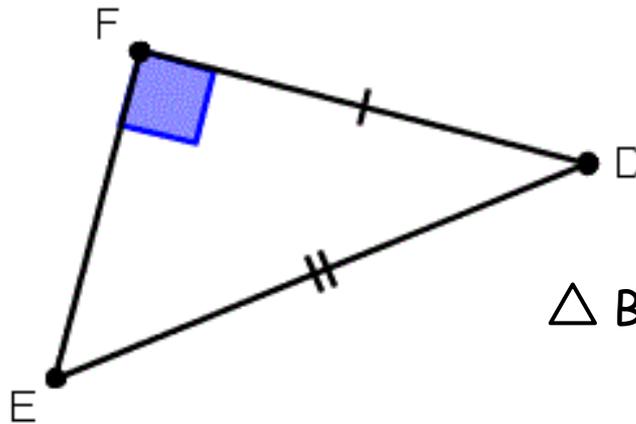
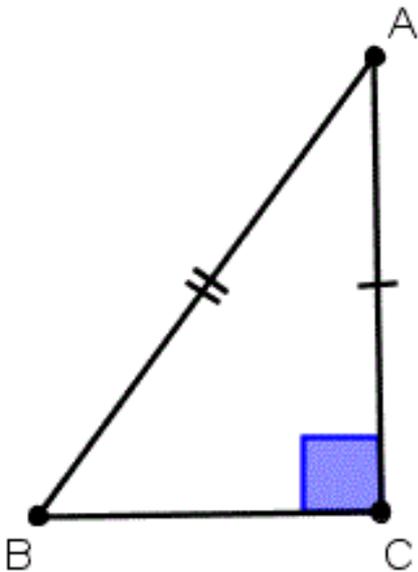
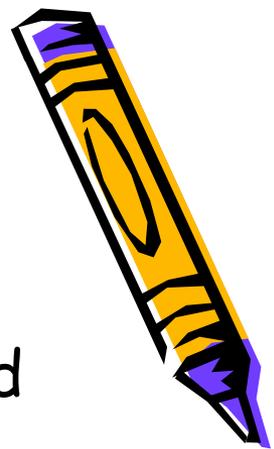


Note: if side DE was marked as congruent instead of DF, we cannot conclude that the triangles are congruent. It must be the corresponding side.

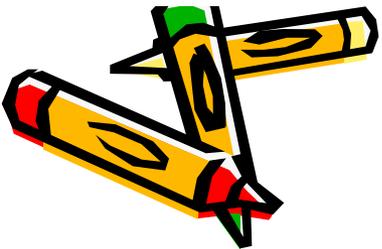


# HL (hypotenuse-leg)

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



$$\triangle BAC \cong \triangle EDF$$



# Proving Triangles Congruent

The names of the theorems tell us the parts of the triangles we need to show as congruent, and where they are in the picture.

Use the list of theorems as a process of elimination.

To use each, we must show that the parts match up in each triangle.

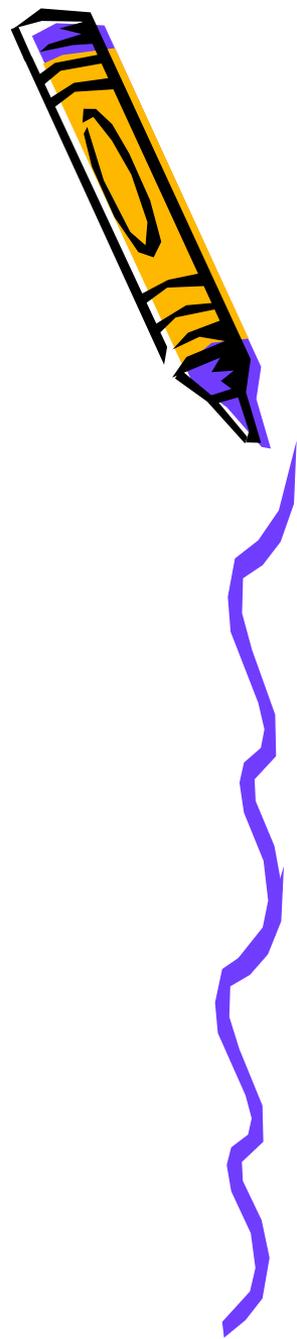
SSS

SAS

ASA

AAS

HL



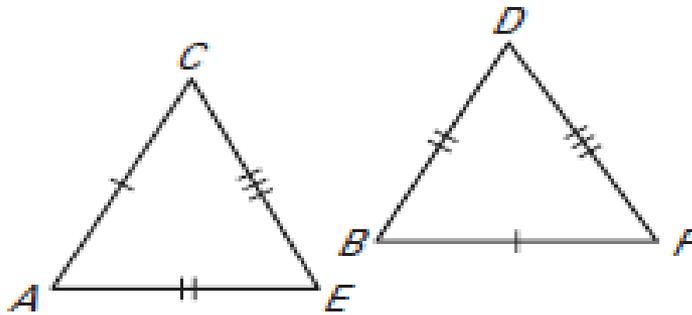
# Proving Triangles Congruent



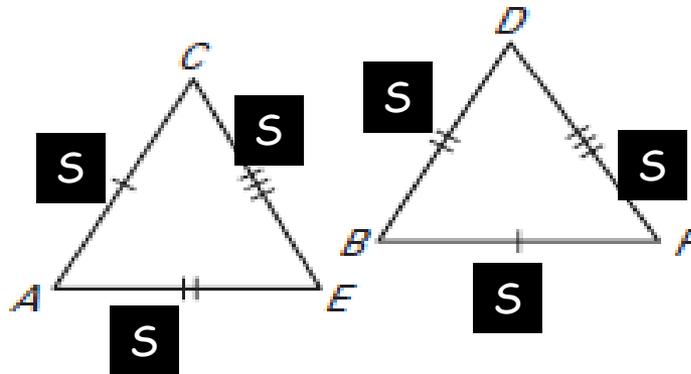
Determine if the triangles are congruent. If they are, write a triangle congruence statement and state the postulate or theorem used. If not, say "not congruent".

Keep our list of theorems in mind:

- SSS
- SAS
- ASA
- AAS
- HL



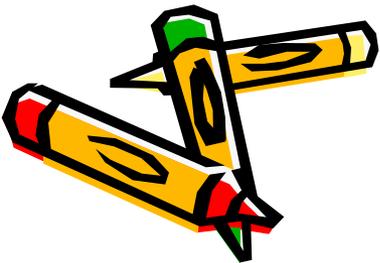
In the picture label the corresponding / congruent parts. Then use their location in the picture to determine which theorem is used.



$$\triangle ACE \cong \triangle BFD$$

by SSS

Note the corresponding order of the points



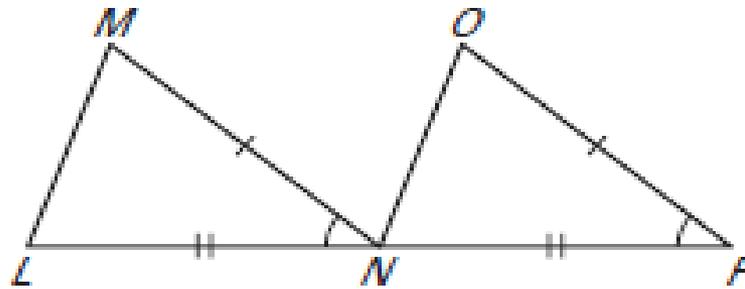
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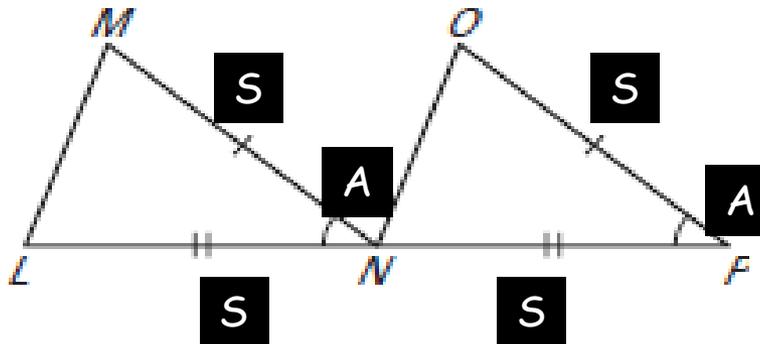
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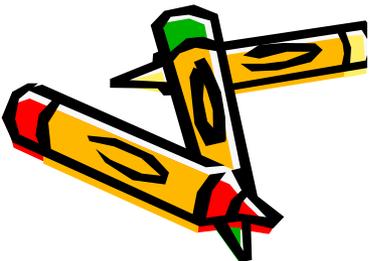
In the picture label the corresponding / congruent parts. Then use their location in the picture to determine which theorem is used.



$$\triangle MNL \cong \triangle OFN$$

by SAS

Note the corresponding order of the points



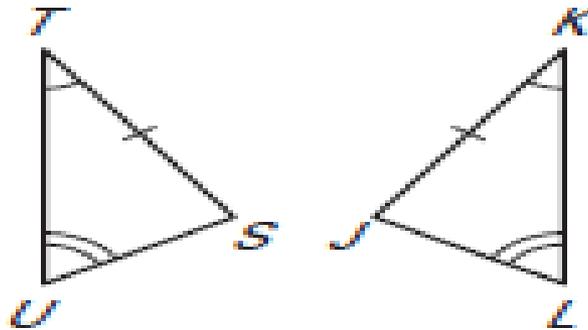
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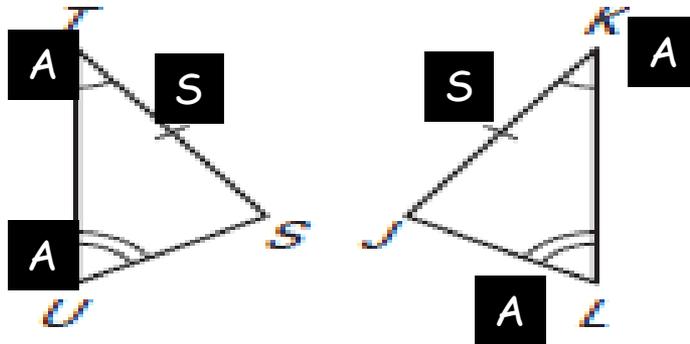
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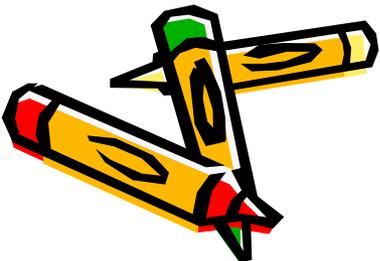
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$$\triangle TUS \cong \triangle KLJ$$

by AAS

Note the corresponding order of the points



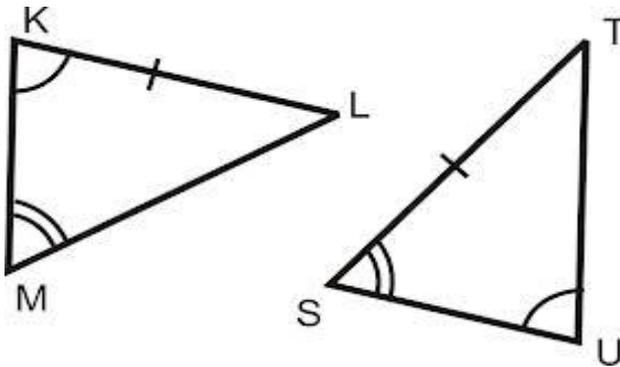
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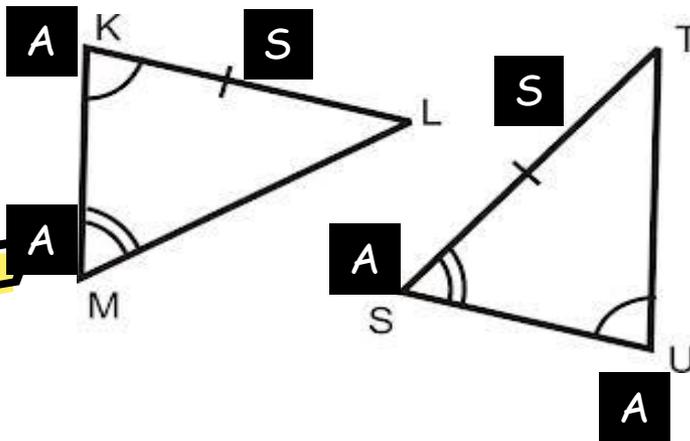
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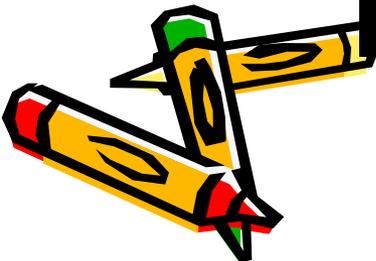


In the picture label the corresponding / congruent parts. Then use their location in the picture to determine which theorem is used.



The triangles are not congruent

Note the non-included side is not corresponding



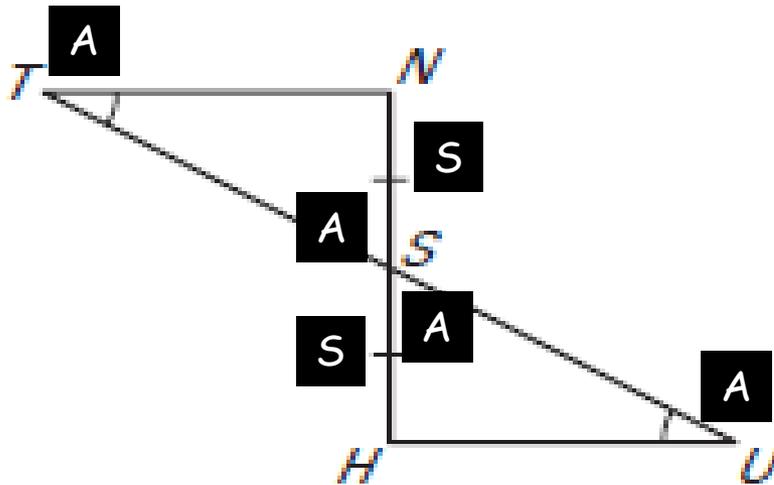
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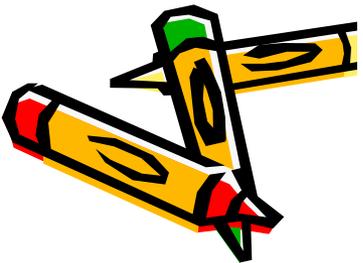
- SSS
- SAS
- ASA
- AAS
- HL



When triangles are connected, look for parts they share to determine which theorem is used.

$$\triangle TNS \cong \triangle UHS$$

by AAS



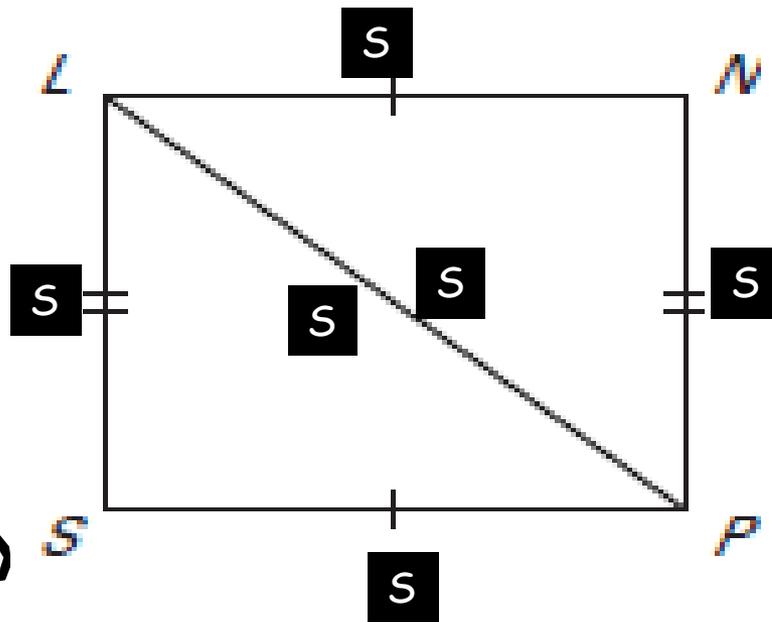
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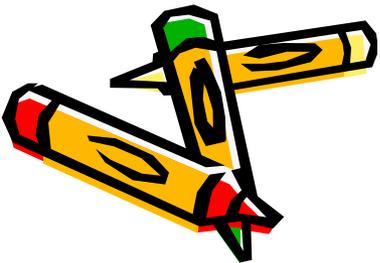
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When triangles are connected, look for parts they share to determine which theorem is used.

$$\triangle LNP \cong \triangle PSL$$

by SSS



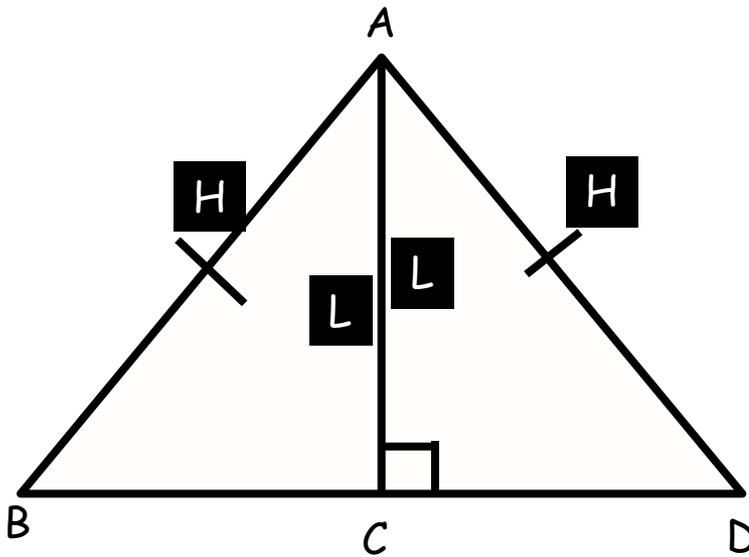
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Determine if the triangles are congruent. If they are, write a triangle congruence statement and state the postulate or theorem used. If not, say "not congruent".

Keep our  
list of  
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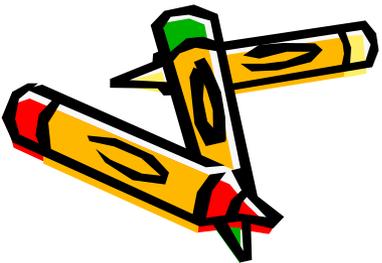
SSS  
SAS  
ASA  
AAS  
HL



When triangles are  
connected, look for  
parts they share  
to determine which  
theorem is used.

$$\triangle BCA \cong \triangle DCA$$

by HL

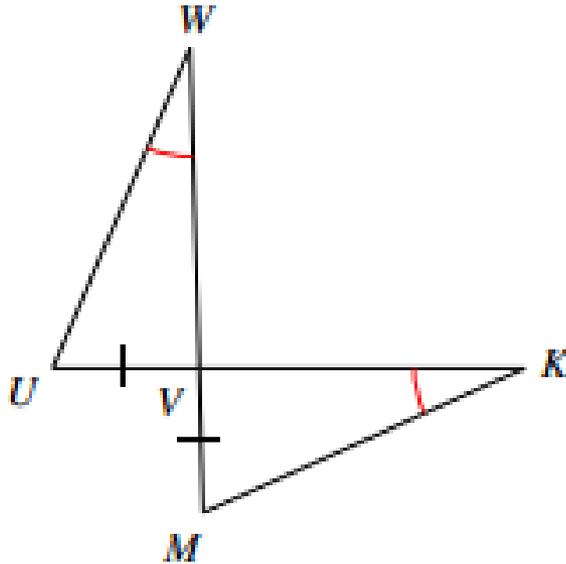


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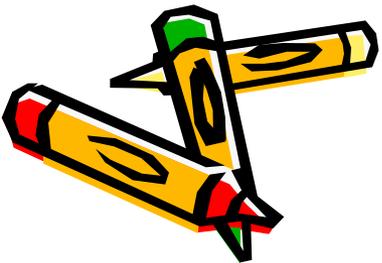
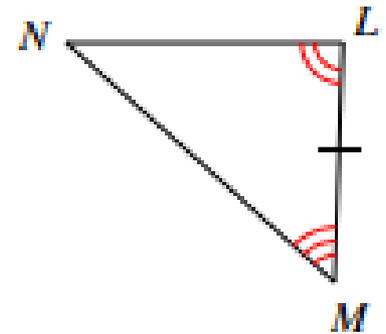
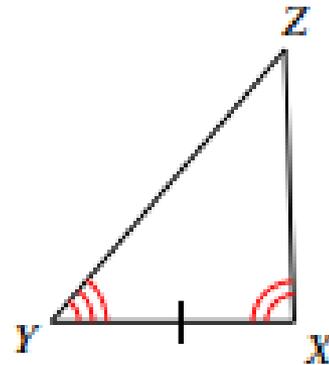


Determine if the triangles are congruent. If they are, write a triangle congruence statement and state the postulate or theorem used. If not, say "not congruent".

1.

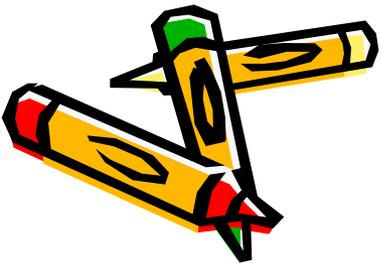
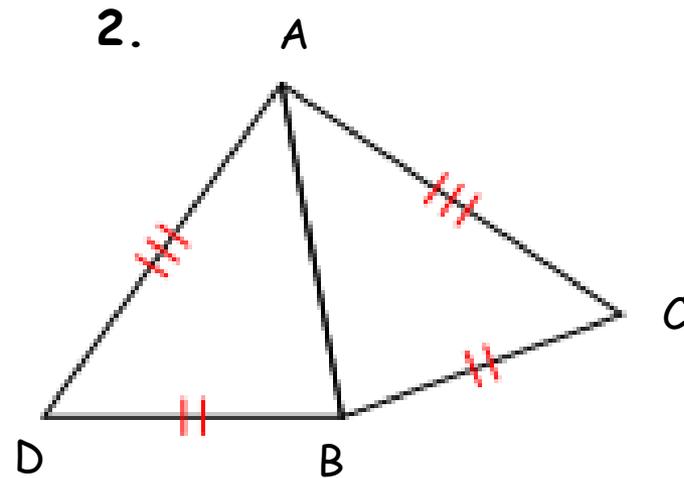
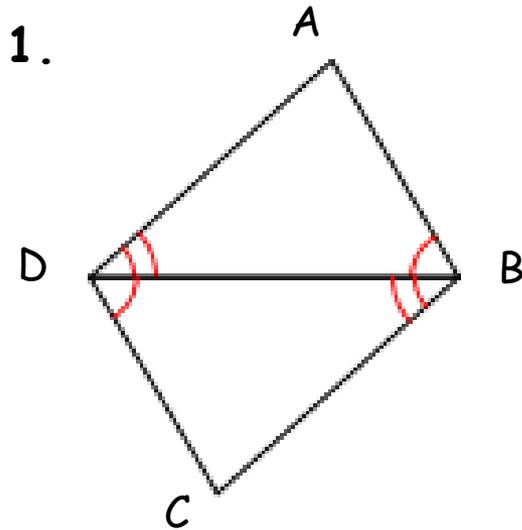


2.



# Proving Triangles Congruent

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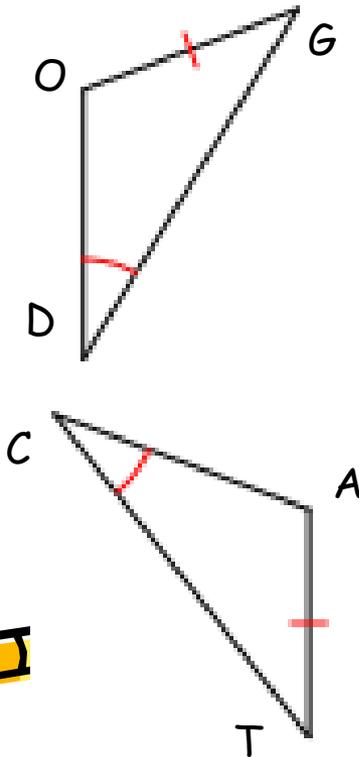


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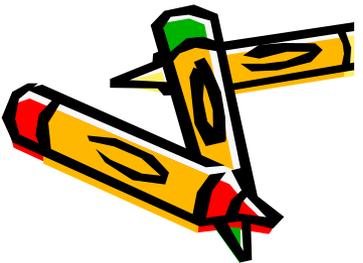
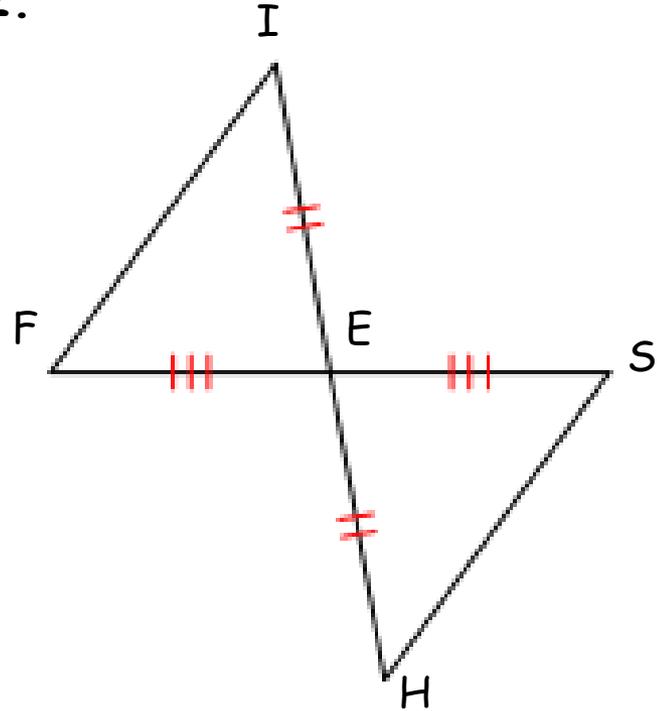


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1.



2.

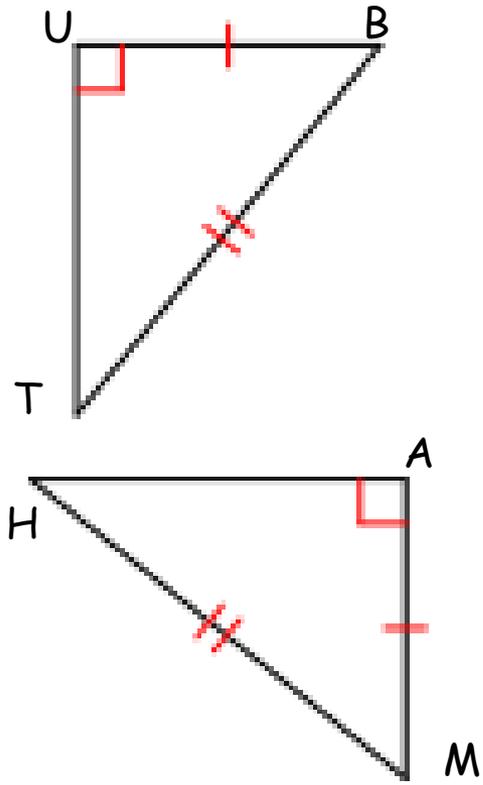


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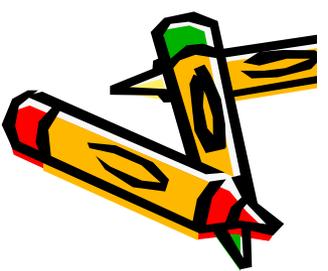
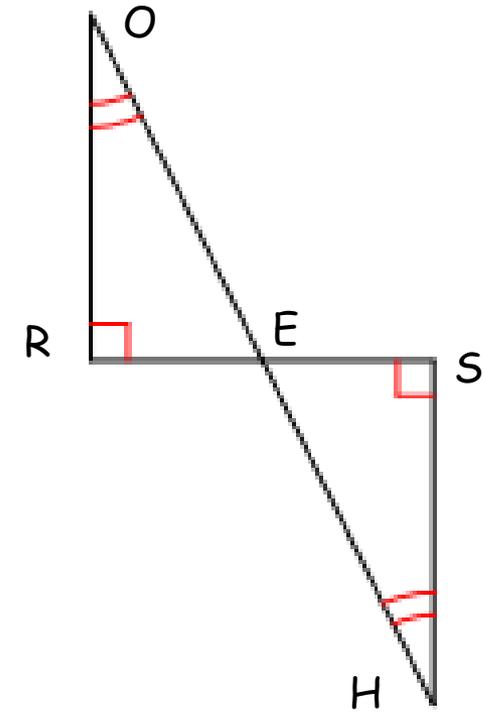


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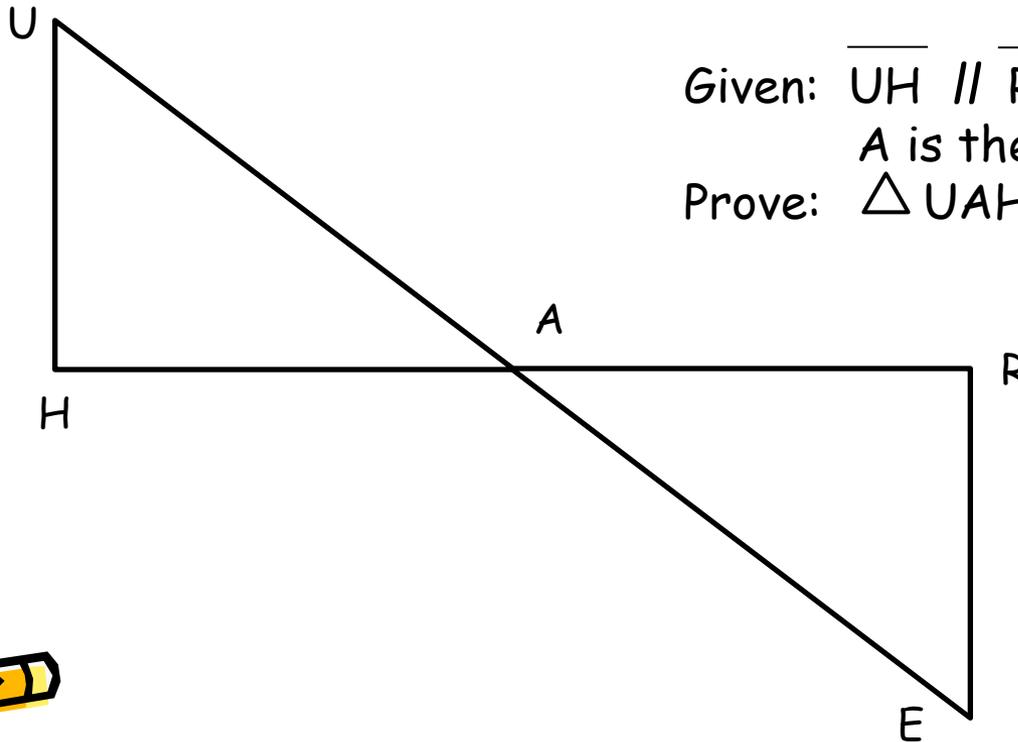
2.



# Proving Triangles Congruent



Determine if the triangles are congruent. If they are, write a triangle congruence statement and state the postulate or theorem used. If not, say "not congruent".



Given:  $\overline{UH} \parallel \overline{RE}$   
A is the midpoint of  $\overline{UR}$   
Prove:  $\triangle UAH \cong \triangle EAR$

