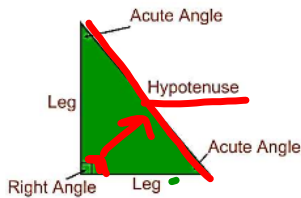


## Hypotenuse Leg

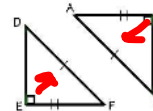
### Parts of a Right Triangle



### HL

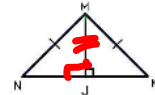
If the hypotenuse and a leg of one right triangle is congruent to the hypotenuse and a leg of another right triangle, then the triangles are congruent

$$\triangle DEF \cong \triangle CBA$$



### Hypotenuse-Leg (HL)

$$\triangle NMJ \cong \triangle KMJ$$

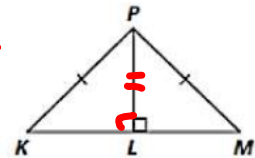


### Hypotenuse Leg Checklist:

- ✓ Can you add any marks? (ONLY USE THE FOUR!)
- ✓ Are both triangles right triangles? (they must have marked right angles)
- ✓ Are the hypotenuse of both congruent? (draw the arrow to help find this)
- ✓ Is there one pair of congruent legs marked?

Can you use HL to prove the two triangles congruent? If yes, write a congruence statement. If not, explain why not.

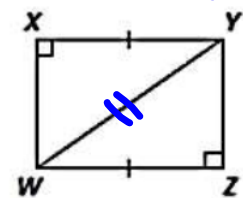
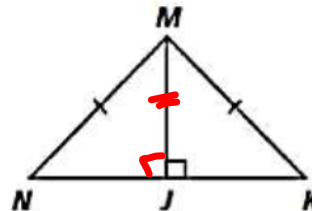
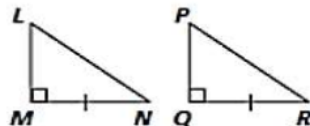
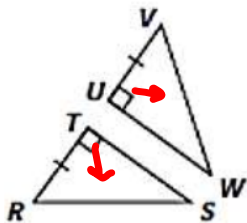
1.  $\triangle KPL \cong \triangle MPL$



2. Not

3. Not

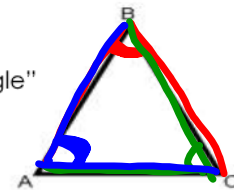
4.  $\triangle MNJ \cong \triangle MKJ$  5.  $\triangle XYW \cong \triangle ZWY$



The next three theorems utilize angles:

**Included Angle**: The angle directly between two sides. "The sandwiched angle"

Name the angle included between  $\overline{AB}$  and  $\overline{BC}$   $\angle ABC$   
 $\overline{BC}$  and  $\overline{AC}$   $\angle BCA$   $\overline{AC}$  and  $\overline{AB}$   $\angle CAB$



**Included Side**: The side directly between two angles.

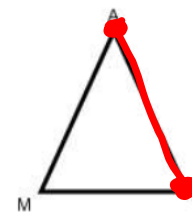
1. In  $\triangle MAT$ , which side is included between  $\angle A$  and  $\angle T$ ?

$\overline{AT}$   
 $\overline{MA}$

2. In  $\triangle MAT$ , which side is included between  $\angle M$  and  $\angle A$ ?

3. Which side is not included between angles A and T?

$\overline{AM} + \overline{MT}$  →



### Side Angle Side

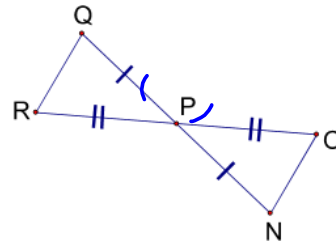
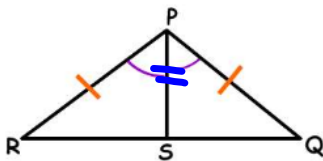
Side-Angle-Side (SAS)	
$\triangle SRT \cong \triangle LMN$ 	$\triangle SRT \cong \triangle QRP$ 
<p>If two sides and the <u>included</u> angle of one triangle are congruent to two sides and the <u>included</u> angle of a second triangle, then the two triangles are congruent.</p>	

**Side Angle Side Checklist:**

- ✓ Can you add any marks? (Only use the four! Reflexive property, Vertical angles, Alternate Interior Angles, and Base Angle Theorem)
- ✓ Look for two congruent sides with an included angle on both
  - "congruent side then congruent angle then congruent side"

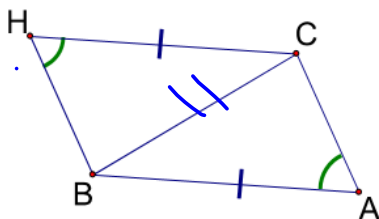
Examples: Write the statement if the triangles are congruent

1.  $\triangle RPS \cong \triangle QPS$  by SAS      2.  $\triangle QRP \cong \triangle NOP$  by SAS

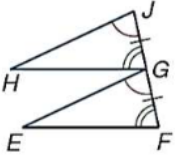
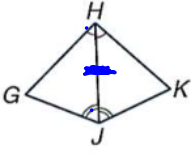


**A non-example:**

This would not be congruent by SAS! The angles are not included angles



### Angle Side Angle

Angle-Side-Angle (ASA)	
$\triangle GHJ \cong \triangle FEG$ 	$\triangle GHJ \cong \triangle KHJ$ 

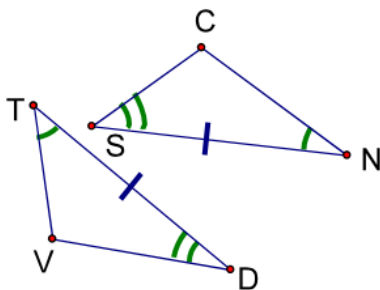
If two angles and the included side of one triangle are congruent to two angles and the included side of a second triangle, then the two triangles are congruent.

**Angle Side Angle Checklist:**

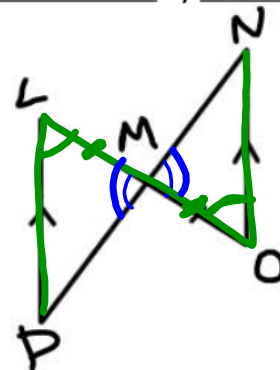
- ✓ Can I add any marks? (ONLY OUR FOUR ALLOWED! Reflexive property, vertical angles, alternate interior angles, or base angle theorem).
- ✓ Look for two congruent angles with an included side
  - "congruent angle then congruent side then congruent angle"

Examples: Write the statement if the triangles are congruent.

1.  $\triangle TDV \cong \triangle NSC$  by ASA

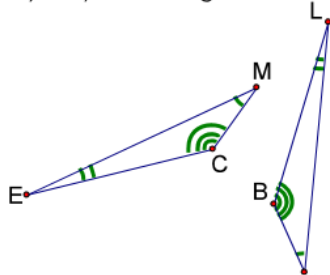


2.  $\triangle LMP \cong \triangle OMN$  by ASA

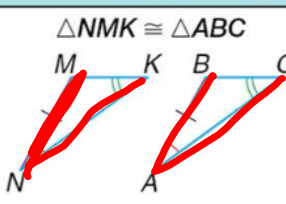
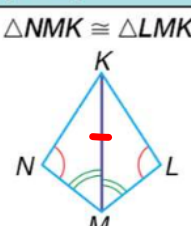


**Non-Example:**

These are not congruent because they only have angles marked (no sides). ANGLE-ANGLE-ANGLE is not a congruency theorem!



### Angle Angle Side

Angle-Angle-Side (AAS)	
$\triangle NMK \cong \triangle ABC$ 	$\triangle NMK \cong \triangle LMK$ 

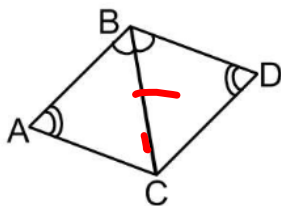
If two angles and a nonincluded side of one triangle are congruent to two angles and the corresponding nonincluded angle of a second triangle, then the two triangles are congruent.

**Angle-Angle-Side Checklist:**

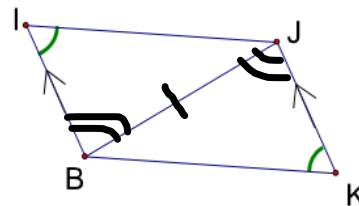
- ✓ Can I add any marks? (ONLY THE FOUR ALLOWED MARKS! Reflexive property, vertical angles, alternate interior angles, base angle theorem)
- ✓ Do I have two congruent angles and a non-included side that is congruent?
  - "congruent angle then congruent angle then congruent side"

Examples: Write the statements if the triangles are congruent

1.  $\triangle ABC \cong \triangle DCB$  by **AAS**



2.  $\triangle IBJ \cong \triangle KJB$  by **AAS**



**A non-example:**

This would not be an example because there are two congruent pairs of sides and one congruent pairs of angles with the wrong ordering. Here there is side then side then angle, or angle then side then side. There are no bad words in math!

