

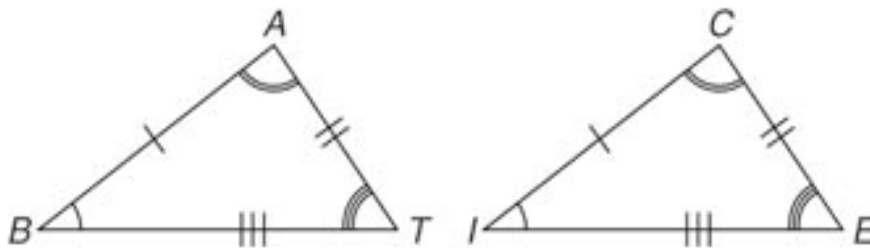
Triangles that have exactly the same size and shape are called **congruent triangles**.

The symbol for congruent is  $\cong$ .

Two triangles are congruent when the **three sides** and the **three angles** of one triangle have the same measurements as the three sides and the three angles of another triangle.

**Congruent**  
means the same  
thing as  
**Isometric**

These two triangles are **congruent**



Can you identify the corresponding sides by letters?

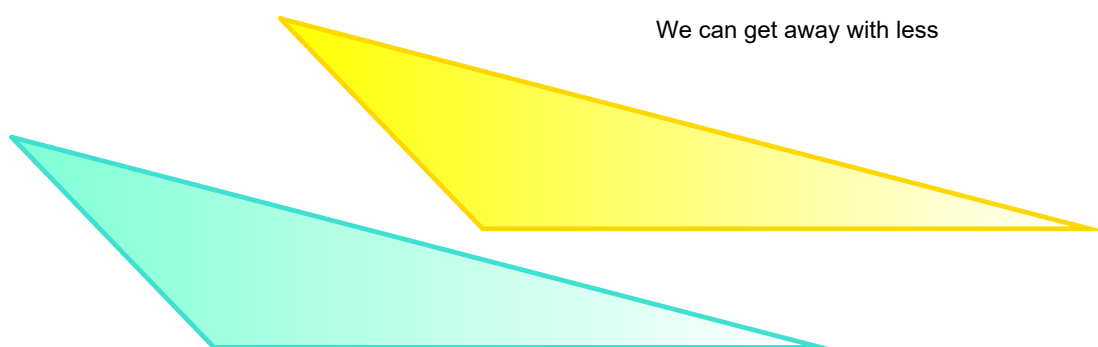
$$\overline{AT} = \overline{CE} \quad \overline{BA} = \overline{IC} \quad \overline{BT} = \overline{IE}$$

Can you identify the corresponding angles by letters?

$$\angle E = \angle T \quad \angle A = \angle C \quad \angle B = \angle I$$

There are **minimum** conditions for proving that two triangles are congruent.

In other words, it is not necessary to prove that **ALL three sides** and **ALL three angles** are congruent **every time** we want to prove that two triangles are congruent.



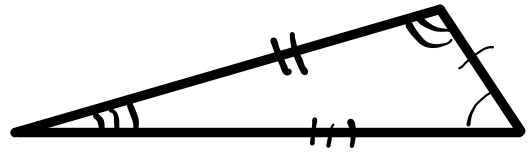
**3 ways** to prove that triangles are congruent:

1. SSS side-side-side
2. SAS side-angle-side
3. ASA angle-side-angle

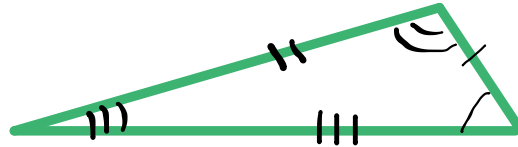
# 1. Proving triangles are congruent by **SSS**

side-side-side

Take three black "sticks" and form a triangle with them



Take the same three green "sticks" and form a triangle with them that is different from the black one, if possible



Are these two triangles isometric? *Yes*  
 Are the corresponding angles in these triangles congruent? *Yes*

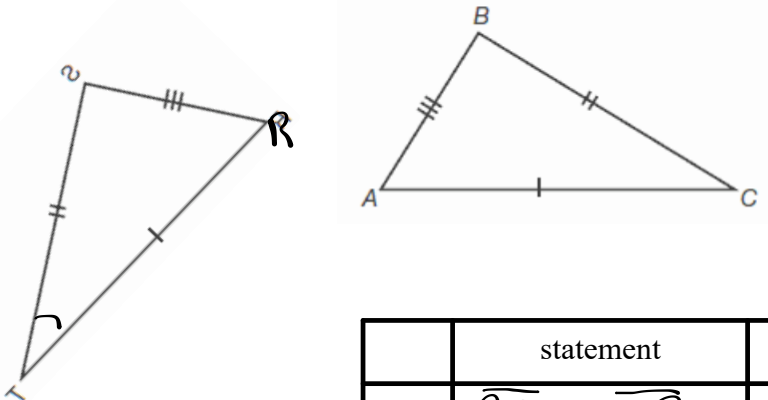
We do not need to **KNOW** that all three corresponding angles and that all three corresponding sides are congruent to prove that the triangles are congruent....

If three corresponding **SIDES** are congruent then the corresponding **ANGLES** will be HAVE to be congruent.

Therefore, **SSS** (side-side-side) is "**ENOUGH**" or sufficient **proof** to say that **everything** about the **triangles are congruent**.

Prove that the following two triangles are congruent.

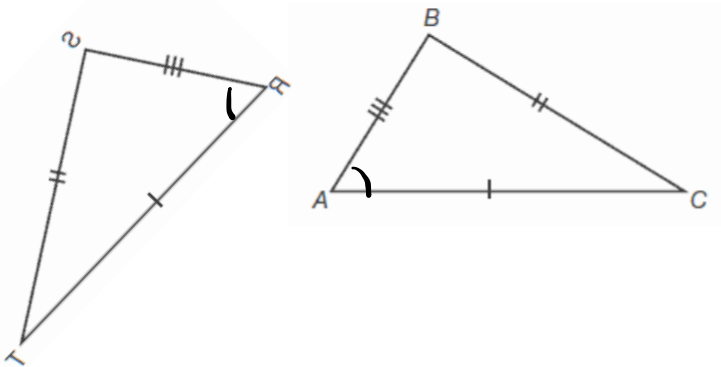
This is how you do a formal proof



	statement	justification
1	$\overline{AB} = \overline{SR}$	Given
2	$\overline{AC} = \overline{RT}$	Given
3	$\overline{BC} = \overline{ST}$	Given
4	$\triangle ABC \cong \triangle SRT$	SSS

Example:

Prove that  $\angle R \cong \angle A$

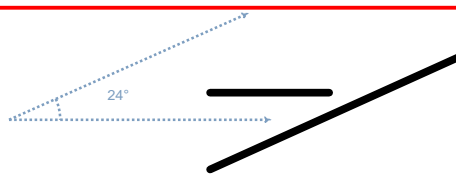


	statement	justification	
1	$\overline{AB} = \overline{SR}$	Given	
2	$\overline{AC} = \overline{RT}$	Given	
3	$\overline{BC} = \overline{ST}$	Given	
4	$\triangle ABC \cong \triangle SRT$	SSS	
5	$\angle R \cong \angle A$	Corresp Angles	

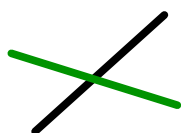
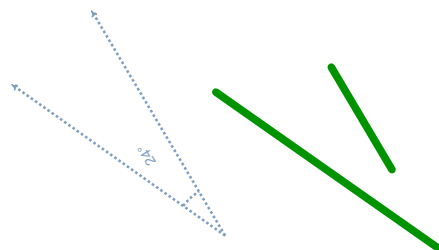
## 2. Proving triangles are congruent by **SAS**

side-angle-side

Take two black "sticks" and an angle and form a triangle with them--the angle must be **contained** by the two sides



Take the same two **green** "sticks" and angle and form a triangle with them that is different from the black one, if possible



Are the corresponding angles in these triangles congruent?  
Are the corresponding sides in these triangles congruent?

Are these two triangles isometric?

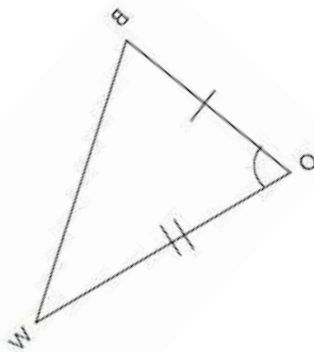
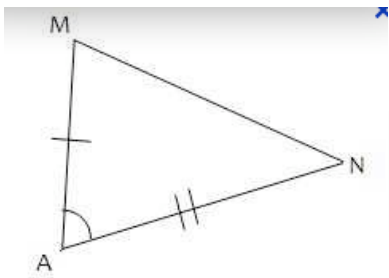
We do not need to **KNOW** that all three corresponding angles and that all three corresponding side are congruent to prove that the triangles are congruent....

If two corresponding **SIDES** are congruent and the corresponding **ANGLE contained** by these sides are congruent, then the third corresponding sides and the other corresponding 2 angles will **HAVE** to be congruent.

Therefore, **SAS** (side-angle-side) is "ENOUGH" or sufficient proof to say that **everything** about the triangles are congruent.

Prove that the following two triangles are congruent.

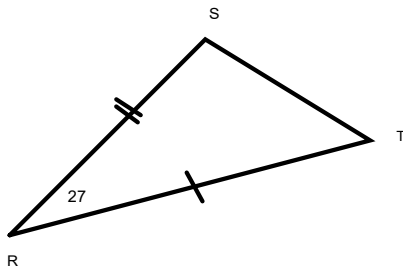
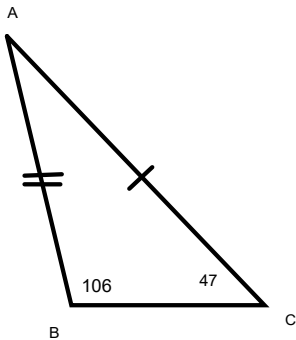
This is how you do a formal proof



	statement	justification

Example:

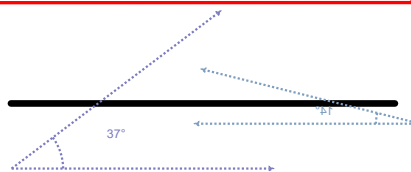
Prove that  $\overline{BC} \cong \overline{ST}$



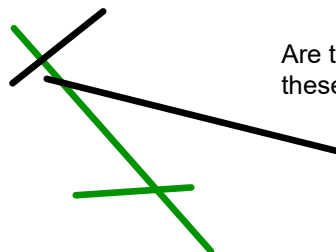
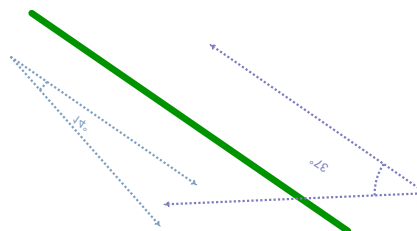
	Statement	Justification

### 3. Proving triangles are congruent by **ASA** angle-side-angle

Take one black "stick" and 2 angles and form a triangle with them--the side must be **contained** by the two angles



Take the same **green** "stick" and 2 angles and form a triangle with them that is different from the black one, if possible



Are the corresponding angles in these triangles congruent?

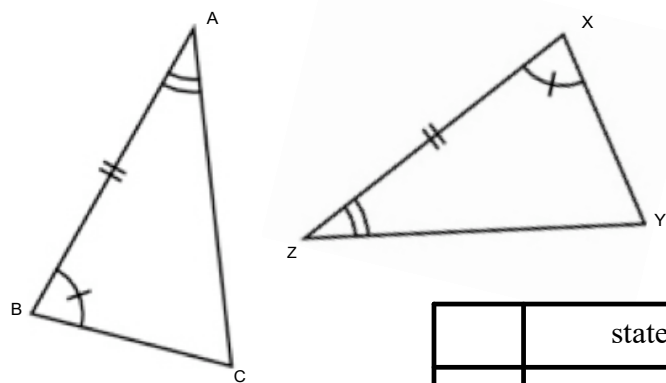
We do not need to **KNOW** that all three corresponding angles and that all three corresponding sides are congruent to prove that the triangles are congruent....

If two corresponding **ANGLES** are congruent and the corresponding **SIDE contained** by these angles are congruent, then the third corresponding angle and the 2 other corresponding sides will **HAVE** to be congruent.

Therefore, **ASA** (angles-side-angle) is "ENOUGH" or sufficient proof to say that **everything** about the triangles are congruent.



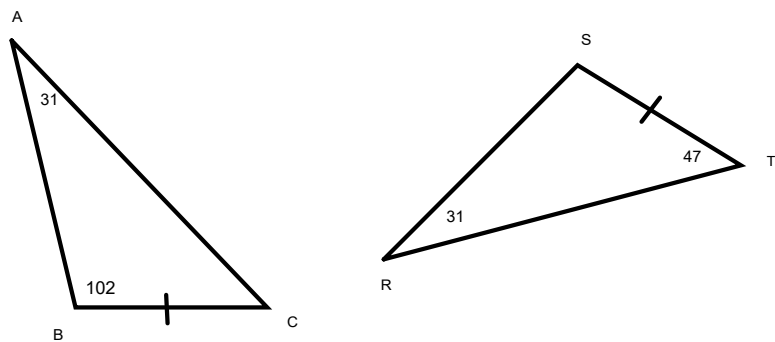
Prove that the following two triangles are congruent.



	statement	justification

Example:

Prove that  $\overline{AB} \cong \overline{SR}$



	Statement	Justification



# Let's recap!

## ISOMETRIC TRIANGLES

1. Theorem of Congruence SAS: Two triangles with corresponding congruent angle **contained** between two congruent corresponding sides are isometric.
2. Theorem of Congruence ASA: Two triangles with corresponding congruent side **contained** between two congruent corresponding angles are isometric.
3. Theorem of Congruence SSS: Two triangles with corresponding congruent sides are isometric.

**When 2 triangles are proven to be ISOMETRIC, their corresponding elements are ISOMETRIC** Property of Congruent Triangles --PCT