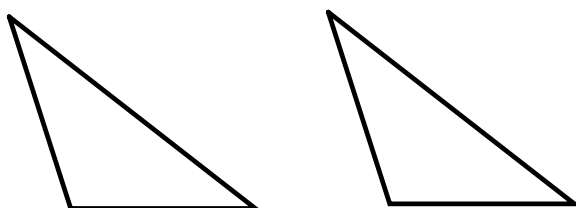


Triangles that have exactly the **same size** and **shape** are called **congruent triangles**.

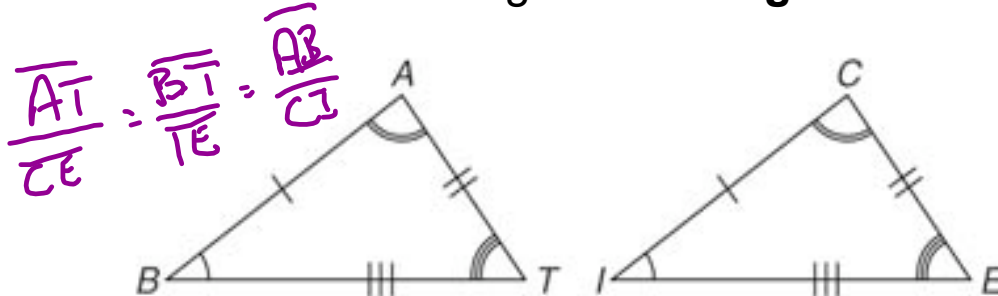
The symbol for congruent is \cong .

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?

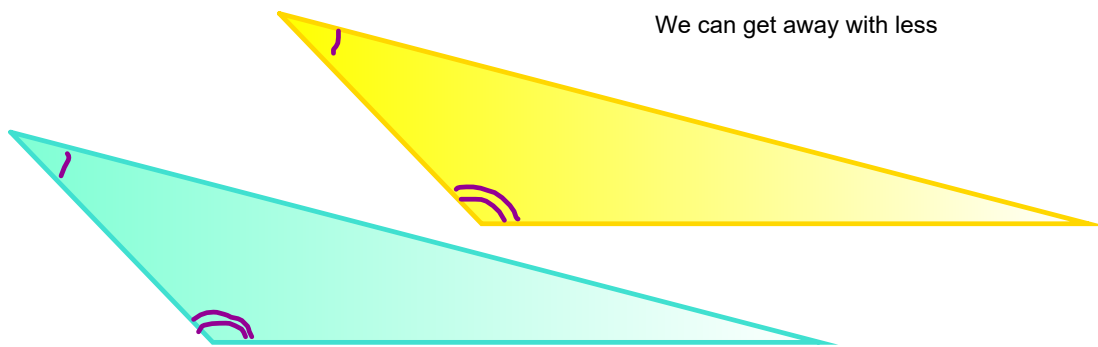
$$\overline{AT} \cong \overline{CE} \quad \overline{BT} \cong \overline{IE} \quad \overline{AB} \cong \overline{CI}$$

Can you identify the **corresponding** angles by letters?

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

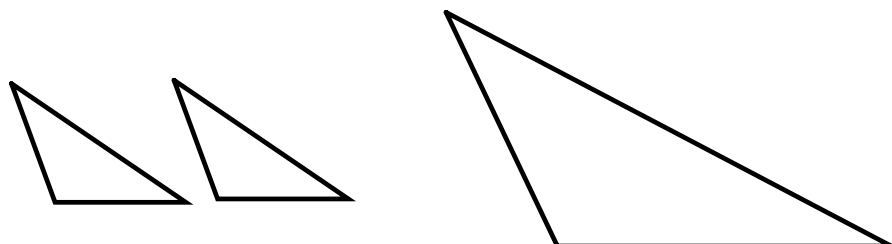
There are **minimum** conditions for proving that two triangles are congruent.

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:

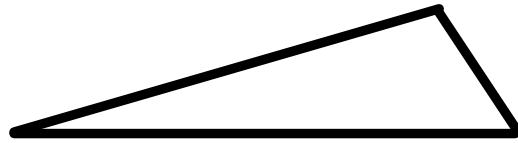
1. SSS side-side-side
2. SAS side-angle-side
3. ASA angle-side-angle



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?
Are the corresponding angles in these triangles congruent?

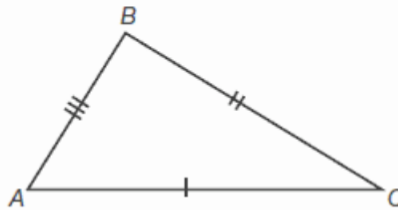
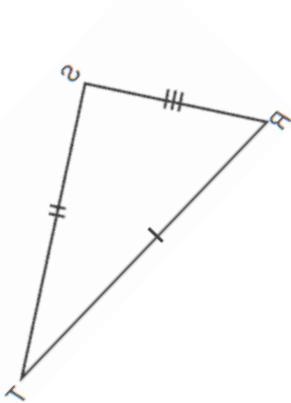
We do not need to **KNOW** that all three corresponding angles and that all three corresponding sides are congruent to prove that the triangles are congruent....

If 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.

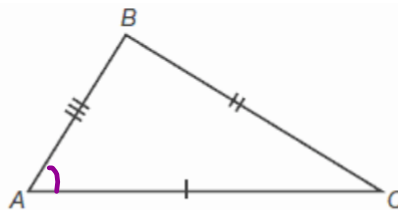
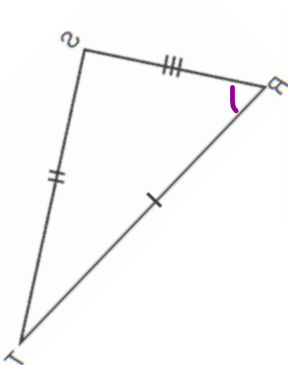
This is how you do a formal proof



	statement	justification
1	$\overline{TR} = \overline{AC}$	Given
2	$\overline{ST} = \overline{BC}$	Given
3	$\overline{RS} = \overline{AB}$	Given
4	$\triangle RST \cong \triangle ABC$	SSS

Example:

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

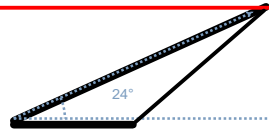


	Statement	Justification
1	$\overline{ST} = \overline{BC}$	Given
2	$\overline{SR} = \overline{AB}$	Given
3	$\overline{RT} = \overline{AC}$	Given
4	$\triangle RST \cong \triangle ABC$	SSS
5	$\angle R \cong \angle A$	Corresponding angles in congruent triangles

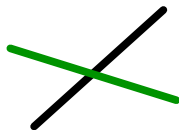
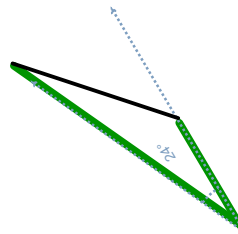
2. Proving triangles are congruent by **SAS**

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? *yes*

Are the corresponding sides in these triangles congruent? *yes*

Are these two triangles isometric? *yes*

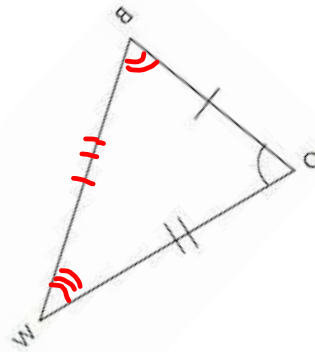
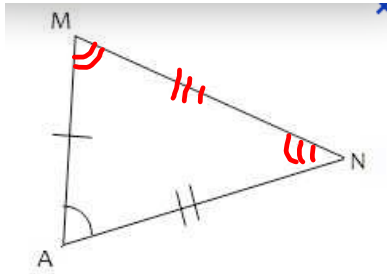
We do not need to **KNOW** that all three corresponding angles and that all three corresponding side are congruent to prove that the triangles are congruent....

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

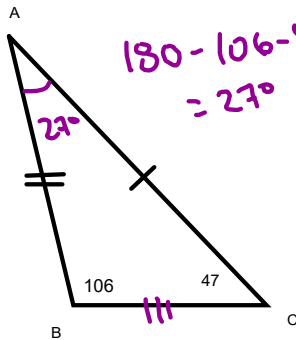


	statement	justification
1	$\overline{AM} = \overline{BO}$	Given
2	$\angle A = \angle O$	Given
3	$\overline{AN} = \overline{WO}$	Given
4	$\triangle AMN \cong \triangle BOW$	SAS

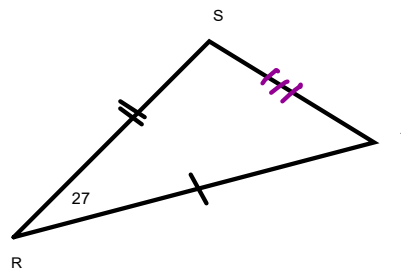


Example:

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



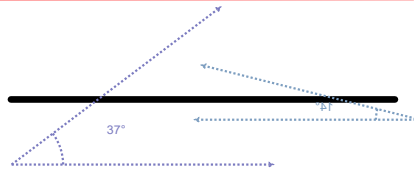
$$180 - 106 - 47 = 27^\circ$$



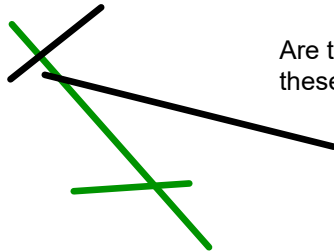
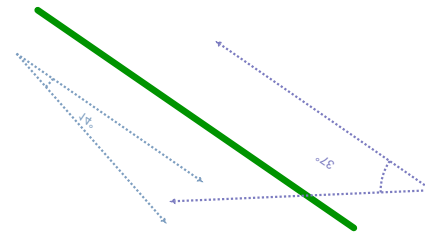
	Statement	Justification
1	$\overline{AB} = \overline{SR}$	Given
2	$\overline{AC} = \overline{RT}$	Given
3	$\angle A = \angle R$	$\sum \angle \Delta = 180^\circ$
4	$\triangle ABC \cong \triangle RST$	SAS
5	$\overline{BC} \cong \overline{ST}$	Corr. Sides in Cong. Tr.

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

Take one black "stick" and 2 angles 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



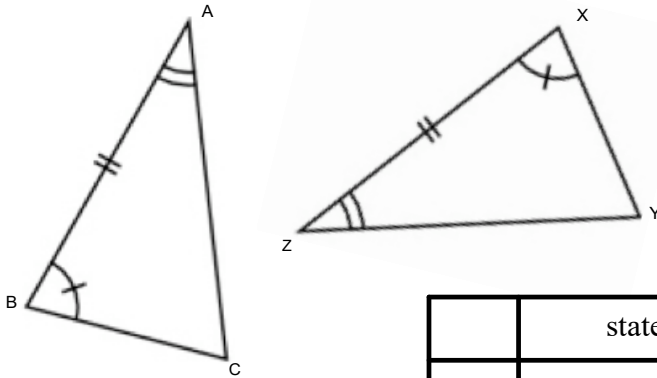
Are the corresponding angles in these triangles congruent?

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.

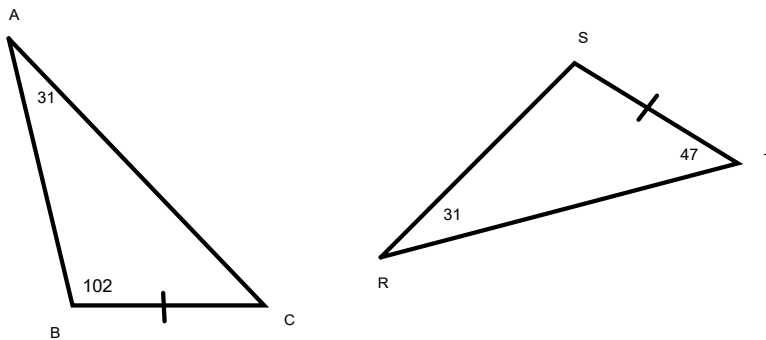
Prove that the following two triangles are congruent.



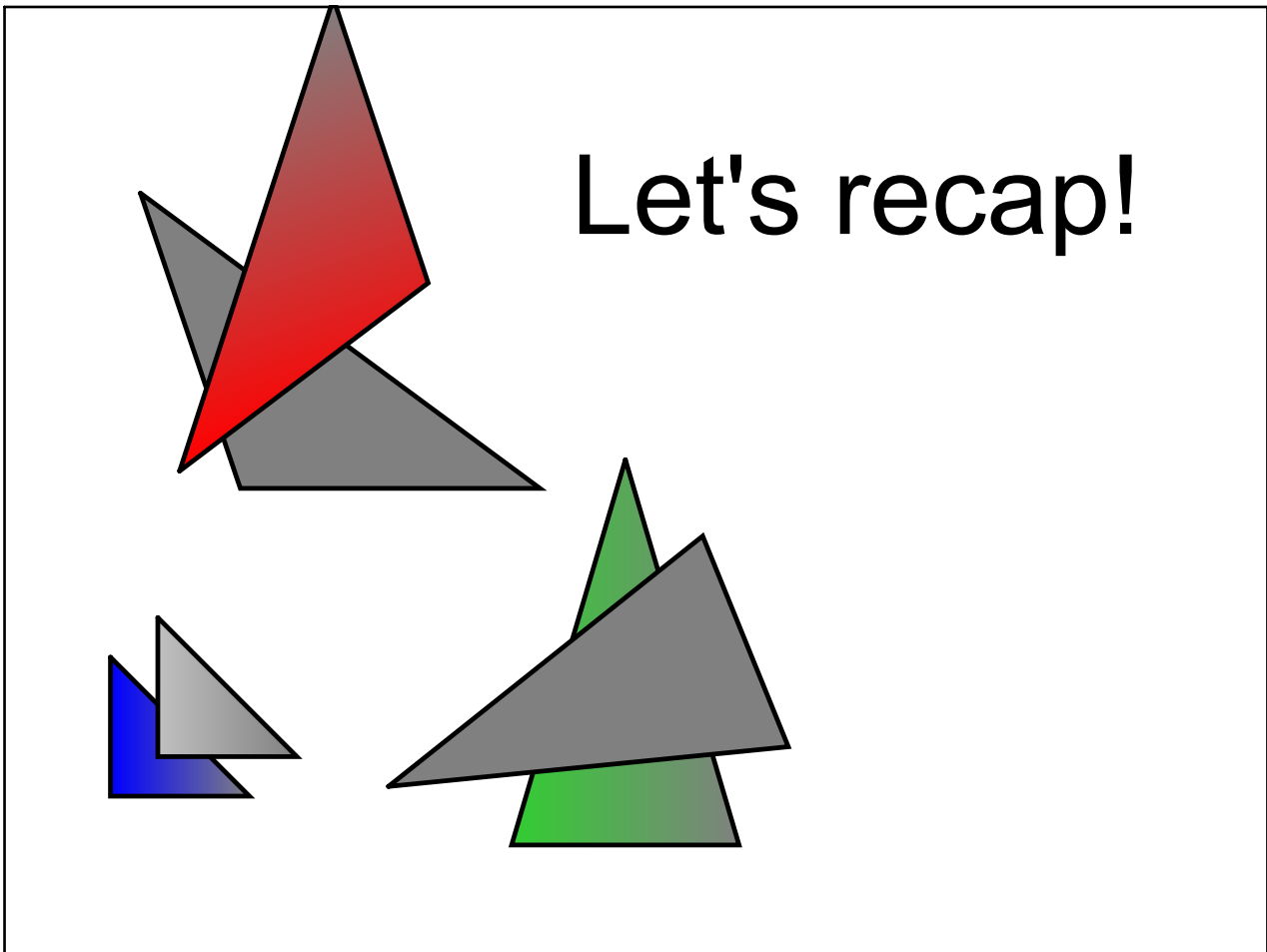
	statement	justification

Example:

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



	Statement	Justification



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

