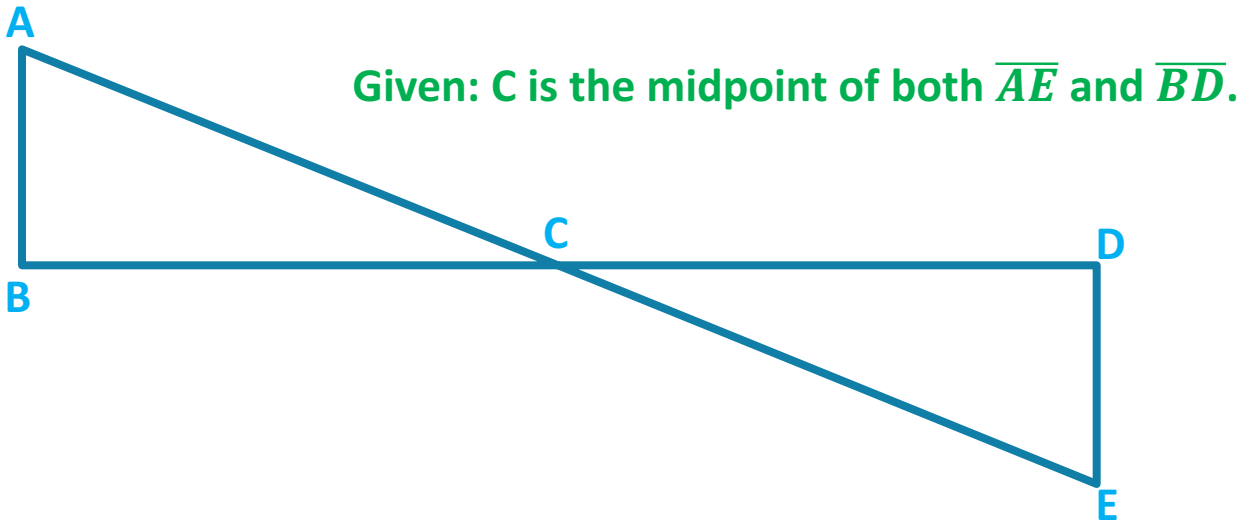
Warmup

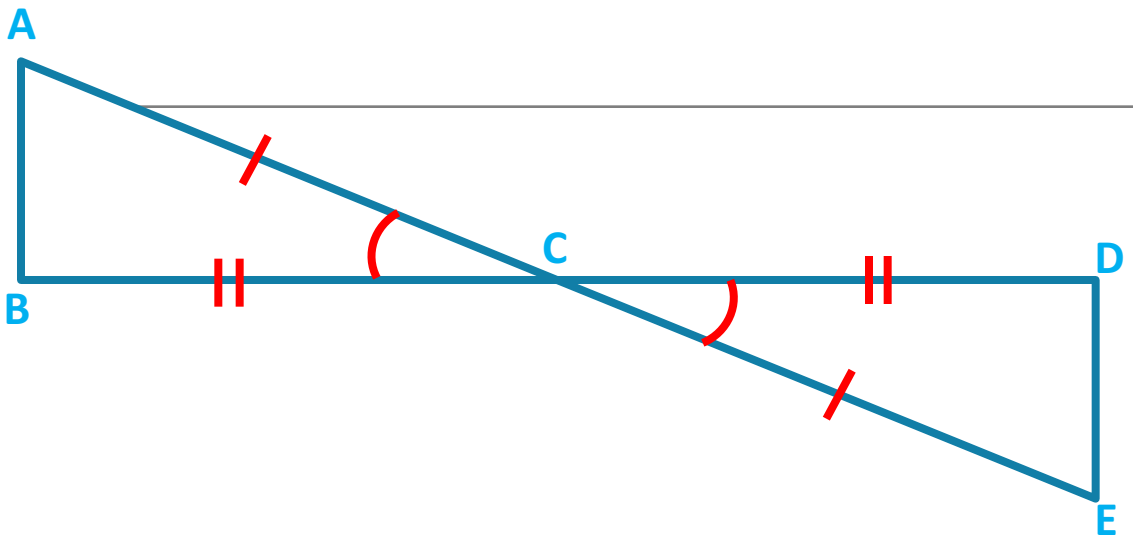
Are the triangles congruent? Explain why or why not.



Given: C is the midpoint of both $\overline{AE}$ and $\overline{BD}$.

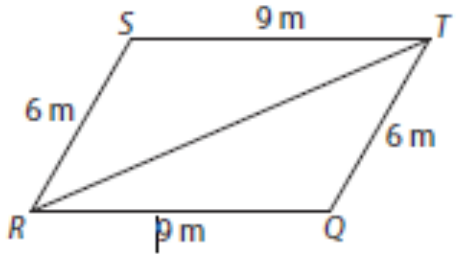
Are the triangles congruent? Explain why or why not. Write the congruence statements for each pair of sides or angles in your explanation.

Given: C is the midpoint of both $\overline{AE}$ and $\overline{BD}$.



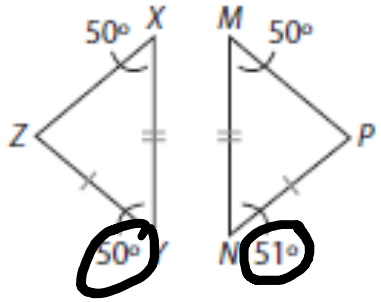
- $\overline{AC} \cong \overline{EC}$ because **C** is the midpoint of $\overline{AE}$.
- $\overline{BC} \cong \overline{DC}$ because **C** is the midpoint of $\overline{BD}$.
- $\angle ACB \cong \angle ECD$ because vertical angles are congruent.
- So the triangles are congruent by SAS.

10.



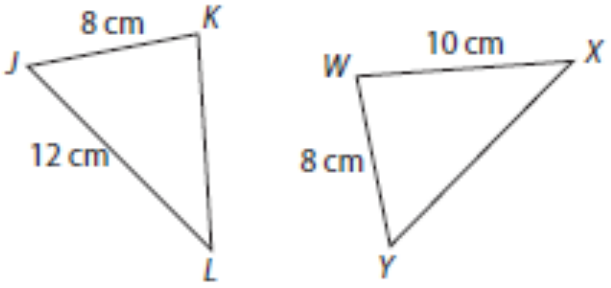
Congruent, by SSS congruence: $\overline{SR} \cong \overline{TQ}$ because they have the same measure, $\overline{RT} \cong \overline{RT}$ by the reflexive property, and $\overline{ST} \cong \overline{QR}$ because they have the same measure.

11.



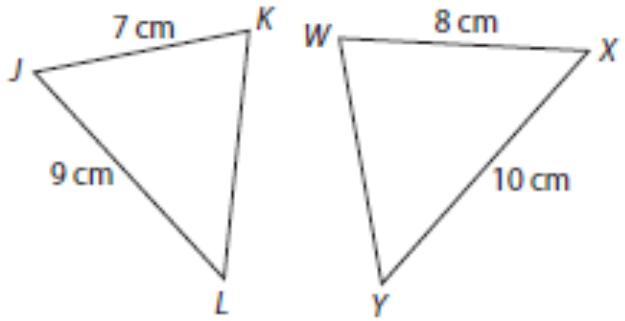
Not congruent, because only one triangle has an interior angle of 51° so there is no rigid motion that will map one to the other.

12.



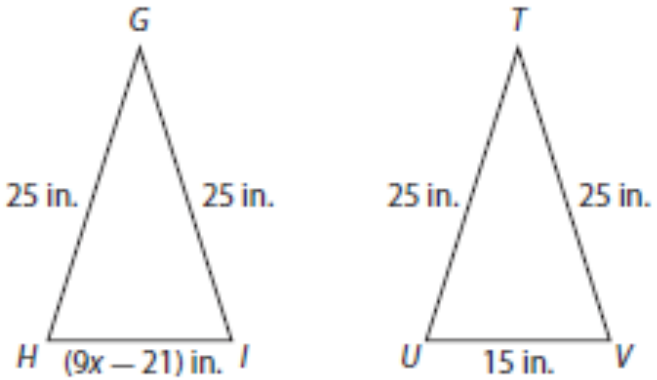
Possibly congruent, depending on the lengths of the unlabeled sides.

13.



Not congruent. The diagrams show a total of 4 different side lengths, but two congruent triangles have only 3 different side lengths.

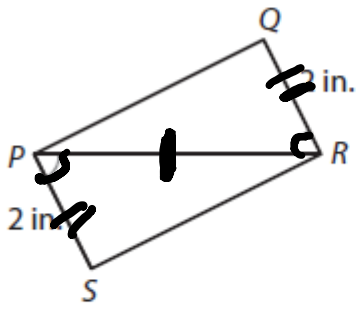
14. Carol bought two chairs with triangular backs. For what value of x can you use a triangle congruence theorem to show that the triangles are congruent? Which triangle congruence theorem can you use? Explain.



$x = 4$; $\overline{GH} \cong \overline{TU}$ and $\overline{GI} \cong \overline{TV}$, because they have the same measure.

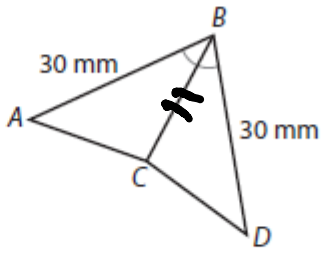
So, if $\overline{HI} \cong \overline{UV}$, then $\triangle GHI \cong \triangle TUV$ by the SSS Triangle Congruence Theorem.

2.



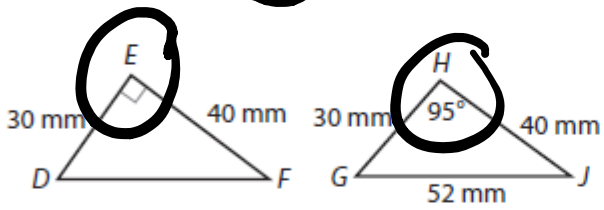
$\overline{PS} \cong \overline{RQ}$, $\overline{PR} \cong \overline{PR}$, $\angle SPR \cong \angle QRP$, and $\angle SPR$ and $\angle QRP$ are included by congruent corresponding sides. $\triangle SPR \cong \triangle QRP$ by SAS.

3.



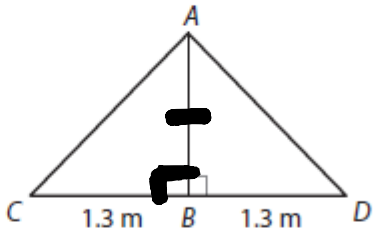
$\overline{AB} \cong \overline{DB}$, $\overline{BC} \cong \overline{BC}$, and $\angle ABC \cong \angle DBC$, and $\angle ABC$ and $\angle DBC$ are included by congruent corresponding sides. $\triangle ABC \cong \triangle DBC$ by SAS.

4.



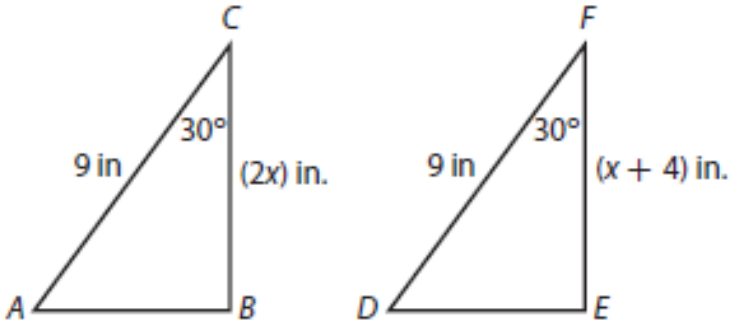
$\overline{DE} \cong \overline{GH}$ and $\overline{EF} \cong \overline{HJ}$, but included angles $\angle E$ and $\angle H$ are not congruent. The triangles are not congruent, because there is no sequence of rigid motions that maps $\triangle DEF$ onto $\triangle GHJ$.

5.



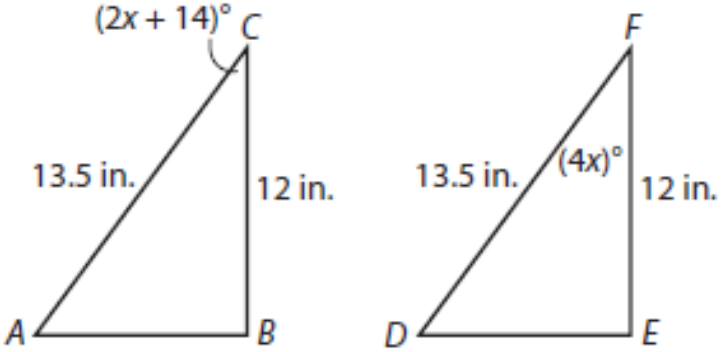
$\overline{AB} \cong \overline{AB}$, $\overline{CB} \cong \overline{DB}$, $\angle ABC \cong \angle ABD$ and $\angle ABC$ and $\angle ABD$ are included by congruent corresponding sides. $\triangle ABC \cong \triangle ABD$ by SAS.

6.



$2x = x + 4$; $x = 4$; $\triangle ABC \cong \triangle DEF$ by SAS when x is 4.

7.



$2x + 14 = 4x$; $x = 7$; $\triangle ABC \cong \triangle DEF$ by SAS when x is 7.

What if…

We only knew two sides of two triangles and a non-included angle? Would that be enough to determine congruence?

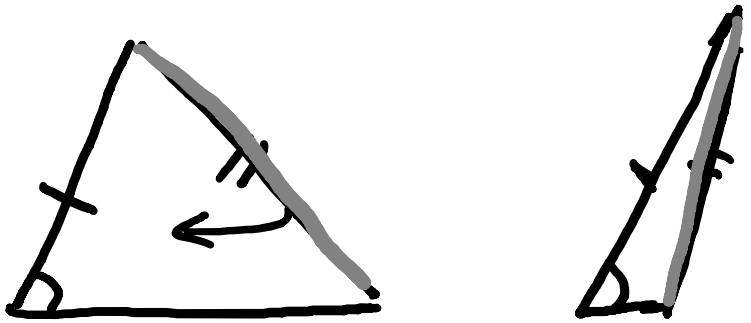
A Video…

https://www.khanacademy.org/math/geometry/congruence/triangle-congruence/v/more-on-why-ssa-is-not-a-postulate

SSA is not a shortcut!

Write down when it is not a shortcut.

SSA



SAS

↓

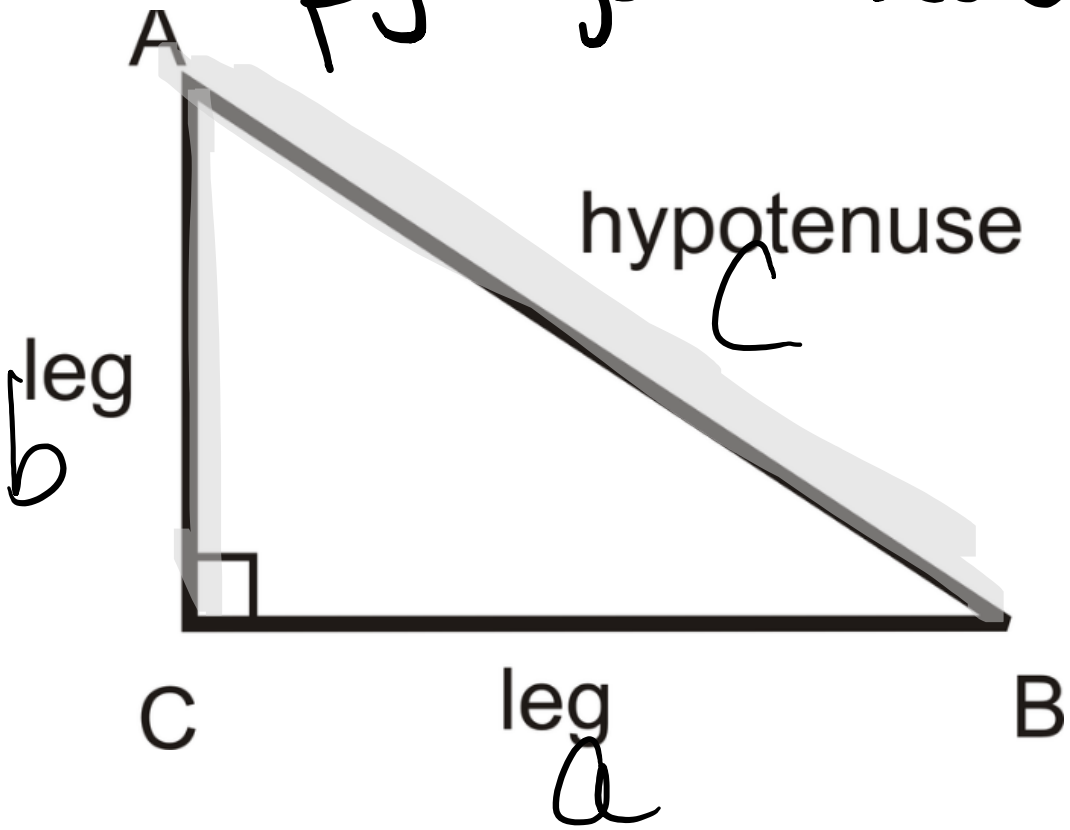
angle included angle

two ∢ a non included

angle is Not enough INFO

★ an exception to the rule is right triangles

Remember: For right triangles… Pythagorean theorem



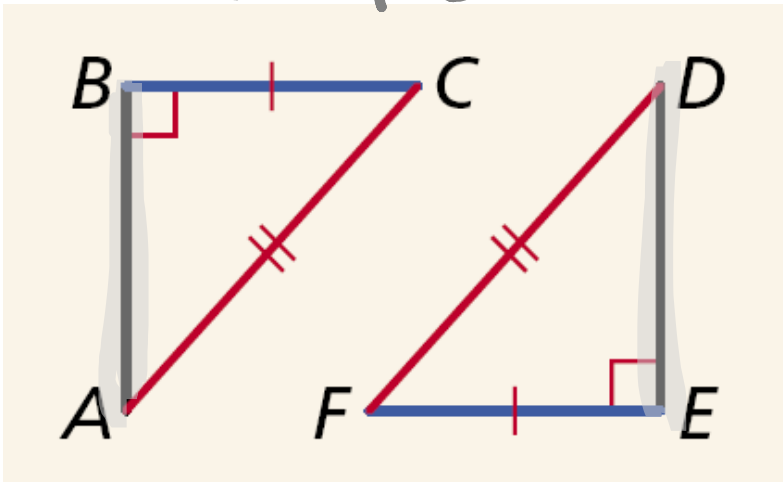
$a^2 + b^2 = c^2$

HL Congruence (Special Case of SSA) Hypotenuse – Leg

Definition

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

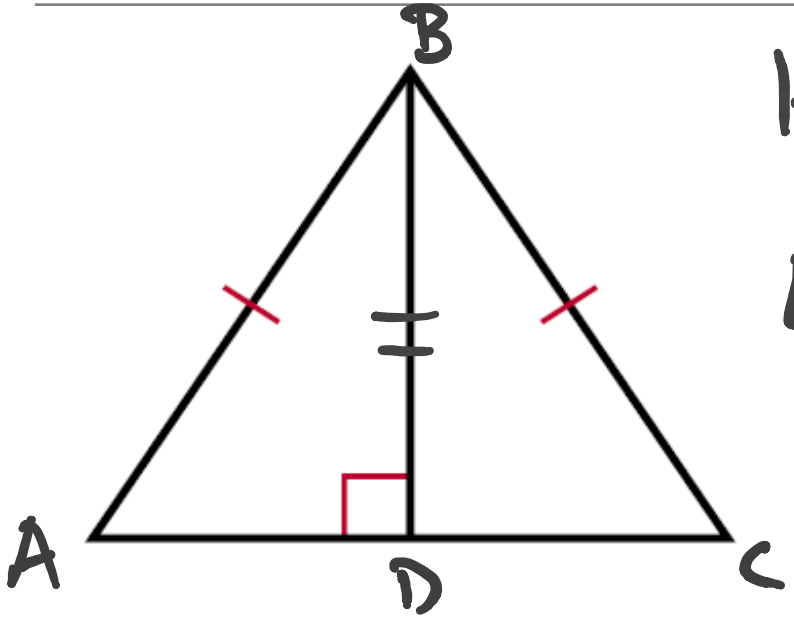
Example



$\triangle ABC \cong \triangle DEF$

this is because of the Pythagorean Theorem!

Example of HL Congruence



H $\overline{AB} \cong \overline{CB}$ Given

L $\overline{BD} \cong \overline{BD}$ Reflexive Property

Which rigid motion???

Reflection

Triangle Angle Sum Theorem

All of the angles in a triangle sum to 180 degrees

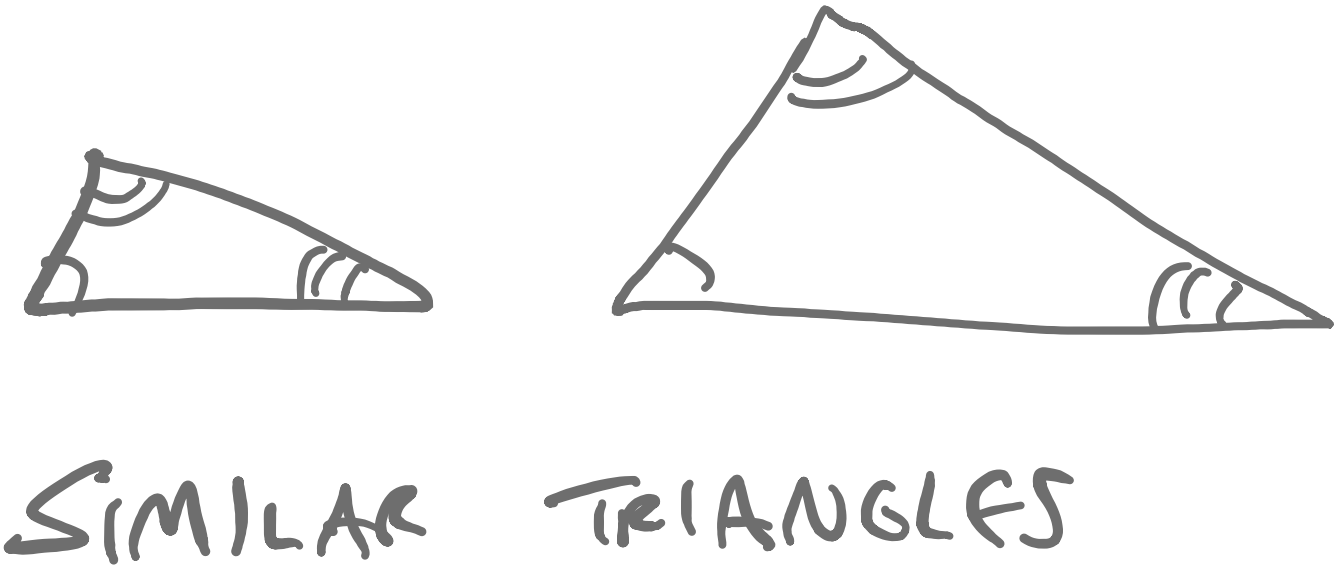
Discuss with your # partners

Do you think that AAA works as a shortcut?

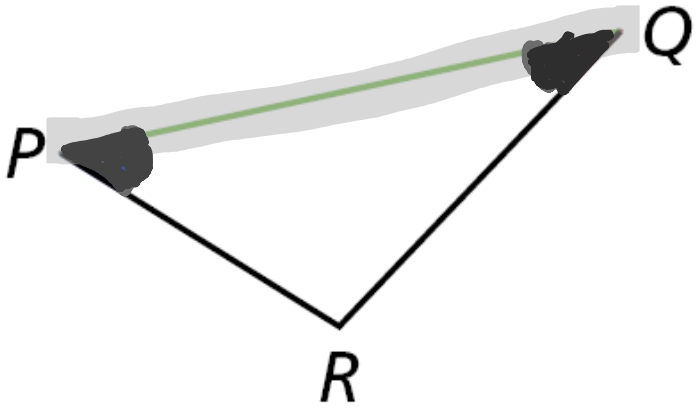
- In other words, if we know all of the angles of two triangles are congruent, do we know that the two triangles are congruent?

AAA is not a shortcut!

Write down why it is not a shortcut.



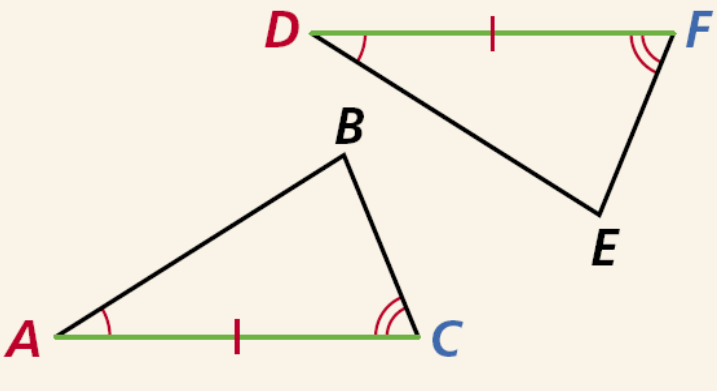
An **included side** is the common side of two consecutive angles in a polygon. The following postulate uses the idea of an included side.



$\overline{PQ}$ is the included side of $\angle P$ and $\angle Q$.

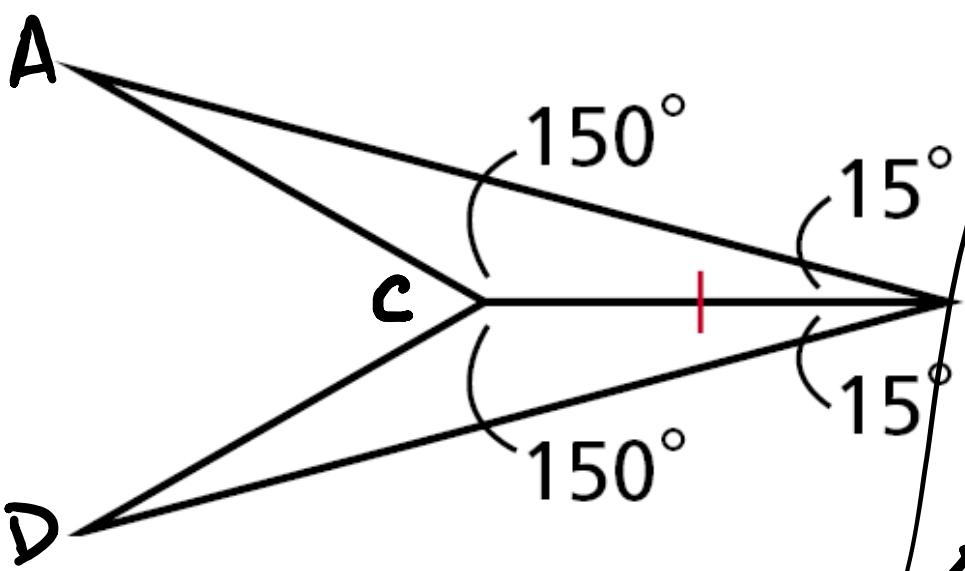
ASA Congruence

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



$\triangle ABC \cong \triangle DEF$

Example of ASA Congruence



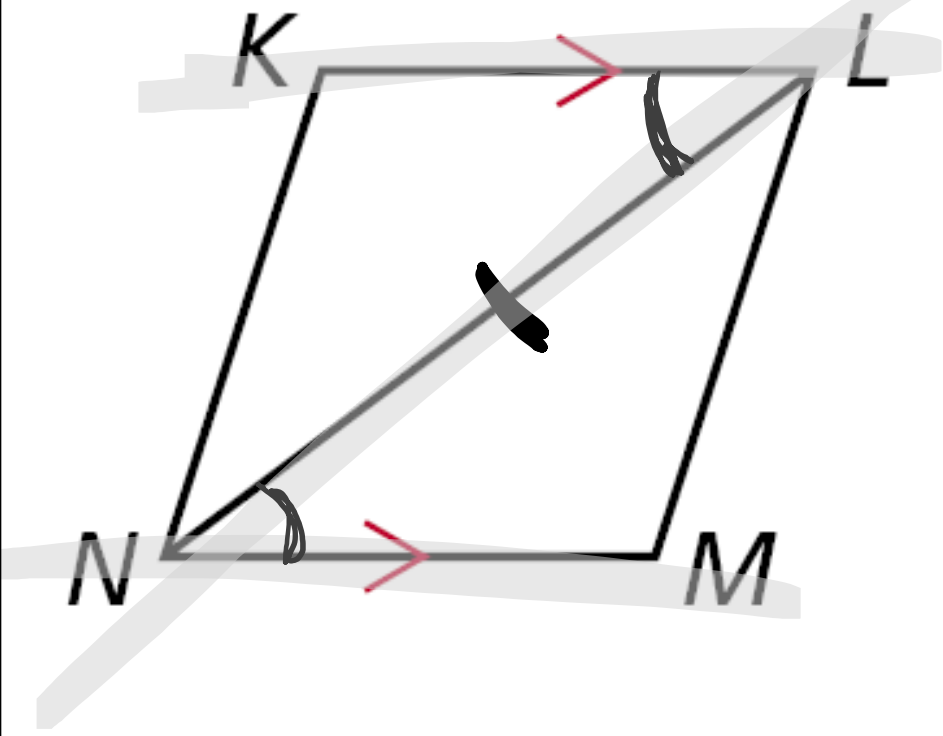
A $\angle ACB \cong \angle BCD$ Given

S $\overline{CB} \cong \overline{CB}$ Reflexive Property

A $\angle ABC \cong \angle DBC$ Given

$\triangle ACB \cong \triangle DCB$ ASA

Determine if you can use ASA to prove $\Delta NKL \cong \Delta LMN$. Explain.



$\angle KLN \cong \angle MNL$

A — Alt Interior Ls

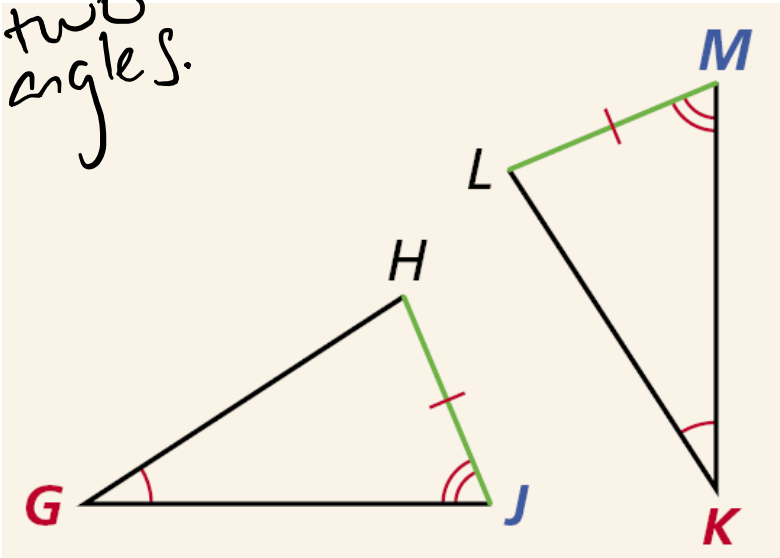
S — $\overline{LN} \cong \overline{LN}$ Reflexive Prop

A — X

AAS Congruence

not between the two angles.

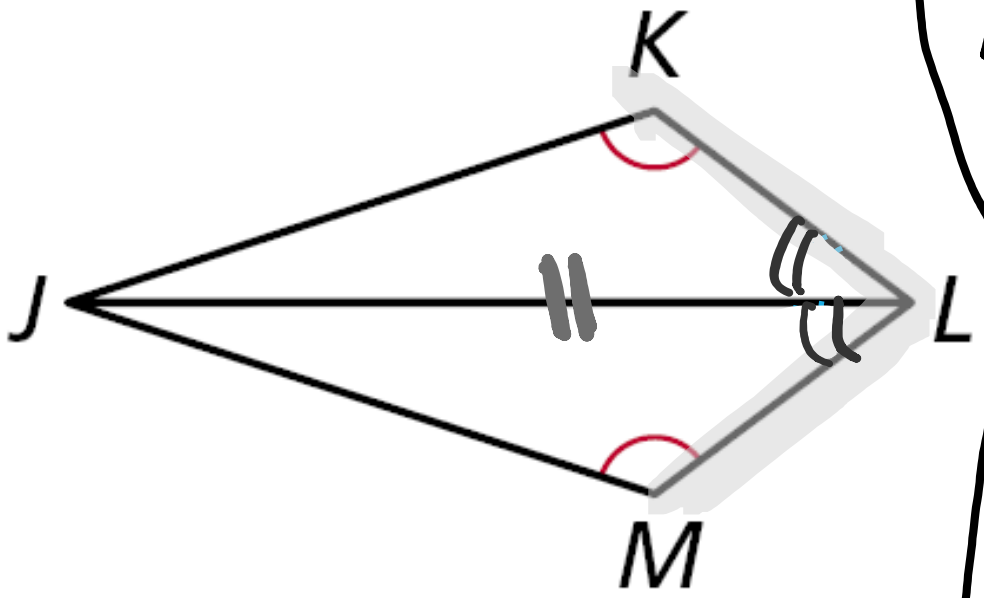
If two angles and a nonincluded side of one triangle are congruent to the corresponding angles and nonincluded side of another triangle, then the triangles are congruent.



$\triangle GHJ \cong \triangle KLM$

Example of AAS Congruence

Given: $\overline{JL}$ bisects $\angle KLM$

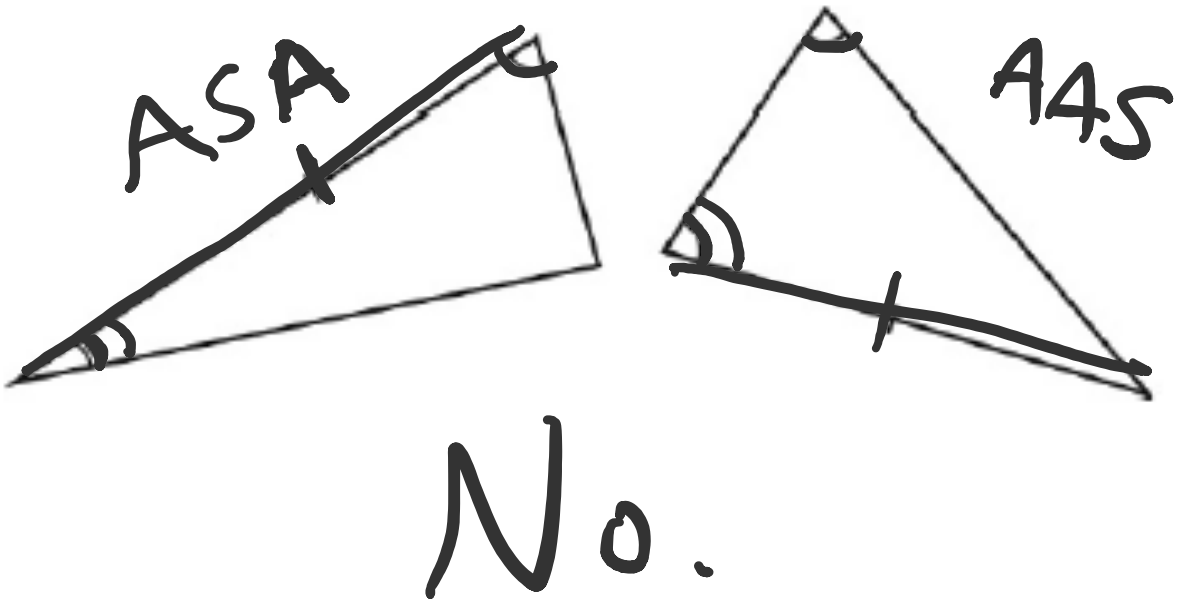


A $\angle K \cong \angle M$ Given

A $\angle JLM \cong \angle JLK$ def of $\angle$ bisector

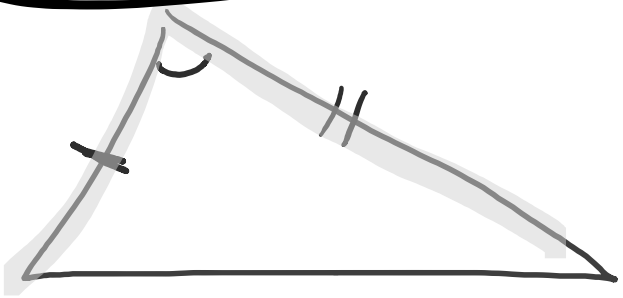
S $\overline{JL} \cong \overline{JL}$ Reflexive Property

Determine if you can use AAS to prove that the triangles are congruent.

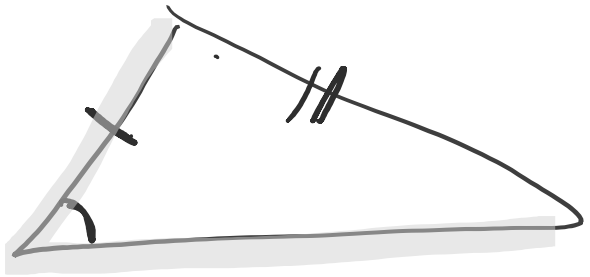


works a shortcut	doesn't work as a shortcut
SSS SAS HL ASA AAS / SAA	AAA SSA / ASS

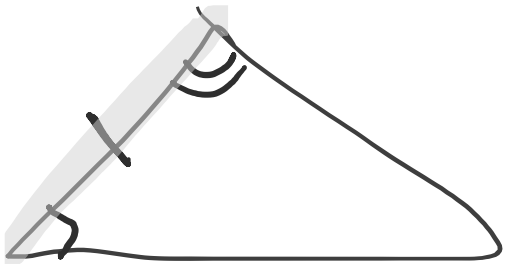
SAS



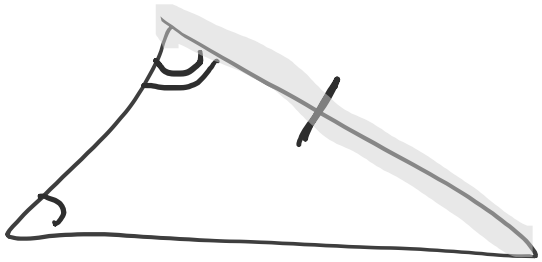
SSA



ASA



AAS



Homework

ASA pg. 1007-1008 (3-6)

AAS pg. 1060 (1-7)