Proving Triangles are Congruent by SAS & ASA

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Overview This math worksheet provides model problems, practice proofs and an engaging activity on the topic of proving triangles are congruent by the Side Angle Side postulate and the Angle Side Angle Postulate. Answers to most of these worksheet questions can be found in PowerPoint style demonstrations at the following URLS:

1) http://www.mathwarehouse.com/geometry/congruent_triangles/side-angle-side-postulate.php

2) http://www.mathwarehouse.com/geometry/congruent_triangles/angle-side-angle-postulate.php

An overview of how to prove triangles are congruent can be found at:
http://www.mathwarehouse.com/geometry/congruent_triangles/

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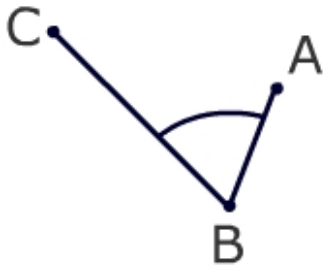
Warm Up Activity:

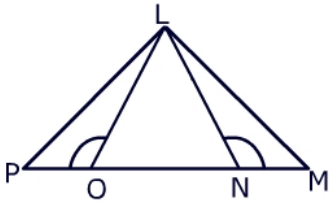
Below is a partially drawn triangle and $\overline{AB} = 2, \overline{CB} = 1, \angle ABC = 55$.

1) Draw the final leg of the triangle ($\overline{AC}$).
2) How many different triangles could you create when you connected A and C?



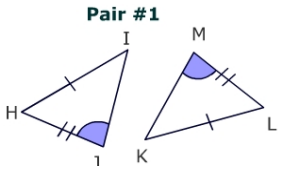
Below is another partially drawn triangle. In this case, AB has been drawn and two angles have been created. If you extend two sides from $\angle a$ and $\angle b$, how many different triangles can you create?

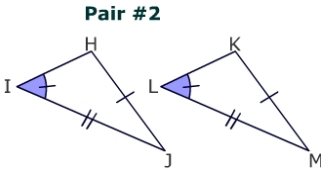
Based on the picture on the right, what is true about $\angle LOM$ and $\angle LNP$ **?**

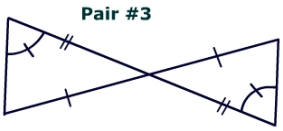


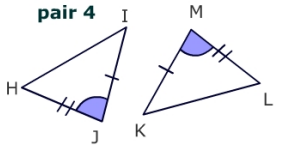
Identify SAS

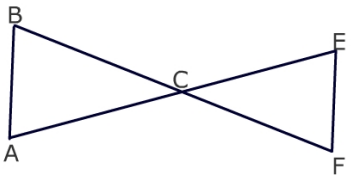
1. Which pair of triangles below illustrates the SAS postulate?











Model Practice Proof

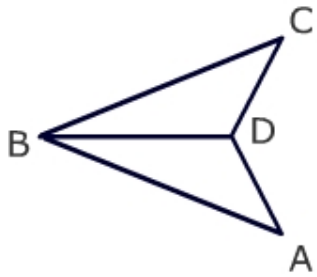
Given 1) C is the midpoint of $\overline{BF}$

2) $\overline{AC} \cong \overline{CE}$

Statement	Reason
1) $\overline{AC} \cong \overline{CE}$	
2) $\angle ACB = \angle ECF$	
3) $\overline{BC} \cong \overline{CF}$	
4) $\Delta ABC \cong \Delta EFC$	

Proof #1) **Given:** 1) BD bisects $\angle CDA$ 2) $\overline{CD} \cong \overline{DA}$

Prove: $\Delta BCD \cong \Delta BAD$

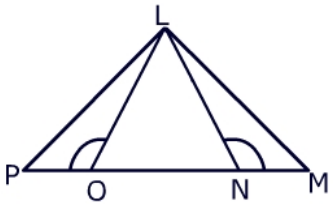


Statement **Reason**

Proof #2) Given $\angle POL \cong \angle MNL$, $\overline{PO} \cong \overline{NM}$, $\overline{PL} \cong \overline{LM}$

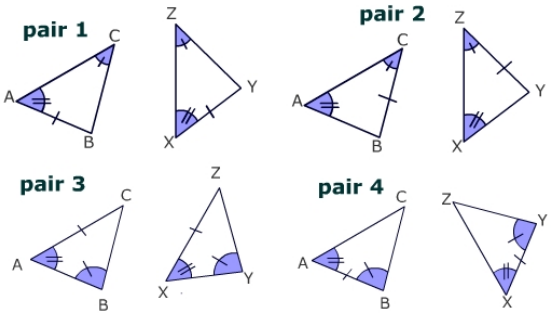
Prove: $\Delta PLN \cong \Delta MLO$

Statement **Reason**

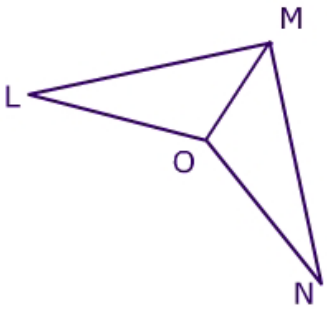


Identify Angle Side Angle Relationships

1) Which pair of triangles on the right illustrates a side angle side relationship?



Proof #3)



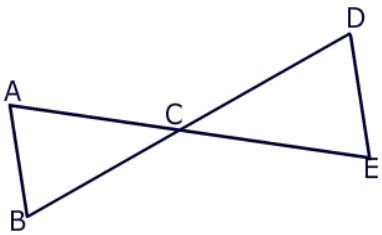
Given

$\overline{OM}$ bisects $\angle LMN$

$\angle LOM = \angle NOM$

Prove: $\Delta LMO \cong \Delta NMO$

Proof #4)



Given

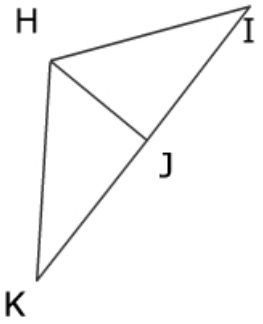
$\angle BAC = \angle DEC$

$\overline{BD}$ bisects $\overline{AE}$

Prove: $\Delta ACB \cong \Delta DCE$

Proof #5) **Given** $\overline{HJ}$ is a perpendicular bisector of $\overline{KI}$

Prove: $\Delta HJK \cong \Delta HJI$



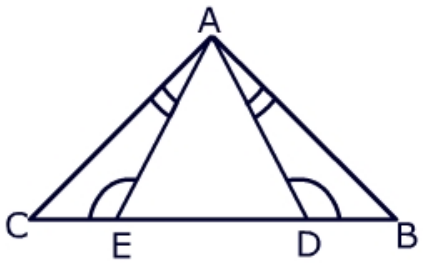
Activity Below is the proof that two triangles are congruent by Side Angle Side. Draw two triangles, ΔBCA and ΔXCY, whose diagram is consistent with the proof below.

Statement	Reason
1) c is midpoint of $\overline{BX}$	1) Given
2) c is midpoint of $\overline{AY}$	2) Given
3) $\overline{BC} = \overline{XC}$	3) definition of midpoint
4) $\overline{CA} = \overline{CY}$	4) definition of midpoint
5) $\angle BCA \cong \angle XCY$	5) Vertical angles are congruent
$\Delta BCA \cong \Delta XCY$	**by SAS**

Proof #6)

Given: $\angle CAE \cong \angle BAD,\ \angle ADB \cong \angle AEC,\ \overline{AE} \cong \overline{AD}$

Prove: $\Delta CAD \cong \Delta BAE$



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