Geometry A

4.5 : Prove Triangles Congruent by ASA, AAS

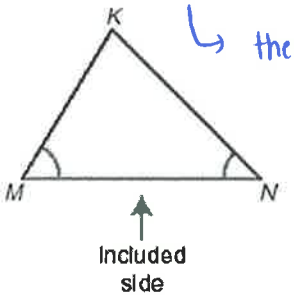
Name: Key

Date: _____ Period: _____

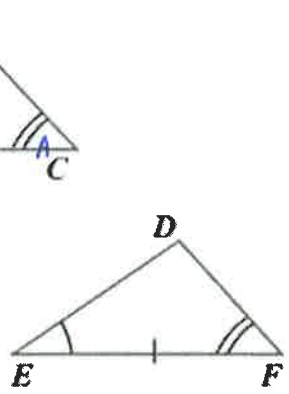
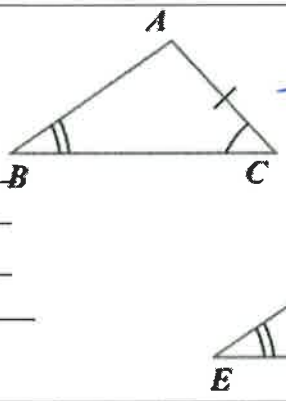
- I can use sides and angles to prove congruent.
  - ➢ I can prove triangles congruent using ASA.
  - ➢ I can prove triangle congruent using AAS.

Vocabulary:

An **included side** is the side that links two angles together. In the diagram below, $\overline{MN}$ is the included side of $\angle M$ and $\angle N$.



↳ the side that connects the two marked angles

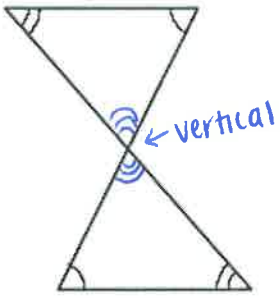
ASA Congruence Theorem (ASA) If two angles and the included side of one triangle are congruent to two angles and the included side of a second triangle, then the two triangles are congruent.	**Example:**  If **Angle** $\angle B \cong$ $\angle E$ **Side** $\overline{BC} \cong$ $\overline{EF}$ **Angle** $\angle C \cong$ $\angle F$ then, $\Delta ABC \cong \Delta$ DEF by ASA
AAS Congruence Theorem (AAS) If two angles and the non-included side of one triangle are congruent to two angles and the corresponding non-included side of a second triangle, then the two triangles are congruent.	**Example:**  If **Angle** $\angle C \cong$ _____ **Angle** $\angle B \cong$ _____ **Side** $\overline{AC} \cong$ _____ then $\Delta ABC \cong \Delta$_____

the side does not connect the two marked angles

Example 1: Identify Congruent Triangles

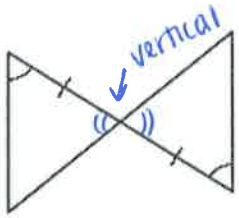
Can the triangles be proven congruent based on the given information in the diagram? If so, state the postulate or theorem you would use. If not, why not?

a)



not enough info; no sides are marked

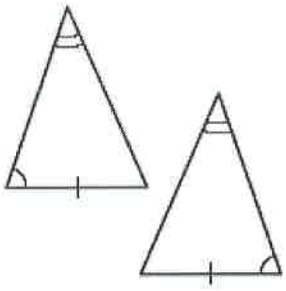
b)



Yes, by ASA

The side connects the two marked angles

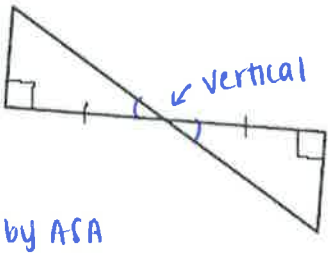
c)



Yes, by AAS

The side does not connect the marked angles

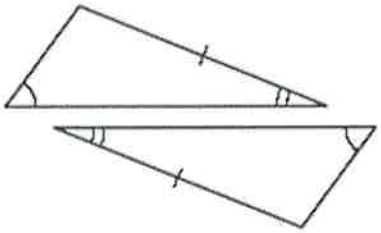
d)



Yes, by ASA

the side connects the two angles

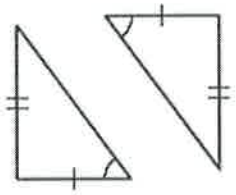
e)



Yes, by AAS

the side does not connect the two angles

f)

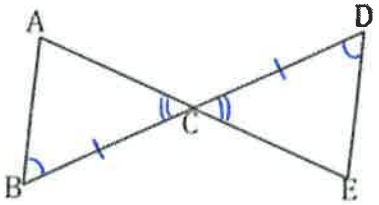


not enough info; no SSA congruence

Example 2: Proofs involving ASA and AAS

a) **Given:** $\overline{AE}$ bisects $\overline{BD}$; $\angle B \cong \angle D$ → $\overline{AE}$ is splitting $\overline{BD}$ in half

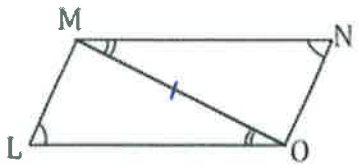
Prove:



Statements	Reasons
1. $\overline{AE}$ bisects $\overline{BD}$	1. Given
2. $\overline{BC} \cong \overline{DC}$	2. Def. of segment bisector
3. $\angle B \cong \angle D$	3. Given
4. $\angle ACB \cong \angle ECD$	4. VAT
5. $\triangle ABC \cong \triangle EDC$	5. ASA

↳ the side connects the marked angles

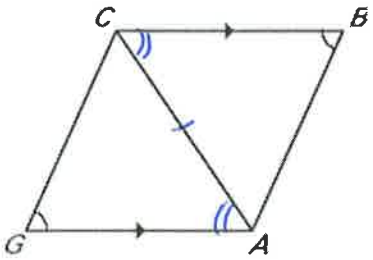
b) **Given:** $\overline{MN} \parallel \overline{LO}$, $\angle L \cong \angle N$
Prove: $\Delta LMO \cong \Delta NOM$



Statements	Reasons
1. $\overline{MN} \parallel \overline{LO}$	1. Given
2. $\angle NMO \cong \angle LOM$	2. Alt. Int. Angles Theorem
3. $\angle L \cong \angle N$	3. Given
4. $\overline{MO} \cong \overline{MO}$	4. Reflexive Property
5. $\Delta LMO \cong \Delta NOM$	5. AAS

↳ side does not connect the two angles

c) **Given:** $\angle G \cong \angle B$, $\overline{CB} \parallel \overline{GA}$ → think angle pairs
Prove: $\Delta GCA \cong \Delta BAC$

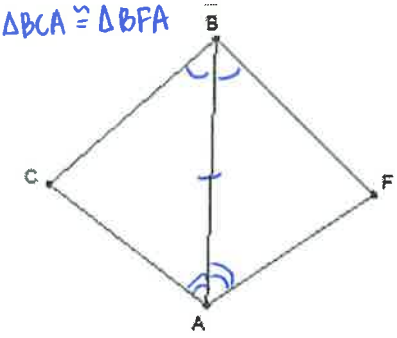


Statements	Reasons
1. $\angle G \cong \angle B$	1. Given
2. $\overline{CB} \parallel \overline{GA}$	2. Given
3. $\angle BCA \cong \angle GAC$	3. Alt. Int. Angles Theorem
4. $\overline{AC} \cong \overline{AC}$	4. Reflexive Property
5. $\Delta GCA \cong \Delta BAC$	5. AAS

↳ side does not connect the two angles

d) A zoo keeper wants to make sure that the triangular pens for her animals are the same size. Prove the two triangular areas are congruent if $\overline{BA}$ bisects $\angle CBF$ and $\angle CAF$. ← Given

Prove: $\Delta BCA \cong \Delta BFA$



Statements	Reasons
1. $\overline{BA}$ bisects $\angle CBF$	1. Given
2. $\angle CBA \cong \angle FBA$	2. Def. of angle bisector
3. $\overline{BA}$ bisects $\angle CAF$	3. Given
4. $\angle CAB \cong \angle FAB$	4. Def. of angle bisector
5. $\overline{AB} \cong \overline{AB}$	5. Reflexive Prop.
6. $\Delta BCA \cong \Delta BFA$	6. ASA