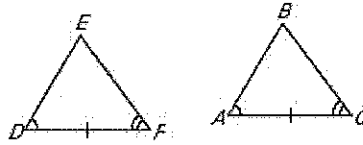


5.3 Prove Triangles Congruent by ASA and AAS

ANGLE-SIDE-ANGLE Congruence Postulate (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.

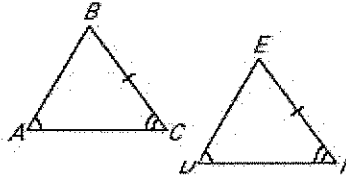


If Angle $\angle A \cong \angle D$
 Side $\overline{AC} \cong \overline{DF}$
 Angle $\angle C \cong \angle F$,

Then $\triangle DEF \cong \triangle BAC$

ANGLE-ANGLE-SIDE Congruence Theorem (AAS)

If two angles and a 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.



If Angle $\angle A \cong \angle D$
 Angle $\angle C \cong \angle F$
 Side $\overline{BC} \cong \overline{EF}$,

Then _____ \cong _____

Example 1: Can the triangles be proven congruent with the information given in the diagram? If so, write a congruence statement and state the postulates/theorems used to reach your conclusion.

| | | |
|--------------------------|-------------------------|---------------------------|
| <p>a.</p> <p>YES AAS</p> | <p>b.</p> <p>NO AAA</p> | <p>c.</p> <p>YES, ASA</p> |
|--------------------------|-------------------------|---------------------------|

Example 2: Proving Triangles similar using ASA and AAS

| <p>1. Given: $\angle D \cong \angle R$; $\overline{OR} \parallel \overline{DM}$ Prove: $\triangle DOM \cong \triangle RMO$</p> | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Statements</th> <th style="text-align: center;">Reasons</th> </tr> </thead> <tbody> <tr> <td>1. $\angle D \cong \angle R$; $\overline{OR} \parallel \overline{DM}$</td> <td>1. GIVEN</td> </tr> <tr> <td>2. $\angle DOM \cong \angle RMO$</td> <td>2. ALT. INT. \angles</td> </tr> <tr> <td>3. $\overline{OM} \cong \overline{OM}$</td> <td>3. REFLEXIVE PROP.</td> </tr> <tr> <td>4. $\triangle DOM \cong \triangle RMO$</td> <td>4. AAS</td> </tr> </tbody> </table> | Statements | Reasons | 1. $\angle D \cong \angle R$; $\overline{OR} \parallel \overline{DM}$ | 1. GIVEN | 2. $\angle DOM \cong \angle RMO$ | 2. ALT. INT. \angle s | 3. $\overline{OM} \cong \overline{OM}$ | 3. REFLEXIVE PROP. | 4. $\triangle DOM \cong \triangle RMO$ | 4. AAS | |
|---|--|------------|---------|---|----------|--|-------------------------|--|--------------------|--|--------|--|
| Statements | Reasons | | | | | | | | | | | |
| 1. $\angle D \cong \angle R$; $\overline{OR} \parallel \overline{DM}$ | 1. GIVEN | | | | | | | | | | | |
| 2. $\angle DOM \cong \angle RMO$ | 2. ALT. INT. \angle s | | | | | | | | | | | |
| 3. $\overline{OM} \cong \overline{OM}$ | 3. REFLEXIVE PROP. | | | | | | | | | | | |
| 4. $\triangle DOM \cong \triangle RMO$ | 4. AAS | | | | | | | | | | | |
| <p>2. Given: $\angle BHL \cong \angle AHL$; \overline{LH} bisects $\angle BLA$ Prove: $\triangle BLH \cong \triangle ALH$</p> | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Statements</th> <th style="text-align: center;">Reasons</th> </tr> </thead> <tbody> <tr> <td>1. $\angle BHL \cong \angle AHL$; \overline{LH} bisects $\angle BLA$</td> <td>1. GIVEN</td> </tr> <tr> <td>2. $\overline{LH} \cong \overline{LH}$</td> <td>2. REFLEXIVE PROP.</td> </tr> <tr> <td>3. $\triangle BLH \cong \triangle ALH$</td> <td>3. ASA</td> </tr> </tbody> </table> | Statements | Reasons | 1. $\angle BHL \cong \angle AHL$; \overline{LH} bisects $\angle BLA$ | 1. GIVEN | 2. $\overline{LH} \cong \overline{LH}$ | 2. REFLEXIVE PROP. | 3. $\triangle BLH \cong \triangle ALH$ | 3. ASA | | | |
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| 3. $\triangle BLH \cong \triangle ALH$ | 3. ASA | | | | | | | | | | | |

Skills Practice

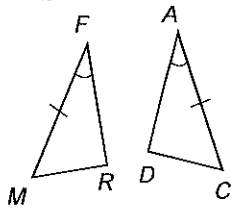
ASA and AAS

Write a congruence statement for each pair of triangles represented.

- In $\triangle ABC$ and $\triangle ZXR$, $\angle C \cong \angle X$, $\angle A \cong \angle Z$, and $\overline{AB} \cong \overline{ZR}$. $\triangle ABC \cong \triangle ZRX$
- In $\triangle DEF$ and $\triangle BGO$, $\angle D \cong \angle B$, $\angle E \cong \angle O$, and $\overline{DE} \cong \overline{BO}$. $\triangle DEF \cong \triangle BOG$
- In $\triangle TRI$ and $\triangle GAN$, $\angle T \cong \angle A$, $\overline{TI} \cong \overline{AG}$, and $\overline{TR} \cong \overline{AN}$. $\triangle TRI \cong \triangle ANG$
- In $\triangle ZIP$ and $\triangle LOS$, $\angle P \cong \angle O$, $\angle I \cong \angle L$, and $\overline{PI} \cong \overline{OL}$. $\triangle ZIP \cong \triangle SLO$

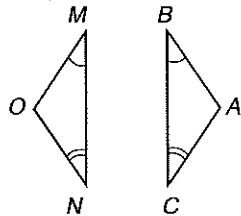
Name the additional congruent parts needed so that the triangles are congruent by the postulate or theorem indicated.

5. AAS



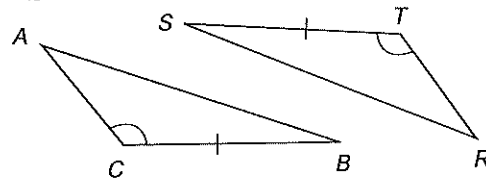
$$\angle R \cong \angle D$$

7. AAS



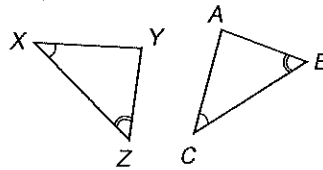
$$\overline{ON} \cong \overline{AC} \text{ or } \overline{MO} \cong \overline{BA}$$

6. ASA



$$\angle S \cong \angle B$$

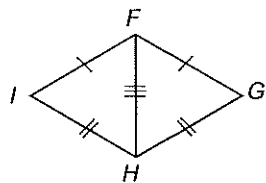
8. ASA



$$\overline{XZ} \cong \overline{BC}$$

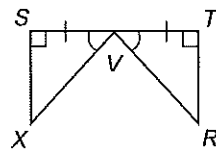
Determine whether each pair of triangles is congruent by SSS, SAS, ASA, or AAS. If it is not possible to prove that they are congruent, write not possible.

9.



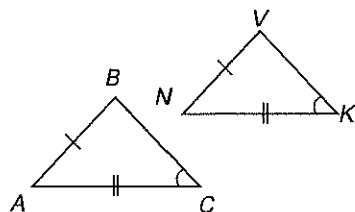
SSS

10.



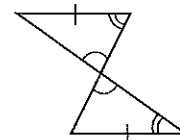
ASA

11.



not possible

12.



AAS