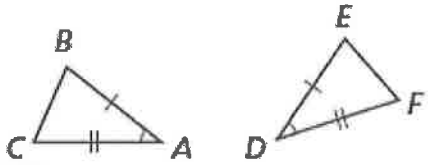
5.3 Proving Triangles Congruent by SAS

Theorem

Theorem 5.5 Side-Angle-Side (SAS) Congruence Theorem

If two sides and the included angle of one triangle are congruent to two sides and the included angle of a second triangle, then the two triangles are congruent.

If $\overline{AB} \cong \overline{DE}$, $\angle A \cong \angle D$, and $\overline{AC} \cong \overline{DF}$, then $\triangle ABC \cong \triangle DEF$.



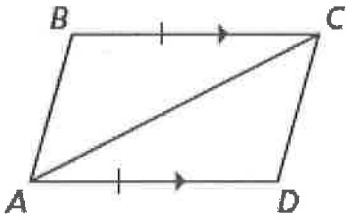
Proof p. 246

Essential Question

Write a proof.

Given $\overline{BC} \cong \overline{DA}$, $\overline{BC} \parallel \overline{AD}$

Prove $\triangle ABC \cong \triangle CDA$

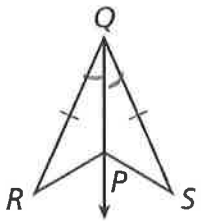


S	R
$\overline{BC} \cong \overline{DA}$	Given
$\overline{BC} \parallel \overline{AD}$	Given
$\angle BCA \cong \angle CAD$	Alt. Int $\angle$'s Thm
$\overline{AC} \cong \overline{AC}$	Reflexive POC
$\triangle ABC \cong \triangle CDA$	SAS

Example 1

Given: $\overline{QP}$ bisects $\angle RQS$. $\overline{QR} \cong \overline{QS}$

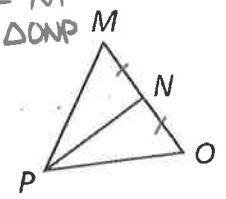
Prove: $\Delta RQP \cong \Delta SQP$



S	R
① $\overline{QP}$ bisects $\angle RQS$	Given
$\angle RQP \cong \angle SQP$	Def. of Bisects
$\overline{QR} \cong \overline{QS}$	Given
$\overline{QP} \cong \overline{QP}$	Reflexive POC
$\Delta RQP \cong \Delta SQP$	SAS

4. Given: $\overline{PN}$ bisects $\overline{MO}$, $PN \perp MO$

Prove: $\Delta MNP \cong \Delta ONP$



S	R
② PN bisects MO	Given
$\overline{MN} \cong \overline{NO}$	Def. of bisect
$\overline{PN} \perp \overline{MO}$	Given
$\angle PNM$ and $\angle PNO$ are right $\angle$'s	Def. of $\perp$
$\angle PNM \cong \angle PNO$	Right $\angle \cong$ Thm
$\overline{NP} \cong \overline{NP}$	Reflexive POC
$\Delta MNP \cong \Delta ONP$	SAS

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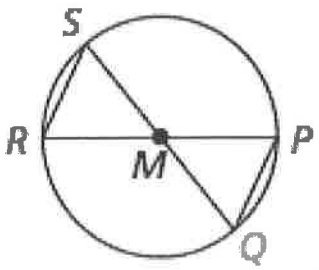
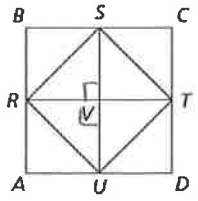
In the diagram, $\overline{QS}$ and $\overline{RP}$ pass through the center M of the circle. What can you conclude about $\triangle MRS$ and $\triangle MPQ$?



$\triangle MRS$ is $\cong$ to $\triangle MPQ$ because of vertical $\angle$'s at $\angle SMR$ and $\angle PMQ$ and since $\overline{SM}$, $\overline{MQ}$, $\overline{MP}$, and $\overline{MR}$ are all radii, they are $\cong$. This gives you enough to prove the $\triangle$'s $\cong$ by SAS

Example 2

In the diagram, *ABCD* is a square with four congruent sides and four right angles. *R*, *S*, *T*, and *U* are the midpoints of the sides of *ABCD*. Also, $\overline{RT} \perp \overline{SU}$ and $\overline{SV} \cong \overline{VU}$.



1. Prove that $\triangle SVR \cong \triangle UVR$.

~~2. Prove that BCR ≅ DUT.~~

S	R
① $\overline{RT} \perp \overline{SU}$	Given
$\angle SVR$ + $\angle UVR$ are right $\angle$'s	Def. of $\perp$
$\angle SVR \cong \angle UVR$	Right $\angle \cong$ Thm
$\overline{SV} \cong \overline{VU}$	Given
$\overline{VR} \cong \overline{VR}$	Reflexive POC
$\triangle SVR \cong \triangle UVR$	SAS

Monitoring Progress 1-2

Homework

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Closure