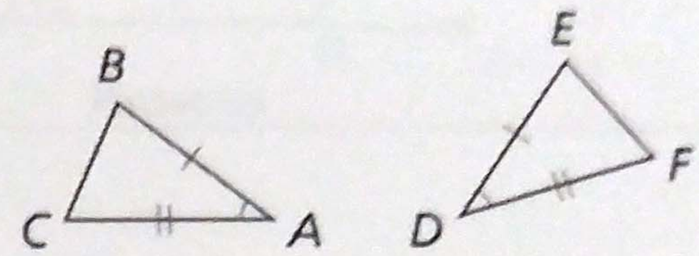
Geometry 5.3 Notes: Side-Angle-Side Triangle Congruence

Side-Angle-Side Congruence Theorem (SAS ≅ **)**

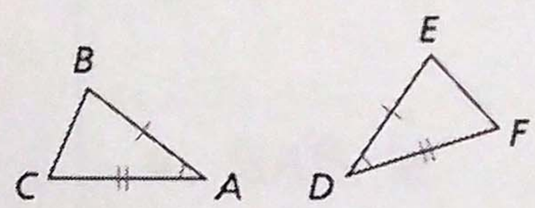
two sides and the INCLUDED angle of one triangle are ≅ to two sides and the INCLUDED angle of a second triangle, then the two triangles are ≅.



* Included means BETWEEN TWO SETS OF CONGRUENT SIDES.

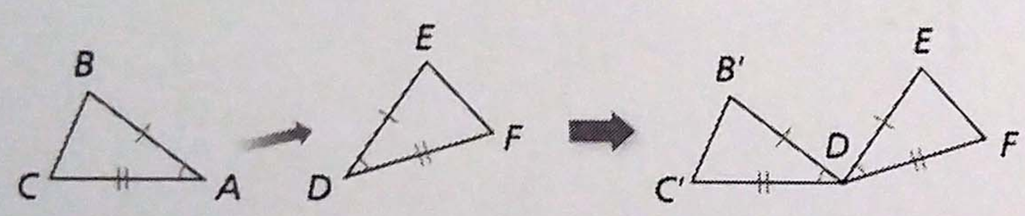
PROOF: Use transformations to prove why the two triangles are congruent.

1. **Given:** $\overline{AB} \cong \overline{DE}$, $\angle A \cong \angle D$, $\overline{AC} \cong \overline{DF}$
   Prove: $\Delta ABC \cong \Delta DEF$



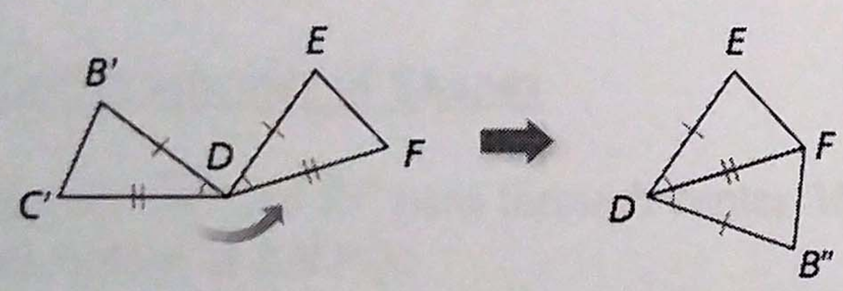
A VARIETY OF TRANSFORMATIONS

2.



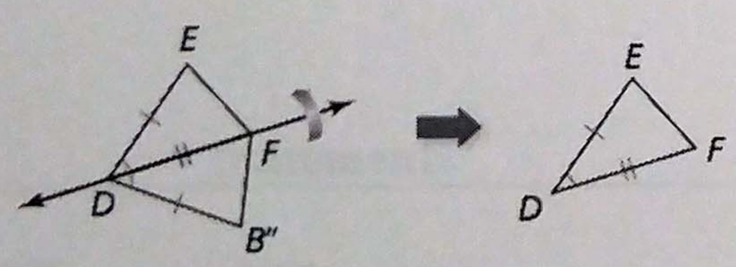
TRANSLATION (SLIDE/MOVE)

3.



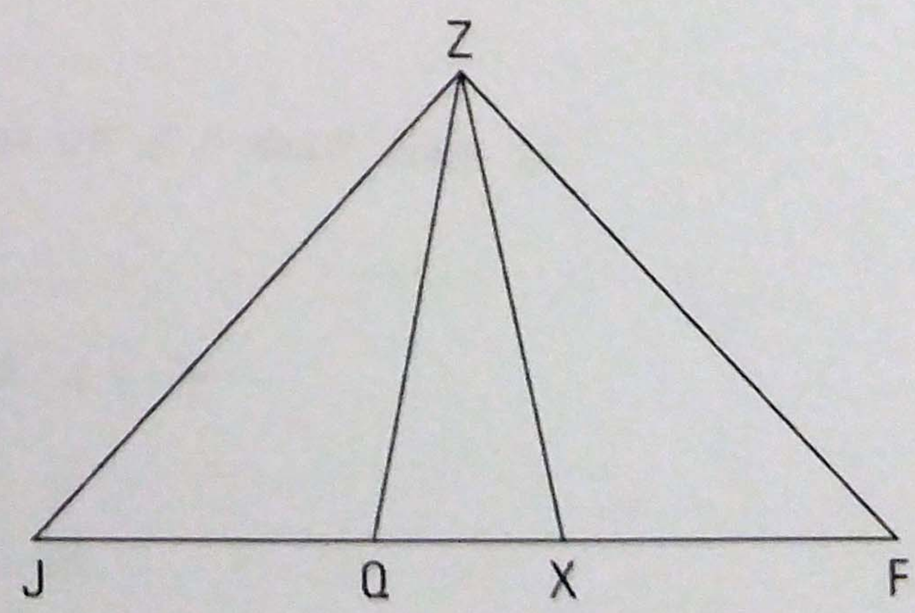
ROTATION

4.



REFLECTION (FLIP/MIRROR)

Name the included angle between the pair of sides given:



5. $\overline{QZ}$ and $\overline{ZF}$ $\angle QZF$

6. $\overline{JQ}$ and $\overline{ZQ}$ $\angle JQZ$

7. $\overline{QZ}$ and $\overline{QX}$ $\angle ZQX$

Given a side and the included angle, name the other side:

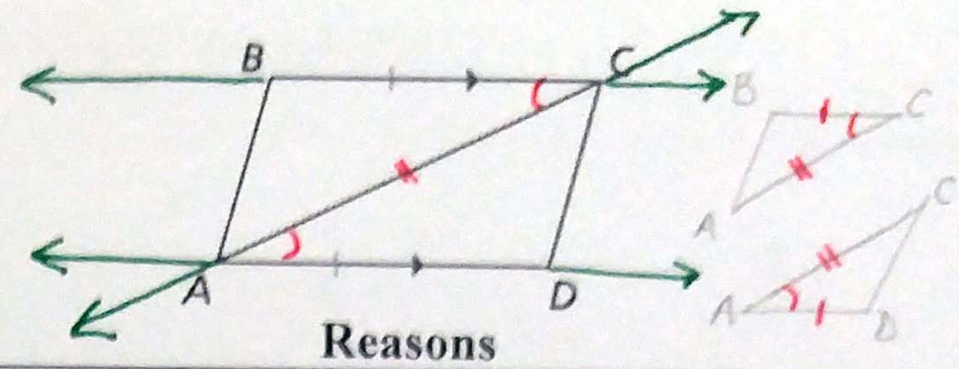
8. $\overline{ZJ}$ and $\angle J$
   $\overline{ZJ}$ and $\angle ZJQ$ $\overline{JQ}$

9. $\overline{XZ}$ and $\angle ZXF$ $\overline{XF}$

ne SAS ≅ Theorem

Write a two-column proof.

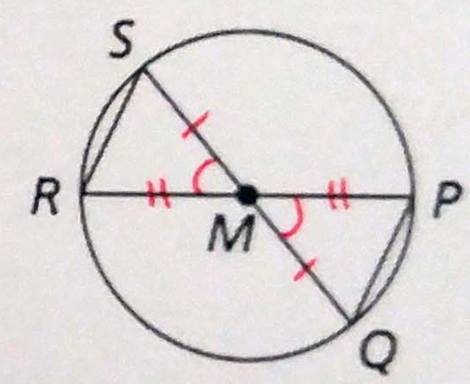
Given: $\overline{BC} \cong \overline{DA}$, $\overline{BC} \parallel \overline{DA}$
Prove: $\Delta ABC \cong \Delta CDA$



Statements	Reasons
1. $\overline{BC} \cong \overline{DA}$ $\overline{BC} \parallel \overline{DA}$	1. GIVEN
2. $\overline{AC} \cong \overline{AC}$	2. REFLEXIVE PROP. OF ≅
// LINES SO ... ALT. INT. ∠S → 3. $\angle BCA \cong \angle DAC$	3. ALT. INT. ∠S
4. $\Delta ABC \cong \Delta CDA$	4. SAS ≅

Using SAS and Properties of Shapes

1. In the diagram, $\overline{QS}$ and $\overline{RP}$ pass through center M of the circle. Prove that $\Delta MRS \cong \Delta MPQ$.



Statements	Reasons
1. $\overline{QS}$ AND $\overline{RP}$ PASS THROUGH CENTER M OF THE CIRCLE	1. GIVEN
2. $\overline{SM} \cong \overline{MQ}$ $\overline{RM} \cong \overline{MP}$	2. RADII OF A CIRCLE ARE ≅
3. $\angle SMR \cong \angle QMP$	3. VERT. ∠S ≅
4. $\Delta MRS \cong \Delta MPQ$	4. SAS ≅