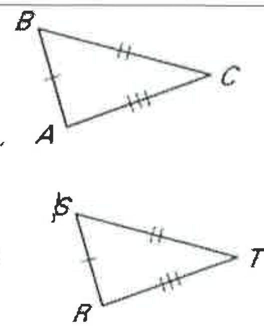
Geometry H
4.3: Prove Triangles Congruent by SSS

Name: Key
Date: ____________

LEARNING TARGETS

- I can prove triangles congruent using SSS Postulate.

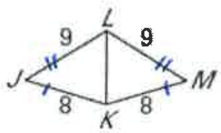
Side-Side-Side Congruence Postulate (SSS)	Example:
If three sides of one triangle are congruent to three sides of a second triangle, then the two triangles are congruent.	If Side $\overline{AB} \cong \overline{RS}$, Side $\overline{BC} \cong \overline{ST}$, and Side $\overline{CA} \cong \overline{TR}$, then $\triangle ABC \cong \triangle RST$. by SSS 

EXAMPLE 1 – Use the SSS Congruence Postulate

Decide whether the congruence statement is true. Explain your reasoning.

a) $\triangle JKL \cong \triangle MKL$

Yes, true by SSS



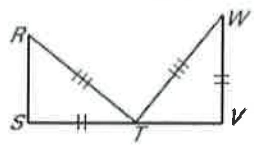
$\overline{JK} \cong \overline{MK}$

$\overline{JL} \cong \overline{ML}$

$\overline{LK} \cong \overline{LK}$ by reflexive property

b) $\triangle RST \cong \triangle TVW$

Not enough info

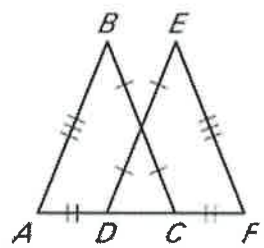


$\overline{RT} \cong \overline{WT}$

$\overline{ST} \cong \overline{WV}$

$\overline{RS} \overset{?}{\cong} \overline{TV}$ ← can't assume sides are $\cong$

c) $\triangle ABC \cong \triangle FED$



$\overline{AB} \cong \overline{EF}$

$\overline{BC} \cong \overline{ED}$

$\overline{AC} \cong \overline{FD}$

↓

b/c $\overline{AD} \cong \overline{FC}$ and $\overline{DC} \cong \overline{DC}$

Reasons to prove sides are congruent in triangle proofs:

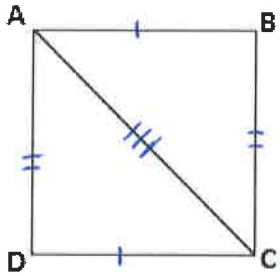
- Givens
- Reflexive Property
- Definition of Midpoint

Example 2 – Use the SSS Congruence Postulate to write a proof.

a. **Given:** $\overline{AB} \cong \overline{CD}, \overline{DA} \cong \overline{CB}$

* mark diagrams

Prove: $\Delta ABC \cong \Delta CDA$

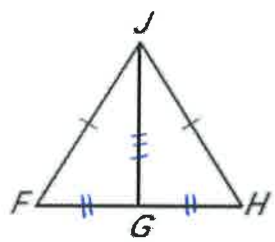


Statements	Reasons
1. $\overline{AB} \cong \overline{CD}$	1. Given
2. $\overline{DA} \cong \overline{CB}$	2. Given
3. $\overline{AC} \cong \overline{AC}$	3. Reflexive Property
4. $\Delta ABC \cong \Delta CDA$	4. SSS

b. **Given:** $\overline{FJ} \cong \overline{HJ}$

G is the midpoint of $\overline{FH}$

Prove: $\Delta FGJ \cong \Delta HGJ$



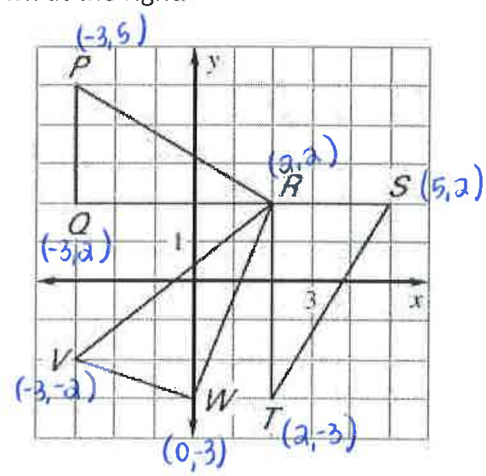
Statements	Reasons
1. $\overline{FJ} \cong \overline{HJ}$	1. Given
2. G is the midpoint of $\overline{FH}$	2. Given
3. $\overline{FG} \cong \overline{HG}$	3. Definition of midpoint
4. $\overline{JG} \cong \overline{JG}$	4. Reflexive Property
5. $\Delta FGJ \cong \Delta HGJ$	5. SSS

always go together

Example 3 – Congruent Triangles in the Coordinate Plane

a) Determine whether ΔPQR is congruent to the other triangles shown at the right.

Use distance formula to find the lengths of the sides:



PQ = 3   VW = $\sqrt{10}$ RS = 3

QR = 5   WR = $\sqrt{29}$ RT = 5

PR = $\sqrt{34}$ VR = $\sqrt{41}$ ST = $\sqrt{34}$

$PR = \sqrt{(2+3)^2+(2-5)^2} = \sqrt{(5)^2+(-3)^2} = \sqrt{25+9} = \sqrt{34}$

$VW = \sqrt{(0+3)^2+(-3+2)^2} = \sqrt{(3)^2+(-1)^2} = \sqrt{9+1} = \sqrt{10}$

$WR = \sqrt{(0-2)^2+(-3-2)^2} = \sqrt{(-2)^2+(-5)^2} = \sqrt{4+25} = \sqrt{29}$

$VR = \sqrt{(-3-2)^2+(-2-2)^2} = \sqrt{(-5)^2+(-4)^2} = \sqrt{25+16} = \sqrt{41}$

$ST = \sqrt{(2-5)^2+(-3-2)^2} = \sqrt{(-3)^2+(-5)^2} = \sqrt{9+25} = \sqrt{34}$

CONCLUSIONS:

since all sides are the same length in ΔPQR and ΔSRT, ΔPQR ≅ ΔSRT