4.4 Proving Congruence SSS, SAS

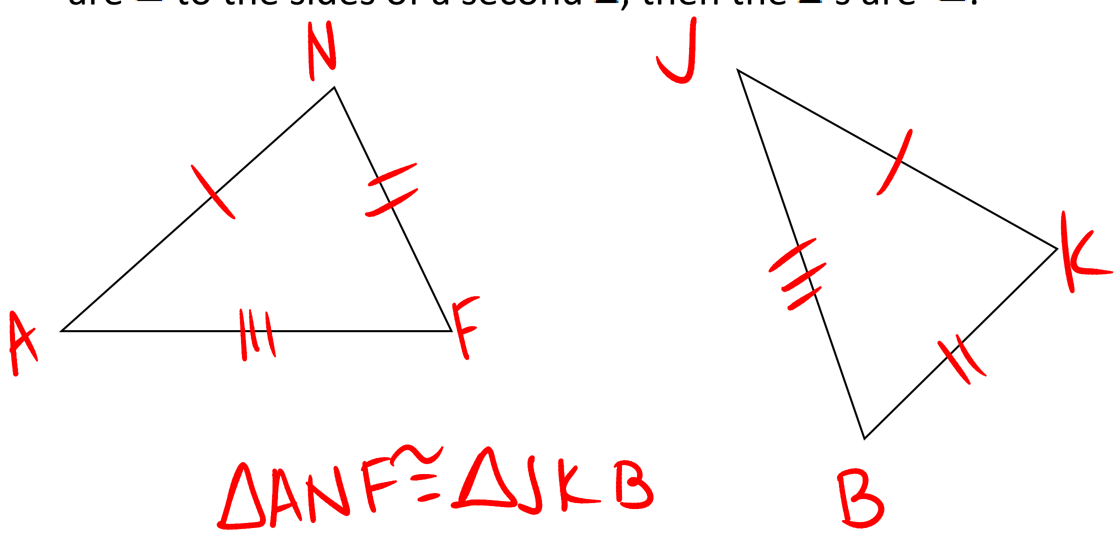
1. You learned CPCTC
2. But Now
    a. SSS
    b. SAS
    c. ASA
    d. AAS (same as SAA)

    Can all show congruence.

    e. SSA, AAA

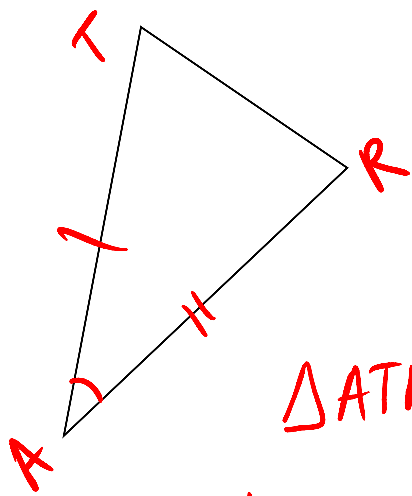
    Cannot show congruence

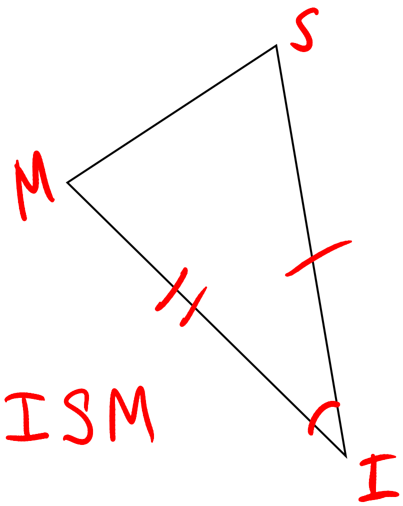
- <u>Side-Side-Side Congruence Postulate (SSS)</u>: If the sides of one Δ are $\cong$ to the sides of a second Δ, then the Δ's are $\cong$.



$\Delta ANF \cong \Delta JKB$

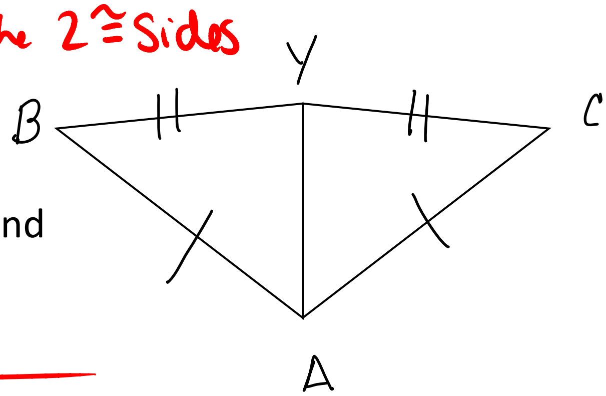
- <u>Side-Angle-Side Congruence Postulate (SAS)</u>: If two sides and the ***included** angle of one Δ are ≅ to two sides and the ***included** angle of a second Δ, then the Δ's are ≅.





ΔATR ≅ ΔISM

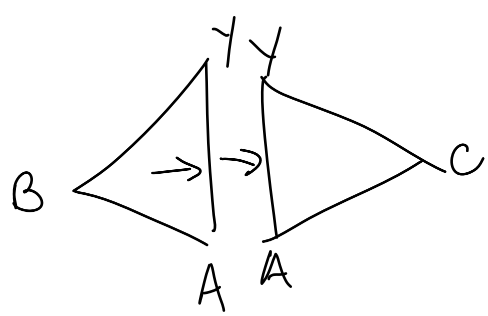
***included** angle: touching the 2 ≅ sides



Prove:

$\Delta BYA \cong \Delta CYA$ if $\overline{AB} \cong \overline{AC}$ and $\overline{BY} \cong \overline{CY}$.

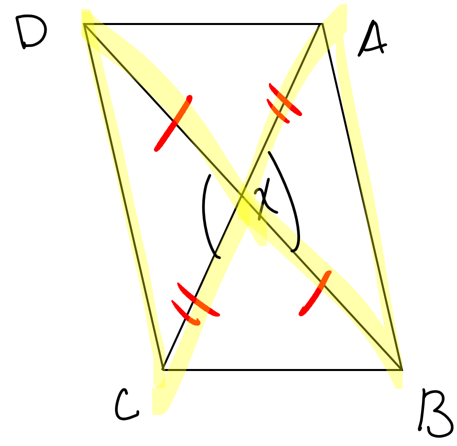
① $\overline{AB} \cong \overline{AC}$, ② $\overline{BY} \cong \overline{CY}$	given
③ $\overline{YA} \cong \overline{YA}$	reflexive prop.
$\Delta BYA \cong \Delta CYA$	SSS



Given: x is midpoint of $\overline{BD}$.

x is midpoint of $\overline{AC}$.

Prove: $\Delta DXC \cong \Delta BXA$



x is midpt $\overline{BD}$ x is midpt $\overline{AC}$	given
① $\overline{DX} \cong \overline{XB}$ ② $\overline{AX} \cong \overline{XC}$	midpt thm midpt thm
③ $\angle DXC \cong \angle BXA$ $\Delta DXC \cong \Delta BXC$	vertical ∠'s thm SAS

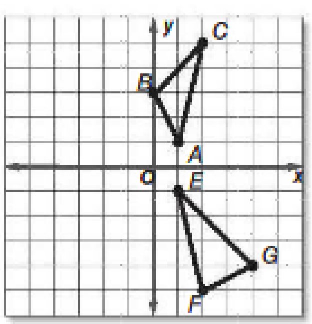
EXTENDED RESPONSE Triangle *ABC* has vertices *A*(1, 1), *B*(0, 3), and *C*(2, 5). Triangle *EFG* has vertices *E*(1, −1), *F*(2, −5), and *G*(4, −4).

a. Graph both triangles on the same coordinate plane.

b. Use your graph to make a conjecture as to whether the triangles are congruent. Explain your reasoning.

c. Write a logical argument using coordinate geometry to support the conjecture you made in part b.

a.



b. From the graph, it appears that the triangles do not have the same shape, so we can conjecture that they are not congruent.

c. Use the Distance Formula to show that not all corresponding sides have the same measure.

$AB = \sqrt{(0-1)^2 + (3-1)^2}$

$= \sqrt{1+4}$ or $\sqrt{5}$

$EF = \sqrt{(2-1)^2 + [-5-(-1)]^2}$

$= \sqrt{1+16}$ or $\sqrt{17}$

$BC = \sqrt{(2-0)^2 + (5-3)^2}$

$= \sqrt{4+4}$ or $\sqrt{8}$

$FG = \sqrt{(4-2)^2 + [-4-(-5)]^2}$

$= \sqrt{4+1}$ or $\sqrt{5}$

$AC = \sqrt{(2-1)^2 + (5-1)^2}$

$= \sqrt{1+16}$ or $\sqrt{17}$

$EG = \sqrt{(4-1)^2 + [-4-(-1)]^2}$

$= \sqrt{9+9}$ or $\sqrt{18}$

While $AB = FG$ and $AC = EF$, $BC \neq EG$. Since SSS congruence is not met, $\triangle ABC \ncong \triangle EFG$.