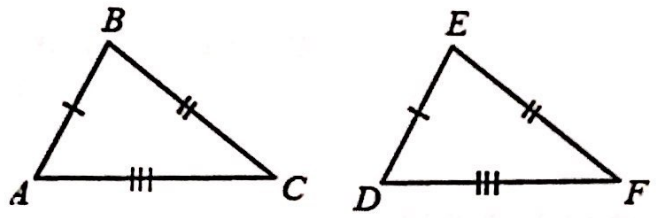
TRIANGLE CONGRUNCE: **SSS & SAS** Key

If all corresponding angles and sides of two triangles are congruent, then the triangles are congruent. However, you can prove triangles are congruent using fewer parts.

SIDE-SIDE-SIDE (SSS)

If three sides of one triangle are congruent to three sides of another triangle, then the triangles are congruent.



If $\overline{AB} \cong \overline{DE}$ (Side)

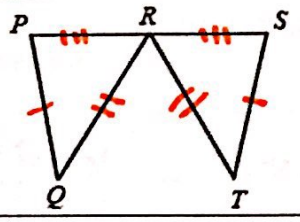
$\overline{BC} \cong \overline{EF}$ (Side)

$\overline{AC} \cong \overline{DF}$ (Side)

Then, $\triangle ABC \cong \triangle DEF$

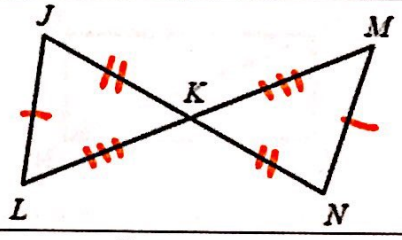
SAMPLE SSS PROOFS:

1. **Given:** $\overline{PQ} \cong \overline{ST}, \overline{QR} \cong \overline{RT}, R$ *is the midpoint of* $\overline{PS}$
   Prove: $\Delta PQR \cong \Delta STR$



Statements	Reasons
1. $\overline{PQ} \cong \overline{ST}$	1. given
2. $\overline{QR} \cong \overline{RT}$	2. given
3. R is the midpoint of $\overline{PS}$	3. given
4. $\overline{PR} \cong \overline{RS}$	4. def. of midpoint
5. $\Delta PQR \cong \Delta STR$	5. SSS

2. **Given:** $\overline{JL} \cong \overline{MN}, K$ *is the midpoint of* $\overline{JN}$ *and* $\overline{LM}$
   Prove: $\Delta JKL \cong \Delta NKM$



Statements	Reasons
1. $\overline{JL} \cong \overline{MN}$	1. given
2. K is the midpoint of $\overline{JN}$ *and* $\overline{LM}$	2. given
3. $\overline{JK} \cong \overline{KN}$	3. def. of midpoint
4. $\overline{LK} \cong \overline{KM}$	4. def. of midpoint
5. $\Delta JKL \cong \Delta NKM$	5. SSS

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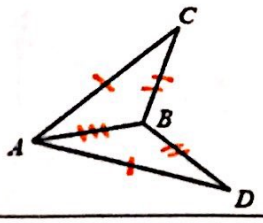
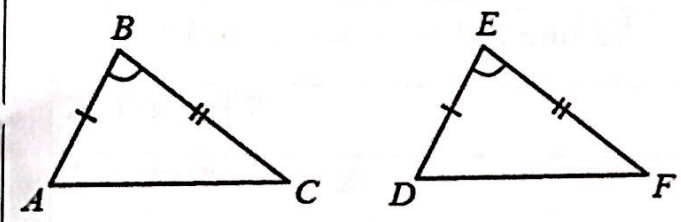
3. **Given:** $\overline{AC} \cong \overline{AD}, \overline{CB} \cong \overline{BD}$
Prove: $\Delta ABC \cong \Delta ABD$



Statements	Reasons
1. $\overline{AC} \cong \overline{AD}$	1. given
2. $\overline{CB} \cong \overline{BD}$	2. given
3. $\overline{AB} \cong \overline{AB}$	3. reflexive
4. $\Delta ABC \cong \Delta ABD$	4. SSS

SIDE-ANGLE-SIDE (SAS)

If two sides and the included angle of one triangle is congruent to two sides and the <u>included</u> angle of another triangle, then the triangles are congruent.



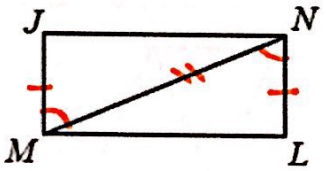
If $\overline{AB} \cong \overline{DE}$ (Side)
$\angle B \cong \angle E$ (Angle)
$\overline{BC} \cong \overline{EF}$ (Side)

Then, $\Delta ABC \cong \Delta DEF$

INCLUDED MEANS THE ANGLE BETWEEN THE SIDES!!

SAMPLE SAS PROOFS:

4. **Given:** $\overline{JM} \cong \overline{NL}, \angle JMN \cong \angle LNM$
Prove: $\Delta JMN \cong \Delta LNM$



Statements	Reasons
1. $\overline{JM} \cong \overline{NL}$	1. given
2. $\angle JMN \cong \angle LNM$	2. given
3. $\overline{MN} \cong \overline{MN}$	3. reflexive
4. $\Delta JMN \cong \Delta LNM$	4. SAS

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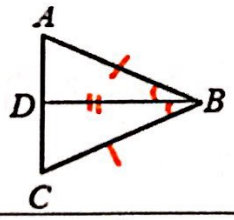
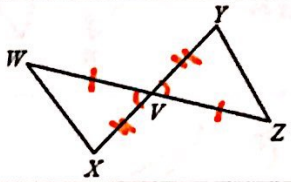
5. **Given:** $\overline{AB} \cong \overline{BC}$, $\overline{BD}$ *bisects* $\angle ABC$
Prove: $\Delta ABD \cong \Delta CBD$



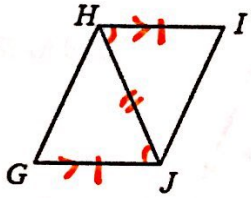
Statements	Reasons
1. $\overline{AB} \cong \overline{BC}$	1. given
2. $\overline{BD}$ *bisects* $\angle ABC$	2. given
3. $\angle ABD \cong \angle CBD$	3. def. of bisect
4. $\overline{BD} \cong \overline{BD}$	4. reflexive
5. $\Delta ABD \cong \Delta CBD$	5. SAS

6. **Given:** *V is the midpoint of* $\overline{WZ}$ *and* $\overline{XY}$
Prove: $\Delta WXV \cong \Delta ZYV$



Statements	Reasons
1. *V is the midpoint of* $\overline{WZ}$ *and* $\overline{XY}$	1. given
2. $\overline{WV} \cong \overline{VZ}$	2. def. of midpoint
3. $\angle WVX \cong \angle YVZ$	3. vertical angles theorem
4. $\overline{XV} \cong \overline{VY}$	4. def. of midpoint
5. $\Delta WXV \cong \Delta ZYV$	5. SAS

7. **Given:** $\overline{HI} \cong \overline{GJ}, \overline{HI} \parallel \overline{GJ}$
Prove: $\Delta GJH \cong \Delta IHJ$



Statements	Reasons
1. $\overline{HI} \cong \overline{GJ}$	1. given
2. $\overline{HI} \parallel \overline{GJ}$	2. given
3. $\angle GJH \cong \angle IHJ$	3. alternate interior angles
4. $\overline{HJ} \cong \overline{HJ}$	4. reflexive
5. $\Delta GJH \cong \Delta IHJ$	5. SAS

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