Name: _____ Date: _____

Triangle Proofs

- Two-column geometric proofs are essentially just tables with __Statements__ on the left and a __reasons__ on the right.
- The statements we make are going to be the __steps__ we take toward solving our problem.
- Reasons can consist of information given within the problem itself, definition, postulates, or theorems.

Statements and Reasons

| If…	Then the reason is…
an angle or side is marked on the picture, or if it is given in the directions,	Given
you recognize that the shapes share a side,	Reflexive
you see alternate interior angles,	AIA ≅
you see vertical angles,	VA ≅
the statement states that the triangles are congruent, △ ≅ △	SSS SAS AAS ASA HL
the triangles have already been proven to be congruent, and now we are trying to prove a side or angle is congruent,	CPCTC

Don't forget to ALWAYS mark your pictures!

Example 1:

Given: Y is the midpoint of $\overline{XZ}$, $\overline{AY} \cong \overline{BY}$, and $\angle AYX \cong \angle BYZ$..
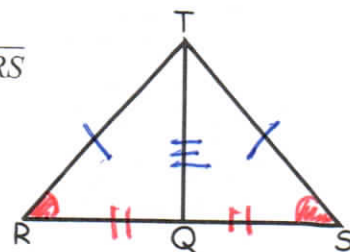Prove: $\triangle XYA \cong \triangle ZYB$

Statements	Reasons
1) $\overline{AY} \cong \overline{BY}$	Given
2) $\angle AYX \cong \angle BYZ$.	Given
3) Y is the midpoint of $\overline{XZ}$	Given
4) $\overline{XY} \cong \overline{YZ}$	Def. of Mdpt
5) $\triangle XYA \cong \triangle ZYB$	SAS
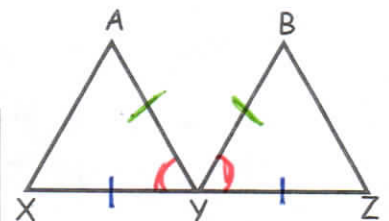
Example 2:

Given: $\triangle RTS$ is isosceles with legs $\overline{RT}$ and $\overline{TS}$. Q is the midpoint of $\overline{RS}$
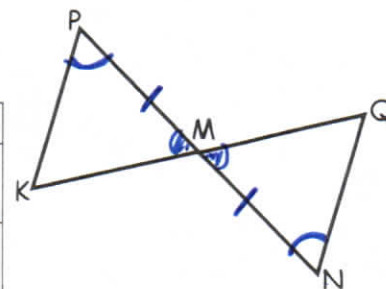
Prove: $\triangle RTQ \cong \triangle STQ$

Statements	Reasons
1) $\triangle$ RTS is ISOS. w/ legs RT and TS	Given
2) $\overline{RT} \cong \overline{TS}$	Def. of ISOS $\triangle$
3) $\angle R \cong \angle S$ ~~Q is Mdpt of RS~~	Base $\angle$'s are $\cong$ ~~Given~~
4) ~~Q is Mdpt of RS~~ $\overline{RQ} \cong \overline{QS}$	~~Given~~ Def of Mdpt
5) ~~RQ $\cong$ QS~~ $\overline{QT} \cong \overline{QT}$	~~Def of Mdpt~~ Reflexive
6) $\triangle RTQ \cong \triangle STQ$	~~SAS~~ SSS

Example 3:

Given: $\angle P \cong \angle N, \overline{PM} \cong \overline{NM}$
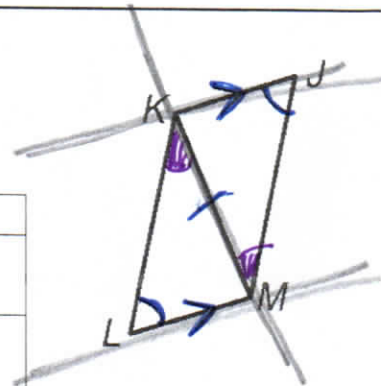
Prove: $\triangle PMK \cong \triangle NMQ$

Statements	Reasons
1) $\angle P \cong \angle N$ $\overline{PM} \cong \overline{NM}$	Given
2) $\angle PMK \cong \angle NMQ$	VA $\cong$
3) $\triangle PMK \cong \triangle NMQ$	ASA
4)	

Example 4:

Given: $\angle L \cong \angle J, \overline{LM} \parallel \overline{KJ}$

Prove: $\triangle LKM \cong \triangle JMK$

Statements	Reasons
1) $\angle L \cong \angle J$	Given
2) $\overline{LM} \parallel \overline{KJ}$	Given
3) $\angle LKM \cong \angle JMK$	AIA $\cong$
4) $\overline{KM} \cong \overline{KM}$	Reflexive
5) $\triangle LKM \cong \triangle JMK$	AAS