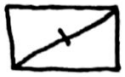
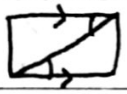
Name: _____ Date: _____

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

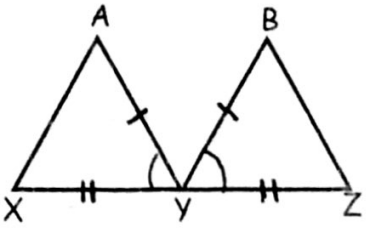
If...	Then the reason is...
an angle or side is marked on the picture, or if it is given in the directions,	"Given"
you recognize that the shapes share a side, 	Reflexive Property
you see alternate interior angles,  (Remember: lines must be parallel)	Alternate Interior ∠s are $\cong$
you see vertical angles, 	Vertical ∠s are $\cong$
the statement states that the triangles are congruent.	SAS, ASA, SSS, AAS, or 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 $\angle AYX \cong \angle BYZ$..

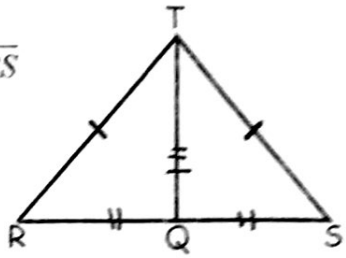
Prove: $\triangle XYA \cong \triangle ZYB$



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 Midpt.
5) $\triangle XYA \cong \triangle ZYB$	SAS

Example 2:

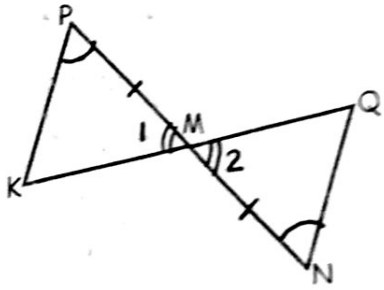
Given: $\triangle RTS$ is isosceles with legs $\overline{RT}$ and $\overline{TS}$. Q is the midpoint of $\overline{RS}$
Prove: $\triangle RTQ \cong \triangle STQ$



Statements	Reasons
1) $\triangle RTS$ is isosceles w/ legs $\overline{RT}$ and $\overline{TS}$	Given
2) $\overline{RT} \cong \overline{TS}$	def. of isosceles
3) Q is the midpt. of $\overline{RS}$	Given
4) $\overline{RQ} \cong \overline{SQ}$	def. of midpt.
5) $\overline{TQ} \cong \overline{TQ}$	reflexive property
6) $\triangle RTQ \cong \triangle STQ$	SSS $\cong$

Example 3:

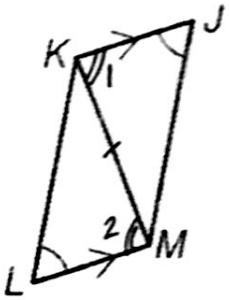
Given: $\angle P \cong \angle N, \overline{PM} \cong \overline{NM}$
Prove: $\triangle PMK \cong \triangle NMQ$



Statements	Reasons
1) $\angle P \cong \angle N$	Given
2) $\overline{PM} \cong \overline{NM}$	Given
3) $\angle PMK \cong \angle QMN$ OR $\angle 1 \cong \angle 2$	vertical $\angle$s are $\cong$
4) $\triangle PMK \cong \triangle NMQ$	ASA $\cong$

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) $\overline{LM} \parallel \overline{KL}$	Given
3) $\angle 1 \cong \angle 2$ OR $\angle JKM \cong \angle KML$	Alt. Int. $\angle$s are $\cong$
4) $\overline{KM} \cong \overline{KM}$	Reflexive Property
5) $\triangle KML \cong \triangle MKJ$	AAS $\cong$