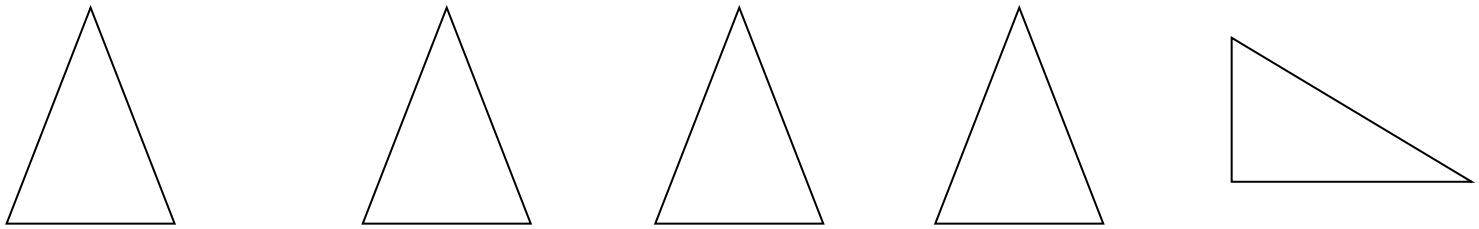
GS Name: _____

Congruent Triangle Proofs

What are the 5 ways to prove two triangles are congruent to one another?

_____ _____ _____ _____ _____



In order to PROVE that 2 triangles are congruent to one another, you must be able to show one of the 5 reasons above is true.

When you are completing proofs in geometry it is important to "squeeze" as much information from our givens as possible. Assume that every statement below is the beginning of a new proof. What information could you conclude?

1. $m\angle 1 = m\angle 2$ **GIVEN**

2. $m\angle 1 + m\angle 5 = 90$ degrees **GIVEN**

3. $\angle 1$ and $\angle 7$ form a linear pair **GIVEN**

4. $\angle 4$ and $\angle 7$ are complementary **GIVEN**

5. $\angle 8$ and $\angle 9$ are vertical angles **GIVEN**

6. $\angle H$ and $\angle P$ form a linear pair **GIVEN**

7. TI = FG, FG = SD **GIVEN**

The type of proof we have been doing is called a two column proof. In a two column proof you list statements that follow logically from a given statement to a conclusion (what you are trying to prove). Across from each statement you give a reason that you can make the claim you did. This is where you use definitions and properties that we have talked about.

MAKE A PLAN

Writing a Two-Column Geometry Proof

Steps:

1. Copy all given information

2. pause to get an understanding of what you know and what you are trying to prove. MAKE MARKS ON THE DIAGRAM.

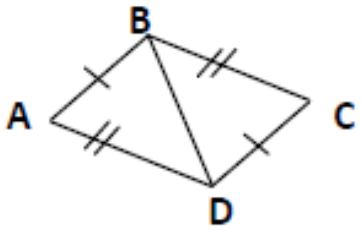
3. Write and work with EQUATIONS BASED ON THE GIVEN STATEMENTS if possible. (sometimes you can convert statements into equations using Definitions)

4. Develop new equations from the diagram if possible.

5. Manipulate and combine your equations, always keeping your GOAL IN MIND. (you can sometimes use the transitive property or substitution to combine two lines)

Examples:

1. Given AB≅CD and AD≅CB, show that the statement below is true.



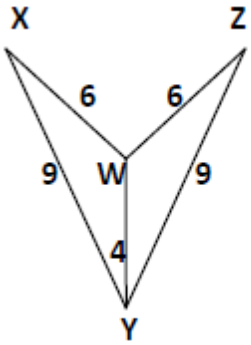
$\Delta ABD \cong \Delta CDB$

Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{BD} \cong \overline{BD}$ $\Delta ABD \cong \Delta CDB$ $\overline{AB} \cong \overline{CD}$ $\overline{AD} \cong \overline{CB}$	Reflexive Property Given SSS Congruent Theorem Given

2. Given the information in the triangles below, show that the statement below is true.

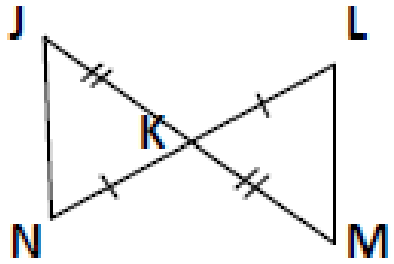
Prove: $\Delta XWY \cong \Delta WZY$



Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{WY} \cong \overline{WY}$	Definition of congruent
$\overline{XY} \cong \overline{ZY}$	Given
$XW = 6 = ZW$	SSS Congruent Theorem
$WY = 4 = WY$	Given
$\Delta XWY \cong \Delta ZWY$	Definition of congruent
$XY = 9 = ZY$	Given
$\overline{XW} \cong \overline{ZW}$	Definition of congruent

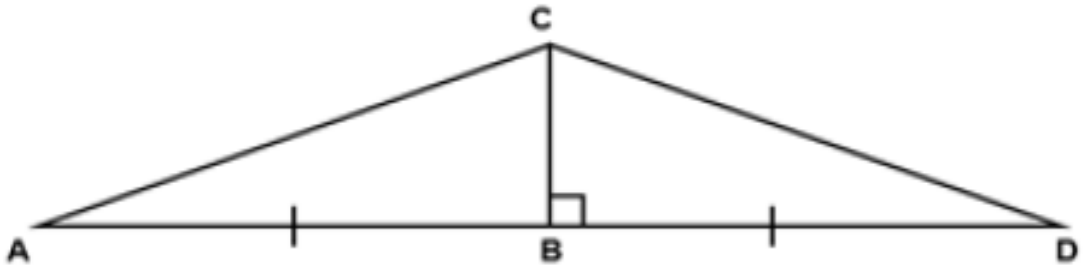
3. Given: LN and JM bisect each other
Prove: $\Delta NKJ \cong \Delta LKM$



Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{JK} \cong \overline{KM}$ $\Delta NKJ \cong \Delta LKM$ $\overline{LK} \cong \overline{NK}$ $< JKN \cong < MKL$ LN and JM bisect each other	Definition of Bisector Given Definition of Bisector SAS Congruence Theorem Vertical Angles

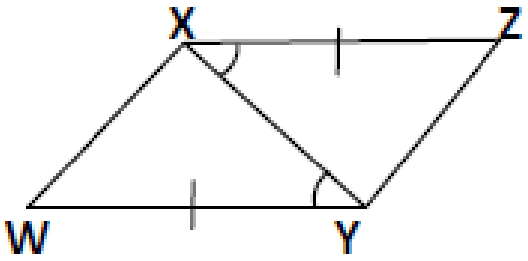
4. Given: $\overline{CB}$ is the perpendicular bisector of $\overline{AD}$
Prove: $\Delta ABC \cong \Delta DBC$



Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{AB} \cong \overline{DB}$ $\Delta ABC \cong \Delta DBC$ $\overline{CB} \cong \overline{CB}$ $< CBD \cong < CBA$ CB is the perpendicular bisector of AD $m < CBD = 90° = m < CBA$	SAS Congruence Theorem Definition of Perpendicular Given Definition of Bisect Definition of Equal angles Reflexive Property

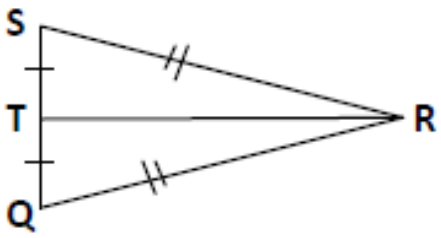
5. Given: $\overline{XZ} \cong \overline{YW}$ and <YXZ≅<WYX
Prove: $\Delta WXY \cong \Delta ZYX$



Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{XZ} \cong \overline{YW}$ $\Delta WXY \cong \Delta ZYX$ $\overline{XY} \cong \overline{XY}$ $< YXZ \cong < WYX$	Reflexive Property Given SAS Congruent Theorem Given

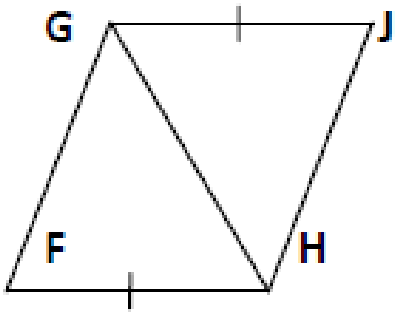
6. Given: $\overline{SR} \cong \overline{QR}$ and $\overline{ST} \cong \overline{QT}$
Prove: $\Delta SRT \cong \Delta QRT$



Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{TR} \cong \overline{TR}$ $\Delta SRT \cong \Delta QRT$ $\overline{SR} \cong \overline{QR}$ $\overline{ST} \cong \overline{QT}$	Reflexive Property Given SSS Congruent Theorem Given

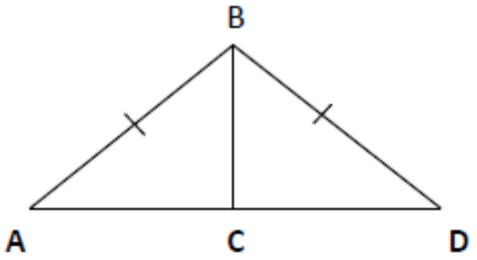
7. Given: $\overline{JG} \cong \overline{FH}$ and $\overline{GF} \| \overline{HJ}$
Prove: $\Delta JGH \cong \Delta FHG$



Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{JG} \cong \overline{FH}$ $\Delta JGH \cong \Delta FHG$ $\overline{GH} \cong \overline{\mathrm{GH}}$ $\overline{GF} \| \overline{HJ}$ $< GHF \cong < HGJ$	Alternate Interior Angles Theorem Reflexive Property Given SAS Congruent Theorem Given

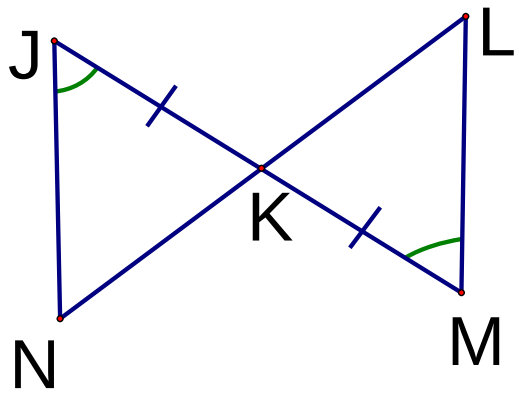
8. Given: $\overline{AB} \cong \overline{DB}$, $\overline{BC} \perp \overline{AD}$
   Prove: $\Delta ABC \cong \Delta DBC$



Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{BC} \cong \overline{BC}$ $\Delta ABC \cong \Delta DBC$ $\overline{AB} \cong \overline{DB}$ $\overline{BC} \perp \overline{AD}$ m<BCD = 90 m<ACB = 90	Definition of perpendicular Definition of perpendicular Given Reflexive Property Given HL Congruence Theorem

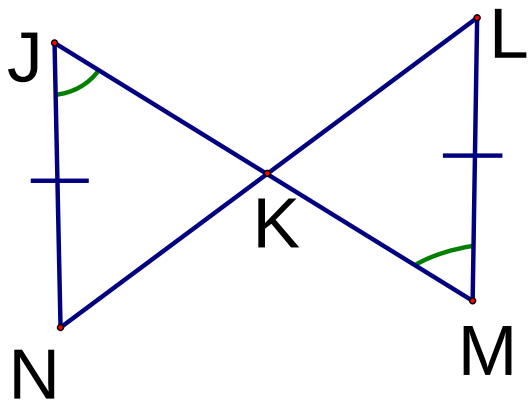
9. Given: $\overline{JK} \cong \overline{MK}$ and <J≅<M
Prove: $\Delta NKJ \cong \Delta LKM$



Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{JK} \cong \overline{MK}$ $\Delta NKJ \cong \Delta LKM$ $< J \cong < M$ <JKN≅<LKM	ASA Congruence Theorem Given Vertical Angles Theorem Given

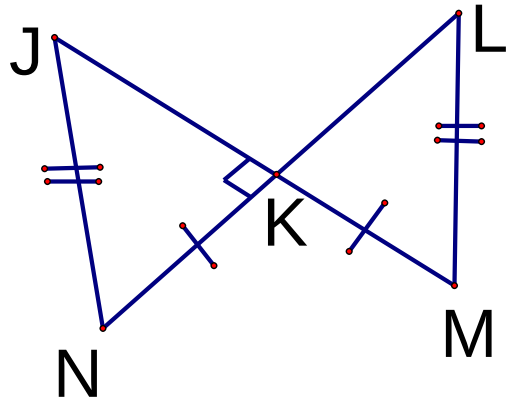
10. Given: $\overline{JN} \cong \overline{ML}$ and <J≅<M
Prove: $\Delta NKJ \cong \Delta LKM$



Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{JN} \cong \overline{ML}$ $\Delta NKJ \cong \Delta LKM$ $< J \cong < M$ <JKN≅<LKM	AAS Congruence Theorem Given Vertical Angles Theorem Given

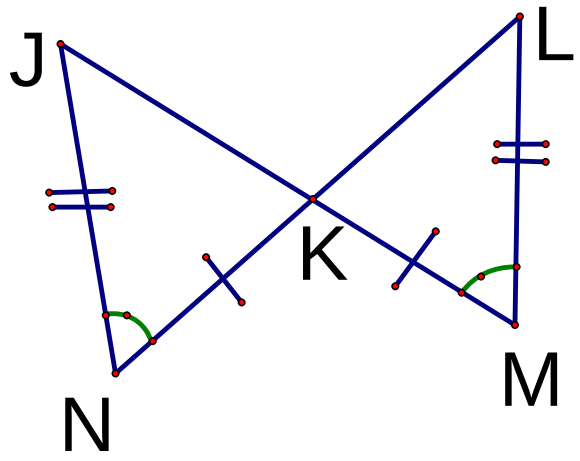
11. Given: $\overline{JN} \cong \overline{LM}$ and $\overline{NK} \cong \overline{MK}$ and <K is a right angle
Prove: $\Delta NKJ \cong \Delta MLK$



Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{JN} \cong \overline{LM}$ $\Delta NKJ \cong \Delta MLK$ $< LKM \cong < JKN$ $\overline{NK} \cong \overline{MK}$ <K is a right angle m<LKM=90	HL Congruence Theorem Given Vertical Angles Theorem Given Given Definition of Congruent Angles

12. Given: $\overline{JN} \cong \overline{LM}$ and $\overline{NK} \cong \overline{MK}$ and <N≅<M
Prove: $\Delta NKJ \cong \Delta MKL$



Statement	**Reason**

Bank for statements:	Bank for Reasons:
$\overline{JN} \cong \overline{LM}$ $\Delta NKJ \cong \Delta MKL$ $< N \cong < M$ $\overline{NK} \cong \overline{MK}$	SAS Congruence Theorem Given Given Given