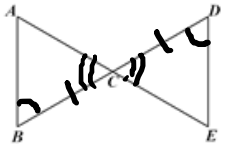
Warm Up

SSS
SAS
ASA
AAS
HL

Warm Up: For the following problems, mark the given information to determine if the triangles are congruent.

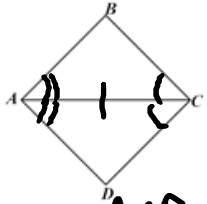
1. $\angle B \cong \angle D$, C is midpoint of $\overline{BD}$



$\Delta CAB \cong \Delta$ CED

by ASA

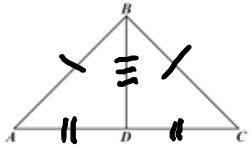
2. $\overline{AC}$ bisects $\angle BCD$ *and* $\angle BAD$



$\Delta ACB \cong \Delta$ ACD

by AS—

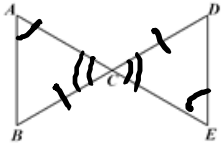
3. $\overline{AB} \cong \overline{BC}$, and $\overline{BD}$ bisects $\overline{AC}$



$\Delta ABD \cong \Delta$ CBD

by SSS

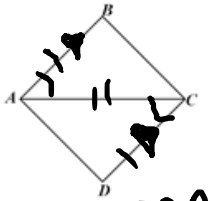
4. C is the midpoint of $\overline{BD}$, $\angle A \cong \angle E$



$\Delta BCA \cong \Delta$ DCE

by AAS

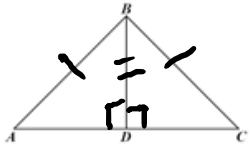
5. $\overline{AB} \| \overline{CD}$, $\overline{AB} \cong \overline{CD}$



$\Delta ABC \cong \Delta$ CDA

by SAS

6. $\overline{BD} \perp \overline{AC}$, $\overline{BA} \cong \overline{BC}$



$\Delta ABD \cong \Delta$ CBD

by HL

What is a Proof?

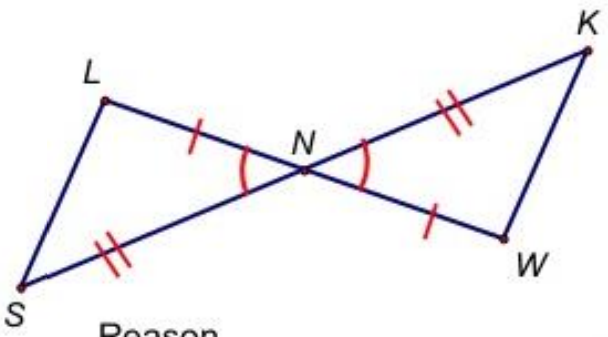
- A proof is a “deductive argument for a mathematical statement”

- i.e. It’s an answer to the question “Why?”, where you support your reasoning with definitions, theorems and other given facts.

Example Proof

Given: N is the midpoint of $\overline{LW}$
N is the midpoint of SK

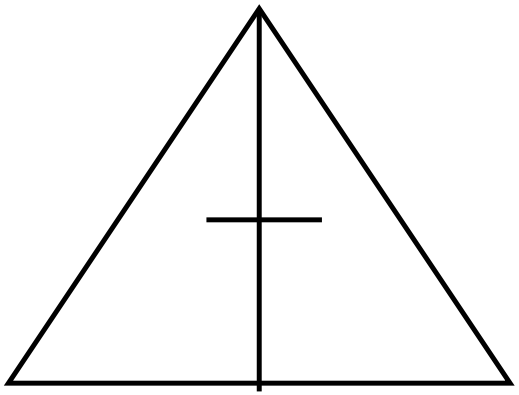
Prove: $\Delta LNS \cong \Delta WNK$



Statement	Reason

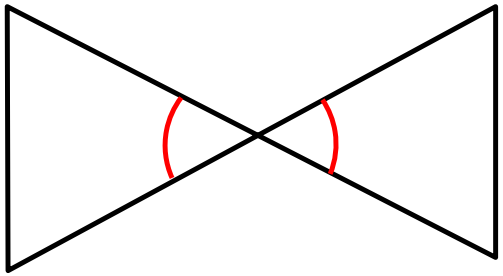
Hints on Proofs

If two triangles share a side, then you will probably use the ___reflexive___ property.



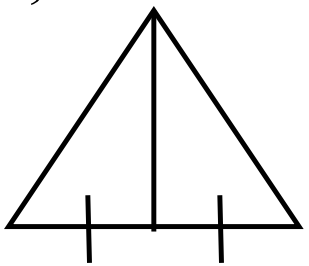
Hints on Proofs

If you have vertical angles, you will probably use vertical angles in the proof.



Hints on Proofs

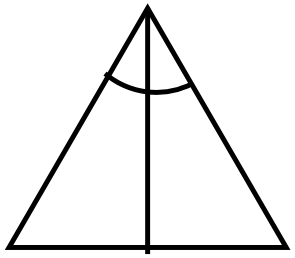
If you are given "midpoint" or "bisects", then



you WILL use def. of midpoint,

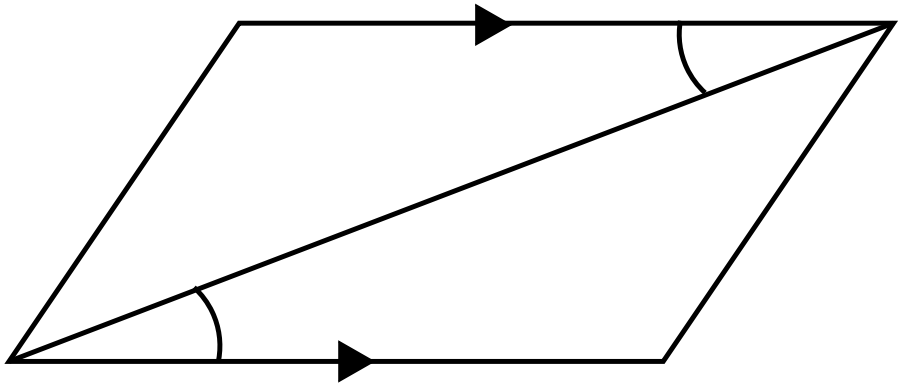
def. of segment bisector, or

def. of angle bisector in the proof.



Hints on Proofs

If you are given parallel lines, then you will use alternate interior.

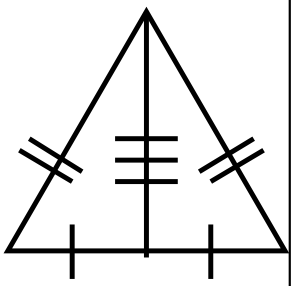
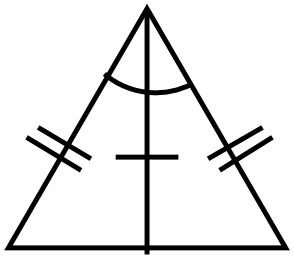
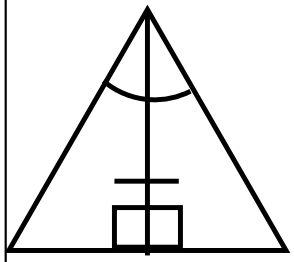
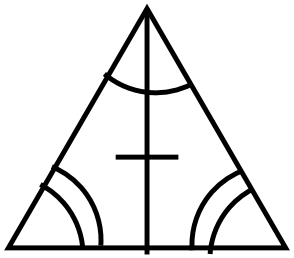
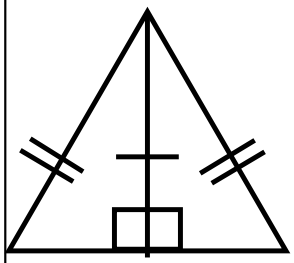


Hints on Proofs

If you are proving parts of a triangle are congruent, then the proof will probably end with CPCTC.

Corresponding Parts of Congruent Triangles are Congruent

If proving triangles congruent, your proof will end with:

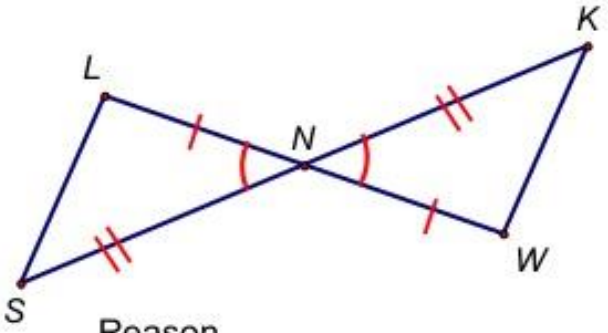
Ways to Prove Triangles are Congruent				**Rt. ∆s only**
SSS	SAS	ASA	AAS	HL
				

- The first step is to rewrite the given information, and the first reason is Given
- The last reason will be SSS, SAS, ASA, AAS, HL (or CPCTC)
  - YOUR REASON WILL NEVER BE “PROVE”
- If you mark something in your picture, you need to state it in the proof
- Once you have 3 congruent statements, you can state congruent triangles

Example Proof

Given: N is the midpoint of $\overline{LW}$
N is the midpoint of SK

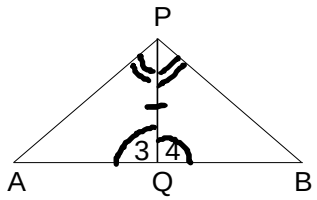
Prove: $\Delta LNS \cong \Delta WNK$



	Statement	Reason
1	N is the midpoint of LW N is the midpoint of SK	1 Given
2	$\overline{LN} \cong \overline{NW}, \quad \overline{SN} \cong \overline{NK}$	2 Definition of Midpoint
3	$\angle LNS \cong \angle WNK$	3 Vertical Angles are congruent
4	$\Delta LNS \cong \Delta WNK$	4 SAS

1. *Given*: $\angle 3 \cong \angle 4$, $\overline{PQ}$ bisects $\angle APB$

Pr*ove*: $\triangle APQ \cong \triangle BPQ$

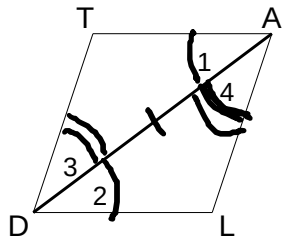


Statements	Reasons
1) $\angle 3 \cong \angle 4$, $\overline{PQ}$ bis. $\angle APB$	1) Given
2) $\angle APQ \cong \angle BPQ$	2) Def. $\angle$ Bis.
3) $\overline{PQ} \cong \overline{PQ}$	3) Reflex.
4) $\triangle APQ \cong \triangle BPQ$	4) ASA

2.

Given: $\overline{TA}$ is parallel to $\overline{LD}$, $\overline{TD}$ is parallel to $\overline{LA}$

Pr*ove*: $\Delta ATD \cong \Delta DLA$

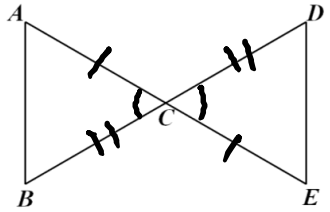


Statements	Reasons
1) $\overline{TA} \parallel \overline{LD}$, $\overline{TD} \parallel \overline{LA}$	1) Given
2) $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$	2) Alt. Int.
3) $\overline{AD} \cong \overline{AD}$	3) Reflex.
4) $\triangle ATD \cong \triangle DLA$	4) ASA

3.

Given: C is the midpoint of $\overline{AE}$ & $\overline{BD}$

Pr*ove*: $\angle A \cong \angle E$

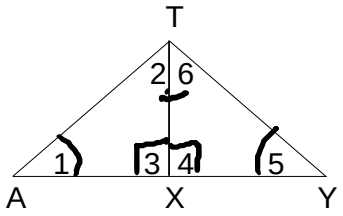


Statements	Reasons
1) C is midpt $\overline{AE}$ and $\overline{BD}$	1) Given
2) $\overline{AC} \cong \overline{CE}$, $\overline{BC} \cong \overline{CD}$	2) Def. midpt.
3) $\angle ACB \cong \angle ECD$	3) Vert. $\angle$'s
4) $\triangle ACB \cong \triangle ECD$	4) SAS
5) $\angle A \cong \angle E$	5) CPCTC

4.

Given: $\overline{TX} \perp \overline{AY}$, $\angle 1 \cong \angle 5$

Prove: $\angle 2 \cong \angle 6$



Statements	Reasons
1) $\overline{TX} \perp \overline{AY}$, $\angle 1 \cong \angle 5$	1) Given
2) $\angle 3$ and $\angle 4$ rt. $\angle$'s	2) Def. perp.
3) $\angle 3 \cong \angle 4$	3) Rt. $\angle$'s are $\cong$
4) $\overline{TX} \cong \overline{TX}$	4) Reflex.
5) $\triangle ATX \cong \triangle YTX$	5) A AS
6) $\angle 2 \cong \angle 6$	6) CPCTC

Classwork:

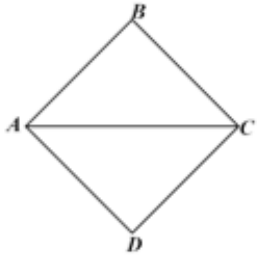
For the following problems, mark the given information to determine if the triangles are congruent.

1. $\overline{AC} \cong \overline{DC}$, $\angle A \cong \angle D$

$\Delta CAB \cong \Delta$_____

by _____

2. $\overline{AC}$ bisects $\angle BCD$ *and* $\angle B \cong \angle D$

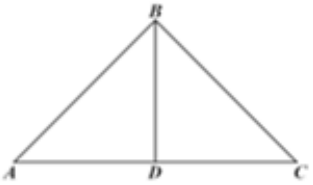


$\Delta ACB \cong \Delta$_____

by _____

3. D is midpoint of $\overline{AC}$

$\overline{BD} \perp \overline{AC}$



$\Delta ABD \cong \Delta$_____

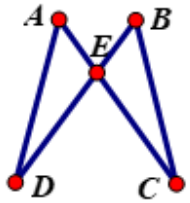
by _____

GIVEN:

$\angle D \cong \angle C$ & $\overline{DE} \cong \overline{CE}$

PROVE:

$\overline{AD} \cong \overline{BC}$



Hint: 1st prove that triangles are congruent

STATEMENT	REASON