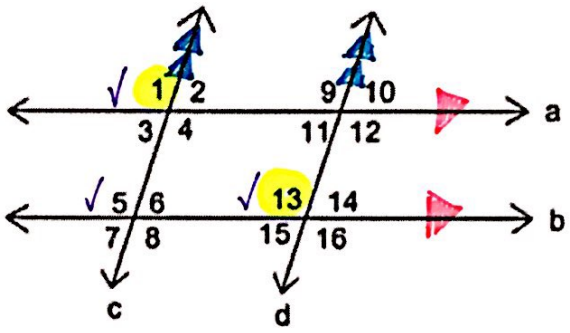
6.2 Proofs (Parallel Lines and Triangles)

SWBAT prove lines to be parallel and prove triangles to be congruent.

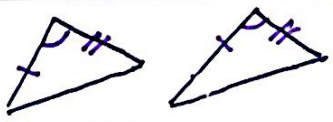
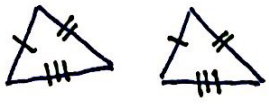
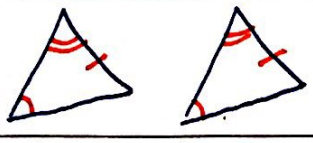
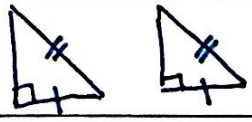
What can we use to Prove?		
Definition of Vertical Angles	Linear Pair Postulate	Definition of Midpoint
Definition of Supplementary Angles	Corresponding Angle Postulate	Definition of Bisect
Definition of Parallel Lines	Alternate Exterior Angle Theorem	Substitution Property
Definition of Perpendicular Lines	Alternate Interior Angle Theorem	Angle Addition Postulate
Reflexive Property (AB = AB)	Transitive Property (a = b, b = c, then a = c)	Segment Addition Postulate

Example 1: Given: $a \parallel b$ and $c \parallel d$
Prove: $\angle 1 \cong \angle 13$

Statements	Reasons
1. a // b, c // d	1. Given
2. $\angle 1 \cong \angle 5$	2. Corresponding ∠ Postulate
3. $\angle 5 \cong \angle 13$	3. Corresponding ∠ Postulate
4. $\angle 1 \cong \angle 13$	4. Transitive Property

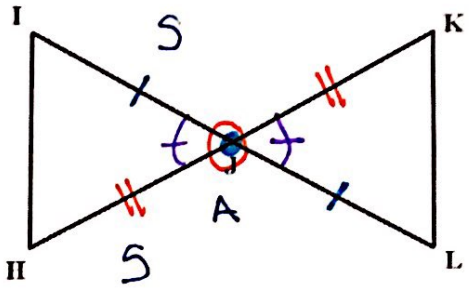


Triangle Congruence

Name:	Picture	Definition
Angle-Side-Angle (ASA)		2 congruent angles, congruent side btwn ⇒ ≅ Δ's
Side-Angle-Side (SAS)		2 congruent sides, congruent angle btwn ⇒ ≅ Δ's
Side-Side-Side (SSS)		3 congruent sides ⇒ ≅ Δ's
Angle-Angle-Side (AAS)		2 congruent angles, congruent side not btwn ⇒ ≅ Δ's
Hypotenuse-Leg (HL) *Right Δ only		Right angle, congruent hypotenuse, 1 ≅ leg ⇒ ≅ Δ's

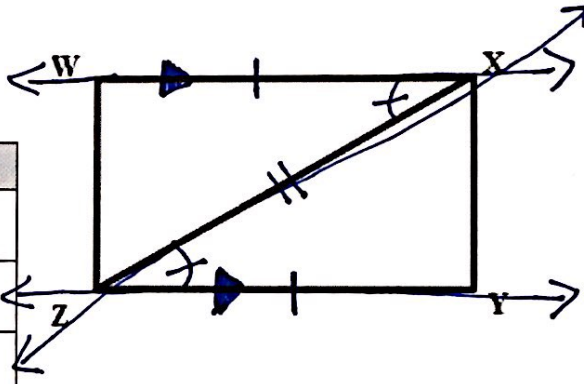
The Donkey Theorem: You can't travel (AAA) by Donkey (SSA) to triangle congruence!

Example 2: Given: J is the midpoint of IL.
J is the midpoint of HK.
Prove: $\Delta IJH \cong \Delta LJK$



Statement:	Reason:
1. J is the midpoint of $\overline{IL}$	1. Given
2. $\overline{IJ} \cong \overline{LJ}$	2. Def. Midpoint
3. J is the midpoint of $\overline{HK}$	3. Given
4. $\overline{HJ} \cong \overline{KJ}$	4. Def. Midpoint
5. $\angle IJH \cong \angle LJK$	5. Def. Vertical Angle
6. $\Delta IJH \cong \Delta LJK$	6. SAS

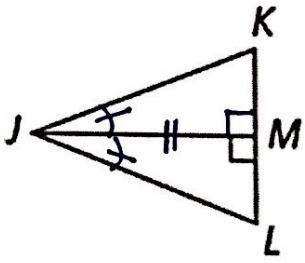
You Try! Given: $WX \parallel YZ$, $WX \cong YZ$
Prove: $\Delta WXZ \cong \Delta YZX$
(Hint: It should take anywhere from 4-5 steps)



Statement:	Reason:
1. $\overline{WX} \parallel \overline{YZ}$	1. Given
2. $\angle WXZ \cong \angle YZX$	2. Def. Alt. Int. $\angle$'s
3. $\overline{WX} \cong \overline{YZ}$	3. Given
4. $\overline{XZ} \cong \overline{ZX}$	4. Reflexive Prop.
5. $\Delta WXZ \cong \Delta YZX$	5. SAS

You Try! Given: $\overline{JM}$ bisects $\angle J$.
$\overline{JM} \perp \overline{KL}$

Prove: $\Delta JMK \cong \Delta JML$



Statement:	Reason:
1. $\overline{JM}$ bisects $\angle J$	1. Given
2. $\angle KJM \cong \angle LJM$	2. Def. bisect
3. $\overline{JM} \perp \overline{KL}$	3. Given
4. $\angle JML$ and $\angle JMK$ are 90° and $\cong$	4. Def. Perpendicular Lines
5. $\overline{JM} \cong JM$	5. Reflexive Prop.
6. $\Delta JMK \cong \Delta JML$	6. ASA