Vocab quiz:

1. Reflexive Property
2. Substitution Property
3. Transitive Property
4. Complimentary angles
5. Addition Property
6. Definition of congruent segments
7. Angle Addition Postulate

a. If a = b, then a can be replaced for b in any equation or expression.

b. If B is inside $\angle ABD$ $m\angle ABC + m\angle CBD = m\angle ABD$

c. If a = b, then b = a

d. If a = b, then a + c = b + c

e. If a = b, and b = c, then a = c

f. $\overline{AB} \cong \overline{CD} \leftrightarrow AB = CD$

g. $m\angle A + m\angle B = 90°$

h. For any real number a, a = a

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6-2
Proofs (Vertical Angles and Parallel Lines)

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Postulate: to assume without proof, or as self-evident

Conjecture: a hypothesis that something is true

Theorem: a statement that can be demonstrated to be true by accepted mathematical operations and arguments.

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Proofs

Proofs use logic and reasoning to come to a conclusion.

We must show a reason for every statement that is made. Reasons can be rules or properties.

Types of Proofs:

- Flow Chart Proof
- Two-column Proof
- Paragraph Proof

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Flow chart proof

Steps and reasons are written in boxes and connected by arrows.

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Two-Column Proof

Statements are listed on the left hand column and reasons for each fall on the right. Starts with the "Given" statement and ends with the "Prove" statement.

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Properties from last time

Addition Property of Equality:

Subtraction Property of Equality:

Reflexive Property:

Substitution Property:

Transitive Property:

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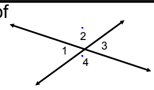
Vertical Angle Theorem Proof

"Vertical Angles are congruent."



Given: $\angle 1$ and $\angle 2$ form a linear pair
Given: $\angle 2$ and $\angle 3$ form a linear pair
Given: $\angle 3$ and $\angle 4$ form a linear pair
Given: $\angle 4$ and $\angle 1$ form a linear pair
Prove: $\angle 1 \cong \angle 3$
Prove: $\angle 2 \cong \angle 4$

Create a flow chart proof of the first "Prove" statement of the Vertical Angle Theorem

$\angle 1, \angle 2$ linear pair — given
$\angle 2, \angle 3$ lin pair — given
$m\angle 1 + m\angle 2 = 180°$ — LPP
$m\angle 2 + m\angle 3 = 180°$ — LPP
$m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$ — Substitution
$m\angle 1 = m\angle 3$ — Subtraction
$\angle 1 \cong \angle 3$ — DOCA

Statement	reason
$\angle 1, \angle 2$ lin pair	given
$\angle 2, \angle 3$ lin pair	given
$m\angle 1 + m\angle 2 = 180$	LPP
$m\angle 2 + m\angle 3 = 180$	LPP
$m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	subst
$m\angle 1 = m\angle 3$	subtract
$\angle 1 \cong \angle 3$	DOCA

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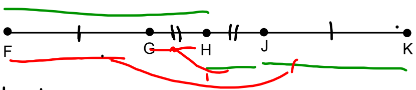
Given: $\overline{FG} \cong \overline{JK}$
Given: $\overline{GH} \cong \overline{HJ}$
Prove: $\overline{FH} \cong \overline{HK}$



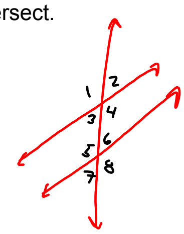
statement	reason
① $\overline{FG} \cong \overline{JK}$	① given
② $\overline{GH} \cong \overline{HJ}$	② given
③ $\overline{FG} + \overline{GH} = \overline{FH}$	③ Seg add
④ $\overline{HJ} + \overline{JK} = \overline{HK}$	④ Seg add
⑤ $\overline{JK} + \overline{HJ} = \overline{FH}$	⑤ Substitution
⑥ $\overline{FG} + \overline{GH} = \overline{HK}$	⑥ Substitution
⑦ $\overline{FH} \cong \overline{HK}$	⑦ Subst

Oct 30-4:57 PM

Vocab

Transversal: *A line that intersects two or more lines.*

Parallel Lines: Two lines on the same plane that never intersect.



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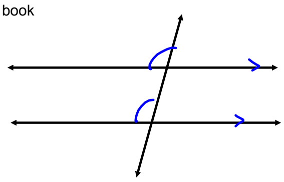
Corresponding angle postulate (CA): Two lines intersected by a transversal are parallel iff the corresponding angles are congruent.

Write this down in your book



Write this as a conditional statement and its converse

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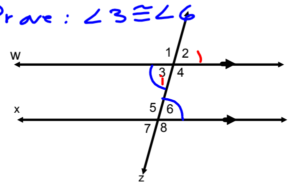
Prove the Alternate Interior Angle Conjecture: "If two parallel lines are intersected by a transversal, then alternate interior angles are congruent."

Prove: $\angle 3 \cong \angle 6$



parallel

statements	reasons
$w \parallel x$	given
$\angle 3 \cong \angle 2$	vertical angles
$\angle 2 \cong \angle 6$	corresponding
$\angle 3 \cong \angle 6$	transitive

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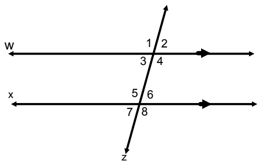
When we prove this it now becomes a theorem:

Alternate Interior Angle Theorem: If two parallel lines are intersected by a transversal, then alternate interior angles are congruent. (don't write this down yet.)



When Lines are parallel:

1. Corresponding → congruent
2. Alt-Int → congruent
3. Alt-ext → Congruent
4. Same-Side Int → supplementary
5. Same-Side Ext → supplementary

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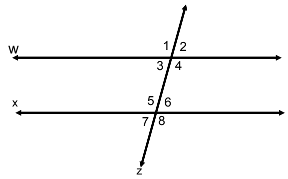
Now we are going to Prove the converse to the Alternate Interior Angle Conjecture: "If alternate interior angles of a transversal are congruent then the two lines are parallel."



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Now that we have proven the Alternate Interior Angle Conjecture and it's converse we can write the Alternate Interior Angle theorem as a biconditional statement.

Alternate Interior Angle Theorem (AIA): Two lines intersected by a transversal are parallel iff the alternate interior angles are congruent.

write this down in you theorem book

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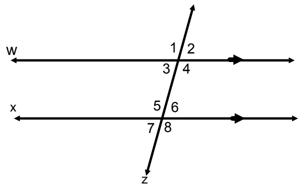
Prove the Same-Side Exterior Angle Conjecture: "If two parallel lines are intersected by a transversal, then exterior angles on the same side of the transversal are supplementary."



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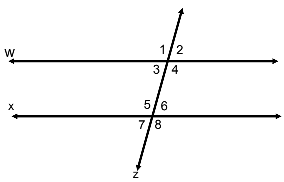
If there is time

Prove the Converse to the Same-Side Exterior Angle Conjecture: "If same-side exterior angle of a transversal are supplementary then the two lines are parallel."



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Same-Side Exterior Angle Conjecture Theorem (SSE): Two lines intersected by a transversal are parallel iff the same-side exterior Angles are supplementary.

(these others are theorems we are not going to prove in class but they can be proved in a similar way.)

Same-Side Interior Angle Conjecture Theorem (SSI): Two lines intersected by a transversal are parallel iff the same-side interior Angles are supplementary.

Alternate Exterior Angle Theorem (AEA): Two lines intersected by a transversal are parallel iff the alternate exterior angles are congruent.

write these in your book

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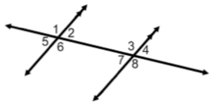
Determine the relationship between the indicated angles and write a postulate or theorem that justifies your answer

Angles 1 and 8

Angles 2 and 3



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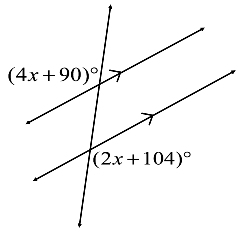
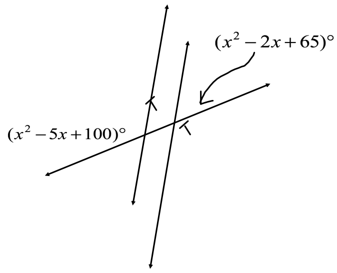
Solve for x





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