3-1

Proofs (Vertical Angles and Parallel Lines)

Student book pgs. 159-162, 170-182,185-193

Vocab: (write and draw a picture for each pair of angles)

Supplementary angles: two angles whose measures add to 180°

180

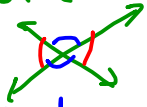
Complementary angles: two angles whose measures add to 90°

90

Adjacent angles: next to - 2 angles that share a side

Linear pair: 2 angles that form a straight line

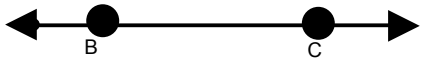
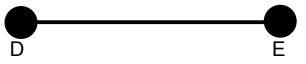
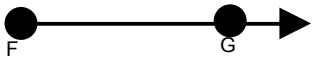
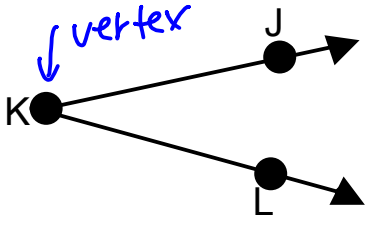
Vertical angles: The angles opposite each other when 2 lines intersect



Postulate: a true statement that doesn't need to be proved

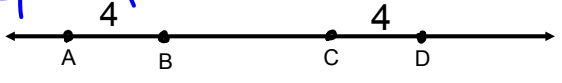
Theorem: a statement that needs to be proved

Notation:

Point A:	A	
Line:	$\overleftrightarrow{BC}$	
Line segment:	$\overline{DE}$	
Ray:	$\overrightarrow{FG}$	
Angle:	$\angle JKL$ or $\angle LKJ$ or $\angle K$	

Lengths are equal and segments are congruent.

numeric value $AB = CD$ $4 = 4$ $\overline{AB} \cong \overline{CD}$ DOCS



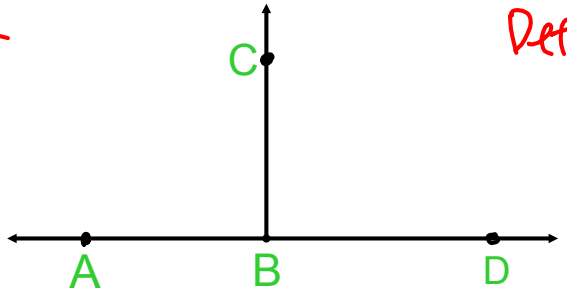
Definition of congruent segment

Measures are equal and angles are congruent.

$m\angle ABC = m\angle CBD$ $\angle ABC \cong \angle CBD$ DOCA

numeric value

Definition of congruent angles

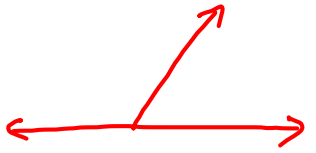


Recall:

Hypothesis

Linear Pair Postulate: If two angles form a linear pair, then the angles are supplementary. (pg. 150)

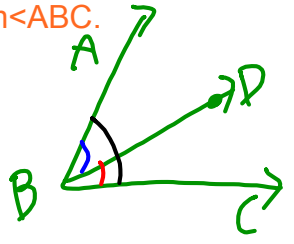
Conclusion



180°

Segment Addition Postulate: If point B is on $\overline{AC}$ and between points A and C, then AB + BC = AC. (pg. 151)

Angle Addition Postulate: If point D lies in the interior of <ABC, then m<ABD + m<DBC = m<ABC.



Logic Video

Discussion of logic from clip.

Logic

Conditional Statement: If, then

If she's a witch, then she's made out of wood

Converse:

If she's made out of wood then she's a witch

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

Properties

Addition Property of Equality: $a = b$
$a + c = b + c$

Subtraction Property of Equality: $a + c = b + c$
$a - b$

Reflexive Property: $a = a$ $\quad \overline{XY} \cong \overline{XY}$
$AB = AB$

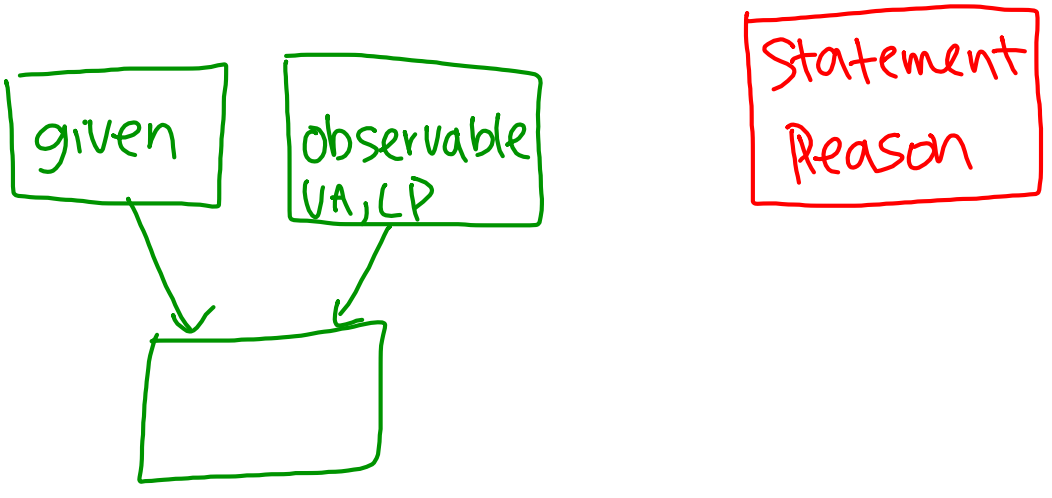
Substitution Property: $a = b \quad b + c = d$
$a + c = d$

Transitive Property: if $a = b$ and $b = c$
then $a = c$

pg. 159

Flow chart proof

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



pg. 162

Two-Column Proof

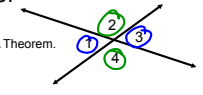
Statements are listed on the left hand column and reasons for each fall on the right. Starts with the "Given" statement and ends with the "Prove" statement.

Statements	Reasons
Givens	

pg. 170

Vertical Angle Theorem Proof

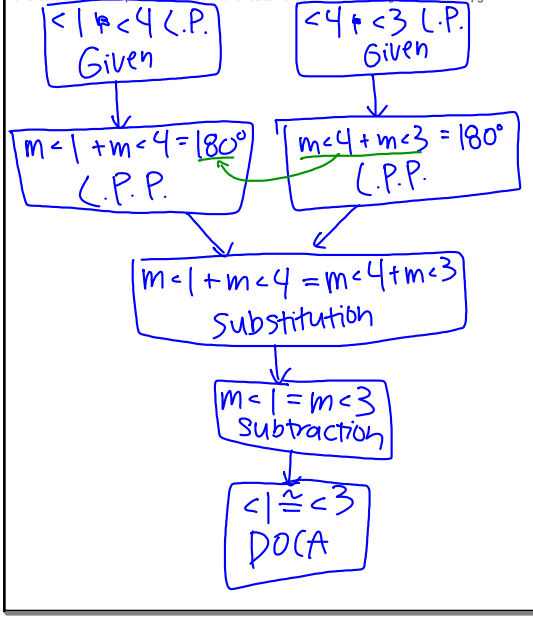
"Vertical Angles are congruent."



2. Use the diagram to write the "Prove" statements for the VA Theorem. The "Given" statements are provided.

Given: <1 and <2 are a linear pair.
Given: <2 and <3 are a linear pair.
Given: <3 and <4 are a linear pair.
Given <4 and <1 are a linear pair.
Prove: $\angle 1 \cong \angle 3$
Prove: $\angle 2 \cong \angle 4$

3. Create a flow chart proof of the first "Prove" statement of the Vertical Angle Theorem on pg. 171.

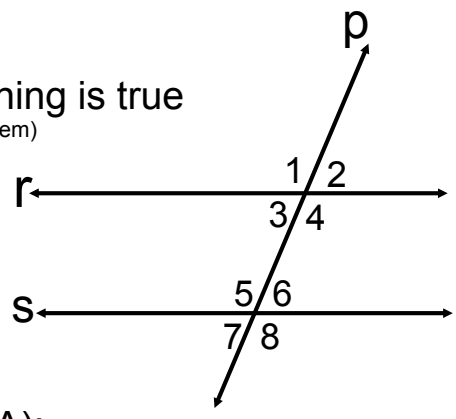


pg. 176-177

Vocab

Conjecture: a hypothesis that something is true

Label. From the diagram, list each part. (discuss postulate/theorem)



Transversal:

Parallel Lines:

Corresponding Angle Postulate:

Alternate Interior Angle Theorem (AIA):

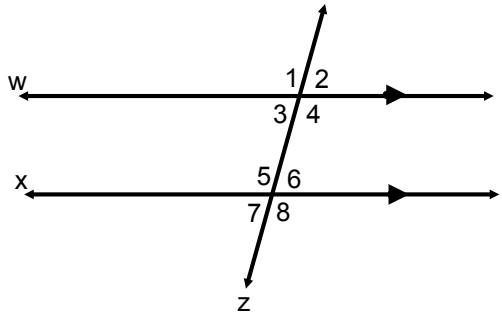
Alternate Exterior Angle Theorem (AEA):

Same-Side Interior Angle Theorem (SSI):

Same-Side Exterior Angle Theorem (SSE):

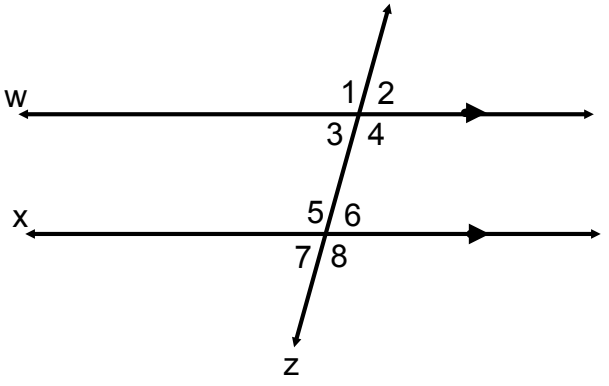
pg. 178-9

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



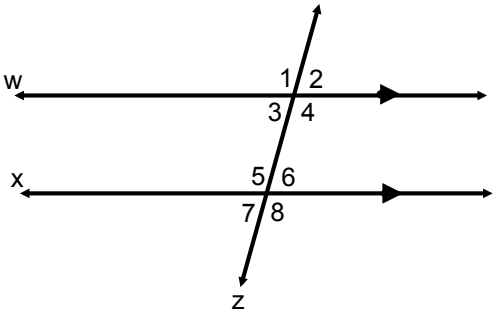
pg. 180

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



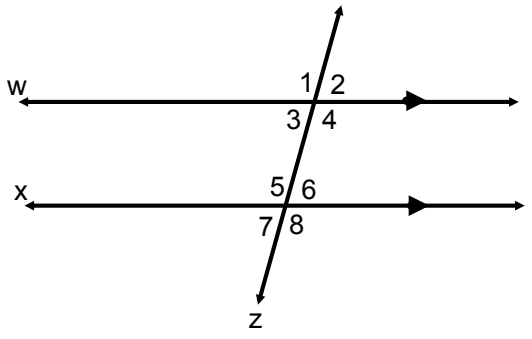
pg. 181

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



pg. 182

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.



pg. 186-193

Parallel Line Converse Theorems

We could prove the converse of all of our parallel line cut by a transversal theorems by just going backwards in our proofs.

Some are in your book and on the homework.