

Content Objective: I will apply the relationships between the measures of the angle pairs formed by two parallel lines cut by a transversal to proofs.

EXAMPLE 1: Use the diagram on the right to complete the following theorems/postulates.

THEOREMS/POSTULATES

If two parallel lines are cut by a transversal, then alternate interior angles are congruent.

If two parallel lines are cut by a transversal, then same-side interior angles are supplementary.

If two parallel lines are cut by a transversal, then alternate exterior angles are congruent.

If two parallel lines are cut by a transversal, then same-side exterior angles are supplementary.

If two parallel lines are cut by a transversal, then corresponding angles are congruent.

Oct 10-9:16 AM

QUICK CHECK: Use the theorems/postulates from Example 1 to justify the following conclusions.

a. $\angle 2 + \angle 3 = 180^\circ$ because ss int

b. $\angle 2 \cong \angle 4$ because corresp

c. $\angle 4 \cong \angle 8$ because alt ext

d. $\angle 8 + \angle 5 = 180^\circ$ because ss ext

e. $\angle 1 \cong \angle 7$ because vertical

f. $\angle 8 + \angle 7 = 180^\circ$ because linear pair

Geometry Unit 3 - Reasoning & Proofs w/ Congruent Triangles Page 163

Notes: **PROOFS OF PARALLEL LINES**

Oct 10-9:22 AM

EXAMPLE 2: Given: $r \parallel s$
 $m \parallel l$

Prove: $m\angle 5 + m\angle 11 = 180^\circ$

Fill in any missing statements or reasons to complete the proof.

Statements	Reasons
1. $r \parallel s$	1. Given
2. $\angle 5$ & $\angle 9$ are supplementary.	2. <u>ss int</u>
3. $m\angle 5 + m\angle 9 = 180^\circ$	3. Definition of supplementary angles
4. $m \parallel l$	4. Given
5. $\angle 9 \cong \angle 11$	5. Corresponding Angles Postulate
6. $m\angle 9 = m\angle 11$	6. <u>Def \cong \angle's</u>
7. $m\angle 5 + m\angle 11 = 180^\circ$	7. Substitution

QUICK CHECK: Given: $r \parallel s$

Oct 10-9:25 AM

QUICK CHECK: Given: $r \parallel s$
 $m \parallel l$

Prove: $m\angle 3 \cong m\angle 14$

Fill in any missing statements or reasons to complete the proof.

Statements	Reasons
1. $r \parallel s$	1. Given
2. $\angle 3 \cong \angle 6$	2. <u>alt int</u>
3. $m \parallel l$	3. Given
4. $\angle 6 \cong \angle 14$	4. <u>corresp</u>
5. $m\angle 3 \cong m\angle 14$	5. Transitive Property of Equality

Geometry Unit 3 - Reasoning & Proofs w/ Congruent Triangles Page 164

Oct 10-9:27 AM

We can also prove lines parallel using the converse of the following statement:

If two parallel lines are cut by a transversal, then alternate interior angles are congruent.

The converse is: If two lines in a plane are cut by a transversal and alternate interior angles are congruent, then the two lines are parallel.

IF	THEN
Corresponding angles are <u>congruent</u> .	The lines are PARALLEL .
Alternate interior angles are <u>congruent</u> .	
Alternate exterior angles are <u>congruent</u> .	
Consecutive interior angles are <u>supplementary</u> .	
The lines are <u>perpendicular</u> to the same line.	

EXAMPLE 4: Given the following information, determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

a. $\angle 8$ & $\angle 11$

Oct 10-9:28 AM

EXAMPLE 4: Given the following information, determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

a. $\angle 8$ & $\angle 11$
Postulate/Theorem: ss int

b. $\angle 12$ & $\angle 14$
Postulate/Theorem: alt ext

QUICK CHECK:

a. $\angle 10$ & $\angle 2$
Postulate/Theorem: corresp

b. $\angle 5$ & $\angle 3$
Postulate/Theorem: alt int

Oct 10-9:30 AM

3b. NOTES Proofs of Parallel Lines.pdf [Geometry: Week 1.4] Day 3] - Go PDF Reader

EXAMPLE 5: Fill in any missing statements or reasons to complete the proof.

Given: $c \parallel d$; $\angle 1 \cong \angle 15$

Prove: $a \parallel b$

Statements	Reasons
1. $c \parallel d$	1. Given
2. $\angle 1 \cong \angle 3$	2. Corresponding Angles are congruent
3. $\angle 1 \cong \angle 15$	3. Given
4. $\angle 15 \cong \angle 3$	4. Transitive Property
5. $a \parallel b$	5. Converse of Alternate Exterior Angles

QUICK CHECK:

Given: $a \parallel b$; $\angle 2 \cong \angle 12$

Oct 10-10:12 AM

3b. NOTES Proofs of Parallel Lines.pdf [Geometry: Week 1.4] Day 3] - Go PDF Reader

QUICK CHECK:

Given: $a \parallel b$; $\angle 2 \cong \angle 12$

Prove: $c \parallel d$

Statements	Reasons
1. $a \parallel b$	1. Given
2. $\angle 12 \cong \angle 8$	2. alt int Angles are congruent
3. $\angle 2 \cong \angle 12$	3. Given
4. $\angle 8 \cong \angle 2$	4. Transitive Property
5. $c \parallel d$	5. Converse of alt int Angles

Geometry Unit 3 - Reasoning & Proofs w/ Congruent Triangles Page 166

Oct 10-10:14 AM