

Properties of Parallel Lines:

Corresponding Angles Postulate: If two parallel lines are cut by a transversal then the pair of corresponding angles are congruent.

Alternate Interior Angles: If two parallel lines are cut by a transversal, the the pairs of alternate interior angles are congruent.

Consecutive Interior Angles: If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary.

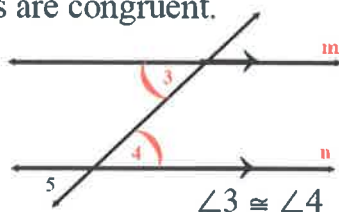
Alternate Exterior Angles: If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles are congruent.

Theorem 3.4 Alternate Interior Angles

If two parallel lines are cut by a transversal then the pairs of alternate interior angles are congruent.

Given: $m \parallel n$

Prove: $\angle 3 \cong \angle 4$



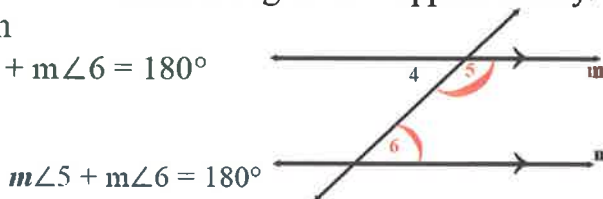
Statements	Reasons
1. $m \parallel n$	1. Given
2. $\angle 3 \cong \angle 5$	2. Corresponding angles postulate
3. $\angle 5 \cong \angle 4$	3. Vertical angles theorem
4. $\angle 3 \cong \angle 4$	4. Transitive property of congruence

Theorem 3.5 Consecutive Interior Angles

If two parallel lines are cut by a transversal then the pairs of consecutive interior angles are supplementary.

Given: $m \parallel n$

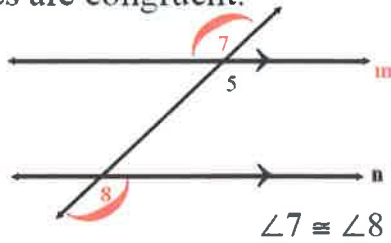
Prove: $m\angle 5 + m\angle 6 = 180^\circ$



Statements	Reasons
1. $m \parallel n$	1. Given
2. $\angle 4$ and $\angle 5$ are supplementary	2. def. of linear pair
3. $m\angle 4 + m\angle 5 = 180$	3. def of supplementary
4. $\angle 4 \cong \angle 6$	4. alt. int. \angle 's \cong
5. $\angle 5$ and $\angle 6$ are Supp.	5. substitution
6. $m\angle 5 + m\angle 6 = 180^\circ$	6. def. of Supplementary

Theorem 3.6 Alternate Exterior Angles

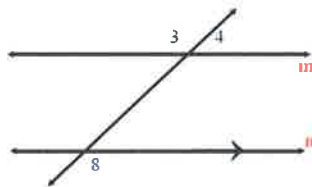
If two parallel lines are cut by a transversal then the pairs of alternate exterior angles are congruent.



Statements	Reasons
1. $m \parallel n$	1. Given
2. $\angle 7 \cong \angle 5$	2. vertical \angle 's \cong
3. $\angle 5 \cong \angle 8$	3. corresponding \angle 's postulate
4. $m\angle 7 \cong m\angle 8$	4. transitive

Given: $m \parallel n$

Prove: $m\angle 4 + m\angle 8 = 180^\circ$

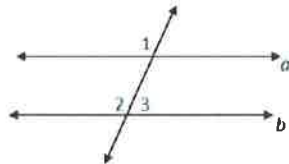


Statements	Reasons
1. $m \parallel n$	1. Given
2. $\angle 3 \cong \angle 8$	2. alt. exterior \angle 's theorem
3. $m\angle 3 + m\angle 4 = 180^\circ$	3. supplement theorem
4. $m\angle 4 + m\angle 8 = 180^\circ$	4. substitution

Fill in the blanks.

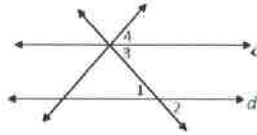
Given: $a \parallel b$

Prove: $m\angle 1 + m\angle 3 = 180^\circ$



Statement	Reason
1. $a \parallel b$	1. Given
2. $\angle 1 \cong \angle 2$	2. corresponding \angle 's postulate
3. $m\angle 1 = m\angle 2$	3. def. of \cong
4. $\angle 2$ and $\angle 3$ are supp.	4. Definition of a linear pair
5. $m\angle 2 + m\angle 3 = 180^\circ$	5. If two angles form a linear pair, their angle measures sum to 180° .
6. $m\angle 1 + m\angle 3 = 180^\circ$	6. substitution

Given: $\angle 4 \cong \angle 3$; $c \parallel d$
 Prove: $\angle 4 \cong \angle 2$



Statement	Reason
1. $\angle 4 \cong \angle 3$; $c \parallel d$	1. Given
2. $\angle 3 \cong \angle 1$	2. alternate interior angles theorem
3. $\angle 4 \cong \angle 1$	3. Transitive Property of Congruence
4. $\angle 1 \cong \angle 2$	4. vertical angles theorem
5. $\angle 4 \cong \angle 2$	5. transitive

Proving Lines are Parallel:

Corresponding Angles Converse: If two lines are cut by a transversal so the corresponding angles are congruent, then the lines are parallel.

Alternate Interior Angles Converse: If two lines are cut by a transversal so the alternate interior angles are congruent, then the lines are parallel.

Consecutive Interior Angles Converse: If two lines are cut by a transversal so that consecutive angles are supplementary, then the lines are parallel.

Alternate Exterior Angles Converse: If two lines are cut by a transversal so the alternate exterior angles are congruent, then the lines are parallel.

****Use these when given a specific angle pair is congruent, but asked to prove two lines are parallel.****