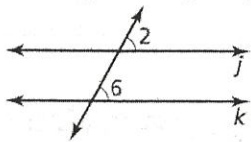


Parallel Line Theorem Converses

Lesson Objective **INBAT** prove and use theorems about parallel lines.

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

Corresponding Angles Converse:



If: If two lines are cut by a transversal so that the Corresponding angles are $\cong$

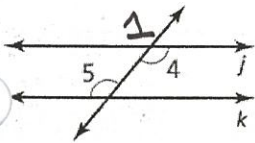
Then: the lines are parallel.

if corresp. $\angle$'s $\cong \rightarrow //$

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

parallel

Alternate Interior Angles Converse:



If: If two lines are cut by a transversal so that the alt. int. angles are $\cong$

Then: the lines are parallel.

if alt. int. $\angle$'s $\cong \rightarrow //$

PROOF:

Given: $\angle 4 \cong \angle 5$

Prove: $j \parallel k$

$\angle 4 \cong \angle 5$

given $\downarrow$

$\angle 1$ and $\angle 4$ are vert. $\angle$'s

given

$\angle 1 \cong \angle 4$

if vert. $\angle$'s $\rightarrow \angle$'s $\cong$

$\angle 1 \cong \angle 5$

trans. prop. $\cong$

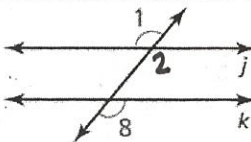
$j \parallel k$

if corresp. $\angle$'s $\cong \rightarrow //$

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

parallel

Alternate Exterior Angles Converse:



If: If two lines are cut by a transversal so that the alt. ext. angles are $\cong$

Then: the lines are parallel.

if alt. ext. $\angle$'s $\cong \rightarrow //$

Given: $\angle 1 \cong \angle 8$

PROOF: use proof above to help you 😊

Prove: $j \parallel k$

$\angle 1 \cong \angle 8$

given

$\angle 2 \cong \angle 8$

trans. prop. $\cong$

$j \parallel k$

if corresp. $\angle$'s $\cong \rightarrow //$

$\angle 1$ and $\angle 2$ are vert. $\angle$'s

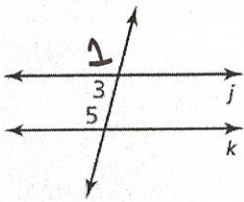
given

$\angle 1 \cong \angle 2$

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

parallel

Consecutive Interior Angles Converse:



If: If two lines are cut by a transversal so that the consec. int. angles are Supp.

Then: the lines are parallel

if consec. int. $\angle$'s Supp $\rightarrow \parallel$

PROOF: Given: $\angle 3$ and $\angle 5$ are supplementary

Prove: $j \parallel k$

$\angle 1$ and $\angle 3$ form a lin. pair
given

$$m\angle 1 + m\angle 3 = 180$$

if lin pair $\rightarrow$ Supp
if Supp $\rightarrow$ add to 180

$$m\angle 1 + m\angle 3 = m\angle 3 + m\angle 5$$

trans. prop. =

$$m\angle 1 = m\angle 5$$

Subtract. prop. =

$$\angle 1 \cong \angle 5$$

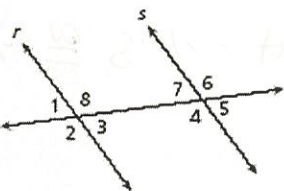
if $\angle$'s = $\rightarrow \angle$'s $\cong$

$$j \parallel k$$

if corresp. $\angle$'s $\cong \rightarrow \parallel$

Examples:

Use theorems and given information to show that $r \parallel s$.



1. $\angle 1 \cong \angle 5$ if alt. ext. $\angle$'s $\cong \rightarrow \parallel$

2. $m\angle 3 + m\angle 4 = 180^\circ$ if consec. int. $\angle$'s Supp $\rightarrow \parallel$

3. $m\angle 4 = (13x - 4)^\circ, m\angle 8 = (9x + 16)^\circ, x = 5$

$$m\angle 4 = m\angle 8$$

$$13x - 4 = 9x + 16$$

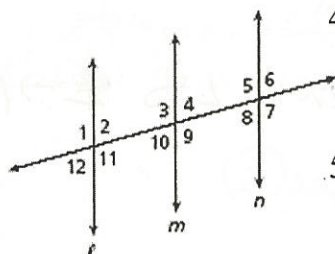
$$4x - 4 = 16$$

$$4x = 20$$

$$x = 5$$

if alt. int. $\angle$'s $\cong \rightarrow \parallel$

For the given information, tell which pairs of lines must be parallel. Name the postulate or theorem that supports your answer.



4. $m\angle 2 = m\angle 10 \rightarrow \angle 2 \cong \angle 10$

$$l \parallel m$$

if alt. int. $\angle$'s $\cong \rightarrow \parallel$

5. $m\angle 8 + m\angle 9 = 180^\circ$

$$m \parallel n$$

if consec. int. $\angle$'s Supp $\rightarrow \parallel$