



3.3: Proofs with Parallel Lines

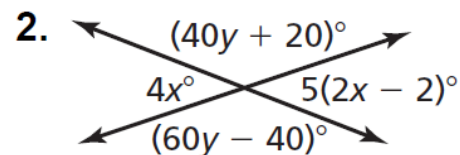
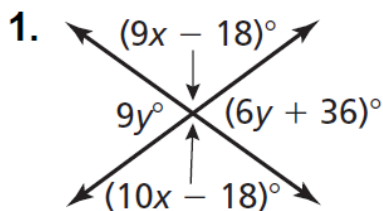
Essential Question

For which of the theorems involving parallel lines and transversals is the converse true?

Conditional: If it is December 25th,
Then it is Christmas.

Converse: If it is _____
Then it is _____

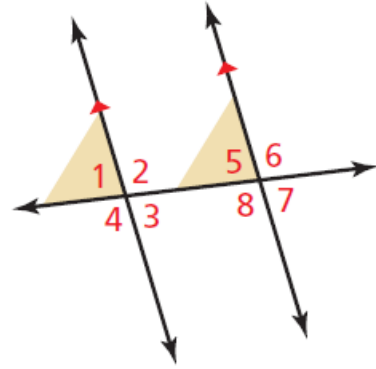
Find the values of x and y .



a. Corresponding Angles Theorem
(Theorem 3.1)

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

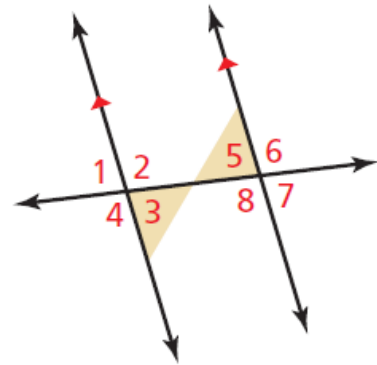
Converse



b. Alternate Interior Angles Theorem
(Theorem 3.2)

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

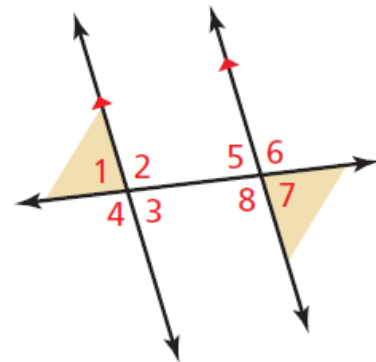
Converse



c. Alternate Exterior Angles Theorem
(Theorem 3.3)

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

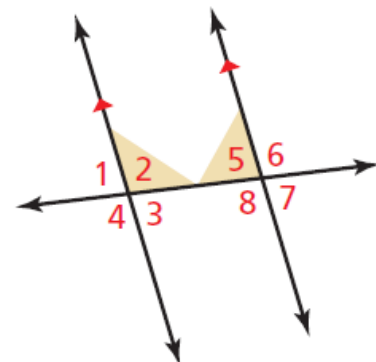
Converse



d. Consecutive Interior Angles Theorem (Theorem 3.4)

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

Converse

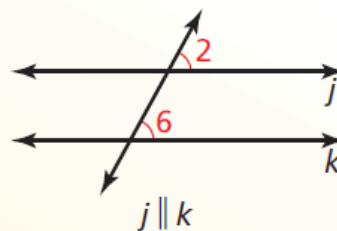


Theorem

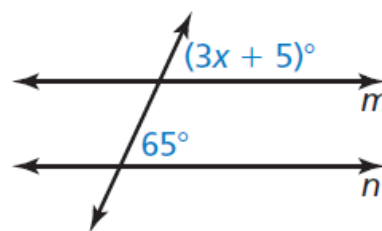
Theorem 3.5 Corresponding Angles Converse

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

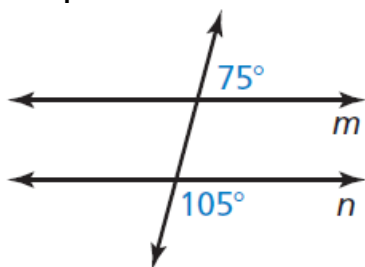
Proof Ex. 36, p. 180



Find the value of x that makes $m \parallel n$.



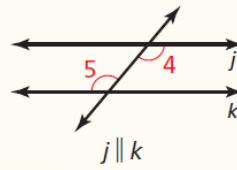
1. Is there enough information in the diagram to conclude that $m \parallel n$? Explain.



Theorems

Theorem 3.6 Alternate Interior Angles Converse

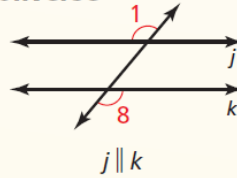
If two lines are cut by a transversal so the alternate interior angles are congruent, then the lines are parallel.



Proof Example 2, p. 140

Theorem 3.7 Alternate Exterior Angles Converse

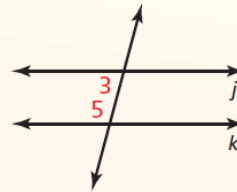
If two lines are cut by a transversal so the alternate exterior angles are congruent, then the lines are parallel.



Proof Ex. 11, p. 142

Theorem 3.8 Consecutive Interior Angles Converse

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



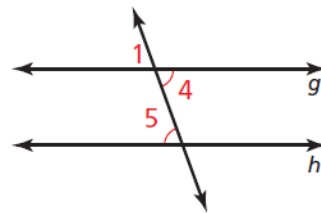
If $\angle 3$ and $\angle 5$ are supplementary, then $j \parallel k$.

Proof Ex. 12, p. 142

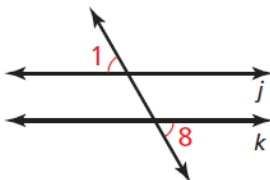
Prove that if two lines are cut by a transversal so the alternate interior angles are congruent, then the lines are parallel.

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

Prove: $g \parallel h$



3. If you use the diagram below to prove the Alternate Exterior Angles Converse, what Given and Prove statements would you use?



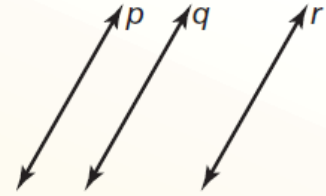
Given: $\angle 1 \cong \angle 8$,

Prove: $j \parallel k$

Theorem

Theorem 3.9 Transitive Property of Parallel Lines

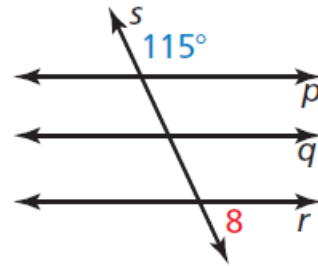
If two lines are parallel to the same line, then they are parallel to each other.



Proof Ex. 39, p. 144; Ex. 48, p. 162

If $p \parallel q$ and $q \parallel r$, then $p \parallel r$.

6. In the diagram below, $p \parallel q$ and $q \parallel r$. Find $m \angle 8$. Explain your reasoning.



In the diagram, $r \parallel s$ and $\angle 1$ is congruent to $\angle 3$. Prove $p \parallel q$.

