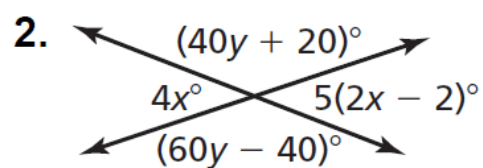
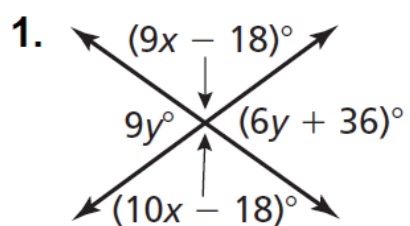


Find the values of x and y .



Use the property to copy and complete the statement.

1. Symmetric Property of Equality:

If $m\angle 1 = m\angle 2$, then _____.

2. Addition Property of Equality:

If $EF = GH$, then $EF + HJ =$ _____.

3. Multiplication Property of Equality:

If $EF = GH$, then $4 \cdot EF =$ _____.

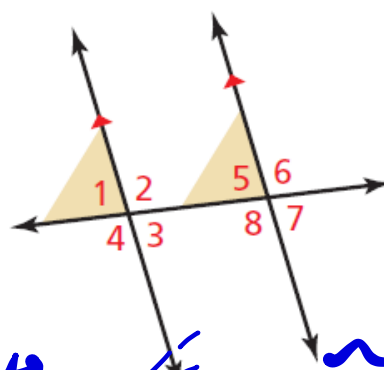
Essential Question

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

Work with a partner. Write the converse of each conditional statement. Draw a diagram to represent the converse. Determine whether the converse is true. Justify your conclusion.

**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

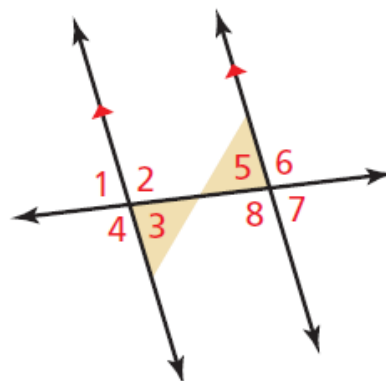
If a pair of corresponding \angle s are \cong ,
then the pair of lines cut by
the transversal are \parallel .

Work with a partner. Write the converse of each conditional statement. Draw a diagram to represent the converse. Determine whether the converse is true. Justify your conclusion.

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

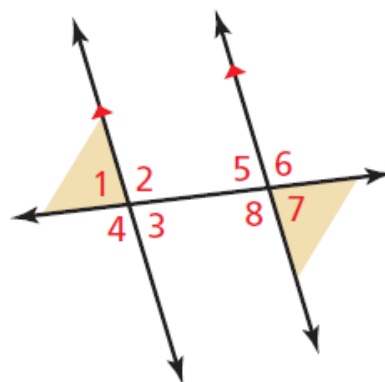


Work with a partner. Write the converse of each conditional statement. Draw a diagram to represent the converse. Determine whether the converse is true. Justify your conclusion.

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

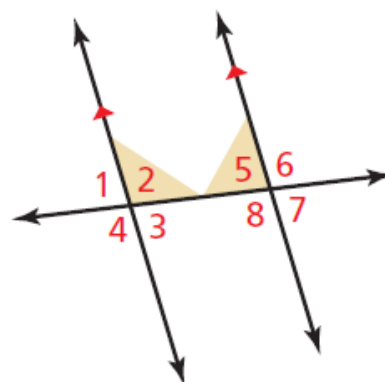


Work with a partner. Write the converse of each conditional statement. Draw a diagram to represent the converse. Determine whether the converse is true. Justify your conclusion.

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

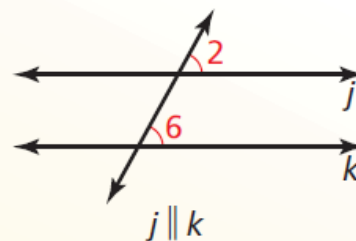


Theorem

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

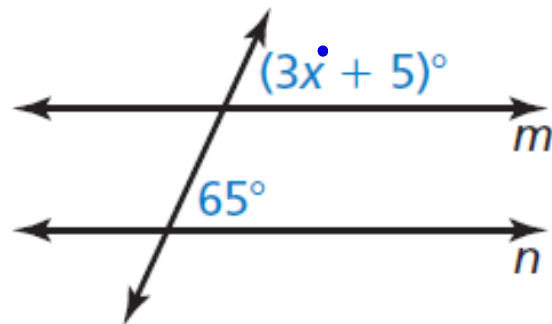


Find the value of x that makes $m \parallel n$

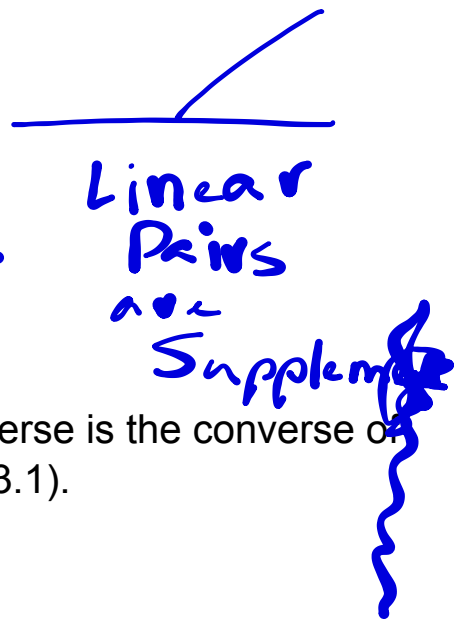
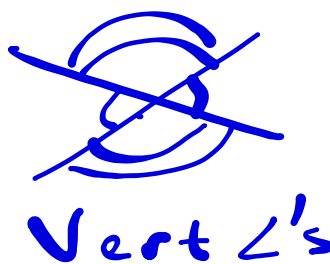
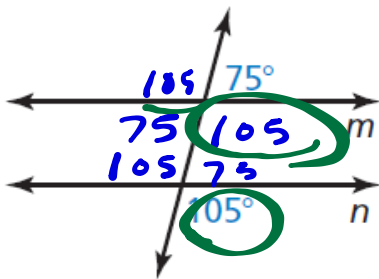
$$\begin{aligned} \text{IF } 3x + 5 &= 65 \\ -5 \quad -5 & \\ \hline 3x &= 60 \\ \frac{3x}{3} &= \frac{60}{3} \end{aligned}$$

$$\text{IF } x = 20$$

then by corresponding \angle 's
Converse, $m \parallel n$



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

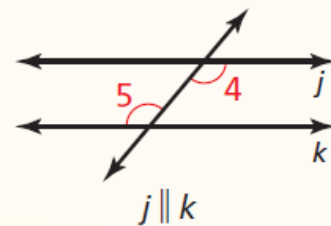


2. Explain why the Corresponding Angles Converse is the converse of the Corresponding Angles Theorem (Theorem 3.1).

Theorems

Theorem 3.6 Alternate Interior Angles Converse

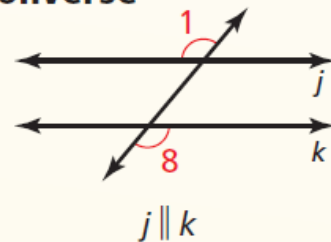
If two lines are cut by a transversal so the alternate interior angles are congruent, then the lines are parallel.



Proof Example 2, p. 140

Theorem 3.7 Alternate Exterior Angles Converse

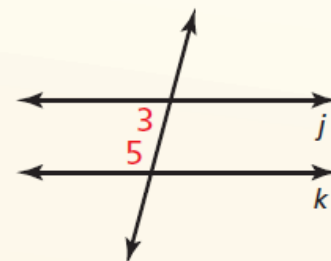
If two lines are cut by a transversal so the alternate exterior angles are congruent, then the lines are parallel.



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.



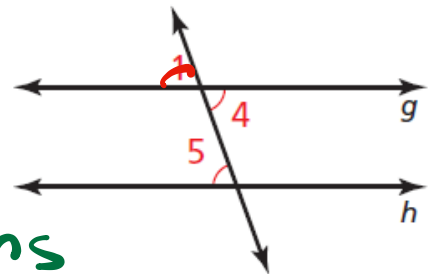
If $\angle 3$ and $\angle 5$ are supplementary, then $j \parallel k$.

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.

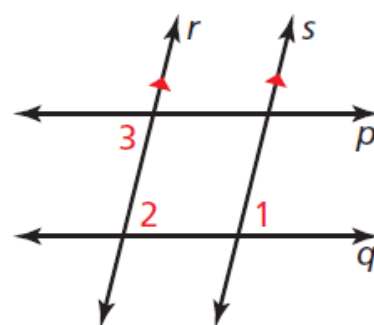
Given: $\angle 4 \cong \angle 5$

Prove: $g \parallel h$

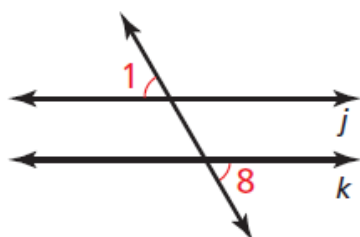


Statements	Reasons
1. $\angle 4 \cong \angle 5$	1. Given
2. $\angle 4 \cong \angle 1$	2. Vertical \angle 's Thm
3. $\angle 5 \cong \angle 1$	3. Transitive Prop \cong
4. $g \parallel h$	4. Corresponding \angle 's Converse

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



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



4. Copy and complete the following paragraph proof of the Alternate Interior Angles Converse using the diagram in Example 2.

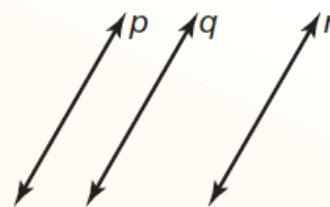
It is given that $\angle 4 \cong \angle 5$. By the _____, $\angle 1 \cong \angle 4$. Then by the Transitive Property of Congruence (Theorem 2.2), _____. So, by the _____, $g \parallel h$.

Theorem

Theorem 3.9 Transitive Property of Parallel Lines

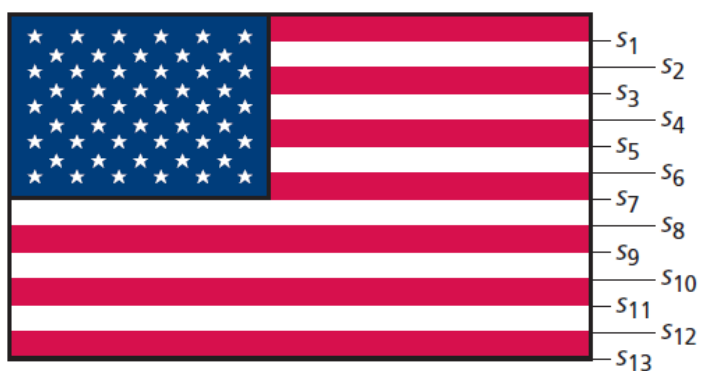
If two lines are parallel to the same line,
then they are parallel to each other.

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



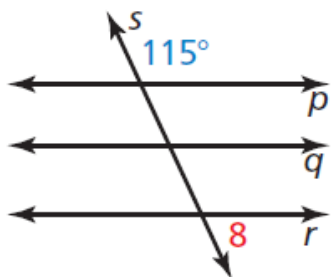
If $p \parallel q$ and $q \parallel r$, then $p \parallel r$.

The flag of the United States has 13 alternating red and white stripes. Each stripe is parallel to the stripe immediately below it. Explain why the top stripe is parallel to the bottom stripe.



5. Each step is parallel to the step immediately above it. The bottom step is parallel to the ground. Explain why the top step is parallel to the ground.

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



Writing Prompt: To prove that lines are parallel ...

