

Essential Question

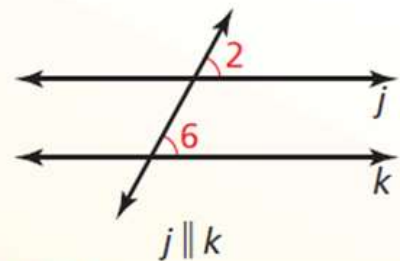
For which of the theorems involving parallel lines and transversals is the converse true?

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 $m \parallel n$.

$$3x + 5 = 65$$

$$\begin{array}{r} -5 \\ -5 \end{array}$$

$$3x = 60$$

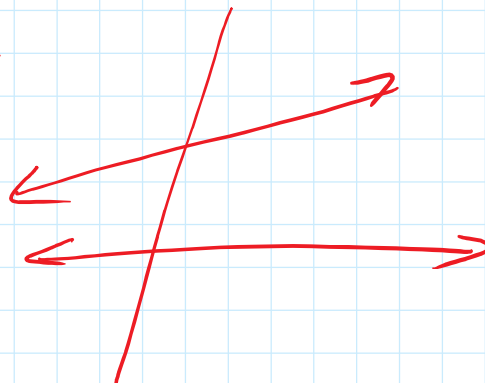
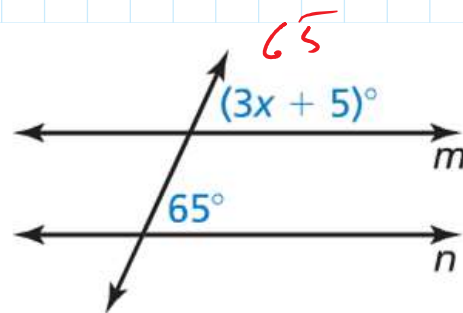
$$\begin{array}{r} \underline{3} \quad \underline{3} \\ x = 20 \end{array}$$

$$x = 21$$

$$3 \cdot 21 + 5$$

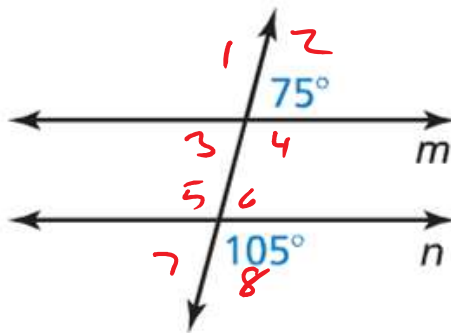
$$63 + 5$$

$$68$$



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

yes,
L.P.
↓
Corr. \angle Converse.

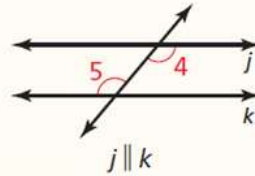


Theorems

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.

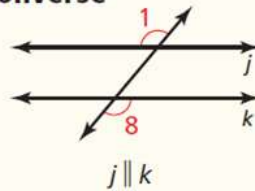
Proof Example 2, p. 140



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.

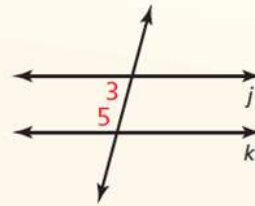
Proof Ex. 11, p. 142



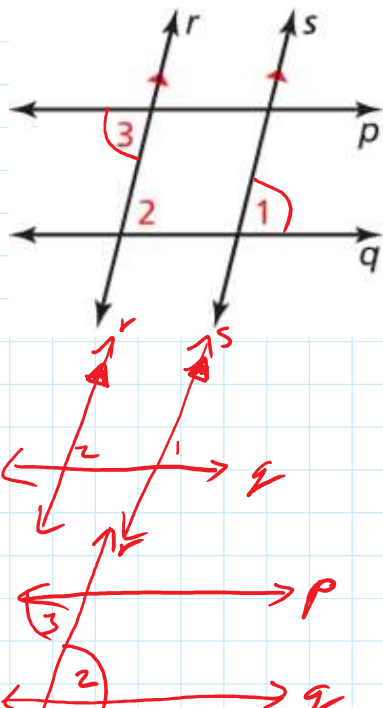
Theorem 3.8 Consecutive Interior Angles Converse

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

Proof Ex. 12, p. 142



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

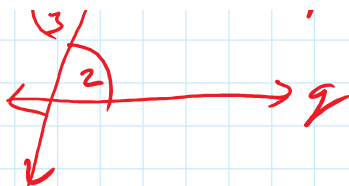


In the diagram, $r \parallel s$ and $\angle 1$ is congruent to $\angle 3$. Prove $p \parallel q$.

$r \parallel s$
 $\angle 1 \cong \angle 3$
 $\angle 2 \cong \angle 1$
 $\angle 2 \cong \angle 3$
 $p \parallel q$

given
 given
 corr. \angle s Thm.

trans. POC
 alt. Int. \angle s Conv.

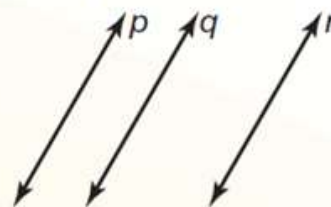


Theorem

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



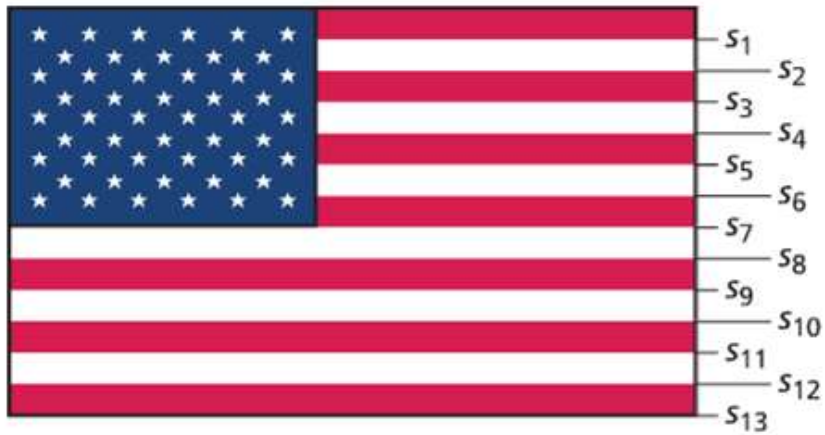
If $p \parallel q$ and $q \parallel r$, then $p \parallel r$.

$$a = b$$

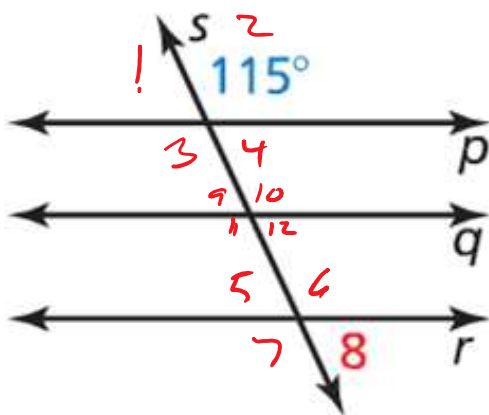
$$b = c$$

$$a = c$$

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.



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



$m\angle 8 = 65^\circ$
Trans Prop \parallel lines
 \downarrow
Corr. \angle s Thm
L.P.

Practice *sec.* 3.3

Pg. 142

1, 2, 3-7 EO, 13-19 EO, 33, 34, 41, 43
