

3.3

Proofs with Parallel Lines

For use with Exploration 3.3

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

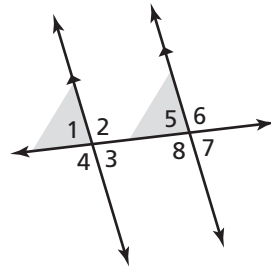
1 EXPLORATION: Exploring Converses

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.

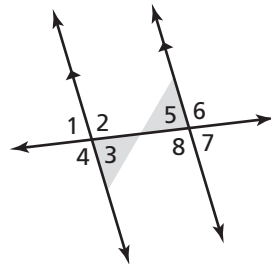
Converse



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.

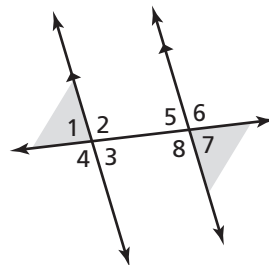
Converse



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.

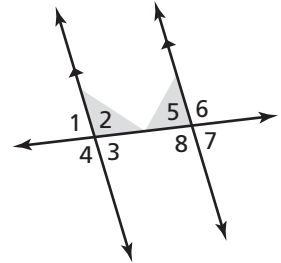
Converse



3.3 Proofs with Parallel Lines (continued)**1 EXPLORATION:** Exploring Converses (continued)**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

**Communicate Your Answer**

- For which of the theorems involving parallel lines and transversals is the converse true?
- In Exploration 1, explain how you would prove any of the theorems that you found to be true.

3.3**Notetaking with Vocabulary**

For use after Lesson 3.3

In your own words, write the meaning of each vocabulary term.

converse

parallel lines

transversal

corresponding angles

congruent

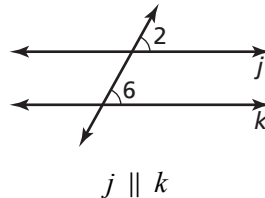
alternate interior angles

alternate exterior angles

consecutive interior angles

Theorems**Theorem 3.5 Corresponding Angles Converse**

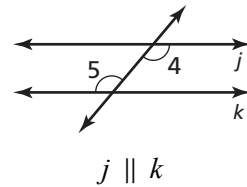
If two lines are cut by a transversal so the corresponding angles are congruent, then the lines are parallel.

**Notes:**

3.3 Notetaking with Vocabulary (continued)

Theorem 3.6 Alternate Interior Angles Converse

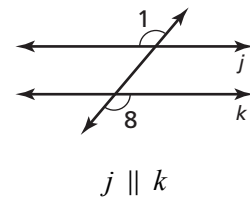
If two lines are cut by a transversal so the alternate interior angles are congruent, then the lines are parallel.



Notes:

Theorem 3.7 Alternate Exterior Angles Converse

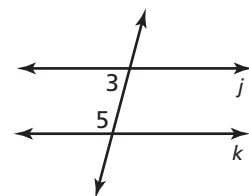
If two lines are cut by a transversal so the alternate exterior angles are congruent, then the lines are parallel.



Notes:

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.

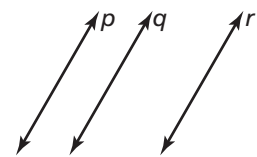


If $\angle 3$ and $\angle 5$ are supplementary, then $j \parallel k$.

Notes:

Theorem 3.9 Transitive Property of Parallel Lines

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

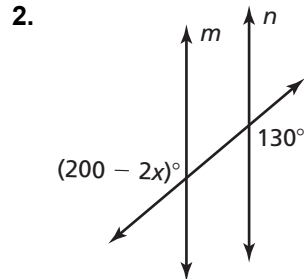
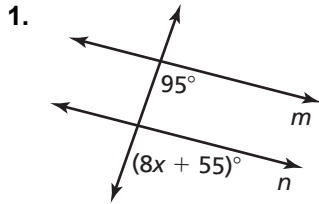


If $p \parallel q$ and $q \parallel r$, then $p \parallel r$.

3.3 Notetaking with Vocabulary (continued)

Extra Practice

In Exercises 1 and 2, find the value of x that makes $m \parallel n$. Explain your reasoning.



In Exercises 3–6, decide whether there is enough information to prove that $m \parallel n$. If so, state the theorem you would use.

