3-3 Proving Lines Parallel

Vocabulary

Review

Write the *converse* of each statement.

1. Statement: If you are cold, then you wear a sweater.

   Converse: If ? , then ? .

   If _____, then _____.

2. Statement: If an angle is a right angle, then it measures 90°.

   Converse: _____

3. The *converse* of a true statement is always / sometimes / never true .

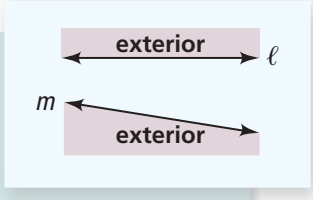
Vocabulary Builder

exterior (adjective) **ek STEER ee ur**

Related Words: **exterior** (noun), external, interior (antonym)

Definition: **Exterior** means on the outside or in an outer region.

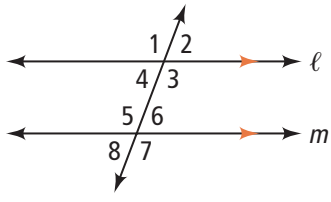
Example: Two lines crossed by a transversal form four **exterior** angles.



Use Your Vocabulary

Underline the correct word to complete each sentence.

4. To paint the outside of your house, buy interior / exterior paint.
5. The protective cover prevents the interior / exterior of the book from being damaged.
6. In the diagram at the right, angles 1 and 7 are alternate interior / exterior angles.
7. In the diagram at the right, angles 4 and 5 are same-side interior / exterior angles.



Underline the *hypothesis* and circle the *conclusion* in the following statements.

8. If the lines do not intersect, then they are parallel lines.
9. If the angle measures 180°, then it is a straight angle.

take note

Postulates 3-1 and 3-2 Corresponding Angles Postulate and Its Converse

Postulate 3-1 Corresponding Angles Postulate

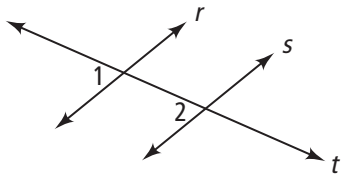
If a transversal intersects two parallel lines, then corresponding angles are congruent.

10. Complete the statement of Postulate 3-2.

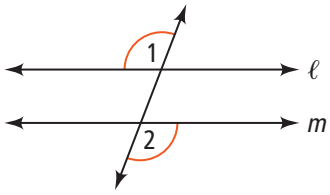
Postulate 3-2 Converse of the Corresponding Angles Postulate

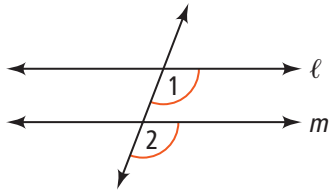
If two lines on a transversal form corresponding angles that are congruent, then the lines are ? .

11. Use the diagram below. Place appropriate marking(s) to show that $\angle 1$ and $\angle 2$ are congruent.



12. Circle the diagram that models Postulate 3-2.





take note

Theorems 3-4, 3-5, and 3-6

Theorem 3-4 Converse of the Alternate Interior Angle Theorem

If two lines and a transversal form alternate interior angles that are congruent, then the two lines are parallel.

Theorem 3-5 Converse of the Same-Side Interior Angles Theorem

If two lines and a transversal form same-side interior angles that are supplementary, then the two lines are parallel.

Theorem 3-6 Converse of the Alternate Exterior Angles Theorem

If two lines and a transversal form alternate exterior angles that are congruent, then the two lines are parallel.

13. Use the diagram at the right to complete each example.

Theorem 3-4

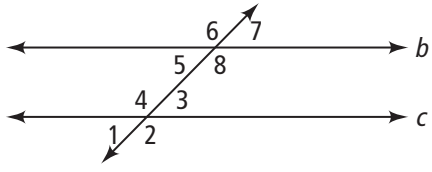
If $\angle 4 \cong$, then $b \| c$.

Theorem 3-5

If $\angle 3$ and are supplementary, then $b \| c$.

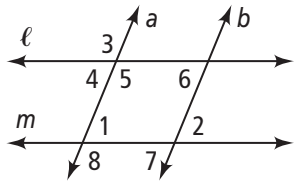
Theorem 3-6

If $\angle 1 \cong$, then $b \| c$.



Problem 1 Identifying Parallel Lines

Got It? **Which lines are parallel if $\angle 6 \cong \angle 7$? Justify your answer.**



14. Underline the correct word(s) to complete each sentence.

$\angle 6 \cong \angle 7$ is given / to prove .

$\angle 6$ and $\angle 7$ are alternate / same-side angles.

$\angle 6$ and $\angle 7$ are corresponding / exterior / interior angles.

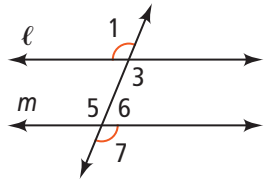
I can use Postulate 3-1 / Postulate 3-2 to prove the lines parallel.

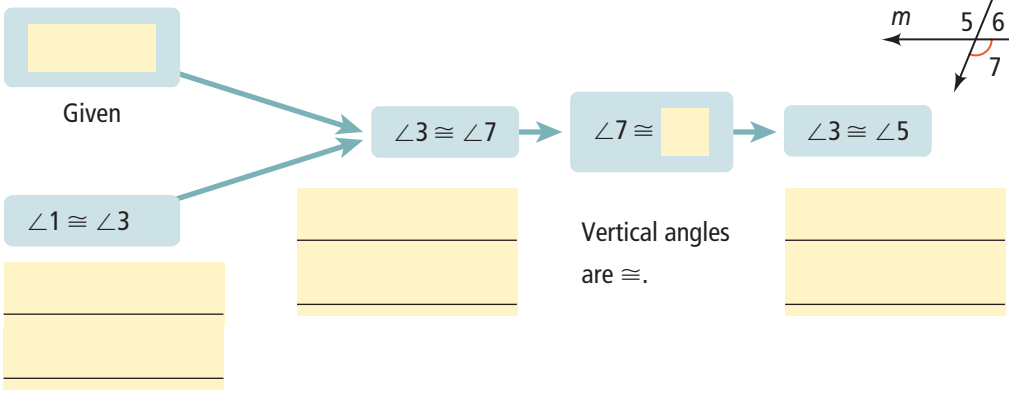
Using $\angle 6 \cong \angle 7$, lines a and b / ℓ and m are parallel and the transversal is a/ b / ℓ/ m.

Problem 2 Writing a Flow Proof of Theorem 3-6

Got It? **Given that $\angle 1 \cong \angle 7$. Prove that $\angle 3 \cong \angle 5$ using a flow proof.**

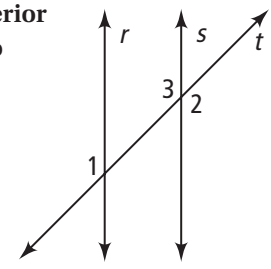
15. Use the diagram at the right to complete the flow proof below.





Problem 3 Determining Whether Lines Are Parallel

Got It? **Given that $\angle 1 \cong \angle 2$, you can use the Converse of the Alternate Exterior Angles Theorem to prove that lines r and s are parallel. What is another way to explain why $r \| s$? Justify your answer.**



16. Justify each step.

$\angle 1 \cong \angle 2$

$\angle 2 \cong \angle 3$

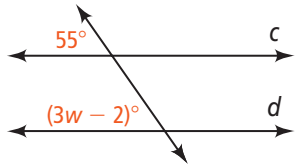
$\angle 1 \cong \angle 3$

17. Angles 1 and 3 are alternate / corresponding .

18. What postulate or theorem can you now use to explain why $r \| s$?

Problem 4 Using Algebra

Got It? What is the value of w for which $c \parallel d$?



Underline the correct word to complete each sentence.

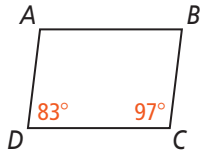
19. The marked angles are on opposite sides / the same side of the transversal.

20. By the Corresponding Angles Postulate, if $c \parallel d$ then corresponding angles are complementary / congruent / supplementary.

21. Use the theorem to solve for w.

Lesson Check • Do you UNDERSTAND?

Error Analysis A classmate says that $\overleftrightarrow{AB} \parallel \overleftrightarrow{DC}$ based on the diagram at right. Explain your classmate's error.



22. Circle the segments that are sides of $\angle D$ and $\angle C$. Underline the transversal.

$\overline{AB}$ $\overline{BC}$ $\overline{DC}$ $\overline{DA}$

23. Explain your classmate's error.

Math Success

Check off the vocabulary words that you understand.

☐ flow proof ☐ two-step proof ☐ parallel lines

Rate how well you can *prove that lines are parallel.*

Need to review 0 2 4 6 8 10 Now I get it!