

3-3

Proving Lines Parallel

Content Standard

Extends G.CO.9 Prove theorems about lines and angles. Theorems include: ... when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent ...

Objective To determine whether two lines are parallel

Essential Understanding You can use certain angle pairs to decide whether two lines are parallel.

Take note

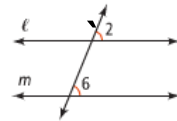
Theorem 3-4 Converse of the Corresponding Angles Theorem

Theorem

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

If ...

$$\angle 2 \cong \angle 6$$



Then ...

$$l \parallel m$$

Take note

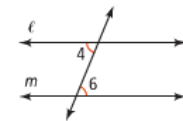
Theorem 3-5 Converse of the Alternate Interior Angles Theorem

Theorem

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

If ...

$$\angle 4 \cong \angle 6$$



Then ...

$$l \parallel m$$

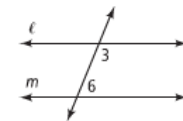
Theorem 3-6 Converse of the Same-Side Interior Angles Postulate

Theorem

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

If ...

$$m\angle 3 + m\angle 6 = 180$$



Then ...

$$l \parallel m$$

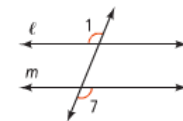
Theorem 3-7 Converse of the Alternate Exterior Angles Theorem

Theorem

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

If ...

$$\angle 1 \cong \angle 7$$



Then ...

$$l \parallel m$$

The order of the information given to you in these theorems/postulates has changed but the information hasn't. Same-side interior angles should still be supplementary and all the other angle relationships are congruent.

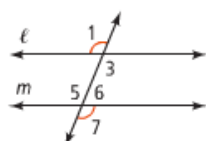
You know two forms of proof—paragraph and two-column. In a third form, called **flow proof**, arrows show the logical connections between the statements. Reasons are written below the statements.



Problem 2 ~~Writing a Flow Proof of Theorem 3-7~~

Given: $\angle 1 \cong \angle 7$

Prove: $\ell \parallel m$



Know

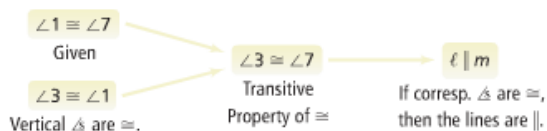
- $\angle 1 \cong \angle 7$
- From the diagram you know
- $\angle 1$ and $\angle 3$ are vertical
- $\angle 5$ and $\angle 7$ are vertical
- $\angle 1$ and $\angle 5$ are corresponding
- $\angle 3$ and $\angle 7$ are corresponding

Need

One pair of corresponding angles congruent to prove $\ell \parallel m$

Plan

Use a pair of congruent vertical angles to relate either $\angle 1$ or $\angle 7$ to its corresponding angle.



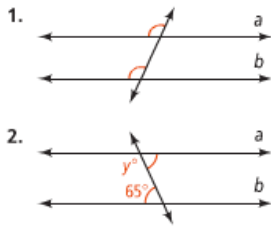
Know what a flow proof is and what it looks like. You will never have to complete a full flow proof on your own but you may be asked to fill in the blanks of a flow proof.



Lesson Check

Do you know HOW?

State the theorem or postulate that proves $a \parallel b$.



3. What is the value of y for which $a \parallel b$ in Exercise 2?

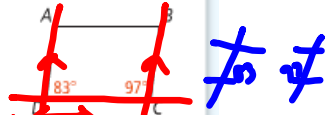
Do you UNDERSTAND?



4. Explain how you know when to use the Alternate Interior Angles Theorem and when to use the Converse of the Alternate Interior Angles Theorem.

5. ~~Compare and Contrast~~ How are flow proofs and two-column proofs alike? How are they different?

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



$\overleftrightarrow{AB} \nparallel \overleftrightarrow{DC}$ $\overleftrightarrow{AB} \parallel \overleftrightarrow{BC}$

1. Converse of the Corresponding \angle s Thm

2. Converse of the Alt. Interior \angle s Thm

$$3. y + 65 = 180$$

$$y = 115^\circ$$

4. Use the Converse Thms/Posts. when you are proving lines \parallel .

Use the Plain Thms/Posts when you know lines are \parallel (and are finding angle measure)

The highlighted portion is the most important concept from this lesson!!!!

Name

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Notes 3.4