**H. Geometry Section 3.1 Cont. 2 – Properties Parallel Lines Date: \_\_\_\_\_**

You can display the steps that prove a theorem in a two-column proof.



Example 1: Proving Alt. Interior Angles are Congruent

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

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**Given:** $a∥b$

**Prove:** $∠1 ≅∠3$

**Statements Reasons**

Example 2: Proving Alt. Exterior Angles are Congruent

**Given:** $a∥b$

**Prove:** $∠1 ≅∠3$

**Statements Reasons**

Example 3: Finding angle measures

 **Given:** $a∥b$**. Find the measure of the numbered angles**

 1

 4 2

 6 3

 $40°$ 5

 7 a

 b

Example 4: Find the measure of Angle 1 in each pair of parallel lines.

a. b.

 1

 1 80°

 50°

c. d.

 1 1

 110°

 95°

H. Geometry **3-2: Proving Lines Parallel**

**Objective: To use a transversal in proving lines parallel**

 **Postulate 3-2: Converse of the Corresponding Angles Postulate**

 If two lines and a transversal form corresponding angles that are congruent,

In Lesson 3-1, you proved four theorems based on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

You can also prove theorems that are based on its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Let’s take a look.

 **Theorem 3-5: Converse of the Alternate Interior Angles Theorem**

 If \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then the two lines are parallel.

 **Theorem 3-6: Converse of the Same-Side Interior Angles Theorem**

 If \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then the two lines are parallel.

Example 1:

A. Which lines, if any, must be parallel if *m*1 = *m* 2? Justify your answer with a theorem or postulate.

 3

 E C

 D 1 4 K

 2

B. Which lines if any, must be parallel if *m*3 = *m*4? Explain.

 **Theorem 3-7: Converse of the Alternate Exterior Angles Theorem**

 If \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then the two lines are parallel. a

 b

1. 2

 **Theorem 3-8: Converse of the Same-Side Exterior Angles Theorem**

 If two lines and a transversal form same-side exterior angles that are supplementary, then

Example 2: 

A. Find the value of x for which *l* || *m*. *l*

 *m*

 

B. Find the value of x for which a || b. Explain how you can check your answer.

 

 a

 b

 

Example 3:

A. Two workers are painting lines for angled parking spaces. The first worker paints a line so that

. The second worker paints a line so that. Explain why their lines are parallel.

B. If the second worker uses 3, what should *m* 3 be for parallel lines? Explain.