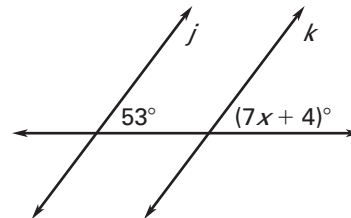## LESSON 3.3 Study Guide
For use with pages 161–169

GOAL Use angle relationships to prove that lines are parallel.

Vocabulary

A proof can be written in paragraph form, called a **paragraph proof.**

Postulate 16 Corresponding Angles Converse: If two lines are cut by a transversal so the corresponding angles are congruent, then the lines are parallel.

Theorem 3.4 Alternate Interior Angles Converse: If two lines are cut by a transversal so the alternate interior angles are congruent, then the lines are parallel.

Theorem 3.5 Alternate Exterior Angles Converse: If two lines are cut by a transversal so the alternate exterior angles are congruent, then the lines are parallel.

Theorem 3.6 Consecutive Interior Angles Converse: If two lines are cut by a transversal so the consecutive interior angles are supplementary, then the lines are parallel.

Theorem 3.7 Transitive Property of Parallel Lines: If two lines are parallel to the same line, then they are parallel to each other.

EXAMPLE 1 ## Apply the Corresponding Angles Converse

Find the value of x that makes $j \parallel k$.

Solution

Lines j and k are parallel if the marked corresponding angles are congruent.

$53°$ $(7x + 4)°$

$(7x + 4)° = 53°$ Use Postulate 16 to write an equation.
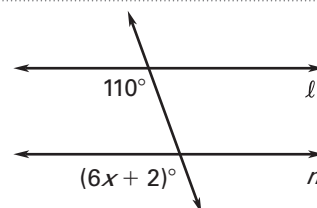
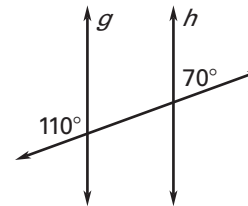$7x = 49$ Subtract 4 from each side.

$x = 7$ Divide each side by 7.

The lines j and k are parallel when $x = 7$.

Exercises for Example 1

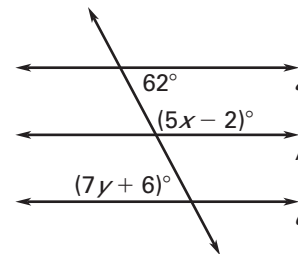**1.** Find the value of x that makes $\ell \parallel m$.

$110°$ ℓ

$(6x + 2)°$ m

2. Is there enough information in the diagram to conclude that $g \parallel h$? *Explain.*

$g \quad h$

$70°$

$110°$

EXAMPLE 2 **Show lines are parallel**

Use the diagram at the right.

a. Find the value of x that makes $a \parallel b$.

b. Find the value of y that makes $a \parallel c$.

$62°$ $\quad a$

$(5x - 2)°$

$\quad b$

$(7y + 6)°$

$\quad c$

Solution

a. Lines a and b are parallel if the marked consecutive interior angles are supplementary.

$(5x - 2)° + 62° = 180°$ Use Theorem 3.6 to write an equation.

$5x + 60 = 180$ Combine like terms.

$5x = 120$ Subtract 60 from each side.

$x = 24$ Divide each side by 5.

The lines a and b are parallel when $x = 24$.

b. Lines a and c are parallel if the marked alternate interior angles are congruent.

$(7y + 6)° = 62°$ Use Theorem 3.4 to write an equation.

$7y = 56$ Subtract 6 from each side.

$y = 8$ Divide each side by 7.

The lines a and c are parallel when $y = 8$.

Exercises for Example 2

Find the value of x that makes $p \parallel q$.

3.

$140°$

p

$(13x - 3)°$ $\quad q$

4.

$p \quad q$

$72°$

$(9x)°$

5.

$98°$ $\quad p$

$(7x - 2)°$

q