NAME _____ DATE _____

Reteaching with Practice

For use with pages 661–668

GOAL **Find the measures of interior and exterior angles of polygons**

VOCABULARY

Theorem 11.1 Polygon Interior Angles Theorem
The sum of the measures of the interior angles of a convex *n*-gon is
$(n - 2) \cdot 180°$.

Corollary to Theorem 11.1
The measure of each interior angle of a regular *n*-gon is

$$\frac{1}{n} \cdot (n - 2) \cdot 180°, \text{ or } \frac{(n - 2) \cdot 180°}{n}.$$

Theorem 11.2 Polygon Exterior Angles Theorem
The sum of the measures of the exterior angles of a convex polygon,
one angle at each vertex, is 360°.

Corollary to Theorem 11.2
The measure of each exterior angle of a regular *n*-gon is

$$\frac{1}{n} \cdot 360°, \text{ or } \frac{360°}{n}.$$

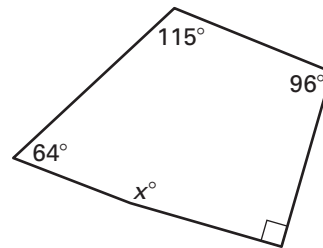**EXAMPLE 1** *Finding Measures of Interior Angles of Polygons*

Find the value of *x*.

SOLUTION

The sum of the measure of the interior
angles of any pentagon is
$(5 - 2) \cdot 180° = 3 \cdot 180° = 540°$.
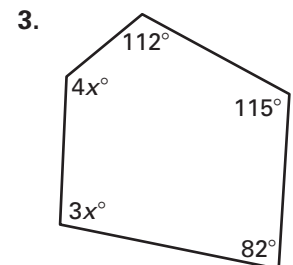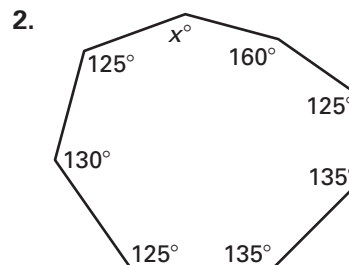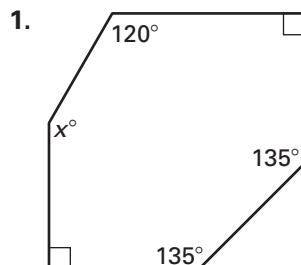
Add the measures of the interior angles of the pentagon.

$$64° + 115° + 96° + 90° + x° = 540° \qquad \text{The sum is } 540°.$$
$$365 + x = 540 \qquad \text{Simplify.}$$
$$x = 175 \qquad \text{Subtract 365 from each side.}$$

Exercises for Example 1

In Exercises 1–3, find the value of *x*.

1.   120°   □
   $x°$
   135°
   □   135°

2. $x°$ 160°
   125°   125°
   130°   135°
   125°   135°

3.   112°
   $4x°$ 115°
   $3x°$
   82°

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EXAMPLE 2 *Finding the Number of Sides of a Polygon*

The measure of each interior angle of a regular polygon is 144°.
How many sides does the polygon have?

SOLUTION

$$\frac{1}{n} \cdot (n - 2) \cdot 180° = 144°$$ Corollary to Theorem 11.1

$$(n - 2) \cdot 180 = 144n$$ Multiply each side by n.

$$180n - 360 = 144n$$ Distributive property
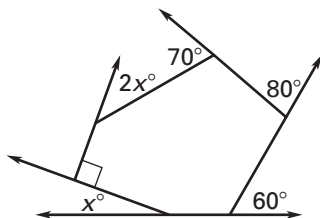
$$n = 10$$ Solve for n.

Exercise for Example 2

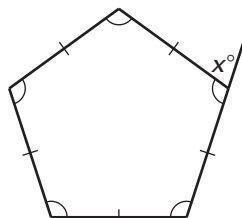**4.** The measure of each interior angle of a regular n-gon is 156°. Find the
value of n.

EXAMPLE 3 *Finding the Measure of an Exterior Angle*

Find the value of x in each diagram.

a.

b.

SOLUTION

a. $x° + 90° + 2x° + 70° + 80° + 60° = 360°$ Theorem 11.2

$$3x = 60$$ Combine like terms.

$$x = 20$$ Divide each side by 3.

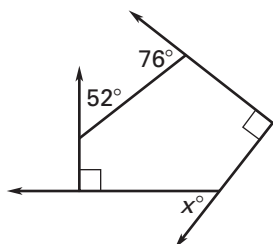**b.** $x° = \frac{1}{5} \cdot 360°$ Use $n = 5$ in the Corollary to Theorem 11.2.

$$x = 72$$ Simplify.

Exercises for Example 3

Find the value of *x*.

5.

6.