NAME _____ DATE _____ PERIOD ____

# 8-1 Study Guide and Intervention

## *Angles of Polygons*

**Sum of Measures of Interior Angles** The segments that connect the nonconsecutive sides of a polygon are called **diagonals**. Drawing all of the diagonals from one vertex of an ***n*-gon** separates the polygon into $n - 2$ triangles. The sum of the measures of the interior angles of the polygon can be found by adding the measures of the interior angles of those $n - 2$ triangles.

| **Interior Angle Sum Theorem** | If a convex polygon has $n$ sides, and $S$ is the sum of the measures of its interior angles, then $S = 180(n - 2)$. |
|---|---|

**Example 1** **A convex polygon has 13 sides. Find the sum of the measures of the interior angles.**

$S = 180(n - 2)$
$= 180(13 - 2)$
$= 180(11)$
$= 1980$

**Example 2** **The measure of an interior angle of a regular polygon is 120. Find the number of sides.**

The number of sides is $n$, so the sum of the measures of the interior angles is $120n$.

$S = 180(n - 2)$
$120n = 180(n - 2)$
$120n = 180n - 360$
$-60n = -360$
$n = 6$

**Exercises**

**Find the sum of the measures of the interior angles of each convex polygon.**

**1.** 10-gon **2.** 16-gon **3.** 30-gon

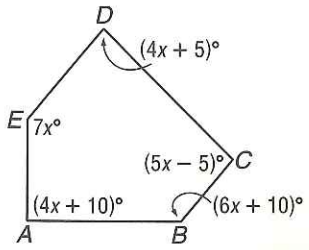
**4.** 8-gon **5.** 12-gon **6.** $3x$-gon

**The measure of an interior angle of a regular polygon is given. Find the number of sides in each polygon.**

**7.** 150 **8.** 160 **9.** 175

**10.** 165 **11.** 168.75 **12.** 135

**13.** Find $x$.




Lesson 8-1

NAME _____ DATE _____ PERIOD ____

# 8-1 Study Guide and Intervention *(continued)*

## *Angles of Polygons*

**Sum of Measures of Exterior Angles** There is a simple relationship among the exterior angles of a convex polygon.

| | |
|---|---|
| **Exterior Angle Sum Theorem** | If a polygon is convex, then the sum of the measures of the exterior angles, one at each vertex, is 360. |

**Example 1** **Find the sum of the measures of the exterior angles, one at each vertex, of a convex 27-gon.**

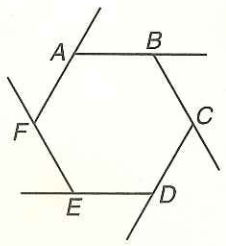
For *any* convex polygon, the sum of the measures of its exterior angles, one at each vertex, is 360.

**Example 2** **Find the measure of each exterior angle of regular hexagon *ABCDEF*.**

The sum of the measures of the exterior angles is 360 and a hexagon has 6 angles. If $n$ is the measure of each exterior angle, then

$6n = 360$

$n = 60$




**Exercises**

**Find the sum of the measures of the exterior angles of each convex polygon.**

**1.** 10-gon **2.** 16-gon **3.** 36-gon

**Find the measure of an exterior angle for each convex regular polygon.**

**4.** 12-gon **5.** 36-gon **6.** $2x$-gon

**Find the measure of an exterior angle given the number of sides of a regular polygon.**

**7.** 40 **8.** 18 **9.** 12

**10.** 24 **11.** 180 **12.** 8

NAME _____ DATE _____ PERIOD ____

# 8-1 Study Guide and Intervention

## Angles of Polygons

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$= 180(13 - 2)$
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**Example 2** **The measure of an interior angle of a regular polygon is 120. Find the number of sides.**

The number of sides is $n$, so the sum of the measures of the interior angles is $120n$.

$S = 180(n - 2)$
$120n = 180(n - 2)$
$120n = 180n - 360$
$-60n = -360$
$n = 6$

Lesson 8-1

**Exercises**

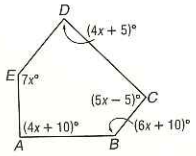
**Find the sum of the measures of the interior angles of each convex polygon.**

1. 10-gon — 1440
2. 16-gon — 2520
3. 30-gon — 5040
4. 8-gon — 1080
5. 12-gon — 1800
6. $3x$-gon — $180(3x - 2)$

**The measure of an interior angle of a regular polygon is given. Find the number of sides in each polygon.**

7. 150 — 12
8. 160 — 18
9. 175 — 72
10. 165 — 24
11. 168.75 — 32
12. 135 — 8

13. Find $x$. — 20






NAME _____ DATE _____ PERIOD ____

# 8-1 Study Guide and Intervention *(continued)*

## Angles of Polygons

**Sum of Measures of Exterior Angles** There is a simple relationship among the exterior angles of a convex polygon.

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**Example 1** **Find the sum of the measures of the exterior angles, one at each vertex, of a convex 27-gon.**

For *any* convex polygon, the sum of the measures of its exterior angles, one at each vertex, is 360.

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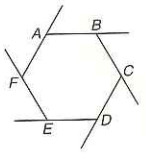
The sum of the measures of the exterior angles is 360 and a hexagon has 6 angles. If $n$ is the measure of each exterior angle, then

$6n = 360$
$n = 60$




**Exercises**

**Find the sum of the measures of the exterior angles of each convex polygon.**

1. 10-gon — 360
2. 16-gon — 360
3. 36-gon — 360

**Find the measure of an exterior angle for each convex regular polygon.**

4. 12-gon — 30
5. 36-gon — 10
6. $2x$-gon — $\frac{180}{x}$

**Find the measure of an exterior angle given the number of sides of a regular polygon.**

7. 40 — 9
8. 18 — 20
9. 12 — 30
10. 24 — 15
11. 180 — 2
12. 8 — 45