NAME _____ DATE _____ PERIOD ____

6-1 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

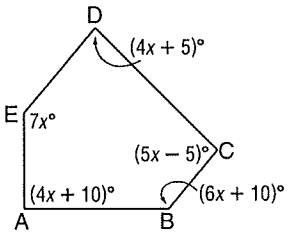
4. 8-gon **5.** 12-gon **6.** $3x$-gon

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.



NAME _____ DATE _____ PERIOD ____

6-1 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.**

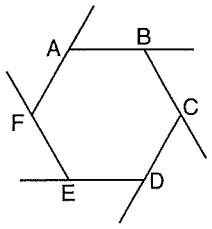
For *any* convex polygon, the sum of the measures of its exterior angles, one at each vertex, is 360.

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

Lesson 6-1