Name_____ Date_____

7.1 Angles of Polygons
For use with Exploration 7.1

Essential Question What is the sum of the measures of the interior angles of a polygon?
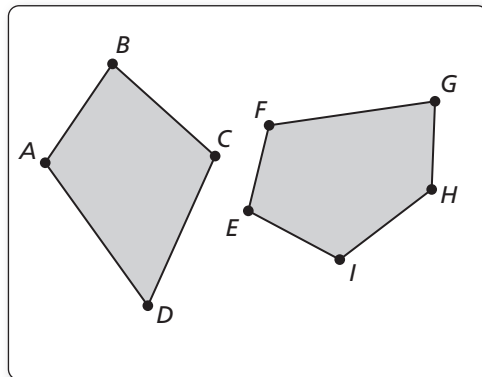
1 EXPLORATION: The Sum of the Angle Measures of a Polygon

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Use dynamic geometry software.

a. Draw a quadrilateral and a pentagon. Find the sum of the measures of the interior angles of each polygon.
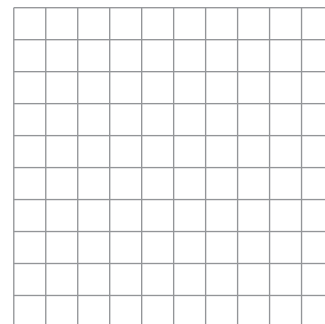
Sample

b. Draw other polygons and find the sums of the measures of their interior angles. Record your results in the table below.

Number of sides, *n*	3	4	5	6	7	8	9
Sum of angle measures, *S*							

c. Plot the data from your table in a coordinate plane.

d. Write a function that fits the data. Explain what the function represents.

7.1 **Angles of Polygons** (continued)

2 **EXPLORATION:** Measure of One Angle in a Regular Polygon

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner.

    a. Use the function you found in Exploration 1 to write a new function that gives the measure of one interior angle in a regular polygon with *n* sides.

    b. Use the function in part (a) to find the measure of one interior angle of a regular pentagon. Use dynamic geometry software to check your result by constructing a regular pentagon and finding the measure of one of its interior angles.

    c. Copy your table from Exploration 1 and add a row for the measure of one interior angle in a regular polygon with *n* sides. Complete the table. Use dynamic geometry software to check your results.

Number of sides, *n*	3	4	5	6	7	8	9
Sum of angle measures, *S*							
Measure of one interior angle							

Communicate Your Answer

3. What is the sum of the measures of the interior angles of a polygon?

4. Find the measure of one interior angle in a regular dodecagon (a polygon with 12 sides).

7.1 Notetaking with Vocabulary
For use after Lesson 7.1

In your own words, write the meaning of each vocabulary term.
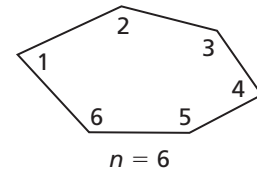
diagonal

equilateral polygon

equiangular polygon

regular polygon

Theorems

Theorem 7.1   Polygon Interior Angles Theorem

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

$$m\angle 1 + m\angle 2 + \cdots + m\angle n = (n - 2) \cdot 180°$$

$n = 6$

Notes:

7.1 **Notetaking with Vocabulary (continued)**

Corollary 7.1   Corollary to the Polygon Interior Angles Theorem

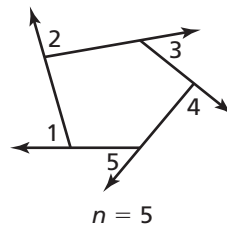The sum of the measures of the interior angles of a quadrilateral is $360°$.

Notes:

Theorem 7.2   Polygon Exterior Angles Theorem

The sum of the measures of the exterior angles of a convex polygon, one angle at each vertex, is $360°$.

$$m\angle 1 + m\angle 2 + \cdots + m\angle n = 360°$$

Notes:

$n = 5$

7.1 **Notetaking with Vocabulary** (continued)

Extra Practice

In Exercises 1–3, find the sum of the measures of the interior angles of the indicated convex polygon.

1. octagon **2.** 15-gon **3.** 24-gon

In Exercises 4–6, the sum of the measures of the interior angles of a convex polygon is given. Classify the polygon by the number of sides.

4. 900° **5.** 1620° **6.** 2880°

In Exercises 7–10, find the value of *x*.

7.

8.

9.

10.