Lesson 5.1: Polygon Sum Conjecture - 1 -

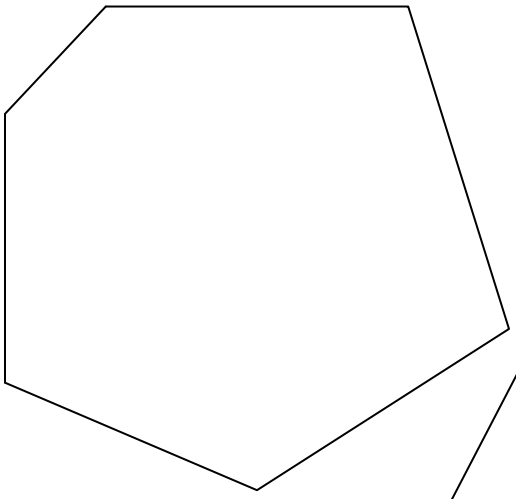
In this lesson you will:

- discover a formula for finding the sum of the angle measures for any polygon
- use deductive reasoning to explain why the polygon sum formula works

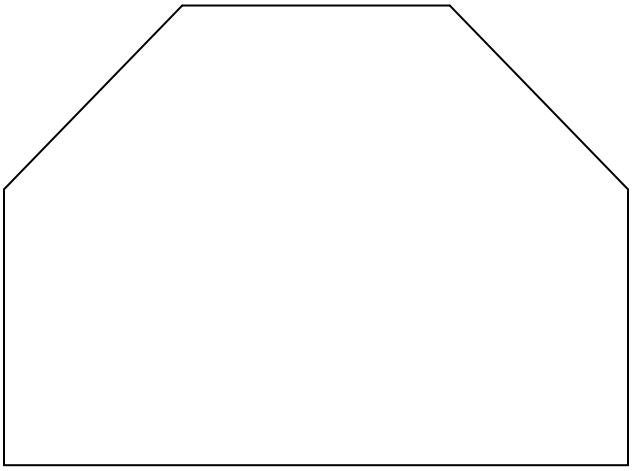
Triangles come in many different shapes and sizes. However, as you discovered in Chapter 4, the sum of the angle measures of any triangle is _____. In this lesson you will investigate the sum of angle measures of other polygons. After you find a pattern, you'll write a formula that relates the number of sides of a polygon to the sum of the measures of its angles.

Investigation 5.1: "Is There a Polygon Sum Formula?"

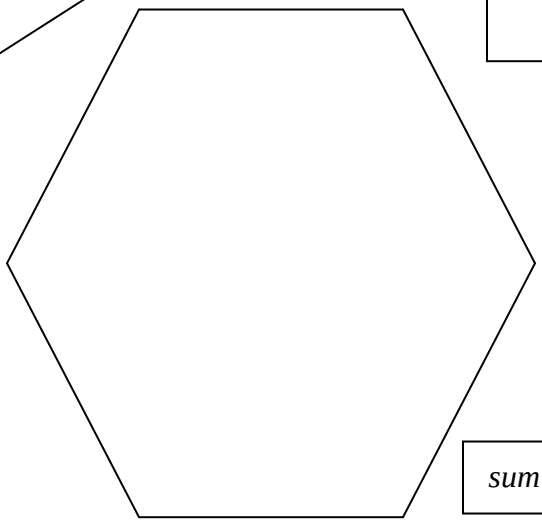
A.) Carefully measure and label all the interior angles of each hexagon below. Then find the sum of each hexagon's angles.



sum = _____°



sum = _____°

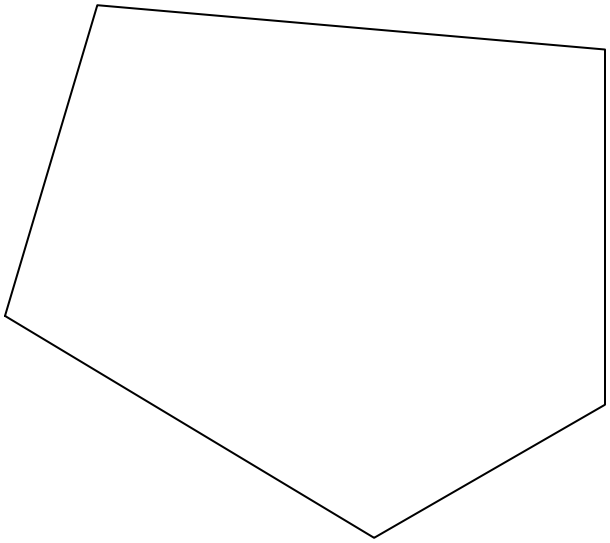


sum = _____°

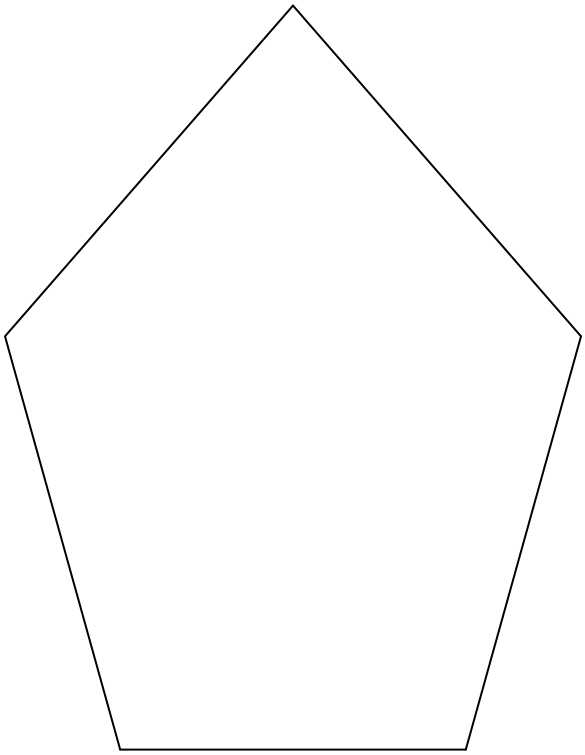
B.) Share the results with your group. If you measured carefully, you should all have the same sum! What is the sum of the interior angles of any hexagon? _____

Lesson 5.1: Polygon Sum Conjecture - 2 -

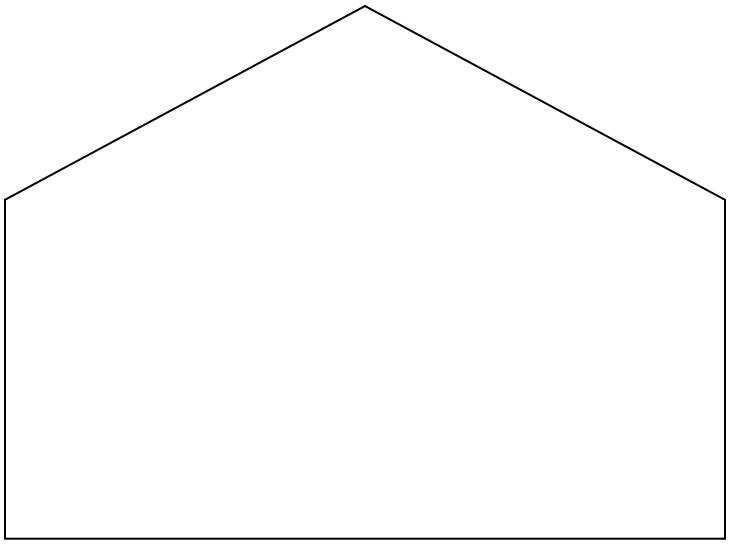
C.) Carefully measure and label all the interior angles of each pentagon below. What is the sum of the interior angles of any pentagon? _____



sum = _____°



sum = _____°



sum = _____°

D.) Fill in the table below. Using the data given, find a pattern. Use that pattern to find the sum of the measures of angles for heptagons and octagons.

Number of sides of a polygon	3	4	5	6	7	8	…	*n*
Sum of measures of angles		360°					…	

E.) Fill in the conjectures below, and then add them to your conjecture list.

Quadrilateral Sum Conjecture (C-29)

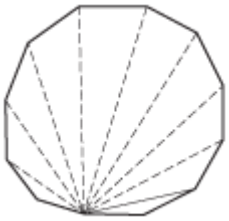
The sum of the measures of the four interior angles of any quadrilateral is _____.

Pentagon Sum Conjecture (C-30)

The sum of the measures of the five interior angles of any pentagon is _____.

F.) Look for a pattern in the completed table. Write a general formula for the sum of the angle measures of a polygon in terms of the number of sides, *n*.

G.) Draw all the diagonals from **ONE** vertex of one of your hexagons in part A. How many triangles do your diagonals create? _____ Do the same thing for one of your pentagons in part C. How many triangles do your diagonals create? _____ How many triangles do the diagonals create in the dodecagon (12-sides) at right? _____ How do the number of triangles relate to *n*?



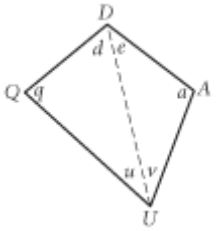
H.) Another way you can think about the sum of the measures of the interior angles of any polygon is to use the number of triangles that the diagonals create. Because each triangle's angles sum to _____°, then you can multiply the number of triangles created by the diagonals by _____° to get the total sum of the polygon's angles.

I.) State your observations as a conjecture below, and then add it to your conjecture list.

Polygon Sum Conjecture (C-31)

The sum of the measures of the *n* interior angles of an *n*-gon is _____.

•Example 1: Write a proof for the Quadrilateral Sum Conjecture using the diagram at right.



⇒**ASSIGNMENT**: _____