

Answer Key – Adding It All Up

NAME OF POLYGON	TRIANGLE	QUADRILATERAL	PENTAGON	HEXAGON	HEPTAGON	OCTAGON
NUMBER OF SIDES	[3]	[4]	[5]	[6]	[7]	[8]
NUMBER OF TRIANGLES	[1]	[2]	[3]	[4]	[5]	[6]
SUM OF INTERIOR ANGLES	[180]	[360]	[540]	[720]	[900]	[1080]

For each polygon:

1. Fill in the table as you work through each part of the activity.
2. Open the Angle Sum Applet (<http://illuminations.nctm.org/ActivityDetail.aspx?ID=9>). Select the appropriate polygon, and manipulate the figure by moving the vertices.
3. Draw the polygon on blank paper using a ruler.
4. Triangulate the polygon by drawing diagonals (segments between non-adjacent vertices), dividing the polygon into non-overlapping triangles. It is easiest to draw all diagonals from a single vertex.



When you have finished filling in your table, compare your table with your partner's and answer the following questions.

1. Did you notice any patterns as you were completing your table? What patterns did you notice using the Angle Sum Applet? using triangulation? Did you follow all the steps to complete each column of the table, or did you use your pattern?

Answers will vary.

2. What is the sum of the interior angles of a nonagon? a decagon? a 25-gon?

1,260°; 1,440°; 4,140°

3. Determine the formula that you would use to find the angle sum of an n -gon.

$$\text{Sum} = 180(n - 2)$$

4. What is special about a regular polygon? How would you find the measure of each interior angle of a regular polygon if you knew the number of sides? (**Hint:** Use the table on page 1 to find a pattern. Then, see test your pattern on polygons with more sides, such as a 25-gon.)

In a regular polygon, all the sides and angles are congruent. Since all the angles are congruent, to find the measure of just one angle, divide the sum of all the angles by the number of angles. For example, in an octagon, the sum of all the angles is $1,080^\circ$ and there are 8 angles. Therefore, the measure of one angle in a regular octagon is $1,080 \div 8 = 135^\circ$.