Name: _____ Date: _____ Class: _____

Sum of Angles in Polygons Worksheet Answer Key

Part 1: Drawing Polygon Shapes

1. Each group selects 6-8 different regular polygons (two per person). Each group member is responsible for accurately drawing two polygons on separate sheets of paper. Use a ruler or straightedge to draw the shapes. *Choose from the following regular polygons:* Triangle, quadrilateral, pentagon, hexagon, heptagon, octagon, nonagon and decagon.

2. In each polygon, draw all the diagonals from a single vertex. (Pick one vertex and connect that vertex by lines to every other vertex in the shape.) *See examples at the end of the next page.*

Part 2: Polygon Data Table—Sides, Triangles and Angles

1	2	3	4	5
Polygon name	**# of sides**	**# of triangles formed**	**Sum of all angles in the polygon (in degrees)**	**How many degrees is each angle in the polygon?**
Example: Triangle	3	1	180°	60°
Square	4	2	360°	90°
Pentagon	5	3	540°	108°
Hexagon	6	4	720°	120°
Heptagon	7	5	900°	128.8°
Octagon	8	6	1080°	135°
Nonagon	9	7	1260°	140°
Decagon	10	8	1440°	144°
n-gon	n	n-2	(n-2) * 180°	[(n-2) * 180°] / n

3. Working as a group, fill in the first three columns of the table.

4. How many degrees do the angles of each triangle add to? *__180°__*

5. Fill in the fourth column of the table.

6. Look at the data for patterns that apply to all the polygons.
   Write an **equation to find the sum of interior angles for a polygon with *n* sides.**

<p style="text-align:center">sum of interior angles = (n-2) *180</p>

Part 3: Test and Apply Your Equation
7. How many degrees in the angles of a 13-gon?
    n=13
    (n-2)*180=11 * 180 =1980

8. Fill in the fifth column of the table and answer the following questions applying the equation that you derived above.
    A. How many degrees are in **each** angle of a regular 13-gon?
        [(n-2)*180]/n = 1980 / 13 = 152.3

    B. How many degrees in the angles of a 23-gon?
        n=23
        (n-2) * 180 = 21 * 180 = 3780

    C. How many degrees in **each** angle of a regular 23-gon?
        3780/23 = 164.3

9. Look at the data for patterns that apply to all the polygons.
    Write an **equation to find the measure of each angle in a regular n-gon?**

    [(n-2) * 180] / n

    A. How many degrees are in each angle of a regular quadrilateral (square)?
        n=4
        [(n-2)*180]/n = (2 * 180)/4 = 90

    B. A regular pentagon?
        n=5   108 degrees

    C. A regular hexagon?
        n=6   120 degrees

Example vertex drawings for Parts 1 and 2. A red dot indicates a chosen vertex.