**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 |

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

**180°**

1. How many degrees do the angles of each triangle add to? \_\_\_\_\_\_\_\_\_\_
2. Fill in the fourth column of the table.
3. 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.**

sum of interior angles = (n-2) \*180

**Part 3: Test and Apply Your Equation**

1. How many degrees in the angles of a 13-gon?

n=13

(n-2)\*180=11 \* 180 =1980

1. Fill in the fifth column of the table and answer the following questions applying the equation that you derived above.
2. How many degrees are in **each** angle of a regular 13-gon?

[(n-2)\*180]/n = 1980 / 13 = 152.3

1. How many degrees in the angles of a 23-gon?

n=23

(n-2) \* 180 = 21 \* 180 = 3780

1. How many degrees in **each** angle of a regular 23-gon?

3780/23 = 164.3

1. 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

1. How many degrees are in each angle of a regular quadrilateral (square)?

n=4

[(n-2)\*180]/n = (2 \* 180)/4 = 90

1. A regular pentagon?

n=5 108 degrees

1. A regular hexagon?

n=6 120 degrees

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