**Activity 3.4.2 Angles in Regular Polygons**

**Angles in a Regular Polygon Conjecture**: In a regular polygon the measure of each interior angle is \_\_\_\_\_\_\_\_\_

Below are an equilateral triangle and a square. Find the measure of each angle in these regular polygons.

|  |  |
| --- | --- |
| http://upload.wikimedia.org/wikipedia/commons/2/28/Triangle_equilateral.png | http://ehsklein.pbworks.com/f/1262884171/square.JPG |
| Sum of interior angles: Measure of each interior angle:  | Sum of interior angles: Measure of each interior angle: |

What do you notice?

Recall that the sum of all interior angle measures in a regular polygon with *n* sides is (*n* – 2)180°. Also, notice that all of the interior angles in a regular polygon have the same measure. Then we could find the measure of each interior angle by taking the interior angle sum and dividing by the number angles: $\frac{\left(n-2\right)180°}{n}$.

Similarly, recall that the sum of all exterior angle measures of a regular polygon with *n* sides is 360°. Then we could find the measure of each exterior angle by taking the exterior angle sum and dividing by the number angles: $\frac{360°}{n}$.

Complete the table below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Polygon | Number of sides*n* | Interior angle sum | Measure of each interior angle | Measure of each exterior angle |
| Triangle |  |  |  |  |
| Quadrilateral |  |  |  |  |
| Pentagon |  |  |  |  |
| Hexagon  |  |  |  |  |
| n-gon |  |  |  |  |

**Angles in a Regular Polygon Theorem**: In a regular polygon the measure of each interior angle is $\frac{\left(n-2\right)180°}{n}$ and the measure of each exterior angle is $\frac{360°}{n}$.

**Practice Problem**:

The Cherokee People originally inhabited the southern Appalachian mountain region of North Carolina, Tennessee, and Georgia. Their society was organized into 7 clans. Their council houses had seven sections, one for each clan to sit in. The council house was built in the shape of a regular heptagon. Find the measure of each interior angle and the measure of each exterior angle.

