**6-1: Angles of Polygons**

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a polygon is a segment that connects any two nonconsecutive vertices. Polygons with more than \_\_\_\_\_\_\_\_\_\_\_\_\_\_ sides have diagonals.

For the polygons below, draw all of the possible diagonals from the designated vertex.

Recall the Triangle Sum Theorem, which states that the sum of the interior angles of a triangle is \_\_\_\_\_\_\_\_\_\_\_\_\_. Using this theorem, complete the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Convex Polygon | Number of Sides | Number of Triangles | Sum of Angle Measures |
| triangle | 3 | 1 | 180° |
| quadrilateral |  |  |  |
| pentagon |  |  |  |
| hexagon |  |  |  |
| heptagon |  |  |  |
| octagon |  |  |  |
| *n*-gon |  |  |  |

**Interior Angle Sum Theorem:** If a convex polygon has *n* sides and *S* is the sum of the measures of its interior angles, then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. The Paddington family is assembling a hexagonal sandbox. What is the sum of the measures of the interior angles of the hexagon?
2. The measure of an interior angle of a regular polygon is 108°. Find the number of sides of the polygon.
3. The measure of an interior angle of a regular polygon is 135°. Find the number of sides of the polygon.

The Interior Angle Sum Thm. can be used to find the measures of interior angles for irregular polygons that are represented algebraically.

1. Find the measure of each interior angle.

2*x°*

*x°*

**Exterior Angle Sum Theorem:** If a polygon is convex, then the sum of the measures of the exterior angles, one at each vertex, is \_\_\_\_\_\_\_\_\_\_.

1. Find the measure of an exterior angle and an interior angle of a convex regular octagon.