# Examining Angles in Polygons

Name_____

PolygonAngles.gsp

## Tab "Diagonals" – Examining Diagonals

*Go to the Tab – "Diagonals" in PolygonAngles.gsp*

| Polygon | Number of Sides | Number of Diagonals from one vertex | Number of Triangles |
|---|---|---|---|
| Quadrilateral | | | |
| Pentagon | | | |
| Hexagon | | | |
| Octagon | | | |

What do you notice about the number of sides and the number of triangles formed by the diagonals from one vertex in each polygon? _____

_____

What conclusion can be drawn about the number of triangles formed from a single vertex within a convex polygon with *n* sides? _____

_____

## Tab "Interior Angles" – Examining Interior Angles

*Go to the Tab – "Interior Angles" in PolygonAngles.gsp*

| Number of Sides | Number of Triangles | Sum of the measures of the interior angles |
|---|---|---|
| 3 | 1 | $1 \cdot 180^o = 180^o$ |
| 4 | | |
| 5 | | |
| 6 | | |
| 8 | | |

Describe in words the relationship between the numbers of sides in a polygon and the sum of the measures of its interior angles. _____

_____

_____

What conclusion can be drawn about the sum of the measures of the interior angles of a polygon with *n* sides? _____

## Tab "Exterior Angles" – Examining Exterior Angles

*Go to the Tab – "Exterior Angles" in PolygonAngles.gsp*

An exterior angle of a polygon is formed between the extension of one side of a polygon and an existing side. Exterior angles lie outside of the polygon. While there are two exterior angles at each vertex, we will be examining only ONE at each vertex.

Record the measures of the exterior angles:

$m\angle FAB$ = _____
$m\angle HBG$ = _____
$m\angle HCD$ = _____
$m\angle IDJ$ = _____
$m\angle JEF$ = _____

The sum of the exterior angles =

Drag any of the vertices to form a new polygon. Record the measure of the exterior angles again:

$m\angle FAB$ = _____
$m\angle HBG$ = _____
$m\angle HCD$ = _____
$m\angle IDJ$ = _____
$m\angle JEF$ = _____

The sum of the exterior angles =

What conclusion can be drawn about the sum of the exterior angles of a convex polygon? _____
_____
_____

## Tab "Regular Polygon" – Examining Angles in Regular Polygons

*Go to the Tab – "Regular Polygon" in PolygonAngles.gsp*

In a regular polygon, all of the sides are the same length and all of the interior angles are the same measure.

Record the measures of the interior angles of the hexagons:

| Hexagon | Regular Hexagon |
|---|---|
| $m\angle IJK$ = _____<br>$m\angle JKF$ = _____<br>$m\angle KFG$ = _____<br>$m\angle FGH$ = _____<br>$m\angle GHI$ = _____<br>$m\angle HIJ$ = _____<br>The sum of the interior angles of hexagon =_____ | $m\angle FED$ = _____<br>$m\angle ABC$ = _____<br>$m\angle BCD$ = _____<br>$m\angle CDE$ = _____<br>$m\angle BAF$ = _____<br>$m\angle AFE$ = _____<br>The sum of the interior angles of a regular hexagon = _____ |

Are the sums of the interior angles in both hexagons the same? _____ Explain why or why not:
_____
_____

How can the size of each interior angle of a regular polygon be determined if the number of sides is known?_____
_____