

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 | $1 \cdot 180^\circ = 180^\circ$ |
| 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:

$m\angle FAB = \underline{\hspace{2cm}}$

$m\angle HBG = \underline{\hspace{2cm}}$

$m\angle HCD = \underline{\hspace{2cm}}$

$m\angle IDJ = \underline{\hspace{2cm}}$

$m\angle JEF = \underline{\hspace{2cm}}$

| |
|----------------------------------|
| The sum of the exterior angles = |
|----------------------------------|

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

$m\angle FAB = \underline{\hspace{2cm}}$

$m\angle HBG = \underline{\hspace{2cm}}$

$m\angle HCD = \underline{\hspace{2cm}}$

$m\angle IDJ = \underline{\hspace{2cm}}$

$m\angle JEF = \underline{\hspace{2cm}}$

| |
|----------------------------------|
| 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 |
|--|--|
| $m\angle IJK = \underline{\hspace{2cm}}$ | $m\angle FED = \underline{\hspace{2cm}}$ |
| $m\angle JKF = \underline{\hspace{2cm}}$ | $m\angle ABC = \underline{\hspace{2cm}}$ |
| $m\angle KFG = \underline{\hspace{2cm}}$ | $m\angle BCD = \underline{\hspace{2cm}}$ |
| $m\angle FGH = \underline{\hspace{2cm}}$ | $m\angle CDE = \underline{\hspace{2cm}}$ |
| $m\angle GHI = \underline{\hspace{2cm}}$ | $m\angle BAF = \underline{\hspace{2cm}}$ |
| $m\angle HIJ = \underline{\hspace{2cm}}$ | $m\angle AFE = \underline{\hspace{2cm}}$ |
| The sum of the interior angles of hexagon = _____ | 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? _____
