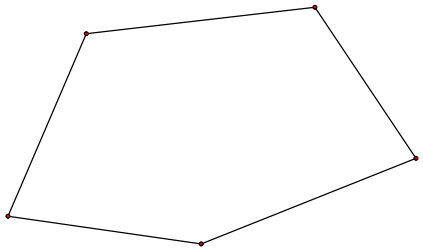
6.7 ANGLES in POLYGONS INVESTIGATION

Name: _____

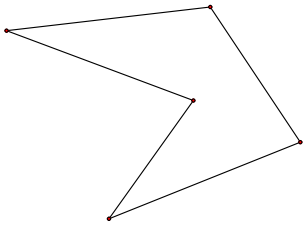
OBJECTIVE:

By the end of this investigation, you will be able to describe the relationship between interior and exterior angles in polygons.

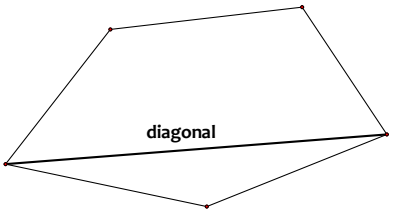
Important Terms:



Convex Polygon: A polygon where all the angles are less than 180˚.



Concave Polygon: A polygon where at least one angle is greater than 180˚.



Diagonal: A line segment that connects two non-adjacent vertices.

HYPOTHESIS

Record a hypothesis about the relation ship between angles in polygons. In other words, complete this sentence:

As the number of sides in a polygon increases,

How do you think the sums of exterior angles of polygons are related?

RECORDING YOUR OBSERVATIONS

As you complete the tasks below, record your observations in this table:

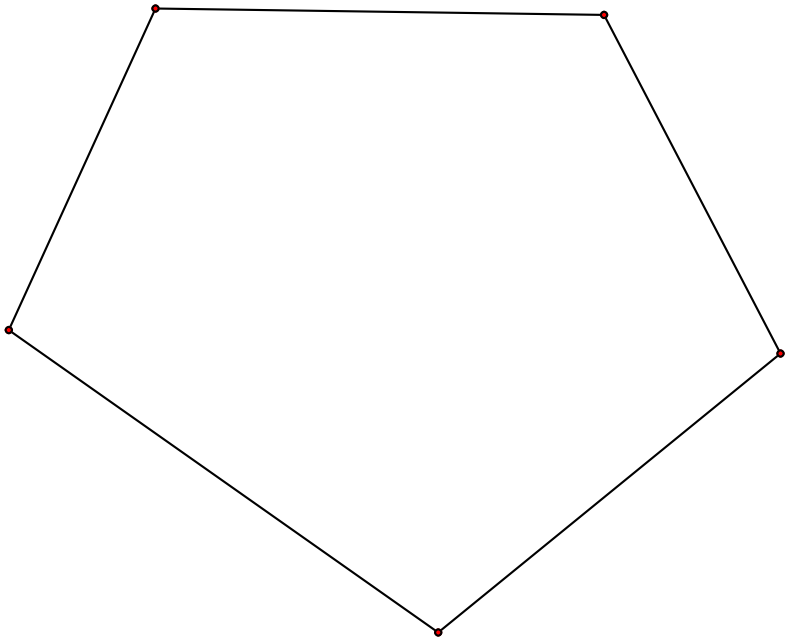
Polygon	Number of Sides	Number of Triangles made with Diagonals	Sum of Interior Angles	Sum of Exterior Angles
Triangle	3	1	180˚	360˚
Quadrilateral				
Pentagon				
Hexagon				
Heptagon				
Octagon				

1. Draw a CONVEX pentagon, label each vertex and calculate each interior angle. Use a ruler and protractor.

2. Determine the sum of the angles in the pentagon above: _____.

3. Would this be the same for all pentagons?

4. Measure the angles of this pentagon to verify your answer.

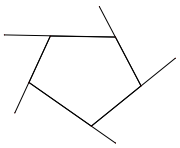


5. Draw two diagonals from ONE vertex of the pentagon in #4.
   How many triangles do these diagonals create?

6. How do the interior angles of the pentagon relate to the interior angles of the triangles?

7. Record your findings for a pentagon in the table on page 1: the sum of the interior angles in a pentagon **and** the number of internal triangles.

8. For the pentagon in #4, extend each side to create exterior angles like this: Measure each exterior angle and calculate the sum of the exterior angles.



9. Compare your answers with those of your peers. Record your answer to #8 in the table on page #1.

10. Draw a CONVEX hexagon (6 sided figure) below, label each vertex and calculate the sum of the interior and exterior angles (to measure exterior angles, extend each side).

11. Draw diagonals from ONE vertex. How many triangles are formed inside the hexagon? Record this answer in the table on page #1.

12. Compare your answers to #10 and 11 with your peers'. Record your answers in the table on page #1.

13. Based on the results from a hexagon, fill in the table for a heptagon and an octagon.

SUMMARY

The formula to determine the sum of the interior angles of a polygon with "n" sides is _____

The sum of exterior angles for a polygon is _____.

EXAMPLES

1. Calculate the sum of the interior angles of a decagon (10 sided figure).

2. How many sides does a polygon have if the sum of its interior angles is 1980˚?

3. a) Draw a 10 sided polygon. Calculate how many diagonals you could draw from any one vertex of this polygon.

   b) Calculate the sum of the interior angles using TWO different methods.

4. A REGULAR polygon has sides and angles that are equal. Determine the measure of each interior angle of a polygon with 18 sides.