

Interior and Exterior Angles of Polygons

Lesson Summary:

Students will investigate the sums of interior and exterior angles of a polygon. The lab leads students through three short activities, each addressing a separate goal.

Key Words:

Interior angle, exterior angle, polygon

Background Knowledge:

It is assumed that students will have been exposed to and are familiar with the following terms: polygons and interior and exterior angles.

Learning Objectives:

1. Find the sum of the measures of interior angles of polygons.
2. Find the sum of the measures of exterior angles of polygons.

Materials: Computer lab or set of calculators equipped with Cabri Geometry II and lab worksheet.

Procedure:

- Group students in pairs. The instructor may choose the method to determine the pairings.
- Begin by putting up several examples of polygons (quadrilateral, hexagon, nonagon, etc.) on the chalkboard or overhead. Have students classify each by its number of sides.
- Have students work in pairs to perform the following constructions.

Interior and Exterior Angles of Polygons

Team Members' Names: _____

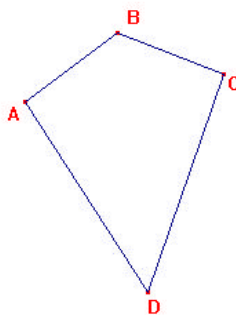
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Goal 1: Determine the sum of the measures of the interior angles of polygons.

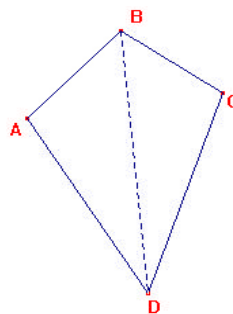
Investigate Using Cabri Geometry II*

1. Construct quadrilateral ABCD.

[use **polygon** and **label tools**]



2. Divide the quadrilateral into triangles.
That is, draw all of the diagonals from one vertex!.
Without measuring the angles, determine what is the sum of the interior angles of this quadrilateral? Explain how you obtain your answer.



3. Repeat this process with a pentagon, hexagon, heptagon, and octagon to complete the following table.

Polygon	# of Sides	# of Triangles Formed	Interior Angle Sum of Polygons
Quadrilateral			
Pentagon			

* If you are not familiar with Cabri's tools, press F1 on the keyboard. A help menu for each tool selected will appear on the bottom of the screen.

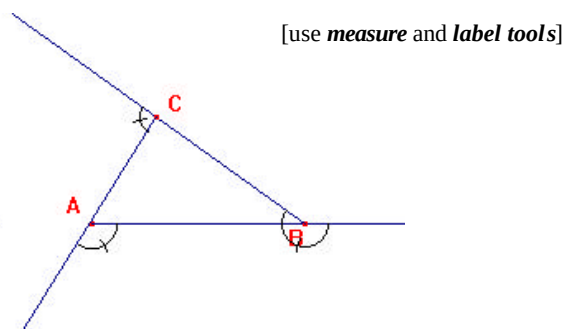
Hexagon			
Heptagon			
Octagon			

4. Now, look at the results in your table. Do you notice a pattern?
Write a rule for finding the sum of the measures of the interior angles of a polygon with n sides.

Goal 2: Determine the sum of exterior angles of a polygon.

5. Using the ray tool, create $\overline{AB}$, $\overline{BC}$, and $\overline{CA}$ to construct a triangle.

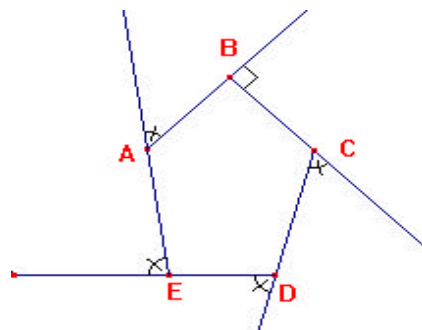
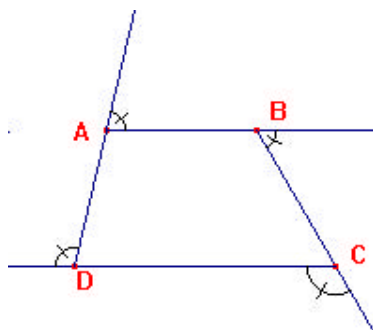
6. Measure and label the 3 exterior angles.



7. What is the sum of the three exterior angles?

[use *calculate tool*]

8. Repeat this process for a quadrilateral ABCD and pentagon ABCDE.



* If you are not familiar with Cabri's tools, press F1 on the keyboard. A help menu for each tool selected will appear on the bottom of the screen.

9. What are the sums of the exterior angles for each of these figures?

10. Can you make a conjecture about the sum of the measures of the exterior angles (one at each vertex) of a polygon with n sides?

Extension

11. Find the measures of both an interior angle and an exterior angle of a regular octagon.