Exterior Angles in a Polygon

Description: Students construct a convex polygon and make a conjecture about the sum of the measures of its exterior angles. They dilate the polygon to approximately a single point to create a visual proof by dilation that the sum of the measures of the exterior angles of a convex polygon is what they conjectured.

Technology Strength: By constructing a dynamic model of a convex polygon and measuring all of its exterior angles, students can discover the sum of the measures of these angles. By dilating their polygon to approximately a single point, students can create a visual proof to demonstrate the truth of their conjecture.

Objectives: Construct a convex polygon; discover the sum of the measures of the exterior angles in a convex polygon; create a visual proof by dilation that the sum of the measures of the exterior angles of a convex polygon is 360°

Prerequisites: Understanding of the terms exterior angle and convex polygon

Suggested Grade Level: 9 to 10

Sketchpad Level: Beginning

Suggested Duration: 30 minutes

Suggested Classroom Setting: Whole Class, Student Pairs. This activity, designed for use by student pairs, can be easily modified for whole-class use.

Preparation: Review the Activity Notes. Work through the steps on the worksheet and make a copy of the worksheet for each student. See the presentation sketch for an example of completed student work and a demonstration.

Materials: None

Student Worksheet(s): Exterior Angles in a Polygon

Student Sketch: None

Presentation Sketch: Exterior Angles Present.gsp

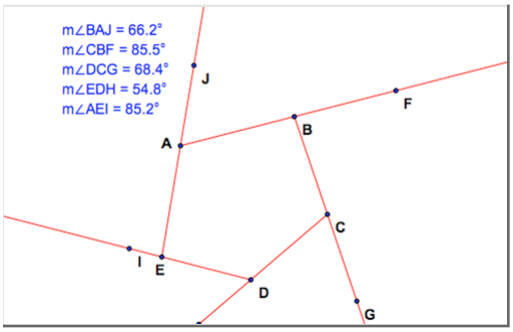
Vocabulary: Exterior angle, convex polygon, concave polygon

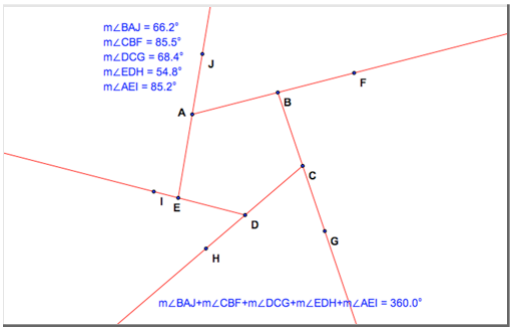
Sketchpad Version: GSP5

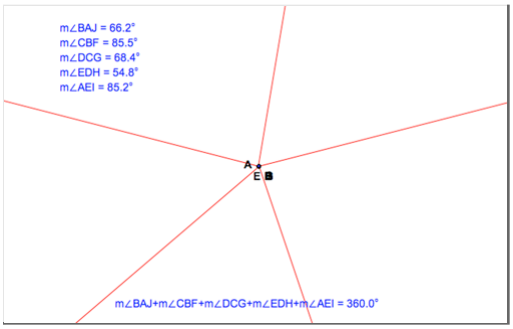
Using the Sketch:

Students use rays to construct a dynamic convex polygon, labeled *ABCDE*. They measure the exterior angles of the polygon and calculate their sum, drag different parts of the original polygon (while keeping it convex), and observe the sum. Students write a conjecture about the sum of the measures of the exterior angles in a convex polygon.

Next, students mark any of the points in their sketch as a center for dilation and dilate their polygon to approximately a single point to create a visual proof of their conjecture. In the Explore More section, they investigate the sum of the measures of the exterior angles in a concave polygon.







Sketch Tips:

Sketch Tips show skills needed in this activity, and the step at which the skill is first used.

Sketch Tip	**Tip Sheet or Tip Video**
Step 2: Construct a point on an object with the **Point** tool	Using the Point Tool
Step 3: Measure an angle by selecting three points and using **Measure | Angle**	Measuring Angles
Step 4: Click a value in the sketch to enter it into the Calculator	Using the Calculator
Step 9: Dilate objects with the **Arrow** tool	Rotating and Dilating with the Arrow Tool