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2.1 **2.2** 2.3 2.4

2.2 Angle Sums of Any Polygon

Does the pattern you observed in angle sums of regular polygons apply to irregular polygons? To tackle this question, you could draw many different polygons and measure all of the angles. But there are other strategies that provide answers with a little experimentation and some careful thinking.
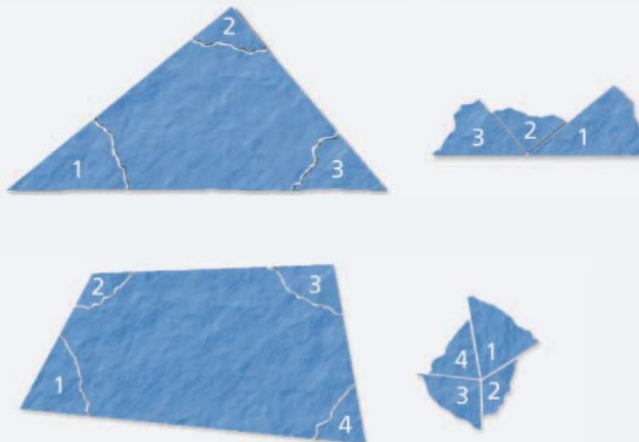
Problem 2.2

Devon, Trevor, and Casey tried three different ways to find a formula relating the angle sum of any polygon to the number of sides.

A Devon began by drawing irregular triangles and quadrilaterals. Then he tore the corners off of those polygons and 'added' the angles by arranging them like this:


1. What angle sum does Devon's work suggest for the triangle? For the quadrilateral?

2. Test Devon's idea with triangles and quadrilaterals of your own design. See if you get the same result.

3. Draw irregular pentagons and hexagons. Use Devon's method to determine the angle sums for those figures.

4. Does this 'draw and tear' experimentation show the same angle sum pattern that you discovered with regular polygons? Why or why not?

Investigation 2   Designing Polygons: The Angle Connection   **45**

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2.1 **2.2** 2.3 2.4

Problem 2.2 continued

B Trevor examined Devon's results from his study of irregular triangles. This gave him a new idea to study polygons with more sides. He divided some polygons into smaller triangles by drawing diagonals from one vertex.
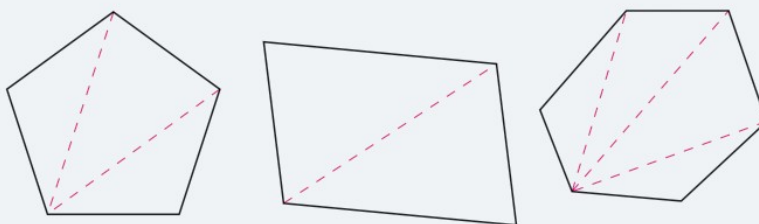
1. Describe the relationship between the number of sides of a polygon and the number of triangles formed.

2. Find the angle sum of each polygon. It might help to use Trevor's drawings and what you learned earlier about the angle sum of any triangle.

3. Will Trevor's method work to find the angle sum of any polygon? If so, what equation would relate the angle sum S to the number of sides n? If not, why not?

C Casey used Devon's discovery about triangles in a different way. She divided polygons into triangles by drawing line segments from a point within the polygon.
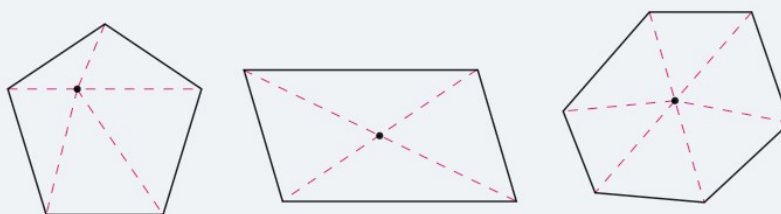
1. Study Casey's drawings to find the angle sum of each polygon.

2. Will Casey's method work to find the angle sum of any polygon? If so, what pattern would relate the angle sum S to the number of sides n? If not, why not?

D Think about your experimentation and reasoning about irregular polygons. Did you produce an angle sum pattern that agrees with what you found for regular polygons? Explain.

A C E Homework starts on page 52.