KHM: Exterior Angles of Polygons

An angle *inside* a polygon, formed by the polygon's sides, is an **interior angle.** By extending a side of a polygon, you can make an **exterior angle,** which is *outside* the polygon. Extending a side of the polygon forms one ray of the exterior angle.

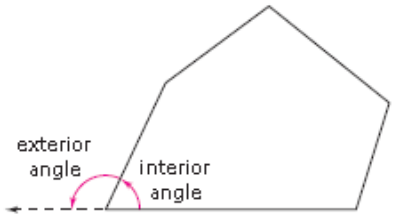


Figure 1 shows the exterior angles made by extending sides as you move counterclockwise around the polygon. Figure 2 shows the exterior angles formed by extending sides as you move clockwise around the polygon.

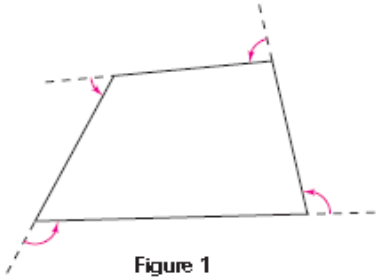


Figure 1
Exterior angles as you move counterclockwise.

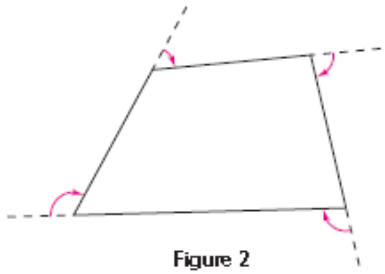
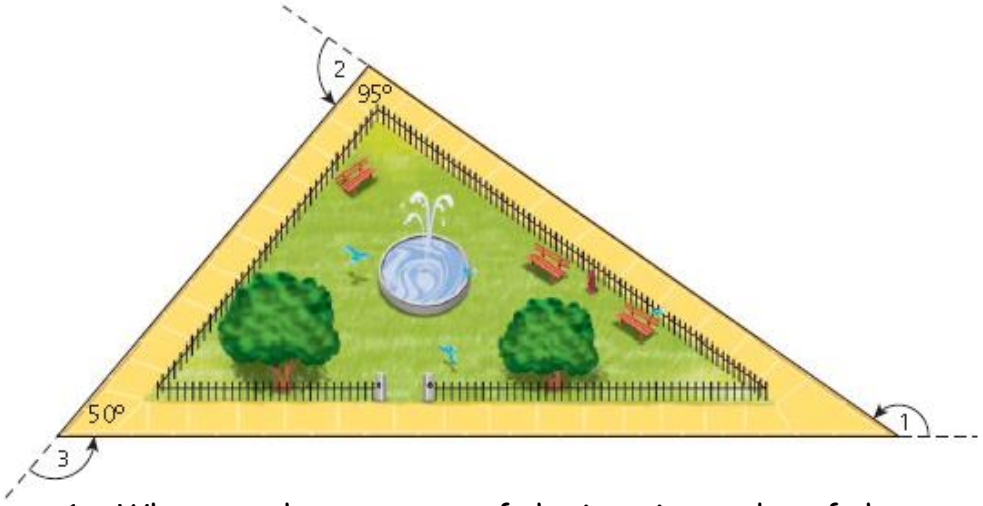


Figure 2
Exterior angles as you move clockwise.

Investigation

A skateboarder is skating on a triangular path around a park. In the diagram below, each segment of the path has been extended to show the angle of turn the skateboarder makes as she turns the corner. Each of these angles is an exterior angle of the triangle.

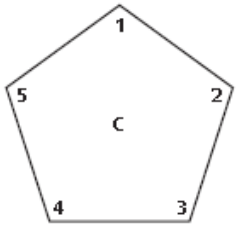


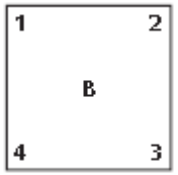
1. What are the measures of the interior angles of the triangle?

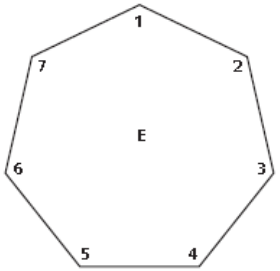
2. What is the measure of angle 1?

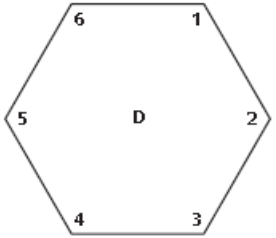
3. What are the measures of angles 2 and 3?

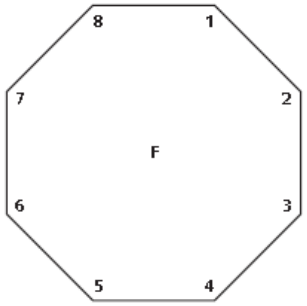
4. Suppose the skateboarder skates once around the park counterclockwise, turning each corner exactly once. What is the sum of the angles through which she turns?











For each polygon on the left, extend each line segment either in a clockwise or counterclockwise direction.

Then use what you know about the *interior* angles of a polygon to find the *exterior* angles associated with it.

Use what you discover to fill out the table below.

Polygon	**# of sides**	**Exterior angle measure**	**Exterior angle sum**
Triangle	3		
Quadrilateral	4		
	5		
	6		
	7		
	8		

A. The figures to the left are *regular* polygons. Would your results be the same for *non-regular* polygons? Explain.

B. Write a conclusion about what you discovered about the sum of the exterior angles of a polygon.