Reflect On This

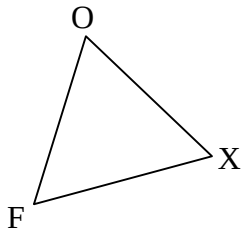
NAME _____

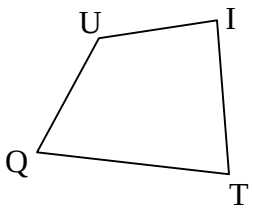
In this exploration, you will examine polygons formed by reflections in hinge mirrors and investigate the relationship between these polygons and the hinge angle.

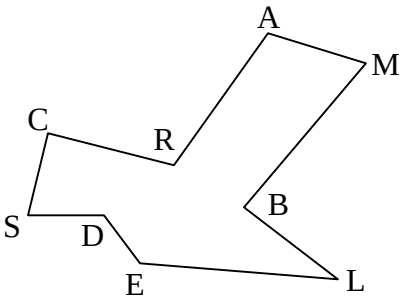
A **polygon** is a union of segments intersecting only at endpoints.

At most, two segments intersect at any one endpoint, and each segment intersects exactly two other segments. Each segment in a polygon is a **side**; each endpoint is a **vertex** (plural, *vertices*).

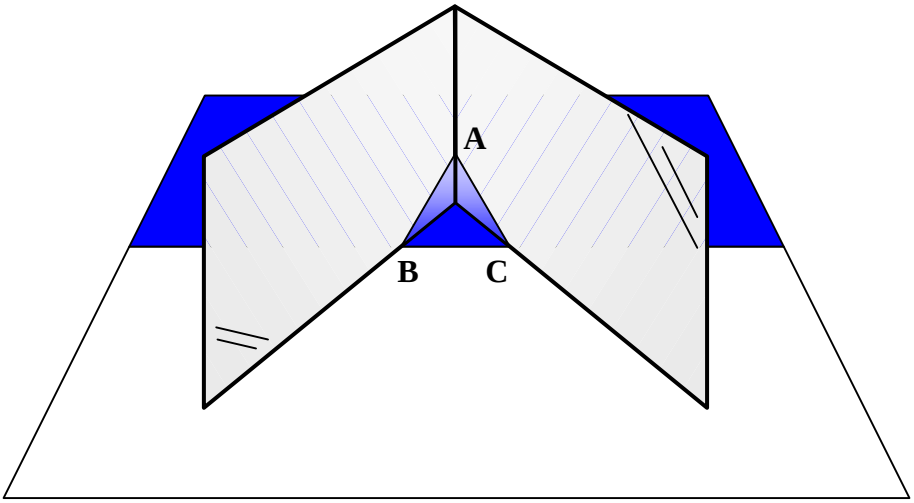
In the figures below, points X, T and L are vertices, while $\overline{FO}$, $\overline{QU}$, and $\overline{SC}$ are sides.







- Reconstruct the kaleidoscope from the introduction (without the confetti).
- Place the hinge mirrors across the pieces of paper as you did before.
- Begin with the mirrors completely open. Slowly close them so that the colored paper and its reflections form a triangle. As shown below, the mirrors form a hinge angle at the center of the triangle. Draw this angle and determine its measure.



Continue to close the mirrors, keeping the distance from A to B equal to the distance from A to C. Other polygons will appear, such as a quadrilateral, a pentagon, and a hexagon.

1. Record the measure of the hinge angle for each polygon that appears in the table below.

POLYGON	NUMBER OF SIDES	MEASURE OF HINGE ANGLE
Triangle	3	120°
Quadrilateral	4	
Pentagon		
Hexagon		
Heptagon		$51\frac{3}{7}°$
Octagon		
Nonagon		
Decagon	10	

2. Use the patterns you observe in the table to describe a relationship between the number of sides of a polygon and the measure of the hinge angle.