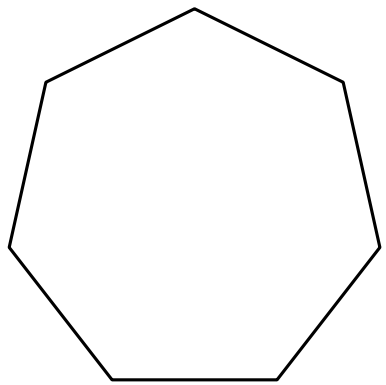
Section 4 – Topic 1
Introduction to Polygons – Part 1

The word polygon can be split into two parts:

- "poly-" means _____.
- "gon" means _____.

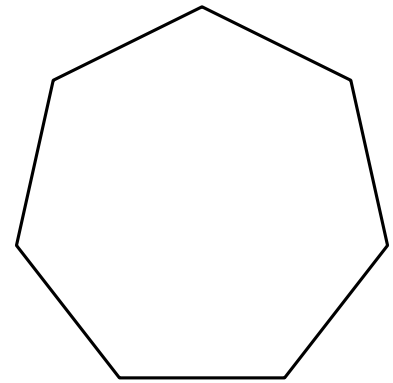
Consider the polygon below.



Are polygons closed or open figures? Explain your answer.

How many sides does a polygon have?

Consider the polygon again.



The ***interior angles of a polygon*** are the angles on the inside of the polygon formed by each pair of adjacent sides.

Use I to label the interior angles of the polygon above.

An ***exterior angle of a polygon*** is an angle that forms a linear pair with one of the interior angles of the polygon.

Use E to label the exterior angels of the polygon above.

Draw a representation of each of the polygons below.

Name	Definition	Representation
Regular	All angles and sides of this polygon are congruent.	
Irregular	All angles and sides of this polygon are not congruent.	
Convex	This polygon has no angles pointing inwards. That is, no interior angles can be greater than $180°$.	
Concave	This polygon has an interior angle greater than $180°$.	
Simple	This polygon has one boundary and doesn't cross over itself.	

We can also classify a polygon by the number of sides.

# Sides	Names	# Sides	Names
3		8	
4		9	nonagon
5	pentagon	10	
6		11	hendecagon
7	heptagon	12	dodecagon

Let's discover some facts about angle measures of polygons.

How many sides does a triangle have?

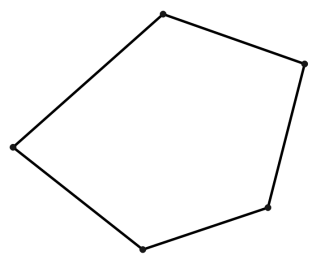
What is the sum of the interior angles of a triangle?

Consider the quadrilateral below.

How many sides does a quadrilateral have?

Use your knowledge of triangles to find the sum of the interior angles of the quadrilateral.

Consider the pentagon below.

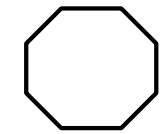


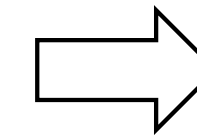
How many sides does a pentagon have?

Use your knowledge of triangles to find the sum of the interior angles of the pentagon.

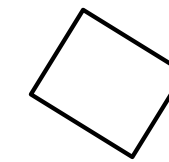
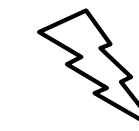
Let's Practice!

1. Determine whether the following shapes are polygons. Classify the polygons by their number of sides.





_____ _____ _____

_____ _____ _____

Try It!

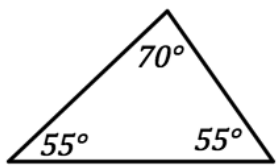
2. Complete the table below.

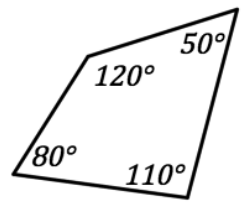
Number of sides	Sum of interior angles
3	
4	
5	
6	
7	
n	

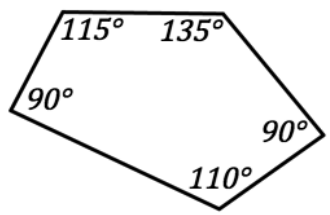
Section 4 – Topic 2
Introduction to Polygons – Part 2

Let's Practice!

1. Consider each of the following polygons. Find the sum of the exterior angles in each polygon below.







2. The sum of the exterior angles of any polygon equals _____.

Try It!

3. A convex pentagon has exterior angles with measures 66°, 77°, 82° and 62°.

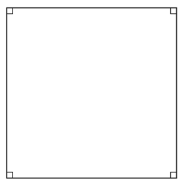
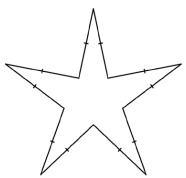
   a. Draw a representation of the pentagon.

   b. What is the measure of an exterior angle of the pentagon at the fifth vertex?

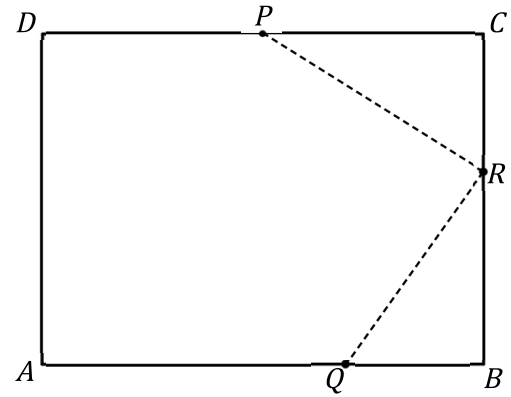
   c. Classify the pentagon as regular or irregular. Justify your answer.

BEAT THE TEST!

1. Eddie has a square piece of paper that he cuts into different shapes. The table below shows the piece of paper in the first row and then, each figure he made in the other rows. Classify each figure as regular, concave, and/or convex by marking the appropriate box. Name each type of polygon represented by filling in each blank provided.

Figure	Regular	Concave	Convex	Name the Polygon
	☐	☐	☐	_____
	☐	☐	☐	_____
	☐	☐	☐	_____

2. Consider the figure below. Moses cut rectangle $ABCD$ into pentagon $AQRPD$.



If $m\angle PRQ = 71°$ and $m\angle PRC \cong m\angle QRB$, verify the sum of the interior angles of pentagon $AQRPD$ using two different methods. Justify your answers.