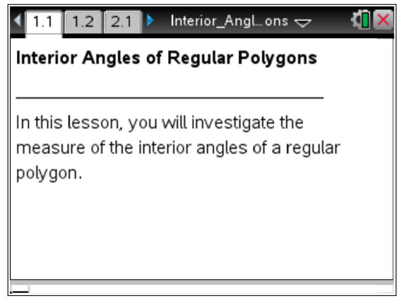
Name ________________

Class ________________



Open the TI-Nspire document ***Interior_Angles_of_Regular_Polygons.tns*****.**

A regular polygon is a closed figure in a plane that is equilateral and equiangular. Therefore, the sides of a regular polygon are congruent, and the angles are also congruent. In this activity, you will explore the interior angles of regular polygons by dividing the polygons into triangles.

Move to page 1.2.

The regular polygon is inscribed in a circle whose central angle measure is given. Change the number of sides in the regular polygon by using the up and down arrows.

1. Use the polygons and central angle measurements to complete the following table.

Regular Polygon	# of Sides	$\frac{360°}{\text{\# of sides}} =$	Central Angle Measure
Triangle			
Quadrilateral			
Pentagon			
Hexagon			
n-gon			

a. Each regular polygon is divided into triangles. What type of triangles are they? Why?

b. For each regular polygon, what is the relationship between these triangles? Why?

c. Use the pattern in the table to find the central angle measure of a regular octagon (8 sides).

Move to page 2.1 and read the instructions. Move to page 2.2.

The measures of the central angle, the base angles of an isosceles triangle, and an interior angle of the regular polygon are given.

2. a. Madeline makes the following table to explore the relationship between the number of triangles and the angle measurements in regular polygons. Complete Madeline's table.

Regular Polygon	# of Sides	# of Triangles	# of Triangles(180°) – 360° =	Sum of Interior Angles	Sum of Base Angles of 1 Δ
Triangle					
Quadrilateral					
Pentagon					
Hexagon					
n-gon					

b. When the number of sides in a regular polygon increases by 1, why does the interior angle sum increase by 180°?

c. Use the pattern in the table to find the sum of the base angles of an isosceles triangle drawn from the center of a regular nonagon (9 sides).

d. When congruent isosceles triangles are drawn from the center of a regular polygon, why is the base angle sum of any one of the isosceles triangles equivalent to the measure of an interior angle of the polygon?

Move to page 3.1 and read the instructions. Move to page 3.2.

Diagonal segments are drawn from a single vertex to form triangles.

Change the number of sides in the regular polygon by using the up and down arrows.

3. a. Joshua created a different table to explore the relationship between the number of triangles and the interior angle measurements in regular polygons. Complete Joshua's table.

Regular Polygon	# of Sides	# of Triangles	# of Triangles (180°) = Sum of Interior Angles	$\frac{\text{Interior Angle Sum}}{\text{\# of Sides}}$ = Interior Angle Measure
Triangle				
Quadrilateral				
Pentagon				
Hexagon				
n-gon				

b. Use the pattern in the table to find the interior angle measure of a regular decagon (10 sides).

4. The interior angle sum can be calculated using Joshua's expression $(n - 2)180$, or $180n - 360$ (as done by Madeline).

   a. What is the relationship between these two expressions?

   b. How can these expressions be modeled geometrically?

5. An irregular polygon is not equiangular and equilateral. Can Madeline's or Joshua's methods be used to determine the interior angle sum of an irregular polygon? Why or why not?