



## Geometry

### Polygons and Angles: Looking for Patterns.





Name: \_\_\_\_\_

#### Getting Started:




*Step 1:* On your TI-nSpire calculator go to the home screen . Select "7: My Documents." Find "Polygons and Angles - BLP" and hit enter . You will be asked to save the previous document. Just choose "No."


*Step 2:* The first screen (1.1) is just the title of the activity. Hit control / and right cursor on the donut to go to the next page.

#### Interior and Exterior Angles

*Step 3:* Interior and Exterior angles(1.2). Record the original values of  $m\angle ACB$  and  $m\angle ACE$ . Grab A by moving the cursor over the letter until the hand appears  and then hold down the center button  until the hand closes . Use the arrow keys until the values change. Record the new values. Repeat three more times. Fill in the chart as you go. When you are finished go to the next page by hitting control  and right cursor on the donut.

$m\angle ACB$	$m\angle ACE$	$m\angle ACB + m\angle ACE$






*Step 4:* Interior and Exterior angles (1.3). Record the original values of  $m\angle UAD$  and  $m\angle UAS$ . Grab U by moving the cursor over the letter until the hand appears  and then hold down the center button  until the hand closes . Use the arrow keys until the values change.

Record the new values. Repeat three more times. Fill in the chart as you go. When you are finished go to the next page by hitting control  and right cursor on the donut.

$m\angle UAD$	$m\angle UAS$	$m\angle UAD + m\angle UAS$





Observation 1: Write a conjecture about the relationship of an interior angle and its corresponding exterior angle.

## Angles of a Triangle

*Step 5: Sum of the interior angles.* Go to the next page (2.1) by hitting control  and right cursor on the donut. To collect the data just hit control , decimal point  . You will see the 1<sup>st</sup> line of the chart automatically fill in. Move any point of the triangle to change the measures of the angles. Stop and collect the data after each move. Collect at least five sets of data; record in the table below. In order to see the last column hit control  tab  to switch to the right hand side of the screen cursor to the right to see the fourth column.


$m\angle A$	$m\angle B$	$m\angle C$	$m\angle A + m\angle B + m\angle C$

*Observation 2:* Write a conjecture about the relationship of the interior angles of a triangle.

*Step 6: Sum of the exterior angles.* Go to the next page (3.1) by hitting control  and right cursor on the donut. To collect the data just hit control , decimal point  . Although you can't see the table on 3.2 it will still fill in as you collect data. Move any point of the triangle to change the measures of the angles. Stop and collect the data after each move. Collect at least five sets of data; record in the table below. In order to see the table hit control  right cursor to proceed to page 3.2.

$m\angle DTI$	$m\angle GIR$	$m\angle TRF$	$m\angle DTI + m\angle GIR + m\angle TRF$





*Observation 3:* Write a conjecture about the relationship of the exterior angles of a triangle.

*Step 7:* A regular triangle (3.3). A regular triangle has been constructed on this page. Measure all six angles by hitting menu  choose 7: Measurement, on the sub menu choose 4: Angle. You should see an angle icon in the upper left hand corner of the screen. In order to measure an angle you must choose the 3 points that make up the angle with the vertex in the center. When you see the measure of the angle you must hit enter to make it stick. Move the measure to the appropriate angle. Fill in your information below. Grab one of the points and move it. Note the angle measures.

Interior Angles	Exterior Angles
$m\angle 1 =$	$m\angle 6 =$
$m\angle 2 =$	$m\angle 7 =$
$m\angle 3 =$	$m\angle 8 =$





*Observation 4:* Write a conjecture about the interior and exterior angles of a regular triangle.

### Angles of a Quadrilateral

*Step 8:* Go to the next page (4.2) by hitting control  and right cursor on the donut. To collect the data just hit control , decimal point . Although you can't see the table on 4.3 it will still fill in as you collect data. Move any point of the quadrilateral to change the measures of the angles. Stop and collect the data after each move. Collect at least five sets of data; record in the table below. In order to see the table hit control  right cursor to proceed to page 4.3.


$m\angle A$	$m\angle B$	$m\angle C$	$m\angle D$	$m\angle A + m\angle B + m\angle C + m\angle D$

*Observation 5:* Write a conjecture about the relationship of the interior angles of a quadrilateral.

*Step 9:* Sum of the exterior angles. Go to the next page (5.1) by hitting control  and right cursor on the donut. To collect the data just hit control , decimal point . Although you can't see the table on 5.2 it will still fill in as you collect data. Move any point of the quadrilateral to change the measures of the angles. Stop and collect the data after each move. Collect at least five sets of data; record in the table below. In order to see the table hit control  right cursor to proceed to page 5.2.

$m\angle XFR$	$m\angle YRO$	$m\angle GOZ$	$m\angle FGW$	$m\angle XFR + m\angle YRO + m\angle GOZ + m\angle FGW$

*Observation 6:* Write a conjecture about the relationship of the exterior angles of a quadrilateral.

*Step 10:* A regular quadrilateral (5.3). A regular quadrilateral has been constructed on this page. Measure both angles by hitting menu  choose 7: Measurement, on the sub menu choose 4: Angle. You should see an angle icon in the upper left hand corner of the screen. In order to measure an angle you must choose the 3 points that make up the angle with the vertex in the center. When you see the measure of the angle you must hit enter to make it stick. Move the measure to the appropriate angle. Fill in your information below. Grab one of the points and move it. Note the angle measures.

Interior Angles	Exterior Angles
$m\angle 7 =$	$m\angle 8 =$

*Observation 7:* Write a conjecture about the interior and exterior angles of a regular triangle.

## **Angles of a Pentagon**

*Step 11:* Go to page 6.1.

Conjecture about the interior angles of a pentagon:

*Step 12:* Collect data on page 6.2 and observe the answer on 6.3. Was your conjecture correct? If not, revise your conjecture.

Revised Conjecture:

*Step 13:* Finally, make a conjecture about the sum of the exterior angles of a pentagon, the measure of one interior angle of a pentagon, and the measure of one exterior angle of a pentagon.

Sum of the exterior angles:

One interior angle:

One exterior angle: