Sum of Interior Angles of Polygons

Name: _____ Date: _____

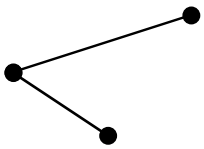
Directions: Using the computer program, Geometer's Sketchpad, we are going to learn about interior angles of polygons. Follow these step-by-step instructions and use the diagrams on the side to help you work through the activity. Use the worksheet attached to the last page to fill in when instructed to do so.

1. Find the Geometer's Sketchpad icon on your computer desktop and double click on it. You should see a blank screen with the heading "Untitled 1" and icons along the side.

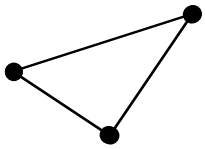
2. Along the side of the page go to the fourth icon down; it is a segment icon. Click on the icon and go anywhere in the sketching region, or the white space. Click and drag the arrow to a desired place and let go. Your segment should be highlighted pink. You should have constructed something similar to the one at the right.


segment icon

3. Now click anywhere in the sketch pad and drag your cursor to an endpoint of the segment you just made, the endpoint will light up a light blue color when it is directly overtop. Now you should have something similar to the diagram on the right.



4. Now we'll connect the other two endpoints so it looks like a triangle. Move the cursor so one of the endpoints is highlighted and click and drag to the other endpoint to complete the triangle. The figure should be similar to the one at the right.



5. Go back to the icons down the left side of the screen and click on the first icon at the top, the selection icon. Then click anywhere on the white sketchpad. This will deselect all of the segments.


selection icon

6. Move the cursor over top of one of the endpoints until the cursor turns to a horizontal position. (The cursor should look like the one at the right.) Click the endpoint to select it. Then in clockwise or counter-clockwise order select the other two endpoints.

7. From the menu at the top of the screen click on **MEASURE** then **ANGLE**. Notice this now has labeled all the vertices and measured the angle that you selected. (The angle is the vertex you selected second.)

8. Click in the white space to deselect all the measurement of the angle. Then repeat steps 6-8 for the other two angles.

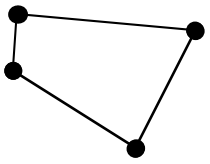
9. Make sure all items are deselected by clicking in the white area. Click on **MEASURE** from the menu and then **CALCULATE**. A calculator will appear on your screen. To add all the angles together, select the first angle from the list of them in the upper left hand corner of your screen. Then click the **PLUS** sign on the calculator. Click the second angle on your screen and then the **PLUS** sign and then click on the last angle. At the top of the calculator it should have the sum of the interior angles. Please answer question 1 on your worksheet that is

attached to the back of this handout.

10. Now click on an endpoint and drag it all over the screen. Take note that the angles on the calculator always equal 180 degrees. To get rid of the calculator click **OK**

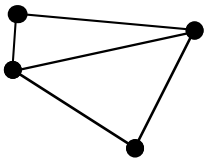
11. To get rid of this sketch, deselect all the selected items by clicking on the white screen. Then click on the white screen and drag the cursor until everything is highlighted (including the measures of the angles) then press the **DELETE** button on the keyboard. Your screen should now be blank.

12. Now we are going to investigate the sum of the interior angles of a quadrilateral. To do this we first must construct a quadrilateral. Follow steps 2-4 except construct a figure with 4 sides instead of 3. The figure should look like the one at the right.



13. Now instead of calculating it on the calculator we are going to do it an easier way. Choose any vertex and click on it (making sure the arrow is horizontal) and then draw all diagonals you can from that point. Your diagram should be similar to the one at the right.

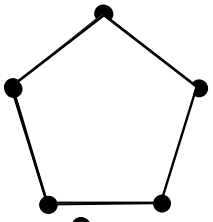

segment icon



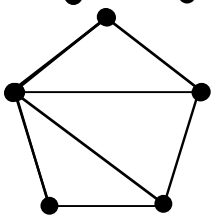
14. Using the information you have just drawn fill the row on the chart for the quadrilateral.

15. Clear your sketchpad again and if you don't remember how to, see step 11. Remember, you must have selected the selection icon first.

16. Now the next step of the worksheet is to find the sum of the angles in a pentagon. Follow the steps 2-4 again but this time use 5 sides instead of 3. Your figure should be something similar to the one at the right.

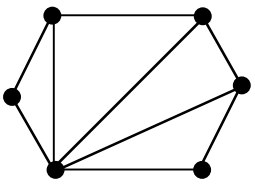


17. After constructing a pentagon, again draw all diagonals from one vertex. (If you need to remember how to do this review step 13.) Your figure should be similar to the one at the right.



18. Fill out the worksheet for the row on the pentagon.

19. Now we must find how many degrees are in a hexagon. Again clear your screen (step 11 with pointer icon selected) and construct a hexagon (steps 2-4). Then make all the diagonals from one vertex (step 13). The figure should be similar to the one at the right.



20. Fill out the worksheet for the hexagon row, then do the "Challenge Your Mind" on the worksheet.

21. To get out of sketchpad click on the **FILE** menu and then **QUIT**. Click NO to not save your changes. Please log off your computer then.

Sum of Interior Angles of Polygons Worksheet Name:_____

Directions: Fill out this table and questions as you are told to do so in the activity.

1. What is the sum of the interior angles of a triangle: _____

NOTE: Does your answer match the information in the chart below for a triangle?

~ Go back to your investigation sheets

Name of Polygon	Number of Sides	Number of Triangles made by diagonal(s)	Total number of interior degrees
Triangle	3	1	$180 \times 1 = 180°$
Quadrilateral	4		
Pentagon	5		
Hexagon	6		
20-sided polygon	20		
n - sided polygon	*n*		

Challenge Your Mind:
The 20-sided polygon is not filled out on the chart. This would be too troublesome to try and construct on the sketchpad or by hand. How could we figure out the sum of the interior angles ~ review the chart to find a pattern. (You may use the bottom of this page for scratch work.) Once you have figured it out, make sure it works for the ones you already know for sure (the triangle, quadrilateral, pentagon and hexagon), and then finish filling out the chart that doesn't have the shaded blocks.

After you have finished please do step 21 and hand-in this worksheet.