Lab Framework

Text: Applied Mathematics

Unit number and title: 16 Soling Problems Involving Linear Equations

Short Description: (To assist other teachers when they are searching for a lab)

Developed by: Marcia Pink and Linda Thornberry

Contact Information: Newport High, Bellevue, WA (206)455-6136

Date:

Lab Title

The Sum of the Interior Angles of Polygons

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**

  Find the equation of a line using student generated data.
  Use the equation and its graph to make predictions.
  Practice measurement using a protractor.
  Connect the symbolic representation of a line to student collected data and tangible geometric objects.

- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)

- **Vocabulary**

- **Materials List**

  1 protractor per student (circular protractors preferred)
  4 worksheets per team each containing a triangle, a quadrilateral, a pentagon, and a hexagon These should be different from each other and preferably copied in different colors.
  4 worksheets per group each containing a different heptagon.
  1 sheet of graph paper per student (10 squares per inch)

- **GLEs (State Standards) addressed**

  Math: (Math)
  Reading: (Reading)
  Writing: (Writing)

- **Leadership Skills**

- **SCAN Skills/Workplace Skills**

- **Set-up information**

  Create and copy worksheets.
  Since the equation of this line should be y = 180x - 360, your students' graphs will need to extend from -500 to 1500 vertically and 0 to 10 horizontally. You may need to work with your students on scaling the graph so that all points will fit and the y-intercept is on it.

Your students may make measurement and calculation errors sufficient to cause outliers in their data. You need to be aware of that possibility and ask them to recalculate if they are too far off.

- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required)**

  Groups of four students; 1-2 class periods depending on the optional activities used.
- **Teacher Assessment of student learning** (scoring guide, rubric)

- **Summary of learning** (to be finished after student completes lab)

  -discuss real world application of learning from lab

  -opportunity for students to share/present learning

- **Optional activities**

  Graph data points using STATPLOTS on the TI-82. Have students graph their line using Y1 and the calculator generated regression line in Y2. Compare. Give students another sheet of polygons and have them divide the polygons into triangles by drawing all of the diagonals from one vertex. The number of triangles times 180 is the sum of the interior angles of the polygon. You can generalize this to the formula sum of the interior angles of a polygon = (n-2)180, which simplifies to the linear equation y = 180x - 360.

- **Career Applications**

LAB TITLE: Sum of Interior Angles of a Polygon
STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**
  You will create a linear mathematical model of the relationship between the number of sides in a polygon and the sum of the measures of the interior angles.

- **Grouping instructions and roles**
  Teams of four students

- **Materials**
  Protractors, graph paper
  1 worksheet containing four polygons for each team member

- **Procedures** – steps to follow/instructions
  1. Measure each interior angle of the polygons on your worksheet. Write the angle measures in the angles on the worksheet and calculate the sum of the angles for each polygon. Write the sum in the center of the polygon and circle it.

  2. When you have finished your worksheet transfer your sums to the team Data Table.

  3. When all of the data has been collected, calculate the average angle sum for each polygon. If any of your data points vary from the average by more than 10, you need to re-measure that polygon and/or recalculate that data point and compute the average again.

  4. Using the number of sides as your x-coordinate and the average as the y-coordinate, plot your four data points as ordered pairs on a rectangular coordinate system. Each team member should make an individual graph.

  5. Draw the line that best fits your four data points on your graph. ***Make sure the line extends through the y-axis.***

Now do the activities and answer the questions on the Individual Specification Sheet.

Data Table:

<-------Sums of the Interior Angles of Polygon-------->

Number of Sides x	Member 1	Member 2	Member 3	Member 4	**Average of Sums y**
1					
2					
3					
4					

TURN IN THIS WORKSHEET & THE FOUR POLYGON WORKSHEETS AS A TEAM.

Lab Data Collection

Student: _____ **Date:** _____

Unit: 16

Lab Title: Sum of the Interior Angles of Polygons

Procedure:

1. Show your work for finding the equation of the best fit line through your data points.

   Selected points: _____ _____

   Calculate slope = $\frac{rise}{run}$ Slope = $\frac{\_\_\_\_\_}{\_\_\_\_\_}$

   Find the y-intercept of your graph: Y-intercept = _____

   Equation of line (linear model): _____

2. Predict the sum of the angles of a heptagon (7 sides) using...

   a. Your graph (Show the method on the graph) . Prediction _____

   b. Your linear model (Show your work below). Prediction _____

3. Get a copy of a heptagon from your teacher, measure the interior angles and compute their sum. Show your work on the heptagon.

4. Which method used in #3 is most accurate for predicting the sum of the angles of a heptagon? Support your opinion using a logical argument.

5. Predict the sum of the angles of a polygon with 10 sides. Show your method. Why did you choose this method?

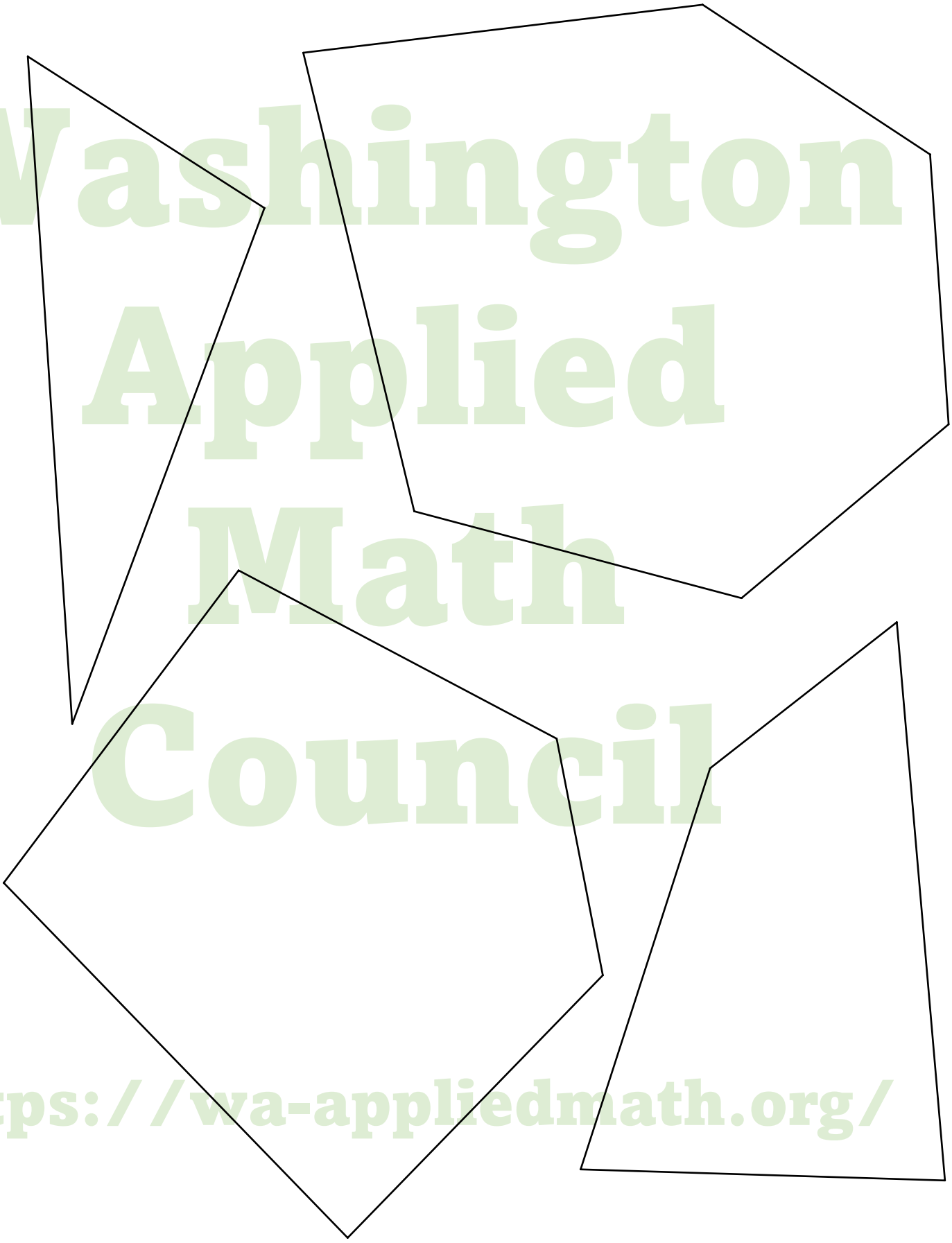
6. Predict the sum of the angles of a polygon with 100 sides. Show your method. Why did you choose this method?

7. Use your equation to predict the number of sides that a polygon with an angle sum of 1980 degrees would have.

8. Does your answer to #8 make sense? Why or why not?

TURN IN THIS WORKSHEET, YOUR GRAPH, AND YOUR HEPTAGON FOR INDIVIDUAL CREDIT.

Name _____



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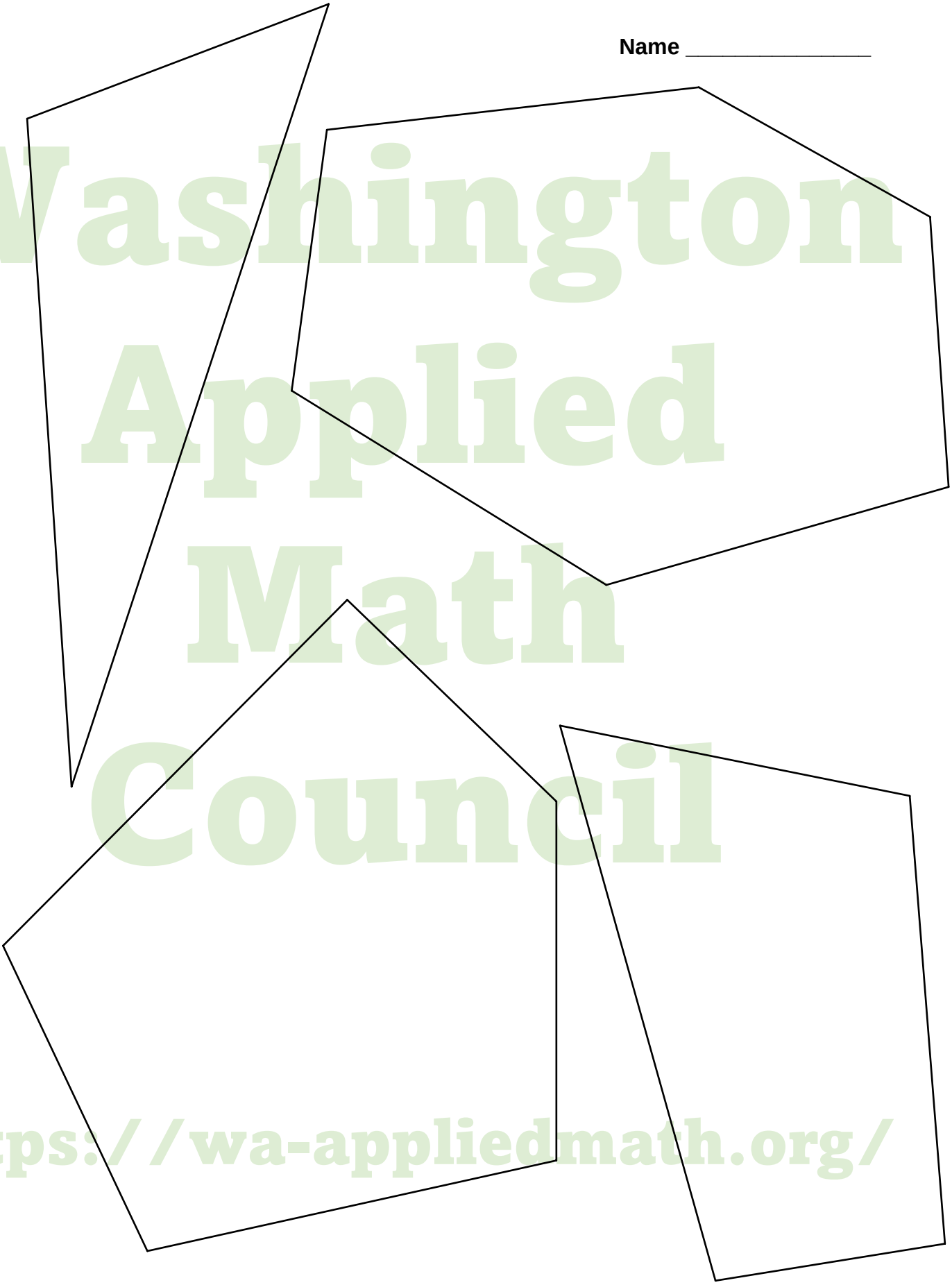

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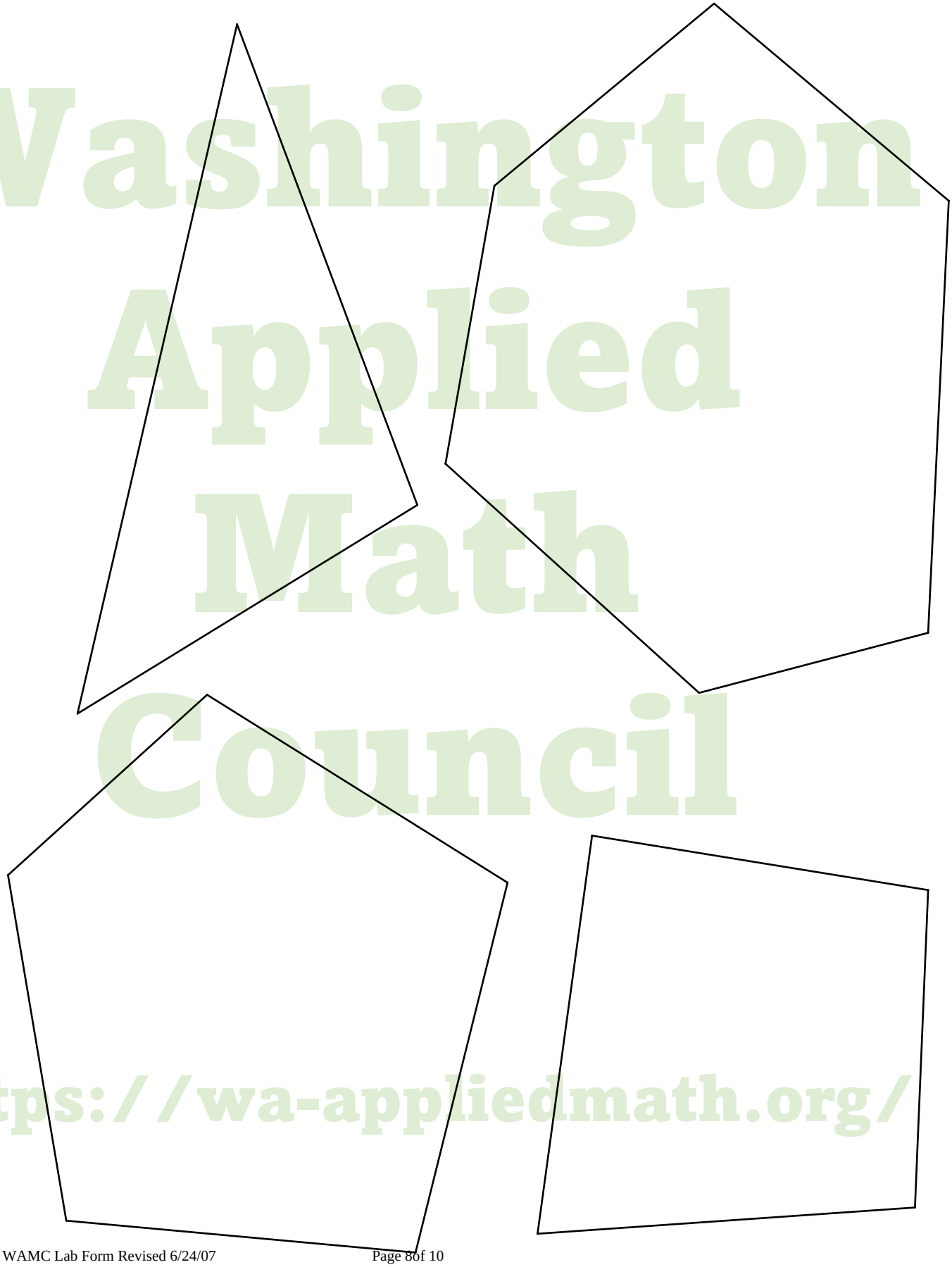

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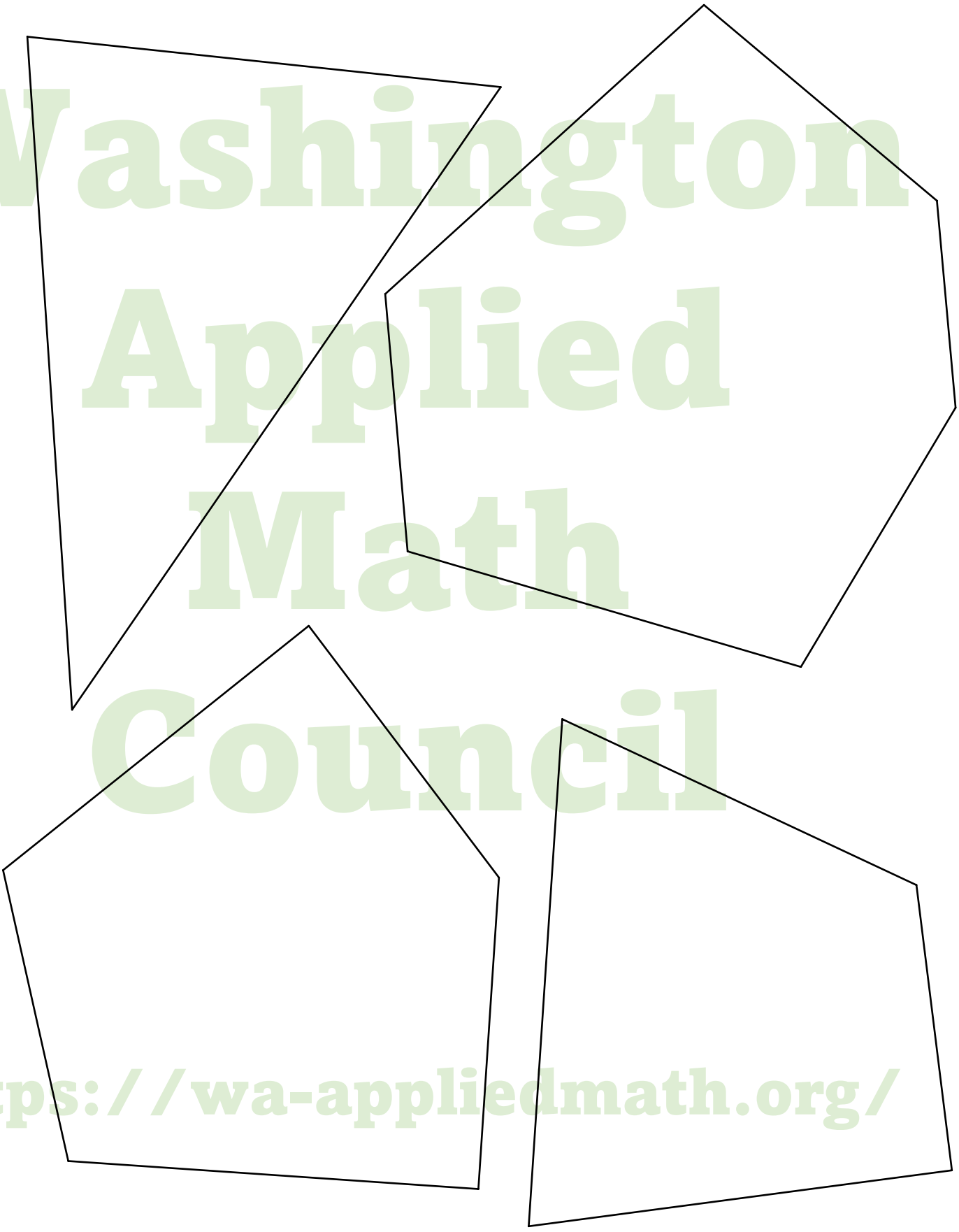

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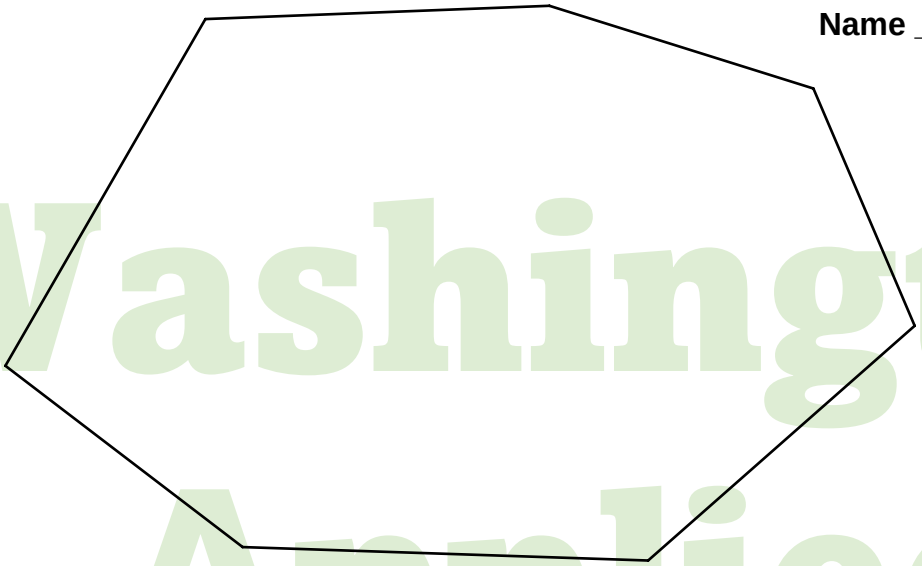

Name _____