MAT 1420 (Algebra and Data Analysis)

Special Activity #2 – Rectangular Activity Data – How Big Does It Get?

Objective: To investigate the relationship between variables.

Materials: Geoboard
Geoboard Pegs
Strings of different sizes
Metric ruler

Overall Procedure: Using one side of the Geoboard as one edge, stretch the fixed length of string to form a rectangle placing the Geoboard pegs at the corners. Make sure that each rectangle is formed with the entire length of string as three sides of its outer edge. Measure the area of the rectangle. Repeat the process six or seven times if possible.

PART A WHAT DO YOU THINK?

1. Background: We are considering the relationship between the length of the side parallel to the fixed side and the area of the rectangle.
   a) How many variables are there in this activity?

b) Describe each variable.

c) Which variable is the independent variable?

d) Which variable is the dependent variable?

2. What do you think the relationship is between these variables? Explain. Include a graph.
MAT 1420 (Algebra and Data Analysis)  Special Activity #2 – Continued

PART B  COLLECT THE DATA

3. Select a piece of string. Record the length of the string (nearest millimeter) = ________

4. Form the first rectangle and record the data for each of the variables you have identified.

5. Form the next rectangle. Record the data for each of the variables you have identified.
   Continue this process to form 12 rectangles. Include thin and tall rectangles, wide and short rectangles, and rectangles that are almost squares.

6. Record the data from steps 4 and 5 above.

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<tr>
<th>No.</th>
<th>Length of the side parallel to the fixed side (to the nearest millimeter)</th>
<th>Length of the side perpendicular to the fixed side (to the nearest millimeter)</th>
<th>Area of the rectangle (to the nearest millimeter$^2$)</th>
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7. Make a graph of your data. Graph area of the rectangle versus the length of the side parallel to the fixed side.
8. How does your graph in #7 compare to your “guess” graph in #2?

9. Find a function (based on three points from your graph in #7) that relates the area of the rectangle and the length of the side parallel to the fixed side. Explain how you derived your function.
10. Find the vertex of the parabola using your equation from number 9 above.

11. Write your function from #9 in here: _______________________

   a. What do the function values (y-values) represent?

   b. What does the independent variable represent?

   c. Do the function values have a maximum or minimum? If so, find them.

   d. What does the leading coefficient indicate about the graph?

   e. Identify what the x-coordinate and the y-coordinate of the vertex represent.
12. Compare your function from #9 above with a function from another group that used a string with a different length.

   a. Length of your string: _______   Your function:____________________

   b. Length of their string: _______   Their function:____________________

   c. Discuss any differences in the functions in a and b above.

      What are the differences? Why?

      What are the similarities? Why?
PART D  OVERALL RESULTS AND CONCLUSIONS

13. Why is the function that you found in #9 above reasonable?

14. Explain what you learned from this activity/lab.

PART E  EXTENSION

15. Describe another activity/lab that would have similar results as this activity/lab. Give details. Be specific.

(Use a separate sheet of paper to answer this question.)