Name: _____ Date: _____

ALGEBRA II

Area of a Rectangles With a Constant Perimeter

Marvin is an electrical engineer working in a big company in Austin, Texas. In his job, he often works with copper wires bent into different shapes to form electrical circuits. The line below represents a 40 feet long wire that Marvin has to bend into a rectangle. He can use whatever width and length he wants as long as all the 40 feet of wire will be used. Marvin tried several rectangles of different width.

_____

40 ft.

Two of Marvin's rectangle are shown below. Use your designated number as the width and determine the corresponding length. Find the area of each rectangle formed.

A) width = _____

Length = _____

Area = _____

B) width = _____

Length = _____

Area = _____

C)

Width	Area of the Rectangle
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

D) Answer the following questions

1. What type of function is implied in table C ?
   Why ?

2. Is it possible to have a width of 25? Why?

3. What is the domain of the function? Use interval form in your answer.

   Is it correct to use brackets instead of parentheses? Why not?

4. Find the functions that generates table C.

5. Sketch a graph of the function.

6. Find the appropriate width that produces the area below.

   A) 50 ft^2.

   B) 35 ft^2

7. Is it possible to construct a rectangle with an area of 101 ft^2?
Use your answer in number 4 to justify mathematically.

8. Base on the table, what appears to be the area of the largest possible rectangle?

9. Verify mathematically that your answer in number 8 is largest area using your answer in number 4.

10. What kind of rectangle is formed that results in a maximum area ?

E) Extension

A) Prove that the largest rectangle that can be constructed using a fix perimeter is a square.

B) Writing to learn.

Is a square a rectangle? Justify your answer.

Is a rectangle a square? Justify your answer.

Teachers Guide

Area of a Rectangle With a Constant Perimeter

This activity is mainly about a table of values that is generated by a quadratic function that naturally lend itself to solving quadratic equations. The table serves as instructional tool to emphasize the concept of domain, range, functions, and equations. The concept of area and perimeter is utilized in the beginning part of the activity as a jumping board. As such it is presumed that the student has prior knowledge about this topic. In the activity sheets, the students will be asked to justify mathematically most of their answers. The activity sheets also contain extension activities that can be used to challenge and reinforce students understanding of mathematical ideas.

Before the Activity

Each student will be assigned with two numbers from {.5, 1, 1.5, 2, 2.5, 3, 3.5, … and 19.5}. If a class has more than 20 students, then two students may be assigned to the same pair of numbers. If the class has less than 20 students, the teacher must see to it that half of the class is assigned to a number less than 10 and the other half is assigned to a number more than 10. Let the students log in into the TI-Navigator.

Activity Proper

Distribute the activity sheets to students. Allow 3 – 4 minutes to complete table A and table B. Review on area of a rectangle if necessary.

In the TI-Navigator activity center, use form and configure using 2 pages and 3 inputs per page. Use L1 for width, L2 for length and L3 for area. Start the activity and instruct the students to type table A and table B in the calculator and send through the TI-Navigator. In the List-Graph, configure to use plot 1 and use L1 for x list and L3 for y list. Click “L1” to arrange L1 in ascending order. Check the table, make L1 starts with 0.5 and with an increment of 0.5. Check also that the corresponding area is correct. Let the students copy the table. Discuss and generate ideas from the table. Change the window settings of the graph if necessary. In the settings, you may use width for x and area for y. Let the students answer the questions 1 to 3 in the activity sheets. In finding the equation, let the students submit their answer through the navigator to verify that all the plotted points lie on the graph of the function. In answering question number 6, let the students use the different ways in solving a quadratic equation. Apply the concept of discriminant, to answer number 7 and use the formula for the vertex to answer number 9.

Prepared by: A. Ninal
Hidalgo High School
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