Function Reprentations

Grade Levels

This activity is intended for grades 6 - 8.

Objectives and Topics

In this lesson, students look at functions in three different ways: as equations, as graphs, and as tables of values. At the end of the lesson, students should see that, depending on the kind of question asked, one representation may be more helpful than another.

Materials

- Worksheet
- Scientific Calculator
- Spools of string
- Scissors

Outline

The first page of the worksheet gives the students a scenario, first asking them to complete a table of values for the function representing the scenario. Organize students into groups of four, and ask each group to measure out a piece of string 100 fistlengths long (alternatively, you can have the students measure out 50 fistlengths, or some smaller division, of string and ask them to remember to convert back when filling out their table), cut it from the spool, and tie the ends to form a loop of string. Using each of the different lengths provided under the "L" column of the table, ask the students to form a rectangle from the loop of string, each member creating a corner of the rectangle. Afterward, perhaps with the help of a scientific calculator if needed, have the students complete the entries under the "A(L)" column of the table.

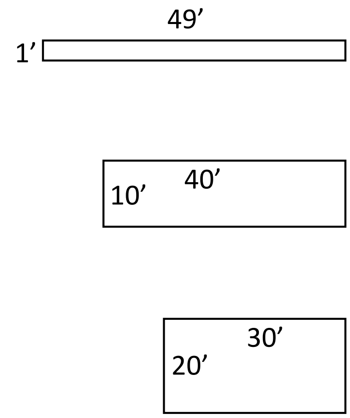
MATHEMATICS DEPARTMENT

After graphing their table of values on the graph provided and coming up with a symbolic (equation) representation for the function, students are asked to come up with their own scenarios where each of the three representations of a function discussed would be most helpful. The idea here is for students to recognize the strengths and weaknesses of the different representations. Finally, students are asked different questions about the different scenario and asked to decide which representation of a function best helps them arrive at their answer. Though there may be multiple solutions if provided with a well-supported reason, our suggested solutions are: Problem A is easy to answer using the graph, Problem B table, Problem C graph, and Problem D table and graph together or just graph.

Name ________________________________
Per _____ Date _________________________

Designing a Pool

Marcus wants to border a rectangular pool that is being installed in his backyard with decorative tile. His mom, Mrs. Galeste, provided him with tile, measuring a total of 100 feet in length, for this purpose.
There are many (infinitely many, actually) dimensions for the rectangular pool. Assume he uses all 100 ft of tile. Here are diagrams for just a few of these possibilities.



A=L•W

A=49•1
A=49 sq ft

A=10•40
A=400 sq ft

A=20•30
A=600 sq ft

Although each of these rectangles uses 100ft of tile, the areas vary greatly. The rectangle illustrated at the top-right, for example, has an area of 49 sq ft (**A=LW**). The bottom rectangle at the right has an area of 600 sq ft.

1. Complete the table below relating the area **A** to the length **L** (the height) of the rectangle. Note, although the width (base) is not included in this table, this measure must be known in order to determine the area. The process for completing each row of this table is included for the first few rows.

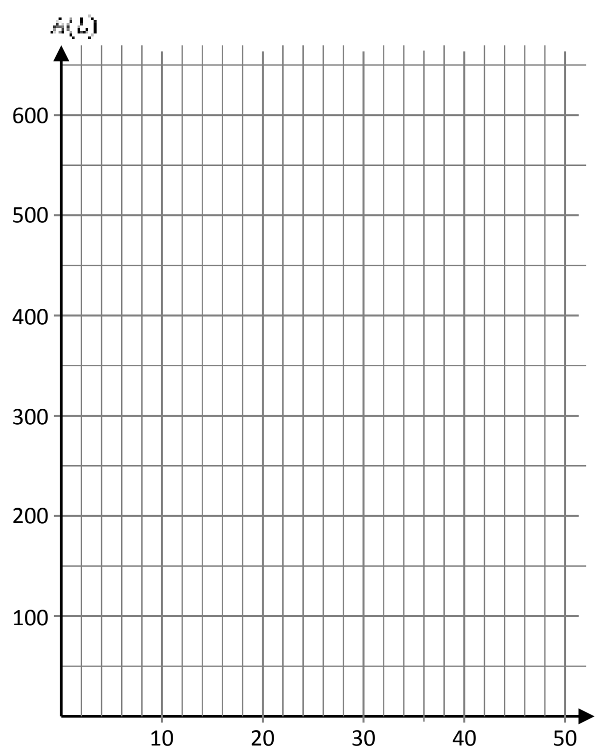
L	*A(L)*
1	49
5	225
10	
24	
25	
27	
30	
35	
40	
48	

If the length is 1 ft, the width has to be 49 ft since 1 + 49 + 1 + 49 = 100 (Perimeter = 100).
The area is then $A = LW$ or $A = 1 \cdot 49 = 49$ sq ft.

If the length is 5 ft, the width has to be 45 ft since 5 + 45 + 5 + 45 = 100 (Perimeter = 100).
The area is then $A = LW$ or $A = 5 \cdot 45 = 225$ sq ft.

If the length is 10 ft, the width has to be 40 ft since 10 + 40 + 10 + 40 = 100 (Perimeter = 100).
The area is then $A = LW$ or $A = 10 \cdot 40 =$ ______ sq ft.

2. Use the values in your table above to sketch a graph for the area *A* as a function of the length *L*. Connect your points with a smooth curve. Finally, write a symbolic representation (an equation) for the area *A* as a function of the length *L* below the graph.



Name ________________________________
Per _____ Date _________________________

The previous page has three representations of the function $A(L)$: a graph, a table of values, and the symbolic representation. Come up with three situations where a graph would help you find the solution, a table of values would help you find the solution, and a symbolic representation would help you find the solution.

Name ________________________________
Per _____ Date _________________________

The previous page has three representations of the function $A(L)$: a graph, a table of values, and the symbolic representation. Answer the below questions and decide which representation was most helpful in coming up with the answer.

A. Marcus' pool would have an area of 500 sq ft if the length was about 14 ft long. At about what other length would give Marcus this same area of 500 sq ft? Reason:	☐ symbolic ☐ table ☐ graph
B. What is the area of Marcus' pool if his rectangle is also a square (the length and width are the same)? Reason:	☐ symbolic ☐ table ☐ graph
C. A pool length of 48 ft gave Marcus a pool area of 96 sq ft. What other length would give him the same area (96 sq ft)? Reason:	☐ symbolic ☐ table ☐ graph
D. What length(s) would give Marcus an area of 600 sq ft? Reason:	☐ symbolic ☐ table ☐ graph