**Task 2: Toothpick Rectangles**

1) Pick up 20 toothpicks for your group and one piece of graph paper for each member of your group.

2) Each toothpick will be equivalent to 5 feet. Create as many different rectangular plots of land as you can using all 20 toothpicks. Then find the area of each rectangle. Organize and record your data in the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  Number of toothpicks in the length. | **Length of Rectangle**(Number of toothpicks times 5) | Number of toothpicks in the width. | **Width of Rectangle**(Number of toothpicks times 5) | **Area of Rectangle**(length of rectangle times width of rectangle) |
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3) Can you see a pattern in your data that will help you generate other data points? For example, can you have a length of 6.5 toothpicks? Fill the rest of your table with more data points.

4) On your graph paper, graph your data using the length of the rectangle as the x value and the area of the rectangle as the y value.

5) Look at the shape of your graph. Is this shape the same or different than other graphs you have seen?

6) What is the formula for the perimeter of a rectangle?

7) What is the perimeter of your rectangles? Why? (Remember that each toothpick is equivalent to 5 feet.)

8) Fill in the new table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Length of Rectangle** | **Width of Rectangle** | **2L + 2W** | **Perimeter of the Rectangle** | **Area of the Rectangle** |
| 10 ft. | 40 ft. | 2(10) + 2(40) | 100 ft. | 400 sq. ft. |
| 30 ft. | 20 ft. | 2(30) + 2(20) | 100 ft. |  |
| x ft. |  |  |  |  |

9) Write the area function below:

 Let x = the length of the rectangle

 A(x) =

10) Find the length and width of the rectangle that will give you the maximum area.