**Rates of Change-Part 2**

**Materials needed:**  25 (or 36) wooden blocks

Directions:

1. Return to the 3 by 3 square that you formed in Part 1. If you take away the blocks that lie on the perimeter of the square, how many are left in the interior of the original square. Record that number in the table below.

|  |  |
| --- | --- |
| Number of blocks on the side of the square. | Number of blocks left. |
|  |  |
| 3 |  |
| 4 |  |
| 5 |  |
| 6 |  |
|  |  |

1. Now take away the blocks that lie on the perimeter of the 4 by 4 square. How many blocks are left in its interior? Record that number in the table above.
2. Do the same for a 5 by 5 square and a 6 by 6 square, recording your answers in the table.
3. Try to determine a pattern for your data and fill in the values for 2 and 7 in your table using the pattern.
4. Make a scatterplot of this data on Desmos. Let x represent the number of blocks on the side of a square and y represent the number of blocks in the interior. Copy the scatterplot onto graph paper. Be sure to label your axes with a scale and a description of the variable.
5. Can this data be approximated by a line very easily?
6. In the first column of the table on the top of the next page record the successive differences between the values in the second column. Does the data we found form a linear function? Explain.
7. In the second column, record the successive differences in values of the first column. What do you notice?

|  |  |
| --- | --- |
| Difference between 2nd column values in previous table. | Difference between 1st column values in this table. |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

1. Write an equation that describes the pattern you determined in step 4 in terms of x and y. Graph the equation on Desmos and on your scatterplot. Does it go through your data?
2. The graph on Desmos is a solid curve. What is the domain of this function in the context of this problem? Does it make sense to connect the data points you plotted? Explain.
3. Use your equation to predict how many blocks there would be in the interior of an 11 by 11 square.
4. Use your equation to predict the original size of a square if there are 144 squares left in its interior after the square on the perimeter have been taken away.