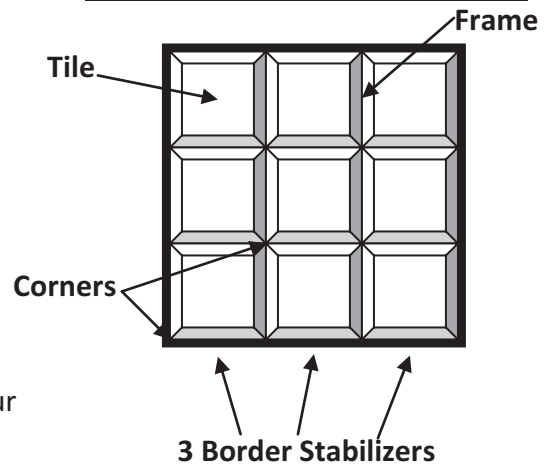


Building Square Patios

Name _____ Date _____

Materials

- 30 construction paper squares, each cut to the length of a wooden toothpick, to use as tiles
- 45 wooden toothpicks to use as frames
- 40 miniature marshmallows to use as corners
- 30 colored toothpicks to use as border stabilizers



Directions

1. Using the materials above, build models of the first *five* square patios listed in the chart below. Record your data in the chart.
2. Looking at the number of tiles in each of your patios, predict and write in the chart how many tiles would be in a 6 x 6 patio, a 7 x 7 patio, and a 10 x 10 patio. Explain how you arrived at your answers.
3. Now, fill in the number of tiles needed for an $n \times n$ patio, and explain how you arrived at your answer.

Patio Dimensions	No. of Tiles	No. of Border Stabilizers	No. of Frames	No. of Corners
1 x 1				
2 x 2				
3 x 3				
4 x 4				
5 x 5				
6 x 6				
7 x 7				
10 x 10				
$n \times n$				

4. Create a graph showing the different patio dimensions and the number of tiles in each patio. Which variable is independent, and which is dependent?

5. You have made algebraic and graphic representations of this relationship. Is this relationship a function? How do you know?
6. Next, fill in the number of border stabilizers needed for each of the five patios you built. Do you see a pattern? If so, use this pattern to predict the number of border stabilizers needed for a 6 x 6 patio, a 7 x 7 patio, and a 10 x 10 patio. Explain how you arrived at your answers.
7. Now, fill in the number of border stabilizers needed for an $n \times n$ patio, and explain how you arrived at your answer.
8. Create a graph showing the different patio dimensions and the number of border stabilizers needed for each patio. Which variable is independent, and which is dependent?
9. You have made algebraic and graphical representations of this relationship. How could you use each of these representations to predict the number of border stabilizers needed for a 16 x 16 patio?
10. Compare the two different graphical representations you have made. What do you notice?
11. Can you find a relationship between the patio size and the number of frames? If so, what is it in algebraic form?
12. Can you find a relationship between the patio size and the number of corners? If so, what is it in algebraic form?