Name: _____

Science Period: ____ Math Period: _____ Date: _____

Magic Squares

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1. As best you can, describe in your own words what is Mathematics? What is its purpose?

2. What can mathematicians do?

3. In math terms: What is a variable?

4. What are Magic squares?

Definitions:

A. **Magic Square –** a n by n matrix where all the rows, columns and main diagonals sum to the same number.

B. **Order of a Magic Square –** The size of the magic square

C. **Magic Constant -** The sum of all the rows and columns of a magic square

Magic Squares of Odd Order:

Together, we are going to construct a magic square. The magic square will have an order of 3, and a magic constant of 15 and using only the numbers 1 through 9.
PLEASE USE A PENCIL.

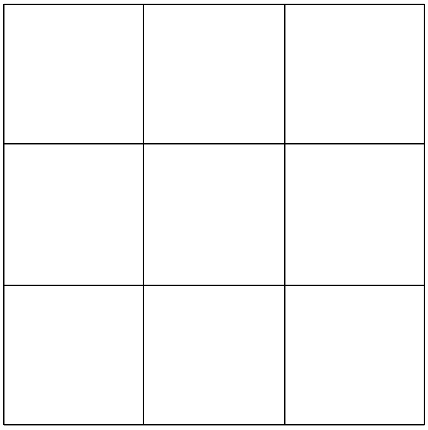
1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9

Now we will learn the Siamese Method of constructing a magic square. The rules are simple. Starting with a simple progression of numbers, 1,2,3,4,5,6,7,8,9. We follow the steps given below.

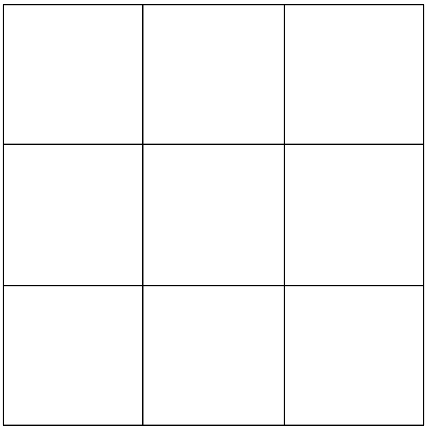
1. Place 1 in the middle of the 1st row.
2. Go up and to the right. Since there is no row above, we wrap around and go to the 3rd row, 3rd column, and since it is empty, we place a 2.
3. Again go up and to the right, wrapping around we end up in the 1st column in row 2. Since it is empty we place a 3.
4. Again we go up and to the right, which lands us in the 1st row, 2nd column, which is already filled with a 1. Since it is filled, we go directly down 1 to row 3, column one and place a 4.
5. From here we repeat the process. Up 1 right 1. If the next square is filled, we go down

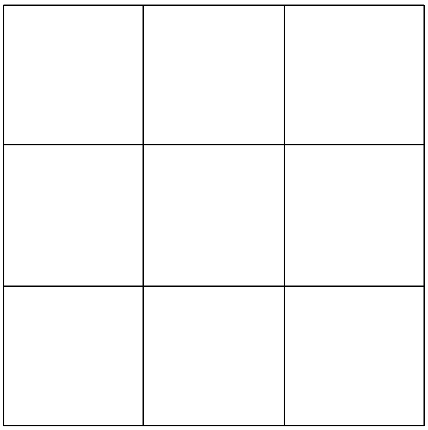
one instead.

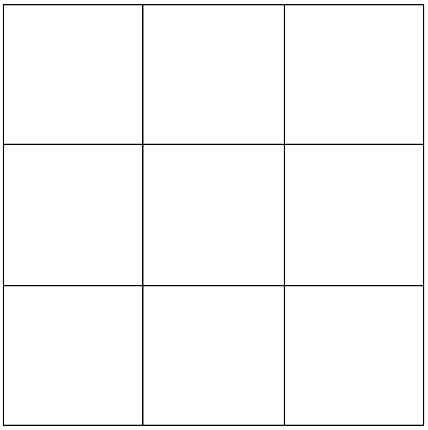
6. Finish the magic square.

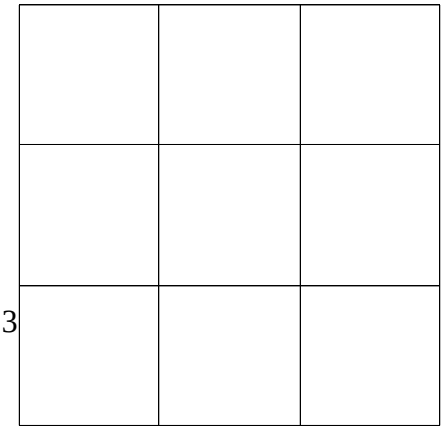


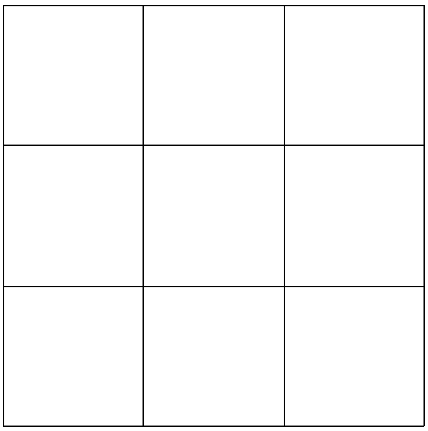
Using the magic square we created on the previous page, perform rotations and reflections of the square to create more magic squares.











Using the Siamese method, fill in the 5x5 magic square using numbers 1-25
Start with 1 in the top row in the middle.

1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9 , 10 , 11 , 12 , 13 , 14 , 15 , 16 , 17 , 18 , 19 , 20 , 21 , 22 , 23 , 24 , 25

What is the order of this magic square?

What is the magic number of this magic square?

Extra Work: In your MSU notebook, create your own magic squares of order 3 and 5 using any positive integers you want.

More Questions:

After seeing how a mathematician would try to investigate and solve a magic square, answer the following questions as best as possible:

1. In your own words, what can a mathematician do?

2. What problem would you like to investigate mathematically?