

Name _____

Date _____

Make your own Magic Squares!

You can write your own magic squares. There are some patterns to the numbers which you can use.

3 by 3 Magic Squares

1. Follow these steps to make a 3 by 3 magic square:
 - a. Start with a list of 9 numbers. Begin by using 9 consecutive numbers, but you don't have to start with 1. You can skip-count to make your list.
 - b. Write the numbers in order from least to greatest.
 - c. Mark the middle number, and place it in the center box of the magic square.
 - d. Multiply the middle number by 3. The product is the magic sum.
 - e. Then try writing different numbers in the boxes around the center. Make sure that the numbers in each row, column, and diagonal add up to the magic sum. You will need to use trial and error -- look for patterns in the magic squares you have done to help you.

2. Start with the list below. There are several blank squares so you can try different solutions without having to erase them.

Cross the numbers off the list as you use them.
Remember -- the magic sum is equal to 3 times the middle number.

7 8 9 10 11 12 13 14 15

What is the middle number? _____ What is the magic sum? _____

Notes and hints:

- a. You are combining 2 numbers in each row, column, or diagonal with the middle number. So one of those 2 numbers will be higher than the middle number, and one lower.
- b. The highest and lowest numbers in the sequence will be opposite each other, and NOT in corners. They will form either the middle column, or the middle row.

Four by four magic squares are different. There isn't a center box.

- To make a 4 by 4 magic square, start with a list of 16 numbers. It's easier to start with 16 consecutive numbers. You can skip-count to make your list.
- Write the numbers in order from least to greatest. Draw a vertical line between the 2 middle numbers.
- Add the lowest and highest numbers in the list and multiply the sum by 2 (or add it to itself). The total is the magic sum.
- You will need to use some trial and error to make 4 by 4 magic squares.
- Here are some helpful patterns to get you started.

The magic sum for this magic square is 34. It has the numbers 1 through 16.

1 2 3 4 5 6 7 8 | 9 10 11 12 13 14 15 16

- a. The numbers in the 4 corners of the magic square will add up to the magic sum.

$$16 + 13 + 1 + 4 = 34$$

16	3	2	13
9	6	7	12
5	10	11	8
4	15	14	1

- b. The numbers in the 4 boxes at the center of the square will add up to the magic sum.

$$6 + 10 + 11 + 7 = 34$$

16	3	2	13
9	6	7	12
5	10	11	8
4	15	14	1

- c. The largest and the smallest numbers are in the outside boxes.

Notes and hints:

- The highest and lowest numbers can be placed at opposite corners. The difference between them and the numbers in the other two corners is identical: $16 - 13 = 3$ and $4 - 1 = 3$.
- The highest and lowest numbers are all in the outside boxes of the magic square. The center foursquare includes middle numbers, but not the two median numbers (8 and 9).