

Stephanie Whitney  
R & R Lesson Plan  
Magic Squares

A. Objective

Grades 6-8 Process Standard 1:1. Problem Solving: Develop and test strategies to solve problems which may have single or multiple answers.

Students will use trial and error to solve magic squares

B. Instruction

I read the students the book Ben Franklin and The Magic Squares. This book is written by Frank Murphy and illustrated by Richard Walz. It is published by Random House and is a Step Into Reading book.

This is a fantastic book that incorporates history and reading into the math lesson. It gives highlights from Ben Franklin's life, and details how he made his magic squares.

After we read the book and were given an introduction on how to make magic squares, I showed the students examples of larger magic squares (8x8), and briefly talked about how formulas could be used to place the numbers.

Then I assigned the students to go the website  
[www.allmath.com/magicsquare.php](http://www.allmath.com/magicsquare.php)

On this website, students can solve 3x3, 4x4, or 5x5 magic squares of various degrees of difficulty. It is an interactive website that will check answers and give hints if needed as students progress.

As I dismissed class, I encouraged the students to play with this website in their free time, and to search out other magic square puzzles they can find on the internet.

C. Assessment

As the students worked on the computer, I monitored their progress to ensure all were participating.

#### D. Modification

Students could be assigned easier or harder squares to complete, depending on their level and ability. Upper level students could be encouraged to discover a formula for completing the squares or to do research and find a formula someone else came up with and apply it to a magic square they create.

#### E. Reflection

I did this activity on December 5<sup>th</sup> with some IEP students. The book was at a level that they understood and even though they are sophomores in high school they loved to be read to! I let them do the interactive puzzle as a class and I was amazed that the student who causes the most behavior problems in the class (and who has the lowest grade) really took charge of the activity and provided most of the answers. It really gave him a chance to shine in front of his peers!

This activity could really be used with any grade – there are many levels of puzzles. I think my 2<sup>nd</sup> grade son could do an easy magic square, and it could also be a challenge to seniors if presented at a higher level.

Below I put a copy of an 8 x 8 magic square so that students could see another application. You can find many variations on magic squares on the internet.

### Benjamin Franklin's 8x8 Magic Square

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Benjamin Franklin was a scientist, an inventor, a statesman, a printer, a philosopher, a musician, and an economist. It is easy to see how a person of such diverse talents could have invented this interesting magic square.

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## Benjamin Franklin's Magic Square

14	3	62	51	46	35	30	19
52	61	4	13	20	29	36	45
11	6	59	54	43	38	27	22
53	60	5	12	21	28	37	44
55	58	7	10	23	26	39	42
9	8	57	56	41	40	25	24
50	63	2	15	18	31	34	47
16	1	64	49	48	33	32	17

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See W. S. Andrews, *Magic Squares and Cubes* (New York: Dover, 1960). Chapter 3, entitled "The Franklin Squares," begins by quoting Franklin's original account of his discovery, as found in "Letters and papers on Philosophical subjects by Benjamin Franklin, LL.D., F.R.S.," London, 1769.

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