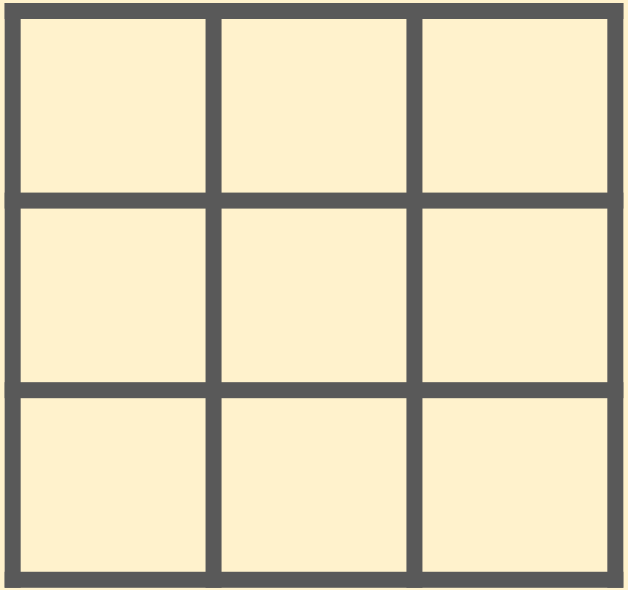
The Global Math Circle

Using Magic Squares in Math Circles of all ages, ability levels and topics

Tifin Calcagni
Campo Elias Suarez Villagran

January 5, 2023 9:00 AM
Joint Mathematics Meeting 2023

Using the numbers 1 through 9, create a square whose rows, columns, and diagonals all sum to the same number.



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Discovering math together

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Re-imagining Math Education for 21st century learners

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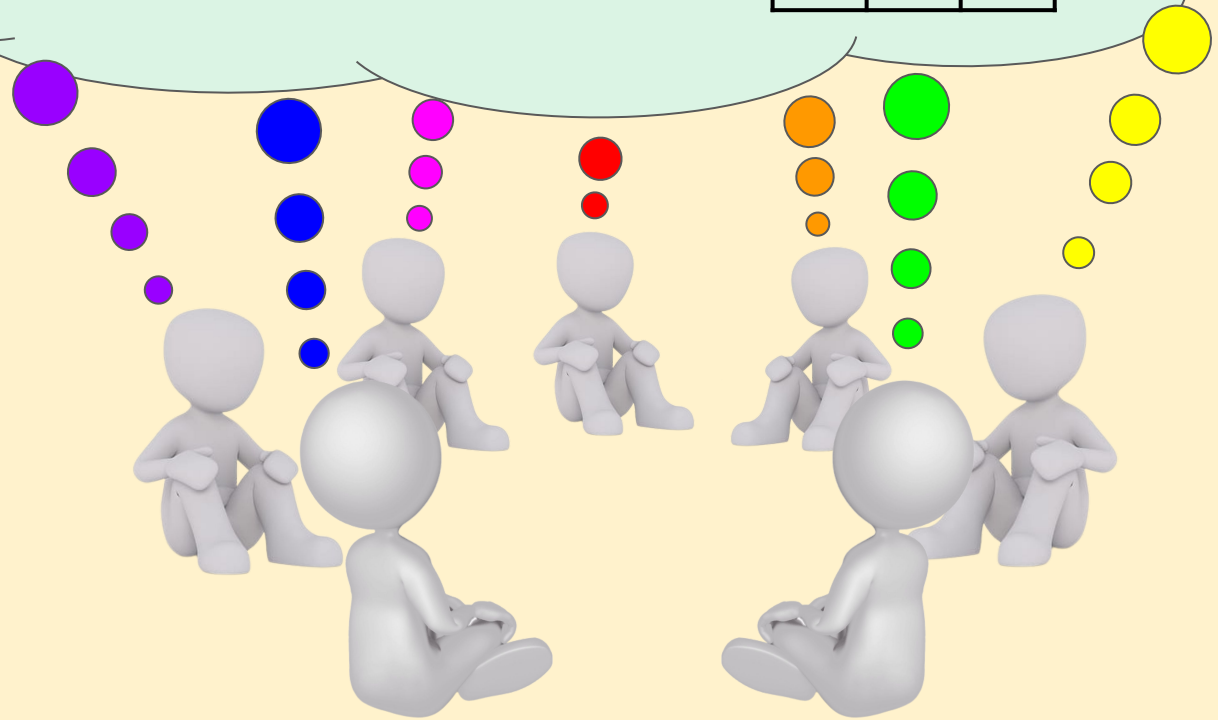
A	B	C
D	E	F
G	H	I

$A + E + I = 3N$
$C + E + G = 3N$
$B + E + H = 3N$

$3E = N$

M	N	?
?	K=3N	?
?	H	I

$C = 3K - (M+N)$



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Using the numbers 1 through 9, create a square whose rows, columns, and diagonals all sum to the same number.

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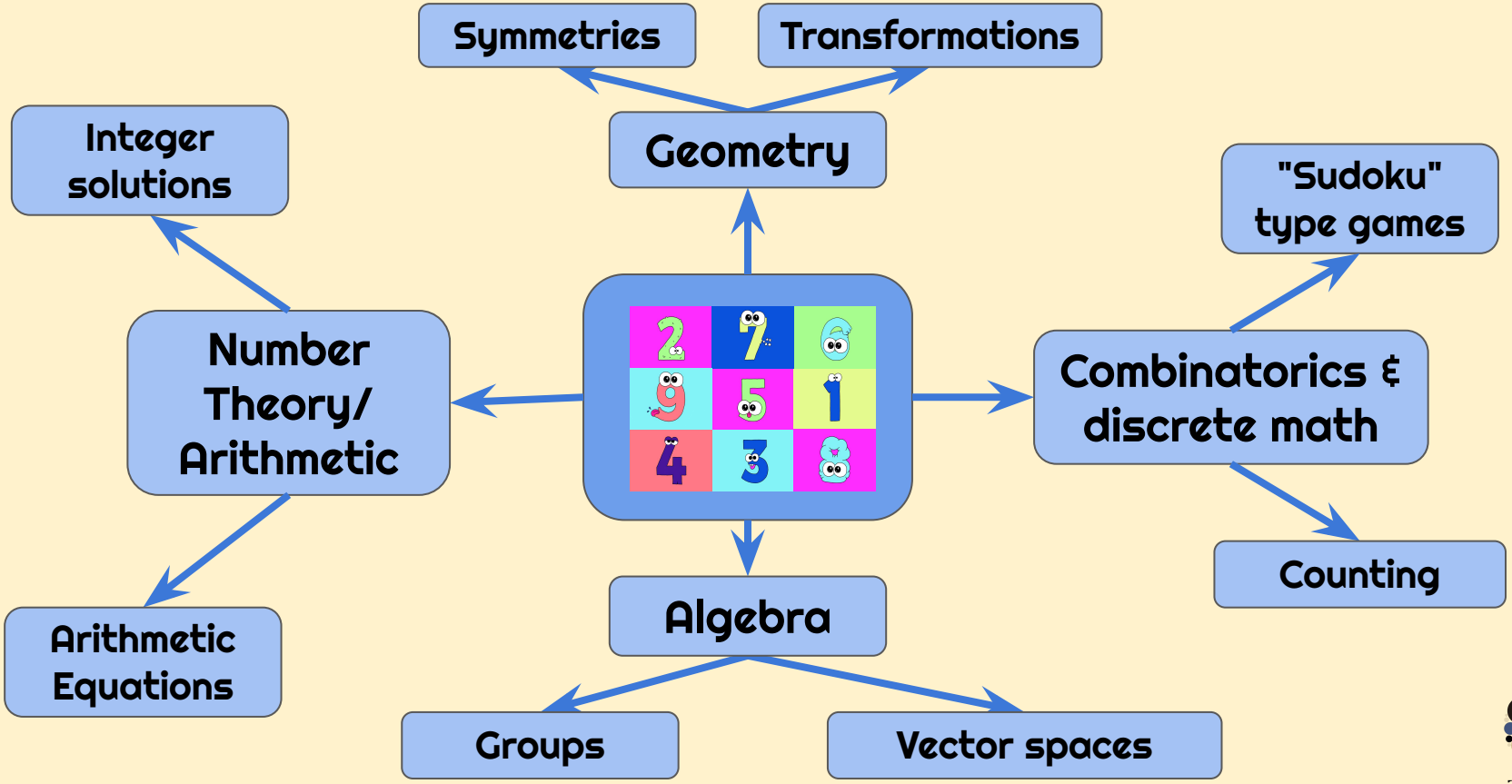
Magic squares can take us in many directions



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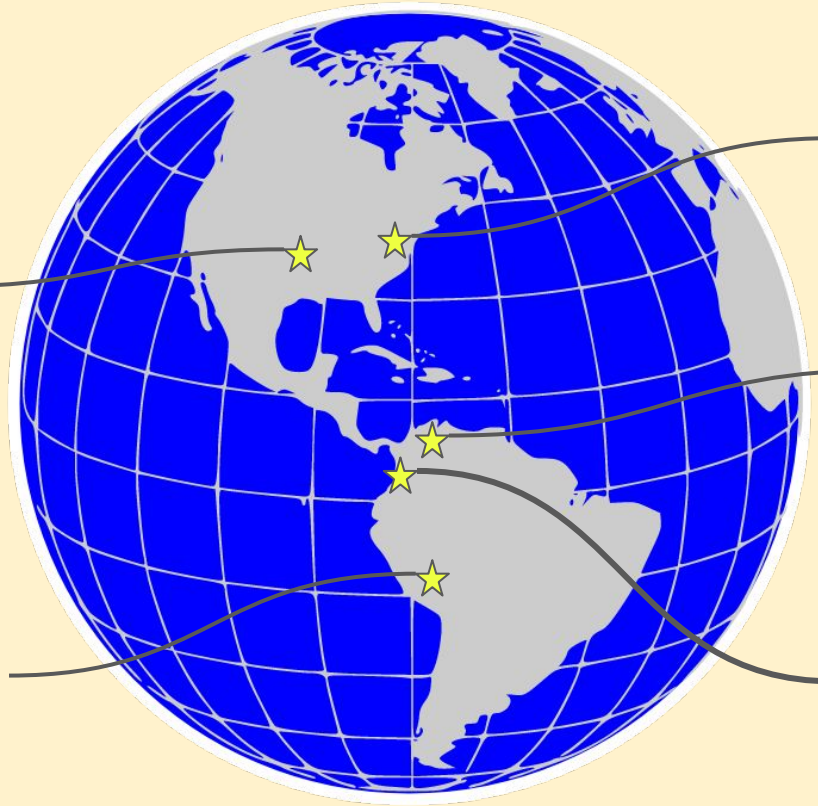
We have successfully run this circle five times with different groups



2020: American online students 8-10 years old

2022: American & Canadian online students 11-13 years old

2022: Indigenous Colombian students

2021: Peruvian 13-15 year old students

2021: Colombian students online

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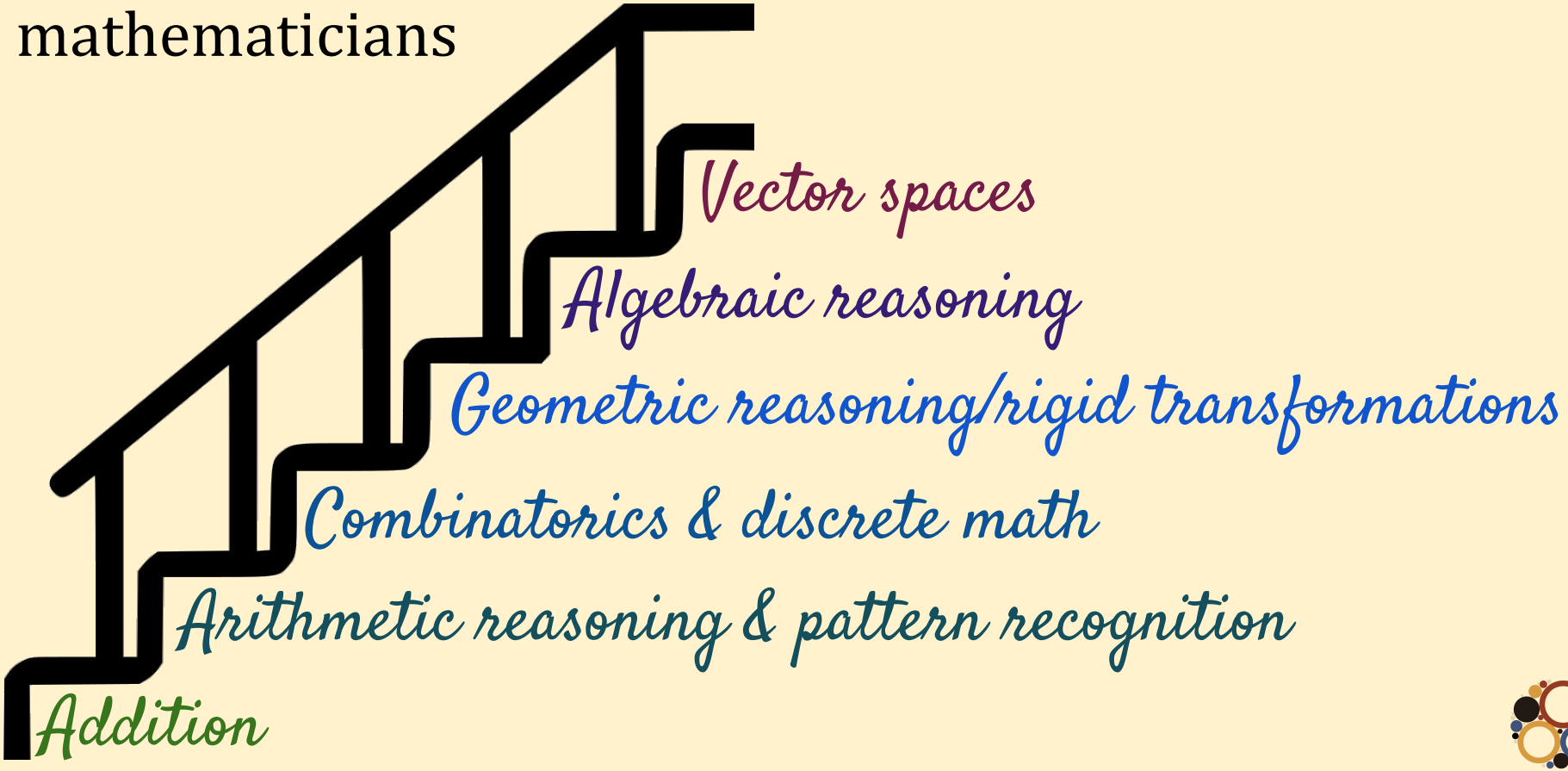
Magic squares are accessible by all levels of young mathematicians



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Arithmetic reasoning & pattern recognition

What is the sum of each row, colu[illegible]?

Which sum appears the most? Why do you suppose that's the case?

1	2	3
4	5	6
7	8	9

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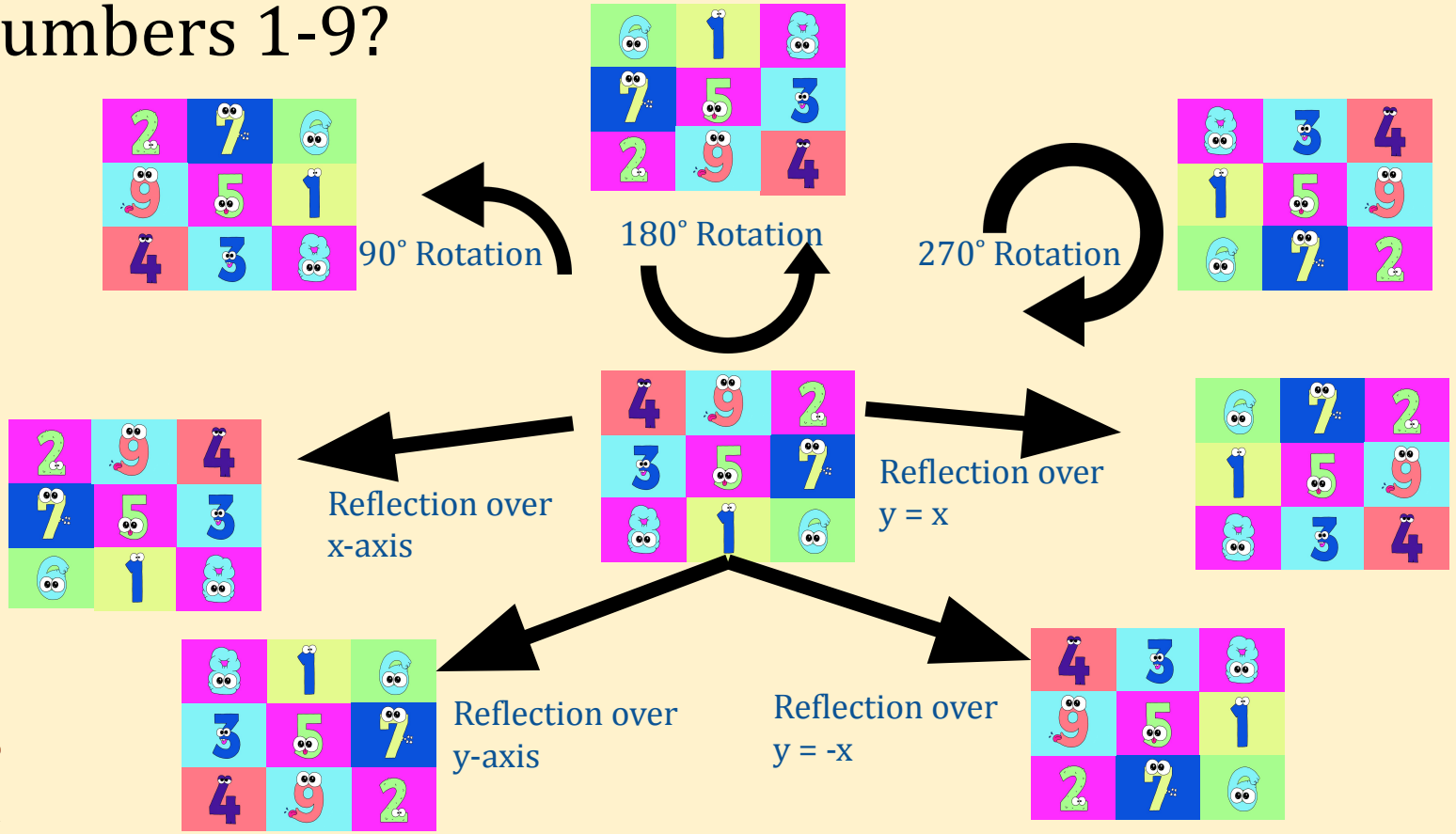
How many 3x3 magic squares are there using the numbers 1-9?



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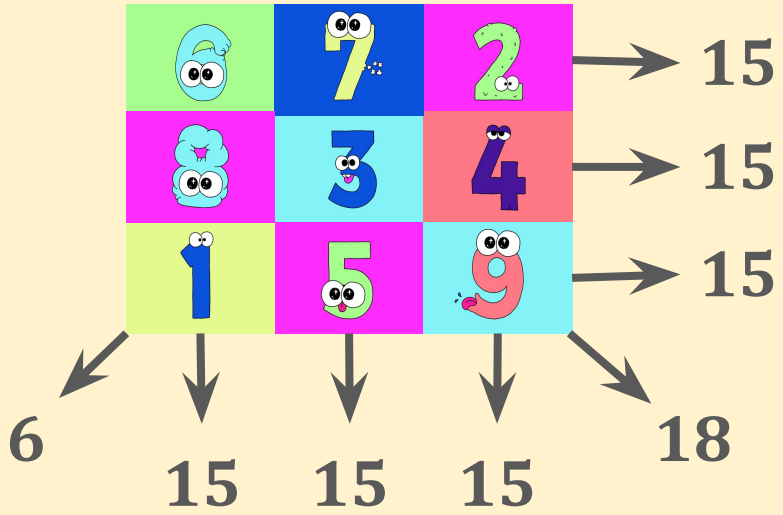
Semi-magic Squares and Tiling (Translations)



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Semi-magic Squares and Tiling (Translations)

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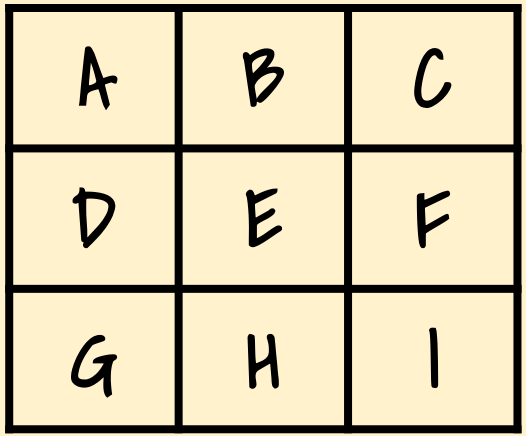
Using structure to help you find relationships



Can you prove that the sum of all rows columns and diagonals in a magic square would equal 3E?

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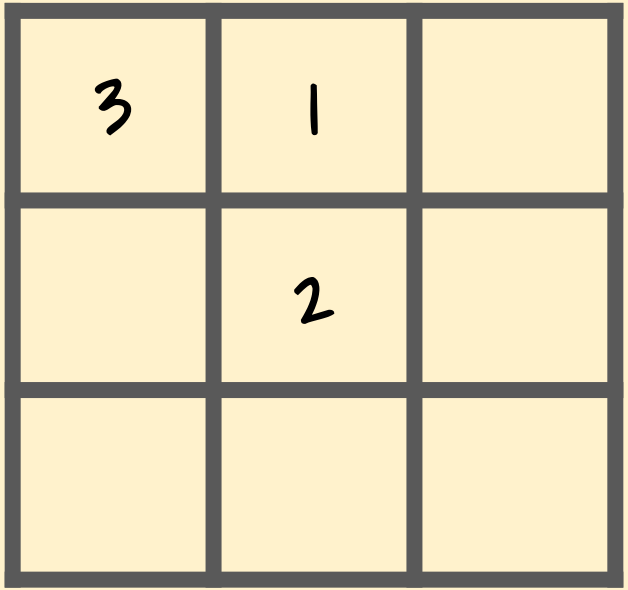
Given three numbers, can you complete the magic square?



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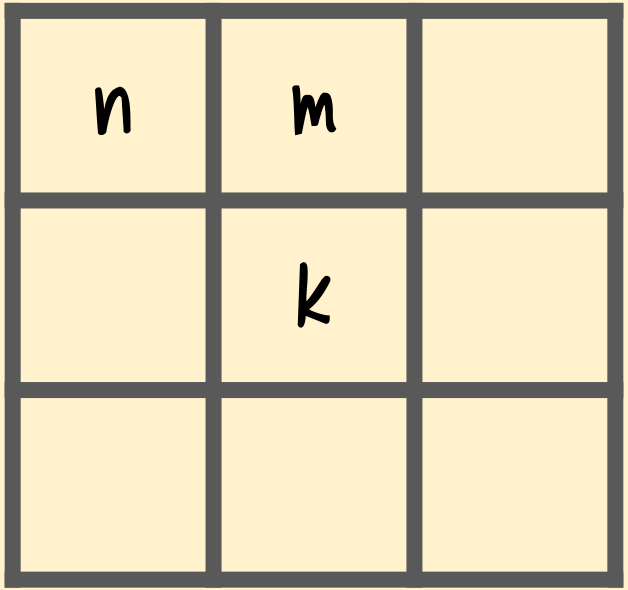
Given three variables, can you complete the magic square?



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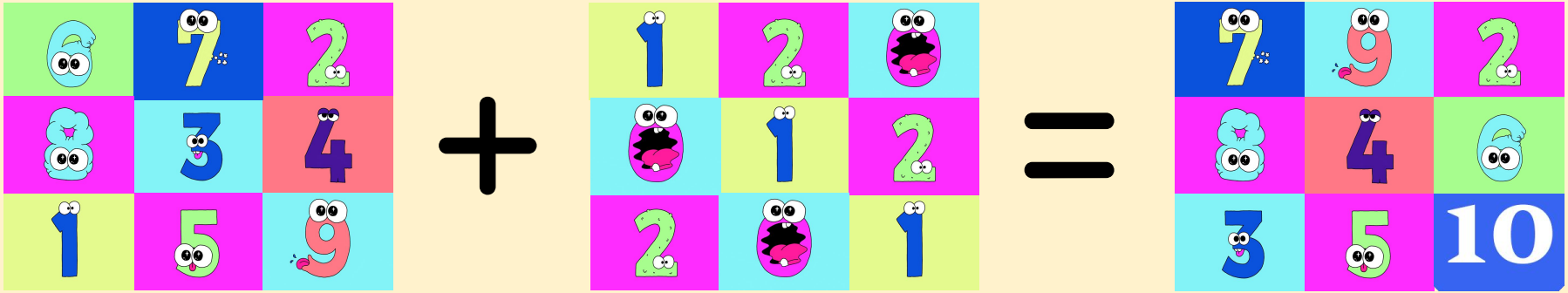
Magic squares are preserved under addition



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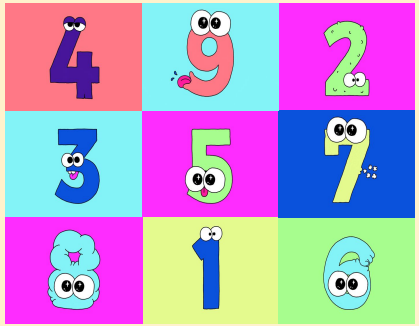
Magic squares are scalable



× 3 =

12	27	6
9	15	21
24	3	18

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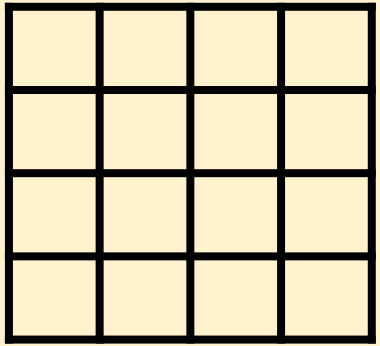
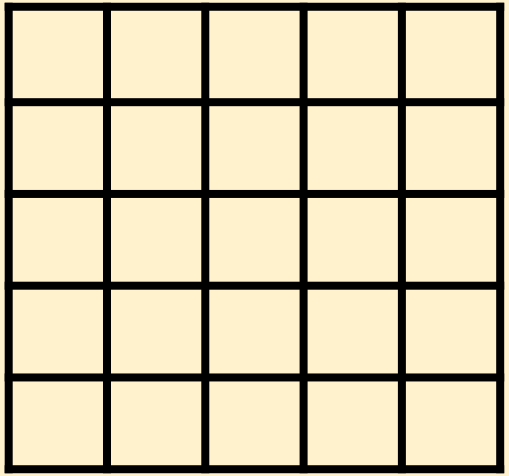
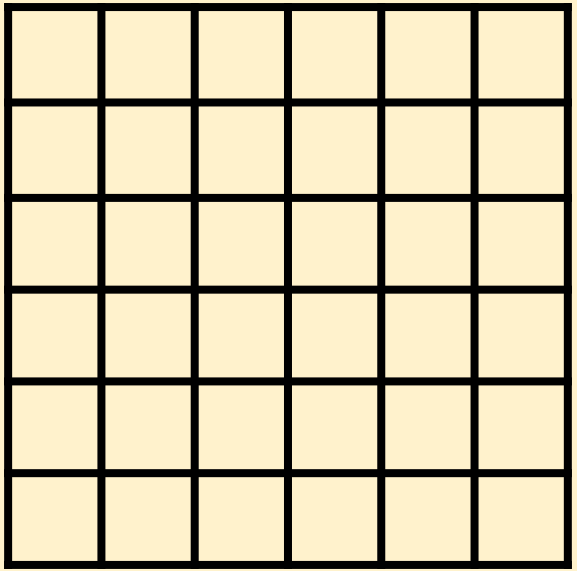
Giant magic squares







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Giant magic squares

Using the base of the 3x3 magic square, can you complete this 5x5?

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

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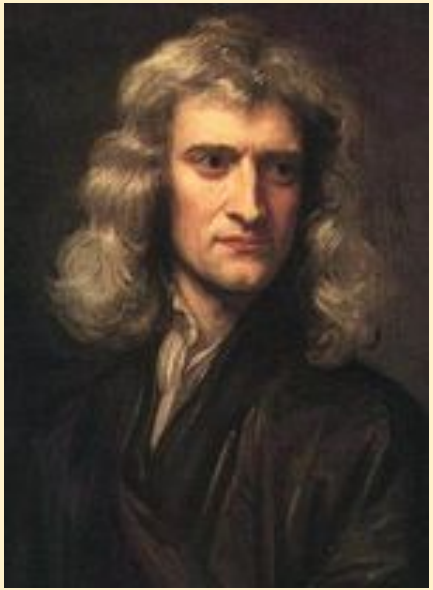
"If others would think as hard as I did, they would get similar results."

-Isaac Newton



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Thank you!

https://www.theglobalmathcircle.org/

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