

# Weekly Challenge #10: Magic Squares **Answers**

Welcome to the Count on Us Secondary Challenge's tenth weekly challenge. The best maths is simple to explain and hard to solve! In challenge 7 we showed you Arithmagons. A pattern in which numbers are combined according to a rule. The all time classic is magic squares. Here you place numbers into a square grid. If you add up the total for each row, column and diagonal you get the same number. This is called the magic number for that grid. Here is a 3x3 magic square with magic number 15.

2	7	6	→15	
9	5	1	→15	
4	3	8	→15	
15↙	↓15	↓15	↓15	↘15

1. Getting started. Make a 3x3 magic square (there are many possible answers, these are examples only)

1	3	2
3	2	1
2	1	3

3	8	7
10	6	2
5	4	9

12	42	36
54	30	6
24	18	48

-3	2	1
4	0	-4
-1	-2	3

Adding 1 to each adds 3 to the magic number

Times each by 6, the magic number is  $6 \times 15 = 90$

Take away 5 from each number

2. Make a 3x3 magic square with these 9 prime numbers; 5, 17, 29, 47, 59, 71, 89, 101, 113

17	89	71
113	59	5
47	29	101

3. 4. and 5. Make a 4x4 magic square ...

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

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

17.5	4.5	3.5	14.5
6.5	11.5	12.5	9.5
10.5	7.5	8.5	11.5
5.5	16.5	15.5	2.5

The magic number is 34

Add 1.5 to each number and the magic number increases by 6

4. Ramanujan's magic square for today's date (28/05/2020).

28	5	20	20
21	19	2	31
3	30	22	18
21	19	29	4

This date has a repeated number, so it is not strictly a magic square. Hopefully, your birthdate is better!  
The Wikipedia entry in Magic Squares is excellent and the main mathematics is about finding methods for efficiently composing magic squares. Look here: [https://en.wikipedia.org/wiki/Magic\\_square](https://en.wikipedia.org/wiki/Magic_square)