



Math for the people, by the people.

magic constant

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Given a magic square, magic cube, etc., the sum of any row, column or diagonal is called the *magic constant* of that magic square, cube, etc.

In the case of a standard $n \times n$ magic square that uses the integers from 1 to n^2 , the magic constant is

$$\frac{1}{n} \sum_{i=1}^{n^2} i,$$

while that for a magic cube is

$$\frac{1}{n^2} \sum_{i=1}^{n^3} i.$$

We can then generalize to higher dimensions d thus:

$$\frac{1}{n^{d-1}} \sum_{i=1}^{n^d} i.$$

So, for dimension d the magic constant is $\frac{n(n^d+1)}{2}$. For instance, a Franklin magic square ($n = 8, d = 2$) has magic constant $\frac{8(8^2+1)}{2} = 260$.

In a trivial sense, an $n \times n$ sudoku puzzle has a magic constant of n^2 .