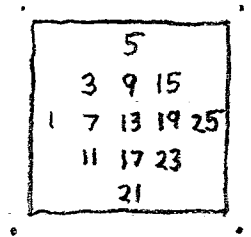
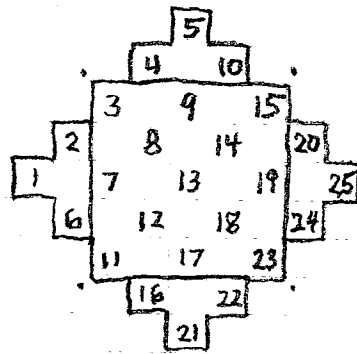


The Math Circle at Canisius,
<https://blogs.canisius.edu/themathcircle/>
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**Sumptuous Squares:
 some questions to investigate.**

Introduction: A sumptuous square is an n by n square grid filled out with the numbers from 1 to n^2 , where each row and each column sums to the same answer. Let's find some. The back of this page is done in convenient grids.

1. Have you seen any tricks for the sum of the consecutive numbers from 1 to N ? If not, try writing the numbers twice like this (where $N = 9$):

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

Does that suggest a general formula?

2. Can we predict the sum for each row and column in an n by n sumptuous square?
3. Is there a 2 by 2 sumptuous square?
4. Find three different numbers less than 10 which add up to 15. How many different answers are there? Can we use these as rows and columns in a 3 by 3 sumptuous square?
5. Try to wrap pattern A to form a 5 by 5 sumptuous square. Does it work?
6. They claim that there is a similar pattern for other odd n . Any ideas why it should it work?
7. Does a similar pattern work for n even?
8. Can we complete pattern B to form a 5 by 5 sumptuous square? J.H.Conway (at Princeton U.) says we can, and that the corresponding pattern can be completed for any odd n . Why should it work?
9. Which of our sumptuous squares have the "magic" property that each diagonal sum is the same as each row and column sum? Does that always happen?
10. A game of magic 15: Players take turns choosing a digit (from 1 to 9) which hasn't been used so far. Each player wants their chosen digits to add to 15. Who wins? Who wins at tic-tac-toe?