

Uncovering the Magic in Magic Squares

NAME _____

Each spring, a trout pond is restocked with fish. That is, the population decreases each year due to natural causes, but at the end of each year, more fish are added. Here's what you need to know.

- Using the magic square shown at below, answer the questions which follow.

1	19	7	25	13
10	23	11	4	17
14	2	20	8	21
18	6	24	12	5
22	15	3	16	9

- What order is the magic square? Explain your answer.
 - What is the magic constant? Explain your answer.
- In India, around 1500 A.D., 4-by-4 magic squares were constructed for particular purposes. For example, to soothe a crying child, a fourth-order magic square with a magic constant of 84 was prescribed.
 - If you were traveling in India around 1500 A.D., you would want to construct a fourth-order magic square with a magic constant of 34 to protect you on your travels. Do so using the numbers 1-16.

b. If you were a warrior in India around 1500 A.D., you would need to construct a fourth-order magic square with a magic constant of 64 for protection. Construct this square using 7 as the smallest number and 25 as the largest number.

3. Use Pheru's method to construct magic squares in which n equals 5.

4. A Frenchman named Antoine de la Loubere created a method for constructing a magic square using consecutive numbers starting with 1. An n -by- n square would contain the numbers $1, 2, 3, \dots, n^2$. To construct a fifth-order square, first draw a square and divide it into twenty-five cells (see the figure below). Add a border of cells along the top and right edges. Shade the added cell in the top-right corner, and think of it as occupied. Write 1 in the middle-top cell of the original square. As a general rule, fill in cells diagonally upward and to the right with numbers that increase by 1. This rule has two exceptions. First, if you land in a cell that is outside the original square, then you can get back into the original square by shifting completely across the square, either from top to bottom or from right to left, and continuing with the general rule. Second, if you land in a cell that is already occupied, then you must write the number in the cell immediately beneath the one last filled, then continue with the general rule.

		18	25	2	9	
	17	24	1	8	15	17
	23	5	7	14	16	23
	4	6	13	20	22	4
	10	12	19	21	3	10
	11	18	25	2	9	

Using de la Loubere's method, construct a normal magic square of the third order.