

A NEW PATTERN TO CONSTRUCT EIGHT POSSIBLE THIRD ORDER (3×3) MAGIC SQUARES

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ABSTRACT

Magic squares are much fascinating for humanity. The third-order magic square with entries 1,2,3.....9 or desired numbers are considered in this paper. In which we have to introduce a new pattern to construct eight possible magic squares for third-order new magic squares with the same magic sum. It is found that mesmerizing passion and remarkable mathematical principles and procedures.

Key words: Magic square, third order, magic sum.

1. INTRODUCTION

A magic square consists of a square array of numbers, whose row, column, and its diagonals sums add to the same number. The first chapter in the great mathematician Srinivasa Ramanujan note book-1, is the only one that has a title and it is a magic square, he starts with first non-trivial magic square for 15, which is 3x3, and it A magic square of order n is an array of n^2 of numbers.

The sum of each row and column and of both the corner diagonals shall be equal. Any numbers that fulfil these conditions may properly be called magic sums.

Thirumurugan [6] made the methods of constructing the different types of magic squares very interesting and informative. Magic squares [1] have been considered a mathematical reaction providing entertainment and an interesting outlet for creating mathematical knowledge [2]. New construction has been made for special magic squares by Nordgren [3].

A small note was given on franklin and complete magic square matrices by Nordgren [4] and Gupta [5] studied a generalized form of a 4 x 4 magic square. Thirumurugan et al [7] have constructed the 3936 different 4×4 new magic squares with the same magic sum.

FORMATION OF EIGHT POSSIBLE MAGIC SQUARE

There are exactly eight distinct 3x3 magic squares which can be generated by rotations and reflections of a base form, serve as a powerful illustration. Here are the construction. Base form of magic square,

8	1	6
3	5	7
4	9	2

90° rotation clockwise

2	9	4
7	5	3
6	1	8

180° rotation clockwise

4	3	8
9	5	1
2	7	6

270° rotation clockwise

2	9	4
7	5	3
6	1	8

Reflection of the base form across the vertical axis

6		7	2
1		5	9
8		3	4

Reflection of the base form across the horizontal axis

6	1	8
7	5	3
2	9	4

Reflection across the main diagonal

4	9	2
3	5	7
8	1	6

Reflection across the anti-diagonal

6	7	2
1	5	9
8	3	4

Each of these square is a valid magic square with the same magic constant of 15.

6	1	8
7	5	3
2	9	4

A NEW PATTERN FOR CONSTRUCTING EIGHT POSSIBLE MAGIC SQUARE

The fascinating of magic squares is that they have no big or no practical application that we can construct. The ancient Chinese, the Lo-shu whose magic square construction same as Fig 1.1. An easy and the common way of forming regular arithmetical square of third order magic square of third order magic square was constructed by a 17th French man De La Loubere .

His staircase method can be easily understood from other method like as Lo-Shu. There are eight way of different arrangements possible to form a basic third order magic squares. we can construct eight possible magic square. The first number 1 is placed in the middle cell of the first row. Sequent number 2 is placed in diagonals of upward to right, which seems to be a staircase.

At the edge of the square, the next number 3 is placed and to complete its diagonal as shown Fig 1.1. Otherwise, when meeting filled cell or the edge of the square, drop to the cell next below and continue the staircase march on the new diagonal.

As when 4 follows 3 in Fig 1.1. Thus 7 is placed where shown after 4,5 and 6 have been entered. Finally 8 and 9 complete the staircase.

With familiarity third order square can be formed directly, using only a mental staircase. Similarly by using staircase principle, we can construct remaining magic squares.

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

3	5	7
4	9	2

For Fig 1.2, first number 1 is placed in the middle cell of the third row. Sequent number 2 is placed in diagonals of downward to left, which seems to be a staircase. At the edge of the square, the next number 3 is placed and to complete its diagonal as shown Fig 1.2. Otherwise, when meeting filled cell or the edge of the square, drop to the cell next above and continue the staircase march on the new diagonal. As when 4 follows 3 in Fig 1.2. Thus 7 is placed where shown after 4,5 and 6 have been entered. Finally 8 and 9 complete the staircase. Using only a mental staircase third order square can be formed directly. Similarly by using staircase principle, we can construct remaining magic squares.

		8
	9	4
7	5	3
6	1	
2		

Fig 1.2

2	9	4
7	5	3
6	1	8

Fig 1.3

2		
6	1	
7	5	3
	9	4
		8

Fig 1.4

8		
4	9	
3	5	7
	1	6
		2

Fig 1.5

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

Fig 1.6

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

Fig 1.7

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

Fig 1.8

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

Fig.1.9

2. CONCLUSION

The construction of 3rd order magic squares of the new patterns is presented in this paper. This new pattern, compared with another known pattern, is one of the best usable ones, based on quickness and easiness, very usable, and highly commanded. The eight forms of a 3x3 magic square can be utilized in various ways depending on the context, such as in mathematics, art, puzzles, and cultural symbolism. There is a lot of possibility for readers who can find their own new pattern for constructing a 3x3 order magic square. These forms have diverse applications, from educational tools and mathematical research to artistic inspiration. Further research in this process to explore to seek more possibilities of constructing third order magic square.

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