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A Report

On

Student Study Projects

ORGANISED

BY

DEPARTMENT OF MATHEMATICS

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DEPARTMENT OF MATHEMATICS

2022-23

MAGIC SQUARES, CONSTRUCTION & APPLICATIONS

Project Report

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CERTIFICATE

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Abstract:

Magic Squares have been the subject of interest among mathematicians for several centuries because of its magical properties. In the present discussion, the magic squares will be discussed in short, i.e. how magic squares have evolved and where they originally came from will be discussed. Next we will present and elaborate some of the methods of constructing magic squares. Lastly, we will give some of its applications in our day-to-day life

Introduction:

A Magic Square of order n is an arrangement of n^2 numbers, usually distinct integers in a square such that the sum of n numbers in all rows, all columns and both diagonals is the same constant called magic number. The magic square in normal is represented by n×n matrix. A normal magic square contains the integers from 1 to n^2. Normal magic squares exist for all orders $n \geq 1$, except n=2.The magic constant for normal magic squares of order n is given by $n (n^2+1)/2$.

The construction of magic square of order n is divided in to the following categories

- Magic square of order n, where n is odd
- Magic square of order n, where n is even

How to Construct Odd Order Magic Squares

CONSTRUCTION STEPS:

1) 1 is stored at position (n/2, n-1)
2) (i, j)............(i-1, j+1)
3) If i=-1 …….i=n-1
4) If j=n.......... j=0
5) If position is occupied, then i=i+1, j=j-2
6) If (-1, n)..........(0, n-2)

EXAMPLE: 1

If you take n=3 that means here $n^2=9$

i.e. 1, 2, 3,4,5,6,7,8,9

Step: 1

1 is stored at position (n/2, n-1) = (3/2, 3-1)

= (1, 2)   (take only integral part)

	0	1	2
0			
1			1
2			

Step: 2

2 is stored at position if (i,j) becomes (i-1,j+1)

=if (1, 2) becomes (0, 3) but here j=3=n then j=0

=(1, 2) becomes (0, 0)

	0	1	2
0	2		
1			1
2			

Step: 3

3 is stored at position if (i,j) becomes (i-1,j+1)

Now our (i,j)=(0,0) then it becomes (0-1,0+1) =(-1,1)

But if i=-1 then i=n-1 that means i=3-1

=2

Then our position is (i,j)=(2,1)

	0	1	2
0	2		
1			1
2		3	

Step: 4

4 is stored at position if (i,j) becomes (i-1,j+1)

Now our (i,j)=(2,1) then it becomes (2-1,1+1) =(1,2)

(1, 2) position occupied then i=i+1, j=j-2

Here i=1+1, j=2-2 then it becomes (i,j)=(2,0)

Now the position is (2, 0)

	0	1	2
0	2		
1			1
	4	3	

Step: 5

5 is stored at position if (i,j) becomes (i-1,j+1)

Now our (i,j)=(2,0) then it becomes (2-1,0+1) =(1,1)

Now the position is (1, 1)

	0	1	2
0	2		
1		5	1
2	4	3	

Step: 6

6 is stored at position if (i,j) becomes (i-1,j+1)

Now our (i,j)=(1,1) then it becomes (1-1,1+1) =(0,2)

Now the position is (0, 2)

	0	1	2
0	2		6
1		5	1
2	4	3	

Step: 7

7 is stored at position if (i,j) becomes (i-1,j+1)

Now our (i,j)=(0,2) then it becomes (0-1,2+1) =(-1,3)

If (i,j)=(-1,n) then becomes (0,n-2)

If (i,j)=(-1,3) then it becomes (0,1)

Now our position is (0, 1)

	0	1	2
0	2	7	6
1		5	1
2	4	3	

Step: 8

8 is stored at position if (i,j) becomes (i-1,j+1)

Now our (i,j)=(0,1) then it becomes (0-1,1+1) =(-1,2)

If i=-1 then i=n-1

i=3-1

=2

Now our position is (2, 2)

	0	1	2
0	2	7	6
1		5	1
2	4	3	8

Step: 9

9 is stored at position if (i,j) becomes (i-1,j+1)

Now our (i,j)=(2,2) then it becomes (2-1,2+1) =(1,3)

If j=n=3 then j=0

Now our position is (1, 0)

	0	1	2
0	2	7	6
1	9	5	1
2	4	3	8

Check:

If magic sum or magic constant can be calculated using the constructed magic square, then the magic square is correct.

So, let us calculate the magic sum.

Sum of first row = 2+7+6= 15

Sum of second row = 9 + 5 + 1 = 15

Sum of third row = 4 + 3 + 8 = 15

Sum of first column = 2 + 9 + 4 = 15

Sum of second column = 7 + 5 + 3 = 15

Sum of third column = 6 + 1 + 8 = 15

Sum of diagonal = 2 + 5 + 8 = 6 + 5 + 4 = 15

⇒ Magic sum = 15

Thus, the magic square so constructed is correct.

How to Construct Even Order Magic Squares

Magic squares of even order having two types

1) **Doubly even magic squares**
2) **Singly even magic squares**

Doubly even magic squares:

A double even order magic square is one whose order is divisible by 4

i.e., 4, 8, 12, 16, 20……..

Now construct a magic square of order 4 (n=4)

So, for the 4 by 4 magic square, each row, each column and both diagonals would sum to

$4 \times (4^2+1) \div 2 = 34$ $[n \bullet (n^2+1)] \div 2$

In a 4 by 4 grid write the numbers 1 through 16 from left to right.

Now "flip" the numbers in the diagonals. i,e. exchange 16 & 1, 6 & 11, 13 & 4 and 10 & 7 ,and you got a magic square totalling 34.

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

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

Unfortunately, the above method only works for the 4 by 4 square and so we'll have to learn another way for constructing doubly even magic squares of *any* size.

Looking at the diagram below, divide the square into four "mini-squares" - squares at the four corners, the size of each equals n/4.
A 4 by 4 magic square has mini-squares that are 1 by 1. (note the 4 red squares).
For an 8 by 8 the mini-squares are 2 by 2, for a 12 by 12 the mini-squares are 3 by 3 and so on.

Next, divide the canter into a large square the size of which is n/2.
For a 4 by 4 square the size would be 2. (Note the blue square)
Now, we fill in the square with the numbers from 1 through 16 but only for the squares that have a 'M' or 'L' in it and we leave the others blank.

M			M
	L	L	
	L	L	
M			M

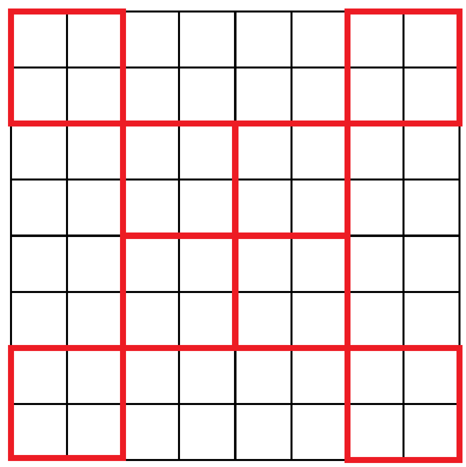
1			4
	6	7	
	10	11	
13			16

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

Finally, starting at the top left cell, counting backwards from 16, only fill in the blank cells and then the square is completed. (See the square at the right)

This method works perfectly but gets a bit confusing with the "mini-squares", the large square and the formula for each.

Let's try building an 8 by 8 square with a different approach. For this method, we will divide up the square into smaller squares, each of which has a side equal to n/4. We will place these 2 by 2 squares along both diagonals of the square. (See illustration)



Counting from 1 to 64, starting from the top left and only filling in numbers that fall within the red squares (while leaving the others blank) produces this partially completed magic square:

1	2					7	8
9	10					15	16
		19	20	21	22		
		27	28	29	30		
		35	36	37	38		
		43	44	45	46		
49	50					55	56
57	58					63	64

Starting at the top leftmost cell, while counting from 64 then backwards to 1, insert this number whenever a blank cell is encountered. For example, we can't fill in 64 or 63 because 1 and 2 are in those cells. However, when we reach 62, 61, 60 and 59 we can fill in those numbers because those squares are blank.

Then we continue without filling in 58, 57, 56 and 55 but 54, 53, 52 and 51 are blank cells and do get filled in.

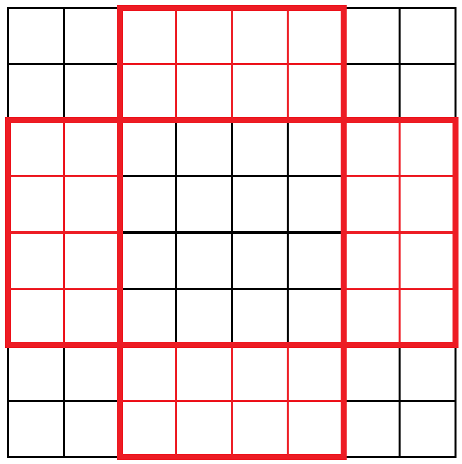
Continuing in this way, until the bottom right cell is encountered, the magic square is now complete with each row, column and diagonal summing to 260.

1	2	62	61	60	59	7	8
9	10	54	53	52	51	15	16
48	47	19	20	21	22	42	41
40	39	27	28	29	30	34	33
32	31	35	36	37	38	26	25
24	23	43	44	45	46	18	17
49	50	14	13	12	11	55	56
57	58	6	5	4	3	63	64

A Third Solution

This is similar to the previous two solutions but is much easier to understand and to memorize.

This time the n=8 square is divided into rectangles, each of which has a dimension of n/2 by n/4. The red lines indicate where to place the numbers 1 through 64 if the number is within a rectangle.



Following these rules, the partially-completed magic square will look like this:

		3	4	5	6		
		11	12	13	14		
17	18					23	24
25	26					31	32
33	34					39	40
41	42					47	48
		51	52	53	54		
		59	60	61	62		

Starting from the top left and counting backwards from 64 to 1, fill in the blank cells of the square and you have the finished square.

64	63	3	4	5	6	58	57
56	55	11	12	13	14	50	49
17	18	46	45	44	43	23	24
25	26	38	37	36	35	31	32
33	34	30	29	28	27	39	40
41	42	22	21	20	19	47	48
16	15	51	52	53	54	10	9
8	7	59	60	61	62	2	1

Singly Even Magic Squares:

Well it seems we have encountered another phrase that isn't very descriptive. Basically, "singly even" means divisible by 2 but not by four. A formula for generating singly even numbers is (n*4) + 2, which generates the numbers 2, 6, 10, 14, 18, 22, 26, 30 and so on. There is no magic square that can be constructed in a 2 by 2 square but singly even magic squares can be constructed for n=6, 10, 14 and so on.

Singly even magic squares are the most difficult to construct and so let's start with the smallest possible one where n = 6.
To get the sum, we'll use the formula that we previously used:

$$\text{Sum} = \frac{n \cdot (n^2 + 1)}{2}$$

So, the sum for n=6 is 111.

The first step is to break the square into four smaller, equally-sized squares. So, for constructing a 6 by 6 magic square we start with four 3 by 3 squares. We then construct four magic squares in a pattern indicated here:

A	C
D	B

Basically, this means that in section 'A' we will build a magic square with the numbers 1 through 9, in section 'B' the magic square will start with 10 and end with 18, section 'C' will have the numbers 19 through 27 and section 'D' goes from 28 through 36. So, when we finish this step, the square looks like this:

8	1	6	26	19	24
3	5	7	21	23	25
4	9	2	22	27	20
35	28	33	17	10	15
30	32	34	12	14	16
31	36	29	13	18	11

Well, you probably noticed that six numbers on the left side of the square have been highlighted in red or blue and that's because there is still some more work to be done on this magic square.

In this case, the "red" numbers have to be moved where the "blue" numbers are and vice versa. After doing this, the square should now look like this:

35	1	6	26	19	24
3	32	7	21	23	25
31	9	2	22	27	20
8	28	33	17	10	15
30	5	34	12	14	16
4	36	29	13	18	11

Yes, finally we are done and all rows, columns and both diagonals sum to 111.

Types of magic squares

In this section, about 20 types of magic squares are introduced, and some of their formula-tions are expressed.

Hetero square:

A hetero square is an *n n* array of the integers from 1 to n^2 such that the rows, columns, and diagonals have different sums. (By contrast, in a magic square, they have the same sum.) They can be constructed by placing consecutive integers in a spiral pattern (Fig. 9) [18],[19].

9	8	7
2	1	6
3	4	5

Figure 9: Hetero square of order 3.

Anti-magic square:

An anti-magic square is an $n \times n$ array of integers from 1 to n^2 such that each row, column, and main diagonals produce a different sum such that these sums form a sequence of con-secutive integers. It is therefore a special case of a hetero square. Anti-magic squares of orders one, two, and three are impossible. For the 4×4 square, the sums are 30, 31, 32, . . . , 39 (Fig. 10) [20],[21].

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

Figure 10: Anti-magic square of order 4

Semi-magic square:

A semi-magic square is a square that fails to be a natural magic square only because one or both of the main diagonals sums are not equal to the magic constant (Fig. 11) [22],[23].

1	5	9
6	7	2
8	3	4

Figure 11: Semi-magic square of order 3.

PanMagic (Pandiagonal magic) square:

If *all* the diagonals including those obtained by "wrapping around" the edges of a natural magic square sum to the same magic constant, the square is said to be a panmagic square. No panmagic squares exist of order 3 or any order $4k+2$ (Fig. 12) [24],[25].

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

Figure 12: Panmagic of order 5.

Compact magic square:

In a panmagic square of order *n*, if the sum of each 2 2 block, (including wrap-around), is equal to 4/*n* of the magic constant, the result will be a compact magic square where *n* is a multiple of 4. In the compact magic square of Fig. 13, there are 16 blocks including groups (1,8,14,11) (8,13,11,2) (13,12,2,7) (14,11,4,5) (11,2,5,16) (2,7,16,9) (4,5,15,10) (5,16,10,3) (16,9,3,6) (15,10,1,8) (10,3,8,13) (3,6,13,12) (1,14,12,7) (14,4,7,9) (4,15,9,6) (1,12,15,6) [26].

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

Figure 13: Compact magic square of order 4.

Complete magic square:

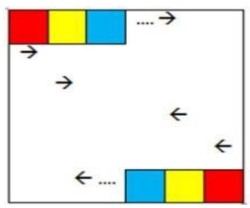
In a panmagic square of order *n*, if the numbers of each complementary pair are at distance *n*/2 on diagonals, the result will be a complete magic square where *n* is a multiple of 4 and complementary pairs are the pairs that sum to $n^2 + 1$. In Fig. 13, pairs such as (6,11) or (2,15) are at distance 2 on diagonals [26].

Most perfect magic square:

Most perfect squares are panmagic squares that are simultaneously compact and complete. There are most perfect squares for all multiples of 4 (Fig. 13) [27].

Associative (Regular, Symmetric) magic square:

An n n natural magic square for which every pair of numbers symmetrically opposite the center, sum to $n^2 + 1$ is known as associative magic square (Fig. 14). It can be proved that there is no associative magic square of order $4k + 2$ for an integer k [28],[29].



4	9	2
3	5	7
8	1	6

Figure 14: Schematic of associative magic squares (left), associative magic square of order 3 (right).

Ultra magic square:

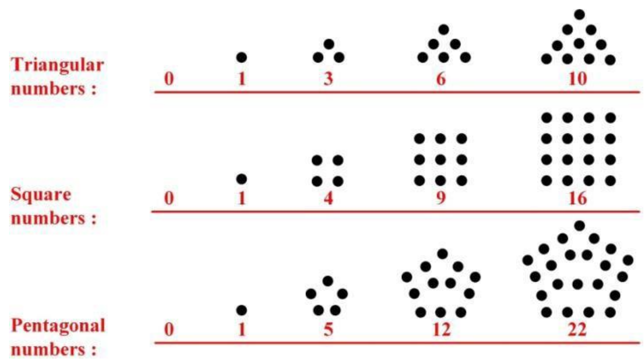
Squares that are pandiagonal and associative are called ultra magic (Fig. 15). Smallest ultramagic square is of order 5 [30].

27	46	31	1	6	17	47
8	9	20	26	34	43	35
29	28	11	32	37	36	2
45	38	40	25	10	12	5
48	14	13	18	39	22	21
15	7	16	24	30	41	42
3	33	44	49	19	4	23

Figure 15: Ultra magic square of order 7.

Magic square of polygonal numbers (Triangular, Square, Pentagonal, . . .):

A magic square which is filled by triangular, square or pentagonal numbers is called a magic square of polygonal numbers (Fig. 16, left). The smallest square of this kind is of order 6 with magic constant 1295 which is filled by 36 consecutive triangular numbers from 0 to 630 (Fig. 16, right) [31],[32].



0	406	120	528	105	136
1	300	435	378	171	10
66	276	496	15	91	351
595	78	153	28	210	231
3	190	55	21	465	561
630	45	36	325	253	6

Figure 16: Triangular, square and pentagonal numbers (left), Magic square of triangular num-bers of order 6 (right).

Magic square of squares and cubes:

A magic square which is filled by square or cube numbers is called magic square of squares or cubes. In Fig. 17, a magic square of squares of order 4 with constant 8515 is shown [33],[34].

68^2	29^2	41^2	37^2
17^2	31^2	79^2	32^2
59^2	28^2	23^2	61^2
11^2	77^2	8^2	49^2

Figure 17: Magic square of squares of order 4.

Magic square of primes and prime squares:

A prime magic square is a magic square consisting only of prime numbers (although the number 1 is sometimes allowed in such squares). Fig. 18, is the 3 3 prime magic square having the smallest possible magic constant 111. The smallest magic square composed ofconsecutive odd primes including the number 1 is of order 12. Also, magic square of prime squares is a magic square consisting only of prime squares [35].

67	1	43
13	37	61
31	73	7

Figure 18: Prime magic square of order 3.

Multi magic square (Bi magic, Tri magic, . . .):

A magic square is said to be p-multimagic if the square formed by replacing each element by its k^{th} power for k = 1, 2, . . . , p is also magic. For example, if replacing each number by its square or cube in a magic square produces another magic square, then the square is said to be bimagic and the cube is said to be trimagic. The first known bimagic square (Fig. 19), has order 8 with magic constant 260 for the base square and 11180 after squaring [36][37],[38].

56	34	8	57	18	47	9	31
33	20	54	48	7	29	59	10
26	43	13	23	64	38	4	49
19	5	35	30	53	12	46	60
15	25	63	2	41	24	50	40
6	55	17	11	36	58	32	45
61	16	42	52	27	1	39	22
44	62	28	37	14	51	21	3

Figure 19: Bimagic square of order 8.

Multiplication magic square:

A square which is magic under multiplication instead of addition is called a multiplication magic square. The smallest possible magic constant for 3 × 3 is 216 (Fig. 20) [39].

2	9	12
36	6	1
3	4	18

Figure 20: Multiplication magic square of order 3.

Addition multiplication (Add-mult) magic square:

An addition multiplication square is a square of integers that is simultaneously a magic square and multiplication magic square. Fig. 21 shows a square of order 8 with addition magic constant 840 and multiplicative magic constant 2058068231856000 [40].

162	207	51	26	133	120	116	25
105	152	100	29	138	243	39	34
92	27	91	136	45	38	150	261
57	30	174	225	108	23	119	104
58	75	171	90	17	52	216	161
13	68	184	189	50	87	135	114
200	203	15	76	117	102	46	81
153	78	54	69	232	175	19	60

Figure 21: Addition multiplication magic square of order 8.

Distributive magic square:

Distributive magic squares have the property that each of the four integers in the following sets of numbers (1,2,3,4) and (5,6,7,8) and (9,10,11,12) and (13,14,15,16) are located in separate rows and columns. An example of a distributive magic square is shown in Fig. 22[41].

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

Figure 22: Distributive magic square of order 4.

Reversible magic square:

Consider the magic square of Fig. 23, left, with magic constant 264. If you turn it upside down, the magic constant is still 264 (Fig. 23, right). The squares such as this are called reversible magic square [42].

96	11	89	68
88	69	91	16
61	86	18	99
19	98	66	81

96	11	68	89
88	69	16	91
19	98	81	66
61	86	99	18

Figure 23: Reversible magic square, before reversing (left) and after reversing (right).

Domino magic square:

A domino magic square is defined using a set of dominoes to form a magic square, each domino supplying two numbers. Here is a 4 4 domino magic square with 8 dominoes andmagic sum 5 (Fig. 24) [8],[43].

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

Figure 24: Domino magic square of order 4.

Palindrome magic square:

A palindrome number is a number that remains the same when its digits are reversed, like 16461. A palindrome magic square is a square which its magic constant is a palindrome number (Fig. 25).

494	503	500	505
508	497	502	495
501	496	507	498
499	506	493	504

Figure 25: Palindrome magic square of order 4.

In Fig. 26, not only the magic constant is palindromic, but also all the numbers are palindromic [44].

363	424	646	747	757	767	787	393
696	232	383	898	939	969	242	525
676	949	222	595	737	888	272	545
656	868	959	666	444	373	353	565
636	343	484	333	999	626	878	585
535	292	777	848	262	555	929	686
494	979	838	323	282	252	989	727
828	797	575	474	464	454	434	858

Figure 26: Palindrome magic square of order 8.

AlphaMagic square:

A magic square for which the number of letters in the word for each number generates another magic square. This definition depends, of course, on the language being used (Fig.27) [45],[46].

5	22	18
28	15	2
12	8	25

Five	Twenty two	Eighteen
Twenty eight	Fifteen	Two
Twelve	Eight	Twenty five

4	9	8
11	7	3
6	5	10

Figure 27: Alphamagic square of order 3, first step (left), 2nd step (middle), 3rd step (right).

Applications:

Now we take a 3×3 magic square

8	1	6
3	5	7
4	9	2

Then the characteristic equation is = $\begin{vmatrix} 8-\lambda & 1 & 6 \\ 3 & 5-\lambda & 7 \\ 4 & 9 & 2-\lambda \end{vmatrix} = 0$

=> $\lambda^3-15\lambda^2-24\lambda+360=0$

=> $\lambda=15, -2\sqrt{6}, 2\sqrt{6}$

The value $\lambda=15$ is the same as the magic constant S=15.in the three Eigen values, 15 is the largest absolute value

Sudoku:

Sudoku was introduced in 1979 & became popular in Japan during the 1980's. It has recently become a very popular puzzle in Europe, but it is actually a form of Latin square. A sudoku square is a 9×9 grid, split into 9, and 3 × 3 sub-squares. Each sub-square is filled in with the numbers 1 to n where n=9, so that the 9×9 grid becomes a Latin square. This means each row and column contain the numbers 1 to 9 only once. Therefore, each row, column and sub-square will sum to the same amount.

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

Conclusion:

Some types of magical squares are briefly introduced in this project. The most common varieties of magic squares and their characteristics are in detailed. Furthermore, the construction methods of odd, even magic squares, as well as their key qualities, are discussed. Finally, we look at some fascinating applications of magic squares.

References:

1) Peyman Fahimi and Ramin Javadi 2012 A simple comparision of two issues in three matrices

2) 1728.org software systems-magic squares

MKR GOVERNMENT DEGREE COLLEGE DEVARAKONDA - 508248

Department Of Mathematics

2021-2022

A STUDENT STUDY PROJECT -JIGNASA

Topic

Designing of QR Codes

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Lecturer in Mathematics

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Submitted to

The Commissioner of Collegiate Education

Government of Telangana

Hyderabad.

MKR GOVT DEGREE COLLEGE

DEVARAKONDA, NALGONDA (Dist)-508242

CERTIFICATE

This is to certify that this project report entitled, **"Designing of QR Codes"**

Is the bonafied work of B. Sc. (MPCS) students during the academic year 2021-22

under the supervision of Mrs. Shaik. Arifa, Lecturer in Mathematics.

Ch Ramu Raj

PRINCIPAL (FAC)

Signature of the Principal

M.K.R. Government Degree College,

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DECLARATION

We the students of B.Sc.(MPCS) declare that this work has been originally carried out by us under the supervision of **Shaik. Arifa, Lecturer in Mathematics,** M.K.R. Government Degree College, Devarakonda, Nalgonda and this has not been submitted to any other institution/ university.

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We are extremely grateful to the Principal, M.K.R. Government Degree College, Devarakonda, Nalgonda, for providing necessary facilities to carry out our project work.

We would like to thank our batch mates of B.Sc. MPCS. Students for their support.

INDEX

Abstract

The QR code was first designed for the automotive industry by Denso Wave in Japan. This code is the type of matrix barcode. QR Codes are two-dimensional barcodes that may contain virtually any kind of data, including links to websites, text, videos, etc. The aim and objective of this research paper was to create system that uses Quick Response (QR) codes to increase knowledge gain by students to the MKR Government Degree College, Devarakonda Campus.

Standard barcodes can only be read in one direction-top to bottom. That means they can only store a small amount of information, usually in an alphanumeric format. But QR Code is read in two directions-top to bottom and right to left. This allows it to house significally more data.

Keywords: Digitalization, Quick Response code, Application, Digital Information.

Designing of QR Codes

Aim: How to make a QR Code online quickly, easily and for free.

Introduction:

QR Code is short for "Quick response" code. It's a square shaped black and white symbol that is scanned with a smart phone or laser to learn more about a product or service. These encrypted squares can hold content, links, coupons, event details, and other information that users want to see. QR Code provides high data storage capacity, fast scanning Omni directional readability, and many other advantages including, error-correction and different type of versions. Different varieties of QR code symbols like logo QR code, encrypted QR code. QR code is also available so that user can choose among them according to their need. Now these days a QR code is applied in different application streams related to marketing, security, Academics etc. And gain popularity at a really high pace. Day by day more people are getting aware of this technology and use it accordingly. The popularity 0of QR code grows rapidly with the growth of Smart phone users and thus the QR code is rapidly arriving at high levels of acceptance worldwide.

How to design the QR codes

Methodology:

1) Choose the type of content you are promoting:

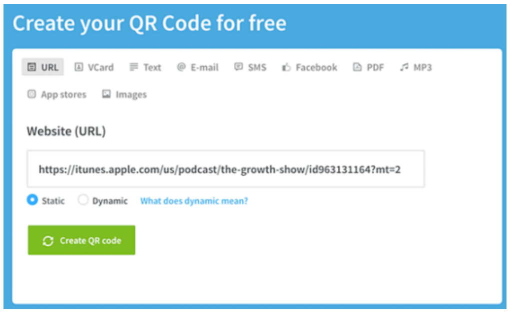
First, you'll need to choose your favourite QR code generator. For this example, we're going to use **qr-code-generator.com**. Select what type of content you want your QR code to show the user after they scan it. You can choose from one of 10 content types, as shown in the below.

1. URL 2.VCard 3. Text 4. E Mail 5. SMS 6. Face book 7. PDF 8. MP3 9. App Stores10.Images

We're going to promote a URL that directs users to our podcast.

2) Enter your data in the form that appears:

Once you select the type of content you're promoting with this QR code, a field or form will appear where you can enter the information that corresponds with your campaign. If you want your QR code to save contact information, for example, you'll see a set of fields where you can enter your email address, subject line, and associated message. To save a link to our podcast, we'll simply enter the URL in the field that appears, like so



3) Consider downloading a dynamic QR code:

With a free membership to QR code generators like qr-code-generator.com, you can print a dynamic QR code, scan it, and pull up an editable form where you can modify the data your visitors will receive when they scan the QR code themselves.

4) Customise your QR code:

Using qr-code-generator.com, we can customize our QR code by clicking the button to the top-right, as shown in the screenshot below. Keep in mind not every QR code maker offers this design option -- depending on the QR code you're looking to generate, you might find some tools limited in their functionality.

5) Test the QR code to make sure it scans:

Don't forget to check to see if the QR code reads correctly, and be sure to try more than one QR code reader. **QR Code Reader**, which automatically takes you to whatever it "reads." Most smart phones these days include a built-in QR code reader, so you should test to make sure your code is readable there, as well.

6) Share and distribute your QR code:

A QR code won't be able to do its job unless people see it. So make sure you come up with a distribution plan for sharing the code. This could include displaying it in print ads, on clothing, or in physical locations where people can take out their phones to scan it.

Example 1

To create a QR Code to a YOU TUBE CHANENEL

1. Take QR Code generator link **qr-code-generator.com**

2. Suppose I am going to generate QR code for my you tube channel **GHANITHALAY** so that copy the URL from **GHANITHALAY**

3. Select channel URL https://www.youtube.com/results?search_query=ghanithalay and copy.

4. Now paste in QR Code generator web after converts into dynamic to shorten URL.

5. After make dynamic QR code and set the pixel for QR code to what you want

6. Now select copy image to clip board

7. You can send this image for the people who do you want.

QRCODE

Our Students done some QR Codes and attached to our college garden trees.

Example 2

How to create a QR Code to an E-mail.

1. Take QR Code generator link **qr-code-generator.com**
2. Suppose I am going to generate QR code for my E-mail account

   shaikarifa961@gmail.com

You can send this image for the people who do you want.

Example 3

How to create a QR Code NSS Photos 2021-22

3. Take QR Code generator link **qr-code-generator.com**
4. Suppose I am going to generate QR code for NSS Photos

Reference:

Chinmay Jathar,Swapnil Gurav and Krantee Jamdaade ,A Riview on QR Code Analysis

Conclusion:

In the present Digital environment, use of internet through mobile phones, smart phones and table PCs have been increased

- QR Code is a way of encoding more information than a traditional bar code
- QR code is now being widely used in a variety of business
- For security of QR code info encryption is required
- Goods are identified using QR codes in Commerce. There is a clear need to build new mobile payment systems for mobile users to support mobile transactions based on QR codes.

- Can enhance classroom learning
- Easy way to send mobile users to online content
- The main advantage of a QR code is its versatility
- QR Codes and their effective use in library services can enable the popularity the libraries.So the future of QR Codes for mobile phones is very bright and it is need of the hour. The library professionals have been playing very vital role in providing the prompt information services to maximum users.

DEPARTMENT OF MATHEMATICS

2019-20

STUDENT STUDY PROJECT

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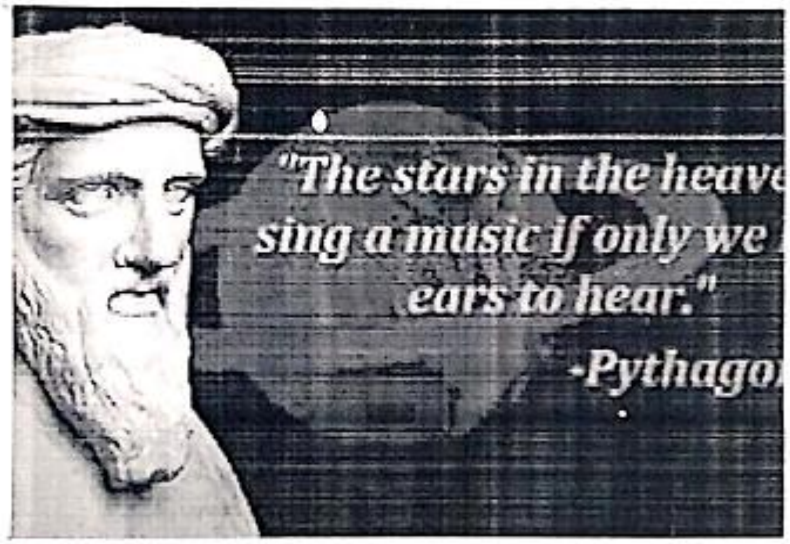
2019 – 20

Pythagoras


"The stars in the heave
sing a music if only we
ears to hear."
-Pythago

Greek Genius in "be" between two 'mats' and 'ics'

Pythagoras of Samos (582 to 502 B.C) was a
reek genius in Mathematics who flourished in ancient
nes about 2500 years ago. He was born about
2 B.C. in Samos, Greece in a rich family

At the age of 16 he was a student prodigy.
inting of books was not known in those days.
e only way was to express one's views and to
iteract with others. He travelled through the
lediterranean, persia, Babylon, and Arabia.
ndia

Pythagoras and his followers said that human
ul is immortal/indestructible. This coincides with
uch a view in Bhagavad Gita.

न जायते म्रियते वा कदाचि-
न्नायं भूत्वा भविता वा न भूयः ।
अजो नित्यः शाश्वतोऽयं पुराणो
न हन्यते हन्यमाने शरीरे ॥

Further, the soul returns to earth again,
ransmigrating into different people, which view is
again substatiated in Bhagavad Gita —

the cycle of birth, rebirth

वासांसि जीर्णानि यथा विहाय
नवानि गृह्णाति नरोऽपराणि ।
तथा शरीराणि विहाय जीर्ण-
न्यन्यानि संयाति नवानि देही ॥

Studies in Pythagoreanism :→

Metaphysics (the nature of Being)
Religion and ethics: Friendship and modesty
Number theory:

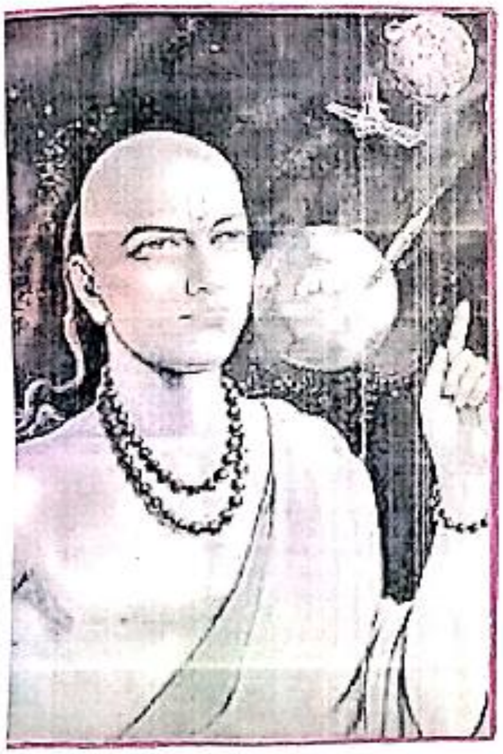
One is seen as both even and odd. This mbivalence applies to the total Universe

The pythagoran theorem which is a popular ndamental basic concept which brought name and me to pythagoras, States that in right angle triangle he square on the hypotenuse (longest side) is equal o the Sum of the squares on the other two sides

Italy respected this great Greek 200 years fter his death when the Senate in Rome buit his tatue and honoured his as

"The Wisest and bravest of the Greeks"

Aryabatta



"India's first satellite Aryabatta, was named after him"

* * *

"Arya: Jai Bhatta: Learned Brahmin"

* * *

ryabhatta :⇒

Aryabhatta (476 AD – 550) is the first in the of great mathematician- astronomers from the classical of indian mathematics and indian Astronomy statue Of Aryabhatta is existing in pune, harashtra, India.

Aryabatta was born in kerala in 476 AD; r traditions claim he was a maga Brahmin from jarat. At some point of time, he went to kusuma- ra (patna). Aryabatta was a jain astronomer of ala; kusumapura was a jain center of learning.

His first name Arya is a term used for respect, ch as Sri, Thiru; whereas Bhatta, a typical orth indian name – among brahmin pundits as eir last name.

pi(π) as irrational :⇒

→ Aryabhatta realized that π is irrational e irrationality of pi was proved in Europe only 1761 by Lambert

⇒ Motions of the the solar System is also Explained by Aryabhattiya.

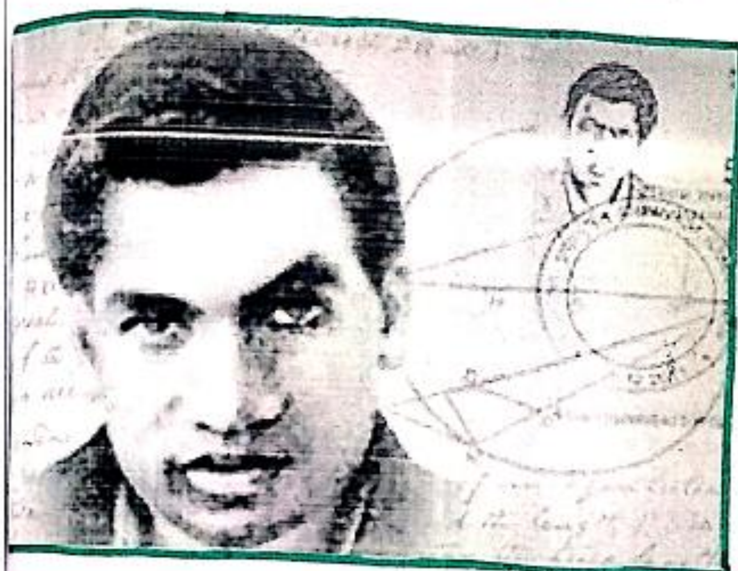
Aryabhatta's work was of great influence in the [Ind]ian astronomical tradition, and influenced the [ne]ighbouring countries / cultures. The Arabic translatio[n]s are cited by Al-khwarizmi, Al-Birouni

Legacy :→

* India's first sattellite Aryabhatta, was named [af]ter him
* The lunar crater Aryabhatta is named in his [ho]nour
* The interschool Arybhatta Maths competition named after him

* * *

Ramanuja n, Srinivasa



"A Gem....
What Mozart was to music and Einstein was to physics, Ramanujan was to maths......"

– Clifford Stoll

If i am to sum Ramanujan one word, I uld say ...ianality."...

Ramachandra Rao

The Greatest Mathematician, did mathema
ics (tricks in Maths), Human brain is
Super computer....

Ramanujan, Srinivasa (1887 to 1920)
ild-famous Indian Mathematician, Son of Srinivasa
yangar was born on December 22, 1887 in Erode

During his childhood, in an arithmetic class,
budding genius posed a question to his class
cher, "If zero is divided by zero, will the result
one ?"

e prudence about zero

⇒ 0 is designated as a digit or number. if zero
fixes a number it has no value; if zero suffixes
number or if it prefixes a number with a decimal
ore it, it carries value. Hence we realize the
ortance of the position of 0 in a number.

Zero has got the ability to destroy another
ber if it is multiplied by zero, e.g. 452×0 = 0.

It has no role in addition or substraction,
12 plus zero is twelve, 12 minus zero is
lve.

Hardy said, "The number of the taxi-cab in
ich I came is '1729'. The number seems to be a
ll one and I hope it is not an unfavourable
nen"

⇒ The Genius in Ramanujan sparkled immediately.
o; Hardy, it is a very interesting number. It is the
nallest number expressible as the sum of two cubes
two different ways: '1729' = $12^3 + 1^3$ (or)
$^3 + 9^3$. Professer. Hardy was amazed.

⇒ India postage 15 n.p. postal stamp was
ued in his birth centenary year in 1987 in
mmemoration of this Genius.

• Genious :→

* 11,11,11,111 × 11,11,11,111 = 123456789 87654321

* The figure forty contains the letters in its
elling in alphabetical order.

* Word – Simplicity
Synonym – Ramanujan *

* * *

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