

[illegible]

Number boards

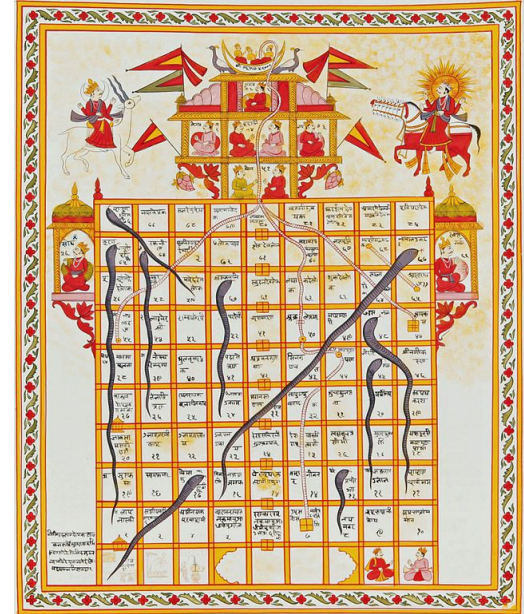
A number square is a grid filled with numbers, often used as a counting tool. Typically, it appears as a 10×10 grid with numbers from 1 to 100 arranged in sequential order, commonly referred to as a hundred square. Number squares can help students count both forward and backward, not only by ones but also by tens and other multiples. They can offer a broad range of numbers, allowing students to develop an understanding of number sequences but also can help students to understand and see patterns in a variety of mathematical concepts, including times tables, calculations and fractions.

History:

Snakes and ladders is played on numbered grid.

The game originated in ancient India in 13th century, where it was known as "Moksha Patamu". Snakes and ladders was designed as a moral lesson, symbolizing a person's journey through life. The ladders represented values such as kindness, faith, and humility, which allowed players to ascend, while the snakes symbolized weaknesses like anger, greed, and theft, which caused players to fall back.

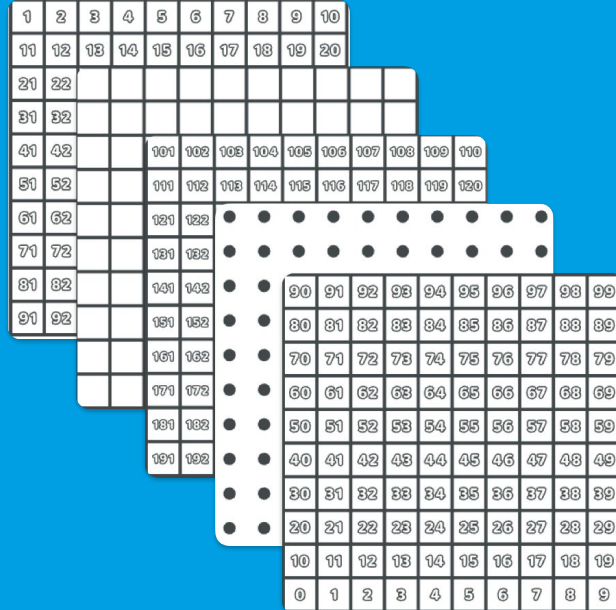
In the latter part of the 19th century, colonial rulers transported a modified version of the game to England.



The numbers on the boards can be manipulated, for example, instead of having a hundred square from 1 - 100 it could be numbered 0 - 99 or 101- 200. The numbers can be arranged ascending, descending, vertically or even in a spiral. The different versions are endless.

1	2	3	4	5	6	7	8	9	10										
11	12	13	14	15	16	17	18	19	20										
21	22																		
31	32																		
41	42				101	102	103	104	105	106	107	108	109	110					
51	52				111	112	113	114	115	116	117	118	119	120					
61	62				121	122	•	•	•	•	•	•	•	•	•	•	•	•	•
71	72				131	132	•	•	•	•	•	•	•	•	•	•	•	•	•
81	82				141	142	•	•											
91	92				151	152	•	•											
					161	162													
					171	172	•	•											
					181	182	•	•											
					191	192	•	•											
							•	•											
							•	•											
									90	91	92	93	94	95	96	97	98	99	
									80	81	82	83	84	85	86	87	88	89	
									70	71	72	73	74	75	76	77	78	79	
									60	61	62	63	64	65	66	67	68	69	
									50	51	52	53	54	55	56	57	58	59	
									40	41	42	43	44	45	46	47	48	49	
									30	31	32	33	34	35	36	37	38	39	
									20	21	22	23	24	25	26	27	28	29	
									10	11	12	13	14	15	16	17	18	19	
									0	1	2	3	4	5	6	7	8	9	

Number boards are the ultimate playground for numbers, making maths as easy as one, two, three!



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

One is top left.

100	99	98	97	96	95	94	93	92	91
90	89	88	87	86	85	84	83	82	81
80	79	78	77	76	75	74	73	72	71
70	69	68	67	66	65	64	63	62	61
60	59	58	57	56	55	54	53	52	51
50	49	48	47	46	45	44	43	42	41
40	39	38	37	36	35	34	33	32	31
30	29	28	27	26	25	24	23	22	21
20	19	18	17	16	15	14	13	12	11
10	9	8	7	6	5	4	3	2	1

One is bottom right.

99	98	97	96	95	94	93	92	91	90
89	88	87	86	85	84	83	82	81	80
79	78	77	76	75	74	73	72	71	70
69	68	67	66	65	64	63	62	61	60
59	58	57	56	55	54	53	52	51	50
49	48	47	46	45	44	43	42	41	40
39	38	37	36	35	34	33	32	31	30
29	28	27	26	25	24	23	22	21	20
19	18	17	16	15	14	13	12	11	10
9	8	7	6	5	4	3	2	1	0

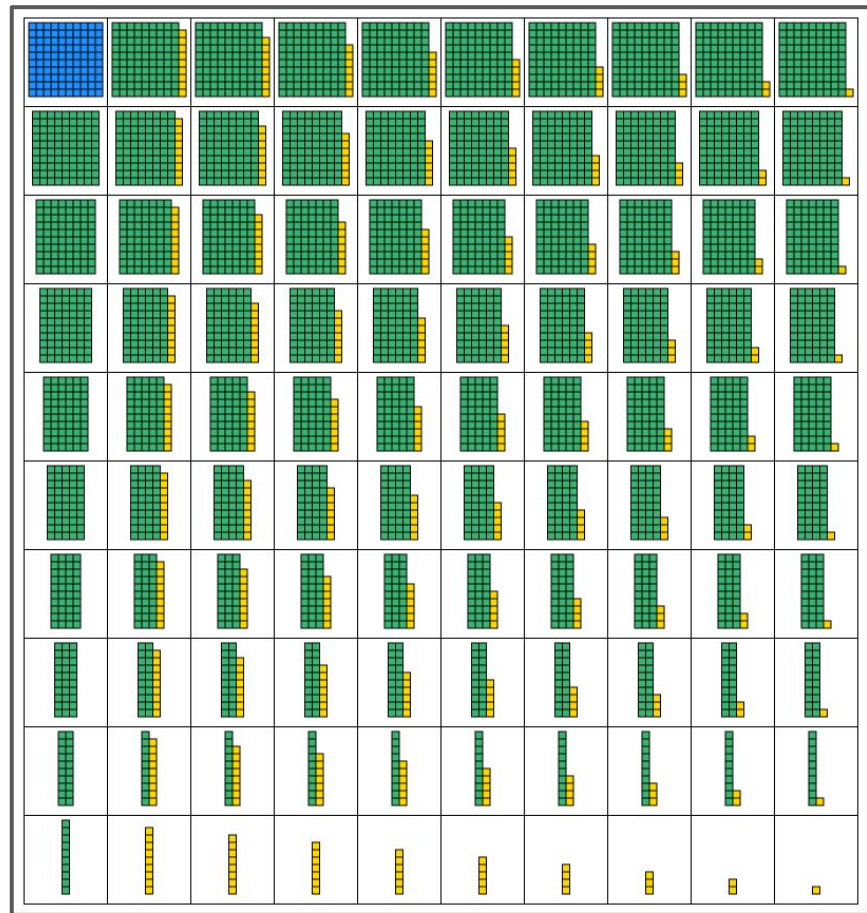
Starts with 0 bottom right

91	92	93	94	95	96	97	98	99	100
90	89	88	87	86	85	84	83	82	81
71	72	73	74	75	76	77	78	79	80
70	69	68	67	66	65	64	63	62	61
51	52	53	54	55	56	57	58	59	60
50	49	48	47	46	45	44	43	42	41
31	32	33	34	35	36	37	38	39	40
30	29	28	27	26	25	24	23	22	21
11	12	13	14	15	16	17	18	19	20
10	9	8	7	6	5	4	3	2	1

Snakes and ladders

200	199	198	197	196	195	194	193	192	191
190	189	188	187	186	185	184	183	182	181
180	179	178	177	176	175	174	173	172	171
170	169	168	167	166	165	164	163	162	161
160	159	158	157	156	155	154	153	152	151
150	149	148	147	146	145	144	143	142	141
140	139	138	137	136	135	134	133	132	131
130	129	128	127	126	125	124	123	122	121
120	119	118	117	116	115	114	113	112	111
110	109	108	107	106	105	104	103	102	101

101 - 200



Base ten

0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2
0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3
0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4
0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5
0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.6
0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.7
0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.8
0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.9
0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1

Decimals

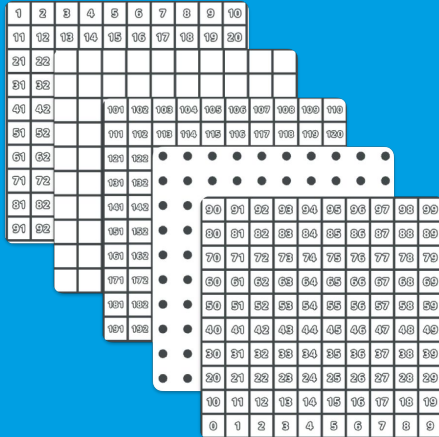
120	119	118	117	116	115	114	113	112	111
110	109	108	107	106	105	104	103	102	101
100	99	98	97	96	95	94	93	92	91
90	89	88	87	86	85	84	83	82	81
80	79	78	77	76	75	74	73	72	71
70	69	68	67	66	65	64	63	62	61
60	59	58	57	56	55	54	53	52	51
50	49	48	47	46	45	44	43	42	41
40	39	38	37	36	35	34	33	32	31
30	29	28	27	26	25	24	23	22	21
20	19	18	17	16	15	14	13	12	11
10	9	8	7	6	5	4	3	2	1

1	36	35	34	33	32	31	30	29	28
2	37	64	63	62	61	60	59	58	27
3	38	65	84	83	82	81	80	57	26
4	39	66	85	96	95	94	79	56	25
5	40	67	86	97	100	93	78	55	24
6	41	68	87	98	99	92	77	54	23
7	42	69	88	89	90	91	76	53	22
8	43	70	71	72	73	74	75	52	21
9	44	45	46	47	48	49	50	51	20
10	11	12	13	14	15	16	17	18	19

99	64	65	66	67	68	69	70	71	72
98	63	36	37	38	39	40	41	42	73
97	62	35	16	17	18	19	20	43	74
96	61	34	15	4	5	6	21	44	75
95	60	33	14	3	0	7	22	45	76
94	59	32	13	2	1	8	23	46	77
93	58	31	12	11	10	9	24	47	78
92	57	30	29	28	27	26	25	48	79
91	56	55	54	53	52	51	50	49	80
90	89	88	87	86	85	84	83	82	81

Spirals

Activities



These activities are not presented in any particular order. Many of them can be adapted for students of different ages. Some of the activities can be carried out using different sized grids or grids containing different numbers.

1. Jigsaw
 - *Ordering & recognising number patterns*
2. Race to 100 and beyond
 - *Place value*
3. Number Patterns
 - *Recognising patterns and relationships*
4. The Equivalents
 - *Relationships & equivalents*
5. Investigations
 - *Looking for patterns*
6. Totals
 - *Fluency practice with addition*
7. Four
 - *Develop fluency with numbers*
8. Detectives
 - *Reasoning*
9. Pathways
 - *Addition, Subtraction & Place value*
10. Different number systems
 - *Seeing patterns and proof*

1. Jigsaw

Required: A number square of your choice.

You may choose to do the *Make a Track* activity first.

The number board is cut up into pieces cutting along the horizontal and vertical lines.

The students are tasked with assembling the parts back together to make the square.

Simpler:

- Reduce the size of the square (5 by 5)
- Make the pieces larger
- Give the actual square - matching the pieces

Challenge:

- Increase the number of pieces
- Different numbers in different orientation
- Some of the numbers are blanked out
- A differently sized numbered square such as 9 by 9 or 12 by 12.

Students should be exposed to different numbers boards, even part of boards to use their knowledge to make sense of the order of the numbers. See examples.

Ordering and recognising number patterns

2	3	4	5
12	13	14	15
22	23	24	25

36	37	38
46	47	48
56	57	58
66	67	68

61	62
----	----

9	10
19	20
29	30
39	40
49	50
60	
70	

71	72
81	82

59
69

6	7	8
16	17	18
26	27	28

77	78	79	80
87	88	89	90

63
73
83
93

1
11
21

65			
75	76		
85	86		
95	96	97	98

31	32	
41	42	43
51	52	53

91	92
----	----

Key questions

- What are you looking out for?
- Which piece has the lowest number on it? Which has the highest number?
- How might that help us to complete the jigsaw? Where will the smallest number go? How do you know?

Make a Track

Cut a hundred square into rows, and then stick it together as a number track.

How is the track the same and/or different to the hundred square? Where do we cut the track to make it into a hundred square again? Explain how you know. Can you order the rows differently?

2. Race to 100 or beyond

Place value



Required: Variety of number squares

Race to 100:

Give the students a blank 100 square and ask them to fill in the numbers.

Which number will they start with? Where on the grid will this be?

Missing numbers:

Provide a 100 square with only some of the numbers filled in. The students have to think about the numbers and patterns to work out how to complete the missing numbers.

Hidden numbers:

Cover the numbers 1 - 100 with counters(numbers could be arranged differently or use an interactive number board). Roll two dice 0 - 9 and make a two digit number. Work out which counter the number is hidden under. If right you get to keep the counter!

Neighbours Number:

Begin with a blank 100 square. Highlight a number and ask students to identify the neighbouring numbers.



3. Number Patterns

Recognising patterns and relationships



Times tables, common multiples, square numbers and prime numbers

Required: Number board

Students colour in multiples of different numbers (times tables). You could colour more than one e.g. 4x, 8x

- What do you notice?
- What happens if you colour more than one times table? (common multiples)
- What will be the next number in the pattern?

Square numbers

How many square numbers are on a hundred square?
Make a list of all the square numbers and shade this numbers in on a 100 square.
Describe the patterns you see.

Prime numbers

Shade all the numbers of the 2x table, then the three times table and so on. Remember to **NOT** shade the number of the times table you are doing e.g. 2x you do NOT shade number 2 and so on. The numbers left unshaded are **prime numbers**.

	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

4. The equivalents

Fractions, decimals and percentages

Relationships & equivalents



Required: Blank hundred square

When students begin learning tenths and hundredths, a number square can be a really useful tool to assist them.

As there are 10 columns and 10 rows, it is easy to split the hundred square into tenths e.g. 3 tenths; $\frac{3}{10}$.

If students can express $\frac{3}{10}$ and know that the first place after the decimal point is called tenths then they will understand 0.3. This can lead onto hundredths.

0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2
0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3
0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4
0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5
0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.6
0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.7
0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.8
0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.9
0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1

There are also number squares with decimals written instead of whole numbers.

Percent means 'in every hundred' so a hundred square is perfect. The work on fractions $\frac{3}{10}$ can be used again to understand that $\frac{30}{100} = 30\%$.

This helps students to visualise what 30% is and how it relates to its equivalents in decimals and fractions.

5. Investigations

Looking for patterns



Required: hundred squares

Palindromic numbers are numbers that read the same forward and backward. E.g. 33.



Colour the palindromic numbers on a hundred square.

Can you describe the pattern made?
Would it be the same pattern on differently numbered hundred squares?

Consecutive numbers

Circle three numbers next to each other in a row. Find their total. Repeat for other groups of three consecutive numbers. What do they all have in common?

35	34	33	32	31
25	24	23	22	21
15	14	13	12	11
5	4	3	2	1

$$14 + 13 + 12 = 39$$

The difference between consecutive numbers is always fixed and it follows a pattern. Look at the sums carefully!

6. Totals

Required: hundred square

Find pairs of numbers on the hundred square that total 100.

How many different pairs can you find?
Do all the numbers have a partner?



Fluency practice with addition

100	99	98	97	96	95	94	93	92	91
90	89	88	87	86	85	84	83	82	81
80	79	78	77	76	75	74	73	72	71
70	69	68	67	66	65	64	63	62	61
60	59	58	57	56	55	54	53	52	51
50	49	48	47	46	45	44	43	42	41
40	39	38	37	36	35	34	33	32	31
30	29	28	27	26	25	24	23	22	21
20	19	18	17	16	15	14	13	12	11
10	9	8	7	6	5	4	3	2	1

Digit sums

Cover the numbers on the hundred square whose digits add up to 10 with a counter. Explain the pattern you notice.

Use a different coloured counter to cover numbers whose digits add up to 9, 8, 7 etc. Can you explain what is happening each time?

7. Four

Required: Dice and hundred squares (a game for 2 or 3 players)

4 in a row

Throw three 0 - 9 dice. Use the numbers and any operation to make one of the numbers on the hundred square. If correct cover the number with a counter. The aim is to get four counters in a row, column or diagonal to win.

Develop fluency with numbers



$$23 + 12$$

23	22
13	12

$$22 + 13$$

Squares

Draw a 2 by 2 square on the hundred square. Add the numbers in opposite corners.

What do you notice?

Is it the same for different 2 by 2 squares?

Now multiply the numbers in the opposite corners.

What do you notice now?

Is it always true?

8. Detectives!

Reasoning



Required: Hundred square

As a detective you have been given directions to a house but you have not been given the house number. Here are some clues to help you find the house number.

- ❖ The number is greater than 50.
- ❖ The number is less than 90.
- ❖ The two digits are different.
- ❖ The tens digit is larger than the ones digit.
- ❖ It is an odd number.
- ❖ The sum of the digits is 15.

What is the house number?

Have a go at writing some clues for a different number. Think carefully about the order of the clues.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

9. Pathways

Addition, subtraction & place value



Required: Hundred square

Use a hundred square with 1 - 10 on the bottom row.
Choose start and finish number. Write a list of instructions
to move from the **start number** to the **finish number**.

E.g. Start on 17, add 20, subtract 14, add 22, multiply by 2.

Read the instructions to your partner. Do they finish on the
correct number? Can they tell you how to get back to the
start number. (reverse the instructions)

Devise a set of calculations so
the answers when covered on
the grid should make a shape
or a letter.

100	99	98	97	96	95	94	93	92	91
90	89	88	87	86	85	84	83	82	81
80	79	78	77	76	75	74	73	72	71
70	69	68	67	66	65	64	63	62	61
60	59	58	57	56	55	54	53	52	51
50	49	48	47	46	45	44	43	42	41
40	39	38	37	36	35	34	33	32	31
30	29	28	27	26	25	24	23	22	21
20	19	18	17	16	15	14	13	12	11
10	9	8	7	6	5	4	3	2	1

10. Different number systems

Seeing patterns & proof

Required: Number boards that use different number systems (see examples)

Begin by looking at the different 100 squares – Arabic, Mayan and Bengali.

What do you notice about them?

What about the numbers?

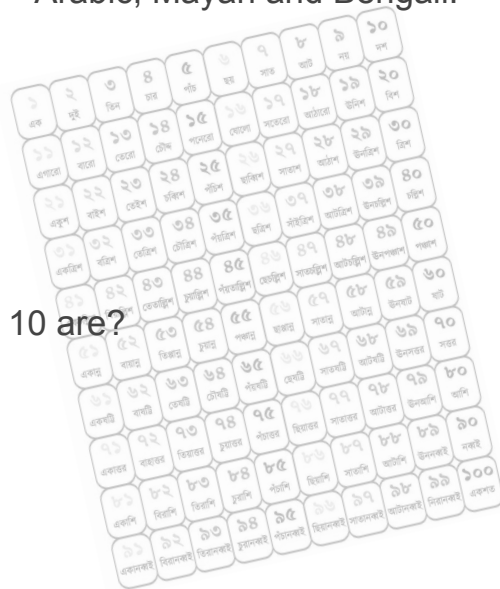
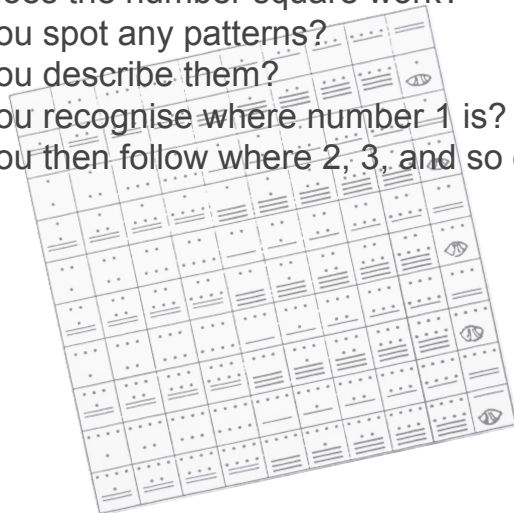
How does the number square work?

Can you spot any patterns?

Can you describe them?

Can you recognise where number 1 is?

Can you then follow where 2, 3, and so on to 10 are?



Challenge: Cut up one of the 100 squares and get the students to reassemble the 100 square. How did you work out the order? What was the first thing you did? What did you do next?

১	২	৩	৪	৫	৬	৭	৮	৯	১০
এক	দুই	তিন	চার	পাঁচ	ছয়	সাত	আট	নয়	দশ
১১	১২	১৩	১৪	১৫	১৬	১৭	১৮	১৯	২০
এগারো	বারো	তেরো	চৌদ্দ	পনেরো	ষোলো	সতেরো	আঠারো	উনিশ	বিশ
২১	২২	২৩	২৪	২৫	২৬	২৭	২৮	২৯	৩০
একুশ	বাইশ	তেইশ	চব্বিশ	পঁচিশ	ছাব্বিশ	সাতাশ	আঠাশ	উনত্রিশ	ত্রিশ
৩১	৩২	৩৩	৩৪	৩৫	৩৬	৩৭	৩৮	৩৯	৪০
একত্রিশ	বত্রিশ	তেত্রিশ	চৌত্রিশ	পঁয়ত্রিশ	ছত্রিশ	সাত্ত্রিশ	আটত্রিশ	উনচত্ব্বিশ	চত্ব্বিশ
৪১	৪২	৪৩	৪৪	৪৫	৪৬	৪৭	৪৮	৪৯	৫০
একচত্ব্বিশ	বিয়ত্ব্বিশ	তেতত্ব্বিশ	চুয়ত্ব্বিশ	পঁয়তত্ব্বিশ	ছেতত্ব্বিশ	সাতচত্ব্বিশ	আটচত্ব্বিশ	উনপঞ্চাশ	পঞ্চাশ
৫১	৫২	৫৩	৫৪	৫৫	৫৬	৫৭	৫৮	৫৯	৬০
একান্ন	বায়ান্ন	তিগ্নান্ন	চুয়ান্ন	পঞ্চান্ন	ছাণ্নান্ন	সাতান্ন	আটান্ন	উনষাট	ষাট
৬১	৬২	৬৩	৬৪	৬৫	৬৬	৬৭	৬৮	৬৯	৭০
একষষ্টি	বাষষ্টি	তেষষ্টি	চৌষষ্টি	পঁয়ষষ্টি	ছেষষ্টি	সাতষষ্টি	আটষষ্টি	উনসত্তর	সত্তর
৭১	৭২	৭৩	৭৪	৭৫	৭৬	৭৭	৭৮	৭৯	৮০
একাত্তর	বাছাত্তর	তিয়াত্তর	চুয়াত্তর	পঁচাত্তর	ছিয়াত্তর	সাতাত্তর	আটাত্তর	উনআশি	আশি
৮১	৮২	৮৩	৮৪	৮৫	৮৬	৮৭	৮৮	৮৯	৯০
একাশি	বিরাশি	তিরিশি	চুরাশি	পঁচাশি	ছিয়াশি	সাতাশি	আটাশি	উননব্বই	নব্বই
৯১	৯২	৯৩	৯৪	৯৫	৯৬	৯৭	৯৮	৯৯	১০০
একানব্বই	বিরানব্বই	তিরানব্বই	চুরানব্বই	পঁচানব্বই	ছিয়ানব্বই	সাতানব্বই	আটানব্বই	নিরানব্বই	একশত

Bengali number square

১০	৯	৮	৭	৬	৫	৪	৩	২	১
২০	১৯	১৮	১৭	১৬	১৫	১৪	১৩	১২	১১
৩০	২৯	২৮	২৭	২৬	২৫	২৪	২৩	২২	২১
৪০	৩৯	৩৮	৩৭	৩৬	৩৫	৩৪	৩৩	৩২	৩১
৫০	৪৯	৪৮	৪৭	৪৬	৪৫	৪৪	৪৩	৪২	৪১
৬০	৫৯	৫৮	৫৭	৫৬	৫৫	৫৪	৫৩	৫২	৫১
৭০	৬৯	৬৮	৬৭	৬৬	৬৫	৬৪	৬৩	৬২	৬১
৮০	৭৯	৭৮	৭৭	৭৬	৭৫	৭৪	৭৩	৭২	৭১
৯০	৮৯	৮৮	৮৭	৮৬	৮৫	৮৪	৮৩	৮২	৮১
১০০	৯৯	৯৮	৯৭	৯৬	৯৫	৯৪	৯৩	৯২	৯১

Arabic number square

Mayan number square

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