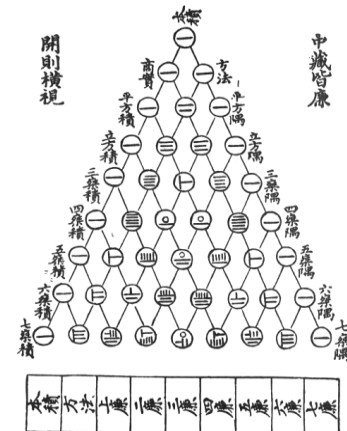


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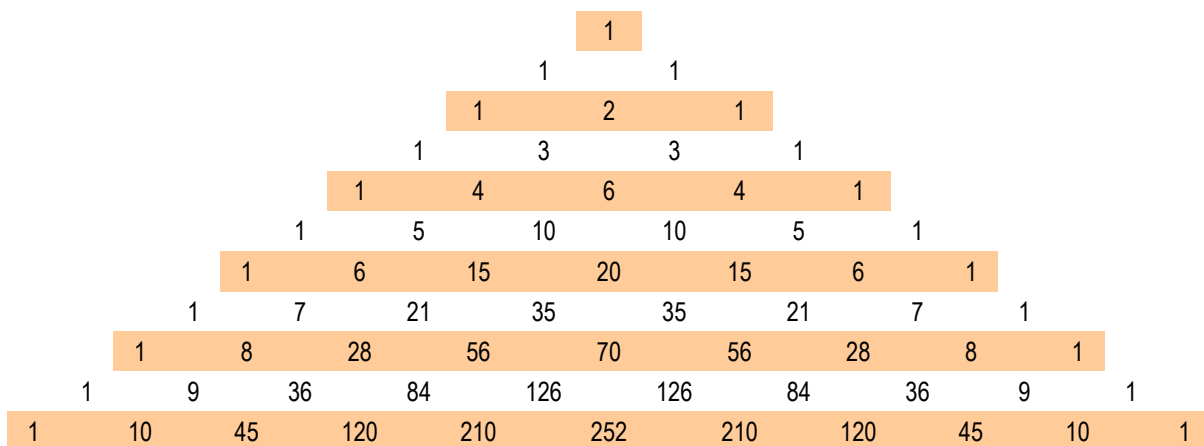
Pascal's triangle is a triangular array of numbers that has numerous applications in mathematics. The triangle is named for the great French mathematician Blaise Pascal (1623 – 1662); however, there is evidence that a famous Chinese algebraist, Chu Shi-kie, was familiar with the number pattern as early as 1303. In a Pascal's triangle, each term is equal to the sum of the two terms immediately above it.

Draw *at least* the first 10 rows of Pascal's Triangle.

圖方蔡七法古



Chu Shi-kie's triangle



Example 1

The first 5 terms in row 13 of Pascal's triangle are 1, 13, 78, 286 and 715. Determine the first 5 terms in row 14.

1
13
78
286
715

1
14
91
364
1001

Example 2

Shown below are portion of Pascal's triangle. Fill in the missing numbers.

a)

	10	5	
20	15	6	
	35	21	

b)

	84	126	
120	210	252	
	330	462	

Example 3

a) Find the sums of the numbers in each of the first 6 rows of the Pascal's triangle and list them in a table of values.

b) Predict the sum of the entries in row 7.

c) Determine the row number from a Pascal's triangle if the row sum is 2048.

$2^{11} = 2048$ Therefore, it's row 11 (assuming we start at row 0)

d) Determine a general rule for the sum of the terms in the n^{th} row.

$$\sum_{k=0}^n t_{n,k} = 2^n$$

Row, r	$\sum_{k=0}^n t_{k,r}$
0	1
1	2
2	4
3	8
4	16
5	32
6	64

Example 4

On the checkerboard shown, the checker can travel only diagonal upward. It cannot move through a square containing an X. Determine the number of paths from the checker's current position to the top of the board.

30 ways to move the checker to the top of the board.

	5		9		8		8	
	5		4		4		4	
	1		4		X		4	
	1		3		3		1	
			1		2		1	
					O			