

Pascal 400th

Blaise Pascal was born in France in 1623. He was from a well-connected family but his mother died when he was 3 years old. His father was a tax collector and educated Blaise and his two gifted sisters, Jacqueline and Gilberte at home. Pascal was to become a great mathematician, inventor and philosopher. He died in 1662.



Pascal's Triangle

Although it is called Pascal's Triangle it was known long before Pascal's time.

The Persian mathematician Al-Karaji wrote about it in the 10th century and later the famous Persian poet and mathematician Omar Khayyam used it. Then in China, Jia Xian worked on the triangle in the 11th century. In succeeding centuries in Europe, several mathematicians explored the properties of the triangle. Pascal however, wrote a detailed exploration of the triangle and its properties. It was published after his death in 1665 in a book called *Traité du triangle arithmétique*, which in English is *Treatise on Arithmetical Triangle*.



Binomial Theorem

A binomial is an expression with two terms such as $x + y$. Raising such an equation to the power of 2 i.e.: $(x + y)^2 = (x + y)(x + y)$ which works out as $1x^2 + 2xy + 1y^2$. As we increase the power, it quickly gets more difficult and the binomial theorem helps us to simplify the equations efficiently, i.e.: simplifying $(x + y)^{10}$. Pascal's Triangle gives us these binomial coefficients in each row.

Binomial Coefficients

$(x+y)^n$	Expansion of $(x + y)^n$	Coefficients
0	1	1
1	$1x + 1y$	1 1
2	$1x^2 + 2xy + 1y^2$	1 2 1
3	$1x^3 + 3x^2y + 3xy^2 + 1y^3$	1 3 3 1
4	$1x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + 1y^4$	1 4 6 4 1

Pascal showed that these coefficients can also be used to calculate probabilities.

For more amazing facts on Pascal, check out

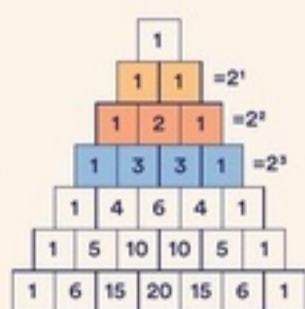


DID YOU KNOW?

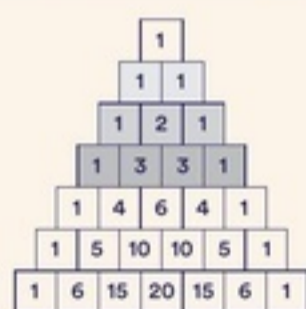
Pascal helped his father do endless counting and calculations of taxes, so at the age of 19 he constructed the **WORLD'S FIRST MECHANICAL CALCULATOR**.



In Pascal's triangle each number is the sum of the numbers immediately above it to the left and the right. It starts with 1 and all the numbers on the edges are 1. It creates a very interesting pattern in which many other mathematical relationships are found.



Adding the numbers on each row will give powers of two: 1, 2, 4, 8, 16, ...



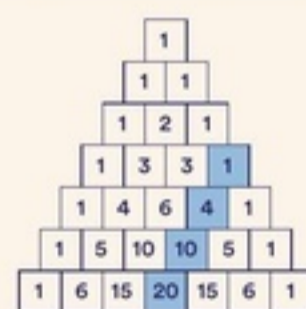
The numbers on each row are the binomial coefficients



Along each edge are 1s but next to them you will find the natural numbers: 1, 2, 3, 4, ...



Next you will find triangular numbers: 1, 3, 6, 10, 15, ...



Next there are the tetrahedral numbers: 1, 4, 10, 20, ...

Pascal was born in Clermont Ferrand, a city in central France overlooked by an extinct volcano, Puy de Dôme. In 1648 as Pascal was in poor health, he asked his brother-in-law Florin Périer to carry a mercury barometer to the top of Puy de Dôme and measure the air pressure. This experiment provided convincing evidence that changes in a barometer reading were caused by the weight of the air.

The standard international unit of pressure the pascal (Pa) is named in his honour.

