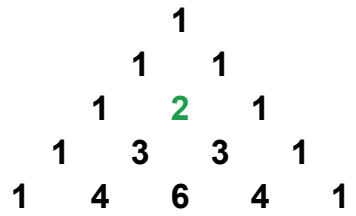
▶ Video explanation (YouTube Short) · Instagram

Pascal's Triangle and Number Patterns

1. The rule

Start with 1. **Each number is the sum of the two numbers above it.** The edges are all 1.



2. History

Blaise Pascal wrote about it in 1654, but it appears centuries earlier in India as **Meru Prastara**, in Halayudha's commentary on Pingala.

3. The patterns

Look at	You find
Row sums	1, 2, 4, 8, 16: powers of 2
Second diagonal	1, 2, 3, 4, 5: natural numbers
Third diagonal	1, 3, 6, 10: triangular numbers
Slanted lines	1, 1, 2, 3, 5, 8: Fibonacci numbers
Row n	Coefficients of $(a + b)^n$

Solved example

Q. Use the triangle to expand $(a + b)^3$.
A. Row 3 is 1, 3, 3, 1, so $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$.

Practice questions

1. (MCQ) The sum of row 5 is (a) 16 (b) 25 (c) 32 (d) 64
2. (Short) Write row 5 of the triangle.
3. (Very short) What is the next triangular number after 10?
4. (Short) Expand $(a + b)^4$ using the triangle.
5. (Very short) What is this triangle called in old Indian texts?
6. (Short) Add the slanted line through 1, 3, 1. Which Fibonacci number do you get?

Answer key

1. (c).
2. 1, 5, 10, 10, 5, 1.
3. 15.
4. $a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$.
5. Meru Prastara.
6. 5.

▶ Watch the video explanation · Instagram