

Binomial Theorem

CBSE Class 11 Maths · Knowledge organiser

KEY DEFINITIONS

Binomial theorem

Expands $(a + b)^n$ for a positive integer n using the coefficients nC_r .

General term

$$T_{r+1} = {}^nC_r a^{n-r} b^r.$$

Pascal's triangle

Each entry is the sum of the two above it; row n gives the coefficients of $(a + b)^n$.

KEY FORMULAS

Expansion $(a + b)^n = \sum_{r=0}^n {}^nC_r a^{n-r} b^r$

$n + 1$ terms; sum of coefficients $\sum {}^nC_r = 2^n, \quad \sum (-1)^r {}^nC_r = 0$

WORKED EXAMPLE

Expand $(1 + 2x)^3$.

$$1 + 3(2x) + 3(2x)^2 + (2x)^3 = 1 + 6x + 12x^2 + 8x^3.$$

YOU SHOULD BE ABLE TO...

- Use Pascal's triangle, count terms and find coefficients in small expansions.
- Expand binomials with coefficients and fractions and evaluate powers of numbers near round numbers.
- Prove divisibility results and combine $(a + b)^n \pm (a - b)^n$ in multi-part questions.
- Compare sizes of powers and reason about sums of coefficients.

COMMON MISTAKES

- ✗ Forgetting to raise the coefficient of x to the power: $(2x)^3 = 8x^3$, not $2x^3$.
- ✗ Signs in $(a - b)^n$: every odd power of b carries a minus sign.
- ✗ Using row $n - 1$ of Pascal's triangle for $(a + b)^n$ (the row starting 1, n is the right one).
- ✗ Writing n terms instead of $n + 1$.