

Binomial Theorem

IP Math

Topic Summary

Pascal's Triangle		
n	$(a+b)^n$	Coefficients
0	$(a+b)^0 = 1$	1
1	$(a+b)^1 = a+b$	1 1
2	$(a+b)^2 = a^2 + 2ab + b^2$	1 2 1
3	$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$	1 3 3 1
4	$(a+b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$	1 4 6 4 1
5	$(a+b)^5 = a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$	1 5 10 10 5 1

Expansion of a binomial

$$(a+b)^n = a^n + {}^nC_1 a^{n-1}b^1 + {}^nC_2 a^{n-2}b^2 + \dots + {}^nC_r a^{n-r}b^r + \dots + b^n$$

General Term

In the expansion of $(a+b)^n$, the $(r+1)^{\text{th}}$ term is given as $\binom{n}{r} a^{n-r} b^r$

Binomial Theorem Practice Questions

- Find the coefficient of x^2 in the expansion of $(1-3x)^2 \left(\frac{1}{\sqrt{x}} - \sqrt[4]{x^3} \right)^8$.
- Expand $(1+x)^8$ in ascending powers of x , up to and including the term in x^3 .
 - In the expansion of $(1+y+ky^2)^8$ in ascending powers of y , the coefficient of y^3 is zero. Find the value of the constant k .
- Find the coefficient of x^5 in the expansion of $(1-2x+3x^2)^6$.
- Write down and simplify the first three terms in the expansion, in ascending powers of x , of $\left(2-\frac{x}{4}\right)^{10}$. Hence find the coefficient of x^2 in the expansion of $(3+4x)^2 \left(2-\frac{x}{4}\right)^{10}$.

Answers

- 420
- $(1+x)^8 = 1+8x+28x^2+56x^3+\dots$
 - $k = -1$
- 2712
- $1024-1280x+720x^2$; -7856



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