

8A Introduction & Pascal's Triangle

1. Find the expansion of $(x + 2y)^3$

2. Find the expansion of $(2x - 5)^4$

3. The coefficient of x^2 in the expansion of $(2 - cx)^3$ is 294. Find the value of c .

8B ${}^n C_r$

1) Calculate $6!$

2) Calculate ${}^8 C_3$

3) Calculate ${}^9 C_3$ and ${}^9 C_6$, and comment on your answers

8C ${}^n\text{C}_r$ with Binomials

Binomial series

$$(a + b)^n = a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \dots + \binom{n}{r}a^{n-r}b^r + \dots + b^n \quad (n \in \mathbb{N})$$

$$\text{where } \binom{n}{r} = {}^n\text{C}_r = \frac{n!}{r!(n-r)!}$$

$$(1 + x)^n = 1 + nx + \frac{n(n-1)}{1 \times 2}x^2 + \dots + \frac{n(n-1)\dots(n-r+1)}{1 \times 2 \times \dots \times r}x^r + \dots \quad (|x| < 1, n \in \mathbb{R})$$

1. Use the binomial theorem to find the expansion of $(3 - 2x)^5$

2. Find the first 4 terms in the expansion of $(1 + 2x)^{10}$

3. Find the first 4 terms in the expansion of $\left(10 - \frac{1}{2}x\right)^6$

4.

a) Write down the first three terms, in ascending powers of x , of the binomial expansion of $(1 + qx)^8$, where q is a non-zero constant.

b) Given that, in the expansion of $(1 + qx)^8$, the coefficient of x is $-r$ and the coefficient of x^2 is $7r$, find the values of q and r

8E Using the Binomial Expansion for Approximations

$$(1 + x)^n \quad (|x| < 1, n \in \mathbb{R})$$

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1.

a) Find the first four terms of the binomial expansion of $\left(1 - \frac{x}{4}\right)^{10}$, in ascending powers of x

b) Use your expansion to estimate the value of 0.975^{10} , giving your answer to 4 decimal places