

First Year Maths and Further Maths combined Test B7

Binomial expansion

27 minutes

Throughout the entire test all working must be shown and solutions based entirely on graphical or numerical methods may not be acceptable.

Binomial series

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

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

$$(1 + x)^n = 1 + nx + \frac{n(n-1)}{1.2}x^2 + \dots + \frac{n(n-1)\dots(n-r+1)}{1.2\dots r}x^r + \dots \quad (|x| < 1, n \in \mathbb{Q})$$

1.

- (a) The expression $(1 - 2x)^5$ can be written in the form

$$1 + px + qx^2 + rx^3 + 80x^4 - 32x^5$$

By using the binomial expansion, or otherwise, find the values of the coefficients p , q and r .

[3 marks]

- (b)** Find the value of the coefficient of x^{10} in the expansion of $(1 - 2x)^5(2 + x)^7$.

[5 marks]

[illegible]

[illegible]

2.

- (i) Find the first three terms of the binomial expansion of $\frac{1}{\sqrt[3]{1-2x}}$. State the set of values of x for which the expansion is valid. [5]
- (ii) Hence find a and b such that $\frac{1-3x}{\sqrt[3]{1-2x}} = 1 + ax + bx^2 + \dots$. [3]

[illegible]

[illegible]

3.

(i) Find the binomial expansion of $(3 + kx)^3$, simplifying the terms.

[4]

(ii) It is given that, in the expansion of $(3 + kx)^3$, the coefficient of x^2 is equal to the constant term. Find the possible values of k , giving your answers in an exact form. **[2]**

[2]

[illegible]

[illegible]