IGCSE · Cambridge (CIE) · Further Maths

🕐 1 hour   ❓ 12 questions

Exam Questions

Binomial Theorem

Binomial Theorem

Medium (3 questions)	/13
Hard (5 questions)	/27
Very Hard (4 questions)	/26
Total Marks	**/66**

Medium Questions

1 (a) Find the first 3 terms in the expansion of $\left(4 - \dfrac{x}{16}\right)^6$ in ascending powers of x. Give each term in its simplest form.

(3 marks)

(b) Hence find the term independent of x in the expansion of $\left(4 - \dfrac{x}{16}\right)^6\left(x - \dfrac{1}{x}\right)^2$

(3 marks)

2 Find the term independent of x in the binomial expansion of $\left(3x - \dfrac{1}{x}\right)^6$.

(2 marks)

3 Find the coefficient of x^2 in the expansion of $\left(x - \dfrac{3}{x}\right)\left(x + \dfrac{2}{x}\right)^5$.

(5 marks)

Hard Questions

1 (a) Expand $(2 - x)^5$, simplifying each coefficient.

(3 marks)

(b) Hence solve $\dfrac{e^{(2-x)^5} \times e^{80x}}{e^{10x^4+32}} = e^{-x^5}$.

(4 marks)

2 In the expansion of $\left(2k - \dfrac{x}{k}\right)^5$, where k is a constant, the coefficient of x^2 is 160.

Find the value of k.

(3 marks)

3 (i) Find the first 3 terms in the expansion of $(1 + 3x)^6$, in ascending powers of x. Simplify the coefficient of each term.

(ii) When the expansion of $(1 + 3x)^6(a + x)^2$ is written in ascending powers of x, the first three terms are $4 + 68x + bx^2$, where a and b are constants. Find the value of a and the value of b.

4 The first 3 terms in the expansion of $(3 - ax)^5$, in ascending powers of x, can be written in the form $b - 81x + cx^2$. Find the value of each of a, b and c.

5 (a) Find the first 3 terms in the expansion of $\left(2 + \dfrac{k}{2}\right)^8$ in ascending powers of k.

Simplify the coefficient of each term.

(b) Hence find the first three terms in ascending powers of p in the expansion of $\left(2 + \dfrac{p - p^2}{2}\right)^8$.

Simplify the coefficient of each term.

(c) Find the term independent of x in the expansion of $\left(ax^2 - \dfrac{1}{x^2}\right)^6$ where $a \neq 0$.

Give your answer in terms of a.

(3 marks)

Very Hard Questions

1 The first 3 terms in the expansion of $(a+x)^3 \left(1 - \dfrac{x}{3}\right)^5$, in ascending powers of x, can be written in the form $27 + bx + cx^2$, where a, b and c are integers. Find the values of a, b and c.

(8 marks)

2 The first three terms in the expansion of $(a + bx)^5 (1 + x)$ are $32 - 208x + cx^2$. Find the value of each of the integers a, b and c.

(7 marks)

3 Given that the coefficient of x^2 in the expansion of $(1 + x)\left(1 - \dfrac{x}{2}\right)^n$ is $\dfrac{25}{4}$, find the value of the positive integer n.

(5 marks)

4 In the expansion of $\left(1 + \dfrac{x}{2}\right)^n$ the coefficient of x^4 is half the coefficient of x^6.

Find the value of the positive constant n.

(6 marks)