Additional Mathematics
Chapter 1: Binomial Theorem Problems

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Problems

1. Use the binomial theorem to expand these.

    (a) $(1 - x)^3$

    (b) $(2x - 1)^4$

    (c) $(3 - x)^5$

    (d) $(2 - 3x)^4$

2. Use the binomial theorem to expand these.

    (a) $\left(2 + \frac{1}{x}\right)^5$

    (b) $\left(\frac{2}{x} - 1\right)^4$

    (c) $\left(x^2 + \frac{1}{x^2}\right)^6$

    (d) $\left(x + \frac{1}{x}\right)^8$

3. Find the coefficient of the term indicated in square brackets in the binomial expansion of these.

    (a) $(2 + 3x)^{12}$ $[x^4]$

    (b) $(1 - 2x)^{14}$ $[x^8]$

    (c) $(3 + 2x)^{10}$ $[x^5]$

    (d) $(2x - 1)^9$ $[x^7]$

    (e) $\left(x - \frac{1}{x}\right)^{12}$ $[x^4]$

    (f) $\left(x^2 - \frac{1}{x}\right)^{16}$ $[x^{13}]$

4. (a) Expand $(2 - 3x)^6$ as far as the term in x^3.

    (b) Use the result to find the coefficient of x^2 in the expansion of $(1 + 2x)(2 - 3x)^6$.

5. (a) Find the expansion, in ascending powers of x, as far as the term in x^3, of $(1 - 2x)^8$.

    (b) Use the result to find the coefficient of x^3 in the expansion of $(2 - 3x)(1 - 2x)^8$.

6. The binomial expansion of $(a - x)^n$, where $n > 0$, in ascending powers of x, is $531441 - 2125764x + 3897234x^2 + \ldots$ Find the value of a and the value of n.

7. Find the coefficient of x^2 in the expansion of $(2 - x)^4(1 + x)^3$.

8. Find the term independent of x in the expansion of $\left(x^2 - \frac{2}{x}\right)^9$.

9. Find the term independent of x in the expansion of $\left(x + \frac{3}{x^2}\right)^{12}$.

10. In the expansion of $(a + x)^n$, the coefficients of x and x^2 are equal. Express n in terms of a.

11. The first three terms in the expansion of $(1 + ax)^n$ are $1 - 14x + 84x^2$. Find the value of a and the value of n.