Binomial 1

1) Obtain

    (i) the expansion, in ascending powers of x, of $(2 - x^2)^5$,

    (ii) the coefficient of x^6 in the expansion of $(1 + x^2)^2(2 - x^2)^5$.

                            [6]

2) **(i)** Find the first 3 terms in the expansion, in ascending powers of x, of $(2 - x)^5$.   [3]

    (ii) Hence find the value of the constant k for which the coefficient of x in the expansion of $(k + x)(2 - x)^5$ is −8.   [2]

3) **(a)** Calculate the term independent of x in the binomial expansion of $\left(x - \dfrac{1}{2x^5}\right)^{18}$.   [3]

    (b) In the binomial expansion of $(1 + kx)^n$, where $n \geqslant 3$ and k is a constant, the coefficients of x^2 and x^3 are equal. Express k in terms of n.   [4]

4) **(a)** **(i)** Expand $(2 + x)^5$.   [3]

        (ii) Use your answer to part **(i)** to find the integers a and b for which $(2 + \sqrt{3})^5$ can be expressed in the form $a + b\sqrt{3}$.   [3]

    (b) Find the coefficient of x in the expansion of $\left(x - \dfrac{4}{x}\right)^7$.   [3]

5) **(i)** In the binomial expansion of $\left(x + \dfrac{k}{x^3}\right)^8$, where k is a positive constant, the term independent of x is 252.

        Evaluate k.   [4]

    (ii) Using your value of k, find the coefficient of x^4 in the expansion of $\left(1 - \dfrac{x^4}{4}\right)\left(x + \dfrac{k}{x^3}\right)^8$.   [3]

6) **(i)** Find the first three terms, in ascending powers of u, in the expansion of $(2 + u)^5$.   [2]

    (ii) By replacing u with $2x - 5x^2$, find the coefficient of x^2 in the expansion of $(2 + 2x - 5x^2)^5$.   [4]

7) Find the coefficient of x^3 in the expansion of

    (i) $(1 + 3x)^8$,   [2]

    (ii) $(1 - 4x)(1 + 3x)^8$.   [3]

8) Find the coefficient of x^4 in the expansion of

    (i) $(1 + 2x)^6$,   [2]

    (ii) $\left(1 - \dfrac{x}{4}\right)(1 + 2x)^6$.   [3]