(6) Binomial Theorem

1. The x-independent term in the expansion of $(3-ax)^{2n+1}$ is 81 times the x-independent term in the expansion of $(3+x)^n$. Find n.

2. In the expansion of $\left(ax+\frac{b}{3x}\right)^n$,the fifth term is 1120 and the coefficient of the x^2 term is 1792, where a, b and n are positive constants.

   a. Write down the value of n

   b. Find the values of a and b

3. Expand, in ascending power of x, up to the x^2 term for the following binomials:
   a. $(5+x)^5$

   b. $\left(2-\frac{x}{5}\right)^5$

4. Expand $(1+2x-2x^2)^8$ in ascending powers of x up until the x^3 term. Using a suitable numerical value of x, find an approximate value of 1.001998^8, giving your answer correct to 4 significant figures.

5. In the binomial expansion of $(3+x)^n$, where n is a positive integer, the coefficients of x^3 and x^4 are in the ratio $\frac{3}{2}$. Find the value of n.

6. The first four terms in the expansion of $(1+ax)^n$ is $1+18x+15a^2x^2+bx^3+\cdots$

   Find the value of n, a and b.

7. In the expansion of $(2+5x)^n$, the first three terms in ascending power of x are denoted by a, b and c respectively. Given that $\frac{ac}{b^2}=\frac{3}{7}$, find the value of n.

8. i) Find the value of q if the coefficient of x in the expansion of $(1+2x)^5\left(1-\frac{1}{3}x\right)^6 - (1+x)^9(1+qx)^4$ is zero.
   ii) State the term independent of x in the above equation.

9. In the expansion of $\left(\frac{x}{3}+\frac{3}{x}\right)^n$ in descending powers of x, the ratio of the coefficient of the third term to that of the fourth term is $\frac{1}{15}$. Find the value of n.

10. Given the expression $\left(\frac{2x\sqrt{x}-1}{2\sqrt{x}}\right)^n$ where the 11th term of the expansion, in descending powers of x is independent of x. Find the value of this term.