SATPREP
Assignment : Binomial Theorem

1   a   Find the expansion, in ascending powers of u, of $(1+u)^4$.

      b   By substituting $u = x + x^2$, find the expansion of $(1 + x + x^2)^4$.

2   Find the term independent of x in the expansion of $\left(x + \dfrac{1}{x}\right)^{10}$.

3   a   Find the first four terms in the expansion, in ascending powers of x, of $(1-x)^6$.

      b   Find the coefficient of x^3 in the expansion of $(2 - 3x)(1-x)^6$.

4   Calculate the term independent of x in the binomial expansion of $\left(x^2 + \dfrac{1}{2x^4}\right)^{12}$.

5   Find the coefficient of x^6 in the expansion of $(2x-1)^6(3x+1)$.

6   a   Find the expansion, in ascending powers of u, of $(1-u)^5$.

      b   By substituting $u = x - x^2$, find the expansion of $(1 - x + x^2)^5$.

7   a   Expand $\left(x - \dfrac{1}{x}\right)^8$.

      b   Find the value of k that creates a term of 140 in the expansion of $(k - 2x)\left(x - \dfrac{1}{x}\right)^8$.

8   The binomial expansion of $(1 + ax)^n$, where $n > 0$, in ascending powers of x, is

     $1 + 20x + 45a^2x^2 + bx^3 + \ldots$

     Find the value of n, of a and of b.

Answer to Assignment to Binomial Theorem

1 **a** $1 + 4u + 6u^2 + 4u^3 + u^4$ **b** $1 + 4x + 10x^2 + 16x^3 + 19x^4 + 16x^5 + 10x^6 + 4x^7 + x^8$

2 252   **3** **a** $1 - 6x + 15x^2 - 20x^3 \ldots$ **b** -85

4 $\dfrac{495}{16}$ **5** -512

6 **a** $1 - 5u + 10u^2 - 10u^3 + 5u^4 - u^5$

    b $1 - 5x + 15x^2 - 30x^3 + 45x^4 - 51x^5 + 45x^6 - 30x^7 + 15x^8 - 5x^9 + x^{10}$

7 **a** $x^8 - 8x^6 + 28x^4 - 56x^2 + 70 - \dfrac{56}{x^2} + \dfrac{28}{x^4} - \dfrac{8}{x^6} + \dfrac{1}{x^8}$ **b** 2

8 $n = 10;\ a = 2;\ b = 960$