

Binomial Theorem Practice [52 marks]

1. In the expansion of $ax^3(2 + ax)^{11}$, the coefficient of the term in x^5 is 11880. Find the [6 marks] value of a .

2. In the expansion of $(3x + 1)^n$, the coefficient of the term in x^2 is $135n$, where [7 marks] $n \in \mathbb{Z}^+$. Find n .

Consider the expansion of $(2x + 3)^8$.

- 3a. Write down the number of terms in this expansion. [1 mark]

- 3b. Find the term in x^3 . [4 marks]

4. The third term in the expansion of $(x + k)^8$ is $63x^6$. Find the possible values of k . [5 marks]

In the expansion of $(3x - 2)^{12}$, the term in x^5 can be expressed as $\binom{12}{r} \times (3x)^p \times (-2)^q$.

- 5a. (a) Write down the value of p , of q and of r . [5 marks]
(b) Find the coefficient of the term in x^5 .

- 5b. Write down the value of p , of q and of r . [3 marks]

- 5c. Find the coefficient of the term in x^5 . [2 marks]

6. The constant term in the expansion of $\left(\frac{x}{a} + \frac{a^2}{x}\right)^6$, where $a \in \mathbb{R}$ is 1280. Find a . [7 marks]

Consider the expansion of $(3x^2 + 2)^9$.

- 7a. Write down the number of terms in the expansion. [1 mark]

- 7b. Find the term in x^4 . [5 marks]

The fifth term in the expansion of the binomial

$(a + b)^n$ is given by

$$\binom{10}{4} p^6 (2q)^4.$$

8a. Write down the value of n .

[1 mark]

8b. Write down a and b , in terms of p and/or q .

[2 marks]

8c. Write down an expression for the sixth term in the expansion.

[3 marks]

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