Binomial Expansion Year 1 - Integer Powers

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Qualification: A-Level
Areas: Binomial Expansion
Subtopics: Binomial Expansion (integer powers), Binomial Expansion - Double Brackets
Paper: C2-AQA / Series: 2006-June / Difficulty: Hard / Question Number: 4

(a) The expression $(1-2x)^4$ can be written in the form

$$1+px+qx^2-32x^3+16x^4$$

By using the binomial expansion, or otherwise, find the values of the integers p and q. *(3 marks)*

(b) Find the coefficient of x in the expansion of $(2+x)^9$. *(2 marks)*

(c) Find the coefficient of x in the expansion of $(1-2x)^4(2+x)^9$. *(3 marks)*

Qualification: A-Level
Areas: Binomial Expansion
Subtopics: Binomial Expansion (integer powers), Binomial Expansion - Double Brackets
Paper: C2-OCR / Series: 2007-Janyuary / Difficulty: Hard / Question Number: 6

(i) Find and simplify the first four terms in the expansion of $(1+4x)^7$ in ascending powers of x.

(ii) In the expansion of

$$(3+ax)(1+4x)^7,$$

the coefficient of x^2 is 1001. Find the value of a.

Qualification: A-Level
Areas: Binomial Expansion
Subtopics: Binomial Expansion (integer powers), Binomial Expansion - Double Brackets
Paper: C2-OCR / Series: 2013-June / Difficulty: Hard / Question Number: 3

(i) Find and simplify the first three terms in the expansion of $(2 + 5x)^6$ in ascending powers of x. **[4]**

(ii) In the expansion of $(3 + cx)^2(2 + 5x)^6$, the coefficient of x is 4416. Find the value of c. **[3]**

Qualification: A-Level
Areas: Binomial Expansion
Subtopics: Binomial Expansion (integer powers), Binomial Expansion - Double Brackets
Paper: C2-AQA / Series: 2016-June / Difficulty: Hard / Question Number: 7

(a) The expression $(1-2x)^5$ can be written in the form

$$1+px+qx^2+rx^3+80x^4-32x^5$$

By using the binomial expansion, or otherwise, find the values of the coefficients p, q and r.

[3 marks]

(b) Find the value of the coefficient of x^{10} in the expansion of $(1-2x)^5(2+x)^7$.

[5 marks]

Qualification: A-Level

Areas: Binomial Expansion

Subtopics: Binomial Expansion (integer powers), Binomial Expansion - Three Terms

Paper: C2-OCR / Series: 2017-June / Difficulty: Hard / Question Number: 3

(i) Find and simplify the first four terms in the expansion of $\left(1+\frac{1}{2}x\right)^8$ in ascending powers of x. **[4]**

(ii) Hence find the coefficient of y^2 in the expansion of $\left(1+\frac{1}{2}(y+y^2)\right)^8$. **[2]**

(a) Expand $(2+y)^6$ in ascending powers of y as far as the term in y^3, simplifying each coefficient. **(4)**

(b) Hence expand $(2+x-x^2)^6$ in ascending powers of x as far as the term in x^3, simplifying each coefficient. **(3)**

Given that for small values of x

$$(1 + ax)^n \approx 1 - 24x + 270x^2,$$

where n is an integer and $n > 1$,

(a) show that $n = 16$ and find the value of a, **(7)**

(b) use your value of a and a suitable value of x to estimate the value of $(0.9985)^{16}$, giving your answer to 5 decimal places. **(3)**

In the binomial expansion of $(a + x)^n$, where $n > 4$, the coefficient of x^3 is twice that of x^4.

(i) Show that $n = 2a + 3$. [4]

In the same expansion, the coefficient of x^2 is $\frac{3}{2}$ times the coefficient of x.

(ii) Obtain another relation between n and a. Hence find the values of n and a. [4]

(iii) State the constant term in the expansion. [2]

Qualification: A-Level

Areas: Binomial Expansion

Subtopics: Binomial Expansion (integer powers), Binomial Expansion - Double Brackets

Paper: C2-Edexcel / Series: Practice-Mock / Difficulty: Very Hard / Question Number: 7

[Maximum mark: 7]

Given that $\left(1+\frac{2}{3}x\right)^n(3+nx)^2 = 9+84x+\ldots$, find the value of n.

(a) Find the first four terms, in ascending powers of x, of the binomial expansion of

$$(2 + 3x)^6$$

simplifying each term.

(4)

(b) Hence, without further calculation, write down the first four terms in the binomial expansion of

$$(2 - 3x)^6$$

(1)

(c) Hence, find the first two non-zero terms in the binomial expansion of

$$\left[(2 + 3x)^6 + (2 - 3x)^6\right]^2$$

(2)

(d) Find the term that is independent of x in the binomial expansion of

$$\left[(2 + ax)^n + (2 - ax)^n\right]^p$$

giving your answer in the form 2^y, where y is in terms of n and p

(2)