
Core 2: Binomial Expansion

Past Paper Questions
2006 - 2012

Name:

Binomial Series

$$(a+b)^n = a^n + \binom{n}{1} a^{n-1}b + \binom{n}{2} a^{n-2}b^2 + \dots + \binom{n}{r} a^{n-r}b^r + \dots + b^n \quad (n \in \mathbf{N})$$

$$\text{where } \binom{n}{r} = {}^n C_r = \frac{n!}{r!(n-r)!}$$

June 2006

- 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)

January 2007

- 7 (a) The first four terms of the binomial expansion of $(1 + 2x)^8$ in ascending powers of x are $1 + ax + bx^2 + cx^3$. Find the values of the integers a , b and c . (4 marks)
- (b) Hence find the coefficient of x^3 in the expansion of $\left(1 + \frac{1}{2}x\right)(1 + 2x)^8$. (3 marks)

January 2008

- 6 (a) Using the binomial expansion, or otherwise:
- (i) express $(1 + x)^3$ in ascending powers of x ; (2 marks)
- (ii) express $(1 + x)^4$ in ascending powers of x . (2 marks)
- (b) Hence, or otherwise:
- (i) express $(1 + 4x)^3$ in ascending powers of x ; (2 marks)
- (ii) express $(1 + 3x)^4$ in ascending powers of x . (2 marks)
- (c) Show that the expansion of
- $$(1 + 3x)^4 - (1 + 4x)^3$$
- can be written in the form
- $$px^2 + qx^3 + rx^4$$
- where p , q and r are integers. (2 marks)

June 2008

7 (a) The expression $\left(1 + \frac{4}{x^2}\right)^3$ can be written in the form

$$1 + \frac{p}{x^2} + \frac{q}{x^4} + \frac{64}{x^6}$$

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

January 2009

5 (a) By using the binomial expansion, or otherwise, express $(1 + 2x)^4$ in the form

$$1 + ax + bx^2 + cx^3 + 16x^4$$

where a , b and c are integers. (4 marks)

(b) Hence show that $(1 + 2x)^4 + (1 - 2x)^4 = 2 + 48x^2 + 32x^4$. (3 marks)

January 2010

7 (a) The first four terms of the binomial expansion of $(1 + 2x)^7$ in ascending powers of x are $1 + ax + bx^2 + cx^3$. Find the values of the integers a , b and c . (4 marks)

(b) Hence find the coefficient of x^3 in the expansion of $\left(1 - \frac{1}{2}x\right)^2(1 + 2x)^7$. (4 marks)

June 2010

4 (a) The expression $\left(1 - \frac{1}{x^2}\right)^3$ can be written in the form

$$1 + \frac{p}{x^2} + \frac{q}{x^4} - \frac{1}{x^6}$$

Find the values of the integers p and q . (2 marks)

January 2011

5 (a) Using the binomial expansion, or otherwise, express $(1 - x)^3$ in ascending powers of x . *(2 marks)*

(b) Show that the expansion of

$$(1 + y)^4 - (1 - y)^3$$

is

$$7y + py^2 + qy^3 + y^4$$

where p and q are constants to be found.

(4 marks)

June 2011

3 (a) The expression $(2 + x^2)^3$ can be written in the form

$$8 + px^2 + qx^4 + x^6$$

Show that $p = 12$ and find the value of the integer q .

(3 marks)

January 2012

5 The first four terms in the binomial expansion of $\left(1 + \frac{x}{3}\right)^6$ are $1 + ax + bx^2 + cx^3$. Find the values of the constants a , b and c , giving your answers in their simplest form. *(4 marks)*

January 2013

8 (a) Expand $\left(1 + \frac{4}{x}\right)^2$. *(1 mark)*

(b) The first four terms of the binomial expansion of $\left(1 + \frac{x}{4}\right)^8$ in ascending powers of x are $1 + ax + bx^2 + cx^3$. Find the values of the constants a , b and c . *(4 marks)*

(c) Hence find the coefficient of x in the expansion of $\left(1 + \frac{4}{x}\right)^2 \left(1 + \frac{x}{4}\right)^8$. *(4 marks)*