

Revision – Binomial Expansions (Year 12) - 1

1.

- (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)
-

2.

- (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)
-

3.

- (a) Find the first 3 terms, in ascending powers of
- x
- , of the binomial expansion of

$$(1 + px)^9,$$

where p is a constant.

(2)

The first 3 terms are 1 , $36x$ and qx^2 , where q is a constant.

- (b) Find the value of
- p
- and the value of
- q
- .

(4)

4.

Find the first 4 terms, in ascending powers of x , of the binomial expansion of

$$\left(3 - \frac{1}{3}x\right)^5$$

giving each term in its simplest form.

(4)

5.

- (a) Write down the first three terms, in ascending powers of x , of the binomial expansion of $(1 + px)^{12}$, where p is a non-zero constant. (2)

Given that, in the expansion of $(1 + px)^{12}$, the coefficient of x is $(-q)$ and the coefficient of x^2 is $11q$,

- (b) find the value of p and the value of q . (4)
-

6.

- (a) Find the first four terms, in ascending powers of x , in the binomial expansion of $(1+kx)^6$, where k is a non-zero constant. (3)

Given that, in this expansion, the coefficients of x and x^2 are equal, find

- (b) the value of k , (2)
- (c) the coefficient of x^3 . (1)
-

7.

Given that $\binom{40}{4} = \frac{40!}{4!b!}$,

- (a) write down the value of b . (1)

In the binomial expansion of $(1+x)^{40}$, the coefficients of x^4 and x^5 are p and q respectively.

- (b) Find the value of $\frac{q}{p}$. (3)
-

8.

- (a) Find the first 4 terms, in ascending powers of x , of the binomial expansion of $(1-2x)^5$. Give each term in its simplest form. (4)

- (b) If x is small, so that x^2 and higher powers can be ignored, show that

$$(1+x)(1-2x)^5 \approx 1-9x. \quad (2)$$

9.

- (a) Find the first 3 terms, in ascending powers of x , of the binomial expansion of

$$(2 - 9x)^4$$

giving each term in its simplest form.

(4)

$$f(x) = (1 + kx)(2 - 9x)^4, \text{ where } k \text{ is a constant}$$

The expansion, in ascending powers of x , of $f(x)$ up to and including the term in x^2 is

$$A - 232x + Bx^2$$

where A and B are constants.

- (b) Write down the value of A .

(1)

- (c) Find the value of k .

(2)

- (d) Hence find the value of B .

(2)

10.

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

- (ii) In the expansion of $(3 - 5x)(2 + ax)^6$, the coefficient of x is 64. Find the value of a . [3]
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11.

- (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]
-

12.

- (a) Find the first 4 terms of the expansion of $\left(1 + \frac{x}{2}\right)^{10}$ in ascending powers of x , giving each term in its simplest form. (4)

- (b) Use your expansion to estimate the value of $(1.005)^{10}$, giving your answer to 5 decimal places.

(3)

13.

- (a) Find the first 4 terms of the binomial expansion, in ascending powers of x , of

$$\left(1 + \frac{x}{4}\right)^8$$

giving each term in its simplest form.

(4)

- (b) Use your expansion to estimate the value of $(1.025)^8$, giving your answer to 4 decimal places.

(3)
