

Binomial Expansion 2 - Past Edexcel Exam Questions

1. (Question 1 - C4 June 2018)

1. (a) Find the binomial series expansion of

$$\sqrt{4 - 9x}, \quad |x| < \frac{4}{9}$$

in ascending powers of x , up to and including the term in x^2
Give each coefficient in its simplest form.

(5)

- (b) Use the expansion from part (a), with a suitable value of x , to find an approximate value for $\sqrt{310}$
Show all your working and give your answer to 3 decimal places.

(3)

2. (Question 2 - C4 June 2017)

2. $f(x) = (2 + kx)^{-3}$, $|kx| < 2$, where k is a positive constant

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

$$A + Bx + \frac{243}{16}x^2$$

where A and B are constants.

- (a) Write down the value of A . (1)

- (b) Find the value of k . (3)

- (c) Find the value of B . (2)

3. (Question 1 - C4 June 2016)

1. Use the binomial series to find the expansion of

$$\frac{1}{(2 + 5x)^3}, \quad |x| < \frac{2}{5}$$

in ascending powers of x , up to and including the term in x^3 .
Give each coefficient as a fraction in its simplest form.

(6)

4. (Question 1 - C4 June 2015)

1. (a) Find the binomial expansion of

$$(4 + 5x)^{\frac{1}{2}}, \quad |x| < \frac{4}{5}$$

in ascending powers of x , up to and including the term in x^2 .
Give each coefficient in its simplest form.

(5)

(b) Find the exact value of $(4 + 5x)^{\frac{1}{2}}$ when $x = \frac{1}{10}$

Give your answer in the form $k\sqrt{2}$, where k is a constant to be determined.

(1)

(c) Substitute $x = \frac{1}{10}$ into your binomial expansion from part (a) and hence find an approximate value for $\sqrt{2}$

Give your answer in the form $\frac{p}{q}$ where p and q are integers.

(2)

5. (Question 2 - C4 June 2014)

2. Given that the binomial expansion of $(1 + kx)^{-4}$, $|kx| < 1$, is

$$1 - 6x + Ax^2 + \dots$$

(a) find the value of the constant k , (2)

(b) find the value of the constant A , giving your answer in its simplest form. (3)

6. (Question 2 - C4 June 2013)

2. (a) Use the binomial expansion to show that

$$\sqrt{\left(\frac{1+x}{1-x}\right)} \approx 1 + x + \frac{1}{2}x^2, \quad |x| < 1 \quad (6)$$

(b) Substitute $x = \frac{1}{26}$ into

$$\sqrt{\left(\frac{1+x}{1-x}\right)} = 1 + x + \frac{1}{2}x^2$$

to obtain an approximation to $\sqrt{3}$

Give your answer in the form $\frac{a}{b}$ where a and b are integers. (3)

7.

(Question 3 - C4 June 2012)

3.
$$f(x) = \frac{6}{\sqrt{9 - 4x}}, \quad |x| < \frac{9}{4}$$

- (a) Find the binomial expansion of $f(x)$ in ascending powers of x , up to and including the term in x^3 . Give each coefficient in its simplest form. (6)

Use your answer to part (a) to find the binomial expansion in ascending powers of x , up to and including the term in x^3 , of

(b) $g(x) = \frac{6}{\sqrt{9 + 4x}}, \quad |x| < \frac{9}{4}$ (1)

(c) $h(x) = \frac{6}{\sqrt{9 - 8x}}, \quad |x| < \frac{9}{8}$ (2)

8.

(Question 2 - C4 June 2011)

2.
$$f(x) = \frac{1}{\sqrt{9 + 4x^2}}, \quad |x| < \frac{3}{2}$$

- Find the first three non-zero terms of the binomial expansion of $f(x)$ in ascending powers of x . Give each coefficient as a simplified fraction. (6)

Solutions

1. (a) $2 - \frac{9}{4}x - \frac{81}{64}x^2$
 (b) 17.607
2. (a) $A = \frac{1}{8}$
 (b) $k = 9$
 (c) $B = -\frac{27}{16}$
3. $\frac{1}{8} - \frac{15}{16}x + \frac{75}{16}x^2 - \frac{625}{32}x^3$
4. (a) $2 + \frac{5}{4}x - \frac{25}{64}x^2$
 (b) $\frac{3}{2}\sqrt{2}$
 (c) $\frac{181}{128}$
5. (a) $k = \frac{3}{2}$
 (b) $A = \frac{45}{2}$
6. (a) -
 (b) $\frac{7025}{4056}$
7. (a) $f(x) \approx 2 + \frac{4}{9}x + \frac{4}{27}x^2 + \frac{40}{729}x^3$
 (b) $g(x) \approx 2 - \frac{4}{9}x + \frac{4}{27}x^2 - \frac{40}{729}x^3$
 (c) $h(x) \approx 2 + \frac{8}{9}x + \frac{16}{27}x^2 + \frac{320}{729}x^3$
8. $f(x) \approx \frac{1}{3} - \frac{2}{27}x^2 + \frac{2}{81}x^4$