

Edexcel GCE

Core Mathematics C4

Partial Fractions and Binomial Expansion

Materials required for examination
Mathematical Formulae (Green)

Items included with question papers
Nil

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.
You must show sufficient working to make your methods clear to the Examiner. Answers without working may gain no credit.

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

Find the binomial expansion of $f(x)$ in ascending powers of x , up to and including the term in x^3 . Give each coefficient as a simplified fraction.

(6)
[June 2009]

2.
$$f(x) = \frac{27x^2 + 32x + 16}{(3x + 2)^2(1-x)}, \quad |x| < \frac{2}{3}.$$

Given that $f(x)$ can be expressed in the form

$$f(x) = \frac{A}{(3x + 2)} + \frac{B}{(3x + 2)^2} + \frac{C}{(1 - x)},$$

(a) find the values of B and C and show that $A = 0$.

(4)

(b) Hence, or otherwise, find the series expansion of $f(x)$, in ascending powers of x , up to and including the term in x^2 . Simplify each term.

(6)

(c) Find the percentage error made in using the series expansion in part (b) to estimate the value of $f(0.2)$. Give your answer to 2 significant figures.

(4)

[January 2009]

3. (a) Expand $\frac{1}{\sqrt{4-3x}}$, where $|x| < \frac{4}{3}$, in ascending powers of x up to and including the term in x^2 . Simplify each term.

(5)

(b) Hence, or otherwise, find the first 3 terms in the expansion of $\frac{x+8}{\sqrt{4-3x}}$ as a series in ascending powers of x .

(4)

[June 2008]

4. (a) Use the binomial theorem to expand

$$(8 - 3x)^{\frac{1}{3}}, \quad |x| < \frac{8}{3},$$

in ascending powers of x , up to and including the term in x^3 , giving each term as a simplified fraction.

(5)

(b) Use your expansion, with a suitable value of x , to obtain an approximation to $\sqrt[3]{7.7}$. Give your answer to 7 decimal places.

(2)

[January 2008]

5. $f(x) = (3 + 2x)^{-3}, \quad |x| < \frac{3}{2}.$

Find the binomial expansion of $f(x)$, in ascending powers of x , as far as the term in x^3 .

Give each coefficient as a simplified fraction.

(5)

[June 2007]

6. $f(x) = (2 - 5x)^{-2}, \quad |x| < \frac{2}{5}.$

Find the binomial expansion of $f(x)$, in ascending powers of x , as far as the term in x^3 , giving each coefficient as a simplified fraction.

(5)

[January 2007]

7. $f(x) = \frac{3x - 1}{(1 - 2x)^2}, \quad |x| < \frac{1}{2}.$

Given that, for $x \neq \frac{1}{2}$, $\frac{3x - 1}{(1 - 2x)^2} = \frac{A}{(1 - 2x)} + \frac{B}{(1 - 2x)^2}$, where A and B are constants,

(a) find the values of A and B .

(3)

(b) Hence, or otherwise, find the series expansion of $f(x)$, in ascending powers of x , up to and including the term in x^3 , simplifying each term.

(6)

[June 2006]

8. $f(x) = \frac{3x^2 + 16}{(1 - 3x)(2 + x)^2} = \frac{A}{(1 - 3x)} + \frac{B}{(2 + x)} + \frac{C}{(2 + x)^2}, \quad |x| < \frac{1}{3}.$

(a) Find the values of A and C and show that $B = 0$.

(4)

(b) Hence, or otherwise, find the series expansion of $f(x)$, in ascending powers of x , up to and including the term in x^3 . Simplify each term.

(7)

[January 2006]