

Write your name here

Surname

Other Names

AS/A Level Mathematics

Binomial Expansion

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled..
- Answer the questions in the spaces provided
– there may be more space than you need.
- You should show sufficient working to make your methods clear.
Answers without working may not gain full credit.
- Answers should be given to three significant figures unless otherwise stated.

Information

- The marks for **each** question are shown in brackets
– use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

1 Work out the first four terms, in ascending powers of x , in the binomial expansion of $\frac{1}{(1+x)^2}$

(Total for question 1 is 3 marks)

2 (a) Expand $(4 + 6x)^{-\frac{1}{2}}$ in ascending powers of x up to and including x^3 (4)

(b) Write down the range of values of x for which the expansion is valid. (1)

(Total for question 2 is 5 marks)

3 (a) Expand $(8 + 12x)^{\frac{1}{3}}$ in ascending powers of x up to and including x^3 (4)

(b) Write down the range of values of x for which the expansion is valid. (1)

(Total for question 3 is 5 marks)

4 (a) Expand $\sqrt[3]{1 + 2x}$ in ascending powers of x up to and including x^3 and state the set of values of x for which the expansion is valid. (5)

(b) Use your expansion to find an approximation for $\sqrt[3]{1.1}$ to 5 decimal places. (2)

(Total for question 4 is 7 marks)

5 (a) Work out the first three terms in the binomial expansion of $\frac{1}{(2 + 3x)^2}$ (4)

(b) Write down the range of values of x for which the expansion is valid. (1)

(Total for question 5 is 5 marks)

6 (a) Expand $(3 + 2x)^{\frac{1}{2}}$ in ascending powers of x up to and including x^3 (4)

(b) Write down the range of values of x for which the expansion is valid. (1)

(c) Use your expansion, with $x = 0.1$, to find an approximation of the value of $\sqrt{5}$
Give your answer to 3 decimal places. (3)

(Total for question 6 is 8 marks)

7 (a) Expand $(1 + 3x)^{-3}$ in ascending powers of x up to and including x^3 (4)

(b) Write down the range of values of x for which the expansion is valid. (1)

(c) Use your expansion to find the expansion of $\frac{2x + 1}{(1 + 3x)^3}$ up to and including x^3 (3)

(Total for question 7 is 8 marks)

8 (a) Expand $(9 - 2x)^{\frac{1}{2}}$ in ascending powers of x up to and including x^3 (4)

(b) Write down the range of values of x for which the expansion is valid. (1)

(c) Use your expansion, with a suitable value of x , to find the value of $\sqrt{8.9}$
correct to 5 significant figures (2)

(Total for question 8 is 7 marks)