

Write your name here

Surname

Other Names

AS/A Level Mathematics

The 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 (a) Find the first 3 terms in ascending powers of x of the binomial expansion of $\left(2 + \frac{x}{2}\right)^6$ (4)
- (b) Use your expansion to find an estimate for the value of 2.05^6 (2)
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- (Total for question 1 is 6 marks)**

- 2 (a) Find the first 3 terms in ascending powers of x of the binomial expansion of $\left(2 - \frac{x}{8}\right)^7$ (4)
- $f(x) = (ax + b)\left(2 - \frac{x}{8}\right)^7$ where a and b are constants
- Given that the first two terms, in ascending powers of x , in the series expansion of $f(x)$ are 384 and $-104x$
- (b) Find the values of a and b (4)
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- (Total for question 2 is 8 marks)**

- 3 (a) Fully expand $(p + q)^5$ (4)
- The probability of Dave being late for school on any day is 0.1 . Let p represent the probability that Dave is late on a given day.
- (b) Using the last two terms of the binomial expansion, or otherwise, find the probability that Dave is late no more than one time in a school week. (3)
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- (Total for question 3 is 7 marks)**

- 4 (a) Expand $(1 + 4x)^8$ in ascending powers of x , up to and including x^3 , simplifying each coefficient in the expansion. (5)
- (b) Showing your working clearly, use your expansion to find, to 5 significant figures an approximation for 1.04^8 . (2)
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- (Total for question 4 is 7 marks)**

- 5 (a) Find the first four terms, in ascending powers of x , of the binomial expansion $(2 + kx)^6$ (4)
- Given that the coefficient of the x^3 term in the expansion is -20
- (b) Find the value of k (3)
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- (Total for question 5 is 7 marks)**

- 6 (a) Find the first three terms, in ascending powers of x , of the binomial expansion $(1 - 2x)^5$ (4)
- (b) Find the first three terms, in ascending powers of x , of the binomial expansion $(1 + x)(1 - 2x)^5$ (3)
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- (Total for question 6 is 7 marks)**