

Write your name here

Surname

Other Names

AS/A Level Mathematics

Algebraic Expressions

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 Simplify $\left(\frac{125x^6}{64}\right)^{\frac{1}{3}}$

(Total for question 1 is 2 marks)

2 Simplify $\frac{(2x^{\frac{1}{2}})^3}{4x^2}$

(Total for question 2 is 2 marks)

3 Simplify $\left(\frac{216x^6}{27y^3}\right)^{-\frac{2}{3}}$

(Total for question 3 is 2 marks)

4 Express 9^{3x+2} in the form 3^y , giving y in the form $ax + b$, where a and b are constants.

(Total for question 4 is 2 marks)

5 Express 8^{2x-5} in the form 2^y , giving y in the form $ax + b$, where a and b are constants.

(Total for question 5 is 2 marks)

6 Given $y = 2^x$

(a) Express 4^x in terms of y .

(2)

(b) Hence, or otherwise, solve $4^x - 6(2^x) - 16 = 0$

(3)

(Total for question 6 is 5 marks)

7 Solve: $2^{2x+1} - 5(2^x) - 12 = 0$

(Total for question 7 is 5 marks)

8 Solve the equation $8^{2x-5} = 2^{x+1}$

(Total for question 8 is 3 marks)

9 (a) Solve the equation: $x^2 - 9x + 8 = 0$

(2)

(b) Hence solve the equation: $y^3 - 9y^{\frac{3}{2}} + 8 = 0$

(2)

(Total for question 9 is 4 marks)

10 Find the value of x such that

$$8^{x+1} = 4^{3x-1}$$

(Total for question 10 is 3 marks)

11 Factorise completely: $x - 16x^3$

(Total for question 11 is 2 marks)

12 Factorise completely: $75x - 12x^3$

(Total for question 12 is 2 marks)

13 Expand and Simplify: $(2x - 1)(x + 2)(x - 3)$

(Total for question 13 is 2 marks)

14 Expand and Simplify: $(3x - 2)(x - 5)^2$

(Total for question 14 is 2 marks)

15 Find the value of x such that

$$\frac{1+x}{x} = \sqrt{5}$$

Giving your answer in the form $a + b\sqrt{5}$ where a and b are rational numbers.

(Total for question 15 is 4 marks)

16 Show that $\frac{5 + \sqrt{3}}{2 - \sqrt{3}}$ can be written as $13 + 7\sqrt{3}$

(Total for question 16 is 3 marks)

17 Show that $\frac{5 + 2\sqrt{3}}{2 + \sqrt{3}}$ can be written as $4 - \sqrt{3}$

(Total for question 17 is 3 marks)

18 Show that $\frac{1 - \sqrt{2}}{3 + 2\sqrt{2}}$ can be written as $7 - 5\sqrt{2}$

(Total for question 18 is 3 marks)