



# Cambridge International AS & A Level

CANDIDATE  
NAME

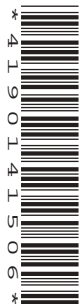
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CENTRE  
NUMBER

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## FURTHER MATHEMATICS

9231/11

Paper 1 Further Pure Mathematics 1

May/June 2022

2 hours

You must answer on the question paper.

You will need: List of formulae (MF19)

### INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

### INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.











(b) Show that  $u_{n+1} < u_n$  for  $n \geq 1$ .

[3]





- (c) Find also the value of  $\frac{1}{\alpha^9} + \frac{1}{\beta^9} + \frac{1}{\gamma^9}$ . [2]



(c) Sketch  $C$ , stating the coordinates of the intersections with the axes.

[3]

.....

(d) Sketch the curve with equation  $y = \left| \frac{2x^2 - x - 1}{x^2 + x + 1} \right|$  and state the set of values of  $k$  for which  $\left| \frac{2x^2 - x - 1}{x^2 + x + 1} \right| = k$  has 4 distinct real solutions. [2]



















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