

Please check the examination details below before entering your candidate information

Candidate surname	Other names
<b>Pearson Edexcel</b>	Centre Number
<b>Level 3 GCE</b>	Candidate Number
Specimen Paper	Paper Reference <b>8FM0/22</b>
<b>Further Mathematics</b> <b>Advanced Subsidiary</b> <b>22: Further Pure Mathematics 2</b>	
<b>You must have:</b> Mathematical Formulae and Statistical Tables, calculator	Total Marks

**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, centre number and candidate number.
- 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

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 4 questions in this question paper. The total mark for this paper is 40.
- 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.

*Turn over* ►

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Answer ALL questions. Write your answers in the spaces provided.

1. (i) The set  $G = \{1, 3, 4, 9, 10, 12\}$  forms a group under the operation of multiplication modulo 13
- (a) Complete the Cayley table below, Table 1, for this group. (3)
- (b) Find a subgroup of  $(G, \times_{13})$  of order 3 (1)
- (c) Explain why there can be no subgroup of  $(G, \times_{13})$  of order 4 (1)
- (ii) Determine whether the set  $\{1, 3, 6, 9, 12\}$  under the operation of multiplication modulo 15 forms a group. (3)

$\times_{13}$	1	3	4	9	10	12
1		3				
3			12			
4						
9			10			
10	10					
12					3	

Table 1

A spare table can be found on page 3 if you need to rewrite your Cayley table.

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Question 3 continued

Lined area for writing the answer to Question 3.

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