

ERUVIO MENTORING · EXTERNAL-STYLE EXAMINATION

Specialist Mathematics

Units 1 and 2 · Combinatorics, proof, vectors and matrices; complex numbers and trigonometry

Paper 2 · Section 1

MULTIPLE CHOICE · 10 MARKS

STUDENT DETAILS

GIVEN NAME(S)

FAMILY NAME

SCHOOL

DATE

BOOK OF

DO NOT WRITE ON THIS PAGE

Structure of this examination

PAPER	SECTION	QUESTION TYPE	TIME	MARKS
Paper 1 TECHNOLOGY-FREE	Section 1	Multiple choice, 10 questions	5 min perusal	10
	Section 2	Short response, 9 questions	90 min working	55
Paper 2 TECHNOLOGY-ACTIVE	Section 1	Multiple choice, 10 questions	5 min perusal	10
	Section 2	Short response, 9 questions	90 min working	55
Total		38 questions	190 minutes	130

Degree of difficulty

Every question in this examination is tagged with its degree of difficulty. The tag appears in brass beside the marks.

DEGREE OF DIFFICULTY	MARKS	PROPORTION
Simple familiar SF	78	60%
Complex familiar CF	26	20%
Complex unfamiliar CU	26	20%
Total	130	100%

Instructions

- **Perusal time: 5 minutes. Working time: 90 minutes.**
- **This is the technology-active paper.** A QCAA-approved graphics calculator or CAS may be used, and the QCAA formula book is provided.
- Write using black or blue pen. Planning paper will not be marked.
- All questions are drawn from Unit 1 (combinatorics, proof, vectors and matrices) and Unit 2 (complex numbers, trigonometry, functions and matrices).
- **Each question is tagged with its degree of difficulty** in brass beside the marks: **SF** simple familiar, **CF** complex familiar, **CU** complex unfamiliar.
- **Section 1 contains 10 multiple choice questions.** Choose the best answer for each and record it on the response grid provided.

Answers must be recorded on the response grid on the final page. Marks are not deducted for incorrect answers, so attempt every question.

- 1 Eight different books are arranged on a shelf. The number of arrangements in which three particular books stand together is
 - A 720
 - B 4320
 - C 40 320
 - D 120 960

- 2 Correct to two decimal places, the angle between the vectors $3\mathbf{i} + 4\mathbf{j}$ and $-\mathbf{i} + 2\mathbf{j}$ is
 - A 26.57°
 - B 45.00°
 - C 53.13°
 - D 63.43°

- 3 The argument of the complex number $-1 + i\sqrt{3}$ is
 - A $2\pi/3$
 - B $3\pi/4$
 - C $5\pi/6$
 - D $4\pi/3$

- 4 The matrix $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ represents
 - A a reflection in the line $y = x$.
 - B a rotation of 90° clockwise about the origin.
 - C a rotation of 90° anticlockwise about the origin.
 - D a dilation of factor -1 from the origin.

- 5 The number of solutions of $2 \sin^2(x) + \sin(x) - 1 = 0$ for $0 \leq x \leq 2\pi$ is
 - A 2
 - B 3
 - C 4
 - D 6

- 6 The magnitude of the projection of $5\mathbf{i} + 2\mathbf{j}$ onto $3\mathbf{i} + 4\mathbf{j}$ is
 - A 1.84
 - B 2.76
 - C 3.68
 - D 4.60

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The inverse of $\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}$ is

A $\begin{bmatrix} 2 & -1 \\ -3 & 2 \end{bmatrix}$

B $\begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$

C $\begin{bmatrix} -2 & 1 \\ 3 & -2 \end{bmatrix}$

D $\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}$

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The complex number $3 + 3i$ written in polar form is

A $3 \operatorname{cis}(\pi/4)$

B $6 \operatorname{cis}(\pi/3)$

C $3\sqrt{2} \operatorname{cis}(\pi/4)$

D $3\sqrt{2} \operatorname{cis}(\pi/3)$

9

Correct to four decimal places, the exact value of $\sin(75^\circ)$ evaluates to

A 0.2588

B 0.9659

C 1.2247

D 1.9319

10

A committee of 5 is chosen from 12 people. One particular person must be included and another particular person must be excluded. The number of possible committees is

A 120

B 165

C 198

D 210

Response grid

Shade or cross the box for your chosen answer

Question	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

END OF SECTION 1