**

**Mathematics Specialist Unit 1&2**

# Test 6

**Matrices and Complex Numbers**

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| **Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Total Marks:\_\_\_\_\_\_\_\_\_\_** |
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|  |

**Task type: Response**

**Time allowed for this task:** 60 minutes, in-class, under test conditions

Section One: Calculator-free 30 minutes ( 19marks)

Section Two: Calculator-assumed 30minutes ( 30marks)

**Materials required:** Calculator with CAS capability (to be provided by the student)

**Standard items:** Pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

**Special items:**  Drawing instruments, templates, notes on one unfolded sheet of   
A4 paper, and up to three calculators approved for use in the WACE examinations

Formula sheet

**Marks available: 60 marks**

**Task weighting: 8.5%**

**Section One : Calculator Free 27 Marks**

**Time Allowed 30 minutes**

**Question 1**

**[7 marks]**

**[8 marks]**

1. Rewrite the following in terms of matrix
2. For the non-singular matrices **and** such that **. Show that**

Let and . Find

**Question 2**

**[3 marks]**

If . Find and .

**Question 3**

**[3 marks]**

Prove that the product of a complex number and its conjugate is a real number.

**Question 4**

**[3 marks]**

The solutions to a quadratic equation are and . Determine the original quadratic equation.

Solve the following equations

**Section Two : Calculator Assumed 30 Marks**

**Time Allowed 30 minutes Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Question 6**

**[5 marks]**

**Question 7**

**[4 marks]**

Consider the system of equations:

a) Write this system as a matrix equation. (2)

b) Solve the system using matrix methods. (2)

**Question 8**

**[4 marks]**

Show the following numbers as vectors on a single Argand diagram.

|  |  |
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|  |  |

**Question 9**

**[3 marks]**

Express as the product of two linear factors.

**Question 9**

**[4 marks]**

1. Find the transformation matrix representing a rotation of 30 anti-clockwise about the origin
2. Find the transformation matrix representing a rotation of 45 anti-clockwise about the origin.
3. Hence, find the transformation matrix that represents a 75 anti-clockwise rotation about the origin.

**Question 7**

**[3 marks]**

Use matrices to find the image of the line after it is reflected in the line.