

# Baldivis Secondary College

### Semester Two Examination, 2016

### Question/Answer booklet

# MATHEMATICS

If required by your examination administrator, please place your student identification label in this box

**SPECIALIST**

**UNITS 1 AND 2**

## Section One:

## Calculator-free

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Student number: In figures |  |  |  |  |  |  |  |  |

In words

## Time allowed for this section

Reading time before commencing work: five minutes

Working time for section: fifty minutes

## Materials required/recommended for this section

***To be provided by the supervisor***

This Question/Answer booklet

Formula sheet

***To be provided by the candidate***

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

Special items: nil

## Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

## Structure of this paper

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Section | Number of questions available | Number of questions to be answered | Working  time (minutes) | Marks available | Percentage of exam |
| Section One:  Calculator-free | 7 | 7 | 50 | 51 | 35 |
| Section Two:  Calculator-assumed | 13 | 13 | 100 | 98 | 65 |
|  | | |  | **Total** | 100 |

## Instructions to candidates

1. The rules for the conduct of examinations are detailed in the school handbook. Sitting this examination implies that you agree to abide by these rules.

2. Write your answers in this Question/Answer booklet.

3. You must be careful to confine your response to the specific question asked and to follow any instructions that are specified to a particular question.

4. Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

5. Show all your working clearly. Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks. If you repeat any question, ensure that you cancel the answer you do not wish to have marked.

6. It is recommended that you do not use pencil, except in diagrams.

7. The Formula sheet is not to be handed in with your Question/Answer booklet.

Section One: Calculator-free 35% (51 Marks)

This section has**seven (****7)** questions. Answer **all** questions. Write your answers in the spaces provided.

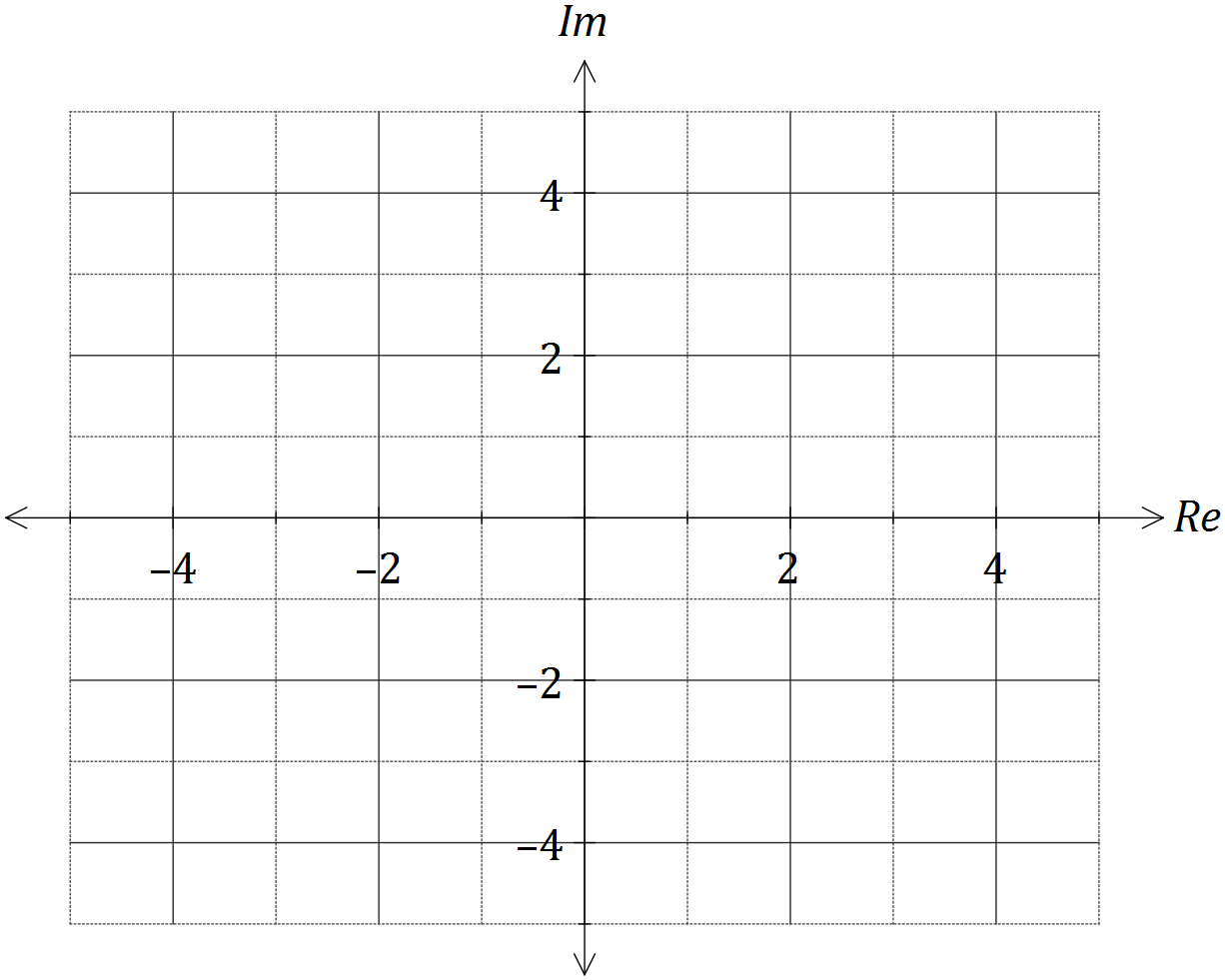
Working time for this section is 50 minutes.

Question 1 (6 marks)

(a) Determine the number of real solutions to the equation . (1 mark)

(b) Determine all complex solutions to the equation . (2 marks)

(c) and are the complex solutions to the equation . If , plot and in the complex plane below. (3 marks)



Question 2 (7 marks)

Three vectors are given by , and .

Determine

(a) a unit vector d, parallel to . (3 marks)

(b) the value(s) of k so that the magnitude of the vector is 4. (4 marks)

Question 3 (9 marks)

Consider the matrices , , and .

(a) It is possible to form the product of all four matrices. State the dimensions of the resulting product. (2 marks)

(b) Determine the matrix . (2 marks)

(c) Determine the inverse of matrix A. (2 marks)

(d) Clearly show use of matrix algebra to solve the system of equations and . (3 marks)

Question 4 (7 marks)

Let and .

(a) Simplify

(i) . (1 mark)

(ii) . (2 marks)

(iii) . (2 marks)

(b) Show that . (2 marks)

Question 5 (7 marks)

(a) Solve the equation for . (3 marks)

(b) Prove that . (4 marks)

Question 6 (7 marks)

(a) Determine the value(s) of a for which the matrix is singular. (2 marks)

(b) The non-singular matrix B is such that and .

(i) Use these results to show that . (2 marks)

(ii) Determine . (3 marks)

Question 7 (8 marks)

(a) Prove that the sum of any three consecutive terms of an arithmetic sequence with first term a and common difference d is always a multiple of three, for . (3 marks)

(b) Use mathematical induction to prove that is always divisible by 12, for .

(5 marks)

Additional working space

Question number: \_\_\_\_\_\_\_\_\_

Additional working space

Question number: \_\_\_\_\_\_\_\_\_

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