# Rossmoyne Senior High School

### Year 11 Examination, 2014

### Question/Answer Booklet

**SOLUTIONS**

# MATHEMATICS: SPECIALIST 3A/3B

## Section One:

## Calculator-free

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Student Number: In figures |  |  |  |  |  |  |  |  |

In words

Your name

## Time allowed for this section

Reading time before commencing work: five minutes

Working time for this 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, pencils, pencil sharpener, eraser, correction fluid/tape, ruler, highlighters

Special items: nil

## Important note to candidates

No other items may be used in this section of the examination. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. 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 | 50 | 33⅓ |
| Section Two:  Calculator-assumed | 12 | 12 | 100 | 100 | 66⅔ |
|  | | | **Total** | 150 | 100 |

## Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2013*. Sitting this examination implies that you agree to abide by these rules.
2. Write your answers in the spaces provided in this Question/Answer Booklet. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

* Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
* Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

1. **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 an answer to any question, ensure that you cancel the answer you do not wish to have marked.
2. It is recommended that you **do not use pencil**, except in diagrams.

Section One: Calculator-free (50 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 (5 marks)

(a) Simplify . (1 mark)



(b) Solve for , where . (2 marks)



(c) If , determine . (2 marks)



Question 2 (10 marks)

(a) Differentiate the following with respect to , simplifying where possible.

(i) . (2 marks)



(ii) . (3 marks)



(iii) . (3 marks)



(b) Evaluate  if ,  and . (2 marks)



Question 3 (9 marks)

(a) If , determine each of the following in the form .

(i) . (2 marks)



(ii) . (2 marks)



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



(c) Determine the complex number  if . (3 marks)



Question 4 (8 marks)

The graph below shows the four functions





The coordinates of two of the stationary points on the graph are  and .

Complete the following table with the values of the constants .

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Constant |  |  |  |  |  |  |  |  |
| Value | **3** | **1** | **-2** | **0.5** | **-0.5** | **-3** | **1/3** |  |

Question 5 (7 marks)

(a) Use the identity  to prove that .

(3 marks)



(b) Solve  over the domain . (4 marks)



Question 6 (7 marks)

Let  for .

(a) Sketch the graph of  and  on the axes below. (3 marks)



(b) Find an expression for . (3 marks)



(c) Evaluate . (1 mark)



Question 7 (4 marks)

The diagram shows the two chords AC and BD intersecting at O, the centre of the circle. The area of the minor sector OAB is 50% larger than the area of the minor segment bounded by the chord CD.

The graph of  is also shown.



Determine the value of  in radians, correct to one decimal place.

Sector area  segment area



Add line  to graph and read off intersection:



Additional working space

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

Additional working space

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

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