****

**Semester One Examination 2011**

**Question/Answer Booklet**

**MATHEMATICS**

**3C/3D**

**Section One:**

**Calculator-free**

 Student Name:

**Time allowed for this section**

Reading time before commencing work: Five (5) minutes

Working time for this section: Fifty (50) minutes

**Material 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, 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 | 8 | 8 | 50 | 40 | 33 1/3  |
| Section Two:Calculator-assumed | 11 | 11 | 100 | 80 | 66 2/3 |
|  |  |  |  | 120 | 100 |

**Instructions to candidates**

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2010*. 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.

3. **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.

4. It is recommended that you **do not use pencil** except in diagrams.

**Section One: Calculator-free (40 Marks)**

This section has **eight (8)** questions. Answer **all** questions. Write your answers in the space provided.

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.

The working time for this section is 50 minutes.

**Question 1 (4 marks)**

Solve the system of equations 

**Question 2 (7 marks)**

Differentiate each of the following:

(You do not need to perform more than the most obvious algebraic simplifications)

|  |  |  |
| --- | --- | --- |
| (a) |  | (2 marks) |
|  |  |  |
| (b) |  | (2 marks) |
|  |  |  |
| (c) |  | (3 marks) |

**Question 3 (6 marks)**

For which value(s) of x is:

|  |  |  |
| --- | --- | --- |
| (a) |  | (2 marks) |
|  |  |  |
| (b) |  | (4 marks) |

**Question 4 (5 marks)**

Fred is selling raffle tickets and will sell *x* of them at $ each.

How many need he sell to maximise his total sales?

Clearly demonstrate that your solution is a relative maximum.

**Question 5 (3 marks)**

Take a sequence of 5 consecutive positive integers, such as 7, 8, 9, 10 and 11.

If you subtract the product of the first and last integer from the product of the second and second last you will get, in this case, 

Prove that, for any sequence of 5 consecutive positive integers, the difference between the product of the first and last and the product of the second and second last is always 3.

**Question 6 (6 marks)**

For  and , determine:

1. the domain of  (1 mark)
2. the range of  (1 mark)
3.  (1 mark)
4. the domain and the range of  (3 marks)

**Question 7 (5 marks)**

Describe, or illustrate with a sketch, how a polynomial curve  behaves under each of these separate conditions:

1. 
2. the gradient is increasing
3.  changes sign
4.  but  nearby

**Question 8 (4 marks)**

*AB* is the diameter of a circle with centre *O*, as shown.

*C* and *D* are located on the circumference such that 

If , determine .

Give reasons for all statements made.

**Additional working space**

Question number(s):