



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.

Important note to candidates

Special items: **nil**

Standard items: pens, pencils, pencil sharpener, eraser, correction fluid/tape, ruler, highlighters
To be provided by the candidate

Formula sheet

This Question/Answer booklet

To be provided by the supervisor

Material required/recommended for this section

Working time for paper: fifty minutes
 Reading time before commencing work: five minutes

Time allowed for this section

Please circle your teacher's name: S Ebert T Hosking S Rowden

Your name: _____

Calculator-free

Section One:

3C/3D (Year 12)

MATHEMATICS

Question/Answer Booklet

Semester 1 Examination, 2012

STRIVE FOR THE HIGHEST

DENPHOS COLLEGE

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Working time (minutes)	Marks available
Section One: Calculator-free	8	8	50	50
Section Two: Calculator-assumed	13	13	100	100
				150

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2012*. 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.

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Additional working space

Question number(s): _____

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[3]

- (b) If $P(A \cup B) = 0.7$ determine $P(B/A)$.

[1]

- (a) Given A and B are events with $P(A) = 0.3$ and $P(B) = 0.5$. State the values of m and n for $m \leq P(A \cup B) \leq n$.

(4 marks)

Question 1

Working time for this section is 50 minutes.

- Number of the question(s) that you are continuing to answer at the top of the page.
- Original answer space where the answer is continued, i.e. give the top page number.
 - Continuing an answer if you need to use the space to continue an answer indicated in the margin.
 - Planning: if you use the spare pages for planning, indicate this clearly at the top of the page.
 - Planning: if you use the spare pages for planning, indicate this clearly at the top of the page.
 - And/or as additional space if required to continue an answer.

Spare pages are included at the end of this booklet. They can be used for planning your responses

Section One: Calculator-free
(50 Marks)

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

MATHEMATICS 3C/3D
CALCULATOR-FREE
SEMESTER ONE 2012
SECTION ONE
MATHEMATICS 3C/3D
CALCULATOR-FREE

Question 2

(7 marks)

Find the derivative of each of the following: [DO NOT SIMPLIFY YOUR ANSWER]

(a) $7x^3 - \frac{3}{x} + 4\pi$

[1]

(b) $(\sqrt{2x})(1+x)^2$

[2]

(c) $\frac{x}{\sqrt{2x-3}}$

[2]

(d) $\int_1^{2x} (t^3 + t^2) dt$

[2]

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Question 8 continued

(c) Hence determine the Lumen capacity of each of the stage lights Aa, Bb and Cc.

[2]

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Question 3

Make use of the chain rule (with Leibniz notation), to determine:

$$\frac{dy}{dz}, \text{ if } z = \frac{1}{3x} \text{ and } y = \frac{x-3}{4}$$

(5 marks)

Question 8

(7 marks)

Lumen (lm) is the unit of total light output from a light source. Three stage lights, Aa, Bb and Cc, of different light outputs are positioned above the stage in the Rixton Theatre. If all of the three stage lights are put on at 50% capacity a total output of 1200 lm lights up the stage. If Aa is turned on 50% and Bb is turned on 100% capacity, then 1000 lm lights up the stage and if 50% of Bb and 100% of Cc are turned on, 1300 lm lights up the stage.

$$\begin{aligned} x + y + z &= 24 \\ x + 2y &= 20 \\ y + 2z &= 26 \end{aligned}$$

(b) Solve the system of equations

[3]

[2]

$$\begin{aligned} x + y + z &= 24 \\ x + 2y &= 20 \\ y + 2z &= 26 \end{aligned}$$

(a) Write three equations to represent this information.

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(7 marks)

Question 4

Given $f(x) = x + 3$ and $g(x) = \frac{2}{x-3} + x$:

(a) show that $g \circ f(x) = \frac{x^2+3x+2}{x}$

[3]

(b) determine when $g \circ f(x) \geq 0$

[4]

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Question 7 continued

(b) Simplify $\frac{x-2}{x+3} - \frac{4}{5x^2+14x-3} + 1$

[3]

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QUESTION

MATHEMATICS 3C/3D
CALCULATOR-FREE
MATHEMATICS 3C/3D
CALCULATOR-FREE

7

SEMESTER ONE 2012
SECTION ONE

Question 5

Find the maximum and minimum values of the function
 $f(x) = 104 + 8x + \frac{288}{x}$, over the
interval $1 \leq x \leq 7$.

(5 marks)

ANSWER



See next page

See next page

10

SEMESTER ONE 2012
SECTION ONE

Question 7
(7 marks)

ANSWER

(a) Solve
$$\frac{3x+9}{x} - \frac{x^2-9}{6} = 0$$

[4]

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Question 6

(8 marks)

(a) Integrate each of the following with respect to x . DO NOT SIMPLIFY

(i) $3 - 2x$

[1]

(ii) $\frac{6x - 4}{\sqrt{x}}$

[2]

(iii) $-3(5 - x)^{\frac{3}{4}} + \frac{1}{2x^2}$

[3]

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Question 6 continued

(b) $\int \frac{2ax + b}{(ax^2 + bx + c)^2} dx$

where a and b are constants. Simplify the answer.

[2]

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