SECTION 1

Question	Available Marks	Your Mark
1	4	
2	5	
3	8	
4	8	
5	9	
6	9	
7	7	
TOTAL	50	

PERTH COLLEGE

Year 12

Semester Two Examination 2012

Question/Answer booklet

MATHEMATICS 3C/3D
Section One:
Calculator-free

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

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(blue/black preferred), pencils(including coloured), 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	$33\frac{1}{3}$
Section Two: Calculator-assumed	13	13	100	100	$66\frac{2}{3}$
			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 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.

5. The Formula Sheet is not handed in with your Questions/Answer Booklet.

DO NOT WRITE IN THIS AREA

Additional working space

Question number(s): _____

Additional working space

Question number(s): _____

DO NOT WRITE IN THIS AREA

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 **(4 marks)**

For the two independent events A and B, $P(A) = 0.3$ and $P(B) = 0.1$.

Calculate

(a) $P(\overline{B})$ (1 mark)

(b) $P(A \cap B)$ (1 mark)

(c) $P(A \cup \overline{B})$ (1 mark)

(d) $P(\overline{A} \mid B)$ (1 mark)

Question 2 **(5 marks)**

Solve the system of equations

$$3x + 2y + 6z = 3$$
$$x + 3y + 4z = 9$$
$$2x + 8 = 2z + y$$

See next page

Question 7 **(7 marks)**

A closed cylindrical can of radius r cm has a volume of 250π cm³.

(a) Show that the total surface area, A cm², of this can is given by $A = \frac{500\pi}{r} + 2\pi r^2$. (2 marks)

(b) Determine the minimum possible surface area of the can, in terms of π and the radius and height required to achieve this optimum area. (5 marks)

End of Questions

Question 6 **(9 marks)**

(a) Determine $\int x(3x^2 + 6x)^4 + (3x^2 + 6x)^4 \, dx$ (3 marks)

(b) Calculate the area bounded by the functions $f(x) = (x - 2)^2 - 3$ and $g(x) = 2x - 4$. (6 marks)

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Question 3 **(8 marks)**

(a) Differentiate the following with respect to x. There is no need to simplify your answer.

(i) $y = 2x^3\sqrt{3 - x^2}$ (2 marks)

(ii) $y = \dfrac{1 + e^{3x-1}}{2e^{-x^2}}$ (3 marks)

(b) Simplify $\dfrac{d}{dx}\int_2^{x^2}\left(\dfrac{t^2}{3}\right)dt$ (3 marks)

See next page

Question 4 **(8 marks)**

(a) Determine the maximum and minimum values of the function $y=2x+\frac{27}{x^2}$ over the domain $1\le x\le 7$.

(4 marks)

(b) A drinking glass is shaped by rotating the curve $y=\sqrt{x}$ around the *x* axis from 0 to *h*, where *h* is the height of the glass.

(i) Write an expression in terms of *h* for the volume of the glass.

(2 marks)

(ii) Determine the height of one of these drinking glasses if it is to have a volume of 120cm^3. Give your answer in terms of π.

(2 marks)

See next page

Question 5 **(9 marks)**

Let $f(x)=\frac{1}{1-x}$ and $g(x)=e^{2x}$.

(a) Determine the domain of $f(g(x))$. (2 marks)

(b) Determine the range of $g(f(x))$. (3 marks)

(c) Solve $f(|x|)\ge -x+1$ (4 marks)

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