

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

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

Materials required/recommended for this section
To be provided by the Supervisor
This Questionnaire/Answer Booklet
Formula Sheet

Reading time before commencing work: five minutes **Working time for this section:** **five minutes**

Your name
In words
Student Number: In figures

MATHEMATICAL
3C/3D
Section One:
Calculator-Free

Copying or communication for any other purposes can only be done within the terms of the Copyright Act or within prior written permission of WA Examination papers.

Published by WA Examination Papers
PO Box 445 Claremont WA 6910

	PERTH MODERN SCHOOL EXCEPTIONAL LEARNING. EXCEPTIONAL STUDENTS.
MATHEMATICS	
3C/3D	
Student Name	
Teacher Name	
Section One	



End of Year Examination, 2011

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
Section Two: Calculator-assumed	12	12	100	80	67
Total			120	100	

Additional working space

Question number: _____

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2011*. 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.

(4 marks)

- MATHEMATICS 3C/3D 10 CALCULATOR-FREE 3 MATHEMATICS 3C/3D
- Section One: Calculator-free
- This section has **eight (8)** questions. Answer all questions. Write your answers in the spaces provided.
- Working time for this section is 50 minutes.
- Question 1**
- Find the minimum and maximum values of $f(x) = 2x^3 - 3x^2 - 12x + 27$ over the interval $-3 \leq x \leq 3$.

- m must be a positive odd integer.
- m can be any odd integer.

Section Two: Calculator-free
(40 Marks)

The variables k and m are both integers such that $m^2 + 3 = 2k$.

(a) Use counter-examples to disprove any two of the three conjectures listed below. (2 marks)

- m can be any even integer.

Section Three: Calculator-free
(4 marks)

- (b) Using the fact that any odd integer can be written in the form $2n + 1$ or otherwise, prove that k is always the sum of three square numbers. (4 marks)

(5 marks)

Question 2

Find $\frac{dy}{dx}$ in terms of x for each of the following.

(a) $y = x(1 + 2e^{3x})$

(2 marks)

(b) $y = \int_1^x t^2 + t - 1 \, dt$

(1 mark)

(c) $y = z^3 - z$ and $z = x^2 - 9$

(2 marks)

Question 7

(4 marks)

The region in the first quadrant bounded by $x = 0$, $y = 0$ and $y = 1 - \frac{x^2}{9}$ is rotated 360° about the y -axis. If x and y are distances measured in centimetres, find the volume of the solid formed.

MATHEMATICS 3C/3D

5

CALCULATOR-FREE

CALCULATOR-FREE

8

(5 marks)

Two independent events A and B are such that $P(A) = 0.9$ and $P(B) = 0.4$.

(1 mark)

(a) Determine $\int_{e^{-0.2y}}^e dy$.

(a) Find $P(A \cup B)$.

(1 mark)

(b) Find $P(\bar{B} \mid \bar{A} \cup B)$.

(2 marks)

$$(b) \quad \text{Determine } \int (t - 1)(1 - 2t + t^2) \, dt.$$

(2 marks)

(c) Show that A and B are also independent.

(2 marks)

(c) Evaluate $\int_6^1 \frac{x^2}{3} dx$.

(7 marks)

Two functions are defined as $f(x) = \sqrt{x - 1}$ and $g(x) = \frac{1}{x - 1}$.

(a) Evaluate $g \circ f\left(\frac{13}{9}\right)$.

(2 marks)

(b) Find in simplified form $g \circ g(x)$.

(2 marks)

(c) Determine the domain of $f(g(x))$.

(3 marks)

(4 marks)

Question 5

Solve the system of equations

$$\begin{aligned} c + 2a &= 3 + 4b \\ a + 2b + 2c &= 4 \\ 5a + 3c &= 5 + 2b \end{aligned}$$