Government of **Western Australia**
Curriculum Council

WACE
Western Australian Certificate of Education

Western Australian Certificate of Education Examination, 2010

Question/Answer Booklet

MATHEMATICS 3C/3D

Please place your student identification label in this box

Section One: Calculator-free

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

In words _____

_____

Time allowed for this section

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

Materials required/recommended for this paper

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 taken into the examination room. 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.

2010/31001

Ref: 10-136

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	
Section Two: Calculator-assumed	12	12	100	80	
			Total	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.

See next page

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.

Working time: 50 minutes.

Question 1 **(4 marks)**

Differentiate the following, without simplifying:

(a) $y = \dfrac{x-1}{x^2+4}$ (2 marks)

(b) $y = x^5 e^{-3x}$ (2 marks)

Question 2 **(4 marks)**

Determine the domain and range of $f\big(g(x)\big)$, given that $f(x) = \sqrt{1-x}$ and $g(x) = 3^x - 8$

Question 3 **(5 marks)**

Find the maximum and minimum values over the interval $1 \leq x \leq 5$ of the function

$$f(x) = 3x + \frac{16}{x^3}$$

Question 4 **(3 marks)**

Solve for x the inequality

$$\frac{1}{x-1} < \frac{1}{x+1}$$

See next page

Question 5 **(6 marks)**

(a) Evaluate $\int_1^3 (x^3 - 1)dx$ (3 marks)

(b) Determine $\int x(1 - x^2)^{10}dx$ (3 marks)

Question 6 **(3 marks)**

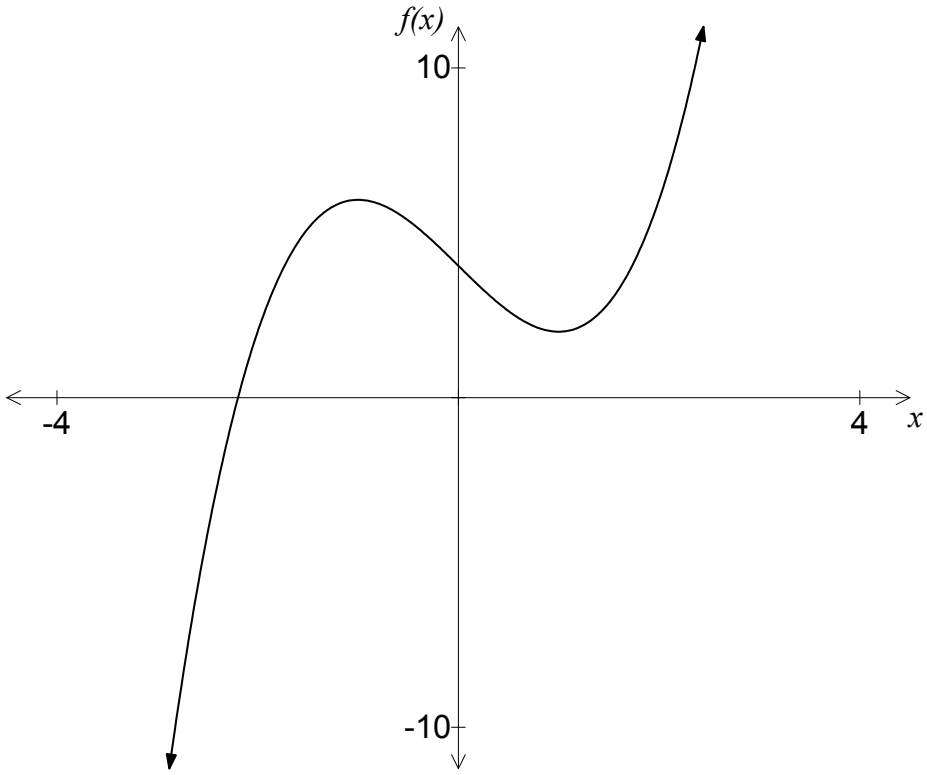
A certain type of computer password is 8 characters long. Six of the characters are lower-case letters from the English alphabet, i.e. members of the 26-element set $\{a, b, c, \ldots, x, y, z\}$. The other 2 characters are decimal digits. However, the decimal digits must occur consecutively. So $gyjp53iw$ is a possible password, but $af4tfz0y$ is not.

How many possible passwords are there? Give your answer as an arithmetical expression, without evaluating.

See next page

Question 7 **(10 marks)**

The graph of $y = f(x) = x^3 - 3x + 4$ is shown below.



(a) Determine the coordinates of the turning points of the function f (3 marks)

(b) For what values of x is it true that $f'(x) < 0$ and $f''(x) > 0$? (2 marks)

(c) Without integrating, use the graph of $y = f(x)$ to explain why $\int_{-1}^{1} f(x)dx = 8$ (2 marks)

The function $g(x)$ is defined by $g(x) = f(2x)$

(d) Show that $g(x) = 8x^3 - 6x + 4$ (1 mark)

(e) Sketch on the axes on page 6 the graph of $y = 8x^3 - 6x + 4$ (2 marks)

See next page

Question 8 **(5 marks)**

Solve the system of equations

$$x - 4y - 3z = 1$$
$$x + 2y + 3z = 4$$
$$3x - 8y - z = 1$$

End of questions

Additional working space

Question number: _____

Additional working space

Question number: _____

Additional working space

Question number: _____

Published by the Curriculum Council of Western Australia
27 Walters Drive
OSBORNE PARK WA 6017

DO NOT WRITE IN THIS AREA