



Examination, 2014 Western Australian Certificate of Education

Question/Answer Booklet

(<u> </u>
	Ensure the label is straight and within the lines of this box.
	Place one of your candidate identification labels in this box.

(if applicable):

answer booklets used

Number of additional

Calculator-free
Section One:
3C\3D
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Materials required/recommended for this section

Reading time before commencing work: five minutes

To be provided by the supervisor

Time allowed for this section

This Question/Answer Booklet

Working time for section:

Formula Sheet

To be provided by the candidate

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener,

correction fluid/tape, eraser, ruler, highlighters

Special items:

Important note to candidates

examination room. If you have any unauthorised material with you, hand it to the supervisor that you do not have any unauthorised notes or other items of a non-personal nature in the No other items may be taken into the examination room. It is your responsibility to ensure

before reading any further.

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CANNINGTON WA 6107 303 Sevenoaks Street

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MATHEMATICS 3C/3D 2 CALCULATOR-FREE

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	9	9	50	50	331⁄3
Section Two: Calculator-assumed	13	13	100	100	662/3
				Total	100

Instructions to candidates

- The rules for the conduct of Western Australian external examinations are detailed in the Year 12 Information Handbook 2014. Sitting this examination implies that you agree to abide by these rules.
- 2. Write your answers in this Question/Answer Booklet.
- You must be careful to confine your response to the specific question asked and to follow any instructions that are specified to a particular question.
- 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 that you are continuing to answer at the top of the
 page.
- 5. 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 any question, ensure that you cancel the answer you do not wish to have marked.
- 6. It is recommended that you do not use pencil, except in diagrams.
- 7. The Formula Sheet is **not** to be handed in with your Question/Answer Booklet.

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CALCULATOR-FREE	15	MATHEMATICS 3C/3D
Additional working space		
Question number:		

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Write your answers in the spaces	swer all questions.	This section has nine (9) questions. An
(50 Marks)		Section One: Calculator-free
MATHEMATICS 3C/3D	3	CALCULATOR-FREE

number of the question that you are continuing to answer at the top of the page. original answer space where the answer is continued, i.e. give the page number. Fill in the • Continuing an answer: If you need to use the space to continue an answer, indicate in the Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.

responses and/or as additional space if required to continue an answer.

CALCULATOR-FREE

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Question number:

Additional working space

MATHEMATICS 3C/3D

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(c) $\frac{d}{dx} \int_{x^2}^{x^2} \frac{2}{3t^3 - 1} dt$

 $xp\left(\frac{1+z^{x}}{s^{x}}\right)\frac{xp}{p} \int_{0}^{z} (q)$

(a) $\int_{0}^{\pi} (6x^{2} + 2x + 1) dx$

Evaluate the following:

Working time: 50 minutes.

Cuestion 1

(3 marks)

(3 marks)

(3 marks)

(6 marks)

Question 2

(a) Simplify the expression $2 - \frac{1}{2 - \frac{1}{x}}$

(7 marks) (3 marks)

(b) Solve the inequality $\frac{2x^3}{(x-2)(x+4)} > 0$.

(4 marks)

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Question number: _

CALCULATOR-FREE

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	of the uppermost faces is	Question 3 When two fair six-sided dice are ro odd. Event 8 occurs when the sun Explain whether events 4 and 8 are answer.	DO NOT WRITE IN THIS AREAAS IT WILL BE CUT OFF	DO NOT WRITE IN THIS AREA AS IT WILL BE CUT OFF	
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Additional working space		
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Question number: _

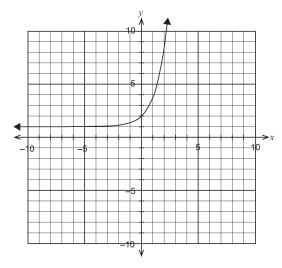
MATHEMATICS 3C/3D

CALCULATOR-FREE

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Question 4 (8 marks)

The function $f(x) = e^x + 1$ is graphed on the axes below.



(a) On the same axes, sketch the following functions, showing all relevant features. Label each graph.

(i) f(x-3) (2 marks)

(ii) f(-2x) (3 marks)

See next page

CALCULATOR-FREE 11 MATHEMATICS 3C/3D

Question 9 (3 marks)

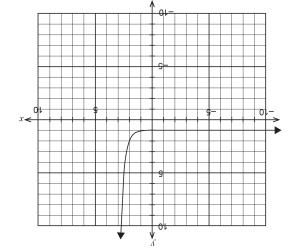
The derivatives of the sequence $1, x, x^2, x^3, \ldots, x^{n-1}$ are $0, 1, 2x, 3x^2, \ldots, (n-1)x^{n-2}$. If the sum of the power series $1+x+x^2+x^3+\ldots+x^{n-1}=\frac{1-x^n}{1-x}$, show that the sum of the series of

derivatives
$$1 + 2x + 3x^2 + ... + (n-1)x^{n-2} = \frac{x^n(n-1) - nx^{n-1} + 1}{(1-x)^2}$$
.

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End of questions

(b) The graph y=g(x) is drawn below. Given that $g(x)=\int (ax-6)$ where a is a constant, determine the value of a.



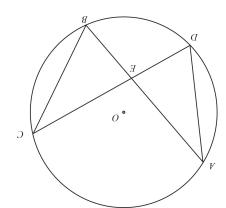
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 MATHEMATICS 3C/3D
 10
 CALCULATOR-FREE

 Question 8
 (5 marks)

Points A, B, C and D lie on the circle with centre O, as shown below, with \overline{AB} , $\overline{\overline{CD}}$, \overline{AD} and $\overline{\overline{CB}}$ chords of the same circle. Point E is the point of intersection of chords \overline{AB} and $\overline{\overline{CD}}$.



Prove $\frac{AD}{AE} = \frac{CB}{CE}$.

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MATHEMATICS 3C/3D

8

CALCULATOR-FREE

Question 5

(4 marks)

Given that $y=x^{\frac{1}{3}}$, use x=1000 and the increments formula $\delta y\approx \frac{dy}{dx}\,\delta x$ to determine an approximate value for $\sqrt[3]{1006}$.

Question 6

(6 marks)

Let f(x) = x - 7 and $g(x) = \frac{1}{x}$.

(a) State $g \circ f(x)$ with its domain and range.

(3 marks)

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b) Determine h(x) if $h \circ f(x) = 10x - 49$.

(3 marks)

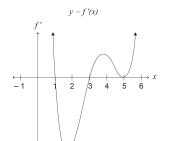
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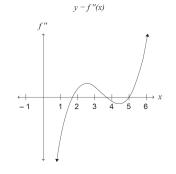
Question 7

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(4 marks)

The graphs of y = f'(x) and y = f''(x) of a function y = f(x) are shown below. The function y = f(x) passes through points (1, 4), (3, -2) and (5, 1).





(a) Determine the coordinates of the maximum and minimum points of y = f(x). (2 marks)

(b) Determine whether there exists a horizontal point of inflection. Give reasons. (2 marks)