

Government of Western Australia School Curriculum and Standards Authority

Western Australian Certificate of Education 2015

Question/Answer Booklet

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Calculator-free
Section One:
3C\3D
COLLAMAH IAM

Time allowed for this section Reading time before commencing wo	re commencing work: five minu		Number of additional answer booklets used (if applicable):			
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Student Number: In figur						

Materials required/recommended for this section

To be provided by the supervisor

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: 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.

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CANNINGTON WA 6107

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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	8	8	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 2015. 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.
- The Formula Sheet is **not** to be handed in with your Question/Answer Booklet.

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

Question number: _____

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The waiting times at a Perth railway station vary between five and 13 minutes and are distributed (e marks) Cuestion 1 Working time: 50 minutes. 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. Spare pages are included at the end of this booklet. They can be used for planning your provided. This section has eight (8) questions. Answer all questions. Write your answers in the spaces 331/3% (20 Marks) Section One: Calculator-free MATHEMATICS 3C/3D CALCULATOR-FREE

Jim has observed that 60% of the time the train arrives before T minutes. Determine the

See next page

Jim has been waiting at the station for eight minutes. What is the probability that he waits

(3 marks)

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less than 10 minutes?

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Additional working space CALCULATOR-FREE カレ **MATHEMATICS 3C/3D**

Question number:

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A small car company produces three different types of cars, models 'A', 'B' and 'C'. Model A is a two-door coupé, model B is a four-door sedan while model C is a six-wheel SUV with four doors. All three models use the same type of doors and wheels. Each coupé costs \$10 000 to make, each sedan \$30 000 and each SUV \$50 000. The company only has 72 doors in stock, 106 wheels and \$680 000 for production costs. The company notices that it is possible to use all available resources to produce a certain number of each type of vehicle.

Let x = the number of coupés, y = the number of sedans and z = the number of SUV's.

(a) Write the above information as three simultaneous equations in terms of x, y and z.

(b) Solve the simultaneous equations from part (a) to determine the number of each type of car that can be produced. (4 marks)

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CALCULATOR-FREE	13	MATHEMATICS 3C/3D

Additional working space

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	$\frac{1+x}{1-x} \ge \zeta - x$
	Solve the following inequality.
(2 marks)	Question 4
(3 шяцкг)	(b) Use your result from part (a) to determine $\int_0^1 e^{c^{x+x}} dx$.
· · · · · · · · · · · · · · · · · · ·	1
(2 marks)	(a) Determine the derivative of $e^{\epsilon^{\tau}}$.
(2 шяғка)	Question 3
MATHEMATICS 3C/3D	CALCULATOR-FREE 5

·	Question numbe
d space	Additional working

15

MATHEMATICS 3C/3D

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CALCULATOR-FREE

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MATHEMATICS 3C/3D

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CALCULATOR-FREE

Question 5

(8 marks)

The functions f and g are defined as follows:

$$f(x)=e^x, x\in R,$$

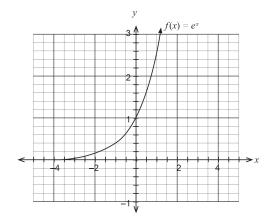
$$g(x) = 2x - 3, x \in R.$$

(a) Determine the function $f \circ g(x)$ and state its domain and range.

(3 marks)

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The function f(x) is drawn on the axes below.



(b) Sketch $f \circ g(x)$ on the axes above.

(2 marks)

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CALCULATOR-FREE

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MATHEMATICS 3C/3D

(b) Hence, or otherwise, prove that if two chords of a circle are of the same length, then both chords are equidistant from the centre. (3 marks)

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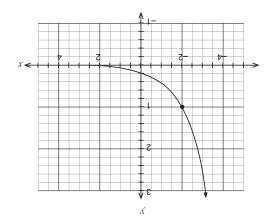
End of questions

MATHEMATICS 3C/3D

CALCULATOR-FREE

The function h is defined as h(x) = -x + a, $x \in R$ where a is a constant integer.

The function $f \circ h(x)$ is drawn below and includes the point $f \circ h(x)$.



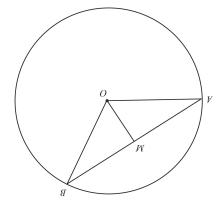
(1 mark) . b to salue of a.

(S marks) (b) On the axes above, sketch the function $y = -\int \delta h(x) + \lambda$.

> Consider the chord \overline{AB} in a circle with centre O, as in the diagram below. (e marks) Question 8

> > 10

MATHEMATICS 3C/3D



(3 marks) perpendicular to \overline{AB} . (a) Prove that if M is the midpoint of the chord \overline{AB} , then the line segment \overline{OM} is

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CALCULATOR-FREE

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MAT	HEMATICS 3C/3D	8	CALCULATOR-FREE
Ques	stion 6		(5 marks)
The f	function $f(x)$ has the following properties	:	
•	f(x) is defined for all real numbers $f(t)dt = f(x)$ $f(t) = 1$.		
(a)	Determine a function $f(x)$ that satisfies (Hint: consider the derivative of $f(x)$.)	s all of the above properties.	(3 marks)
(b)	Is the function $f(x)$ above unique? Jus	itify your answer.	(2 marks)

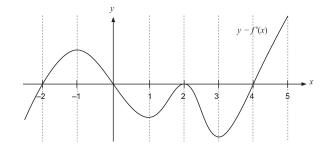
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Question 7 (9 marks)

The figure below shows the graph of the derivative f' of a function f.



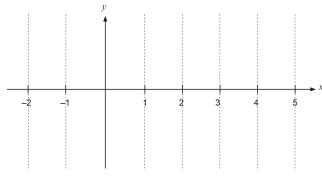
(a) For what values of x does f have a local maximum or minimum?

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For what values of x does f have an inflection point? (2 marks)

(2 marks)

- (c) Does f have a horizontal point of inflection? Explain. (2 marks)
- (d) On the axis below, sketch the graph of f ". (3 marks)



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