Rossmoyne Senior High School

Semester Two Examination, 2021

Question/Answer booklet

MATHEMATICS METHODS UNITS 1&2

Section One: Calculator-free

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

WA student number: In figures | | | | | | | | |

In words _____

Your name _____

Circle your Teacher's Name:

Mrs Bestall	Mr Buckland	Mrs Fraser-Jones
Mr Gibbon	Ms Goh/Mr Freer	Ms Leonard
Mr Luzuk	Mr Ng	Mrs Murray

Time allowed for this section

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

Number of additional answer booklets used (if applicable): ☐

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, 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 material. 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 examination
Section One: Calculator-free	8	8	50	53	35
Section Two: Calculator-assumed	13	13	100	97	65
				Total	100

Instructions to candidates

1. The rules for the conduct of examinations are detailed in the school handbook. Sitting this examination implies that you agree to abide by these rules.
2. Write your answers in this Question/Answer booklet preferably using a blue/black pen.
   Do not use erasable or gel pens.
3. You must be careful to confine your answers to the specific question asked and to follow any instructions that are specific to a particular question.
4. 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.
5. It is recommended that you do not use pencil, except in diagrams.
6. Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.
7. The Formula sheet is not to be handed in with your Question/Answer booklet.

Markers use only		
Question	Maximum	Mark
1	6	
2	6	
3	5	
4	7	
5	7	
6	5	
7	7	
8	10	
S1 Total	53	
S1 Wt (×0.6731)	35%	
S2 Wt	65%	
Total	100%	

See next page

Supplementary page

Question number: _____

DO NOT WRITE IN THIS AREA AS IT WILL BE CUT OFF

Question 8 **(10 marks)**

(a) Solve the following simultaneous equations for *x* and *y*.

$4^{x+y} = \frac{8}{2^x}$ and $0.1^{x-y} = 10^{2y+4}$ (3 marks)

(b) Determine the coordinates of the point(s) where the line $3y - x = 10$ intersects the circle with centre $(-2, 1)$ and radius 5. (7 marks)

End of questions

DO NOT WRITE IN THIS AREA AS IT WILL BE CUT OFF

Section One: Calculator-free **35% (53 Marks)**

This section has **eight** questions. Answer **all** questions. Write your answers in the spaces provided.

Working time: 50 minutes.

Question 1 **(6 marks)**

(a) Solve $(x - 6)^2 - 25 = 0$. (2 marks)

Let $g(x) = x^3 - 7x^2 + 7x + 15$.

(b) Evaluate $g(-1)$. (1 mark)

(c) Factorise $g(x)$. (3 marks)

See next page

Question 2 **(6 marks)**

(a) Evaluate $f'(3)$ when $f(x) = 10x^2 - 5x^4$. (2 marks)

(b) Determine $\frac{d}{dx}\big((5x-6)(5x+6)\big)$. (2 marks)

(c) The volume of water in a tank at time t seconds is given by $V(t) = t^3 - 3t + 1$ cm^3. Determine the instantaneous rate of change of volume when $t = 5$. (2 marks)

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Question 7 **(7 marks)**

(a) Solve the equation $\tan(3x - 15°) = 1$ when $0 \leq x \leq 90°$. (3 marks)

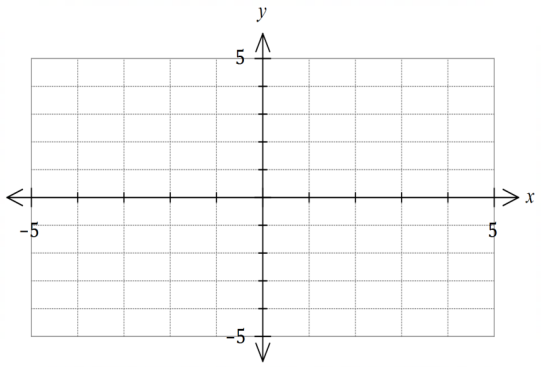
(b) In triangle ABC, the length of side AB is 12 cm, $\sin A = 0.6$ and $\sin C = 0.9$. Determine the length of side BC. (2 marks)

(c) Triangle PQR has sides of length $3, 4$ and 6 cm. Given that PR is the longest side in the triangle, determine the value of $\cos Q$. (2 marks)

Question 6 **(5 marks)**

Let $f(x) = 2^{x-3}$.

(a) Sketch the graph of $y = f(x)$ on the axes below. (3 marks)



(b) Solve algebraically $f(x) = \sqrt[3]{2}$ for x. (2 marks)

Question 3 **(5 marks)**

The quadratic function $f(x) = ax^2 + bx - 6$ has roots at $x = 1$ and $x = -3$.

(a) Determine the value of the constant a and the value of the constant b. (3 marks)

(b) State the range of the function f. (2 marks)

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Question 4 **(7 marks)**

(a) The first term of an arithmetic sequence is 4 and the 11^{th} term is three times the 4^{th} term. Determine the sum of the first 10 terms of this sequence. (4 marks)

(b) Determine S_∞ for the following geometric sequence: (3 marks)

$$\frac{7}{4}, \quad \frac{7}{16}, \quad \frac{7}{64}, \quad \frac{7}{256}, \ldots$$

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Question 5 **(7 marks)**

(a) Determine the function f given that $f(3) = 2$ and $f'(x) = 11 - 8x$. (3 marks)

(b) Determine the equation of the tangent to the curve $y = x^4 - 4x^2 + 19x + 42$ at the point where $x = -2$. (4 marks)