Rossmoyne Senior High School

Semester Two Examination, 2020

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: Koulianos   Luzuk   Rudland   Tanday

Bestall   Goh   Fraser-Jones   Freer

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	52	35
Section Two: Calculator-assumed	13	13	100	98	65
				Total	100

Instructions to candidates

Markers use only		
Question	Maximum	Mark
1	7	
2	6	
3	6	
4	6	
5	7	
6	7	
7	6	
8	7	
S1 Total	52	
S1 Wt (×0.6731)	35%	
S2 Wt	65%	
Total	100%	

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.

Supplementary page

Question number: _____

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Section One: Calculator-free **35% (52 Marks)**

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

Working time: 50 minutes.

Question 1 (7 marks)

(a) Simplify $\sqrt{9^{-3}}$. (2 marks)

(b) Write the value of xy in scientific notation when $x = 6 \times 10^6$ and $y = 2.5 \times 10^{-3}$. (2 marks)

(c) Determine the value of n given that $16^{2n} = \sqrt{32}$. (3 marks)

See next page

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Question 8 (7 marks)

The line $y = 6x + c$ is a tangent to the curve $y = 2x^3 + 3x^2 - 6x - 3$. Determine the value(s) of the constant c.

End of questions

Question 2   **(6 marks)**

Solve the following equations.

(a) $16x = 11x + 40$.   (1 mark)

(b) $4x^2 = 36x$.   (2 marks)
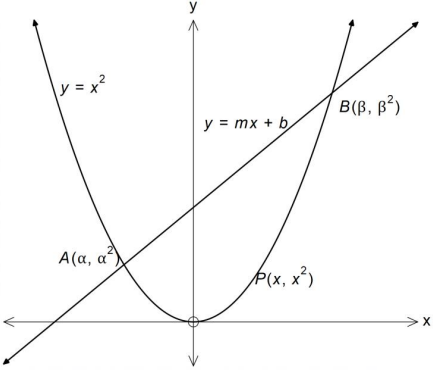
(c) $x^3 + x^2 - 17x + 15 = 0$.   (3 marks)

Question 7   **(6 marks)**

The parabola $y = x^2$ intersects with the line AB at the points $A\left(\alpha,\ \alpha^2\right)$ and $B\left(\beta, \beta^2\right)$ as shown in the diagram.

(a)   Show clearly that $\alpha + \beta = m$ and $\alpha\beta = -b$.   (4 marks)

(b)   Given that $\alpha = -2$ and that P is a point on the parabola such that the midpoint of the line segment AP is $(-0.25,\ 3.125)$. Determine the co-ordinates of the point P.   (2 marks)

Question 3　(6 marks)

(a) The turning point of a quadratic is at $(-3, -10)$ and the curve passes through $(0,8)$.
Determine the equation of the quadratic in the form $y = ax^2 + bx + c$.　(3 marks)

(b) Functions f, g and h are defined by $f(x) = 3 + \sqrt{x - 5}$, $g(x) = 2f(x)$ and $h(x) = f(x + 7)$.

State the

(i) domain of $f(x)$.　(1 mark)

(ii) range of $g(x)$.　(1 mark)

(iii) domain of $h(x)$.　(1 mark)

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Question 6　(7 marks)

(a) A sequence is defined by $T_{n+1} = T_n + 0.3$, $T_1 = 5$. Determine

(i) T_{101}.　(2 marks)

(ii) the sum of the first 101 terms of the sequence.　(2 marks)

(b) The sum to infinity of the series $4 + 4k + 4k^2 + 4k^3 + \cdots$ is 10. Determine the sum of the first three terms of the series.　(3 marks)

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Question 4   **(6 marks)**

(a)   The point $A(1, 2)$ lies on the curve with equation $y = x^3 + 2x^2 - 4x + 3$. Determine the equation of the tangent to the curve at A.   (3 marks)

(b)   Determine $g(1)$ given that $g(-1) = 8$ and $g'(x) = 8x^3 + 6x - 7$.   (3 marks)
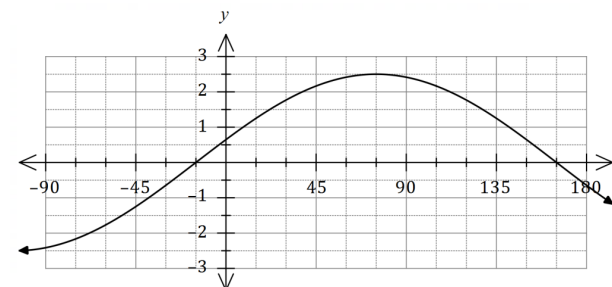
Question 5   **(7 marks)**

(a)   Part of the graph of $y = a\cos(x - \theta)$ is shown below.

State the value of the constant a and the value of the constant θ, $0° \leq \theta \leq 180°$.
                                                                  (2 marks)

(b)   i) Show that $\cos(x + y) + \cos(x - y) = k\cos x \cos y$ and state the value of the constant k.
                                                                  (2 marks)

ii) Hence or otherwise determine an exact value for $\cos 75° + \cos 15°$.   (3 marks)