

Semester Two Examination, 2022

Question/Answer booklet

MATHEMATICS  
METHODS  
UNITS 1&2

Section One:  
Calculator-free

**Student Name**

**Teacher Name**

|  |  |
| --- | --- |
| Number of additional answer booklets used (if applicable): |  |

## Time allowed for this section

Reading time before commencing work: five minutes

Working time: fifty minutes

## 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 | 7 | 7 | 50 | 52 | 35 |
| Section Two: Calculator-assumed | 12 | 12 | 100 | 98 | 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.

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

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

Working time: 50 minutes.

Question 1 (6 marks)

(a) Determine . (2 marks)

(b) Determine when . (2 marks)

(c) Determine the instantaneous rate of change of area when if the area of a region at time seconds is given by cm2. (2 marks)

Question 2 (7 marks)

(a) Expand . (2 marks)

(b) Solve the equation . (2 marks)

(c) Determine the centre and radius of the circle with equation . (3 marks)

Question 3 (9 marks)

(a) Solve the equation for . (3 marks)

(b) The periodic function is defined as .

(i) State the amplitude and period of . (2 marks)

(ii) Sketch the graph of on the axes below over the domain .

(3 marks)

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(iii) State the range of . (1 mark)

Question 4 (7 marks)

(a) Determine in simplified form when . (2 marks)

(b) Determine the value of in scientific notation when and .

(2 marks)

(c) Solve the equation . (3 marks)

Question 5 (7 marks)

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</EFOFEX>(a) Given and when , determine the value of when .

(3 marks)

(b) The height metres above the ground  
of a small body seconds after it is  
projected vertically upwards is shown  
in the position-time graph.

Given that , where and   
are constants, determine the speed of  
the body when .

(4 marks)

Question 6 (7 marks)

Let .

(a) Determine the equation of the tangent to the curve when . (4 marks)

(b) The tangent to the curve at is perpendicular to a different tangent to the same curve at point . Determine the equation of the tangent at . (3 marks)

Question 7 (9 marks)

Let .

(a) Show that and hence factorise . (3 marks)

(b) Determine the location of the stationary points of the curve . (3 marks)

(c) Sketch the graph of . (3 marks)

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Supplementary page

Question number: \_\_\_\_\_\_\_\_\_

Supplementary page

Question number: \_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| Markers | Markers use only | | |
| Question | Maximum | Mark |
| Kalotay  (29 marks) | 1 | 6 |  |
| 2 | 7 |  |
| 3 | 9 |  |
| 4 | 7 |  |
| Leow  (23 marks) | 5 | 7 |  |
| 6 | 7 |  |
| 7 | 9 |  |
|  | S1 Total | 52 |  |
|  | Total | 100% |  |

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