

Write your name below:

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**Hale School**

**Year 11 Semester 1 Examination, 2016**

**Mathematics
Methods**

**Circle your teacher**

**VMU MPC RPT AGC SAV BAH**

**Section Two:
Calculator-assumed

Booklet 3 of 3**

TIME ALLOWED FOR THIS SECTION

Reading time before commencing: Ten minutes
Working time for paper: One hundred minutes

**MATERIAL REQUIRED/RECOMMENDED FOR THIS PAPER**

*TO BE PROVIDED BY THE SUPERVISOR*

**TWO** Question/Answer booklets for Section Two – complete BOTH.

Formula Sheet (retained from Section One).

*TO BE PROVIDED BY THE CANDIDATE*

*Standard Items*: pens (blue/black preferred), pencils (including coloured), sharpener,
 correction fluid/tape, eraser, ruler, highlighters

*Special Items*: drawing instruments, templates, notes on two unfolded sheet of A4 paper, and
 calculators approved for use.

**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. Please check carefully, and 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 exam |
| Section One:Calculator-free | 8 | 8 | 50 | 53 | 37 |
| Section Two:Calculator-assumed | 13 | 13 | 100 | 90 | 63 |
|  |  | **Total** | 100 |

**INSTRUCTIONS TO CANDIDATES**

1. Write your answers in this Question/Answer Booklet.
2. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.
3. 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.

1. 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.
2. It is recommended that you do not use pencil, except in diagrams.

Section Two: Calculator Assumed
This section has 13 questions. Answer all questions. Write your answers in the spaces provided.
Working time: 100 minutes
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 16 7 marks**

The water depth, d metres, measured from the bottom of a lake, t hours **after 6 am** is modelled by the equation



1. Determine the water depth at 11 am. (2 marks)
2. Determine maximum water depth and the first time after 6 am when this occurs.

 (2 marks)

1. Determine the number of hours before noon when the water depth is below 9 m.

 (3 marks)

**Question 17 8 marks**

Sets ,  and  are defined as follows with  being the Universal Set.



List the elements of the following sets:

a.  (1 mark)

b.  (1 mark)

c.  (1 mark)

d.  (1 mark)

For each of the following state whether true or false.

e.  (1 mark)

f.  (1 mark)

g.  (1 mark)

h.  (1 mark)

**Question 18 7 marks**

1. Shade the indicated regions

(i) 

 **A** **B**

 **C** (2 marks)

 (ii)

**A** **B **

 **C** (2 marks)

1. 

 (3 marks)

**Question 19 5 marks**

The eradication of a nasty crop eating insect was undertaken on a plantation by

introducing a small rodent that had the insect as part of its diet. During the eradication

programme it was found that the number of insects followed the equation

  

where is the number of insects present and  is the time in weeks after the rodents were

introduced.

 a. If the initial insect population was 10 000 find the value of . (2 marks)

 b. How many insects were alive after 18 weeks? (1 mark)

 c. Explain what happens to the insect population over time. (2 marks)

**Question 20 5 marks**

1. Given that , determine if are independent. Justify your answer. (2 marks)
2. Events  and  are such that  and .

 Determine  if  and  are mutually exclusive. (3 marks)

**Question 21 13 marks**

 The diagram below shows a circle, centre O, with a radius 12 cm. The chord AB subtends at an angle of 1.2 radians at the centre. The tangents to the circle at A and at B meet at P. . Give your answers to 2 decimal places.

12 cm

A

P

B

1.2

O

1. Find the length of chord AB. (3 marks)
2. Calculate the length of BP. (3 marks)

 **Question 21 continued next page**

 **Question 21 continued**

1. Find the area of triangle APB. (3 marks)
2. Determine the area of the shaded region. (4 marks)

**END OF BOOKLET 3**

This page may be used for extra working space:

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

This page may be used for extra working space:

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

This page may be used for extra working space:

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