

**WAEP Semester Two Examination, 2018**

**Question/Answer booklet**

**MATHEMATICS**

**METHODS**

**UNITS 1 AND 2 Section One:**

**Calculator-free**

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

Student number: In figures

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In words \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Your name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**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.

**METHODS UNITS 1 AND 2 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 examination |
| --- | --- | --- | --- | --- | --- |
| Section One: Calculator-free  | 8  | 8  | 50  | 52  | 35 |
| Section Two: Calculator-assumed  | 13  | 13  | 100  | 98  | 65 |
|  |  |  |  | **Total**  | 100 |

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**Instructions to candidates**

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1. The rules for the conduct of examinations are detailed in the school handbook. Sitting this

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examination implies that you agree to abide by these rules.

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2. Write your answers in this Question/Answer booklet.

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3. You must be careful to confine your response to the specific question asked and to follow

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any instructions that are specified to a particular question.

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4. Supplementary pages for the use of planning/continuing your answer to a question

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have been provided at the end of this Question/Answer booklet. If you use these pages

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to continue an answer, indicate at the original answer where the answer is continued,

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i.e. give the page number.

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5. Show all your working clearly. Your working should be in sufficient detail to allow your E

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answers to be checked readily and for marks to be awarded for reasoning. Incorrect

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answers given without supporting reasoning cannot be allocated any marks. For any

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question or part question worth more than two marks, valid working or justification is T

required to receive full marks. If you repeat any question, ensure that you cancel the

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answer you do not wish to have marked.

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

7. The Formula sheet is not to be handed in with your Question/Answer booklet.

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**CALCULATOR-FREE 3 METHODS UNITS 1 AND 2**

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

This section has **eight (8)** questions. Answer **all** questions. Write your answers in the spaces provided.

Working time: 50 minutes.

**Question 1 (4 marks)** (a) Expand (2�� + 1)3. (2 marks)

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(b) Determine the gradient of the curve �� = (2�� + 1)3 at the point (1, 27). (2 marks)

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**METHODS UNITS 1 AND 2 4 CALCULATOR-FREE**

**Question 2 (6 marks)** (a) Evaluate ��2

��0.5when �� = 6 × 102 and �� = 9 × 104, writing your answer without the use of

scientific notation. (3 marks)

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(b) Determine the value of �� when 9�� = 27√3. (3 marks)

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**CALCULATOR-FREE 5 METHODS UNITS 1 AND 2**

**Question 3 (7 marks)** Solve each equation below for ��.

(a) 3��

�� − 5=23. (2 marks)

D

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(b) (�� + 3)(�� − 3) = 8��. (3 marks)

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(c) √2 sin �� + 1 = 0, 0° ≤ �� ≤ 360°. (2 marks)

F

F

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**METHODS UNITS 1 AND 2 6 CALCULATOR-FREE**

**Question 4 (7 marks)** (a) Simplify

(i) ������(10 − 3�� + 4��2). (1 mark)

(ii) lim ℎ→0

(�� + ℎ)2 − ��2

ℎ. (1 mark)

F

F

O

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(b) Determine the equation of the tangent to the curve �� = ��3 − 9�� + 15 when �� = 2.

B

L

(3 marks)

L

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(c) Determine ��(��) given ��′(��) = 6�� − 2 and ��(−1) = 6. (2 marks)

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**CALCULATOR-FREE 7 METHODS UNITS 1 AND 2**

**Question 5 (6 marks)**

A small body moves in a straight line so that its displacement �� from a fixed point �� after �� seconds is given by �� = ����2 + ���� + �� metres.

The position-time graph of the body is shown below.

D

O

N

O

T

W

R

I

T

E

(a) Determine the values of the constants ��, �� and ��. (3 marks)

I

N

T

H

I

S

A

R

E

A

A

S

I

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W

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L

L

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E

C

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F

F

(b) Determine the displacement of the body when its velocity is 24 ms-1. (3 marks)

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**METHODS UNITS 1 AND 2 8 CALCULATOR-FREE**

**Question 6 (6 marks)** The derivative of a cubic polynomial is given by ����

����= 3��2 + 6�� − 10.

The cubic passes through the point (1, −30).

(a) Determine the equation of the cubic. (2 marks)

F

F

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L

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(b) Show that the cubic has a root when �� = 3. (1 mark)

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(c) Determine the coordinates of the other two roots of the cubic. (3 marks)

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**CALCULATOR-FREE 9 METHODS UNITS 1 AND 2**

**Question 7 (8 marks)** The first three terms, in order, of a sequence are 4�� + 3, 2�� − 1 and �� − 8.

Determine the fourth term of the sequence if

(a) the sequence is arithmetic. (4 marks)

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(b) the sequence is geometric. (4 marks)

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F

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**METHODS UNITS 1 AND 2 10 CALCULATOR-FREE**

**Question 8 (8 marks)** Let ��(��) =��

�� + 3. The graph of �� = ��(��) is shown below.



(a) Points �� and �� lie on the curve with ��-coordinates 1 and 4 respectively.

F

F

(i) Determine ��(1) and ��(4). (1 mark)

O

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L

I

(ii) Determine the gradient of the straight line through �� and ��. (2 marks)

W

T

I

S

A

A

E

R

A

S

I

H

T

N

I

��(�� + ℎ) − ��(��)

E

(b) Use the formula ��′(��) = lim ℎ→0

ℎto determine the gradient of the curve at ��.

T

I

R

(5 marks)

W

T

O

N

O

D

**End of questions** SN078-122-1

**CALCULATOR-FREE 11 METHODS UNITS 1 AND 2**

Supplementary page

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

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