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**WAEP Semester One Examination, 2016**

**Question/Answer booklet**

**MATHEMATICS**  
**METHODS**  
**UNIT 1**

**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

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Your name

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**Time allowed for this section**

Reading time before commencing work: five minutes  
Working time for section: 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 exam
Section One: Calculator-free	7	7	50	50	35
Section Two: Calculator-assumed	13	13	100	99	65
<b>Total</b>					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.
3. You must be careful to confine your response to the specific question asked and to follow any instructions that are specified to a particular question.
4. Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.
5. 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.
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.

**Section One: Calculator-free****35% (50 Marks)**

This section has **seven (7)** questions. Answer **all** questions. Write your answers in the spaces provided.

Working time for this section is 50 minutes.

**Question 1****(8 marks)**

Solve the following equations for  $x$ .

(a)  $x^2 = 4x$  .

**(2 marks)**

(b)  $x^3 - 2x^2 - 3x = 0$  .

**(3 marks)**

(c)  $\frac{x-1}{3} + \frac{x+1}{4} + 3 = 0$  .

**(3 marks)**

## Question 2

(8 marks)

(a) A function is defined by  $f(x) = (x-2)^2(x+1)$ .

(i) Determine the coordinates of the y-intercept of the graph of  $y = f(x)$ . (1 mark)

(ii) Expand and simplify  $f(x)$ . (2 marks)

(iii) The coordinates of one of the turning points of the graph of  $y = f(x)$  can be read from the function definition. State the coordinates of this turning point. (1 mark)

(b) Consider the function  $g(x) = x^3 - 3x^2 - 10x + 24$ .

(i) Determine  $g(2)$ . (1 mark)

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

**Question 3****(7 marks)**

Consider the points  $A(6, -10)$  and  $B(-2, -4)$ .

- (a) If  $B$  is the midpoint of  $A$  and  $C$ , determine the coordinates of  $C$ . (2 marks)

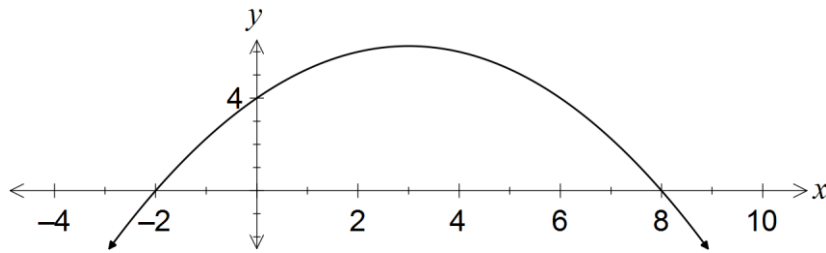
- (b) Determine the equation of the line through  $A$  that is perpendicular to  $AB$ . (3 marks)

- (c) Explain whether the line through  $A$  and  $B$  will intersect the line with equation  $3x + 4y + 5 = 0$ . (2 marks)

## Question 4

(7 marks)

- (a) Part of the graph of  $y = ax^2 + bx + 4$  is shown below.



Determine the values of the coefficients  $a$  and  $b$ .

(3 marks)

- (b) A quadratic has equation  $y = x^2 - 6x + 2$ . Determine

- (i) the coordinates of its turning point.

(2 marks)

- (ii) the exact values of the zeros of the quadratic.

(2 marks)

**Question 5****(8 marks)**

(a) A circle of radius 5 has its centre at (6, -4).

(i) Determine the equation of this circle.

(2 marks)

(ii) State, with justification, whether the point (9, -8) lies on the circle.

(1 mark)

(b) Determine the centre and radius of the circle with equation  $x^2 + y^2 - 4x + 6y + 9 = 0$  .

(3 marks)

(c) Determine the coordinates of the vertex and the equation of the axes of symmetry of the curve with equation  $2y^2 = x + 3$  .

(2 marks)

## Question 6

(7 marks)

(a) Evaluate  ${}^{14}C_6 \div {}^{13}C_8$ .

(3 marks)

(b) Expand and simplify

(i)  $(a + b)^2$ .

(1 mark)

(ii)  $(x + 2)^5$ .

(3 marks)



## Question 7

(5 marks)

(a) Simplify  $\cos \frac{11\pi}{3} \cos \frac{10\pi}{3} + \sin \frac{11\pi}{3} \sin \frac{10\pi}{3}$ .

(2 marks)

(b) Show that the exact value of  $\tan\left(\frac{\pi}{12}\right)$  is  $\frac{\sqrt{3}-1}{\sqrt{3}+1}$ .

(3 marks)

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Additional working space

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

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