



Year 12 MATHEMATICS METHODS

Section One: Calculator free

Teacher:

____ J. Fletcher

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Name:

Time allowed for this section

Reading time before commencing work: 5 minutes

Working time for this section: 50 minutes

Material 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, pencils, pencil sharpener, eraser, correction fluid, ruler, highlighters

Special items: nil

Important note to candidates

No other items may be used in this section of the examination. 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. 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 |
|-----------------------------------|-------------------------------|------------------------------------|------------------------|-----------------|
| Section One: Calculator-free | 7 | 7 | 50 | 50 |
| Section Two Calculator-assumed | 14 | 14 | 100 | 100 |
| | | | | 150 |

Instructions to candidates

- The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2010*. Sitting this examination implies that you agree to abide by these rules.
- Write your answers in the spaces provided in this Question/Answer Booklet. 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(s) that you are continuing to answer at the top of the page.
- 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 an answer to any question, ensure that you cancel the answer you do not wish to have marked.
- It is recommended that you **do not use pencil** except in diagrams.

Question 1. [9 marks]

Differentiate the following with respect to x . Do not simplify unless specifically required.

a) $f(x) = 4x^2 + 4 + \frac{3}{x^2}$ [2]

b) $y = \sqrt{(2x^2 + 5x)^3}$ [2]
(fully simplify)

c) $y = 2dx^4 + 3d^2$ [2]

d) $g(x) = \frac{6x-1}{3(4x+6)^2}$ [3]

Question 2. [6 marks]

Find the points on the curve $y = \cos(2x + \pi)$ for $0 \leq x \leq 2\pi$ where the gradient of the curve is -1.

Question 3. [9 marks]

- a) Complete the following indefinite integral;
[2]

$$\int (4x^3 + x^2 + 2) dx$$

- b) Evaluate; $\int_0^4 (x+1)(2x-6) dx$ [3]

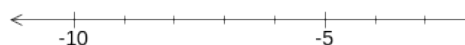
- c) Determine the **exact value** of the area bounded by the function $f(x) = -x^2 + 6$ and the x axis.

[4]

Question 4. [5 marks]

Use the axis below to draw a sketch of a graph with the following characteristics.

- Both the x and y intercept are 4 and these are the only intercepts.
- $f'(x)=0$ at $x=4$
- $f'(-1)=f''(-1)=0$
- Apart from $x=-1$ the graph has a negative gradient for $x<4$
- The graph has a positive gradient when $x>4$



Question 5. [8 marks]

(a) Simplify the following:

(i) $\frac{\log 16}{\log 2}$

(ii) $\frac{2}{3}\log_2 8 + 6\log_2 \sqrt[3]{2} - \frac{1}{2}\log_2 \frac{1}{4}$

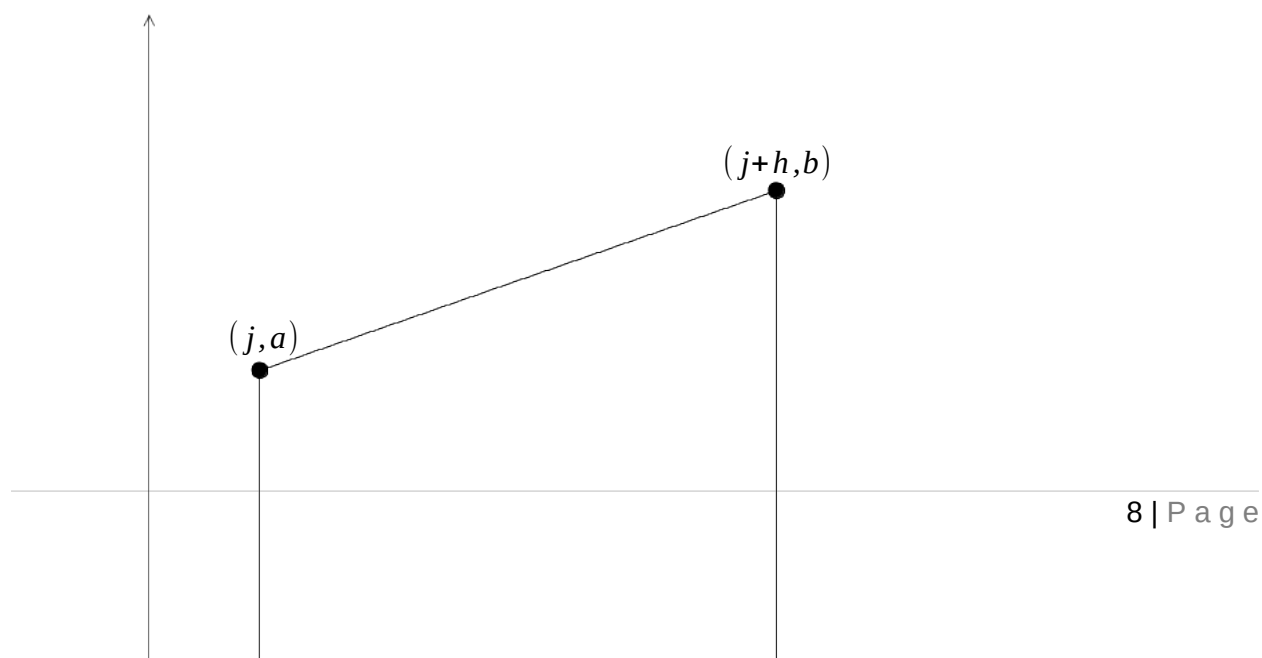
(b) Solve the following equations:

(i) $6^{1-x} = 2^{3x+5}$

(ii) $6e^{1-2x} = 360$

Question 6. [8 marks]

Consider the graph below of the function $f(x) = kx + n$ between the values of j and $j+h$.



a) Evaluate $\int_j^{j+h} f(x) dx$ (simplify your answer) [3]

b) By determining the values of a and b in similar variables, show that the area of a trapezium is; $Area = \frac{1}{2}(a+b) \times \text{perpendicular height}$ [5]

Question 7. [5 marks]

The curve $y = px^3 + qx^2 - 4x$ has turning point at $x = \frac{-2}{3}$ and a point of inflection at $x = \frac{1}{6}$.

Determine the values of p and q .

END OF SECTION ONE

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LABEL THE QUESTION CLEARLY

| Question | Possible Marks | Marks Achieved |
|-----------------|-----------------------|-----------------------|
| 1 | 9 | |
| 2 | 6 | |
| 3 | 9 | |
| 4 | 5 | |
| 5 | 8 | |
| 6 | 8 | |
| 7 | 5 | |
| TOTAL | 50 | |