SCOTCH COLLEGE

Scotch College
Semester One Practice Examination, 2016

Question/Answer Booklet

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

1. 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.

2. 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.

3. **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.

4. 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	Possible Marks	Marks Achieved
1	9	
2	6	
3	9	
4	5	
5	8	
6	8	
7	5	
TOTAL	50	

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 $x>4$

END OF SECTION ONE

BLANK PAGE FOR EXTRA WORKING

LABEL THE QUESTION CLEARLY

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.

Question 5. [8 marks]

(a) Simplify the following:

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

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

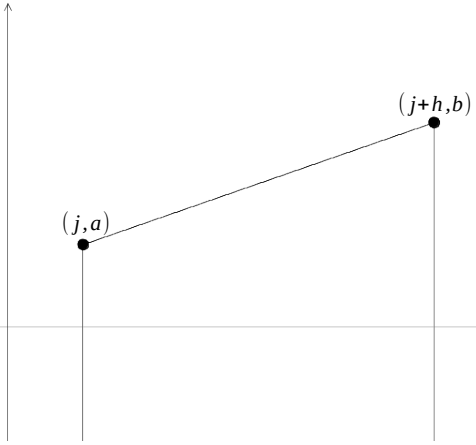
(b) Solve the following equations:

(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; $Area = \frac{1}{2}(a+b) \times perpendicular\ height$

[5]