



PERTH COLLEGE

YEAR 12

Semester One Examination, 2010

Question/Answer Booklet

MATHEMATICS 3CMAT/3DMAT

Section One: Calculator-free

Student 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 which may also be used for Section Two

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.

Section One: Calculator-free
Structure of this paper

(40 marks)

Section	Number of questions available	Number of questions to be answered	Working time (minutes)	Marks available
Section One: Calculator-free	7	7	50	40
Section Two: Calculator-assumed	13	13	100	80
				120

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 [6 marks]

$$\frac{1}{x} \quad \sqrt{x+2}$$

Given $f(x) = \frac{1}{x}$, $g(x) = \sqrt{x+2}$ and $h(x) = x^2$.

Determine:

(a) $f \circ g(x)$ [1]

(b) $(g \circ h)(1)$ [2]

(c) the domain and range of $f \circ g(x)$. [3]

Question 2 [6 marks]

Differentiate the following, without simplifying:

(a) $y = 4x^5 + 3\sqrt{x}$ [2]

(b) $y = (5e^{2x} + 1)^3$ [2]

(c) $y = \frac{x^2+3}{2x-1}$ [2]

Question 3 [5 marks]

The probabilities of two events A and B are such that

$$P(A) = 0.6, P(A \cap B) = 0.8 \text{ and } P(B | A) = 0.5.$$

(a) Find

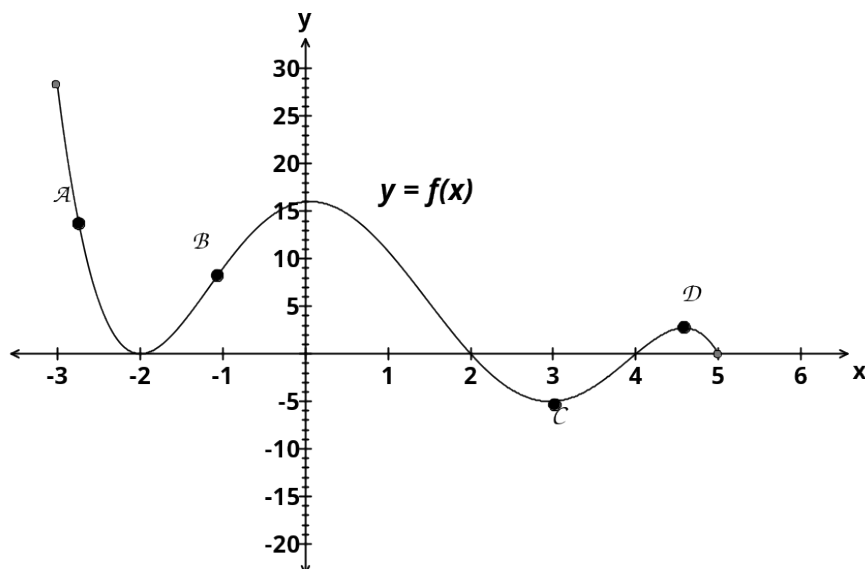
(i) $P(A \cap B)$ [2]

(ii) $P(B)$ [1]

(b) Are the events A and B independent? Justify your answer. [2]

Question 4 [9 marks]

The graph of the function $y = f(x)$ on the interval $-3 \leq x \leq 5$ is given below.



- (a) A, B, C and D are four points on the graph of $y = f(x)$. Determine whether the first and second derivatives are positive, negative or equal to zero at these points. Record your answers in the table below.

[4]

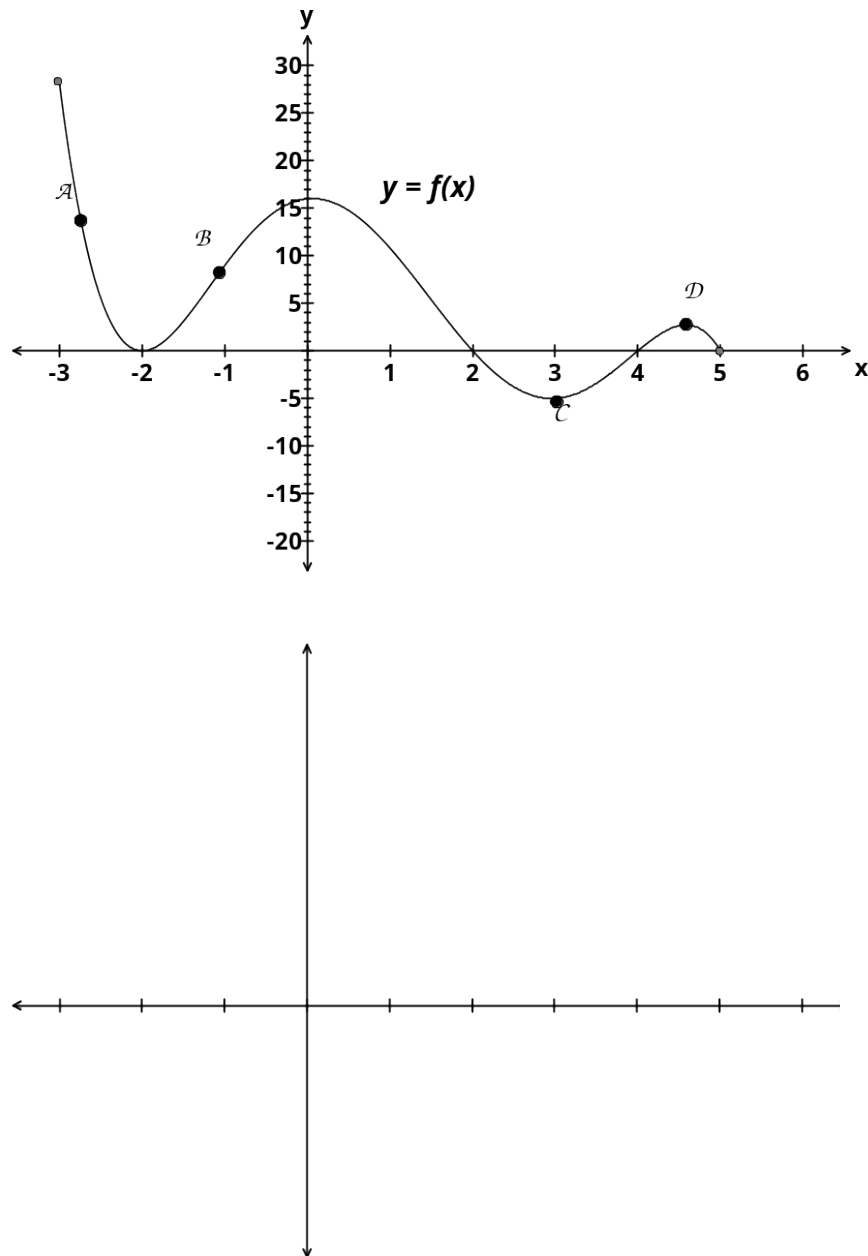
Point	f'	f''
A		
B		
C		
D		

- (b) Indicate on the graph of $y = f(x)$ above, the two other points of inflection, and label them as E and F.

[1]

- (c) Sketch the graph of $y = f'(x)$ on the axes provided below the graph of $y = f(x)$.

[3]



- (d) State the coordinates of the global maximum and global minimum points of $y = f(x)$ on the interval $-3 \leq x \leq 5$.

[1]

Question 5 [7 marks]

- (a) Determine the following indefinite integrals: (answer with positive indices)

(i) $\int \left(5x^6 - \frac{4}{x^3} - 1 \right) dx$ [2]

(ii) $\int 5x(3x^2 + 2)^4 dx$ [2]

(b) Evaluate $\int_0^2 \left(\frac{1}{e^{5x}} \right) dx$ and give your answer in terms of e. [3]

Question 6 [4 marks]

Solve the system of equations

$$x - y - z = 0$$

$$x + 2y + z = 1$$

$$3x + y - 2z = 8$$

Question 7 [3 marks]

Solve the inequality $5 \geq \frac{4x}{x-2}$ where $x \neq 2$.

END OF SECTION ONE

EXTRA PAGE FOR WORKING

See next page

