WESLEY COLLEGE
SOUTH PERTH

MATHEMATICS
3C/3D

Semester Two Examination 2012

Question/Answer Booklet

Section One:
Calculator-free

Student Name: _____

Teacher Name: _____

Time allowed for this section
Reading time before commencing work: Five (5) minutes
Working time for this section: Fifty (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	Percentage of exam
Section One: Calculator-free	8	8	50	50	33 1/3
Section Two: Calculator-assumed	13	13	100	100	66 2/3
				150	100

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2012*. 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.

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

SPARE PAGES FOR WORKING

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

Question 1 (2, 3, 2, 3 = 10 marks)

(a) Determine $\frac{dy}{dx}$ in each of the following (there is no need to simplify answers)

(i) $y = \frac{\sqrt{x^2 - 16}}{x}$

(ii) $y = \int_{3}^{e^{1-x}} \left(\frac{t - 2}{t^2 - 1} \right) dt$

(b) (i) determine $\frac{d}{dx}\left(8x\, e^{4x}\right)$

(ii) hence or otherwise, determine $\int 32x e^{4x}\, dx$

Question 2 (1, 2, 2 = 5 marks)

A standard normal score of 1.15 is such that $P(z > 1.15) = 0.125$ *or* $\frac{1}{8}$
Use this information to determine:

(a) $P(-1.15 < z < 1.15)$

(b) $P(z < -1.15 \mid z < 1.15)$

(c) a 75% confidence interval (correct to one decimal place) for the mean of any sample of size 25 taken from a population of mean 50 and standard deviation 10.

END OF SECTION 1
SPARE PAGES FOR WORKING

Write down the equation of $k(x)$ in its simplest form.

Question 8 (6 marks)

A cubic function $f(x)$ whose derivative $f'(x)$ is given by $f'(x) = 2x^2 - 5x + 2$ has a local or relative minimum value of 2. Determine the local or relative maximum value.

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Question 3 (2, 3 = 5 marks)

A particle moves in a straight line so that its distance from a fixed point O is given by $x = \frac{4}{t+1} \quad t > 0$ where x is the distance in metres at time t seconds.

(a) What is the average speed for the first two seconds?

(b) When does the particle reach a speed of $\frac{1}{4}\ m/\sec$

Question 4 (2, 2 = 4 marks)

The first stage of the 2013 AFL Training Camp for elite 18 year old footballers consists of three sets of skills testing A, B and C. From previous experience, the probabilities of success in skills A is 0.4, skills B is 0.6 and skills C is 0.75.

(a) For the top 50 18 year olds who attend the Training Camp, how many would be expected to succeed in all three skills tests?

To be accepted into the second stage of the Training Program, a trainee must pass Test A and at least one of the other two tests.

(b) What is the probability that a person is accepted into the second stage?

Question 5 (5 marks)

Solve the inequality $\frac{x}{x-2} \leq \frac{8}{x}$

Question 6 (3, 3 = 6 marks)

The probability distribution and cumulative probability distribution for a discrete random variable X are shown in the tables below:

x	0	1	2	3	4
P(X = x)	0.05	*p*	*q*	*r*	0.25

x	0	1	2	3	4
P(X ≤ x)	0.05		*0.55*		1

and it is known that the expected value of the random variable is 2.5.

(a) Form three equations from the given information

(b) Solve for *p*, *q* and *r*

Question 7 (1, 3, 3, 2 = 9 marks)

(a) Functions *f, g, h* are defined:

$f(x) = \sqrt{4-x}$ $g(x) = 2^x - 12$ $h(x) = e^{2x-1} - 1$

Determine:

(i) $f \circ g(x)$

(ii) the domain and range of $f \circ g(x)$

(iii) *j(x)* if $j \circ f(x) = 1 - x$

(b) The function *k(x)* is a transformation of *h(x)* consisting of a horizontal dilation of factor 2 followed by a vertical translation of 1 unit.