

ROSSMOYNE SENIOR HIGH SCHOOL



ROSSMOYNE
SENIOR HIGH SCHOOL
Semester Two Examination, 2012
Yr11/12

Question/Answer Booklet

MATHEMATICS 3A/3B

Section One:
Calculator-free

Time allowed for this section
Reading time before commencing work: five minutes
Working time for this section: fifty minutes

Teacher's name _____

Your name _____

Materials required/recommended for this section

To be provided by the supervisor
This Question/Answer Booklet
Formula Sheet

Standard items: pens, pencils, pencil sharpener, eraser, correction fluid/tape, 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.

Published by WA Examination Papers
PO Box 445 Claremont WA 6910

Copying or communication for any other purpose can only be done within the terms of the Copyright Act or with prior written permission of WA Examination Papers.
Educational institutions that have purchased the paper from WA Examination Papers provided that WA Examination Papers is acknowledged as the copyright owner. Teachers within purchasing schools may change the paper provided that WA Examination Papers moral rights are not infringed.
This examination paper may be freely copied, or communicated on an internet, for non-commercial purposes within educational institutions that have purchased the paper from WA Examination Papers provided that WA Examination Papers is acknowledged as the copyright owner. Teachers within purchasing schools may change the paper provided that WA Examination Papers moral rights are not infringed.

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	33
Section Two: Calculator-assumed	12	12	100	100	67
Total			150	100	

Additional working space

Question number: _____

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.

(3 marks)

Find the values of x and y if $3x + 2y = -4$ and $5x - 3y = 25$.

Question 1

Question 2(a) If $a = 5 \times 10^2$ and $b = 8 \times 10^6$ evaluate $a^2 \div b^{13}$.**(9 marks)**

(3 marks)

Question 7**(7 marks)**

(a) Prove that the product of any two odd numbers will always be odd.

(4 marks)

(b) Solve the following for x .

(i) $25^x = 125\sqrt{5}$

(3 marks)

(ii) $\frac{(2x - 3)^3}{4} = 16$

(3 marks)

(b) A simple polygon is a closed two-dimensional shape, made of straight lines with only one boundary that doesn't cross over itself.

Consider the conjecture: "If all the sides are of length d , then as the number of sides of a polygon increases, so does the area of the polygon."

State whether the conjecture is true or false and justify your answer.

(3 marks)

MATHEMATICS 3A/3B	8	CALCULATOR-FREE	5	MATHEMATICS 3A/3B	
Question 6	8 marks	Question 3	9 marks	Question 6	8 marks
(a) $P = (t^2 - 2)(1 - 3t + 2t^2)$.	The universal set $\{1, 2, 3, 4, 5, 6, 7\}$ has subsets $A = \{1, 3, 5, 7\}$ and $B = \{4, 5, 6\}$.	(a) Determine $n(A \cup B)$.	(a) Determine $n(A \cup B)$.	Use the product rule to find $\frac{dp}{dt}$, simplifying your answer.	
(b) List the elements of $A \cup B$.		(b) List the elements of $A \cup B$.	(b) List the elements of $A \cup B$.		

(b) A polynomial function $f(x)$ passes through the point $A(1, -2)$ and is such that $f(x) = 5 - 2x$.	(i) Find the equation of the tangent to $f(x)$ at the point A.	(i) In how many ways can the first two digits be chosen?	(ii) What is the probability that the last two digits chosen are both sixes?	(iii) Find $f(x)$.
	(c) A four-digit PIN number is made by randomly choosing the first two digits from subset A and the last two digits from subset B. An example of such a PIN number is 3346.	(i) What is the probability that the PIN number starts with a five but does not end with a five?		
		(iii) What is the probability that the PIN number starts with a five?	(iii) What is the probability that the PIN number ends with a five?	
		(2 marks)	(3 marks)	

(i) Find the equation of the tangent to $f(x)$ at the point A.	(i) In how many ways can the first two digits be chosen?	(ii) What is the probability that the last two digits chosen are both sixes?	(iii) Find $f(x)$.
(c) A four-digit PIN number is made by randomly choosing the first two digits from subset A and the last two digits from subset B. An example of such a PIN number is 3346.	(i) What is the probability that the PIN number starts with a five?		
	(ii) What is the probability that the PIN number ends with a five?	(2 marks)	

See next page	See next page

Question 4

(6 marks)

A set of test scores were 12, 9, 4, 16, 13, 2, 10, 11, 10, 15.

- (a) State the mode of the scores. (1 mark)

- (b) The minimum and maximum scores are 2 and 16 respectively. Calculate the other statistics that would be required to construct a boxplot for these scores. (3 marks)

- (c) Use a calculation to decide whether or not the set of scores contains an outlier. (2 marks)

Question 5

(8 marks)

The eight activities involved in a construction project, together with their completion times and immediate predecessors are shown in this table:

Activity	Time (days)	Immediate Predecessor
A	7	-
B	6	-
C	24	-
D	18	A, B
E	5	A, B
F	8	A, B
G	12	E, F
H	10	E, F

- (a) Display this information as a project network. (3 marks)

- (b) List the activities on the critical path and state the minimum completion time for this project. (2 marks)

- (c) Consider each of the questions below in isolation.

- (i) How many days can activity E be delayed, without an increase in the minimum completion time? (1 mark)

- (ii) If the time taken by activity F is halved, what effect does this have on the minimum completion time and critical path? (2 marks)