Papers written by Australian Maths Software

SEMESTER TWO

YEAR 11

MATHEMATICS METHODS
Units 1 & 2
REVISION 2
2016

Section One
(Calculator–free)

Name: _____

Teacher: _____

TIME ALLOWED FOR THIS SECTION

Reading time before commencing work: 5 minutes
Working time for section: 50 minutes

MATERIAL REQUIRED / RECOMMENDED FOR THIS SECTION

To be provided by the candidate
Standard items*:* pens, pencils, pencil sharpener, highlighter, eraser, ruler.

IMPORTANT NOTE TO CANDIDATES
No other items may be taken into the examination room. 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.

To be provided by the supervisor
Question/answer booklet for Section One.
A formula sheet which may also be used for Section Two.

Structure of this examination

	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**	**52**	**35**
Section Two Calculator—assumed	11	11	100	98	65
Total marks				150	

Instructions to candidates

1. The rules for the conduct of this examination are detailed in the Information Handbook. Sitting this examination implies that you agree to abide by these rules.

2. Write your answer in the Question/Answer booklet.

3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.

4. Spare pages are provided at the end of this booklet. If you need to use them, indicate in the original answer space where the answer is continued i.e. give the page number.

5. 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.

6. It is recommended that you **do not use pencil**, except in diagrams.

7. The Formula Sheet is **not** to be handed in with your Question/Answer booklet.

Section One: Calculator–free 52 marks

This section has **six (6)** questions. Attempt **all** questions.
Working time: 50 minutes

Question 1 **(6 marks)**

Complete the following

$f(x) = x^2 - 4x$

$f(x+h) = (x+h)^2 - 4(x+h)$

$= x^2 + 2x^2h +$ _____

By definition

$$f'(x) = \lim_{h\to 0}\left(\frac{f(x+h) - f(x)}{(x+h) - x}\right)$$

and

$f(x+h) - f(x) =$ _____

$\dfrac{f(x+h) - f(x)}{h} =$ _____

$=$ _____

Therefore

$$f'(x) = \lim_{h\to 0}\left(\qquad\qquad\right)$$

$\therefore \quad f'(x) =$ _____

(6)

Question 2 **(7 marks)**

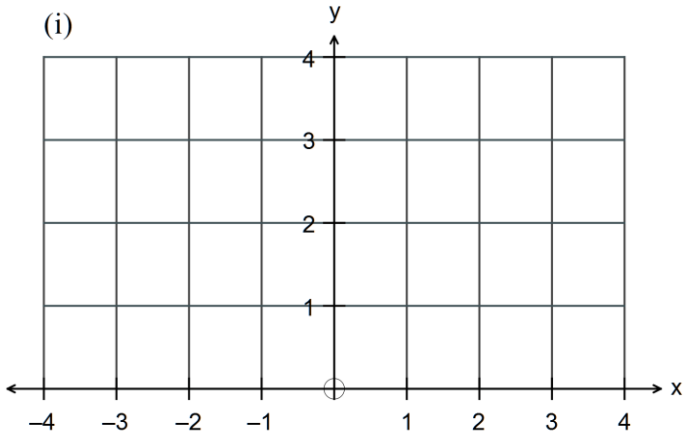
(a) Given $x^3-1=(x-1)(x^2+x+1)$, prove algebraically that there is only one solution to the equation $x^3-1=0$. (2)

(b) Sketch the relations

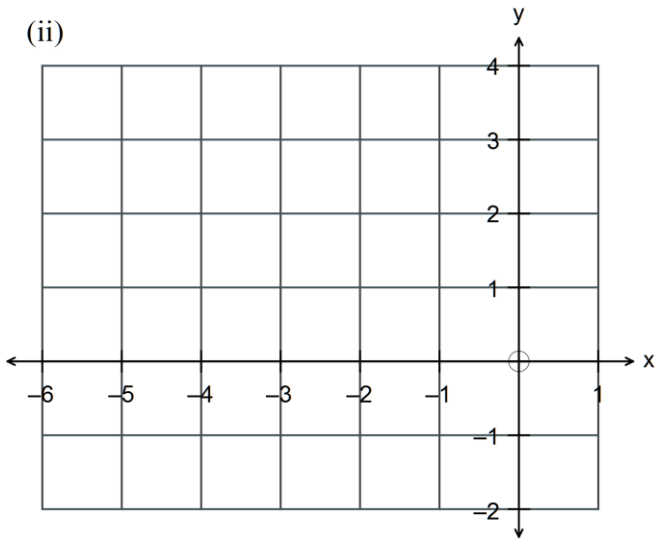
(i) $y=3^{1-x}$ (ii) $(x+3)^2+(y-1)^2=4$ (3+2)

on the sets of axes below.

(i)



(ii)



Question 3 **(9 marks)**

(a) Simplify $\left(\frac{8^{-1}x^3}{y^{-6}}\right)^{-\frac{1}{3}}$ (3)

(b) Simplify $2\left(81^{-\frac{1}{4}}\right)-\frac{1}{16^{-0.5}}+17^0$ (3)

(c) Solve $16^x-3\left(4^x\right)+2=0$ (3)

Question 4 **(13 marks)**

(a) Giventhe first four terms of a sequence $10, 8, 6, 4....$,

(i) write down the rule for the sequence in terms of n. (2)

(ii) write the recursive rule that describes the sequence. (2)

(b) Given $T_n = \frac{1}{2}T_{n-1}$ with $T_1 = 12$, rewrite the expression in terms of n. (2)

(c) A tree grew to 2 metres in the first year. Every year the tree grew one half of what it grew the previous year.

How tall does the tree grow? (3)

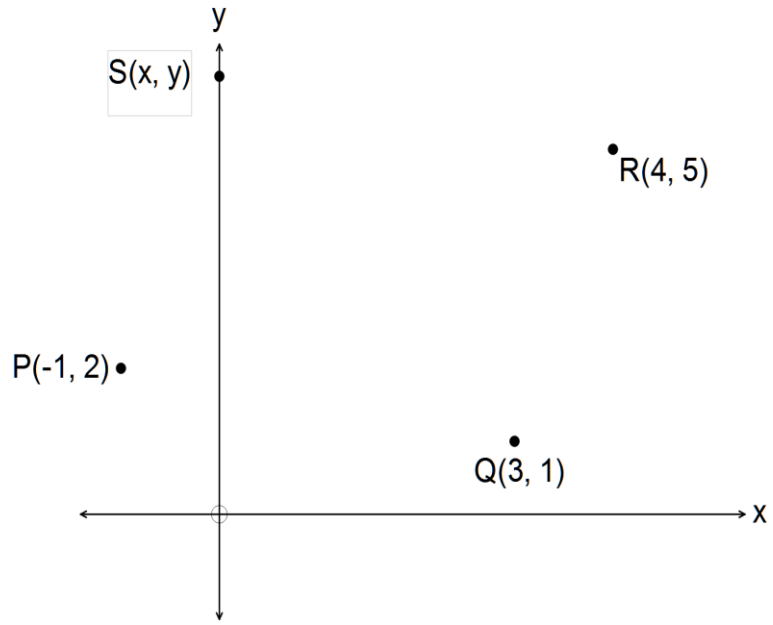
(d) In how many ways can a basketball team of 5 players be selected from 8 boys

(i) if all boys are available? (2)

(ii) if one boy has broken his ankle and another is moving to another city so neither of them can play? (2)

Question 5 **(8 marks)**

Consider the points with coordinates P(-1, 2), Q(3, 1), R(4, 5) and S(x, y) as in the diagram below.



(a) Determine if

(i) PQ is perpendicular to QR. (2)

(ii) PQ = QR (2)

(b) Find the coordinates of S if PQRS is a parallelogram. (2)

(c) Show that the diagonals of this parallelogram bisect each other. (2)

Question 6 **(6 marks)**

(a) The number of amoeba in a petri dish doubles every minute.
If there are 10^6 amoeba in the dish at 10.20 a.m., write down an expression for the number in the dish at

(i) 10.24 a.m. (2)

(ii) 10.17 a.m. (2)

At what time will the number be equal to

(iii) $10^6 \times 2^{10}$? (2)

Question 7 **(3 marks)**

Determine

(a) $\int\left(10-3x^2+12x\right)dx$ (1)

(b) $\int\left(\frac{x^2+x-12}{x-3}\right)dx$ (2)

END OF SECTION ONE