

Question/answer booklet for Section One.

A formula sheet which may also be used for Section Two.

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

IMPORTANT NOTE TO CANDIDATES

To be provided by the candidate

MATERIAL REQUIRED / RECOMMENDED FOR THIS SECTION

5 minutes
Working time for section:

Reading time before commencing work:
50 minutes

TIME ALLOWED FOR THIS SECTION

Teacher: _____

Name: _____

(Calculator-free)
Section One

2017

Unit 3

MATHEMATICS METHODS

YEAR 12
SEMESTER ONE
Papers written by Australian Maths Software

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	13	13	100	98	65
	Total marks		150	100	

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 answers 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.

(3)

(b) Given $f(x) = x - \sin(x)$ and $y = \sin(x)$ find $\frac{dy}{dx}$.

(3)

$$\frac{x^2}{(x^3 - e^x)} = y \quad (\text{ii})$$

(2)

(a) Find $\frac{dy}{dx}$ and simplify the expression for each of the following
 (i) $y = e^{2x} \times \cos(2x)$

1. (8 marks)

Extra page for working if necessary

2. (9 marks)

Evaluate the following

(a) $\int_{\pi/6}^{\pi/2} \cos(2x) dx$ (3)

(b) $\int_0^3 (x^2 - 4x^3) dx$ (2)

(c) $\int e^{0.5x} dx$ (1)

(d) $\int_{3\pi/4}^{\pi/3} (1 - \sin(x)) dx$ (3)

7. (3 marks)

Given that $\frac{d}{dx}(e^x) = e^x$ show that $\lim_{h \rightarrow 0} \left(\frac{e^h - 1}{h} \right) = 1$.Hint: Use $f'(x) = \lim_{h \rightarrow 0} \left(\frac{f(x+h) - f(x)}{h} \right)$. (3)

4. (6 marks)

- (a) Find the area between the function $f(x) = -(x-2)^2 + 4$ and the x axis. (3)

5. (9 marks)

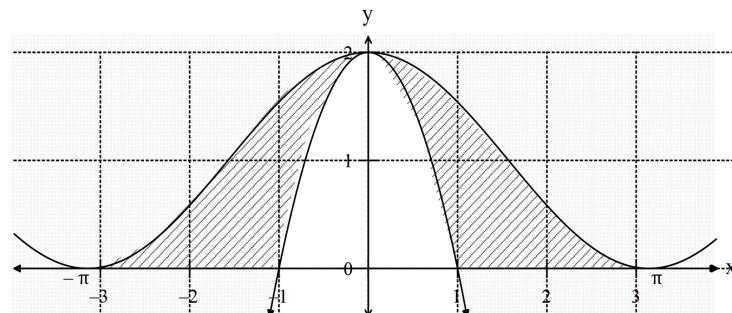
The acceleration of a particle is given by $a = -6t + 6 \text{ ms}^{-2}$ for $t \geq 0$ and it is known that $v_0 = -3 \text{ m s}$ and $x_0 = 4 \text{ m}$.

- (a) Find the velocity and the displacement equations. (4)

- (b) Hence find the velocity and displacement at $t = 2 \text{ s}$. (2)

- (b) Write down the expression for the area between the functions

$y = 2 - 2x^2$ and $y = 1 + \cos(x)$ that is illustrated in the diagram below. (3)



- (c) Find when the particle changes direction. (3)