

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.

Important note to candidates

Special items: nil

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction tape/liquid, erasers, ruler, highlighters
To be provided by the candidate

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

Material required/recommended for this section

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

Teacher's Name:
Student Name:
Section One:
Calculator-free

MATHEMATICS METHODS UNITS 1 & 2

Semester Two Examination 2019
Question/Answer Booklet



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Structure of this paper

	Number of questions available	Number of questions to be attempted	Working time (minutes)	Marks available	Percentage of exam
Section One Calculator—free	9	9	50	52	35
Section Two Calculator—assumed	14	14	100	98	65
					100

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2019*. Sitting this examination implies that you agree to abide by these rules.
2. Answer the questions according to the following instructions.

Section One: Write answers in this Question/Answer Booklet. Answer **all** questions.

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.

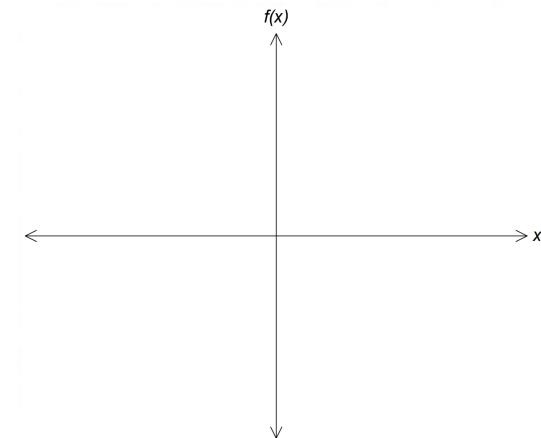
3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.
4. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue 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 that you are continuing to answer at the top of the page.
5. The Formula Sheet is **not** handed in with your Question/Answer Booklet.

Question 9 (6 marks)

Sketch a graph for each of the functions with the features shown over the domain $-\infty < x < \infty$. Label your graphs clearly.

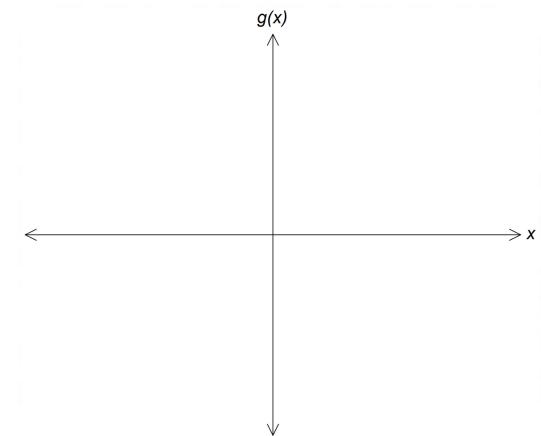
- (a) $f(-1) = 0$ and $f(0) = 1$
 $f(x) \rightarrow 2$ for $x \rightarrow \infty$
 $f(x) \rightarrow -\infty$ for $x \rightarrow -\infty$

(3 marks)



- (b) $g(x)$ has a stationary point at $x = 2$
 $g(x)$ has a global maximum at $x = 2$
 $g(x) \rightarrow 0$ for $x \rightarrow -\infty$
 $g(x) \rightarrow -\infty$ for $x \rightarrow \infty$

(3 marks)



End of Section One
See Next Page

(3 marks)

$$\frac{(9x^2y^2)^{-2}}{\left(\frac{1}{3}x^3y^{-2}\right)^3}$$

(b)

(2 marks)

Show your working.

(d) How far from Perth will James be at the end of October 12th?

(2 marks)

$$(2ab^{-1})^{-2}$$

(a)

Simplify each of the following, giving your answers with positive indices.

Question 1 (5 marks)

- Working time: 50 minutes
- number of the question(s) that you are continuing to answer at the top of the page.
- Counting an answer: if you need to use the space to continue an answer, indicate this clearly at the top of the page.
 - Planning: if you use the spare pages for planning, indicate this clearly at the top of the page.

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.

This section has nine (9) questions. Attempt all questions. Write your answers in the spaces provided.

Section One: Calculator-free**CALCULATOR - FREE****MATHEMATICS METHODS UNITS 1 & 2**

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MATHEMATICS METHODS UNITS 1 & 2

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Question 8 (6 marks)**CALCULATOR - FREE**

- (b) Write the number of kilometres travelled by James each day as a non-recurring rule, in terms of n .

- (a) Write the number of kilometres travelled by James each day as a recursive rule.

James decides to ride from Perth to Sydney, a 3940 km journey. He decides to leave on October 1st and travels 100 km the first day. It happens that James manages to increase the number of kilometres travelled each day by 10 km, so travels 110 km the second day and continues travelling in that sequence.

MATHEMATICS METHODS UNITS 1 & 2

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CALCULATOR - FREE

Question 2 (6 marks)

Solve the following exponential equations, giving your answers as exact values.

(a) $4^{1-x} = \frac{1}{8^{x-1}}$

(2 marks)

Question 7 (5 marks)

Determine the antiderivatives of the following.

(a) $2x - \pi^2 + \frac{3}{5}x^2$

(2 marks)

(b) $\frac{n^3 - 4n^2}{3n}$

(3 marks)

(b) $\sqrt{9^{x^2+1}} = 3^{x+3}$

(4 marks)

(2 marks)

$$9 - (x) \neq \mathcal{K} \quad (\text{II})$$

(2 marks)

·(x-) f = A (1)

(b) On the same set of axes, and with clear labelling, sketch:

(2 marks)

clie.

(q)

(1 mark)

$\cdot w$ (1)

(a) If $f(x) = ma_x$, determine:

(1 mark)

(ii) when the particle is stationary.

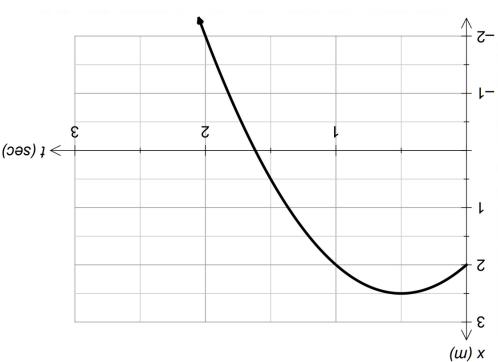
Consider the graph of $y = f(x)$, passing through $(0, 4)$.

Question 3 (6 marks)

MATHEMATICS METHODS UNITS 1 & 2

CALCULATOR - FREE

Consider the displacement-time graph of a particle undergoing rectilinear motion shown below.



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Question 4 (5 marks)

(a) Determine the derivative with respect to x of each of the following.

(i) $y = \frac{3}{4}x^4 + x^5 - 7$

(2 marks)

Question 5 (9 marks)

Given $y = t^3 - 5t^2$, determine:

(a) (i) the average rate of change of the function between $t = 1$ and $t = 3$. (2 marks)

(ii) the instantaneous rate of change of the function at $t = 2$. (2 marks)

(b) Use the fact that $\delta y \approx \frac{dy}{dt} \times \delta t$ to determine the approximate change in y as t increases from 1 to 3. (2 marks)

(b) Simplify $\lim_{h \rightarrow 0} \frac{x^3 - (x + h)^3}{h}$

(1 mark)

(c) Determine the equation of the tangent to the curve $y = f(t)$ at the point where $t = 2$. (3 marks)