2024
VCE
Mathematical Methods
Year 12
Trial Examination 1

Kilbaha Education

Quality educational content

Kilbaha Education (Est. 1978) (ABN 47 065 111 373) **PO Box 3229** **Cotham Vic 3101** **Australia**	**PayID: 47065111373** **Email: kilbaha@gmail.com** **Tel: (03) 9018 5376** **Web: https://kilbaha.com.au**

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Victorian Certificate of Education
2024

STUDENT NUMBER

									Letter
Figures									
Words									

MATHEMATICAL METHODS

Trial Written Examination 1

Reading time: 15 minutes
Total writing time: 1 hour

QUESTION AND ANSWER BOOK

Structure of book

Number of questions	*Number of questions to be answered*	*Number of marks*
10	10	40

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers.
- Students are NOT permitted to bring into the examination room: any technology (calculators or software) notes of any kind, blank sheets of paper, and/or correction fluid/tape.

Materials supplied

- Question and answer book of 16 pages.
- Detachable sheet of miscellaneous formulas at the end of this booklet.
- Working space is provided throughout the booklet.

Instructions

- Detach the formula sheet from the end of this book during reading time.
- Write your **student number** in the space provided above on this page.
- Unless otherwise indicated, the diagrams in this booklet are **not** drawn to scale.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

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Instructions

Answer **all** questions in the spaces provided.
In all questions where a numerical answer is required an exact value must be given unless otherwise specified.
In questions where more than one mark is available, appropriate working **must** be shown.
Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1 (4 marks)

a. Evaluate $f'(2)$, where $f(x) = \log_e\left(\sqrt{x^3+1}\right)$.

2 marks

b. If $\frac{d}{dx}\left(\frac{x}{\sqrt{4x+9}}\right) = \frac{px+q}{(4x+9)^n}$, find the values of p, q and n.

2 marks

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Question 2 (3 marks)

a. Solve for x if $3^{x^2+6x} = \frac{1}{243}$

1 mark

b. Solve for x if $\log_2\left(x^2+4\sqrt{2}\right)+\log_2\left(x^2-4\sqrt{2}\right)=5$

2 marks

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Question 3 (3 marks)

Find the values of a and b for which the simultaneous linear equations,

$$\begin{aligned} 2ax - 2by &= 5 \\ (1-3b)x + 12y &= 2-4b \end{aligned}$$

have an infinite number of solutions.

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Question 4 (3 marks)

For random samples of six year 12 students, $\hat{P}$ represents the proportion of students who have brown eyes. If $\Pr\left(\hat{P}=\frac{1}{3}\right)=\Pr\left(\hat{P}=\frac{1}{2}\right)$ find $\Pr\left(\hat{P}=1\right)$ giving your answer in the form $\left(\frac{a}{b}\right)^n$ where $a,b,n\in N$.

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Question 5 (3 marks)

Consider the function defined by $f(x)=\begin{cases}\sqrt{5-x^2}, & x\le 2\\ ax^2+bx, & x>2\end{cases}$ where a and b are real numbers.

If the function has a smooth join at $x=2$, find the values of a and b.

Question 6 (3 marks)

A certain curve has its gradient given by $5\sin\left(\frac{x}{2}\right)+me^{-2x}+4$, if the curve has a turning point at the origin, find the value of m and the equation of the curve.

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