

Trial Examination 2022

VCE Mathematical Methods Units 1&2

Written Examination 1

Question and Answer Booklet

Reading time: 15 minutes

Writing time: 1 hour

Student's Name: _____

Teacher's Name: _____

Structure of booklet

<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
10	10	40

Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and 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 booklet of 11 pages

Formula sheet

Working space is provided throughout the booklet.

Instructions

Write your **name** and your **teacher's name** 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.

At the end of the examination

You may keep the formula sheet.

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

Question 2 (3 marks)

Let $P(x) = 2x^3 - 5x^2 + 3x - 4$.

Express $P(x)$ in the form $P(x) = D(x)Q(x) + R(x)$ when divided by $x - 2$.

Question 3 (5 marks)

Consider the data shown in the table below.

x	1	2	3	4	5	6
$\Pr(X = x)$	$2a$	$3a$	a	a	$3a$	$2a$

- a. If the table shows a probability distribution, what is the value of a ? 1 mark

- b. Find $\Pr(X < 3)$. 1 mark

- c. Find $\Pr(1 < X \leq 4)$. 1 mark

- d. Find $\Pr(X < 3 | X \leq 5)$. 2 marks

Question 4 (7 marks)

Let $f : \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = 2x(x^3 - 2x^2 + 2x) - 3$.

a. Find $f(1)$. 1 mark

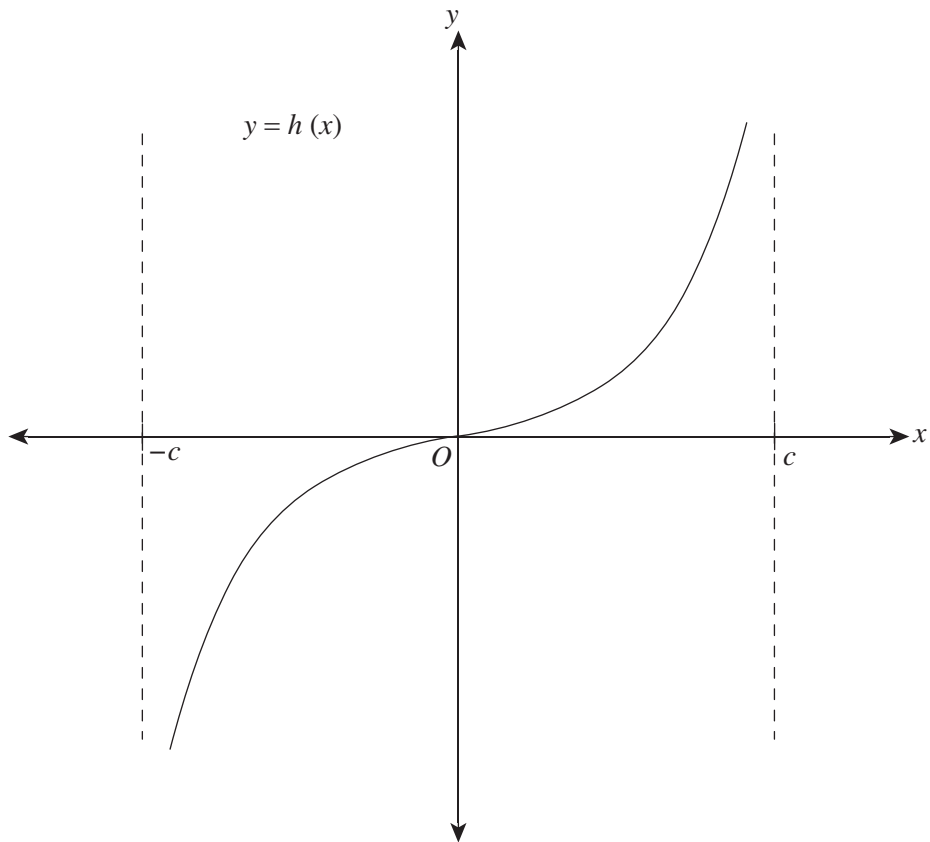
b. i. Find $f'(x)$. 1 mark

ii. Find $f'(-1)$. 1 mark

c. Determine the coordinates and nature of any stationary points. 4 marks

Question 5 (4 marks)

The graph of the function $h : (-c, c) \rightarrow \mathbb{R}$, $h(x) = 2 \tan\left(\frac{x}{4}\right)$ is shown below.



- a.** Find the value of c . 1 mark

- b.** Find the average rate of change of h between $x = 0$ and $x = \pi$. 3 marks

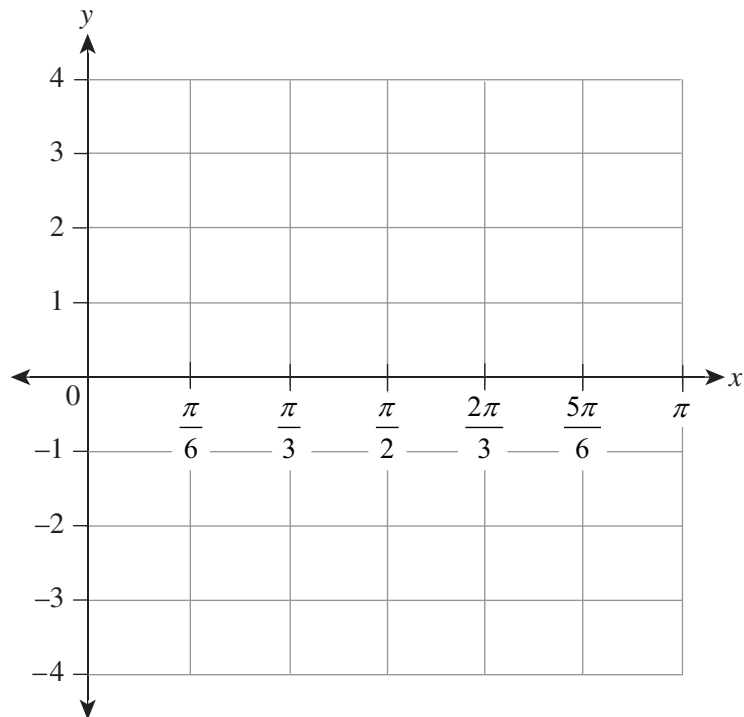
Question 6 (5 marks)

a. Solve $2\cos(2x) + 1 = 0$ for $x \in [0, \pi]$.

2 marks

b. Sketch the graph of $y = 2\cos(2x) + 1$ for $x \in [0, \pi]$ on the axes provided. Indicate the coordinates of the endpoints, turning points and any intercepts.

3 marks



Question 8 (4 marks)

A group of five students go to the cinema. There are three girls and two boys in the group.

- a.** If the students sit together, how many possible seating arrangements exist? 1 mark

- b.** If the three girls sit together, how many possible seating arrangements exist? 1 mark

On one occasion, only four seats remain for the movie session that the students wish to attend.

- c. i.** If the three girls and one boy attend the cinema, how many possible combinations of students exist? 1 mark

- ii.** If at least two girls attend the cinema, how many possible combinations of students exist? 1 mark

Question 9 (2 marks)

For $f(x) = \frac{6x^2 + 7x - 3}{3x - 1}$, where $x = \frac{1}{3}$, find $\lim_{x \rightarrow \frac{1}{3}} f(x)$.

Question 10 (4 marks)

- a. Show that $f(x) = -2x^3 + 2x^2 - 4x - 24$, given that $f'(x) = -2x(3x - 2) - 4$ and $f(-2) = 8$. 2 marks

- b. Find $\int_0^2 (3x^2 - 4x + 6) \cdot dx$. 2 marks

END OF QUESTION AND ANSWER BOOKLET