

Trial Examination 2021

VCE Specialist Mathematics Units 3&4

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 12 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, and on the answer sheet for multiple-choice questions.

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.

Students are advised that this is a trial examination only and cannot in any way guarantee the content or the format of the 2021 VCE Specialist Mathematics Units 3&4 Written Examination 1.

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Instructions

Answer **all** questions in the spaces provided.

Unless otherwise specified, an **exact** answer is required to a question.

In questions where more than one mark is available, appropriate working **must** be shown.

Unless otherwise indicated, diagrams in this booklet are **not** drawn to scale.

Take the **acceleration due to gravity** to have magnitude $g \text{ ms}^{-2}$, where $g = 9.8$.

Question 1 (4 marks)

Relative to a fixed origin O , the point A has position vector $\underline{a} = \underline{j} + \underline{j}$ and the point B has position vector $\underline{b} = -5\underline{k}$. The point C has position vector \underline{c} where $\underline{c} = \underline{a} + \underline{b}$.

- a. Express \underline{c} in terms of unit vectors \underline{i} , \underline{j} and \underline{k} . 1 mark

- b.** Prove that $OACB$ is a rectangle. 3 marks

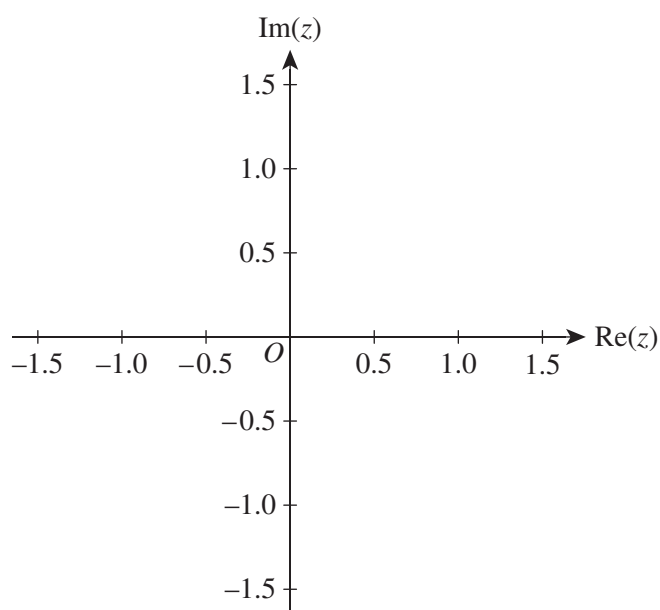
This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Question 10 (6 marks)

The roots of the equation $z^3 - 1 = 0$, where $z \in \mathbb{C}$, are denoted by 1 , w and w^2 .

- a. Plot the points that represent these roots on the Argand diagram below.

1 mark



- b. Show that $1 + w + w^2 = 0$.

2 marks

c. Find a cubic equation with integer coefficients that has roots 1 , $1+w$ and $1+w^2$. 3 marks

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

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