

EXTERNAL ASSESSMENT SPECIFICATIONS

MATHEMATICS SPECIALISED (MTS415118)

External Assessment Specifications inform the development of external assessments. The primary audience for this document is the course Setting Examiner and Exam Critics. It may also be of use to teachers and students.

These specifications must be read in conjunction with the Course Document.

The external assessment consists of a **3 hour written examination**

The criteria to be externally assessed are:

Written examination:

- Criterion 4: solve problems and use techniques involving finite and infinite sequences and series
- Criterion 5: solve problems and use techniques involving matrices and linear algebra
- Criterion 6: use differential calculus and apply integral calculus to areas and volumes
- Criterion 7: use techniques of integration and solve differential equations
- Criterion 8: solve problems and use techniques involving complex numbers

WRITTEN EXAMINATION STRUCTURE

The examination paper is divided into five (5) sections, each with five (5) to seven (7) questions:

- The sections are in a single question booklet and can be answered in any order and at any time during the examination time
- Responses to the questions are to be given in five (5) separate (lined) response booklets

The following specifications for each part are outlined in the table on the following page:

- The distribution across the parts of:
 - Criteria
 - Course content (topics)
 - Time and mark allocations
- Number and type of items

Section	A	B	C	D	E
Criteria	4 – all elements	5 – all elements	6 – all elements	7 – all elements	8 – all elements
Course Coverage	Unit 1	Unit 3	Unit 4a	Unit 4b	Unit 2
Time Allocation	36 minutes approximately	36 minutes approximately	36 minutes approximately	36 minutes approximately	36 minutes approximately
Mark Allocation	36 marks	36 marks	36 marks	36 marks	36 marks
Number of items	From 5 to 7. Each item may be broken up into sub items which will each have their own mark allocation	From 5 to 7. Each item may be broken up into sub items which will each have their own mark allocation	From 5 to 7. Each item may be broken up into sub items which will each have their own mark allocation	From 5 to 7. Each item may be broken up into sub items which will each have their own mark allocation	From 5 to 7. Each item may be broken up into sub items which will each have their own mark allocation
Compulsory	All items are compulsory	All items are compulsory	All items are compulsory	All items are compulsory	All items are compulsory
Item types	A balance of items ranging from short to extended formats in each section (no item will have more than 9 marks allocated).				

Section	A	B	C	D	E
	Extended items include a balance of routine and non-routine contexts. While an individual section may focus on a specific criterion, it is reasonable to assume the candidate will need to draw on knowledge from across the course. All closed-end responses.				
Calculators	Unless otherwise specified in a question, calculators are allowed to be used in all sections.				

SPECIFIC MATERIALS AND EQUIPMENT APPROVED FOR USE BY CANDIDATES

- Current TASC MTS415118 Mathematics Specialised Information Sheet
- A calculator approved by TASC

ASSESSMENT

A set of solutions or a marking tool will be developed by the Setting Examiner, provided to markers at the marking meeting that follows the external written examination; and will be available from TASC in the following year.

The external assessment must include items that, separately or together, give opportunities to demonstrate the standards from rating C to rating A.

Final results will be awarded as a rating of A, B, C, t or z in the above criteria. These ratings are used in determining the final award according to the algorithm in the course document.

WRITTEN EXAMINATION CONTENT

- A representative sample, encompassing a large proportion of the targeted course content areas, that tests the standard of skills, knowledge and understanding of a candidate
- The relative weighting of items is indicated by
 - The relative allocation of marks, and
 - Sub questions (for example 1a, 1b or 1ai, 1aii) must have an individual mark allocation
 - For items or sub items worth:
 - One (1) – no working are required for a correct answer
 - Correct answer with or without working = 1 mark
 - Incorrect answer with some incorrect working = 0.5 mark
 - Two (2) – learners are required to show relevant working
 - Correct answer with relevant working = full marks
 - Correct answer with no working = maximum 1.5 marks
 - Correct answer with some incorrect working = partial marks
 - Incorrect answer with some correct working = partial marks
 - Incorrect answer with incorrect working = no marks
 - Three (3) or more – learners are required to show relevant working
 - Correct answer with relevant working = full marks
 - Correct answer with no working = maximum half marks
 - Correct answer with some incorrect working = partial marks
 - Incorrect answer with some correct working = partial marks
 - Incorrect answer with incorrect working = no marks
- Approximately one mark per minute with 180 marks in total (not more items – just more opportunity to demonstrate knowledge and understanding of relevant criteria)

ATTACHMENT I

ITEM TYPES

The form in which candidates must answer

- Short response format

These items are composed of a brief prompt that demands a response to some stimulus material that varies from a single response to a few written points. This sort of item is suited to assessing the candidate's ability:

- to recall specific information and methods related to key content
- to apply rehearsed methods to familiar situations
- to demonstrate understanding of key concepts in unseen stimulus material.

Exemplar:

(3 marks)

$$\mathbf{A} = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \text{ and } \mathbf{B} = \begin{pmatrix} -1 & 0 \\ 0 & 2 \end{pmatrix} \text{ Find } \mathbf{A} \text{ given that } \mathbf{AB} = \mathbf{A} + 2\mathbf{B}.$$

- Medium length response format

These items may vary between a mixture of a number of shorter responses to a multiple stage response of increasing complexity. Greater complexity may be due to one or more of the following:

- A greater cognitive demand of mathematical concepts
- The necessity to select appropriate data, information and/or formulae
- Justification of a response via a logical line of reasoning.

Exemplar:

(5 marks)

Prove that the sequence $\left\{ \frac{n^3 - n^2 + n - 1}{n^3 - 1} \right\}$ converges to 1.

- *Extended response format*

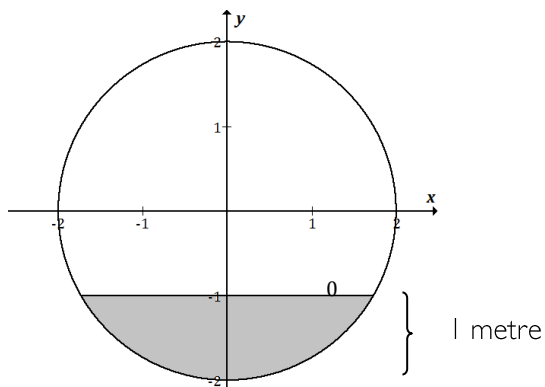
These items involve multi-stage responses of increasing complexity. Greater complexity may be due to one or more of the following:

- A greater cognitive demand of mathematical concepts
- The necessity to select appropriate data, information and/or formulae
- The necessity to select from (and possibly adapt) a number of procedures met in the course
- Justification of a response via a logical line of reasoning.

Exemplar:

(7 marks)

A spherical container of radius 2 metres is partly filled with water, as shown below. The depth of the water in the container is 1 metre.



A cross-section of the container is represented by the graph with equation $x^2 + y^2 = 4$. Calculate the exact volume of water in the container algebraically and hence show that the proportion of water in the container is $\frac{5}{32}$ of the volume of the container.

WRITTEN EXAMINATION CHECKLIST

SECTION A

- assesses examinable aspects of Criterion 4
 - provides a list of all content points that have been included
- provides opportunities to demonstrate standards from rating C to rating A
 - provides a list of all elements from C to A that have been included
- includes a representative sample of course content
- comprises five to seven questions
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 9 marks.
- 36 marks are available for this section

SECTION B

- assesses examinable aspects of Criterion 5
 - provides a list of all content points that have been included
- provides opportunities to demonstrate standards from rating C to rating A
 - provides a list of all elements from C to A that have been included
- includes a representative sample of course content
- comprises five to seven questions
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 9 marks.
- 36 marks are available for this section

SECTION C

- assesses examinable aspects of Criterion 6
 - provides a list of all content points that have been included
- provides opportunities to demonstrate standards from rating C to rating A
 - provides a list of all elements from C to A that have been included
- includes a representative sample of course content
- comprises five to seven questions
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 9 marks.
- 36 marks are available for this section

SECTION D

- assesses examinable aspects of Criterion 7
 - provides a list of all content points that have been included
- provides opportunities to demonstrate standards from rating C to rating A
 - provides a list of all elements from C to A that have been included
- includes a representative sample of course content
- comprises five to seven questions
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 9 marks.
- 36 marks are available for this section

SECTION E

- assesses examinable aspects of Criterion 8
 - provides a list of all content points that have been included
- provides opportunities to demonstrate standards from rating C to rating A
 - provides a list of all elements from C to A that have been included
- includes a representative sample of course content
- comprises five to seven questions
- marks clearly indicated for all items and sub items
- no item or sub item worth more than 9 marks
- 36 marks are available for this section