

EXTERNAL ASSESSMENT SPECIFICATIONS

MATHEMATICS METHODS (MTM415117)

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: understand polynomial, hyperbolic, exponential and logarithmic functions

Criterion 5: understand circular functions

Criterion 6: use differential calculus in the study of functions

Criterion 7: use integral calculus in the study of functions

Criterion 8: understand binomial and normal probability distributions and statistical inference

WRITTEN EXAMINATION STRUCTURE

The examination paper is divided into two parts, each with five (5) sections:

- Part 1 and Part 2 are of unequal weighting as indicated by time and mark allocations
- The parts are in two separate item-and-response booklets
- Part 1 is collected 80 minutes after examination commencement, from which time calculators may be used. (Part 2 can be commenced at any stage without calculator usage in the 80 minute period.)

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

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

Part	Part 1 Calculators are NOT allowed to be used. 5 sections	Part 2 Calculators are allowed to be used. 5 sections
Criteria Elements	Criteria 4, 5, 6, 7 includes all elements Criterion 8 includes all elements except elements 3, 5, 6 where it specifies the use of technology	Criteria 4, 5, 6, 7 and 8 includes all elements
Topics	<ul style="list-style-type: none"> • Functions and graphs • Circular (trigonometric) functions • Differential calculus • Integral calculus • Statistics and probability One topic per section which are equally weighted.	<ul style="list-style-type: none"> • Functions and graphs • Circular (trigonometric) functions • Differential calculus • Integral calculus • Statistics and probability One topic per section which are equally weighted.

Number of items	From 3 to 6 per section, with a total allocation of 16 marks per section. (Each item may be broken into sub items which will each have their own mark allocation)	From 3 to 6 per section, with a total allocation of 20 marks per section. (Each item may be broken into sub items which will each have their own mark allocation)
Number of compulsory items	All	All
Item type(s)	A balance of items ranging from short to extended formats (no item or sub item will have more than 10 marks allocated) Extended items include a balance of routine and non-routine contexts. All closed-ended responses.	A balance of items ranging from short to extended formats (no item or sub item will have more than 10 marks allocated) Extended items include a balance of routine and non-routine contexts. All closed-ended responses.
Suggested Time allocation	80 minutes	100 minutes
Mark allocation	80 marks	100 marks

SPECIFIC MATERIALS AND EQUIPMENT APPROVED FOR USE BY CANDIDATES

- Current TASC MTM415117 Mathematics Methods 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, 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
 - Space for responses
 - Sub questions (for example 1a, 1b or 1ai, 1aii) must have an individual mark allocation
 - For items or sub items worth:
 - One (1) mark items, no workings are required for a correct answer
 - Correct answer with or without working = 1 mark
 - Correct answer with some incorrect working = 1 mark
 - Incorrect answer with some correct working = 0.5 mark
 - Two (2) mark items, 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 mark items, 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 works
 - Incorrect answer with some correct working = partial marks
 - Incorrect answer with incorrect working = no marks
- Approximately a mark per minute with 80 marks in Part 1 and 100 marks in Part 2 (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:

Differentiate $\frac{x^4}{\cos x}$

(2 marks)

- *Extended response format*

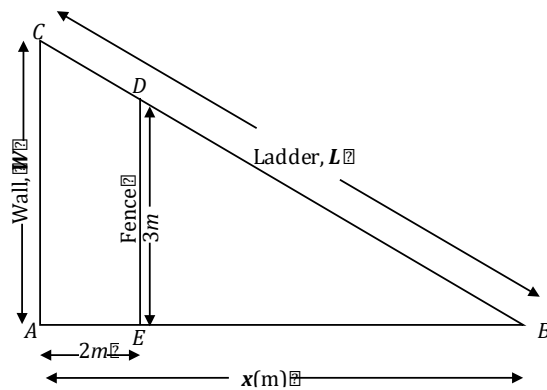
These items involve multi-stage responses of increasing complexity. Greater complexity may be due to one or more of the following:

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

Exemplar:

A ladder, L , is required to just clear a 3 metre fence and lean up against a large wall, W , which is positioned 2 metres behind the fence. The base of the ladder is x metres from the wall.

The diagram below represents the above information.



- (a) In similar triangles, the ratio of corresponding sides are equal, hence

$$\frac{AC}{ED} = \frac{AB}{EB} \quad (1 \text{ mark})$$

Use this relationship to determine an expression for W in terms of x .

- (b) Hence, show that an expression for the length, L , of the ladder in terms of x is

$$\text{represented by the equation } L = \sqrt{x^2 + \frac{9x^2}{(x-2)^2}}. \quad (2 \text{ marks})$$

- (c) Using a gradient table, or some other means, provide reasoning that justifies the existence of a local minimum for L , at $x \approx 4.62 \text{ m}$. (2 marks)

Note: You do not need to provide an expression for $L'(x)$.

- (d) Hence, determine the minimum length of the ladder required. (1 mark)

Express your answer in metres correct to 1 decimal place.

WRITTEN EXAMINATION CHECKLIST

PART I

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 three to six questions.
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 10 marks.

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 three to six questions.
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 10 marks.

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 three to six questions.
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 10 marks.

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 three to six questions.
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 10 marks.

SECTION E

- assesses examinable aspects of Criterion 8 (excluding technology aspects of elements 3, 5, 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 three to six questions.
- marks clearly indicated for all items and sub items
- no item or sub item worth more than 10 marks

PART 2

SECTION A

- assesses examinable aspects of Criterion 4
 - provides a list of all content points that have been included
- assesses examinable aspects of Criterion 4
- 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 three to six questions.
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 10 marks.

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 three to six questions.
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 10 marks.

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 three to six questions.
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 10 marks.

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 three to six questions.
- marks clearly indicated for all questions and sub items
- no question or sub questions worth more than 10 marks.

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 three to six questions.
- marks clearly indicated for all items and sub items
- no item or sub item worth more than 10 marks