PURPOSE

The purpose of the External Assessment Specifications is to provide information about the external assessment that defines:

- the external assessable aspects of the criterion standards of MTG315115 General Mathematics
- the externally assessed course areas
- the nature and range of appropriate types of items, and
- the structure of the external assessment.

These definitions are to be in sufficient detail that they will serve both as a blueprint, describing all the elements required to develop the assessment, and as a basis for accountability.

The External Assessment Specifications are primarily written for use by the setters of the assessment.

Whenever a new external assessment is required, the assessment is to comply with these technical specifications. Assessments may differ from year to year within the framework and rules provided by these specifications.

INTRODUCTION

The external assessment for MTG315115 General Mathematics consists of a written examination. The external assessment is designed to assess the standard of achievement of skills, knowledge and understanding of candidates in targeted course areas. Understanding is assessed by the degree to which both knowledge of mathematical concepts, and also method (skills) are applied to a range of external assessment item types.

The course document MTG315115 General Mathematics is the document used for the development of the examination.

OVERALL CONDITIONS

- The time/date of the examination are set annually by the Office of TASC
- The examination has a duration of three (3) hours
- An additional fifteen (15) minutes reading time is given
- The TASC External Assessment Rule applies to this external assessment. Details of the rule are published on the TASC website https://www.tasc.tas.gov.au/students/exams/rules/
- TASC appoints appropriate persons to set and mark assessments.

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¹ In these specifications, the term item is defined as an individual task to be undertaken by candidates. The task may be divided into several parts.

² Definitions of relevant assessment item types are given in Attachment 1.
SPECIFIC MATERIALS AND EQUIPMENT APPROVED FOR USE BY CANDIDATES

- A calculator as approved by TASC (Refer to https://www.tasc.tas.gov.au/students/exams/what-can-i-take-to-my-exam/)
- Current (calendar year) External Examination Information Sheet for General Mathematics.

ASSESSMENT

The following aspects of five (5) of the criteria and their standards described in the course document are externally assessed. These define the expectations for the nature, scope and level of demand of the targeted course areas.

- **Criterion 4**: Demonstrate knowledge and understanding of bivariate data analysis
  - All aspects of Criterion 4 standards are examinable
- **Criterion 5**: Demonstrate knowledge and understanding of growth and decay in sequences
  - All aspects of Criterion 5 standards are examinable
- **Criterion 6**: Demonstrate knowledge and understanding of standard financial models
  - All aspects of Criterion 6 standards are examinable
- **Criterion 7**: Demonstrate knowledge and understanding of applications of trigonometry
  - All aspects of Criterion 7 standards are examinable
- **Criterion 8**: Demonstrate knowledge and understanding of graphs and networks
  - All aspects of Criterion 8 standards are examinable

The examination must include items that 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.

EXAMINATION CONTENT

- A representative sample, encompassing a large proportion of the targeted course areas, is used to test the standard of skills, knowledge and understanding of a candidate
- The relative weighting of items within a Section of a Part is indicated by
  - the relative allocation of marks, and
  - space for responses
- For items with a mark value of
  - one (1) or two (2), workings do not have to be shown to gain full marks
  - three or more, candidates must show relevant workings. Marks will be allocated:
    - according to the degree to which workings convey a logical line of reasoning, and
    - for suitable justifications and explanations of mathematical methods and processes.

**General guidelines for writing items**

Items are written:
- using language/subject-specific terminology as outlined in the course document
- using unambiguous English language.

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3 Representative sample: a subset of the target course content that accurately reflects the total target course content.

4 Relative weighting: the relative emphasis on the assessment of an item compared with other items within a group, that will influence the final result, that is, the rating.

5 Space: a number of lines provided in the item-and-response booklets indicative of the expected extent of responses.
EXAMINATION STRUCTURE

The examination paper is divided into five (5) parts, each with three (3) to five (5) questions:

- the parts are in five separate item-and-response booklets, one for each of the five examinable criteria
- each part will contain between 3 to 5 questions
- each part has a total of 36 marks and have a recommended time of 36 minutes
- these parts may be done in any order and at any time during the examination time.

The following specifications for each part are outlined in Table 1:

- the distribution across the parts of:
  o each criterion
  o course content (topics)
  o time and mark allocations
- number and type of items.

Relationships between the examination specifications and the written examination items will be mapped each year. (See Attachment 2.)

Table 1: MTG315115 General Mathematics Examination Structure

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Parts 1 to 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculators</td>
<td>Calculators are allowed to be used. Refer to the website for the list of approved calculators for the year.</td>
</tr>
<tr>
<td>Question number and mark allocation</td>
<td>Each part is to be made up of three to five items. At least one item is to total eight (8) marks and at least one item should total more than ten (10) marks.</td>
</tr>
</tbody>
</table>
| Parts (Course Topics)         | • 1. Bivariate data analysis  
                                | • 2. Growth and decay in sequences  
                                | • 3. Finance  
                                | • 4. Trigonometry  
                                | • 5. Graphs and networks |
| Number of items               | Three to five items per part           |
| Compulsory items              | All                                    |
| Item type(s)                  | Context of items  
                                | Mostly routine contexts  
                                | Scenario of items  
                                | Some real-world scenarios or modelled real world scenarios  
                                | Response format  
                                | A balance of items ranging from short to extended formats.  
                                | Assessment of response  
                                | Mostly closed-ended responses, with some open-ended responses. |
| Suggested Time allocation for each part | 36 minutes                        |
| Total mark allocation for each part | 36 marks                          |
**ATTACHMENT 1**

Written Examination Item types

In these specifications, the term ‘item’ is defined as an individual task to be undertaken by candidates. The task may be divided into several parts. Item types can be categorised in terms of:

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>ITEM TYPES AND DEFINITIONS</th>
<th>EXEMPLARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>The context of the item</td>
<td><strong>Routine context</strong>&lt;br&gt;These items require rehearsed skills in ‘standard’ application of formulae, and in familiar contexts.</td>
<td>2011 Mathematics Applied Question 9 (a)&lt;br&gt;If Paris is one hour ahead of GMT, determine the standard time difference between Paris and New York.</td>
</tr>
</tbody>
</table>
|                         | **Non-routine context**<br>These items require procedures that involve the combination, and sometimes the selection, of a set of skills in unfamiliar contexts. | Reference: Gary Anderson Support Materials For General Mathematics 2014<br><br>**Question 2**<br>**Gary and Kataryn are considering buying a block of land. The real estate agent supplies them with the accurate sketch shown below.**<br><br>![Diagram of land block](image)

Show that the angle at A is 48° and determine the area of their block of land. (6 marks)
### The scenario of the item

**Real-world scenarios**
These items relate concepts and methods of mathematics to phenomena in the real world. The nature of approximations of theory to reality is clearly stated.

### The format of response

**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
- apply rehearsed methods

### 2011 Mathematics Applied Question 1

Andrew and Robyn record the heart rate (H, beats per minute) of a pet turtle as the temperature (T, in °C) increases one morning.

<table>
<thead>
<tr>
<th>Temperature T (°C)</th>
<th>Heart Rate H (beats per minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>17</td>
<td>31</td>
</tr>
<tr>
<td>18</td>
<td>36</td>
</tr>
<tr>
<td>19</td>
<td>40</td>
</tr>
<tr>
<td>20</td>
<td>42</td>
</tr>
<tr>
<td>22</td>
<td>44</td>
</tr>
</tbody>
</table>

(a) Determine the **linear relationship** between the heart rate (H) of the turtle and the temperature (T). Give your numbers to one decimal place.

### 2012 Mathematics Applied Question 12 (b)

Flight 185 is scheduled to travel from Adelaide (35°10′S, 138°36′E) to Canberra (35°10′S, 149°24′E).

Determine the distance (travelled in nautical miles) between Adelaide and Canberra if the plane travels **directly east**.
to familiar situations
  o demonstrate understanding of key concepts in previously unseen stimulus material.

**Extended response format**
These items involve multi-stage responses of increasing complexity. Greater complexity may be due to one or more of, but not limited to, the following:
  o a greater cognitive demand of mathematical concepts
  o the necessity to select appropriate information
  o justification of a response via a logical line of reasoning.

(Reference: Gary Anderson: Assessment Support Materials For General Maths 3, DoE 2014 Graphs and Networks, Question 2)

**Question 5**
The project network below displays activities, A to I, with time in hours.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time (hours)</th>
<th>Predecessors</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>B</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>D</td>
</tr>
<tr>
<td>D</td>
<td>6</td>
<td>L</td>
</tr>
<tr>
<td>E</td>
<td>2</td>
<td>G</td>
</tr>
<tr>
<td>F</td>
<td>3</td>
<td>G</td>
</tr>
<tr>
<td>G</td>
<td>1</td>
<td>B, C</td>
</tr>
<tr>
<td>H</td>
<td>2</td>
<td>G, I</td>
</tr>
<tr>
<td>I</td>
<td>3</td>
<td>D, E</td>
</tr>
</tbody>
</table>

Activity D is missing from the network diagram for this project, which is shown below:

(a) Determine the earliest start time for activity H.
(b) Identify the critical path of the project network and hence the minimum time to complete the project. To obtain full marks, numbers must be added to the project network diagram.
(c) The duration of activity I is delayed by ‘x’ hours. For what value of ‘x’ does the critical path determined in part (b) remain critical and the minimum time remain the same?

Question 5 continues on page
<table>
<thead>
<tr>
<th>Assessment of response</th>
<th>Closed-ended response</th>
</tr>
</thead>
<tbody>
<tr>
<td>These are items for which there is a single ‘correct’ or ‘best’ response.</td>
<td>2013 Mathematics Applied Question 17</td>
</tr>
<tr>
<td>(a) On 3 May 2013 a deposit of $800 was put into a new savings account. This account pays a <strong>simple interest rate</strong> of 2.25% p.a. paid each year on 30 June. Calculate the interest received in the account on 30 June 2013, assuming that this account had no further activity over this period of time.</td>
<td></td>
</tr>
<tr>
<td>(b) A person owes $135 000 on a home loan. The bank charges an interest rate of 7.8% p.a., compounding monthly. The current repayments are $2 300 per month.</td>
<td></td>
</tr>
<tr>
<td>How long will it take to pay off this loan?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Open-ended response</th>
</tr>
</thead>
<tbody>
<tr>
<td>These are items for which there may be multiple correct responses OR in which the quality of the argument and/or the expression is being assessed.</td>
</tr>
</tbody>
</table>
ATTACHMENT 2

MTG315115 General Mathematics Examination Mapping

The Setting Examiner designs examination items to adhere to the External Assessment Specifications (see Table 1). During the writing and critiquing of the examination, the Setting Examiner will map the MTG315115 General Mathematics examination to the course document and external assessment specifications. This may be achieved through the mapping grid given in Table 2.

Mapping provides a summary of relationships between examination items and:

- item type
- mark allocation
- content
- achievement standard, and
- item rating.

Mapping is designed primarily to assist the Setting Examiner to:

- see at a glance the range of item types, course coverage and achievement standards used in the examination paper, and
- check for:
  - representative sampling, and
  - adherence to the examination structure specifications.

**Checklist**

The Setting Examiner conducts a final check for adherence of the written examination to the external assessment specifications by completing a checklist. (See Table 3.)

Mapping grid exemplar

<table>
<thead>
<tr>
<th>Item Type</th>
<th>Mark Allocation</th>
<th>Content</th>
<th>Achievement Standard</th>
<th>Item Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Choice</td>
<td>10</td>
<td>Question 1</td>
<td>Level 1</td>
<td>4</td>
</tr>
<tr>
<td>Short Answer</td>
<td>5</td>
<td>Question 2</td>
<td>Level 2</td>
<td>3</td>
</tr>
<tr>
<td>Extended Response</td>
<td>20</td>
<td>Question 3</td>
<td>Level 3</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**General Mathematics**

**Table 2: MTG315115 General Mathematics Examination Mapping Grid**

<table>
<thead>
<tr>
<th>Item</th>
<th>Item type (refer to Table 1 for item types to be used)</th>
<th>Content</th>
<th>Criterion / the standards assessed</th>
<th>Marks (&amp; suggested time)</th>
<th>The rating (A, B, C) that the item is designed to assess</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Here you may combine parts of one item, or detail them separately.]</td>
<td>[Reference and brief description. This may include a range of content statements.]</td>
<td>[Reference for standards assessed, for example, Part 1.2 = Criterion 5, 2nd set of standards. This may include a number of sets of standards per item or part of item.]</td>
<td></td>
<td>[This may include a range of ratings per item or part of item.]</td>
<td></td>
</tr>
</tbody>
</table>
Checklist

**Table 3: MTG315115 General Mathematics Written Examination Checklist**

*Each of the 5 parts:*

- □ Has 3 to 5 items
- □ Has a total of 36 marks and the corresponding suggested time total of 36 minutes
- □ No part of an item worth more than 4 marks
- □ Items give opportunities to demonstrate standards from rating C to rating A in that criterion
- □ All aspects of the criterion are assessed
- □ Items are mostly routine contexts
- □ Some items are real-world scenarios
- □ Items have a balanced range of response formats
- □ Most responses are closed-ended.