EXTERNAL ASSESSMENT SPECIFICATIONS

GENERAL MATHEMATICS (MTG315120)

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 format of the external assessment is:

• a 3 hour written examination.

The criteria to be externally assessed are:

Criterion 4: interpret concepts, explore and apply methods of bivariate data analysis and time series analysis using the statistical investigation process
Criterion 5: interpret concepts and perform calculations to model and investigate patterns of growth and decay in discrete situations
Criterion 6: interpret concepts and perform calculations to solve problems involving standard financial models
Criterion 7: interpret concepts and perform calculations to solve problems involving applications of trigonometry
Criterion 8: interpret language and concepts of graphs and networks in order to model and analyse practical situations aiding mathematical decision making
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, 1a(ii)) 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
WRITTEN EXAM 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 the table below:

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

<table>
<thead>
<tr>
<th>PART</th>
<th>PART 1</th>
<th>PART 2</th>
<th>PART 3</th>
<th>PART 4</th>
<th>PART 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRITERIA</td>
<td>4 – all elements</td>
<td>5 – all elements</td>
<td>6 – all elements</td>
<td>7 – all elements</td>
<td>8 – all elements</td>
</tr>
<tr>
<td>COURSE COVERAGE</td>
<td>Bivariate data analysis</td>
<td>Growth and decay in sequences</td>
<td>Finance</td>
<td>Trigonometry</td>
<td>Networks and decision mathematics</td>
</tr>
<tr>
<td>NUMBER AND NATURE OF ITEMS</td>
<td>3 to 5 items per part</td>
<td>3 to 5 items per part</td>
<td>3 to 5 items per part</td>
<td>3 to 5 items per part</td>
<td>3 to 5 items per part</td>
</tr>
<tr>
<td>COMPULSORY OR OPTIONAL</td>
<td>All items are compulsory</td>
<td>All items are compulsory</td>
<td>All items are compulsory</td>
<td>All items are compulsory</td>
<td>All items are compulsory</td>
</tr>
<tr>
<td>RESPONSE TIME</td>
<td>36 minutes approximately</td>
<td>36 minutes approximately</td>
<td>36 minutes approximately</td>
<td>36 minutes approximately</td>
<td>36 minutes approximately</td>
</tr>
<tr>
<td>MARK ALLOCATION</td>
<td>36 marks</td>
<td>36 marks</td>
<td>36 marks</td>
<td>36 marks</td>
<td>36 marks</td>
</tr>
<tr>
<td>ITEM TYPE(S) (SEE ATTACHMENT 1 FOR DEFINITIONS AND EXEMPLARS)</td>
<td>A balance of items ranging from short to extended formats using mostly routine contexts and some real-world scenarios or modelled real world scenarios.</td>
<td>Responses are to be mostly closed-ended responses, with some open-ended responses.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SPECIFIC MATERIALS AND EQUIPMENT APPROVED FOR USE BY CANDIDATES

- A calculator approved by TASC
- Current External Assessment Information Sheet for General Mathematics (MTG315120)

ASSESSMENT

A set of solutions will be developed by the Setting Examiner, provided to the 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 CHECKLIST

PART 1 – BIVARIATE DATA ANALYSIS
☐ assesses examinable aspects of Criterion 4
  - provides a list of all content points that have been included
☐ all aspects of the criterion are assessed
☐ provides opportunities to demonstrate standards from rating C to rating A
  - provides a list of all content points that have been included
☐ comprises of three to five question
☐ total of 36 marks and the corresponding suggested time total of 36 minutes
☐ marks clearly indicated for all questions and sub items
☐ no part of an item worth more than four marks
☐ includes a representative of sample of course content

PART 2 – GROWTH AND DECAY IN SEQUENCES
☐ assesses examinable aspects of Criterion 4
  - provides a list of all content points that have been included
☐ all aspects of the criterion are assessed
☐ provides opportunities to demonstrate standards from rating C to rating A
  - provides a list of all content points that have been included
☐ comprises of three to five question
☐ total of 36 marks and the corresponding suggested time total of 36 minutes
☐ marks clearly indicated for all questions and sub items
☐ no part of an item worth more than four marks
☐ includes a representative of sample of course content

PART 3 - FINANCE
☐ assesses examinable aspects of Criterion 4
  - provides a list of all content points that have been included
☐ all aspects of the criterion are assessed
☐ provides opportunities to demonstrate standards from rating C to rating A
  - provides a list of all content points that have been included
☐ comprises of three to five question
☐ total of 36 marks and the corresponding suggested time total of 36 minutes
☐ marks clearly indicated for all questions and sub items
☐ no part of an item worth more than four marks
☐ includes a representative of sample of course content
PART 4 - TRIGONOMETRY
☐ assesses examinable aspects of Criterion 4
  - provides a list of all content points that have been included
☐ all aspects of the criterion are assessed
☐ provides opportunities to demonstrate standards from rating C to rating A
  - provides a list of all content points that have been included
☐ comprises of three to five question
☐ total of 36 marks and the corresponding suggested time total of 36 minutes
☐ marks clearly indicated for all questions and sub items
☐ no part of an item worth more than four marks
☐ includes a representative of sample of course content

PART 5 – GRAPHS AND NETWORKS
☐ assesses examinable aspects of Criterion 4
  - provides a list of all content points that have been included
☐ all aspects of the criterion are assessed
☐ provides opportunities to demonstrate standards from rating C to rating A
  - provides a list of all content points that have been included
☐ comprises of three to five question
☐ total of 36 marks and the corresponding suggested time total of 36 minutes
☐ marks clearly indicated for all questions and sub items
☐ no part of an item worth more than four marks
☐ includes a representative of sample of course content
**ATTACHMENT 1**

**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 as follows:

<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></td>
<td>2011 Mathematics Applied Question 9 (a)</td>
</tr>
<tr>
<td></td>
<td>These items require rehearsed skills in the use of language and in familiar contexts.</td>
<td>If Paris is one hour ahead of GMT, determine the standard time difference between Paris and New York.</td>
</tr>
<tr>
<td></td>
<td><strong>Non-routine context</strong></td>
<td>Reference: Gary Anderson Support Materials For General Mathematics 2014</td>
</tr>
<tr>
<td></td>
<td>These items require procedures not previously encountered in expected prior learning activities. These require the combination, and sometimes the selection, of a set of skills in unfamiliar contexts.</td>
<td>Question 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gary and Kathryn are considering buying a block of land. The real estate agent supplies them with the accurate sketch shown below.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Show that the angle at A is 48° and determine the area of their block of land. (6 marks)</td>
</tr>
</tbody>
</table>
The scenario of the item

**Real-world scenarios**

These items relate the use of language to the context of the real world.

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2011 Mathematics Applied Question 1

Andrew and Robyn record the heart rate \( (H, \text{beats per minute}) \) of a pet turtle as the temperature \( (T, \text{in } ^\circ\text{C}) \) increases one morning.

<table>
<thead>
<tr>
<th>Temperature ( T ) ((^\circ\text{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.

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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 to familiar situations
- demonstrate understanding of key concepts in previously unseen stimulus material.

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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**.
Extended response format

These items involve lengthy structured responses. Greater complexity may be due to one or more of, but not limited to, the following:

- a greater cognitive demand of English language concepts
- the necessity to select appropriate information
- justification of a response via a logical line of reasoning.


<table>
<thead>
<tr>
<th>Activity</th>
<th>Time (hour)</th>
<th>Predecessor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>9</td>
<td>E</td>
</tr>
<tr>
<td>G</td>
<td>5</td>
<td>D, B</td>
</tr>
<tr>
<td>H</td>
<td>7</td>
<td>C</td>
</tr>
<tr>
<td>I</td>
<td>3</td>
<td>G, H</td>
</tr>
</tbody>
</table>

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

![Network Diagram]

(a) Complete the network diagram above by inserting activity D.

(3 marks)

Question 3 continues opposite

(b) Determine the earliest start time for activity H.

(1 mark)

(c) 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 opposite.

(4 marks)

Critical path

Minimum time

(2 marks)

(d) The duration of activity E is delayed by ‘n’ hours. For what value of ‘n’ does the critical path determined in part (c) remain critical and the minimum time remain the same?

(2 marks)
<table>
<thead>
<tr>
<th>Assessment of response</th>
<th>2013 Mathematics Applied – Question 17</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Closed-ended response</strong></td>
<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>
</tr>
<tr>
<td></td>
<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. How long will it take to pay off this loan?</td>
</tr>
<tr>
<td><strong>Open-ended response</strong></td>
<td></td>
</tr>
<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>
<td></td>
</tr>
</tbody>
</table>