GENERAL MATHEMATICS (MTG315123)

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

The external assessment specifications are to be read in conjunction with the course document and will not repeat essential information found in other documents.

The external assessment consists of one component:

- a written exam

WRITTEN EXAM STRUCTURE

The written exam is THREE hours.

Students will have an additional 15-minute preparation time during which students can take notes on the note paper provided and highlight any key words in the exam booklet during the allocated time. Students will not be permitted to start their exam until advised by the Exam Supervisor.

The written exam includes FIVE sections:

- one (1) for each of criteria 3, 5, 6, 7 and 8.

Assessed Criteria

Criterion 3: apply mathematical and statistical models to investigate, represent and analyse real-world situations and solve problems

Criterion 5: interpret concepts and apply mathematical techniques to solve problems involving bivariate data analysis and time series analysis using the statistical investigation process

Criterion 6: interpret concepts and apply mathematical techniques to model patterns and solve problems involving growth and decay in sequences

Criterion 7: interpret concepts and apply mathematical techniques to solve problems involving standard financial models

Criterion 8: interpret concepts and apply mathematical techniques to represent, analyse and solve practical problems in the two-dimensional plane

SPECIFIC MATERIALS AND EQUIPMENT APPROVED FOR USE BY STUDENTS

- TASC approved calculators
- current General Mathematics (MTG315123) Information Sheet (provided with exam materials)

ASSESSMENT

All criteria are assessed numerically out of 36 marks. The 36 marks for the 'focus criterion' will be allocated numerically, enabling the level of sophistication of answers, the presence of working out and the final solution to receive marks.

A representative sample, encompassing a large proportion of the targeted course content areas, tests the standard of skills, knowledge and understanding of a student.

The relative weighting of questions is indicated by:

- the relative allocation of marks, and
- space for responses
- items of questions (for example 1a, 1b or 1ai, 1aii) must have an individual mark allocation
- for questions or 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

A set of solutions or a marking tool directly aligned with the course content, criteria and criterion elements will be developed by the Setting Examiner each year. These will be provided to the Marking Coordinator and marking team at the marking meeting that follows the external written exams. *Solutions or marking tools may be included in the Assessment Report published on the TASC website the following year.*

The external assessment must include questions 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.

Numerical mark allocation

Exam papers are designed so that the number of marks allocated to a section, part or question corresponds to the recommended time allocation for it. This is so that a student knows when answering a 10-mark question that the question has been designed for students to spend approximately 10 minutes reading, thinking and then answering the question. Students may find that they spend less or more time on certain questions throughout the exam.

ALL SECTIONS

Nature of responses

- a balance of items ranging from short to extended formats using mostly routine contexts and some real-world scenarios or modelled real-world scenarios.
- questions can be broken into items and sub-items.
- no items are worth more than four (4) marks.
- required responses are mostly closed-ended responses with open ended responses to enable mark allocation towards Criterion 3 (elements 2-5) assessment.

SECTION A – Mathematical and Statistical Models

Structure

- this section will take students approximately 36 minutes to respond to and will be allocated 36 marks
- this section will include between FOUR and SIX questions. All questions are compulsory.
- this section will address course content from Modules 1, 2 and 3 with 12 marks each for questions relating to Bivariate Data Analysis, Sequences and Finance.

Assessed criteria

- Criterion 3 apply mathematical and statistical models to investigate, represent and analyse real-world situations and solve problems (Elements 2, 3, 4 and 5).

Nature of responses

- responses are to be mostly closed-ended responses, with some open-ended responses.
- responses will be assessed numerically.

SECTION B – Bivariate Data Analysis

Structure

- this section will take students approximately 36 minutes to respond to and will be allocated 36 marks.
- this section will include between FOUR and SIX questions. All questions are compulsory.
- this section will address course content from Module 2 Topic 1 – Statistical analysis.

Assessed criteria

- Criterion 5 interpret concepts and apply mathematical techniques to solve problems involving bivariate data analysis and time series analysis using the statistical investigation process (all Elements).

Nature of responses

- responses are to be mostly closed-ended responses, with some open-ended responses.
- responses will be assessed numerically.

SECTION C – Growth and Decay in Sequences

Structure

- this section will take students approximately 36 minutes to respond to and will be allocated 36 marks.
- this section will include between FOUR and SIX questions. All questions are compulsory.
- this section will address course content from Module 2 Topic 2 – Growth and decay in sequences.

Assessed criteria

- Criterion 6 interpret concepts and apply mathematical techniques to model patterns and solve problems involving growth and decay in sequences (all Elements).

Nature of responses

- responses are to be mostly closed-ended responses, with some open-ended responses.
- responses will be assessed numerically.

SECTION D - Finance

Structure

- this section will take students approximately 36 minutes to respond to and will be allocated 36 marks.
- this section will include between FOUR AND SIX questions. All questions are compulsory.

- this section will address course content from Module 3 Topic 1 – Loans, investment and annuities.

Assessed criteria

- Criterion 7 interpret concepts and apply mathematical techniques to solve problems involving standard financial models (all Elements).

Nature of responses

- responses are to be mostly closed-ended responses, with some open-ended responses.
- responses will be assessed numerically.

SECTION E – Networks and/or Trigonometry

Structure

- this section will take students approximately 36 minutes to respond to and will be allocated 36 marks.

This section will be broken into two parts, and students will choose ONE part to respond to.

Part 1

- students will respond to between FOUR and SIX questions on networks and decision mathematics

Part 2

- students will respond to between FOUR and SIX questions on applications of trigonometry and Earth geometry

This section will address course content from Module 3 Topic 2 – Applications of trigonometry and Earth geometry **OR** Networks and decision mathematics.

Assessed criteria

- Criterion 8 interpret concepts and apply mathematical techniques to represent, analyse and solve practical problems in the two-dimensional plane (all Elements).

Nature of responses

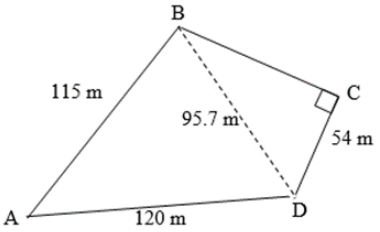
- responses are to be mostly closed-ended responses, with some open-ended responses.
- responses will be assessed numerically.

ATTACHMENT 1

Exam question types

In these specifications, the term 'question' is defined as an individual task to be undertaken by students. The task may be divided into several items.

Question types can be categorised as follows:

CATEGORY	QUESTION TYPES AND DEFINTIONS	EXEMPLARS
The context of the question	Routine context These questions require rehearsed skills in the use of language and in familiar contexts.	2011 Mathematics Applied Question 9 (a) If Paris is one hour ahead of UTC, determine the standard time difference between Paris and New York.
	Non-routine context These questions 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.	**Question 2** Gary and Kathryn are considering buying a block of land. The real estate agent supplies them with the accurate sketch shown below.  Show that the angle at A is 48° and determine the area of their block of land. (6 marks) *Reference: Gary Anderson Support Materials for General Mathematics 2014*

<table>
<tr><th>CATEGORY</th><th>QUESTION TYPES AND DEFINTIONS</th><th>EXEMPLARS</th></tr>
<tr><td>The scenario of the question</td><td>Real-world scenarios

These questions relate the use of language to the context of the real world.</td><td>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><tr><th>Temperature
T
(°C)</th><th>Heart Rate
H
(beats per minute)</th></tr><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></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.</td></tr>
<tr><td rowspan="2">The format of response</td><td>Short response format

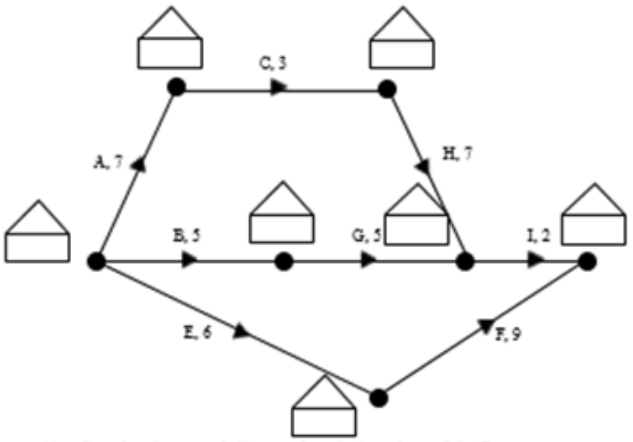
These questions are composed of a brief prompt that demands a response to some stimulus material that varies from a single response to a few written points. This sort of question is suited to assessing the student's ability to:
• recall specific information and methods related to key content
• apply rehearsed methods to familiar situations
• demonstrate understanding of key concepts in previously unseen stimulus material.</td><td>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).</td></tr>
<tr><td>Extended response format

These questions 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</td><td>Reference: Gary Anderson: Assessment Support Materials for General Maths 3, DoE 2014 – Graphs and Networks, Question 2</td></tr>
</table>

CATEGORY	QUESTION TYPES AND DEFINTIONS	EXEMPLARS
	• justification of a response via a logical line of reasoning.	**Question 5** The project network below displays activities, A to I with time in hours. Activity D is missing from the network diagram for this project, which is shown below. (a) Complete the network diagram above by inserting activity D. (2 marks) **Question 5 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 ..... (d) The duration of activity E 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? (2 marks)

Activity	Time (hours)	Predecessor(s)
A	7	
B	5	
C	3	A
D	4	A
E	6	
F	9	E
G	5	D, B
H	7	C
I	2	G, H



CATEGORY	QUESTION TYPES AND DEFINTIONS	EXEMPLARS
Assessment of response	Closed-ended response These are questions for which there is a single 'correct' or 'best' response.	2013 Mathematics Applied – Question 17 (a) **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?**
	Open-ended response These are questions for which there may be multiple correct responses OR in which the quality of the argument and/or the expression is being assessed.	