General Mathematics marking guide

Sample external assessment 2020

Paper 1: Simple familiar (60 marks)

Assessment objectives

This assessment instrument is used to determine student achievement in the following objectives:

1. select, recall and use facts, rules, definitions and procedures drawn from Units 3 and 4
2. comprehend mathematical concepts and techniques drawn from Units 3 and 4
3. communicate using mathematical, statistical and everyday language and conventions
4. evaluate the reasonableness of solutions
5. justify procedures and decisions by explaining mathematical reasoning
6. solve problems by applying mathematical concepts and techniques drawn from Units 3 and 4.

Queensland Government | Queensland Curriculum & Assessment Authority

For all Queensland schools

Introduction

The Queensland Curriculum and Assessment Authority (QCAA) has developed mock external assessments for each General senior syllabus subject to support the introduction of external assessment in Queensland.

An external assessment marking guide (EAMG) has been created specifically for each mock external assessment.

The mock external assessments and their marking guides were:

- developed in close consultation with subject matter experts drawn from schools, subject associations and universities
- aligned to the external assessment conditions and specifications in General senior syllabuses
- developed under secure conditions.

Purpose

This document consists of an EAMG and an annotated response.

The EAMG:

- provides a tool for calibrating external assessment markers to ensure reliability of results
- indicates the correlation, for each question, between mark allocation and qualities at each level of the mark range
- informs schools and students about how marks are matched to qualities in student responses.

Mark allocation

Where a response does not meet any of the descriptors for a question or a criterion, a mark of '0' will be recorded.

Where no response to a question has been made, a mark of 'N' will be recorded.

External assessment marking guide

Multiple-choice

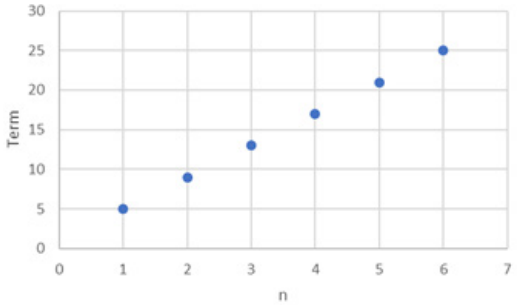
Question	Response
1	B
2	C
3	D
4	B
5	B
6	A
7	D
8	A
9	D
10	D
11	C
12	B
13	C
14	B
15	B
16	A
17	C
18	C
19	B
20	A

Short response

Question 21 (4 marks)

Sample response	The response
$A = 270\,000$ $M = ?$ $i = \frac{0.035}{12}$ $= 0.002916\ldots$ $n = 20 \times 12$ $= 240$	correctly determines i and n **[1 mark]**
$A = M\left(\frac{1-(1+i)^{-n}}{i}\right)$ $A = M\left(\frac{1-(1+0.002916\ldots)^{-240}}{0.002916}\right)$	substitutes into appropriate annuity rule **[1 mark]**
$270\,000 = M \times 172.425\ldots$ $M = \frac{270000}{172.425\ldots}$ $M = 1565.891$	determines monthly payment **[1 mark]**
She will receive \$1 565.89 each month for 20 years	states solution with correct units and appropriate rounding **[1 mark]**

Question 22 (7 marks)

Sample response	The response
a) $t_1 = 5$ $t_2 = 5 + 4$ $= 9$ $t_3 = 9 + 4$ $= 13$ $t_4 = 13 + 4$ $= 17$ $t_5 = 17 + 4$ $= 21$ $t_6 = 21 + 4$ $= 25$	provides evidence of the six terms **[1 mark]**
	correctly scales and labels the axes **[1 mark]** correctly plots the six points **[1 mark]**
b) $t_n = t_1 + (n-1)d$ $t_n = 5 + 4(n-1)$ $= 5 + 4n - 4$ $= 4n + 1$	correctly substitutes into the given equation **[1 mark]** correctly simplifies the equation **[1 mark]**
c) $t_{27} = 4 \times 27 + 1$ $= 109$	substitutes into equation **[1 mark]** determines value of t_{27} **[1 mark]**

Question 23 (6 marks)

Sample response	The response
a) 46	correctly provides a value in the range from 44 to 48 inclusive **[1 mark]**
b) The outlier significantly decreases the R^2 value as without this outlier the R^2 would be 1.	correctly explains the effect of the outlier **[1 mark]**
c) $y = 90x - 23.333$ $at\ x = 18$ $y = 90(18) - 23.333$ $= 1596.667$	correctly substitutes into the given equation **[1 mark]**
The line of best fit predicts that approximately 1597 meals will be sold in the 18th month.	correctly states the number of meals sold, rounded to a whole number **[1 mark]**
d) Extrapolating the given data can be a problem. In this case the number of meals can't keep increasing forever as the restaurant will have a maximum capacity.	communicates the relevant issue **[1 mark]** evaluates the reasonableness of the solution **[1 mark]**

Question 24 (4 marks)

Sample response	The response
a) Total number enjoying swimming $= 33 + 132$ $= 165$	correctly determines the total **[1 mark]**
b) Total number surveyed $= 33 + 132 + 110 + 58$ $= 333$	correctly determines the total **[1 mark]**
c) Percentage who enjoy both $= \frac{33}{333} \times 100\%$	determines fraction **[1 mark]**
$= 9.91\%$	determines percentage to two decimal places **[1 mark]**

Question 25 (3 marks)

Sample response	The response
a) Pond and cafe	correctly identifies the two places **[1 mark]**
b) *Garden shed* 8:55:00 *Pond* 1:10 *Playground* 2:30 *Butterfly house* 2:20 9:01:00 Arrive at 9:01am	correctly identifies the fastest path **[1 mark]** determines clock time **[1 mark]**

Question 26 (2 marks)

Sample response	The response
a) Number of computers	correctly identifies the response variable **[1 mark]**
b) Using calculator $y = 0.7995x + 27.1306$ $\therefore c = 0.80s + 27.13$	correctly determines the equation **[1 mark]**

Question 27 (3 marks)

Sample response	The response
a) 35%	correctly calculates the percentage **[1 mark]**
b) $t_1 = 120$ $t_2 = 0.65 \times 120$ $= 78$ $t_3 = 0.65 \times 78$ $= 50.7$ $t_4 = 0.65 \times 50.7$ $= 32.955$	provides evidence of a valid method **[1 mark]** determines t_4 **[1 mark]**

Question 28 (3 marks)

Sample response	The response
Travelling North from $38°09'S$ to $43°01'N$ $angular\ distance = 38°09' + 43°01'$ $= 81°10'$	correctly calculates the angular distance **[1 mark]**
$D = 111.2 \times$ angular distance $= 111.2 \times 81\frac{10}{60}$ $= 9025.73$	provides evidence of using the correct rule **[1 mark]**
The distance is 9026 km.	calculates distance to the nearest km **[1 mark]**

Question 29 (4 marks)

Sample response	The response
Travelling East ↔ West $angular\ distance = 127° + 122.4°$ $= 249.4°$	correctly calculates the angular distance **[1 mark]**
$shortest\ angular\ distance = 360° - 249.4°$ $= 110.6°$	determines the shortest angular distance **[1 mark]**
$D = 111.2cos\theta \times angular\ distance$ $= 111.2 \times \cos(37.6) \times 110.6$ $= 9744.15$	provides evidence of using the correct rule **[1 mark]**
The shortest distance is 9744 km.	determines distance to the nearest km **[1 mark]**

Question 30 (4 marks)

Sample response	The response
a) A - H	correctly identifies the critical path **[1 mark]**
b) $Critical\ Path = 14\ (end\ of\ day\ 14)$ $Latest\ starting\ time\ for\ Activity\ G$ $= 14 - 2$ $= 12$ Latest starting time is the end of day 12	correctly determines the latest starting time **[1 mark]**
c) $Float\ Time = 10 - 5$ $= 5$	provides evidence of the method used to calculate the float time **[1 mark]**
Float time of 5 days	calculates float time **[1 mark]**