Essential Mathematics marking guide and response

Common internal assessment 2024 — Phase 1

Short response (50 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 all Unit 3 Topics
2. comprehend mathematical concepts and techniques drawn from all Unit 3 Topics
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 all Unit 3 Topics.

Purpose

This marking guide informs schools and students how marks are matched to characteristics in responses to the common internal assessment.

The marking guide provides:

- explicit statements about what is expected of students when they respond to a question
- sample responses that identify characteristics to assist the marker to make judgments
- where relevant, notes that provide further information to assist the marker in making a decision
- a tool for calibrating markers to ensure comparability of results.

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.

Allow FT mark/s — refers to 'follow through', where an error in the prior section of working is used later in the response, a mark (or marks) for the rest of the response can still be awarded so long as it still demonstrates the correct conceptual understanding or skill in the rest of the response.

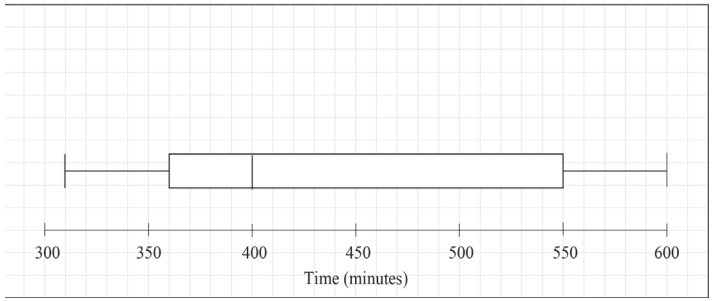
This mark may be implied by subsequent working — the full mathematical reasoning and/or working, as outlined in the sample response and associated mark, is not explicitly stated in the student response, but by virtue of subsequent working there is sufficient evidence to award the mark/s.

Marking guide

Q	Sample response	The response:
1a)	Square	• correctly names shape **[1 mark]**
1b)	8 vertices	• correctly states number of vertices **[1 mark]**
2a)	Number of handspans $= (12 + 5) \times 2$ $= 34$ handspans	• correctly determines perimeter in handspans **[1 mark]**
2b)	Perimeter $= 34 \times 21$ $= 714$ cm $= 7.14$ m	• applies relevant strategy **[1 mark]** • calculates perimeter in metres **[1 mark]**
3a)	3 m^2	• correctly determines actual area of desk A **[1 mark]**
3b)	2 m^2	• correctly estimates actual area of desk E **[1 mark]**
3c)	Total actual area $= 4$ corner desks $+$ centre desk $= (4 \times 3) + 2$ $= 14$ m^2	• applies relevant strategy **[1 mark]** • calculates approximate total actual area **[1 mark]**

Q	Sample response	The response:
4a)	$r = 3$ cm	• correctly determines radius **[1 mark]**
4b)	$h \approx 10$ cm	• correctly estimates height using leading-digit approximation **[1 mark]**
4c)	$V = \frac{1}{3}\pi r^2 h$ $= \frac{1}{3}\pi \times (3)^2 \times 10$ ≈ 94.25 cm^3	• applies relevant strategy **[1 mark]** • calculates approximate volume of cone **[1 mark]**
4d)	Amount $= 20 \times 94.25$ ≈ 1885 mL	• applies relevant strategy **[1 mark]** • estimates amount of ice cream for 20 cones **[1 mark]**
5a)	24 kg	• correctly estimates mass **[1 mark]**
5b)	5 t = 5000 kg	• correctly converts tonnes to kilograms **[1 mark]**
5c)	Number of suitcases $= \frac{5000}{24}$ ≈ 208.33 $= 208$ suitcases	• applies relevant strategy **[1 mark]** • calculates maximum number of suitcases **[1 mark]**

Q	Sample response	The response:
6a)	Actual length AB $= 8.2 \times 4$ $= 32.8$ cm	• correctly applies relevant strategy **[1 mark]** • determines actual length AB **[1 mark]**
6b)	Actual length AC $= 5.4 \times 4$ $= 21.6$ cm	• correctly applies relevant strategy **[1 mark]** • determines actual length AC **[1 mark]**
6c)	$A = L \times W$ $= 32.8 \times 21.6$ $= 708.48$ cm^2 $= 708$ cm^2	• correctly applies relevant strategy **[1 mark]** • calculates actual area, rounded to the nearest square centimetre **[1 mark]**
7a)	$c^2 = a^2 + b^2$ $= 2.1^2 + 3.4^2$ $= 15.97$ $c = \sqrt{15.97}$ $= 3.996248$ $c \approx 4$ m	• correctly selects appropriate rule **[1 mark]** • determines value of c^2 **[1 mark]** • calculates length of diagonal brace **[1 mark]**
7b)	Total length of frame = 2 lengths + 2 widths + 1 diagonal $= (2 \times 2.1) + (2 \times 3.4) + 4$ $= 4.2 + 6.8 + 4$ $= 15$ m	• applies relevant strategy **[1 mark]** • determines total length required for frame **[1 mark]**

<table>
<tr><th>Q</th><th>Sample response</th><th>The response:</th></tr>
<tr><td>8a)</td><td>25 °C</td><td>• correctly identifies mode [1 mark]</td></tr>
<tr><td>8b)</td><td>24 °C</td><td>• correctly determines median [1 mark]</td></tr>
<tr><td>8c)</td><td>$\text{Mean} = \frac{\sum x}{n}$
$= \frac{304}{13}$
$\approx 23.4\ ^\circ\text{C}$</td><td>• applies relevant strategy [1 mark]
• calculates mean [1 mark]</td></tr>
<tr><td>8d)</td><td>Temperatures are clustered around 20 °C to 26 °C.</td><td>• correctly describes spread of data [1 mark]</td></tr>
<tr><td>9a)</td><td>310, 340, 380, 390, 400, 460, 540, 560, 600
<table><tr><th>Minimum</th><th>Lower quartile</th><th>Median</th><th>Upper quartile</th><th>Maximum</th></tr><tr><td>310</td><td>360</td><td>400</td><td>550</td><td>600</td></tr></table></td><td>• correctly arranges numbers in order [1 mark]
• correctly labels headings [1 mark]
• determines minimum, median and maximum [1 mark]</td></tr>
<tr><td>9b)</td><td> 
</td><td>• draws box section [1 mark]
• draws whisker sections connecting to box [1 mark]</td></tr>
</table>

Q	Sample response	The response:
10	Arrange numbers and identify Q_1, Q_3 and IQR for machine B to compare to machine A Q_1 Q_2 Q_3 23, 24, 24, 25, 25, 25, 25, 26, 26	
	$Q_1 = 24$	• correctly determines Q_1 for machine B **[1 mark]**
	$Q_3 = 25.5$	• correctly determines Q_3 for machine B **[1 mark]**
	machine B IQR $IQR = Q_3 - Q_1$ $= 25.5 - 24$ $= 1.5$	• determines IQR for machine B **[1 mark]**
	machine A IQR $IQR = Q_3 - Q_1$ $= 26 - 23$ $= 3$	• correctly determines IQR for machine A **[1 mark]**
	Machine B has an IQR of 1.5 whereas machine A has an IQR of 3. As a result, machine B is more consistent.	• determines which machine is more consistent **[1 mark]**

Q	Sample response	The response:
11	A = 5.2 cm, B = 1.8 cm, C = 3.3 cm, D = 8 cm A = 5.2 cm × 150 = 780 cm = 7.8 m B = 1.8 cm × 150 = 270 cm = 2.7 m C = 3.3 cm × 150 = 495 cm = 4.95 m D = 8 cm × 150 = 1200 cm = 12 m Area of front yard (composite shape) = area of rectangle + area of trapezium $= 7.8 \times 2.7 + \frac{(7.8+12) \times 4.95}{2}$ $= 70.065 \text{ m}^2$ $50 \times 1.3 = 65$ 50 rolls cover 65 m^2, which is less than 70 m^2, so Barry is incorrect. He does not have enough rolls to cover his front yard.	• correctly measures lengths of A, B, C and D **[1 mark]** • applies scale and converts to metres **[1 mark]** • applies relevant strategy **[1 mark]** • calculates area of front yard **[1 mark]** • provides relevant statement of reasonableness **[1 mark]**

© State of Queensland (QCAA) 2024
Licence: https://creativecommons.org/licenses/by/4.0 | Copyright notice: www.qcaa.qld.edu.au/copyright — lists the full terms and conditions, which specify certain exceptions to the licence. |
Attribution: © State of Queensland (QCAA) 2024