# Essential Mathematics marking guide

Common internal assessment 2023 — 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

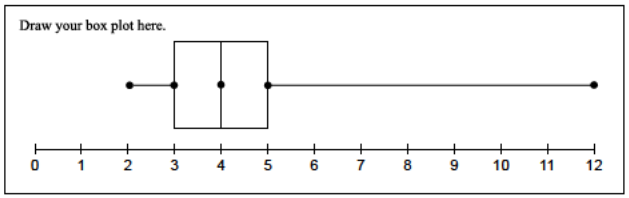
Where a response does not meet any of the descriptors for a question or a criterion, a mark of '0' will be recorded.

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) | Width = 11 cm | • correctly rounds width **[1 mark]** |
| 1b) | $A = 21 \times 11$<br>$= 231 \text{ cm}^2$ | • estimates area of base **[1 mark]** |
| 1c) | $V = 231 \times 9$<br>$= 2079 \text{ cm}^3$ | • estimates volume **[1 mark]** |
| 2a) |  | • correctly labels appropriate scale on number line **[1 mark]**<br>• correctly draws box section **[1 mark]**<br>• draws whisker sections connecting to box **[1 mark]** |
| 2b) | The data is clustered between 3 and 5.<br>There is an outlier of 12. | • identifies data is clustered **[1 mark]**<br>• identifies an outlier **[1 mark]** |

| Q | Sample response | The response: |
|---|---|---|
| 3a) | $V = \frac{1}{3}Ah$<br>$= \frac{1}{3} \times 1.8^2 \times 2$<br>$= 2.16\ \text{m}^3$ | • correctly selects an appropriate rule **[1 mark]**<br>• calculates volume **[1 mark]** |
| 3b) | $1\ \text{m}^3 = 1\ \text{kL}$<br>$2.16\ \text{m}^3 = 2.16\ \text{kL}$<br>$= 2160\ \text{L}$ | • uses an appropriate strategy **[1 mark]**<br>• calculates capacity **[1 mark]** |
| 3c) | $\text{Mass} = 2160 \times 1.3$<br>$\text{Mass} = 2808\ \text{kg}$ | • determines mass **[1 mark]** |
| 4 | <table><tr><th>Minimum</th><th>Lower quartile ($Q_1$)</th><th>Median</th><th>Upper quartile ($Q_3$)</th><th>Maximum</th></tr><tr><td>8</td><td>12</td><td>23</td><td>42</td><td>50</td></tr></table> | • correctly adds appropriate headings **[1 mark]**<br>• correctly orders values **[1 mark]**<br>• correctly determines minimum and maximum values **[1 mark]**<br>• correctly determines median **[1 mark]** |
| 5a) | Measured length = 8 cm<br>Measured width = 2 cm<br>Length: $8 \times 80 = 640$ cm<br>Width: $2 \times 80 = 160$ cm | • correctly measures length and width **[1 mark]**<br>• calculates length **[1 mark]**<br>• calculates width **[1 mark]** |
| 5b) | Perimeter = $2(L + W)$<br>$= 2 \times (6.4 + 1.6)$<br>$= 16$ m | • converts dimensions to metres **[1 mark]**<br>• calculates perimeter **[1 mark]** |

| Q | Sample response | The response: |
|---|---|---|
| 6a) | Mode = 1020 | • correctly determines mode **[1 mark]** |
| 6b) | Mean $= \frac{\sum x}{n}$<br>$= \frac{8284}{11}$<br>$= 753.09$ steps<br>$= 753$ steps (to the nearest whole number) | • correctly uses an appropriate strategy **[1 mark]**<br>• calculates mean and rounds appropriately **[1 mark]** |
| 6c) | 1020 > 753 so the principal's claim is very reasonable. | • provides a justified decision linked to prior reasoning **[1 mark]** |
| 7a) | Rectangular-based prism | • correctly identifies solid **[1 mark]** |
| 7b) | 8 vertices | • correctly states number of vertices **[1 mark]** |
| 7c) | $A = L \times W$<br>$A = 3000 \times 2000$<br>$= 6\,000\,000$ mm$^2$ | • correctly selects an appropriate rule **[1 mark]**<br>• calculates area **[1 mark]** |
| 7d) | $A = 6\,000\,000 \div 100^2 \div 10^2$<br>$= 6$ m$^2$ | • uses an appropriate strategy **[1 mark]**<br>• determines area **[1 mark]** |
| 8a) | Catfish fork length $= 18 \times 13$<br>$= 234$ cm | • correctly uses an appropriate strategy **[1 mark]**<br>• estimates fork length **[1 mark]** |
| 8b) | Catfish fork length $= 234 \div 100$<br>$= 2.34$ m | • converts fork length **[1 mark]** |

| Q | Sample response | The response: |
|---|---|---|
| 9a) | $V = \pi r^2 h$<br>$= \pi(2.5)^2 \times 22$<br>$\approx 431.97 \text{ cm}^3$ | • correctly selects an appropriate rule **[1 mark]**<br>• calculates volume including units **[1 mark]** |
| 9b) | Capacity $= 431.97$ mL | • determines capacity **[1 mark]** |
| 9c) | Number of times $= \frac{2500}{431.97}$<br>$\approx 5.79$ | • uses an appropriate strategy **[1 mark]**<br>• calculates number of times bottle is filled **[1 mark]** |
| 10a) | $\sin\theta = \frac{opp}{hyp}$<br>$\sin 35° = \frac{15}{h}$<br>$h = 15 \div \sin 35°$<br>$\therefore h \approx 26.15$ cm | • correctly selects an appropriate trigonometric ratio **[1 mark]**<br>• calculates slant height **[1 mark]** |
| 10b) | Surface area of one cone:<br>$SA = \pi r^2 + \pi rs$<br>$SA = \pi(15)^2 + \pi(15)(26.15)$<br>$SA \approx 1939.23 \text{ cm}^2$<br>Total surface area for two cones:<br>TSA $= 1939.23 \times 2$<br>TSA $\approx 3878.46 \text{ cm}^2$ | • selects an appropriate rule **[1 mark]**<br>• calculates surface area of one cone **[1 mark]**<br>• calculates total surface area of hourglass **[1 mark]** |

| Q | Sample response | The response: |
|---|---|---|
| 11 | Original Movies:<br>$\text{mean} = \frac{\sum x}{n}$<br>$\text{mean} = \frac{1390}{11}$<br>$\text{mean} \approx \$126.36 \text{ m}$<br>$\text{median} = \$130 \text{ m}$<br><br>Sequel Movies:<br>$\text{mean} = \frac{1440}{11}$<br>$\text{mean} \approx \$130.91 \text{ m}$<br>$\text{median} = \$130 \text{ m}$<br><br>The medians are the same for original and sequel movies but the mean for sequel movies is higher than the mean for original movies. So, using the mean the critic's claim is reasonable to suggest that sequel movies earn more on opening weekends than their original movies, because $131 million is more than $126 million. | • correctly determines original movie mean **[1 mark]**<br>• correctly determines original movie median **[1 mark]**<br><br>• correctly determines sequel movie mean **[1 mark]**<br>• correctly determines sequel movie median **[1 mark]**<br><br>• provides a justified statement of reasonableness **[1 mark]** |