# Essential Mathematics marking guide and response

Common internal assessment 2025 — Phase 2

## 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.

*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) | Using Pythagoras' theorem to work out horizontal length, ($b$)<br>$c^2 = a^2 + b^2$<br>$130^2 = 85^2 + b^2$ | • correctly provides mathematical reasoning or working to support the answer **[1 mark]** |
| | $b^2 = 130^2 - 85^2$<br>$b^2 = 9675$<br>$b = \sqrt{9675}$<br>$b = 98.36$ | • determines value of $b^2$ **[1 mark]** |
| | The width is 98 cm. | • determines width rounded to the nearest centimetre **[1 mark]** |
| 1b) | Convert measurements to metres<br>height = 0.85 m<br>width = 0.98 m | • converts height and width to metres **[1 mark]** |
| | Perimeter of rectangular frame<br>$P$ = total of all sides<br>$= 0.85 + 0.85 + 0.98 + 0.98$ | • provides mathematical reasoning or working to support the answer **[1 mark]** |
| | $= 3.66$ m | • determines perimeter in metres **[1 mark]** |

| Q | Sample response | The response: |
|---|---|---|
| 2 | Number of glasses<br>$= 1300 \div 305$<br>$= 4.262$<br>$\approx 4$ | • correctly provides mathematical reasoning or working to support the answer **[1 mark]** |
| | 4 glasses of milk make up the recommended daily amount of calcium for teenagers. | • correctly determines approximate number of glasses of milk to the nearest whole number **[1 mark]** |
| 3a) | Actual base length $= 5.2 \times 20$<br>$= 104\,\text{cm}$ | • correctly determines actual base length in centimetres **[1 mark]** |
| 3b) | Actual height $= 2 \times 20$<br>$= 40\,\text{cm}$ | • correctly determines actual height in centimetres **[1 mark]** |
| 3c) | Area of tile<br>$A = \frac{1}{2}bh$<br>$= \frac{1}{2} \times 104 \times 40$ | • correctly provides mathematical reasoning or working to support the answer **[1 mark]** |
| | $= 2\,080\,\text{cm}^2$ | • calculates area of tile **[1 mark]** |

| Q | Sample response | The response: |
|---|---|---|
| 4a) | The mode travel time to school is 12 minutes. | • correctly identifies mode **[1 mark]** |
| 4b) | The travel times are clustered around 10–14 minutes.<br>The spread also contains an outlier of 30 minutes. | • correctly describes a feature of the spread **[1 mark]**<br>• correctly describes a second feature of the spread **[1 mark]** |

| Q | Sample response | The response: |
|---|---|---|
| 5a) | 6 faces | • correctly states number of faces **[1 mark]** |
| 5b) | Total length<br>$= 4 \times 12 \text{ cm} + 4 \times 5 \text{ cm} + 4 \times 8 \text{ cm}$ | • correctly provides mathematical reasoning or working to support the answer **[1 mark]** |
| | $= 100 \text{ cm}$ | • calculates total length **[1 mark]** |
| 5c) | Volume of display case<br>$V = Ah$<br>$= 5 \times 12 \times 8$ | • correctly provides mathematical reasoning or working to support the answer **[1 mark]** |
| | $= 480 \text{ cm}^3$ | • calculates volume of display case **[1 mark]** |
| 5d) | Fraction of display case $= \frac{400}{480}$ | • determines fraction **[1 mark]** |

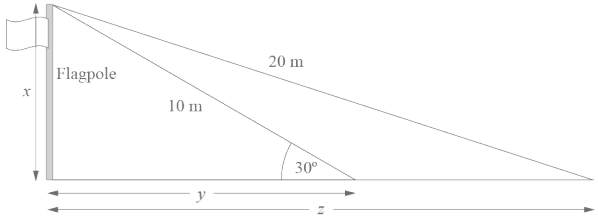
| Q | Sample response | The response: |
|---|---|---|
| 6a) | Volume of storage tank<br>$V = \pi r^2 h$<br>$= \pi \times (2)^2 \times 4$ | • correctly provides mathematical reasoning or working to support the answer **[1 mark]** |
| | $= 50.265 \text{ m}^3$<br>$\approx 50 \text{ m}^3$ | • estimates volume **[1 mark]** |
| 6b) | Approximate mass of animal feed<br>$= 800 \text{kg/m}^3 \times 50 \text{m}^3$<br>$= 40000 \text{kg}$ | • determines approximate mass in kilograms **[1 mark]** |
| 6c) | 1 tonne = 1000 kg<br>$\therefore 40000 \text{kg} \div 1000 \text{kg/tonne} = 40 \text{tonnes}$ | • converts approximate mass to tonnes **[1 mark]** |
| 6d) | Cost $= 40 \times 80$<br>$= \$3200$ | • determines approximate total cost **[1 mark]** |

| Q | Sample response | The response: |
|---|---|---|
| 7a) | Area of wall mural<br>$A = \frac{1}{2}(a+b)h$<br>$= \frac{1}{2}(6+10)4$ | • correctly provides mathematical reasoning or working to support the answer **[1 mark]** |
| | $= 32 \text{ m}^2$ | • correctly calculates wall mural area **[1 mark]** |
| 7b) | Area of circular panels<br>$A = 2\pi r^2$<br>$= 2\pi(1)^2$ | • correctly provides mathematical reasoning or working to support the answer **[1 mark]** |
| | $= 6.28 \text{m}^2$ | • correctly calculates area of two circular panels **[1 mark]** |
| 7c) | One quarter of the mural area<br>$= 0.25 \times 32$<br>$= 8$<br>$6.28 < 8$<br>The painter's estimate is not reasonable, as the two circular panels cover less than 25% of the mural area. | • explains why claim is not reasonable **[1 mark]** |

| Q | Sample response | The response: |
|---|---|---|
| 8a) | Arc length of slab<br>$l = \frac{\theta}{180}\pi r$<br>$= \frac{90}{180} \times \pi \times 2.5$<br>$= \frac{1}{2} \times \pi \times 2.5$ | • correctly provides mathematical reasoning or working to support the answer **[1 mark]** |
| | $= 3.92699$<br>$\approx 3.93\,\text{m}$ | • calculates arc length rounded to two decimal places **[1 mark]** |
| 8b) | Perimeter of slab<br>$= 3.93\,\text{m} + 2.5\,\text{m} + 2.5\,\text{m}$<br>$= 8.93\ \text{m}$ | • determines the perimeter **[1 mark]** |

<table>
<tr><th>Q</th><th>Sample response</th><th>The response:</th></tr>
<tr><td rowspan="2">9a)</td><td>Mean $= \frac{\sum x}{n}$<br>$= \frac{151}{13}$</td><td>• correctly provides mathematical reasoning or working to support the answer [1 mark]</td></tr>
<tr><td>$\approx 11.615$</td><td>• calculates mean [1 mark]</td></tr>
<tr><td rowspan="2">9b)</td><td>$Q_2$<br>8 8 9 9 10 10 10 11 12 14 14 16 20</td><td>• correctly orders all the data values [1 mark]</td></tr>
<tr><td>Median = 10</td><td>• correctly determines median [1 mark]</td></tr>
<tr><td rowspan="2">9c)</td><td>Minimum = 8<br>Maximum = 20</td><td>• correctly determines minimum and maximum values [1 mark]</td></tr>
<tr><td>Five-number summary:<br><table><tr><th>Minimum</th><th>$Q_1$</th><th>$Q_2$</th><th>$Q_3$</th><th>Maximum</th></tr><tr><td>8</td><td>9</td><td>10</td><td>14</td><td>20</td></tr></table></td><td>• completes five-number summary including appropriate labels [1 mark]</td></tr>
</table>

| Q | Sample response | The response: |
|---|---|---|
| 10 | $S = \pi rs$<br>$= \pi \times 2 \times 16$<br>$= 100.5309649$ | • correctly provides mathematical reasoning or working to support the answer **[1 mark]** |
| | $\approx 100.53 \text{ m}^2$ | • determines required surface area **[1 mark]** |
| | Determine how many litres required<br>$= \frac{100.53}{6.5}$<br>$= 15.466$<br>$\approx 16 \text{L}$ | • determines amount of paint required rounded up to nearest litre **[1 mark]** |
| | Determine cost for paint<br>$= 16 \times 53.8$<br>$= \$860.80$ | • determines cost **[1 mark]** |
| | The painter has budgeted enough money. The cost for the paint is $860.80 and they have budgeted $900. | • determines if painter can buy enough paint **[1 mark]** |

| Q | Sample response | The response: |
|---|---|---|
| 11 | Identify variables<br>$x$ = flagpole vertical height<br>$y$ = first line horizontal distance from flagpole<br>$z$ = second line horizontal distance from flagpole<br>  <br><br>Flagpole vertical height<br>$\sin\theta = \frac{\text{opp}}{\text{hyp}}$<br>$\sin 30^o = \frac{x}{10}$<br>$x = \sin 30^o \times 10$<br>$x = 5\,\text{m}$ | • correctly determines flagpole vertical height **[1 mark]** |

| Q | Sample response | The response: |
|---|---|---|
| | First rope horizontal distance from flagpole<br>$c^2 = a^2 + b^2$<br>$10^2 = 5^2 + y^2$<br>$y = \sqrt{10^2 - 5^2}$<br>$y = 8.66\,\text{m}$ | • determines first rope horizontal distance from flagpole **[1 mark]** |
| | Second rope horizontal distance from flagpole<br>$c^2 = a^2 + b^2$<br>$20^2 = 5^2 + z^2$<br>$z = \sqrt{20^2 - 5^2}$<br>$z = 19.3649\,\text{m}$<br>$z \approx 19.36$ | • determines second rope horizontal distance from flagpole **[1 mark]** |
| | The groundkeeper's claim is appropriate as the line is 19.365 m away from the flagpole. This is more than twice the distance of the first rope. | • decides if the claim is appropriate. **[1 mark]** |
| | | • shows logical organisation **[1 mark]** |