

Essential Mathematics marking guide

Common internal assessment 2023 — 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.

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

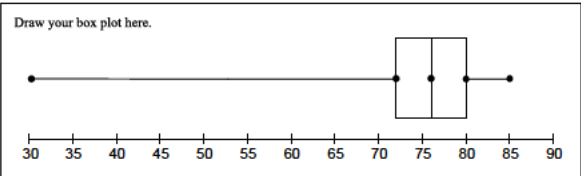
Allow FT mark/s — refers to 'follow through', where an error in the prior section of working is used later in the response, a mark (or marks) for the rest of the response can still be awarded so long as it still demonstrates the correct conceptual understanding or skill in the rest of the response.

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:										
1	<table border="1"> <thead> <tr> <th>Minimum</th> <th>Lower quartile (Q₁)</th> <th>Median</th> <th>Upper quartile (Q₃)</th> <th>Maximum</th> </tr> </thead> <tbody> <tr> <td>22</td> <td>30</td> <td>38</td> <td>45</td> <td>49</td> </tr> </tbody> </table> <p>22, 29, 29, 30, 36, 37, 37, 38, 41, 41, 42, 45, 45, 47, 49</p>	Minimum	Lower quartile (Q ₁)	Median	Upper quartile (Q ₃)	Maximum	22	30	38	45	49	<ul style="list-style-type: none"> correctly adds appropriate headings [1 mark] correctly orders values [1 mark] correctly determines minimum and maximum values [1 mark] correctly determines median [1 mark]
Minimum	Lower quartile (Q ₁)	Median	Upper quartile (Q ₃)	Maximum								
22	30	38	45	49								
2a)	$V = \frac{4}{3} \pi r^3$ $= \frac{4}{3} \times \pi \times 0.1^3$ $\approx \mathbf{0.00419 \text{ m}^3}$	<ul style="list-style-type: none"> correctly selects an appropriate rule [1 mark] calculates volume [1 mark] 										
2b)	<p>Capacity = 0.00419×1000</p> <p>Capacity = 4.19 L</p>	<ul style="list-style-type: none"> identifies use of an appropriate strategy [1 mark] calculates capacity [1 mark] 										
2c)	<p>Mass = 4.19×1.1</p> <p>Mass = 4.61 kg</p>	<ul style="list-style-type: none"> determines mass [1 mark] 										
3a)	<p>Measured length = 6 cm</p> <p>Measured width = 5 cm</p> <p>Length = $6 \times 1500 = 9000 \text{ m}$</p> <p>Width = $5 \times 1500 = 7500 \text{ m}$</p>	<ul style="list-style-type: none"> correctly measures length and width [1 mark] calculates length [1 mark] calculates width [1 mark] 										
3b)	<p>Perimeter = $2(L + W)$</p> <p>= $2 \times (9 + 7.5)$</p> <p>= 33 km</p>	<ul style="list-style-type: none"> converts dimensions to kilometres [1 mark] calculates perimeter [1 mark] 										

Q	Sample response	The response:
4a)	Mode = \$1000	<ul style="list-style-type: none"> correctly determines mode [1 mark]
4b)	$\text{Mean} = \frac{\sum x}{n}$ $= \frac{15\ 100}{12}$ $= \$1258.33$	<ul style="list-style-type: none"> correctly uses an appropriate strategy [1 mark] calculates mean [1 mark]
4c)	Since \$1258.33 > \$1000, the student's claim is not reasonable.	<ul style="list-style-type: none"> provides a justified decision linked to prior reasoning [1 mark]
5a)	Triangular-based prism	<ul style="list-style-type: none"> correctly identifies shape [1 mark]
5b)	6 vertices	<ul style="list-style-type: none"> correctly states number of vertices [1 mark]
5c)	$A = \frac{1}{2}bh$ $A = \frac{1}{2} \times 3000 \times 2500$ $= 3\ 750\ 000\ \text{mm}^2$	<ul style="list-style-type: none"> correctly selects an appropriate rule [1 mark] calculates area [1 mark]
5d)	$A = 3\ 750\ 000 \div 100^2 \div 10^2$ $= 3.75\ \text{m}^2$	<ul style="list-style-type: none"> uses an appropriate strategy [1 mark] determines area [1 mark]
6a)	Horse height = 10.2 × 14 ≈ 142.8 cm	<ul style="list-style-type: none"> correctly uses an appropriate strategy [1 mark] estimates height [1 mark]
6b)	Horse height = 142.8 ÷ 100 = 1.428 m	<ul style="list-style-type: none"> converts height [1 mark]

Q	Sample response	The response:
7a)	$V = \pi r^2 h$ $= \pi(5)^2 \times 3$ $\approx 235.62 \text{ cm}^3$	<ul style="list-style-type: none"> correctly selects an appropriate rule [1 mark] calculates volume including units [1 mark]
7b)	Capacity = 235.62 mL	<ul style="list-style-type: none"> determines capacity [1 mark]
7c)	Number of pie shells = $\frac{900}{235.62}$ ≈ 3.82	<ul style="list-style-type: none"> uses an appropriate strategy [1 mark] calculates number of pie shells [1 mark]
8a)	Height = 2 m	<ul style="list-style-type: none"> correctly rounds height [1 mark]
8b)	$A = 6 \times 2$ $= 12 \text{ m}^2$	<ul style="list-style-type: none"> estimates area of shaded face [1 mark]
8c)	$V = 12 \times 2 = 24 \text{ m}^3$	<ul style="list-style-type: none"> estimates volume [1 mark]
9a)	Draw your box plot here. 	<ul style="list-style-type: none"> correctly labels appropriate scale on number line [1 mark] correctly draws box section [1 mark] draws whisker sections connecting to box [1 mark]
9b)	The middle 50% of the times are evenly spread out. There is an outlier at 30 minutes.	<ul style="list-style-type: none"> identifies data is evenly distributed around the box section [1 mark] identifies an outlier [1 mark]

Q	Sample response	The response:
10a)	$\tan \theta = \frac{\text{opp}}{\text{adj}}$ $\tan 30^\circ = \frac{25}{h}$ $h = \frac{25}{\tan 30^\circ}$ $h \approx \mathbf{43.3 \text{ cm}}$	<ul style="list-style-type: none"> • correctly selects an appropriate trigonometric ratio [1 mark] • calculates perpendicular height [1 mark]
10b)	$A = \frac{1}{2}bh$ $A = \frac{50 \times 43.3}{2}$ $A \approx \mathbf{1082.53 \text{ cm}^2}$ $TSA \approx 1082.53 \times 4$ $TSA \approx \mathbf{4330.13 \text{ cm}^2}$	<ul style="list-style-type: none"> • selects an appropriate rule [1 mark] • calculates surface area of one face [1 mark] • calculates total surface area of pyramid [1 mark]

Q	Sample response	The response:
11	<p>Junior top goal shooter data:</p> $\text{mean} = \frac{\sum x}{n}$ $\text{mean} = \frac{535}{12}$ <p>mean \approx 44.58 median = 45</p> <p>Senior top goal shooter data:</p> $\text{mean} = \frac{600}{13}$ <p>mean \approx 46.15 median = 45</p> <p>The median weekly number of goals for both top goal shooters are the same, but the mean weekly number of goals achieved by the junior goal shooter is less than the mean weekly number of goals achieved by the senior goal shooter. Therefore, the coach's claim is quite reasonable, because an outlier score (25) from the junior goal shooter was included in the calculation, which greatly decreased the mean.</p>	<ul style="list-style-type: none"> • correctly calculates top junior goal shooter mean [1 mark] • correctly calculates top junior goal shooter median [1 mark] • correctly calculates top senior goal shooter mean [1 mark] • correctly calculates top senior goal shooter median [1 mark] • provides a justified statement of reasonableness [1 mark]

Instrument-specific standards — Common internal assessment

Foundational knowledge and problem solving	Cut-off (marks)	Grades
The student work has the following characteristics		
<ul style="list-style-type: none"> comprehensive selection, recall and use of simple and complex facts, rules, definitions and procedures; comprehension and clear communication of simple and complex mathematical concepts and techniques; evaluation of the reasonableness of solutions and use of mathematical reasoning to justify procedures and decisions; and proficient application of simple and complex mathematical concepts and techniques to solve problems 	> 40	A
<ul style="list-style-type: none"> selection, recall and use of simple and some complex facts, rules, definitions and procedures; comprehension and communication of simple and some complex mathematical concepts and techniques; evaluation of the reasonableness of some solutions using mathematical reasoning; and application of simple and some complex mathematical concepts and techniques to solve problems 	> 30	B
<ul style="list-style-type: none"> selection, recall and use of simple facts, rules, definitions and procedures; comprehension and communication of simple mathematical concepts and techniques; discussion of the reasonableness of solutions using mathematical reasoning; and application of simple mathematical concepts and techniques to solve problems 	> 20	C
<ul style="list-style-type: none"> some selection, recall and use of facts, rules, definitions and procedures; basic comprehension and communication of mathematical concepts and techniques; some discussion of the reasonableness of solutions; and inconsistent application of mathematical concepts and techniques 	> 10	D
<ul style="list-style-type: none"> isolated and inaccurate selection, recall and use of facts, rules, definitions and procedures; disjointed and unclear communication of mathematical concepts and techniques; superficial discussion of the reasonableness of solutions. 	≥ 0	E



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