

Essential Mathematics

marking guide and response

Common internal assessment 2024 — 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:
1a)	Number of armspans = $(3 + 2) \times 2$ = 10 armspans	<ul style="list-style-type: none"> correctly determines perimeter in armspans [1 mark]
1b)	Perimeter = 10×160 = 1600 cm = 16 m	<ul style="list-style-type: none"> applies relevant strategy [1 mark] calculates perimeter in metres [1 mark]
2a)	3 m^2	<ul style="list-style-type: none"> correctly determines actual area of image C [1 mark]
2b)	2 m^2	<ul style="list-style-type: none"> correctly estimates actual area of image A [1 mark]
2c)	Total actual area = $A + B + C$ = $2 + 2 + 3$ = 7 m^2	<ul style="list-style-type: none"> applies relevant strategy [1 mark] calculates approximate total actual area [1 mark]
3a)	Triangle	<ul style="list-style-type: none"> correctly names shape [1 mark]
3b)	6 vertices	<ul style="list-style-type: none"> correctly states number of vertices [1 mark]

Q	Sample response	The response:
4a)	5.2 kg	<ul style="list-style-type: none"> • correctly estimates mass [1 mark]
4b)	1.5 t = 1500 kg	<ul style="list-style-type: none"> • correctly converts tonnes to kilograms [1 mark]
4c)	$\text{Number of bags} = \frac{1500}{5.2}$ ≈ 288.46 $= 288 \text{ bags}$	<ul style="list-style-type: none"> • applies relevant strategy [1 mark] • calculates maximum number of bags [1 mark]
5a)	$\text{Actual perpendicular height} = 2.5 \times 5$ $= 12.5 \text{ cm}$	<ul style="list-style-type: none"> • correctly applies relevant strategy [1 mark] • determines actual perpendicular height [1 mark]
5b)	$\text{Actual base} = 3.4 \times 5$ $= 17 \text{ cm}$	<ul style="list-style-type: none"> • correctly applies relevant strategy [1 mark] • determines actual base [1 mark]
5c)	$A = bh$ $= 17 \times 12.5$ $= 212.5 \text{ cm}^2$ $= 213 \text{ cm}^2$	<ul style="list-style-type: none"> • correctly applies relevant strategy [1 mark] • calculates area, rounded to the nearest square centimetre [1 mark]

Q	Sample response	The response:
6a)	$s = 20 \times 2$ $= 40 \text{ cm}$	<ul style="list-style-type: none"> • correctly determines base length [1 mark]
6b)	$h \approx 60 \text{ cm}$	<ul style="list-style-type: none"> • correctly estimates perpendicular height using leading-digit approximation [1 mark]
6c)	$V = \frac{1}{3}Ah$ $= \frac{1}{3}s^2h$ $= \frac{1}{3} \times (40)^2 \times 60$ $\approx 32\,000 \text{ cm}^3$	<ul style="list-style-type: none"> • applies relevant strategy [1 mark] • calculates approximate volume of pyramid [1 mark]
6d)	Amount = $3 \times 32\,000$ $\approx 96\,000 \text{ mL}$	<ul style="list-style-type: none"> • applies relevant strategy [1 mark] • estimates amount for three pyramids [1 mark]

Q	Sample response	The response:										
7a)	22 minutes	<ul style="list-style-type: none"> correctly identifies mode [1 mark] 										
7b)	17 minutes	<ul style="list-style-type: none"> correctly determines median [1 mark] 										
7c)	$\text{Mean} = \frac{\sum x}{n}$ $= \frac{216}{13}$ $\approx 16.62 \text{ minutes}$	<ul style="list-style-type: none"> uses appropriate strategy [1 mark] calculates mean [1 mark] 										
7d)	Spread is skewed.	<ul style="list-style-type: none"> correctly describes spread of data [1 mark] 										
8a)	4, 20, 20, 21, 26, 43, 48, 52, 53 <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Minimum</th> <th>Lower quartile</th> <th>Median</th> <th>Upper quartile</th> <th>Maximum</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>20</td> <td>26</td> <td>50</td> <td>53</td> </tr> </tbody> </table>	Minimum	Lower quartile	Median	Upper quartile	Maximum	4	20	26	50	53	<ul style="list-style-type: none"> correctly arranges numbers in order [1 mark] correctly labels headings [1 mark] correctly determines minimum, median and maximum [1 mark]
Minimum	Lower quartile	Median	Upper quartile	Maximum								
4	20	26	50	53								
8b)		<ul style="list-style-type: none"> draws box section [1 mark] draws whisker sections connecting to box [1 mark] 										

Q	Sample response	The response:
9a)	$c^2 = a^2 + b^2$ $= 4.2^2 + 6.4^2$ $= 58.6$ $c = \sqrt{58.6}$ $= 7.65506$ $c \approx 8 \text{ m}$	<ul style="list-style-type: none"> • correctly applies relevant strategy [1 mark] • determines value of c^2 [1 mark] • calculates length of diagonal divide [1 mark]
9b)	<p>Total length of pipe</p> $= 2 \text{ lengths} + 2 \text{ widths} + 1 \text{ diagonal}$ $= (2 \times 6.4) + (2 \times 4.2) + 8$ $= 12.8 + 8.4 + 8$ $= 29.2 \text{ m}$	<ul style="list-style-type: none"> • applies relevant strategy [1 mark] • determines total length required for irrigation pipe [1 mark]

Q	Sample response	The response:
10	<p>Arrange numbers and identify Q_1, Q_3 and IQR for Program B to compare to Program A.</p> <p style="text-align: center;">Q_1 Q_2 Q_3</p> <p>15, 20, 20, 28, 40, 47, 50, 60, 80</p> <p>$Q_1 = 20$</p> <p>$Q_3 = 55$</p> <p>Program B IQR</p> $\begin{aligned} \text{IQR} &= Q_3 - Q_1 \\ &= 55 - 20 \\ &= 35 \end{aligned}$ <p>Program A IQR</p> $\begin{aligned} \text{IQR} &= Q_3 - Q_1 \\ &= 57 - 37 \\ &= 20 \end{aligned}$ <p>Program B has an IQR of 35 whereas program A has an IQR of 20. As a result, Program A is more consistent.</p>	<ul style="list-style-type: none"> • correctly determines Q_1 for Program B [1 mark] • correctly determines Q_3 for Program B [1 mark] • determines IQR for Program B [1 mark] • correctly determines IQR for Program A [1 mark] • determines Program A is more consistent [1 mark]

Q	Sample response	The response:
11	<p>A = 2 cm, B = 1.5 cm, C = 3 cm, D = 6 cm</p> <p>A = 2 cm × 120 = 240 cm = 2.4 m B = 1.5 cm × 120 = 180 cm = 1.8 m C = 3 cm × 120 = 360 cm = 3.6 m D = 6 cm × 120 = 720 cm = 7.2 m</p> <p>Area of living room (composite shape) = area of rectangle + area of trapezium = $3.6 \times 7.2 + \frac{(2.4 + 7.2) \times 1.8}{2}$</p> <p>= 34.56 m²</p> <p>4 × 12 = 48</p> <p>4 tins of paint will cover 48m² which is greater than 34.56 m², so Bart's belief is correct as he has more than enough paint.</p>	<ul style="list-style-type: none"> • 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 living room [1 mark] • provides appropriate statement of reasonableness [1 mark]



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