Essential Mathematics marking guide

Common internal assessment 2020 — Single phase

Short response (50 marks)

Assessment objectives

This assessment technique 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.

Queensland Government | Queensland Curriculum & Assessment Authority

For all Queensland schools

Purpose

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

The CIAMG 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.

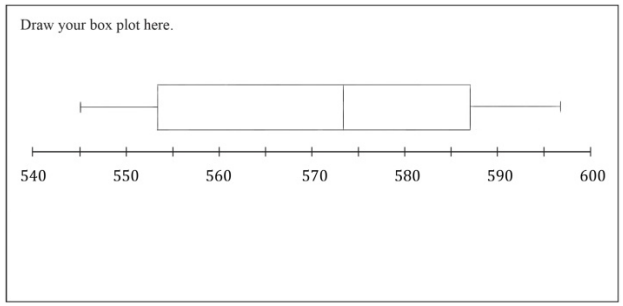
This mark may be implied by subsequent working — the full mathematical reasoning and/or working, as outlined in the sample response and associated mark, is not evident in the student response, but by virtue of subsequent working there is sufficient evidence to award the mark(s).

Common internal assessment marking guide (CIAMG)

Q	Sample response	The response:
1	a) 12 edges b) 6 faces	correctly states the number of edges **[1 mark]** correctly states the number of faces **[1 mark]**
2	a) Measured length = 4 cm Actual length = 4 cm × 350 = 1400 cm = 14 m b) Measured perpendicular height = 4.4 cm Actual perpendicular height = 4.4 cm × 350 = 1540 cm = 15.4 m c) Area of block of land = bh = 14 m × 15.4 m = 215.6 ≈ 216 m^2	correctly measures the length **[1 mark]** applies scale of 1:350 and converts to metres **[1 mark]** correctly measures the perpendicular height **[1 mark]** applies scale of 1:350 and converts to metres **[1 mark]** substitutes into appropriate rule **[1 mark]** calculates area rounded to nearest square metre **[1 mark]**

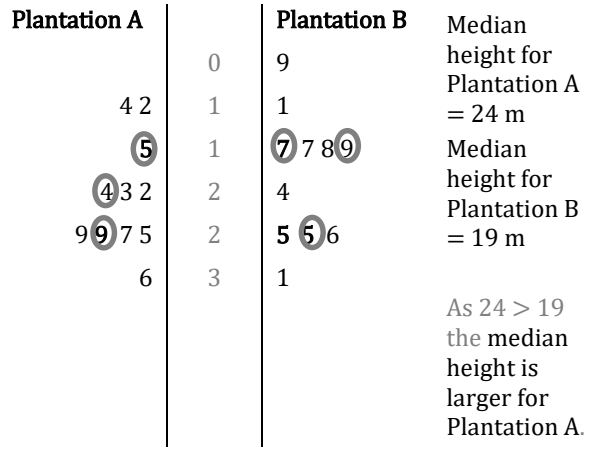
Q	Sample response	The response:
3	a) Volume $= \frac{1}{3}Ah$ $= \frac{2.8 \times 2.8 \times 1.5}{3}$ $= 3.92$ cm^3	correctly substitutes into appropriate rule **[1 mark]** calculates volume in cubic centimetres **[1 mark]**
	b) 3.92 cm$^3 = 3.92$ mL	converts cubic centimetres to millilitres **[1 mark]**
	c) 1 L $= 1000$ mL	converts litres to milllitres **[1 mark]**
	d) Maximum number of moulds $= 1000$ mL $\div 3.92$ mL $= 255.102$ moulds ≈ 255 moulds	calculates number of moulds that can be filled from 1 L of liquid chocolate **[1 mark]** rounds down the number of moulds **[1 mark]**
4	a) Number of steps $= 60$ steps $\times$ 6 sides $= 360$ steps	correctly calculates the number of steps to walk the perimeter **[1 mark]**
	b) Perimeter $= 360$ steps $\times$ 85 cm/step $= 30\,600$ cm $= 306$ m	calculates perimeter in centimetres **[1 mark]** converts centimetres to metres **[1 mark]**

Q	Sample response	The response:
5	a) 4 glasses	correctly identifies the mode **[1 mark]**
	b) 2 3 3 4 4 4 4 5 5 6 9	correctly orders the values **[1 mark]**
	c) 4	determines median **[1 mark]**
	d) Mean $= \frac{\text{sum of all data values}}{\text{number of data values}}$ $= \frac{(2+3+3+4+4+4+4+5+5+6+9)}{11}$ $= \frac{49}{11}$ $= 4.\overline{45}$	correctly substitutes into an appropriate rule **[1 mark]** calculates mean **[1 mark]**
	e) The data is clustered around 4 glasses.	describes at least one valid aspect of the spread of data **[1 mark]**
6	a) $14 \text{ kg/m} \times 9 \text{ m} = 126 \text{ kg}$	correctly calculates the mass of a 9-metre steel beam **[1 mark]**
	b) $2 \text{ t} = 2000 \text{ kg}$	correctly converts tonnes to kilograms **[1 mark]**
	c) Number of beams $= \frac{2000 \text{ kg}}{126 \text{ kg/beam}}$ $= 15.87 \text{ beams}$	calculates number of 9-metre steel beams the truck can carry **[1 mark]**
	≈ 15 beams	rounds down number of beams **[1 mark]**

Q	Sample response	The response:
7	a) 300 m^2	correctly determines the actual area of the shed **[1 mark]**
	b) The area of the dam is approximately 27 grid squares, which is 2700 m^2	correctly estimates area of the dam in the range of 2600 to 2800 m^2 **[1 mark]**
	c) Grid that covers entire area of farm is $8 \times 15 =$ 120 grid squares $=$12 000 m^2	correctly determines area of the entire farm **[1 mark]**
	$12\,000\ m^2 \div 100^2 =$ 1.2 ha	converts square metres to hectares **[1 mark]**
8	545 550 556 568 573 580 582 592 597	correctly orders the values **[1 mark]**
	Lowest value = 545 1st quartile = 553 Median = 573 3rd quartile = 587 Highest value = 597	correctly determines the 1st quartile **[1 mark]** correctly determines the median **[1 mark]** correctly determines the 3rd quartile **[1 mark]**
		accurately constructs box plot using an appropriate scale **[1 mark]**

Q	Sample response	The response:
9	a) Using Pythagoras' theorem $(c^2 = a^2 + b^2)$ Distance from C to A (c) $c^2 = a^2 + b^2$ $c^2 = 60^2 + 32^2$ $c = 68$ km	correctly substitutes into appropriate rule **[1 mark]** calculates distance from C to A **[1 mark]**
	b) Distance for round trip $= 60 + 32 + 68$ $= 160$ km	calculates total distance **[1 mark]**
	As 160 km is longer than 150 km, the boat would not have enough fuel to complete the round trip.	compares distances to determine if round trip is more than 150 km **[1 mark]**

Q	Sample response	The response:
10		
	a) A = 7.7 cm × 120 = 924 cm = 9.24 m B = 4.4 cm × 120 = 528 cm = 5.28 m C = 3.6 cm × 120 = 432 cm = 4.32 m	correctly measures the lengths of A, B and C **[1 mark]** applies scale and converts to metres **[1 mark]**
	b) Area of concert stage (composite shape) = area of rectangle + area of semicircle = 9.24 m × 5.28 m + π × (4.32 m)² ÷ 2	substitutes into appropriate rule for composite shape **[1 mark]**
	= 78.1 m^2	calculates area of concert stage in square metres **[1 mark]**
	4 tins × 20 m^2/tin = 80 m^2	
	Four tins cover 80 m^2, which is more than 78.1 m^2, so this is enough paint.	makes a justified statement about the number of tins of paint available **[1 mark]**

Q	Sample response	The response:
11	1|2 = 12 metres (m)  Median height for Plantation A = 24 m Median height for Plantation B = 19 m As 24 > 19 the median height is larger for Plantation A.	correctly determines a measure of central tendency for each plantation **[1 mark]** compares measures of central tendency to identify a larger measure for Plantation A compared to Plantation B **[1 mark]**
	Interquartile range (IQR) for Plantation A: 29 − 15 = 14 m Interquartile range (IQR) for Plantation B: 25 − 17 = 8 m	correctly determines a measure of spread for each plantation **[1 mark]**
	As 14 > 8 the interquartile range is larger for Plantation A.	compares measures of spread to identify a larger measure for Plantation A compared to Plantation B **[1 mark]**
	The claim is not valid as the median height and the interquartile range are larger for Plantation A than for Plantation B, which means the pine tree heights in Plantation A are larger (not smaller) on average and more (not less) varied than the pine tree heights in Plantation B.	makes a justified conclusion by linking reasoning to statistical measures **[1 mark]**

Instrument-specific standards — Common internal assessment

Foundational knowledge and problem solving	Cut-off (marks)	Grade
The student work has the following characteristics:		
• 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**
• 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**
• 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**
• 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**
• 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**