Essential Mathematics marking guide

Sample common internal assessment 2020

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

Introduction

The Queensland Curriculum and Assessment Authority (QCAA) has developed mock common internal assessments for both Applied (Essential) senior syllabuses to support the introduction of common internal assessment in Queensland.

A common internal assessment marking guide (CIAMG) has been created specifically for each mock common internal assessment.

The mock common internal assessments and their marking guides were:

- developed in close consultation with subject matter experts drawn from schools, subject associations and universities
- aligned to the common internal assessment conditions and specifications in both Applied (Essential) senior syllabuses
- developed under secure conditions.

Purpose

This document informs schools and students how marks are matched to characteristics in responses to the mock 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
- a tool for calibrating markers to ensure comparability of results.

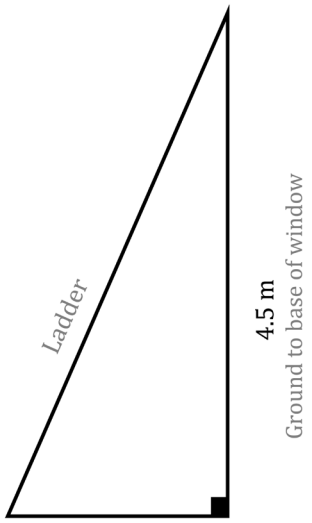
Mark allocation

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

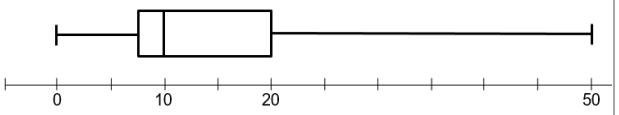
Where no response to a question has been made, a mark of ‘N’ will be recorded.

Question	Sample response	The response
1	a) Triangular-based prism	correctly identifies the name of the shape **[1 mark]**
	b) 9 edges	correctly states the number of edges **[1 mark]**
2	a) Perimeter $= 2 \times (3.2 + 1.9)$	correctly substitutes into an appropriate rule **[1 mark]**
	Perimeter $= 10.2$ m	calculates perimeter **[1 mark]**
	b) Length $= 10.2 \times 100$ $= 1020$ cm	converts metres to centimetres **[1 mark]**
	Remainder $= 1100 - 1020$ $= 80$ cm	determines amount of timber left over **[1 mark]**
3	a) 4.5 m^2	estimates a valid numerical value in the range of 4 – 5 m^2 **[1 mark]**
	b) Area of triangle $= \frac{1}{2}bh$ $= \frac{1}{2} \times 8 \times 7$ $= 28$ m^2	correctly substitutes into an appropriate rule **[1 mark]** determines area of enclosure **[1 mark]**

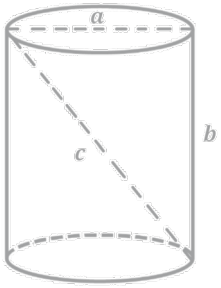
Question	Sample response	The response
4	a) Scales show 750 g	correctly estimates a valid numerical value in the range of 740 – 760 g **[1 mark]**
	b) Using leading-digit approximation, the mass of these three capsicums is: 800 g	uses leading-digit approximation method to obtain an estimate for three capsicums **[1 mark]**
	∴ nine capsicums = 800 × 3 = 2400 g	estimates mass of nine capsicums **[1 mark]**
	c) 2400 g = 2.4 kg	converts grams to kilograms **[1 mark]**
	Cost = $6.40 × 2.4	uses an appropriate rule to connect unit price and mass in kilograms **[1 mark]**
	Cost = $15.36	calculates cost of the nine capsicums **[1 mark]**
5	Find horizontal lengths Scale 1 : 1600 18 mm : 28800 mm ∴ horizontal lengths are 28.8 m	correctly determines the measurements of block **[1 mark]**
	Find slant lengths 17 mm : 27200 mm ∴ slant lengths are 27.2 m	applies scale to convert to metres **[1 mark]**
	Perimeter = 2 × (28.8 + 27.2) = 112 m	calculates perimeter **[1 mark]**
	∴ Perimeter ≈ 110 m (rounded)	rounds perimeter to the nearest 10 metres **[1 mark]**

Question	Sample response	The response
6	a)  Not drawn to scale	draws an appropriate right-angled triangle **[1 mark]** correctly labels 4.5 m and 1.5 m **[1 mark]**
	b) $c^2 = a^2 + b^2$ $a = 4.5, b = 1.5, c = ?$ $c^2 = (4.5)^2 + (1.5)^2$ $c^2 = 22.5$ $c = \sqrt{22.5}$ $c \approx 4.743$ The ladder is 4.74 m long.	correctly substitutes into an appropriate rule **[1 mark]** calculates hypotenuse **[1 mark]** states length of the ladder in metres **[1 mark]**

Question	Sample response	The response
7	a) The mode is 1	correctly identifies the mode **[1 mark]**
	b) 0, 1, 1, 1, 1, 1, 2, 2, 2, 2, 3, 4, 8	correctly lists the results **[1 mark]**
	c) $\text{Mean} = \frac{0+1\times5+2\times4+3+4+8}{13}$ $= \frac{28}{13}$	substitutes into an appropriate rule **[1 mark]**
	$\text{Mean} \approx 2.1538$	calculates mean **[1 mark]**
	d) Median = 2	identifies median **[1 mark]**
	e) It is tightly packed with a gap at 5 pets.	describes at least one valid aspect of the spread of data **[1 mark]**

Question	Sample response	The response
8	\$0, \$5, \$10, \$10, \$10, \$15, \$20, \$20, \$50 Median = 10 1st quartile = 7.5 3rd quartile = 20 Drawing the box plot:  	correctly lists the values in order **[1 mark]** correctly determines the median **[1 mark]** correctly determines the 1st quartile **[1 mark]** correctly determines the 3rd quartile **[1 mark]** accurately constructs box plot using an appropriate scale **[1 mark]**
9	a) Volume $= \frac{1}{3}Ah$ $A = l \times w$ $A = 45 \times 20$ $A = 900$ cm^2 $h = 35$ $V = \frac{1}{3} \times 900 \times 35$ $V = 10500$ cm^3 The volume of the right pyramid is 10500 cm^3 b) 10500 cm^3 = 0.0105 m^3 Since 1 m^3 = 1000 L 0.0105 m^3 = 10.5 L The right pyramid has a capacity of 11 L	correctly determines the base area **[1 mark]** substitutes into an appropriate rule [**1 mark]** calculates volume of pyramid **[1 mark]** converts from cm^3 to L **[1 mark]** determines capacity rounded to the nearest litre **[1 mark]**

Question	Sample response	The response
10	a) At the age of 10, Alex is 129 cm tall.	identifies a value in the range of 128 – 130 cm **[1 mark]**
	b) When Alex is 134 cm tall, she will be approximately 11 years old.	determines corresponding age **[1 mark]**
	c) Given she remains at the 10th percentile, at the height of 150 cm, Alex should be approximately 13.5 years old.	correctly identifies the corresponding age **[1 mark]**
	She will be even taller on her 15th birthday, *therefore* her parents' assumption that the current bike will be suitable until her 15th birthday would not be reasonable.	evaluates assumption **[1 mark]** justifies a conclusion by linking reasoning **[1 mark]**

Question	Sample response	The response
11	 Using Pythagoras' theorem $a^2 = c^2 - b^2$ $a^2 = 160^2 - 128^2$ $a = \sqrt{160^2 - 128^2} = 96$ mm	correctly determines the diameter **[1 mark]**
	Using the formula for the total surface area of a cylinder $S = 2\pi r^2 + 2\pi rh$ $S = 2\pi(48)^2 + 2\pi(48)(128)$ $S \approx 53080.35$ mm^2 $S \approx 531$ cm^2 $S \approx 0.0531$ m^2	substitutes radius into an appropriate rule **[1 mark]** determines surface area **[1 mark]**
	Total cost $\approx \$50 \times 0.0531$ Total cost $\approx \$2.66$	determines total cost **[1 mark]**
	A price of \$3 for each package is a reasonable offer because $\$2.66 \approx \$3$.	makes a justified conclusion about reasonableness of offer by linking reasoning **[1 mark]**