

General Mathematics SEE marking guide and response

External assessment 2025

SEE 1: Short response (52 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 Unit 3 Topics 1, 2 and 3
2. comprehend mathematical concepts and techniques drawn from Unit 3 Topics 1, 2 and 3
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 Unit 3 Topics 1, 2 and 3.

Purpose

This document consists of a marking guide and a sample response.

The marking guide:

- provides a tool for calibrating external assessment markers to ensure reliability of results
- indicates the correlation, for each question, between mark allocation and qualities at each level of the mark range
- informs schools and students about how marks are matched to qualities in student responses.

The sample response demonstrates the qualities of a high-level response.

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.

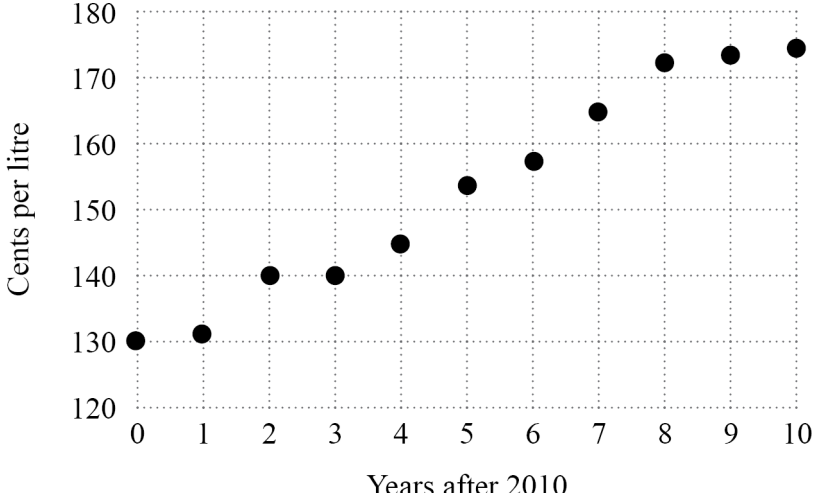
Allow FT mark/s — refers to 'follow through', where an error in the prior section of working is used later in the response, a mark (or marks) for the rest of the response can still be awarded so long as it still demonstrates the correct conceptual understanding or skill in the rest of the response.

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

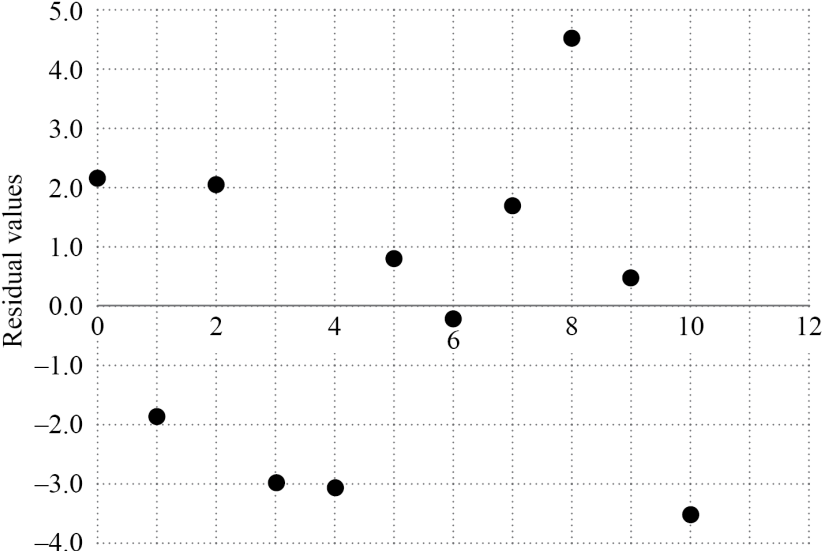
Q	Sample response	The response:																																
1a)	The time series plot of average petrol price for Gladstone in 2024 appears to have a positive trend , with a significant price increase towards the end of the year. During the middle of the year, there are irregular fluctuations around 190 cents.	<ul style="list-style-type: none"> • correctly identifies a relevant feature [1 mark] • correctly identifies a second relevant feature [1 mark] 																																
1b)	<table border="1"> <thead> <tr> <th>Month</th> <th>Months after Dec '23</th> <th>Average price (cents/L)</th> <th>3-point moving average</th> </tr> </thead> <tbody> <tr> <td>Dec 23</td> <td>0</td> <td>177</td> <td></td> </tr> <tr> <td>Jan 24</td> <td>1</td> <td>181</td> <td>180</td> </tr> <tr> <td>Feb 24</td> <td>2</td> <td>182</td> <td>182</td> </tr> <tr> <td>Mar 24</td> <td>3</td> <td>183</td> <td>183</td> </tr> <tr> <td>Apr 24</td> <td>4</td> <td>184</td> <td>185</td> </tr> <tr> <td>May 24</td> <td>5</td> <td>188</td> <td>186</td> </tr> <tr> <td>Jun 24</td> <td>6</td> <td>186</td> <td></td> </tr> </tbody> </table>	Month	Months after Dec '23	Average price (cents/L)	3-point moving average	Dec 23	0	177		Jan 24	1	181	180	Feb 24	2	182	182	Mar 24	3	183	183	Apr 24	4	184	185	May 24	5	188	186	Jun 24	6	186		<ul style="list-style-type: none"> • correctly calculates all 3-point moving averages [1 mark]
Month	Months after Dec '23	Average price (cents/L)	3-point moving average																															
Dec 23	0	177																																
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Apr 24	4	184	185																															
May 24	5	188	186																															
Jun 24	6	186																																

Q	Sample response	The response:
1c)		<ul style="list-style-type: none"> • accurately plots 3-point moving averages [1 mark] • draws straight line through points for months 1 and 5 [1 mark] • extends line to month 23 [1 mark]
1d)	The predicted average price for Gladstone in November 2025 is 213 cents per litre.	<ul style="list-style-type: none"> • predicts petrol price, rounded to nearest cent/L [1 mark]

Q	Sample response	The response:
2a)		<ul style="list-style-type: none"> • correctly identifies the axes for the explanatory and response variables [1 mark] • formats scatterplot with appropriate scaling and labelling for both axes [1 mark] • plots all given data points [1 mark]
2b)	The scatterplot appears to follow a strong positive pattern.	<ul style="list-style-type: none"> • describes direction [1 mark] • describes strength [1 mark]

Q	Sample response	The response:
3a)	Define variables $x =$ number of years since 2010 $y =$ average petrol price for November	<ul style="list-style-type: none"> correctly defines both variables [1 mark]
	Create model using scientific calculator Linear equation in the form $y = a + bx$, where $b = 5.082$ $a = 127.773$	<ul style="list-style-type: none"> correctly determines least-squares line equation [1 mark]
3b)	$r = 0.9881$	<ul style="list-style-type: none"> correctly provides the correlation coefficient [1 mark]
3c)	$x = 2025 - 2010$ $= 15$	<ul style="list-style-type: none"> correctly determines the number of years [1 mark]
	$y = 127.773 + 5.082x$ $= 127.773 + 5.082(15)$	<ul style="list-style-type: none"> substitutes number of years into equation [1 mark]
	$= 204.003$ ≈ 204 The average petrol price in Bundaberg in November 2025 will be 204 cents per litre.	<ul style="list-style-type: none"> determines predicted value, rounded to the nearest cent/L [1 mark]

Q	Sample response				The response:
4a)	Years since 2010	Cents per litre (A)	Modelled petrol price (M)	Residual (A – M)	<ul style="list-style-type: none"> correctly provides an appropriately organised table [1 mark]
	0	130	127.773	2.227	
	1	131	132.855	-1.855	
	2	140	137.936	2.064	<ul style="list-style-type: none"> calculates the predicted values (M) for all years [1 mark]
	3	140	143.018	-3.018	
	4	145	148.100	-3.100	
	5	154	153.182	0.818	
	6	158	158.264	-0.264	<ul style="list-style-type: none"> calculates the residual for all data values with the model [1 mark]
	7	165	163.345	1.655	
	8	173	168.427	4.573	
	9	174	173.509	0.491	
10	175	178.591	-3.591		

Q	Sample response	The response:
	<p style="text-align: center;">Residual plot</p>  <p style="text-align: center;">Years since 2010</p>	<ul style="list-style-type: none"> • labels axes and scales for the residual plot [1 mark] <hr/> <ul style="list-style-type: none"> • plots the points on the residual plot for the model [1 mark]
4b)	<p>The correlation coefficient, r, is 0.9881. This is very close to 1, indicating a strong positive linear association.</p> <p>The residual plot appears to be a random pattern, indicating that the linear model is a good fit.</p> <p>Therefore, the linear model is appropriate.</p>	<ul style="list-style-type: none"> • interprets the correlation coefficient [1 mark] <hr/> <ul style="list-style-type: none"> • describes the pattern of residual plot [1 mark] <hr/> <ul style="list-style-type: none"> • determines if linear model is appropriate [1 mark]

Q	Sample response						The response:
5a)	Quarter	1	2	3	4	Average	<ul style="list-style-type: none"> correctly determines the yearly averages [1 mark]
	2023	176	186	184	190	184	
	2024	189	196	203	200	197	
	Quarter	1	2	3	4		<ul style="list-style-type: none"> calculates seasonal ratios for 2023 [1 mark] calculates seasonal ratios for 2024 [1 mark]
	2023	0.9565	1.0109	1.0000	1.0326		
	2024	0.9594	0.9949	1.0305	1.0152		
	Quarter	1	2	3	4		<ul style="list-style-type: none"> calculates seasonal indices [1 mark]
	Seasonal index	0.9580	1.0029	1.0152	1.0239		
	Quarter	1	2	3	4		<ul style="list-style-type: none"> determines deseasonalised values for 2023, rounded to the nearest cent/L [1 mark] determines deseasonalised values for 2024, rounded to the nearest cent/L [1 mark]
	2023	184	185	181	186		
	2024	197	195	200	195		

Q	Sample response	The response:
5b)	Let x = number of quarters since start of 2023 Let y = deseasonalised quarterly petrol price (cents/L) Linear equation in the form $y = a + bx$, where $a = 179.39$ $b = 2.44$	<ul style="list-style-type: none"> determines the gradient and y-intercept for a linear model [1 mark]
	Determine the equation using scientific calculator $y = 2.44x + 179.39$	<ul style="list-style-type: none"> determines least-squares line equation [1 mark]

Q	Sample response	The response:
5c)	Let x = number of quarters since start of 2023 $= 12$	<ul style="list-style-type: none"> • correctly determines the x-value [1 mark]
	$y = 179.39 + 2.44(12)$	<ul style="list-style-type: none"> • substitutes x-value into least-squares line equation [1 mark]
	$= 208.68$ ≈ 209 The deseasonalised predicted quarterly petrol price in Hervey Bay for the last quarter of 2025 is 209 cents per litre.	<ul style="list-style-type: none"> • determines deseasonalised predicted price [1 mark]
	$208.68 = \frac{\text{actual}}{1.0239}$ $\text{actual} = 208.68 \times 1.0239$	<ul style="list-style-type: none"> • applies relevant strategy to reseasonalise predicted price [1 mark]
	$\text{actual} = 213.67$ ≈ 214 cents/L The predicted actual quarterly petrol price in Hervey Bay for the last quarter of 2025 is 214 cents per litre.	<ul style="list-style-type: none"> • predicts actual quarterly price, rounded to the nearest cent/L [1 mark]

Q	Sample response	The response:																				
6a)	<p>Petrol price in Gladstone is \$2.13/L Petrol price in Bundaberg is \$2.04/L Petrol price in Hervey Bay is \$2.14/L</p> <p>Option 1: Route A both ways</p> <p>Total distance car can travel without refilling is: $\frac{40\text{L}}{8.2\text{L}} \times 100\text{ km} = 487.8\text{ km}$</p> <p>The student would need to top up the petrol tank when they get to Gladstone, as the total distance travelled with a full tank is less than $279 + 279 = 558\text{ km}$.</p>	<ul style="list-style-type: none"> • correctly finds the maximum distance travelled with a full petrol tank [1 mark] • correctly demonstrates the need for purchasing the petrol in Gladstone [1 mark] 																				
	<table border="1" data-bbox="302 774 1176 1284"> <thead> <tr> <th>Origin</th> <th>Destination</th> <th>Distance (km)</th> <th>Petrol cost</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>Hervey Bay</td> <td>Gladstone</td> <td>279</td> <td> $279 \times \frac{8.2}{100} \times \\2.13 $= \\$48.7301$ $\approx \\$48.73$ </td> <td>3 hrs 11 mins</td> </tr> <tr> <td>Gladstone</td> <td>Hervey Bay</td> <td>279</td> <td> $279 \times \frac{8.2}{100} \times \\2.14 $= \\$48.9589$ $\approx \\$48.96$ </td> <td>3 hrs 11 mins</td> </tr> <tr> <td>Total</td> <td></td> <td>558</td> <td>\$97.69</td> <td>6 hrs 22 mins</td> </tr> </tbody> </table>	Origin	Destination	Distance (km)	Petrol cost	Time	Hervey Bay	Gladstone	279	$279 \times \frac{8.2}{100} \times \2.13 $= \$48.7301$ $\approx \$48.73$	3 hrs 11 mins	Gladstone	Hervey Bay	279	$279 \times \frac{8.2}{100} \times \2.14 $= \$48.9589$ $\approx \$48.96$	3 hrs 11 mins	Total		558	\$97.69	6 hrs 22 mins	<ul style="list-style-type: none"> • correctly shows relevant strategy to determine distance and time for Option 1 [1 mark] • shows relevant strategy to determine cost for Option 1 [1 mark]
Origin	Destination	Distance (km)	Petrol cost	Time																		
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Q	Sample response	The response:
	<p>Option 2: Route A to Gladstone and Route B coming back</p> <p>Distance from Hervey Bay to Bundaberg, via friend's place and Gladstone: $279 + 186 = 465$ km</p> <p>Therefore, they won't need to buy any petrol in Gladstone as distance the car can travel with the full tank is greater than 465 km.</p>	<ul style="list-style-type: none"> • correctly finds the distance needed to get to Bundaberg [1 mark] • correctly demonstrates there is no need to buy any petrol in Gladstone [1 mark]

Q	Sample response					The response:
	Origin	Destination	Distance (km)	Petrol cost	Time	
	Hervey Bay	Bundaberg (via Gladstone)	465	$465 \times \frac{8.2}{100} \times \2.04 $= \$77.7852$ $\approx \$77.79$	5 hrs 26 mins	<ul style="list-style-type: none"> • correctly shows relevant strategy to determine distance and time for Option 2 [1 mark] • shows relevant strategy to determine cost for Option 2 [1 mark]
	Bundaberg	Hervey Bay	108	$108 \times \frac{8.2}{100} \times \2.14 $= \$18.9518$ $\approx \$18.95$	1 hr 22 mins	
	Total		573	\$96.74	6 hrs 48 mins	

Q	Sample response	The response:
	<p>Going through Bundaberg would make the trip longer, but it would decrease the cost of petrol from \$97.69 to \$96.74.</p> <p>The student's claims are correct. The return trip is longer by 15 km and will take an extra 26 minutes, but the price will decrease by \$0.95.</p>	<ul style="list-style-type: none"> • provides decision with reference to time or distance [1 mark] • provides decision with reference to cost [1 mark] • shows logical organisation [1 mark]
6b)	<p>One strength of the evaluation is that it considers distance, time and the cost. Therefore, all aspects of the student's claim have been investigated.</p> <p>One limitation of the evaluation is that it does not consider any variations to the trip that may affect the distance, time or cost. The outcome of the evaluation would be different if it considered any extra travelling or time taken for breaks, for example.</p>	<ul style="list-style-type: none"> • correctly identifies one strength and its effect [1 mark] • correctly identifies one limitation and its effect [1 mark]



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