Pilot Assessment Schedule – 2023

Mathematics and Statistics RAS: Interpret and apply mathematical and statistical information in context (91946)

Evidence Statement

Section A

Sec A	Achievement	Merit	Excellence
(i)	A valid comparative comment relating the prices of "Homes" and "Businesses" electricity costs, using Resource 1.		
(ii)	Used Resource 1, Resource 2A **or** Resource 2B for a simple comparison.	Combined Resource 1, Resource 2A, **and** Resource 2B to either support or reject the claim. Must show quantitative evidence.	
(iii)	Made a conclusion on either seasonal spending pattern **OR** Made a conclusion on the overall trend based on the bar graph.	Made a conclusion about Kiwi's electricity consumption, with clear supporting evidence.	
(iv)	Identified at least two aspects.	Identified at least two aspects. **AND** with supporting evidence from the resource sheet.	Discussed at least two assumptions or limitations of choosing a power company based on a medium-sized NZ household.

Sec B	Achievement	Merit	Excellence
(i)	States that using coal for electricity generation is the worst because Resource Booklet 6 indicates that it produces 2.508 billion kg of CO_2.		
(ii)	Concludes the unlikelihood based on Resource Section 4, 5A, and 5B.	Concludes the unlikelihood with the precise evidence and brief explanation.	
(iii)	Identifies at least one area for CO_2 emission deduction, such as replacing coal and gas, targeting agriculture sector and transportation.	Identifies at least one area for CO_2 emission deduction, such as replacing coal and gas, targeting agriculture sector and transportation with supporting evidence cited from the Resource Booklet.	Interprets information and connecting to a context. Discussed at least one possible solution for CO_2 emission deduction, using personal worldviews.

Possible Suggested Responses

		Achievement	Merit	Excellence
A(i)		Both "Homes" and "Businesses" prices have increased over the years. OR "Homes" prices have increased at a faster rate. OR "Homes" prices started off cheaper than "Businesses" prices but became more expensive after 1994 Allow other valid comparative comments.		
(ii)	Yes, it can be supported. OR No, it cannot be fully supported. Allow other valid comments.	Because the average electricity rates for "Homes" customers in Resource 1 has been steadily increasing.	Because the quarterly expenditure in Resource 2 shows an increase in the prices for every comparative quarter. Because the average electricity rate has increased from 9 cents per kW / hour in 1990 to just over 30 cents per kW / hour in 2022 using the graph in Resource 1. OR Because there is only approximately a 1 cent per kw / hour increase since 2017 in the average electricity rate shown in Resource 1. Allow other valid comments.	
(iii)		Resource 2A shows that the highest electricity usage always occur in Q3 where more electricity is used for heating in winter. OR Resource 2A shows that the lowest electricity usage always occur in Q1 where less electricity is used for heating in summer. OR Resource 1 shows that the New Zealand household spending has remained at a similar	It can be seen that the average electricity usage for households has reduced by comparing comparative Quarters in Resource 2B. (including evidence of figures compared.) OR Evidence of calculations and comments connecting Electricity Usage, Electricity cost per kW /hour, and Residential Expenditure. i.e. Expenditure = Usage x Cost per kw / hour.	

		level since 2013.	OR The average expenditure rate has increased between 2013 ($ 2054.06) and 2022 ($ 2194.27) by approximately 6.8 % But the usage rate between those two years has actually decreased by approximately 1.5 %. (including evidence of figures compared.) OR The average cost rate has increased between 1990 (9 cents per kwHr) and 2022 (30 cents per kwHr) by approximately 230 % (including evidence of figures compared.) OR The average cost rate has increased between 2013 (27 cents per kwHr) and 2022 (30 cents per kwHr) by approximately 11 % (including evidence of figures compared.) OR Accept other calculations as evidence. e.g. Could use quarterly data to show similar usage in the past years. (including evidence of figures compared.) OR The annual average expenditure for a New Zealand household is approximately between $ 2110 and $ 2200 by calculating the sum of the 4 Quarters. (including evidence of appropriate calculations.) OR The annual average usage for a New Zealand household is about 7000 kW / hour by calculating the sum of the 4 Quarters. (including evidence of appropriate calculations.)	

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TWO aspects required.

There are several things that the household will need to consider when choosing their electricity company.
A household will consider PRICE whilst choosing their electricity company.</td>
<td>It is assumed that a typical medium-sized New Zealand household will use a similar amount of electricity to that shown in Resources 1 – 3.
OR
A typical medium-sized New Zealand household will likely to use approximately 7000 kwh per year.
OR
A typical medium-sized New Zealand household will likely to spend approximately $ 2200 per year on their electricity.

The different power companies offer different daily charges and electricity rates.</td>
<td>Based on the rates from resource 3, Equator Energy has the cheapest rates (around $2060 per year) closely followed by Shout ($2090). However Shout also offers $100 credit. I used 7000kWh per year and anytime rates to calculate the annual cost for comparison.
Limited power companies pricing provided in Resource 3 so my calculations are only based on these four companies. There might be other companies available offering cheaper price.</td>
<td>The limitation of my comparison on pricing is that the usage of different medium-sized Kiwi households.
Calculations and comparisons between the various companies for a set quantity of electricity and comparing costs including the Daily Charges.
Calculations and comparisons between the various companies for a set quantity of electricity and comparing costs with regards to the off-peak plan</td>
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<tr><td>Company</td><td>Rhythm Energy</td><td>Wired 4 Power</td><td>Equator Energy</td><td>Shout</td></tr>
<tr><td>Annual cost</td><td>$2483</td><td>$2345</td><td>$2058</td><td>$2088</td></tr>
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	A household will consider CUSTOMER RATING whilst choosing their electricity company.	The company with the lowest customer rating may not offer a good service.	Households are likely to use price AND customer rating when selecting their company.	However, it is not known how reliable the ratings provided in Resource 3 are. If the rating is based on a small number of customers, the results can be skewed easily. OR how was this Customer Rating found.
	A household will consider ADD – ONS / SELLING POINT whilst choosing their electricity company.	Not all the companies offer add-ons.	Equator Energy and Shout do not offer any Add – On's to their customers.	Some families may use natural gas for cooking/heating so they will have to go with the power companies who offer this. Some families may want to combine their broadband with their power to get a better deal. It's tricky to say what add-ons a medium-sized Kiwi household would need.
	A household will consider GREEN ENERGY whilst choosing their electricity company.	Not all A household might have an electric car which will need charging so go for the "Off Peak Plan" as cars can be charged over-night.	Some families may be very environmentally conscious so they will likely go with the companies who use 100% renewable energy and have the least amount of carbon footprint.	Different households will have different values and views when choosing their power companies. Price isn't necessarily the most important thing.

		Achievement	**Merit**	**Excellence**
B(i)		Using coal to generate electricity has the most environmental impact. because Resource 6 tells us that it creates 2.508 billion kg of CO_2.		
(ii)		No, New Zealand is not on track. From Resource 5, I can see that there are not many renewable power plants planned especially in the big cities.	From Resource 4, there are only 1.6 GW of renewable power plants planned to replace the 2 GW from operating plants still using coals and gas. (20% of the 10GW currently being generated by these sources) OR There are only 7 years until 2030 and only a fraction of renewable power plants are planned.	
(iii)		Briefly identified one possible government response but without justification and without reference to the Resource Booklet.	The two biggest sectors that contribute to 90% of New Zealand CO_2 emissions are energy and agriculture. The government should focus on these two sectors first. OR In the energy sector, the biggest contributor to CO_2 emissions in 2016 is from transportation.	The government should focus on ways to reduce the number of petrol cars on the road such as building light rails in big cities, encouraging more people to switch to EVs, implementing better and cheaper public transport. OR Resource 1 states "*About 20% of New Zealand's nearly 10 GW of operating power generation capacity is comprised of gas- and coal-fired resources".* However, they generate much higher proportion of CO_2 (nearly 80% showing in resource 5). The government should prioritise replacing coal and gas energy source with renewable clean energy such as solar, wind and hydro. OR For the agriculture sector, they could look at ways to reduce methane gas produced from animals; encourage people eat more plant based food; plant more trees around farms to reduce CO_2 etc.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response, no relevant response.	1 of u	2 of u	3 of u 1 of r and 1 of u	4 of u 1 of r and 2 of u	2 of r	3 of r	1 of t	2 of t

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 2	3 – 4	5 – 6	7 – 8

Appendix: Marker determination of validity of evidence

Professional judgement
The marker will determine a grade using their professional judgement based on a holistic examination of the evidence provided.

Demonstration of understanding
A response must use information to **demonstrate understanding**. The marker must exercise professional judgement to decide if it does so. The following guidance is provided to assist in making this professional judgement.

- A response **demonstrates understanding** if it can be described wholly or substantially by one or more of the statements in the **left-hand column**.
- A response **does not demonstrate understanding** if it can be described wholly or substantially by one or more of the statements in the **right-hand column**.
- If a response is comprised of both used and reproduced information, the marker must decide if it meets the standard **when the reproduced information is ignored**.

Evidence of <u>use</u> of information	**Evidence of <u>reproduction</u> of information**
Prompts and / or questions have been provided and the candidate has responded to these.	Information is presented that does not relate to the prompts.
The response uses information relating to the standard, the prompts, or questions.	
Information from the candidate's practice, performance, research, the practice of others, and or teaching, is related to the candidate's experiences.	Information is presented in isolation from the candidate's experiences.
The response shows understanding that could be expected to come from a course of instruction derived from Level 6 of *The New Zealand Curriculum*.	Little or nothing is offered to suggest the information is related to a course of instruction at Level 6 of *The New Zealand Curriculum*.
Information is presented in the candidate's own voice.	Information is not in the candidate's voice. The word choice, sentence structure, sentence length, punctuation etc. are not what a candidate could be expected to produce.
Referenced complex research information unchanged by paraphrase is related to other information in a manner that constructs meaning.	**Unreferenced** complex information is presented as though it is the candidate's own work.

In general, the marker will exercise the following judgement:

N1	**N2**
The response does not include enough evidence to show understanding, and / or is substantially reproduced with little mediation by candidate.	The response is substantially produced by the candidate, but demonstrates little understanding. One part of the required response may be completely missing, or several parts may be weak.

Where doubt exists as to whether evidence has been produced, mediated, or used by the candidate, the doubt must be exercised to the benefit of the candidate.