Assessment Schedule – 2018

Mathematics and Statistics: Demonstrate understanding of chance and data (91037)

Evidence Statement

Q	Expected coverage	Achievement	Merit	Excellence
ONE (a)(i)	$\frac{28}{64}=\frac{7}{16}=0.4375$	Correct answer.		
(ii)	$1-\frac{3}{20}=\frac{17}{20}=0.85$		Correct answer.	
(b)(i)	$0.75\times0.7=0.525$ ($\frac{21}{40}$)	Correct answer.	Correct answer with working.	
(ii)	$0.25\times0.2\times1\,500\,000=75\,000$	375 000 found OR Correct probabilities selected.	Correct answer.	Correct answer with working.
(c)	Because the 2016 pie graphs have both the North Island and South Island as over 50% of outages caused by vehicles or the weather. From the tables in part (a) this is also true. Although this is true for both islands in 2016, it can't be made as a generalisation for every year because: • The number of severe weather events each year varies. • The number and siting of vehicle accidents vary from year to year. • There can sometimes be years where there are over 50% of outages in the North Island but not the South Island and vice versa. • There could be improvement in equipment.	One valid justification given either for or against the claim.	Two valid reasons either for or against the claim.	Three valid reasons either for or against the claim.

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

Two	Expected coverage	Achievement	Merit	Excellence
TWO (a)(i)	Point at (8700,25).	Correct point circled.		
(ii)	Median between 100 and 110. Count the number of points (20) and the find the 10 or 11 point up from the *x*-axis and read its *y*-value which represents the approximate median.		Approximate median stated with a valid method explained.	
(iii)	**Useful** As there is a linear relationship with some points close to the line of best fit. So the linear model will approximate the amount of power generated if the surface area is substituted into it. **Not very useful** Not a strong relationship between the size of the lake and amount of electricity produced. There is significant variation in the amount of electricity produced by the lakes of all sizes. (Environmental Factors) The amount of electricity produced is not just dependent on lake size, it could be due to: • number of turbines • the 'fall' of the water • depth / volume of the lake • how much rainfall in the lake's catchment area. Not all hydroelectric lakes are included in the data.	States it is useful or not useful with ONE valid reason.	States it is useful or not useful with TWO valid reasons.	States it is useful or not useful with THREE valid reasons. At least one reason has to specifically refer to the graph.

(b)(i)	For both North and South Islands, the long term trend shows that the number of people switching power companies increases from 2004 to 2016. The increase is greater in the North Island. There are spikes which occur occasionally, mainly in the North Island and less so in the South Island. The switching trends have gained greater variation in the North Island since 2011 with many more spikes than previously. The long-term trend in South Island seems to change after 2011 and instead of continuing to increase as before, it drops down and increases at a much lower rate. The spikes in 2011 in both islands could be due to a new provider.	One valid feature with a clear explanation.	Two valid features with clear explanations.	Three valid features with clear explanations.
(ii)	North Island This is because the line representing the number of changes from 2004 to 2016 in the North Island has more spikes (and noise) than the South Island. The difference between change numbers from one month to the next has greater differences, on average, in the North Island than the South Island. As the population of the North Island is larger than the population of the South Island, then the spikes (variation) in the number of changes would be expected to be greater in the North Island than the South Island.	North Island stated.	North Island stated with an explanation using the terms 'spikes' or 'noise' or a well-described explanation as to the difference in monthly values.	

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

Q	Expected coverage	Achievement	Merit	Excellence
THREE (a)(i)	2016 This is shown by the majority of bars in the bar graph being lower than the 2015 bars.	Correct time period stated.	The reason given makes it clear that most (but not all) bars are lower in the 2016 time period.	
(ii)	About 1180 kWh as this was what Nicole used in the July of 2016. About 1010 kWh because July 2015 was 1350 and July 2016 was 1180 so may be on a downward "trend" in July.		A sensible answer stated with a valid justifying statement.	
(iii)	There is more electricity used over winter than in summer, as the bars are higher in winter than in the summer. This may be due to more heating and lights being used over the winter, using more electricity. There is less power being used in the 2016 year with the the bars generally being shorter than in the previous year. This may be due to new appliances being bought, being in the house less often, improving insulations, etc. The bar for August 2015 was lower than expected. It should have been higher than July as it is still winter and cold. This may have happened because Nicole was on holiday or the weather was unseasonably warm this month. Price increase leading to lower power usage in 2016. There is more variability in winter because there are more weather extremes.	One valid trend or feature with a clear explanation.	Two valid trends or features with clear explanations.	Three valid trends or features with clear explanations.

(b)(i)	**Summer** Because the ranges for both the North Island and South Island are smaller. OR The dotplots are less spread out and higher in the summer plots for both the North and South Islands.	Summer, with a valid reason.		
(ii)	There is less variation in winter power consumption in the North Island than the South Island due to the North Island having a smaller range. There is less variation in winter power consumption in the North Island than the South Island due to the North Island having a smaller IQ range. One or more of the point estimates compared. The distribution of energy consumption in the North Island is roughly unimodal and symmetrical (could argue that it is slightly skewed to the right) whereas for the South Island it is more flat. The distribution of winter energy consumption in the South Island is more clustered at 600–1000. There are three values (regions) in the South Island which have values quite a bit larger than the majority of values in winter. These would be worth investigating as possible outliers or errors. The South Island winter consumption is higher than the North Island because the median consumption is much higher in the South Island as seen by the medians, mean, ¾ South Island region's average consumption is more than half of the North Island.	One feature clearly described.	Two features clearly described.	Three features clearly described.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence.	1 0f u	2 of u	3 of u	4 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 – 7	8 – 13	14 – 18	19 – 24