Assessment Schedule – 2019

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

Evidence

ONE	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)(i)	IQR = UQ – LQ = 94 – 67 = 27	Correct answer.		
ii)	Australian overall range = 129 – 55 = 74 New Zealand overall range = 148 – 55 = 93 So greater overall variety in New Zealand caps. Australian IQR = 94 – 67 = 27 New Zealand IQR = 82 – 60 = 22 Therefore, Australia has marginally the greater variation of player caps, based on comparison of the IQR. (Allow "not really much difference from this sample") Must have some statistical reasoning to back up the decision.	New Zealand Decision based on the overall range.	Australia Decision based on the IQR.	
(iii)	**Symmetry / Skew** Neither distribution is symmetrical OR both distributions are skewed to the right because both countries have players with high numbers of caps. **Shift** The Australian middle 50% box has been shifted slightly to the right of the NZ middle 50% box. **Spread** The variation of both is very similar, with Australia (27) marginally greater than that of New Zealand (22), when comparing the IQR OR the variation of New Zealand (93) is greater than the variation of Australia (74), when comparing the overall range. **Centre** The mean / median of NZ caps is less than the mean / median of Australia caps. **Shape** The distribution of Australia has a slight cluster between 67 – 74 caps. Whereas, New Zealand has a cluster between 55 – 60. **Shape** The upper 25% of New Zealand caps is more spread out than the upper 25% of the Australia caps because NZ has a value of 148, which is a lot larger than other values.	ONE valid statement about ONE significant feature.	TWO valid statements about TWO significant features.	THREE valid statements about THREE significant features.

(iv)	This claim is not correct. • As the New Zealand median (66) is less than the Australian median (80), this implies that NZ players have fewer caps than the Australians on average OR NZ mean (75) is less than Australian mean (81). • This sample indicates that New Zealand has slightly fewer caps per player than the Australians because the NZ median (66) is just below the Australian LQ (67) so lies outside the Australian middle 50% box. • However, as the Australian median (80) is only just below the NZ UQ (82), so is just inside the NZ middle 50% box, the difference between the number of caps awarded is not that much. • As this sample size is only 31 and 29, and as the comparison is so close, it would be wise to sample again, with a larger or different sample, to see if sampling variability will lead to a differing result, with the medians possibly both lying within each other's boxes. • As only caps greater than 55 have been considered perhaps this gives a different impression to that if all caps had been considered.	Decision that claim is not correct, with reason based on comparison of the medians or means.	Decision that claim is not correct, with reference to IQR boxes.	Decision that claim is not correct, with reason based on comparison of the medians AND with reference to the IQR boxes AND with reference to the comparison being a narrow margin OR decision based on correct calculations and interpretation of "overall visual spread" with "distance between medians". $(\frac{14}{34} = 0.4117\ )$
(b)(i)	$\frac{90}{300} = \frac{3}{10} = 0.3$	Correct answer.		
(ii)	Rugby $\frac{70}{90} = 0.777$ Netball $\frac{30}{90} = 0.333$ Cricket $\frac{25}{40} = 0.625$ Football $\frac{70}{80} = 0.875$ There is a higher chance of a football player injuring themselves as football is the largest fraction.	Correct decision with probability calculated.	Correct decision, with probabilities calculated and clearly compared to justify the decision.	

N0	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	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)(i)	Straight line of best fit drawn but comments relating to doubts to its accuracy for predictions for the higher values of "Years since Debut" OR curved line of best fit drawn and comments to explain this decision OR piece-wise two straight lines drawn and comments to explain this decision.	Straight line drawn without comments OR curved line of best fit drawn without comments OR piece-wise line of best fit drawn without comments.	Straight line drawn but doubt expressed regarding the accuracy of the model for higher values of "Years since debut" OR curved line of best fit drawn with appropriate comments to explain choice OR piece-wise line of best fit drawn with appropriate comments to explain choice.	
(ii)	Three large clusters of points: between 0 to 2 years, 3 to 3.5 years, and 5 to 7.5 years. There are three interesting / unusual values (5.5,70), (6.5,75), (7.5,80) that are higher "number of caps awarded" than generally other similar values. Reference to differing confidence levels in predictions depending on "Years since debut" values. Strength of the relationship with reference to how close points are visually to the line of best fit.	ONE feature clearly identified.	TWO features clearly identified.	THREE features clearly identified.
(iii)	Useful or not useful with evidence. Not very useful, as predictions cannot be made for ALL rugby players as data is only for NZ and Fiji. There appears to be a positive non-linear relationship. As the years since Fiji / NZ rugby players have debuted the number of caps they receive increases. The predictions for the lower "years since debut" will produce results with higher confidence. The relationship seems to be a weak relationship, so the predictions will not be that useful as these predictions will not be very reliable.	ONE valid statement.	TWO valid statements.	

(b)(i)	The loose forwards position has the greatest number of players. This is shown by the value of 12 or the largest square.	Correct answer with brief justification.		
(ii)	Pie graph • You would need only two. • But the amounts are quite close so would not clearly see the proportions. • Cannot see totals. Bar graph • The heights of the bars would give a clear understanding of the most popular positions. • But could be confusing for making comparisons. Table • It would be easy to see the values. • But could be confusing for making comparisons.	ONE valid data display stated with either an advantage OR a disadvantage stated.	ONE valid data display with an advantage AND disadvantage stated OR TWO valid data displays stated with either an advantage OR disadvantage stated for each.	TWO data displays with THREE valid statements.

N0	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

THREE	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)(i)	1974, 1975 or 1976 with a number of points of approximately 25 points.	Correct answer, with brief justification.		
(ii)	**Long Term Trend** There is an overall increasing trend of the amount of points that the All Blacks have scored, starting from approximately 100 points per season, rising to approximately 700 points per season. **Regular Patterns** There seems to be a regular pattern every couple of years where it will peak and create a trough. **Unusual Features** There is a huge spike in points in 2005, rising to approximately 1350 points per season, which is a lot higher than the other peaks. This would be interesting to investigate. **Noise** Flattening out at end.	ONE feature clearly identified.	TWO features clearly identified.	THREE features clearly identified.
(b)(i)	$\frac{16}{110}=\frac{8}{55}=0.1455$	Correct answer.		
(ii)	$\frac{20}{64}=\frac{5}{16}=0.3125$		Correct answer.	
(iii)	$\frac{14}{110}+\frac{24}{110}=\frac{38}{110}=\frac{19}{55}$ $= 0.3455$	Either probability correct.	Correct answer.	
(iv)	$\frac{20}{110}\times\frac{19}{109}=\frac{38}{1199}$ $=0.0317$ Solution of 0.03 without justification would gain Merit only.	Either probability correct.	EITHER $\frac{20}{110}\times\frac{19}{110}=\frac{19}{605}$ $= 0.0314$ OR $\frac{20}{110}\times\frac{20}{110}=\frac{4}{121}$ $= 0.0331$	Correct answer, with justification, or sufficient accuracy.

N0	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

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 12	13 – 18	19 – 24