Assessment Schedule – 2017

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

Evidence Statement

One	Expected coverage	Achievement	Merit	Excellence
(a)(i)	There appears to be a positive linear relationship. As age increases, so does mileage and vice versa. AND 6000 km. I drew a line of best fit and calculated the gradient. The gradient / slope represents how many km changes for every 1 year increase in age.	Correct basic statement made for relationship with some correct justification. OR An answer in the range of 5000 to 9000 km given with little or poor justification.	An answer in the range of 5000 and 9000 km justified with a sensible statement.	
(b)(i)	Up to \$20 000, it seems as though the amount cars decrease in value increases in variability. The percentage decrease in value seems to rise as the initial price of the cars increases with a line of best fit or a calculation. The percentage decrease in value seems to remain about the same with a line of best fit or value. There are 3 unusual values (outliers): one at \$10 500, one at \$16 000 and one at \$17 000. These 3 points are much higher than the others. This would need to be investigated – it may be due to brand, mileage, wear and tear, etc.	1 valid statement.	2 valid statements.	3 valid statements.
(ii)	If you buy a cheaper car the percentage decrease is less than the percentage decrease for an expensive by around 2 to 5 percent so you should buy a cheaper car. OR The percentage decrease is approximately 10% for both cheaper and more expensive cars so it doesn't matter which you buy. AND As a percentage of the original price, the more expensive cars lose greater monetary value each year.		Makes one of the OR statements.	Makes a final claim with all parts correct.
(c)(i)	$\frac{32}{298} = \frac{16}{149} = 0.1074$	Correct answer.		
(ii)	$\frac{17}{83} = 0.205$		Correct answer.	

(iii)	Males = $\frac{215}{298}$ Females = $\frac{83}{298}$ Males are 2.59 times more likely to be charged with reckless driving than females, in 2016.		The increased likelihood of males stated.

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

Two	Expected coverage	Achievement	Merit	Excellence
(a)(i)	White / white Pearl because it has the longest bar and largest percentage.	Colour and valid reason stated.		
(ii)	Pie Graph – but would need 4 of them; one for each vehicle type. Bar Graph/Dot Plot – the heights of the bars would give a clear understanding of the most popular colours. They could all be displayed in one graph, but there would be multiple bars which would be confusing. Four separate bar graphs would be better. Table-Advantage easy to compare values. Disadvantage could be confusing.		1 valid data display with an advantage and disadvantage stated. OR 2 valid data displays stated with either an advantage or disadvantage stated for each.	At least 2 data displays stated with three valid statements.
(b)(i)	9.49 g / km	Correct answer.		
(ii)	1984 range = 558.83 2016 range = 410 ∴ 1984 has the greatest range and hence the greatest variation in CO_2 emissions. OR 1984 IQR = 81.78 2016 IQR = 85.94 ∴ 2016 has the greater Iq-range (inter quartile range) and hence the greatest variation in CO_2 emissions.		Both ranges stated or IQRs stated with a correct decision made.	
(iii)	The 1984 distribution of CO_2 emissions is skewed to the right, the 2016 emissions are approximately unimodal. The IQR of the 1984 distribution of CO_2 emissions is smaller than the 2016 distribution. The distribution of CO_2 emissions from 2016 is clustered from around 170 g / km to 350 g / km whereas the 1984 distribution is less 'tightly' clustered from around 180 g/km to 400 g/km. The lower 25% of CO_2 emissions is less spread out in 1984 (91.33 g / km) than in 2016 (197.8 g / km) but this is due to a zero value in 2016 (electric vehicles?)	1 valid statement.	2 valid statements.	3 valid statements.

(iv)	Claim is likely to be incorrect – because the median of the 2016 values lies within the IQR of the 1984 values. OR DBM = 9.49, OVS = 110.77 $\frac{\text{DBM}}{\text{OVS}} = 0.086$ Since this is less than ($\frac{1}{3}$ or $\frac{1}{5}$) there is unlikely to be a statistical difference between 1984 and 2016.	Makes a single justified judgement.		Use a test (DBM/OVS) to justify their decision with the correct claim. OR Claim is likely to be incorrect because the medians lie inside the other boxes.

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

Three	Expected coverage	Achievement	Merit	Excellence
(a)(i)	68	Correct answer stated.		
(ii)	1. True – because there are 4 Nissans in the top 15 vehicles stolen. 2. False – it is actually Toyota because 238 (accept 235-240) Toyotas were stolen in the 6 month period, which is the most. 3. False – cannot make this claim because we see only the top 15 vehicles stolen, not all of them.	Justifies using statements similar to 1.	Justifies using a statement similar to 2 or 3.	
(iii)	Different year. AA Insurance have records only for stolen vehicles of their clients and those who made claims. We don't know when the 6 month period was for the police – it may have been during summer when more people are away on holiday / more cars stolen. There may be some vehicles that AA Insurance don't insure, so they won't show up on their list.	1 valid statement.	2 valid statements.	3 valid statements.
(b)(i)	2010, because this is when the time series is at its lowest point (around –6.2%).	Year stated with justification.		
(ii)	It could continue to increase following the trend from about 2013. It could decrease because there is a pattern of troughs following peaks. It could flatten off because this has happened before.	Makes a valid predication with a valid justification,	Makes 2 valid predictions, both with valid justifications.	
(iii)	It helps to 'smooth' the data – the graph is less affected by small variations in monthly values. The time series graph is easier to read. It helps to see longer term trends. It helps to make predictions. It helps reduce seasonal variations.		1 valid statements.	2 valid statements.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence.	Some relevant progress	1 of u	2 of u	3 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 – 8	9 – 13	14 – 18	19 – 24