Assignment 1

1.

(i)	med = 3.2	**B1**	Accept 3.2 ± 0.05
	UQ = 3.65 ⩽ uq ⩽ 3.7 LQ = 2.55⩽ lq ⩽ 2.6	**M1**	UQ – LQ, UQ greater than *their* 'median', LQ less than *their* 'median'
	IQR = 1.05 ⩽ iqr ⩽ 1.15	**A1**	Correct answer from both LQ and UQ in given ranges
	Total:	**3**	
(ii)	134 – 24 = 110	**B1**	Accept 108 ⩽ n ⩽ 112, n an integer
	Total:	**1**	

stion	Answer	Marks	Guidance
iii)	200 – 12 = 188 less than length l	**M1**	188 seen, can be implied by answer in range, mark on graph.
	l = 4.5 cm	**A1**	Correct answer accept 4.4 ⩽ l ⩽ 4.5
	Total:	**2**	

2.

(i)	Anvils | Brecons 8 | 15 9 5 | 16 | 6 5 3 2 0 | 17 | 0 1 2 2 8 4 1 0 | 18 | 1 2 3 3 6 | 19 | 2 Key: 5|16|6 means 165 cm for Anvils and 166 cm for Brecons	**B1**	Correct stem, up or down
		B1	Correct Anvils labelled on left, leaves in order from right to left and lined up vertically, no commas
		B1	Correct Brecons labelled on same diagram on right hand side in order from left to right and lined up vertically, no commas
		B1	Correct key, not split, both teams, at least one with cm
		4	
(ii)	Median = 173	**B1**	Correct median (or Q2)
	LQ = 169; UQ = 181 IQR = 181 – 169	**M1**	Either UQ = 181 ± 4, or LQ = 169 ± 4 and evaluating UQ – LQ
	= 12	**A1**	Correct answer from 181 and 169 only
		3	

(iii)	$\Sigma x = 1923 + 166 + 172 + 182$ (= 2443) $\Sigma x^2 = 337221 + 166^2 + 172^2 + 182^2$ (= 427485)	**M1**	Correct unsimplified expression for Σx and Σx^2, may be implied
	Mean = $\frac{\Sigma x}{14} = \frac{2443}{14} = 174.5$	**M1**	Correct unsimplified mean
	Variance = $\frac{\Sigma x^2}{14} - \left(\frac{\Sigma x}{14}\right)^2 = \frac{427485}{14} - \left(\frac{2443}{14}\right)^2$	**M1**	Correct unsimplified variance using 14, their Σx and their Σx^2, not using 1923 and/or 337221
	S d = 9.19	**A1**	Correct answer
		4	

3.

estion	Answer	Marks	Guidance
(i)	0.5 2.4 3 1.4 0.4	**M1**	At least 3 frequency densities calculated (frequency ÷ class width) e.g. $\left(\frac{10}{20}, \frac{10}{19}\text{ or }\frac{10}{19.5}\right)$ may be read from graph using *their* scale, 3SF or exact
	All heights correct on graph.	**A1**	
	Bar ends of 9.5, 29.5, 39.5, 59.5, 89.5	**B1**	
	Axes labelled: Frequency density (fd) and speed/km h^{-1} (or appropriate title). Linear scales 9.5 ⩽ horizontal axis ⩽ 89.5, 0 ⩽ vertical axis ⩽ 3, 5 bars with no gaps	**B1**	
		4	
(ii)	$\frac{19.5\times10 + 34.5\times24 + 44.5\times30 + 54.5\times14 + 74.5\times12}{\textit{their}\,90}$ $= \frac{195 + 828 + 1335 + 763 + 894}{90}$ $= \frac{4015}{90}\text{ or }\frac{803}{18}$	**M1**	Uses at least 4 midpoint attempts (e.g. 19.5 ± 0.5). Allow unsimplified expression.
	$44\frac{11}{18}$ or 44.6 (km h^{-1})	**A1**	Final answer not an improper fraction NFWW
		2	

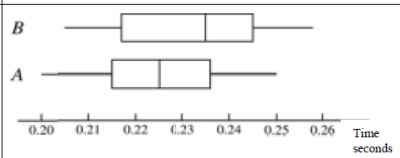
4.

(i)	Mean = (30 × 1500 + 21 × 2400)/51	**M1**	Multiply by 30 and 21, summing and dividing total by 51 $\left(\frac{45000 + 50400}{51}\right)$
	= 1870 (1870.59)	**A1**	correct answer (to 3sf)
	Total:	**2**	
(ii)	$230^2 = \frac{\Sigma x_F^{\,2}}{30} - 1500^2$ so $\Sigma x_F^{\,2} = 69\,087\,000$	**M1**	One correct substitution into a correct variance formula
		A1	Correct $\Sigma x_F^{\,2}$ (rounding to 69 000 000 2sf)
	$160^2 = \frac{\Sigma x_L^{\,2}}{21} - 2400^2$ so $\Sigma x_L^{\,2} = 121\,497\,600$	**A1**	Correct $\Sigma x_L^{\,2}$ (rounding to 121 000 000 3sf)
	New var = $\frac{69\,087\,000 + 121\,497\,600}{51} - 1870.588^2 = 237\,853$	**M1**	using '$\Sigma x_F^{\,2}$'+ '' $\Sigma x_L^{\,2}$ dividing by 51 and subtracting 'i' squared. (Correct '$\Sigma x_F^{\,2}$' + '' $\Sigma x_L^{\,2}$ = 190 584 600)
	New sd = 488	**A1**	Correct answer accept anything between 486 and 490
	Total:	**5**	

5.

Median Maths = 40	**M1**	Indication of finding medians, such as mark on graph or reference marks to 700 pupils, condone poor terminology such as 'mean'
Median English = 55	**A1**	Both values correct, condone 54<English<56 but 54, 56 get A0
Median of English is larger than median of Maths	**B1**	Correct statement, median must be referenced within answer. No credit if statement references 'means'
Range Maths is 100 or IQ range Maths = 80 – 12 = 68	**M1**	Evidence of finding either both ranges or both IQ ranges i.e. see a minus
Range English is 60 or IQ range English = 62 – 42 = 20	**A1**	Both ranges or IQR correct
Maths marks have more spread then English marks	**B1**	Correct conclusion. Accept standard deviation but must see some figures
	6	

6.

2(i)	median = 0.225; LQ = 0.215: UQ = 0.236	**B1**	Correct median (Q_2)
	IQR = 0.236 – 0.215	**M1**	0.232 < UQ (Q_3) < 0.238 – 0.204 < LQ (Q_1) < 0.219
	= 0.021	**A1**	www Omission of all decimal points **MR-1** If M0 awarded **SCB1** for both LQ = 0.215: UQ = 0.236 seen
		3	
2(ii)		**B1**	Linear scale between 0.20 to 0.26 (condone omission of 0.26) axis labelled (time and seconds), at least one box plot attempted, no lines through boxes, whiskers not at corner of boxes
		B1 ft	Labelled correct graph for A, (ft their median/quartiles), condone lines through boxes, whiskers at corner of boxes
	A 0.200 0.215 0.225 0.236 0.250 **B** 0.205 0.217 0.235 0.245 0.258	**B1**	Labelled correct graph for B, condone lines through boxes, whiskers at corner of boxes **SC** If B0B0 scored because graphs not labelled/labels reversed SCB1 if both 'correct' Penalty **MR-1** if graphs plotted on separate axes unless both scales align exactly.
		3	