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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress descriptor |
| **1a** | All points correctly plotted. | **B2** | 1.1b | 2nd  Draw and interpret scatter diagrams for bivariate data. |
|  | **(2)** |  |  |
| **1b** | The **points** lie reasonably close to a **straight line** (o.e.). | **B1** | 2.4 | 2nd  Draw and interpret scatter diagrams for bivariate data. |
|  | **(1)** |  |  |
| **1c** | *f* | **B1** | 1.2 | 2nd  Know and understand the language of correlation and regression. |
|  | **(1)** |  |  |
| **1d** | Line of best fit plotted for at least 2.2 ⩽ *x* ⩽ 8 with *D* and *F* above and *B* and *C* below. | **M1** | 1.1a | 4th  Make predictions using the regression line within the range of the data. |
| 26 to 31 inclusive (must be correctly read from *x* = 7 from the line of best fit). | **A1** | 1.1b |
|  | **(2)** |  |  |

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| **1e** | It is reliable because it is interpolation (700 km is within the range of values collected). | **B1** | 2.4 | 4th  Understand the concepts of interpolation and extrapolation. |
|  | **(1)** |  |  |
| **1f** | No, it is not sensible since this would be extrapolation (as 180 km is outside the range of distances collected). | **B1** | 2.4 | 4th  Understand the concepts of interpolation and extrapolation. |
|  |  | **(1)** |  |  |
| (8 marks) | | | | |
| Notes  **1a**  First B1 for at least 4 points correct, second B1 for all points correct.  **1b**  Do not accept‘The points lie reasonably close to a line’. Linear or straight need to be noted.  **1e**  Also allow ‘It is reliable because the points lie reasonably close to a straight line’.  **1f**  Allow the answer ‘It is sensible since even though it is extrapolation it is not by much’ provided that the answer contains both ideas (i.e. it IS extrapolation but by a small amount compared to the given range of data). | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress descriptor |
| **2a** | 19.5 + = 26.7093… (Accept awrt **26.7** miles) | **M1**  **A1** | 1.1b  1.1b | 3rd  Estimate median values, quartiles and percentiles using linear interpolation. |
|  | **(2)** |  |  |
| **2b** | = 29.6041… o.e. (Accept awrt **29.6** miles) | **B1** | 1.1b | 4th  Calculate variance and standard deviation from grouped data and summary statistics. |
| **  or    or | **M1** | 1.1a |
| *σ* = 16.5515… (Accept awrt **16.6** miles)  (or *s* = 16.6208… = **16.6** miles) | **A1** | 1.1b |
|  | **(3)** |  |  |
| **2c** | Any sensible reason linked to the shape of the distribution.  For example:  The distribution is (positively) skewed.  A few large distances (values) distort the mean. | **B1** | 2.4 | 4th  Calculate means, medians, quartiles and standard deviation. |
|  | **(1)** |  |  |

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| **2d** | Comparison of the two means.  For example, the mean distance for London is smaller than for Devon.  Sensible interpretation comparing a county to a city.  For example, distance to work into one city may not be as far as travelling to different cities in a county.  For example, commuters need to travel further to the cities in Devon for work.  Comparison of the two standard deviations:  For example, the standard deviation for London is larger than for Devon.  Sensible interpretation relating to variability/consistency  For example, there is more variability (less consistency) in the commute distances from the Greater London station than from the Devon station. | **B1**  **B1**  **B1**  **B1** | 1.1b  2.2b  1.1b  2.2b | 4th  Compare data sets using a range of familiar calculations and diagrams. |
|  | **(4)** |  |  |
| (10 marks) | | | | |
| Notes  **2a**  Allow consistent use of *n* + 1 (i.e. for median 60.5th rather than 60th), median = 26.8  **2c**  Candidates must compare both the means and standard deviations with interpretations for full marks. | | | | |

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| **Q** | **Scheme** | **Marks** | **AOs** | **Pearson Progression Step and Progress descriptor** |
| **3ai** | 37 (minutes). | **B1** | 1.1b | 2nd  Draw and interpret box plots. |
|  | **(1)** |  |  |
| **3aii** | Upper quartile or Q3 or third quartile or 75th percentile or P75 | **B1** | 1.2 | 2nd  Understand quartiles and percentiles. |
|  | **(1)** |  |  |
| **3b** | Outliers.  Sensible interpretation:  For example:  Observation that are very different from the other observations (and need to be treated with caution).  Possible errors.  These two children probably walked/took a lot longer. | **B1**  **B1** | 1.2  2.4 | 3rd  Recognise possible outliers in data sets. |
|  | **(2)** |  |  |
| **3c** | 50 + 1.5 × 20 = 80 or 30 − 1.5 × 20 =0  Maximum value =55 < 80 minimum value = 25 > 0  No outliers. | **M1**  **A1**  **B1** | 1.1b  1.1b  1.1b | 4th  Calculate outliers in data sets and clean data. |
|  | **(3)** |  |  |
| **3d** | The scale **must** be the same as for school *A*.  **Figure 1** | **B1** | 1.1b | 2nd  Draw and interpret box plots. |
| Box & whiskers 30, 37, 50 | **B1** | 1.1b |
| 25, 55 | **B1** | 1.1b |
|  | **(3)** |  |  |
| **3e** | Three comparisons in context.  Comment on comparing averages.  For example, children from school *A* took less time **on average**. | **B3** | 2.2b | 4th  Compare data sets using a range of familiar calculations and diagrams. |
| Comment comparing consistency of times.  For example, there is less variation in the times for school *A* than school *B.* |  |  |
| Comment on comparing symmetry:  For example,both positive skew (or neither symmetrical or median closer to LQ (o.e.) for both). (Most children took a short time with a few taking longer.) |  |  |
| Comment on comparing outliers.  For example, school *A* has two children whose times are outliers (or errors) where as school *B* has no outliers. |  |  |
|  | **(3)** |  |  |
| **(13 marks)** | | | | |
| **Notes**  **3c**  Allow horizontal line through box. | | | | |

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| **Q** | **Scheme** | **Marks** | **AOs** | **Pearson Progression Step and Progress descriptor** |
| **4** | = −2.335 (seen or implied)    = 2.5 + 755.0  = 749.1625 (Accept awrt 749)  *σy* =  = 6.3594…  *σx* = 2.5 × 6.3594…  = 15.8986… (Accept awrt 15.9) | **B1**  **M1**  **M1**  **A1**  **M1 A1**  **A1**  **M1**  **A1** | 1.1b  3.1a  1.1b  1.1b  1.1b  1.1b  3.1a  1.1b  1.1b | 5th  Calculate the mean and standard deviation of coded data. |
|  | **(9)** |  |  |
| **(9 marks)** | | | | |
| **Notes** | | | | |

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| **Q** | **Scheme** | **Marks** | **AOs** | **Pearson Progression Step and Progress descriptor** |
| **5a** | Order the data.  125, 160, 169, 171, 175, 186, 210, 243, 250, 258, 390, 420 | **M1** | 1.1b | 2nd  Understand quartiles and percentiles. |
| *Q*3 =(250 + 258) = 254 | **A1** | 1.1b |
|  | **(2)** |  |  |
| **5b** | *Q*3 +1.5(*Q*3 – *Q*1) = 254 + 1.5(254 – 170) | **M1** | 1.1b | 4th  Calculate outliers in data sets and clean data. |
| = 380 | **A1** | 1.1b |
| Patients *F* (420) and *B* (390) are outliers (so may be suspected by the doctor as smoking more than one packet of cigarettes per day). | **B1** | 3.2a |
|  | **(3)** |  |  |
| **(5 marks)** | | | | |
| **Notes** | | | | |

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| **Q** | **Scheme** | **Marks** | **AOs** | **Pearson Progression Step and Progress descriptor** |
| **6** | Three comparisons in context:  For example:  **Very** much warmer in Beijing than Perth.  Both consistent in the temperatures.  Less rainfall in Beijing.  Less likely to have high rainfall in Beijing.  Rainfall in Beijing is consistently less than in Perth.  Evidence of use of a statistic from the boxplots:  For example:  Medians  Measure of a difference in medians  Mention of a particular outlier | **B3**  **B1** | 2.4  2.4 | 4th  Compare data sets using a range of familiar calculations and diagrams. |
| For accurately reading data from boxplots. | **B1** | 2.4 |
|  | **(5)** |  |  |
| **(5 marks)** | | | | |
| **Notes** | | | | |