



**General Certificate of Education**

**Mathematics 6360**  
**Statistics 6380**

**MS/SS1B/W Statistics 1B**

**Mark Scheme**

*2010 examination - January series*

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**Key to mark scheme and abbreviations used in marking**

|              |                                                                    |     |                            |
|--------------|--------------------------------------------------------------------|-----|----------------------------|
| M            | mark is for method                                                 |     |                            |
| m or dM      | mark is dependent on one or more M marks and is for method         |     |                            |
| A            | mark is dependent on M or m marks and is for accuracy              |     |                            |
| B            | mark is independent of M or m marks and is for method and accuracy |     |                            |
| E            | mark is for explanation                                            |     |                            |
| ✓ or ft or F | follow through from previous incorrect result                      | MC  | mis-copy                   |
| CAO          | correct answer only                                                | MR  | mis-read                   |
| CSO          | correct solution only                                              | RA  | required accuracy          |
| AWFW         | anything which falls within                                        | FW  | further work               |
| AWRT         | anything which rounds to                                           | ISW | ignore subsequent work     |
| ACF          | any correct form                                                   | FIW | from incorrect work        |
| AG           | answer given                                                       | BOD | given benefit of doubt     |
| SC           | special case                                                       | WR  | work replaced by candidate |
| OE           | or equivalent                                                      | FB  | formulae book              |
| A2,1         | 2 or 1 (or 0) accuracy marks                                       | NOS | not on scheme              |
| –x EE        | deduct x marks for each error                                      | G   | graph                      |
| NMS          | no method shown                                                    | c   | candidate                  |
| PI           | possibly implied                                                   | sf  | significant figure(s)      |
| SCA          | substantially correct approach                                     | dp  | decimal place(s)           |

**No Method Shown**

Where the question specifically requires a particular method to be used, we must usually see evidence of use of this method for any marks to be awarded. However, there are situations in some units where part marks would be appropriate, particularly when similar techniques are involved. Your Principal Examiner will alert you to these and details will be provided on the mark scheme.

Where the answer can be reasonably obtained without showing working and it is very unlikely that the correct answer can be obtained by using an incorrect method, we must award **full marks**. However, the obvious penalty to candidates showing no working is that incorrect answers, however close, earn **no marks**.

Where a question asks the candidate to state or write down a result, no method need be shown for full marks.

Where the permitted calculator has functions which reasonably allow the solution of the question directly, the correct answer without working earns **full marks**, unless it is given to less than the degree of accuracy accepted in the mark scheme, when it gains **no marks**.

**Otherwise we require evidence of a correct method for any marks to be awarded.**

## MS/SS1B

| Q              | Solution                                                                                                                                                                          | Marks                      | Total    | Comments                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1(a)(i)</b> | $X \sim N(10.2, 0.15^2)$<br>$P(X < 10.5) = P\left(Z < \frac{10.5 - 10.2}{0.15}\right)$<br>$= P(Z < 2)$<br>$= 0.977$                                                               | M1<br>A1<br>A1             | 3        | Standardising (10.45, 10.5 or 10.55) with 10.2 and ( $\sqrt{0.15}$ , 0.15 or $0.15^2$ ) and/or $(10.2 - x)$<br>CAO; ignore inequality and sign<br>May be implied by a correct answer<br>AWRT (0.97725)                                                                                                                                                                           |
| <b>(ii)</b>    | $P(10.0 < X < 10.5)$<br>$= [C's (a)(i)] - P(X < 10.0)$<br>$= (a)(i) - P(Z < -1.33)$<br>$= (a)(i) - (1 - p)$<br>$= 0.97725 - (1 - 0.90824)$<br>$= 0.885 \text{ to } 0.887$         | M1<br><br><br><br>m1<br>A1 | 3        | Or equivalent; must be clear correct method if answer incorrect and answer $> 0$<br>Method correct using $-1.3$ gives 0.88 to 0.881<br>$\Rightarrow$ M1 m1 A0<br>Area change<br>May be implied by a correct answer or answer $> 0.5$<br>AWFW (0.88604)<br>M1 m1 A1 for $0.90824 - [1 - (a)(i)] = 0.886$<br>M1 m0 A0 for $(a)(i) - 0.90824 = 0.0685$<br>M0 mo A0 for answer $< 0$ |
| <b>(b)</b>     | $P(X > 10) = p[\text{from (a)(ii)}]$<br>$= 0.908 \text{ to } 0.909$<br>$P(6 \text{ rolls} > 10) = 0.90824^6$<br>$0.56 \text{ to } 0.565$<br><b>Note:</b><br>B0F M1 A0 is possible | B1F<br><br>M1<br>A1        | 3        | Correct value <b>or</b> F on value used or implied in (a)(ii) providing $> 0.5$<br>Use of $-1.3$ gives 0.9032<br>Accept any probability to power 6<br>AWFW                                                                                                                                                                                                                       |
|                |                                                                                                                                                                                   | <b>Total</b>               | <b>9</b> |                                                                                                                                                                                                                                                                                                                                                                                  |

**MS/SS1B (cont)**

| <b>Q</b>      | <b>Solution</b>                                                                                                   | <b>Marks</b> | <b>Total</b> | <b>Comments</b>                                                                                  |
|---------------|-------------------------------------------------------------------------------------------------------------------|--------------|--------------|--------------------------------------------------------------------------------------------------|
| <b>2(a)</b>   | Ordering values gives:<br><br>(a) 14 15 18 20 25 25 26 27 29 32 34 37 37 (b)                                      | M1           |              | May be implied by correct median or correct IQR<br>Ignore any reference to <i>a</i> and <i>b</i> |
|               | Median = 26                                                                                                       | A1           |              | CAO                                                                                              |
|               | IQR = 34 – 18 = 16                                                                                                | A2           |              | CAO                                                                                              |
|               | <b>Special Case:</b><br>Identification that LQ = 18 and UQ = 34                                                   | (A1)         | 4            | Both CAO                                                                                         |
| <b>(b)(i)</b> | Two values (25 and 37) of mode<br>No unique value<br>Sparse data<br>Many different values                         | B1           |              | Or equivalent                                                                                    |
| <b>(ii)</b>   | <i>a</i> and <i>b</i> (two values) unknown<br>Impossible to calculate<br>Cannot be calculated                     | B1           | 2            | Or equivalent                                                                                    |
| <b>(c)</b>    | Mean = $\frac{\sum x}{n} = \frac{390}{15} = 26$<br><br>If not identified, assume order is $\bar{x}$ then <i>s</i> | B1           |              | CAO                                                                                              |
|               | SD ( $\sum x^2 = 11472$ ) = 9.4 to 9.8                                                                            | B1           | 2            | AWFW (9.423 & 9.754)<br>Treat rounding of a correct stated answer to an integer as ISW           |
|               | <b>Special Case:</b><br>Evidence of $\frac{\sum x}{15}$                                                           | (M1)         |              | Can only be awarded if no marks scored elsewhere in (c)                                          |
|               |                                                                                                                   | <b>Total</b> | <b>8</b>     |                                                                                                  |

## MS/SS1B (cont)

| Q    | Solution                                                                                                                                 | Marks        | Total    | Comments                                                                                                                         |
|------|------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|----------------------------------------------------------------------------------------------------------------------------------|
| 3(a) | $b$ (gradient) = 7.05                                                                                                                    | B2           | 4        | AWRT (7.05134)                                                                                                                   |
|      | $b$ (gradient) = 7(.00) to 7.1(0)                                                                                                        | (B1)         |          | AWFW                                                                                                                             |
|      |                                                                                                                                          |              |          | Treat rounding of correct stated answers as ISW                                                                                  |
|      | $a$ (intercept) = 2500 to 2502                                                                                                           | B2           |          | AWFW (2501.091)                                                                                                                  |
|      | $a$ (intercept) = 2490 to 2510                                                                                                           | (B1)         |          | AWFW                                                                                                                             |
|      | <b>or</b>                                                                                                                                |              |          |                                                                                                                                  |
|      | Attempt at                                                                                                                               |              |          |                                                                                                                                  |
|      | $\sum x \quad \sum x^2 \quad \sum y \quad \& \quad \sum xy \quad (\sum y^2)$                                                             |              |          | 1351 268047 27034 & 5269065 (105653202)                                                                                          |
|      | <b>or</b>                                                                                                                                | (M1)         |          | (all 4 attempted)                                                                                                                |
|      | Attempt at $S_{xx}$ & $S_{xy}$ ( $S_{yy}$ )                                                                                              |              |          | 7304 & 51503 (1247894) (both attempted)                                                                                          |
| (b)  | Attempt at <b>correct</b> formula for $b$ (gradient)                                                                                     | (m1)         | 2        |                                                                                                                                  |
|      | $b$ (gradient) = 7.05                                                                                                                    | (A1)         |          | AWRT                                                                                                                             |
|      | $a$ (intercept) = 2500 to 2502                                                                                                           | (A1)         |          | AWFW                                                                                                                             |
|      | Accept $a$ & $b$ interchanged only if identified correctly by a <b>clearly shown equation</b> (stated answers are not sufficient) in (b) |              |          | If $a$ and $b$ are not identified anywhere in solution, then:<br>$7.05 \Rightarrow B1$<br>$2500 \text{ to } 2502 \Rightarrow B1$ |
|      | $y_{200} = a + b \times 200$                                                                                                             | M1           |          | Used                                                                                                                             |
|      |                                                                                                                                          |              |          | May be implied by correct answer                                                                                                 |
|      | = 3890 to 3930                                                                                                                           | A1           |          | AWFW (3911.36)                                                                                                                   |
|      |                                                                                                                                          |              |          |                                                                                                                                  |
|      |                                                                                                                                          |              |          |                                                                                                                                  |
|      |                                                                                                                                          |              |          |                                                                                                                                  |
| (c)  | Large residuals / residual range suggest estimate may be unreliable                                                                      | B1           | 2        |                                                                                                                                  |
|      | <b>or</b>                                                                                                                                | B1dep        |          |                                                                                                                                  |
|      | Largest residuals only small in relation to $y$ -values (10%)                                                                            | B1           |          |                                                                                                                                  |
|      | so estimate may be reliable (unreliable)                                                                                                 | B1dep        |          | (unreliable) requires (10% or equivalent)                                                                                        |
|      | <b>Special Case:</b><br>If B0 B0dep then:<br>Involves interpolation<br>Does not involve extrapolation<br>Within observed range           | (B1)         |          | Any one; or equivalent                                                                                                           |
|      |                                                                                                                                          | <b>Total</b> | <b>8</b> |                                                                                                                                  |

**MS/SS1B (cont)**

| <b>Q</b>       | <b>Solution</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Marks</b>                                                                     | <b>Total</b> | <b>Comments</b>                                                                                                                                                                                                                                                                                          |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>4(a)(i)</b> | $P(\text{all 3 walk}) = 0.65 \times 0.40 \times 0.25$<br>$= 65/1000 = 13/200 = 0.065$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | M1<br>A1                                                                         | 2            | <b>Ratios (eg 65:1000) are only penalised by 1 mark at first correct answer</b><br>Can be implied by <b>correct</b> answer<br>CAO; do not confuse with 0.65                                                                                                                                              |
| <b>(ii)</b>    | $P(\text{Rita by bus}) = 0.25 \times (1 - 0.15) \times (1 - 0.20)$<br>$= 17/100 = 0.17$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | M1<br>A1                                                                         | 2            | Can be implied by <b>correct</b> answer<br>CAO                                                                                                                                                                                                                                                           |
| <b>(iii)</b>   | $P(2 \text{ cycle})$<br>$= 0.10 \times 0.45 \times (0.25 + 0.20)$<br>$= 0.02025$<br>$+ 0.10 \times (0.40 + 0.15) \times 0.55$<br>$= 0.03025$<br>$+ (0.65 + 0.25) \times 0.45 \times 0.55$<br>$= 0.22275$<br>(0.27325)<br><br>$P(3 \text{ cycle}) = 0.10 \times 0.45 \times 0.55$<br>$= 0.02475$<br><br>$P(\geq 2 \text{ cycle}) = P(2 \text{ cycle}) + P(3 \text{ cycle})$<br><br>$= 0.298$<br><br><b>or</b><br>$P(0 \text{ cycle}) = 0.90 \times 0.55 \times 0.45 = 0.22275$<br><br>$P(1 \text{ cycles})$<br>$= 0.10 \times 0.55 \times 0.45 = 0.02475$<br>$+ 0.90 \times 0.45 \times 0.45 = 0.18225$<br>(0.47925)<br>$+ 0.90 \times 0.55 \times 0.55 = 0.27225$<br>$P(\geq 2 \text{ cycle})$<br>$= 1 - [P(0 \text{ cycle}) + P(1 \text{ cycles})]$<br><br>$1 - 0.702 = 0.298$ | B1<br><br>B1<br><br>M1<br><br>A1<br><br>(B1)<br><br>(B1)<br><br>(M1)<br><br>(A1) | 4            | CAO at least 1 of these 3 terms or equivalent but allow a '× 3'<br><br>CAO<br><br>Sum of 4 or 7 terms each a product of 3 probabilities but not '× 3'<br>CAO<br><br>CAO at least 1 of these 3 terms but allow a '× 3'<br><br>1 – [sum of 4 terms each a product of 3 probabilities but not '× 3']<br>CAO |
| <b>(b)(i)</b>  | $P(WW) = (0.65 \times 0.90) = 0.585$<br><br>$P(CC) = (0.10 \times 0.70) = 0.070$<br><br>$P(WW \text{ or } CC) = 0.585 + 0.070$<br>$= 0.655$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | B1<br><br>M1<br>A1                                                               | 3            | CAO either<br><br>Sum of 2 terms each a product of 2 probabilities<br>CAO; or equivalent                                                                                                                                                                                                                 |
| <b>(ii)</b>    | $P(\text{different}) = 1 - (b)(i) = 0.345$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | B1F                                                                              | 1            | F on (b)(i) providing $0 < p < 1$                                                                                                                                                                                                                                                                        |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Total</b>                                                                     | <b>12</b>    |                                                                                                                                                                                                                                                                                                          |

## MS/SS1B (cont)

| Q       | Solution                                                                                                                                                          | Marks        | Total     | Comments                                                                |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------|-------------------------------------------------------------------------|
| 5(a)(i) | Mean = $\frac{12120}{12} = 1010$                                                                                                                                  | B1           |           | CAO                                                                     |
|         | 98% (0.98) $\Rightarrow z = 2.32$ to 2.33                                                                                                                         | B1           |           | AWFW (2.3263)                                                           |
|         | CI for $\mu$ is $\bar{x} \pm z \times \frac{\sigma}{\sqrt{n}}$                                                                                                    | M1           |           | Used<br>Must have $\sqrt{n}$ with $n > 1$                               |
|         | Thus $1010 \pm 2.3263 \times \frac{10.5}{\sqrt{12}}$                                                                                                              | A1F          |           | F on $\bar{x}$ and $z$ only                                             |
|         | Hence $1010 \pm (7(.0) \text{ to } 7.1)$<br>or (1003, 1017)                                                                                                       | A1dep        | 5         | CAO & AWFW (accept 7)<br>Dependent on A1F<br>AWRT                       |
|         | <b>Notes:</b><br>Use of $t_{11}(0.99) = 2.718 \Rightarrow$<br>maximum of B1 B0 M1 A0F A0<br>Use of a 'corrected' 10.5 $\Rightarrow$<br>maximum of B1 B1 M1 A0F A0 |              |           |                                                                         |
| (ii)    | <b>Weight</b> of flour in a bag (may be assumed to be) is <b>normally distributed</b>                                                                             | B1           | 1         | Or equivalent; must refer to <b>weight</b>                              |
| (iii)   | Any number such that $20 \leq \text{number} \leq 50$                                                                                                              | B1           | 1         | Must be a <b>single integer value</b><br>Ignore any reasoning           |
| (b)     | 1 kg or 1000 grams is outside / below CI<br>or<br>From CI, (population) mean weight is <b>greater than</b> 1kg or 1000 grams                                      | B1F          |           | Or equivalent<br>F on (a)(i)<br>Any reference to 1010 $\Rightarrow$ B0F |
|         | <b>3 or 3/12 or 25%</b> of bags in sample weigh <b>less than</b> 1kg or 1000 grams                                                                                | B1           |           | Or equivalent; but not 'some'                                           |
|         | Statement appears dubious/incorrect/invalid                                                                                                                       | B1dep        | 3         | Dependent on both B1F and B1                                            |
| (c)     | 2/100 or 1/50 or 0.02 or 2%                                                                                                                                       | B1           | 1         | CAO; not 0.02%                                                          |
|         |                                                                                                                                                                   | <b>Total</b> | <b>11</b> |                                                                         |



**MS/SS1B (cont)**

| <b>Q</b>       | <b>Solution</b>                                                                                                                                                                                                                               | <b>Marks</b>           | <b>Total</b> | <b>Comments</b>                                                                                                                                                                                                       |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>6(a)(i)</b> | $R \sim B(14, 0.35)$<br>$P(R \leq 7) = 0.924$ to $0.925$                                                                                                                                                                                      | M1<br>A1               | 2            | Used somewhere in (a); may be implied<br>AWFW (0.92466)                                                                                                                                                               |
| <b>(ii)</b>    | $P(R \geq 11) = 1 - P(R \leq 10)$<br>$= 1 - (0.9989 \text{ or } 0.9999)$<br><br>$= 0.0011$                                                                                                                                                    | M1<br><br>A1           | 2            | Requires '1 -' and $\geq 4$ dp accuracy<br>AWRT (0.001106)                                                                                                                                                            |
| <b>(iii)</b>   | $P(5 < R < 10) = 0.9940 \text{ or } 0.9989$ ( $p_1$ )<br><br>minus $0.6405$ or $0.4227$ ( $p_2$ )<br><br>$= 0.353$ to $0.354$                                                                                                                 | M1<br><br>M1<br><br>A1 | 3            | Accept 3 dp accuracy<br>$p_2 - p_1 \Rightarrow$ M0 M0 A0<br>$(1 - p_2) - p_1 \Rightarrow$ M0 M0 A0<br>$p_1 - (1 - p_2) \Rightarrow$ M1 M0 A0<br>only providing result $> 0$<br>Accept 3 dp accuracy<br>AWFW (0.35346) |
|                | <b>or</b><br>$B(14, 0.35)$ expressions stated for <b>at least 3</b> terms within $4 \leq R \leq 11$ gives probability<br>$= 0.353$ to $0.354$                                                                                                 | (M1)<br>(A2)           |              | Can be implied by correct answer<br>AWFW (0.35346)                                                                                                                                                                    |
| <b>(b)</b>     | $R \sim B(21, 0.35)$<br><br>$P(R = 4) = \binom{21}{4}(0.35)^4(0.65)^{17}$<br><br>$= 0.059$ to $0.0595$                                                                                                                                        | M1<br><br>A1<br>A1     | 3            | Implied from correct stated formula; do not accept misreads<br>Can be implied by a correct answer<br>Ignore any additional terms<br>AWFW (0.059274)                                                                   |
| <b>(c)(i)</b>  | $S \sim B(7, 5/7)$<br>Mean $= np = 7 \times 5/7 = 5$<br>If not identified, assume order is $\mu$ then $\sigma^2$<br><br>Variance $= np(1 - p)$<br>$= 7 \times 5/7 \times 2/7 = 10/7$ or $1.42$ to $1.43$                                      | B1<br><br>B1           | 2            | CAO<br>Must clearly state variance value if standard deviation (also) stated<br>CAO / AFWW                                                                                                                            |
| <b>(ii)</b>    | <b>Means are the same and (both comparisons clearly stated) Variances/standard deviations are similar</b><br>Do not accept statements involving correct/incorrect/exact/etc<br><br>Barry's claim appears/is <b>sound/valid/correct/likely</b> | B1dep<br><br>B1dep     | 2            | Must have scored B1 B1 in (i) or B1 B0 plus<br>$10/7 \vee 1.5$ or $\sqrt{10/7} \vee \sqrt{1.5}$ <b>stated</b><br>Must have scored previous B1dep                                                                      |
|                |                                                                                                                                                                                                                                               | <b>Total</b>           | <b>14</b>    |                                                                                                                                                                                                                       |

**MS/SS1B (cont)**

| Q      | Solution                                                                                                                                                                                                           | Marks                                                                                                                   | Total              | Comments                                                                                                                                                                                       |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7(a)   | $r = -0.0355$ to $-0.035$                                                                                                                                                                                          | B3                                                                                                                      | 3                  | AWFW (– 0.03546)                                                                                                                                                                               |
|        | $r = -0.036$ to $-0.034$                                                                                                                                                                                           | (B2)                                                                                                                    |                    | AWFW                                                                                                                                                                                           |
|        | $r = -0.04$ to $+0.04$                                                                                                                                                                                             | (B1)                                                                                                                    |                    | AWFW                                                                                                                                                                                           |
|        | or<br>Attempt at $\sum x$ $\sum x^2$ $\sum y$ $\sum y^2$ &<br>$\sum xy$                                                                                                                                            |                                                                                                                         |                    | 636 42702 738 68294 & 38605<br>(all 5 attempted)                                                                                                                                               |
|        | or<br>Attempt at $S_{xx}$ $S_{yy}$ & $S_{xy}$                                                                                                                                                                      | (M1)                                                                                                                    |                    | 8994 22907 & –509<br>(all 3 attempted)                                                                                                                                                         |
|        | Attempt at substitution into <b>correct</b><br>corresponding formula for $r$                                                                                                                                       | (m1)                                                                                                                    |                    |                                                                                                                                                                                                |
|        | $r = -0.0355$ to $-0.035$                                                                                                                                                                                          | (A1)                                                                                                                    |                    | AWFW                                                                                                                                                                                           |
| (b)    | Almost/virtually/practically <b>no / zero</b><br>(linear) <b>correlation</b> / relationship /<br>association / link ( <b>but not ‘no trend’</b> )<br><br>between<br><b>purchase and auction prices</b> of antiques | B1dep<br><br>B1                                                                                                         | <br>2              | <br>Dependent on $-0.1 < r < 0.1$<br>Or equivalent; must qualify strength as<br>‘zero’; B0dep for very weak/weak/etc<br>unless then qualified correctly<br><br>Context; providing $-1 < r < 1$ |
|        | (c)(i)                                                                                                                                                                                                             | Figure 1: <b>6</b> correct labelled points<br><b>5 or 4</b> correct labelled points<br><b>3</b> correct labelled points | B3<br>(B2)<br>(B1) | 3                                                                                                                                                                                              |
| (ii)   | (Two) outlier/anomaly/unusual or<br>identification of <b>J and L</b>                                                                                                                                               | B1                                                                                                                      |                    | Or equivalent                                                                                                                                                                                  |
|        | (Otherwise) a <b>positive/linear correlation</b>                                                                                                                                                                   | B1                                                                                                                      | 2                  | Or equivalent; ignore any qualification of<br>‘strength’                                                                                                                                       |
| (d)(i) | $r = \frac{4268.8}{\sqrt{4854.4 \times 4216.1}}$                                                                                                                                                                   | M1                                                                                                                      |                    | Used<br>Award B2 for a <b>correct</b> answer<br>without/with different method                                                                                                                  |
|        | $r = 0.943$ to $0.944$                                                                                                                                                                                             | A1                                                                                                                      | 2                  | AWFW (0.94359)                                                                                                                                                                                 |
| (ii)   | <b>Very strong/strong positive</b> (linear)<br><b>correlation</b> /relationship/association/link                                                                                                                   | B1dep                                                                                                                   | 1                  | Dependent on $0.9 < r < 1$<br>Or equivalent; must qualify strength and<br>indicate positive; B0dep for high/etc                                                                                |
|        | Previous calculation of $r$ was not<br>appropriate (due to outliers)                                                                                                                                               | (B1)                                                                                                                    |                    |                                                                                                                                                                                                |
|        |                                                                                                                                                                                                                    | <b>Total</b>                                                                                                            | <b>13</b>          |                                                                                                                                                                                                |
|        |                                                                                                                                                                                                                    | <b>TOTAL</b>                                                                                                            | <b>75</b>          |                                                                                                                                                                                                |