Mark Scheme (Results)
Summer 2013

GCSE Statistics
5ST1H_01 (Higher)

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## NOTES ON MARKI NG PRI NCI PLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:
i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear
Comprehension and meaning is clear by using correct notation and labeling conventions.
ii) select and use a form and style of writing appropriate to purpose and to complex subject matter
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.
iii) organise information clearly and coherently, using specialist vocabulary when appropriate.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

## 7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses $A$ (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

## 8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

## 9 I gnoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

## 10 Probability

Probability answers must be given as fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

## 11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

## 12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

## 13 Range of answers

Unless otherwise stated, when an answer is given as a range e.g. [3.5, 4.2] then this is inclusive of the end points and includes all numbers within the range.

Guidance on the use of codes within this mark scheme

```
M1 - method mark
A1 - accuracy mark (dependent on method mark)
B1 - working mark
C1 - communication mark
QWC - quality of written communication
awrt - answer which rounds to
oe - or equivalent
cao - correct answer only
ft - follow through
sc - special case
dep - dependent (on a previous mark or conclusion)
indep - independent
isw - ignore subsequent working
```

| Question | 5ST1H 01 Scheme | Marks |
| :---: | :---: | :---: |
| 1. (a) | 74 |  |
|  |  <br> 65 | (1) |
| (b)(i) | Adult | B1 |
| (ii) | $\frac{24}{120} \text { oe }$ | B1 |
|  |  | (2) |
| (c) | $\frac{10}{22} \text { oe or awrt } 0.45 \text { or } 0.455$ | M1 A1 <br> (2) |
|  |  | [5] |
|  | Notes |  |
| (a) | B1 for 65, 14 and 74 seen in the correct cells |  |
| (b)(i) | B1 for adult/male/adult male |  |
| (ii) | B1 allow any equivalent fraction, decimal or percentage |  |
| (c) | M1 for attempt at conditional probability (a fraction [0,1] with denominator 22) A1 allow equivalent fractions. Allow decimals or percentages to at least 2 sf . Note: 0.45 on its own scores M1A1 but 0.45 from incorrect working scores M0A0 |  |


| 2. (a) | Somerfield | B1 |
| :---: | :---: | :---: |
| (b) | $1890000 \quad$ (allow 1890 ) | (1) B1 |
|  |  | (1) |
| (c) | 2009:30.1+17.2+16.2+11.7 = 2010:30.4+17.0+16.3+12.3= | M1 |
|  | $\underline{75.2} \underline{76}$ | A1 A1 |
|  |  | (3) |
| (d) | A correct comment (follow through their figures) | B1ft |
|  |  | (1) |
|  |  | [6] |
|  | Notes |  |
| (c) | M1 for 4 figures added together with at least three correct for either year (may be implied |  |
|  | by one correct total). |  |
|  | Do not isw here. If there is division by 4 (or 100), then M0 A1 for 75.2 or 76 (allow 76.0) |  |
|  | A1 for both answers correct and associated with correct year |  |
| (d) | B1 ft for a correct comment based on two values found in (c). (Ignore figures in their statement). |  |
|  | Do NOT allow comments about individual supermarkets only. Accept: both about $3 / 4$ / they are similar / there is little change / it has increased etc. |  |


| Question | 5ST1H_01 Scheme | Marks |
| :---: | :---: | :---: |
| 3. (a) | Advantage: <br> - People can give a more considered response / feel less pressured / take their time <br> - Avoids possible interviewer bias / ensures all get questions asked the same way <br> - Cheaper/no need to pay interviewers <br> - Faster way to collect lots of data <br> Disadvantage: <br> - Questions cannot be explained if not understood | B1 |
|  | - May have many non-responses | B1 <br> (2) |
| (b) | One reason from each of: <br> - Biased/leading question or says "do you agree..." <br> - Open question (allows for too many different answers) or no response boxes | $\begin{array}{\|l\|} \hline \text { B1 } \\ \text { B1 } \end{array}$ |
| (c) | e.g. How much would you be willing to pay to park at the theatre (per visit)? Set of unique boxes - must include units | $\begin{array}{ll} \text { B1 } & \text { (2) } \\ \text { B1 } \end{array}$ |
| (d) | Any two of: <br> - A sample is quicker <br> - A sample is easier <br> - A sample is cheaper to do <br> - A sample is convenient <br> - A sample has less data to handle | B1 B1 $\begin{array}{r} \\ \\ \\ \\ \\ \\ \end{array}$ |
| (e) | Any two of: <br> - Not a good sample <br> - Sample too small <br> - Not everyone is in telephone directory <br> - Sample not representative <br> - Not everyone has a chance of being asked <br> - Not random/Is biased | B2 |
|  | Notes |  |
| (a) | For part (a), (b), (d) and (e) ignore excess comments if not contradictory. B1 for any suitable advantage. Condone 'quicker' Condone 'more honest'/'anonymous' B1 for any suitable disadvantage that does not contradict the advantage. Condone 'cannot ask follow up questions' Do not allow 'cannot expand on answers' |  |
| (b) | B1 for biased or leading or a comment which directly implies biased/leading B1 for open question or equivalent Both marks may be scored in one line |  |
| (c) | B1 for a suitable non-biased question about the cost of parking B1 for at least 3 response boxes. Response boxes need not be exhaustive but must not overlap. Must include units ( $£ / \mathrm{p}$ ) in the question or response boxes. |  |
| (d) | B1 B1 for any two correct statements. Both marks may be scored in one line Do not allow converse about census unless compared with sample |  |
| (e) | B2 for any two correct statements <br> (B1 for any one correct statement) |  |


| Question | 5ST1H_01 Scheme | Marks |
| :---: | :---: | :---: |
| 4. (a) | Raw data not known, or Mid points were used | B1 |
| (b) | Increase by $£ 10$ | B1 |
|  |  | (1) |
|  |  | [2] |
|  | Notes |  |
|  | B1 for any comment stating or implying that the original data is not used in the calculation (e.g. data is grouped) |  |
| (b) | B1 for a response which has BOTH increase (or equivalent) and by 10 |  |


| 5. (a) | They have gone up <br> by $12 \%$ | B1 <br> B1 <br> (b) <br> $\frac{123}{100} \times 14000 \quad\left(\mathrm{OR} \frac{23}{100} \times 14000+14000\right)$ <br> $=\mathbf{£ 1 7 2 2 0}$ |
| ---: | :--- | :--- |
| (a) | M1 <br> B1 for gone up/higher/more. Accept was lower in 2000 <br> B1 for $12 \% / 112 \%$ of what it was $/ £ 1680 /$ now $£ 15680$ <br> Gone up by $112 \%$ is B1 B0 |  |
| (b) | M1 for a fully correct method <br> A1 cao |  |






| Question | 5ST1H_01 Scheme | Marks |
| :---: | :---: | :---: |
| 10. (a) | 290 | B1 |
|  |  | (1) |
| (b) | 350-260 = 90 | M1A1cao |
|  |  | (2) |
| (c) | Outlier or a building much taller than the others | B1 |
| (d) |  | M1 (1) |
|  | $1.5 \times(300-255)(=67.5) \quad$ or $300+1.5 \times{ }^{\prime} 45^{\prime}(=367.5)$ | M1 |
|  | $>67.5$ above UQ or $442>367.5$ | A1 |
|  |  | (2) |
| (e) | box with at least one whisker | B1 |
|  |  | B1 |
|  | $\underbrace{}_{20} \underbrace{}_{30}$ | B1 (3) |
| *(f) | Three comparisons: <br> - Asia has higher median. <br> - Asia has greater IQR (or range) <br> - Both positive skew <br> Comment: <br> Asia has the taller skyscrapers | B1 |
|  |  | B1 |
|  |  | B1 |
|  |  |  |
|  |  | B1 |
|  |  | (4) |
|  |  | [13] |
|  | Notes |  |
| (b) | M1 for 350-260 (=90) |  |
| (c) | B1 for word outlier seen or for making it clear that the building is a lot/significantly taller than the others. |  |
| (d) | M1 for $1.5 \times(300-255)$ |  |
|  | A1 for comparison $442>367.5$ or 442 is more than 67.5 above UQ |  |
| (e) | $1 / 2$ square tolerance |  |
|  | B1 for box with at least one whisker. |  |
|  | B1 for all three quartiles correct |  |
|  |  |  |
| (f) | For $1^{\text {st }} 3 \mathrm{~B} 1 \mathrm{~s}$ must be a comparison and must use correct statistical words. Allow converse statements. Do not allow 'wider' IQR/range. <br> $4^{\text {th }} \mathrm{B} 1$ is independent of $1^{\text {st }} 3 \mathrm{~B}$ marks (condone Asia has the tallest skyscraper) |  |



| 12. (a) | $\sum \mathrm{d}^{2}=4+9+16+9+4+0+25+9(=76)$ | M1 |
| :---: | :---: | :---: |
|  | $1-\frac{6 \times^{\prime} 76^{\prime}}{8(64-1)}=\text { awrt } 0.095$ | M1 A1cao |
| (b) | 0.095 is close to zero, so there is little/no correlation meaning there is no association between the judges' ranks or judges are not in agreement, or judges are using different criteria | B1ft <br> B1ft <br> (2) |
|  |  | [5] |
|  | Notes |  |
| (a) | M1 for attempt at $\sum \mathrm{d}^{2}$ with at least $3 \mathrm{~d}^{2}$ correct |  |
|  | M1 for use of correct formula with their $\sum \mathrm{d}^{2}$ and with $1-\ldots$ |  |
|  | A1 for awrt 0.095 . Allow $\frac{2}{21}$ |  |
| (b) | Must have a value in (a) and only ft a value in the range $[-1,1]$ <br> $1^{\text {st }} \mathrm{B} 1 \mathrm{ft}$ for little correlation/no correlation/weak correlation. Allow positive correlation $2^{\text {nd }} \mathrm{B} 1 \mathrm{ft}$ for sensible statement that matches their choice of correlation OR a correct contextualised statement on its own. |  |


| Question | 5ST1H_01 Scheme | Marks |
| :---: | :---: | :---: |
| 13. (a) | Mean $=55$ | B1 |
| (b) | (85 - '55') | M1 |
|  | 3 | A1 |
|  | $\begin{aligned} & \text { or } \\ & (85-25) \end{aligned}$ |  |
|  | 6 |  |
|  | $=10$ |  |
|  | (Test 1) $\frac{60-' 55 '}{' 10 '}=0.5$ <br> (Test 2) $\frac{60-64}{12}=-0.3333 \ldots$ | M1A1ftA1 |
|  | Performed better on Test 1 ... as standardised score is higher | B1 <br> dB1 <br> (5) |
|  |  | [8] |
|  | Notes |  |
| (a) | B1 allow anything [53,57] <br> M1 for finding half the range $[27,33]$ and using 3sd or finding the range $[54,66]$ and using 6sd <br> A1 for [9,11] |  |
| (b) | $\text { M1 } \frac{60-' 55 '}{} \text { or } \frac{60-64}{}$ |  |
|  | M1 $\frac{10}{10}$ ' 12 er ${ }^{\text {a }}$ |  |
|  | A1ft for Test 1 correct to 1 dp or better using their values from (a) |  |
|  | Al for -0.3 or better <br> $1^{\text {st }} \mathrm{B} 1$ performed better on Test 1 |  |
|  | $2^{\text {nd }} \mathrm{B} 1$ dependent on first B1 for Test 1 score is higher OR |  |
|  | Test 1 score is positive and Test 2 score is negative OR <br> Test 1 is above mean and Test 2 is below mean (condone average) |  |


| Question | 5ST1H_01 Scheme | Marks |
| :---: | :---: | :---: |
| 14. (a) | $\text { f.d. }=\frac{8}{50}=0.16 ; \frac{2}{100}=0.02 ; \frac{3}{200}=0.015$ <br> Use of frequency density <br> horizontal boundaries: 400, 500, 700 all heights correct | M1 <br> A1 <br> A1 <br> (3) |
| (b) | The median is less than (£)350 (000) <br> or <br> The median lies in the class $300 \leq p<350$ | B1 |
| (c) | Evidence to support that Jason is wrong. | B1 <br> (2) |
|  | $\left(\begin{array}{l} 1+9+\frac{4}{5} \times 10 \\ (\text { or } 1+9+40 \times 0.2) \end{array}=\quad \mathbf{1 8}\right.$ | M1A1cao <br> (2) |
|  | Notes |  |
| (a) | M1 for attempt at frequency density (may be implied by one correct bar height or one correct calculation) <br> ( $1 / 2$ square tolerance) |  |
| (b) | B1 correctly identifying the median is less than $(\mathfrak{f}) 350$ or identifying correct class interval for the median <br> B1 for evaluating $\mathrm{n} / 2($ condone $(\mathrm{n}+1) / 2)$ to support conclusion i.e. $33 / 2$ or $34 / 2$ or 17 or 16.5 or stating 20 houses less than $£ 350$ or 13 houses more than $£ 350$ or 350 does not lie in the class interval that contains the median |  |
| (c) | M1 for a fully correct calculation <br> A1 for 18 only |  |



## Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.
The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: $\pm 5^{\circ}$
Measurements of length: $\pm 5 \mathrm{~mm}$

| PAPER: 5ST1H_01 |  |  |  |
| :---: | :---: | :---: | :---: |
| Question |  | Modification | Notes |
|  |  | MLP: wording added 'There are three spaces to fill.' Braille: roman numerals inserted in spaces - Adult total (i), Junior female (ii), Total male (iii). | Standard mark scheme |
| Q2 |  | Iceland, Aldi and Farm Foods removed from table. | Standard mark scheme |
| Q7 | (a) <br> (b) <br> (c) <br> (d) | Graph: Grid y axis 1.5 cm for $5 \%, \mathrm{x}$ axis x 2 <br> Light sugar content up to $5 \%$ <br> Standard salt down to $40 \%$ <br> Light saturates up to $30 \%$ <br> Table: Standard RDA altered to 55 <br> Light RDA altered to 10 | Two correct bars: 55 and 10 with shading <br> 40 <br> Sugar <br> Light curry has lower \%RDA for saturates. Standard is $90(\%)$ and Light is $30(\%)$ |


| PAPER: 5ST1H_01 |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Question |  | Modification | Notes |  |  |
| Q8 |  | Grid x 2 no small squares Crosses changed to filled in circles. <br> (c)leeway needed | Standard mark scheme |  |  |
| Q9 |  | Enlarge Venn diagram x 2 | Standard mark scheme |  |  |
| Q10 | (b) <br> (d) | Asia skyscraper heights on box plot changed to $225 \mathrm{~m}, 250 \mathrm{~m}$, $300 \mathrm{~m}, 350 \mathrm{~m}$ and 500 m <br> America skyscraper heights in table 225, 250, 275, 300 and 450m | $\begin{aligned} & 350-250= \\ & 1.5 \times(300-250) \quad(=75) \\ & >75 \text { above UQ } \end{aligned}$ | $100$ <br> or or | $\begin{gathered} 300+1.5 \times, 50 \prime(=375) \\ 450>375 \end{gathered}$ |
| Q11 |  | Graph 1.5 cm for 10 on both axes. Crosses changed to filled in circles. | Standard mark scheme |  |  |
| Q13 |  | Graph y axis x 2 1.5 cm for 5 on x -axis. | Standard mark scheme |  |  |
| Q14 |  | $x$-axis: 1.5 cm for 50 <br> $y$-axis: 1.5 cm for 0.01 | Standard mark scheme |  |  |
| Q15 |  | Both axes: 1.5 cm for 1. Crosses changed to filled in circles. | Standard mark scheme |  |  |

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FINAL MARK SCHEME

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