edexcel

Mark Scheme (Results)

Summer 2013

GCSE Statistics
5ST1H_01 (Higher)

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NOTES ON MARKING PRINCIPLES

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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 Ignoring 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 / 14 / 65	B1 (1)
(b)(i)	Adult	B1
(ii)	$\frac{24}{120}$ oe	B1 (2)
(c)	$\frac{10}{22}$ oe or awrt 0.45 or 0.455	M1 A1 (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 2sf. Note: 0.45 on its own scores M1A1 but 0.45 from incorrect working scores M0A0	

2. (a)	Somerfield	B1 (1)
(b)	1 890 000 (allow 1 890)	B1 (1)
(c)	2009: 30.1+17.2+16.2 +11.7 = **<u>75.2</u>** 2010: 30.4+17.0+16.3+12.3 = **<u>76</u>**	M1 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)	B1ft 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 ¾ / they are similar / there is little change / it has increased etc.	

Question	5ST1H_01 Scheme	Marks
3. (a)	Advantage: • People can give a more considered response / feel less pressured / take their time • Avoids possible interviewer bias / ensures all get questions asked the same way • Cheaper/no need to pay interviewers • Faster way to collect lots of data Disadvantage: • Questions cannot be explained if not understood • May have many non-responses	B1 B1 (2)
(b)	One reason from each of: • Biased/leading question or says "do you agree…" • Open question (allows for too many different answers) or no response boxes	B1 B1 (2)
(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	B1 B1 (2)
(d)	Any two of: • A sample is quicker • A sample is easier • A sample is cheaper to do • A sample is convenient • A sample has less data to handle	B1 B1 (2)
(e)	Any two of: • Not a good sample • Sample too small • Not everyone is in telephone directory • Sample not representative • Not everyone has a chance of being asked • Not random/Is biased	B2 (2) **[10]**
	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 (£/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 (B1 for any one correct statement)	

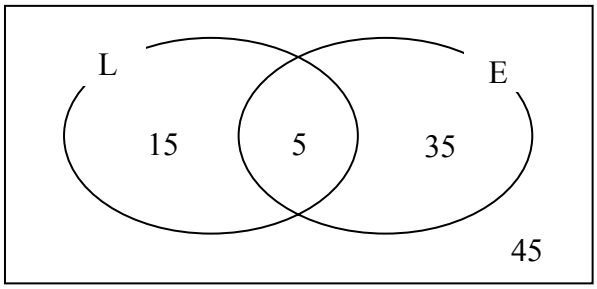
Question	5ST1H_01 Scheme	Marks
4. (a)	Raw data not known, or Mid points were used	B1 (1)
(b)	**Increase by £10**	B1 (1) **[2]**
	Notes	
(a)	B1 for any comment stating or implying that the original data is not used in the calculation (e.g. data is grouped)	
(b)	B1 for a response which has BOTH increase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

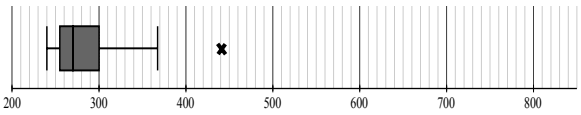
5. (a)	They have gone up by 12%	B1 B1 (2)
(b)	$\frac{123}{100}\times 14000$ (OR $\frac{23}{100}\times 14000 + 14000$) = **£17 220**	M1 A1cao (2) **[4]**
	Notes	
(a)	B1 for gone up/higher/more. Accept was lower in 2000 B1 for 12% / 112% of what it was / £1 680/ now £15 680 Gone up **by** 112% is B1 B0	
(b)	M1 for a fully correct method A1 cao	

Question	5ST1H_01 Scheme	Marks
6. (a)	A relevant hypothesis relating to books	B1 (1)
***(b)**	Students numbered - either of: • **number** the students OR use a **list/database/register** of students	B1
	Selection: • Use of a **random number generator**	B1
	Matching: • Use student corresponding to number selected	B1
	For any relevant statistical problem about the sample selection	B1 (4)
(c)(i)	Stratified (sampling)	B1
(ii)	$\frac{240}{1200} \times 40$ = **8**	M1A1cao (3) **[8]**
	Notes	
(a)	B1 e.g. Students buy less ebooks than books from shops or More students buy ebooks than books from shops or The amount spent on ebooks is the same as the amount spent on books at shops (B0 for a question)	
(b)	*For QWC: 1st B1 and 2nd B1 use of words in bold (oe) required *1st B1 for **number/list/data base/register/sampling frame/spreadsheet** *2nd B1 for use of a suitable **random number generator** e.g. **random number table**, **calculator**, **computer** oe (B0 for put the names/numbers in a hat) 3rd B1 for matching number to student. 4th B1 e.g. 'do not use repeats' 'discard numbers out of range' 'may be difficult to obtain a register of all 1200 students' 'register of students may not be up-to-date' 'students may be absent/may refuse to participate,' etc.	
(c)(ii)	M1 for any equivalent method A1 cao	

Question	5ST1H_01 Scheme	Marks
7. (a)	Two correct bars: 54 and 12 with shading	B2 (2)
(b)	42	B1 (1)
(c)	Sugar	B1 (1)
(d)	Light curry has lower %RDA for saturates. Standard is 90(%) and Light is 28(%)	B1 B1 (2) **[6]**
	Notes	
(a)	B2 for both bars with standard chicken curry bar shaded. ½ square tolerance on height (ignore width) (B1 for both bars no shading or either bar correct with shading)	
(d)	B1 for any correct comparison involving saturates (allow converse) B1 for any correct supporting figures e.g. 'difference is 62(%)', 'Standard is (approximately) 3 times Light' (condone 'more than double')	

8. (a)	(Quarters) 2 & 3, 2007	B1 (1)
(b)	Downwards	B1 (1)
(c)	21.95	B1 (1)
(d)	Expect it to be higher (than the true value) Quarter 4 figures are below trend line/ seasonal variation is negative	B1 B1 (2) **[5]**
	Notes	
(b)	B1 for falling/negative/decreasing oe Negative correlation on its own is B0. Condone e.g. as the years increase, the hours decrease Do not allow quarter on quarter comments/It goes down and then back up	
(c)	B1 accept anything in the range [21.92,21.98]	
(d)	1st B1 for higher (allow converse if the response says: **true/actual** value is less than 'c' or **true/actual** value is below trend line) 2nd B1 for Q4 figures below trend line/negative seasonal variation SC: B2 for lower since the difference between Q3 and Q4 is increasing (allow converse)	

Question	5ST1H_01 Scheme		Marks
9. (a)		5 15 or 35 All correct	B1 B1 B1 (3)
(b)(i)	$\frac{60}{100}$ oe		B1 (1)
(ii)	$\frac{35}{100}$ oe		M1A1ft (2)
(c)	$\frac{5}{20}$ oe		M1A1 (2) **[8]**
	Notes		
(a)	B1 for 5 B1 for 15 or 35 in correct region of Venn diagram B1 fully correct including 45 (Allow 0.05, 0.15, 0.35 and 0.45)oe		
(b)(ii)	M1 for $\frac{'35'}{k}$ with $k > '35'$ A1ft for $\frac{'35'}{100}$		
(c)	M1 for $\frac{'5'}{'5'+'15'}$ (may be implied by correct answer)		

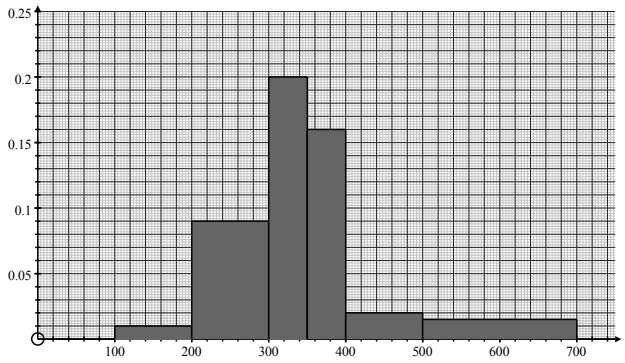
Question	5ST1H_01 Scheme	Marks
10. (a)	290	B1 (1)
(b)	350-260 = **90**	M1A1cao (2)
(c)	Outlier or a building **much** taller than the others	B1 (1)
(d)	1.5×(300-255) (=67.5) or 300+1.5×'45' (=367.5) >67.5 above UQ or 442 > 367.5	M1 A1 (2)
(e)	 box with at least one whisker 255, 270, 300 All correct with outlier at 442	B1 B1 B1 (3)
***(f)**	Three comparisons: • Asia has higher **median**. • Asia has greater **IQR** (or **range**) • Both **positive skew** Comment: 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 x (300-255) A1 for comparison 442>367.5 or 442 is more than 67.5 above UQ	
(e)	½ square tolerance B1 for box with at least one whisker. B1 for all three quartiles correct B1 for all correct with outlier (condone upper whisker extending to 367.5)	
(f)	For 1st 3 B1s must be a comparison and must use correct statistical words. Allow converse statements. Do not allow 'wider' IQR/range. 4th B1 is independent of 1st 3 B marks (condone Asia has the tallest skyscraper)	

Question	5ST1H_01 Scheme	Marks
11. (a)	50-54	B1 (1)
(b)	Negative	B1 (1)
(c)(i)	$\Delta y/\Delta x = -1.05$	M1A1
(ii)	(1.05 mm) decrease in rainfall for every additional hour of sunshine	B1 (3) **[5]**
	Notes	
(c)(i)	M1 for attempt at $\Delta y/\Delta x$ with figures seen. This may be implied by the subtraction of any two numbers in the range [24,118] for Δy and [136,224] for Δx. ($\Delta x/\Delta y$ is M0) A1 for answers in the range [-1.12,-0.98] SC B1 for answers in the range [0.98, 1.12]	
(ii)	B1 must mention decrease in rainfall per unit increase in sunshine in a correct comment.	

12. (a)	$\sum d^2 = 4+9+16+9+4+0+25+9$ (= 76)	M1
	$1-\frac{6\times'76'}{8(64-1)}$ = awrt 0.095	M1 A1cao (3)
(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 B1ft (2) **[5]**
	Notes	
(a)	M1 for attempt at $\sum d^2$ with at least 3 d^2 correct M1 for use of correct formula with their $\sum d^2$ and with 1 –… 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] 1st B1ft for little correlation/no correlation/weak correlation. Allow positive correlation 2nd B1ft 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
	$\frac{(85 - '55')}{3}$	M1
	or $\frac{(85 - 25)}{6}$	A1 (3)
	= 10	
(b)	(Test 1) $\frac{60-'55'}{'10'} = 0.5$ (Test 2) $\frac{60 - 64}{12} = -0.3333...$	M1A1ftA1
	Performed better on Test 1 ... as standardised score is higher	B1 dB1 (5)
		[8]
	Notes	
(a)	B1 allow anything [53,57] M1 for finding half the range [27, 33] and using 3sd or finding the range [54, 66] and using 6sd A1 for [9,11]	
(b)	M1 $\frac{60-'55'}{'10'}$ or $\frac{60 - 64}{12}$ A1ft for Test 1 correct to 1dp or better using their values from (a) A1 for -0.3 or better 1st B1 performed better on Test 1 2nd B1 dependent on first B1 for Test 1 score is higher OR Test 1 score is positive **and** Test 2 score is negative OR Test 1 is above mean **and** Test 2 is below mean (condone average)	

Question		5ST1H_01 Scheme	Marks
14.	**(a)**	f.d. $= \frac{8}{50} = 0.16\,;\ \frac{2}{100} = 0.02\,;\ \frac{3}{200} = 0.015$ Use of frequency density horizontal boundaries: 400, 500, 700 all heights correct  	M1 A1 A1 (3)
	(b)	The median is less than (£)350 (000) or The median lies in the class $300 \leq p < 350$ Evidence to support that Jason is wrong.	B1 B1 (2)
	(c)	$1 + 9 + \frac{4}{5} \times 10$ = **18** (or 1+9+40×0.2)	M1A1cao (2) **[7]**
		Notes	
	(a)	M1 for attempt at frequency density (may be implied by one correct bar height or one correct calculation) (½ square tolerance)	
	(b)	B1 correctly identifying the median is less than (£)350 or identifying correct class interval for the median B1 for evaluating n/2 (condone (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 A1 for 18 only	

Question	5ST1H_01 Scheme	Marks
15. (a)	Horizontal lines at 108 and 110, labelled **warning** and **action** respectively	B2 (2)
(b)	5	B1 (1)
(c)(i)	point plotted (6, 97.8)	B1
(ii)	Production line must be stopped	B1 (2)
(d)	If a sample (mean) is **between** warning **and** action limits a further sample is taken. If further sample is also outside warning limits then stop the process OR If further sample is within warning limits take no action	B1 B1 dB1 (3) **[8]**
	Notes	
(a)	B2 lines and labels (B1 1 line + correct label or both lines and no/incorrect labels)	
(c)(i)	Point plotted between (6, 97.2) and (6, 98)	
(c)(ii)	B1 allow reset/adjusted	
(d)	1st B1 for sample between warning and action limits 2nd B1 for a further sample is taken 3rd B1 dependent on at least one B1 being earned previously for a correct decision of what action to take following the outcome of the further sample	

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: ±5º
Measurements of length: ±5 mm

PAPER: 5ST1H_01			
Question		**Modification**	**Notes**
Q1		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		Graph: Grid y axis 1.5cm for 5%, x axis x2 Light sugar content up to 5% Standard salt down to 40% Light saturates up to 30%	
	(a)	Table: Standard RDA altered to 55 Light RDA altered to 10	Two correct bars: 55 and 10 with shading
	(b)		40
	(c)		Sugar
	(d)		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. (c)leeway needed	Standard mark scheme
Q9		Enlarge Venn diagram x 2	Standard mark scheme
Q10	 (b) (d)	Asia skyscraper heights on box plot changed to 225m, 250m, 300m, 350m and 500m America skyscraper heights in table 225, 250, 275, 300 and 450m	 350-250 = **100** 1.5×(300-250) (=75) or 300+1.5×'50' (=375) >75 above UQ or 450 > 375
Q11		Graph 1.5cm 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 *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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