

Mark Scheme (Results)

Summer 2013

GCSE Statistics
5ST1F_01 (Foundation)

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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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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 cancelling 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	5ST1F_01 Mark Scheme	Marks
<p>1. (a)</p> <p>(b)</p>	<p>A tally or frequency table with 5 colour categories</p> <p style="text-align: right;">table with at least 2 columns column labelled tally or frequency or amount/number of cars five given colours in first column</p> <p>Any one of: Bar chart/graph, Pie chart, Pictogram or Vertical line graph/chart</p>	<p>B1 B1 B1 (3)</p> <p>B1 (1) [4]</p>
Notes		
<p>(a)</p> <p>(b)</p>	<p>1st B1: Allow rows instead of columns. 2nd B1: Condone blank tally column heading if chart clearly labelled 'tally chart'. 3rd B1: Condone 'other' as an extra label in colour column.</p> <p>If they draw a suitable diagram rather than use the word give the mark. Condone 'line graph/chart'.</p>	
Notes		
<p>2. (a)</p> <p>(b)</p> <p>(c)</p>	<p>France</p> <p>Japan</p> <p>(The %) has gone up (except in France) or It has risen. oe</p>	<p>B1 (1)</p> <p>B1 (1)</p> <p>B1 (1) [3]</p>
Notes		
<p>(c)</p>	<p>Must be an indication of <u>increase</u> but allow 'increased or stayed the same' Condone 'all increased' and 'number increased'. Do not allow 'none decreased'. Do not accept reference to just one or two countries.</p>	
<p>3. (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p>	<p>A: Unlikely B: Evens C: Likely</p> <p>X nearer to 0 than 0.5, but not at 0</p> <p>X at 0.5</p> <p>X to right of 0.5 but nearer to 0.5 than 1</p>	<p>B1 B1 B1 (3)</p> <p>B1 (1)</p> <p>B1 (1)</p> <p>B1 (1) [6]</p>
Notes		
<p>(a)</p> <p>(b)(c)(d)</p>	<p>allow 'even' for evens</p> <p>Condone labelling with A, B, C instead of X. More than one X in each scores B0</p>	

Question	5ST1F_01 Mark Scheme	Marks
4. (a)	7 12 19 5 6 11 12 18 30	all four entries correct (OR at least two correct scores B1)
(b)(i)	$\frac{7}{30}$ (accept awrt 23% or awrt 0.23)	B1
(b)(ii)	$\frac{11}{30}$ (accept awrt 37 % or awrt 0.37) – follow through their 11 from table	B1 ft
		(2) [4]
	Notes	
(b)	For probabilities allow truncated to 2 decimal places or awrt 2 decimal places	

5. (a)	$\frac{5}{6}$ for first dice, not a six $\frac{5}{6}, \frac{1}{6}, \frac{5}{6}$ for second dice outcomes in correct order	B1 B1
(b)	Yes she is right (oe) as chance of getting two sixes is 1 in 36 or $\frac{1}{6} \times \frac{1}{6}$ or $\frac{1}{36}$ or 0.02(777...), o.e. (allow 0.02/0.03) (OR incomplete answer scores B1)	B2 (2) [4]
	Notes	
(b)	Calculation may be with tree diagram. B2 requires correct conclusion with a reason referring to <u>both</u> dice, with no contradictory comments, no incorrect answer to $\frac{1}{6} \times \frac{1}{6}$. Other acceptable reasons (not exhaustive): e.g. ‘only 1/6 chance <u>on each</u> dice’, or ‘there are five other numbers <u>on each</u> dice’. If B2 not scored then allow B1 for EITHER: • Correct reason (or working) with no conclusion/wrong conclusion, OR: • Correct conclusion with partially correct reason, e.g.: ○ with incorrect answer to $\frac{1}{6} \times \frac{1}{6}$ ○ with reference to only one dice being unlikely (condone ‘less than even chance of a six’) ○ condone ‘only 1/6 (or 2/12) chance of 2 sixes’ NB: reference to adding fractions scores 0/2	

Question	5ST1F_01 Mark Scheme	Marks
6. (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)
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 $\frac{3}{4}$ / they are similar / there is little change / it has increased etc.	

7. (a)	5 at end of the second line and 1 on the fourth line. Both required, no extras.	B1 (1)
(b)	3 (allow 03 or 3 beetles)	B1 ft (1)
(c)	12	B1 ft (1)
(d)	$\left(\frac{121}{11} = \right)$ attempt to add the numbers <u>and divide by 11</u> (implied by correct answer) 11	M1 A1 (2)
(e)	The mean or '11' (ie their answer to (d)) It takes into account all the values, oe	B1 B1dep (2)
Notes		
(b)	May be a follow through if they have added many leaves to the stem plot	
(c)	If nothing is added to the given stem plot then median of 6 is B1ft	
(d)	Must attempt sum of numbers, not just leaves, <u>and</u> divide by 11 for M1 SPECIAL CASE: for $\frac{75}{9}$ or 8.3... award M1A0 as misread (using only the original 9 results)	
(e)	If more than one average is mentioned, their <u>choice</u> of average must be clear to award the 1 st B1 2 nd B1 is dependent upon scoring the 1 st B1 Do not accept 'more accurate' for reason. But more <u>representative</u> is B1. SC: Median (or their '12') with a sensible reason scores B1B0 (eg half the days had more & half less, or not affected by extreme values)	

Question	5ST1F_01 Mark Scheme	Marks
8. (a)	Point (30,95) uniquely identified.	B1 (1)
(b)	Sensible attempt at <u>ruled</u> line of best fit, neither above nor below all points.	B1 (1)
(c)	Positive The greater the (body) length the greater the (brain) weight, oe	B1 B1 (2)
(d)(i)	Line on graph from 120 to their lobf Answer in Range 52 to 64 (answer in range scores both marks)	M1 A1 (2)
(d)(ii)	Reliable/yes AND interpolation/in range of data (oe), or <u>strong</u> correlation	B1 (1)
(e)(i)	Line on graph from 180 to their lobf Answer in Range 80 to 92 (answer in range scores both marks)	M1 A1 (2)
(e)(ii)	Unreliable/no Extrapolation or outside range of <u>data</u> or mammal may not be the same as the type used for the graph oe.	B1 B1 (2)
Notes		[11]
(b)	Line should be between tramlines on overlay & extend at least as far as indicated.	
(c)	Converse comments are fine.	
(d)(i)	If answer not in range and no line seen from 120, then award M1A0 if their answer follows correctly from their lobf (½ square tolerance)	
(ii)	Must have both conclusion and reason. Reason should relate to interpolation or to correlation being strong. (Do not accept eg ‘inside range of <u>graph</u> ’)	
(e)(i)	If answer not in range and no line seen from 180, then award M1A0 if their answer follows correctly from their lobf (½ square tolerance)	
(ii)	Reason should relate to extrapolation, or mammal being of different type. Do NOT accept eg ‘outside range of <u>graph</u> ’, ‘no points at/near 180’.	

Question	5ST1F_01 Mark Scheme	Marks
9. (a)	Box with at least one whisker (condone missing median) At least 4 out of 5 values correct on graph (½ square tolerance, line or cross etc) Fully correct box plot within tolerance.	B1 B1 B1 (3)
(b)*	1. Zoo deer have a higher median 2. Wild deer have a greater IQR (or interquartile range) 3. Wild deer have a greater range (Accept converse statements for 1, 2 & 3) 4. Wild deer have positive skew AND zoo deer have negative skew	B1 B1 B1 B1 ft (4) [7]
Notes		
(a)	Condone freehand provided lines fully within tolerance.	
(b)	QWC: To give these marks correct statistical terms must be used - shown in bold. Must be explicit <u>comparisons</u> , not just listing (e.g. simply stating the two medians is B0) Do NOT allow comparison of any individual weights other than median. Ignore extra statements but do not accept contradictory comments. 1. Condone misspelling but ‘medium’ is B0. ‘mean’ is B0. 2&3. Allow greater/higher/larger/bigger. Do not allow ‘wider’ or ‘longer’. 4. Skew comment should follow through from their box plot. (‘...positive/negative <u>distribution</u> ...’ etc is B0)	

10. (a)(i)	$\frac{7.8 + 11.5 + 12 + 6.7}{4}$ = 9.5 cao	adding 4 numbers (at least 3 correct) intention to divide sensible sum by 4 (May see in table. Answer alone scores 3/3)	M1 M1 A1 (3)
(a)(ii)	Point in correct place between Q2 and Q3 2009 at 9.5 (½ square tolerance)		B1ft (1)
(b)	3 (accept Quarter 3, Q3, etc but reference to a particular year is B0)		B1 (1)
(c)	Downward (trend) or (it is) falling There are less overseas visitors as time goes by, (oe) (eg ‘Numbers are smaller and smaller’/’fewer each year’. ‘Numbers have decreased.’)		B1 B1 (2) [7]
Notes			
(a)	For 2 nd M1 they should be dividing an attempt at the sum of any four numbers from the correct column.		
(b)	e.g. ‘Quarter 3, 2007’ is B0, but ‘Q3 <u>every</u> year’ is B1		
(c)	1 st B1: Correct <u>description</u> of trend. Accept decreasing/negative as descriptions BUT negative <u>correlation</u> / <u>skew</u> on its own is B0 2 nd B1: Correct <u>interpretation</u> . (‘numbers going <u>up</u> and <u>down</u> ’ scores B0, as this does not interpret <u>trend</u>) NB “visitors are falling” on its own will score B0B1 as it is an interpretation of trend not a description.		

Question	5ST1F_01 Mark Scheme	Marks
<p>11. (a)</p> <p>Advantage:</p> <ul style="list-style-type: none"> • 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 <p>Disadvantage:</p> <ul style="list-style-type: none"> • Questions cannot be explained if not understood • May have many non-responses <p>(b) One reason from each of:</p> <ul style="list-style-type: none"> • Biased/leading question or says “do you agree...” • Open question (allows for too many different answers) or no response boxes <p>(c) e.g. <i>How much would you be willing to pay to park at the theatre (per visit)?</i> Set of unique boxes – must include units</p> <p>(d) Any two of:</p> <ul style="list-style-type: none"> • 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 <p>(e) Any two of:</p> <ul style="list-style-type: none"> • 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 		<p>B1</p> <p>B1</p> <p>(2)</p> <p>B1</p> <p>B1</p> <p>(2)</p> <p>B1</p> <p>B1</p> <p>(2)</p> <p>B1 B1</p> <p>(2)</p> <p>B2</p> <p>(2)</p> <p>[10]</p>
Notes		
<p>(a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p> <p>(e)</p>	<p>For part (a), (b), (d) and (e) ignore excess comments if not contradictory.</p> <p>B1 for a suitable advantage. Condone ‘quicker’. Condone ‘may be more honest’ / ‘anonymous’ B1 for a suitable disadvantage which does not contradict their advantage. Condone ‘cannot ask follow up questions’. Do not allow ‘cannot expand on answers’</p> <p>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</p> <p>B1 for a suitable non-biased question about the cost of parking B1 for at least 3 response boxes. (Must be non-overlapping but need not be exhaustive) but must include units (£/p) in the question or response boxes.</p> <p>B1 B1 for any two correct statements. Both marks may be scored in one line. Do not allow converse statements about census unless compared with sample.</p> <p>B2 for any two correct statements (B1 for any one correct statement)</p>	

Question	5ST1F_01 Mark Scheme	Marks
12*	<p>One mark for each of three aspects:</p> <ol style="list-style-type: none"> Number all the boys/pupils (from 0 to 159) or put all names on piece of paper, oe EITHER: Generate eight random numbers OR: draw out eight numbers/names from a hat, oe Boys/pupils (with the) drawn (numbers) are selected for sample. 	<p>B1</p> <p>B1</p> <p>B1</p> <p>[3]</p>
Notes		
	<p>If describing a method other than simple random, then score 0/3 e.g. mention of ‘picking every 20th boy/pupil’ is B0B0B0 e.g. ‘choosing the same number from each class/group’ is B0B0B0</p> <p>‘words’ in brackets not needed.</p> <p>For aspect 1. allow use of a numbered list/numbered register</p> <p>For aspect 3. Accept e.g. Boys drawn <u>represent</u> the school / boys with those numbers <u>are used</u>, etc.</p> <p>NB: ‘eight boys are drawn from a hat’ on its own scores B1 for aspect 2 (but without ‘names put on paper’ etc is B0 for aspect 1, and, without ‘are used’ etc is B0 for aspect 3).</p>	

13. (a)	Using the new fertiliser gives a heavier crop (than if the previous/no fertiliser is used) oe.	B1 (1)
(b)(i)	To <u>compare</u> the crop weights with the new fertiliser / <u>compare</u> how effective the fertiliser is.	B1 (1)
(b)(ii)	He grows a plot with the previous/no fertiliser and a plot with the new fertiliser. The plots must be the same size/ have same conditions	B1 B1 (2) [4]
Notes		
(a)	<p>Must be a statement, not a question.</p> <p>Other hypotheses possible and converses acceptable.</p> <p>Must mention <u>new fertiliser</u> and <u>wheat/crop</u> AND imply a comparison.</p> <p>Condone ‘wheat grows faster with new fertiliser’</p> <p>e.g. ‘new fertiliser produces a <u>higher</u> crop’ B1 BUT ‘new fertiliser produces a <u>high</u> crop’ B0 (no comparison) ‘Will new fertiliser produces a higher crop’ B0 (a question) ‘He will find out if the new fertiliser produces a higher crop’ B0 (an aim not a hypothesis about what will happen)</p>	
(b)(i)	Other equivalent answers acceptable but must be clearly implying it is to allow a <u>comparison</u> .	
(b)(ii)	<p>1st mark is for planting two crops with/without new fertiliser.</p> <p>2nd mark for aiming to eliminate other variables such as different: land area/watering/amount of fertiliser/drainage/sunlight etc (e.g. ‘using two halves of <u>same field</u>’ or ‘compare crop per hectare’ is B1) Do not accept ‘same time’ as a similar condition. Do not accept ‘half the crop’ on its own as a similar condition.</p>	

Question	5ST1F_01 Mark Scheme	Marks
14. (a)	They have gone up by 12%	B1 B1 (2)
(b)	$\frac{123}{100} \times 14000 \quad (\text{OR } \frac{23}{100} \times 14000 + 14000)$ $= \text{£}17\,220$	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	

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