

Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE
In 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**

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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.

14 Quality of Written Communication

This is denoted by an asterisk near the question number/part (*). Mark schemes will indicate within the table how marks are to be allocated. In this subject we need to see that correct statistical terms are used.

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	Scheme	Marks
1. (a)	Brazil	B1 (1)
(b)	Russia	B1 (1)
(c)	<ul style="list-style-type: none"> • Poland won more gold medals • Poland won more silver medals • Netherlands won more bronze medals • Netherlands won more total/overall medals 	B2 (2) [4]
	Notes	
(c)	<p>B2 for any two correct comparisons (Allow each bullet point only once) (B1 for one correct comparison)</p> <p>Condone 'Netherlands won 3 more medals' for the final bullet point</p> <p>Special Case: Allow 'Netherlands won more medals' on its own to score B1.</p> <p>Allow converse statements. Must be a comparison. e.g. 'Poland won 14 gold but Netherlands won 10' is B0</p>	

2. (a)	Daily	B1 (1)
(b)	Weekly and Less than once a month	B1 (1)
(c)	<p>Proportion using computer daily has increased (in 2012)/Proportion using computer less than once a month has decreased (in 2012)/Proportion using computer monthly has decreased (in 2012)</p> <p>PLUS</p> <p>Supports claim</p>	B2 (2) [4]
	Notes	
(c)	<p>B2 for correct comparison of sectors on the two pie charts AND claim is supported (B1 a correct comparison with no/incorrect conclusion)</p> <p>Allow converse comparisons if it is clear that the response refers to 2006. Allow e.g. 'white area' as equivalent to daily computer use. Condone use of 'number' instead of proportion Supports claim on its own is B0.</p>	

Question	Scheme	Marks
<p>3. (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p> <p>(e)</p>	<p>Bar height 8 for Action and 9 for Romance Both shaded</p> <p>52</p> <p>Thriller</p> <p>Qualitative</p> <p>For any sensible additional data collected</p>	<p>B1 B1 (2)</p> <p>B1 (1)</p> <p>B1 (1)</p> <p>B1 (1)</p> <p>B1 (1)</p> <p>B1 (1)</p> <p>[6]</p>
Notes		
<p>(a)</p> <p>(e)</p>	<p>$\frac{1}{2}$ line tolerance</p> <p>Ignore widths of bars. Condone poor shading. Special Case: If only one bar is drawn: Can score 1 out of 2 if it has correct height and has been shaded.</p> <p>e.g. number of tickets sold, box office sales, amount of money earned, number of awards won, data from other years, questionnaire asking people what films they prefer, etc. Questionnaire/survey on its own is B0.</p>	

Question	Scheme				Marks
4. (a)	(10)	(7)	(4)	21	B2 (2)
	(9)	8	(12)	29	
	19	(15)	16		
(b)	50				B1 (1)
(c)	Under 18				B1ft (1)
(d)	Any two from: <ul style="list-style-type: none"> • Sample is only taken in the morning • Sample is only taken on a Tuesday • People in work/school may not visit the museum on a Tuesday morning 				B2 (2) [6]
Notes					
(a)	B2 for all five cells correct (ignore the bottom right cell) (B1 for 3 or 4 cells correct)				
(b)	B1 for 50 (must be seen in the answer line and not in the table).				
(c)	B1 for Under 18 or ft the age group with the highest total from their table				
(d)	B2 for any two distinct reasons which refer to any two of the following: <ol style="list-style-type: none"> 1) Time of day (e.g. 'should be done throughout the day') 2) Day of week (e.g. 'only done on one day') 3) Specific age of visitors (e.g. 'more school children' or 'no working adults') (B1 for any one reason)				
Allow two reasons given in the same line. e.g. 'Sample is only taken on Tuesday morning' Ignore excess non-contradictory reasons.					

Question	Scheme	Marks
5.	Two reasons from <ul style="list-style-type: none"> • 3D / at angle / difficult to read off (vertical scale) • Vertical scale not from 0 • Not all months are included 	B2 [2]
<p>B2 Any two correct reasons accepted. Must be from these three options. Allow equivalent expressions, but each bullet point once only. (or B1 for any one correct reason)</p> <p>For point 1: Anything implying 3D, e.g. lines not straight to read off is B1</p> <p>For point 2: Vertical scale: e.g. axis starts at 200 is B1 BUT: vertical axis <u>not accurate</u> / has big jumps ... are B0</p> <p>For point 3: Months: e.g. there are gaps <u>in dates</u> / not consecutive months ... are B1 BUT there are gaps / bars are spread out / x-axis not labelled ... alone are B0</p> <p>Also watch for: only for academies / figures may be cumulative / unequal gaps ... all B0</p>		
6. (a)	$72 - 14$ $= \underline{58}$	M1 A1cao (2)
(b)	$14, 18, 18, 19, 20 \dots$ $\underline{20}$	M1 A1cao (2)
(c)	$(14+18+18+\dots) \div 9$ $= \underline{27}$	M1 A1cao (2)
(d)	Not affected by extreme values or outliers/Easy to calculate	B1 (1) [7]
Notes		
(a)	In (a), (b) and (c) a correct answer with no working scores 2 out of 2 M1 for using 72 and 14 A1 cao	
(b)	M1 for ordering the numbers (condone one error or omission) This may be seen anywhere else on the page. (Look out for ordering seen at top of page). A1 cao	
(c)	M1 for attempt at sum and division by 9 (at least 3 numbers added) A1 cao	
(d)	Allow equivalent statements Identifies that there is an 'outlier'/72 is an 'outlier' oe is sufficient for B1	

Question	Scheme	Marks
7. (a)(i)	25-29 (Allow 25 to 29 or 25/29)	B1 (1)
(a)(ii)	35-39 (Allow 35 to 39 or 35/39)	B1 (1)
(b)	65-69 (Allow 65 to 69 or 65/69)	B1 (1)
(c)	People aged 60 and over make up a larger percentage of the population in Richmond than in Hackney. o.e.	B1 (1)
		[4]
Notes		
(c)	<p>Must be a comparison.</p> <p>Allow converse statements about lower for Hackney. Condone reference to <i>numbers</i> in this question. e.g. higher in Richmond OR lower in Hackney ... are B1 Ignore any incorrect figures. e.g. condone half as many in Hackney for B1 Assume statement is about Hackney if no name given. So 'there are fewer' is B1 BUT: reference to <u>one</u> individual age group only OR <u>one</u> gender only ... are B0</p>	

Question	Scheme	Marks										
8. (a)	Know how data was obtained/Reliability (is known)/Up to date	B1 (1)										
(b)	<table border="1" style="width: 100%;"> <thead> <tr> <th></th> <th>Type of data</th> </tr> </thead> <tbody> <tr> <td>Time spent cycling</td> <td>Continuous</td> </tr> <tr> <td>Number of bikes</td> <td>Discrete</td> </tr> <tr> <td>Distance cycled</td> <td>Continuous</td> </tr> <tr> <td>Height of cyclist</td> <td>Continuous</td> </tr> </tbody> </table>		Type of data	Time spent cycling	Continuous	Number of bikes	Discrete	Distance cycled	Continuous	Height of cyclist	Continuous	B2 (2)
	Type of data											
Time spent cycling	Continuous											
Number of bikes	Discrete											
Distance cycled	Continuous											
Height of cyclist	Continuous											
(c)	e.g. <table border="1" style="width: 100%;"> <thead> <tr> <th>Colour of bike</th> <th>Tally</th> </tr> </thead> <tbody> <tr> <td>Red</td> <td></td> </tr> <tr> <td>Blue</td> <td></td> </tr> <tr> <td>Green</td> <td></td> </tr> <tr> <td>Other</td> <td></td> </tr> </tbody> </table>	Colour of bike	Tally	Red		Blue		Green		Other		B2 (2)
Colour of bike	Tally											
Red												
Blue												
Green												
Other												
*(d)	Not a suitable diagram Colour of bike is qualitative (not numerical/quantitative)	B1 B1 (2)										
		[7]										
Notes												
(a)	B1 for a suitable advantage Note: a definition of primary data on its own is B0, i.e. 'you collect it yourself' 'Accurate' is B0.											
(b)	B2 for all 4 correct (B1 for 3 correct)											
(c)	B1 for 'colour' column or listing at least three options for colours in a table B1 for separated space labelled tallies/frequencies/number/total A question for a questionnaire is B0 even if there are colour options listed. A diagram (e.g. bar chart) is B0 even if there are colour options included on it.											
*(d)	B1 for not suitable PLUS any reason B1 for sensible reason which correctly describes colour as qualitative or states that a stem and leaf diagram is used for quantitative/numerical (data) or numbers Condone misspelling if intention is clear.											

Question	Scheme	Marks
<p>9. (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p> <p>(e)</p>	<p>Points plotted at (2,3), (2.5,2.3)</p> <p>Negative (correlation) Interpretation: As the distance (from the source of the river) increases, the width (of the stone) decreases</p> <p>Single straight line drawn from at least $x=0.5$ to at least $x=1.7$ which if extended would pass between: (0.5,5) and (0.5, 5.6) and (2.0, 2.7) and (2.0, 3.3)</p> <p>Answer in range [3.8,4.2]</p> <p>Extrapolation/3.2km is beyond range of data set/Trend may not continue</p>	<p>B1B1 (2)</p> <p>B1 B1</p> <p>B1 (2)</p> <p>(1)</p> <p>B1ft (1)</p> <p>B1 (1)</p> <p>[7]</p>
Notes		
<p>(a)</p> <p>(b)</p> <p>(d)</p> <p>(e)</p>	<p>$\frac{1}{2}$ small square tolerance</p> <p>B1 negative (negative skew is B0) B1 must be in context and mention 'distance' oe and 'width' oe</p> <p>B1 anything in the range [3.8,4.2] or if answer is not in range, then fit from value read off their 'line' of best fit with negative gradient and $\frac{1}{2}$ small square tolerance</p> <p>B1 for an answer which states that the distance is beyond/outside the data set. 'Far away from other points' is B0 'The line doesn't extend that far' is B0</p>	

Question	Scheme	Marks
10. (a)(i) (a)(ii) (b) (c)	14500-15500 12000-13000 not inclusive Upward Any 2 sensible comparisons from: <ul style="list-style-type: none"> • There are always more students taking Physics than French • The number of students taking Physics is increasing while French is decreasing (from 2008) • The difference between the number taking Physics and French is increasing (from 2008) 	B1 B1 B1 B2 (2) [5]
Notes		
(b) (c)	B1 for rising/positive/increasing/upward positive correlation is B0 goes down and then goes up is B0 B2 for any 2 sensible comparisons (B1 for 1 comparison)	

Question	Scheme	Marks
<p>11. (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p> <p>(e)</p> <p>(f)</p>	<p><u>All</u> customers/people (in the offices)</p> <p>Completely accurate/opinions of all customers considered/unbiased</p> <p>Sample is (any two from):</p> <ul style="list-style-type: none"> • Quicker • Cheaper / uses less resources • Easier (to do / to calculate ... etc) • Less data to handle <p>All people/items have <u>same/equal chance</u> of selection</p> <ul style="list-style-type: none"> • Leading/biased <p>Open OR no answer boxes/options given</p> <p>Advantage (any one from):</p> <ul style="list-style-type: none"> • questions can be explained • better response rate <p>Disadvantage (any one from):</p> <ul style="list-style-type: none"> • expensive • time consuming • possible interviewer bias • interviewee may be less candid / feel pressured (into giving a 'right' answer) 	<p>B1 (1)</p> <p>B1 (1)</p> <p>B1B1 (2)</p> <p>B1 (1)</p> <p>B1 (2)</p> <p>B1 (2)</p> <p>B1 (2)</p> <p>[9]</p>
Notes		
<p>(a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p> <p>(e)</p> <p>(f)</p>	<p>Must clearly imply <u>ALL</u> customers for B1 (allow people/workers/sandwich eaters etc for customers) Condone <i>list of all</i> customers. Condone <u>all</u> offices BUT: 'the customers' / 'the offices' ... alone are B0 NB: A description of taking a sample ...is B0</p> <p>Allow equivalent statements. e.g. includes whole population / true representation / (completely) fair are all B1 Condone more accurate / more reliable / more representative for B1 BUT gets lots of data / more varied results ... alone are B0</p> <p>May have two reasons in one statement. Must be from these four options, but each bullet point once only.</p> <p>Condone 'more convenient' as a separate point for B1 Only allow converse statements if they use the word 'census'. Note: possible non-response from census, ... is B0</p> <p>completely fair / not biased / no control over choice OR just a description of how to take a random sample ... alone are B0</p> <p>May have two reasons in one statement. Must be from these two options, but each bullet point once only.</p> <p>Note: May vary between sandwich type / question too vague, etc ... are all B0</p> <p>Converses are only allowed if they state face-to-face / questionnaire. Allow sensible equivalent answers.</p> <p>Advantages: quicker / more accurate results / more detailed answers / can ask follow-up questions / less likely to lie ... are all B0</p> <p>Disadvantages: Condone less likely to be honest (face to face)</p> <ul style="list-style-type: none"> • BUT: 'biased'/'not random' ... alone is B0 	

Question	Scheme	Marks
<p>12. (a)</p> <p>(b)</p> <p>*(c)</p>	<p>$9.5 - 3 =$ 6.5</p> <p>Box plot drawn</p> <p>The distribution is not symmetrical since... It has (positive) skew(ness)</p> <p>box with at least one whisker 2, 3 and 10 plotted correctly all correct (0, 2, 3, 10 and 15)</p>	<p>M1 A1cao (2)</p> <p>B1 B1 B1 (3)</p> <p>B1 B1 (2)</p> <p>[7]</p>
Notes		
<p>(a)</p> <p>(c)</p>	<p>M1 for $k - 3$ where $9 < k < 10$</p> <p>1st B1 for not symmetrical/not evenly distributed/no PLUS any reason 2nd B1 for <u>skew</u> or a correct description of skewness which involves the <u>median</u> and a <u>quartile</u> (e.g. 'The median is closer to the lower quartile ').</p> <p>No/Not symmetric on its own is 1st B0 Negative skew here is 2nd B0 Must use correct statistical language. Condone poor spelling if intention is clear.</p>	

Question	Scheme				Marks
13. (a)	Probability words	Probability			B2 (2)
	Impossible	0			
	Certain	1			
	Unlikely	1/20			
	Evens	1/2			
	Likely	3/4			
(b)	2	3	4	5	B2 (2)
	3	4	5	6	
	4	5	6	7	
	5	6	7	8	
	6	7	8	9	
	7	8	9	10	
(c)	$\frac{1}{24}$				B1oe (1)
(d)	$\frac{5}{24} \times \frac{5}{24}$ $= \frac{25}{576}$				B1ft M1 A1 (3) [8]
Notes					
(a)	B2 for all 5 correct in correct place (B1 for 3 or 4 in correct place)				
(b)	B2 for all cells correct (B1 for any one row or column correct)				
(d)	B1ft for $\frac{5}{24}$ oe seen or $\frac{k}{24}$ oe ($0 \leq k \leq 24$) which follows through from their completed sample space of totals M1 for $p \times p$ where $0 < p < 1$ A1 for $\frac{25}{576}$ (allow awrt 0.04) Special case: $\frac{10}{24}$ scores 1 out of 3.				

Question	Scheme	Marks
<p>14. (a)</p> <p>(b)</p>	$\frac{1187}{1042} \times 100$ $= 113.915547\dots$ <p style="text-align: right;">awrt 114</p> <p>Comparison: (Both) prices have gone up / 3-bed (%) has gone up <u>more</u></p> <p>Percentage (at least one correct (ft) from): (2-bed) <u>up 14%</u> OR (3-bed) <u>up 20%</u> OR the <u>difference is 6%</u> (allow ft (not if £) and awrt nearest unit %)</p>	<p>M1</p> <p>A1 (2)</p> <p>B1 ft</p> <p>B1 ft (2)</p> <p style="text-align: right;">[4]</p>
Notes		
<p>(a)</p> <p>(b)</p>	<p>M1 fraction correct way up and $\times 100(\%)$ A1 awrt 114 BUT: 114% or £114 are both M1A0</p> <p>1st B1ft: must be a <u>comparison</u>, (and not '£' or 'amount'). Condone 3-bed has gone up more BUT 3-bed has gone up more <i>pounds</i> OR 2-bed is cheaper ... are B0</p> <p>2nd B1 ft: need percentages with '%' (correct ft) for at least one comment. Not just index numbers.</p> <p>Note: <u>2-bed up 14%</u> AND <u>3-bed up 20%</u> ...scores both marks OR <u>3-bed up by 6% more</u> ...scores both marks</p>	

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: ± 5 mm

PAPER: 5ST1F_01			
Question		Modification	Notes
Q01		China, Ukraine and Australia removed	Standard mark scheme
Q02		Shading – Daily, Weekly and Monthly kept. ‘Less than once a month’ – hatched.	Standard mark scheme
Q03		Comedy’ REMOVED from table and diagram Diagram: dotted shading for 2011 and diagonal shading for 2010 Right axis also labelled y axis 2 cm for 5, x axis $x1\frac{1}{2}$ Table: 2011 Action 5 films, Romance 10 films	For part (a) Bar height of 5 for Action and 10 for Romance Correct dotted shading for each bar.
Q04		Table for braille: 10, 7, 4 (i) 9 (ii) 12 (v) (iii) 15 (iv) (vi)	Standard mark scheme
Q05		Model provided as well as diagram.	Standard mark scheme
Q07		Diagram enlarged, lines drawn across to join both pyramids. ‘Men’ and ‘Women’ moved up above grid.	Standard mark scheme

PAPER: 5ST1F_01		
Question	Modification	Notes
Q08	- Braille – roman numerals put in spaces in table	Standard mark scheme
Q09	Table width for H changed to 2.5 (d) Leeway needed (e) 3.0 km not 3.2 km Diagram – 2 cm grid	In part (a) points plotted at (2, 3) and (2.5, 2.5) In part (c) single straight line which passes between (0.5, 4.5) and (0.5, 6) and (2.0, 2.0) and (2.0, 3.5) In part (d) Answers in the range [3.5, 4.5]
Q10	X axis 3 cm per year with an intermediate line Y axis 3 cm for 5000 with an intermediate line Label right axis Crosses changed to solid circles A Level Physics 2012 – point moved up to 35000	Standard mark scheme
Q12	Box plot – move UQ to 9 1½ cm grid 0 – 16 marked top of grid Data ‘adapted from’	In part (a) M1 for 9 – 3 and A1 for 6.
Q13	Braille – roman numerals put in spaces in table	Standard mark scheme

