Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE
In Statistics (2ST01)
Foundation Paper 1F

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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)	Sleeping	B1 (1)
	(b)	¼	B1 (1)
	(c)	6 (hours)	B1 (1)
			[3]
		Notes	
	(b)	Allow 0.25 or 25% or equivalent fraction e.g. $\frac{25}{100}$, $\frac{6}{24}$ or $\frac{90}{360}$; But 90° is B0	

Question		Scheme	Marks
2	(a)	Frequencies: (2), 6, 4, 2, 1, 0, 1 (Otherwise B1 for <u>either</u> correct tallies for results 1 to 6 <u>or</u> frequencies for results 1 to 6 match tallies)	B2 (2)
	(b)	Vertical **lines** correct (<u>**or**</u> correct for their frequencies) (Otherwise B1ft for <u>either</u> at least 4 correct (ft) <u>or</u> 6 bars or points consistently plotted at correct height (ft))	B2 ft (2)
	(c)	16 (or ft sum of their frequencies from table)	B1ft (1)
	(d)	$\Sigma x \div$ '16' = 1.8(75) or 1.9	M1 A1cao (2)
	(e)	Median or Mode (either)	B1 (1)
	(f)	Answer in range 180~190	B1ft (1)
			[9]
		Notes	
	(b)	Allow follow through from their frequencies in (a). If no frequencies, follow through their tallies. Ignore any polygon joining tops of lines.	
	(c)	May follow through their frequencies from table	
	(d)	M1: attempt $\Sigma x \div 16$ or their (c). Allow $25 \leq \Sigma x \leq 35$. (implied by correct answer) A1: allow truncated or rounded to at least 1 d.p.	
	(e)	We need the word. Condone poor spelling if intention is clear.	
	(f)	Must be an integer. Answer in range <u>or</u> 100 × their (d) truncated or rounded.	

Question	Scheme	Marks
3 **(a)**	e.g. longer concerts are more expensive	B1 (1)
(b)	<u>Length of</u> concert / <u>number of</u> hours / <u>number of</u> songs	B1
	Cost, or price (of ticket)	B1 (2)
(c)	Scatter (diagram)	B1 (1) **[4]**
Notes		
(a)	Other answers possible but must be a statement relating duration & cost. Any *question* is B0	
(b)	B1 for each of the stated variables. Could be two on one line. Allow equivalent answers. Condone 'time', 'pounds' or 'hours' but not 'pounds per hour' nor 'time <u>of day/year</u>'	

Question	Scheme	Marks
4 **(a)**		B1 (1)
(b)	There are more staying in tents (than in campervans) + supporting evidence e.g. 'three more stay in tents than campervans' scores B2	B2ft (2)
*(c)	15 + 22 + 12 They do make a profit / Yes	M1 A1 (2) **[5]**
Notes		
(a)	Six complete stick men added to third row. Ignore spacing & size.	
(b)	Supporting evidence may be: e.g. 15 in tents, 12 in campervans <u>or</u> there is a difference of 3 <u>or</u> more stick men for tents, etc (Follow through their pictogram) Award B1 for an incomplete answer: e.g. 'more stay in tents' without reason/figures, <u>or</u> correct evidence without conclusion, (e.g. 15 in tents, 12 in campervans <u>or</u> difference of 3, o.e.)	
(c)	M1: Working may be seen on pictogram. <u>either</u> total = 49 (allow ft) (if *only* a total is given it should be correct or correct from their pictogram) <u>or</u> sufficient working needed to show total exceeds 40. Figures need not be correct. A1: correct conclusion (dep. on reason/working)	

Question	Scheme	Marks
5 **(a)**	1906 (thousand tonnes)	B1 (1)
(b)	Greece and Austria	B1 (1)
(c)	Honey consumption is increasing in France ... (ie upward trend) ... but decreasing in Spain (ie downward trend)	B1 B1 (2) **[4]**
Notes		
(b)	Both needed	
(c)	Allow equivalent wording for each (rising / going up, etc) Ignore any figures. Condone reference to amounts per person. SC: discussion of trend in the difference can score max B1 (e.g. Spain were more, then about equal, then France were more.)	

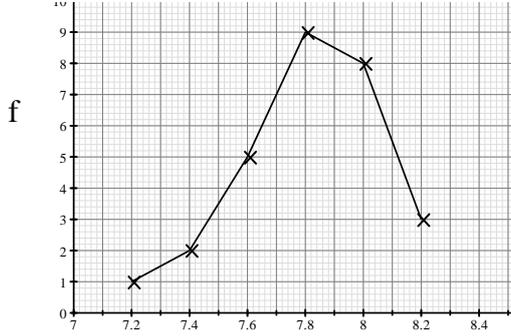| Question	Scheme	Marks
6 **(a)**	Not biased/not weighted <u>or</u> each outcome is equally likely/outcomes random, o.e.	B1 (1)
(b)	$\dfrac{1}{6}$	B1 (1)
(c)(i)	$\dfrac{5}{36}$ o.e.	B1
(c)(ii)	$\dfrac{6}{36}$ or $\dfrac{1}{6}$ o.e.	B1 (2)
(d)	Spinner $\begin{array}{c c c c c} & 1 & 2 & 3 & 4 \\ \hline 1 & \mathbf{2} & \mathbf{3} & \mathbf{4} & \mathbf{5} \\ 2 & \mathbf{3} & \mathbf{4} & \mathbf{5} & \mathbf{6} \end{array}$ Coin All totals	B1 (1)
(e)	$\dfrac{3}{8}$ o.e.	M1 A1 (2) **[7]**
Notes		
	For all probability answers allow percentage or decimal equivalent to 2 d.p. *rounded or truncated.*	
(a)	Allow equivalent statements which suggest having/trying to make outcomes equally likely. e.g. all sides same (shape) / each number once only / not tampered with, etc	
(e)	M1 for $\dfrac{n}{8}$ (with $0 \le n \le 8$) This can be implied by a cancelled fraction which is consistent with their table. A1 cao **SC:** M1A0 for answer of zero if consistent with a completed table.	

Question		Scheme	Marks
7	**(a) (i)**	France	B1
	(a) (ii)	Spain	B1
			(2)
	(b)	24 – 3	M1
		21	A1
			(2)
			[4]
		Notes	
	(b)	M1 for 24 – 3 with at least one of these correct (subtraction may be implied by their answer) A1 for answer in the range 20 to 22 not inclusive SC: 22 – 1.5 scores M1A0	

Question		Scheme		Marks
8	**(a)**	<table><tr><td>Number sold</td><td>Patter ned</td><td>Plain</td><td>Total</td></tr><tr><td>Male</td><td>8</td><td>12</td><td>**20**</td></tr><tr><td>Female</td><td>56</td><td>**24**</td><td>80</td></tr><tr><td>Total</td><td>**64**</td><td>**36**</td><td>100</td></tr></table>	All 4 correct values 20, 24, 64, 36	B2
				(2)
	(b)	$\dfrac{'64'}{100}$ o.e.		B1 ft
				(1)
	(c)	Female sales are $\dfrac{80}{100}$ o.e. or more than half ... so Felix is correct / Yes		M1 A1
				(2)
				[5]
		Notes		
	(a)	If B2 not given allow B1 for any one correct		
	(b)	Follow through their 64 from table Any equivalent fraction, decimal or percentage (at least 2 s.f.)		
	(c)	M1: correct reasoning or 80% (o.e.) seen. A1: correct conclusion dependent on appropriate reasoning.		

Question		Scheme	Marks
9	**(a)**	Any equivalent reason from: • not all have a telephone / not all in phone book / to avoid bias • quicker/cheaper (way to get lots of data) • residents can take their time / give considered response / are less pressured • responses may be more candid / more honest / more reliable	B1 (1)
	(b)	Question A: open question / no answer boxes / no units specified / too vague	B1
		Question B: leading / biased / negative options only	B1 (2)
	***(c)**	They should carry out a **pilot** survey/study...	B1

		... to check ◦ if questions are understood
		                  ◦ that required information is obtained / likely answers
		                  ◦ the response rate / see how long it takes
		                  ◦ for any errors / see if changes needed	

		Two clear reasons based on the list (or B1 for at least one acceptable reason)	B2 (3) **[6]**
Notes			
	(a)	Allow wording equivalent to one of these reasons. Do not accept non-response: they may not answer / don't like unwanted calls Assume comment is about questionnaires, BUT accept converse statements if clear reference is to telephone survey.	
	(b)	Allow equivalent wording but: A: do not allow 'may not know how far away' B: do not allow 'insufficient options' / 'no box for other' on its own	
	(c)	QWC 1st B1: require 'pilot' or 'pre-test' B2: Use professional judgement for two reasons clearly based on the list (allow only one answer from each bullet point). Otherwise B1 for at least one *acceptable* reason, e.g. to check questions are good. Note: check it works / check for bias / check spelling /see what people think of it, alone are B0	

Question		Scheme	Marks
10	**(a)**	Quantitative	B1
		Bivariate	B1
			(2)
	*(b)	(Except for one point) there is **positive correlation** (between male and female earnings)	B1
		Two further comments from:	
		o Countries with higher male earnings also have higher female earnings	
		o Male earnings are higher (than female earnings for all these countries)	
		o One country / Ireland does not fit the pattern.	B2
			(3)
			[5]
		Notes	
	(a)	B1B1 for two correct words clearly identified in some way.	
		(Any <u>extra</u> word identified cancels out a correct answer)	
	(b)	QWC	
		1st B1: require 'positive correlation'	
		B2: Two clearly expressed comments based on the three options. (Allow only one from each.) Allow equivalent / converse comments. Ignore any figures.	
		Otherwise award B1 for one acceptable comment.	

Question	Scheme	Marks
11 **(a)**	7 | 4 6 6 8 8 | 1 2 5 7 9 9 | 5 7 8 10 | 0 1 2 3 Key 7|6 = 76 (points) Stems correct Ordered leaves correct (condone one error or omission) Fully correct with key	B1 B1 B1 (3)
(b)	88	M1A1 (2)
(c)	103-74 = 29	M1 A1 (2)
(d)	Bolton has a smaller median/Durham has a larger median Bolton has a larger range/Durham has a smaller range	B1ft B1ft (2)
(e)	Durham, as they have a higher median.	B2ft (2)
		[11]

	Notes	
(a)	B1 for correct stems identified (may be reversed) B1 for correct ordered leaves (condone one error or omission) B1 for key correct and no errors	
(b)	M1 for using $\dfrac{n+1}{2}$ from ordered diagram or from ordered list or for identifying '87' **and** '89' (may be implied by a correct ft median from their stem and leaf diagram) A1 cao	
(c)	M1 for 103 – 74 <u>or</u> for identifying 103 and 74 seen together A1 cao	
(d)	B1ft for a correct comparison of **medians**. (for ft, must have an answer to (b)) B1ft for a correct comparison of **ranges** (for ft, must have an answer to (c)) Must use words in bold. Condone misspelling if intention is clear.	
(e)	B2ft for Durham plus correct supporting reason <u>comparing</u> medians (condone average here). Allow converse. Ignore comments about range or other values. (B1 for Durham with any reason)	

Question	Scheme	Marks
12 **(a)**	Mid points: 7.2, 7.4, 7.6, 7.8, 8.0, 8.2	B1
	$\Sigma fx = 7.2 \times 1 + 7.4 \times 2 + 7.6 \times 5 + \ldots$ (implied by sight of 218.8)	M1
	$(218.8 \div 28) =$ awrt **7.8**	A1
		(3)
(b)		Correct heights B1
		Correct horizontal+joined B1
		All correct including
		polygon, scale & label B1
		(3)
(c)	Negative (skew)	B1 ft
		(1)
		[8]

	Notes	
(a)	B1 Midpoints correct. Condone one error. (Can be implied by 218.8 seen)	
	M1 for sensible attempt at Σfx (x must be a consistent value within each class)	
	A1 for answer rounding to 7.8 **NB:** Not from wrong method.	
(b)	(Different vertical scales are possible. ½ square tolerance on plots)	
	B1 for at least 5 points at correct height, consistently within intervals.	
	(If no correct scale check relative heights: k, $2k$, $5k$, $9k$, $8k$, $3k$)	
	B1 for at least 5 correct horizontal plots <u>and</u> attempt at joining (ignore extra lines)	
	B1 for fully correct frequency polygon with consistent numbered & labelled scale.	
	(For 3rd B1 ignore lines joining first/last points to axis but not to each other.)	
(c)	Negative *correlation* or negative *trend* score B0	

Question	Scheme	Marks
13 **(a)**	Sampling frame	B1
		(1)
(b)	Each voter has an 'equal chance' (oe) of being selected	B1
		(1)
(c)	<u>Daily Dispatch</u> is more reliable since its survey asked 'more people' (oe).	B2
		(2)
		[4]

	Notes	
(a)	Condone 'sample frame'	
(b)	B1 for any correct equivalent expression	
	Condone fair/no bias	
(c)	B2 Daily Dispatch is more reliable with correct <u>comparative</u> reason	
	(B1 Daily Dispatch with any reason)	

Question		Scheme	Marks
14	**(a)**	3	B1 (1)
	(b)	Will be more <u>representative</u>, or will have correct <u>proportions</u> of each house size.	B1 (1)
	(c)(i)	$\dfrac{140}{1200} \times 60$	B1
	(c)(ii)	Randomly	B1 (2) **[4]**
Notes			
	(b)	Allow equivalent statements. Condone 'fairer', BUT 'better' /'more reliable' /'more accurate' alone are B0	
	(c)(i)	Allow equivalent calculation. e.g. $1200 \div 60 = 20$ <u>and</u> $140 \div 20$ $(= 7)$ <u>or</u> any rearrangement of $\dfrac{140}{1200} = \dfrac{7}{60}$ Note: allow 0.11(666…) for 140/1200 and 8.5(714…) for 1200/140 ***Answer 7 is given**.	
	(c)(ii)	Any attempt to describe a method must use the word **random** or **randomly**.	

Question		Scheme	Marks
15	**(a)**	(Increased by) 28%	B1 (1)
	(b)	97.5	B1 (1) **[2]**
Notes			
	(a)	B1 for **28%** (must be %)	
	(b)	97.5**%** is B0	

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: ±5°
Measurements of length: ±5 mm

PAPER: 5ST1F_01			
Question		**Modification**	**Notes**
1	(b)	Diagram has been enlarged.	Allow 0.25 or 25%
2	(b)	Diagram has been enlarged. Right axis labelled. Vertical line on the graph at zero has been made wider.	B2ft: all correct (or B1ft if at least 4 correct)
4	(a)	Pictures have been simplified and enlarged. Key is moved to the top left.	Six complete circles added to third row. Ignore spacing & size.
4	(b)	Pictures have been simplified and enlarged. Key is moved to the top left.	Award B1 for an incomplete answer – eg more stay in tents Follow through their pictogram
4	(c)	Pictures have been simplified and enlarged. Key is moved to the top left.	Sufficient working needed to show total exceeds 40. '49' not required. Working may be seen on pictogram
5	(b)	Rows for Portugal, Sweden and Hungary are removed.	Both needed
5	(c)	Rows for Portugal, Sweden and Hungary are removed.	Allow equivalent wording for each (rising / going up, etc)

PAPER: 5ST1F_01			
Question		**Modification**	**Notes**
6	(a)	Label for red dice moved up. Label for blue dice moved left.	For all probability answers allow percentage or decimal equivalent to 2 d.p. rounded or truncated.
6	(b)	Label for red dice moved up. Label for blue dice moved left.	For all probability answers allow percentage or decimal equivalent to 2 d.p. rounded or truncated.
6	(c)(i)	Label for red dice moved up. Label for blue dice moved left.	For all probability answers allow percentage or decimal equivalent to 2 d.p. rounded or truncated.
6	(c)(ii)	Label for red dice moved up. Label for blue dice moved left.	For all probability answers allow percentage or decimal equivalent to 2 d.p. rounded or truncated.
6	(d)	Diagrams are enlarged and the print straightened up. The sample space diagram is put under the coin and spinner in the data book. Braille only; coin 1 roman numerals are inserted (i) to (iv), coin 2 roman numerals are inserted (v) to (viii).	Spinner |	1	2	3	4 | Coin 1	2	3	4	5 2	3	4	5	6 B1 All totals
6	(e)	Diagrams are enlarged and the print straightened up. The sample space diagram is put under the coin and spinner in the data book. Braille only; coin 1 roman numerals are inserted (i) to (iv), coin 2 roman numerals are inserted (v) to (viii).	M1 for $\dfrac{n}{8}$ (with $0 < n < 8$)
7	(b)	Key is put at the top left. "No forest" – dotty shading "forest" – no shading Bars for Belgium, Ireland, Netherlands and Portugal have been removed. Bar for UK with forest raised to 4. Source changed to "adapted from"	M1 for 24 – 4 A1 awrt 20 (Condone 20 000 000)

PAPER: 5ST1F_01				
Question		**Modification**	**Notes**
8	(a)	Wording is added; "There are four spaces to fill. Braille – (i) to (iv) labels are inserted into gaps. That is 8 12 (i), 56 (ii) 80, (iii) (iv) 100.	If B2 not given allow B1 for at least two correct or correct follow through
10	(a)	Diagram; crosses changed to filled in circles. Grid enlarged and simplified.	Two words clearly identified in some way. (Any extra word identified cancels out a correct answer)
10	(b)	Diagram; crosses changed to filled in circles. Grid enlarged and simplified.	QWC 1st B1: require 'positive correlation' B2: Allow only one answer from each bullet point. Allow equivalent / converse comments. (Award B1 for one acceptable comment only.) e.g. 'males earn (20%-30%) more than females in all countries' scores B1 (ignore the figures)
11	(a)	Four horizontal lines are put on the diagram.	B1 for correct stems identified B1 for correct ordered leaves (condone one error or omission) B1 for key correct and no errors
11	(b)	Four horizontal lines are put on the diagram.	M1 for ordering and use of $\dfrac{n}{2}$ or $\dfrac{n+1}{2}$ A1ft their ordered stem and leaf diagram
11	(c)	Four horizontal lines are put on the diagram.	M1 for 103-74 A1 cao
11	(d)	Four horizontal lines are put on the diagram.	B1ft for a comparison of medians (for ft, must have an answer to (b)) B1ft for a comparison of ranges (for ft, must have an answer to (c))
11	(e)	Four horizontal lines are put on the diagram.	B2ft for Durham plus correct comparison of medians (B1 for any correct comparison but incorrect conclusion)

PAPER: 5ST1F_01			
Question		**Modification**	**Notes**
12	(b)	Grid is enlarged and simplified.	B1 all correct M1 for sensible attempt at $\Sigma fx \div \Sigma f$ A1 for 7.8 or better.