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Mark Scheme (Results)

Summer 2016

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

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Summer 2016
Publications Code 5ST1F_01_1606_MS

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

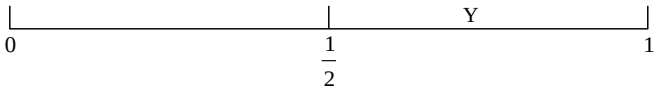
Unless otherwise stated, when an answer is given as a range e.g. [3.5, 4.2] then this is inclusive of the end points and includes all numbers within the range.

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.

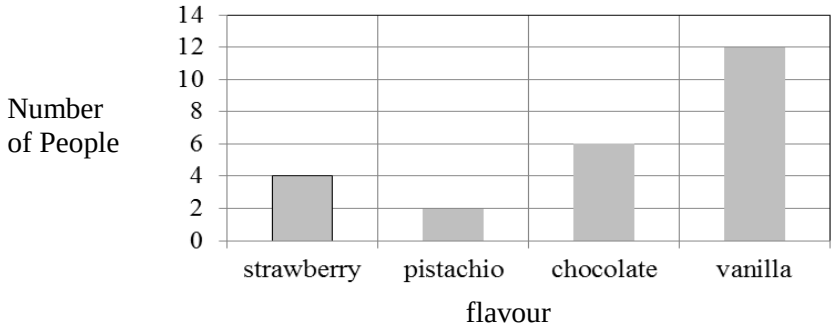
Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark (dependent on method mark) B1 – working mark C1 – communication mark QWC – quality of written communication awrt – answer which rounds to oe – or equivalent cao – correct answer only ft – follow through sc – special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

Question	Scheme	Marks
1. (a)	**<u>10</u>**	B1 (1)
(b)	10 + 7 + 20 = **<u>37</u>**	M1 A1 (2)
(c)	Yes Rita becomes student president since 20 > '18.5'	B1 (1) **[4]**
	Notes	
(b)	M1 for at least 2 of 10, 7 and 20 seen (may be in pictogram) or other fully correct method e.g. '$8\times4+3+2$'	
(c)	B1 for Yes (Rita becomes student president) **<u>and</u>** a correct supporting figure seen in part (c) (e.g. 20, 18/18.5/19 or $\frac{20}{37}$). Allow a follow through figure from 'their (b)' / 2, but must conclude Rita becomes student president.	

Question	Scheme	Marks
2. (a)(i)	likely	B1 (1)
(ii)	impossible	B1 (1)
(b)(i)		B1 (1)
(b)(ii)	$\frac{8}{11}$ o.e.	B1 (1) **[4]**
	Notes	
(b)(i)	Y indicated between ½ and 1	

Question	Scheme	Marks
3.(a)	8	B1 (1)
(b)	14	B1 (1)
(c)	The mean cannot be higher than 17/The mean must be between 12 and 17 (in the range of the data)/The mean is actually 14.4(2857….)	B1 (1)
(d)	The mode for the fourteen days **is equal to** the mode for the fifteen days since it is **still 14°C**	B2 (2) **[5]**
	Notes	
(c)	Allow other correct reasons	
(d)	B2 for is equal to with supporting reason relating to the mode of 14°C (B1 for is equal to)	

Question	Scheme	Marks
4.(a)	Cereals	B1 (1)
(b)	81 – 75 = **6** (pence)	M1 A1 (2)
(c)	Sugar and Beverages	B1 (1)
(d)	The figures have been rounded/given to the nearest penny	B1 (1)
(e)	Any two from: • Sophie spent (75p) more eating at home (than the mean/figure in the table) • Sophie spent (33p) less eating out (than the mean/figure in the table) • Sophie spent (42p) **more** than average in **total** • Sophie spends more eating at home than eating out in line with the figures in the table	B2 (2)
		[7]
	Notes	
(b)	M1 for use of 81 and 75 A1 for 6 (pence)	
(e)	B2 for any two correct comparisons (B1 for any one correct comparison) For the third bullet point the response must refer to the **total** of both categories (may be implied by 42) Sophie spent more eating at home **and** less eating out is B2 Sophie spent more eating at home **than** eating out on its own is B0	

Question	Scheme	Marks
5.(a)	Vanilla	B1 (1)
(b)	$\frac{2}{12} \times 24 (= 4)$	B1 (1)
(c)		M1 A2 B1 (4)
		[6]
	Notes	
(b)	Any equivalent calculation (e.g. 2 × 2) which may been seen in stages or identifying 1 'sector' = 2 **and** an answer of 4 seen	
(c)	M1 for any bar drawn to a height of 2, 6 or 12 A2 for all bars drawn to correct height (ignore width and shading of bars) (A1 for one error or omission) B1 for label of flavour/ice cream on *x*-axis and label of number/frequency/people on *y*-axis (but e.g. 'number of ice creams' is B0).	

Question	Scheme	Marks
6.(a)	50	B1 (1)
(b)	80 – 4 = **76**	M1 A1 (2)
(c)	There is positive skew	B1 (1)
(d)	median	B1 (1) **[5]**
	Notes	
(b)	M1 for subtraction of $80 - k$ (with $0 < k < 10$) **or** for identifying 80 and 4 together	
(c)	Positive correlation is B0	

Question	Scheme	Marks
7. (a)	35-44	B1 (1)
(b)	30 (million)	B1 (1)
(c)	Upward/rising trend o.e.	B1 (1)
(d)	Does not include all age groups / children OR is for UK only	B1 (1) **[4]**
	Notes	
(b)	Allow 30 or 30 000 000	
(c)	Allow equivalent description (e.g. goes up / increasing). Ignore any figures. Condone 'positive (trend)' but 'positive correlation' seen is B0 Ignore comments about dips/fluctuations **only if** they have a clear statement that the **overall** trend is rising.	
(d)	Recognition of EITHER the missing age group OR being UK only. Do not accept non-response or 'only a sample' arguments	

Question	Scheme	Marks
8.(a)	30-39	B1 (1)
(b)(i)	False. The percentage is 36	B1 (1)
(b)(ii)	True. The bar for each age group 21-69 is above 50%	B1 (1)
(b)(iii)	False. This is not true for the age groups 17-20 and 21-29.	B1 (1) **[4]**
	Notes	
b(i)	False plus a valid supporting reason which uses a correct figure (36) from the bar chart or refers to the scale on the bar chart (e.g. scale goes up by 2(%) or it's more than 33)	
b(ii)	True plus a valid supporting reason which refers to the heights of the bars in those age groups (e.g. all 64% or higher, they are all above 50%) Just repeating the claim is B0 (e.g. True, more than half had a driving licence)	
b(iii)	False plus valid reason identifying at least one age group where the statement is false Special Case: True for all **except** 2 age groups/17 – 29 scores B1	

Question	Scheme	Marks
9. (a)	All of the people in the choir	B1 (1)
(b)	Less time/quicker Less data/easier (to handle)	B1 (1)
(c)	Bias	B1 (1)
(d)	<table><tr><th></th><th>Type of data</th></tr><tr><td>Number of people</td><td>Quantitative</td></tr><tr><td>Type of music</td><td>Qualitative</td></tr><tr><td>Age of people in years</td><td>Quantitative</td></tr></table>	B2 (2)
***(e)**	He should use closed questions since • Easier to answer • Quicker to answer • Easier to analyse/compare results • Limits the answers	B1 (1)
(f)	It is leading.	B1 (1) **[7]**
	Notes	
(a)	Must include/imply all members of choir/singers	
(b)	For any sensible advantage of a sample (apart from cost)	
(d)	B2 for all 3 correct (B1 for any 2 correct)	
***(e)**	B1 for closed questions with one correct bullet point	
(f)	B1 for leading oe (allow biased)	

Question	Scheme	Marks
10. (a)	Scatter (diagram)	B1 (1)
(b)	2.8 4.3	B1 B1 (2)
(c)	Circle drawn around (1.6, 1.6)	B1 (1)
***(d)**	There is no/weak correlation (or the points do not lie close to a line/linear pattern), so it is not a good decision to draw a line of best fit.	B2 (2) **[6]**
	Notes	
(d)	B2 NOT a good a decision **and** correct supporting reason which describes lack of (linear) correlation in data. (B1 for a correct description of the points on the scatter diagram (e.g. points are scattered) with no/incomplete conclusion)	

Question	Scheme	Marks
11. (a)(i)	$\frac{7}{10}$ o.e.	B1 (1)
(a)(ii)	$\frac{8}{10}$ o.e.	B1 (1)
(b)	Events that cannot happen **together**/**at the same time**	B1 (1)
(c)	$P(\text{both odd}) = \frac{3}{10} \times \frac{3}{10} = \frac{9}{100}$ o.e.	M1A1 (2) **[5]**
	Notes	
(a)(i)	Allow any equivalent fraction, decimal or percentage	
(a)(ii)	Allow any equivalent fraction, decimal or percentage	
(b)	Condone e.g. 'either one happens **<u>or</u>** the other happens' B0 for description of independence	
(c)	M1 for $\frac{3}{10} \times p$ OR $p \times p$, where $0 < p < 1$ A1 for any equivalent fraction, decimal or percentage	

Question	Scheme	Marks
12.(a)	e.g. Which do you prefer as a pet? Dog □ or Cat □ (or Neither □)	B1 (1)
(b)	e.g. Dog | Cat | Fish | Mouse | other Male | | | | | | Female | | | | | |	B2,1,0 (2)
(c)	Data is qualitative/non-numeric	B1 (1) **[4]**
	Notes	
(a)	Any non-biased closed question about pet preference or ownership which can be responded to with dog/cat as minimum. With response box o.e.	
(b)	B2 for a usable **table** with both features: • male/female • at least two pet options **listed** (may include 'other' or 'none') or B1 for at least one correct feature	
(c)	Allow any equivalent statement that data is non-numeric Ignore excess statements	

Question	Scheme	Marks
13. (a)	$180 < h \leq 190$	B1 (1)
(b)	Data is grouped/Raw data not used	B1 (1)
(c)	$(165 \times 3 + 175 \times 16 + 185 \times 22 + 195 \times 2) / 43 =$ **<u>180.3</u>**	M1 M1 A1 (3)
***(d)**	The second table/180.1 estimate will be better, since the class widths used are smaller **or** you have more information in the second table	B1 B1 (2) **[7]**
	Notes	
(b)	Allow any comment about not having the exact/precise heights.	
(c)	M1 for $f \times h$ with at least 3 h consistently within interval (including ends) (implied by 7755) This may be seen in table M1(dep) $\Sigma fw \div 43$ A1 awrt 180.3	
(d)	1st B1 for second table/180.1 estimate is better (or equivalent statement) 2nd B1 for correct comparison of class widths/size of each group **or** for stating more information	

Question	Scheme	Marks
14.(a)	$\frac{90}{240}\times 40\ (=15)$	B1 (1)
(b)	Number the (first year) students	B1
	The (first year) students that correspond to the numbers in her list are selected for the sample, e.g use student number 47, 12, etc.	B1
	Ignore the repeated numbers	B1 (3)
(c)	$\frac{7}{15}\times 90 = 42$	M1 A1 (2) **[6]**
	Notes	
(a)	For any equivalent expression $\left(\frac{40}{240}\times 90,\ 40\div\frac{240}{90}, \textit{etc.}\right)$ which may be seen in stages Must see 90, 40, 240 used in a correct calculation, e.g. 90 × 40 = 15 × 240	
(b)	1st B1 for the idea of numbering <u>or</u> ordering <u>or</u> listing Allow a list/database/register/sampling frame (of students) 2nd B1 for matching (the) random numbers to the students 3rd B1 for ignoring the repeated random numbers (53)	
(c)	M1 for any equivalent correct expression (implied by 7 × 6) A1 for 42 Special Case: $\frac{42}{90}$ M1A0	

Question	Scheme	Marks
15. (a)	(19 + 14 + 13 + 12 + 24) / 5 = **16.4**	M1A1 (2)
(b)	Point plotted at (Week 3 W, 16.4)	B1ft (1)
(c)	Trend line drawn between (Week 1 W, 8) and (Week 1 W, 12) and (Week 3 T, 14) and (Week 3 T, 18)	B1 (1)
***(d)**	The headteacher is right to be concerned because… The number of absences on Fridays is increasing. There are more absences on Friday (than other days of the week as Friday has the greatest variation above the trend line).	 B1 B1 (2) **[6]**
	Notes	
(a)	M1 for the addition of 5 numbers from the table with division by 5	
(b)	Point plotted at Week 3 W either between 16 and 17 (inclusive) or ft 'their (a)' plotted with ½ square tolerance. Only allow ft in the range 5 < 'their (a)' < 25	
(c)	A single straight line drawn in tolerance	
***(d)**	1st B1 for increasing 2nd B1 for a correct comment about Fridays having the largest number of absences.	

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: 5ST1F_01			
Question		**Modification**	**Notes**
Q01		Diagram enlarged. Key moved to the left.	See standard mark scheme
Q02	(b)	Diagram enlarged. 'with the letter Y' wording removed.	See standard mark scheme
Q05		Diagram enlarged. Vanilla shading changed to dotty shading. Pistachio shading changed to crosses shading. Dot added to the centre of the pie chart.	See standard mark scheme
Q05	(c)	Diagram enlarged.	See standard mark scheme
Q06		Diagram enlarged. Minim um point on the box plot has been changed from 4 to 10.	
	(a) (b) (c) (d)	80 – 10 = **<u>70</u>**	See standard mark scheme M1 for subtraction of $80 - k$ (with $5 < k < 15$) **or** for identifying 80 and 10 together See standard mark scheme See standard mark scheme

PAPER: 5ST1F_01			
Question		**Modification**	**Notes**
Q07		Diagram enlarged and changed to two graphs. First graph has the ages '15-24' and '45 and over'. Second graph has the ages '25-34' and '35-44'.	See standard mark scheme
Q08		Diagram enlarged. '70 and over' category has been removed. Wording changed from 'each age group' to 'some age groups' in the question. Shading changed.	See standard mark scheme
Q09	(d)	Wording added 'There are three spaces to fill.'	See standard mark scheme
Q10		Grid enlarged. Crosses changed to filled in circles. Three sets of coordinates moved.	See standard mark scheme
Q10	(b)	Wording added 'There are two spaces to fill.' '2.7' changed to '2.5' and '0.9' changed to '1.0' as points have been moved.	
Q10	(c)	Answer is now (1.5, 1.5) as point has been moved.	A circle drawn around (1.5, 1.5)
Q15		Shading changed to striped shading. Very thick outline to box level for week 3, Wednesday.	See standard mark scheme
Q15	(c)	Grid enlarged. Vertical axis finishes at 25. Grid lines 3 cm for 5 with an intermediate. Horizontal lines rising from days only, with 1.5 cm gaps. Crosses changed to solid circles. Crosses for moving averages kept.	See standard mark scheme

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