Mark Scheme (Results)

Summer 2019

Pearson Edexcel GCSE
In Statistics (1ST0)
Paper 1F

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General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

1   All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

2   All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no 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.

Questions where working is not required: In general, the correct answer should be given full marks.
Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

3   **Crossed out work**
This should be marked **unless** the candidate has replaced it with an alternative response.

4   **Choice of method**
If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line then mark both methods **as far as they are identical** and award these marks.

5   **Incorrect method**
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

6   Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, 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.

7   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 or its context. (eg an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg incorrect algebraic simplification).

8   Probability

Probability answers must be given as a fraction, percentage or decimal. 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 fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9   Range of answers

Unless otherwise stated, when an answer is given as a range (eg 3.5 – 4.2) then this is inclusive of the end points (eg 3.5, 4.2) and all numbers within the range.

Guidance on the use of abbreviations within this mark scheme

M   method mark awarded for a correct method or partial method

A   accuracy mark (awarded after a correct method; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)

B   unconditional accuracy mark (no method needed)

oe   or equivalent

cao   correct answer only

ft   follow through (when appropriate as per mark scheme)

sc   special case

dep   dependent (on a previous mark)

indep independent

awrt answer which rounds to

isw   ignore subsequent working

Question number	Answer	Additional guidance	Mark
1 (a)	B1 unlikely		(1)
(b)	B1 green AND yellow	Accept in either order.	(1)
(c)	B1 cross marked at $\frac{1}{2}$		(1)
(d)	B1 cross marked at 0		(1)

Question number	Answer	Additional guidance	Mark
2 (a)	B1 bar of height 3		(1)
(b)	B1 3		(1)
(c)	B1 e.g. • reference to lots of people giving only one or two stars • reference to more people giving a score other than 5-star	B1 for correct comment on the validity of the conclusion Accept e.g. because it is only 6 people who chose 5 star rating out of 20 people/ number of 1 star ratings close to number of 5 star ratings. Do not accept e.g. 5 gave 1 star (no reference to out of 20); references to small sample size.	(1)

Question number	Answer	Additional guidance	Mark
3 (a)	B1 secondary	Accept an aspect relating to secondary data e.g. unreliable. Do not accept discrete, numerical, quantitative.	(1)
(b)	B1B1 	1st B1 for any one row or one column correct 2nd B1 all correct	(2)
(c)	B1ft '3 or 4'	Do not accept 3 on its own. Do not accept 4 on its own.	(1)
(d)	M1 '4' + '14' + '6' or 30 – ('3' + '2' + '1') A1ft 24	M1 for the addition of 3 appropriate numbers from their tally chart **or** 30 – (the addition of 3 appropriate numbers from their tally chart) A1 24 or ft their tally chart	(2)
(e)	B1 e.g. bar chart, pie chart, line graph, bar-line graph	B1 for any suitable diagram Accept stem and leaf diagram Do not accept frequency diagram	(1)

Table within (b):

Number of British Oscar winners	Tally	Frequency
1 or 2	||||	4
3 or 4	⫽⫽⫽⫽ ⫽⫽⫽⫽ ||||	14
5 or 6	⫽⫽⫽⫽ |	6
7 or 8	|||	3
9 or 10	||	2
11 or 12	|	1

Question number	Answer	Additional guidance	Mark
4 (a)	M1 68.2 – 4.3 A1 63.9	M1 for subtraction with one value correct **or** both values correctly identified A1 cao If M0 scored SCB1 for -63.9	(2)
(b)	M1 for 4.3 6.5 8.5 9.1 9.2 10.6 12.3 14.2 16.0 68.2 A1 for 9.9	M1 for ordering (condone one missing value) seen under list/in part (a) or in part (b) **or** using $(n+1)/2$ **or** for identifying 9.2 and 10.6 A1 cao	(2)
(c)	B1 e.g. • reference to the extreme value/outlier in the weights • reference to the median not being affected by extreme values/outlier • reference to the mean being affected by extreme values/outlier	B1 for an answer assessing the appropriateness of using the median as the average for the data	(1)

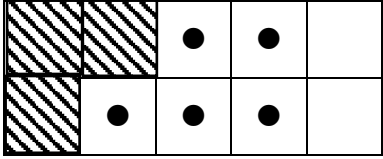| Question number	Answer	Additional guidance	Mark
5 (a)	B2 Not suitable as the data is not bivariate / in related pairs oe OR if B2 not earned... B1 Not suitable with an attempt at a reason why a scatter diagram is not appropriate	B2 for a complete answer assessing the appropriateness of the choice of diagram OR if B2 not earned... B1 for an incomplete answer assessing the appropriateness of the choice of diagram For B1 do not accept 'not suitable' and an indication of another diagram only, but 'not suitable' with an attempt at reason and a reference to another diagram is B1. e.g. not suitable, use a bar chart is B0. not suitable, due to comparing, use a pie chart B1.	(2)
(b)	B1 e.g. not able to access all of the players	B1 for any correct comment identifying an issue with the collection of primary data in this case Condone asking about income is a personal question	(1)

Question number	Answer	Additional guidance	Mark
6 (a)	B1 'takeaway' column **or** listing at least three options for takeaway types in a table B1 for a column labelled tallies/frequencies/number in a suitable position to collect data or tallies shown	A question for a questionnaire is B0 even if there are takeaway options listed. A diagram (e.g. bar chart) is B0 even if there are takeaway options included on it. If both a tally chart and a diagram shown then mark the tally chart.	(2)
(b)	B1 salad		(1)
(c)	B1 meat		(1)

(d)	B2
	    • the diagrams cannot be used to support the statement as the pie charts show proportions (not amounts)/don't know if numbers of males and females are equal/don't know numbers of male and female customers oe
	    • only valid if the pie charts represent the same number of males and females
	
	OR if B2 not earned…
	B1 the diagrams cannot be used to support the statement with an attempt at a reason
	or
	B1 for identifying that the pie charts show proportions (not amounts) oe without a comment on the appropriateness of the statement
		B2 for a complete answer assessing the appropriateness of the statement
		
		Allow assumption of comparative pie charts for B2
		e.g. both are the same size <u>and</u> the meat segments are equal therefore it can be used/they are the same.
		
		OR if B2 not earned…
		B1 for an incomplete answer assessing the appropriateness of the statement
			(2)

Question number	Answer	Additional guidance	Mark
7 (a)(i)	B1 type of game		(1)
(a)(ii)	B1 minimum number of players		(1)
(b)	B2 full description of systematic sampling including: • select a random start point (between 1 and 10 inclusive) • select every 10th person OR if B2 not earned… B1 for a partial description of systematic sampling including reference to a random start point **or** selecting at a fixed interval	B2 for a complete description of systematic sampling For B2 the fixed interval must be every 10th person OR if B2 not earned… B1 for a partial description of systematic sampling For B1 the fixed interval may be 10 or another value.	(2)

Question number	Answer	Additional guidance	Mark
8 (a)	B1 e.g. employee records contain confidential information so Suresh won't be allowed to access them	B1 for correctly assessing the appropriateness of the method for data collection Accept might not get access to records. Accept records could be out of date / may not record absences	(1)
(b)	B2 Tia AND reference to dividing the total number of absences by the total number of people OR B1 Tia AND reference to total number of absences / multiplication of number of days by frequency / use of frequency linked with number of days OR B1 Tia AND reference to (division by) total number of people or 30	B2 for a complete assessment of the appropriate choice with reason Must refer to both total number of absences or multiplication of number of days by frequency or use of frequency linked with number of days (e.g. 6 have 0 days off) **and** total number of people or 30 OR B1 for an incomplete assessment of the appropriate choice	(2)
(c)	M1 for $(30 + 1)/2$ or 15.5 seen or an attempt at listing all values in order A1 for 2 cao		(2)

Question number		Answer	Additional guidance	Mark
9	(a)	B1 31	Condone 3100	(1)
	(b)	B1 straight line drawn between (30, 5)/(30, 10) and (100, 25)/(100, 30) inclusive		(1)
	(c)	B1 positive B1 strong B1 as the weight (in tons) increases the maximum number of passengers increases oe	Accept as the maximum number of passengers increases the weight (in tons) increases Do not accept e.g. a big ship will hold more people as this is referring to a single vessel only.	(3)
	(d)	B2 not appropriate AND this would be extrapolation / point is outside the range of the data / trend may not continue OR if B2 not scored… B1 not appropriate AND an attempt at a reason OR B1 for reference to extrapolation / point being outside the range of the data/trend may not continue without a comment on appropriateness	B2 for assessing the appropriateness of the use of the line of best fit to estimate the maximum number of passengers OR B1 for an attempt at assessing the appropriateness of the use of the line of best fit to estimate the maximum number of passengers	(2)

Question number		Answer	Additional guidance	Mark
10	(a)	M1 $36 - 6$ A1 30	M1 for $36 - k$ or $k - 6$ SCB1 for answer of 30 from $33 - 3$	(2)
	(b)	B1 e.g. we only know percentages and not the number of listeners	B1 for any reason which implies we only know percentages/proportions	(1)

Question number	Answer	Additional guidance	Mark
11 (a)	B2	B2 for all 8 correct. (B1 for 6 or 7 correct)	(2)
(b)	B1 Grace's comment is valid because the darker areas/more children are in the top left (and children tend to congregate around play equipment). Or Grace's comment may not be valid because we only know that there are more children in that region (and not where the play equipment is).	B1 for correct assessment of the validity of the conclusion and a correct supporting reason We **must** see • a decision given – e.g. valid or invalid, correct or incorrect • reference to more children/higher concentration of children in the top left hand corner/that region (of the map)	(1)

Question number	Answer	Additional guidance	Mark
12 (a)	B2 Accept answers in the range $6.0 \leq Q_1 \leq 6.5, \qquad Q_2 = 10, \qquad 15.0 \leq Q_3 \leq 15.5$	B2 for all three values correct (quartiles in ranges) OR B1 for one value correct	(2)
(b)	M1 for a box with two whiskers AND at least **two** values plotted correctly from any of 2.0, 22.3, Q_1, Q_2, Q_3 (correct or follow through) A1ft for all correct with 2, 22.3 and median and quartiles (median and quartiles correct or follow through from (a))	For M1 and A1 Allow 22.3 plotted at between 22.0 and 22.5 Allow $\pm\frac{1}{2}$ small square accuracy on Q_1, Q_2, Q_3.	(2)
(c)	B1ft e.g. median height for Oak trees greater B1ft e.g. IQR/range smaller for Maple trees B1ft e.g. Maple symmetrical and Oak positively skewed depB1ft for any of the above interpreted in context e.g. • Oak <u>trees are taller</u> (on average) or Maple <u>trees are shorter</u> on (on average) • The <u>heights</u> of Oak trees are more widely dispersed, or the <u>heights</u> of Maple trees are more consistent. • The spread of <u>heights</u> above the average (median) for the Oak trees is greater than the spread of <u>heights</u> below the average, whereas the spread of heights above and below the average for the Maple trees is broadly the same.	B1ft for a correct statistical statement comparing the medians (ft (a) or (b)) Condone taller for comparison of medians. Must refer to <u>median</u>, not average for this B mark Condone misspellings but medium is B0. B1ft for a correct comparison of the IQRs or ranges (ft (a) or (b)) Condone wider for comparison of IQR/range. B1ft for a correct comparison of the skews (ft (b)) Condone both positively skewed. For symmetrical accept no skew but not neutral skew, normal skew or symmetrical skew. depB1ft for a correct contextual interpretation comparing medians or IQR/ranges or skew Dependent on correct statistical comparison having been made to support the interpretation given. Note: in this question ignore any numerical values in comparisons.	(4)

Question number	Answer	Additional guidance	Mark
13 (a)	M1 $\frac{4479 \times 200}{9963}$ (=89.9126…) or 0.45×200 or $45\% \times 200$ oe A1 90	Accept a correct equivalent calculation. M1 implied by 89.9 Do not award M1 for e.g. 45% of 200 alone. A1 accept either 89 or 90	(2)
(b)	B1 e.g • When the investigation only relates to one gender e.g. pregnancy, all boys schools • When a comparison is being made between genders e.g. male heights compared to female heights • If gender is not recorded in the data	B1 for a correct explanation of a **statistical situation** when it would not be appropriate to take a sample stratified by gender. Accept responses that refer to only one gender being present in the sample. Do not accept when gender is not relevant to the investigation / when gender is relevant to the investigation unless accompanied by an example of a situation.	(1)
(c)	B1 type of school/college. (Allow by gender **and** by type of school/college).	Accept maintained/independent/other and overseas only if all three listed.	(1)
(d)	B1 The events can both happen at the same time (1268 are female and from an independent school).		(1)
(e)	M1 $\frac{2778+6573}{9963}$ A1 $\frac{9351}{9963}$ or $\frac{1039}{1107}$ or awrt 0.94 or awrt 94% oe	M1 for fully correct method A1 awrt 0.94	(2)

Question number	Answer	Additional guidance	Mark
14 (a)	B1 IQR would not be affected by outliers/extreme house prices/extreme values OR IQR would allow comparison/measure of the spread/variability of the middle 50% of house prices/data	B1 for appropriate reason why the IQR would be appropriate Condone IQR would allow comparison/measure of the spread/variability (of the middle 50%) of house prices/data (in 1996 and 2016)	(1)
(b)	B1 e.g. the target audience might not understand IQR	B1 for appropriate reason why the IQR would not be appropriate Allow IQR only covers 50% of the data / does not include all of the data.	(1)

Question number	Answer	Additional guidance	Mark
15	B1 for finding the total number of diesel cars (10) AND the number of manual petrol cars (20) OR for finding the number of manual petrol cars (20) AND the total number of manual cars (24) B1 for finding the number of manual diesel cars (4) M1 for finding the probability of a manual diesel car $\frac{'4'}{'10'}$ OR a manual petrol car $\frac{'20'}{30}$ A1 $\frac{4}{10}$ and $\frac{20}{30}$ oe depB1ft correct conclusion for their two probabilities	B1B1 may be scored in a table or frequency (tree) diagram. Values may be implied by relevant probabilities, e.g. manual diesel $\frac{4}{10}$ oe implies 4 manual diesel cars and 10 diesel cars; petrol manual $\frac{20}{30}$ oe implies 20 petrol manual cars Numbers alone are not sufficient – there must be an indication of class of car e.g. diesel 10, petrol manual 20 Accept 0.66, 0.67 or better for $\frac{20}{30}$ Dependent on M1 scored.	(5)

Question number	Answer	Additional guidance	Mark
16 (a)	M1 $\dfrac{59430 \times 1000}{4660833}$ A1 12.8	Do not accept 100 as a misread of 1000 Accept answers in the range 12.7-12.8	(2)
(b)	B1 e.g. the size of the populations are the same	B1 for any reason which implies that the populations must be the same.	(1)

Question number	Answer	Additional guidance	Mark
17	B1B1B1B1B1 for five correct things identified • Both cars decrease in price as their mileage increases • Model A reduces in price by 13.5p per mile • Model B reduces in price by 10.5p per mile • Model A reduces in price more per mile than model B / model A's mileage affects the price more than model B's. • Model B has a greater (initial) price • A correct comparison of the price of model A and model B for a specific mileage	e.g. at 2000 miles Model A would be expected to cost £13,230 and Model B would be expected to cost £20,290 Note: 'for model A the price decreases as the mileage increases at a faster rate than it does for model B' can score B1B1 for the first and fourth bullet point in one statement.	(5)

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1ST0 1F
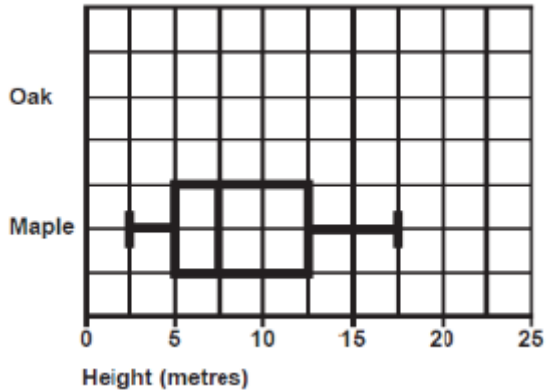
Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5º
Measurements of length: ±5 mm

Question number		Modification	Mark scheme notes
1		Wording added 'of five'.	
1	(c)	Diagram enlarged.	
1	(d)	Diagram enlarged.	
2		Diagram enlarged. Right axis labelled.	
6		Diagram enlarged. Shading changed.	
8	(b)	Table turned vertical.	

Question number		Modification	Mark scheme notes
9*		Diagram enlarged. Right axis labelled. Number of cruise ships reduced to 10.	
10*		Diagram enlarged. Shading changed.	
11*		Diagrams enlarged. Shading changed.	
12*		Diagram enlarged. Line moved to go through (5, 25), (10, 50), (15, 75). Box plot adjusted as follows: Values 2.0 and 22.3 changed to 2.5 and 22.5.	
17		Diagram enlarged.	