

Mark Scheme

Summer 2023 (Results)

Pearson Edexcel GCSE (9 – 1) In Statistics (1ST0) Foundation Paper 2F

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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.

Guida	ance on the use of abbreviations within this mark scheme
м	method mark awarded for a correct method or partial method
A	accuracy mark (awarded after a correct method; if no method is seen then full marks for the question are implied but see individual mark schemes for more details)
в	unconditional accuracy mark (no method needed)
oe	or equivalent
сао	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

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 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 bar drawn at length of 14 and not shaded.	B1 Ignore bar width and a bar not drawn with a ruler.	(1)
(b)	M1 15 -5 A1 10	M1 15 $-k$ or $k - 5$ OR 5 and 15 identified	(2)
(c)	 B2 for any two from ; Sweden won the most/Sweden won (4) more than Switzerland/ Sweden won (10) more than Great Britain Great Britain won the least Switzerland had the second most/Switzerland won (6) more than Great Britain 	Accept converse statements If figures are given they need to be correct	(2)
	(B1 for one correct comparison)	B0 for comparing the total number of medals won in 2014 and 2018 for each country.	
(d)	B1 Data that is numeric or numbers.	Do not accept answers referencing integer/quantity/data that you count	(1)

Question number	Answer	Additional guidance	Mark
2(a)	M1 A1 Frequencies 8,6,3,3	M1 At least one tally or frequency correct A1 all frequencies correct (tallies not required and incorrect tallies can be ignored if frequencies are correct)	(2)
(b)	B1ft 20	B1ft from their frequency table total	(1)
(c)	B1ft $\frac{"3"}{"20"}$ oe	B1ft their numerator for their frequency for orange from the table and ft their answer to part (b) for their denominator	(1)
(d)	B1ft More students preferred apples	 Accept for example; B1ft 5 more students preferred apple or the difference is 5. If figures are stated they need to be correct or ft from their tally chart. B0 for just stating figures 	(1)
(e)	 B1 for one of The data is non numeric Qualitative (data) (Data is) not numbers Not possible to find the mean or median. 	B1 for a correct reason. Do not allow e.g. 'easy to find', 'gives the most popular' which are both B0	(1)
(f)	 B1 for one of easier to analyse data Data is more organised Easier to read off the most/least popular/read off frequencies/see the differences 	B1 for any equivalent statement about the advantage of a tally chartAccept: clearer to see resultsB0 for it is more reliable or more accurate.	(1)

(g)	B1 bar chart	B1 for selecting correct option only.	(1)

Question number	Answer	Additional guidance	Mark
3(a)	 B1 for ONE of the following More likely/higher probability to land on the number 1 than any other number It lands on the number 1 significantly more than other numbers. Less likely/smaller probability to land on 2,3,4 	Accept it lands on number 1 the most or it lands on 2,3,4 the least. Do not accept it always lands on the number 1/keeps landing on number 1.	(1)
(b)	 B1 for ONE of the following There is a large number of 1's/more than half the spins were the number 1/ number 1 had the largest frequency 24 is much more than 5 and 6 There are fewer 2,3,4's than expected Would have expected each numbers frequency to be close to 10/ number of spins for each number are not equal Dep B1 Support Keshav/spinner appears to be biased (towards the number 1) 	Or any other reasonable explanations Just stating that the number 1 had 24 spins and not making a comparison is B0.	(2)
(c)	B1 Increase the number of trials/ spin the spinner more/ repeat the experiment.	 B1 for recognising that a larger sample is likely to give a better result B0 for a description of changing the properties of the spinner/ changing the environment or for spinning the spinner less times. 	(1)

Question number	Answer	Additional guidance	Mark
4(a)	 B1 for ONE of the following needs to collect more data/small sample size. use a different sampling method/the sample is not random/should take a random sample/biased /not representative, needs to ask other year groups/only 2 year groups being represented/should ask each year 	B1 for a suitable assessment or improvement Ignore additional comments unless contradictory.	(1)
(b)	M1 4 + 3 + 2 OR 20- (4+7) A1 9		(2)
(c)	B1 1		(1)
(d)	 B1for e.g. No, as only true for the data collected not the whole school No, sample size too small No, only two year groups 	Any other reasonable statistical explanation Ignore reference to figures for sample size.	(1)

Question number	Answer	Additional guidance	Mark
5(a)	B2 Ham/plain 6, Egg/total 39, fruit/total 55	B2 for 3 correct values in tableOtherwise:B1 for 1 correct value found	(2)
(b) (i)	B1 $\frac{25}{80}$ oe	B1 for any equivalent fraction, decimal or percentage Allow 0.31 or 31%	(1)
(b) (ii)	$B1\frac{20}{80}$ oe	B1 for any equivalent fraction, decimal or percentage	(1)
(b) (iii)	M1 '39' or $1 - \frac{41}{80}$ or $80 - 41$ A1ft $\frac{39}{80}$ oe	M1 for an attempt at subtraction or identifying '39' from their table A1ft allow equivalent answers Allow awrt 0.49 M1A0 for an answer of 39:80	(2)
(c)	 B2 Yes/Order more fruit scores with a reason she sold 55 fruit whereas she only sold 25 plain sold/ordered more fruit/fruit was the most popular sold 30 more fruit (B1 for stating order more fruit scones with an attempt at a reason OR for correct reason with an incorrect conclusion/no conclusion)	Accept comparisons of probabilities. If figures are given they need to be correct.	(2)

Question number	Answer	Additional guidance	Mark
6(a)	B1 Source of data box picked		(1)
(b)	B1 e.g. internet, weather reports, databases, scientific research.	B1 for a sensible source of collecting secondary dataB0 for a description of secondary data.	(1)
(c)	M1 attempt to add the numbers and divide by 12 (62.5 ÷12) A1 5.2(083) dep B1ft provided M1 is scored yes, (as the mean is bigger in Aberdeen)	M1 For appropriate addition and division by 12, condone one error dep B1ft for a correct conclusion following their figures.	(3)

Question number	Answer	Additional guidance	Mark
7 (a)	B1 Quota	B1 Condone misspelling Condone opportunity/convenience	(1)
(b)	B1 All visitors/customers/visitors in the theme park./ the 30 000 customers/ the 30 000 visitors	B1 must imply all visitors/customers B0 the visitors/customers/ 30 000	(1)
(c)	 B1 B1 Any three from Not random/ not everyone has an equal chance of been chosen/ Navine is picking the people Easy to do Allows for comparison in age groups, a range of people no sample frame required Only asking people's opinions on one day/ask opinions on another day Small sample compared with number visitors each day/should ask more people Face to face gets better response rate/explain question Face to face expensive/ time consuming/interview bias/ pressured to give an answer/may not be honest/should give a questionnaire instead Only asks about favourite ride and no other opinions/ask other questions about the theme park Asking them at the end of the day is sensible as they have had an opportunity to visit the theme park May not want to answer the questionnaire as they leave (as they are tired) / ask them inside the theme park 	B1 for equivalent of each of three appropriate bullets from the list.	(3)

Question number	Answer	Additional guidance	Mark
8 (a)	B1 Give the students a test before some revision and a similar test after some revision OR dividing the group into two and giving one group some revision and the other group no revision.	B1 Some reference to giving the students a test before and after some revision OR dividing the students into two groups.	(2)
	B1 Compare the results of the two tests for each student OR give the two groups a test and compare the two groups test results.	B1 Reference to comparing the results of the two tests.	
(b)	 If in part (a) they have suggested giving the students a test before some revision and a similar test after: B1 Any one from Small sample size Students may have revised before the first test and not revised before the second test Difficult to ensure that the tests are of equal difficulty The act of doing the first test may help with doing the second test If in part (a) they have suggested dividing the group into two and giving one group some revision and the other group no revision: B1 Any one from Small sample size Students/groups may be of different abilities Students who were meant to revise may not or students who were meant not to revise may revise If in part (a) BOB0 or BOB1 has been awarded B1 for small sample size 		(1)

Question number	Answer	Additional guidance	Mark
9(a)	 B1 for one of e.g. There are more births than deaths (per 1000 people) The crude birth rate, (per 1000 people) is higher than the crude death rate (per 1000 people) (between 2000 and 2014) The birth rate is (always) higher than the death rate 	B1 for a correct interpretation of crude birth rates and death rates.B0 do not allow reference to individual years	(1)
(b)	B1 Doesn't take into account people moving out of the country/migration.	B0 for any reference saying that the data is inaccurate	(1)
(c)	M1 $\frac{4398 \times 1000}{445053}$ A1 awrt 9.9	Do not allow 100 as a misread for 1000.	(2)

Question	Answer	Additional guidance	Mark
10(a) (i)	 B1 Any from Grouping data can help to spot patterns in the data Makes it easier to process large amounts of data Easy to compare different groups The data is easier to read The data is easier to represent on graphs 	Accept any other equivalent answer B0 for more accurate/easier/quicker	(1)
(a)(ii)	 B1 Any from Some detail is lost using grouped data/raw data retains the actual data We can only calculate estimates of statistical values /statistics can be calculated exactly from raw data 	B0 for not reliable	(1)
(b)	B1 Couldn't record the longest time in the table OR didn't allow him to record any data past 18 minutes.	B1 Some reference to been unable to record the longest timeReference to the table only containing data for 49 riders isB0.Do not accept it is an outlier.	(1)
(c)	B1 Outlier	B1 accept anomaly or it is far from the rest of the data. Allow any equivalent description Do not accept outliner for outlier.	(1)

(d)(i)	B1 Positive (skew)		(1)
(d)(ii)	B1ft	B1ft for correct interpretation of	(1)
	e.g. More than half of the cyclists took less than the mean time	the skewness in part (i)	
	cycling up the hill		
	Or	Any reference to the spread of	
	B1 Cyclists who take longer than the median time are more varied in	values below/above the mean is	
	their times than those who take less time than the median time	B0.	

Question number	Answer	Additional guidance	Mark
11(a)	France Spain 16 17 23 4	Accept e.g. F,S or any other unambiguous indication for labels.	(5)
	M1 two intersecting circles drawn A1 17 in centre and 23 in Spain M1 33 – 17 or 16	Do not accept three intersecting circles.	
	M1 $60 - (`16' + 17 + 23)$ or 4 in the correct region A1 fully correct with labels	Their ft '16' must be ≤ 20	
(b)	 B1 e.g. The statement is valid for her sample since 33/60 is more than ¹/₂ The statement is valid as 0.55 is greater than 0.5 The statement is valid as 33 is more than half of 60 	B1 for first statement valid with supporting reason Allow: Valid, since 33 is more than half.	(3)
	B2 e.g. Not valid/we cannot be sure since we don't know if the sample was representative.(B1 e.g. 'Not Valid/We cannot be sure' with an attempt at a reason OR sample may not be representative/sample is too small/do not know the population size of the town with no conclusion/incorrect conclusion)	B2 for second statement may be valid with supporting reason (B1 for not valid/unable to determine the validity of the second statement with an attempt at a reason OR for a correct comment on issues with the sample with no	
	population size of the town with no conclusion/incorrect conclusion)	conclusion/incorrect conclusion)	

Question	Answer	Additional guidance	Mark
number			
12	M1 for males: IQR: 6 – 5.2 (= 0.8) or Range: 6.2 – 4.6 (= 1.6) for females: IQR: 5.4 – 4.2 (= 1.2) or Range: 5.9 – 3.9 (= 2)	M1 for attempt at finding either IQR or range. Accept for a subtraction with one of the two values correct e.g. $6.2 - k$	(5)
	 A1 0.8 and 1.2 OR 1.6 and 2 B1 e.g. Median height for male adult giraffes, 5.6, is greater Median height for male giraffes is 5.6 and median height for female adult giraffes is smaller 5.6 for male giraffes is greater than 4.9 for female giraffes 	A1 for both correct IQRs or ranges B1 for a correct statistical statement comparing the medians together with the correct median for males. Do not accept comparison with 4.8/mean. If they have compared both 5.6 and 4.9 allow the use of the word average for median.	
	B1ft IQR/range for male adult giraffes is smaller or IQR/range for female adult giraffes is bigger	B1ft for a correct statistical statement comparing the range or IQR. ft their stated range or stated IQR for male giraffes	
	dep B1ft Claim one is correct (for Giraffes at the zoo) AND claim two is incorrect	dep B1ft for accepting claim one and rejecting claim two. Dependent on B1 B1 scored correct statistical comparison having been made to support the conclusion.	

Question	Answer	Additional guidance	Mark
13(a)	B1 e.g. 'The number of goals scored is discrete'	B1 for correct reference to the type of data (allow ungrouped) Accept whole numbers or integers. Do not accept quantitative.	(1)
(b)	B1 4		(1)
(c)(i)	B1 0		(1)
(c)(ii)	M1 28 – 23 OR 1 + 3 + 1 A1 5	M1 for identifying 23	(2)
(d)	B1 8		(1)
(e)	B1 e.g. 'The range/maximum number of goals scored is <u>10</u> ,(so the IQR must be less than 10')	B1 for correct reasoning Do not accept reference to the maximum/range being 11 or 12.	(1)

Question number	Answer	Additional guidance	Mark
14 (a)	M1 $(1 \times 2)+(2 \times 2) + (x \times 5) + (y \times 4)$ where x is 3,4 or 5 and y is 6,7 or 8	M1 For attempting to find the total amount of rubbish using consistent values within the class intervals including the boundaries	(3)
	$depM1 \ 2 + 4 + 20 + 28$	depM1 for adding their four values together from using midpoints of the groups.	
	A1 54 cao	A1 54	
(b)	B2 Arthur's comment is valid because the darker areas/more rubbish is found in the bottom right of the park.	B2 for correct assessment of the validity of the conclusion and a correct supporting reason We must see	(2)
	(B1 for e.g. the darker areas/more rubbish is found in the bottom right of the park with no conclusion or incorrect conclusion.)	 a decision given – valid, correct reference to more rubbish/higher concentration of rubbish in the bottom right hand corner 	
		(B1 a correct assessment with no or incorrect decision)	
(c)	 B1 Ian's suggestion is valid AND one of the reasons below Only collected on one day (Saturday) Only collected on one morning (Saturday morning) Weekend so park may have been busier 	B1 for a correct conclusion with a supporting reason Allow equivalent appropriate reasons.	(1)

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1ST0 2F

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: 1ST0_2F			
Ques	stion	Modification	Mark scheme notes
1		Wording added 'Look at the diagram for Question 1 in the	Standard mark scheme
		Data Booklet. It is an'.	
		Wording removed 'The'.	
		Wording 'shows' removed and replaced with 'showing'.	
		Diagram enlarged.	
		Black grid lines.	
		Top axis labelled.	
		Axes labels moved to top of vertical axis and to left of	
		horizontal axis.	
		Key moved above diagram and to the left.	
		Wording added 'in the Diagram Booklet'.	
		Leeway needed.	
2		Wording added 'Look at the table for Question 2 in the Data	Standard mark scheme
		Booklet.'	
		Wording added 'in the table in the Data Booklet'.	
		Table enlarged.	
3		Wording added 'Look at the diagram for Question 3 in the	Standard mark scheme
		Data Booklet.'	
		Diagram enlarged.	
		Open headed arrow.	
		Table enlarged and left aligned.	
		Wording added 'on the previous page'.	
4		Wording added 'Look at the diagram for Question $4(b)$, $4(c)$	Standard mark scheme
		and 4(d) in the Data Booklet. It is a'.	
		Wording removed 'The'.	
		Wording 'shows' removed and replaced with 'showing'.	
		Diagram enlarged.	
		Black grid lines.	
		Open headed arrows.	
		Axis label moved to top of vertical axis.	
		Right axis labelled.	

PAPER: 1ST0_2F			
Questio	n Modification	Mark scheme notes	
5	Wording added 'Look at the table for Question 5 in the Data Booklet. It shows an incomplete two-way table.'Wording added 'in the Data Booklet'.Table enlarged.Wording added 'There are three spaces to fill'.	Standard mark scheme	
6	 Wording removed 'This question must be answered' and replaced by 'This question is multiple choice. Write the letter of your chosen answer in the box provided'. Option boxes removed. Answers labelled A, B C and D and stacked vertically. Answer box added. Wording added 'Look at the table for Question 6(c) in the Data Booklet.' Wording 'The table' removed and replaced with 'It'. Table enlarged and turned vertical. 	Answer 'A'	
7	No modifications	Standard mark scheme	
8	No modifications	Standard mark scheme	
9	 Wording added 'Look at the diagram for Question 9 in the Data Booklet. It is a graph showing'. Wording removed 'The graph below shows'. Wording 'above' removed and replaced with 'in the Data Booklet'. Diagram enlarged and turned landscape. Black grid lines. Graph lines made thicker. Open headed arrows. Axes labels moved to top of vertical axis and to left of horizontal axis. Key moved above diagram and to the left. Dotty line changed to dashed line for 'Birth Rate'. 	Standard mark scheme	

PAPER: 1ST0_2F			
Ques	tion	Modification	Mark scheme notes
10		Table enlarged and left aligned. Wording added 'Look at the diagram for Question 10(c) and 10(d) in the Data Booklet. It shows the frequency polygon that Sam drew for the hill climb results.' Wording removed 'Sam drew this frequency polygon for the hill climb results'. Diagram enlarged. Black grid lines. Open headed arrows. Axes labels moved to top of vertical axis and to left of	Standard mark scheme
		horizontal axis. Crosses changed to solid dots. Graph line made thicker. Graph cut to reduce amount of reading.	
11		Wording added 'There is blank space on pages * and * in the Data Booklet'.	Standard mark scheme

PAPER: 1ST0_2F			
Ques	stion	Modification	Mark scheme notes
12		Wording added 'Look at the diagram for Question 12 in the Data Booklet. It is a box plot.' Wording removed 'below' and replaced by 'in the Data Booklet'. Diagram enlarged. Black grid lines. Small squares removed. Axis label moved to left of horizontal axis. Box plot outline made thicker. Table enlarged, turned vertical and left aligned.	 M1 for males: IQR: 6 - their 5.2 (= 0.8) or Range: 6.2 - their 4.6 (= 1.6) for females: IQR: 5.4 - 4.2 (= 1.2) or Range: 5.9 - 3.9 (= 2) A1 their 0.8 and 1.2 OR their 1.6 and 2 B1 Median height / their 5.6 for male adult giraffes is greater or median height / 4.9 for female adult giraffes is smaller B1 B1ft as standard scheme Additional guidance column: M1 for attempt at finding either IQR or range For their 5.2 accept 5.15 ≤ LQ ≤ 5.2 For their 4.6 accept 4.55 ≤ min ≤ 4.7 A1 for both correct IQRs or ranges For their 0.8 accept 0.8 ≤ IQR ≤ 0.85 For their 1.6 accept 1.5 ≤ range ≤ 1.65 B1 for a correct statistical comparing the medians For their 5.6 accept 5.55 ≤ median ≤ 5.7 B1 B1ft as standard scheme

PAPER: 1ST0_2F			
Ques	tion	Modification	Mark scheme notes
13		Wording added 'Look at the diagram for Question 13 in the	Standard mark scheme
		Data Booklet. It is a'.	
		Wording removed 'The'.	
		Wording 'shows' removed and replaced with 'showing'.	
		Diagram enlarged.	
		Black grid lines.	
		Graph line made thicker.	
		Open headed arrows.	
		Axes labels moved to top of vertical axis and to left of	
		horizontal axis.	
		Right axis labelled.	
14		Wording added 'Look at the diagram for Question 14 in the	Standard mark scheme
		Data Booklet. It is a'.	
		Wording removed 'The'.	
		Wording removed 'below'.	
		Wording 'represents' removed and replaced with	
		'representing'.	
		Diagram enlarged.	
		Key moved above diagram and to the left.	
		Shading changed.	

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