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Examiners' Report  
Principal Examiner Feedback

June 2023

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

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## **GCSE (9 – 1) Statistics – 1ST0**

### **Principal Examiner Feedback – Foundation Paper 1**

#### **Introduction**

#### **General comments**

In comparison to earlier series, the overall spread of difficulty within this paper was not similar, and as a consequence, it proved slightly less accessible for foundation candidates. This was not due to the questions testing outside of the foundation scheme of work. This comparison has been reflected in the grade boundaries accordingly.

Students were generally able to attempt the whole paper within the time allowed. Students performed well on the first three questions, and there were varying degrees of success on most of the remaining questions. Question 7 proved to be quite inaccessible to the majority of candidates. This is very likely to be due to the topic of stratified sampling being presented as an extended response question for the first time since the curriculum changed.

#### **Question 1**

This question required students to extract information from a table. Parts (a) and (b) were very accessible. Part (c) was generally answered very well with most students gaining full marks. Comparisons were stated for both Australia and Italy clearly either by the table or on the answer line. Where students did not gain full marks, they either identified Australia as having the greater difference with no correct numerical evidence or stated an incorrect conclusion from incorrect differences. Although offered as an alternative answer in the mark scheme, there were very few candidates whose response compared the Philippines to Australia. Part (d) was answered very well on the whole with students gaining full marks either for saying males in Australia were taller or for correctly stating the difference between the two countries. Some just worked out '180-169=11' with no comment. Where students did go wrong, they either compared the wrong countries or misread the question to look at the difference in males and females as was required in part (c). Part (e) was not answered as well. Often students would give an alternative graph such as a bar graph but not actually state what was wrong with the time series graph. Students also stated that height and time were not related which meant they did not gain the mark. Students who did not score were not able to articulate the change over a period of time needed for the time series graph.

## Question 2

This question required students to locate the likelihood of an event on a scale and use the correct language to describe the likelihood of an event. Part (c), requiring the calculation of an expected frequency, was well attempted with many responses scoring both marks. Those scoring zero often incorrectly calculated  $\frac{5}{8}$  of 80 or alternatively calculated  $80/5$ . Dividing by 6 (as on a normal dice) was condoned for 1 mark, and a few responses did gain this mark. 1 mark was awarded for incorrectly written final answers such as 10/80 when read to mean '10 out of 80'. Part (d) was attempted by most candidates. Some incorrect responses included that Jonathan and Kasia had the same/even chance of getting a six, or they had the same chance, as they were each getting one roll. Some responses identified the number of sides on each dice but did not actually say that one was more or less sides than the other. This was a similar case when probabilities were shown. In a few cases learners thought that 8 sides were more likely as there were more than 6.

## Question 3

This question required students to recognise where errors in construction lead to graphical misrepresentation. Many of the candidates attempted this. Often the vertical axis was referred to as the y-axis. Some incorrect responses with regards to the vertical axis stating it was wrong as they were not whole numbers; there wasn't a percentage sign on the numbers; the scale went up by 4 then 2 instead of 0.4 then 0.2. Candidates also referenced the lack of title as a common misconception. Instead of using accurate language regarding the width of the bars, many candidates wrote the size of the bars.

## Question 4

The candidates were required to comment on the appropriateness of conducting a sample rather than a census in (a). Many candidates scored full marks available by simply stating 'cheap and easy'. More sophisticated answers elaborated on this. Amongst the responses seen, there were many candidates who did not seem to understand the difference between a census and a sample. A few responses indicated that a census would be the whole country so was not relevant for this investigation. Other common errors seen included: samples are more reliable/accurate/unbiased, and candidates interpreting 'census' as the 10-yearly UK census.

In Part (b)(i)(ii) many candidates scored zero, they were unable to explain the term 'sampling frame', particularly in regard to the context of the question. Many candidates seemed unfamiliar with the concept of the electoral register, and this confused some when forming their responses.

In part (c) candidates had to give reasons for conducting a pilot survey. There were some very good responses, but the majority of candidates did not seem to have a grasp on what a pilot study is and how it would be used. A large number of responses referred to pilots and air stewards demonstrating this lack of understanding of the key term. Others incorrectly stated the advantages of conducting a sample, rather than a pilot survey as requested in the question.

Part (d) was an extended response question. A small number of candidates received full marks on this question. Many scored two marks for stating an appropriate sampling method and an appropriate diagram, usually, these were 'random' and a 'bar chart'. Candidates did not always give a reason for their chosen sampling method or diagram, and a reason alone was not awarded due to the dependency requirements of the mark scheme. One common error seen for the use of a bar chart was that a chart like this is easy to draw. Instead, the candidate should reason that the bar chart allows for easy comparison. The third mark was often scored for stating an appropriate closed, non-leading and relevant question, but again; candidates often neglected to give a reason as to why this question was appropriate.

### **Question 5**

Part (a) was well attempted with many candidates scoring at least one mark. This mark was usually awarded for stating a negative correlation and then neglecting to interpret this in context. In 5(b) most responses had a correct line of best fit. This mark was lost if their line of best fit did not go through all the points or not ruled. In part (c) many candidates misread the scale along the horizontal axis, leading to an incorrect answer. Another common mistake was to state the answer as a negative value. Perhaps due to the perfect linear relationship of the line of best, many candidates did not manage to describe the extrapolation of the data in part (d) which would explain the unreliability of the answer. Those who did understand the concept of extrapolation, did not always explain it succinctly in their answers.

### **Question 6**

Parts (a)(b) and (c) were answered reasonably well. There were a large number of students who were unable to identify the correct type of data in (a), but still went on to score one or both marks in (b) and (c).

In part (d) candidates attempted this question but outcomes were varied. Many students incorrectly stated that the median was the better average because it was not affected by outliers. This scored zero because there was no comparison made with the mode. Other incorrect answers included candidates stating the mean as the most appropriate when the question requested the median or the mode.

Part (e) was well attempted. Where students did not get full marks they often worked out the range instead of the interquartile range.

In (f) very few students gained full marks. Some were able to make a correct comparison between the medians but then did not put that into context for the second mark. Some pupils stated the medians or interquartile ranges of each but did not actually make a comparison between them. Many students compared the upper and lower quartiles but did not actually make a comment about the interquartile range. Some students commented on the presentation of the data rather than comparing the data itself. Very few picked up more than 2 marks for this question.

Parts (g)(i) and (ii) were not answered well. Where candidates did gain marks it was usually for a correct comment about how it would have an effect on the mean. Unfortunately, there were many whose comments were too vague, stating only that including the outlier would affect the data. The responses for g(i) and (ii) were occasionally given in reverse order, scoring no marks.

### **Question 7**

This extended response question was not answered well, and often not attempted. Only a small number of candidates gained any marks on this question. Most students failed to do the calculations for the stratified sample. Some instead gave an alternative sampling method or simply said to take 5000 from each group and sample them. Where students did attempt a calculation and it was too often not done correctly, either dividing the total of the 17-year-olds by the total of the 18 and older rather than the total or dividing the total by the number in each individual group. Only a few managed to calculate 67 and 9933. Most students failed to make a comment about the random sampling within the strata, and incorrect statements were given as to how the sampling method could be improved. Those who scored well on this question usually scored the first 3 marks for the correct calculations of the strata sizes.

### **Question 8**

This question required students to demonstrate their knowledge of how to use a random number table in order to design an investigation using a simulation technique. This question proved to be inaccessible for most candidates. When attempted, responses in (a) were often good. The remaining parts (b), (c), and (d) were often not attempted. Part (b) was not answered well, many candidates did not eloquently explain why the use of 00-37 was appropriate for a population with 38% of one blood type, their response seemingly just rewriting the question. Many candidates failed to understand the application of the simulation method in part (c). A correct answer of 6 was awarded one mark, and evidence of a correct method was required for the second mark. In part (d) candidates failed to link the sample mean to the population mean. Marks here were usually earned by mentioning that the sample size could be larger, or that it was too small.

### **Question 9**

Question 9 was the first of two common questions with the higher-tier paper. Parts (a), (b) and (c) were answered reasonably well by the foundation candidates. There were a large number of students who were unable to identify the correct type of data in (a), but still went on to score one or both marks in (b) and (c). In parts (b) and (c), those that attempted this question were able to work out the scale and gain at least one mark in part (b) and in part (c). In part (c) the correct scale was also required on the histogram in order for it to be completed, occasionally costing some candidates the second mark.

Part (d) was answered very poorly, and often left blank. Candidates were unable to comment on the distribution of the data for a negative skew. Many candidates made irrelevant comments attempting to compare the weights of the basketball players to different parts of the histogram. Comments such as the weight

decreased or increased. Most students did not mention the median or the mean in their responses and did not give any correct contextual interpretation.

In part (e)(i) the candidates were expected to calculate the mean from a grouped frequency table. When attempted, generally candidates gained the first method mark from using a number in the interval and attempting to sum. Some abandoned their correct working for the first M1 and then decided to calculate  $810/6$ . A few worked out  $fx$  but then failed to sum their values. Many students who did not answer it correctly with no working answered with 135 because they simply divided the total of 810 by the 6 class intervals. Some who gained the first method mark then lost the remainder of the marks because they divided the correct total of the midpoints rather than the total frequency. The final accuracy mark was occasionally lost for incorrect rounding. Part (e)(ii) was a follow-through question, but not a strict follow-through. So, as a consequence, it proved to be a very generous mark. Most students who attempted it were able to gain the mark for a correct description of how the heights had changed over time according to their calculated answer, or from direct interpretation from the data in the table.

### **Question 10**

Question 10 was the second of two common questions with the higher-tier paper. Stating a hypothesis in (a) was often attempted and answered well by the foundation candidates. The statement had to include a reference to a type of vehicle, an increase or decrease in registrations or sales, and a time frame. Where students lost marks, it was generally because they were missing one of those three elements of the hypothesis or in a few cases wrote a question rather than a statement.

Part (b) proved to be more difficult for the foundation candidates, whose attempts to answer often confused the quartiles with incorrect seasons. The responses were often too vague, discussing the first part of a year rather than distinguishing the quartiles they were referring to. In general, this part of the question did not score well.

Part (c) was not answered well either. When attempted, candidates wrote a comment about removing the trend, but the comments were too vague to award the mark. Most students who scored on this question successfully identified the four quarters or seasons in the year. Often the question was just rewritten for the response.

In part (d) some responses only involved a description of one vehicle, so no comparison was made. Some included the difference in the overall graphs rather than specific references to seasons as required.

In part (e) there was a lot of inaccurate plotting of the moving averages both vertically and horizontally; the trend line was often not plotted; often points were joined up instead of drawing a straight line. When the trend line was drawn. It was mostly within tolerance.

In part (f) responses that scored the mark were often succinct. Students who attempted to go into more detail often described the various increases and

decreases over the period of time, and failed to state what the overall trend was overtime.

### **Question 11**

In part (a) the sample space diagram was generally completed well, with a few responses making an error or two, and a few that were quite confused. Most attempted this question. In (b) many responses correctly used 12 as a denominator for 1 mark, but far fewer gained both marks for a correct answer. Many worked out the probability that Chloe won the game, and did not then use this to find the complement.

### **Summary**

Based on their performance on this paper, students should:

- read each question fully and carefully before attempting to answer it
- show working out to support the final answer
- practice interpreting answers to statistical calculations and diagrams in context
- practice identifying the appropriateness of calculations, diagrams and approaches in
- different settings
- give a decision when the question asks for this and support it using the information from
- the question, such as a relevant sampling method given the sampling frame that is intended for
- use (4d)
- practice on making comparisons, particularly those in context (6f, 10b, 10d)
- Recognise the importance of any numbers in a question as an indication that the response requires a calculation to be done or use the number to explain or justify a conclusion
- Including the use of a correct comparative word when required within a response.

