Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

Summer 2019

Pearson Edexcel GCSE (9 – 1)

In Statistics (1ST0)

Foundation Paper 2F

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GCSE (9 – 1) Statistics – 1ST0
Principal Examiner Feedback – Foundation Paper 2

Introduction

Students often find a change of specification challenging and this was true for many on this first paper 2F of the new specification.

It was pleasing however to see Foundation students achieve success on probability questions (e.g. 1(e), 2(b) and 5(a)) as these have historically been found challenging at this tier. Also quite successful was the interpretation of secondary data, both from diagrams (pictograms in Q1 and population pyramids in Q11(c)), and from tables of data (Q3).

Whilst it appeared that some students may have been less familiar with some topics new to Foundation tier, considering target audience in choice of diagram was addressed quite well. In some questions however, it seemed that a number had taken insufficient care in reading the question to be clear about what was being asked.

Calculations were generally attempted when expected (although not always correct, such as attempting mean in Q12(c)). On some comment questions, especially when worth multiple marks (such as Q8(b)), some students offered only brief answers.

Individual Questions

Question 1

On the most part the first question on this paper provided a very familiar and accessible start to students at all levels although in part (a) a surprising number of students could not name the diagram as a pictogram. Nearly all however correctly read and interpreted the pictogram to complete the table in part (b) and identify the mode in part (c)(i).

It was significant in part (c)(ii) that very few students recognised the demand of the question as reasoning why mode was the appropriate choice of average. Most commonly seen was stating the definition of the mode. A very small number correctly identified that the median and the mean cannot be used for non-numeric data.

Part (d) was generally well answered with most students recognising that a pictogram is a suitable, usually suggesting it is an easy to understand diagram for the given context. Some students offered a conclusion without an attempt at reasoning and this scored no marks, whilst others suggested that the key might be confusing (representing 2 members) or that a bar chart would be better. These were not accepted as appropriate arguments.

The vast majority of the students scored the final mark for writing down the probability in part (e). Few failed to gain the mark by giving answers inappropriately as ratios or in words.

Question 2

The majority of students managed to give at least one correct reason in part (a), usually by suggesting it was a leading question or an open question (often referring to no answer boxes). It was much less common to see two correct reasons. A lack of time frame was not uncommon among non-scoring answers as were criticisms of the grammar and, from some, attempts to re-write the question rather than to criticise it.

In part (b) more than half of students were able to identify the two correct probabilities, whilst the common incorrect answers were 8/20 and 12/20 in parts (i) and (ii) respectively. A large majority were able to score the final mark (whether or not they had scored the first two), usually with reference to Nabir being on a smaller team, rather than by using the probabilities obtained. Those failing to score the final mark either stated a name without a reason or incorrectly gave the answer of 'Jenny, because she was from a larger team'.

Question 3

Interpreting secondary data sources as in this question is usually done well and this was the case for most students, particularly in the first three parts. Common errors in part (a) were due to rounding or truncating the table value of 8.88%. Part (b) was expressed in a variety of ways but was usually correct. Some did unnecessary calculations, sometimes not stating a conclusion, with a small number incorrectly referring to market share not sales.

Volkswagen was usually correctly identified for part (c) but in part (d) students were a little less successful, with some perhaps not realising they could simply use the final column to identify those with a fall in sales.

Question 4

For many students this question started well with often 3 or 4 marks scored from the first 5. Explanations for parts (d) and (e) were less successful.

Accuracy of plotting (perhaps due to issues reading the vertical scale) was disappointing for a number of students with not uncommonly only one of the first two marks scored. A number of students failed to plot the points and did not score in part (a).

Appropriate trend lines were often added to the graph for part (b)(i) but the most common ones not to be acceptable were either drawn through the corner of the grid

(2006, 5.00), or joined point to point. An acceptable interpretation of trend was usually offered in part (b)(ii) with the most common answer not to score being 'positive correlation'. Students need to be careful not to confuse correlation on a scatter diagram with trend on a time series graph.

Interpretation of the gradient for part (c) was typically less successful with few realising it was the change (in price) *per year*. Incomplete answers referred again to a description of trend.

In part (d) many students failed to recognise that the price scale did not start from zero, making the graph potentially misleading, and so did not score. Some incorrect answers suggested the decimals might make it confusing, or argued that it was an easy scale and so was not misleading.

Many students in part (e) failed to recognise the dual demand in the question, not making it clear which year they were referring to. (Questions should be read carefully.) Few recognised that one of the years involved extrapolation whilst the other did not. Common incorrect descriptions included comments such as 'off the graph', which is not an acceptable equivalent to 'outside the range of data' (i.e. extrapolation). Some students incorrectly made comments about whether it was 'possible' rather than 'sensible'. Students should be advised to be careful and precise with the language that they use.

Question 5

Part (a) was the most successful part of the question with three-quarters correctly finding the probability. Common errors were including the £20, or extracting figures incorrectly from the table. Some found a correct total without attempting to give a probability.

About one in three students realised more data would lead to a better prediction for part (b), this being expressed in a variety of ways. Some did not address the question, incorrectly suggesting other ways of presenting the results (e.g. with graphs), or even suggesting there may be an error in his calculations.

A majority of students gained at least 1 mark in part (c), commonly for a correct comparison. A common failing among those not scoring was to simply list the proportions without making a comparison. A not uncommon error in students' reasoning was that there was a mistake in the calculation. A variety of appropriate reasons were offered and gained credit, the most common relating to items costing less in the shop so only smaller notes were needed.

Question 6

This question was not a good source of marks for many students, part (c) being the most likely place for many to score a mark. Incomplete answers to part (a) often identified that

15 (or 15.5) was relevant but did not make the connection with the cumulative frequencies in the table. Incorrect answers made reference to the mode, or just stated that 'the middle value was in the class' (i.e. restating the question) with no attempt to justify the statement.

Linear interpolation is new to Foundation tier on this GCSE and most students were unable to start an appropriate attempt in part (b). Incorrectly stating 180 (as the middle of the median class) was most common.

Many students were able to score 1 mark in part (c), either for a correct comparison of their answer in (b) with the stated 110, or for an interpretation of how much duration had been affected. Few scored both marks. Only about one fifth of students recognised the skew in the data (or extreme values) as being an issue when finding mean. Answers not to score often gave a definition of mean, or suggested that mean was in fact appropriate.

Question 7

Just over half of students were able to identify the qualitative variable from the list in part (a). Cleaning data is a new topic and just under half were able to identify at least one reason for doing this in answer to part (b), focussing commonly on mixed units, whilst about one in five students scored both marks.

Considering use of technology is also a new demand but only a minority of students offered a suitable answer. It was apparent that many did not understand the advantages of a spreadsheet over manual processing. (Although condoned this time, the common answer of 'displaying data clearly' does not strictly relate to processing.) Many suggested a spreadsheet would not be appropriate, either offering no reason or suggesting it would make it more complicated.

Part (d) was a more standard question and the majority of students were able to give an appropriate calculation for mean. Considering target audience is a new demand but two thirds of students were able to correctly identify pie chart as the appropriate answer to part (e).

Question 8

Only a minority of students were able to offer an appropriate advantage of stem and leaf diagrams compared with histograms in answer to part (a). Common wrong answers suggested the diagram was quicker or easier, rather than recognising that the data *values* were present so could be used.

Part (b), worth 6 marks, was one of the extended questions to be expected on the new GCSE, although it involved the previously regularly tested and important skill of comparing distributions. These questions need to be read carefully to ensure the

demands are being met. Here students usually focussed only on addressing the hypotheses using the data, or less often on the reliability of conclusions, but commonly not addressing both of these demands. (A small number of students did achieve 5 or 6 marks however.) Some students mistakenly thought 'reliability of the conclusions' meant whether or not they were correct. There were some students leaving this question blank, perhaps not understanding what was expected.

Analysis of the first hypothesis was commonly correct although not always using appropriate statistics, even though a table of key statistics had been given. e.g. It is not appropriate to be comparing the tallest or shortest in each population. Analysis of the second hypothesis was less successful with some reaching the incorrect conclusion that the hypothesis was supported. In addressing each of these hypotheses some students *listed* appropriate values but failed to explicitly *compare* them.

For those that did go on to consider the reliability of conclusions marks were most often gained for recognising that the investigation and results were based on a small sample.

Question 9

Part (a) was a standard probability question but a large number of students incorrectly read it as a conditional question with 27/120 being a common wrong answer. Wording needs to be read more carefully.

The remainder of the question was on the new topic of 'risk'. Whilst about half of students understood absolute risk and were able to answer part (b) correctly, there were very few who understood relative risk. Various calculations leading to the stated answer of 0.5 in part (c)(i) were sometimes seen but not relevant and did not score. For the interpretation in part (c)(ii) some students came close by recognising which mode of transport had the greater chance of lateness but rarely with reference to the specific relative risk of 0.5

Question 10

A depth of understanding of sampling was not commonly demonstrated by Foundation students on this common question (also on paper 2H). It was not usual to see two correct reasons given for part (a) but many students were able to score for one correct; most often this was for recognising that there may be repeated numbers. A common answer to not score was that there might be fewer than 100 students at the university. Other appropriate answers, e.g. that random numbers might be out of range for the sample frame, were much less commonly seen.

In part (b), the advantage that quota sampling fairly represents proportions in the population was rarely seen, whilst the most common advantage to score a mark was related to speed or efficiency.

Very commonly in part (c) answers simply repeated the question, stating that students are not selected randomly. Some students were able to score by correctly stating that not all students would have an equal chance (but note that reference to 'even chance' is not correct), that they were *chosen* rather than randomly selected, or less frequently that the sample was restricted to those in the building at the time.

Question 11

This common question was found more accessible by Foundation students with many picking up marks in parts (a) and (c). In part (a) most were able to correctly read the answer from the population pyramid. Fewer in part (b) explicitly recognised that the first age group was narrower than the rest, or that there would be fewer drivers. Often the mark was scored by suggesting that as young drivers they were still learners or hadn't been driving long, which was condoned.

In part (c) students were very often able to extract the necessary information from the diagram to compare with the 66 700 claims for 2014. A very common error however was to read 25 000 for the 20–29 class only, not finding the total figure for 20–49. A correct interpretation that the number of claims had fallen was often reached however.

There were very few students who answered part (d) as directed. They were asked for *features* of the population pyramid as justification, so should have been referring to bar lengths. Comments *interpreting* the pattern of bar lengths were most common and these were condoned when correct. A common problem however was that students often did not recognise the multivariate nature of the question. They should have been considering each of gender and age to score the 2 marks. Instead, a combined statement was often seen such as 'young male drivers make the most claims', which could score at most 1 as an incomplete answer. Some students failed to score as they did not make reference to the diagram, instead suggesting their own opinions as reasons, such as males were more dangerous.

The final two parts required students to consider the validity of statistical methods and conclusions. This is explicitly expected on the new specification. Unfortunately only a minority of students recognised that the statement in part (d) was not valid as the information presented was about number of *claims* not number of *drivers*. This failure of recognition was clear given the commonly asserted answer that it was appropriate because there were 'more men than women on the pyramid'.

Again, in part (e) only a minority recognised the poor validity, in this case using data from 2015 to draw conclusions about 2019. Some incorrectly referred to the trend (e.g. not continuing) – we only have relevant information from one year so cannot be considering trend. Many answers were unclear or vague, sometimes agreeing or disagreeing with the statement but giving no clear reason.

Question 12

Interpreting class boundaries from a frequency polygon was poorly done by many in part (a) of this final common question. The most common errors were either stating the 'range' of the graph (from 50.5 to 54.5), or stating 50 to 51.

Part (b) was more successful for many Foundation students who were able to identify the three correct frequencies to add up. Some were able to gain a method mark when two of their three values were correct, but those only showing the answer could not score this mark having made such a slip. Students should be encouraged to write down their calculations before evaluating.

Mean of a frequency distribution is a common demand but the additional requirement to obtain the appropriate values from the graph meant that only a small minority scored here. Common errors were adding the five mid-points then dividing by 5 or sometimes by 49.

Question 13

Interpretation of Spearman's rank correlation coefficient is new to Foundation tier and this question was answered better than some other new topics. This was often without full understanding being evident however. Typically 1 mark was scored in part (a) for saying that it was a sensible statistic to use but usually this was not accompanied by a correct reason. Some referred to the quality of the mince pies without linking it to the price. Part (b) was better for many, often giving an appropriate conclusion in context, although not too often stating the justification that there was positive correlation, or that 0.77 is close to 1.

Summary

Based on their performance on this paper, students are offered the following advice:

- Practice the statistical techniques new to Foundation tier, including linear interpolation, relative risk, and Spearman's rank correlation.
- Learn key terms and practice using them in their statistical work and investigations. Students need to be careful in their choice of vocabulary.
- Carry out statistical investigations using real data (both primary and secondary) to develop their understanding of the statistical enquiry cycle.
- Practice drawing conclusions (and assessing conclusions) from results presented to them (or that they have produced). Comparing data sets remains a key element in statistical investigations, using measures of average and spread. Such analysis needs to include a consideration of the appropriateness of statistical methods and conclusions drawn.

- Carrying out statistical investigations should help familiarise students with skills now explicitly tested in the exam for the new specification. These include cleaning data and the advantages of using technology (such as spreadsheets), as well as considering the reliability and validity of statistical methods used to address hypotheses or reach conclusions.
- Take care with clarity of handwriting and calculations, otherwise it can be difficult to see the evidence to award marks.
- Practise writing clear explanations and interpretations, bearing in mind exactly what is asked in the question and what statistical evidence you should give to support your answer. Re-read comments to check they are not too vague.
- In open response comment type questions take notice of the number of marks available as this is generally an indication of how many points are expected to be made.
- Where comparisons are required in a question, students need to be aware that listing figures alone is insufficient without then making a comparative statement.
- Practice problems requiring more than one stage, such as extracting information from a graph in order to perform a calculation.

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