Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

November 2020

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In Statistics (1ST0)

Higher Paper 2H

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GCSE (9 – 1) Statistics 1ST0

Principal Examiner feedback – Higher Paper 2

Introduction

General Comments

This was the second entry of the new specification in GCSE (9 – 1) Statistics. There were some notably improved responses in terms of the AO3 assessment objective where candidates made clear decisions about appropriateness of methodologies and conclusions and made good attempts at justifying their responses. Comparison of Spearman's rank versus Pearson's product moment correlation coefficient remains at challenging topic at this tier. Candidates are reminded to give their answers and interpretations in the context of the question rather than relying on stock responses. This report is based on a relatively small number of entries due to the exceptional circumstances of this series.

Question 1

Candidates made a strong start to the paper with virtually all being able to use the data to complete the frequency polygon in part (a). Typical mistakes, including joining the first point to the last point, were rarely seen.

When comparing distributions in part (b), candidates should focus on a measure of central tendency and a measure of spread rather than giving a point by point description. Most were able to identify that the spread was greater in 1918 but they were less successful at articulating the fact that the mode/mean was higher in 1918. It was fairly common to see vague comments which did not score such as 'there were more children in 1918'.

Question 2

There were some strong performances on this question from candidates at this tier. The vocabulary of regression is well known and many gave a correct reason in part (a) as to why 'annual profit' is considered the response variable. Most candidates described the fact that this was dependent upon the distance from the car park.

Part (b) was again well answered with most candidates referencing negative correlation and correctly concluding this supported Mike's hypothesis. On a few rare occasions, candidates simply repeated the wording in the question rather than making a specific reference to the scatter diagram.

There was a somewhat mixed response in part (c) but overall the majority of candidates realise the need to plot the line of best fit through the mean point. Some obviously tried to plot this by eye and often did not achieve an accurate y–intercept. The interpretation of the y-intercept was perhaps the least successfully answered part of the entire question. Many did not make reference to the context of the question and were unable to access the mark here.

Candidates are familiar with the dangers of extrapolation and part (d) was generally well answered. It was pleasing to see candidates using correct statistical vocabulary.

Part (e) was more challenging with about half of candidates realising that this was testing the fact that correlation does not mean causation. Others focused solely on the positive correlation and concluded that the statement was valid.

The calculation of a percentage decrease was well attempted in part (f) though many gave a negative percentage decrease which was not accepted. Some only went as far as calculating the percentage that remained.

Question 3

Histograms with equal class widths are well understood by candidates at this tier and parts (a) and (b) were well answered. Most went on to label the vertical scale which helped ensure accuracy.

Given the shape of the distribution, many candidates were able to identify that the skew in part (c) was positive but some opted to describe the shape rather than identify the skew. Interpretations were less successful and candidates should aim to give their interpretations in the context of the question. The most common incorrect answer described the distribution as 'increasing then decreasing'.

There were many good attempts at part (d) with the calculation of the estimate of the mean from a grouped frequency table a strength of the candidates at this tier. Some did not read the question carefully enough and calculated both means even though one was already given to them. On some occasions, candidates forgot to state that David was incorrect. But more often, candidates did not state a reasonable limitation of the calculation. Some stated insufficiently that it was simply an estimate.

Question 4

Part (a) of this question required an assessment of both aspects of the plan, namely the location of the sample and the method of quota sampling chosen by Matthew. Very few gave both comments with most commenting on the fact 'all age groups were represented' or that 'quota sampling is not random'.

There was a good success rate in part (b) with many stating a question that would be suitable for the random response method. Of those who went on to describe that a random event should determine which box you tick, a significant minority

stated that you should tick 'No'. This would mean that only those who drove above the speed limit ticking 'Yes' and therefore defeating the purpose of random response.

Question 5

In this question, candidates demonstrated good knowledge of how a simulation could be carried out. In part (a) a full description was required which included assigning an outcome to each side of the coin and carrying out the simulation until 4 consecutive flips of the coin were the same side. A few candidates stated that you would flip the coin e.g. 'until the 4^{th} head was obtained' rather than understanding that 4 in a row were necessary.

There were plenty of things that could be commented upon in part (b) and most obtained at least 2 marks here. The most common was to state that the three drinks should not be given equal probabilities of being selected and it was pleasing to see that candidates went on to give a definitive conclusion that the plan was not appropriate.

Question 6

The comparison in part (a) asked about age and gender so candidates were expected to comment about each. Most stated that there was a higher percentage of under 24s in India, though some inappropriately stated 'number'. Less common was to see that the percentages for males were slightly higher than the percentages for females.

Part (b) was a unique question requiring use of figures from the population pyramid. Candidates responded well and, in general, selected the appropriate

figures from the correct pyramid. A number of candidates did select India instead of UK. Even those making slips finding the percentage were able to pick up further method marks by using their percentage to work out the general fertility rate. A number of slips were seen confusing 1000 with 100 in the given formula. Nearly ¼ of candidates earned all four marks on this part.

Question 7

This question was accessible to all candidates but also discriminated the most able candidates in part (b). Many correctly completed Venn diagrams were seen in part (a). On some occasions, candidates neglected to include the 12 outside of the intersecting circles. On fewer occasions 33 was included as 'bluetooth' only and 44 was included as 'air conditioning' only.

Part (b) was one of the more discriminating parts of the paper. Of those realising that conditional probabilities were needed, many were able to give the correct one (or correct follow through one) for bluetooth given sat nav. The probability for Bluetooth given not sat nav was more challenging as many neglected to include the 12 in the denominator. Most were able to give a correct follow through conclusion about Inge's thought.

Part (c) had the highest success rate of this question with most candidates being able to give an appropriate calculation which showed that the relative risk was 2. The interpretation was often correctly given in context.

Question 8

Question 8 was one of the most demanding questions on the entire paper. Candidates continue to find the comparison of Spearman's and Pearson's

correlation coefficients difficult to express. Part (a) was no exception as it was rare to see a complete comparison of the two values. Some made an attempt to discuss linear and non-linear but did not score unless they specifically mentioned 'both would be negative'. The comment about the relative strength was scored less often as there was a lack of clarity since 'higher' was confused with 'stronger'.

Though most were able to access one mark in part (b), it was extremely rare for candidates to progress past 4 marks. The mark often came for comparing the correlation coefficients (stating both were positive). Candidates then attempted to compare the regression equations by making vague comments such as 'the regression equation for wheat is higher than the one for barley'. Candidates should have focused specifically on the gradient and explain in context what the gradient showed in order to access marks here. Only the most able candidates described the effect of each additional t/ha of wheat yield on the crop yields. Candidates should consider the number of marks available as an indication to the amount of detail that is required in an answer.

In part (c)(i), more than ½ the candidates were able to show how the answer was obtained with the vast majority opting for solving the equation directly (with only a handful substituting the value in both sides). There were some slips with the decimals so candidates should be encouraged to check over the work, particularly in the case where the answer is given to them. Many understood that the regression equations needed to be used in determine which crop to plant, but very few made the connection with the value found in part (i). Candidates were more successful stating a limitation of the data with 'weather' being a popular answer.

Question 9

Candidates made a confident display of knowledge on this Quality Assurance question. Most recognised that the upper action limit should be 3 standard

deviations above the mean though a few thought it was only 2. Virtually all understood the effect that changing the upper action limit would have on the production process in part (b).

There was mixed success in part (c) as any tried to give two separate answers rather than considering the production process as a whole. Perhaps some did not realise that the given data referred to one sample. Whilst the sample mean was not outside the action limit, the sample range was so the process needs to be stopped. Only about ¼ of candidates realised this.

Question 10

At this stage of the paper only the most able candidates were accessing marks. In part (a) the most common responses to score a mark was to explain that the responses were exhaustive or that they were not overlapping (thought a surprising minority of candidates believed there was overlap). Many did not understand the implications of unequal class widths and what that might allow you to learn about the data.

Part (b) was meant to give candidates the opportunity to display their knowledge about the Normal distribution and the type of data required, but there were very few candidates who accessed any marks here. Most did not justify their answers and engage with the given plan and simply commented that the plan was appropriate. There were plenty of things in the plan that could have been commented upon and candidates are encouraged to make specific reference to the plan when expressing whether or not it is appropriate. A small number of candidates made progress by stating the amount of data they would expect to find within 1 and within 2 standard deviations from the mean.

Question 11

The final question on the paper was accessible to high achieving candidates, likely because the formulae for skew and for standard deviation are given on the formula page. The common tripping point was the calculation of the standard deviation which is challenging for many at this level. The final mark was often not scored because the interpretation was not given in context. Reference to the finish times was required rather than a generic comment about the mean and the median.

Summary

Based on their performance on this paper, candidates should:

- use a measure of central tendency and a measure of spread when comparing distributions
- give statistical interpretations in the context of the question
- develop understanding on distinguishing between Spearman's and Pearson's correlation coefficients
- develop understanding on comparing linear regression equations
- practice development of extended response questions by focusing on details mentioned in the question

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