Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2019

Pearson Edexcel GCSE (9 – 1)
In Statistics (1ST0)
Higher Paper 2H

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

Introduction

General comments

Higher students responded well to the demands of the first sitting of this new specification and generally made good progress throughout the 2H paper. New assessment objectives on this paper mean that it is important that students take time to read questions carefully. There were many cases where students did not sufficiently respond to the demand of the question.

The new assessment objective A03 requires students to assess methodologies used and conclusions drawn. It is important that students give an assessment, i.e. explicitly state whether or not the methods and conclusions are appropriate.

This paper required more detailed knowledge on some topics and it was sometimes evident that students were not always fully prepared. For example, students are no longer given the expansion to help them calculate binomial distribution probabilities and some students struggled to accurately expand $(p + q)^4$. Students should be reminded that they are allowed calculators with the binomial distribution function on it in the exam.

Students also found distinguishing between Spearman's rank correlation coefficient and Pearson's product moment correlation coefficient on a scatter graph particularly challenging.

The extended response questions generally saw good progress as many students made good attempts at the less structured questions on the paper. Students should be reminded that the number of marks should indicate the depth of response required.

Students performed well on standardised scores and time series graphs.

Question 1

Most students were able to make a strong start to this paper on this sampling question with answers focussing on repeated values or values out of range in part (a). The most common errors here were to suggest that the university population could be less than 100 or that the numbers generated would be greater than 100.

In part (b), most were able to identify one advantage of quota sampling. A large proportion of students responded with 'stock' answers encompassed by the first bullet point. Least common responses were the lack of need for a sample frame and allows for comparison.

Part (c) was mostly well answered by students, with the largest proportion mentioning that not every student had an equal chance of being selected. Students need to realise that 'even chance' is not acceptable for 'equal chance'.

Question 2

Virtually all students read the population pyramid correctly in part (a) to obtain the correct answer.
Again, part (b) was very successfully answered. Correct responses included a wide variety of sensible contextual comments.

There were some students who failed to read part (c) carefully and only quoted a single figure from one of the age groups, usually 25 000. There were a few students who stated the amounts for each year, but did not actually make any comparison.

Most students achieved one mark in part (d) for describing one distinguishing feature of the population pyramid. Many attempted generic statements that did not refer to features of the graph.
Young male drivers made the most claims was frequently seen but was only accepted as one comment.

Parts (e) and (f) had a higher success rate for students with most saying that the population pyramid represented only claimants, not the whole driving population in (e). Most realised that the data presented only represented 2015, but some incorrectly assumed this data showed a trend.

Question 3

Just over half of students were able to interpret the frequency polygon in part (a) to come up with the required bounds. In part (b) many students showed a good understanding of reading values off the frequency polygons by selecting the appropriate values and adding them together. From those students who did not earn full marks, the most common mistakes were reading a value incorrectly from the diagram or adding 4 figures together rather than 3.

Again, in part (c) only around half of students were able to calculate the estimated mean correctly. Many simply found the mean of mid-points whilst others incorrectly divided the sum of fx by 5 leading to non-sensible answers.

Question 4

Part (a) of this question was well answered in general with the majority of students earning two marks. The most common incorrect response was noting the need for a title to the diagram. Some students suggested giving the data in chronological order, showing the years the score occurred and separating out data for different teams – possibly adding the second improvement later after being influenced by part (c) of the question.

Students need to be aware that sometime the internet is a reliable source of data. In part (b) many opted for the stock response 'Not reliable as it is secondary data' for this question. For official events multiple sources would have the same data, so the use of a trusted website should not be viewed as unreliable. Only around one in five students gave a correct response here.

Although part (c) was generally well answered, some students forgot that this question required an assessment and many did not include 'no' or 'not suitable' in their response. Many just repeated the question rather than giving a suitable reason. Where students realised that this diagram would be unsuitable, some found it difficult to give an appropriate supporting reason. A few students did not understand the question, ignoring Randall's belief, but focussing on whether a stem and leaf is an appropriate diagram for the data generally.

Question 5

This open-ended question was well received by students with over half of them earning at least 3 marks here. The calculation of the mean and the standard deviation were generally accurately completed, though some struggled to use the standard deviation formula correctly. Many went on to compare the means and standard deviation, though few gave a contextual interpretation of these comparisons. Numerous arithmetic errors were seen, so students are advised to check over their working carefully. There were a few students who tried to tackle the question by comparing the standardised score of the greatest value from each set of data. When comparing data sets, it is appropriate to compare an average and a measure of spread.

Question 6

The interpretation of the index number was well understood by the vast majority of students in part (a) with many scoring both marks by identifying both the increase and the 3.2%. Those who scored only mark often recognised the increase, but incorrectly interpreted the value of 103.2 – common errors were 103.2% and increase by 3.2 points. A small minority of students did not make reference to the 103.2 at all, just stating that the CPI had increased.

Part (b) turned out to be one of the most challenging questions on the entire paper. Where students were able to set up the correct formula, the majority did go on to score full marks. A common mistake was to divide the services weighting by the good weighting and multiply by 100 or vice versa.

The final part of this question was more successful and well attempted by most students. Some scored one mark with a general comment (usually about external factors affecting food) not linked to goods.

Question 7

Overall this question saw a mixed response and did well to discriminate the more able students on this paper. In part (a) only a minority of students were able to give a response that

focused on why the data made a histogram an appropriate diagram to use. Some focused on the fact it was easy to read the data from a histogram, not the reason why that particular diagram was suitable.

Dealing with the class intervals in part (b) caused difficulty for many and only a minority of students were able to complete the histogram correctly. A very common error was to calculate 4 ÷ 3 (=1.33…) as the frequency density of the second group (failing to recognise the width of 4). The first bar height was calculated more successfully. Weaker students often just used the frequency and did not make the link with frequency density. When drawing the bars many students did not use the correct widths (i.e. using 8 and 11 instead of 8.5 and 11.5) and sometimes left gaps between the bars. In other cases the bars were extended to the full length of the graph provided.

Part (c) also discriminated more able students and the correct answer was not often achieved. Some students correctly identified the denominator as 34, but many of these gave 14 as the numerator using the whole frequency of the class rather than the appropriate fraction.

Parts (d) and (e) targeted students' ability to assess methodologies and conclusions drawn in the statistical enquire cycle. It was clear that students are not yet fully prepared for the demands in these questions as many listed a bunch of factors, but failed to give an assessment of each factor involved. The most common answer in (d) was the lack of exhaustive response boxes whilst others commented about the rounding involved. A common error was to state that students may have lied.

In (e) it was rare to see full marks, and many scored 0 as they often did not answer the question and link any of their answers to the validity. Common answers included commenting that the result is only valid on Saturday or describing the effect of the sample size on the validity.

Question 8

This question saw a higher success rate as students at this level are confident when dealing with time series graphs. In part (a) the majority of students were able to link the 4-point moving averages to the quarters (or seasons) and earned the mark. Those who did not achieve the mark concentrated on why you calculate moving averages and not the '4 point' aspect of the question.

Parts (b) and (c) were very well answered.

Part (d)(i) had a much lower success rate as many students were unable to interpret the value of the seasonal trend. There were many partial answers where students understood that there were 140 thousand visitors fewer, but often they believed it was in comparison to the third quarter and not the trend line.

In (d)(ii), many correct answers were seen. Where full marks were not awarded, it was usually because the candidate had used the last value in the table, 1690, and subtracted 140 from that

instead of using their value read from the trend line. Others attempted to find the average seasonal variation from their trend line rather the using the given one.

Finally, in part (e) few students gave the complete description required here. Many scored one mark stating that the 'trend continues', but few distinguished that both the overall trend and the seasonal trend needed to continue. Others came up with non-statistical reasons such as the museum staying open, and these were not accepted.

Question 9

Standardised scores are a topic where higher tier students perform strongly and this was indeed the case on this question. In (a), the vast majority knew how to work out the standardised score and it was pleasing to see that they could also interpret the answer in the required context.

Part (b) was slightly less successful, but many did provide the full reasoning required to show why Alexi performed worse than Fiona. Many students could recognise that Alexi performed worse, but it was common to see 'Alexi performed worse since his score is further away from 0/mean' showing a lack of full understanding of the interpretation of standardised scores.

Question 10

At this stage of the paper only the more able students were able to make a significant attempt at this extended response question. Many students earned one mark on this question for stating a reason why data needs to be cleaned. They had a concept of what cleaning data was and stated that you needed to 'remove outliers' 'put data in the same units' etc, but then did not go any further with the question. For those who realised that they had to state the rule for removing outliers and work out if there were any, they generally achieved four or five marks. The sixth mark was achieved much less regularly with few students stating why they needed to remove outliers and so lost the second B1 in the mark scheme. There were some students who stated the rule for removing outliers as 1.5 × IQR away from the lower/upper quartile instead of using the mean plus or minus three standard deviations. Students should have realised by the number of marks that a single comment here is not sufficient.

Question 11

Question 11 had some of the most and least accessible parts on the entire paper. Part (a) was extremely well answered overall. The vast majority responded with either 'faster' or 'reduces/removes human error'.

The interpretation of correlation remains a strength of students on this paper and the first mark in (b)(i) the positive correlation was achieved by most. The interpretation mark was not awarded as often and it was common to see 'there's a positive relationship between age and salary' rather than a correct response.

Part (b)(ii) was again very well answered and most understand that closer to 1 means stronger correlation. Those that got it wrong believed that Spearman's rank correlation coefficient was unable to show such correlation.

Part (c) proved to be the most challenging item on the entire paper. The overwhelming majority of students chose Figure 2. Those very few who did answer correctly were able to talk about Pearson's being a measure of linear correlation. There is work to be done for students to fully understand the difference between Spearman's and Pearson's correlation coefficients on a scatter diagram.

Part (d) was also not very well answered. There was a mix of responses here, with a lot of incomplete explanations. Only the most able identified that for the PMCC bivariate data is required.

Question 12

It was pleasing to see some good attempts at this question despite the increased difficulty in not having the binomial expansion given to students. In part (a) the majority of students were able to show the given result. Having the answer given to them was probably a helpful hint which likely increased the likelihood of students getting part (b) correct. Of those who made a meaningful attempt, the most common mistake was to miss out the 3 in the multiplication of 0.144.

Generally if a candidate had correctly answered part (b) they did well in (c) as they could calculate the remaining 2 probabilities with no errors and go on to make a sensible conclusion. Many gained the 3^{rd} and 4^{th} marks for converting the table of frequencies to decimals. There were a few instances of attempts at the SC (special case) in the mark scheme where students only attempted to show that the proportions matched but did not show that the entire distribution matched. Just over 10% of students achieved full marks here.

Summary

Based on their performance on this paper, students should:

- interpret statistical calculations in the context of the question.
- practice questions which target A03, particularly those questions where the command word is 'assess'.
- develop understanding on distinguishing between Spearman's and Pearson's correlation graphically (question 11(c)).
- ensure statistical reasoning is used when answering questions.
- practice questions which involve the calculation of a weighted index number (question 6(b)).

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