Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2022

Pearson Edexcel GCSE
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 first full summer series since 2019 and it was pleasing to see that students were generally able to attempt the whole paper within the time allowed. The Advance Information was helpful in providing students targeted revision for this paper.

Students made clear decisions about appropriateness of methodologies and conclusions and made good attempts at justifying their responses.
Standard statistical techniques such as the drawing of box plots (Q02) and the use of the Petersen capture-recapture method (Q06) were extremely well attempted.
Using comparative pie charts and understanding and using the Normal distribution remain challenging topics to students at this tier.

Question 1

This question was answered well by the majority students, with many scoring full marks.

Part (a) was often correct with little or no working shown. Occasionally an answer of 14.012 was given and so was awarded M1 only.

Part (b) offered slightly more varied responses. Quite often an incorrect method of using 1 – 0.452 (= 0.548) was seen. Some made the same mistake as part (a) and gave an answer of 18.075 and this was only penalised once.

Question 2

Part (a) was answered well and it seems that students have been well prepared in drawing box plots. Many interpreted the given information to find all 5 values and plot these correctly to score full marks. A few students made plotting errors and when this occurred it was usually the upper quartile or the largest value that was incorrect.

Part (b) saw a varied range of marks but seemed accessible to all students. Generally, students were able to compare medians, but a few just quoted figures with using comparative language. A few confused what average the box plot used and so quoted average/mean. Again, many were able to compare range and/or IQR but like the median some just quoted the figures. Those students that compared skew either did so correctly or made the usual errors, which include, confusing positive and negative skew or saying that Basketball had symmetrical skew (which was not allowed). A few did say that both had negative skew which was a correct answer when considering the whiskers

of the boxplot. Too many students compared the largest/smallest/Q1/Q3 and were not awarded any marks for these comparisons. When an interpretation was given the most common correct answer came from interpreting the medians with many students saying that Basketballers are taller or its converse. Those that interpreted the range/IQR were less successful (IQR was done better than range) than those that interpreted the median. A correct interpretation of the skew was rarely seen.

Students found little difficulty in part (c) with the majority scoring at least 1 mark as they said 'unreliable' with an attempt at reason. The students that scored both marks usually did so because they referred to secondary data being used or that the samples were small. Very few gave an answer based on random/representative samples. Some students quoted 'reliable' but only a few referred to the fact that the data comes from a trustworthy website.

Question 3

In part (a) the majority of students gave a correct hypothesis in the given context. Students who gained no marks tended to not mention "urban areas" in their statement. Most correct answers looked at "higher life expectancy" although a few still gained the mark by stating "lower life expectancy".

A lot of students correctly stated "bivariate" or "correlation" in part (b). Some referred to the data being continuous, but this was not sufficient.

Part (c) had a mixed response with only about half of students managing to identify "urban population" as the explanatory variable. Some then managed to expand and explain that life expectancy was the response variable. Some students gave the wrong answer for the explanatory variable stating that it was either "the country" or "life expectancy".

In part (d) most students managed to gain one mark by saying that the graph supported their hypothesis from part (a). Some then lost the second mark by explaining what positive correlation was, but not actually stating the statistical reason in words, "positive correlation".

Most students drew an appropriate line of best fit in part (e) through the given double mean point, though it seemed some got lucky drawing it by eye and just happening to pass through this point. Those that did not score the mark here often started their line at the 'origin', others drew a line of best fit which was below all of the given points.
Part (f) was the most challenging part of this question and although some described the graph and talked about the correlation, very few were able to quantify this relationship in context.. Some students managed to work out that life expectancy increased by 0.19 but quite often this was written as a percentage rather than in years.
Finally, in part (f) most identified the given information about South Africa as being "an anomaly" or "an outlier". Many went on to state that the life expectancy value was lower

than expected or that the life expectancy should have been around 77 years and a fair number plotted this point on the graph.

Question 4

Many students referenced “proportion” correctly in part (a). Many gave incomplete or insufficient answers saying that the numbers well represented the consultants or that there were no overlapping numbers.

Part (b) saw a very mixed response from students. Many appeared to fail to understand how to add on the additional responses to the initial table given. Common incorrect responses included: 3 2 0 - the additional responses, not added to the initial consultations, tallies of additional responses, the additional random numbers copied into the table, the boundaries for A, B and C copied into the table.

Students, as in part (b), struggled with part (c) of this question. However, a number of follow through marks were awarded for incorrect answers to part (b), particularly 60 (from 3 2 0). A number of students failed to recognise they had to multiply the difference by 20 minutes. Some struggled due to an inappropriate response to part (b) and used the results from the table of the first 45 responses. Common incorrect responses included: 13, the difference between the consultations A and C; 200, taken from the table for the first results.

The vast majority of students attempted part (d), however where many were able to identify that time considerations would affect the answer or said the results would vary; they failed to understand the nature of the question in that they were to criticise the result of the simulation and suggest improvements. Many failed to appreciate that repeating the simulation would give an indication of the variability of the number of consultations. Only the most able students scored both marks here.

Question 5

Knowledge of control groups and matched pairs are topics generally understood by higher achieving students and this was clearly the case on this question. The most common correct answer in part (a) was to state that control groups allow for comparisons to be made. Some gave rather vague responses like ‘to see if the new sports drink works’.

Part (b) also saw a mixed response. Many students wanted to choose the pairs randomly whilst others explained why matched pairs should be used rather than explaining how they should be chosen.

Better responses were seen in part (c) as many gave two reasons why the results may not be reliable. Common answers included the small sample sizes and the subjectivity of the questionnaire. Some misunderstood the question and discussed the conclusions the manager could come to rather than the reliability of the experiment.

Question 6

Overall this question on the Petersen capture-recapture method was well answered, particularly part (b).

In part (a), many attempted to give the comments on reliability and validity expected in paert (b). Most responses focused on the population and not the requirements of the sampling.

Part (b) was extremely well answered with the majority of students correctly calculating the 250, and most going on to secure at least 4 of the mark available. The only minor issue here is that some students confuse accuracy for validity. On some occasions students only did the calculation but then failed to discuss the validity/reliability.

Question 7

Students did well in part (a) to identify an advantage of using secondary data in this context. Some however just wrote 'too time consuming' but did not reference that it was the collection of primary data that took too long.

Most students on this tier appreciate that area represents frequency on a histogram and many correct attempts in part (b) were made. On some occasions, students only added the area of the bars from 0 to 5 minutes and 5 to 10 minutes forgetting that the given 14 also did not arrive more than 10 minutes late. Those who used a method of subtracting the number arriving more than 10 minutes late from the total, mistakenly thought the final bar had an area of 15 (having a height of 0.3) rather than realising its area had to be 14 from the given information. Responses that used the total frequency to be 239 were not penalised.

Finally in part (c) the success rate here was closely linked to the success rate in part (b) with many simply using their answer to part (b) to make good progress here and conclude that Andy was incorrect. The most common route was to convert the fraction to a decimal and show that this was less than 0.3 recurring. It was not uncommon here for some students to omit the comment about the reliability of the result obtained. Only a few commented on the fact that this week may not be representative of all weeks. Comments referring to secondary data were seen fairly commonly.

Question 8

There were some very good attempts at this question showing that students were well prepared for Quality Assurance perhaps due to the Advance Information for this paper.

In part (a) many students could draw the 2 warning lines in the correct place. On rare occasions these were plotted only 1 standard deviation from the target line.

In (b) this was generally well answered although the quality of responses did vary somewhat. The most common response was that the range cannot be negative and only a few commented that low ranges in quality assurance were desirable.

Part (c) was again well attempted although some were confused by the scale of the vertical axes. A surprising number of students drew horizontal lines at the vertical values needed, rather than a single coordinate.

Though most students correctly calculated the mean, many slips were made with the range in part (d) and 0.011 a common incorrect answer (subtracting the first sample from the last). Those plotting correctly in part (c) often plotted correctly here as well.

Students who were able to produce a value or coordinate for the range in part (d) almost always went on to score the mark in part (e) for identifying that the process/machine needed to be stopped. Without evidence of a range in part (d), this mark could not be scored for guessing what needed to be done. A number of follow through marks were awarded following on from incorrect ranges in part (d).

Question 9

Most students scored well in part (a) here, with incorrect responses being mostly due to a lack of contextual understanding bigger population rather than more sales. Some students mentioned specific types rather than the whole. Other common incorrect answers talked about “population” or the “an increase in the number of vegans”.

Part (b) was generally poorly answered with a small proportion of correct responses. Many students obtained 1 mark for applying a scale factor based on angles (90/60) but most failed to demonstrate knowledge that the ratio of the radii needed to be squared to obtain the correct frequency. Most incorrect answers were based on a simple “scale up” rather than looking at area/squaring. Some worked out the number of packs in total for 2015 but didn’t know where to go from there.

Question 10

This question was not attempted by a significant number of students indicating that its open nature and position in the paper meant that only the most able were able to progress. It was also unfortunate to see a large number of students attempting it by taking the arithmetic mean of the six index numbers. The students who went on to obtain the change in the cost of living for the Jones family generally used the table well. Of those students who obtained the change in the cost of living for the Jones family, many compared their value to the change in the CPI between June 2015 and June 2019 as how financially better/worse off the Jones' family were and not the cost of living difference for the Jones family compared to the CPI change. Only some students managed to answer the last part of the question giving a correct statement about the lack of information on income change or spending habits of the Jones family.

Question 11

The final question on the paper provided a mixed response with higher achieving students being able to make good progress and demonstrate their knowledge of the normal distribution.

Part (a) was fairly well attempted, with most students recognising that it was a normal distribution. Though answers such as 'binomial' and 'even' were seen regularly.

The majority of students achieved 1 mark out of the 2 in part (b) as they mentioned 'the mean is higher in summer' but few went on to support this conclusion with correct figures.

Of those students who attempted part (c), many achieved the full two marks and remembered to round their answers to one decimal place. It was on many occasions left blank. On other occasions we saw students trying to use a formula for standard deviation clearly making no progress.

Only few correct responses were seen in part (d). Many students misunderstood what the heights of the distributions show giving answers such as 'it is hotter in summer', 'the graph is higher for summer', 'there are more days in summer', 'the temperature reaches a higher maximum in summer'. Only a significant minority realised that the area of the two distributions had to be equal.

Though many realised that Carol was not correct, it was very rare to see this supported with a correct reason. Many gave vague responses that 'summer is more spread out' or 'things change over such a long period of time'. Many spoke about global warming. Very few students understood that the daily temperatures would vary more than the sample means.

Finally in part (f), a large number of these were left blank. Of the students who attempted the question, many knew that 15.6 degrees centigrade was 2 standard

deviations from the mean but often did not know the probability of the temperature above 15.6 degrees centigrade. 0.05 was a popular incorrect probability. Many did not know that this value had to be squared to find the probability required and some who did complete the question failed to assess their conclusion losing an easy and valuable mark.

Summary

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

- Ensure that correct statistical language is used throughout when making comparisons and conclusions.
- Revise how to select matched pairs in an experiment.
- Develop understanding on comparative pie charts.
- Develop skills in assessing the reliability of using given data.
- Practise calculating weighted means.
- Develop statistical reasoning and engaging with the given the context of a question (rather than simply relying on stock/textbook answers).

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