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Principal Moderator Feedback

Summer 2016

Pearson Edexcel GCSE in Statistics (2ST01) Controlled Assessment

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GCSE Statistics 2ST01
Principal Moderator Feedback – Controlled Assessment

Introduction

In general the work from centres was well presented, neatly packaged, and arrived in good time. As in previous sessions a significant number of centres did not adhere to all the procedures necessary for the submission of samples of work for moderation - often causing a great deal of extra work for moderators having to resolve these issues. A check list is offered at the end of this report to assist teachers and Examinations Officers in preparing samples of work for submission in future examination sessions.

Some centres provided data sets for their students. Centres are reminded that students are expected to collect their own data sets, whether it be primary data or secondary data, (eg from the Internet), and not to have data sets provided for them. Students collecting primary data may do this in groups if they wish, but each student must take part in the data collection.

Some centres did not use the Student Record Form to record the relevant teacher-student interactions during the controlled assessment stages, particularly at the end of the planning stage. Centres are reminded that students are permitted to change their initial plans in the light of teacher feedback but the mark awarded cannot be changed. All changes to the initial plan must be agreed by the teacher and recorded on the Student Record Form. Unplanned work must not be awarded credit in the final assessment.

It should be noted that controlled assessment activities that are heavily orchestrated by teachers, such as class investigations, may restrict the ability of the more able students to access the higher marks.

Some centres submitted work that had not been annotated, (eg by ticks and crosses) and in many of these cases the student work contained errors that affected the mark that could be awarded. Identifying the errors in unmarked student work often caused moderators a great deal of extra work, as they effectively had to re-mark the work.

Many students produced investigations involving a collection of hypotheses (usually 3) that were related by the theme but not interrelated in terms of the variables. This approach often resulted in a collection of mini-investigations, the best of which, on its own, serving as evidence for the overall assessment of the work. Students should give a detailed justification for their choice of variables and explain how suspected interrelationships contribute to the overall analysis and expected interpretation of their results.

Centres are reminded that internal moderation must take place if there are two or more assessors marking the work and that there should be clear evidence within the sample to demonstrate that this has taken place.

Many students responded well to their chosen theme. The most popular theme this year was Team Sports and Team Competitions.

Strand 1 (Planning)

Many teachers provided excellent and appropriate feedback to students enabling students to pursue investigations commensurate with their ability. This feedback was often well documented on the Student Record Form.

Many students were able to give some indication of which techniques they were going to use but few were able to give more than a simple reason for the choice, eg “I am going to use box plots because they show the data clearly” is a low demand reason for the choice of box plots to display the data; whilst “I am going to draw a scatter graph and calculate Spearman’s rank correlation coefficient”, states an intention to use particular techniques but does not give a reason for the particular choice. Students are advised to explain in detail why they have chosen particular techniques in their analysis.

Investigations attracting the highest marks in the assessment were those involving some degree of complexity. Complexity includes the analysis of interrelated variables, eg (i) a first hypothesis set up to investigate the variables A and B, a second hypothesis set up to investigate the variables B and C and a third hypothesis set up to investigate the variables C and A, together with an attempt to synthesise all three hypotheses into an overarching conclusion or (ii) a sequence of related activities such as if P then Q, if Q then R, if R then S etc. A common approach this year was to set up a first hypothesis to investigate the correlation between two variables, X and Y say, then to set up a second hypothesis to investigate the correlation between variables, X and Z say, and finally to set up a third hypothesis to investigate which of the variables, Y or Z, has the greater effect on the variable X.

Many students were able to anticipate possible problems in the collection of their data and were able to give a clear strategy for dealing with outliers and anomalies. Students are advised to explain their reasons for removing poor data in the context of the investigation and comment specifically on the possible impact the poor data could have on the reliability of the results. Simply stating that any outliers will be removed or replaced is a low demand reason, even if accompanied by sophisticated techniques for identifying them.

Strand 2a (Data collection)

Many students collected sufficient data for their investigations, identified the source of the data and commented on the possible presence of outliers. Often the data collection was poorly described and ill defined.

Centres are advised not to provide sets of data for their students as this usually denies them the opportunity to access the full range of marks in this strand.

Students are advised to give more detail when describing their sampling techniques, eg when selecting a random sample they should explain the unique numbering of the data items and the specific technique used to generate the random numbers, such as 30 × Ran#.

There appears to be a popular misconception that the use of stratified sampling is a pre-requisite for gaining a high mark in this strand. The use of stratified sampling, often to a sub-sample from a small population, is a low demand application of the technique if it is clear that it is more appropriate to use the whole population. Named sampling methods should be justified in terms of the techniques employed, eg in order to produce unbiased estimates of population parameters.

Students are advised to think more carefully about the amount of data they are using in their analyses. The sample size should be justified in terms of the techniques that will be employed. For

example, using 25 items of data may be appropriate for some techniques, eg a box plot, but may not be appropriate for other techniques, eg a histogram, where more data is needed.

Many students are able to identify outliers formally and represent them in diagrams. But it should be noted that it is not only the calculation of the outliers that drives the assessment but also the purpose of the calculation. For example, the formal identification of outliers merely to represent them in a box plot is a low demand application of the technique, whereas the formal identification of outliers to remove them as a pre-requisite to calculating a standard deviation, for example, is a more demanding application.

Strand 2b (Processing, analysing and representing data)

Most students were able to select appropriate techniques to analyse the data they had collected.

Moderators reported that the mark awarded in this strand was generally too high.

It should be noted that the marks awarded in this strand should not be awarded in isolation. The notional difficulty of a technique does not mean that it can automatically be awarded a high mark in this strand. It is how the technique is being used that drives the assessment, eg the use of standard deviation to compare the spreads of data sets is, in principle, no more sophisticated than using interquartile ranges to compare the spreads of data sets, particularly when ICT is being used. Whereas the use of standard deviation for a more demanding purpose, eg to test for normality and/or to calculate a standardised score, is a more demanding application of the technique. Further, the quality of the interpretation of results also affects the marks that can be awarded in this strand, eg the greater the depth of the interpretation of results and the greater the demand of the application of the technique then the greater the mark that can be awarded.

To access the higher marks in this strand, students are expected to produce a diagram and a calculation. These should be related activities. For instance, in a formal proof of normality it is expected that students will not only produce correct calculations for the comparison of normality but also a suitable representation for the comparison, eg a histogram.

The overall assessment in this strand is affected by the quality of the diagrams produced and the accuracy of the calculations carried out. Errors in calculations and omissions in graphs must be penalised in this strand. For example, the omission of units in box plots is usually penalised by the deduction of 1 mark.

The use of ICT to do the more arduous calculations and representations is to be commended, but this means that students should be more critical of the accuracy of answers and of the quality of the representations. Often students give the impression of being controlled by the technology rather than of being in control of it.

Strand 3 (Interpretation and discussion of results)

Many students were able to draw their investigation together in a final conclusion and relate their findings to their initial hypotheses.

Students are advised to give a practical interpretation of their results in the context of their aims. Interpreting a Spearman's rank correlation coefficient as "positive" is considered to be a low demand interpretation of the correlation coefficient and consequently a low demand application of the technique.

Many students were able to comment on the reliability of their results in terms of the size of the samples they had taken, but it should be noted that a comment such as "I could have improved my results by taking a larger sample", is considered to be a low demand comment on reliability. Few students commented on the reliability of their results in terms of the techniques they had employed, eg the amount of data used to populate individual class intervals in histograms.

Only the best students were able to discuss the range of applicability of their results beyond the immediate sample or population.

Summary

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

- do not to produce collections of mini-investigations, as this increases the work load with no obvious benefit to the overall assessment
- give more detail when describing sampling techniques
- identify the data source explicitly, eg by the web address
- think more carefully about the amount of data being used and explain the choices made in the context of the techniques being employed
- be more critical of the accuracy of answers and the quality of representations
- give practical interpretations of results in the context of the tasks aims

Administration check list

The following check list is offered to teachers and Examinations Officers to assist them in preparing samples in future submissions.

1) Have the marks been entered correctly on the OPTEMS?

2) Does the sample contain all the starred candidates on the OPTEMS?

3) Has the work of an absent candidate been replaced by an equivalent piece of work?

4) Does the sample contain the tasks with the highest mark and the lowest mark?

5) Has the work been authenticated by both the teacher and the student?
(Two signatures are required on the Student Record Form).

6) Has the centre retained a copy of the OPTEMs for its records?

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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