
A-LEVEL STATISTICS

SS02 – Statistics 2
Report on the Examination

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General

The level of computational skills was generally good, although explanations sometimes suggested a poor grasp of the underlying processes. There was evidence of greater practical experience of sampling techniques. In some of the responses, too little attention had been paid to the detailed requirements of the question.

Question 1

Almost all students correctly found the missing probability. Most realised that only the probabilities, as parts of a whole, were suitable for display in a pie chart, but a sizeable minority calculated angles for the three fee figures. The calculation of the mean was clearly shown and the standard deviation was usually calculated correctly. Part (c) proved challenging for many, and those who worked with numbers of clients often rounded to the nearest whole number, not appreciating that, when dealing with means, decimal parts of a person are possible. Others worked with the two mean values and found this part straightforward.

Question 2

Part (a)(i) was well answered. In part (a)(ii), most students correctly worked with $Po(13)$, but there was much confusion over whether 9, 10, 11 or 19, 20 should have been used. In part (b)(i), while many students correctly calculated $1 - P(0)$, a similar number used $1 - P(0 \text{ or } 1)$.

Part (b)(ii) was very poorly answered with even the few who started correctly frequently forgetting the '× 3'. Part (c) caused problems, as many students forgot that this related to a 10-second time period. Many realised that the lack of independence was the key to part (d), although some confused independent with random, while others thought it safest to mention independent, random, 'constant rate' and even 'no upper limit'. Students should realise that the selection of a correct explanation is what is required and that any explanation should be in the context of the question.

Question 3

The vast majority of students correctly calculated the missing 5-point moving average and the plotting and drawing of the trend line were equally well done. Some confused short-term and seasonal variation or offered random variation as the answer. Most knew the principles in part (c), but some only used week 3 Friday's residual, thus neglecting some available data. In part (d), responses frequently made no reference to the success or otherwise of the incentives, as requested. The quality of written English was often poor and frequently obscured any statistical content.

Question 4

The introductory part (a) was surprisingly poorly done, with many offering the seemingly reasonable, but incorrect, answer of "they must be normally distributed". There were also many other incorrect answers such as "they must be from the same manufacturer". In part (b), most students correctly stated hypotheses in terms of μ , calculated and compared the test statistic and critical values, often using a diagram, but then drew the conclusion in terms of the double negative "**not** sufficient evidence that the mean of the batch is **not** 9.0". Some felt that this double negative was equivalent to the positive "significant evidence that the mean **is** 9.0", while others stated "**not** sufficient evidence that the mean **is** 9.0". There was much confusion amongst students using the p -value approach, with 0.046 being equally compared with 0.05 or 0.025, and even 0.954 compared with 0.05. Where a graphics calculator is being used, students should ensure that they understand what their p -value should be compared with. Part (c) was well done generally, although some students found what was revealed — that the outcome depended on your original opinion — hard to handle.

Question 5

The numerical part (a) was generally well done. Students seemed to know the theory and to have practiced the technique. In part (b), however, while most could quote some theory, only a few correctly applied this to obtaining the sample from Year 9. Many students simply described how to get a random sample. Part (c) was very poorly answered, with most students repeating generic 'learnt' advantages and disadvantages such as "quicker and easier", "may not be representative", with no attempt to apply these in context as the question required. Responses such as "may get more boys than girls" or "may all be from one year group", which were common, showed a failure to grasp the concept of quota sampling. A small number of students, however, did appreciate the ease of not needing to find particular pupils and the problem presented by groups of students who had all travelled together.

Question 6

Most students correctly identified the peak year of the baby boom and recognised the downwards then upwards trend in part (b), although some put the start of the rise as late as 1991. Students should realise that description of a trend avoids mentioning every slight rise or fall in the original data, concentrating on overall pattern and key features. In part (c), many students erroneously calculated the reduction in the percentage, rather than the percentage reduction in the number, and others merely expressed the 2010 figure as a percentage of the 1966 figure. In part (d), there were many good answers, although a significant number of students seemed to have no concept of 'cumulative', despite the given graph. Medians were sometimes read at 400 000 or even upwards from 25 years. Part (e) was generally well done and many students were clearly experienced in applying the rules, although some simply listed every number in the column.

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