Principal Examiner Feedback

Summer 2018

Pearson Edexcel GCE AS Mathematics

Statistics & Mechanics (8MA0/02)

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SECTION A: STATISTICS

Introduction

This was the first paper in the new specification and sadly there seemed to be some students who were not well prepared for the change in content and question style. In the statistics section, the responses to questions 2 and 5 were particularly poor, with over 40% failing to score any of the marks.

Comments on individual questions

Question 1

Part (a) proved an accessible starter for students with most students describing the correlation as positive as required. We use the command "interpret" when we expect a comment related to the context and "describe" when all we are looking for is a description of the statistic. In part (b), some mention of the context and the idea of "rate" was required and we would also expect to see a mention of the correct value for the gradient. A typical answer was "an increase of 1 point gives an increase of £4.50 in pay". In part (c), the students needed to engage with the model and explain why it might not be suitable. One such reason focussed on the fact that for a score of less than 11 points the pay was negative which would not be reasonable. Some honed in on the small sample size and gave the sensible suggestion that the sample may not be large enough to be representative of all jobs in the company.

Question 2

This question was supposed to suggest to students that a tree diagram would provide a suitable method for solving the problem and many did use such an approach; formulating an equation for p, the probability of a faulty component coming from factory C, and solving it. Others were obviously thinking along the right lines and wrote down a calculation such as $6 - (0.9 + 0.9) = 4.2\%$ which was the probability of a randomly chosen component coming from C and being faulty, though they rarely told us that. A correct answer could easily be derived from here.

Despite the large number of students scoring zero here, about 1/3 managed to answer part (a) successfully. Part (b) required an explanation which means both words and a simple calculation were required. Some found $\mathrm{P}(B) \times \mathrm{P}(F) = 0.018$ and others gave the probability of the component coming from B and being faulty as 0.009 but both of these calculations and a concluding statement were needed to secure the mark.

Question 3

In the new specification, students are required to evaluate binomial probabilities using their calculators. Some students seemed to be unaware of this and although they could answer part (a)(i) using a formula, part (ii) was not feasible that way . In the hypothesis test in part (b), the hypotheses were usually given in terms of p and most identified the correct model to use $\mathrm{B}(32, \frac{1}{3})$. A correct probability calculation did not always follow: some found $\mathrm{P}(X = 16)$ instead of $\mathrm{P}(X \ldots 16)$ and we would usually expect values to be given to 3 significant figures, but some students gave no value at all simply stating that the probability was < 0.05. In order to award the mark we do need sufficient evidence that the correct value has been obtained. The final mark of a hypotheses test will always require a correct conclusion in context: in this case a statement saying there is evidence to support Naasir's claim is all that we expected.

Question 4

The new specification requires students to be familiar with the large data set and the first part of the question addressed this issue. In part (a) the students needed to realise that n/a in the large data set means that the data for that point was not available and this means that there are only 18 (not 31) pieces of data available. Another skill students are required to have under the new specification is to be able to calculate standard statistics using their calculators. In this case, we expected students to enter the data into their calculator and write down the mean (part (a)) and standard deviation (part (b)). It was clear that many students were not familiar with this requirement and we often saw several lines of working to derive these results which unfortunately under the new specification cannot receive any marks. A small number of students knew that wind speed was measured in knots but many did not know this.

In part (c) there were many good attempts and most students gave a correct response here and in (d)(i) most knew that the * represented an outlier. Part (ii) was very challenging and required some careful thought and inference. Some confused mean with median and assumed that *C* and *D* were the 2nd and 3rd box plots in the list since they had the same medians. The intention was that they should identify *E* as the 5th box plot and *A* as the 2nd (it has a low mean and standard deviation and clearly has the smallest range on the box plots). Looking at the other 3 they should notice that the range is large and the outlier too would suggest a large standard deviation. The box plot *Y* has the smallest median of these 3 so a lower mean is suggested which points to *B*. We were looking for some explanation using correct terminology so we expected references to the mean and median and the standard deviation and a suitable measure of spread from the box plots.

Question 5

There were a number of blank responses here which may have been due to a shortage of time as students wanted to make sure they had time to complete the mechanics section of the paper. Those who did attempt the question sometimes struggled with interpreting the meaning of $\mathrm{P}(X = r) = \mathrm{P}(X = r + 2)$ and this would often lead them to an incorrect probability distribution. Many did realise that $\mathrm{P}(X = 2) = \mathrm{P}(X = 4) = 0.35$ and were then able to find the other two probabilities = 0.15

In part (b) they needed to use their calculators again to calculate a cumulative binomial probability and also needed to appreciate the discrete nature of the distribution to find $1 - \mathrm{P}(A \leqslant 30)$ and once again we expect answers to be given to 3 significant figures. The final part required students to either form a list of values for Y, or even $Y - X$, or solve an inequality to realise that they needed $\mathrm{P}(X \geqslant 2)$. Some were able to do this and this proved to be a good discriminator on this section.