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Examiners' Report

Principal Examiner Feedback

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Pearson Edexcel GCE AS

In Mathematics (8MA0)

Paper 21 Statistics

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## Introduction

The entry for this paper was small and it was clear that we were not seeing the full range of abilities this time. Students are becoming more adept at using their calculators to find probabilities as was evident in question 4. There is some evidence of progress in their familiarisation with the large data set (question 3(b)); a good knowledge of the variables and terms used could yield some easy marks here. Question 5 was a challenging probability problem and proved to be a step too far for the majority of these students.

## Comments on individual questions

### Question 1

The vast majority were able to find the correct value for  $p$  but under half managed to identify a pair of mutually exclusive events. Some lost the mark for confusing events with probabilities of events and others thought the answer was  $A$  and  $B$  or  $B$  and  $C$ .

### Question 2

The response to this question on histograms was much better than in previous series with over 50% scoring 7 or more marks. Most managed to complete at least one of the bars of the histogram correctly but a sizeable minority did not make any progress at all here. In part (b) many were able to complete the table correctly and find the total number of passengers. They could often go on to find the median but there were some errors in class boundaries and a fair number of very confused attempts. In part (c) most were able to find the upper outlier limit but some were not able to explain clearly why they could then deduce that none of the passengers were outliers. We required a clear statement that none of the passengers were over 90 and 90 was less than this limit so there were no outliers.

### Question 3

Although some showed a genuine familiarity with the large data set many seemed totally unfamiliar with it and subsequently could not make progress in part (b). For part (b) the students needed to be familiar with the qualitative variables in the large data set (wind speed and cardinal direction were the only choices) and then select an appropriate variable in the knowledge that there were only 3 outcomes. Those who were familiar with the data set would then know that the majority of wind speeds are “light”. Aside from the large data set, most correctly identified the sampling technique in part (a) and some drew a sensible inference in part (c) by simply stating that variable  $A$  was the most frequent.

### Question 4

Most students were able to identify the correct binomial model in part (a) and use this to find the probabilities in part (b). However nearly 15% of students failed to score any marks in this question and this is possibly a reflection of the weaker nature of the entry this time. In part (c) students were expected to comment on the suitability of this binomial model and we were looking for a recognition that removing beads without replacement would impact on the assumption that  $p$  is constant and so a large number of beads in the sack would be needed to ensure that the binomial distribution could still be used as a model; sadly none of the students scored the mark here.

Part (d) was a standard binomial hypothesis test and most students stated correct hypotheses and a correct model. There was still some confusion about the appropriate probability to calculate and a significant number found  $P(X = 4)$  rather than  $P(X \leq 4)$ . Those who did find the correct probability were usually able to give a correct conclusion in context which is encouraging however few knew what the  $p$ -value was in part (e).

### Question 5

Sadly two thirds of the candidates were not able to make any progress with this question. Those who did pause for a moment and consider the situation often realised that there were two possible cases to consider. The majority of these failed to give the correct probabilities though as they did not realise that after the initial transfer from bag **A** there were 10, rather than 9, balls in bag **B**. A handful of the students did negotiate the problem successfully though some then added together their probabilities (instead of giving the two pairings of  $n$  and  $p$ ) and lost the final mark.