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Mathematics MS/SS1A

(Specification 6360)

Statistics 1A

Report on the Examination

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Written Component

General

Whilst the average attainment of the students this summer was in line with, or slight better than that on recent previous papers, there was a marked reduction in the spread of marks due to both no excellent and very few weak performances. This suggested that, whilst the students had the basic knowledge required, they lacked the in-depth knowledge necessary to answer the more demanding parts of questions, particularly those that required discursive answers.

Students generally showed sufficient working to allow some method marks to be awarded for incorrect numerical answers and, at the same time, made appropriate use of their calculators and the supplied blue AQA booklet of formulae and statistical tables. Nevertheless, it was very disheartening to see a number of simple, even silly, numerical mistakes and even more so to find it sometimes almost impossible to understand discursive answers that lacked clarity or even sense in terms of English.

Question 1

Most students were able to make a good attempt at this first question. In part (a), most students obtained the correct answer, but a small minority evaluated $\frac{\sum x}{n}$ for no marks. Again in part (b), there were many sound, often correct, attempts but some students divided 5840 by 730 and saw nothing suspicious about £8 as Steve's mean daily takings. It was pleasing to see the many students who obtained correct answers in parts (a) & (b), and then argued correctly in part (c) that Steve should not purchase the business on financial grounds.

Question 2

Most students scored the 4 marks in part (a) by obtaining values of a and b directly from their calculators. Plotted lines in parts (b) &(c)(i) were sufficiently accurate to gain full marks in many cases. However, some students appeared to have no ruler whilst others were at a loss as to how to position the line for *Salt B*; perhaps as the equation was not held in their calculators. Most students did as was expected in part (c)(ii) and read the value directly from the graph. Very few students scored both marks in part (c)(iii). Many gave **two non-distinct** statements by stating that 'at low temperatures more of *Salt B* dissolved whereas at high temperatures more of *Salt A* dissolved'. There were also worthless comments about the relative strengths of correlation (suggesting that this was shown by the gradients of the lines) and comparisons at 0°C (by reference to the intercepts). Students who tried to comment about 'rate of change' often suggested that '*Salt A* dissolved faster than *Salt B*'.

Question 3

In answering this question, some students ignored the instruction regarding answers 'to three decimal places' and simply left them as fractions. This was not penalised in part (a) but was penalised in part (b). Most students answered parts (a)(i) & (ii) correctly but in part (a)(iii), some incorrectly assumed independence and so multiplied together their previous two answers. Part (a)(iv) caused significantly more students a problem. Whilst many obtained the correct numerator of 153, they used a denominator of 640 instead of 172. Most students scored only 1 or 2 marks in part (b). Whilst some were able to quote the three correct numerators, they then used 194^3 or $(640 \times 639 \times 638)$ in the denominator or failed to multiply by $3! = 6$.

Question 4

There were many good answers scoring most, sometimes all, of the marks on this binomial question. In part (a), almost all students were able to write down the correct formula and then evaluate correctly $\mathrm{P}(X = 2 \mid \mathrm{B}(10, 0.275))$. In part (b), it was also pleasing to see the high proportion of students who scored the 5 marks by using the tables correctly for $\mathrm{B}(40, 0.35)$ but, as is the norm, some students have yet to master the correct table readings for 'no more than', 'at least' and 'at most'. Sadly, some students equated $(1 – 0.65)$ to 0.45 which proved somewhat disastrous. In order to use tables, part (c) required changing from $\mathrm{B}(40, 0.85)$ to $\mathrm{B}(40, 0.15)$; a non-too-easy process. Hence, it was most gratifying to see a number of very sound, even fully correct, solutions using tables. A minority of students used $\mathrm{B}(40, 0.85)$ and their calculators' in-built cumulative binomial function with similar levels of success.

Question 5

Most students scored well in part (a) as they were usually well aware of how to standardise or how to use their calculators' in-built function. When errors did occur it was often down to rounding z-values to one decimal place thereby obtaining inaccurate answers or, particularly in part (a)(ii), finding the complement of the probability required. In part (b)(i), most students obtained 0.372. Although some methods were not always clear and others were somewhat contrived they usually gained the 2 marks available. This was not the case for those students who relied entirely on their calculators' in-built function. Although questions similar to parts (b)(ii) & (c) have appeared fairly regularly on previous papers, students still struggle to distinguish between the two situations. Typical approaches were to use $\frac{0.2}{\sqrt{4}}$ in part (b)(ii) and then use $\frac{0.5}{\sqrt{6}}$ or 0.5 in part (c). Other less common errors in part (b)(ii) were 0.372^4 or $1 – 0.372^4$ and, in part (c), was the omission of the necessary area change.

Question 6

The better students generally scored full marks in part (a) usually by working in litres. However, a large proportion of students provided answers that scored at most 2 marks. Errors seen were the use of 5 instead of 5.05, the use of 75 or 0.75 instead of 0.075, an incorrect z-value or the omission of the divisor of $\sqrt{36}$. The one mark for answering the first claim in part (b) was only available to those better students who had obtained a correct confidence interval in part (a). Even so, some such students made no comparison using the stated mean of 5 litres but merely commented that the sample mean of 5.05 was greater than 5. This was very disappointing particularly given similar requests on previous papers. In answering the second claim in part (b), some students again referred to their confidence interval and so scored no marks. Of those that correctly evaluated $\frac{8}{36}$ as 22%, many were not sufficiently explicit in comparing this with 10% and so scored only 1 of the 2 marks available.

Coursework Component

There was a reduced amount of work submitted for this series. The administration for this series was generally good, with no addition/transcription errors noted; although scripts should be sent without the requirement for a signature.

There was a tendency to mark on the lenient side across many of the scripts moderated. The areas of concern are in the design strand where students are not giving enough detail of their sampling method, including the considerations they made prior to choosing the sample such as randomness, practicality, etc. This then provides the opportunity to revisit these thoughts when looking at the effect of the sampling method on the results. The discussion of the theory was often cursory and not in context. Some scripts were correctly identified as not discussing the theory, but then awarded inappropriate marks. In the regression tasks, it is important for students to discuss and justify their choice of independent and dependent variables.

The other area of concern was in the interpretation where students were not relating their results back to reality enough (in some cases not at all). Do the results seem sensible? If not, why not? Are there any ways of validating/comparing their results to other statistics available? If the interpretation is lacking/weak, this can affect the 'depth and difficulty' of the work in strand 4.

The analysis seen was of a high standard with some comprehensive, accurate and high quality calculations. In fact, some students spent too long on these calculations to the detriment of the overall piece of work.

Internal moderation remains an important part of the responsibility of Centres and it may be that some sharing of good practice of what should be marked on scripts would facilitate the process of moderation of the scripts. In particular a signpost of 'checked' for checked calculations would be useful.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results statistics page of the AQA Website. UMS conversion calculator www.aqa.org.uk/umsconversion