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Principal Examiner Feedback

January 2014

Pearson Edexcel Level 3 Award In Statistical Methods (AST30)

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Introduction

There was no evidence to suggest that students had difficulty completing the paper in the given time. The vast majority of students completed their answers in the spaces provided and many showed the steps in their working.

Some students did not learn all the required formulas for the examination. It was pleasing to see so many students showing the intermediate stages in their calculations.

Some students did not use a ruler to draw the bars in the histogram in Q7(a).

Reports on Individual Questions

Question 1

Part (a) was generally answered well. Many students were able to calculate the mean of the ages and give the correct answer.

Part (b) was not done well. Few students were able to recall or apply correctly the formula for calculating the standard deviation of a frequency distribution.

Question 2

Part (a) was generally answered well. Many students were able to draw a back-to-back stem and leaf diagram correctly but some lost marks by not writing down the two correct keys.

Part (b) was not done well. Many students did not make correct comparisons. In questions like this, students should compare the mean/median, range/IQR and skew not simply stating the values.

Students should be advised to be both precise and explicit in their comparisons, eg comments such as ‘the heart rates after running are more than the heart rates when seated’ is insufficient as it is not true for all heart rates, whilst ‘the median of the heart rates after running is 86 beats per minute and the median of the heart rates seated is 69 beats per minute’ is not a comparison.

Question 3

Part (a) was answered well. Many students were able to write the correct probabilities on the branches of the tree diagram.

Part (b) was answered well, many students writing down 0.7 × 0.8 and obtaining the correct answer. It was encouraging to see that students were not adding the two values.

In part (c) most students knew that they needed to multiply and add probabilities.

Question 4

Part (a) was answered well. Most students were able to complete the Venn diagram correctly, but some students omitted to include the number of students who did not study any of the subjects.

Part (b) was answered well. Most students followed through their answers from the Venn diagram to gain the method mark.

Question 5

This question was answered well. Many students wrote down the correct method and obtained 10.07. A few students did not round the answer to 10

Question 6

Part (a) was answered well. Many students realised they had to calculate the index number for 2012 as $\frac{1260}{980}\times 100$ and then obtained the correct answer. A few students calculated $\frac{1260}{1080}\times 100$ which is an incorrect method.

In part (b), many students were able to calculate the geometric mean of the index numbers, but few were able to interpret the answer in the context of the problem, often omitting to describe the increase as a specified percentage. A significant number of students calculated the *arithmetic* mean of the index numbers rather than the geometric mean or some students included 100 in the calculation of the geometric mean.

Question 7

Part (a) was answered well. Many students realised they had to calculate the frequency density and then drew the histogram correctly. It was pleasing to see students using a correct scale on the y-axis, however, some students did not label the y-axis as *frequency density* or *FD*.

Part (b) was not done well. Few students were able to recall or apply correctly the formula for calculating the standard deviation of a grouped frequency distribution.

Question 8

This question was answered quite well. In part (a), many students were able to work out a correct estimate for the number of ants in a colony. Some students prematurely rounded their answer to $8 \div 60$ to two decimal places before dividing it into 60, however, this did not have an significant effect on the final answer.

Part (b) was not done as well as part (a). Many students gave reasons that were based on their method of calculating the estimate rather than on any underlying assumptions inherent in the Peterson method.

Question 9

Part (a) was answered well. Many students stated the correct disadvantage for collecting secondary data and the correct answer for which type of data.

Part (b) was not answered well. Many students did not realise the area of a bar in a histogram represents frequency. Students could have compared, for example, medians, size of pebbles, skew or frequency of the pebbles.

Question 10

Many students answered this question well. It was encouraging to see tree diagrams drawn out with correct probabilities and students realising that this problem is without replacement. A minority of students wrote down an incorrect method such as $\left(\frac{6}{10} \times \frac{5}{10}\right) + \left(\frac{4}{10} \times \frac{3}{10}\right)$ which gave the wrong answer. Students should be advised to use exact values in their calculations of probabilities.

Question 11

Part (a) was answered well. Many students could show that 19 is an outlier by using a formal method of identifying outliers.

Students should be advised that, for a ‘Show that …’ style question, they should show all the intermediate stages in their calculations.

Part (b) was answered well. Many students drew the box plot correctly with an outlier. Some students who did not show that 19 is an outlier drew the box plot correctly.

Question 12

This question was answered well. In part (a), many students were able to calculate the 3-point moving average for the time-series correctly.

In part (b), students plotted the 3-point moving averages correctly. Part (c) was done well.

In part (d)(i), few students were able to use the trend line to find the mean seasonal variation for the Autumn Term.

In part (d)(ii), some students, having calculated a correct estimate for the mean seasonal variation, went on to correctly add this to their extrapolated value for 2014

Question 13

Part (a) was answered well. Many students knew the rules for mutually exclusive events and independent events.

For part (b), many students could not recall the formula for conditional probability, therefore, losing all three marks.

Question 14

This question was answered well. In part (a), most students were able to recall and use the formula to calculate Spearman's coefficient of rank correlation. It was encouraging to see many students clearly showing all the steps to a correct answer.

In part (b), most students were able to interpret correctly the value of their correlation coefficient and make a sensible comment about its strength.

Question 15

Part (a) was generally answered well. Many students were able to calculate the standardised score for Andrew and give the correct answer.

Part (b) was not done well. Few students were able to interpret the correlation coefficient correctly in the context of the problem. Common incorrect answers here were 'Ravina, because she has a higher standardised score' and 'Andrew, because his standardised score is closer to the mean'.

Question 16

Part (a) was answered quite well. Many students were able to standardise 105, and then were able to use the standard normal tables to find $P(X < 105)$.

Many students answered part (b) quite well by standardising 111 and then finding $P(X > 111)$. A minority of students did not subtract 0.9599 from 1, therefore, leading to an incorrect answer.

Question 17

Many students answered part (a) well, they appreciated the need to calculate the probability that the tile will not be broken as 1 – 0.05, i.e. 0.95. Many students did write $(1 - 0.05)^8$ or 0.95^8 and then obtained the correct answer.

In part (b), many students made the common error of writing 0.05×0.95^7 omitting to include 8 or ${}^8C_1$ as students did not realise binomial probabilities were required.

Many students made a correct attempt to answer part (c) in which they multiplied their part (b) with 150 thus gaining one mark.

Question 18

Part (a) was answered well. Most students were able to find $\sum x, \sum y$ and $\sum xy$ and then substitute the values in to the equation to obtain 8.08.

Part (b) was answered well, many students obtained the correct answer by showing their method clearly.

Many students went on to interpret their part (b) correctly as positive correlation in part (c)

Summary

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

- Read the question fully and carefully before attempting to answer them
- Show working out to support the final answer
- Be encouraged to use a ruler when drawing straight lines as in histograms
- Know how to calculate the standard deviation
- Write down the answers given by calculators to at least 2 decimal places but to use accurate unrounded values in calculations
- To be both precise and explicit in comparisons of distributions
- To see if answers make sense in the context of the problem
- For a 'Show that …' style question, students should show all their intermediate stages in the calculations not just the substitution stage

Grade Boundaries

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