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# **Examiners' Report**

## Principal Examiner Feedback

Summer 2017

Pearson Edexcel Level 2 Award  
In Statistical Methods (AST20)

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## **Edexcel Award in Statistical Methods Level 2 (AST20) Principal Examiner Feedback**

### **Introduction**

Most students attempted all the question on the paper. 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.

It was pleasing to see so many students showing the intermediate stages in their calculations; this is to be encouraged as it allows for part marks to be awarded where slips are made in calculations.

The design of this paper and the performance of students on this paper were consistent with previous papers so allowing a pass mark of about 66% of the total mark to be considered as showing proficiency in Statistical Methods at Level 2.

### **Report on individual questions**

#### **Question 1**

This question was generally answered well. In part (a), the majority of students could complete correctly the table. Some students appeared to make slips when completing the table and so gained 1 mark for this part of the question.

Part (b) was also answered well. The majority of students could identify the probability of a total of 3 as  $\frac{1}{20}$  gaining two marks in part (b)(i). There were more errors observed in part (b)(ii) with some students appearing to miscount and giving an answer of  $\frac{6}{20}$  or  $\frac{8}{20}$ . Occasionally an answer of  $\frac{10}{20}$  was seen. This appeared to be due to students giving the probability of a total of 11 or greater rather than a total of greater than 11. It was pleasing to note that only a small minority of students gave words describing a likelihood as the answer in part (b).

#### **Question 2**

Part (a) of this question was generally done well with the majority of students able to produce a fully correct ordered stem and leaf diagram with a key. Where full marks were not awarded, this was generally due to missing "leaves" and less commonly due to the omission of the key.

The majority of students could identify the median from their stem and leaf diagram in part (b). It appeared that a small number of students could not find the median from a stem and leaf diagram with some using an ordered list of the numbers given in the question (generally leading to the correct answer) and others making errors when attempting to use their stem and leaf diagram.

Students found part (c) of the question more challenging. Unsurprisingly, students found identifying the quartiles from the stem and leaf diagram more challenging than finding the median and so it was not uncommon to see incorrect values identified. Some students incorrectly gave the range rather than the interquartile range. Where students had omitted a value in producing their stem and leaf diagram they found it challenging to follow through in parts (b) and (c) to find the correct median and the correct interquartile range from their stem and leaf diagram, as it now had 26 values rather than 27.

### **Question 3**

This question was generally done well. It was common to see 2 or 3 issues with the pie chart correctly identified. The most common issues identified were the overlapping intervals and missing data with reference to the pie chart being 3-D or broken also being popular correct answers. Some students referred to missing data twice by identifying both missing data intervals, but this was only counted as one issue. Some students referred to the pie chart not being labelled or wanted numbers (or percentages) to be shown on the diagram, these answers did not gain marks.

### **Question 4**

In part (a) of this question most students scored at least 1 mark for using tallies or giving two or more correct frequencies. A good number of students scored 2 marks for a fully correct tally chart.

Part (b) was done less well. Many students did not scale their horizontal axis correctly; however these students were generally able to score 1 mark for the polygon. Where the axes were correctly scaled it was common for students to score 2 marks as labels were omitted.

### **Question 5**

This question was done well by most students. In part (a) most students gained at least 1 mark for either an appropriate question with a time frame or for at least 3 non-overlapping exhaustive answer boxes with a unit. Common issues included the omission of a time frame, omission of a unit for the amount of tea, non-exhaustive response boxes and overlapping response boxes.

In part (b) a high proportion of students could identify an advantage of taking a sample with quicker and cheaper being seen frequently. Many of the students were also able to identify a problem with the sample selected. Common correct answers to part (b)(ii) were to indicate that the sample would be biased, that the sample was only her family (not representative) or that it was a small sample. There was a range of different incorrect answers.

### **Question 6**

This question was done reasonably well. In part (a) the majority of students were able to name the type of data as continuous. Part (b) was also generally answered correctly, although a minority of students gave the answer as  $6 < w \leq 8$  (the modal class interval) or  $4 < w \leq 16$ .

There was a pleasing number of correct answers to part (c). Some students correctly found  $\sum fx$  but went on to divide by 4 rather than by the total frequency (47). Other students incorrectly added the frequencies and divided by 4.

### **Question 7**

This question was generally done well, with the exception of part (c). In part (a), the majority of students could correctly identify the number of posters sold on the day in question. In part (b) most students could identify that the scatter graph showed positive correlation and could interpret this in context.

Part (c) of the question was answered poorly, with many students not aware of how to use the information that was provided to them to find the mean point of the data. A range of incorrect calculations was seen, many of which involved working with the numbers given in different combinations and  $4700/340$  was a common incorrect approach. When students were able to find the mean point in (c) then they were generally able to plot this correctly in part (d)(i). Even when students had an incorrect mean point in part (c) some were able to gain the mark for correctly plotting their mean point. In part (d)(ii) a majority of students were able to draw an acceptable line of best fit and part (e) was generally answered correctly.

### **Question 8**

A pleasing number of fully correct box plots were observed in part (a). Where a fully correct box plot was not seen this was sometimes due to errors in plotting. Even when students were not able to draw a fully correct box plot they could generally identify the median correctly, although errors in finding the quartiles were more common with some students finding incorrect positions in the list and others adding and subtracting values to the median.

In part (b), the majority of students could correctly identify negative skew. Unsurprisingly the most common incorrect answer was to indicate positive.

### **Question 9**

Part (a) was answered reasonably well. Many students were able to complete the table correctly. The most common error was to assume that there were only 13 females in total (adding the numbers of females given in the question) which often lead to 1 mark being awarded for completing correctly the entries for total males, total Hamlet and total Macbeth.

In part (b) a significant number of students correctly calculated the number of students in the stratified sample who like Hamlet the best. A small number of students showed a correct calculation but then gave their answer as 11.05 and therefore gained 1 mark. A common error was to calculate  $\frac{138}{61} \times 25 = 56.5$  which students did not see was larger than the total sample of 25. Other errors included  $138 \div 25 = 5.52$  with a final answer of 6, working out the number of students in the sample for Macbeth  $\frac{49}{138} \times 25$  or incorrectly adding an extra 138 to the total number of students  $\frac{61}{28+61+49+138} \times 25$

### Question 10

This question was done well. The majority of students could estimate the median weight using the cumulative frequency diagram as required in part (a). In part (b) a significant number of students scored at least 1 mark for 36 seen or for a line drawn at a weight of 65 grams. A good number of students got part (b) fully correct.

### Question 11

Part (a) was done well. The majority of students gave a fully correct answer which was most frequently seen as a decimal, but also occasionally seen as a fraction or as a percentage. The most common incorrect method was to work out  $0.35 \times 0.45$

Part (b) caused slightly more difficulty than part (a), but was done well overall. Where students gave the correct answer there were some who used  $1 - 0.35$  and others who worked out  $0.45 + 0.2$  both of which were correct methods. Common incorrect methods were to work out  $1 - 0.8$  (subtracting the answer to part (a) from 1),  $0.2 + 0.35$ ,  $0.45 \times 0.2$ ,  $1 - 0.45$  and  $1 - (0.45 + 0.2)$

Part (c) was done well. The majority of students could state that the probabilities added to 1 or to show that this was the case. Where students gave incorrect answers these often referred to there being three colours without reason or indicated that these were all the colours in the box without reason.

### Question 12

In part (a) there was a good number of correct answers.

Part (b) of this question was not answered at all well. Many students incorrectly identified histogram B and therefore scored no marks. Where students did identify histogram A, it was common to award 1 mark for an incomplete reason. Where students were awarded 2 marks, the most successful reason was that the modal class was to the left or that histogram B was more symmetrical.

### Question 13

Part (a) of this question caused students difficulties. Some students were able to use the information in the table correctly and indicated that the value was much larger than all the other values; however it was common to see answers that referred to Easter which did not gain the mark.

Students were generally able to work out the 3 point moving averages correctly in part (b). Where incorrect answers were seen, this was often due to a slip in the calculation which could gain a mark for the method. Some students divided by 2 rather than by 3 when attempting to work out the moving averages and did not gain any marks.

Part (c) of the question was generally answered well. The majority of students correctly identified the trend in the number of chocolate eggs sold by using the moving averages.

### Question 14

Part (a) was answered well. The majority of students could correctly calculate an estimate for the number of times that the dice will land on 5. Where incorrect calculations were seen, these generally involved working with the numbers from the question, examples of incorrect calculations were  $5 \times 90$ ,  $\frac{90}{5}$  and  $\frac{5}{6} \times 90$ . Some of the incorrect answers given were larger than the total number of rolls given in the question and it was disappointing to note that students did not identify a problem with this.

Part (b) was not answered well. The most successful response was to identify the fact that there should be 25 heads and 25 tails. Many students just stated that there were more tails than heads which was not sufficient for the award of the mark.

### Question 15

In part (a) the majority of students could correctly calculate the index number for the average price of the lawnmowers in the shop in 2014. It was pleasing to note that only a small number of students performed a correct calculation but went on to write £102.90 or 102.9% as the answer (these were only awarded the method mark). There was a small number of students who showed a correct calculation but then did not give their answer to the required accuracy and therefore gained only the method mark. Common errors included omitting  $\times 100$ , calculating  $\frac{88.32}{90.87} \times 100$ ,  $90.87 - 88.32$  or finding the mean of the two prices given in the question.

For part (b) a range of incorrect, partially correct and fully correct answers was seen. Those students who knew what the index numbers meant scored 2 marks. However many students tried to make a comparison between the lawnmowers and the wheelbarrows by doing a calculation with the index numbers. A few students recognised the decrease but failed to mention 1.5% and scored 1 mark. A small number of students identified decrease and 1.5 but omitted the % and so scored 1 mark.

### **Question 16**

This question was generally well done and a good number of students scored full marks in both parts (a) and (b). The most common error in both part (a) and part (b) was to add the probabilities rather than multiplying them, it was disappointing to note that students who followed this approach did not seem to recognise the issue with their answer to part (a) being greater than 1. When students added rather than multiplied the probabilities they generally scored 1 mark in part (b) for  $1 - 0.3 (= 0.7)$  or for  $1 - 0.8 (= 0.2)$  which was often seen on the tree diagram.

### **Question 17**

This question was not done well with only about half of the students being able to work out the standard deviation correctly using the information given in the question. A range of incorrect methods was seen involving the working with combinations of the numbers given in the question.

### **Question 18**

This question was done reasonably well. Many students recognised that it was just a frequency table and calculated the mean accurately. The most common error was to add the temperatures and divide by 3. Other incorrect responses involved dividing 90 by the total of the temperatures.

### **Summary**

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

- Read the question fully and carefully before attempting to answer it
- Show working out to support the final answer
- Ensure that scales for diagrams are equally spaced
- Ensure that scales provided are read accurately, both when plotting and when reading off values
- Consider whether answers are reasonable, such as in the case of probability questions and questions given in context
- Check methods and answers more carefully

### **Grade Boundaries**

Grade boundaries for this, and all other papers, can be found on the website on this link:

<http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx>



