Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

January 2020

Pearson Edexcel Level 3 Award
In Statistical Methods (AST30)
Paper 1

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

January 2020
Publications Code AST30_01_2001_ER

Edexcel Award in Statistical Methods (AST30)
Principal Examiner Feedback – Level 3

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 formulae for the examination. It was pleasing to see so many students showing the intermediate stages in their calculations.

Report on Individual Questions

Question 1

Part (a) was answered well by the majority of the students who were able to give a correct advantage for taking a sample. Common correct answers such as quicker or cheaper were regularly seen.

Part (b) was not answered well by the majority of the students who could not give a correct sampling frame. A common incorrect answer given was 'all the cars'. Some students missed out the word 'all'.

Part (c) was answered well by the majority of the students. Many students clearly showed how they arrived at 23. Some students misinterpreted the question by including 2 cars rather than more than 2 cars.

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, e.g. comments such as 'the people in the summer were quicker to complete the obstacle course than the people in Winter' is insufficient as it is not true for all the people, whilst 'the median time in Winter is 68 minutes and the median time in the summer is 51 minutes' is not a comparison.

Question 3

Part (a) was answered well. Most students were able to complete the Venn diagram correctly.

Part (b) was answered well. Students showed an understanding of mutually exclusive events.

Part (c) was answered well. Students showed a clear understanding of men not wearing a white shirt or a blue shirt or a tie.

Part (d) was answered well. Most students followed through their answers from the Venn diagram to gain the method mark. It was pleasing to see students answering conditional probability questions well.

Question 4

Part (a) was answered well by some students. It was encouraging to see correct probabilities on the tree diagrams.

Part (b) was answered well by most students. Students knew that they needed to multiply and add probabilities, but some got this confused and did these in the wrong order, i.e. $(0.75 + 0.1) \times (0.25 + 0.9)$

Question 5

Part (a) was answered better than in previous series. Students who knew how to formally identify outliers scored at least 2 marks. A number of students could identify 645 as the boundary value for the outlier but then made no comparison with 700. Students should make sure that they answer questions in full especially when a reason is required.

Part (b) was generally well answered by most students. Many students drew the correct box plot. When an error occurred, it was usually a plotting error which cost students 1 mark.

Part (c) was very well answered. A common incorrect answer was incorrectly identifying the nature of the skew. Some students wrote down the values for the various summary statistics without comparing them, e.g. "the median for Ben is 510 and the median for Govind is 545". Students should be aware that only 1 mark is available for comparing the dispersions/spread of the distributions, i.e. only 1 mark would be awarded for a correct comparison of both the interquartile ranges and the ranges of the distributions.

Question 6

Most of the students were able find an estimate for the number of outcomes. Where fully correct answers were not seen, this was generally due to students dividing 300 by 0.35

Question 7

Part (a) was answered successfully by the majority of students. The majority of students were able to draw a correct histogram; however, some omitted the label on the vertical axis and so gained two rather than three marks. A minority of students made an error in calculation of one or more of the frequency densities. Some students used an incorrect formula in their attempt to calculate frequency density.

In part (b), it was pleasing to see that most students knew how to calculate an estimate of the mean from grouped data. Only a few students made arithmetic errors in their calculation, but these students had generally shown their calculation steps and therefore were able to gain partial credit. A common error by some students was to use the upper or lower limits to work out the mean.

Part (c) was answered well. Most students were able to correctly calculate an estimate for the standard deviation of the ages. A minority of students used an incorrect formula in their attempt to calculate an estimate for the standard deviation.

Question 8

Part (a) was answered quite well. Many students were able to work out a correct estimate for the number of squirrels in the forest. Some students prematurely rounded their answer to 14 ÷ 40 before dividing it into 45. Students should be aware that premature rounding affects the final answer.

Part (b) was answered quite well. It was encouraging to see many students gave a correct assumption.

Question 9

This question was answered well. Many students wrote down the correct method and obtained 8.1. A few students did not round the answer to 8.

Question 10

Part (a) was answered well. Many students realised they had to calculate the chain base index number. A few students calculated, for example, $\frac{17575}{17145}\times 100$ which is an incorrect method. Only a few students calculated fixed base index numbers.

Part (b) was answered well by many students who were able to calculate the geometric mean of the index numbers. Some students calculated the *arithmetic* mean of the index numbers rather than the geometric mean or adding rather than multiplying their four numbers.

Part (c) was answered well by most students. Students were able to interpret the answer in the context of the problem, however, sometimes omitting to describe the decrease as a specified percentage and others failed to realise that this was an average monthly decrease.

Question 11

Part (a) was answered successfully. Many students were able to calculate the standardised scores for Neville's race.

Part (b) was generally answered well. Many students were able to work out Mark's time to complete the race. A minority of students wrote down $-1.5 = \frac{50 - x}{4}$ and obtained 56 which gained the method mark only.

Part (c) was done well by a minority of the students. Many students still cannot interpret standardised scores. A common incorrect answer was to say that Mark had a shorter time because his score is closer to zero or to the mean value.

Question 12

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. A common error was to write the answer as 0.81 thus losing the final mark.

In part (b), most students were able to state and interpret correctly the value of their correlation coefficient.

Question 13

Many students answered part (a) well, many students could recall the formula for the binomial distribution and apply it correctly. Some students made the common error of writing 0.2^{10}.

Part (b) was not answered well as many students did not add the probability from part (a). Some students forgot to write 10 in front of their probability statement for when one customer is served,

Question 14

Part (a) was answered well. Many students could find the value of S_{pv}.

Part (b) was answered well as many students recalled the formula for the product moment correlation coefficient correctly and obtained the correct answer of −0.87

Part (c) was answered well by many students. Many students gave a correct interpretation of the value found in part (b).

Question 15

In part (a) only the most able students were able to score 3 marks. Many students were able to score 1 mark by drawing a bell shaped curve centred on the mean. Students lost the final 2 mark as they drew curves that did not start or end at the correct places or their curve was the same height as the other curve.

In part (b) many students were able to give 2 correct comparisons. Some students did compare ranges, which was accepted, but students should really compare standard deviations in these types of questions. A few students had obviously been trained to compare skew in questions that ask for comparisons to be made. Unfortunately for these students, in questions on normal distributions this is not an acceptable comparison as all normal distributions are symmetrical.

Question 16

Part (a)(i) was not answered well. Many students did not know the rule for mutually exclusive events. However, part (a)(ii) was answered well as many students knew the rule for independent events.

For part (b), this was answered poorly. Many students did not realise that they had to recall the formula $P(A \mid B) = \dfrac{P(A \cap B)}{P(B)}$ to work out $P(A \cap B)$ at first. A common error made was to write 0.35 divided by 0.8

Question 17

Part (a) was done well. Most of the students were able to describe the trend shown by the moving averages. Students should be advised that the correct word to describe the trend here is upwards, and that, for example, "increasing" and "positive" are merely condoned.

Part (b) of this question was done well and many students scored both marks. Many students were able to calculate the difference between the actual value and the trend line value for quarter 3 for at least one of the years. A common error was to calculate, for example, 220 – 280 rather than 280 – 220 for the seasonal variation of quarter 3 so that some students obtained –46.7 rather than 46.7

Question 18

Many students did not answer part (a) well. These students simply found the z value and did not look this up in the tables. A common error was to find 1 – 1.5 and give the final answer as –0.5. Students should quote the probability values as they are in the table and not round them.

Part (b) again was not answered well. Many students were able to standardise but did not look up the z value in the tables or when they found 0.9599 they did not subtract this value from 1. Students should quote the probability values as they are in the table and not round them.

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;
- 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;
- be both precise and explicit in comparisons of distributions;
- check to see if answers make sense in the context of the problem;
- for a 'Show that …' style question, show all intermediate stages in the calculations, not just the substitution stage.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom