Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2025

Pearson Edexcel International Advanced Level
In Statistics S2 (WST02) Paper 01

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General Introduction

Overall, this paper allowed all students to demonstrate their ability and knowledge of the WST02 specification. There were several places where students struggled to translate the context into correct statistical processes/calculations. In particular questions that ask a student to show something is true require all the steps in the working to be shown.

Report on Individual Questions

Question 1

Part (a) was a nice easy start to the paper with many students using F(1) = 1 leading to the given answer of $k = {}^1/_5$

Part (b) was generally answered well with many students scoring full marks. Common error seen was usually when students calculated F(6) but then failed to subtract from 1. Very occasionally students lost the final mark as they gave a less accurate answer than the one required in the mark scheme.

Part (c) proved a good source of marks for many students. Many students knew that to find the median they needed to set F(x) = 0.5 and so scored M1. A few lost this mark as they thought that the median was found by calculating F(0.5). The question asked students to show that the median was given by $am^4 + bm^2 + c = 0$ where a, b and c are integers. Many followed this instruction and gave correct equations; however, too many gave a correct equation but a, b and c were not integers and so the A mark was withheld. The final mark was for finding the value of m and many students scored this mark. Those that lost this mark often failed to reject the roots that were not valid. A few left their answers as the roots for m^2 not m. Again a few gave answers that were less accurate than the answer required in the mark scheme.

Part (d) Here the instruction in the question paper was "using calculus…" and students should be encouraged to follow any instruction given in the question paper. The students that realised that this instruction required F(x) to be differentiated twice often scored full marks. Some students lost marks as they only differentiated once. A few students lost the final mark as they failed to reject the root of –1, which in this case was not possible.

Part (e) was generally answered well as the mark scheme allowed for follow through from the students median and/or their mode. Some students stated the skew but failed to give a reason, so no marks were awarded. Some students gave a correct reason but then drew an incorrect conclusion and so the final A mark was withheld.

Question 2

Part (a) Many students scored this mark as they could state the necessary distribution. Common errors included, stating Poisson but with no value for λ or stating an incorrect value for λ.

Part (b) Students were well prepared to state the assumptions that are required for a Poisson distribution. However, some students failed to give a correct assumption in context and just regurgitating the assumptions with no context and this did not gain any credit.

Part (c) Many students scored this mark as they gave correct hypotheses. Common error included stating hypotheses that were not in terms of λ or μ. A very small number of students gave hypotheses written in words and so lost this mark.

Part (d) Many students were able to identify the correct critical regions and scored full marks. Students should be encouraged to show the probability statements that lead to the critical regions, as marks were sometimes lost when incorrect critical regions were stated. This would

have also helped students gain marks in part (e). Common errors included $X \leqslant 4$ for the lower critical region and $X \geqslant 17$ for the upper critical region. A few students gave an acceptance region rather than critical regions.

Part (e) As the mark scheme allowed follow through from part (d) students answered this part well. For those students who had incorrect critical regions in part (d) it would have helped if they had stated the probability statements. For those students that did not have a 2 tailed critical region no marks were awarded.

Part (f) Many students often scored the M mark as they gave a correct non contextual statement. However, a few students lost marks as they gave contradicting non contextual statements. The final mark caused some students issues. After making a correct non contextual statement an incorrect contextual statement was seen. Some students also failed to give a correct contextual statement with all the key words required in the mark scheme.

Question 3

This proved a good source of marks for many students.

Part (a) was answered well by many students, and often full marks was awarded. Common error included setting $np(1 - p) = 2.25$ which led to incorrect values for n and p.

Part (b) Many students scored full marks. Common error included writing or using $1 - \mathrm{P}(X \,,, 7)$ rather than $1 - \mathrm{P}(X \,,, 7)$ and so lost 2 marks. Again a few gave answers that were less accurate than the answer required in the mark scheme.

Part (c)(i) Many students scored full marks. Common error included writing or using $1-\mathrm{P}(X \text{,,} 10)$ rather than $1-\mathrm{P}(X \text{,,} 11)$ and so lost 2 marks. Again a few gave answers that were less accurate than the answer required in the mark scheme.

Part (c)(i) Students were able to justify why an approximation was suitable in this question. When marks were lost it was usually because students only gave 1 of the required conditions and not both.

Question 4

Part (a) For those students who knew how to find a sampling distribution this proved a good source of marks, with many scoring full marks. The most common error made by students was to mix up the probability of black with the probability of white. However, students still managed to find the required probabilities albeit in the reverse order that was required. Whilst the mark scheme allowed for probabilities given as decimals, students should be encouraged to give their probabilities as exact fractions. Occasionally students lost the final mark as the decimal answers were not given to the accuracy defined in the mark scheme.

Part (b) was answered well and many students scored full marks. Most took the route of solving using logs and a few had issues with the inequalities required. A common error was $n < \dfrac{\log(0.05)}{\log(\text{"}\frac{283}{343}\text{"})}$ which led to an incorrect answer of $n = 15$

Question 5

Part (a) caused some students issues. The most common correct solution involved finding $\frac{2}{21}\int_0^k x\,\mathrm{d}x + \frac{2}{15}\int_k^6 (6-x)\,\mathrm{d}x = 1$. Those that took this route scored well and often at least 4 of the 5 marks were scored. This was a show that question, so students were expected to show working from the 3 term quadratic to the given answer. Occasionally this was not done so the final A mark was withheld. Very few students took the approach of finding the area of the 2 triangles and setting = 1 or finding the cumulative distribution function and equating the 2 parts. Again, for those that did the final mark was often withheld as they failed to show working from the 3 term quadratic to the given answer.

The main issue for students stemmed from an incorrect assumption. Too many students assumed that $\frac{2}{21}k = \frac{2}{15}(6-k)$ and whilst this led to the given answer, this is not true for all probability density functions and so no marks were credited for this approach. As this was a 5 mark question students should have questioned why such a trivial approach gave the correct answer. It was pleasing to see that very few students took a verification approach, but for those that did only 2 marks were available.

Part (b) was answered better than part (a). Many students showed sufficient working to score all 4 marks. Common error included not writing or using the integral of xf(x) on both parts and so scored no marks. Other errors occurred in the substitution of limits leading to an incorrect answer.

Part (c) was answered well with many students scoring both marks. Common errors included adding $\mathrm{E}(X)^2$ to $\mathrm{E}(X^2)$ rather than subtracting, or failing to square their $\mathrm{E}(X)$.

Question 6

Part (a) Many students were able to use the given information to set up the two required equations and then correctly solve to find the value of *a* and the value of *b*. A common incorrect equation seen was $\frac{1}{b-a}=\frac{3}{16}$ which obviously does not meet the given condition and so led to incorrect values of *a* and *b*. Very few students took the alternative solution shown in the mark scheme.

Part (b) was answered well with many students scoring full marks. Common error was to think that $\mathrm{E}(aX+b)$ was the same as $a\mathrm{E}(X)$ and so scored no marks.

Part (c) As the mark scheme allowed for follow through from their *a* and *b* values many students scored this mark. Common error was to calculate $\frac{(b-a)^2}{2}$ rather than $\frac{(b-a)^2}{12}$

Part (d) Again, as the mark scheme allowed for follow through from their *a* and *b* values many students scored 2 marks. Common errors included subtraction of $\mathrm{E}(X)^2$ from Var(*x*) rather than adding or failing to square $\mathrm{E}(X)$.

Question 7

Part (a) was answered well as students were able to identify the correct distribution. Those that lost this mark usually just stated binomial without any reference to the parameters required.

Part (b) Students were well prepared to state the assumptions that are required for a binomial distribution. However, some students failed to give a correct assumption in context and just regurgitating the assumptions with no context and this did not gain any credit. A few students mixed up the assumptions required with the assumptions required for a Poisson distribution.

Part (c) Often this part was answered with no working and whilst a correct answer scored both marks, students that gave an incorrect answer with no working scored no marks. Students should be encouraged to show the probability statements for this type of question.

Part (d) allowed many students to gain some mark, with a number gaining full marks. Most students were able to state or use N(60, 42) and so gained the first M mark. Many students were able to apply the correct continuity correction $t - 0.5$, however, some students failed to use a continuity correction and so lost marks. The main error stemmed from students using an incompatible z value for their standardisation, so it was not unusual the final B and A mark to be withheld.

Part (e) Many students were able to score marks in this part of the question. Many students gave correct hypotheses and so gained B1. However, some students did not give hypotheses in terms of p or π and so lost this mark. Also a few students gave hypotheses written in words, which we do not accept. Many students were able to calculate a correct probability or a correct critical region. Common error was to find $1 - \mathrm{P}(X \leqslant 11)$ rather than $1 - \mathrm{P}(X \leqslant 10)$ and so lost the next 2 marks. Many students often scored the next M mark as they gave a correct non contextual statement. However, a few students lost marks as they gave contradicting non contextual statements. The final mark caused some students issues. After making a correct non

contextual statement an incorrect contextual statement was seen. Some students also failed to give a correct contextual statement with all the key words required in the mark scheme.

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