# Examiners' Report
Principal Examiner Feedback

Summer 2017

Pearson Edexcel GCE Mathematics

Statistics S4 (6686)

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# Statistics 4 (6686) – Principal Examiner's report

## General introduction

Students found this paper very accessible and scored well. They were able to make a reasonable attempt at the majority of questions with some excellent scripts submitted. The presentation of the work was generally good and students were able to complete the paper within the time.

## Question 1

This proved to be a nice start to the paper with many students gaining full marks in part (a).

In part (b), if letters other than G for girls and B for Boys are used in the hypotheses then they need to be defined. The majority of students were able to proceed and gain a *t*-value of 2.14 with only a minority, forgetting to subtract the 5 or using $-29.5 + 22.8 - 5$ for the numerator.

## Question 2

In part (a), few students stated the Critical region or even wrote down any probabilities. For those who calculated the probability of Type I error correctly, this did not cause any issues. For those who got an incorrect answer, the lack of working meant a loss of 3 marks in part (a) and unless a Critical region was given in part (c), or a correct probability was calculated, the method mark was lost in this part as well.

In part (b) many students were able to give a correct contextual statement but were unable to express their reason clearly. Most just said "it is not in the Critical region" leaving the examiner to guess what is not in the critical region hence receiving no marks.

Part (c) was a good source of marks for those students who had stated a Critical region in part (a).

## Question 3

This question was well answered with only a few students giving a positive *t*-value 2.828 in part (a) rather than -2.828.

**Question 4**

In part (a)(i), a significant number of students did not seem to realise that to carry out a paired *t*-test the data needed to collected in pairs and just stated that there were two sets of data. In (a)(ii), many mentioned that the scores had to be normally distributed. Whilst this is a sufficient condition the required answer was that the differences were normally distributed.

In part (b), most students carried out a paired *t* test, although a minority chose to do a difference of means test even though the question strongly hinted which test to use. The method was well known and clearly demonstrated.

In part (c) it was pleasing to see that many students knew what a Type II error was. However, many students wrote a short essay trying to explain what it was in context often making contradictions in the process. The question said to "explain in the context of the coach's belief" so the easiest way to it explain it was to use the words "coach's belief".

**Question 5**

Many students were able to produce neat accurate solutions with virtually all able to obtain the first 2 marks. The main errors were using the wrong critical values or calculation errors such as $\frac{1}{20}+\frac{1}{10}=\frac{1}{30}$

**Question 6**

This question was a good discriminator. The majority of students were able to prove the results required in parts (a) and (b).

Part(c) was well attempted, although many students did not explain or show that they had found the values of *a* and *b* for the minimum point.

In Part (d), a significant number of students thought that $E(X^2)$ was $(np)^2$ . Those who used $E(X^2) = np(1 – p) + (np)^2$ made more progress but only a minority managed to rewrite it in the form $p^2 + \ldots\ldots$that could be used to show it was biased.

In part (e), the majority of the students who used $E(X^2) = np(1 – p) + (np)^2$ gained the correct solution.

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