6. A farmer sells strawberries in baskets. The contents of each of 100 randomly selected baskets were weighed and the results, given to the nearest gram, are shown below.

Weight of strawberries (grams)	Number of baskets
302 – 303	5
304 – 305	13
306 – 307	10
308 – 309	18
310 – 311	25
312 – 313	20
314 – 315	5
316 – 317	4

The farmer proposes that the weight of strawberries per basket, in grams, should be modelled by a normal distribution with a mean of 310 g and standard deviation 4 g.

Using his model, the farmer obtains the following expected frequencies.

Weight of strawberries (s, grams)	Expected frequency
$s \leqslant 303.5$	a
$303.5 < s \leqslant 305.5$	7.8
$305.5 < s \leqslant 307.5$	13.6
$307.5 < s \leqslant 309.5$	18.4
$309.5 < s \leqslant 311.5$	19.6
$311.5 < s \leqslant 313.5$	16.3
$313.5 < s \leqslant 315.5$	10.6
$s > 315.5$	b

(a) Find the value of a and the value of b. Give your answers correct to one decimal place.

(5)

Question 6 continues on page 23

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Question 6 continued

Before $s \leqslant 303.5$ and $s > 315.5$ are included, for the remaining cells,

$$\sum \frac{(O - E)^2}{E} = 9.71$$

(b) Using a 5% significance level, test whether the data are consistent with the model. You should state your hypotheses, the test statistic and the critical value used.

(7)

An alternative model uses estimates for the population mean and standard deviation from the data given.

Using these estimated values no expected frequency is below 5

Another test is to be carried out, using a 5% significance level, to assess whether the data are consistent with this alternative model.

(c) State the effect, if any, on the critical value for this test. Give a reason for your answer.

(2)

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Question 6 continued

(Total for Question 6 is 14 marks)

TOTAL FOR PAPER: 75 MARKS

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