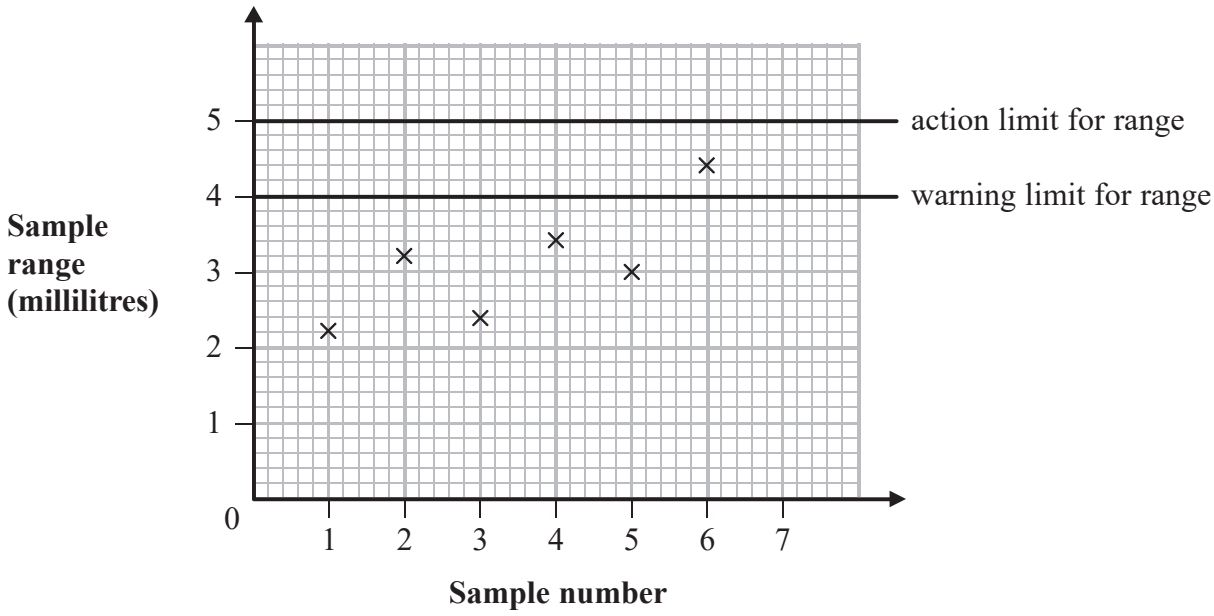
1 A coffee machine is designed to produce 150 millilitres of coffee per serving.

For quality control, random samples of 3 servings are taken and the range of each sample is found.

A quality control chart is used to plot the sample ranges.

The first 6 sample ranges have been plotted.



(a) Describe what action should be taken after the 6th sample.

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.....

(1)

The amounts of coffee, in millilitres, in the 7th sample are

147.4 152.6 152.1

(b) (i) Find the value of the sample range for this sample.

..... millilitres

(ii) Plot this sample range on the quality control chart.

(iii) Describe what action should be taken after the 7th sample.

.....

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(3)

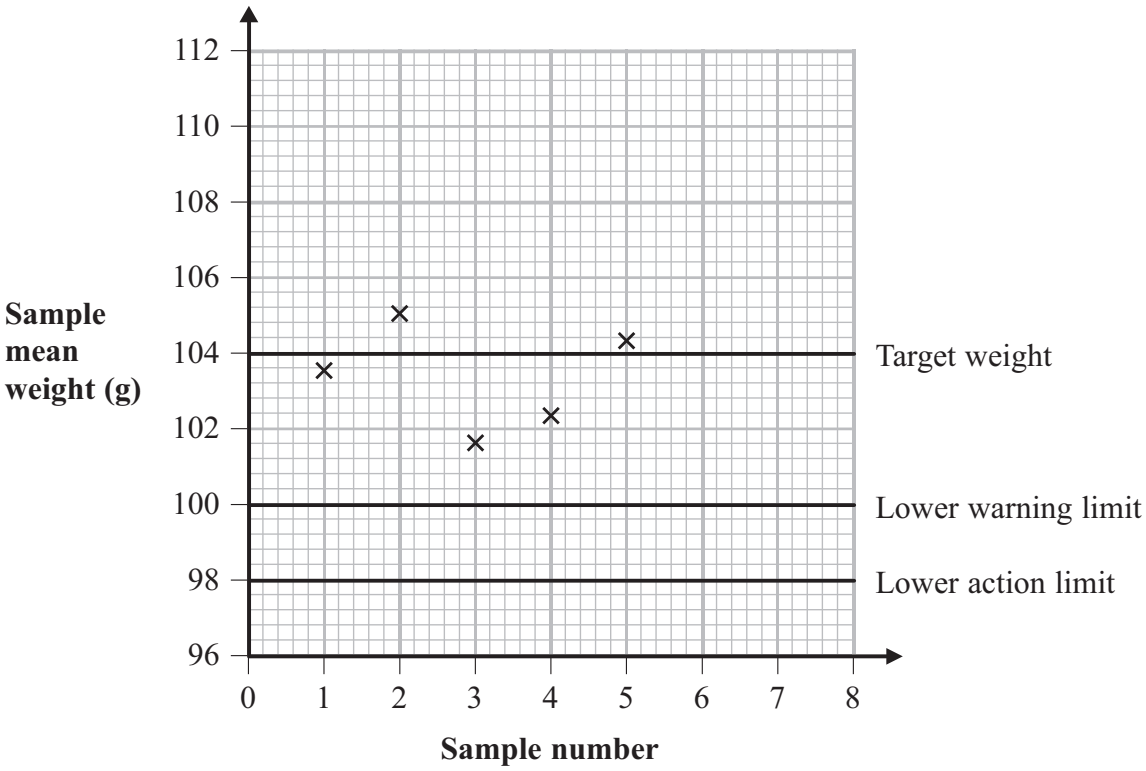
(Total for Question 1 is 4 marks)

2 A production line is set up to produce chocolate bars with a target weight of 104 g. For quality control, random samples are taken to check that the production line is working correctly.

The chocolate bars in each sample should have a mean weight of 104 g and a standard deviation of 2 g.

The sample mean weights have a normal distribution.

A quality control chart is used to plot the sample mean weights.



The lower warning limit and the lower action limit have been drawn on the chart.

(a) Complete the control chart by adding the upper warning limit and the upper action limit.
Label your lines.

(2)

(b) When the chocolate production line is working correctly, write down the percentage of samples expected to have a mean weight outside the warning limits.

..... %

(1)

Five sample means have been plotted on the control chart.

The next sample has a mean weight of 97.8 g

(c) (i) Plot this sample mean on the control chart.

(ii) Describe the action that now needs to be taken.

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(2)

(d) Explain how warning limits on a control chart are used.

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(3)

(Total for Question 2 is 8 marks)