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4. A group of students took some tests. A teacher is analysing the average mark for each student. Each student obtained a different average mark.

For these average marks, the lower quartile is 24, the median is 30 and the interquartile range (IQR) is 10
The three lowest average marks are 8, 10 and 15.5 and the three highest average marks are 45, 52.5 and 56

The teacher defines an outlier to be a value that is either

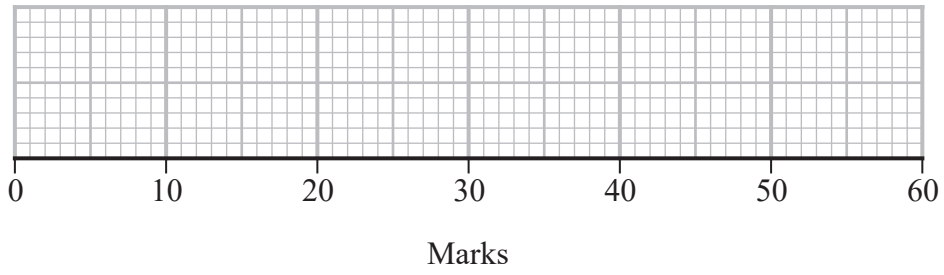
more than 1.5 × IQR below the lower quartile or
more than 1.5 × IQR above the upper quartile

(a) Determine any outliers in these data.

(4)

(b) On the grid below draw a box plot for these data, indicating clearly any outliers.

(3)



(c) Use the quartiles to describe the skewness of these data.
Give a reason for your answer.

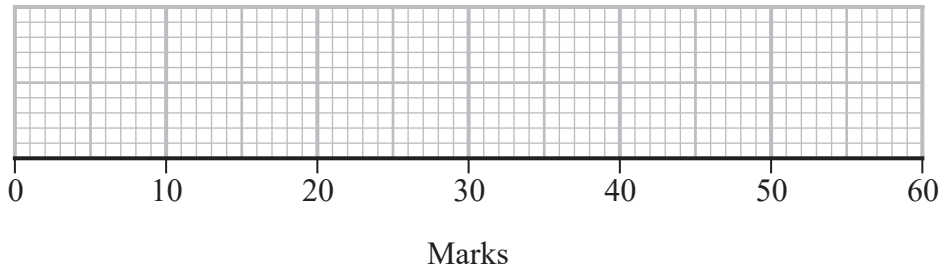
(2)

Two more students also took the tests. Their average marks, which were both less than 45, are added to the data and the box plot redrawn.

The median and the upper quartile are the same but the lower quartile is now 26

(d) Redraw the box plot on the grid below.

(3)



(e) Give ranges of values within which each of these students' average marks must lie.

(2)

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Question 4 continued

Turn over for spare grids if you need to redraw your answer for part (b) or part (d).

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Question 4 continued

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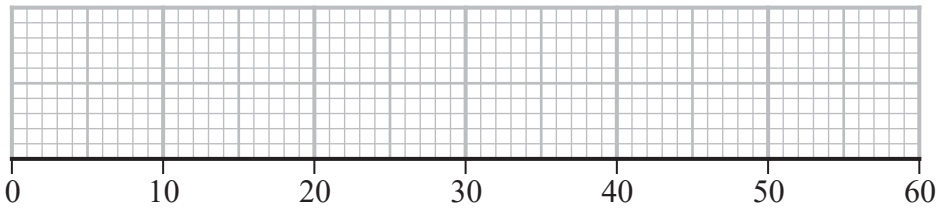
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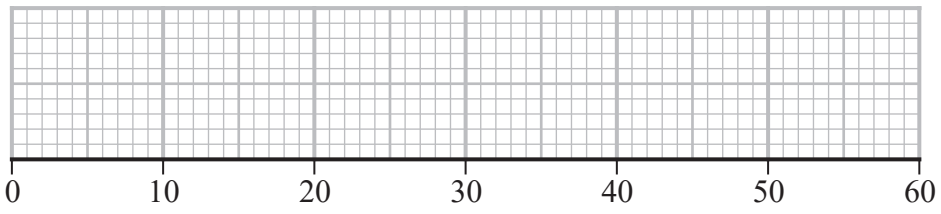
Question 4 continued

Only use these grids if you need to redraw your answer for part (b) or part (d).

Copy of grid for part (b)



Copy of grid for part (d)



Q4

(Total 14 marks)