Basic stats *[32 marks]*

A college runs a mathematics course in the morning. Scores for a test from this class are shown below.

$25 \quad 33 \quad 51 \quad 62 \quad 63 \quad 63 \quad 70 \quad 74 \quad 79 \quad 79 \quad 81 \quad 88 \quad 90 \quad 90 \quad 98$

For these data, the lower quartile is 62 and the upper quartile is 88.

1a. Show that the test score of 25 would not be considered an outlier. *[3 marks]*

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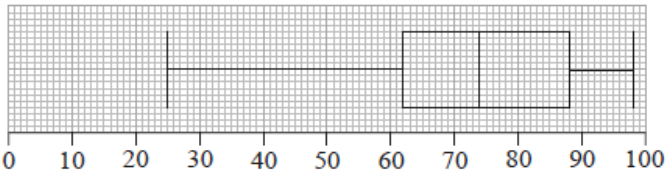
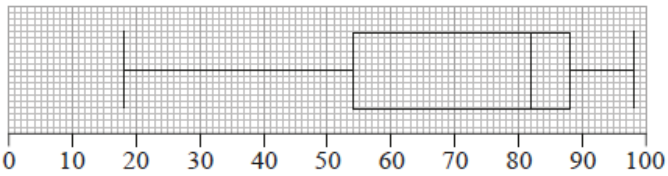
The box and whisker diagram showing these scores is given below.



Test scores

Another mathematics class is run by the college during the evening. A box and whisker diagram showing the scores from this class for the same test is given below.



Test scores

A researcher reviews the box and whisker diagrams and believes that the evening class performed better than the morning class.

1b. With reference to the box and whisker diagrams, state one aspect that may support the researcher's opinion and one aspect that may counter it. *[2 marks]*

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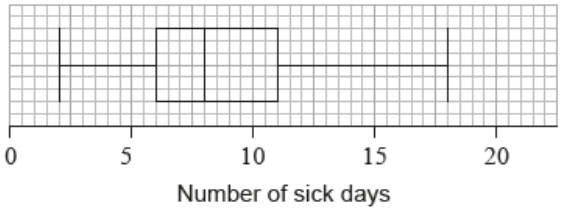
The number of sick days taken by each employee in a company during a year was recorded. The data was organized in a box and whisker diagram as shown below:



For this data, write down

2a. the minimum number of sick days taken during the year. *[1 mark]*

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2b. the lower quartile. *[1 mark]*

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2c. the median. *[1 mark]*

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2d. Paul claims that this box and whisker diagram can be used to infer that the percentage of employees who took fewer than six sick days is smaller than the percentage of employees who took more than eleven sick days. *[2 marks]*

State whether Paul is correct. Justify your answer.

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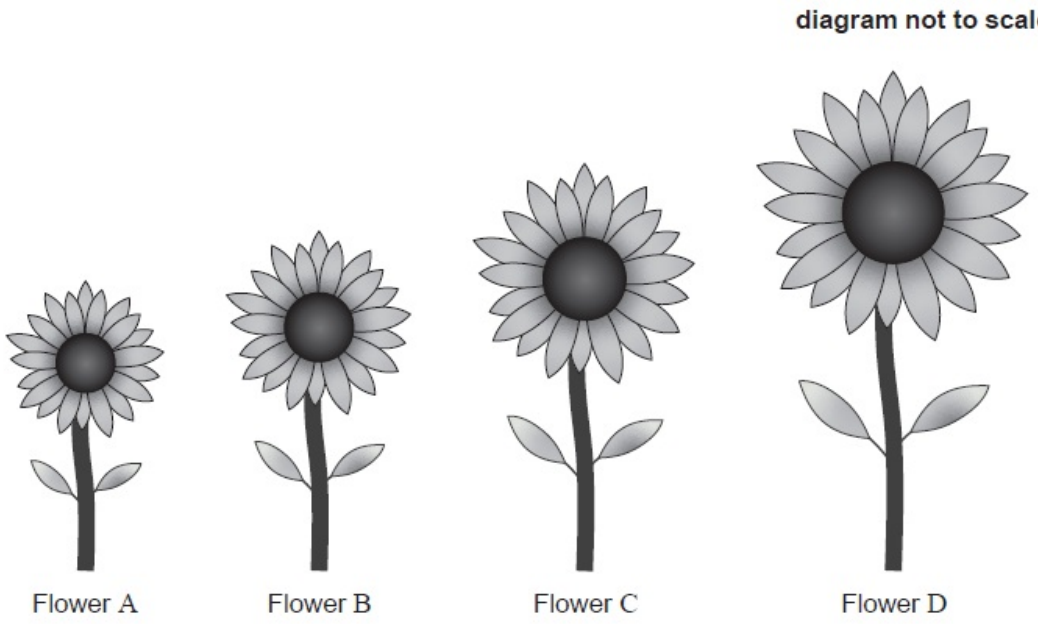
Anne-Marie planted four sunflowers in order of height, from shortest to tallest.



Flower C is $32\ \mathrm{cm}$ tall.

The median height of the flowers is $24\ \mathrm{cm}$.

3a. Find the height of Flower B. *[2 marks]*

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The range of the heights is $50\ \mathrm{cm}$. The height of Flower A is $p\ \mathrm{cm}$ and the height of Flower D is $q\ \mathrm{cm}$.

3b. Using this information, write down an equation in p and q. *[1 mark]*

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The mean height of the flowers is $27\ \text{cm}$.

3c. Write down a second equation in p and q. *[1 mark]*

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3d. Using your answers to **parts (b)** and **(c)**, find the height of Flower A. *[1 mark]*

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3e. Using your answers to **parts (b)** and **(c)**, find the height of Flower D. *[1 mark]*

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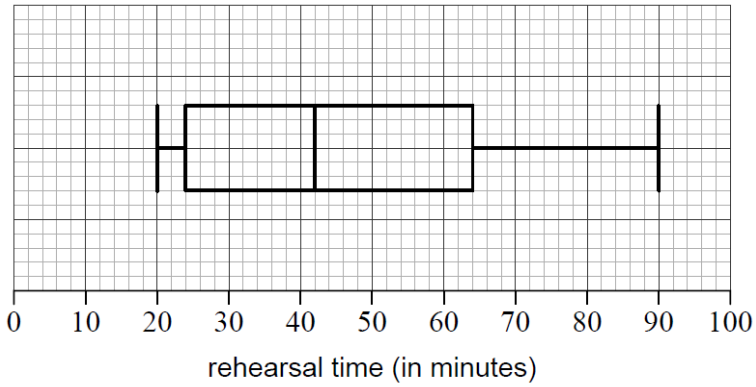
Stephen was invited to perform a piano recital. In preparation for the event, Stephen recorded the amount of time, in minutes, that he rehearsed each day for the piano recital.

Stephen rehearsed for 32 days and data for all these days is displayed in the following box-and-whisker diagram.



4a. Write down the median rehearsal time. *[1 mark]*

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Stephen states that he rehearsed on each of the 32 days.

4b. State whether Stephen is correct. Give a reason for your answer. *[2 marks]*

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4c. On k days, Stephen practiced exactly 24 minutes. *[3 marks]*

Find the possible values of k.

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The following box-and-whisker plot shows the number of text messages sent by students in a school on a particular day.

5a. Find the value of the interquartile range. *[2 marks]*

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5b. One student sent k text messages, where $k > 11$. Given that k is an outlier, find the least value of k. *[4 marks]*

A group of 20 students travelled to a gymnastics tournament together. Their ages, in years, are given in the following table.

Age (years)	14	15	16	17	18	19	20	22
Frequency	1	2	7	1	4	1	1	3

6a. For the students in this group write down the median age. *[1 mark]*

The lower quartile of the ages is 16 and the upper quartile is 18.5.

6b. Draw a box-and-whisker diagram, for these students' ages, on the following grid. *[3 marks]*