

Box Plots

GCSE Maths · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Find the median, quartiles and IQR of 3, 5, 7, 8, 9, 11, 12, 14, 15.

Step 1 · 9 values; the median is the 5th

9

Step 2 · Lower half 3, 5, 7, 8 → LQ

$$(5 + 7) \div 2 = 6$$

Step 3 · Upper half 11, 12, 14, 15 → UQ

$$(12 + 14) \div 2 = 13$$

Answer: Median 9, LQ 6, UQ 13, IQR 7

Check: Roughly a quarter of the values lie in each section ✓

2. Now try one with the steps

Draw a box plot for the data in example 1.

Step 1 · Five-number summary

Step 2 · Box from 6 to 13 with a line at 9

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Name the five values shown on a box plot. [1]

2. Find the median of 2, 4, 5, 7, 8, 10, 13. [1]

3. Find the lower quartile of 2, 4, 5, 7, 8, 10, 13. [1]

4. Find the upper quartile of 2, 4, 5, 7, 8, 10, 13. [1]

5. Find the interquartile range of 2, 4, 5, 7, 8, 10, 13. [1]
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6. Find the median of 12, 15, 18, 20, 21, 25, 27, 30. [1]
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7. Find the lower quartile of 12, 15, 18, 20, 21, 25, 27, 30. [1]
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8. Find the upper quartile of 12, 15, 18, 20, 21, 25, 27, 30. [1]
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9. A box plot has minimum 5, LQ 12, median 18, UQ 25 and maximum 40. Find the IQR. [1]
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10. For the box plot in question 9, find the range. [1]
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11. What fraction of the data lies inside the box of a box plot? [1]
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12. What percentage of the data is greater than the median? [1]
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13. One common rule says a value is an outlier if it is more than $1.5 \times \text{IQR}$ above the UQ. For the box plot in question 9, is the maximum of 40 an outlier? [2]
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14. Train A's journey times have median 12 min and IQR 4 min. Train B's have median 10 min and IQR 9 min. Compare the trains. [2]
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15. A cumulative frequency graph for 80 values gives readings of 34 at a cumulative frequency of 20, 41 at 40 and 47 at 60. Find the IQR. [2]
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4. Before you hand it in

Finding quartiles without putting the data in order

Always sort the data first; quartiles and the median are positions in ORDERED data.

'Box A is wider, so group A has more data'

Every box holds the middle 50% of its data. A wider box means MORE SPREAD, not more values.

Comparing two box plots using only the maximum values

Compare the medians and the IQRs. These describe the typical value and the middle half.

$IQR = LQ - UQ$, giving a negative answer

$IQR = UQ - LQ$, which is never negative.