

GCSE Maths: Box plots and outliers (Higher): answers

GCSE Maths - Statistics - Higher - Lesson 24.14

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch24-statistics/higher/box-plots-and-outliers/

Exercise 24N Box plots and outliers Non-calculator

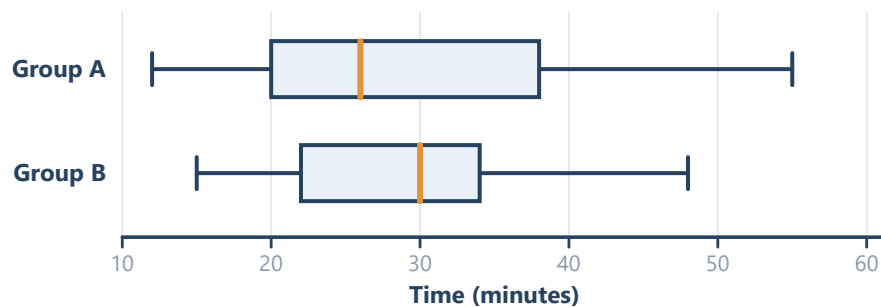
- 1 Draw a box plot for these values: 8, 11, 14, 15, 17, 19, 22, 25, 30.

Answer: See the box plot in the solution

- 2 Draw a box plot for these values: 41, 50, 38, 45, 52, 47, 60, 43.

Answer: See the box plot in the solution

- 3 The box plots show the times, in minutes, taken by two groups to solve a puzzle. (a) Write down the median of group A. (b) Work out the interquartile range of each group. (c) Work out the range of group B. (d) Compare the two groups.



- (a) Median of group A

Answer: 26 minutes

- (b) IQRs

Answer: A: 18, B: 12

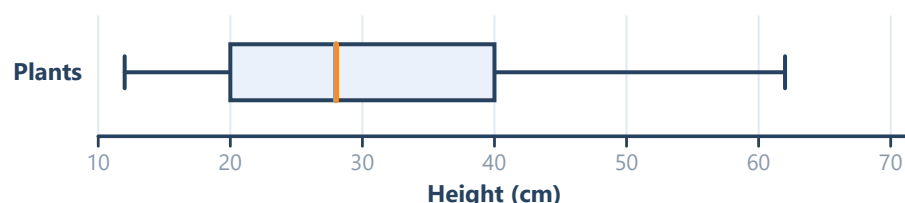
- (c) Range of group B

Answer: 33 minutes

- (d) Comparison

Answer: Group B has the higher median (30 compared with 26) and is more consistent (IQR 12 compared with 18, range 33 compared with 43).

- 4 The box plot shows the heights of some plants. (a) What fraction of the plants are taller than the upper quartile? (b) In a sample of 80 plants, how many have a height between the median and the upper quartile? (c) Explain why you cannot tell from the box plot how many plants there were.



- (a) Taller than the upper quartile

Answer: $\frac{1}{4}$ (a quarter)

- (b) Between the median and the upper quartile

Answer: 20

- (c) Why the number is unknown

Answer: A box plot shows only the five-number summary, not the number of values.

- 5 Find out whether there are any outliers using the rule “more than $1.5 \times \text{IQR}$ from the quartiles”.

Data: 31, 33, 35, 37, 38, 40, 41, 42, 44, 46, 78. For this data $Q1 = 35$ and $Q3 = 44$.

Answer: 78

- 6 Use the same rule to check for outliers in this data: 44, 46, 47, 49, 50, 52, 53, 55, 56, 58, 59. For this data $Q1 = 47$ and $Q3 = 56$.

Answer: None

- 7 Two data sets have the same median. Data set P has an IQR of 6 and data set Q has an IQR of 15. Write down one thing the box plots would show about the two data sets.

Answer: The box for Q would be much longer than the box for P, so the middle half of Q is much more spread out; the medians (lines) would be at the same position.

- 8 In a data set with 60 values, 25% of the values are bigger than 52. How many values are bigger than 52? What does 52 represent on a box plot?

Answer: 15; upper quartile

- 9 A box plot has smallest value 10, range 40, median 28, lower quartile 20 and interquartile range 16. Work out the largest value and the upper quartile, then draw the box plot.

Answer: $Q3 = 36$, largest value = 50

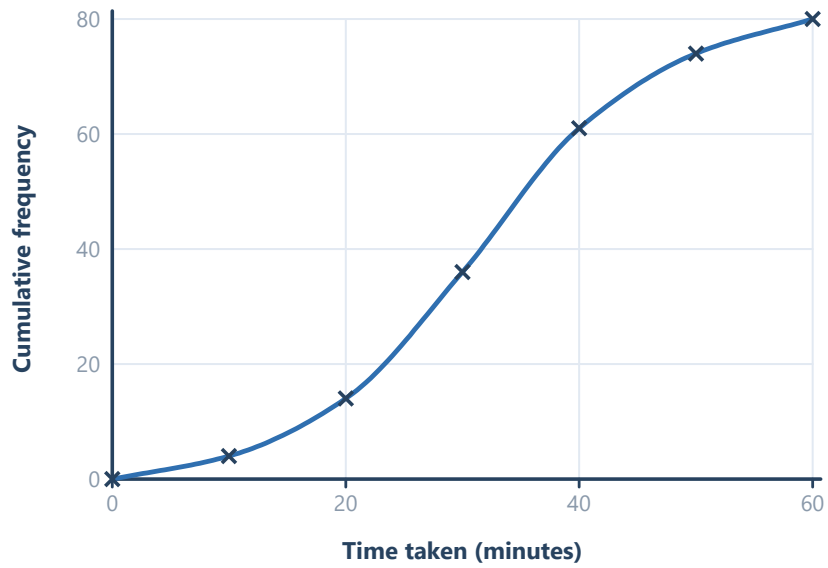
- 10 Aisha says: “The box plot for group A has a longer box than group B, so group A has more people in it.” Is she right? Explain.

Answer: No: the length of the box shows the IQR, a measure of spread, not the number of people.

- 11 The box plot for the times of 40 runners has a median of 24 minutes, a lower quartile of 20 and an upper quartile of 31. Work out, giving reasons, how many runners ran faster than 24 minutes, and how many ran between 20 and 31 minutes.

Answer: 20 runners; 20 runners

- 12 The cumulative frequency graph shows the times of 80 workers. The quickest took 2 minutes and the slowest took 58 minutes. Use the graph to draw a box plot of the times.



Answer: See the box plot in the solution

- 13** In a box plot the median is very close to the lower quartile, but far from the upper quartile. What does this tell you about the data?

Answer: The lower half of the middle 50% is bunched together, while the upper half is spread out.