

GCSE Maths: Quartiles and the interquartile range (Higher): answers

GCSE Maths - Statistics - Higher - Lesson 24.12

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/quartiles-and-the-interquartile-range/

Exercise 24L Quartiles and the interquartile range Non-calculator

1 Work out the lower quartile, upper quartile and interquartile range of each set of numbers.

(a) 2, 4, 7, 9, 12, 15, 20

Answer: Q1 = 4, Q3 = 15, IQR = 11

(b) 5, 8, 3, 12, 15, 7, 10, 20, 17

Answer: Q1 = 6, Q3 = 16, IQR = 10

(c) 18, 22, 15, 30, 25, 28, 12, 20, 24, 16, 26

Answer: Q1 = 16, Q3 = 26, IQR = 10

(d) 1.5, 2.1, 0.8, 3.2, 2.7, 1.9, 2.4

Answer: Q1 = 1.5, Q3 = 2.7, IQR = 1.2

2 Work out the median, lower quartile and interquartile range of each set of numbers (there are an even number of values).

(a) 4, 7, 9, 12, 15, 18

Answer: Q1 = 7, Q3 = 15, IQR = 8

(b) 31, 25, 28, 40, 35, 22, 38, 30

Answer: Q1 = 26.5, Q3 = 36.5, IQR = 10

3 Work out the lower quartile, upper quartile and interquartile range from each frequency table.

(a)

Value	1	2	3	4	5
Frequency	2	6	9	8	6

Answer: Q1 = 2, median = 3, Q3 = 4, IQR = 2

(b)

Value	10	20	30	40
Frequency	4	7	9	3

Answer: Q1 = 20, median = 30, Q3 = 30, IQR = 10

4 The ages of 11 people on a bus are 23, 31, 19, 42, 35, 27, 38, 29, 22, 45, 33. Find the interquartile range of the ages.

Answer: 15

- 5 Hannah found the interquartile range of 9, 3, 12, 6, 15, 4, 7 by working with the numbers in the order given. She said $Q1 = 3$ and $Q3 = 15$. Explain her mistake and work out the correct interquartile range.

Answer: 8

- 6 The median of a set of data is 14, the lower quartile is 9 and the interquartile range is 12. Work out the upper quartile.

Answer: 21

- 7 In a data set of 80 values, how many values lie between the lower quartile and the upper quartile? Explain.

Answer: 40

- 8 The list 12, 14, 15, 17, 18, 20, 22 has the new value 60 added. Work out each of these for the new list of 8 values: (a) the range, (b) the interquartile range.

(a) Range

Answer: 48

(b) Interquartile range

Answer: 6.5

- 9 Zara says: "The interquartile range is the better measure of spread when there are outliers." Explain why she is right.

Answer: The IQR uses only the middle half of the data, so extreme values do not affect it; the range depends on the most extreme values.

- 10 The list 2, 5, 7, 10, 13, 16, 20 has median 10. A new value, 10, is added. Show that the median does not change but the interquartile range gets smaller.

Answer: Median stays 10; IQR changes from 11 to 8.5

- 11 Compare the ages of two clubs using the median and the interquartile range.

Club A: 12, 18, 20, 22, 25, 27, 30

Club B: 15, 16, 18, 19, 21, 22, 24

Answer: On average, Club A has the higher age (median 22 compared with 19). Club B is more consistent (smaller interquartile range: 6 compared with 9), so Club A is more spread out.

- 12 A set of seven whole numbers has median 8, lower quartile 5 and upper quartile 12. The smallest number is 2 and the largest is 20. Write down the interquartile range and the range, and give one possible list of the seven numbers.

Answer: IQR 7, range 18; for example 2, 5, 6, 8, 10, 12, 20