Median, quartiles and interquartile range

Grade 5 | Worked solutions

GCSE Statistics topic practice

1 Here are the ages, in years, of the 7 members of a chess club. The ages are in order.

11 13 14 16 19 23 30

a. Write down the median age. (1)

b. Work out the interquartile range of the ages. (2)

(3 marks)

a)

$(7 + 1) \div 2 = 4$

The 4th value is 16

b)

$(7 + 1) \div 4 = 2$

Lower quartile is the 2nd value, which is 13

$3 \times 2 = 6$

Upper quartile is the 6th value, which is 23

$23 - 13 = 10$

a) 16 years b) 10 years

2 A call centre records how long, in seconds, each of 11 callers waits before their call is answered.

12 7 15 9 21 10 18 7 14 25 11

a. Find the median waiting time. (1)

b. Work out the interquartile range of the waiting times. (2)

c. At a second call centre the median waiting time is 12 seconds and the interquartile range is 15 seconds. Compare the consistency of the waiting times at the two call centres. (1)

(4 marks)

a)

Put the times in order

7, 7, 9, 10, 11, 12, 14, 15, 18, 21, 25

$(11 + 1) \div 2 = 6$

The 6th value is 12

b)

$(11 + 1) \div 4 = 3$

Lower quartile is the 3rd value, which is 9

Upper quartile is the 9th value, which is 18

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18 - 9 = 9

c)

The first call centre has the smaller interquartile range (9 < 15).

So its waiting times are more consistent.

a) 12 s b) 9 s c) first centre is more consistent

3 The stem and leaf diagram shows the times, in minutes, of 15 bus journeys into Bristol.

Stem	Leaves
1	2 5 8
2	0 3 3 6 9
3	1 4 4 7
4	0 2 8

Key: 1 | 2 means 12 minutes

a. Find the median journey time. (1)

b. Work out the interquartile range of the journey times. (2)

c. Give one reason why the interquartile range can be a better measure of spread than the range. (1)

(4 marks)

a)

(15 + 1) ÷ 2 = 8

Count along the leaves to the 8th value

The 8th value is 29

b)

(15 + 1) ÷ 4 = 4

Lower quartile is the 4th value, which is 20

3 x 4 = 12

Upper quartile is the 12th value, which is 37

37 - 20 = 17

c)

It only uses the middle half of the data,

so it is not affected by extreme values.

a) 29 min b) 17 min c) not affected by extreme values

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4 Oluwaseun records the number of goals scored in each of 39 hockey matches.

Number of goals	0	1	2	3	4
Number of matches	6	9	11	8	5

a. Find the median number of goals. (2)

b. Work out the interquartile range of the number of goals. (2)

(4 marks)

a)

Running totals of the matches

6, 15, 26, 34, 39

$(39 + 1) \div 2 = 20$

The 16th to 26th values are all 2

So the 20th value is 2

b)

$(39 + 1) \div 4 = 10$

The 7th to 15th values are all 1

Lower quartile is the 10th value, which is 1

$3 \times 10 = 30$

The 27th to 34th values are all 3

Upper quartile is the 30th value, which is 3

$3 - 1 = 2$

a) 2 goals b) 2 goals

5 Yusuf records the number of text messages he sends on each of 11 days. Here are his results in order. Two of the numbers are shown as a and b.

3 5 a 8 9 12 14 15 b 21 24

The upper quartile is 19 and the interquartile range is 13.

a. Find the value of a and the value of b. (2)

b. Yusuf finds that he wrote down the largest number wrongly. It should be 42, not 24. Explain what effect, if any, this has on the median and on the interquartile range. (2)

c. Write down one measure of spread that will change when 24 is replaced by 42. (1)

(5 marks)

a)

$(11 + 1) \div 4 = 3$

Lower quartile is the 3rd value, which is a

Upper quartile is the 9th value, which is b

$b = 19$

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$a = 19 - 13$

$= 6$

b)

42 is still the largest value,

so the order of the values does not change.

The median is still the 6th value, 12.

The quartiles are still 6 and 19,

so the interquartile range is still 13.

c)

The range changes

$42 - 3 = 39$

It was $24 - 3 = 21$ before.

a) $a = 6$, $b = 19$ b) no effect on either c) the range

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