

Quartiles



Order the data, then find the quartiles and the interquartile range (IQR).

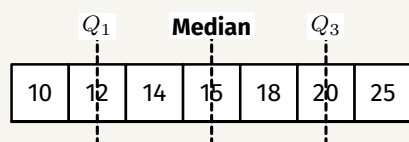
Name _____

Date _____

Finding quartiles

Sort the data first. The median (Q_2) splits it in half. Q_1 is the median of the lower half and Q_3 is the median of the upper half – leave the overall median out of both halves when the count is odd. $IQR = Q_3 - Q_1$.

Worked example Find Q_1 , Q_2 , Q_3 , and the IQR for: 10, 12, 14, 15, 18, 20, 25.



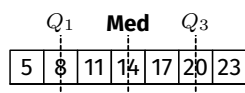
Median (Q_2) = 15 (the middle value)

Lower half 10, 12, 14 $\Rightarrow Q_1 = 12$ Upper half 18, 20, 25 $\Rightarrow Q_3 = 20$

$IQR = Q_3 - Q_1 = 20 - 12 = 8$

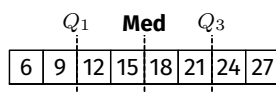
1. Find Q_1 , the median, and Q_3 .

Solution: $Q_1 = 8$, median = 14, $Q_3 = 20$



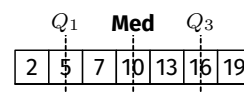
2. Find Q_1 , the median, and Q_3 .

Solution: $Q_1 = 10.5$, median = 16.5, $Q_3 = 22.5$



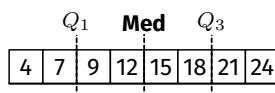
3. Find Q_1 , the median, and Q_3 .

Solution: $Q_1 = 5$, median = 10, $Q_3 = 16$



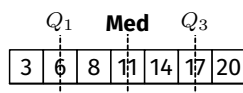
4. Find Q_1 , the median, and Q_3 .

Solution: $Q_1 = 8$, median = 13.5, $Q_3 = 19.5$



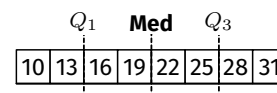
5. Find Q_1 , the median, and Q_3 .

Solution: $Q_1 = 6$, median = 11, $Q_3 = 17$



6. Find Q_1 , the median, and Q_3 .

Solution: $Q_1 = 14.5$, median = 20.5, $Q_3 = 26.5$



7. If $Q_1 = 11$ and $Q_3 = 29$, find the IQR.

Solution: $29 - 11 = 18$

8. The IQR of a dataset is 14 and $Q_1 = 9$. Find Q_3 .

Solution: $9 + 14 = 23$

9. $Q_1 = 15$, $Q_3 = 24$. Find the IQR and state what it measures.

Solution: $IQR = 9$; the spread of the middle 50% of the data

10. What fraction of the data lies between Q_1 and Q_3 ?

Solution: One half (50%) – the middle half

11. What fraction of the data lies below Q_1 ?

Solution: One quarter (25%)

12. Which two quartiles form the edges of the box in a box-and-whisker graph?

Solution: Q_1 and Q_3

Quartiles (continued)



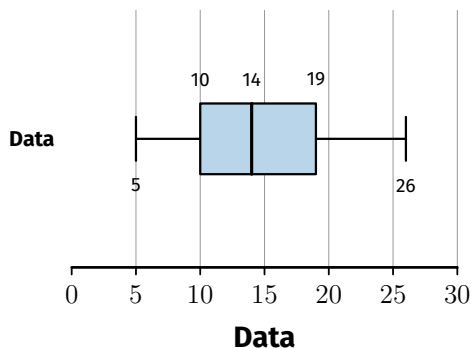
Read the five-number summary from a box-and-whisker graph.

Name _____

Date _____

13. State the median and the IQR.

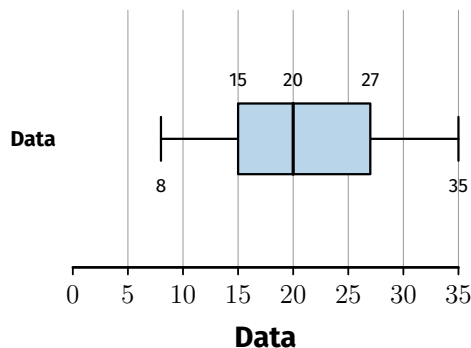
Solution: Median = 14; IQR = $19 - 10 = 9$



Working

14. State the range and the IQR.

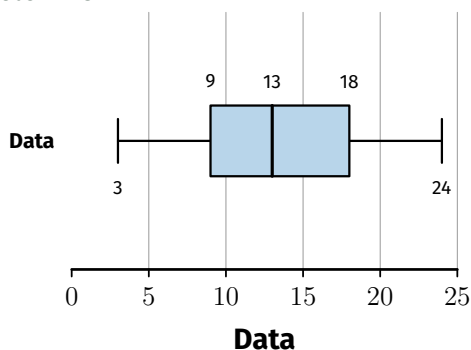
Solution: Range = $35 - 8 = 27$; IQR = $27 - 15 = 12$



Working

15. Which value is Q_3 ? What does it tell you about the data?

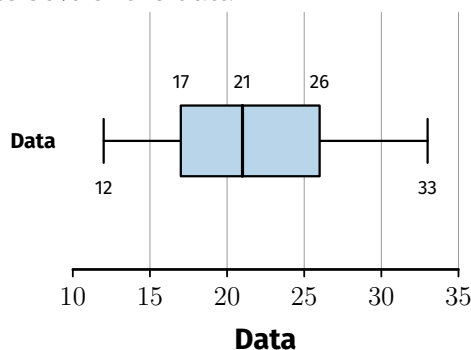
Solution: $Q_3 = 18$; three-quarters of the data lies below 18



Working

16. State the interquartile range and describe what it measures.

Solution: IQR = $26 - 17 = 9$; the spread of the middle 50% of the data



Working

17. Five-number summaries – Class A: 6, 12, 16, 22, 30. Class B: 8, 14, 18, 29, 36. Which class has the larger IQR?

Solution: A: IQR = $22 - 12 = 10$. B: IQR = $29 - 14 = 15$. Class B is larger

18. Five-number summaries – Team A: 5, 11, 15, 19, 24. Team B: 5, 9, 15, 23, 30. Which team is more consistent (smaller IQR)?

Solution: A: IQR = $19 - 11 = 8$. B: IQR = $23 - 9 = 14$. Team A is more consistent

19. A dataset has $Q_1 = 20$ and $Q_3 = 35$. A student says the IQR is 55. Explain the mistake.

Solution: The IQR is $Q_3 - Q_1 = 35 - 20 = 15$, not $Q_1 + Q_3$