Interpreting box and whisker plots (CSSI)

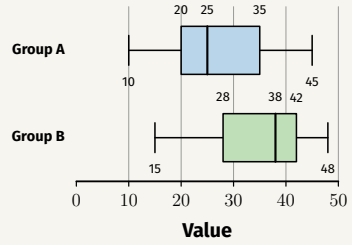
Read the five-number summary and IQR, then apply the 75%/50% rule to judge real differences.

Name _____ **Date** _____

The 75%/50% rule

A box plot shows the five-number summary: minimum, lower quartile (LQ), median, upper quartile (UQ), and maximum. The IQR (UQ − LQ) is the middle 50% of the data. If one group's median sits *outside* the other group's IQR, that's evidence of a real difference between the groups; if it sits *inside*, the difference could just be normal variation.

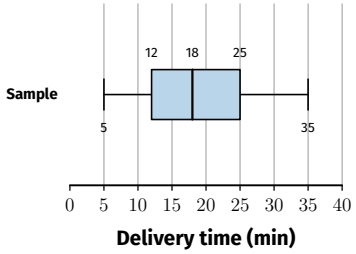
Worked example Is Group B's median inside or outside Group A's IQR? Is there evidence of a real difference?



Group A's IQR is 20 to 35. Group B's median (38) is **outside** this range. Yes – this is evidence of a real difference between the groups.

1. Read the five-number summary and calculate the IQR.

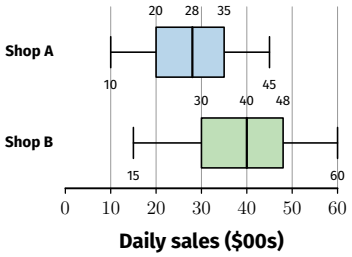
Solution: Min 5, LQ 12, median 18, UQ 25, max 35. IQR $= 25 - 12 = 13$.



Working

2. Which shop has the higher median, and which has the larger IQR?

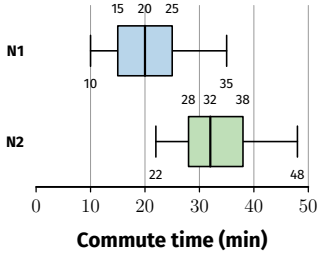
Solution: Shop B has the higher median (40 vs. 28) and the larger IQR ($48 - 30 = 18$ vs. $35 - 20 = 15$).



Working

3. Is Neighbourhood 2's median inside or outside Neighbourhood 1's IQR? Evidence of a real difference?

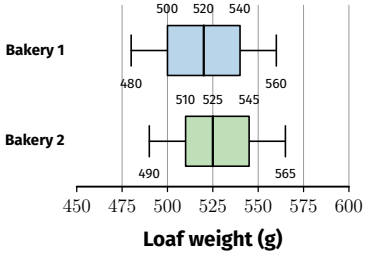
Solution: N1's IQR is 15 to 25. N2's median (32) is outside this range – yes, evidence of a real difference.



Working

4. Is Bakery 2's median inside or outside Bakery 1's IQR? What does this suggest?

Solution: Bakery 1's IQR is 500 to 540. Bakery 2's median (525) is inside this range – no strong evidence of a real difference.



Working

Interpreting box and whisker plots (CSSI) (continued)

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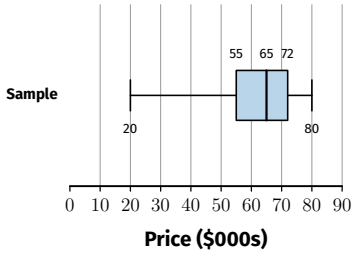
5. Describe this data's shape (symmetrical/skewed) and justify using the box and whiskers.

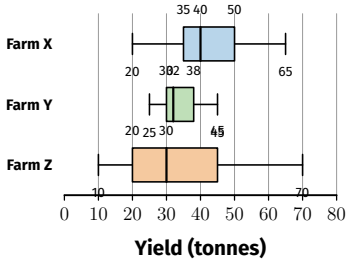
Solution: Left-skewed – the lower whisker and box (min to median: 20 to 65) are far longer than the upper side (65 to 80), showing most values sit high with a longer, sparser stretch below.



Working

6. Which farm's yields are most consistent (smallest IQR)?

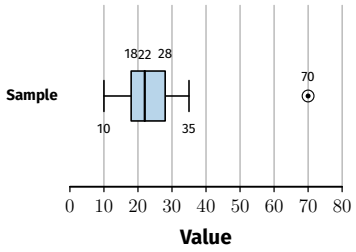
Solution: Farm Y: IQR $= 38 - 30 = 8$, the smallest of the three (Farm X: 15; Farm Z: 25).



Working

7. An outlier of 70 is shown. Does it change the median or the IQR? Explain.

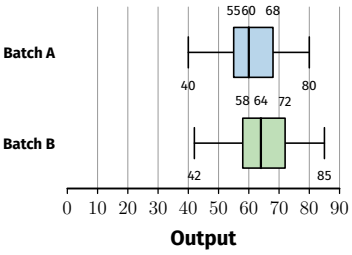
Solution: No – the median (22) and IQR (18 to 28) are based on the quartile positions of the main body of data, and are unaffected by a single extreme value.



Working

8. A salesperson says Batch B is "definitely better" since $64 > 60$. Using the rule, why is this too strong?

Solution: Batch B's median (64) sits inside Batch A's IQR (55 to 68), so the difference is small enough to be normal variation – not strong evidence Batch B is genuinely better.



Working