Comparing Two Populations Visually

Apply the skill to decisions and designs

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Compare plots on a common scale for center, spread, and overlap. Dot plots show individual values; box plots show min, lower quartile, median, upper quartile, max. For $2, 3, 3, 4, 4, 5$, median 3.5 and range 3. Adding 3 to every value raises the median to 6.5 but keeps range 3. Quartiles are medians of the lower and upper halves.

Worked example

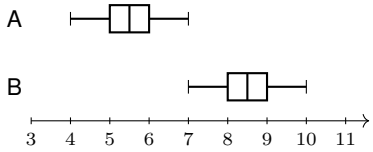
Compare ranges of $2, 3, 4$ and $1, 3, 5$.

1. First range $= 4 - 2 = 2$.
2. Second range $= 5 - 1 = 4$.
3. Both medians are 3, so equal center does not imply equal spread.
Answer: Ranges 2 and 4; first set is less spread.

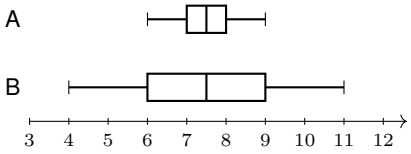
Practice Problems

Show your thinking.

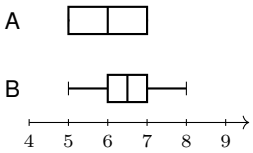
1. The box plots show bus-route minutes. Choose the route with the shorter median time, then decide whether the median savings meet a 2-minute target. Use A and B on the common scale.



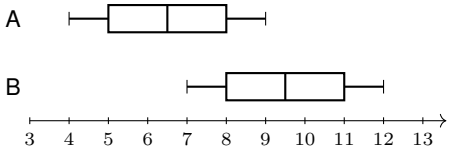
2. The displays show machine-fill amounts. A machine is eligible only if all displayed amounts fall from 4 to 9 inclusive. Which machine is eligible? Use both endpoints. Use A and B on the common scale.



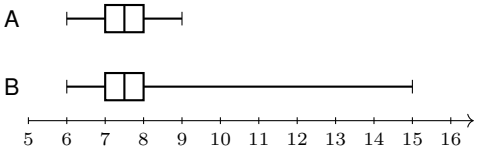
3. The displays show practice times. Compare middle-half spreads using quartiles. Use A and B on the common scale.



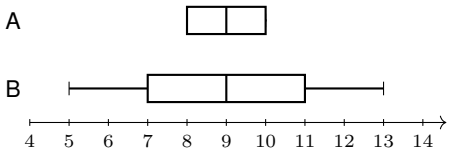
4. Route A adds 2 minutes to every old time. Will its adjusted median reach the current median of B? What happens to the range of A? Use A and B on the common scale.



5. One unusually late trip occurs in B. Compare maxima and medians before judging a typical trip. Use A and B on the common scale.



6. Choose a service under a cap of 12 on every displayed value. Compare medians and full ranges to explain what your choice does and does not change. Use A and B on the common scale.



Answer Key

1. A; it saves 3 minutes by median, meeting the target.
2. Only A. Its amounts run from 6 to 9; B reaches 11.
3. IQRs A 2 and B 1.
4. No. Adjusted A median $\frac{17}{2}$ minutes; B median $\frac{19}{2}$. A range stays 5 minutes.
5. Medians A $\frac{15}{2}$, B $\frac{15}{2}$; ranges A 3, B 9. Maximum A 9, B 15; their medians are equal.
6. A meets the cap. Both medians are 9; ranges A 2 and B 8.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Read A's median line at $\frac{11}{2}$. Its whisker tips are 4 and 7, so range $= 7 - 4 = 3$.

2. Read B's median line at $\frac{17}{2}$. Its whisker tips are 7 and 10, so range $= 10 - 7 = 3$.

3. Choose the lower median, A. Savings $= \frac{17}{2} - \frac{11}{2} = 3$ minutes, at least 2.

Problem 2

1. A: endpoints 6 and 9, both within 4 through 9. All its displayed data are inside that interval.

2. B: endpoints 4 and 11. The lower endpoint meets the limit, but the maximum exceeds 9.

3. Only A passes both checks. Comparing spreads alone would not test the allowed interval.

Problem 3

1. A box edges: $Q_1 = 5$, $Q_3 = 7$; IQR $= 7 - 5 = 2$.

2. B box edges: $Q_1 = 6$, $Q_3 = 7$; IQR $= 7 - 6 = 1$.

3. The larger IQR indicates a wider middle half.

Problem 4

1. Read A's median line at $\frac{13}{2}$. Its whisker tips are 4 and 9, so range $= 9 - 4 = 5$.

2. Read B's median line at $\frac{19}{2}$. Its whisker tips are 7 and 12, so range $= 12 - 7 = 5$.

3. Add 2 to each A time: the median becomes $\frac{13}{2} + 2 = \frac{17}{2}$, below B. Both A endpoints rise by 2, so their difference stays 5.

Problem 5

1. Read A's median line at $\frac{15}{2}$. Its whisker tips are 6 and 9, so range $= 9 - 6 = 3$.

2. Read B's median line at $\frac{15}{2}$. Its whisker tips are 6 and 15, so range $= 15 - 6 = 9$.

3. Median gap B minus A $= 0$; range change $= 6$.

Problem 6

1. Read A's median line at 9. Its whisker tips are 8 and 10, so range $= 10 - 8 = 2$.

2. Read B's median line at 9. Its whisker tips are 5 and 13, so range $= 13 - 5 = 8$.

3. A max 10 meets the 12 cap, while B max 13 does not. A has the narrower spread, with no change in the median.

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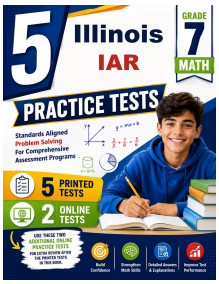

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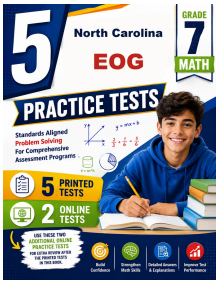

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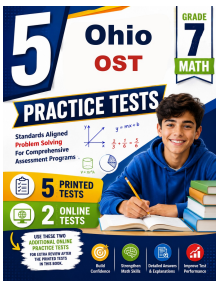

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