

Push Tasks — Answers



1. For 4, 6, 8, 10, 12, 14, 30, find Q_1 , Q_2 , Q_3 , IQR.

Solution

$Q_2 = 10$; $Q_1 = 6$, $Q_3 = 14$
 $IQR = 14 - 6 = 8$

2. For 4, 6, 8, 10, 12, 14, 30: IQR or range for spread? Why?

Solution

IQR = 8 resists the outlier 30;
range = 26 is inflated by it.
IQR is the better measure.

3. A: $Q_1 = 14$, $Q_3 = 26$. B: $Q_1 = 18$, $Q_3 = 22$ (both median 20). More consistent?

Solution

A: IQR = 12; B: IQR = 4
B is more consistent (smaller IQR).

4. Create 7 ordered numbers with $Q_1 = 8$, median 12, $Q_3 = 18$.

Solution

E.g. 5, 8, 11, 12, 15, 18, 21
 $Q_1 = 8$, $Q_2 = 12$, $Q_3 = 18$.

5. Create 8 ordered numbers with $Q_1 = 15$, $Q_3 = 27$. Find the IQR.

Solution

E.g. 10, 14, 16, 20, 24, 26, 28, 32
 $Q_1 = 15$, $Q_3 = 27$
 $IQR = 27 - 15 = 12$

6. A student says “IQR 12 means 12 of the data is in the middle.” What’s wrong?

Solution

IQR is a spread, not a count:
 $Q_3 - Q_1 = 12$ is a width.
It spans the middle 50%.

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7. Box: min 5, $Q_1 = 11$, med 16, $Q_3 = 24$, max 40. IQR and range.

Solution

$$\text{IQR} = 24 - 11 = 13$$

$$\text{Range} = 40 - 5 = 35$$

8. For the same box, which measure is affected most by the maximum? Explain.

Solution

The range — it uses the max directly. The IQR depends only on Q_1 and Q_3 , so it is unmoved.

9. A: 2, 8, 12, 20, 22. B: 2, 10, 12, 14, 22. Which has the larger IQR?

Solution

$$\text{A: } 20 - 8 = 12$$

$$\text{B: } 14 - 10 = 4$$

A has the larger IQR.

10. $Q_1 = 14$ and $\text{IQR} = 9$. Find Q_3 .

Solution

$$Q_3 = Q_1 + \text{IQR}$$

$$= 14 + 9 = 23$$

11. $Q_1 = 18$, $Q_3 = 30$. What part of the data lies in the box?

Solution

The middle half (50%) of the data.

12. For 7, 9, 10, 12, 15, 18, 21, 24, 30, find Q_1 , Q_2 , Q_3 .

Solution

$$Q_2 = 15$$

$$Q_1 = (9 + 10)/2 = 9.5$$

$$Q_3 = (21 + 24)/2 = 22.5$$

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13. For that set, compare the bottom quarter ($\min - Q_1$) with the top ($Q_3 - \max$).

Solution

Bottom: $9.5 - 7 = 2.5$

Top: $30 - 22.5 = 7.5$

The top quarter is wider.

14. Both have IQR 10. A range 18, B range 35. Compare.

Solution

Middle 50% is the same (IQR 10 each). B's tails are far wider (range 35 vs 18).

15. Rule for the IQR from a box plot; apply to min 6, $Q_1 = 13$, med 17, $Q_3 = 21$, max 28.

Solution

Rule: $\text{IQR} = Q_3 - Q_1$.

Here $21 - 13 = 8$.

16. Can the median lie outside the box (between Q_1 and Q_3)? Explain.

Solution

No — always $Q_1 \leq \text{median}$

$\leq Q_3$,

so the median sits inside (or on the edge of) the box.