Displaying Data with Box Plots

Name: _____	Date: _____	Score: _____ / 24

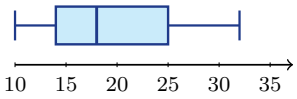
Quick Review

A **box plot** summarizes data with five numbers: minimum, Q_1, median, Q_3, and maximum. The box runs from Q_1 to Q_3 and contains the middle 50% of the data. The median line shows the center, and the whiskers show the lower and upper spread. The **IQR** is $Q_3 - Q_1$. Use box plots to compare centers, spreads, and possible outliers.

PRACTICE

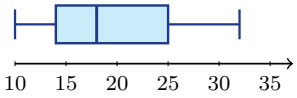
Use five-number summaries and box plots.

1. Use the box plot. What is the median?



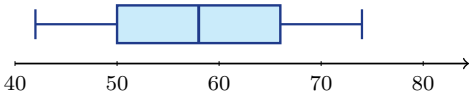
Answer: _____

2. Use the box plot. What is the interquartile range?



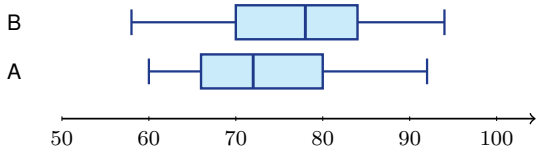
Answer: _____

3. Use the box plot. What is the right whisker endpoint?



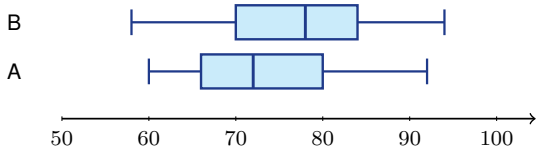
Answer: _____

4. Two classes are shown. Which class has the higher median?



Answer: _____

5. Two classes are shown. Which class has the larger IQR, or are they the same?



Answer: _____

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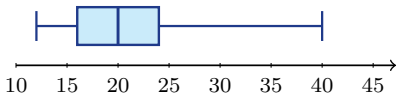
6. Use the box plot. Which side of the data has the longer whisker?



Answer: _____

7. Five-number summary: $5, 9, 12, 18, 24$. Where is the median line?

Answer: _____

8. Five-number summary: $5, 9, 12, 18, 24$. What are the whisker endpoints?

Answer: _____

9. Class A has $Q_1 = 70, Q_3 = 88$. Class B has $Q_1 = 74, Q_3 = 82$. Which has larger IQR?

Answer: _____

10. Class A median is 76; Class B median is 81. Which has higher typical value?

Answer: _____

11. If IQR is 10, what percent of data lies in the box?

Answer: _____

12. Given $Q_1 = 20, Q_3 = 32$, find the upper outlier fence.

Answer: _____

13. Given $Q_1 = 20, Q_3 = 32$, find the lower outlier fence.

Answer: _____

14. With fences 2 and 50, is 55 an outlier?

Answer: _____

15. With fences 2 and 50, is 48 an outlier?

Answer: _____

16. Which has more spread: IQR 6 or IQR 15?

Answer: _____

17. Which display is better for exact interval frequencies: histogram or box plot?

Answer: _____

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18. Which display is better for comparing medians quickly: histogram or box plot?

Answer: _____

19. Data: $1, 2, 4, 7, 9, 11, 13, 16, 20$. Find IQR.

Answer: _____

20. Data: $18, 22, 24, 25, 28, 30, 31, 33, 35, 38, 44$. Find the five-number summary.

Answer: _____

Word Problems

21. Two routes have medians 32 minutes and 35 minutes. Which route has the lower typical travel time?

Answer: _____

22. A class has $Q_1 = 65$ and $Q_3 = 85$. Find the IQR and explain what it measures.

Answer: _____

23. A data set has five-number summary $42, 50, 58, 66, 74$. What number is the right whisker endpoint?

Answer: _____

24. Class A has IQR 25 minutes and Class B has IQR 15 minutes for study time. Which class is more consistent?

Answer: _____

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Answer Keys

1. 18
2. 11
3. 74
4. Class B
5. same IQR
6. right side
7. 12
8. 5 and 24
9. Class A
10. Class B
11. 50%
12. 50
13. 2
14. yes
15. no
16. IQR 15
17. histogram
18. box plot
19. 11.5
20. $18, 24, 30, 35, 44$
21. the route with median 32
22. 20
23. 74
24. Class B

Step-by-Step Tutor Notes

1. Use the clue in the question first, then let the arithmetic finish the job. The median is the vertical line inside the box. So the answer is 18.
2. This is a good place to slow down, check the notation, and simplify cleanly. The IQR is $Q_3 - Q_1 = 25 - 14 = 11$. So the answer is 11.
3. Take it one clear step at a time and keep the original question in mind. The right whisker reaches the maximum value, which is 74. So the answer is 74.
4. Class B's median line is at 78, which is higher than Class A's median 72.
5. Class A has IQR $80 - 66 = 14$. Class B has IQR $84 - 70 = 14$, so they are equal.
6. Take it one clear step at a time and keep the original question in mind. The right whisker runs from 24 to 40, which is longer than 12 to 16. So the answer is right side.
7. Start with the definition the problem is testing, then apply it directly. The median is the third number in the summary. So the answer is 12.
8. Compare the change in output to the change in input, because slope is a rate of change. Whiskers reach to the minimum and maximum unless outliers are handled separately. So the requested value is 5 and 24.
9. Use the clue in the question first, then let the arithmetic finish the job. Class A IQR is 18; Class B IQR is 8. So the answer is Class A.
10. Focus on the main idea of the problem, then simplify carefully. The median is the typical value shown by a box plot. So the answer is Class B.
11. Focus on the main idea of the problem, then simplify carefully. The box always contains the middle half of the data. So the answer is 50%.
12. This is a good place to slow down, check the notation, and simplify cleanly. IQR is 12, so upper fence is $32 + 1.5(12) = 50$. So the answer is 50.
13. Take it one clear step at a time and keep the original question in mind. Lower fence is $20 - 1.5(12) = 2$. So the answer is 2.
14. Start with the definition the problem is testing, then apply it directly. 55 is above the upper fence. So the answer is yes.
15. This is a good place to slow down, check the notation, and simplify cleanly. 48 is inside the fences. So the answer is no.
16. This is a good place to slow down, check the notation, and simplify cleanly. Larger IQR means the middle half is more spread out. So the answer is IQR 15.
17. Read the table by matching the correct row and column first, then use the count or total that fits the question. A box plot does not show each interval's frequency. This gives histogram.
18. Start with the definition the problem is testing, then apply it directly. The median is marked directly in a box plot. So the answer is box plot.
19. Focus on the main idea of the problem, then simplify carefully. $Q_1 = 3$ and $Q_3 = 14.5$, so IQR is 11.5. So the answer is 11.5.
20. Take it one clear step at a time and keep the original question in mind. The median is 30, with lower-half median 24 and upper-half median 35. So the answer is $18, 24, 30, 35, 44$.
21. In a box plot, the median is the typical value. A lower median means a lower typical travel time.
22. The IQR is $85 - 65 = 20$. It measures the spread of the middle 50% of scores.
23. Set up the model from the story, then calculate carefully. The right whisker reaches the maximum value, which is 74.
24. More consistent means less spread. Class B has the smaller IQR, so its middle half is tighter.

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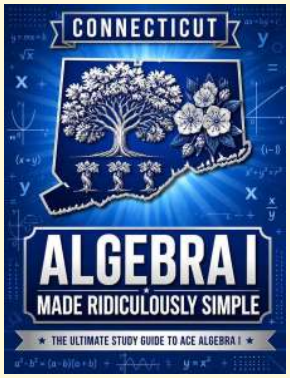

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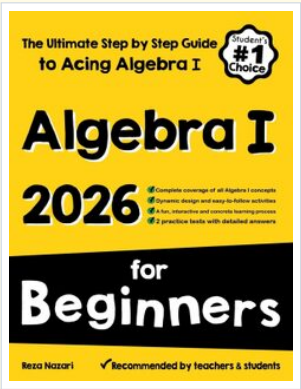

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