Measures of Center and Spread

Name: _____	Date: _____	Score: _____ / 26

Quick Review

Measures of center describe where the data clusters. The **mean** (average) is the sum divided by the count. The **median** is the middle value when data is ordered (average the two middles if even count). The **mode** is the value(s) that appear most often. **Measures of spread** describe how scattered the data is. The **range** is max minus min. The **interquartile range (IQR)** is $Q_3 - Q_1$ — the spread of the middle 50%, less affected by outliers. The **mean absolute deviation (MAD)** is the average distance of each data point from the mean. **Mean vs. median**: use mean for symmetric data, median when there are outliers or skew.

PRACTICE

Find the indicated measure.

1. Mean of $4, 6, 8, 10$ _____
2. Median of $3, 7, 9, 11, 15$ _____
3. Mode of $2, 5, 2, 7, 2, 9$ _____
4. Range of $12, 18, 4, 20, 8$ _____
5. Median of $2, 5, 9, 11$ _____
6. Mean of $10, 20, 30$ _____
7. Mode of $1, 2, 3, 4, 5$ _____
8. Mode of $3, 3, 7, 7, 9$ _____
9. Range of $-5, 0, 8, 12$ _____
10. Median of $100, 50, 75, 25$ _____
11. Mean of $2, 4, 4, 4, 5, 5, 7, 9$ _____
12. Median of same set _____
13. Mode of same set _____
14. IQR of $1, 3, 5, 7, 9, 11, 13$ _____
15. Mean of $3, 3, 3, 3, 3$ _____
16. If add 10 to mean of $5, 7, 9$ _____
17. Median resistant to outliers? _____
18. Range of $5, 5, 5$ _____
19. Mode of single value 7 _____
20. Mean affected by outlier? _____

VISUAL PRACTICE

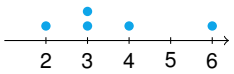
Use the graph, table, chart, or diagram to answer the question.

21. Use the frequency table to find the mode.

score	80	90	100
frequency	2	3	1

Answer: _____

22. Find the median from the dot plot.



Answer: _____

Word Problems

23. A teacher reviews the latest quiz scores: $82, 75, 90, 88, 80$. Find the mean and median, then decide which number better represents a typical score. _____

24. A class has heights in centimeters: $150, 155, 160, 158, 162, 200$. Decide whether the mean or median better represents a typical student height, and explain why. _____

25. A weather station recorded one week's high temperatures: $58, 62, 71, 65, 60, 75, 68$ degrees. Find the range and explain what it tells you. _____

26. A coach records the number of laps run by nine students: $1, 2, 4, 7, 9, 11, 13, 16, 20$. Find the IQR to describe the spread of the middle half of the group. _____

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Answer Keys

1. $\boxed{7}$
2. $\boxed{9}$
3. $\boxed{2}$
4. $\boxed{16}$
5. $\boxed{7}$
6. $\boxed{20}$
7. $\boxed{\text{none}}$
8. $\boxed{3, 7}$
9. $\boxed{17}$
10. $\boxed{62.5}$
11. $\boxed{5}$
12. $\boxed{4.5}$
13. $\boxed{4}$
14. $\boxed{8}$
15. $\boxed{3}$
16. $\boxed{\text{new mean } 17}$
17. $\boxed{\text{yes}}$
18. $\boxed{0}$
19. $\boxed{7}$
20. $\boxed{\text{yes}}$
21. $\boxed{90}$
22. $\boxed{3}$
23. $\boxed{\bar{x} = 83,\ \text{med} = 82}$
24. $\boxed{\text{median}}$
25. $\boxed{17^\circ}$
26. $\boxed{\text{IQR} = 11.5}$

Step-by-Step Tutor Notes

1. Start with the definition the problem is testing, then apply it directly. $28/4 = 7$. So the answer is 7.
2. Use the clue in the question first, then let the arithmetic finish the job. Middle value. So the answer is 9.
3. Take it one clear step at a time and keep the original question in mind. Appears most. So the answer is 2.
4. Focus on the main idea of the problem, then simplify carefully. $20 - 4$. So the answer is 16.
5. Use the clue in the question first, then let the arithmetic finish the job. Average 5 and 9. So the answer is 7.
6. Focus on the main idea of the problem, then simplify carefully. $60/3$. So the answer is 20.
7. Use the clue in the question first, then let the arithmetic finish the job. All unique. So the answer is none.
8. Use the clue in the question first, then let the arithmetic finish the job. Bimodal. So the answer is $3, 7$.
9. Take it one clear step at a time and keep the original question in mind. $12 - (-5)$. So the answer is 17.
10. This is a good place to slow down, check the notation, and simplify cleanly. Order: $25, 50, 75, 100$. The average of the middle values is 62.5. So the answer is 62.5.
11. Start with the definition the problem is testing, then apply it directly. $40/8$. So the answer is 5.
12. Take it one clear step at a time and keep the original question in mind. Middle two are $4, 5$, average 4.5. So the answer is 4.5.
13. This is a good place to slow down, check the notation, and simplify cleanly. Three 4s. So the answer is 4.
14. Use the clue in the question first, then let the arithmetic finish the job. $Q_1 = 3$, $Q_3 = 11$. $11 - 3 = 8$. So the answer is 8.
15. Use the clue in the question first, then let the arithmetic finish the job. All same. So the answer is 3.
16. Keep the order of operations in view, then simplify without skipping the sign check. Add 10 to every value, mean shifts by 10. After simplifying, the answer is new mean 17.
17. Focus on the main idea of the problem, then simplify carefully. Median doesn't change with extreme values; mean does. So the answer is yes.
18. Use the clue in the question first, then let the arithmetic finish the job. All same value. So the answer is 0.
19. Use the clue in the question first, then let the arithmetic finish the job. Trivially the mode. So the answer is 7.
20. Start with the definition the problem is testing, then apply it directly. Outliers pull the mean toward themselves. So the answer is yes.
21. For a table question, slow down and locate the exact row, column, or cell before calculating. The mode is the value with the greatest frequency. Score 90 appears most often. This gives 90.
22. This is a good place to slow down, check the notation, and simplify cleanly. The ordered data are $2, 3, 3, 4, 6$, so the middle value is 3. So the answer is 3.
23. Sum $= 415$, mean $= 83$. Ordered: $75, 80, 82, 88, 90$. Median $= 82$. The values are fairly close together, so either measure is reasonable; the mean is only one point higher than the median.
24. The 200 is an outlier. Mean is $\frac{985}{6} \approx 164$, but median is 159. Median better represents typical height.
25. The highest temperature is 75 and the lowest is 58. The range is $75 - 58 = 17$ degrees, so the week's highs varied by 17 degrees.
26. Median $= 9$. $Q_1 =$ median of lower half $\{1, 2, 4, 7\} = 3$. $Q_3 =$ median of upper half $\{11, 13, 16, 20\} = 14.5$. So IQR$= 14.5 - 3 = 11.5$ using the same quartile convention throughout.

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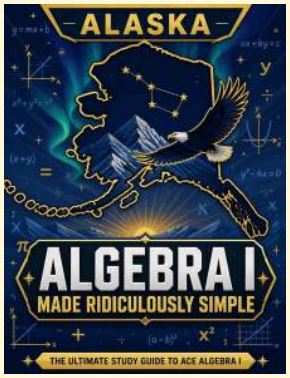

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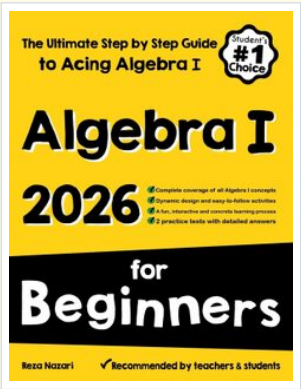

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