Describing Data: Center, Spread, and Shape

Center, spread, and shape: Applications and decisions

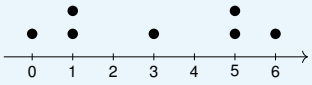
Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Describe center (a typical value), spread (how far values vary), and shape (the pattern). A symmetric plot has equal counts at every pair of positions equally far from its center. If the right tail reaches much farther, the distribution may be right-skewed. A high extreme can pull the mean above the median.

Worked example

Describe center, range, and shape. Data: $0, 1, 1, 3, 5, 5, 6$.

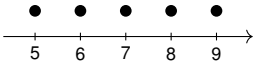


1. Sum $= 0 + 1 + 1 + 3 + 5 + 5 + 6 = 21$; mean $= 21/7 = 3$.
2. Sorted data: $0, 1, 1, 3, 5, 5, 6$; median $= 3$.
3. Range $= 6 - 0 = 6$.
4. At equal distances from median 3, the frequencies match: 0 with 6 (1 each); 1 with 5 (2 each). The center can mirror onto itself.
Answer: Mean 3; median 3; range 6. Symmetric.

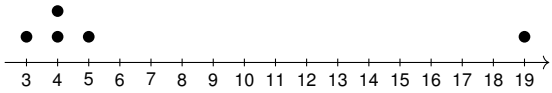
Practice Problems

Show your thinking.

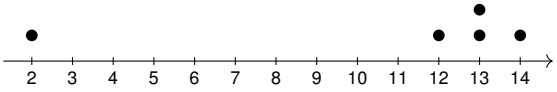
1. Compare the low and high daily attendance deviations using the summaries. Data: $5, 6, 7, 8, 9$.



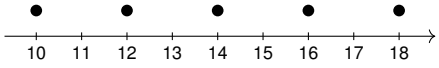
2. A class records trip times in minutes. Describe the influence of the longest trip. Data: $3, 4, 4, 5, 19$.



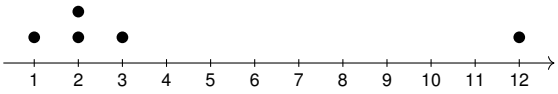
3. Delivery times include an unusually quick trip. Describe center, spread, and shape. Data: $2, 12, 13, 13, 14$.



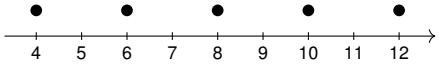
4. Design a concise description of a symmetric production sample. Data: $10, 12, 14, 16, 18$.



5. A report says symmetric because there are five points. Repair it numerically. Data: $1, 2, 2, 3, 12$.



6. Recover the typical value and total spread for this reading survey. Data: $4, 6, 8, 10, 12$.



Answer Key

1. Mean 7; median 7; range 4. Symmetric.
2. Mean 7; median 4; range 16. Right-skewed.
3. Mean $\frac{54}{5}$; median 13; range 12. Left-skewed.
4. Mean 14; median 14; range 8. Symmetric.
5. Mean 4; median 2; range 11. Right-skewed.
6. Mean 8; median 8; range 8. Symmetric.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Sum $= 5 + 6 + 7 + 8 + 9 = 35$; mean $= 35/5 = 7$.
2. Sorted data: $5, 6, 7, 8, 9$; median $= 7$.
3. Range $= 9 - 5 = 4$.
4. At equal distances from median 7, the frequencies match: 5 with 9 (1 each); 6 with 8 (1 each). The center can mirror onto itself.

Problem 2

1. Sum $= 3 + 4 + 4 + 5 + 19 = 35$; mean $= 35/5 = 7$.
2. Sorted data: $3, 4, 4, 5, 19$; median $= 4$.
3. Range $= 19 - 3 = 16$.
4. The high end 19 lies 15 above the median, while the low end is only 1 below it; the longer tail is right.

Problem 3

1. Sum $= 2 + 12 + 13 + 13 + 14 = 54$; mean $= 54/5 = \frac{54}{5}$.
2. Sorted data: $2, 12, 13, 13, 14$; median $= 13$.
3. Range $= 14 - 2 = 12$.
4. The low end 2 lies 11 below the median, while the high end is only 1 above it; the longer tail is left.

Problem 4

1. Sum $= 10 + 12 + 14 + 16 + 18 = 70$; mean $= 70/5 = 14$.
2. Sorted data: $10, 12, 14, 16, 18$; median $= 14$.
3. Range $= 18 - 10 = 8$.
4. At equal distances from median 14, the frequencies match: 10 with 18 (1 each); 12 with 16 (1 each). The center can mirror onto itself.

Problem 5

1. Sum $= 1 + 2 + 2 + 3 + 12 = 20$; mean $= 20/5 = 4$.
2. Sorted data: $1, 2, 2, 3, 12$; median $= 2$.
3. Range $= 12 - 1 = 11$.
4. The high end 12 lies 10 above the median, while the low end is only 1 below it; the longer tail is right.

Problem 6

1. Sum $= 4 + 6 + 8 + 10 + 12 = 40$; mean $= 40/5 = 8$.
2. Sorted data: $4, 6, 8, 10, 12$; median $= 8$.
3. Range $= 12 - 4 = 8$.
4. At equal distances from median 8, the frequencies match: 4 with 12 (1 each); 6 with 10 (1 each). The center can mirror onto itself.

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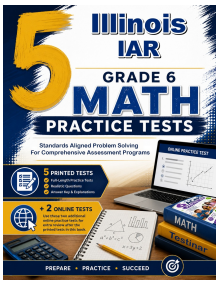

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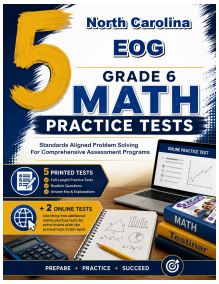

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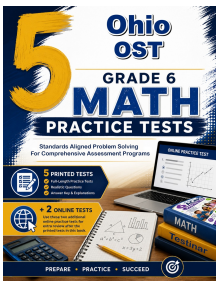

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