Describing Data: Center, Spread, and Shape

Center, spread, and shape: Models and calculations

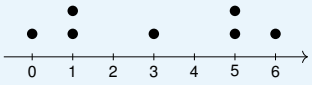
Name _____ **Date** _____ **Score** _____ / 6

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: $0, 1, 1, 3, 5, 5, 6$.

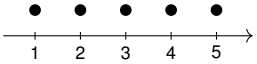


1. Sum $= 0 + 1 + 1 + 3 + 5 + 5 + 6 = 21$; mean $= 21/7 = 3$.
2. Sorted data: $0, 1, 1, 3, 5, 5, 6$; median $= 3$.
3. Range $= 6 - 0 = 6$.
4. At equal distances from median 3, the frequencies match: 0 with 6 (1 each); 1 with 5 (2 each). The center can mirror onto itself.
Answer: Mean 3; median 3; range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

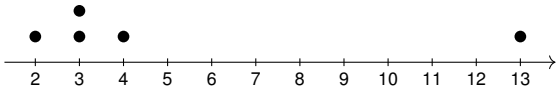
Practice Problems

Show your thinking.

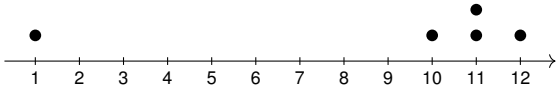
1. Find center and spread; describe shape. Data: $1, 2, 3, 4, 5$.



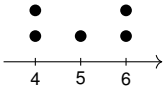
2. Use the display to describe the high tail. Data: $2, 3, 3, 4, 13$.



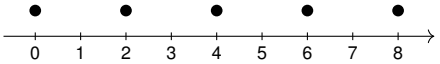
3. Describe the low tail along with center and range. Data: $1, 10, 11, 11, 12$.



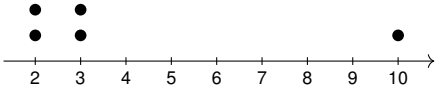
4. Describe these daily reading counts. Data: $4, 4, 5, 6, 6$.



5. Check whether both sides of the center balance. Data: $0, 2, 4, 6, 8$.



6. A student calls this symmetric. Find summaries and correct the shape. Data: $2, 2, 3, 3, 10$.



Answer Key

1. Mean 3; median 3; range 4. Symmetric.
2. Mean 5; median 3; range 11. Right-skewed.
3. Mean 9; median 11; range 11. Left-skewed.
4. Mean 5; median 5; range 2. Symmetric.
5. Mean 4; median 4; range 8. Symmetric.
6. Mean 4; median 3; range 8. Right-skewed.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Sum $= 1 + 2 + 3 + 4 + 5 = 15$; mean $= 15/5 = 3$.
2. Sorted data: $1, 2, 3, 4, 5$; median $= 3$.
3. Range $= 5 - 1 = 4$.
4. At equal distances from median 3, the frequencies match: 1 with 5 (1 each); 2 with 4 (1 each). The center can mirror onto itself.

Problem 2

1. Sum $= 2 + 3 + 3 + 4 + 13 = 25$; mean $= 25/5 = 5$.
2. Sorted data: $2, 3, 3, 4, 13$; median $= 3$.
3. Range $= 13 - 2 = 11$.
4. The high end 13 lies 10 above the median, while the low end is only 1 below it; the longer tail is right.

Problem 3

1. Sum $= 1 + 10 + 11 + 11 + 12 = 45$; mean $= 45/5 = 9$.
2. Sorted data: $1, 10, 11, 11, 12$; median $= 11$.
3. Range $= 12 - 1 = 11$.
4. The low end 1 lies 10 below the median, while the high end is only 1 above it; the longer tail is left.

Problem 4

1. Sum $= 4 + 4 + 5 + 6 + 6 = 25$; mean $= 25/5 = 5$.
2. Sorted data: $4, 4, 5, 6, 6$; median $= 5$.
3. Range $= 6 - 4 = 2$.
4. At equal distances from median 5, the frequencies match: 4 with 6 (2 each). The center can mirror onto itself.

Problem 5

1. Sum $= 0 + 2 + 4 + 6 + 8 = 20$; mean $= 20/5 = 4$.
2. Sorted data: $0, 2, 4, 6, 8$; median $= 4$.
3. Range $= 8 - 0 = 8$.
4. At equal distances from median 4, the frequencies match: 0 with 8 (1 each); 2 with 6 (1 each). The center can mirror onto itself.

Problem 6

1. Sum $= 2 + 2 + 3 + 3 + 10 = 20$; mean $= 20/5 = 4$.
2. Sorted data: $2, 2, 3, 3, 10$; median $= 3$.
3. Range $= 10 - 2 = 8$.
4. The high end 10 lies 7 above the median, while the low end is only 1 below it; the longer tail is right.

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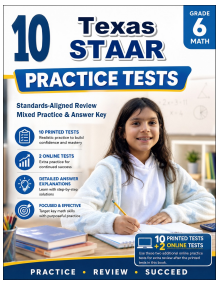

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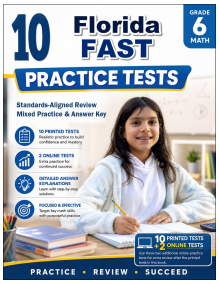

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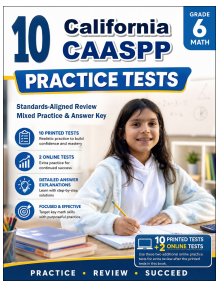

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