Mean vs. Median: Measures of Center

Statistics Worksheet · Grade 8–10

Name: _____ Date: _____

Learning Objectives

- Calculate the mean and median of a data set
- Identify whether a measure of center is resistant or non-resistant to outliers
- Determine the relationship between mean and median based on the shape of a distribution

Problems

1. Find the mean of the following data set: 4, 8, 6, 10, 12.

$$\bar{x} = \frac{4 + 8 + 6 + 10 + 12}{5}$$

2. Find the median of the following data set: 3, 7, 2, 9, 5.

Data (sorted): 2, 3, 5, 7, 9

3. Find the median of the following data set with an even number of values: 14, 22, 8, 30, 18, 26.

Data (sorted): 8, 14, 18, 22, 26, 30

4. A student scored the following on 7 quizzes: 85, 90, 78, 92, 88, 84, 91. Find both the mean and the median.

$$\bar{x} = \frac{85 + 90 + 78 + 92 + 88 + 84 + 91}{7}$$

5. The dot plot below shows the number of books read per month by 9 students. Find the mean and median.

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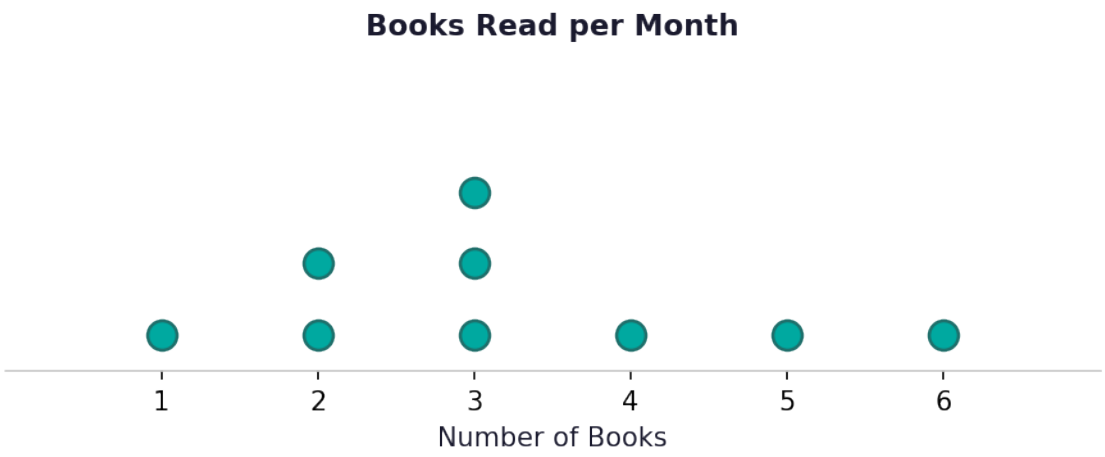

6. The table below shows home run totals for a player over 6 seasons. Find the mean and median, then identify which measure is more affected if an outlier season (73 home runs) is added as a 7th season.

Season	1	2	3	4	5	6
Home Runs	25	28	34	36	40	45

7. Look at the stem-and-leaf plot below. Calculate the mean and median of the data, then determine the shape of the distribution (symmetric, skewed left, or skewed right).

Weekly Hours of Exercise

Stem	Leaves
1	0 2
2	1 4 5 8
3	0 3 3 7
4	2 5
5	0

Key: 1\|0 = 10

8. A real estate agent reports that the mean home price in a neighborhood is $450,000 while the median is $310,000. What does this tell you about the shape of the distribution? Which measure better represents a

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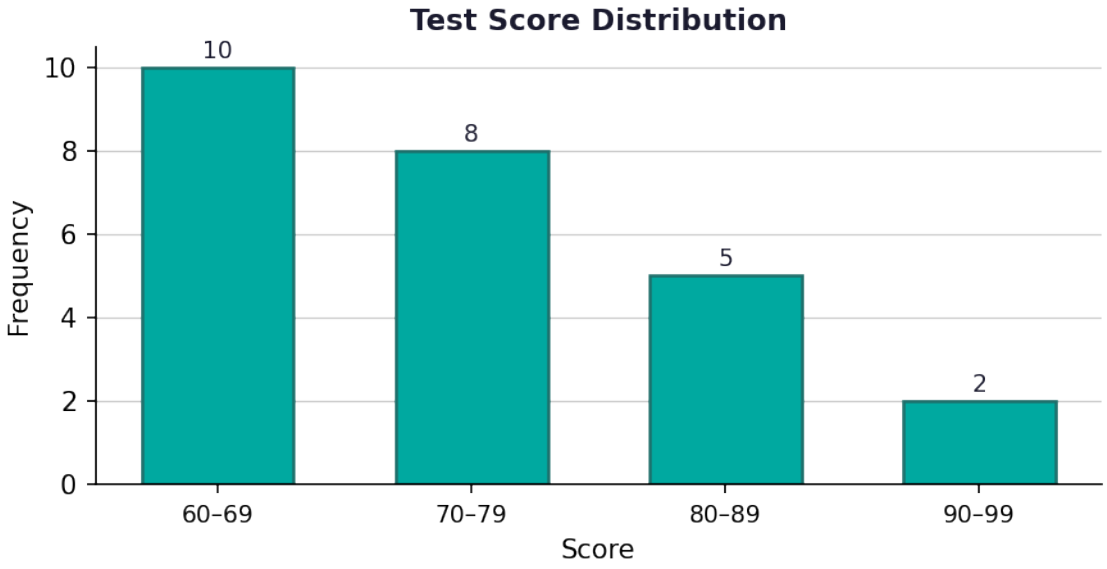
typical home price, and why?

$\bar{x} = \$450{,}000 \quad \text{Median} = \$310{,}000$

9. The histogram below shows the distribution of test scores in a class. Based on the shape of the distribution, predict whether the mean is greater than, less than, or equal to the median. Then calculate both using the midpoint of each interval (65, 75, 85, 95).



10. The table below shows Barry Bonds' home run data for 7 selected seasons including his record-breaking season. Compute the mean and median with and without the outlier season of 73 home runs. Explain why the median is called a resistant measure and the mean is called a non-resistant measure using your calculations.

Season	HR	Season	HR
1	16	5	37
2	25	6	34
3	24	7 (outlier)	73
4	33		

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Mean vs. Median: Measures of Center — Answer Key

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Answer Key

1. Answer: 8

- Sum all values: 4 + 8 + 6 + 10 + 12 = 40
- Divide by the number of observations: 40 ÷ 5 = 8

2. Answer: 5

- Sort the data in ascending order: 2, 3, 5, 7, 9
- There are 5 values, so the median is the 3rd value: 5

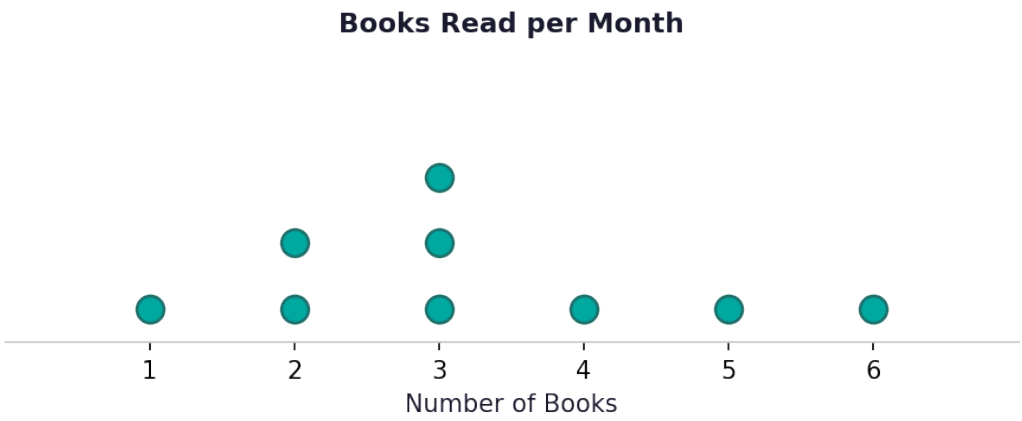
3. Answer: 20

- Sort the data: 8, 14, 18, 22, 26, 30
- With 6 values, the median is the average of the 3rd and 4th values: (18 + 22) ÷ 2 = 20

4. Answer: Mean = 86.86 (approx), Median = 88

- Sum: 85 + 90 + 78 + 92 + 88 + 84 + 91 = 608
- Mean: 608 ÷ 7 ≈ 86.86
- Sort: 78, 84, 85, 88, 90, 91, 92
- Median (4th value): 88

5. Answer: Mean = 3.22 (approx), Median = 3



- Values: 1, 2, 2, 3, 3, 3, 4, 5, 6
- Sum: 1+2+2+3+3+3+4+5+6 = 29
- Mean: 29 ÷ 9 ≈ 3.22
- Median (5th of 9 values): 3

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6. Answer: Original Mean ≈ 34.67, Original Median = 35; With outlier: Mean ≈ 40.14, Median = 36. Mean is more affected.

- Original sum: 25+28+34+36+40+45 = 208; Mean = 208÷6 ≈ 34.67
- Sorted: 25,28,34,36,40,45; Median = (34+36)÷2 = 35
- With outlier 73: sum = 281; Mean = 281÷7 ≈ 40.14
- Sorted: 25,28,34,36,40,45,73; Median = 36 (4th value)
- Mean changed by ~5.47, Median changed by only 1 — Mean is non-resistant

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7. Answer: Mean ≈ 30.93, Median = 31.5, Distribution is approximately symmetric

Weekly Hours of Exercise

Stem	Leaves
1	0 2
2	1 4 5 8
3	0 3 3 7
4	2 5
5	0

Key: 1|0 = 10

- List values: 10,12,21,24,25,28,30,33,33,37,42,45,50
- Sum = 390+10 = 390; count = 13; Mean = 390÷13 ≈ 30
- Actually sum: 10+12+21+24+25+28+30+33+33+37+42+45+50 = 390; Mean = 390÷13 = 30
- Median: 7th value of 13 sorted values = 30
- Mean ≈ Median, so distribution is approximately symmetric

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8. Answer: Skewed right; Median is the better measure because it is resistant to the high-priced outlier homes pulling the mean up.

- When Mean > Median, the distribution is skewed to the right
- A few very expensive homes are pulling the mean higher than what a typical home costs
- The median is resistant to outliers, so it better represents the typical home price
- This is a classic real-world example of why median household income is often reported instead of mean

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9. Answer: Distribution is skewed right (tail on left side), so Mean < Median. Mean ≈ 73.96, Median ≈ 70–79 interval.

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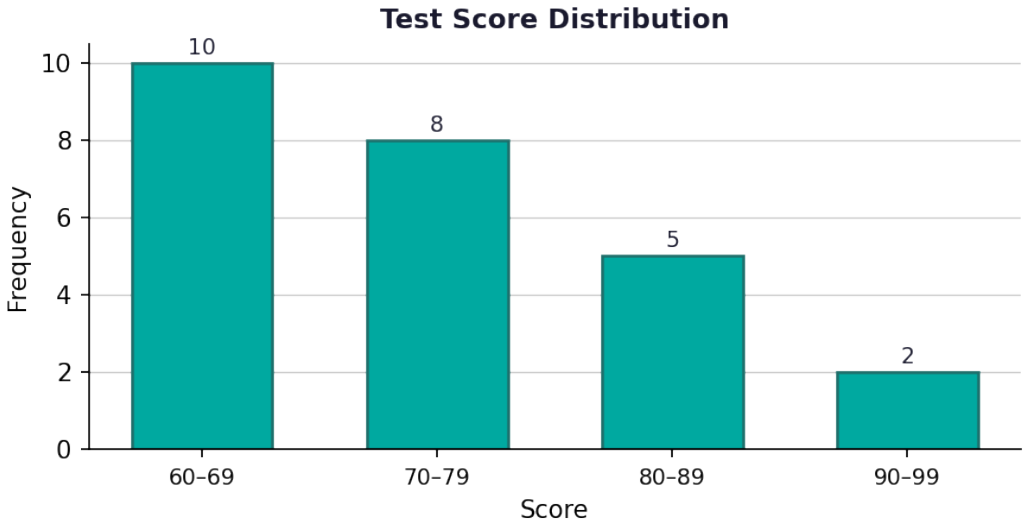

- Frequencies: 60–69: 10, 70–79: 8, 80–89: 5, 90–99: 2; Total = 25
- The distribution is skewed left (more scores in lower range), so Mean < Median
- Weighted sum using midpoints: 65(10)+75(8)+85(5)+95(2) = 650+600+425+190 = 1865
- Mean = 1865 ÷ 25 = 74.6
- Cumulative frequencies: up to 69 = 10, up to 79 = 18. Median is in 70–79 interval since the 13th value falls there
- Mean (74.6) < Median (in 70–79 range), consistent with left skew

10. Answer: With outlier: Mean ≈ 34.57, Median = 33. Without outlier: Mean ≈ 28.17, Median = 33. Median did not change; Mean changed significantly.

- All 7 values: 16, 25, 24, 33, 37, 34, 73
- With outlier — Sum: 16+25+24+33+37+34+73 = 242; Mean = 242÷7 ≈ 34.57
- Sorted: 16, 24, 25, 33, 34, 37, 73; Median = 4th value = 33
- Without outlier (6 values): 16, 25, 24, 33, 37, 34; Sum = 169; Mean = 169÷6 ≈ 28.17
- Sorted: 16, 24, 25, 33, 34, 37; Median = (25+33)÷2 = 29
- Mean changed from 34.57 to 28.17 (a difference of ~6.4) — non-resistant
- Median changed from 33 to 29 — slightly affected but far less than the mean, demonstrating resistance

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