

Mean, Median, Mode, and Range

Name: _____

Date: _____

Score: _____ / 18

When you look at a data set, you usually want one number that shows a typical value and another that shows how spread out the data is. The **mean**, **median**, **mode**, and **range** each tell a different part of the story. Sometimes the mean is the best summary, but if there is an outlier, the median might be a better choice. Learning *what* each measure means is just as important as knowing *how* to calculate it!



Key Concepts & Quick Review

Mean: $\bar{x} = \frac{\text{sum of all values}}{\text{number of values}}$. **Median:** middle value of ordered data (average of two middle values if even count).

Mode: most frequently occurring value (can be none, one, or several).

Range: $\text{max} - \text{min}$. Use **median** when outliers exist; use **mean** when data is symmetric.

Examples

① Find the mean, median, mode, and range of: 4, 7, 2, 9, 7, 5, 7, 3.

Think It Through: Start by sorting the data: 2, 3, 4, 5, 7, 7, 7, 9. The mean is the total divided by the number of values, so $44 \div 8 = 5.5$. Because there are 8 numbers, the median is the average of the two middle values, 5 and 7, which gives 6. The mode is 7 because it appears most often. The range is the largest minus the smallest, $9 - 2 = 7$.

Answer: Mean = 5.5; Median = 6; Mode = 7; Range = 7

② A realtor reports that the “average” home in a neighbourhood sold for \$380,000. The sales prices were: \$210k, \$220k, \$230k, \$235k, \$900k. Is the mean or median a better measure here? Find both.

Think It Through: Find both measures, then decide which one makes more sense. The mean is $\frac{210+220+230+235+900}{5} = 359$, so the mean price is about \$359,000. The median is the middle value of the ordered list, which is \$230,000. Because the \$900k sale is much higher than the others, it pulls the mean upward. That makes the median the better measure of a typical home price here.

Answer: Mean \approx \$359k (inflated); median = \$230k (better)



Practice Problems

Find the mean, median, mode, and range for each data set.

1. For the data set 3, 5, 7, 7, 8, find the mean, median, mode, and range. _____
2. For the data set 12, 15, 11, 14, 13, find the mean, median, mode, and range. _____
3. For the data set 2, 4, 4, 6, 8, 10, find the mean, median, mode, and range. _____
4. For the data set 20, 22, 22, 25, 27, 28, find the mean, median, mode, and range. _____
5. For the data set 9, 3, 6, 3, 9, 6, 3, find the mean, median, mode, and range. _____
6. For the data set 100, 200, 300, 400, find the mean, median, mode, and range. _____
7. For the data set 5, 5, 5, 5, 5, find the mean, median, mode, and range. _____
8. For the data set 1, 2, 3, 10, 10, find the mean, median, mode, and range. _____
9. For the data set 80, 90, 70, 60, 85, 75, find the mean, median, mode, and range. _____
10. For the data set 4, 4, 8, 12, 16, 20, find the mean, median, mode, and range. _____
11. For the data set 15, 18, 13, 15, 19, 10, find the mean, median, mode, and range. _____
12. For the data set 7, 14, 7, 21, 7, 28, find the mean, median, mode, and range. _____
13. The data set 3, x , 5, 7 has a mean of 5. Find the value of x . _____
14. The ordered data set 2, 4, x , 8, 10 has a median of 5. Find the value of x . _____
15. The data set 6, 8, 9, 10 gains one new value, 5. Find the new mean. _____

Study Tips

- Always sort the data first** before finding the median — working from an unsorted list is the most common error.
- If the data has an **outlier** (one extreme value), the median is more reliable than the mean. Outliers pull the mean toward themselves.
- A data set can have **no mode** (all values different), one mode, or multiple modes (bimodal, trimodal).

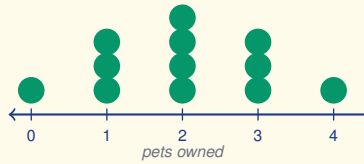
Word Problems

16. A basketball player scores 18, 22, 15, 30, 19, 22, 14, 27 points in eight games. Find the mean, median, mode, and range. In game nine she scores 0 (injured). How does this single score change each of the four statistics? Which measure is most affected? _____
17. Seven friends compare their weekly allowances (in dollars): \$10, \$12, \$12, \$15, \$18, \$20, \$85. Find the



mean and median. Which better represents a “typical” allowance? If the friend who gets \$85 is removed from the group, find the new mean. How much does the mean change? _____

18. This dot plot records the number of pets each student owns. Use the plot to find the mean, median, mode, and range. _____



Answer Keys

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|--|---|
| <p>1) mean 6; med 7; mode 7; range 5</p> <p>2) mean 13; med 13; mode none; range 4</p> <p>3) mean $\frac{17}{3}$; med 5; mode 4; range 8</p> <p>4) mean 24; med $\frac{47}{2}$; mode 22; range 8</p> <p>5) mean $\frac{39}{7}$; med 6; mode 3; range 6</p> <p>6) mean 250; med 250; mode none; range 300</p> <p>7) mean 5; med 5; mode 5; range 0</p> <p>8) mean $\frac{26}{5}$; med 3; mode 10; range 9</p> <p>9) mean $\frac{230}{3}$; med $\frac{155}{2}$; mode none; range 30</p> <p>10) mean $\frac{32}{3}$; med 10; mode 4; range 16</p> <p>11) mean 15; med 15; mode 15; range 9</p> <p>12) mean 14; med $\frac{21}{2}$; mode 7; range 21</p> | <p>13) 5</p> <p>14) 6</p> <p>15) 7.6</p> <p>16) Mean 20.875; median 20.5; mode 22; range 16; with 0: mean 18.6, median 19, mode unchanged, range 30; mean most affected</p> <p>17) Mean about \$24.57; median \$15; median more typical; without outlier mean \$14.50; change about \$10.07</p> <p>18) 12 students; mean 2; median 2; mode 2; range 4</p> |
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Step-by-Step Explanations

Strategy: For Volume of Prisms, identify the base shape first, find its area, and multiply by the prism height. A prism-volume setup starts with base area, then stretches that base through the height.

Practice 1: A rectangular prism has length 5, width 4, and height 6. Find its volume. **Answer:** 120
For the first worked item, find the base area, then multiply by the prism height.

Practice 15: A rectangular prism has length 2.5, width 3, and height 8. Find its volume. **Answer:** 60
Near the end of this topic, find the base area, then multiply by the prism height.

Word-problem notes:

16. Answer: Total: $90 \times 45 \times 50 = 202,500 \text{ cm}^3$; water: $0.8 \times 202,500 = 162,000 \text{ cm}^3 = 162$ liters.

Start with the full rectangular-prism volume: $90 \times 45 \times 50 = 202,500 \text{ cm}^3$. Since the tank is only 80% full, multiply by 0.8 to get the water volume: $0.8 \times 202,500 = 162,000 \text{ cm}^3$. Finally, convert cubic centimeters to liters using $1,000 \text{ cm}^3 = 1$ liter, so the tank holds 162 liters of water.

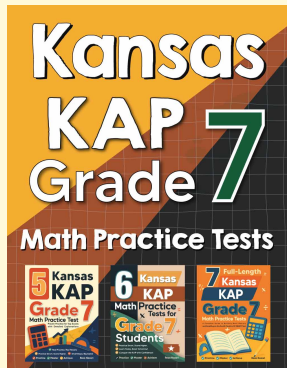
17. Answer: $B = \frac{1}{2}(4)(3.46) = 6.92 \text{ cm}^2$; $V = 6.92 \times 22 \approx 152.2 \text{ cm}^3$; mass $\approx 197.9 \text{ g}$.

First find the area of the triangular cross-section: $B = \frac{1}{2}(4)(3.46) = 6.92 \text{ cm}^2$. Then multiply by the prism length to get the box volume: $6.92 \times 22 \approx 152.2 \text{ cm}^3$. If each cubic centimetre of chocolate weighs 1.3 g, multiply the volume by 1.3 to get a total mass of about 197.9 g.



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