

12-3

Measures of Central Tendency and Dispersion



Vocabulary

Review

Use the set of test scores below for Exercises 1–2.

89 92 100 58 95 68

1. The *range* of a data set is the difference between the greatest and least data values.

greatest data value – least data value = range

 ■ – ■ = ■

2. Suppose the score of 58 changes to 71. Write the new data set in order from the least data value to the greatest data value. Then describe how the *range* changes.

Vocabulary Builder

outlier (noun) owt ly ur

Related Word: outlying (adjective)

Definition: An **outlier** is a data value in a set that is much greater or less than the other values in the set.

Main Idea: An **outlier** disproportionately raises or lowers the mean.

Example: In the data set 5, 7, 8, 5, 109, 2, and 1, the data value 109 is an **outlier**.

Use Your Vocabulary

3. Some people live in the city. Others live in the *outlying* suburbs. Circle all the words and phrases below that have the same meaning as *outlying*.

distant centrally located outside the boundary remote

Circle the *outlier* in each data set.

4. 28 26 3 20 19

5. 599 702 586 1102 601

Key Concept Mean, Median, and Mode

Measure	When to Use
The mean equals $\frac{\text{sum of the data values}}{\text{total number of data values}}$. The mean is often referred to as the <i>average</i> .	Use mean to describe the middle of a set of data that <i>does not</i> have an outlier.
The median is the middle value in a data set when the values are arranged in order. For a set containing an even number of data values, the median is the mean of the two middle data values.	Use median to describe the middle of a set of data that <i>does</i> have an outlier.
The mode is the data item that occurs the most times. A data set can have no mode, one mode, or more than one mode.	Use mode when the data are nonnumeric or when choosing the most popular item.

6. Draw a line from each term in Column A to its description in Column B.

Column A

median

mode

mean

Column B

often called the *average*

middle value when the data are ordered

item that occurs most frequently in a data set

One way to summarize a set of data is to use a *measure of central tendency*. Mean, median, and mode are all **measures of central tendency**.



Problem 1 Finding Measures of Central Tendency

Got It? Consider the bowling scores 104, 117, 104, 136, 109, 113, and 104. What are the mean, median, and mode of the scores? Which measure of central tendency best describes the data?

7. List the data in order from least to greatest.

8. Find each measure of central tendency. Round the mean to the nearest tenth.

Mean

Median

Mode

9. Circle the measure of central tendency that best describes the data set.

mean

median

mode

Problem 2 Finding a Data Value

Got It? Your grades on three exams are 80, 93, and 91. What grade do you need on the next exam to have an average of 88 on the four exams?

10. Let x = the grade on the fourth exam. Solve the equation and complete the justifications below to find the value of x .

$$\frac{80 + 93 + 91 + \square}{\square} = 88 \quad \text{Use the formula for the mean.}$$

$$\frac{\square + x}{\square} = 88 \quad \text{Simplify the numerator.}$$

$$\square + x = 352 \quad \text{Multiply each side by } \square.$$

$$x = \square \quad \text{Subtract } \square \text{ from each side.}$$

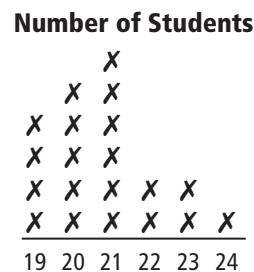
11. You need a grade of \square on the next exam to have an average of 88.

When you add the same amount to each item, the **mean**, **median**, and **mode** of the new data set increase by that number. The range stays the same.

Problem 4 Finding Measures of Central Tendency and Ranges

Got It? Find the mean, median, and range of the data.

12. The line plot shows the number of students in each homeroom at Jefferson High School. List the data from the line plot in order from least to greatest.

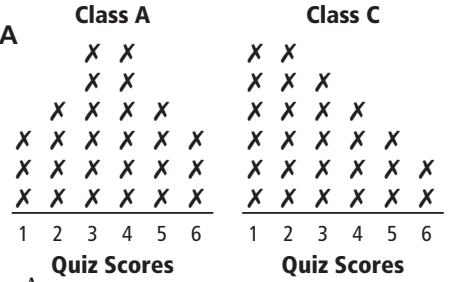


13. Find the mean, median, and range of the data using the numbers above.



Problem 5 Comparing Measures of Central Tendency

Got It? Suppose a third class is tested. The results from Class A and C are shown.



- 14. For Class A, circle the word that tells where most of the scores are located on the plot. Underline the word that describes where most of the scores are for Class C.

left middle right

- 15. The mean for Class C is greater than / less than the mean for Class A.
- 16. In a set of 26 scores, the middle score is between the [] and [] scores.
- 17. The median for Class A is [], while the median for Class C is [].
- 18. Look at the line plot for Class A and the line plot for Class C as well as what you just determined in 14–17. What can you tell from comparing the line plots?



Lesson Check • Do you UNDERSTAND?

Reasoning How is the range of a data set affected by an outlier?

- 19. The range of the data set 7, 8, 12, 3, 6, and 9 is [] .
- 20. Circle the value that would be an outlier if it were included in the data set in Exercise 19.
 [8] 40 7 4
- 21. Suppose you include the outlier you circled in Exercise 20 in the data set. The range of the data set including the outlier is [] .
- 22. How is the range of a data set affected by an outlier?

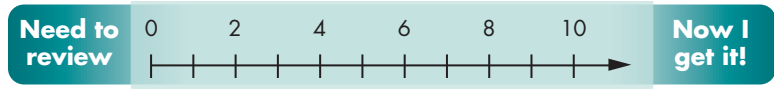


Math Success

Check off the vocabulary words that you understand.

- measure of central tendency outlier range
- mean median mode

Rate how well you can find *mean, median, mode, and range*.



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