

Lesson 12-3 Measures of Central Tendency and Dispersion

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**.

The measure of central tendency that best describes a data set may depend on whether the data set has an *outlier*. An **outlier** is a data value that is much greater or less than the other values in the set. Below is a review of mean, median, and mode, and when to use each as the measure of central tendency.

Take note

Key Concept Mean, Median, and Mode

Measure

The **mean** equals $\frac{\text{sum of the data values}}{\text{total number of data values}}$. The mean is often referred to as the *average*.

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.

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.

When to Use

Use mean to describe the middle of a set of data that *does not* have an outlier.

Use median to describe the middle of a set of data that *does* have an outlier.

Use mode when the data are nonnumeric or when choosing the most popular item.

Problem 1 Finding Measures of Central Tendency

Bowling What are the mean, median, and mode of the bowling scores below? Which measure of central tendency best describes the scores?



Problem 2 Finding a Data Value

Grades Your grades on three exams are 80, 93, and 91. What grade do you need on the next exam to have an average of 90 on the four exams?

Got It? 2. a. The grades in Problem 2 were 80, 93, and 91. What grade would you need on your next exam to have an average of 88 on the four exams?

b. **Reasoning** If 100 is the highest possible score on the fourth exam, is it possible to raise your average to 92? Explain.

A **measure of dispersion** describes how *dispersed*, or spread out, the values in a data set are. One measure of dispersion is *range*. The **range of a set of data** is the difference between the greatest and least data values.

Problem 3 Finding the Range

Finance The closing prices, in dollars, of two stocks for the first five days in February are shown below. What are the range and mean of each set of data? Use the results to compare the data sets.

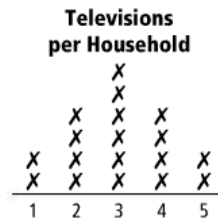
Stock A: 25 30 30 47 28

Stock B: 34 28 31 36 31

Problem 4 Finding Measures of Central Tendency and Ranges

The results of a survey on the number of televisions in students' households are shown in the line plot.

A Calculate the mean, median, and range of the data.



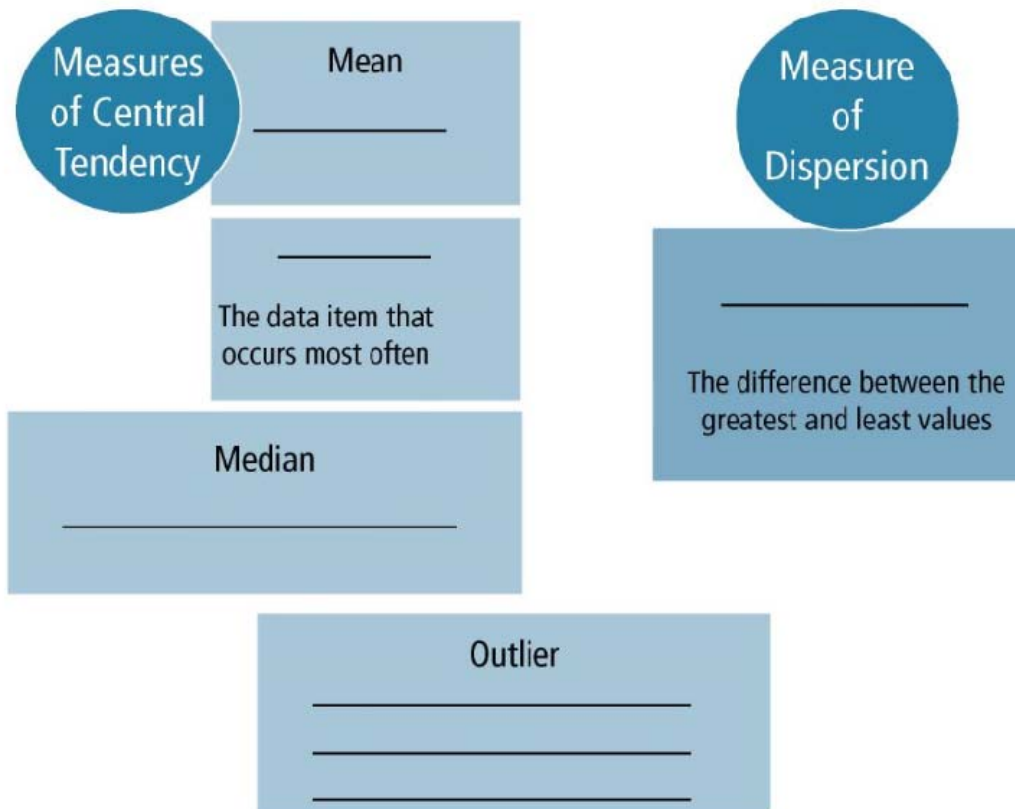
B By comparing line plots, how can you tell which mean is greater?

12-3 Additional Vocabulary Support

Measures of Central Tendency and Dispersion

Use the list below to complete the diagram.

A data value that is much greater or much less than the other values in the set	Mode	Range
	The average	The middle of a set of ordered data



Find the mean, median, mode, outlier, and range of the data set 4, 4, 4, 7, 7, 8, 22.

1. Mean _____
2. Median _____
3. Mode _____
4. Outlier _____
5. Range _____

12-3 Puzzle: One Mean Puzzle

Measures of Central Tendency and Dispersion

Match the solutions to the problems below. Write the letters of your answers in the blank spaces toward the bottom of the page. Your answers will spell out the names of the two mathematicians who are credited with the founding of probability theory.

Use the following data sets.

Data Set 1: 7, 11, 5, 9, 7, 19, 8, 13, 2

Data Set 2: 84, 78, 66, 93, 68, 72, 96, 88, 96, 89

- | | |
|------------------------------|-------|
| 1. the mean of Data Set 1 | A. 7 |
| 2. the median of Data Set 1 | C. 86 |
| 3. the mode of Data Set 1 | E. 96 |
| 4. the maximum of Data Set 1 | F. 30 |
| 5. the range of Data Set 1 | L. 8 |
| 6. the mean of Data Set 2 | M. 83 |
| 7. the median of Data Set 2 | P. 19 |
| 8. the mode of Data Set 2 | R. 9 |
| 9. the minimum of Data Set 2 | S. 17 |
| 10. the range of Data Set 2 | T. 66 |

and

_____ and _____
4 3 5 7 3 2 10 8 1 6 3 9