

LESSON 10.2

Study Guide

GOAL

Compare measures of central tendency and dispersion.

Vocabulary

A **measure of dispersion** describes the dispersion, or spread, of data.

Two such measures are the **range**, which gives the length of the interval containing the data, and the **mean absolute deviation**, which gives the average variation of the data from the mean.

Key Concept

Measures of central tendency, mean, median, and mode, are numbers used to represent a typical number in a data set. Measures of dispersion, range and mean absolute deviation, are numbers used to describe the spread of a data set.

KEY CONCEPT*For Your Notebook*

Measures of Central Tendency

The **mean**, or *average*, of a numerical data set is denoted by \bar{x} , which is read as “x-bar.” For the data set x_1, x_2, \dots, x_n , the mean is $\bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n}$.

The **median** of a numerical data set is the middle number when the values are written in numerical order. If the data set has an even number of values, the median is the mean of the two middle values.

The **mode** of a data set is the value that occurs most frequently. There may be one mode, no mode, or more than one mode.

Common Student Errors

- Getting confused when data values are repeated

Tip Remind students that when calculating the mean, median, and mode, they must include all data values in their computations even if there are repeated values.

- Not writing data values in numerical order

Tip Reinforce to students that the only way they can correctly find the median of a data set is to first write the data values in numerical order.

Example: Find the mean of the data.

2, 3, 3, 3, 4, 4, 5

Student response: $\bar{x} = \frac{2+3+3+3+4+4+5}{7} = 3.43$

Example: Find the median of the data.

18, 12, 19, 14, 10, 16, 15

Student response: 14

EXAMPLE 1

Compare measures of central tendency

The high temperatures (in °F) recorded each day for one week are listed below. Which measure of central tendency best represents the data?

70, 71, 71, 72, 81, 82, 85

Solution

$$\bar{x} = \frac{70+71+71+72+81+82+85}{7} = \frac{532}{7} = 76$$

The median is the middle value, 72.

The mode is 71.

The mean best represents the data. The mode is at the lower end of the data, as is the median.

Exercises for Example 1

In Exercises 1-3, use the data: 5, 9, 11, 12, 13, 15, 15, 22, 60.

1. Find the mean, median, and mode of the data.
2. Which measure of central tendency best represents the data?
3. Suppose you eliminate the greatest and least values, 5 and 60. Which measure of central tendency best represents the remaining data?

EXAMPLE 2

Compare measures of dispersion

Golf Tournament In a golf tournament, the 18-hole totals for the top 6 golfers in the men's competition and the top 6 golfers in the women's competition are given. The men's scores are in set A , and the women's scores are in set B . Compare the spread of the data for the two sets of data using (a) the range and (b) the mean absolute deviation.

A : 67, 69, 69, 71, 74, 76

B : 68, 70, 72, 73, 74, 75

Solution

a. A : $76 - 67 = 9$

B : $75 - 68 = 7$

The range of set A is greater than the range of set B . So, the data in A cover a wider interval than the data in set B .

b. The mean of set A is 71, so the mean absolute deviation is:

$$\frac{|67 - 71| + |69 - 71| + \dots + |76 - 71|}{6} = \frac{16}{6} = 2.\bar{6}$$

The mean of set B is 72, so the mean absolute deviation is:

$$\frac{|68 - 72| + |70 - 72| + \dots + |75 - 72|}{6} = \frac{12}{6} = 2$$

The mean absolute deviation of A is greater, so the average variation from the mean is greater for the data in set A than for the data in set B .

Exercise for Example 2

4. **Golf Tournament** In a golf tournament, the top 6 men's scores are 65, 68, 70, 72, 73, 75.

The top women's scores are 69, 71, 73, 74, 77, 80. Compare the spread of the data for the two sets of scores using (a) the range and (b) the mean absolute deviation.