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Class: \_\_\_\_\_

I CAN determine the standard deviation for a given set of data.

## Finding the Range and Standard Deviation

A **measure of variation** is a measure that describes the spread, or distribution, of a data set. One measure of variation is the *range*. The **range** of a data set is the difference of the greatest value and the least value.

Two reality cooking shows select 12 contestants each. The ages of the contestants are shown in the tables. Find the range of the ages for each show. Compare your results.

Show A		Show B	
Ages		Ages	
20	29	25	19
19	22	20	27
25	27	22	25
27	29	27	22
30	20	48	21
21	31	32	24

### Part II

After the first week, the 25-year-old is voted off Show A and the 48-year-old is voted off Show B. How does this affect the range of the ages of the remaining contestants on each show in Example 3? Explain.

Two game shows select 12 contestants each. The ages of the contestants are shown in the tables. Find the range of the ages for each show. Compare your results.

Show A		Show B	
Ages		Ages	
35	52	28	38
32	35	32	24
25	29	35	34
19	20	26	30
21	43	40	27
40	33	20	35

STOP

## Core Concept

### Standard Deviation

The **standard deviation** of a numerical data set is a measure of how much a typical value in the data set differs from the mean. The symbol  $\sigma$  represents the standard deviation. It is read as “sigma.” It is given by

$$\sigma = \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \cdots + (x_n - \bar{x})^2}{n}}$$

where  $n$  is the number of values in the data set. The deviation of a data value  $x$  is the difference of the data value and the mean of the data set,  $x - \bar{x}$ .

**Step 1** Find the mean,  $\bar{x}$ .

**Step 2** Find the deviation of each data value,  $x - \bar{x}$ .

**Step 3** Square each deviation,  $(x - \bar{x})^2$ .

**Step 4** Find the mean of the squared deviations. This is called the *variance*.

**Step 5** Take the square root of the variance.

Model #1

Find the mean, median, mode, range, and standard deviation of the data set.

1) The data set below gives the prices (in dollars) of cordless phones at an electronics store.

35, 50, 60, 60, 75, 65, 80

Model #2

Find the mean, median, mode, range, and standard deviation of the data set.

2) The data set below gives the numbers of home runs for the 10 batters who hit the most home runs during the 2005 Major League Baseball regular season.

48, 47, 46, 45, 43, 41, 40

### **CFU\_Think-Pair-Share**

Find the mean, median, mode, range, and standard deviation of the data set.

3) The data set below gives the waiting times (in minutes) of several people at a department of motor vehicles service center.

11, 7, 14, 2, 8, 13

4) The data set below gives the calories in a 1-ounce serving of several breakfast cereals.

135, 115, 120, 110, 110, 100, 105, 110, 125

## Independent Practice

- 1) The two sets of data below represent the number of runs scored by two different youth baseball teams over the course of a season.

Team  $A$ : 4, 8, 5, 12, 3, 9, 5, 2

Team  $B$ : 5, 9, 11, 4, 6, 11, 2, 7

Which set of statements about the mean and standard deviation is true?

- 1) mean  $A <$  mean  $B$   
standard deviation  $A >$  standard deviation  $B$
  - 2) mean  $A >$  mean  $B$   
standard deviation  $A <$  standard deviation  $B$
  - 3) mean  $A <$  mean  $B$   
standard deviation  $A <$  standard deviation  $B$
  - 4) mean  $A >$  mean  $B$   
standard deviation  $A >$  standard deviation  $B$
- 2) The heights, in inches, of 12 students are listed below.  
61,67,72,62,65,59,60,79,60,61,64,63
- Which statement best describes the spread of these data?
- 1) The set of data is evenly spread.
  - 2) The median of the data is 59.5.
  - 3) The set of data is skewed because 59 is the only value below 60.
  - 4) 79 is an outlier, which would affect the standard deviation of these data.

- 3) The 15 members of the French Club sold candy bars to help fund their trip to Quebec. The table below shows the number of candy bars each member sold.

Number of Candy Bars Sold				
0	35	38	41	43
45	50	53	53	55
68	68	68	72	120

When referring to the data, which statement is *false*?

- 1) The mode is the best measure of central tendency for the data.
- 2) The data have two outliers.
- 3) The median is 53.
- 4) The range is 120.

- 4) The standard deviation is used to tell how far on average any data point is from the mean. The smaller the standard deviation, the closer the scores are on average to the mean. When the standard deviation is large, the scores are more widely spread out on average from the mean.

The **standard deviation** is calculated to find the **average distance from the mean**.

**For the following sets of data, calculate the mean and standard deviation of the data. Describe the mean and standard deviation in words after calculating it.**

- a) **Test Scores:** 22, 99, 102, 33, 57, 75, 100, 81, 62, 29

- b) The data set below gives the prices (in dollars) of cordless phones at an electronics store.

35, 50, 60, 60, 75, 65, 80

- c) The data set below gives the numbers of home runs for the 10 batters who hit the most home runs during the 2005 Major League Baseball regular season.

51, 48, 47, 46, 45, 43, 41, 40, 40, 39

- d) The data set below gives the waiting times (in minutes) of several people at a department of motor vehicles service center.

11, 7, 14, 2, 8, 13, 3, 6, 10, 3, 8, 4, 8, 4, 7