

# 12-6 Study Guide and Intervention

## Statistical Measures

### Measures of Central Tendency

Measures of Central Tendency	Use	When
	mean	the data are spread out and you want an average of values
	median	the data contain outliers
	mode	the data are tightly clustered around one or two values

**Example** Find the mean, median, and mode of the following set of data: {42, 39, 35, 40, 38, 35, 45}.

To find the mean, add the values and divide by the number of values.

$$\text{mean} = \frac{42 + 39 + 35 + 40 + 38 + 35 + 45}{7} \approx 39.14.$$

To find the median, arrange the values in ascending or descending order and choose the middle value. (If there is an even number of values, find the mean of the two middle values.) In this case, the median is 39.

To find the mode, take the most common value. In this case, the mode is 35.

### Exercises

Find the mean, median, and mode of each set of data. Round to the nearest hundredth, if necessary.

- {238, 261, 245, 249, 255, 262, 241, 245}
- {9, 13, 8, 10, 11, 9, 12, 16, 10, 9}
- {120, 108, 145, 129, 102, 132, 134, 118, 108, 142}
- {68, 54, 73, 58, 63, 72, 65, 70, 61}
- {34, 49, 42, 38, 40, 45, 34, 28, 43, 30}

6. The table at the right shows the populations of the six New England capitals. Which would be the most appropriate measure of central tendency to represent the data? Explain why and find that value.

Source: [www.factfinder.census.gov](http://www.factfinder.census.gov)

City	Population (rounded to the nearest 1000)
Augusta, ME	19,000
Boston, MA	589,000
Concord, NH	37,000
Hartford, CT	122,000
Montpelier, VT	8,000
Providence, RI	174,000

# 12-6 Study Guide and Intervention *(continued)*

## Statistical Measures

**Measures of Variation** The *range* and the **standard deviation** measure how scattered a set of data is.

<b>Standard Deviation</b>	If a set of data consists of the $n$ values $x_1, x_2, \dots, x_n$ and has mean $\bar{x}$ , then the standard deviation is given by $\sigma = \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n}}$ .
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The square of the standard deviation is called the **variance**.

### Example

**Find the variance and standard deviation of the data set**

**{10, 9, 6, 9, 18, 4, 8, 20}.**

**Step 1** Find the mean.

$$\bar{x} = \frac{10 + 9 + 6 + 9 + 18 + 4 + 8 + 20}{8} = 10.5$$

**Step 2** Find the variance.

$$\begin{aligned} \sigma^2 &= \frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n} && \text{Standard variance formula} \\ &= \frac{(10 - 10.5)^2 + (9 - 10.5)^2 + \dots + (20 - 10.5)^2}{8} \\ &= \frac{220}{8} \text{ or } 27.5 \end{aligned}$$

**Step 3** Find the standard deviation.

$$\begin{aligned} \sigma &= \sqrt{27.5} \\ &\approx 5.2 \end{aligned}$$

The variance is 27.5 and the standard deviation is about 5.2.

### Exercises

**Find the variance and standard deviation of each set of data. Round to the nearest tenth.**

- {100, 89, 112, 104, 96, 108, 93}
- {62, 54, 49, 62, 48, 53, 50}
- {8, 9, 8, 8, 9, 7, 8, 9, 6}
- {4.2, 5.0, 4.7, 4.5, 5.2, 4.8, 4.6, 5.1}

5. The table at the right lists the prices of ten brands of breakfast cereal. What is the standard deviation of the values to the nearest penny?

Price of 10 Brands of Breakfast Cereal	
\$2.29	\$3.19
\$3.39	\$2.79
\$2.99	\$3.09
\$3.19	\$2.59
\$2.79	\$3.29