11.2 Apply Transformations to Data

Before	You calculated statistics for data sets.
Now	You will learn how transformations of data affect statistics.
Why?	So you can solve problems about space travel, as in Example 1.

Key Vocabulary
- **mean,** *p. 744*
- **median,** *p. 744*
- **mode,** *p. 744*
- **range,** *p. 745*
- **standard deviation,** *p. 745*

The following statistics describe the data set 7, 12, 16, 20, and 20.

Mean: 15   **Median:** 16   **Mode:** 20   **Range:** 13   **Std. Dev.:** 5.0

Adding 10 to each data value produces the data set 17, 22, 26, 30, and 30. The statistics for this data set are shown below.

Mean: 25   **Median:** 26   **Mode:** 30   **Range:** 13   **Std. Dev.:** 5.0

Notice that the mean, median, and mode have each increased by 10, but the range and standard deviation are unchanged. These results can be generalized.

KEY CONCEPT   *For Your Notebook*

Adding a Constant to Data Values

When a constant is added to every value in a data set, the following are true:

- The mean, median, and mode of the new data set can be obtained by adding the same constant to the mean, median, and mode of the original data set.

- The range and standard deviation are unchanged.

EXAMPLE 1   Add a constant to data values

ASTRONAUTS The data set below gives the weights (in pounds) on Earth of eight astronauts without their space suits. A space suit weighs 250 pounds on Earth. Find the mean, median, mode, range, and standard deviation of the weights of the astronauts without their space suits and with their space suits.

142, 150, 155, 156, 160, 160, 166, 175

Solution

	Weights without suits	Weights with suits
Mean	158	158 + **250** = 408
Median	158	158 + **250** = 408
Mode	160	160 + **250** = 410
Range	33	33 (unchanged)
Standard deviation	9.3	9.3 (unchanged)