

# 6.7

## Box-and-Whisker Plots

- Goals**
- Draw a box-and-whisker plot to organize real-life data.
  - Read and interpret a box-and-whisker plot of real-life data.

### VOCABULARY

**Box-and-whisker plot** A box-and-whisker plot is a data display that divides a set of data into four parts.

**Second quartile** The second quartile, or median, separates the data set into two halves: the numbers that are below the median and the numbers that are above the median.

**First quartile** The first quartile is the median of the lower half of a data set.

**Third quartile** The third quartile is the median of the upper half of a data set.

### Example 1 Finding Quartiles

Find the first, second, and third quartiles of the data.

15, 8, -5, 0, 2, 11, 10, -5, 4, 4, -3, 10, 7, 2, -2, 1

#### Solution

Begin by writing the numbers in increasing order. You must find the second quartile before you find the first and third quartiles.

-5, -5, -3, -2, 0, 1, 2, 2, 4, 4, 7, 8, 10, 10, 11, 15

$$\text{Second quartile: } \frac{2 + 4}{2} = \underline{3}$$

$$\text{First quartile: } \frac{-2 + 0}{2} = \underline{-1}$$

$$\text{Third quartile: } \frac{8 + 10}{2} = \underline{9}$$

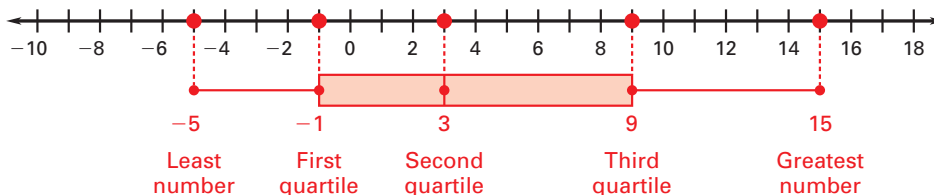
## DRAWING A BOX-AND-WHISKER PLOT

- Step 1** Plot the least number, the first quartile, the second quartile, the third quartile, and the greatest number on a number line.
- Step 2** Draw a line from the least number to the greatest number below your number line. Plot the same points on that line.
- Step 3** Make a box from the first quartile to the third quartile. Draw a vertical line in the box at the second quartile. The "whiskers" connect the box to the least and greatest numbers.

### Example 2 Drawing a Box-and-Whisker Plot

Draw a box-and-whisker plot of the data in Example 1.

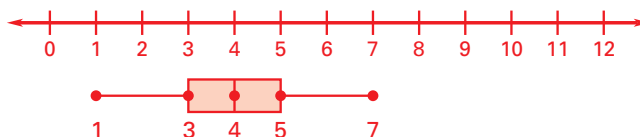
1. Plot the least number, -5, the first quartile, -1, the second quartile, 3, third quartile, 9, and the greatest number, 15, on a number line.
2. Draw a line from -5 to 15 below the number line. Plot the points -5, -1, 3, 9, and 15 on that line.
3. Make a box from -1 to 9. Draw a vertical line in the box at 3.



**Checkpoint** Complete the following exercise.

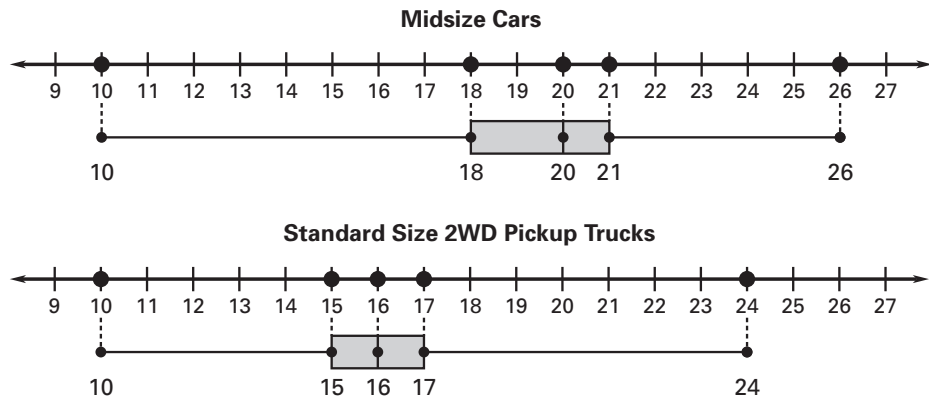
1. Make a box-and-whisker plot of the data.

3, 6, 1, 4, 5, 4, 4, 7, 3, 3, 3, 1, 2, 3, 4, 4, 6, 5, 3, 3, 1, 2, 5, 4, 4, 5, 4, 2, 4, 5



**Example 3****Interpreting a Box-and-Whisker Plot**

**Gas Mileage** The box-and-whisker plots below show the city-driving gas mileages for selected midsize cars and standard size 2WD pickup trucks.



- What is the median city-driving gas mileage for the midsize cars? for the pickup trucks?
- Which vehicle has the overall better city-driving gas mileage?
- How else do the data sets differ?

**Solution**

- The median city-driving gas mileage for the midsize cars is 20 miles per gallon. The median city-driving gas mileage for the pickup trucks is 16 miles per gallon.
- The midsize cars get better city-driving gas mileage than the pickup trucks. Three-fourths of the midsize cars have a gas mileage of 18 miles per gallon or higher, whereas only one-fourth of the pickup trucks have a gas mileage of 17 miles per gallon or higher.
- There is a little more variability in the gas mileages for the midsize cars than for the pickup trucks.

The gas mileages for the midsize cars span from 10 to 26 miles per gallon, while the gas mileages for the pickup trucks span from 10 to 24 miles per gallon.

The difference in the extremes of gas mileages for the midsize cars is 16 miles per gallon, while the difference in the extremes of gas mileages for the pickup trucks is 14 miles per gallon.