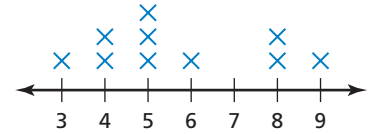# 5.6b Data Displays

🔑 Key Idea

Line Plots

A **line plot** uses a number line to show the number of times each value in a data set occurs. An "×" is placed above the number line for each data value.

Line plots show how much data are spread out or grouped together. This is called the *distribution* of the data.

EXAMPLE 1 Making a Line Plot

Ages			
14	18	13	15
16	15	24	14
17	16	18	15
15	19	16	16
24	14	15	17

The table shows the ages of people in a school library. Display the data in a line plot. Describe the distribution of the data.

Step 1: Draw a number line that includes the least and greatest values in the data set. The least age is 13 and the greatest age is 24.

Step 2: Place an "×" above the number line for each data value.
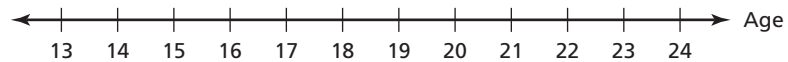
There are two 18-year-old people.
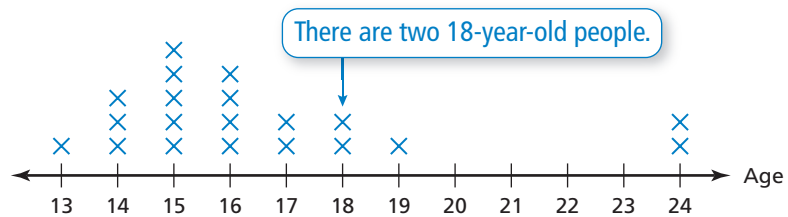
::: Most of the people are in their teens. Two of the people are 24 years old.

🟢 Practice

Display the data in a line plot. Describe the distribution of the data.

1.

Number of Fouls					
2	1	2	0	0	3
2	1	5	0	3	0

2.

| Camper Registrations				
21	25	19	22	21
23	24	27	25	16
24	21	22	25	22

🔑 Key Idea

Histograms

Remember

The *frequency* is the number of data values in an interval. A *frequency table* groups data values into intervals.

A **histogram** is a bar graph that shows the frequencies of data values in intervals of the same size.

The height of a bar represents the frequency of the values in the interval.

Push-Ups

Number of students

| | 0–9 | 10–19 | 20–29 | 30–39 | 40–49 |

Number of push-ups
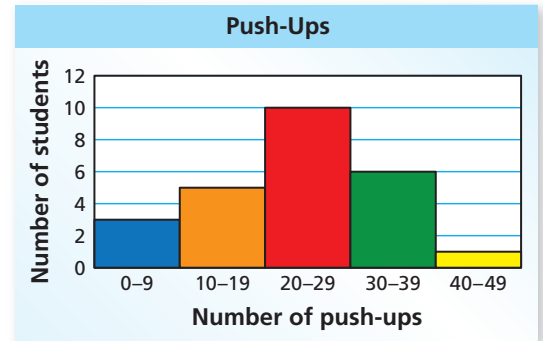
EXAMPLE ② **Making a Histogram**

The frequency table shows the number of points that each student in a class earns on a 15-point quiz. Display the data in a histogram.

Step 1: Draw and label the axes.

Step 2: Draw a bar to represent the frequency of each interval.

Points	Frequency
1–3	2
4–6	0
7–9	6
10–12	10
13–15	9

Quiz Scores

Frequency

Points: 1–3, 4–6, 7–9, 10–12, 13–15
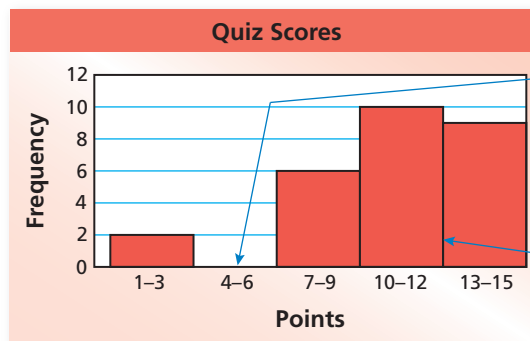
Include any interval with a frequency of 0. The bar height is 0.

There is no space between the bars of a histogram.

🟢 Practice

Display the data in a histogram.

3.

Heights of Plants	
Inches	**Frequency**
10–13	8
14–17	11
18–21	5
22–25	2
26–29	7

4.

| Time on Hold	
Minutes	**Frequency**
0–4	11
5–9	19
10–14	5
15–19	0
20–24	3

Key Idea

Box-and-Whisker Plots

A **box-and-whisker plot** displays a data set along a number line using medians. **Quartiles** divide the data set into four equal parts. The median (second quartile) divides the data set into two halves. The median of the lower half is the first quartile. The median of the upper half is the third quartile.

Study Tip

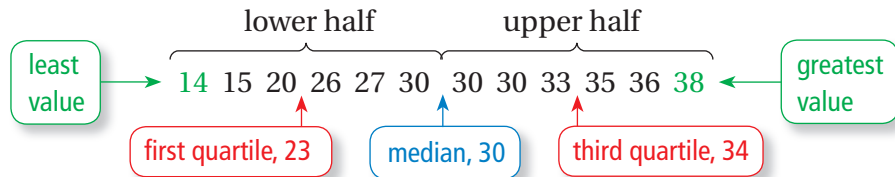A box-and-whisker plot shows the *variability* of a data set.
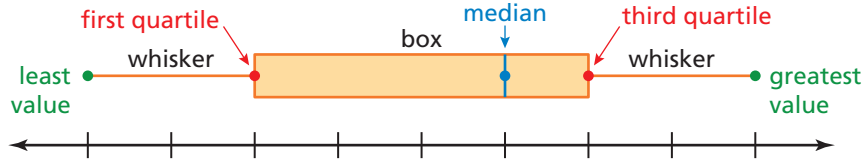
EXAMPLE 3 **Making a Box-and-Whisker Plot**

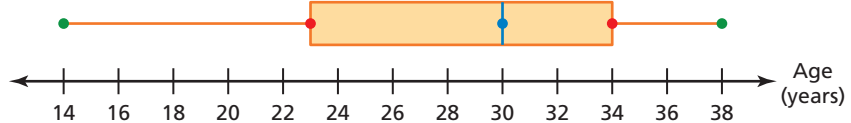Make a box-and-whisker plot for the ages (in years) of the spider monkeys at a zoo.

$$15, 20, 14, 38, 30, 36, 30, 30, 27, 26, 33, 35$$

Step 1: Order the data. Find the median and the quartiles.

lower half   upper half

least value → 14 15 20 26 27 30 30 30 33 35 36 38 ← greatest value

first quartile, 23   median, 30   third quartile, 34

Step 2: Draw a number line that includes the least and greatest values. Graph points above the number line for the least value, greatest value, median, first quartile, and third quartile.

Step 3: Draw a box using the quartiles. Draw a line through the median. Draw whiskers from the box to the least and greatest values.

Age (years)

14 16 18 20 22 24 26 28 30 32 34 36 38

Practice

Make a box-and-whisker plot for the data.

5. Hours spent online:
1, 0, 2, 3, 3, 6, 1, 1, 2, 2

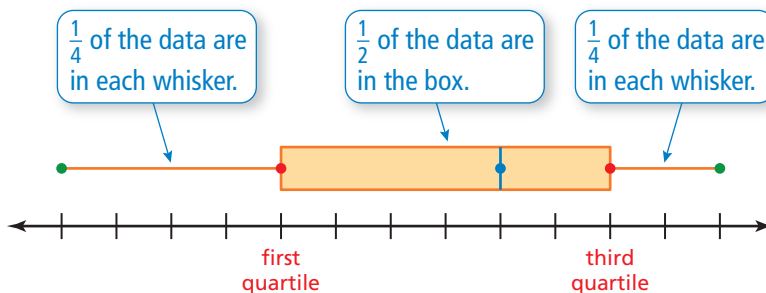**6.** Ages of teachers:
30, 62, 45, 22, 28, 50, 42, 35

7. Quiz scores:
8, 12, 9, 12, 8, 5, 9, 7, 10

8. Weights (in pounds) of dogs:
10, 30, 15, 20, 25, 5, 20, 15, 35

The figure shows how data are distributed in a box-and-whisker plot.

$\frac{1}{4}$ of the data are in each whisker.

$\frac{1}{2}$ of the data are in the box.

$\frac{1}{4}$ of the data are in each whisker.

first quartile

third quartile

The **interquartile range** of a data set is the difference of the third quartile and the first quartile. It represents the range of the middle half of the data.

EXAMPLE 4 **Analyzing a Box-and-Whisker Plot**

The box-and-whisker plot shows the heights of the players on a basketball team.

Height (inches)

62   64   66   68   70   72   74   76   78   80
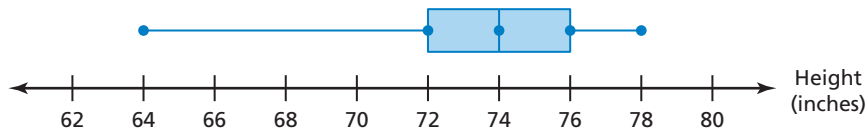
a. What portion of the players are at least 76 inches tall?

The right whisker represents the players that are at least 76 inches tall.

So, $\frac{1}{4}$ of the players are at least 76 inches tall.

b. Find and interpret the interquartile range of the data.

$$\text{interquartile range} = \text{third quartile} - \text{first quartile}$$
$$= 76 - 72$$
$$= 4$$

So, the middle half of the heights vary by no more than 4 inches.

Practice

9. ROLLER COASTERS The box-and-whisker plot shows the heights of the roller coasters at an amusement park.

Height (feet)

80   100   120   140   160   180   200   220   240   260
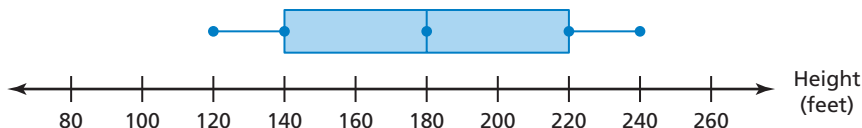
a. What portion of the roller coasters are between 120 feet tall and 220 feet tall?

b. Find and interpret the interquartile range of the data.