

# Key Concepts



## Stem-and-Leaf Plots

**Objective** Teach students how to construct stem-and leaf plots for a set of data.

**Note to the Teacher** *A stem-and-leaf plot is a way of displaying a set of data values. This display provides a useful picture of the distribution of the data, which is not readily apparent when the data are presented as a list of numbers.*

## Stem-and-Leaf Plots

A stem-and-leaf plot is a way of displaying a set of data. Inform students that a stem-and-leaf plot looks like a two-column table with no outside border, just a vertical line between the columns and a horizontal line under the column headings *Stem* (on the left) and *Leaf* (on the right). To the left of the vertical line (below *Stem*), a range of tens digits from the least number to the greatest number in the data set are written in order from least to greatest. To the right of each of the tens digit (in the column headed *Leaf*) we write, in order, every ones digit that occurs with that tens digit in the data set. Sometimes, the same number will occur more than once in a data set. When this occurs, the ones digit for that number will occur more than once next to its corresponding tens digit. Stress that students will find the construction of a stem-and-leaf plot easier if they write the data set in order from least to greatest before writing the stems and leaves.

**Example 1** A data set consists of the ages of the employees working at a small company. Their ages are given below.

{24, 26, 28, 28, 31, 31, 34, 34, 34, 42, 43, 44, 49, 52, 52, 56, 61}

**Solution** Notice that the given data set is already in order from least to greatest. Examining the tens digits of the data values shows that the stems needed for the plot are 2, 3, 4, 5, and 6. Begin by entering these into the plot.

Stem	Leaf
2	
3	
4	
5	
6	

Now look at the data values that share a common tens digit, and identify the ones digits that need to appear to the right of that stem. For example, look at the data values 24, 26, 28, and 28. The digits 4, 6, 8, and 8 should appear next to the stem 2. After filling in the rest of the data values, the stem-and-leaf plot should look like the one shown below.

Stem	Leaf
2	4 6 8 8
3	1 1 4 4 4
4	2 3 4 9
5	2 2 6
6	1

*6|1 = 61 inches*

**Note to the Teacher** *Point out that the leaves for each stem are written in order from left to right.*

Focus your students' attention on the finished stem-and-leaf plot in Example 1. Have them note the following characteristics that are readily apparent in the display.

1. Every data value appears in the display, so one can check that every data value has been plotted simply by counting.
2. The greatest and least values can be identified quickly, so the range of the data values is easily computed.
3. The median can be found easily by counting inward from both ends of the list of leaves.
4. The mode can be found by identifying the leaf that occurs most often in any of the rows.

**Note to the Teacher** *The stem-and-leaf plot sometimes makes it clear how the data are distributed. In the case of the example, we can see that most of the employees are in the age range 20–49, with only four employees aged 50 or more. This is useful information that is not as clear when the ages are presented as a list, especially if the data are not in order.*

Another example is given on the next page. Emphasize that the lists in this example do not give the data values in order, and suggest that students begin by placing the values in order from least to greatest.

**Example 2** The heights in inches of the students in two classes at Hillside Middle School are given below. Draw a stem-and-leaf plot for each set of data.

**Ms. Smith's class:**

{48, 49, 53, 46, 54, 46, 47, 50, 48, 49, 60, 46, 55, 53, 52, 47, 49}

**Mr. Ramirez's class:**

{56, 54, 59, 61, 55, 49, 52, 57, 59, 61, 49, 56, 58, 62, 48, 55, 59}

**Solution** In order from least to greatest, the heights in Ms. Smith's class are:

{46, 46, 46, 47, 47, 48, 48, 49, 49, 49, 50, 52, 53, 53, 54, 55, 60}.

So, the stems are 4, 5, and 6. The stem-and-leaf plot is shown below.

Stem	Leaf
4	6 6 6 7 7 8 8 9 9 9
5	0 2 3 3 4 5
6	0

*6|0 = 60 inches*

In order from least to greatest, the heights in Mr. Ramirez's class are:

{48, 49, 49, 52, 54, 55, 55, 56, 56, 57, 58, 59, 59, 59, 61, 61, 62}.

Here again, the stems are 4, 5, and 6. The stem-and-leaf plot is shown below.

Stem	Leaf
4	8 9 9
5	2 4 5 5 6 6 7 8 9 9 9
6	1 1 2

*6|1 = 61 inches*

Have students compare the stem-and-leaf plots constructed in Example 2. Tell them that one class is a second-grade class and the other is a fourth-grade class. Ask the class to decide which grade Ms. Smith teaches. Have students justify their choice.

Finish the lesson by giving students several data sets and asking them to draw stem-and-leaf plots to display the data. Consider providing at least one data set in which a stem (or more than one) has no leaves, as shown in the stem-and-leaf plot on page 108 of the Student Edition.

