6.6 Stem-and-Leaf Plots and Mean, Median, and Mode

Goals • Make and use a stem-and-leaf plot to put data in order.
• Find the mean, median, and mode of data.

VOCABULARY

Stem-and-leaf plot A stem-and-leaf plot is an arrangement of digits that is used to display and order numerical data.

Measure of central tendency A measure of central tendency is a number that is used to represent a typical number in a data set.

Mean The mean, or average, of n numbers is the sum of the numbers divided by n.

Median The median of n numbers is the middle number when the numbers are written in order. If n is even, the median is taken to be the average of the two middle numbers.
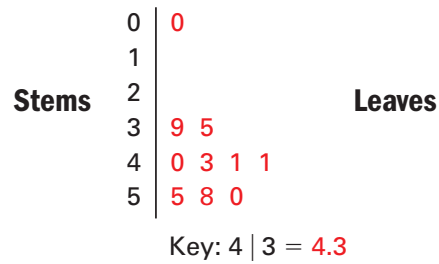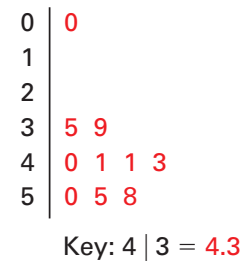

Mode The mode of n numbers is the number that occurs most frequently. A set of data can have more than one mode or no mode.

Example 1   *Making a Stem-and-Leaf Plot*

Figure Skating In a skating competition, a figure skater's technical marks were 4.0, 5.5, 5.8, 4.3, 3.9, 0.0, 5.0, 4.1, 3.5, and 4.1. Make a stem-and-leaf plot to display the data.

Solution

Use the digits in the ones' place for the <u>stems</u> and the digits in the tenths' place for the <u>leaves</u>. The <u>key</u> shows you how to interpret the digits.

Unordered stem-and-leaf plot

           0 | 0
           1 |
Stems   2 | **Leaves**
           3 | 9 5
           4 | 0 3 1 1
           5 | 5 8 0
        Key: 4 | 3 = <u>4.3</u>

Ordered stem-and-leaf plot

           0 | 0
           1 |
           2 |
           3 | 5 9
           4 | 0 1 1 3
           5 | 0 5 8
        Key: 4 | 3 = <u>4.3</u>

Example 2   *Finding the Mean, Median, and Mode*

Find the mean, median, and mode(s) of the figure skater's technical marks given in Example 1.

1. To find the mean, add the 10 marks and divide by <u>10</u>.

mean =

$$\frac{0.0 + 3.5 + 3.9 + 4.0 + 4.1 + 4.1 + 4.3 + 5.0 + 5.5 + 5.8}{10}$$

$$= \frac{40.2}{10} \approx \underline{4.0}$$

2. To find the median, write the marks in <u>order</u> and find the <u>average</u> of the two <u>middle</u> numbers. To order the marks, use the ordered stem-and-leaf plot in Example 1.

<u>0.0 3.5 3.9 4.0 4.1 4.1 4.3 5.0 5.5 5.8</u>
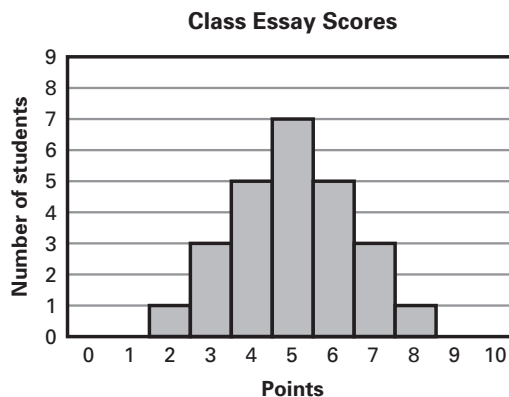
The two middle numbers are <u>4.1</u> and <u>4.1</u>.
The median is the average of these two numbers: <u>4.1</u>.

3. To find the mode(s), use the ordered list in step 2. The mode is <u>4.1</u>.

Example 3 *A Bell-Shaped Distribution*

Essay questions on a history test are given a score from 0 to 10. Find the median and mode of the data given in the histogram.

Class Essay Scores

Solution The tallest bar is at __5__ points, so that is the mode. The number of responses to the left of that bar is the same as the number of responses to the right, so __5__ points is the __median__.

✔ *Checkpoint* **Make an ordered stem-and-leaf plot of the data. Then find the mean, median, and mode(s).**

1. 15, 10, 17, 23, 19, 15, 22, 16, 45, 20, 13, 12, 17, 15

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1 | 0 2 3 5 5 5 6 7 7 9
2 | 0 2 3
3 |
4 | 5
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   Key: 1 | 0 = 10

mean = 18.5, median = 16.5, mode = 15

2. 89, 72, 79, 60, 51, 54, 60, 89, 67, 60, 58, 56, 77, 55, 78

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5 | 1 4 5 6 8
6 | 0 0 0 7
7 | 2 7 8 9
8 | 9 9
```
Key: 5 | 1 = 5.1

mean: 67, median = 60, mode = 60