

Study Guide and Intervention

7SDAP1.3

Measures of Variation

The **lower quartile** or LQ is the median of the lower half of a set of data. The **upper quartile** or UQ is the median of the upper half of a set of data. The **interquartile range** is the difference between the upper quartile and the lower quartile.

Example 1 Find the range, median, upper and lower quartiles, and interquartile range for the following set of data.
13, 20, 18, 12, 21, 2, 18, 17, 15, 10, 14

The greatest number in the data set is 21. The least number is 2. The range is $21 - 2$ or 19.

To find the quartiles, arrange the numbers in order from least to greatest.

2 10 12 13 14 15 17 18 18 20 21

The median is 15. The numbers below 15 are 2, 10, 12, 13, and 14. The median of the numbers below 15 is 12, so the lower quartile is 12. The numbers above 15 are 17, 18, 18, 20, and 21. The median of the numbers above 15 is 18, so the upper quartile is 18. The interquartile range is $18 - 12$ or 6.

In some data sets, a few of the values are much greater than or less than the rest of the data. Data that are more than 1.5 times the value of the interquartile range beyond the quartiles are called **outliers**.

Example 2 Find any outliers for the set of data given in Example 1.

The interquartile range is $18 - 12$ or 6.

Multiply the interquartile range by 1.5.

$$6 \times 1.5 = 9$$

Any data more than 9 above the upper quartile or below the lower quartile are outliers. Find the limits of the outliers.

Subtract 9 from the lower quartile.

$$12 - 9 = 3$$

Add 9 to the upper quartile.

$$18 + 9 = 27$$

The limits of the outliers are 3 and 27. The only data point outside this range is 2, so the only outlier is 2.

Exercises

Find the range, median, upper and lower quartiles, interquartile range, and any outliers for each set of data.

1. 14, 16, 18, 24, 19, 15, 13

2. 29, 27, 24, 28, 30, 51, 28

3. 57, 60, 43, 55, 46, 43, 62, 31

4. 91, 92, 88, 89, 93, 95, 65, 85, 91

5. 104, 116, 111, 108, 113, 127, 109, 122, 115, 105