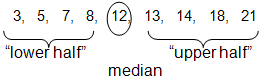
First Quartile and Third Quartile

**Definitions:**

* The **lower half** of a data set is the set of all values that are to the left of the median value when the data has been put into increasing order.
* The **upper half** of a data set is the set of all values that are to the right of the median value when the data has been put into increasing order.
* The **first quartile,** denoted by ***Q*1** , is the median of the *lower half* of the data set. This means that about 25% of the numbers in the data set lie below *Q*1 and about 75% lie above *Q*1 .
* The **third quartile,** denoted by ***Q*3** , is the median of the *upper half* of the data set. This means that about 75% of the numbers in the data set lie below *Q*3 and about 25% lie above *Q*3 .

**Example 1:** Find the first and third quartiles of the data set {3, 7, 8, 5, 12, 14, 21, 13, 18}.

First, we write data in increasing order: 3, 5, 7, 8, 12, 13, 14, 18, 21.



As on the previous page, the median is 12.

Therefore, the lower half of the data is: {3, 5, 7, 8}.

The first quartile, *Q*1, is the median of {3, 5, 7, 8}.

Since there is an even number of values, we need the mean of the middle two values to find the first quartile:

http://web.mnstate.edu/peil/MDEV102/U4/S36/ada-equation.gifhttp://web.mnstate.edu/peil/MDEV102/U4/S36/lessonimages/equation_image4.gif .

Similarly, the upper half of the data is: {13, 14, 18, 21}, so

http://web.mnstate.edu/peil/MDEV102/U4/S36/ada-equation.gifhttp://web.mnstate.edu/peil/MDEV102/U4/S36/lessonimages/equation_image5.gif .

**Example 2:** Find the first and third quartiles of the set {3, 7, 8, 5, 12, 14, 21, 15, 18, 14}.

Note that here we consider the two 14's to be distinct elements and not representing the same item; consider this like you obtained a score of 14 on two different quizzes.

First, we write the data in increasing order: 3, 5, 7, 8, 12, 14, 14, 15, 18, 21.

As before, the median is 13 (it is the mean of 12 and 14 — the pair of middle entries).

Therefore, the lower half of the data is: {3, 5, 7, 8, 12}.

Notice that 12 is included in the lower half since it is below the median value.

Then ***Q*1 = 7** (there are five values in the lower half, so the middle value is the median). Similarly, the upper half of the data is: {14, 14, 15, 18, 21}, so ***Q*3 = 15**.

Self Check Problem

The following dollar amounts were the hourly collections from a Salvation Army kettle at a local store one day in December: $19, $26, $25, $37, $32, $28, $22, $23, $29, $34, $39, and $31. Determine the first quartile and third quartile for the amount collected.

[**Solution**](http://web.mnstate.edu/peil/MDEV102/U4/S36/S363.html)http://web.mnstate.edu/peil/MDEV102/U4/S36/ada-annotation.gif