

## Percentiles

A percentile is defined as a point below which a certain per cent of the observations lie e.g. the 50th percentile is the point below which half (i.e 50%) of the observations lie.

## Quartiles

The percentiles that divide the data into four quarters are called **Quartiles**:

Q1        - 25th percentile or lower quartile

Q2        - 50th percentile or median

Q3        - 75th percentile or upper quartile

## Interquartile Range (IQR)

The Interquartile Range ( $Q3 - Q1$ ) is a measure of variability commonly used for skewed data.

The IQR the difference between the point below which 25% of your data lie and the point below which 75% of your data lie i.e.  $Q3 - Q1$ .

To find the value of the quartiles, think of Q1 as the middle of the data less than or equal to the median, and of Q3 as the middle of the data greater than or equal to the median.

Use the same technique for calculating the mean to find these values.

### **Example**

Find the three quartiles and the IQR of the following data

**15 34 7 12 18 9 1 42 56 28 13 24 35**

- First sort the data set into ascending order

**1 7 9 12 13 15 18 24 28 34 35 42 56**

- Count how many items are in the data set ( answer 13 items)
- Which value is the second quartile, which is the median (answer: the 7<sup>th</sup> item, which is **18**)
- Q1 median of data less than or equal to median ( 7 items)

**1 7 9 12 13 15 18**

Answer: the 4<sup>th</sup> item, which is **12**

- Q3 median of data greater than or equal to median ( also 7 items)

**18 24 28 34 35 42 56**

Answer: the 4<sup>th</sup> item of this 7, which is **34**

The three quartiles are therefore  $Q1 = \mathbf{12}$ ,  $Q2 = \mathbf{18}$ ,  $Q3 = \mathbf{34}$

The interquartile range is therefore  $Q3 - Q1 = \mathbf{22}$

## **Boxplot**

A graphical representation of the quartiles is called a Box plot (Figure 1.3).

It displays

- (a) lower quartile
- (b) median
- (c ) upper quartile
- (d) interquartile range (IQR)
- (e) whiskers of length = 1.5 IQR
- (f) outlying observations



