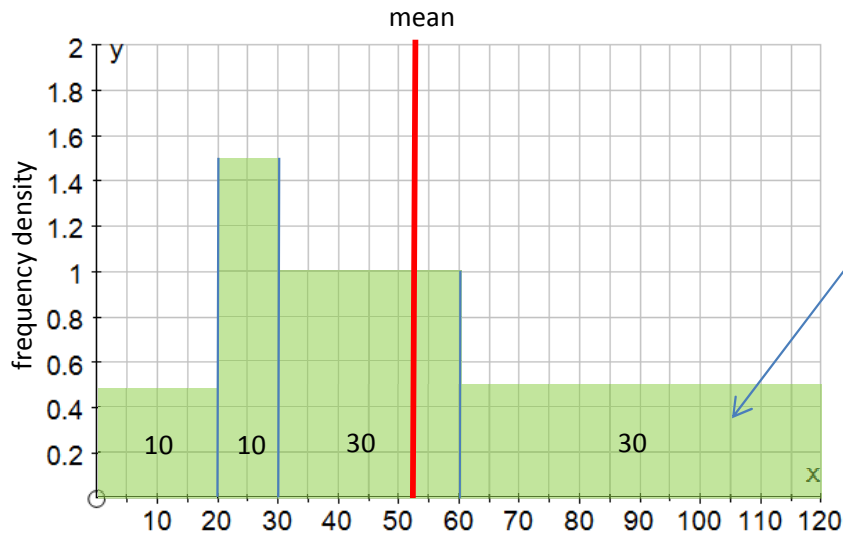# Cumulative frequency graphs

A cumulative frequency graph gives an additional statistical perspective on data presented in a *frequency table.* The cumulative frequency graph enables estimates to be made for the *median* and *upper and lower quartiles.* Combined with the data range and the *mean estimate*, these parameters can be used to construct a **box and whisker** plot. This is often a very useful summary of the key features of the data *distribution* revealed by a *histogram*.

Variable range	Frequency	Cumulative frequency	Cumulative frequency %
$x < 20$	10	10	12
$x < 30$	15	25	29
$x < 60$	30	55	65
$x < 120$	30	85	100

The cumulative frequency is the number of data values *that are less than a particular value*

The **Lower Quartile (LQ)** corresponds to a cumulative frequency of **25%** of the total frequency.

The **Median** corresponds to **50%**

The **Upper Quartile (UQ)** corresponds to **75%**

The **Inter-Quartile-Range** is the **UQ - LQ**

Histogram of the data in the table above. The mean estimate is 53.24
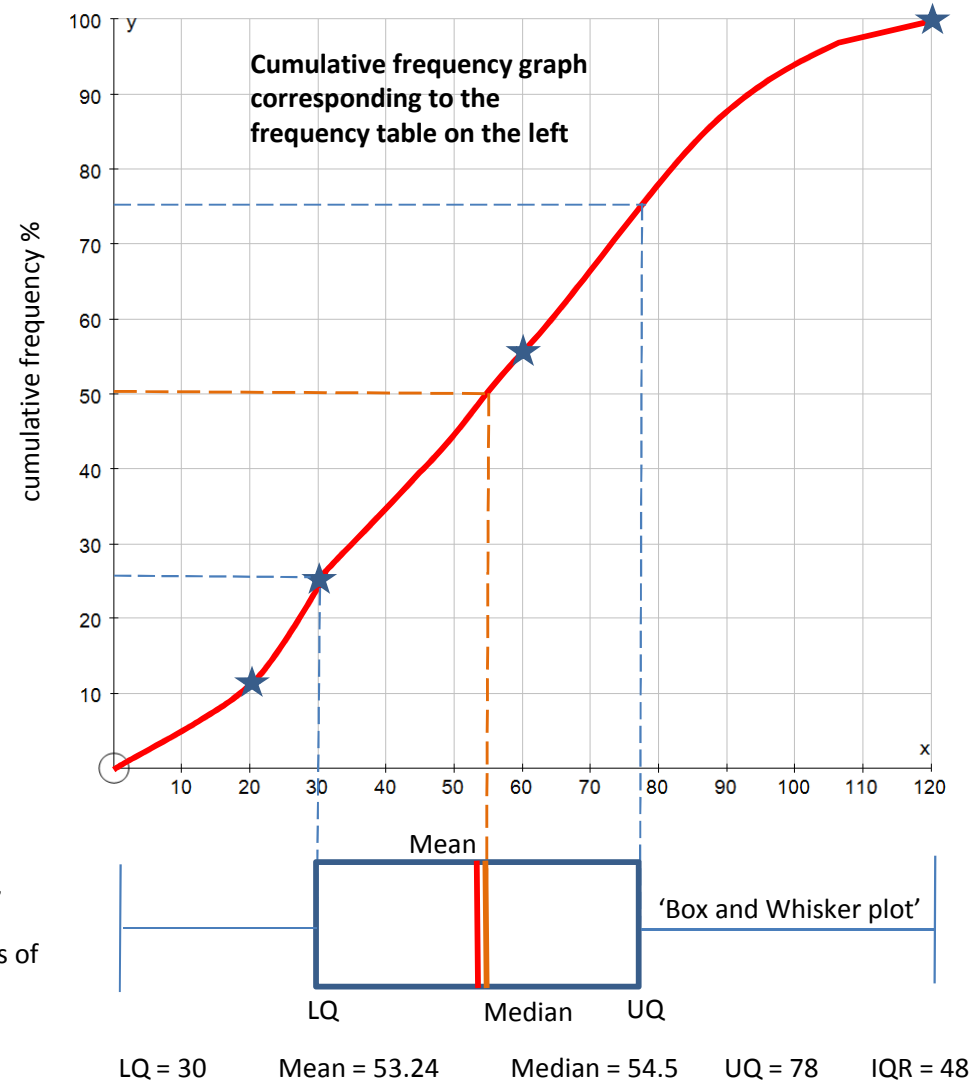

Total area of bars is the total frequency i.e. 85

Areas of each bar are given, which correspond to the frequency of measurements of the quantity x in the range associated with each bar.

Cumulative frequency graph corresponding to the frequency table on the left

'Box and Whisker plot'

LQ = 30   Mean = 53.24   Median = 54.5   UQ = 78   IQR = 48

A high IQR implies a high degree of spread in the data. A significant difference between mean and median gives clues to the symmetry of the distribution, and can be a useful guide interpreting the histogram.