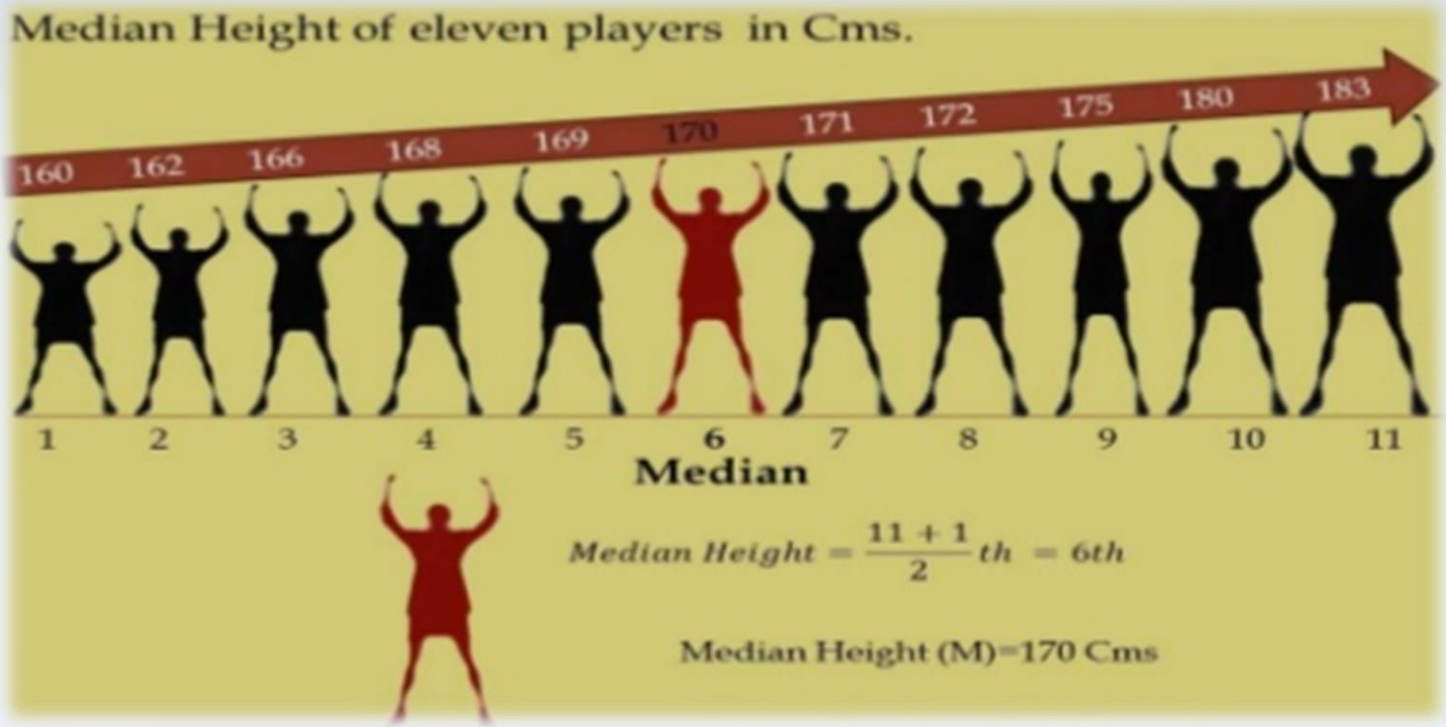
Positional Measures

- “Median is that value of the variable which divides the group into two equal parts, one part comprising all values greater and the other all values less than median”.

- “Median of a series is the value of the item actual or estimated when a series is arranged in order of magnitude which divides the distribution into two parts.” —Horace Secrist



Median is a value which divides the series into two equal parts.

It is position which is exactly in the centre, equal number of terms lie on either side of it, when terms are arranged in ascending or descending order.

Calculation of Median:

A. Individual Series:

To find the value of Median, in this case, the terms are arranged in ascending or descending order first; and then the middle term taken is called Median.

Two cases arise in individual type of series:

(a) When number of terms is odd:

The terms are arranged in ascending or descending order and then are taken as Median.

- **Example 1. Find Median from following data:**

17	19	21	13	16	18	24	22	20

Solution

Arranging the terms in ascending order

13	16	17	18	19	20	21	22	24

N = Total number of terms = 9

Now = N+1/2 = 9+1 /2 = 2

Median = 5th term = 19.

- **(b) When number of terms is even:**

In this case also, the terms are arranged in, order and then mean of two middle terms is taken as Median.

Example 2. From the following figures of ages of some students, calculate the median age:

Age in years :	18	16	14	11	13	10	9	20

Solution

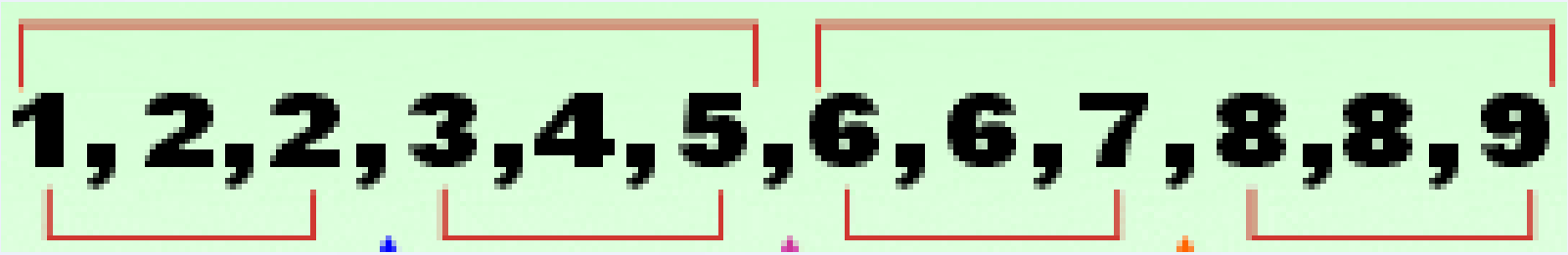
Age of years	9	10	11	13	14	16	18	20

$\therefore$ Median Age $= \text{size of } \left(\frac{8+1}{2}\right)\text{th item} = \text{Size of } 4.5^{\text{th}} \text{ item}$

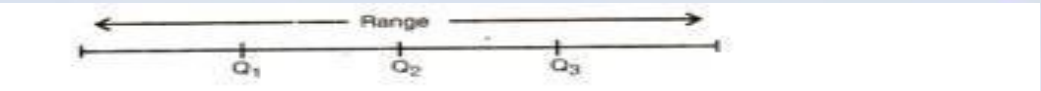
$= \frac{\text{4th term} + \text{5th term}}{2} = \frac{13+14}{2} = \frac{27}{2} = 13.5 \text{ years.}$

Other Positional Measures (Quartile):

Positional Measures are also known as Partition Values. Median is also such value which divides the given series in two equal parts. Similarly Quartiles divide the series in four equal parts. Deciles in ten equal parts and percentiles in 100 equal parts. These measures are known as Depending Measures on Median.



Quartiles:



Quartiles divide a series in four equal parts. For any series, there are three quartiles.

Method of Calculation:

Method to calculate any Quartile, Decile or Percentile is the same as that of Median; But only difference that is there, belongs to the divisor. To find the required value, in Median, the divisor is 2 as median divides the distribution in two equal parts. Thus the divisor is 10 and 100 in case of Deciles and Percentiles as they divide the distribution in 10 and 100 equal parts respectively.

Similarly the divisor is 4 in case of Quartiles; and in all these cases we multiply such result by a digit; whose value we have to find according to the given problem

Example 1. Determine median Q_1, Q_3, from the following :
Marks in Statistics : 31, 29, 27, 33, 35, 41, 39, 41, 43, 45, 47.

Solution

Arranging in ascending order

27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47 ; N = 11

$$Q_1 = \frac{N+1}{4} \text{ th term} = \frac{11+1}{4} \text{ th} = 3\text{rd term} = 31$$

$$Q_3 = \frac{3(N+1)}{4} \text{th term} = \frac{3(11+1)}{4} \text{th} = 9\text{th term} = 43$$

Example 2. Find Q_1, Q_3, for the data given below.
17, 11, 18, 21, 22, 26, 24, 20, 14

Solution

Arranging in ascending order

11, 14, 17, 18, 20, 21, 22, 24, 26

$$Q_1 = \text{Size of } \frac{(9+1)}{4} \text{th term} = \text{Size of } 2.5\text{th term}$$

$$= 2\text{nd term} + .5\,(3\text{rd term} - 2\text{nd term}) = 14 + .5\,(17 - 14)$$

$$= 14 + .5 \times 3 = 14 + 1.5 = 15.5$$

$$Q_3 = \text{Size of } \frac{3\,(9+1)}{4} \text{ th term} = \text{Size of } 7.5 \text{ th term}$$

$$= 7\text{th term} + .5\,(8\text{th term} - 7\text{th term}) = 22 + .5\,(24 - 22)$$

$$= 22 + .5 \times 2 = 22 + 1 = 23$$