## Median :

Median is the value which divides the distribution into two halves. Thus median is the mid value of the distribution.

## Formula :

* When frequencies are given, by forming the cummulative frequency column, median is calculated.

(i.e): Median = Size of $\left[\frac{N+1}{2}\right]^{th}$ item

* In continuous series to determine the median we use the formula

Median = Size of $\left[\frac{N}{2}\right]^{th}$ item

* To find the exact value of the median we use the formula

(i.e) $$\text{Median} = L + \frac{\frac{N}{2} - C.f}{f} \times i$$

where $L$ = Lower limit of the median class

$C.f$ = Cummulative frequency of the class preceeding the median class.

$f$ = Frequency corresponding to median class

$i$ = Length of the median class

problems :

1) Find the median marks of 9 students:
70, 60, 75, 90, 65, 80, 42, 65, 72.

First arrange the data in ascending order.

42, 60, 65, 65, 70, 72, 75, 80, 90

Median = Size of $\left[\frac{N+1}{2}\right]^{th}$ item

$= \left[\frac{9+1}{2}\right]^{th}$ item

$= \left[\frac{10}{2}\right]^{th}$ item

$= [5]^{th}$ item

**Median = 70**

2) Calculate the median for the following data (or) distribution.

| x [Heights in cms] | 120 | 122 | 124 | 126 | 128 | 130 |
|---|---|---|---|---|---|---|
| y [No. of students] | 5 | 7 | 9 | 6 | 4 | 10 |

| x | f | C.f |
|---|---|---|
| 120 | 5 | 5 |
| 122 | 7 | 12 |
| 124 | 9 | 21 |
| 126 | 6 | 27 |
| 128 | 4 | 31 |
| 130 | 10 | (41) |

Median = Size of $\left[\frac{N+1}{2}\right]^{th}$ item

$= \left[\frac{41+1}{2}\right]^{th}$ item

$= \left[\frac{42}{2}\right]^{th}$ item

$= [21]^{th}$ item

**Median = 124**

3) (X) Calculate the median for the following data.

| x [Class interval] | 120-150 | 150-180 | 180-210 | 210-240 | 240-270 | 270-300 | 300-330 | 330-360 |
|---|---|---|---|---|---|---|---|---|
| y [Frequency] | 25 | 65 | 135 | 430 | 320 | 175 | 79 | 21 |

| C.I | Frequency | C.f |
|---|---|---|
| 120-150 | 25 | 25 |
| 150-180 | 65 | 90 |
| 180-210 | 135 | 225 |
| 210-240 | 430 | 655 |
| 240-270 | 320 | 975 |
| 270-300 | 175 | 1150 |
| 300-330 | 79 | 1229 |
| 330-360 | 21 | 1250 |

Median = Size of $\left[\frac{N}{2}\right]^{th}$ item

= Size of $\left[\frac{1250}{2}\right]^{th}$ item

= Size of $[625]^{th}$ item

**Median = 210-240**

$L = 210$ ; $N = 1250$

$C.F = 225$ ; $f = 430$ ; $i = 30$

$$\text{Median} = L + \frac{\frac{N}{2} - C.f}{f} \times i$$

$$= 210 + \frac{\frac{1250}{2} - 225}{430} \times 30$$

$$= 210 + \frac{625 - 225}{430} \times 30$$

$$= 210 + \frac{400}{430} \times 30$$

$$= 210 + 0.930 \times 30$$

$$= 210 + 27.9$$

$$= 237.9$$

**Median = 237.9**