

# STATISTICS

$$\text{mode} = 3 \text{ median} - 2 \text{ mean}$$

## Grouped

Class of Intervals	10-25	25-40	40-55	55-70	70-85	85-100
NO. of Students	2	3	7	6	6	6

### MEDIAN

Intervals	No. of students	Cummulative frequency
10-25	2	2
25-40	3	5
40-55	7	12 c
55-70	6 f	18
70-85	6	24
85-100	6	30

**Median class** : Class where c.f. is just greater or equal to  $n/2$   
 $n = 30$  ;  $n/2 = 15$   
 55-70 is median class  
 lower limit of the median class ( $\ell$ ) = 55  
 $c$  = cum frequency of median preceding class

$$\text{Median} = \ell + \frac{n/2 - c}{f} \times h = 62.5$$

### MODE

**Modal Class**: Class where frequency is maximum  
 Class size ( $h$ ) = 15  
 Max. frequency  $f_1 = 7$ , Modal class = 40-55  
 Lower limit of modal class = 40  
 $f_0 = 3$  (Previous class  $f$  value)  
 $f_2 = 6$  (next class  $f$  value)

$$\text{Mode} = \ell + \left( \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h = 40 + 4/5 \times 15 = 52$$

### MEAN

### 3 Methods

#### Direct Method

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i} = 62$$

#### Step deviation

$$\bar{x} = a + h \bar{u}$$

$$\bar{x} = a + h \left( \frac{\sum f_i u_i}{\sum f_i} \right) = 62$$

#### Assumed mean method

$$\bar{x} = a + \bar{d}$$

$$\bar{x} = a + \left( \frac{\sum f_i d_i}{\sum f_i} \right) = 62$$

Class Interval	$f_i$	$x_i$	$f_i x_i$	$d_i = x_i - a$	$u_i = \frac{x_i - a}{h}$	$f_i u_i$	$f_i d_i$
10-25	2	17.5	35	-30	-2	-4	-60
25-40	3	32.5	97.5	-15	-1	-3	-45
40-55	7	47.5	332.5	0	0	0	0
55-70	6	62.5	375	15	1	6	90
70-85	6	77.5	465	30	2	12	180
85-100	6	92.5	555	45	3	18	270
	30		1860			$\sum f_i u_i = 29$	$\sum f_i d_i = 435$

## Ungrouped

### MEAN

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$$

### MODE

The value of the observation having the max. frequency

### MEDIAN

$x_1, x_2, \dots, x_n \rightarrow$  observations  
 $f_1, f_2, \dots, f_n \rightarrow$  frequencies

Average of  $\left(\frac{n}{2} + 1\right)^{\text{th}}$  &  $\left(\frac{n}{2}\right)^{\text{th}}$  observation.

n is even

$\left(\frac{n+1}{2}\right)^{\text{th}}$  observation.

n is odd