

## 1. Calculating Mean, Median, Mode, Quartiles, Range, and Interquartile Range for Individual Data

Let's take a sample data set:

Data: 4, 7, 7, 10, 12, 13, 14, 18, 20

### Mean (Average):

$$\text{Mean} = \frac{\text{Sum of values}}{\text{Number of values}} = \frac{4 + 7 + 7 + 10 + 12 + 13 + 14 + 18 + 20}{9} = \frac{105}{9} \approx 11.7$$

### Median (Middle Value):

- Arrange the data in order (already done).
- Since there are 9 values, the **median is the 5th value: 12**

### Mode (Most Frequent):

- 7 appears twice, more than any other number → **Mode = 7**

### Quartiles:

- Q2 (Median) = 12
- Q1 = Median of lower half = median of (4, 7, 7, 10) =  $(7+7)/2 = 7$
- Q3 = Median of upper half = median of (13, 14, 18, 20) =  $(14+18)/2 = 16$

### Range:

$$\text{Range} = \text{Largest value} - \text{Smallest value} = 20 - 4 = 16$$

### Interquartile Range (IQR):

$$\text{IQR} = Q3 - Q1 = 16 - 7 = 9$$

### Purpose of Each:

- **Mean:** Best for symmetric data without outliers.
- **Median:** Better with skewed data or outliers.
- **Mode:** Useful for categorical data or finding the most frequent value.
- **Range & IQR:** Show how spread out the data is (IQR is less affected by outliers).

## 2. Estimate of the Mean for Grouped Data

Example:

Class Interval	Frequency (f)	Midpoint (x)
0 – 10	3	5
10 – 20	5	15
20 – 30	7	25
30 – 40	5	35

**Step 1: Multiply  $f \times x$**

$$3 \times 5 = 15, 5 \times 15 = 75, 7 \times 25 = 175, 5 \times 35 = 175$$

**Step 2: Total  $f = 3+5+7+5 = 20$**

**Step 3: Total  $fx = 15+75+175+175 = 440$**

**Estimated Mean = Total  $fx$  / Total  $f$**

$$\text{Estimated Mean} = \frac{440}{20} = 22$$

## 3. Identifying the Modal Class from Grouped Data

The **modal class** is the class interval with the **highest frequency**.

Using the table above:

- Frequencies: 3, 5, 7, 5
- Highest frequency = 7 → **Modal class = 20 – 30**