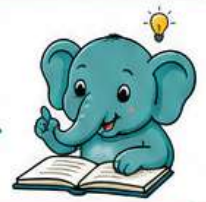


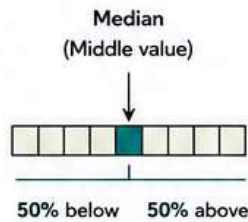
MEDIAN



1 CHAPTER SNAPSHOT

Median is the **middle value** of the data when observations are arranged in ascending or descending order.

It divides the data into **two equal parts** – 50% observations below it and 50% above it.



Relationship between Mean, Median & Mode

$$\text{Mode} = 3 \text{ Median} - 2 \text{ Mean}$$

2 HIGH-YIELD CONCEPTS

- ★ Median is suitable for **skewed data** and is **not affected** by extreme values.
- ★ For ungrouped data, if the number of observations is **odd**, median is the middle term. If **even**, median is the average of two middle terms.
- ★ For grouped data, the median lies in the **median class**.
- ★ Cumulative frequency helps locate the position of the median.
- ★ Median is a **positional average**.

3 FORMULA BANK

A. Ungrouped Frequency Distribution

Steps:

1. Arrange data in ascending/descending order.

2. Find total frequency (N).

3. If N is odd:

$$\text{Median} = \frac{N+1}{2}^{\text{th}} \text{ term}$$

4. If N is even:

Median = average of

$$\left(\frac{N}{2}\right)^{\text{th}} \text{ and } \left(\frac{N}{2} + 1\right)^{\text{th}} \text{ terms}$$

(N = total frequency)

B. Grouped Frequency Distribution

$$\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h$$

where,

l = lower limit of median class after converting to continuous class boundaries

cf = cumulative frequency of class preceding median class

f = frequency of median class

h = class width

n = total frequency

C. Cumulative Frequency Distribution

Steps:

1. Find total frequency (n).

2. Find $\frac{n}{2}$ th term.

3. Locate the cumulative frequency just greater than or equal to $\frac{n}{2}$.

4. The corresponding value is the median.

Types:

- Less than type ($< x$)
- More than type ($\geq x$)

4 BOARD EXAM FOCUS & HOTSPOTS

Expect Questions On:

- ✓ Finding median of ungrouped data.
- ✓ Finding median of grouped data.
- ✓ Constructing cumulative frequency tables.
- ✓ Identifying median class.
- ✓ Application based problems.

Typical Question Types:

- ◆ Find the median of given ungrouped data.
- ◆ Find the median of grouped frequency distribution.
- ◆ Construct less than / more than cumulative frequency table.

Example (Hotspot)

Find the median of the following data:

Marks	30	35	60	92	85	75
No. of students	1	4	6	2	10	7

Solution:

- ◆ Total frequency, $N = 1 + 4 + 6 + 2 + 10 + 7 = 30$
- ◆ Since N is even, median = average of $(N/2)^{\text{th}}$ and $(N/2 + 1)^{\text{th}}$ terms = average of 15^{th} and 16^{th} terms
- ◆ Cumulative frequency:

Marks	30	35	60	75	85	92
Cumulative frequency	1	5	11	18	28	30

15^{th} and 16^{th} terms lie in the marks 75.

∴ Median = 75

5 SMART REVISION TIPS

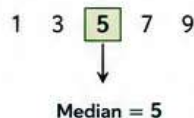
- 💡 Always arrange data before finding median.
- 💡 For even N , don't forget to take average of two middle terms.
- 💡 In grouped data, correctly identify the median class using $\frac{n}{2}$.
- 💡 Convert class intervals to continuous form before applying the formula.
- 💡 Use cumulative frequency tables carefully.
- 💡 Practice both ungrouped and grouped data problems.

6 COMMON MISTAKES

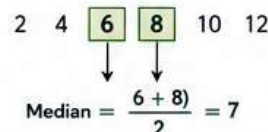
- ✗ Forgetting to arrange data in order.
- ✗ Taking only the middle term when N is even.
- ✗ Incorrectly constructing cumulative frequency table.
- ✗ Choosing wrong median class.
- ✗ Wrong substitution in the formula.
- ✗ Not converting class intervals to continuous form.

7 VISUAL MEMORY AID

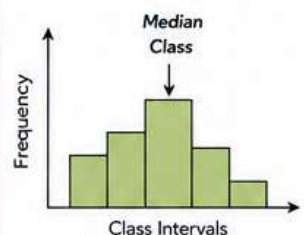
Ungrouped Data (Odd N)



Ungrouped Data (Even N)



Grouped Data



Median class is the class interval containing the $\frac{n}{2}$ th term.

8 30-SECOND RAPID REVISION

➤ Ungrouped (Odd N): Median = $\frac{N+1}{2}$ th term

➤ Ungrouped (Even N): Median = average of $(\frac{N}{2})^{\text{th}}$ and $(\frac{N}{2} + 1)^{\text{th}}$ terms

➤ Grouped Data: Median = $l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h$

➤ Median = middle value → divides data into two equal halves.

➤ Use cumulative frequency to locate median.



★ Key Takeaway: Median gives the true middle and is reliable for all types of data!