Class 10 Maths Chapter 13 Statistics Notes

Class 10 Maths Chapter 13 Statistics Notes are helpful for quick revision and exam preparation. These notes cover key topics like mean, median, mode of grouped data, cumulative frequency, and ogive (cumulative frequency curve). Students can use them to understand the concepts clearly, learn the important formulas, and prepare confidently for school and board exams. A free PDF download is also available for easy offline practice.

Important Topics Covered in the Chapter

The chapter covers mean (direct method, assumed mean method, step-deviation method), median of grouped data, mode of grouped data, cumulative frequency distribution, and the ogive curve. All of these revolve around the same frequency distribution table, so learning to read and build that table correctly is the most important skill in the chapter.

Key Terms to Remember

- Statistics: The study of collecting, presenting, and interpreting numerical data.
- Frequency Distribution: A table that shows how often each value or range of values appears in a dataset.
- Class Interval: A range of values grouped together in the table, such as 10 - 20 or 20 - 30. Each interval has a lower boundary and an upper boundary.
- Class Mark: The midpoint of a class interval. It is calculated as: Class mark = (Lower limit + Upper limit) / 2. For the class 10 - 20, the class mark is 15.
- Cumulative Frequency: The running total of frequencies up to and including a particular class interval. It is used to find the median and to draw the ogive curve.

Important Formulas from Statistics

1. Mean Formula (Direct Method)

Mean ($\bar{x}$) = $\Sigma f_i x_i / \Sigma f_i$

where f_i = frequency of each class, and x_i = class mark of each class.

2. Assumed Mean Method Formula

Mean ($\bar{x}$) = $a + (\Sigma f_i d_i / \Sigma f_i)$

where a = assumed mean, and $d_i = x_i - a$ (deviation of class mark from assumed mean).

3. Step-Deviation Method Formula

Mean ($\bar{x}$) = a + ($\Sigma f_i u_i$ / Σf_i) × h

where u_i = (x_i − a) / h, h = class width, and a = assumed mean.

4. Median Formula

Median = l + [(n/2 − cf) / f] × h

where l = lower boundary of the median class, n = total frequency, cf = cumulative frequency of the class before the median class, f = frequency of the median class, h = class width.

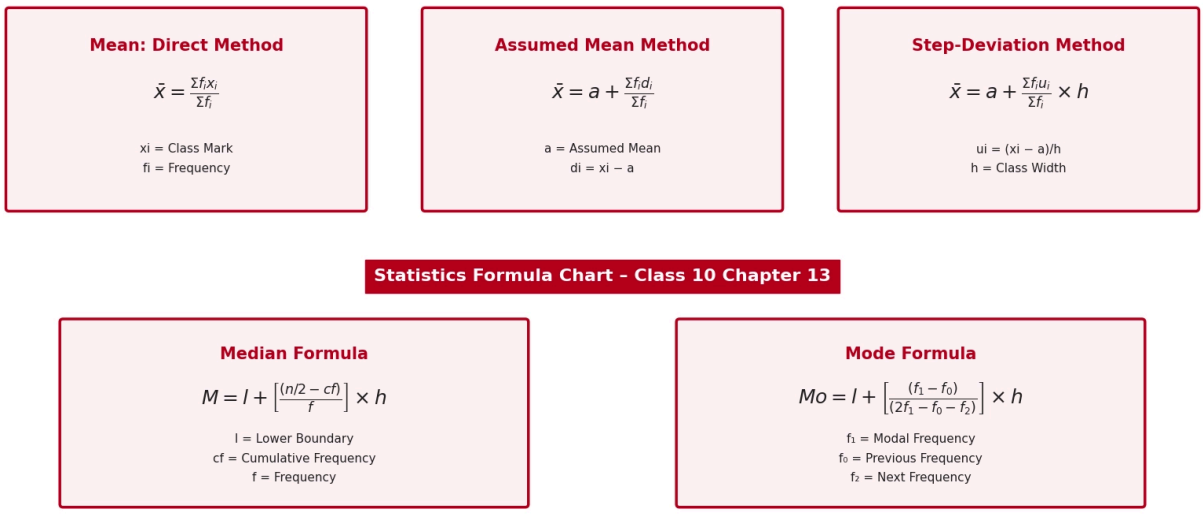
5. Mode Formula

Mode = l + [(f_1 − f_0) / (2f_1 − f_0 − f_2)] × h

where l = lower boundary of the modal class, f_1 = frequency of modal class, f_0 = frequency of the class before modal class, f_2 = frequency of the class after modal class, h = class width.

Statistics Formula Chart

The diagram below shows all five formulas together so you can revise them at a glance.



Mean Revision Notes

Direct Method

List the class marks (x_i), multiply each by its frequency (f_i), add all products, and divide by the total frequency. This method works well when the numbers are small and easy to multiply.

Assumed Mean Method

Pick a convenient middle value as the assumed mean (a). Find the deviation $d_i = x_i - a$ for each class. Multiply d_i by f_i, sum them up, divide by Σf_i, and add a. This method reduces the size of the numbers you work with.

Step-Deviation Method

This is the fastest method when all class widths are equal. Divide each deviation d_i by the class width h to get u_i. Use the formula $\bar{x} = a + (\Sigma f_i u_i / \Sigma f_i) \times h$. In CBSE exams, equal class widths are the norm, so this method saves the most time.

Median Revision Notes

Median of Grouped Data

The median is the middle value of the dataset. For grouped data, you first build a cumulative frequency column, find n/2 (half the total frequency), then identify which class that value falls in. That class is called the median class.

Steps:

1. Build the cumulative frequency (cf) column.
2. Find n/2.
3. Locate the first cf value that is ≥ n/2 that row is the median class.
4. Read off l, cf (of the class before), f, and h.
5. Apply the formula: Median = $l + [(n/2 - cf) / f] \times h$

Always use the cumulative frequency of the class before the median class, not the median class itself. The lower boundary l is the exact lower limit of the median class (not the class mark). A small table drawn in rough work saves errors.

Mode Revision Notes

Mode of Grouped Data

The mode is the value that appears most often. In grouped data, the modal class is simply the class with the highest frequency. You do not need to build a cumulative frequency table for mode.

Mode = $l + [(f_1 - f_0) / (2f_1 - f_0 - f_2)] \times h$

If two classes have the same highest frequency, this formula cannot be applied directly the question will usually make this situation clear. The modal class is identified by the highest frequency, not the highest class mark. Never confuse f_0 and f_2 — f_0 is always the class before the modal class, and f_2 is always the class after.

Cumulative Frequency Distribution Revision Notes

Construction of Cumulative Frequency Table

Start with the frequency column. For the first row, the cumulative frequency equals the frequency. For every row after that, add the current frequency to the previous cumulative frequency. The last cumulative frequency must equal n (total frequency) use this as a self-check.

Class	Frequency	Cumulative Frequency
0 − 10	5	5
10 − 20	8	13
20 − 30	12	25
30 − 40	10	35
40 − 50	5	40

Here n = 40. The median class is found at n/2 = 20, which first appears in the 20 − 30 row (cf = 25 ≥ 20).

Importance in Statistics

Cumulative frequency is essential for finding the median and for plotting the ogive (cumulative frequency curve). Without this column, neither calculation can proceed.

Graphical Representation of Data

Histogram

A histogram is a bar chart for grouped data. Each bar covers one class interval on the x-axis, and its height equals the frequency of that class. Bars have no gaps between them, unlike a regular bar chart. In CBSE Class 10, histograms are used as a visual check on the data but are not directly tested as a calculation.

Frequency Polygon

A frequency polygon is drawn by connecting the midpoints (class marks) of the tops of each histogram bar with straight lines. It gives a quick picture of how frequency changes across classes.

Ogive Curve

The ogive (pronounced oh-jive) is a smooth curve drawn by plotting cumulative frequency against the upper boundary of each class. It is used to estimate the median graphically: draw a horizontal line from n/2 on the y-axis to the ogive, then drop a vertical line to the x-axis the value on the x-axis is the median. CBSE exams sometimes ask you to draw or read off the median from an ogive.

Difference Between Mean, Median and Mode

Mean vs Median vs Mode

Property	Mean	Median	Mode
Definition	Average of all values	Middle value	Most frequent value
Outlier effect	Yes, highly affected	Not affected	Not affected
Needs cf table?	No	Yes	No
Best used for	Balanced datasets	Skewed data	Most common item
CBSE formula	3 methods	1 formula	1 formula

Use the mean when the data is evenly spread and there are no extreme values that would pull the average up or down. Use the median when the data is skewed — for example, income data where a few very high earners would distort the mean. Use the mode when you need the most popular or most common value — for example, the most popular shoe size in a batch.

Solved Examples for Quick Revision

1. Question: Find the mean using the step deviation method.

Class	Frequency (f_i)	Class mark (x_i)
0 − 10	5	5
10 − 20	8	15
20 − 30	15	25
30 − 40	12	35
40 − 50	10	45

Solution: Take a = 25, h = 10.

x_i	f_i	$u_i = (x_i - 25)/10$	f_iu_i
5	5	−2	−10
15	8	−1	−8
25	15	0	0
35	12	1	12
45	10	2	20
Total	50	14	

Mean = 25 + (14/50) × 10 = 25 + 2.8 = 27.8

2. Question: Find the median for the same data above.

Solution: n = 50, so n/2 = 25.

Cumulative frequencies: 5, 13, 28, 40, 50. The cf first reaches or exceeds 25 at the 20 − 30 class (cf = 28). So the median class is 20–30.

l = 20, cf = 13, f = 15, h = 10

Median = 20 + [(25 − 13) / 15] × 10 = 20 + (12/15) × 10 = 20 + 8 = 28

3. Question: Find the mode for the same data.

Solution: The class 20 − 30 has the highest frequency (f_1 = 15). So l = 20, f_0 = 8, f_2 = 12, h = 10.

Mode = 20 + [(15 − 8) / (2×15 − 8 − 12)] × 10 = 20 + [7 / 10] × 10 = 20 + 7 = 27

Common Mistakes in Statistics

Errors in Class Mark Calculation

Students sometimes use the lower limit instead of the midpoint as the class mark. Always compute (lower + upper) / 2. For the class 20–30, the class mark is 25, not 20.

Incorrect Frequency Totals

If Σf_i is wrong, every formula gives a wrong answer. Always cross-check: the last cumulative frequency must equal the sum of all frequencies. If they differ, recheck your addition before proceeding.

Mistakes in Median Formula Application

The most common error is using cf of the median class itself instead of the class before it. In the formula M = l + [(n/2 − cf) / f] × h, cf refers to the cumulative frequency of the class just before the median class. Label this clearly in rough work to avoid the mix-up.

Errors in Mode Calculation

Students occasionally swap f_0 and f_2. Remember: f_0 is always the frequency of the class that comes before the modal class, and f_2 is always the frequency of the class that comes after. Getting these reversed changes the answer completely.