



ChapterNotes

chaptersnotes.in · free NEET & JEE prep

CHAPTER NOTES

Statistics Class 10 Notes | CBSE Maths Chapter 13

- ✓ Chapter-wise notes & important questions
- ✓ Free gamified practice app — streaks
- ✓ Free mock & prediction papers with answers

Source: <https://chaptersnotes.in/cbse/class-10-maths>



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Explain Statistics simply

What can the board exam ask?

Most important formulas

Quiz me on this chapter

Ask Ira anything...



Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

Statistics Class 10 Notes | CBSE Maths

Chapter 13

Statistics is Chapter 13 of CBSE Class 10 Maths. In Class 9 you found the mean, median and mode of ungrouped data. This chapter extends all three measures of central tendency to grouped data, where observations are packed into class intervals such as 10 - 25 or 140 - 145. It covers class marks, the direct, assumed mean and step-deviation methods for the mean, the modal class and the mode formula, cumulative frequency tables of the less than and more than type, the median class and the median formula, and the empirical relation between the three measures.

For board exams the chapter is almost entirely calculation. Every question follows a fixed routine: build a table, pick the right class, substitute into a formula and interpret the answer. Marks are lost on small slips such as a wrong class mark, the wrong cumulative frequency, or forgetting to make classes continuous. Once the table is built, the rest is calculation. Pick and reliable to score.

Quick Answer - Statistics in 30 Seconds

For grouped data, each class is represented by its class mark (midpoint). The **mean** is $\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$ (direct method) or $\bar{x} = \frac{\sum f_i u_i}{\sum f_i}$ (step-deviation method). The **mode** lies in the modal class. The **median** lies in the class where the cumulative frequency exceeds $n/2$: Median = $l + \frac{(n/2 - cf)}{f} \times h$. Make classes continuous before using the median formula.



Ira

Your teacher for Statistics



Hi, I am [Ira](#). I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

All Key Formulas at a Glance

Measure	Formula	Symbols
Class mark	(Upper class limit + Lower class limit)/2	Mid-point that represents the class
Mean, direct method	$\bar{x} = \sum f_i x_i / \sum f_i$	x_i = class mark, f_i = frequency
Mean, assumed mean method	$\bar{x} = a + \sum f_i d_i / \sum f_i$	a = assumed mean, $d_i = x_i - a$
Mean, step-deviation method	$\bar{x} = a + h \times (\sum f_i u_i / \sum f_i)$	$u_i = (x_i - a)/h$, h = class size
Mode	$l + [(f_1 - f_0) / (2f_1 - f_2)] \times h$	
Median class	First class with cumulative frequency greater than $n/2$	
Median	$l + [(n/2 - cf) / f] \times h$	
Empirical relation	$3 \text{ Median} = \text{Mode} + \text{Mean}$	



Ira
Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.
Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Key Concepts

1. Grouped Data and the Class Mark

Real surveys are large, so the data is condensed - 55. This is **grouped data**. The individual

To do any calculation, each class needs one value to stand for all the observations in it. NCERT makes one assumption: **the frequency of each class is centred around its mid-point**. This mid-point is called the **class mark**.

Class mark = (Upper class limit + Lower class limit) / 2

- Class 10 - 25: class mark = $(10 + 25)/2 = 17.5$
- Class 150 - 250: class mark = $(150 + 250)/2 = 200$

Boundary convention: an observation equal to an upper class limit is counted in the next class. In NCERT's marks example, the 4 students who scored exactly 40 go in 40 - 55, not in 25 - 40. So in a class written as 25 - 40, the value 25 is included and 40 is excluded.

Class size (h) is the difference between the upper and lower limits of a class. For 10 - 25 it is 15.

2. Mean of Grouped Data: the Direct Method

The mean is the sum of all observations divided by the number of observations. If observations occur with frequencies $f_1, f_2, \dots, f_n$, then the number of observations is $f_1 + f_2 + \dots + f_n$.

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

For grouped data, x_i is the class mark of the class.

NCERT illustration. Marks of 30 students



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

Class interval	f_i	x_i	$f_i x_i$
10 - 25	2	17.5	35.0
25 - 40	3	32.5	97.5
40 - 55	7	47.5	332.5
55 - 70	6	62.5	375.0
70 - 85	6	77.5	465.0
85 - 100	6	92.5	555.0
Total	30		1860.0

$$\bar{x} = 1860/30 = 62.$$

Why the answer differs from the ungrouped
a mean of $1779/30 = 59.3$. The grouped method
assumption: 59.3 is the exact mean and 62 is the

3. Assumed Mean and Step-deviation Method

When x_i and f_i are large, the products $f_i x_i$ become very large, but each x_i can be made smaller by subtracting a constant a from each x_i .

Assumed Mean Method.

1. Choose one class mark as the **assumed mean** a . This keeps the numbers small.
2. Find the deviation $d_i = x_i - a$ for every class.
3. Find $f_i d_i$ and add them to get $\sum f_i d_i$.
4. Use $\bar{x} = a + \frac{\sum f_i d_i}{\sum f_i}$.

Why it works. The mean of the deviations from a is $\bar{d}$.
 $\bar{x} = a + \bar{d}$.

For the marks data with $a = 47.5$: $d_i = -30, -15, 0, 15, 30$,
 $\sum f_i d_i = 435$, so $\bar{x} = 47.5 + 435/30 = 47.5 + 14.5 = 62$, the same as the direct method.



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

The value of the mean does not depend on the choice of a. NCERT Activity 1 asks you to take each class mark 17.5, 32.5, ... as a in turn; every choice gives 62.

Step-deviation Method. In the table above every d_i is a multiple of 15, the class size. Divide each deviation by h :

$$u_i = (x_i - a) / h, \text{ and then } \bar{x} = a + h \times (\Sigma f_i u_i / \Sigma f_i)$$

This follows because $\bar{u} = (\bar{x} - a)/h$, so $\bar{x} = a + h\bar{u}$. For the marks data, $u_i = -2, -1, 0, 1, 2, 3$ and $f_i u_i = -4, -3, 0, 6, 12, 18$. $\Sigma f_i u_i = 29$, so $\bar{x} = 47.5 + 15 \times 29/30 = 47.5 + 14.5 = \mathbf{62}$.

Choosing a method (NCERT). All three methods give the same mean, and the two shortcuts are simplified forms of the direct method. Use the direct method when x_i and f_i are small, and the assumed mean or step-deviation method when they are large. Step-deviation is convenient when all the d_i have a common factor. With unequal class sizes, take h as a suitable divisor of all the d_i .

NCERT Example 3 shows the last point. With 5 classes. With $a = 200$ and $h = 20$, the class size is allowed. $\Sigma f_i u_i = -106$ and the mean is 200 - 10.6 = 189.4.

4. Mode of Grouped Data

The **mode** is the observation that occurs with the highest frequency. For ungrouped data you read it off. For example, a bowler's wickets in 10 matches are 2, 6, 4, 2, 1, 5, 3, 2, 7, 2, than any other, so the mode is 2.

If more than one value has the same maximum frequency, the data is **multimodal**. This chapter deals only with problems that have a single mode.

For grouped data you cannot see the most frequent observation. This class is the **modal class**.

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

Here l = lower limit of the modal class, h = class size of the modal class, f_0 = frequency of the class preceding the modal class, f_1 = frequency of the modal class, f_2 = frequency of the class succeeding the modal class.



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

NCERT Example 5. Family sizes of 20 households: 1 - 3 (7), 3 - 5 (8), 5 - 7 (2), 7 - 9 (2), 9 - 11 (1). The highest frequency is 8, so the modal class is 3 - 5, with $l = 3$, $h = 2$, $f_1 = 8$, $f_0 = 7$, $f_2 = 2$.

$$\text{Mode} = 3 + [(8 - 7)/(16 - 7 - 2)] \times 2 = 3 + 2/7 = \mathbf{3.286}.$$

How to read the formula. The mode is pulled towards the neighbouring class with the larger frequency. Here $f_0 = 7$ is much larger than $f_2 = 2$, so the mode sits near the lower end of 3 - 5. When $f_0 = f_2$, the fraction becomes $1/2$ and the mode is exactly the class mark of the modal class.

Comparing mode and mean (NCERT Example 6). For the 30 students' marks, the modal class is 40 - 55 with $f_1 = 7$, $f_0 = 3$, $f_2 = 6$. $\text{Mode} = 40 + [(7 - 3)/(14 - 6 - 3)] \times 15 = 40 + (4/5) \times 15 = \mathbf{52}$. The mean was 62. So the maximum number of students obtained 52 marks, while on average a student obtained 62 marks. The mode may be less than, equal to, or more than the mean depending on the data.

The chapter uses this formula only for equ

5. Cumulative Frequency Distribut

The **cumulative frequency** of a class is the sum of the frequencies of all the classes preceding the given class to th

NCERT uses the marks of 53 students (ou frequencies 5, 3, 4, 3, 3, 4, 7, 9, 7, 8.



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

Less than type	Cumulative frequency	More than or equal to type	Cumulative frequency
Less than 10	5	≥ 0	53
Less than 20	8	≥ 10	48
Less than 30	12	≥ 20	45
Less than 40	15	≥ 30	41
Less than 50	18	≥ 40	38
Less than 60	22	≥ 50	35
Less than 70	29	≥ 60	31
Less than 80	38		
Less than 90	45		
Less than 100	53		



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

- In the **less than type**, the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 column keeps growing and ends at n.
- In the **more than type**, the numbers 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 column starts at n and keeps falling.
- A table with only the class column and frequency column is called a **frequency table**.

Going backwards. To recover class frequencies from cumulative frequencies. In NCERT Example 4, less than 140 (4), less than 145 (11), less than 150 (29), less than 155 (46), less than 160 (51). The frequencies are: below 140: 4; 140 - 145: 11 - 4 = 7; 145 - 150: 29 - 11 = 18; 150 - 155: 46 - 29 = 17; 155 - 160: 51 - 46 = 5; 160 - 165: 53 - 51 = 2.

6. Median of Grouped Data

The **median** is the middle-most observation in the ascending order. If n is odd, the median is the $((n + 1)/2)^{\text{th}}$ observation. If n is even, it is the

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

average of the $(n/2)^{\text{th}}$ and $(n/2 + 1)^{\text{th}}$ observations.

Ungrouped with frequencies (NCERT). Marks of 100 students: 20 (6), 25 (20), 28 (24), 29 (28), 33 (15), 38 (4), 42 (2), 43 (1). The cumulative frequencies are 6, 26, 50, 78, 93, 97, 99, 100. Since $n = 100$ is even, the median is the average of the 50^{th} and 51^{st} observations. These are 28 and 29, so Median = $(28 + 29)/2 = 28.5$.

Grouped data. The middle observation now lies somewhere inside a class, so we find the class first and then a value inside it.

1. Find $n = \sum f_i$ and $n/2$.
2. Write the cumulative frequency column.
3. The **median class** is the class whose cumulative frequency is greater than (and nearest to) $n/2$.
4. Apply **Median** = $l + [(n/2 - cf) / f] \times h$.

Here l = lower limit of the median class, n = total frequency, cf = cumulative frequency of the class **preceding** the median class, f = frequency of the median class (all classes equal).

NCERT illustration. For the 53 students above 26.5 at 29, in the class 60 - 70. So

Median = $60 + [(26.5 - 22)/7] \times 10 = 60 + 6.4$ and the other half scored more.

The idea behind the formula. Up to the lower limit, we need $n/2 - cf$ more observations from inside the class. If these are spread evenly over a width h , so the median is

The median of grouped data with unequal class intervals does not discuss it.

7. Continuous Classes

The mode and median formulas assume continuity. The mode equals the lower limit of the next. NCERT's method for mode and median of grouped data, the class interval is applied.



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

Some data comes in classes with gaps, such as 118 - 126, 127 - 135, 136 - 144. The gap is $127 - 126 = 1$. Subtract half the gap (0.5) from every lower limit and add 0.5 to every upper limit.

The classes become 117.5 - 126.5, 126.5 - 135.5, ..., 171.5 - 180.5, exactly as the NCERT hint for Exercise 13.3 Question 4 says. The class size is now 9, and the class marks are unchanged (122, 131, ...). For the **mean**, only class marks are needed, so conversion makes no difference there. For the mode and median, l and h come from the converted classes.

8. Choosing a Measure and the Empirical Relation

Measure	Best used when	NCERT examples
Mean	All observations matter and you want to compare distributions. It uses every observation and lies between the smallest and largest values.	Comparing average results of different schools in one examination
Median	Individual observations are important. You want a "typical" value, and extreme values are present	
Mode	You want the most frequent value, or the most popular item	

Weakness of the mean. Extreme values affect the mean. For example, if one student has 100 marks and the five others have 20, 25, 20, 21 and 22, the mean is 40.5, which is not a typical mark.

Mean or mode for marks. If you want the average mark, use the mean. If you want the marks obtained by most students, use the mode.

Empirical relationship:

3 Median = Mode + 2 Mean

It is an observed (empirical) relation and gives a rough idea. It asks for one measure from the other two. Rearranging, $\text{Median} = (\text{Mode} + 2 \text{ Mean}) / 3$, $\text{Mode} = 3 \text{ Median} - 2 \text{ Mean}$, $\text{Mean} = (3 \text{ Median} - \text{Mode}) / 2$, $\text{Median} = (\text{Mode} + 2 \text{ Mean}) / 3$.

Example: if the median is 26 and the mean is 27, then $\text{Mode} = 3 \times 26 - 2 \times 27 = 78 - 54 = 24$.



Ira
Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed
AI generated, can make mistakes. Cross-check with NCERT.

Formula and Theorem Sheet

Result	Formula	When to use
Class mark	$(\text{Upper limit} + \text{Lower limit})/2$	Every mean calculation on grouped data
Direct method	$\bar{x} = \sum f_i x_i / \sum f_i$	Small x_i and f_i
Assumed mean method	$\bar{x} = a + \sum f_i d_i / \sum f_i, d_i = x_i - a$	Large x_i
Step-deviation method	$\bar{x} = a + h(\sum f_i u_i / \sum f_i), u_i = (x_i - a)/h$	Large x_i with a common factor in all d_i
Mode	$l + [(f_1 - f_0)/(2f_1 - f_0)]h$	
Median	$l + [(n/2 - cf)/f]h$	
Empirical relation	$3 \text{ Median} = \text{Mode} + 2 \text{ Mean}$	



Ira
Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Important Definitions

- **Grouped data:** data condensed into class intervals.
- **Class mark (mid-point):** the average of the upper and lower limits of observations in that class.
- **Mode:** the value among the observations which occurs with maximum frequency.
- **Modal class:** the class with the maximum frequency.
- **Median:** the value of the middle-most observation in the ordered data.
- **Cumulative frequency:** the frequency of the observations up to the given class.

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

- **Cumulative frequency distribution of the less than type:** a table giving the number of observations less than each upper class limit.
- **Cumulative frequency distribution of the more than type:** a table giving the number of observations greater than or equal to each lower class limit.
- **Median class:** the class whose cumulative frequency is greater than and nearest to $n/2$.

Solved Examples (NCERT-Based)

Example 1: Plants in 20 houses (NCERT Exercise 13.1, Q1)

Question: A survey was conducted by a group of students as a part of their environment awareness programme, in which they collected the following data regarding the number of plants in 20 houses in a locality. Find the mean number of plants per house. Number of plants: 0 - 2, 2 - 4, 4 - 6, 6 - 8, 8 - 10, 10 - 12, 12 - 14; number of houses: 1, 2, 1, 5, 3, 2, 3. Which method did you use for finding the mean, and why?

Class marks: 1, 3, 5, 7, 9, 11, 13. $f_i x_i = 1, 6, 5, 35, 27, 26, 39$

$\bar{x} = 162/20 = \mathbf{8.1 \text{ plants per house}}$. The direct method is used as the frequencies are small.

Example 2: Daily wages of 50 workers

Question: Consider the following distribution of daily wages (in ₹) of 50 workers in a factory. Find the mean daily wages of the workers in the factory by using an appropriate method.

The class marks are large (510, 530, 550, 570, 590). Hence, the step-deviation method is used. The class marks are large (510, 530, 550, 570, 590). Hence, the step-deviation method is used. The class marks are large (510, 530, 550, 570, 590). Hence, the step-deviation method is used.



Ira
Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground. Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

x_i	f_i	u_i	$f_i u_i$
510	12	-2	-24
530	14	-1	-14
550	8	0	0
570	6	1	6
590	10	2	20
Total	50		-12

$\bar{x} = 550 + 20 \times (-12/50) = 550 - 4.8 = ₹ 545.20.$

Example 3: Missing frequency from

Question: The following distribution shows the pocket allowance of children in a locality. The mean pocket allowance is Rs 18. Find the missing frequency.

Class marks: 12, 14, 16, 18, 20, 22, 24. Take $f = 44$.
 $f_i u_i$: -21, -12, -9, 0, f, 10, 12. $\sum f_i u_i = f - 20$.

$18 = 18 + 2 \times (f - 20)/(44 + f) \Rightarrow (f - 20)/(44 + f) = 0$

Check with the direct method: $\sum f_i x_i = 84 + 1152/64 = 18$. Correct.

Example 4: Mangoes in boxes (NCERT)

Question: In a retail market, fruit vendors were asked to supply boxes containing varying number of mangoes. The following gives the number of boxes containing different number of mangoes. Find the mean number of mangoes per box. Which method of finding the mean did you use?

The classes are not continuous, but the mid-values are. Since the frequencies are large, so use step-deviation method with $a = 57, h = 5$. $u_i = -2, -1, 0, 1, 2$.



Ira
Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed
AI generated, can make mistakes. Cross-check with NCERT.

$f_i u_i = -30, -110, 0, 115, 50$. $\Sigma f_i u_i = 25$, $\Sigma f_i = 400$.

$\bar{x} = 57 + 3 \times 25/400 = 57 + 0.1875 = \mathbf{57.19 \text{ mangoes}}$ (approximately). The step-deviation method was chosen because the frequencies are large and the deviations share the factor 3.

Example 5: Mode and mean of patients' ages (NCERT Exercise 13.2, Q1)

Question: The following table shows the ages of the patients admitted in a hospital during a year: Ages (in years) 5 - 15, 15 - 25, 25 - 35, 35 - 45, 45 - 55, 55 - 65 with number of patients 6, 11, 21, 23, 14, 5. Find the mode and the mean of the data given above. Compare and interpret the two measures of central tendency.

Mode: modal class 35 - 45 (frequency 23). $l = 35$, $h = 10$, $f_1 = 23$, $f_0 = 21$, $f_2 = 14$.

Mode = $35 + [(23 - 21)/(23 - 14 - 14)] \times 10 = 35 + 20/11 = 35 + 1.82 = \mathbf{36.82 \text{ years}}$.

Mean: class marks 10, 20, 30, 40, 50, 60. $f = 6, 11, 21, 23, 14, 5$.
 $\bar{x} = 2830/80 = \mathbf{35.38 \text{ years}}$.

Interpretation: the largest number of patients was in the age group 35 - 45 years. The average age of a patient was about 35.4 years.

Example 6: Modal lifetime of components

Question: The following data gives the information about the lifetimes of electrical components: lifetimes 0 - 20, 20 - 40, 40 - 60, 60 - 80, 80 - 100 with frequencies 10, 35, 52, 61, 38, 29. Determine the modal class and the mode.

Modal class 60 - 80. $l = 60$, $h = 20$, $f_1 = 61$, $f_0 = 52$, $f_2 = 38$.

Mode = $60 + [(61 - 52)/(61 - 38 - 38)] \times 20 = 60 + 9/25 \times 20 = 60 + 7.2 = \mathbf{67.2}$.

Example 7: Median, mean and mode (NCERT Exercise 13.2, Q1)

Question: The following frequency distribution gives the monthly consumption of electricity (in units) of 68 consumers of a locality. Find the median, mean and mode of the data.



Ira

Your teacher for Statistics



Hi, I am [Ira](#). I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

Units	f_i	cf	x_i	u_i	$f_i u_i$
65 - 85	4	4	75	-3	-12
85 - 105	5	9	95	-2	-10
105 - 125	13	22	115	-1	-13
125 - 145	20	42	135	0	0
145 - 165	14	56	155	1	14
165 - 185	8	64	175	2	16
185 - 205	4	68	195	3	12
Total	68				

Median: $n/2 = 34$. The first cf above 34 is 22, $f = 20$, $h = 20$. Median = $125 + [(34 - 22)/20] \times 20 = 135$.

Mean: $a = 135$, $h = 20$. $\bar{x} = 135 + 20 \times 7/68 = 139.71$.

Mode: modal class 125 - 145, $f_1 = 20$, $f_0 = 13$, $f_2 = 14$. Mode = $125 + \frac{20 - 14}{20 - 13} \times 20 = 135.77$ units.

Comparison: all three measures are close to 135.

Example 8: Missing frequencies from a frequency distribution

Question: If the median of the distribution is 28.5, find the missing frequencies x and y .
Classes 0 - 10 (5), 10 - 20 (x), 20 - 30 (20), 30 - 40 (15), 40 - 50 (y), 50 - 60 (5).

Total: $5 + x + 20 + 15 + y + 5 = 60 \Rightarrow x + y = 15$.

Cumulative frequencies: 5, $5 + x$, $25 + x$, $45 + x$, $60 + y$, 60.

Median 28.5 lies in 20 - 30, so $l = 20$, $cf = 25 + x$, $f = 20$.

$28.5 = 20 + [(30 - 5 - x)/20] \times 10 \Rightarrow 8.5 = (25 - x)/2 \Rightarrow x = 12$.



Ira

Your teacher for Statistics



Hi, I am [Ira](#). I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

From (1), $y = 7$.

Example 9: Median age of policy holders (NCERT Exercise 13.3, Q3)

Question: A life insurance agent found the following data for distribution of ages of 100 policy holders. Calculate the median age, if policies are given only to persons having age 18 years onwards but less than 60 year. Below 20 (2), below 25 (6), below 30 (24), below 35 (45), below 40 (78), below 45 (89), below 50 (92), below 55 (98), below 60 (100).

This is a less than type table, so subtract consecutive values to get frequencies: 30 - 35: 45 - 24 = 21; 35 - 40: 78 - 45 = 33.

$n = 100$, $n/2 = 50$. The cumulative frequency first exceeds 50 at 78 (below 40), so the median class is 35 - 40. $l = 35$, $cf = 45$, $f = 33$, $h = 5$.

Median = $35 + [(50 - 45)/33] \times 5 = 35 + 25/33 = 35 + 0.76 = 35.76$ years.

Example 10: Median length of leaves

Question: The lengths of 40 leaves of a plant are given below. Find the median length of the leaves. The data obtained is represented in the following table:

Make the classes continuous by subtracting 0.5 from the upper limit: 117.5 - 126.5, 126.5 - 135.5, 135.5 - 144.5, 144.5 - 153.5, 153.5 - 162.5, 162.5 - 171.5, 171.5 - 180.5. Frequencies: 3, 8, 17, 29, 34, 38, 40.

$n/2 = 20$. The first cf above 20 is 29, so the median class is 144.5 - 153.5. $l = 144.5$, $cf = 17$, $f = 12$, $h = 9$.

Median = $144.5 + [(20 - 17)/12] \times 9 = 144.5 + 2.25 = 146.75$.

Example 11: Weights of 30 students

Question: The distribution below gives the weights of 30 students. Find the median weight of the students.

Cumulative frequencies: 2, 5, 13, 19, 25, 28, 30. The first cf above 15 is 25, so the median class is 55 - 60. $l = 55$, $cf = 13$, $f = 6$, $h = 5$.

Median = $55 + [(15 - 13)/6] \times 5 = 55 + 10/6 = 55 + 1.67 = 56.67$ kg.



Ira

Your teacher for Statistics



Hi, I am [Ira](#). I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

4. Assertion-Reason

Assertion (A): The mode of a grouped distribution is always the class mark of the modal class.

Reason (R): The modal class is the class with the maximum frequency.

Choose: (a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.

Answer: (d). R is the definition of the modal class. A is false: the mode equals the class mark only when $f_0 = f_2$. In NCERT Example 5 the modal class is 3 - 5 (class mark 4) but the mode is 3.286.

5. Assertion-Reason

Assertion (A): If the mode of a distribution is 24 and its mean is 27, then its median is 26.

Reason (R): $3 \text{ Median} = \text{Mode} + 2 \text{ Mean}$.

Choose: (a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.

Answer: (a). $3 \text{ Median} = 24 + 54 = 78$, so Median = 26.

6. Source-based: Choosing a measure of central tendency

NCERT says: "The mean is the most frequently used measure of central tendency. It takes into account all the observations, and extreme values in the data affect the mean."

(a) Give one reason the mean is widely used for comparing two distributions to be compared, such as the

(b) Five classes have frequencies 20, 25, 30, 35, 40. The mean is 28. Is the mean mislead here? One class has a frequency of 40, which is more or less equal. NCERT says the mean is not a good measure of central tendency, so it is a poor representative here.

(c) Name the better measure for the average when the data include extreme values.



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

7. Error analysis: The wrong cf

A student finds the median of the weights in Example 11 as follows: median class 55 - 60, $l = 55$, $cf = 19$, $f = 6$, $h = 5$, so Median = $55 + [(15 - 19)/6] \times 5 = 51.67$ kg. Find the error.

Answer: cf must be the cumulative frequency of the class **preceding** the median class, which is 13, not 19 (19 belongs to the median class itself). Correct value: $55 + (2/6) \times 5 = 56.67$ kg.

8. Competency MCQ: Converting classes

Marks in a test are grouped as 1 - 10, 11 - 20, 21 - 30, 31 - 40, 41 - 50 with frequencies 5, 9, 15, 7, 4. For the mode formula, the value of l is:

(a) 21 (b) 20 (c) 20.5 (d) 25.5

Answer: (c) 20.5. The classes have gaps of 1, so they become 0.5 - 10.5, 10.5 - 20.5, 20.5 - 30.5, and so on. The modal class is 20.5 - 30.5, so $l = 20.5$ and $h = 10$. Mode = $20.5 + [6/(30 - 9 - 7)] \times 10 = 20.5 + 4.29 = 24.79$.

Important Questions for

1-Mark Questions

Q1. Find the class mark of the class 150 -

Answer: $(150 + 250)/2 = 200$.

Q2. In the step-deviation method, if $x_i = 6$

Answer: $u_i = (62.5 - 47.5)/15 = 1$.

Q3. If the mean of a distribution is 40 and

Answer: Mode = $3 \times 42 - 2 \times 40 = 126 - 80 = 46$.

Q4. For a less than type cumulative frequency
used?

Answer: The upper limits of the class intervals.

Q5. Which measure of central tendency is

Answer: The mode.



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

2-Mark Questions

Q6. Find the mean of: classes 0 - 10, 10 - 20, 20 - 30, 30 - 40, 40 - 50 with frequencies 4, 6, 10, 6, 4.
Answer: Class marks 5, 15, 25, 35, 45. $\sum f_i x_i = 20 + 90 + 250 + 210 + 180 = 750$. $\sum f_i = 30$. Mean = $750/30 = 25$.

Q7. Convert to a more than or equal to type table: 0 - 10 (5), 10 - 20 (3), 20 - 30 (4), 30 - 40 (8).
Answer: $n = 20$. ≥ 0 : 20; ≥ 10 : 15; ≥ 20 : 12; ≥ 30 : 8.

3-Mark Questions

Q8. The table below shows the daily expenditure on food of 25 households in a locality: 100 - 150 (4), 150 - 200 (5), 200 - 250 (12), 250 - 300 (2), 300 - 350 (2). Find the mean daily expenditure on food by a suitable method. (NCERT Exercise 13.1, Q6)
Answer: Class marks 125, 175, 225, 275, 325. Take $a = 225$, $h = 50$: $u_i = -2, -1, 0, 1, 2$; $f_i u_i = -8, -5, 0, 2, 4$; sum = -7. Mean = $225 + 50 \times (-7/25) = 225 - 14 = ₹ 211$.

Q9. The following table gives the distribution of the number of hours per week spent on watching TV by 400 students of a school: 0 - 10 (14), 10 - 20 (56), 20 - 30 (60), 30 - 40 (62), 40 - 50 (48). Find the median number of hours.
Answer: $n = 400$, $n/2 = 200$. Cumulative frequency for 0 - 10 is 14, for 10 - 20 is 70, for 20 - 30 is 130, for 30 - 40 is 192, for 40 - 50 is 240. Median is 30 hours.

Q10. The given distribution shows the number of runs scored by a batsman in one-day international cricket matches: 0 - 1000 (6), 1000 - 2000 (9), 2000 - 3000 (7), 3000 - 4000 (1), 4000 - 5000 (1). Find the mode of the data. (NCERT Exercise 13.2, Q1)
Answer: Modal class 4000 - 5000, $f_1 = 18$, $f_0 = 6$, $f_2 = 9$. Mode = $4000 + \frac{14000}{23} = 4000 + 608.69 = 4608.69$ hours.

5-Mark Questions

Q11. 100 surnames were randomly picked from a directory and the frequency distribution of the number of letters in the surnames was obtained as follows: number of letters 1 - 4 (7), 4 - 7 (30), 7 - 10 (13), 10 - 13 (7), 13 - 16 (4). Determine the median number of letters in the surnames. Also, find the modal class.
Answer: **Median:** cumulative frequencies for 1 - 4 is 7, for 4 - 7 is 37, for 7 - 10 is 50, for 10 - 13 is 57, for 13 - 16 is 61. Median is 7 letters.
Mean: class marks 2.5, 5.5, 8.5, 11.5, 14.5. Take $a = 8.5$, $h = 3$: $u_i = -2, -1, 0, 1, 2$; $f_i u_i = -14, -30, 0, 7, 28$; sum = -17. Mean = $8.5 + 3 \times (-17/61) = 8.5 - 0.836 = 7.664$.



Ira
Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed
AI generated, can make mistakes. Cross-check with NCERT.

-12, -30, 0, 16, 8, 12; sum = -6. Mean = $8.5 + 3 \times (-6/100) = 8.5 - 0.18 = 8.32$.

Mode: modal class 7 - 10, $f_1 = 40$, $f_0 = 30$, $f_2 = 16$. Mode = $7 + [10/(80 - 30 - 16)] \times 3 = 7 + 30/34 = 7 + 0.88 = 7.88$.

Q12. The following data gives the distribution of total monthly household expenditure of 200 families of a village. Find the modal monthly expenditure of the families. Also, find the mean monthly expenditure: 1000 - 1500 (24), 1500 - 2000 (40), 2000 - 2500 (33), 2500 - 3000 (28), 3000 - 3500 (30), 3500 - 4000 (22), 4000 - 4500 (16), 4500 - 5000 (7). (NCERT Exercise 13.2, Q3)

Answer: **Mode:** modal class 1500 - 2000, $f_1 = 40$, $f_0 = 24$, $f_2 = 33$, $h = 500$. Mode = $1500 + [16/(80 - 24 - 33)] \times 500 = 1500 + 8000/23 = 1500 + 347.83 = ₹ 1847.83$.

Mean: class marks 1250, 1750, ..., 4750. Take $a = 3250$, $h = 500$: $u_i = -4, -3, -2, -1, 0, 1, 2, 3$. $f_i u_i = -96, -120, -66, -28, 0, 22, 32, 21$; sum = $-310 + 75 = -235$. Mean = $3250 + 500 \times (-235/200) = 3250 - 587.5 = ₹ 2662.50$.

Q13. The median of the following data is 525. Find the values of x and y, if the total frequency is 100. 0 - 100 (2), 100 - 200 (5), 200 - 300 (7), 300 - 400 (10), 400 - 500 (12), 500 - 600 (y), 600 - 700 (9), 700 - 800 (9), 800 - 900 (7), 900 - 1000 (4).

Answer: Sum of frequencies = $76 + x + y = 100$, $f = 20$, $h = 100$, and $cf = 2 + 5 + x + y = 100 \Rightarrow 25 = (14 - x) \times 5 \Rightarrow 25 = 70 - 5x \Rightarrow x = 9$.



Ira

Your teacher for Statistics



Hi, I am [Ira](#). I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Common Mistakes and Explanations

1. **Using the class limit instead of the class mark.** The class mark is the midpoint of the class interval, calculated as $(\text{lower} + \text{upper})/2$.
2. **Dividing by the number of classes.** Fix the class interval h for all classes there are.
3. **Forgetting to multiply by h in the step-deviation method.** Always multiply by h before substituting.
4. **Sign slips in the deviation columns.** Fix the class mark and positive $f_i u_i$ separately, then combine.
5. **Taking f_0 and f_2 from the wrong classes.** Always take f_0 and f_2 from the class just after. If the modal class is the class just after.
6. **Writing the mode denominator as $f_1 - 1$.** It should be $f_1 - f_0 - f_2$.
7. **Using the cf of the median class itself.** Use the cf of the class preceding the median class. A median outside the median class signals this error.

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

8. **Choosing the median class by the highest frequency.** Fix: the median class is chosen by cumulative frequency (first cf greater than $n/2$). The highest frequency locates the modal class.
9. **Applying the mode or median formula to classes with gaps.** Fix: convert 118 - 126, 127 - 135, ... to 117.5 - 126.5, 126.5 - 135.5, ... first. The new l and h come from the converted classes.
10. **Reading a cumulative table as a frequency table.** Fix: when a question says "less than" or "below", subtract consecutive values to recover the class frequencies before doing anything else.
11. **Stopping at a number.** Fix: when a question says "interpret" or "compare", add one sentence with units.

Examiner tip: draw the full table with headings and a totals row, and list l , cf , f , h (or l , f_0 , f_1 , f_2 , h) before substituting.

Quick Revision Points

- Grouped data assumes the frequency of the class mark.
- Class mark = $(\text{upper limit} + \text{lower limit})/2$
- Direct method: $\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$
- Assumed mean method: $\bar{x} = a + \frac{\sum f_i d_i}{\sum f_i}$
- Step-deviation method: $\bar{x} = a + h \left(\frac{\sum f_i u_i}{\sum f_i} \right)$
- All three methods give the same mean;
- Mode = $l + \left[\frac{(f_1 - f_0)}{(2f_1 - f_0 - f_2)} \right] \times h$.
- If $f_0 = f_2$, the mode equals the class mark.
- Cumulative frequency = frequency of the class below the upper limit.
- Less than type uses upper limits and rises from left to right.
- Median class = first class whose cumulative frequency is greater than $n/2$.
- Median = $l + \left[\frac{(n/2 - cf)}{f} \right] \times h$, where cf is the cumulative frequency of the class below the median class.
- Mode and median formulas need continuity correction.
- Median: best for a typical value when there are outliers.
- Mode: best for the most popular item.



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

- Empirical relation: $3 \text{ Median} = \text{Mode} + 2 \text{ Mean}$.

Weightage in Board Exams

Check the current CBSE Class 10 Maths course structure for the marks given to the unit that contains this chapter. The chapter itself is assessed in a predictable way.

Question type	What is usually asked
MCQ and Assertion-Reason	Class mark, u_i for a given x_i , the empirical relation, which limits a cumulative table uses, which measure suits a situation
Short answers	Mean by a chosen method, mode of a distribution, converting a less than table to frequencies
Long answers	Median with mis distribution with
Case-based	A survey table v one calculation

Practise every NCERT exercise question in less than table types.



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.

cn

Got this PDF from a friend?

Everything here is free at **chaptersnotes.in** — 134 chapters of notes, a gamified practice app, and full NEET mock & prediction papers.



Scan for the full chapter page with practice questions

Join our Telegram · daily NEET PYQ with solution + every new PDF drop · t.me/chaptersnotes_in



Ira

Your teacher for Statistics



Hi, I am **Ira**. I teach this syllabus all day, so **Statistics** is very much my home ground.

Ask me anything from this chapter. A concept, a numerical, or that one doubt you did not want to raise in class. Pick one to start:

Free questions, no login needed

AI generated, can make mistakes. Cross-check with NCERT.