

Mode of Grouped Data — Class 10 Summary

NCERT Chapter 13, Statistics · Section 13.3 · Exercise 13.2 · CBSE Unit VII

The mode is the **most frequent** value. In grouped data you cannot read it off, so you find the **modal class** — the interval with the highest frequency — then walk into it by how far it beats its two neighbours.

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

Two definitions, and the condition that decides your answer

Mode — the observation with the maximum frequency; the most common value. For ungrouped data you simply pick it out. **Modal class** — for grouped data, the class interval with the highest frequency. The mode is then a value *inside* that class.

Condition: the class intervals must be **continuous** and of **equal** size. Classes written 1–10, 11–20 have a gap, so **l** and **h** are both wrong until you convert them — subtract half the gap from every lower limit and add it to every upper. Skipping that shifts your answer by exactly half the gap, and nothing in the arithmetic looks wrong while it happens.

The method, run on the shared Statistics data set

Class interval	Frequency (f)	Reading off the modal class
0 – 10	7	
10 – 20	10	$f_0 = 10$ (the class before)
20 – 30 ► modal class	15	$l = 20, f_1 = 15, h = 10$
30 – 40	8	$f_2 = 8$ (the class after)
40 – 50	10	

$$\text{Mode} = 20 + ((15 - 10) / (30 - 10 - 8)) \times 10 = 20 + (5 / 12) \times 10 = 20 + 4.17 = \mathbf{24.17}$$

Sanity check. The empirical relationship $3 \text{ Median} = \text{Mode} + 2 \text{ Mean}$ gives $3(25.33) - 2(25.80) = \mathbf{24.40}$ against the true 24.17. The two do not match exactly and are not meant to — the relationship is *approximate*. Use it to confirm your mode is in the right region, never to replace the formula.

The five symbols, and the trap in each

Symbol	What it is	Where marks are lost
l	Lower limit of the modal class	Read before converting an inclusive table
f₀	Frequency of the class before	Swapped with f_2 — the most common slip
f₁	Frequency of the modal class	Picked by biggest class mark, not frequency
f₂	Frequency of the class after	Left as 0 when the modal class is last
h	Class size	Counted as upper – lower + 1

NCERT and CBSE scope. Mode of grouped data is **Chapter 13, Section 13.3**, taught in Examples 4–6 and drilled in **Exercise 13.2 (6 questions)** — note the offset, Section 13.3 but Exercise 13.2, because 13.1 is the introduction. The CBSE scope reads, verbatim: “*Mean, median and mode of grouped data (bimodal situation to be avoided).*” So the board will always give you **one clear highest frequency**; a tie means you misread the table. The cumulative frequency graph (ogive) was removed in the rationalisation. Unit VII, Statistics and Probability, is **11 of the 80** theory marks, shared with Probability.

Key Takeaways

- **Mode** = $l + ((f_1 - f_0) / (2f_1 - f_0 - f_2)) \times h$. Find the modal class first, always.
- The modal class is chosen by **highest frequency**, never by the widest interval or the biggest class mark.
- **f₀** is before the modal class, **f₂** is after. Write both down beside the table before you substitute.
- Gaps between classes must be closed **first**. On a gap of 1 an unconverted answer is exactly **0.5 too high**.
- Naming the modal class in words is **a mark of its own** in Section C — do not start with the formula.
- Reach for the mode when the question wants the **most frequent or most popular** value, not an average.

Two questions the formula alone will not get you through

Both appear on CBSE papers; neither is a plain substitution.

3 MARKS · SECTION C · THE GAP

The marks of 32 students are given below. Find the mode.

Marks	1 – 10	11 – 20	21 – 30	31 – 40	41 – 50
Students	4	5	15	5	3

Steps 1 and 2 – spot the gap, then convert. Nothing lies between 10 and 11, so these classes are **inclusive**. Half the gap is 0.5, giving 0.5–10.5, 10.5–20.5, **20.5–30.5**, 30.5–40.5, 40.5–50.5, with $h = 10$ throughout.

Step 3 – name the modal class. Highest frequency 15, so the modal class is **20.5 – 30.5**, with $l = 20.5$, $f_1 = 15$, $f_0 = 5$, $f_2 = 5$, $h = 10$.

Step 4 – substitute. Mode = $20.5 + ((15 - 5) / (30 - 5 - 5)) \times 10 = 20.5 + (10/20) \times 10 = 20.5 + 5 = \mathbf{25.5 \text{ marks}}$.

What the conversion is worth. Take l straight off the written table as 21 and you get 26.0 – clean-looking, and wrong by exactly the 0.5 you never subtracted.

Check. Here f_0 and f_2 are both 5, so the two neighbours pull equally and the mode must land exactly at the centre of the modal class. The centre of 20.5–30.5 is 25.5. It does.

3 MARKS · THE MISSING FREQUENCY

The mode of the distribution below is 52. Find the missing frequency x .

Class	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Frequency	10	x	30	16	10

The mode 52 lies in **40–60**, so that is the modal class: $l = 40$, $f_1 = 30$, $f_0 = x$, $f_2 = 16$, $h = 20$. The formula now becomes an equation in one unknown.

$$52 = 40 + ((30 - x) / (60 - x - 16)) \times 20 \Rightarrow 12 = ((30 - x) / (44 - x)) \times 20 \Rightarrow 0.6(44 - x) = 30 - x$$

$$26.4 - 0.6x = 30 - x \Rightarrow 0.4x = 3.6 \Rightarrow \mathbf{x = 9}$$

Check by substituting back. With $x = 9$: Mode = $40 + ((30 - 9) / (60 - 9 - 16)) \times 20 = 40 + (21/35) \times 20 = 40 + 12 = \mathbf{52}$. And 30 is still the largest frequency, so 40–60 really is the modal class. Total frequency 75.

WHERE THE MARKS ACTUALLY GO

No modal class named	Costs the identification mark, and invites an f_0/f_2 swap.
Gap left unconverted	l and h are both wrong; the whole answer goes with them.
Denominator sign slip	It is $2f_1$ minus f_0 minus f_2 – minus both.
Answer left as a fraction	Finish the division; give the value in the question's units.

NOW TRY THIS ONE

Frequencies 5, 12, 20, 8, 5 on 0–10, 10–20, 20–30, 30–40, 40–50 (50 observations, already continuous). Find the mode. **Answer: 24 exactly.** Then the harder half: a shopkeeper wants to know which shoe size to stock most of – mean, median or mode, and why?

Practise it on examfront — free to start

- ✓ **Chapter 1 is free** – start today, no payment, no trial clock.
- ✓ **Mistake Identification** names the slip – swapped f_0 and f_2 , or a gap you never closed.
- ✓ **Anytime tests** on any topic, whenever you have twenty minutes.
- ✓ **Weekly tests** so Statistics does not quietly go stale while you do Algebra.
- ✓ **Full mock tests before the exam**, in board conditions and to the board's clock.

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