ANSWER KEY & MARKING SCHEME · CBSE CLASS 11

Measures of Central Tendency

Statistics for Economics, Cl-11 · Chapter 5 · Use this with the Board Paper · Companion to Quick Drill

HOW TO USE

Attempt the Board Paper first (closed-book, full time). Then come here. For 2-mark+ questions, compare your answer to the model. For 3-4 mark questions, also consult the **Topper Templates** below — these show the exact step-by-step structure that scores full marks per CBSE marking-scheme conventions.

MODEL ANSWERS · BOARD PAPER

Section A — Objective (8 marks)

Q1. **Which of the following is NOT a measure of central tendency? (a) Mean (b) Median (c) Mode (d) Range [1 mark]**

Ans: (d) Range — it is a measure of dispersion.

Q2. **$\Sigma(x - \bar{x})$ equals _____. [1 mark]**

Ans: Zero (0). It is the self-balancing property of the arithmetic mean.

Q3. **State the formula for finding median of a continuous frequency distribution. [1 mark]**

Ans: Median = l + [(N/2 − c.f.)/f] × h, where l = lower limit of median class, c.f. = c.f. of preceding class, f = frequency of median class, h = class size.

Q4. **If Mean = 25 and Median = 24, find Mode using the empirical relation. [1 mark]**

Ans: Mode = 3·Median − 2·Mean = 3·24 − 2·25 = 72 − 50 = 22.

Q5. **Name the appropriate measure of central tendency for qualitative data such as 'preferred brand'. [1 mark]**

Ans: Mode — arithmetic operations are not meaningful for qualitative data; the most frequent category (mode) is the only valid average.

Q6. **Median of the data 12, 15, 18, 21, 24 is _____. [1 mark]**

Ans: Median = 18 (3rd term, since n = 5 is odd).

Q7. **Mode of the data 4, 6, 4, 8, 4, 10, 6 is _____. [1 mark]**

Ans: Mode = 4 (occurs 3 times — highest frequency).

Q8. **Which measure is most affected by extreme values? [1 mark]**

Ans: Arithmetic Mean — because it uses every observation, outliers shift it significantly.

Section B — Short Answer I (6 marks)

Q9. **Distinguish between positional and computed averages with one example each. [3 marks]**

Ans: Computed averages use all data values in arithmetic operations (e.g., arithmetic mean, weighted mean, geometric mean). Positional averages depend on the RANK or position of values in the ordered series (e.g., median, quartiles, mode for ungrouped data). Example computed: Mean of 2,4,6 = 4. Example positional: Median of 2,4,6 = 4 (middle position).

Q10. **Compute the weighted mean of marks 60, 80, 75, 90 with weights 1, 2, 3, 4 respectively. [3 marks]**

Ans: ΣWX = 1·60 + 2·80 + 3·75 + 4·90 = 60 + 160 + 225 + 360 = 805. ΣW = 1+2+3+4 = 10. Weighted mean = 805/10 = 80.5.

Section C — Short Answer II (8 marks)

Q11. **Compute the arithmetic mean by step-deviation method for the following data: Classes 0-10, 10-20, 20-30, 30-40, 40-50 with frequencies 4, 6, 10, 6, 4. [4 marks]**

Ans: x = 5, 15, 25, 35, 45. Take A = 25, h = 10. d' = (x–25)/10 = –2, –1, 0, 1, 2. fd' = 4·(–2), 6·(–1), 10·0, 6·1, 4·2 = –8, –6, 0, 6, 8. $\Sigma fd'$ = 0. Σf = 30. $\bar{x}$ = A + h·($\Sigma fd'/\Sigma f$) = 25 + 10·(0/30) = 25. Mean = 25.

Q12. **Find the median for the following continuous distribution: Wages (₹) 0-10, 10-20, 20-30, 30-40, 40-50; Workers 5, 10, 15, 8, 2.** **[4 marks]**

> **Ans:** c.f. = 5, 15, 30, 38, 40. N = 40. N/2 = 20. Median class = class where c.f. first reaches 20 → 20-30 (c.f. = 30). l = 20, c.f. (preceding) = 15, f = 15, h = 10. Median = 20 + [(20 − 15)/15] × 10 = 20 + (5/15)·10 = 20 + 10/3 ≈ 23.33. Median ≈ ₹23.33.

Section D — Long Answer (8 marks)

Q13. **Find the mode of the following continuous distribution and state which measure of central tendency is most representative for this data; justify briefly. Age (yrs) 0-10, 10-20, 20-30, 30-40, 40-50; Frequency 6, 11, 25, 14, 4.** **[5 marks]**

> **Ans:** Modal class = class with highest frequency = 20-30 (f = 25). $f_1 = 25$, $f_0 = 11$, $f_2 = 14$. l = 20, h = 10. Mode = $l + [(f_1 - f_0)/(2f_1 - f_0 - f_2)]\cdot h = 20 + [(25-11)/(50-11-14)]\cdot 10 = 20 + (14/25)\cdot 10 = 20 + 5.6 = 25.6$ years. Justification: The distribution is moderately skewed (no extreme outliers) and quantitative — mean is appropriate, but median (positional) would also serve well. Mode here gives the 'typical' age but Mean (around 25) is the most representative single value for further statistical computation.

Q14. **Explain with reasons which measure of central tendency you would use in each case: (i) average income of a country; (ii) most popular shoe size for a store's inventory; (iii) average marks in a uniform class test where no student scored extreme values.** **[3 marks]**

> **Ans:** (i) MEDIAN — income data is highly skewed; a few billionaires inflate the mean. Median income is the standard reported measure. (ii) MODE — the store needs to stock the MOST DEMANDED size; mean shoe size is meaningless (you can't sell a 'size 7.4'). (iii) MEAN — symmetric data with no outliers, every score counts, and AM uses all values fairly.

★ TOPPER ANSWER TEMPLATES

3 TEMPLATES · MEMORISE THE FORMAT

★ TOPPER TEMPLATE — Topper template 1

Common

Step 1 [1 mark]	**State formula**	$\bar{x} = A + h \cdot (\Sigma fd' / \Sigma f)$, where A = assumed mean, d' = (x − A)/h.
Step 2 [1 mark]	**Build computation table**	Columns: class | x (mid-value) | f | d' = (x–A)/h | fd'. Choose A as the middle class-mark; choose h = class width.
Step 3 [1 mark]	**Sum the relevant columns**	Compute Σf and Σfd' carefully; double-check signs of d'.
Step 4 [1 mark]	**Substitute + state answer with units**	$\bar{x} = A + h \cdot (\Sigma fd'/\Sigma f)$ = computed value. Write the units (marks, ₹, kg).

COMMON LOSS OF MARKS:

- Skipping definitions or terminology mid-answer
- No clear paragraph/point structure
- Conclusion absent or one-line

★ TOPPER TEMPLATE — Topper template 2

Common

Step 1 [1 mark]	**State formula**	Median = l + [(N/2 − c.f.) / f] × h, where l = lower limit of median class, c.f. = c.f. of preceding class, f = frequency of median class, h = class size.
Step 2 [1 mark]	**Compute N and N/2**	N = Σf. Locate N/2 in cumulative frequency column.
Step 3 [1 mark]	**Identify median class**	The class where c.f. first reaches/exceeds N/2 is the median class.
Step 4 [1 mark]	**Substitute + state answer**	Plug values and state median with units.

COMMON LOSS OF MARKS:

- Skipping definitions or terminology mid-answer
- No clear paragraph/point structure
- Conclusion absent or one-line

★ TOPPER TEMPLATE — Topper template 3

Common

Step 1 [1 mark]	**State formula**	Mode = $l + [(f_1 - f_0) / (2f_1 - f_0 - f_2)] \times h$.
Step 2 [1 mark]	**Identify modal class + f_0, f_1, f_2**	Modal class = class with highest frequency. f_1 = its frequency, f_0 = frequency just before, f_2 = frequency just after.
Step 3 [1 mark]	**Substitute and compute**	Plug in carefully and state mode with units.

COMMON LOSS OF MARKS:

- Skipping definitions or terminology mid-answer
- No clear paragraph/point structure
- Conclusion absent or one-line

MARKING SCHEME — GENERAL NOTES

- For all numerical questions, ½ mark for formula, ½ for correct identification of class/values, remaining marks for substitution and final answer with units.
- Deduct ½ mark if final answer is given without units (where applicable: ₹, years, marks).
- For median/mode questions, ½ mark reserved for correctly identifying the median/modal class.
- Empirical relation (Mode = 3Median – 2Mean) — accept both rearrangements as full marks.
- Working must be shown for Sections C and D — answer-only attempts get at most 50%.
- If a student uses direct or short-cut method instead of step-deviation (when step-deviation is asked), award full marks ONLY if the final answer matches; otherwise penalise method 1 mark.
- For 'justify' / 'explain' questions, accept any valid economic reasoning even if phrasing differs from the model answer.