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CLASS X · MATHEMATICS BASIC (241) · CBSE BOARD EXAMINATION 2027

CHAPTER 13 BASIC

Statistics

Chapter Practice Booklet · Questions only · Answers in the separate Answer Booklet

6 guided method questions | 25 practice questions | 3 case studies | Basic (430 series) board question index

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STUDENT DETAILS

NAME _____

CLASS & SECTION _____

ROLL NO. _____

BOOKLET STARTED ON _____

CHAPTER TEST SCORE _____ / 20

1

READ THIS FIRST · MATHEMATICS BASIC

Chapter Notes

The whole chapter in short-note form: every definition, formula, method and model answer. Revise from here – you should not need the textbook again.

1 Grouped data: the words you need

- **Class interval** 20–30: lower limit 20, upper limit 30, **class size** $h = 30 - 20 = 10$.
- **Class mark** (middle value) $x_i = \dfrac{\text{lower} + \text{upper}}{2}$. For 20–30 it is 25.
- **Frequency** f_i is the number of values in the class; $n = \Sigma f_i$ is the total.
- **Cumulative frequency** (cf, less than type) is the running total of the frequencies. The last cf is n.
- In 20–30 and 30–40, the value 30 is counted in 30–40 (the upper limit belongs to the next class).
- **Inclusive classes** such as 1–10, 11–20 have gaps. Subtract 0.5 from each lower limit and add 0.5 to each upper limit: 0.5–10.5, 10.5–20.5. Do this before finding the median or the mode.

EXAMPLE

Class 45–55: $x = 50$, $h = 10$. Class 10–19 (inclusive) becomes 9.5–19.5.

2 Mean of grouped data: three methods

Every value in a class is taken to be the class mark x_i. All three methods give the same mean.

Direct

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

Assumed mean (a = a class mark you choose)

$$d_i = x_i - a, \quad \bar{x} = a + \frac{\Sigma f_i d_i}{\Sigma f_i}$$

Step deviation (h = class size)

$$u_i = \frac{x_i - a}{h}, \quad \bar{x} = a + h \times \frac{\Sigma f_i u_i}{\Sigma f_i}$$

- Take a as a class mark near the middle of the table. Use step deviation when the numbers are large.

EXAMPLE

Class	0–10	10–20	20–30	30–40	40–50	Total
f_i	5	8	12	9	6	**40**
x_i	5	15	25	35	45	
$f_i x_i$	25	120	300	315	270	**1030**
u_i	−2	−1	0	1	2	
$f_i u_i$	−10	−8	0	9	12	**3**
cf	5	13	25	34	40	

Direct: $\bar{x} = \dfrac{1030}{40} = 25.75$. Step deviation ($a = 25$, $h = 10$): $25 + 10 \times \dfrac{3}{40} = 25.75$.

3 Mode of grouped data

The **modal class** is the class with the highest frequency. The mode is a value inside it.

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

- l lower limit of the modal class, h class size, f_1 its frequency, f_0 frequency of the class before, f_2 of the class after.
- If the modal class is the first class, $f_0 = 0$; if it is the last, $f_2 = 0$.

EXAMPLE

Same table: modal class 20–30, $f_1 = 12$, $f_0 = 8$, $f_2 = 9$. Mode $= 20 + \dfrac{4}{7} \times 10 \approx 25.71$.

4 Median of grouped data

1. Write the cumulative frequencies and find $\frac{n}{2}$.
2. **Median class:** the first class whose cf is greater than $\frac{n}{2}$.
3. Use the formula below.

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

- l lower limit and f frequency of the median class; cf is the cumulative frequency of the class **before** it.
- A "less than" or "more than" table gives cumulative frequencies. Subtract next-door values to get the frequencies first.

EXAMPLE

Same table: $n = 40$, $\frac{n}{2} = 20$, median class 20–30, $cf = 13$, $f = 12$. Median $= 20 + \frac{7}{12} \times 10 \approx 25.83$.

5 Empirical relation and missing frequencies

$$3\,\text{Median} = \text{Mode} + 2\,\text{Mean} \quad \text{(approximately)}$$

- Use it when two of the three are given. Mean 25.75 and mode 25.71 give median $\approx$ 25.74 (true value 25.83).
- **One missing frequency:** write Σf_i and $\Sigma f_i x_i$ (or the median formula) with the unknown, put in the given value and solve.
- **Two missing frequencies:** the total n gives the second equation.
- **Which average?** The mean uses every value. The median is not pulled by a few very large values (incomes). The mode is the most common value (the shoe size a shop should stock most).

6 Model answer: mean by step deviation (3 marks)

The lengths of 50 leaves are given. Find the mean length.

Length (cm)	2–4	4–6	6–8	8–10	10–12	12–14
Leaves	4	9	15	12	7	3

1. $x_i = 3, 5, \ldots, 13$; $a = 7$, $h = 2$; $u_i = -2, -1, 0, 1, 2, 3$; $f_i u_i = -8, -9, 0, 12, 14, 9$ 1
2. $\Sigma f_i = 50$, $\Sigma f_i u_i = 18$ 1
3. $\bar{x} = 7 + 2 \times \frac{18}{50} = 7 + 0.72 = 7.72$ cm 1

7 Model answer: median (3 marks)

Find the median mass of 60 parcels.

Mass (kg)	0–10	10–20	20–30	30–40	40–50	50–60
Parcels	5	9	14	16	10	6
cf	5	14	28	44	54	60

1. $n = 60$, $\frac{n}{2} = 30$; first cf above 30 is 44, so the median class is 30–40 1
2. $l = 30$, $cf = 28$, $f = 16$, $h = 10$ 1
3. Median $= 30 + \frac{30 - 28}{16} \times 10 = 31.25$ kg 1

8 Checks that save marks

- Check that Σf_i equals the total given and the last cf equals n.
- The mean must lie between the smallest and the largest class limits.
- The mode must lie inside the modal class, and the median inside the median class.
- Use the cf of the class **before** the median class, not of the median class itself.
- Write the unit (marks, kg, ₹, hours) with the answer.

Exam snapshot

What the board asks, and how to prepare

SYLLABUS 2026–27

- Mean, median and mode of grouped data (bimodal situations are avoided).
- Cumulative frequency graphs (ogives) are not in the syllabus.

BOARD WEIGHTAGE

11 / 80

Unit VII Statistics and Probability together. Basic papers give one or two 1-mark questions (class mark, modal or median class, the empirical relation), and two of three had a 3- or 5-mark question on mean, median or mode.

MOST ASKED IN BASIC BOARD PAPERS + SAMPLE PAPER 2026–27 (3 PAPERS CHECKED)

How often	Question type	Marks	Papers
★★★	1 mark: class mark, modal or median class, empirical relation	1	3 of 3
★★☆	3 or 5 marks: mean, median or mode of grouped data	3–5	2 of 3

MISTAKES THAT COST MARKS

- Using the upper limit instead of the class mark for x_i.
- Dividing $\Sigma f_i x_i$ by the number of classes.
- Choosing the modal class by the largest class, not the largest frequency.
- Using the wrong cf in the median formula.
- Mixing up f_0 and f_2 in the mode formula.
- Writing no unit.

HOW TO USE THIS BOOKLET

1. **Day 1:** Notes, then Part A (guided methods) – fill every blank.
2. **Day 2:** Part B (NCERT practice). Do every MUST DO question first.
3. **Day 3:** Part C (board pattern), Part D (case studies) and the real board questions in Part E.
4. **Sat 16 Jan (Lily: Fri 15 Jan): chapter test – 20 marks in 40 minutes, without the booklet.**
5. Check every answer in the Answer Booklet. Write each mistake on the My Mistakes page.

RULES AT A GLANCE

Mean	$\Sigma f_i x_i \div \Sigma f_i$ (x_i = class mark)
Mode	$l + \dfrac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$
Median	$l + \dfrac{\frac{n}{2} - cf}{f} \times h$
Relation	$3\,\text{Md} = \text{Mo} + 2\,\bar{x}$

A

PART A · LEARN THE METHODS

Guided Practice

Fill in the blanks to learn each board method step by step. Then use the same steps on your own in Part B.

Mean

A1. Complete the table and find the mean. [2]

Class	0–10	10–20	20–30	30–40
Frequency	2	3	4	1

MUST DO

x_i	___	___	___	___
$f_i x_i$	___	___	___	___

$\Sigma f_i =$ ___, $\Sigma f_i x_i =$ ___. Mean $= \dfrac{\Sigma f_i x_i}{\Sigma f_i} =$ ___

A2. Complete the steps to find the mean. [2]

Class	10–20	20–30	30–40	40–50	50–60
Frequency	3	5	7	3	2

MUST DO

Class marks: ___, ___, ___, ___, ___. $f_i x_i$: ___, ___, ___, ___, ___.

$\Sigma f_i x_i =$ ___, $\Sigma f_i =$ ___. Mean = ___

Mode and median

A3. Complete the steps to find the mode. [2]

Class	0–20	20–40	40–60	60–80	80–100
Frequency	4	7	12	5	2

MUST DO

Modal class = ___; $l =$ ___, $f_1 =$ ___, $f_0 =$ ___, $f_2 =$ ___, $h =$ ___.

Mode $= l + \dfrac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h =$ ___

A4. Complete the steps to find the median. [2]

Class	0–10	10–20	20–30	30–40	40–50
Frequency	3	7	10	6	4

MUST DO

cf: ___, ___, ___, ___, ___. $\dfrac{n}{2} =$ ___; median class = ___.

$l =$ ___, $cf =$ ___, $f =$ ___, $h =$ ___. Median = ___

A5. The heights (in cm) of 40 plants are given. Complete the steps to find the median height. [2]

Height (cm)	100–110	110–120	120–130	130–140	140–150
Plants	5	8	12	10	5

cf: ___, ___, ___, ___, ___. $\dfrac{n}{2} =$ ___; median class = ___. Median = ___ cm

A6. The mean of a distribution is 20 and its mode is 26. Use the empirical relation to find its median. [2]

$3\,\text{Median} = __ + 2\times __ = __$, so Median $= __$

B

PART B · NCERT PRACTICE

NCERT Practice

The same skills as the NCERT examples and exercises, with new numbers. Basic papers are built on NCERT, so finish every question.

Mean of grouped data

B1. The table shows the hours of television watched in a week by 30 students. Find the mean number of hours. [3]

Hours	0–4	4–8	8–12	12–16	16–20
Students	4	8	10	6	2

MUST DO

B2. The mean of the distribution below is 53.2. Find the missing frequency p. [3]

Class	0–20	20–40	40–60	60–80	80–100
Frequency	5	8	p	12	7

MUST DO

B3. The daily wages of 50 workers in a workshop are given. Find the mean daily wage by the assumed mean method. [3]

Wage (₹)	200–250	250–300	300–350	350–400	400–450
Workers	8	12	20	6	4

B4. The marks of 50 students in a test are given. Find the mean marks by the step-deviation method. [3]

Marks	0–20	20–40	40–60	60–80	80–100
Students	7	11	15	10	7

MUST DO

B5. The distances (in km) that 40 students travel to school are given. Find the mean distance. [3]

Distance (km)	0–3	3–6	6–9	9–12	12–15
Students	9	12	10	6	3

Mode of grouped data

B6. The monthly electricity bills of 50 homes are given. Find the modal bill. [3]

Bill (₹)	400–600	600–800	800–1000	1000–1200	1200–1400
Homes	6	11	18	10	5

MUST DO

B7. The ages of 50 people at a health camp are given. Find the mean and the mode, and say what each tells you. [5]

Age (years)	10–20	20–30	30–40	40–50	50–60	60–70
People	4	8	13	15	7	3

B8. Find the mode of the data below. [3]

Class	10–20	20–30	30–40	40–50	50–60
Frequency	16	12	9	7	6

Median of grouped data

B9. The times (in minutes) that 50 students took to solve a puzzle are given. Find the median time. [3]

Time (min)	0–5	5–10	10–15	15–20	20–25	25–30
Students	3	8	12	15	8	4

MUST DO

B10. The median of the distribution below is 32 and the total frequency is 50. Find x and y. [3]

Class	0–10	10–20	20–30	30–40	40–50	50–60
Frequency	4	x	12	15	y	5

MUST DO

B11. The heights of 50 plants are given as a cumulative table. Find the median height. [3]

Height (cm)	less than 140	less than 145	less than 150	less than 155	less than 160	less than 165
Plants	4	11	26	38	46	50

B12. Find the median marks. [3]

Marks	1–10	11–20	21–30	31–40	41–50
Students	6	10	16	12	6

Mean, median and mode together

B13. The speeds of 50 vehicles on a road are given. Find the mean, the median and the mode. [5]

Speed (km/h)	20–30	30–40	40–50	50–60	60–70	70–80
Vehicles	5	9	16	12	6	2

C

PART C · BOARD PATTERN (BASIC)

Board Pattern Practice

Question types from real Mathematics Basic papers (430 series) and the 2026–27 Sample Paper. ★★★ = asked in all 3 papers checked · ★★ = 2 papers · ★ = 1 paper.

ASSERTION–REASON: HOW TO ANSWER

(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.

One-mark questions

★★★ 3 of 3 papers · 1 mark

C1. For a distribution, the mean is 30 and the median is 32. Its mode is about: MUST DO [1]

(a) 34 (b) 31 (c) 36 (d) 38

C2. The class mark of a class is 35 and its lower limit is 30. Its upper limit is: [1]

(a) 40 (b) 35 (c) 45 (d) 65

C3. The upper limit of the modal class of the data below is: [1]

Class	5–15	15–25	25–35	35–45	45–55
Frequency	6	11	9	7	4

MUST DO

(a) 15 (b) 25 (c) 35 (d) 20

C4. The median class of the data below is: [1]

Class	0–20	20–40	40–60	60–80	80–100
Frequency	7	9	12	8	4

MUST DO

(a) 20–40 (b) 60–80 (c) 0–20 (d) 40–60

C5. In a step-deviation table, $\Sigma f_i = 25$, $\Sigma f_i u_i = -5$, $a = 40$ and $h = 10$. The mean is: [1]

(a) 39.8 (b) 42 (c) 38 (d) 35

C6. ASSERTION–REASON [1]

Assertion (A): If the mode of a distribution is 18 and its mean is 15, its median is 16.
Reason (R): $3\,\text{Median} = \text{Mode} + 2\,\text{Mean}$.

C7. Find the mean of the data below. [2]

Class	0–6	6–12	12–18	18–24
Frequency	3	5	8	4

MUST DO

Mean, median and mode: 3–5 marks

★★☆ 2 of 3 papers · 3–5 marks

C8. The ages of 50 patients in a clinic are given. Find the modal age. [3]

Age (years)	15–25	25–35	35–45	45–55	55–65	65–75
Patients	6	10	17	12	4	1

MUST DO

C9. The masses of 60 eggs are given. Find the mean mass by the step-deviation method. [3]

Mass (g)	100–120	120–140	140–160	160–180	180–200
Eggs	10	14	18	12	6

C10. Find the median of the data below. [3]

Class	10–20	20–30	30–40	40–50	50–60	60–70
Frequency	6	12	18	24	9	1

MUST DO

C11. The monthly electricity used (in units) by 100 shops is given. Find the median and the mode. [5]

Units	0–50	50–100	100–150	150–200	200–250	250–300
Shops	8	15	22	30	17	8

MUST DO

C12. The masses of 50 bags of rice are given. Find the mean and the mode, and say which is larger. [5]

Mass (kg)	5–15	15–25	25–35	35–45	45–55
Bags	7	12	20	8	3

D

PART D · SECTION E STYLE

Case-Based Questions

Each case carries 4 marks (1 + 1 + 2), as in Section E of the board paper. Underline the numbers in the passage before you start.

D1. Case Study · School Canteen [4]

The canteen kept a record of the number of samosas sold each day for 40 days.

Samosas sold	40–60	60–80	80–100	100–120	120–140
Days	5	9	13	8	5

(i) Find the modal class. [1]

(ii) Find the median class. [1]

(iii) Find the mean number of samosas sold per day. [2]

OR

(iii) Find the mode of the data. [2]

D2. Case Study · Blood Donation Camp [4]

The ages of 60 donors at a blood donation camp are given.

Age (years)	18–24	24–30	30–36	36–42	42–48
Donors	10	16	14	12	8

(i) Find the class mark of the class 30–36. [1]

(ii) How many donors were younger than 30? [1]

(iii) Find the median age of the donors. [2]

OR

(iii) Find the mean age of the donors. [2]

D3. Case Study · Screen Time [4]

A survey recorded the daily screen time of 50 students.

Hours	0–1	1–2	2–3	3–4	4–5	5–6
Students	4	9	15	12	7	3

(i) Find the modal class. [1]

(ii) How many students use a screen for 3 hours or more? [1]

(iii) Find the mode of the screen time. [2]

OR

(iii) Find the median screen time. [2]

PART E · REAL BOARD QUESTIONS

E Board PYQ Index (Basic)

Real questions from the Mathematics Basic (430 series) papers and the 2026–27 Sample Paper, by type. Open the official paper and solve the listed questions.

Frequency	Question type	Marks	Where asked (year: paper code, question number)	Practise here
★★★	**Class mark, modal or median class, empirical relation (1 mark)**	1	**2026:** 430/1/2 Q13, Q14 · **2025:** 430/1/1 Q16, Q17 · **SQP 2026–27:** Q10, Q12	A6, C1–C7
★★☆	**Mean, median or mode of grouped data (3–5 marks)**	3–5	**2025:** 430/1/1 Q35 · **SQP 2026–27:** Q30(A), Q30(B)	A1–A5, B1–B13, C8–C12

Papers checked (3): 2026 – 430/1/2 (Section A only could be read online) · 2025 – 430/1/1 · CBSE Sample Paper 2026–27 (Mathematics Basic). Sets of one code family share most questions, so they count as one paper. Download the official papers from cbse.gov.in → Previous Year Question Papers → Mathematics Basic.

PART F · YOUR RECORD

F My Mistakes

Write down each mistake from this chapter, including the chapter test.

Every wrong answer is a free lesson. Write it here, find the rule you missed, and redo the question after three days. Bring this page to class before the next test.

Date	Part & Q No.	What went wrong	Correct rule or method	Redone ✓