TYBA COACHING CENTRE, AJMER

RMS / RMC CLASS VI MATHEMATICS • CHAPTER 23: DATA HANDLING & BAR GRAPHS — MASTER NOTES

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Part 1: Introduction to Data, Primary vs Secondary Data & Tally Marks — Basics

1.1 What is Data? A collection of numerical facts or observations gathered to give specific information is called **Data (आंकड़े)**.

• **Primary Data:** Collected directly by the investigator (e.g., counting students in your class).

• **Secondary Data:** Taken from an already published source (e.g., newspaper, government census, textbook).

• **Frequency (बारंबारता):** Number of times a particular observation occurs.

आंकड़े: किसी निश्चित उद्देश्य से एकत्रित संख्यात्मक तथ्यों को आंकड़े कहते हैं। स्वयं एकत्रित आंकड़े 'प्राथमिक' तथा पहले से प्रकाशित स्रोतों से लिए गए आंकड़े 'द्वितीयक' कहलाते हैं।

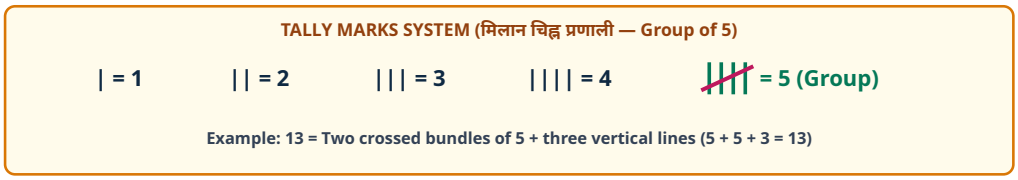


Figure 2: Standard Tally Marks Representation (मिलान चिह्न निरूपण)

Example 1: Represent the frequencies 7, 11, and 15 using tally marks.
Solution: 7 = 5 + 2 (1 bundle + ||); 11 = 5 + 5 + 1 (2 bundles + |); 15 = 5 + 5 + 5 (**3 crossed bundles**).

7 में 1 बंडल व 2 रेखाएँ; 11 में 2 बंडल व 1 रेखा; 15 में 3 बंडल होंगे।

Example 2: In a class test, marks of 10 students are: 8, 9, 8, 7, 10, 8, 9, 7, 8, 10. Find the frequency of 8.
Solution: Count occurrences of 8 ⇒ **4 times**.

अंक 8 कुल **4 बार** आया है, अतः इसकी बारंबारता 4 है।

Example 3: Find the Range of the marks: 14, 27, 18, 45, 32, 39.
Solution: Range = Highest − Lowest = 45 − 14 = **31**.

परिसर = अधिकतम (45) − न्यूनतम (14) = **31**।

Example 4: Find the Range of the first 10 natural numbers (1 to 10).
Solution: Highest = 10, Lowest = 1 ⇒ Range = 10 − 1 = **9**.

परिसर = 10 − 1 = **9**।

Part 2: Pictographs — Reading & Interpreting Symbols (चित्रालेख) — Visual Data

2.1 Pictograph Rules: A pictograph displays numerical data through uniform icons or symbols. Always multiply the number of symbols by the **Scale Value**. A half-symbol equals half of the scale!

चित्रालेख में प्रत्येक चित्र का मान पैमाने (Scale) द्वारा तय होता है। आधा चित्र पैमाने के आधे मान को दर्शाता है।

Example 5: In a pictograph, 1 ★ = 15 students. How many students do 4 ★ represent?
Solution: 4 × 15 = **60 students**.

4 × 15 = **60 विद्यार्थी**।

Example 6: If 1 tree icon = 20 trees, how many icons are needed to show 90 trees?
Solution: 90 ÷ 20 = 4.5 ⇒ **4 full icons and 1 half icon**.

90 ÷ 20 = 4.5 ⇒ **4 पूरे और 1 आधा चित्र**।

Example 7: A pictograph shows 120 cars using 6 car symbols. Find the scale of 1 symbol.
Solution: Scale = 120 ÷ 6 = **20 cars per symbol**.

1 चित्र का पैमाना = 120 ÷ 6 = **20 कारें**।

Part 3: Bar Graphs & Double Bar Graphs (दंड आरेख एवं दोहरा दंड आरेख) — Core Skill

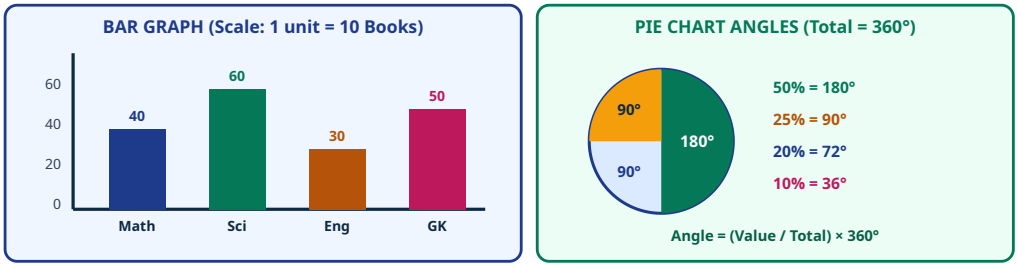


Figure 1: Equal-Width Bar Graph (दंड आरेख) & Pie Chart Central Angles (वृत्त आरेख)

3.1 Properties of a Bar Graph: (1) All bars have **equal width**. (2) Spacing between consecutive bars is **equal**. (3) Bars can be vertical or horizontal. (4) **Double Bar Graphs** compare two data sets side-by-side (e.g., Marks in Term 1 vs Term 2).

दंड आरेख में सभी स्तंभों की चौड़ाई व बीच का अंतर समान होता है। दोहरे दंड आरेख से दो समूहों की एक साथ तुलना की जाती है।

Example 8: If 1 cm = 20 books on a bar graph, find the height of a bar representing 110 books.
Solution: Height = 110 ÷ 20 = **5.5 cm**.

ऊँचाई = 110 ÷ 20 = **5.5 सेमी**।

Example 9: A bar is 7 units tall with scale 1 unit = 50 runs. How many runs does it represent?
Solution: 7 × 50 = **350 runs**.

7 × 50 = **350 रन**।

Example 10: Choose a suitable scale to plot values 200, 450, 600, 800 on a 10 cm tall axis.
Solution: Max value 800 ÷ 10 = 80 ⇒ choose convenient round scale **1 cm = 100 units**.

अधिकतम मान 800 हेतु उपयुक्त पैमाना **1 सेमी = 100 इकाई** होगा।

Part 4: Measures of Central Tendency — Mean, Median & Mode (माध्य, माध्यिका, बहुलक) — High-Yield RMS

4.1 Three Measures:
• **Mean (Arithmetic Mean):** Sum of all observations ÷ Total number of observations.
• **Median:** Sort data in ascending order first!
  – If count **n is Odd**: Median = **((n + 1)/2)th term**.
  – If count **n is Even**: Median = **Average of (n/2)th and (n/2 + 1)th terms**.
• **Mode:** The value that repeats the maximum number of times.

माध्य: कुल योग / संख्या। **माध्यिका:** आरोही क्रम में सजाकर ठीक बीच का पद (विषम में मध्य पद, सम में बीच के दो पदों का औसत)। **बहुलक:** सबसे अधिक बार आने वाला पद।

Example 11: Find the Mean of 12, 18, 20, 14, 16.
Solution: Sum = 12 + 18 + 20 + 14 + 16 = 80. Mean = 80 ÷ 5 = **16**.

योग = 80; माध्य = 80 ÷ 5 = **16**।

Example 12: Find the Mean of the first 5 prime numbers.
Solution: Primes: 2, 3, 5, 7, 11. Sum = 28. Mean = 28 ÷ 5 = **5.6**.

प्रथम 5 अभाज्य संख्याओं का योग = 28; माध्य = 28 ÷ 5 = **5.6**।

Example 13: Find the Median of 22, 8, 15, 19, 12.
Solution: Sort: 8, 12, **15**, 19, 22. Middle (3rd) value = **15**.

आरोही क्रम: 8, 12, 15, 19, 22 ⇒ माध्यिका = **15**।

Example 14: Find the Median of 14, 26, 10, 30, 18, 22.
Solution: Sort: 10, 14, **18, 22**, 26, 30. Median = (18 + 22) / 2 = **20**.

आरोही क्रम में बीच के पद 18 व 22 हैं ⇒ माध्यिका = (18+22)/2 = **20**।

Example 15: Find the Mode of: 4, 7, 5, 7, 8, 7, 3, 5.
Solution: 7 occurs 3 times (maximum) ⇒ Mode = **7**.

7 सबसे अधिक (3 बार) आया है, अतः बहुलक = **7**।

Example 16: If the Mean of 6 observations is 15, find their sum.
Solution: Sum = Mean × Count = 15 × 6 = **90**.

कुल योग = माध्य × संख्या = 15 × 6 = **90**।

Example 17: The Mean of 5 numbers is 12. If four numbers are 10, 11, 13, 14, find the 5th number.
Solution: Total sum = 5 × 12 = 60. Sum of 4 = 48. 5th number = 60 − 48 = **12**.

कुल योग = 60; चार का योग = 48; पाँचवीं संख्या = 60 − 48 = **12**।

Part 5: Pie Charts / Circle Graphs (वृत्त आरेख / पाई चार्ट) — Angle Calculations

5.1 Pie Chart Formulas (Total Circle = 360°):
• **Central Angle** = **(Component Value / Total Value) × 360°** (or **(Percentage / 100) × 360°**).
• **Component Value** = **(Central Angle / 360°) × Total Value**.
• **Percentage** = **(Central Angle / 360°) × 100%**.

पाई चार्ट में पूरा वृत्त 360° का होता है। केंद्रीय कोण = (भाग / कुल) × 360°; प्रतिशत = (कोण / 360°) × 100।

Example 18: In a pie chart, what central angle represents 25% of total data?
Solution: (25 / 100) × 360° = **90°**.

(25 / 100) × 360° = **90°**।

Example 19: Out of 720 students, 180 like Cricket. Find its central angle.
Solution: (180 / 720) × 360° = **90°**.

(180 / 720) × 360° = **90°**।

Example 20: A pie chart sector has central angle 72°. What percentage of total is it?
Solution: (72 / 360) × 100 = **20%**.

(72 / 360) × 100 = **20%**।

Example 21: Monthly budget is ₹18,000. If Food has central angle 120°, find food expenditure.
Solution: (120 / 360) × 18,000 = (1/3) × 18,000 = **₹6,000**.

(120 / 360) × 18,000 = **₹6,000**।

Part 6: Frequency Distribution Table & Grouped Data (बारंबारता बंटन तालिका) — Data Tables

Subject	Students	Percentage	Pie Angle	Bar Height (1 cm = 10)
Mathematics	40	(40/180)×100 = 22.2%	(40/180)×360° = **80°**	4.0 cm
Science	60	(60/180)×100 = 33.3%	(60/180)×360° = **120°**	6.0 cm
English	30	(30/180)×100 = 16.7%	(30/180)×360° = **60°**	3.0 cm
General Knowledge	50	(50/180)×100 = 27.8%	(50/180)×360° = **100°**	5.0 cm
TOTAL	**180**	**100%**	**360°**	—

Part 7: Extra RMS CET Practice Drills (अतिरिक्त परीक्षा अभ्यास उदाहरण) — Exam Drills

Example 22: Find the Mean of 3, 6, 9, 12, 15, 18, 21.
Solution: AP series ⇒ Mean = (3 + 21)/2 = **12**.

समांतर श्रेणी का माध्य = (प्रथम + अंतिम)/2 = (3+21)/2 = **12**।

Example 23: Find the Mode of 11, 13, 15, 13, 11, 13, 17.
Solution: 13 appears 3 times ⇒ Mode = **13**.

13 सबसे अधिक (3 बार) आया है, अतः बहुलक = **13**।

Example 24: What is the Range of 0, 5, 12, 8, 25, 19?
Solution: 25 − 0 = **25**.

25 − 0 = **25**।

Example 25: If the Mean of x, x+2, x+4 is 11, find x.
Solution: Middle term x + 2 = 11 ⇒ x = **9**.

मध्य पद x + 2 = 11 ⇒ x = **9**।

Example 26: A die is thrown 10 times: 1, 3, 6, 2, 6, 4, 6, 5, 1, 6. Find the Mode.
Solution: 6 occurs 4 times ⇒ Mode = **6**.

6 चार बार आया है, अतः बहुलक = **6**।

Example 27: In a class interval 20–30, what is the lower limit, upper limit, and class size?
Solution: Lower limit = **20**, Upper limit = **30**, Class size = 30 − 20 = **10**.

निम्न सीमा = 20, उच्च सीमा = 30, वर्ग अंतराल = 10।

Example 28: Find the class mark (mid-value) of class interval 40–60.
Solution: Class mark = (40 + 60) / 2 = **50**.

वर्ग चिह्न = (40 + 60) / 2 = **50**।

Example 29: If 1 ★ = 8 apples, how many apples do 6.5 ★ represent?
Solution: 6.5 × 8 = **52 apples**.

6.5 × 8 = **52 सेब**।

Example 30: Find the central angle for 45% in a pie chart.
Solution: (45 / 100) × 360° = **162°**.

(45 / 100) × 360° = **162°**।

Example 31: In a bar graph, scale is 1 unit = 250 people. How many units represent 1,750 people?
Solution: 1750 ÷ 250 = **7 units**.

1750 ÷ 250 = **7 इकाई**।

Example 32: If the Mean of 4 numbers is 20 and one number 8 is removed, find the new Mean.
Solution: Old sum = 80; New sum = 80 − 8 = 72; New Mean = 72 ÷ 3 = **24**.

नया योग = 72; नया माध्य = 72 ÷ 3 = **24**।

Example 33: Find the Median of: 5, 9, 3, 7, 11, 13, 1.
Solution: Sort: 1, 3, 5, **7**, 9, 11, 13 ⇒ Median = **7**.

आरोही क्रम में ठीक बीच का पद **7** है।

Example 34: How many crossed bundles of 5 are there in tally marks for 28?
Solution: 28 = 5 × 5 + 3 ⇒ **5 bundles** (plus 3 lines).

28 में 5 के **5 बंडल** व 3 खड़ी रेखाएँ होंगी।

Example 35: In a pie chart of 360 students, 1 student corresponds to what angle?
Solution: 360° ÷ 360 = **1° per student**.

360° ÷ 360 = **1° प्रति छात्र**।

Example 36: Find the empirical relation between Mean, Median, and Mode.
Solution: Mode = 3 × Median − 2 × Mean.

बहुलक = 3 × माध्यिका − 2 × माध्य।

Part 8: Quick-Reference Pie Chart & Mixed Exam Drills (पाई चार्ट त्वरित तालिका एवं मिश्रित प्रश्न) — Exam Boosters

Fraction / Percentage (भिन्न / प्रतिशत)	Central Angle (केंद्रीय कोण)	Fraction / Percentage (भिन्न / प्रतिशत)	Central Angle (केंद्रीय कोण)
50% = 1/2 of total	**180°**	25% = 1/4 of total	**90°**
20% = 1/5 of total	**72°**	10% = 1/10 of total	**36°**
33.33% = 1/3 of total	**120°**	12.5% = 1/8 of total	**45°**
15% = 3/20 of total	**54°**	75% = 3/4 of total	**270°**

Example 37: In a pie chart, a sector has a central angle of 54°. What percentage of the total does it represent?
Solution: (54 ÷ 360) × 100 = **15%**.

प्रतिशत = (54 ÷ 360) × 100 = **15%**।

Example 38: If 15% of a monthly budget of ₹24,000 is spent on books, find the amount and central angle.
Solution: Amount = 15% of 24,000 = **₹3,600**; Angle = 15% of 360° = **54°**.

राशि = ₹3,600; कोण = 54°।

Example 39: The mean of 5 numbers is 18. If one number 22 is excluded, find the new mean.
Solution: Old sum = 5 × 18 = 90. New sum = 90 − 22 = 68. New mean = 68 ÷ 4 = **17**.

नया योग = 90 − 22 = 68; नया माध्य = 68 ÷ 4 = **17**।

Example 40: Find the median of the first 9 prime numbers: 2, 3, 5, 7, 11, 13, 17, 19, 23.
Solution: Already sorted, n = 9 (odd). 5th term = **11**.

कुल 9 पद हैं, अतः 5वाँ पद = **11**।

Example 41: A student scored 65, 70, 85, and x in 4 tests. If the average is 75, find x.
Solution: Total needed = 4 × 75 = 300. Sum = 65 + 70 + 85 = 220 ⇒ x = 300 − 220 = **80**.

x = 300 − 220 = **80**।

Example 42: On a bar graph, scale is 1 cm = 25 students. What is the difference in bar heights for 200 and 125 students?
Solution: Difference = 75 students ⇒ 75 ÷ 25 = **3 cm**.

अंतर = 75 ÷ 25 = **3 सेमी**।

Example 43: Find the range of temperatures (°C): 28, 34, 19, 41, 25, 37.
Solution: Max = 41, Min = 19 ⇒ Range = 41 − 19 = **22°C**.

परिसर = 41 − 19 = **22°C**।

Example 44: If Mode = 24 and Mean = 18, find Median using the empirical formula.
Solution: 24 = 3(Median) − 2(18) ⇒ 3(Median) = 60 ⇒ Median = **20**.

3 × माध्यिका = 24 + 36 = 60 ⇒ माध्यिका = **20**।

TYBA Master Checklist for RMS CET: (1) Always sort data before finding Median. (2) Range = Max − Min. (3) Pie Chart total = 360°. (4) Bar width & gap must always be equal!