LATEST EDITION

CBSE

QUESTION & CONCEPT BANK

Chapter-wise & Topic-wise

CLASS 11

Chapter-wise
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Chapter

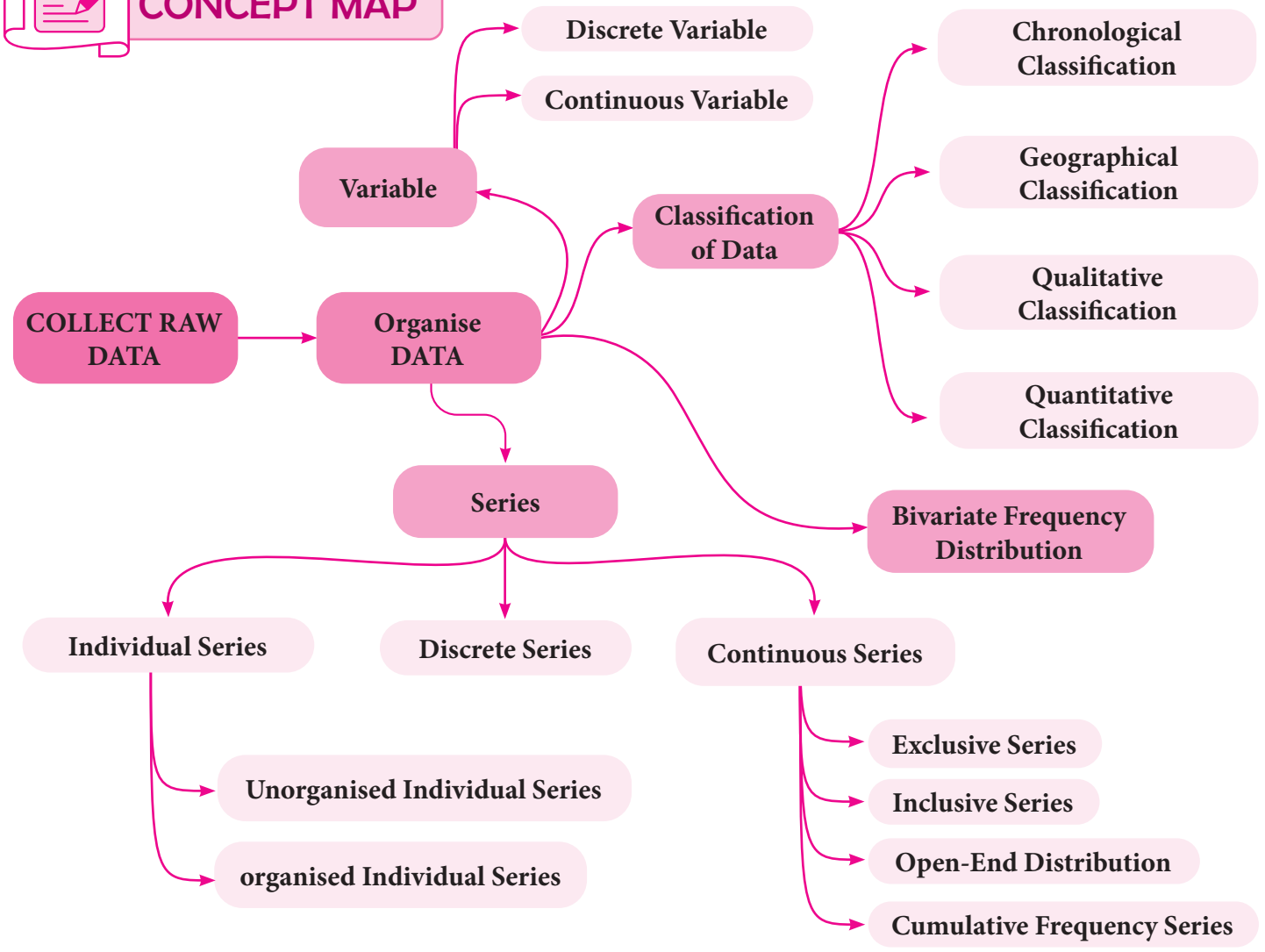
3

ORGANISATION OF DATA

LEARNING OBJECTIVES

- *Understand what organisation of data means.*
- *Know how frequency distribution helps classify data.*
- *Learn the difference between continuous and discrete variables.*
- *Identify the types of classification: time, location, quality, and quantity.*
- *Understand the steps to prepare a frequency distribution*

CONCEPT MAP



1. Introduction

When we collect information (called data), it is usually in a raw and scattered form. To make sense of it, we organise it using tables, charts, arrays, or classifications.

Example: If you collect the test marks of 50 students, listing them randomly is confusing. However, arranging them from highest to lowest or grouping them into ranges (such as 0–10, 11–20, etc.) makes it easier to determine who scored the most or how many passed.

1.1 Classification of Data

Refers to the method of organising data based on shared traits or features.

Purpose of Classification:

- To present complex data in a simpler and more understandable format
- To enable effective comparisons
- To assist in smooth analysis and interpretation
- To identify and understand cause-and-effect connections

1.2 Types of Classification

(*a*) **Chronological Classification/ Temporal Classification (Time-Based):** Data is grouped according to **time, such as year, month, etc.** (Use: Helps study trends or patterns over a specific time period).

Example: Rainfall during the last few years

Year	Rainfall (in mm)
2020	800
2021	950
2022	600
2023	910

(*b*) **Geographical Classification/Spatial Classification (Location-Based):** Data is grouped by **region or place**. (Use: Useful for comparing areas or regions).

Example: Literacy rate in different states of India

State	Literacy Rate (%)
Kerala	96
Bihar	70
Maharashtra	85
Rajasthan	68

(*c*) **Qualitative Classification (Attribute-Based):** Data is grouped based on **non-numeric qualities or characteristics.** (Use: Helps in analyzing social categories like gender, education level, etc.)

Example: Number of students in Class 11

Gender	No. of Students
Male	55
Female	45

(*d*) **Quantitative Classification (Variable-Based):**Data is grouped according to **numerical values**. (Use: Useful for statistical analysis like frequency distribution, mean, graphs, etc.)

Income Range	No. of Families
0-10,000	12
11,000-20,000	25
21,000-30,000	30
31,000-40,000	18

2. Variable

A **variable** is a measurable quantity that can vary or change from one observation to another.

Example: Price is considered a variable since different goods have different prices.

Variables are generally classified into two types:

2.1 Discrete Variable

A variable is termed **discrete** when it takes only specific, distinct whole-number values.

Example: Number of students in a class (can be 30, 31—not 30.5).

2.2 Continuous Variable

A variable is called **continuous** when it can assume any value within a specified range. These values are not restricted to whole numbers and may include fractions or decimals.

Example: Height, weight, temperature, etc.

3. Series

3.1 Individual Series

An **individual series** is a form of data presentation in which each observation is recorded separately. Every item is shown with its distinct value.

There are two types of individual series:

(*a*) Unorganized Individual Series: This involves raw, unarranged data presented in an unordered format.

Example: Marks scored by 10 students in economics—21, 30, 42, 35, 45, 19, 28, 36, 44, and 27.

(*b*) Organized Individual Series: Here, the data is arranged systematically or sequentially, such as in ascending/descending order or according to roll numbers.

Example: Marks of 25 students listed in order based on their serial numbers.

3.2 Discrete Series (Ungrouped Frequency Distribution)

A **discrete series** displays individual data values along with their respective frequencies. Each item in the dataset occurs in a countable manner and is not grouped into intervals.

In such a series, every distinct value is listed, and the number of times it appears (its frequency) is recorded.

Example: Marks obtained (out of 25) by 25 students in economics:

Raw Data:

16, 13, 15, 14, 14, 17, 16, 15, 17, 16, 15, 16, 17, 14, 17, 15, 16, 13, 16, 17, 17, 14, 16, 15, 16

Now let's organize this into a discrete series:

Marks	Frequency
13	2
14	4
15	5
16	8
17	6
Total	**25**

3.3 Continuous Series (Grouped Frequency Distribution)

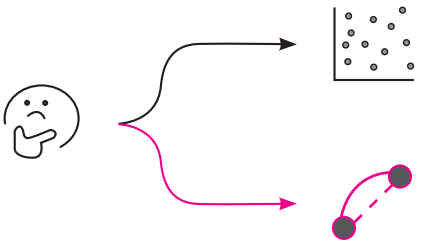
A **continuous series** is a type of statistical series where the data is grouped into class intervals, representing continuous variables. Instead of listing individual values, this series displays a range for each group, making it suitable for large datasets with closely spaced values.

Example: Marks of Students (out of 50)

Marks Obtained	Number of Students
0-10	2
10-20	4
20-30	9
30-40	4
40-50	7

(Class interval, or class width, is the difference between the upper and lower class limits.)

Types of continuous series:



Exclusiave Sevies

Upper limit is excluded, preventing overlap between classes.

Inclusive Sevies

Both limits are included ensuring no gaps between classes.

(*a*) Exclusive Series: In an **exclusive series**, the upper limit of a class is not included in that class. The next class starts from the same number as the upper limit of the previous class.

Format Example: 0–10, 10–20, 20–30, 30–40

Note: A value of 20 will be included in the 20–30 class, not 10–20.

(*b*) Inclusive Series: In an **inclusive series**, both the lower and upper limits are included in the class. There is no overlap or gap between the class intervals.

Format Example: 1–10, 11–20, 21–30, 31–40

Note: A value of 20 belongs to the 11–20 class, not the next one.

(*c*) Open-End Distribution

In this series, either the first class has no lower limit or the last class has no upper limit, or both. This is used when extreme values are uncertain or unlimited.

- **Example:** Below 10, 10–20, 20–30, 30–40, Above 40
- Useful in age, income, or population data where limits can be indefinite.

(*d*) Cumulative Frequency Series

This series shows the total number of observations up to a certain class limit. It helps in understanding the running total of frequencies.

- **Two types:**
  - Less than Series: Shows total frequency less than the upper limit.
    Example: Less than 10, Less than 20, Less than 30
  - More than Series: Shows total frequency more than the lower limit.
    Example: More than 0, More than 10, More than 20

4. Univariate and Bivariate Frequency Distribution

Univariate Frequency Distribution

- When data is grouped or classified based on **only one variable**, it is called univariate.
- It is also known as a one-way frequency distribution.
- **Examples:** Height of students, Marks in Maths

Bivariate Frequency Distribution

- When data is grouped based on **two variables together**, it is called bivariate.
- It is also called a two-way frequency distribution.
- **Examples:** Height and weight of students, marks in economics, and Marks in Business Studies

Multiple Choice Questions

Instructions: Choose the most appropriate option.

1. Meaning & Purpose of Organising Data

1. What is the main purpose of organising raw data?

(*a*) To permanently delete unimportant data
(*b*) To make data readable for computers only
(*c*) To simplify and make the data easier to interpret
(*d*) To remove extreme values

Ans: (*c*) Organising data helps present it in a clear format so that we can easily read, compare, and interpret it.

2. Which of the following tools helps in arranging unorganised data?

(*a*) Stories and poems
(*b*) Tables and arrays
(*c*) Newspaper articles
(*d*) Flashcards

Ans: (*b*) Tables and arrays are the most commonly used tools for arranging raw data meaningfully.

2. Classification of Data

3. In which of the following is data arranged over time (like by year or month)?

(*a*) Geographical classification
(*b*) Mathematical classification
(*c*) Qualitative classification
(*d*) Chronological classification

Ans: (*d*) Chronological classification sorts data by time (like years or months), useful for studying trends.

4. If we group data by states or cities, it is called:

(*a*) Quantitative classification
(*b*) Chronological classification
(*c*) Geographical classification
(*d*) Regional coding

Ans: (*c*) Geographical classification groups data based on regions, such as comparing states or cities.

5. Grouping students as "boys" and "girls" is an example of:

(*a*) Qualitative classification
(*b*) Quantitative classification
(*c*) Geographical classification
(*d*) Chronological classification

Ans: (*a*) Qualitative classification is based on non-numeric features like gender, caste, or education level.

6. In quantitative classification, data is grouped according to:

(*a*) Colours
(*b*) Time
(*c*) Qualities
(*d*) Numerical values

Ans: (*d*) Quantitative classification deals with numbers like income, marks, etc., and is useful for analysis.

3. Variables

7. Which of the following is a discrete variable?

(*a*) Weight of fruits
(*b*) Marks in a class test
(*c*) Number of students in a room
(*d*) Temperature during the day

Ans: (*c*) Discrete variables take only whole values—like number of people, not 3.5 people.

8. A continuous variable can:

(*a*) Only takes values in whole numbers
(*b*) Vary in fractions or decimals across a range
(*c*) Be used only in pie charts
(*d*) Never change in value

Ans: (*b*) Continuous variables include values with decimals or fractions, like weight or height.

4. Types of Series

9. Which type of series shows each item individually, either arranged or unarranged?

(*a*) Continuous series
(*b*) Individual series
(*c*) Frequency series
(*d*) Discrete series

Ans: (*b*) An individual series lists every observation one by one, either in raw or arranged form.

10. The major difference between discrete and continuous series is

(*a*) Discrete series uses class intervals.

(*b*) Continuous series uses individual values.

(*c*) Discrete uses whole values; continuous uses grouped intervals.

(*d*) Both show data in alphabetical order

Ans: (*c*) Discrete series shows specific values with their frequency, while continuous series uses value ranges.

5. Types of Continuous Series

11. In an exclusive series, which class boundary is not included in that class?

(*a*) Upper limit (*b*) Lower limit

(*c*) Both limits (*d*) Frequency

Ans: (*a*) In an exclusive series, the upper limit is excluded from that class and counted in the next.

12. Which of these class formats shows an inclusive series?

(*a*) 0–10, 10–20, 20–30 (*b*) Below 10, 10–20, 20–30

(*c*) 1–10, 11–20, 21–30 (*d*) 10–19, 20–29

Ans: (*c*) An inclusive series includes both limits, e.g., 1–10 includes both 1 and 10 in that class.

13. In which type of series is the first or last class open-ended?

(*a*) Inclusive series (*b*) Chronological series

(*c*) Open-end series (*d*) Discrete series

Ans: (*c*) Open-end series has classes like "Below 10" or "Above 40," where no limit is fixed on one end.

14. A cumulative frequency series helps in:

(*a*) Measuring the speed of data (*b*) Showing the total of frequencies up to a certain limit

(*c*) Collecting random facts (*d*) Drawing bar diagrams only

Ans: (*b*) Cumulative frequency adds up frequencies as we move forward; useful for medians and graphs.

15. "Less than 10," "less than 20," etc., represent which type of frequency series?

(*a*) Less than a series (*b*) Equal class series

(*c*) More than a series (*d*) Exclusive series

Ans: (*a*) The "less than" series shows the total frequency for all values **less than** a particular class limit.

Assertion-Reason Type MCQs

Directions: *In the questions given below, there are two statements marked as Assertion (A) and Reason (R). Read the statements and choose the correct option:*

(*a*) *Both Assertion* (*A*) *and Reason* (*R*) *are true, and Reason* (*R*) *is the correct explanation of Assertion* (*A*).

(*b*) *Both Assertion* (*A*) *and Reason* (*R*) *are true, but Reason* (*R*) *is not the correct explanation of Assertion* (*A*).

(*c*) *Assertion* (*A*) *is true, but Reason* (*R*) *is false.*

(*d*) *Assertion* (*A*) *is false, but Reason* (*R*) *is true.*

1. **Assertion (A):** In a continuous series, data is grouped into class intervals.

Reason (R): Continuous variables can take any value, including decimals or fractions.

Ans: (*a*) In a continuous series, we deal with data like height, weight, income, etc., that can have fractional values. Since it's difficult to list each value individually, we use class intervals to group data (e.g., 0–10, 10–20). The reason is also correct because continuous variables can take any value in a given range, including decimals (like 5.5 kg, 162.3 cm).

So both statements are true, and the reason logically explains why we use class intervals in continuous series.

2. **Assertion (A):** Chronological classification is used to study the literacy rate in different states.

Reason (R): Chronological classification is based on time, such as years or months.

Ans: (*c*) The reason is correct—chronological classification arranges data based on time (e.g., year-wise population growth). However, the assertion is incorrect—the literacy rate in different states refers to regions, not time. This would fall under geographical classification, not chronological. Thus, only R is true; A is false.

3. **Assertion (A):** In an exclusive series, the upper-class limit is included in that class interval.
   Reason (R): Exclusive series helps avoid overlap between class intervals.

Ans: (*c*) In an exclusive series, the upper limit is excluded from the class it appears in and included in the next. For example, in 10–20, the value 20 goes to the next class (20–30). Hence, the assertion is false. However, the reason is correct because this method ensures that there is no overlapping between classes—each value fits into only one class. Therefore, only R is true.

4. **Assertion (A):** Tables and arrays are used to present raw data in an organised form.
   Reason (R): Unorganised data is difficult to interpret and compare.

Ans: (*a*) Raw data, such as test scores from 100 students, is hard to understand if not arranged properly. Tables and arrays help organise such data into meaningful forms (ascending, descending, groups, etc.). Unorganised data makes it hard to draw conclusions or compare. Therefore, the reason correctly explains why we use tables or arrays. Thus, both A and R are true, and R explains A.

5. **Assertion (A):** Qualitative classification is used when data is based on attributes like gender or religion.
   Reason (R): These attributes can be expressed in numerical values.

Ans: (*c*) The assertion is correct—qualitative classification is based on non-numeric features like gender, caste, education level, etc. The reason is false—these features cannot truly be expressed as numerical values (e.g., "male = 1, female = 2" is a coding method, not true quantification). So, the assertion is true, but the reason is incorrect.

6. **Assertion (A):** Discrete variables can take only whole-number values.
   Reason (R): The number of students in a class is an example of a continuous variable.

Ans: (*c*) The assertion is true—discrete variables are countable and take only whole numbers (e.g., 2, 5, 10). But the reason is false—the number of students is a classic example of a discrete variable, not continuous (you can't have 30.5 students). Thus, A is true, and R is false.

Two Statements Based Questions

Instructions:

Read both statements carefully and choose the correct option:

Statement I *and* ***Statement II***

Choose the correct option:

(*a*) *Both statements are true, and Statement II correctly explains Statement I.*

(*b*) *Both statements are true, but Statement II does not explain Statement I.*

(*c*) *Statement I is true, but Statement II is false.*

(*d*) *Statement I is false, but Statement II is true.*

1. **Statement I:** A continuous variable can take only fixed whole-number values.
   Statement II: Height and weight are examples of continuous variables.

Ans: (*d*) Statement I is false because a continuous variable can take any value, including decimals and fractions (e.g., 5.3 kg, 162.5 cm). Statement II is true—height, weight, and temperature are typical examples of continuous variables, as they can take non-whole values.

2. **Statement I:** In a discrete series, data is grouped into class intervals.
   Statement II: A discrete series shows specific values with their frequencies.

Ans: (*d*) Statement I is false because class intervals are used in continuous series, not in discrete series. Statement II is true—in a discrete series, each unique value (e.g., marks like 13, 14, and 15) is shown along with how many times it occurs (frequency).

3. **Statement I:** Qualitative classification groups data based on non-numerical characteristics.
   Statement II: Classifying people by income level is an example of qualitative classification.

Ans: (*c*) Statement I is true—qualitative classification is based on attributes like gender, religion, or education level, not numbers. Statement II is false—income is quantitative data because it involves numbers. Grouping people by income is a quantitative classification, not qualitative.

4. **Statement I:** In exclusive classification, the upper limit of a class is included in that class.
   Statement II: The class intervals in an exclusive series do not overlap.

Ans: (*d*) Statement I is false—in an exclusive series, the upper limit is not included in the class. For example, in 10–20, value 20 goes to the next class. Statement II is true—since the upper limit is excluded, there is no overlap, and each data value fits into only one class interval.

5. **Statement I:** Individual series show each observation separately, often in raw form.
Statement II: Organising individual data is not useful for further statistical analysis.

Ans: (*c*) Statement I is true—individual series lists each data point separately, either in raw, ascending, or descending order. Statement II is false—even though individual series are simple, organising them helps in calculating averages, medians, and other statistical tools, so they are very useful in further analysis.

Match the Following Questions

1. Match Column A with Column B:

Column A (Type of Classification)	Column B (Example)
a. Chronological Classification	i. Literacy rate by state
b. Geographical Classification	ii. Marks of students in a test
c. Qualitative Classification	iii. Gender-wise division
d. Quantitative Classification	iv. Data arranged by year

Ans: a → iv, b → i, c → iii, d → ii
Chronological → time-based; geographical → state-wise; qualitative → based on traits like gender; quantitative → numerical like marks.

2. Match Column A with Column B:

Column A (Term)	Column B (Definition/Example)
a. Discrete Variable	i. Weight of a person
b. Continuous Variable	ii. Number of cars in the parking
c. Inclusive Series	iii. Class: 1–10, 11–20
d. Exclusive Series	iv. Class: 0–10, 10–20

Ans: a → ii, b → i, c → iii, d → iv
Discrete → whole countable values; Continuous → fractional values possible; Inclusive → both limits included; Exclusive → upper limit excluded.

3. Match Column A with Column B:

Column A (Concept)	Column B (Use/Feature)
a. Individual Series	i. Running total of frequencies
b. Cumulative Frequency Series	ii. Raw/unarranged data shown
c. Open-End Class	iii. No lower or upper limit
d. Frequency Distribution	iv. Organised data in intervals

Ans: a → ii, b → i, c → iii, d → iv
Individual → raw data one by one; Cumulative → total up to a point; Open-end → indefinite limits; Frequency distribution → grouped values.

4. Match Column A with Column B:

Column A (Tool/Term)	Column B (Function)
a. Table	i. Numerical grouping
b. Array	ii. Raw data in order
c. Classification	iii. Grouping by similarity
d. Series	iv. Data in column format

Ans: a → iv, b → ii, c → iii, d → i
Tables show data neatly; arrays arrange it in order; classification groups it meaningfully; series refer to organised numerical data.

5. Match Column A with Column B:

Column A (Series Type)	Column B (Key Feature)
a. Discrete Series	i. Grouped into intervals
b. Continuous Series	ii. Data are shown with frequency
c. Individual Series	iii. Each value is listed separately
d. Cumulative Series	iv. Total frequency is shown stepwise

Ans: a → ii, b → i, c → iii, d → iv

Discrete → exact values + frequency; Continuous → grouped data; Individual → one-by-one listing; Cumulative → adds up frequency till each step.

Exam Based Subjective Questions

EXAM-BASED SUBJECTIVE QUESTIONS (1 MARK)

1. What is meant by the classification of data?

Ans: It helps in arranging large raw data into smaller, meaningful parts so we can easily understand and compare them.

2. Give one example of a discrete variable.

Ans: Discrete variables take whole-number values only (like 1, 2, 3…) and not fractions. You can't have 2.5 children.

3. What type of classification is used when data is arranged over years?

Ans: This type of classification is **time-based** and is used to study changes over time, like rainfall from 2020 to 2023.

4. Name the series where every item is shown separately.

Ans: In an individual series, each observation (like a student's mark) is recorded one by one, not grouped.

5. In which type of series is the upper limit **not included** in the class?

Ans: In an exclusive series, the upper limit goes to the next class to avoid overlapping. For example, 10–20 does **not** include 20.

6. What is meant by cumulative frequency?

Ans: It helps show running totals, useful in making ogives or finding medians in grouped data.

7. Which type of classification is based on place or area?

Ans: It groups data by location, like literacy rates in different states or sales in various cities.

SUBJECTIVE QUESTIONS (4 MARKS)

1. What do you mean by the organisation of data?

Ans: Organisation of data means arranging the raw or unprocessed data systematically and logically so that it becomes easier to interpret and analyze. Raw data, when collected, is often scattered and lacks structure. Organising helps in presenting data in tables, series, or graphs, making comparison and statistical analysis more efficient and meaningful.

2. Why is the organisation of data necessary in statistics?

Ans: The organisation of data is essential to:

1. Simplify complex information
2. Identify trends and patterns
3. Facilitate comparisons and interpretations.

Without organising data, it remains confusing and non-informative, which makes decision-making difficult. Systematically presented data helps in better communication of findings.

3. What are the different ways in which data can be organised?

Ans: Data can be organised in the following forms:

1. **Individual Series:** Each observation is listed separately
2. **Discrete Series:** Data values with respective frequencies
3. **Continuous Series:** Data in class intervals with frequencies

These formats help in presenting qualitative and quantitative information depending on the type of variable involved.

Case Study Based Questions

Case Study 1: Survey on Students' Screen Time (6 Marks)

Read the passage and answer the following questions:

A school surveyed 100 students of Class 11 to study their daily screen time. The raw data collected showed varied responses like 2 hours, 5 hours, 3.5 hours, 6 hours, etc. To make the data meaningful, the teacher grouped the data into class intervals such as 0–2 hours, 2–4 hours, 4–6 hours, and so on. The number of students falling in each interval was also recorded.

1. What method of data organisation is being used here? **(2 Marks)**

Ans: The method of data organisation used here is quantitative classification using frequency distribution. The teacher has grouped continuous numerical data (screen time) into class intervals and counted the number of students in each group, which is a typical method of organising data for easy analysis.

2. Explain the importance of class intervals in organising such data. **(2 Marks)**

Ans: Class intervals are important because they help group a large set of individual data points into defined ranges. In this case, instead of studying all 100 responses separately, the data is grouped into ranges like 0–2 hours, 2–4 hours, etc., making it easier to interpret trends. Class intervals reduce complexity, remove duplication, and give a clearer picture of the distribution pattern.

3. Why is the organisation of this data necessary for further analysis? **(2 Marks)**

Ans: Organising data is necessary to make it understandable and useful. Raw data, such as individual screen times, can be confusing and time-consuming to study. Once organized, we can easily find out which screen time category has the most students, compare usage across groups, and draw conclusions. It also helps in applying statistical tools, such as calculating the mean or preparing graphs.

Case Study 2: Income Distribution in a Village

Read the passage and answer the following questions: (6 Marks)

A researcher visited a village to study the income pattern of its residents. He collected primary data from 80 households. The income levels ranged from ₹2,000 to ₹45,000. To simplify analysis, he grouped the data into class intervals such as ₹0–10,000, ₹10,001–20,000, ₹20,001–30,000, and so on, and noted the number of households in each income group.

1. What type of classification is applied here? **(2 Marks)**

Ans: The classification applied here is a quantitative classification. The data is grouped based on measurable income levels into class intervals, which allows for easier comparison and analysis of numerical data across different income brackets.

2. State the benefit of converting raw income data into grouped data. **(2 Marks)**

Ans: Grouping raw data makes it simpler to analyze large and diverse information. In this case, individual income values are numerous and scattered. Grouping them into ranges helps in identifying patterns, such as which income range is most common and whether income is evenly distributed. It simplifies complex data and improves clarity.

3. How can tabulation further help the researcher after classification? **(2 Marks)**

Ans: After classification, **tabulation** helps present the grouped data in a neat, structured form using rows and columns. For example, income intervals can be listed in rows with the number of households in adjacent columns. This makes it easier to compare data, spot trends, and perform statistical calculations like mean or median. It also enhances readability and improves visual presentation for reports or charts.

Unsolved Numerical Questions

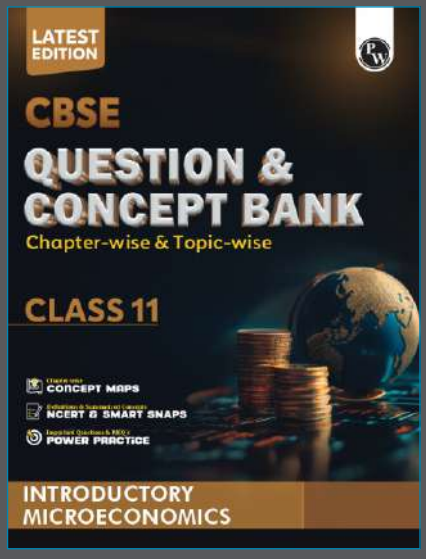
1. Convert the following 'more than' cumulative frequency distribution into a 'less than' cumulative frequency distribution

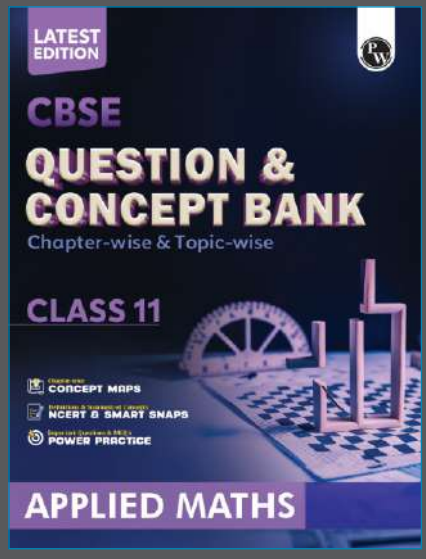
Class-Interval (More than)	10	20	30	40	50	60	70	80
Frequency	124	119	107	84	55	31	12	2

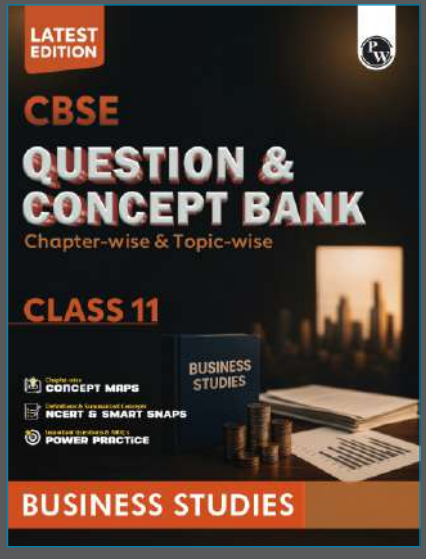
2. Students of the class obtained the following marks in mathematics. Convert the data of the inclusive series into the exclusive series.

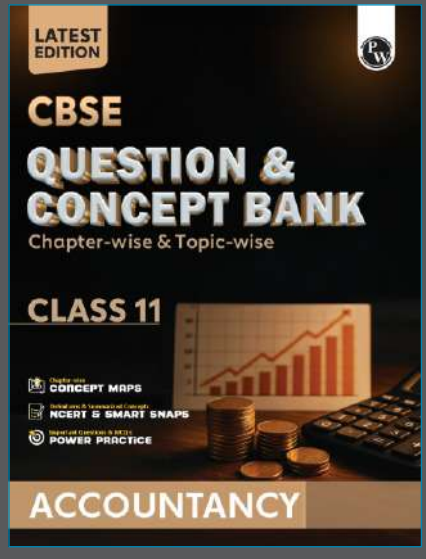
Marks	5-9	10-14	15-19	20-24	25-29
Frequency	3	5	10	4	2

Other books in this series









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