



Chapter 7: Statistics & Data Interpretation

Chapter 1 — Data Tabulation | Detailed Notes & Solved Examples

1. What Is Data?

Data means a collection of facts, figures, observations or measurements gathered for a particular purpose. For example, the marks of students, daily temperatures, monthly sales and population figures are all forms of data.

Raw data is often difficult to understand when it contains many values. Tabulation helps us arrange it in a clear and meaningful form.

2. Meaning of Data Tabulation

Tabulation is the systematic arrangement of data in rows and columns. A table makes a large amount of information easier to read, compare and analyse.

Raw Data → Classification → Tabulation → Interpretation

3. Why Do We Tabulate Data?

- It makes a large set of data easy to understand.
- It allows quick comparison between categories.
- It helps us identify maximum, minimum and repeated values.
- It provides the base for graphs and charts.
- It makes calculations such as totals, averages and percentages easier.
- It reduces confusion caused by unorganised raw data.

4. Important Parts of a Table

Part	Meaning
Table number	Identification number given to a table
Title	Explains what the table represents
Headnote	Additional information about units or coverage
Captions	Headings of columns
Stubs	Headings of rows
Body	Actual numerical or descriptive data
Source	Shows where the information came from, when required
Footnote	Provides clarification about a particular entry

5. Raw Data

Raw data is information in the form in which it was originally collected. It has not yet been arranged into classes or a frequency table.

Example: 12, 15, 10, 18, 12, 14, 15, 12, 16, 10.

Looking at this list, we can see the values, but counting repetitions is inconvenient. A frequency table makes the pattern clearer.

6. Array

An array is raw data arranged in ascending or descending order.



For the data 12, 15, 10, 18, 12, 14, 15, 12, 16, 10, the ascending array is:

10, 10, 12, 12, 12, 14, 15, 15, 16, 18

An array helps us quickly identify the smallest value, largest value and range.

7. Frequency

Frequency tells us how many times a value occurs.

Frequency = Number of occurrences of a value

Example 1

For the data 2, 3, 2, 5, 4, 2, 3, find the frequency of 2 and 3.

The value 2 occurs three times.

The value 3 occurs two times.

Answer: Frequency of 2 = 3; frequency of 3 = 2

8. Frequency Distribution

A frequency distribution is a table showing the values or classes of a variable together with their frequencies.

Marks	Frequency
10	2
12	3
14	1
15	2
16	1
18	1

9. Tally Marks

Tally marks provide a quick way to count observations. The first four observations are shown as four vertical strokes and the fifth crosses them, forming a group of five.

After tallying all observations, the groups are converted into numerical frequencies.

10. Discrete and Continuous Data

Discrete data consists of separate countable values. Examples include number of children, number of books and number of vehicles.

Continuous data can take any value within an interval. Examples include height, weight, time and temperature.

11. Ungrouped Frequency Distribution

When each individual value is shown separately with its frequency, the table is called an ungrouped frequency distribution. It is suitable when the number of different values is small.

12. Grouped Frequency Distribution

When the data covers a wide range, values are grouped into class intervals such as 0–10, 10–20 and 20–30.

Each interval is called a class interval, and the number of observations in it is its class frequency.



13. Class Interval

A class interval is the range covered by a class.

For example, in the class 20–30, 20 is the lower class limit and 30 is the upper class limit.

$$\text{Class width} = \text{Upper class boundary} - \text{Lower class boundary}$$

14. Inclusive and Exclusive Classes

In the inclusive method, both class limits are included in the class, for example 10–19, 20–29, 30–39.

In the exclusive method, the upper limit of one class becomes the lower limit of the next, for example 10–20, 20–30, 30–40. The upper endpoint is excluded from the preceding class.

15. Class Mark or Mid-Value

The class mark is the midpoint of a class interval.

$$\text{Class Mark} = (\text{Lower Limit} + \text{Upper Limit}) / 2$$

Example 2

Find the class mark of the interval 20–30.

$$\text{Class mark} = (20 + 30)/2.$$

$$= 50/2 = 25.$$

Answer: 25

16. Range

Range tells us the spread between the largest and smallest observations.

$$\text{Range} = \text{Maximum Value} - \text{Minimum Value}$$

Example 3

Find the range of 12, 18, 9, 25, 14 and 20.

$$\text{Maximum value} = 25.$$

$$\text{Minimum value} = 9.$$

$$\text{Range} = 25 - 9 = 16.$$

Answer: 16

17. Cumulative Frequency

Cumulative frequency is the running total of frequencies. It tells us how many observations lie up to or below a particular class.

Class	Frequency	Cumulative Frequency
0–10	3	3
10–20	5	8

20-30	7	15
30-40	5	20

18. Less-Than Cumulative Frequency

In a less-than cumulative frequency table, frequencies are added from the lowest class upward. It answers questions such as 'How many observations are less than 30?'.

19. More-Than Cumulative Frequency

In a more-than cumulative frequency table, counting begins from the total frequency and frequencies are successively subtracted. It answers questions such as 'How many observations are 20 or more?'.

20. Relative Frequency

Relative frequency shows the proportion of the total observations belonging to a particular category.

$$\text{Relative Frequency} = \text{Class Frequency} / \text{Total Frequency}$$

$$\text{Percentage Frequency} = (\text{Class Frequency} / \text{Total Frequency}) \times 100$$

Example 4

In a class of 40 students, 10 students scored in a particular interval. Find its relative and percentage frequency.

$$\text{Relative frequency} = 10/40 = 0.25.$$

$$\text{Percentage frequency} = 0.25 \times 100 = 25\%.$$

Answer: Relative frequency = 0.25; Percentage = 25%

21. Two-Way Table

A two-way table displays data according to two different characteristics at the same time. For example, students may be classified by gender and by whether they passed or failed.

Category	Pass	Fail	Total
Group A	18	2	20
Group B	16	4	20
Total	34	6	40

22. Reading a Table Correctly

- Read the title first.
- Check the unit used in the table.
- Read row and column headings carefully.
- Locate the correct row and column before taking a value.
- Check whether figures are actual values, percentages, thousands or lakhs.
- For comparison, calculate differences, ratios or percentages only when needed.

23. Percentage from a Table

$$\text{Percentage} = (\text{Required Value} / \text{Total Value}) \times 100$$

Example 5

A table shows that 45 out of 60 students passed. Find the pass percentage.

$$\text{Pass percentage} = 45/60 \times 100.$$

$$= 75\%.$$

Answer: 75%

24. Percentage Increase and Decrease

$$\text{Percentage Change} = (\text{Change} / \text{Original Value}) \times 100$$

Example 6

Sales increased from 200 units to 250 units. Find the percentage increase.

$$\text{Increase} = 250 - 200 = 50.$$

$$\text{Percentage increase} = 50/200 \times 100.$$

$$= 25\%.$$

Answer: 25%

Example 7

Production decreased from 500 units to 425 units. Find the percentage decrease.

$$\text{Decrease} = 500 - 425 = 75.$$

$$\text{Percentage decrease} = 75/500 \times 100.$$

$$= 15\%.$$

Answer: 15%

25. Ratio from Tabulated Data

Example 8

A table shows 120 male employees and 80 female employees. Find the ratio of males to females.

$$\text{Required ratio} = 120 : 80.$$

Divide both terms by 40.

$$\text{Ratio} = 3 : 2.$$

Answer: 3 : 2

26. Difference and Comparison

Example 9

A company sold 340 units in January and 415 units in February. By how many units did sales increase?

Increase = February sales – January sales.

$$= 415 - 340 = 75.$$

Answer: 75 units

27. Average from Tabulated Values

When individual values and their frequencies are given, the total of all observations can be obtained by multiplying each value by its frequency.

$$\text{Mean} = \Sigma fx / \Sigma f$$

Example 10

Values 10, 20 and 30 have frequencies 2, 3 and 5 respectively. Find the mean.

$$\Sigma f = 2 + 3 + 5 = 10.$$

$$\Sigma fx = 10 \times 2 + 20 \times 3 + 30 \times 5 = 20 + 60 + 150 = 230.$$

$$\text{Mean} = 230/10 = 23.$$

Answer: 23

28. Missing Frequency — Simple Example

Example 11

The frequencies of four categories are 8, 12, x and 10. If the total frequency is 40, find x.

$$8 + 12 + x + 10 = 40.$$

$$30 + x = 40.$$

$$x = 10.$$

Answer: 10

29. Building a Frequency Table from Raw Data

Example 12

Prepare frequencies for the data: 1, 2, 3, 2, 4, 1, 2, 3, 4, 2.

Count each value carefully.

1 occurs 2 times.

2 occurs 4 times.

3 occurs 2 times.

4 occurs 2 times.

Check: $2 + 4 + 2 + 2 = 10$ observations.

Answer: Frequencies: 1→2, 2→4, 3→2, 4→2

30. Grouped Table Example

Example 13

The marks of 20 students are grouped as 0–10: 3, 10–20: 5, 20–30: 8, 30–40: 4. Find the class with the highest frequency and the total frequency.

The frequencies are 3, 5, 8 and 4.

Highest frequency is 8, corresponding to class 20–30.

Total frequency = $3 + 5 + 8 + 4 = 20$.

Answer: Highest-frequency class = 20–30; Total = 20

31. Cumulative Frequency Example

Example 14

Frequencies for four classes are 4, 6, 5 and 3. Find the less-than cumulative frequencies.

First cumulative frequency = 4.

Second = $4 + 6 = 10$.

Third = $10 + 5 = 15$.

Fourth = $15 + 3 = 18$.

Answer: 4, 10, 15, 18

32. Percentage Distribution Example

Example 15

A survey of 200 people shows that 50 prefer option A, 80 prefer B and 70 prefer C. Find the percentage for each option.

$A = 50/200 \times 100 = 25\%$.

$B = 80/200 \times 100 = 40\%$.

$C = 70/200 \times 100 = 35\%$.

Check: $25 + 40 + 35 = 100\%$.

Answer: A = 25%, B = 40%, C = 35%

33. Important Checks in Tabulation

- The sum of all frequencies must equal the total number of observations.
- Percentage frequencies should total 100%, apart from small rounding differences.
- Class intervals should not overlap.
- Classes should cover the complete range of data.
- Use the same unit throughout a table.
- A table should have a clear title and meaningful headings.

34. Common Mistakes

- Confusing frequency with cumulative frequency.
- Using the wrong total while calculating percentages.
- Reading a value from the wrong row or column.
- Creating overlapping class intervals.
- Forgetting that class mark is the midpoint, not the class width.
- Using the new value instead of the original value as the denominator in percentage change.
- Forgetting to check that all frequencies add to the total.

35. Quick Revision Table

Concept	Key Point / Formula
Frequency	Number of times a value occurs
Range	Maximum – Minimum
Class mark	(Lower limit + Upper limit)/2
Cumulative frequency	Running total of frequencies
Relative frequency	f / N
Percentage frequency	$f/N \times 100$
Percentage change	Change/Original $\times 100$
Mean from frequency table	$\Sigma fx / \Sigma f$

36. Final Formula Sheet

Range = Maximum Value – Minimum Value

Class Mark = (Lower Limit + Upper Limit) / 2

Relative Frequency = f / N

Percentage Frequency = $(f / N) \times 100$

Percentage = (Required Value / Total Value) $\times 100$

Percentage Change = (Change / Original Value) $\times 100$

Mean from Frequency Table = $\Sigma fx / \Sigma f$



Data tabulation becomes easy when you first understand what each row and column represents. Read the title and units carefully, identify the required values, and only then perform the calculation.