Chapter 4: Presentation of Data

Exercises — Presentation of Data

Q1 Bar diagram is a
(i) one-dimensional diagram
(ii) two-dimensional diagram
(iii) diagram with no dimension
(iv) none of the above

SOLUTION

A bar diagram uses only one dimension — the height (or length) of the bar — to represent the magnitude of data.
The width of the bar is kept uniform and carries no information; only the height matters for comparison.
Therefore, a bar diagram is a one-dimensional diagram.

Answer: (i) one-dimensional diagram

Q2 Data represented through a histogram can help in finding graphically the
(i) mean
(ii) mode
(iii) median
(iv) all the above

SOLUTION

A histogram can be used to locate the mode graphically: the modal class is the rectangle with the greatest height, and a simple geometric construction (joining the top corners of the tallest rectangle to those of its neighbours) gives the mode on the x-axis.
A histogram alone does not directly yield the mean or median graphically — the ogive (cumulative frequency curve) is used for the median.
Therefore, among the given options, only the mode can be found graphically from a histogram.

Answer: (ii) mode

Q3 Ogives can be helpful in locating graphically the
(i) mode
(ii) mean
(iii) median
(iv) none of the above

SOLUTION

An ogive is a cumulative frequency curve.
When the 'less than' and 'more than' ogives are drawn on the same graph, their point of

intersection corresponds to the median of the frequency distribution.
The x-coordinate of this intersection point gives the median value.
Ogives are not used to locate the mode or mean graphically.

Answer: (iii) median

Q4 Data represented through arithmetic line graph help in understanding
(i) long term trend
(ii) cyclicity in data
(iii) seasonality in data
(iv) all the above

SOLUTION

An arithmetic line graph (time series graph) plots the value of a variable against time on the x-axis and joins the points with straight lines.
It helps in understanding: (i) long-term trend — the overall direction of the data over a long period; (ii) cyclicity — regular wave-like rises and falls over longer cycles; (iii) seasonality — regular patterns that repeat within a year (e.g., monthly rainfall).
All three features can be read from a time series line graph.

Answer: (iv) all the above

Q5 Width of bars in a bar diagram need not be equal (True/False).

SOLUTION

In a bar diagram, only the height of the bar conveys information (the magnitude of the data).
The width of bars is kept uniform purely for visual clarity, but it is not a strict requirement — the chapter states that the width and spacing are arbitrary and what matters is the height.
However, keeping widths equal is the standard convention so that no bar appears more important than another due to its width.
The statement is True: width need not strictly be equal, as it carries no data information in a bar diagram.

Answer: True

Q6 Width of rectangles in a histogram should essentially be equal (True/False).

SOLUTION

In a histogram, both width and height carry information — the area of each rectangle is proportional to the class frequency.
When class intervals are equal, the widths are equal and heights represent frequencies directly.
When class intervals are unequal, widths differ and heights must be adjusted to frequency density (frequency ÷ class width) so that areas remain proportional to frequency.

So widths in a histogram need NOT be equal; unequal class intervals are perfectly valid, provided frequency density is used as the height.
The statement is False.

Answer: False

Q7 Histogram can only be formed with continuous classification of data (True/False).

SOLUTION

A histogram is designed for continuous data where class boundaries of consecutive intervals touch each other (no gap between rectangles).
If the data are in discrete classes, they are first converted into continuous classes (by adjusting class boundaries) before drawing a histogram.
The chapter explicitly states: 'If the classes are not continuous they are first converted into continuous classes.'
So histograms require a continuous scale on the x-axis. The statement is True.

Answer: True

Q8 Histogram and column diagram are the same method of presentation of data. (True/False)

SOLUTION

Although both a histogram and a column (bar) diagram use rectangles, they differ in important ways:
1. Histogram: no space between adjacent rectangles (bars touch); used only for continuous data; both width and height convey information (area $\propto$ frequency).
2. Bar (column) diagram: space is left between consecutive bars; used for discrete variables or attributes; only height matters (width is arbitrary and carries no information).
They are NOT the same method of presentation.
The statement is False.

Answer: False

Q9 Mode of a frequency distribution can be known graphically with the help of histogram. (True/False)

SOLUTION

Yes. In a histogram, the tallest rectangle represents the modal class.
To find the mode graphically: from the top-right corner of the tallest bar draw a line to the top-right corner of the bar to its left; from the top-left corner of the tallest bar draw a line to the top-left corner of the bar to its right. The x-coordinate of their intersection is the mode.
The chapter confirms this at Figure 4.5: 'the x-coordinate of the dotted vertical line gives the mode.'

The statement is True.

Answer: True

Q10 Median of a frequency distribution cannot be known from the ogives. (True/False)

SOLUTION

The median CAN be found from the ogives.
When the 'less than' ogive and the 'more than' ogive are drawn on the same graph, they intersect at a point. The x-coordinate of this intersection point gives the median of the frequency distribution (as shown in Figure 4.8(b) of the chapter).
The statement is False.

Answer: False

Q11 What kind of diagrams are more effective in representing the following?
(i) Monthly rainfall in a year
(ii) Composition of the population of Delhi by religion
(iii) Components of cost in a factory

SOLUTION

(i) Monthly rainfall in a year:
A bar diagram (simple bar diagram with one bar per month) or an arithmetic line graph (time series graph) is most effective. Since rainfall is a time-based variable measured month by month, a bar diagram clearly shows each month's rainfall and allows easy comparison. A line graph is also appropriate for showing the trend and seasonality across months.

(ii) Composition of the population of Delhi by religion:
A pie diagram (pie chart) is most effective. The population is divided into religious components that together make up the whole (100%). A pie chart visually shows each religion's share as a proportion of the total circle, making composition immediately clear. A component bar diagram could also be used.

(iii) Components of cost in a factory:
A component bar diagram (sub-divided bar diagram) or a pie diagram is most effective. Both show how the total cost is broken into its parts (raw materials, labour, overheads, etc.). A pie chart emphasises the proportions of each cost component out of the total.

Answer: (i) Bar diagram or arithmetic line graph; (ii) Pie diagram; (iii) Component bar diagram or pie diagram

Q12 Suppose you want to emphasise the increase in the share of urban non-workers and lower level of urbanisation in India as shown in Example 4.2. How would you do it in the tabular form?

SOLUTION

To emphasise these two facts, present a table that computes percentage shares directly, so the high non-worker share in urban areas and the low urban share of total population are immediately visible as numbers.

Using data from Table 4.5 (Census of India 2001, figures in crore):

Non-worker share by location:

Location	Workers	Non-workers	Total	Non-worker share (%)
Rural	31	43	74	58.1
Urban	9	19	28	67.9
All India	40	62	102	60.8

The urban non-worker share (67.9%) is noticeably higher than the rural share (58.1%) and the national average (60.8%). This is highlighted directly by the percentage column.

Urbanisation level:

Population (crore)	Share of total (%)
Urban: 28	27.5
Rural: 74	72.5
Total: 102	100.0

Only 27.5% of India's population was urban in 2001, showing a low level of urbanisation.

By placing both these computed percentage columns in the table, the reader immediately sees the high urban non-worker share alongside the low share of urban population in the total.

Answer: Construct a table showing non-worker percentage by location (Urban: 67.9%, Rural: 58.1%) and a separate row showing urban population as only 27.5% of India's total, directly highlighting both facts.

Q13 How does the procedure of drawing a histogram differ when class intervals are unequal in comparison to equal class intervals in a frequency table?

SOLUTION

When class intervals are equal:
All rectangles have the same base (width). The height of each rectangle is set equal to the frequency of that class interval. Since all widths are equal, the area of each rectangle (width × height) is directly proportional to frequency, and heights can be compared directly.

When class intervals are unequal:
Rectangles have different base widths. If frequencies were plotted as heights, rectangles with wider bases would have larger areas and appear more important even if their frequency is not higher — this would be misleading.
To correct this, frequency density is used as the height instead of frequency:
Frequency density = Frequency ÷ Width of class interval
This ensures that the area of each rectangle (base × height = width × frequency density = frequency) remains proportional to the class frequency.

In summary: equal intervals → height = frequency; unequal intervals → height = frequency density.

Answer: For equal class intervals, height of each rectangle = frequency. For unequal class intervals, height = frequency density (frequency ÷ class width), so that area, not height, remains proportional to frequency.

Q14 The Indian Sugar Mills Association reported that, 'Sugar production during the first fortnight of December 2001 was about 3,87,000 tonnes, as against 3,78,000 tonnes during the same fortnight last year (2000). The off-take of sugar from factories during the first fortnight of December 2001 was 2,83,000 tonnes for internal consumption and 41,000 tonnes for exports as against 1,54,000 tonnes for internal consumption and nil for exports during the same fortnight last season.'
(i) Present the data in tabular form.
(ii) Suppose you were to present these data in diagrammatic form which of the diagrams would you use and why?
(iii) Present these data diagrammatically.

SOLUTION

(i) Tabular form:

Sugar Data — First Fortnight of December (in tonnes):

Item	Dec 2000	Dec 2001
Sugar Production	3,78,000	3,87,000
Off-take: Internal consumption	1,54,000	2,83,000
Off-take: Export	0	41,000
Off-take: Total	1,54,000	3,24,000

Verification: Dec 2001 off-take total = 2,83,000 + 41,000 = 3,24,000 tonnes. Dec 2000 off-take total = 1,54,000 + 0 = 1,54,000 tonnes.

(ii) Diagram choice:
A multiple bar diagram is most suitable. The data compare two time periods (Dec 2000 and Dec 2001) across multiple categories (production, internal off-take, export off-take). A multiple

bar diagram places grouped bars side by side for each category, making cross-period comparisons easy and immediate.
Alternatively, a component bar diagram could show the composition of off-take (internal vs. export) for each year.

(iii) How to draw the multiple bar diagram:
Step 1 — Draw the x-axis and mark four groups: 'Production', 'Internal Off-take', 'Export Off-take', 'Total Off-take'.
Step 2 — Within each group, draw two bars side by side: one for Dec 2000 (shade/colour A) and one for Dec 2001 (shade/colour B).
Step 3 — Scale the y-axis in tonnes. Suggested y-axis range: 0 to 4,00,000 tonnes.
Step 4 — Bar heights:
Production: Dec 2000 = 3,78,000; Dec 2001 = 3,87,000
Internal Off-take: Dec 2000 = 1,54,000; Dec 2001 = 2,83,000
Export Off-take: Dec 2000 = 0; Dec 2001 = 41,000
Total Off-take: Dec 2000 = 1,54,000; Dec 2001 = 3,24,000
Step 5 — Label the axes ('Categories' on x-axis, 'Quantity in tonnes' on y-axis) and add a legend distinguishing Dec 2000 and Dec 2001 bars.

Answer: (i) Table with rows for production, internal off-take, export off-take, and total off-take, and columns for Dec 2000 and Dec 2001. (ii) Multiple bar diagram — best for comparing two periods across multiple categories. (iii) Draw grouped bars as described; bar heights: Production 3,78,000 vs 3,87,000; Internal 1,54,000 vs 2,83,000; Export 0 vs 41,000; Total 1,54,000 vs 3,24,000.

Q15 The following table shows the estimated sectoral real growth rates (percentage change over the previous year) in GDP at factor cost.

Year	Agriculture and allied sectors	Industry	Services
1994–95	5.0	9.2	7.0
1995–96	–0.9	11.8	10.3
1996–97	9.6	6.0	7.1
1997–98	–1.9	5.9	9.0
1998–99	7.2	4.0	8.3
1999–2000	0.8	6.9	8.2

Represent the data as multiple time series graphs.

SOLUTION

A multiple time series graph (arithmetic line graph) is required, with three lines — one for each sector.

How to plot:
Step 1 — Draw x-axis and mark six points for years: 1994-95, 1995-96, 1996-97, 1997-98, 1998-99, 1999-2000.
Step 2 — Draw y-axis for growth rate (%). Scale must accommodate negative values. Suggested range: -4% to +14%.

Step 3 — Plot the following three sets of points and join each with a separate line (use different colours or dash styles):

Agriculture and allied sectors:

Year	Growth rate (%)
1994-95	5.0
1995-96	-0.9
1996-97	9.6
1997-98	-1.9
1998-99	7.2
1999-2000	0.8

Industry:

Year	Growth rate (%)
1994-95	9.2
1995-96	11.8
1996-97	6.0
1997-98	5.9
1998-99	4.0
1999-2000	6.9

Services:

Year	Growth rate (%)
1994-95	7.0
1995-96	10.3
1996-97	7.1
1997-98	9.0
1998-99	8.3
1999-2000	8.2

Step 4 — Label axes: 'Year' on x-axis, 'Growth Rate (%)' on y-axis.
Step 5 — Add a legend identifying the three lines (Agriculture, Industry, Services).

Interpretation: The Services sector shows the most stable growth (7.0%–10.3% throughout).

Industry shows a high of 11.8% in 1995-96 before declining. Agriculture is most volatile, with negative growth in 1995-96 (-0.9%) and 1997-98 (-1.9%).

Answer: Draw three lines on the same graph: Agriculture (volatile, ranges from -1.9% to 9.6%), Industry (declining trend from 11.8% to 6.9%), Services (stable, 7.0%–10.3%). Plot all six years on x-axis and growth rate % on y-axis with a range that includes negative values.