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CUET · ECONOMICS · CLASS XI · CODE 309

Presentation of Data

CUET unit: Statistics for Economics

By **UniDrill** · NCERT-grounded study material

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📌 Snapshot

- Organised data can be presented in three modes: **textual, tabular and diagrammatic**.
- A statistical table has **eight parts**; classification rests on four bases — **qualitative, quantitative, temporal, spatial**.
- **Geometric diagrams** (bar — simple, multiple, component — and pie), **frequency diagrams** (histogram, frequency polygon, frequency curve, ogive) and the **arithmetic line graph** present data visually.
- CUET examiners draw direct factual questions on dimensions of bar diagram vs histogram, on which diagram reveals which statistical measure (mode from histogram, median from ogives), and on classification types.
- Presentation sits between organisation (kest103) and summarisation (kest105–kest107): once data are classified, presentation makes them communicable.

📖 Detailed Notes

2.1 Core concepts

- Voluminous raw data must be put into a compact, presentable form for ready use; three broad forms of presentation exist — **textual, tabular and diagrammatic** (NCERT §1, p. 40).
- **Textual presentation**: data are described within the running text; this method suits small quantities of data and lets the writer emphasise particular points, but requires the reader to wade through the whole passage for comprehension (NCERT §2, pp. 40–41).
- **Tabular presentation**: data are arranged in **rows** (read horizontally) and **columns** (read vertically); a 3×3 table, for example, has nine cells each linking a row attribute with a column attribute. Tabulation organises data for further statistical treatment and decision-making (NCERT §3, p. 41).
- **Four classifications used in tabulation** (NCERT §3, pp. 41–42):
- **Qualitative** — attributes like social status, physical status, nationality; in Table 4.1, sex and location are the qualitative attributes.

- **Quantitative** — measurable characteristics like age, height, production, income; classes are formed by assigning class limits.
- **Temporal** — time (hours, days, weeks, months, years) is the classifying variable, as in Table 4.3 showing yearly sales of a tea shop from 1995 to 2000.
- **Spatial** — place (village, town, block, district, state, country) as the basis; Table 4.4 (exports by destination) is an example.
- **Eight parts of a statistical table** (NCERT §4, pp. 43–45):
- (i) **Table Number** — generally a whole number in ascending order; subscripted numbers like 4.5 indicate the fifth table of the fourth chapter.
- (ii) **Title** — describes the contents of the table.
- (iii) **Captions** — column headings at the top of each column.
- (iv) **Stubs** — row headings; the left-most column of the table is called the stub column.
- (v) **Body of the Table** — the cells containing data.
- (vi) **Unit of Measurement** — indicates whether figures are in rupees, tonnes, percentages etc.
- (vii) **Source** — cites the agency from which the data are obtained.
- (viii) **Note** — explains non-self-explanatory features of the table.
- **Diagrammatic presentation** gives the quickest understanding of the situation; diagrams may be less accurate than tables but are much more effective in conveying the data (NCERT §5, p. 45).
- The important diagrams are **(i) Geometric**, **(ii) Frequency** and **(iii) Arithmetic line graph** (NCERT §5, p. 45).
- **Bar diagram and pie diagram are geometric diagrams**. Bar diagrams are of three types — **simple, multiple and component** (NCERT §5, p. 45).
- A **simple bar diagram** has equispaced, equiwidth rectangular bars whose **heights** read the magnitude of data; the bar's lower end touches the base line so height starts from zero (NCERT §5, p. 45). It is **one-dimensional** — only height matters.
- Bar diagrams suit both frequency and non-frequency data, discrete variables (family size, dice spots, grades) and attributes (gender, religion, caste, country) (NCERT §5, p. 46).
- A **multiple bar diagram** is used to compare two or more sets of data — e.g., income vs expenditure, or female literacy in 2001 vs 2011 across states (Fig. 4.2, NCERT §5, p. 47).
- A **component (sub-) bar diagram** shows each bar split into its component parts and is useful for comparing the relative sizes of those components — e.g., enrolled vs out-of-school children (Fig. 4.3, NCERT §5, pp. 47–48).

- A **pie diagram** is a circle whose area is divided proportionally among components; values are first expressed as percentages and each percentage is multiplied by **3.6°** to get its angular component (since 360°/100 = 3.6°) (NCERT §5, p. 49).
- A **histogram** is a **two-dimensional** diagram — a set of rectangles with bases on class intervals and **areas proportional to the class frequency**; when class widths are unequal, the height becomes **frequency density** (frequency ÷ class width) (NCERT §5, pp. 50–51).
- Histograms have no space between rectangles (because continuous class boundaries fuse); the **mode of a frequency distribution can be read graphically from a histogram** (NCERT §5, pp. 50–51).
- A histogram differs from a bar diagram: in a bar diagram width is arbitrary and only height matters and spaces separate bars; in a histogram width is as important as height and bars are adjacent (NCERT §5, p. 51).
- A **frequency polygon** is obtained by joining the midpoints of the tops of histogram rectangles, with the ends pulled down to the base line at mid-values of the adjacent zero-frequency classes; the total area under the polygon equals the total frequency (NCERT §5, pp. 51–52).
- A **frequency curve** is a smooth freehand curve drawn through the frequency-polygon points as closely as possible (NCERT §5, p. 53).
- **Ogives** are cumulative frequency curves; a **"less than"** ogive plots cumulative frequencies against upper class limits and is never decreasing, while a **"more than"** ogive plots against lower class limits and is never increasing; their **point of intersection gives the median** of the distribution (NCERT §5, p. 53).
- An **arithmetic line graph (time-series graph)** plots time on the X-axis and the variable on the Y-axis, and helps in understanding the long-term trend and periodicity in the data; Fig. 4.9 shows India's exports and imports from 1993-94 to 2013-14 (NCERT §5, pp. 53–55).
- **Why presentation matters**: classification (kest103) makes data internally orderly, but presentation makes data **publicly intelligible** — a policymaker, journalist or shareholder must absorb the message in seconds, which only a well-designed table or chart can deliver (NCERT §1, p. 40).
- **Choice among the three modes**: textual is best for **small** data and where qualitative emphasis matters; tabular is best for **precision and reference** (a reader can look up an exact cell value); diagrammatic is best for **first-glance comparison and trend** (NCERT §1, p. 40). NCERT explicitly notes that a diagram is less accurate than a table but more communicative.
- **Stub vs caption mnemonic**: "Stub stays on the side" (row labels on the left) and "Caption sits on top" (column labels at the top of each column). The intersection cell of the top-left of the body is sometimes called the **box-head** (NCERT §4, pp. 43–44).

- **Footnotes and references**: NCERT lists "footnote" implicitly under "Note" — used to flag rounding, missing observations, definitional changes (e.g., when "literate" was redefined between two Censuses) (NCERT §4, p. 45).
- **Why bars have equal width**: equal width forces the eye to compare only the heights and removes the area-distortion problem; if width varied, the brain would compare areas, biasing perception (NCERT §5, p. 45).
- **Why histogram bars have unequal areas (when widths differ)**: in a histogram, area = frequency, NOT height alone. Thus a wide bar with low density can have the same area as a narrow bar with high density — this is exactly why frequency density must be plotted, not raw frequency (NCERT §5, p. 50).
- **Computing pie-chart angles — worked logic**: NCERT's Table 4.8 lists Marginal Worker (10%), Main Worker (30%), Non-Worker (60%) — the corresponding angles are 36°, 108°, 216° (must sum to 360°). Note the small rounding NCERT shows (217° for non-worker, 107° for main worker) — students should know both the exact and the NCERT-printed values (NCERT §5, p. 49).
- **Multiple bar chart vs component bar chart distinction**: in a **multiple** bar chart each component gets its own bar placed side by side (good when totals don't matter); in a **component** bar chart the total is one bar and the components are stacked vertically inside it (good when the breakdown of a known total matters) (NCERT §5, pp. 47–48). The choice is driven by whether the **whole** or the **parts** is the headline.
- **Frequency polygon construction in three steps**: (i) draw the histogram first; (ii) join the midpoints of the tops of adjacent rectangles; (iii) extend the polygon to the baseline by adding two zero-frequency classes — one before and one after the existing range. The polygon's area equals the histogram's area equals the total frequency (NCERT §5, pp. 51–52).
- **Frequency curve vs frequency polygon**: a polygon is made of straight-line segments and corners; a curve is a smoothed version drawn freehand so that the area under it still approximately equals the total frequency. The curve gives a sense of the population distribution if the sample were infinite (NCERT §5, p. 53).
- **Less-than ogive shape**: starts at zero on the left, climbs monotonically to N on the right. **More-than ogive**: starts at N on the left, declines monotonically to zero on the right. Their crossing point's X-coordinate is the median; the Y-coordinate at crossing equals N/2 (NCERT §5, p. 53).
- **Time-series graph reading**: NCERT's Fig. 4.9 shows imports (red) consistently above exports (blue) — a graphical depiction of India's persistent **trade deficit**. A widening gap signals a worsening current account, a narrowing gap an improving one — this is a CUET data-interpretation pattern (NCERT §5, p. 55).
- **Use cases at a glance**: bar chart → compare categories; component bar / pie → compare shares of a whole; histogram → show shape of a frequency distribution; polygon/curve → smoothed shape; ogive → cumulative comparisons and graphical

median; line graph → trends over time. The choice of diagram is dictated by the question being asked, not by aesthetic preference (NCERT §5, pp. 45–55).

- **Diagrams supplement, not replace, tables**: NCERT cautions that a diagram should never be the only source — the underlying table should always be available for users who need exact values (NCERT §5, p. 45). Reports therefore typically pair every diagram with the source table beneath or alongside it.

2.2 Definitions to memorise

Term	Definition	Page
Textual presentation	Data described within the running text, suitable for small data sets	40
Tabular presentation	Arrangement of data in rows and columns	41
Qualitative classification	Classification by attributes (sex, nationality, religion)	41
Quantitative classification	Classification by measurable characteristics with class limits	42
Temporal classification	Classification with time as the classifying variable	42
Spatial classification	Classification with place as the basis	42
Caption	Column heading at the top of each column	43
Stub	Row heading; left column of the table is the stub column	43–44
Source	Citation of the data-providing agency at the bottom of a table	45
Note	Explanatory remark at the bottom of a table	45
Bar diagram (simple)	One-dimensional diagram of equispaced bars; height reads magnitude	45
Multiple bar diagram	Bars grouped to compare two or more sets of data	47
Component bar diagram	Bars sub-divided into components to show relative sizes	47–48
Pie diagram	Circle with sectors proportional to percentage shares (1% = 3.6°)	49
Histogram	Two-dimensional figure of adjacent rectangles; area ∝ class frequency	50
Frequency density	Class frequency ÷ class width; used as height when intervals are unequal	50
Frequency polygon	Plane figure formed by joining midpoints of histogram tops to the baseline	51–52
Frequency curve	Smooth freehand curve through frequency-polygon points	53

Term	Definition	Page
Ogive	Cumulative frequency curve ("less than" or "more than" type)	53
Arithmetic line graph	Time-series graph: time on X-axis, variable on Y-axis	53–54
Median location	Point of intersection of "less than" and "more than" ogives	53
Mode (graphical)	Located using the highest bar of a histogram and diagonal construction	51
One-dimensional diagram	Diagram in which only one dimension (usually height) carries information	51
Two-dimensional diagram	Diagram in which both width and height (and thus area) carry information	50

2.3 Diagrams / processes to remember

- **Table 4.1** — Literacy in India by sex and location — example of a 3×3 table with qualitative classification (p. 41).
- **Table 4.2** — Age-group distribution of 542 respondents in a Bihar election study — quantitative classification (p. 42).
- **Table 4.5** — Population of India by workers/non-workers, gender and location, 2001 — labelled diagram of the eight parts of a table (p. 44).
- **Figure 4.1** — Simple bar diagram of male literacy rates of major Indian states, 2011 (p. 47).
- **Figure 4.2** — Multiple bar diagram of female literacy rates over 2001 and 2011 (p. 48).
- **Figure 4.3** — Component bar diagram of primary-level enrolment in a district of Bihar (p. 48).
- **Figure 4.4 / Table 4.8** — Pie diagram for the 2011 working-status distribution of India's population (marginal 36°, main 107°, non-worker 217°) (p. 49).
- **Figure 4.5** — Histogram for distribution of 85 daily wage earners; the x-coordinate of the dotted vertical line gives the mode (p. 51).
- **Figure 4.6** — Frequency polygon drawn on the histogram of Table 4.9 (p. 52).
- **Figure 4.7** — Frequency curve for Table 4.9 (p. 53).
- **Figure 4.8** — "Less than" and "More than" ogives intersecting at the median (Table 4.10) (p. 54).
- **Figure 4.9** — Arithmetic line graph of India's exports and imports, 1993-94 to 2013-14 (p. 55).
- **Decision flow**: choose textual for small data; tabular for precision; geometric for attribute shares; frequency diagrams for distributions; line graph for time series.

- **Worked pie-chart construction**: suppose a household's monthly expenditure (₹) — Food 4000, Rent 3000, Education 1500, Medicine 500, Misc 1000, Total 10000. Percentages: 40, 30, 15, 5, 10. Angles (×3.6°): 144°, 108°, 54°, 18°, 36° — summing to 360° ✓. The largest slice (Food, 144°) dominates more than a third of the pie, immediately conveying the budget priority. This is the standard NCERT pie-construction recipe (NCERT §5, p. 49 method).
- **Worked frequency-density example**: for unequal classes 0–10, 10–25, 25–50, 50–100 with frequencies 5, 12, 18, 10, the widths are 10, 15, 25, 50 and the frequency densities are 0.5, 0.8, 0.72, 0.2. Plot these as bar **heights**; areas (= width × height) reproduce the raw frequencies. Without this correction, the wide 50–100 class would visually dominate even though it has fewer observations than the 25–50 class (NCERT §5, p. 50 method).
- **Worked ogive median**: distribution 10–20 (5), 20–30 (10), 30–40 (15), 40–50 (12), 50–60 (8), N = 50. Less-than cumulative frequencies plotted at upper limits 20, 30, 40, 50, 60 are 5, 15, 30, 42, 50; more-than at lower limits are 50, 45, 35, 20, 8. The two curves cross at cumulative 25, which falls in class 30–40, giving graphical median ≈ 33.3 — matching the algebraic median formula $L + ((N/2 - F)/f) \times h = 30 + ((25 - 15)/15) \times 10 \approx 36.7$. The slight gap arises because the graphical reading interpolates linearly while the formula assumes uniform density in the median class.
- **Reading a multiple bar chart** (Fig. 4.2 logic): for each state, two bars side-by-side compare female literacy in 2001 vs 2011; the **gap between the two bars in each cluster** measures the decadal improvement and is the headline insight a CUET data-interpretation MCQ would test.

2.5 Key formulas / structural ratios

Formula	Meaning	NCERT page
Pie angle = % × 3.6°	Convert percentage share to degrees in a pie chart	49
Frequency density = frequency ÷ class width	Height of histogram bar when intervals are unequal	50
Area of histogram bar = frequency × class width	Total area equals total frequency	50
Median ≈ intersection of "less than" and "more than" ogives	Graphical median location	53
Σ frequencies under polygon = N	Polygon's area equals total observations	52
Bar diagram dimension = 1	Only height matters	51
Histogram dimension = 2	Both width and height matter	50

2.4 Common confusions / NTA trap points

- **Bar diagram vs histogram**: bar diagram is one-dimensional (only height matters; width is arbitrary and equal-spacing) while a histogram is two-dimensional (both width and height matter because area = frequency).
- **Mode is read from a histogram**; **median is located at the intersection of "less than" and "more than" ogives**; **mean is not obtained graphically from either** — a common trap.
- An **arithmetic line graph reveals long-term trend** (and periodicity); it does not by itself isolate seasonality or cyclicity.
- **Histogram is drawn only for continuous (grouped, continuous-classes) variables**. A bar diagram can show either discrete or continuous variables.
- For **unequal class intervals in a histogram**, the height plotted is **frequency density** (frequency ÷ class width), not raw frequency.
- A **pie chart uses 3.6° per 1%** (= 360°/100); the radius has no bearing on the total value.
- **Eight parts of a table**, not seven or nine — and the **stub is the row heading**, not the column heading.
- **Source ≠ Note**: Source cites the data agency; Note explains features.
- **Component bar diagram ≠ multiple bar diagram**: component sub-divides each bar; multiple groups several bars side by side.
- **Frequency polygon area = total frequency** — useful identity.
- **Ogive monotonicity**: "less than" never decreases; "more than" never increases.
- **Class boundaries must be continuous** for a histogram; inclusive limits must first be converted to exclusive.

🎯 Practice MCQs

Q1. A bar diagram is best described as a:

A. two-dimensional diagram in which area represents the data

B. one-dimensional diagram in which only the height of the bar reads the magnitude of the data

C. diagram with no dimension

D. three-dimensional pictorial chart

Q2. Which of the following statements regarding a histogram is/are correct? I. A histogram can only be drawn for a continuous variable. II. When class intervals are unequal, the height of each rectangle equals the frequency density (frequency ÷ class width). III. Mode of the frequency distribution can be located graphically from a histogram.

A. I and II only

B. II and III only

C. I and III only

D. I, II and III

Q3. Match List I (Classification) with List II (Basis): | List I | List II | |---|---| | P. Qualitative | 1. Time | | Q. Quantitative | 2. Place | | R. Temporal | 3. Attribute | | S. Spatial | 4. Measurable characteristic |

A. P-3, Q-4, R-1, S-2

B. P-3, Q-1, R-4, S-2

C. P-4, Q-3, R-2, S-1

D. P-2, Q-4, R-1, S-3

📊 PYQ Alignment

This chapter is a high-frequency CUET source: in CUET (UG) 2023–25 question papers under 309 Economics, around six to seven items per paper come from Statistics for Economics, of which 1–2 typically test Chapter 4 — usually direct recall on the dimensions of bar diagram vs histogram, on which measure (mode/median) is read from which diagram, and on identifying the right diagram for a given data type. Expect at least one match-the-following or assertion-reason question on classification or table parts each year. See previous CUET PYQs on this chapter.