

Graphical Representation of Data

Class 12 Geography - Practical Work in Geography II - Ch 3

Why turn data into pictures

- DATA describe the properties of the things they represent (rainfall, population, exports, ~~etc.~~ etc.).
- Turning data into graphs, diagrams + maps = REPRESENTATION OF DATA. = 1000
- It makes patterns EASY to read + saves time; comparison becomes quick + leaves a long imprint.

What this chapter covers

- Line graph + Polygraph
- Bar diagrams (simple, multiple, compound)
- Line + bar combined + Pie diagram
- Flow map / chart (the 'Dynamic Map')
- Thematic maps: DOT, CHOROPLETH, ISOPLETH

Three big families of diagrams

- ONE-dimensional: line graph, bar, histogram, pyramid
- TWO-dimensional: pie diagram, rectangular diagram
- THREE-dimensional: cube + spherical diagrams

General Rules for Drawing

Before drawing ANY graph, diagram or map, three rules + a proper design must be followed.

1. Select a suitable method

- Match the theme to the right method:
 - temperature / population over time -> LINE GRAPH
 - rainfall / production amounts -> BAR DIAGRAM
 - distribution of people / cattle -> DOT MAP
 - density of population -> CHOROPLETH MAP

2. Select a suitable scale

- Scale is the MEASURE used to represent the data.
- It must cover the WHOLE data set; the scale should be neither too large nor too small.

3. Design

- An important cartographic task. Show carefully:
 - TITLE: area name + reference year + caption (top centre)
 - LEGEND / index: explains colours, shades, signs (usually at lower left or lower right of the sheet)
 - DIRECTION: north symbol, properly placed (maps)

Line Graph.

Drawn for TIME-SERIES data: temperature, rainfall, population growth, birth rates + death rates.

How to construct it

- (a) Simplify data into round numbers (e.g. 1.96 $\rightarrow$ 2.0).
- (b) Draw X + Y axes. TIME (years/months) on X axis, the VALUE (growth %, temp in C) on Y axis.
- (c) Choose a scale + label it on Y axis. If data has a negative figure, the scale must show it too.
- (d) Plot each value, mark with a DOT, join dots by a FREE-HAND line.

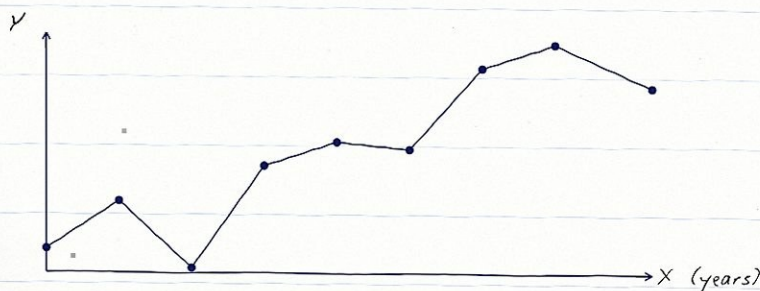


Fig: Annual growth of population, India

~~Trap: first axes X on axis~~

Line Graph: Worked Data

Ex 3.1: growth rate of India's population, 1901-2011.

YEAR	GROWTH RATE (%)
1901	-
1911	0.56
1921	-0.30
1931	1.04
1941	1.33
1951	1.25
1961	1.96
1971	2.20
1981	2.22
1991	2.14
2001	1.93
2011	1.79

Read the graph

- 1921 shows a **NEGATIVE** growth (-0.30%) due to the 1918-19 influenza epidemic + famines.
- Peak growth was 1981 (2.22%); it falls after that.

Polygraph

A line graph with TWO or MORE variables shown by an equal number of lines, for instant comparison.

When to use it

- Compare growth of rice, wheat + pulses together; or birth rate, death rate + life expectancy; or sex-ratio across different states.

Line patterns to tell lines apart

- straight line (———)
- broken line (- - -)
- dotted line (.....)
- dot-dash combination (- . - .) or different colours



Fig: sex-ratio of selected states 1961-2011

Bar Diagram

Drawn through COLUMNS of equal width. Also called a COLUMNAR diagram.

*

Rules for a bar diagram

- (a) Width of all bars / columns must be SAME.
- (b) All bars placed at EQUAL intervals / distance.
- (c) Bars may be shaded with colours or patterns to make them distinct + attractive.

Simple bar diagram

- Made for IMMEDIATE comparison. Arrange data in ascending / descending order, then plot.
- But TIME-SERIES data follows the time sequence, not sorted order. (Ex 3.3: rainfall of T'puram)

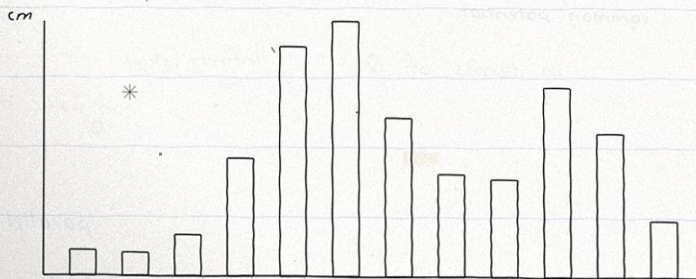


Fig: monthly rainfall, Thiruvananthapuram

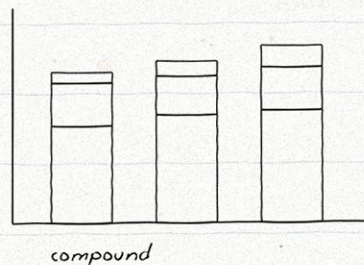
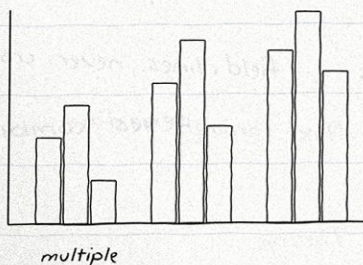
Multiple + Compound Bars

Multiple bar diagram

- Shows TWO or more variables SIDE BY SIDE for comparison (e.g. total, male + female literacy).
- Bars of one group stand TOGETHER, then a gap, then the next group. (Ex 3.5: literacy 1951-2011)

Compound (stacked) bar diagram

- Different COMPONENTS shown in a SINGLE bar, one on top of another, as different rectangles.
- Total length = the sum. (Ex 3.6: electricity = thermal + hydro + nuclear in one bar.)



Key: MULTIPLE = side by side

COMPOUND = stacked.

Line + Bar Graph Combined

A line graph + bar diagram in ONE diagram, used for closely linked data like CLIMATE.

The classic climograph (Ex 3.4)

- Months on X axis (divide into 12 parts).
- TEMPERATURE shown as a LINE; scale labelled on the RIGHT side of Y axis (interval 5 C or 10 C).
- RAINFALL shown as BARS; scale labelled on the LEFT side of Y axis (interval 5 cm or 10 cm).
- Two Y scales, one on each side: this is the trick.

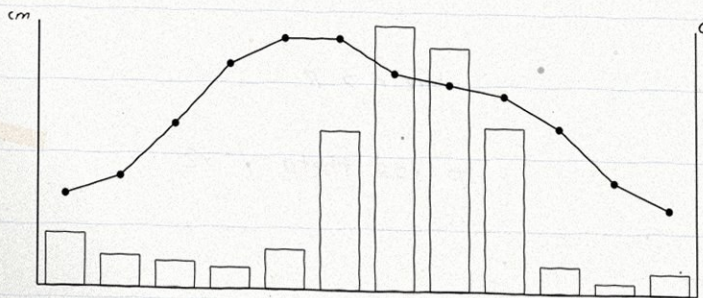


Fig: temperature + rainfall, Delhi

Pie Diagram

Shows the TOTAL value using a CIRCLE; the slices are the parts. Also called DIVIDED CIRCLE diagram.

Calculating the angle of each slice

$$\text{angle} = (\text{value} / \text{total}) \times 360 \quad \leftarrow \text{raw values}$$

$$\text{angle} = (\% \text{ of } x / 100) \times 360 \quad \% \text{ data}$$

- Shortcut for % data: just multiply % by 3.6 (since $360 / 100 = 3.6$).

Construction + precautions

- Arrange data in ASCENDING order; draw slices CLOCKWISE, starting with the SMALLEST angle.
- Circle: not too big, not too small (radius 3-5 cm).
- Add title, sub-title + a legend with distinct shades.

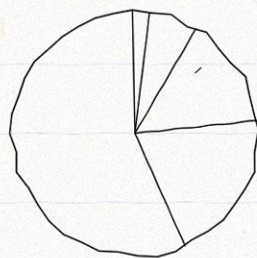
Trap: start ~~biggest~~ from SMALLEST angle (less error).

Pie Diagram: Worked Example

Ex 3.7: India's exports to world regions, 2010-11.

REGION	%	ANGLE
Others	2.3 *	8 deg
Africa	6.5	23 deg
America	14.8	53 deg
Europe	20.2	73 deg
Asia + ASEAN	56.2	203 deg
TOTAL	100	360 deg

The pie



Asia + ASEAN

= biggest slice

(56.2%, 203 deg)

Europe next at 20%

- Each % $\times 3.6 =$ its angle. Check: $56.2 \times 3.6 = 202.3$ rounded to 203 degrees.

Flow Map / Flow Chart

A combination of GRAPH + MAP. Also called the DYNAMIC MAP.

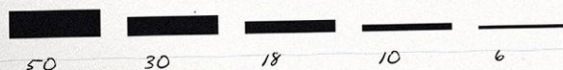
What it shows

- FLOW of goods or people between ORIGIN + DESTINATION. A transport map is the best example.
- Drawn using LINES OF PROPORTIONAL WIDTH: more traffic = thicker strip.
- Two types of data: (1) number / frequency of vehicles, (2) number of passengers or goods. *

How to make one (Ex 3.8)

- (a) Take an outline map with routes + nodal stations.
- (b) Pick a scale: e.g. 1 cm = 50 trains. So 50 trains → 10 mm strip, 6 trains → 1.2 mm strip.
- (c) Plot strips of matching thickness along each route.
- (d) Add a TERRACED SCALE as legend + mark stations.

terraced scale: No. of trains (thicker = more) *



Thematic (Distribution) Maps

• Graphs lack a REGIONAL view. Thematic maps show patterns over SPACE; also called distribution maps.

What every thematic map needs

- State / district level DATA on the chosen theme.
- An OUTLINE map with administrative boundaries.
- A PHYSICAL map of the region (relief / drainage).
- Show: area name, title, source + year, symbols, scale.

Quantitative vs qualitative

- QUANTITATIVE (statistical): show amounts, e.g. areas getting >200 cm, 100-200 cm rainfall, etc.
- QUALITATIVE: show non-measurable traits, e.g. just 'high' + 'low' rainfall areas (no exact figures).

Three quantitative maps we study

- DOT map $\rightarrow$ distribution (population; cattle)
- CHOROPLETH map $\rightarrow$ density / rates by admin unit
- ISOPLETH map $\rightarrow$ continuous data (temp, rainfall)

• Memory hook: DOTS count, CHORO shades, ISO joins equals.

Dot Map

Shows DISTRIBUTION of population, cattle, crops, etc. using dots of the SAME size.

Requirements

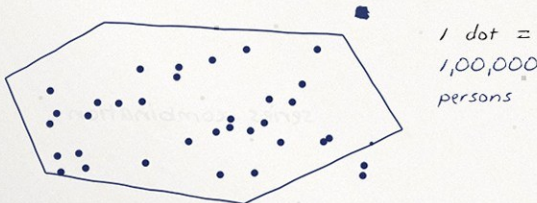
- Admin map (state / district / block boundaries).
- Statistical data per unit; a SCALE = value of one dot.
- Relief + drainage map (to thin dots in hills/desert).

Construction (Ex 3.10)

- Pick dot value, e.g. 1 dot = 1,00,000 people.
- No. of dots = population / dot value. Maharashtra = $9,67,52,247 / 1,00,000 = 967.5 \rightarrow$ rounded to 968 dots.
- Round 0.5 + UP; place fewer dots in hills / deserts.

Precautions

- Boundary lines must be THIN (not thick + bold).
- ALL dots must be the SAME size.



Choropleth Map

Uses SHADES / colours over admin units to show density, literacy, growth rate, sex ratio, etc.

Steps to follow (Ex 3.11: literacy 2001)

- (a) Arrange data in ascending / descending order.
- (b) Group into 5 classes: very high, high, medium, low, very low.
- (c) Class interval = $\text{Range} / 5$;
Range = max value - min value.
- (d) Shade darker for higher, lighter for lower values.

The literacy worked numbers

- Lowest = Bihar (47%), highest = Kerala (90.9%).
- Range = $91 - 47 = 44$. Interval = $44 / 5 = 8.8$
 - 47-56 Very low 56-65 Low 65-74 Medium
 - 74-83 High 83-92 Very high (Kerala, Mizoram)



light = very low → dark = very high

Trap: ~~of equal size~~ uses SHADES.

Isopleth Map + Interpolation

Lines joining places of EQUAL value. ISO = equal,

PLETH = lines. Used for continuous data.

Common isopleths to remember

- Isotherm = equal temperature
- Isobar = equal pressure Isohyet = equal rainfall
- Contour = equal height Isobath = equal depth
- Isohaline = equal salinity Isohel = equal sunshine

Rules + interpolation

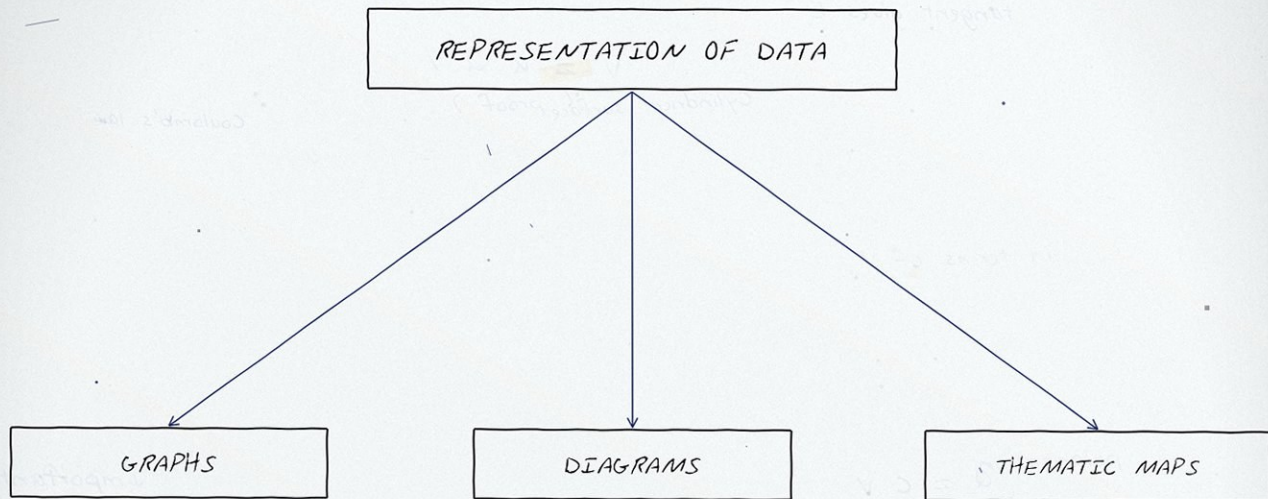
- Use an EQUAL interval (5, 10 or 20 is ideal).
- INTERPOLATION = inserting values between two known points (use a French Curve to draw the line).

$$\text{point} = (\text{dist between pts} / \text{diff in values}) \times \text{interval}$$

Worked: drawing the 30 C isotherm

- Two stations read 28 C + 33 C, 10 mm apart.
- 30 is 2 points above 28, of a total range of 5.
- Point = $(10 / 5) \times 2 = 4$ mm from the 28 C station (or 6 mm ahead of the 33 C station).

Chapter 3 Mind Map



line graph

polygraph

line + bar

bar (simple)

multiple + compound

pie / divided circle

flow map (dynamic)

dot map

choropleth

isopleth

Golden rule: pick the METHOD that fits the DATA +

always add a title, legend + a north arrow on maps.

A picture is worth a thousand words.

Which Diagram for Which Data

USE THIS	WHEN THE DATA IS
Line graph	one variable over time
Polygraph	two variables over time
Simple bar	one variable, quick compare
Multiple bar	2+ variables, side by side
Compound bar	components of one total
Line + bar	temperature + rainfall (climate)
Pie diagram	parts of a whole (%) *
Flow map	* movement: goods / people
Dot map	distribution (population, cattle)
Choropleth	density / rate per admin unit
Isopleth	continuous data (temp, pressure)

One-line definitions worth a mark

Dynamic map = flow map

Divided circle = pie diagram.

Common Exam Traps

The strike-outs are slips students often make.

Time (~~years~~ ~~axis~~) on axis.

Decadal population ~~bar~~ diagram LINE graph.

* ~~one variable~~ TWO or MORE. *

~~dot map~~ FLOW map.

~~to~~ angle ($= \frac{360}{100}$).

Plot ~~biggest~~ SMALLEST angle.

~~equal dots~~ SHADES / colours.

Isopleth ~~different~~ point EQUAL value.

Tip: dot vs choropleth vs isopleth is a favourite 1-marker.

Learn the choropleth steps + the pie angle formula by heart.

Key Terms Grid

TERM	MEANING
Representation of data	* turning data into graphs / maps
Time-series data	values recorded over time
Polygraph	line graph with many lines
Columnar diagram	another name for a bar diagram
Divided circle diagram	another name for a pie diagram
Dynamic map	another name for a flow map
Thematic map	shows a theme over space
Quantitative map	shows amounts (statistical)
Qualitative map	shows high / low, no figures
Choropleth	shades by administrative unit
Isopleth	line joining equal values
Interpolation	finding values between two points

Iso-words: -therm temp, -bar pressure, -hyet rain,

-bath depth, -haline salinity, contour = height.

Quick Question Bank

MCQs (From NCERT)

- Population DISTRIBUTION is shown by? → DOT map
- Decadal population growth? → LINE graph
- Polygraph represents? → MORE than two variables
- Which is the 'Dynamic Map'? → FLOW map

Short answers (30 words)

- Thematic map: shows one theme's distribution over space.
- Multiple vs compound bar: side-by-side vs stacked total.
- Dot map needs: admin map, data, dot value, relief map.
- Isopleth: line of equal value; interpolation fills gaps.

Long answers / practice

- Steps to make a CHOROPLETH map (order, 5 classes, Range/5 interval, shading darker to lighter).
- Steps to make a PIE diagram (angle = % $\times$ 3.6, sort, clockwise from smallest, add legend).
- Method of making a TRAFFIC FLOW map (Ex 3.8).

Practice tables: rainfall + temperature of Kolkata,

land-use 1951-2001 (pie), rice area + production (bar/dot).