- Bar Graph
- Histogram
- Frequency Polygon
- Graphical Representation of Data

Bar Graph

A bar graph is a pictorial representation of data using rectangular bars of uniform width drawn with equal spacing on one axis, usually the x
Bar graphs are used to compare two or more values clearly.

Concept Explanation

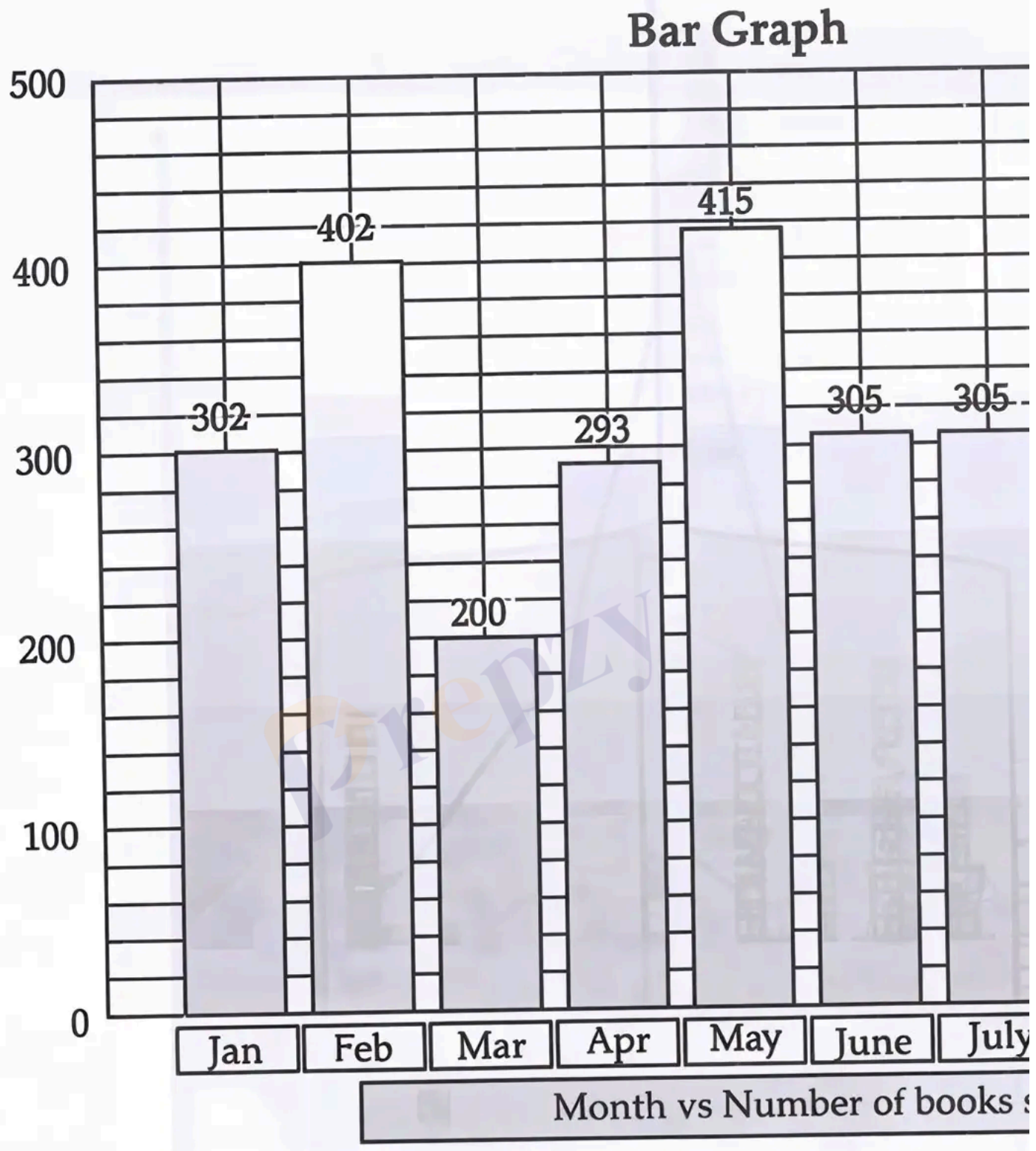
Each bar's height corresponds to the value of the variable it represents. The bars are separated by equal spaces, and the width of each bar i

Formula Derivation

Bar graphs do not involve formula derivation but require correct scaling on both axes to represent data accurately.

Worked Illustration

Consider the number of books sold per month from January to October. The months are plotted on the x-axis, and the number of books sold
books sold in that month.



Solved Example

Example: Represent the following data of books sold in 4 months: January (300), February (350), March (200), April (400).

Solution:

- Plot months on the x-axis with equal spacing.
- Choose a scale for the y-axis, e.g., 1 unit = 50 books.
- Draw bars for each month with heights proportional to the number of books sold.

Practice Set

- **Level 1 – Easy:** Draw a bar graph for the number of students in 5 classes: 20, 25, 15, 30, 10.
- **Level 2 – Moderate:** Represent monthly rainfall (in mm) for 6 months: 50, 80, 60, 90, 70, 100.
- **Level 3 – Challenging:** Given sales data for 12 products, draw a bar graph and identify the product with the highest sales.

Answer Key

- Level 1: Bars with heights proportional to 20, 25, 15, 30, 10 students.
- Level 2: Bars with heights proportional to rainfall values; highest bar corresponds to 100 mm.
- Level 3: Identify the product with the tallest bar representing the highest sales.

Quick Reference

- Bars of equal width and equal spacing.
- Height of bar represents the value.
- Used for comparing discrete data.

Glossary

- **Bar Graph:** A graph using bars to represent data values.
- **Scale:** The ratio of a length on the graph to the actual value.

Histogram

A histogram is a vertical bar graph with no spacing between bars, used to represent continuous or grouped data. The bars represent class in each bar is proportional to the frequency of the class.

Concept Explanation

Histograms are used for exclusive or continuous frequency distributions. The base of each rectangle corresponds to the class interval, and th widths vary.

Formula Derivation

If class widths are unequal, the height of the bar is given by:

a. Frequency Density =

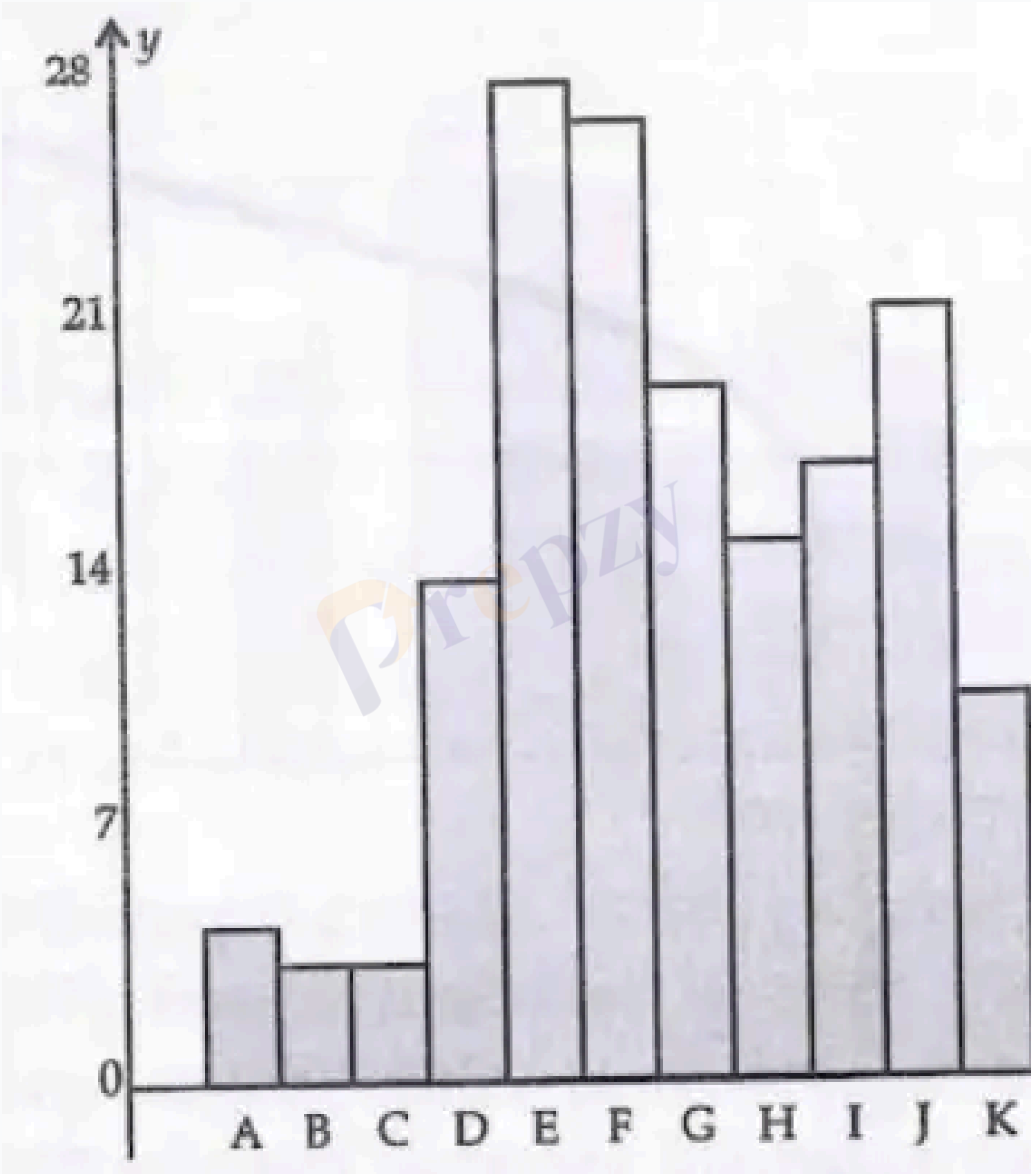
$$\frac{\text{Frequency}}{\text{Class Width}}$$

b. Height of bar = Frequency Density

This ensures the area of the bar represents the frequency.

Worked Illustration

Consider a frequency distribution with class intervals and frequencies. Plot the class intervals on the x-axis and frequencies on the y-axis. Dr
equal to frequencies or frequency densities.



Solved Example

Example: Draw a histogram for the following data:

Class Interval	

10-20	5
20-30	8
30-40	12
40-50	10

Solution:

- Plot class intervals on x-axis.
- Plot frequencies on y-axis.
- Draw adjacent bars with bases equal to class widths (10 units) and heights equal to frequencies.

Practice Set

- **Level 1 – Easy:** Draw a histogram for data with equal class widths and frequencies: 5, 7, 9, 6.
- **Level 2 – Moderate:** Draw a histogram for data with unequal class widths and frequencies: Classes 10-15 (5), 15-25 (10), 25-30 (8).
- **Level 3 – Challenging:** Given a frequency distribution with varying class widths, calculate frequency densities and draw the histogram.

Answer Key

- Level 1: Bars with heights equal to frequencies and equal widths.
- Level 2: Calculate frequency densities for unequal widths and draw bars accordingly.
- Level 3: Frequency Density = Frequency / Class Width; draw bars with height = frequency density.

Quick Reference

- No gaps between bars.
- Area of bar proportional to frequency.
- Used for continuous data.

Glossary

- **Frequency Density:** Frequency divided by class width.
- **Class Interval:** Range of values in a group.

Frequency Polygon

A frequency polygon is a line graph that represents the frequencies of classes by plotting points at class marks on the x-axis and frequencie in understanding the shape of the distribution.

Concept Explanation

To draw a frequency polygon:

- Calculate class marks (midpoints) for each class interval.

- Plot points with class marks on x-axis and frequencies on y-axis.
- Join the points with straight lines.
- Add two extra points with zero frequency before the first class and after the last class to close the polygon.

Formula Derivation

Class mark for a class interval $[a, b]$ is:

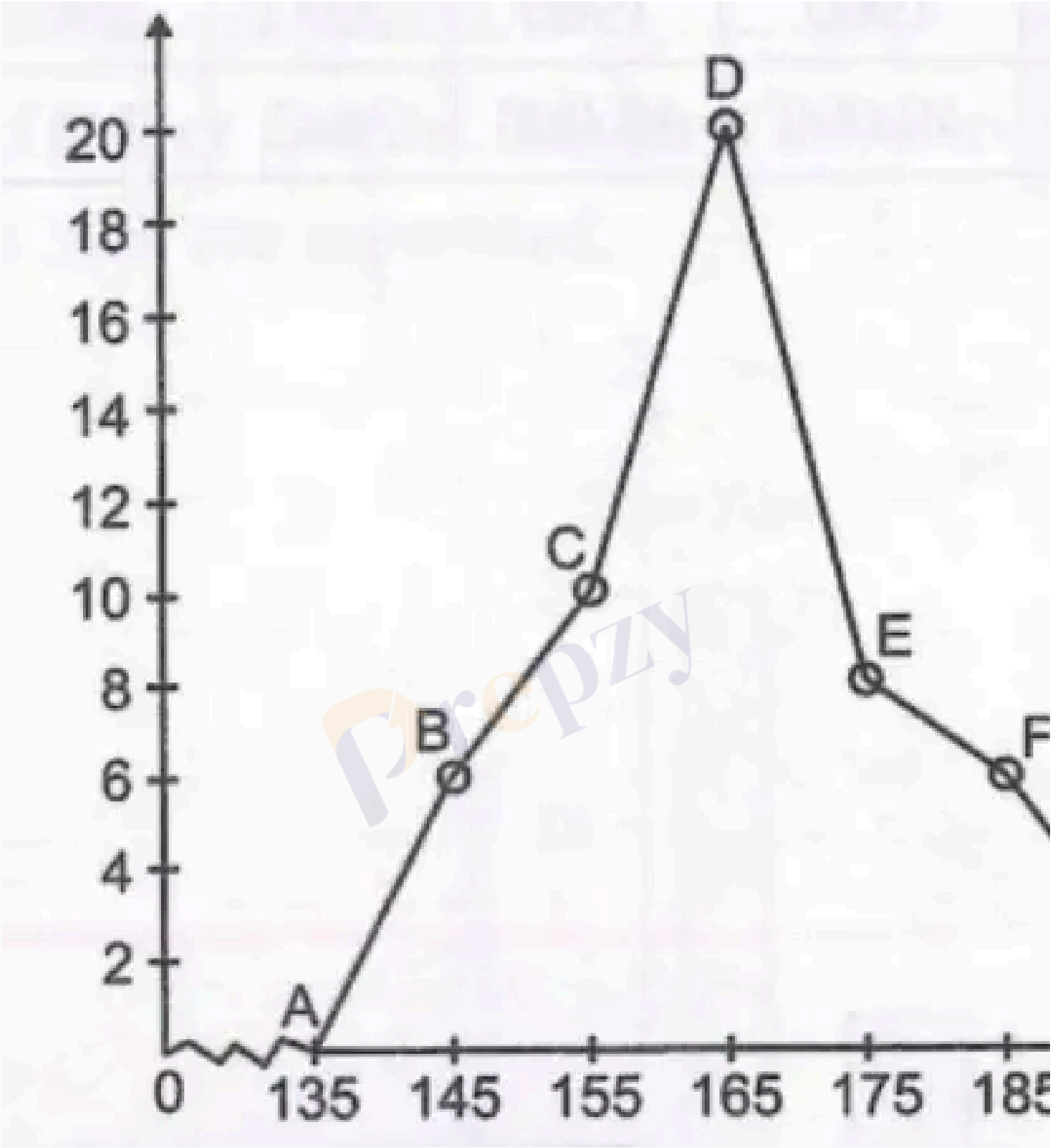
a.

$$\text{Class Mark} = \frac{a+b}{2}$$

Frequencies are plotted against these class marks.

Worked Illustration

Given class intervals and frequencies, calculate class marks, plot points, and join them to form the frequency polygon.



Solved Example

Example: Draw a frequency polygon for the data:

Class Interval	
130-140	2
140-150	5
150-160	8
160-170	12

170-180	7
180-190	4

Solution:

- Calculate class marks: 135, 145, 155, 165, 175, 185.
- Plot points (class mark, frequency).
- Add points at 125 and 195 with frequency 0.
- Join all points with straight lines.

Practice Set

- **Level 1 – Easy:** Calculate class marks for given class intervals.
- **Level 2 – Moderate:** Draw frequency polygon for given frequency distribution.
- **Level 3 – Challenging:** Compare two frequency polygons on the same graph and interpret.

Answer Key

- Level 1: Class marks are midpoints of intervals.
- Level 2: Plot points and join to form polygon.
- Level 3: Analyze differences in shapes and peaks.

Quick Reference

- Class mark = (Lower limit + Upper limit) / 2
- Frequency polygon connects frequency points.
- Used to compare distributions.

Glossary

- **Class Mark:** Midpoint of a class interval.
- **Frequency Polygon:** Line graph connecting frequencies at class marks.

Graphical Representation of Data

Data can be graphically represented using bar graphs, histograms, and frequency polygons. These graphical tools help visualize data trend

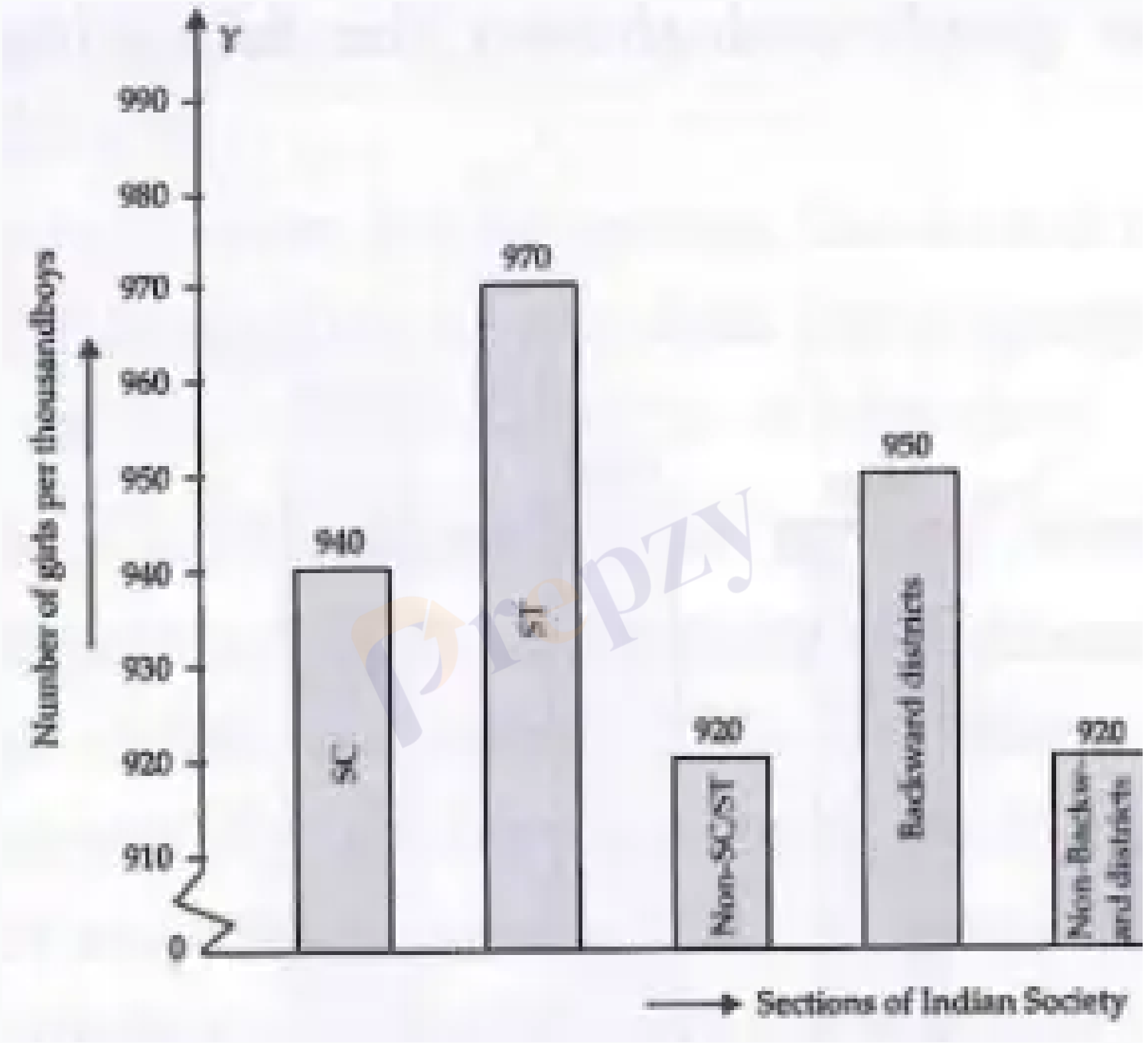
Concept Explanation

Each graph type serves a specific purpose:

- **Bar Graph:** For comparing discrete data.
- **Histogram:** For continuous data with grouped frequencies.
- **Frequency Polygon:** For understanding distribution shapes and comparing data sets.

Worked Illustration

Using the example of number of girls per thousand boys in different sections of Indian society, data is represented by a bar graph to compar



Solved Example

Example: Represent the number of girls per thousand boys in various social groups by a bar graph and analyze the data.

Solution:

- Sections are plotted on the x-axis with equal width bars.
- Number of girls per thousand boys is plotted on the y-axis with an appropriate scale.
- Bars are drawn to represent the data.
- Analysis shows Scheduled Tribe has the highest ratio (970), urban areas the lowest (910).
- Conclusion: Pre-natal sex determination should be banned to improve gender ratio.

Practice Set

- **Level 1 – Easy:** Represent given data of students in different classes using a bar graph.
- **Level 2 – Moderate:** Draw a histogram for given grouped data and interpret.
- **Level 3 – Challenging:** Draw frequency polygons for two data sets and compare their distributions.

Answer Key

- Level 1: Bar graph with equal width bars representing student counts.
- Level 2: Histogram with bars representing frequencies of class intervals.
- Level 3: Frequency polygons showing distribution shapes and differences.

Quick Reference

- Choose appropriate graph type based on data.
- Use correct scales and labels.
- Analyze graphs to draw conclusions.

Glossary

- **Data Visualization:** Representation of data in graphical form.
- **Frequency Distribution:** Table showing frequencies of data classes.