

Data graphics

Construction and Labeling of Graphs

What is a Graph?

- Graphs are **visual representations** of data.
- Constructing a graph involves a few important steps, and proper labeling ensures the graph is understandable.

Steps to Construct a Graph:

1. Choose the Type of Graph:

- Decide whether the graph should be a **line graph**, **bar graph**, **scatter plot**, etc., based on the data and purpose.

2. Draw the Axes:

- Usually, graphs have two lines (called axes):
 - **X-axis (horizontal)**: This usually represents the independent variable (what you control or what changes naturally).
 - **Y-axis (vertical)**: This shows the dependent variable (the result or outcome you measure).

3. Mark Scale on Each Axis:

- You choose appropriate scales for each axis. For example, if your data is from 0 to 100, your scale might go 0, 10, 20, 30, etc.
- Make sure the scale is **evenly spaced**.

4. Plot the Data Points:

- Based on the values, you plot points on the graph where the X and Y values meet.

5. Draw the Graph Line or Bars:

- If it's a line graph, connect the points with straight lines.
- If it's a bar graph, draw bars for each value.
- If it's a scatter plot, just keep the points as they are.

6. Labeling the Graph:

- **Title**: Write a clear title that tells what the graph is about.
- **Label the X and Y axes**: Write the name of the variable and the unit (if applicable), for example: "Time (minutes)", "Temperature (°C)".
- **Legend (if needed)**: If the graph has multiple lines or bars (e.g., data from two sources), use a legend to show what each color or line stands for.

Histogram

What is a Histogram?

- A histogram is a type of graph that shows how data is **distributed** over a range of values.
- It looks similar to a bar graph but has some differences.

Features of a Histogram:

- It shows **continuous data** (not separate categories).
- The **X-axis** shows intervals or ranges (called **bins** or **classes**).
- The **Y-axis** shows the **frequency** (how many times values fall into each interval).
- The **bars are touching** each other (because the data is continuous).

How to Construct a Histogram:

1. Collect Data and Create Intervals:

- Divide the entire range of your data into equal-sized intervals.
- Example: If your data goes from 0 to 100, you might create intervals: 0–10, 10–20, 20–30, etc.

2. Count Frequencies:

- Count how many values fall into each interval.

3. Draw X and Y Axes:

- X-axis: The intervals or bins.
- Y-axis: The frequency.

4. Draw Bars:

- For each interval, draw a **bar** up to the height representing the frequency.
- Make sure **bars are adjacent (no gaps)**.

5. Labeling:

- Give a clear title.
- Label axes (e.g., "Score Range", "Number of Students").
- Add units where necessary.

Example Dataset

- Let's say we have the following scores from a class:
- [12, 17, 23, 25, 27, 35, 36, 45, 47, 50, 52, 59, 63, 65, 70, 72, 74, 78, 80, 85, 89, 90, 95, 97]

Step-by-Step Execution

1. Create Intervals (Bins)

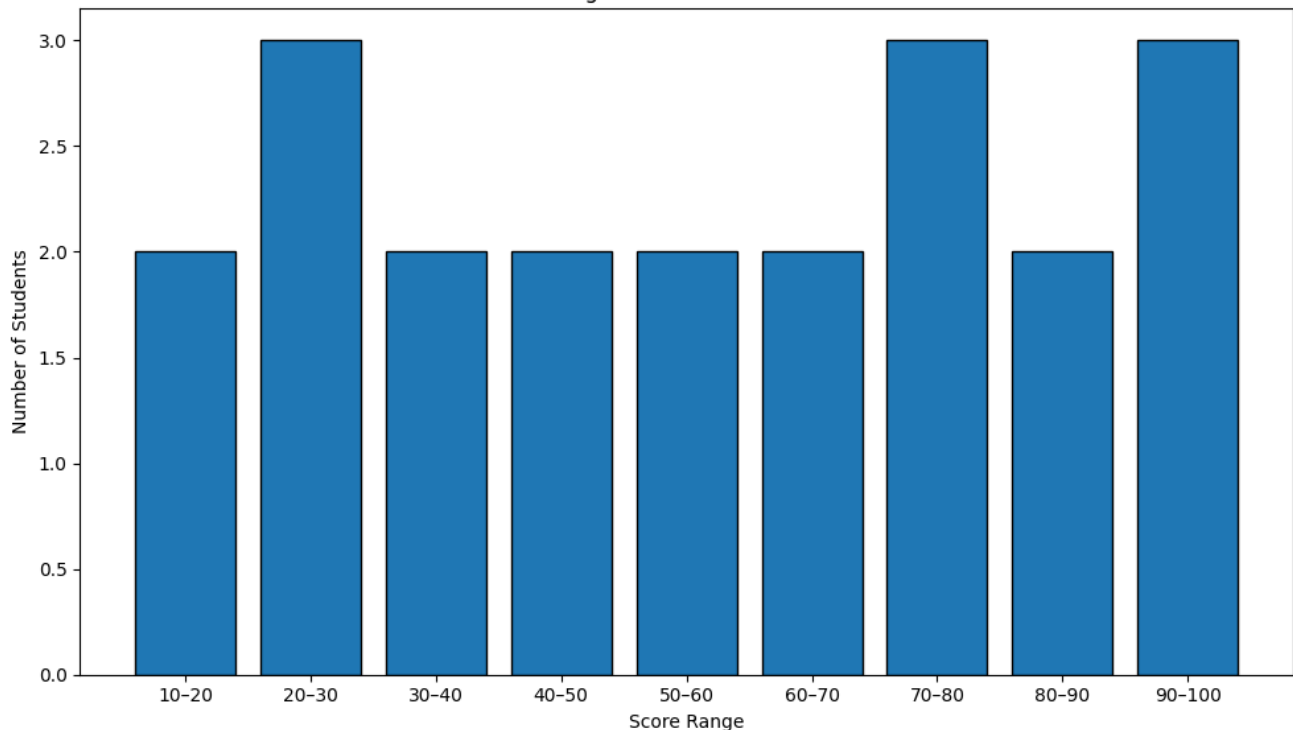
➤ We'll use intervals of size 10:

- 10–20
- 20–30
- 30–40
- 40–50
- 50–60
- 60–70
- 70–80
- 80–90
- 90–100

2. Count Frequencies

- 10–20 → 2
- 20–30 → 3
- 30–40 → 2
- 40–50 → 2
- 50–60 → 2
- 60–70 → 2
- 70–80 → 3
- 80–90 → 2
- 90–100 → 3

Histogram of Student Scores



Pie Charts

What is a Pie Chart?

- A pie chart is a **circular chart** divided into **slices**, where each slice represents a **part of the whole**. It's great for showing **percentages or proportions**.

Features of Pie Chart:

- Each **slice** represents a category.
- The **size of the slice** depends on how big that category is compared to the whole.
- The whole circle represents **100%**.

How to Construct a Pie Chart:

1. Collect the Data:

- You should have **categories and their values**.
- Example: Categories = Apple (30), Banana (20), Orange (50).

2. Calculate Total:

- Add all values to find the total.
- Example: $30 + 20 + 50 = 100$.

3. Convert Values to Angles:

- Each category's angle = $(\text{Category Value} / \text{Total}) \times 360$
- Apple: $(30/100) \times 360 = 108^\circ$
- Banana: $(20/100) \times 360 = 72^\circ$
- Orange: $(50/100) \times 360 = 180^\circ$

4. Draw a Circle and Make Slices:

- Use a protractor to draw each angle from the center of the circle.
- Each slice represents a category.

5. Labeling:

- Label each slice with the category name and percentage.
- Title the chart.
- Optionally, use colors or a legend.

Example: Family Monthly Budget Distribution

- Here is a **pie chart** showing the distribution of a family's monthly budget.
- Each slice represents a category (like Rent or Food), and its size reflects how much of the total budget is spent on that category.



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