

Introduction to Power BI, Charts, DAX & Creating Reports

Question 1 : Define Power BI and What are the key components of the Power BI ecosystem?

Briefly explain:

- Power BI Desktop
- Power BI Service
- Power BI Mobile
- Power BI Gateway

Answer: Power BI is a powerful *Business Intelligence and Data Visualization tool* by Microsoft that allows users to connect to various data sources, transform data, and create interactive reports and dashboards for better decision-making.

Key Components of Power BI Ecosystem:

1. Power BI Desktop

- A *Windows-based application* used for data modeling, data transformation, and report creation.
- Users can connect to multiple data sources, clean and transform data using Power Query, and design visuals.
- Reports created here can be published to the Power BI Service.
Example: Creating a sales performance report by region and product.

2. Power BI Service (Power BI Online)

- A *cloud-based SaaS platform* where users can publish, share, and collaborate on reports and dashboards.
- Supports scheduled data refresh and role-based access.
Example: Managers viewing live dashboards shared from Power BI Desktop.

3. Power BI Mobile

- A *mobile application* (available for Android and iOS) that allows users to view and interact with dashboards and reports on the go.
Example: A sales executive monitoring daily targets through mobile dashboards.

4. Power BI Gateway

- A *bridge between on-premises data sources and the Power BI Service*.
- Enables automatic and secure data refresh from on-premises databases to the cloud.
Example: Connecting an on-prem SQL Server to refresh data automatically in Power BI Service.

Question 2 : Compare the following Power BI visuals:

- Pie Chart vs Donut Chart
- Bar Chart vs Column Chart

When would you prefer one over the other? Give one example for each pair.

Answer:

(a) Pie Chart vs Donut Chart

Feature	Pie Chart	Donut Chart
Structure	Circular chart divided into slices	Similar to Pie, but with a blank center
Use Case	Shows part-to-whole relationships	Shows part-to-whole, but can include total values or multiple series in center
Clarity	Better for fewer categories	Looks cleaner and modern with more categories

When to prefer:

- Pie Chart: When you want to show proportion clearly among 3–5 categories.
Example: Market share by brand.
- Donut Chart: When you want to display percentages with a central total value.
Example: Sales distribution by region with total sales in center.

(b) Bar Chart vs Column Chart

Feature	Bar Chart	Column Chart
Orientation	Horizontal bars	Vertical bars

Best For	Comparing long category names	Showing time-based or sequential data
Readability	Better when category names are long	Better when comparing trends over time

When to prefer:

- Bar Chart: When categories have long text or many items.
Example: Comparing revenue across 20 different products.
- Column Chart: When comparing data over months or years.
Example: Monthly sales trend for the current year.

Question 3 : Explain the significance of:

- Star schema vs Snowflake schema
- Primary key vs Foreign key in relationships (Power BI)

Why is cardinality important?

Answer:

(a) Star Schema vs Snowflake Schema

Feature	Star Schema	Snowflake Schema
Structure	Central fact table connected to denormalized dimension tables	Dimensions are normalized into multiple related tables
Performance	Faster query performance	Slightly slower due to multiple joins
Complexity	Simple and easy to understand	More complex

Use Case	Ideal for Power BI and data warehouses	Useful for large, normalized enterprise databases
----------	--	---

Example:

- *Star Schema*: Sales fact table linked directly with Product, Customer, and Date tables.
- *Snowflake Schema*: Product table further split into Category and Subcategory tables.

(b) Primary Key vs Foreign Key in Power BI Relationships

Key Type	Description	Example
Primary Key	Uniquely identifies each record in a table	CustomerID in Customers table
Foreign Key	Refers to the primary key in another table to create relationships	CustomerID in Sales table (linked to Customers table)

Cardinality Importance:

- Cardinality defines how data in two tables relate — *One-to-One*, *One-to-Many*, or *Many-to-Many*.
- It affects filtering, performance, and correctness of relationships in Power BI.
Example: One Customer can have many Orders (1:M relationship).

Question 4 : Differentiate between:

• Calculated column vs Measure

Also, define Row context and Filter context with simple examples.

Answer:

Feature	Calculated Column	Measure
Evaluation	Calculated row-by-row	Calculated at query level or aggregate level
Storage	Stored in the model, increases size	Not stored, calculated on the fly

Use Case	Useful for row-level calculations	Useful for aggregations and KPIs
Example	Total Price = Quantity * Unit Price	Total Sales = SUM(Sales[Total Price])

Row Context vs Filter Context

Context	Definition	Example
Row Context	Evaluates expression for each row	In calculated column Profit = Sales - Cost, each row has its own row context
Filter Context	Applies filters from visuals or slicers	In a measure SUM(Sales[Amount]), the result changes when user selects a specific region

Question 5: What is the difference between a report and a dashboard in Power BI?

Answer:

Feature	Report	Dashboard
Definition	Multi-page, detailed visualization built in Power BI Desktop	Single-page, high-level summary view in Power BI Service
Pages	Can have multiple pages	Only one page
Interactivity	Highly interactive and detailed	Limited interactivity, focuses on KPIs
Data Source	From one dataset	Can pull visuals from multiple datasets
Creation	Created in Power BI Desktop	Created in Power BI Service
Use Case	Detailed data analysis	Quick business overview

Example:

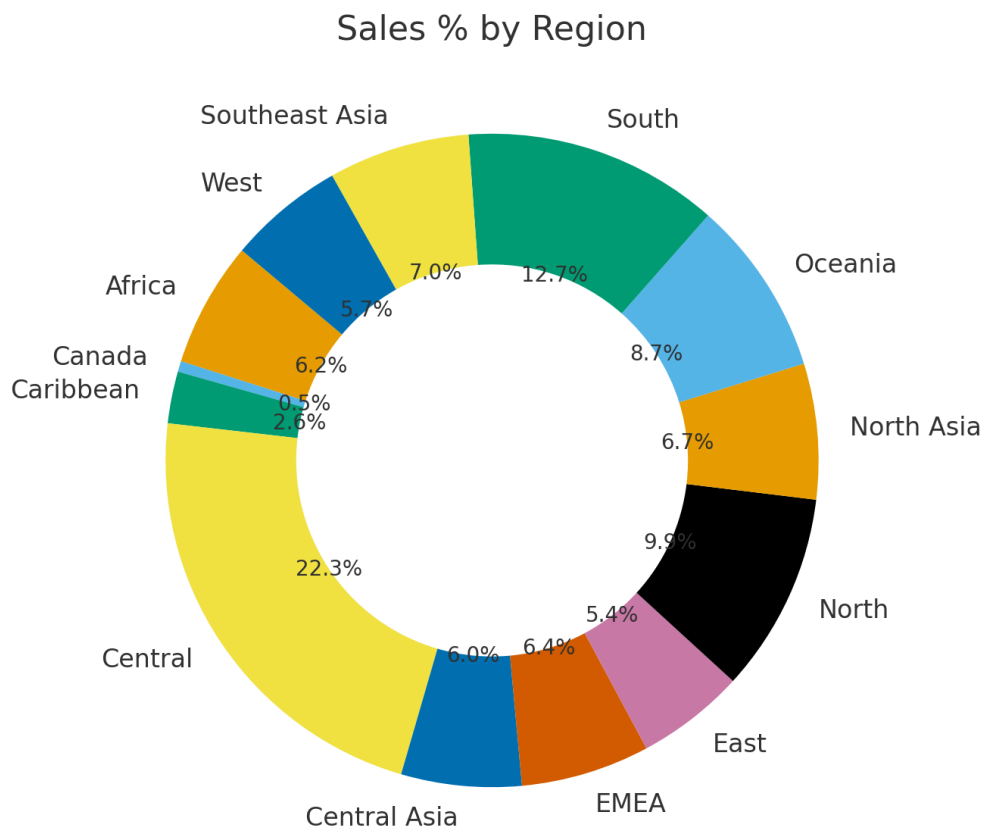
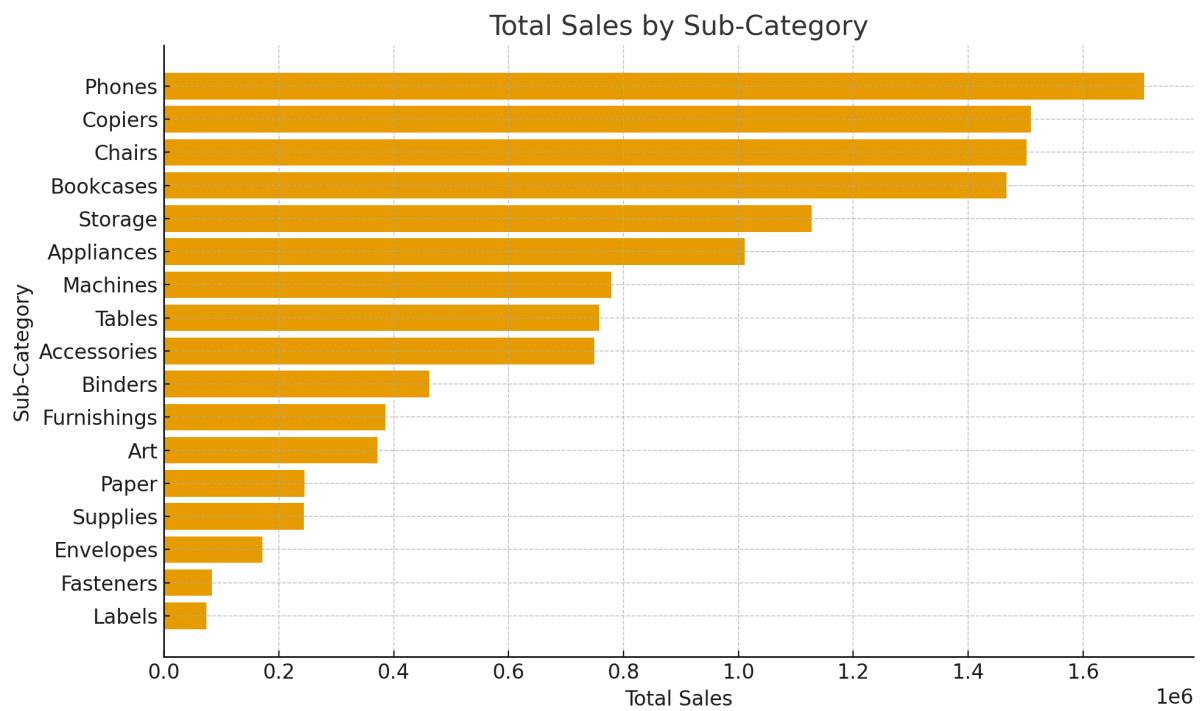
- Report: A detailed sales report showing trends, product-wise revenue, and customer segmentation.
- Dashboard: A single view showing KPIs like Total Sales, Profit Margin, and Customer Growth.

Question 6 : Using the Sample Superstore dataset:

- Create a Clustered Bar Chart to display Total Sales by Sub-Category
- Create a Donut Chart for Sales % by Region

Provide screenshots of both visuals. DATASET LINK : [Global_superstore2](#)

Answer:



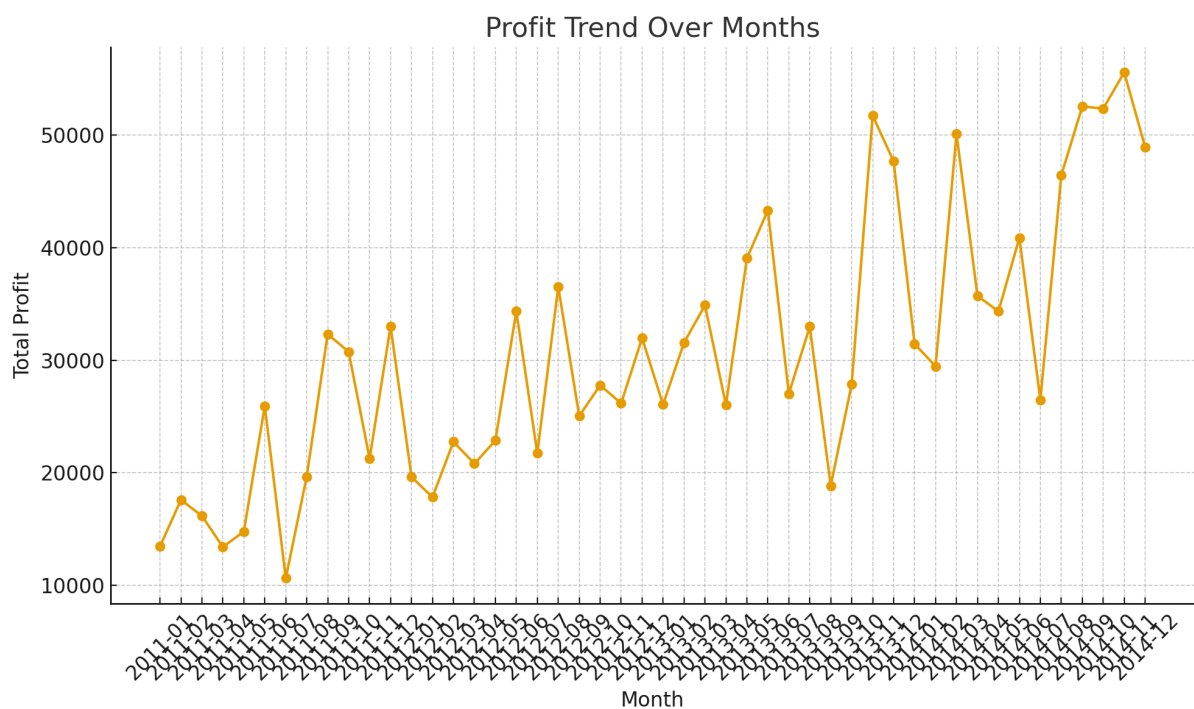
Question 7 : Write and apply the following measures:

- Total Profit = SUM([Profit])
- Average Discount = AVERAGE([Discount])

Display both in a KPI Card, and use a Line Chart to show profit trend over months. Add visuals and DAX formulas.

DATASET LINK : [Global_superstore2](#)

Answer:



DAX Formulas (as used in Power BI)

Total Profit = SUM([Profit])

Average Discount = AVERAGE([Discount])

KPI Card Values

- **Total Profit:** ₹1,467,457.29
- **Average Discount:** 14.29%

Question 8 :

Implement a DAX measure that calculates the percentage of total sales by product category.

Product_category	Sales_Amount
Electronics	5000
Clothing	3000
Home Appliances	7000
Books	2000

Tables & Chairs	8000
Toy	1500
Sports Equipment	1200
Office Supplies	1000
Beauty Products	4400
Garden Supplies	1000
Jewelry	1800
Automotive	2600

Answer:

% of Total Sales =

DIVIDE(

SUM(Sales[Sales_Amount]),

CALCULATE(SUM(Sales[Sales_Amount]), ALL(Sales))

)

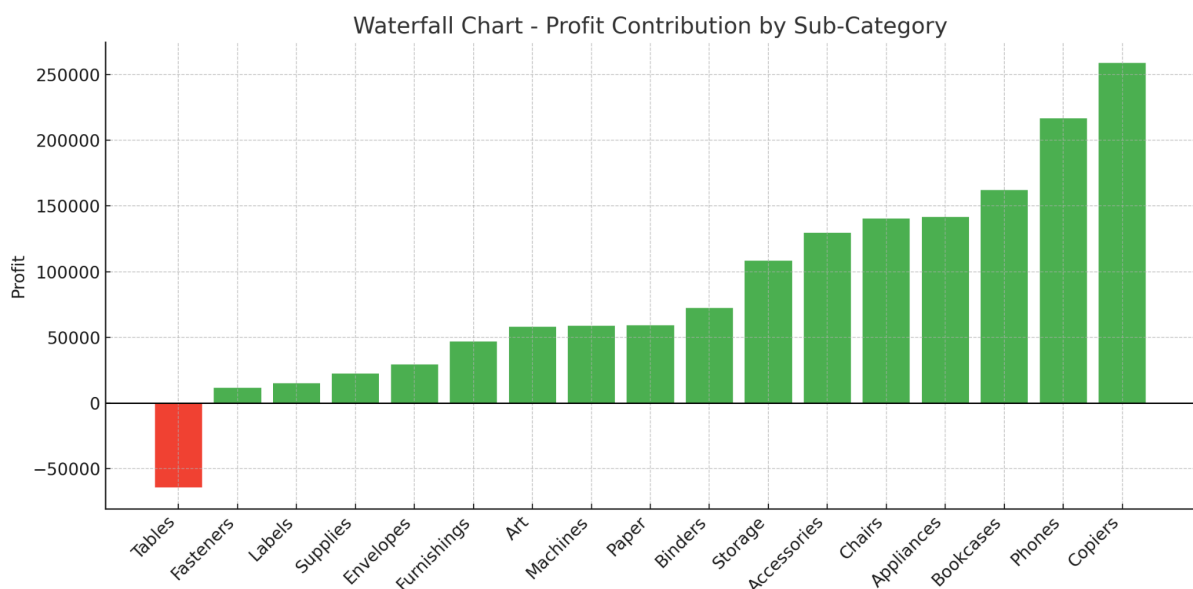
Question 9 :

- Create a DAX Measure for Total Profit
- Use it in a Waterfall Chart to analyze how different Sub-Categories contribute to overall profit
- Add a Slicer for Region to filter the visual
- Write brief business insights (4–5 lines) from the chart and provide 2–3 data-driven recommendations to improve profit.

Provide a steps, screenshot of the Waterfall chart and the DAX formula

DATASET LINK : [Global_superstore2](#)

Answer:



DAX Formula:

Total Profit = `SUM('Global_Superstore2 (2)'[Profit])`

Visual Setup in Power BI :

1. Load your Superstore dataset into Power BI.
2. Go to **Modeling** → **New Measure**, and paste the DAX formula above.
3. Create a **Waterfall Chart**:
 - **Category (Axis):** Sub-Category
 - **Y-Axis (Value):** Total Profit

4. Add a **Slicer** visual → drag the **Region** field into it.
 - This lets you filter profit contribution by specific regions.

Question 10 :

Scenario:

VitaTrack Wellness, a digital health company in FitZone, has collected data on users' daily habits and health vitals. The analytics team is tasked with drawing actionable insights from this data to improve lifestyle suggestions and prevent heart-related risks.

Your Task:

Using the provided dataset (includes Age, Gender, BMI, Steps, Calories, Sleep, Heart Rate, Blood Pressure, Smoking, Alcohol, Exercise, Diabetic & Heart Disease status):

Build a one-page Power BI dashboard that answers:

1. Are users maintaining a balanced lifestyle (Steps, Sleep, Calories)
2. What lifestyle patterns (Smoking, Alcohol, BMI, etc.) indicate heart disease risk?
3. Is there any visible relationship between Sleep and Physical Activity?
4. How does BMI vary across Age Groups and Genders?
5. What is the impact of smoking and alcohol on heart rate and blood pressure?
6. Segment people based on their health activity to suggest lifestyle changes

DATASET LINK: [Health_activity_data](#)

Answer: