

## 1) What is Power BI and how does it differ from Excel?

Power BI is a Microsoft business analytics tool that provides interactive visualizations and business intelligence capabilities with a user-friendly interface for creating reports and dashboards.

### **Difference from Excel:**

- **Visualization:** Power BI has more advanced and dynamic visualizations.
  - **Data Modeling:** Power BI supports complex data models and relationships.
  - **Data Volume:** Handles larger datasets more efficiently.
  - **Automation:** Better at scheduled refreshes and live dashboards.
  - **Sharing:** Easier report distribution via Power BI Service.
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## 2) Explain the concept of data modeling in Power BI.

Data modeling in Power BI involves creating relationships between different data tables and organizing them logically using a star or snowflake schema. It includes:

- Defining relationships (1:many, many:1).
  - Creating calculated columns, measures, and hierarchies.
  - Ensuring data integrity and optimizing query performance.
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## 3) What are the different types of connections available in Power BI?

- **Import:** Data is loaded into Power BI's memory (fast performance).
- **DirectQuery:** Queries data in real-time from the source (live connection).
- **Live Connection:** Used for SSAS models; similar to DirectQuery but doesn't allow modeling.
- **Composite Models:** Combines Import and DirectQuery in a single model.

## 4) How do you handle data transformation in Power BI?

Using Power Query Editor, transformations include:

- Filtering, sorting, renaming columns.
  - Merging and appending tables.
  - Removing duplicates/nulls.
  - Pivoting/unpivoting columns.
  - Changing data types and applying calculated columns.
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## 5) What is DAX (Data Analysis Expressions) and why is it important in Power BI?

DAX is a formula language used in Power BI for creating calculated columns, measures, and custom tables. It enables:

- Powerful calculations (e.g., time intelligence, filters).
  - Creating dynamic aggregations and KPIs.
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## 6) Difference between calculated columns and measures in Power BI?

Feature	Calculated Column	Measure
Storage	Stored in memory	Calculated at runtime
Use case	Row-level calculations	Aggregations like SUM, AVERAGE
Performance	Slower due to storage	Faster and efficient

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## 7) How do you handle relationships between tables in Power BI?

- Use Manage Relationships to define and edit relationships.
- Choose cardinality (One-to-Many, Many-to-One, Many-to-Many).
- Set cross-filtering direction.
- Ensure lookup tables have unique keys for stable relationships.

## 8) What is the purpose of a Power BI Gateway?

A Power BI Gateway connects on-premises data sources with Power BI Service for:

- Scheduled refreshes.
  - Live queries.
- Types: Personal Gateway (for personal use) and Enterprise Gateway (for team or org-wide use).
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## 9) How can you schedule data refresh in Power BI Service?

- Go to the dataset in Power BI Service.
  - Click on "Schedule Refresh" under settings.
  - Set frequency (daily/hourly) and credentials for data source access.
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## 10) Explain the concept of row-level security in Power BI.

Row-Level Security (RLS) controls data access for different users by applying filters based on roles.

Steps:

- Define roles in Power BI Desktop.
  - Use DAX filters on tables.
  - Publish and assign users to roles in Power BI Service.
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## 11) What is the Power BI Desktop and how does it differ from Power BI Service?

Feature	Power BI Desktop	Power BI Service	
Use	Report development	Sharing, collaboration	
Location	Local (Windows app)	Cloud-based	
Refresh	Manual	Scheduled	

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Modeling	Full capabilities	Limited	
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## 12) Explain the concept of Direct Query in Power BI.

DirectQuery allows Power BI to fetch data in real-time directly from the source without importing.

- Pros: Up-to-date data, less memory usage.
- Cons: Slower performance, limited DAX functionality.

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## 13) What are Power BI templates and how are they useful?

Templates (.PBIT) save:

- Report layout.
- Data model and queries (without data).

Useful for:

- Reusability.
- Sharing report structures across teams.

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## 14) How do you handle incremental data refresh in Power BI?

- Define range parameters (e.g., date fields).
- Enable incremental refresh in table settings.
- Publish to Power BI Service (only supported there).
- Benefits: Speeds up refresh by only loading new/updated data.

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## 15) What is the role of Power Query in Power BI?

Power Query is used for:

- Connecting to data sources.
- Cleaning, shaping, and transforming data.
- Preparing data before loading into Power BI model.

## 16) Difference between calculated columns and calculated tables in Power BI?

Feature	Calculated Column	Calculated Table
Based on	Existing row context	Entire data model
Output	Single value per row	New table
Use	Add metadata or categorize data	Custom tables for relationships, filters

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## 17) How do you create custom visuals in Power BI?

- Use Power BI Custom Visual SDK (TypeScript, D3.js).
- Or download from AppSource.
- Developers package visuals as .pbiviz and import into reports.

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## 18) Best practices for optimizing performance in Power BI:

- Use star schema design.
- Minimize calculated columns.
- Prefer measures over columns.
- Limit use of high cardinality columns.
- Filter and aggregate at source when possible.
- Use Performance Analyzer and DAX Studio.

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## 19) Integrate Power BI with Microsoft products:

- Azure Synapse/SQL: DirectQuery or import data.
- Azure Data Lake: Connect to large datasets.
- Microsoft Teams: Embed dashboards.
- SharePoint/OneDrive: Use as data sources.
- Excel: Analyze Power BI datasets in Excel via Analyze in Excel.

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## **20) Explain the concept of aggregations in Power BI.**

Aggregations are precomputed summaries of large datasets to improve performance.

- Create summary tables with SUM, COUNT, etc.
- Power BI auto-detects and uses them during queries to reduce load on source systems.

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## **21) Handling error handling and data quality in Power BI:**

- Use Power Query's Error Handling tools (Remove Errors, Replace Errors).
- Data Profiling to detect anomalies.
- Apply data validation rules (null checks, type validation).
- Create flags or columns to highlight data issues.

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## **22) What is the purpose of Power BI Embedded and when would you use it?**

Power BI Embedded lets developers embed Power BI reports into custom applications using APIs.

Use cases:

- SaaS products wanting to offer analytics.
  - Internal portals requiring embedded dashboards.
  - White-labeling Power BI for clients.
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