1. What is a primary key in a table?

   Primary key – a unique identifier that distinguishes each row in a table. No duplicates allowed, cannot be null.
   Example, OrderID in Sales table where each order has a unique ID

2. Name the two types of table relationships in Power BI.

   There are actually 3 types of relationship in Power BI: One-to-one, One-to-many, Many-to-many. One-to-many relationship is the most common one, while Many-to-many relationship is rarely used.
   Example, one-to-many: one customer can have many orders;
   Many-to-many: customers can buy multiple products and products are sold to multiple customers

3. How do you create a relationship between two tables in Power BI?

   To create a relationship in Power BI Model view, the user drags a field from one table to matching field in another table. Alternative way is like this: Home → Manage Relationships → New to manually create relationships between tables.

4. What is a "star schema"?

   Star schema – a data model design where one central fact table is surrounded by dimension tables directly connected to it. This resembles a star shape. This model simplifies queries and improves performance.

5. Which table is typically the fact table in a sales dataset?

   Among the sample tables given, Sales table can be fact table since it contains measurable business events, transactions with quantities, dates, foreign keys linking to dimension tables.

6. Link Sales.csv to Customers.csv using CustomerID (one-to-many).

   To link Sales.csv to Customers.csv using CustomerID in one-to-many relationship, user drags CustomerID from Sales table to CustomerID in Customers table. This creates requires one-to-many relationship which has the direction of customers to sales.

7. Why is ProductID in Sales.csv a foreign key?

ProductID in Sales table references the primary key ProductID in Products table. This establishes which product was sold in each transaction. It's not unique in Sales table.

8. Fix a relationship error where ProductID has mismatched data types.

   To fix the relationship errors, ProductID in both tables should be converted to the same data type. In the Data view, user should select the column and change the data type from the dropdown.

9. Explain why a star schema improves performance.

   It reduces complex joins between tables, enables faster aggregation, simplifies DAX calculations, allows Power BI engine to optimize queries more efficiently.

10. Add a new column TotalSales in Sales (Quantity * Price from Products).

    In Data view:
    Select Sales table → right click → New column → in formular bar:
    *TotalSales = Sales[Quantity] * RELATED(Products[Price])* → Enter

11. Optimize a model with circular relationships—how would you resolve it?

    To optimize the model, dependency relationships should be reduced, one relationship that creates a loop should be removed. In DAX there is USERELATIONSHIP() function to activate inactive relationships when needed for specific calculations.

12. Create a role-playing dimension for OrderDate and ShipDate.

    Two relationships from date table are created. One is active – OrderDate and one inactive – ShipDate. USERELATIONSHIP(Sales[ShipDate], Calendar[Date]) in measures is used to analyze by ship date.

13. Handle a many-to-many relationship between Customers and Products.

    Although establishing many-to-many relationship directly between tables is available, creating a junction table in between is a common practice.

14. Use bidirectional filtering sparingly—when is it appropriate?

Bidirectional filtering sparingly affects performance. It is appropriate especially when there is need to flow both directions, like filtering customers based on product selections in complex scenarios.

15. Write DAX to enforce referential integrity if a CustomerID is deleted.
    Orphaned Records = SUMX(Sales, IF(ISBLANK(RELATED(Customers[Name])), 1, 0))
    This counts sales records with invalid CustomerIDs.