Core Concepts a Data Analyst Must Know in SQL

## 1. SELECT Statement

The fundamental command to retrieve data from a table.

Example:

SELECT column1, column2 FROM table\_name;

## 2. JOINs

Used to combine rows from two or more tables.

Types:  
 - INNER JOIN  
 - LEFT JOIN  
 - RIGHT JOIN  
 - FULL OUTER JOIN

Example:

SELECT a.id, b.name  
FROM table\_a a  
JOIN table\_b b ON a.id = b.a\_id;

## 3. GROUP BY

Groups rows that have the same values into summary rows.

Often used with aggregate functions.

Example:

SELECT department, COUNT(\*)  
FROM employees  
GROUP BY department;

## 4. Aggregate Functions

Perform a calculation on a set of values.

Common functions: COUNT(), SUM(), AVG(), MIN(), MAX()

Example:

SELECT AVG(salary) FROM employees;

## 5. Subqueries

A query nested inside another query.

Example:

SELECT name FROM employees  
WHERE salary > (SELECT AVG(salary) FROM employees);

## 6. Common Table Expressions (CTEs)

Temporary result set used within a query.

Improves readability and modularity.

Example:

WITH high\_salary AS (  
 SELECT \* FROM employees WHERE salary > 100000  
)  
SELECT \* FROM high\_salary;

## 7. Window Functions

Perform calculations across a set of table rows related to the current row.

Useful for ranking, running totals, etc.

Functions: ROW\_NUMBER(), RANK(), DENSE\_RANK(), LAG(), LEAD()

Example:

SELECT name, salary,  
 RANK() OVER (ORDER BY salary DESC) AS salary\_rank  
FROM employees;

## 8. Filtering: WHERE and HAVING

WHERE: filters rows before grouping

HAVING: filters after GROUP BY

Example:

SELECT department, COUNT(\*)  
FROM employees  
GROUP BY department  
HAVING COUNT(\*) > 5;

## 9. Data Cleaning Using SQL

Handling NULLs, removing duplicates, standardizing values

Examples:

-- Remove duplicates  
SELECT DISTINCT \* FROM table\_name;

-- Replace NULLs  
SELECT COALESCE(column\_name, 'Unknown') FROM table\_name;

## 10. Sorting and Limiting Results

ORDER BY sorts results

LIMIT restricts number of rows returned

Example:

SELECT \* FROM employees  
ORDER BY salary DESC  
LIMIT 10;

These concepts form the foundation of day-to-day SQL use for data analysts in reporting, dashboarding, KPI analysis, and data quality checks.