📘 Module 27: Mathematical Functions

🧠 Why Use Math Functions?

Mathematical functions in SQL help perform calculations like **rounding**, **generating random numbers**, and **power/exponents** — useful in reporting, simulations, discount logic, and more.

1️⃣ `CEILING()` and `FLOOR()`

✅ Definitions:

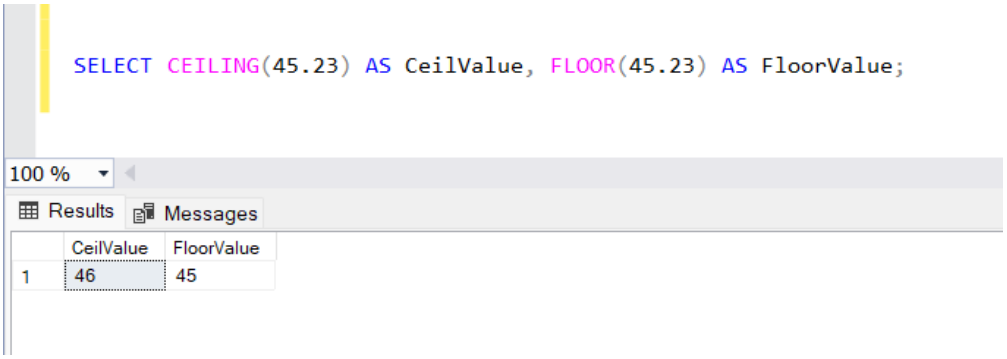
- `CEILING()` returns the **next highest integer** (rounds up).
- `FLOOR()` returns the **next lowest integer** (rounds down).

✅ Syntax:

```
CEILING(numeric_expression)
FLOOR(numeric_expression)
```

📌 Example:

```
SELECT CEILING(45.23) AS CeilValue, FLOOR(45.23) AS FloorValue;
-- Output: CeilValue = 46, FloorValue = 45
```



2️⃣ `RAND()` – Random Number Generator

✅ Definition:

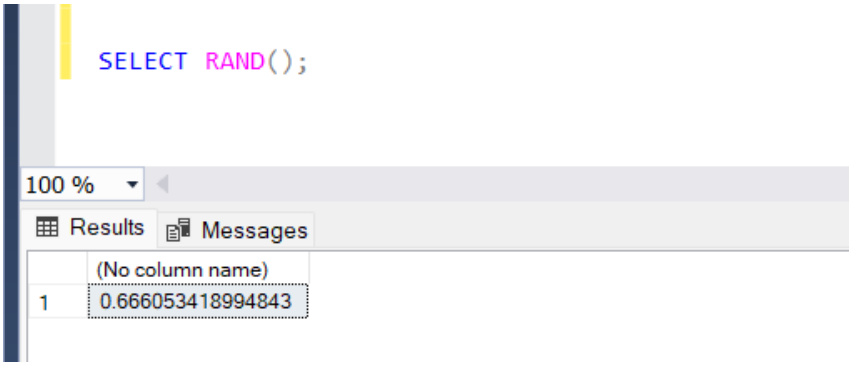
Returns a **random float value** between **0 (inclusive)** and **1 (exclusive)**.

✅ Syntax:

```
RAND() -- no arguments = random decimal between 0 and 1
```

📌 Example:

SELECT RAND();



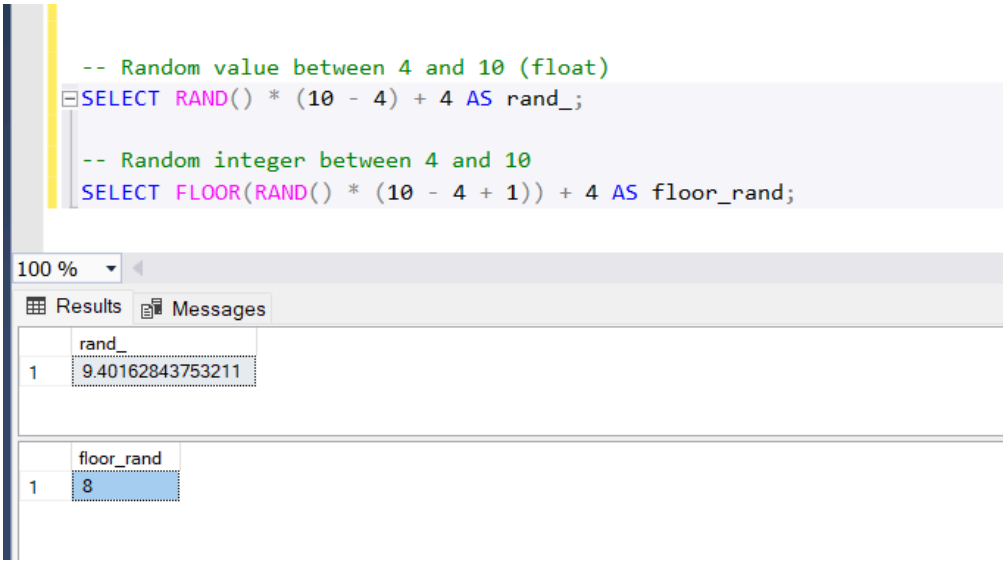
✅ Custom Range Example:

-- Random value between 4 and 10 (float)
SELECT RAND() * (10 - 4) + 4 AS rand_;

-- Random integer between 4 and 10
SELECT FLOOR(RAND() * (10 - 4 + 1)) + 4 AS floor_rand;

🧾 Explanation:

- Multiply by range size → `RAND() * (high - low)`
- Add the lower bound → `+ low`
- Use `FLOOR()` to convert to an integer (optional)



3️⃣ ROUND()

✅ Definition:

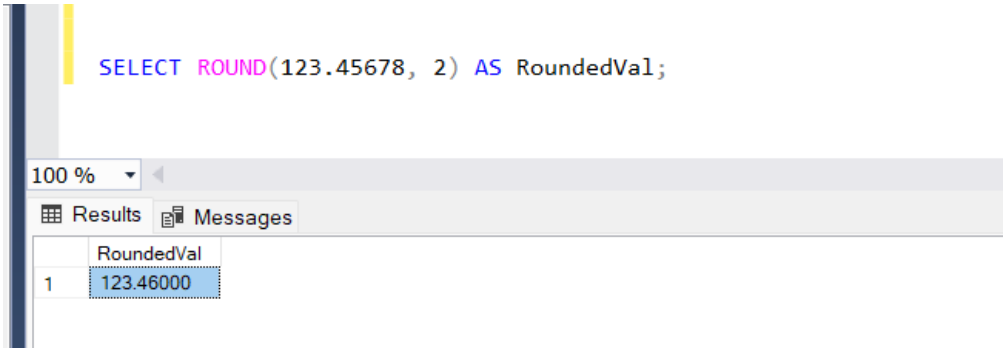
Rounds a number to a specific number of decimal places.

✅ Syntax:

ROUND(numeric_expression, decimal_places)

📌 Example:

SELECT ROUND(123.45678, 2) AS RoundedVal;



4️⃣ POWER()

✅ Definition:

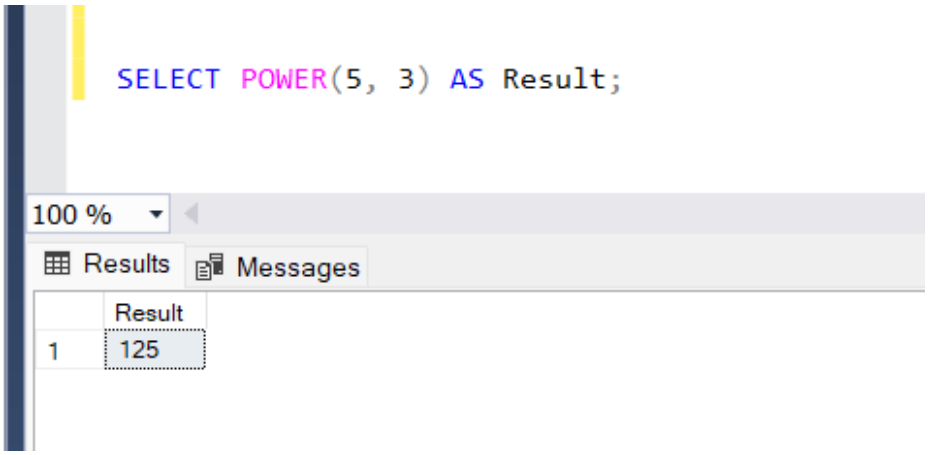
Returns the **result of a number raised to a power** (exponentiation).

✅ Syntax:

POWER(base, exponent)

📌 Example:

SELECT POWER(5, 3) AS Result;



📝 Key Points to Remember

Function	Use Case
`CEILING()`	Always rounds up
`FLOOR()`	Always rounds down
`RAND()`	Returns a **float** between 0 and 1
`ROUND()`	Useful for formatting decimal output
`POWER()`	Calculate exponents (e.g., square, cube)
`FLOOR(RAND()*N)+M`	Formula for random **integers in range**

✔️ `CEILING`, `FLOOR`, and `ROUND` are good for **billing, formatting, and data cleaning**

✔️ `RAND()` helps in generating **test data** or random IDs

✔️ `POWER()` can be used for **growth calculations, interest, etc.**