

Calculations and Business Metrics with DAX

Prepared by Eng. Ahmed Hussein, MBA,
PfMP®, PMP®, CMP APMG

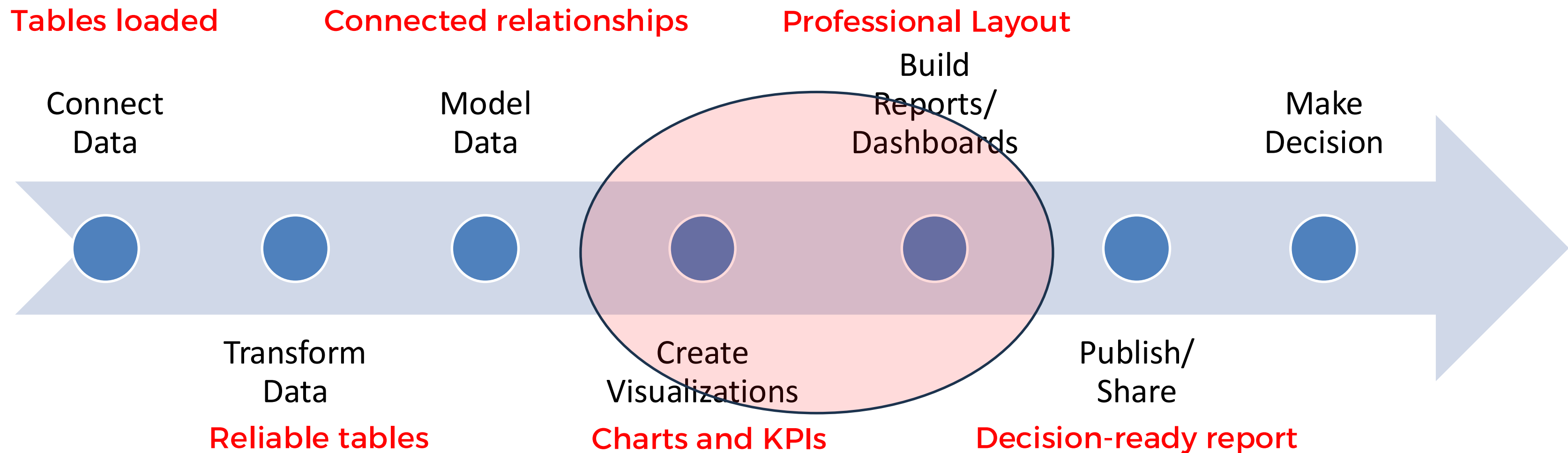
Course: From Data to Decisions using Power BI

Lecture 05



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Power BI Workflow (The Analytics Journey)



Each stage adds value — skip one and the chain breaks

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What we will cover

1. DAX overview
2. Building Calculations using DAX

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1. DAX Overview



Business Scenario

Management wants to answer:

- What is total revenue?
- What is total profit?
- Which products are most profitable?
- What is profit margin?
- How is revenue changing by month?
- Which regions are underperforming?

DAX turns business questions into report calculations.

What is DAX

DAX stands for Data Analysis Expressions.

- It is the formula language used in Power BI to create calculations.
- DAX is used to create:



Measures



Calculated Columns



KPIs



Time-based
Calculations

DAX is the calculation engine behind Power BI business analysis.

Why DAX Matters?

DAX helps transform data into meaningful business calculations.

Without DAX	With DAX
Basic totals only	Dynamic business metrics
Limited analysis	KPIs and performance insights
Manual calculations	Automated calculations
Static reporting	Interactive analysis

DAX allows Power BI reports to answer deeper business questions.

Dax vs. Excel Formulas

DAX is similar to Excel formulas, but designed for data models and interactive

Excel Formulas	DAX in Power BI
Works mainly cell by cell	Works across tables and filters
Used in spreadsheets	Used in data models
Often static	Dynamic and interactive
Manual workbook logic	Report-level business logic

Measures vs Calculated Columns

Calculated Column: Evaluates row by row (called "row context"). It computes the value once when the data loads or refreshes and remains fixed.

Measure: Evaluates over groups of data (called "filter context"). It computes instantly when you drag it into a visual and changes whenever you click a slicer or filter.

Item	Measure	Calculated Column
Calculation level	Aggregated calculation	Row-by-row calculation
Stored in model	Not stored as row data	Stored as a new column
Used for	KPIs and totals	Classification and row logic
Example	Total Revenue	Revenue Category

Without DAX, your Power BI reports are limited to basic drag-and-drop summaries.

Mastering DAX allows you to answer complex business questions, evaluate target tracking percentages, and build interactive, high-performance dashboards.

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2. Building Calculations using DAX



Where to Create a Measure

Go to **Report View** or **Model View**

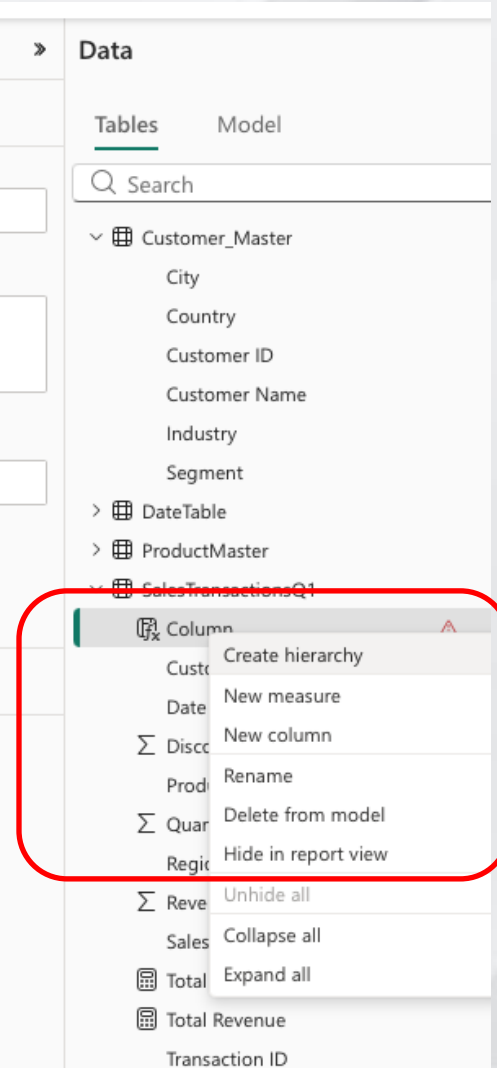
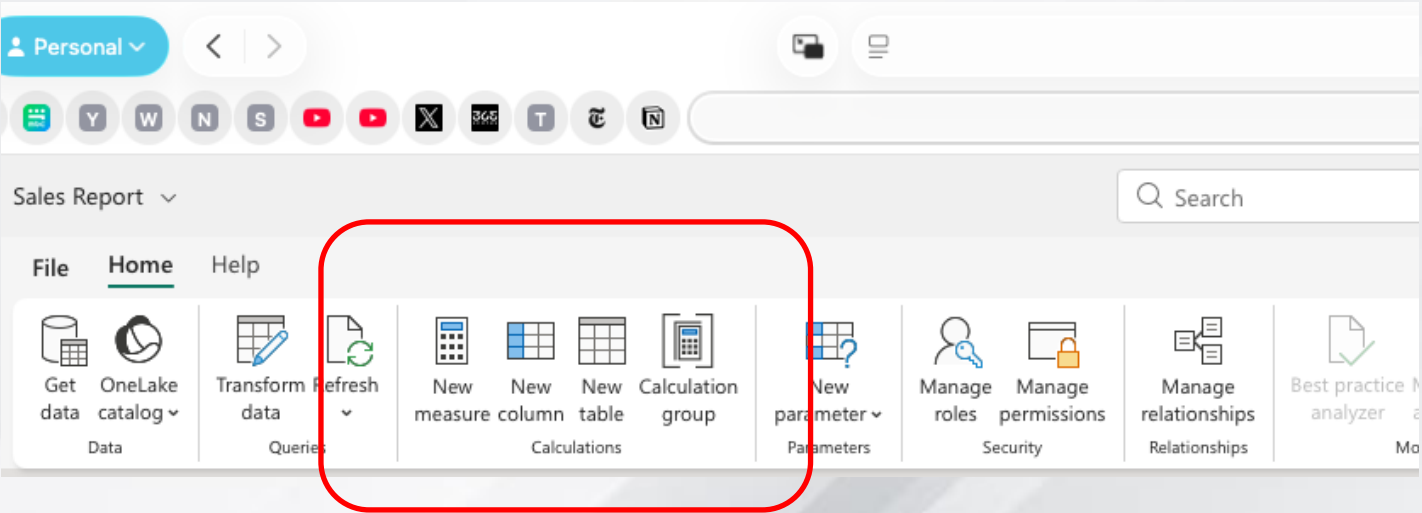
Go to **Table Tools**

Write the DAX formula

Select the table where the measure should be stored

Click **New Measure**

Press **Enter**



Key Categories of DAX Functions

DAX includes a library of over 250 built-in functions to manipulate data.
The most common categories include:

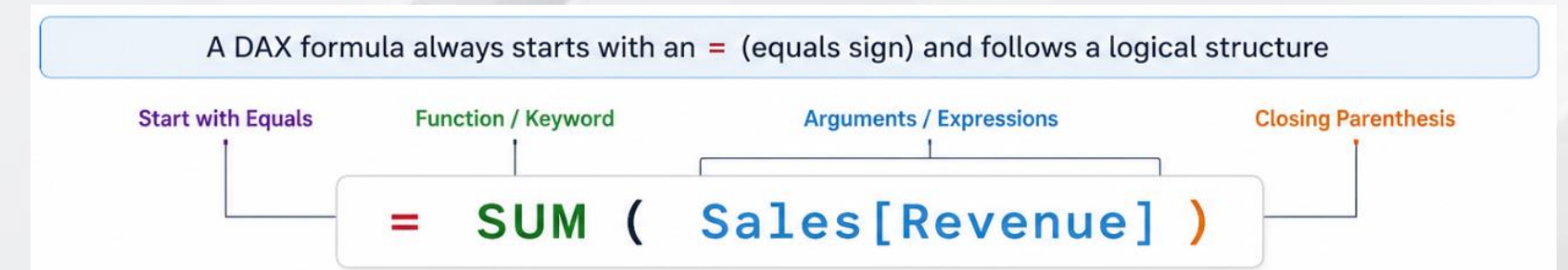
Function Category	Purpose	Examples
Aggregation Functions	Summarize numeric values	SUM, AVERAGE, MIN, MAX
Counting Functions	Count records or unique values	COUNT, COUNTROWS, DISTINCTCOUNT
Logical Functions	Apply business rules	IF, SWITCH
Filter Functions	Modify calculation context	CALCULATE, FILTER, ALL
Time Intelligence Functions	Analyze data over time	TOTALYTD, PREVIOUSMONTH, SAMEPERIODLASTYEAR

Basic DAX Formula Structure

A DAX measure usually follows this structure:

- Measure Name = Function (Table [Column])

Part	Meaning
Total Revenue	Measure name
SUM	DAX function
Sales[Revenue]	Table and column used



Example:

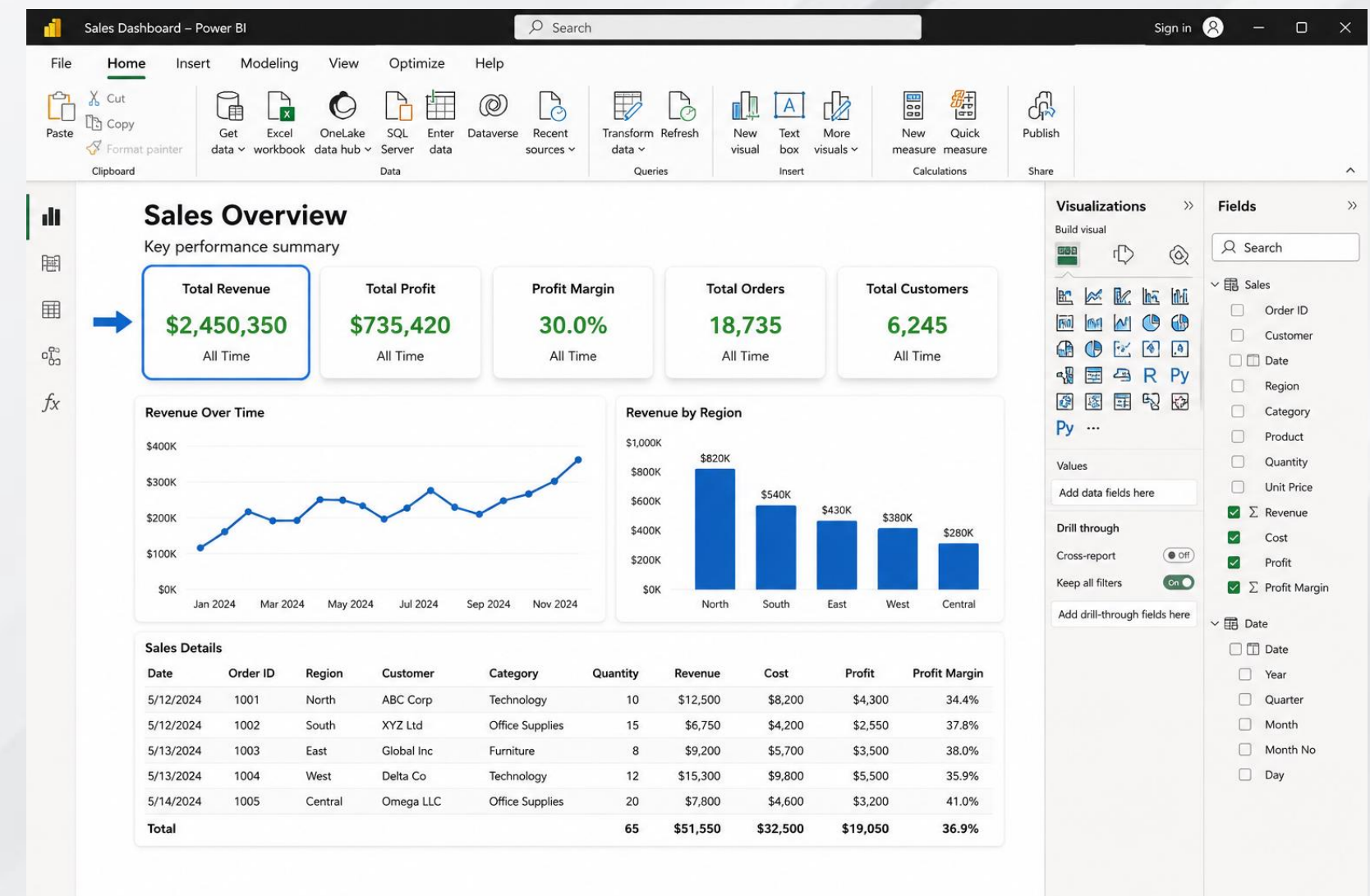
- Total Revenue = SUM(Sales[Revenue])

Creating Total Revenue

Total Revenue = SUM(Sales[Revenue])

Use this measure to show:

- Total sales revenue
- Profit margin
- Growth rate



Why Use DAX for Total Revenue?

Creating a DAX measure is better practice, especially when building professional reports.

Key Difference

Drag and Sum Revenue	DAX Measure: Total Revenue
Quick and simple	More professional and reusable
Created only inside one visual	Can be used across many visuals
Hard to control calculation logic	Calculation logic is clearly defined
Less suitable for complete KPIs	Can be reused in profit, margin, growth, and target measures
May create inconsistent naming across visuals	Creates one standard business definition

Creating Total Cost

Total Cost = SUMX(Sales, Sales[Quantity] * Sales[Unit Cost])

Use when cost is calculated row by row.

Field	Meaning
Quantity	Number of units sold
Unit Cost	Cost per unit
Total Cost	Quantity × Unit Cost

SUMX is useful when each row needs a calculation before being added.

Creating Total Profit

$\text{Total Profit} = [\text{Total Revenue}] - [\text{Total Cost}]$

Profit is calculated using existing measures.

Business Use:

- * Profit by product
- * Profit by region
- * Profit by customer segment

Measures can build on other measures.

Creating Profit Margin

Profit Margin = `DIVIDE([Total Profit], [Total Revenue])`

Why use `DIVIDE` instead of `/`?

DIVIDE	Normal Division
Handles divide-by-zero safely	May return errors
Cleaner for reports	Less controlled

DIVIDE is safer for percentage calculations.

COUNT and DISTINCTCOUNT

Number of Transactions = COUNT(Sales[Transaction ID])

Number of Customers = DISTINCTCOUNT(Sales[Customer ID])

Function	Use
COUNT	Counts rows or values
DISTINCTCOUNT	Counts unique values

Use DISTINCTCOUNT when counting unique customers, products, or transactions.

Average Revenue per Transaction

Average Revenue per Transaction =
DIVIDE([Total Revenue], [Number of Transactions])

Business use:

- * Sales efficiency
- * Average deal size
- * Customer purchase behavior

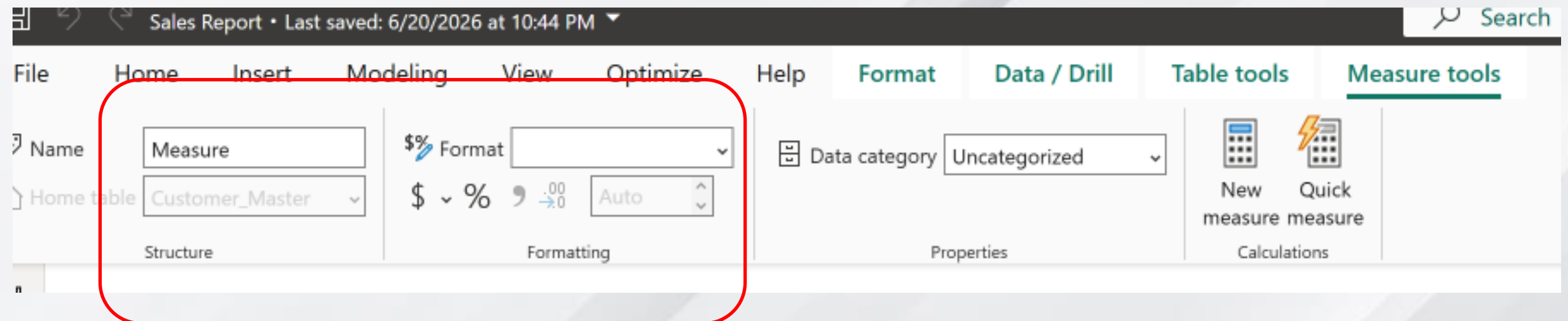


Average metrics help compare performance beyond total values.

Formatting Measures

After creating a measure:

- Select the measure
- Go to Measure Tools
- Choose format:
 - Currency
 - Whole number
 - Decimal
 - * Percentage



4. Adjust decimal places

Example: Format Profit Margin as Percentage.

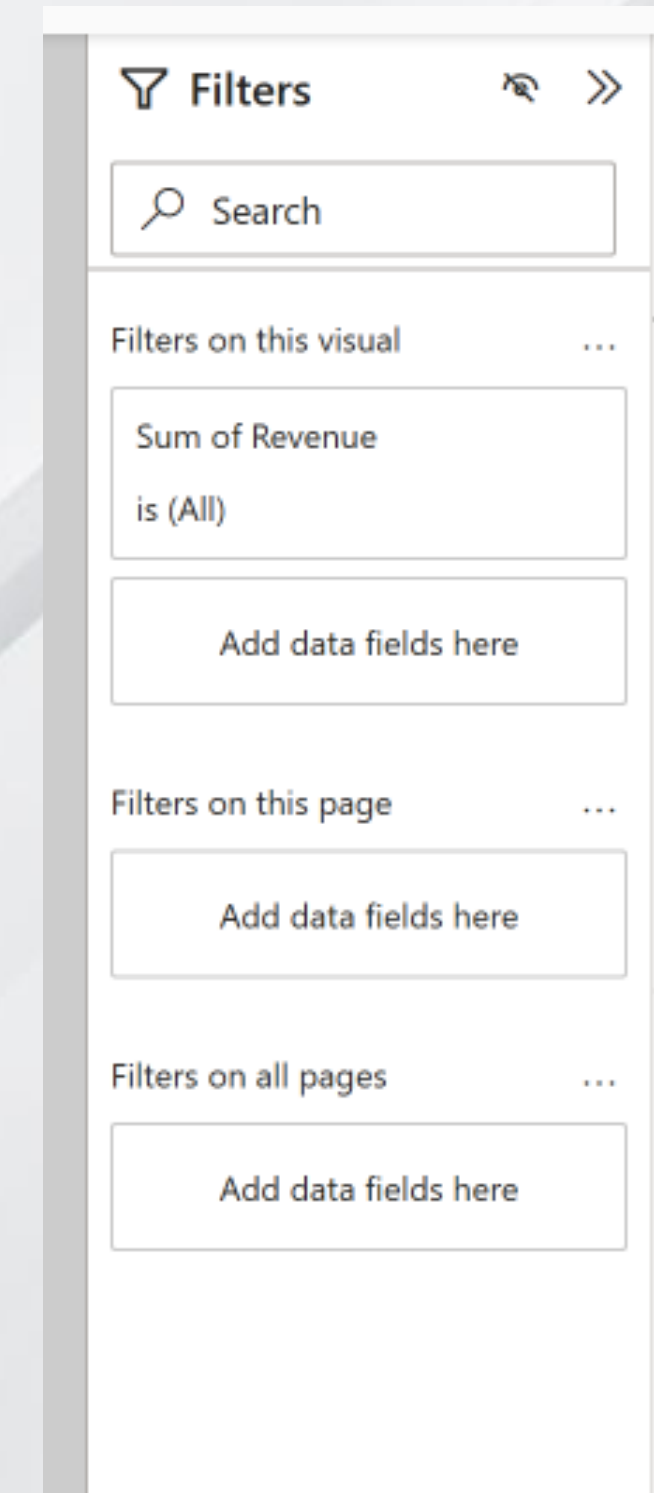
Understanding Filter Context

Filter context means the filters affecting a calculation.

DAX measures calculate based on the current report context.

Filters may come from:

- Visual rows
- Slicers
- Page filters
- Report filters
- Relationships



Example: Total Revenue changes when the user selects Cairo, Electronics, or Q1.

DAX Measures Are Dynamic

The same measure can show different results depending on the visual.

Total Revenue = SUM(Sales[Revenue])

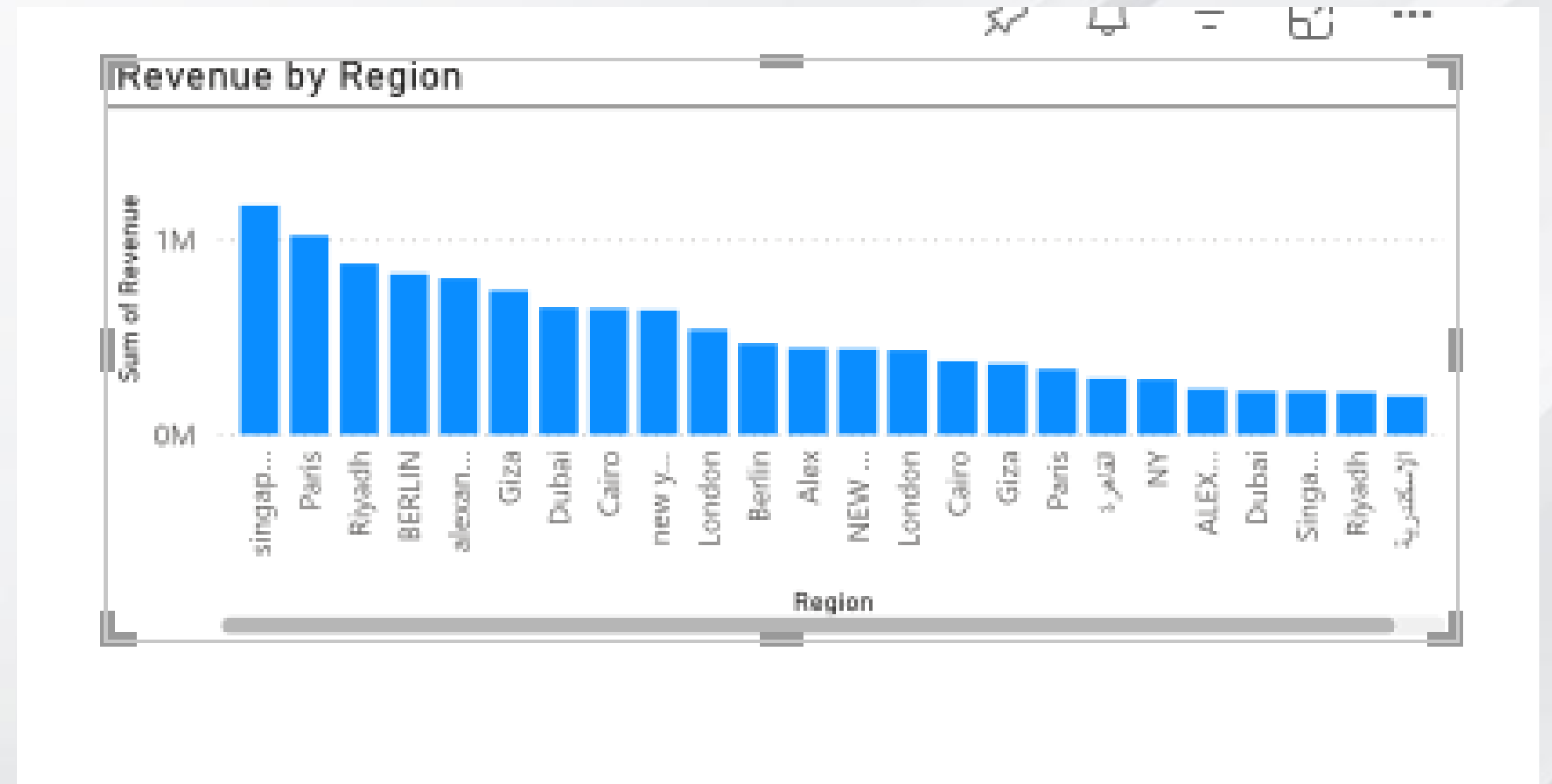
Visual	Result
Card	Total revenue for all data
Bar chart by Region	Revenue per region
Line chart by Month	Revenue per month
Table by Customer	Revenue per customer

Revenue by Region

Total Revenue = SUM(Sales[Revenue])

Create a bar chart:

- Axis: Region
- Values: Total Revenue



DAX measures respond dynamically to report filters and visuals.

Using CALCULATE

Cairo Revenue = CALCULATE([Total Revenue], Sales[Region] = "Cairo")

- CALCULATE changes the filter context of a measure.
- Use it to calculate:
 - Revenue for one region
 - Sales for one category
 - Profit for selected conditions

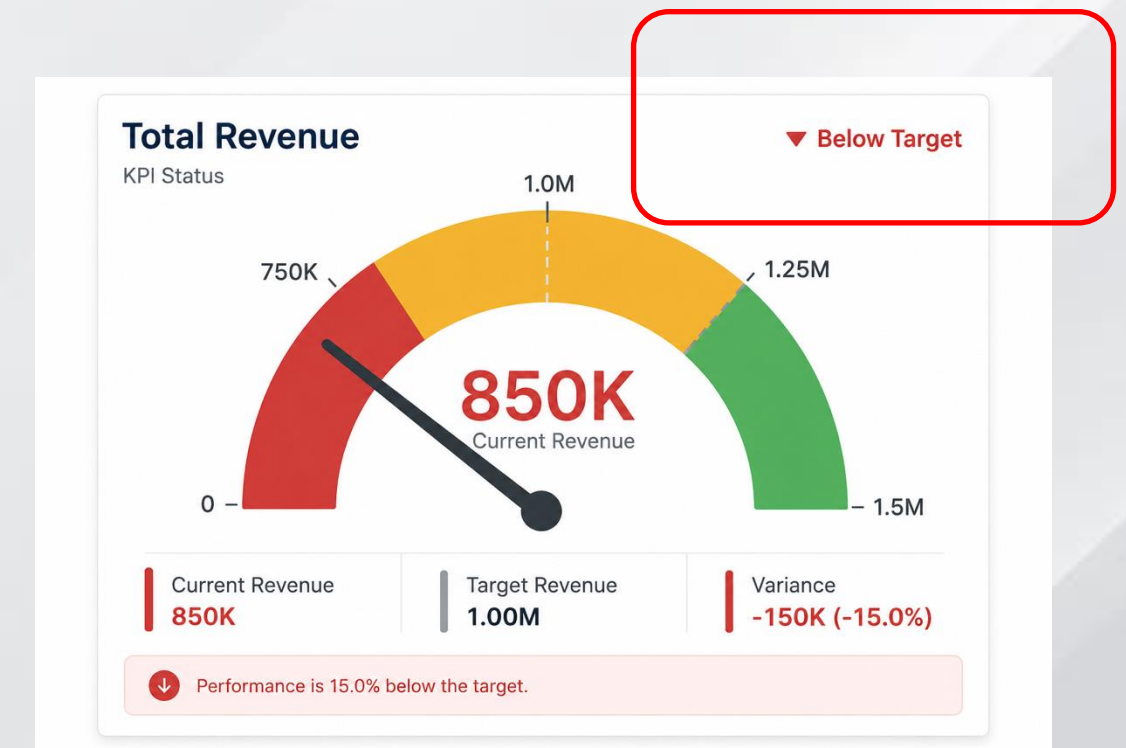
CALCULATE is one of the most powerful DAX functions.

IF Function in DAX

IF(Condition, Result if True, Result if False)

Revenue Status = IF([Revenue Achievement %] >= 1, "On Target", "Below Target")

- The IF function in DAX is used to apply simple business logic in Power BI.
- IF helps turn numeric results into clear business messages that are easier for report users to understand.
- When to Use IF in Power BI
 - Classify performance as High/Low or Good / Needs Attention
 - Identify whether a target was achieved
 - Create simple KPI status labels
 - Support conditional reporting logic



SWITCH Function in DAX

SWITCH(TRUE(), Condition 1, Result 1, Condition 2, Result 2, Condition 3, Result 3, Default Result)

Revenue Category =SWITCH(TRUE(), [Total Revenue] >= 1000000, "High Revenue", [Total Revenue] >= 500000, "Medium Revenue", "Low Revenue")

- The SWITCH function in DAX is used when you need to test multiple conditions and return different results.
- When to Use SWITCH in Power BI
 - Classify revenue as High / Medium / Low
 - Group customers by value
 - Create KPI status labels
 - Replace long nested IF formulas

Creating a KPI Target

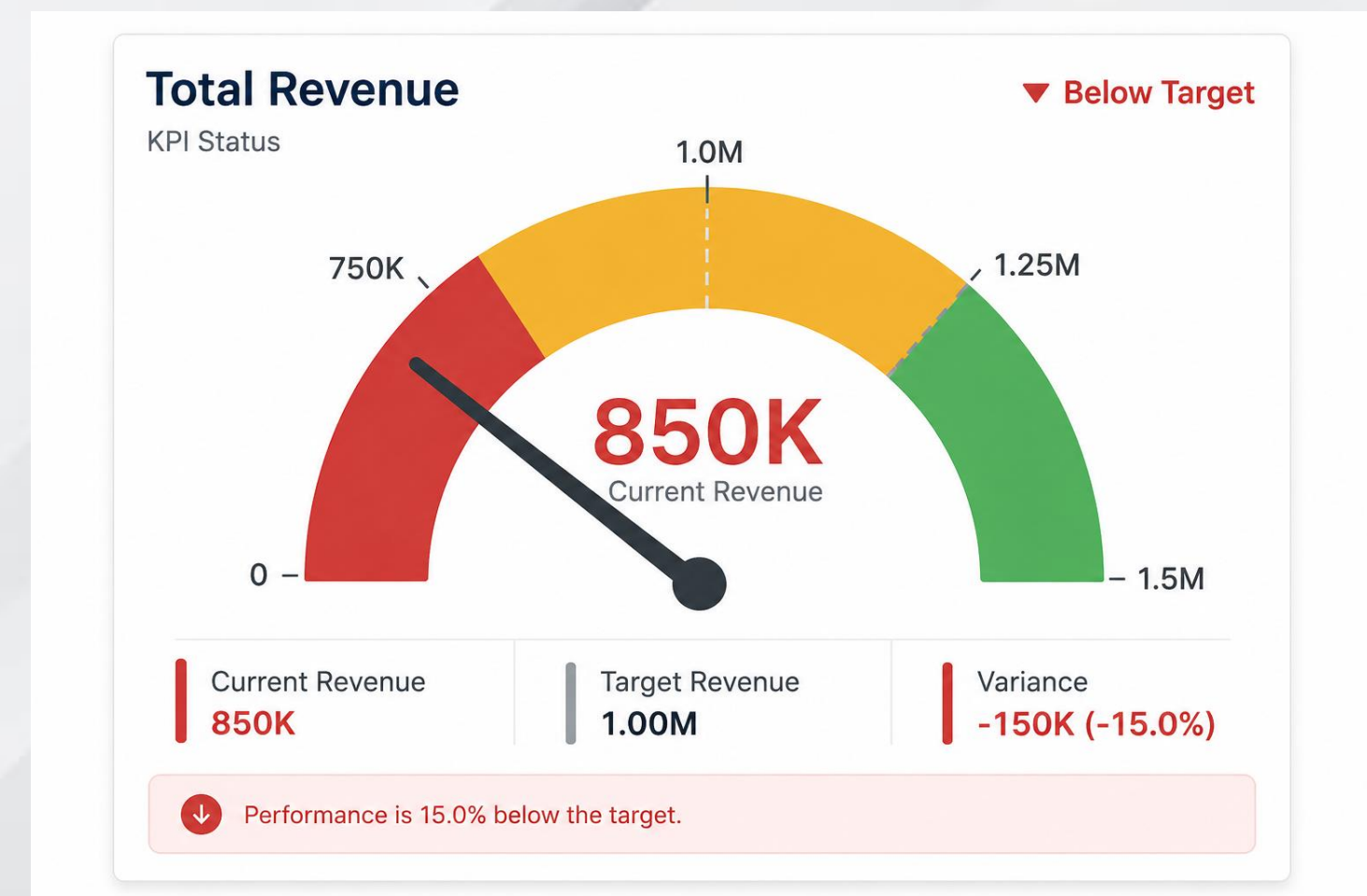
Revenue Target = 1000000

Target Achievement = $\text{DIVIDE}(\text{Total Revenue}, \text{Revenue Target})$

- Use this to compare actual revenue against target.

- Visuals:

- KPI card
- Gauge visual
- Table with variance



Introduction to Time Intelligence

Time intelligence helps analyze data over time.

What is monthly revenue?

What is year-to-date revenue?

What is growth compared to last month?

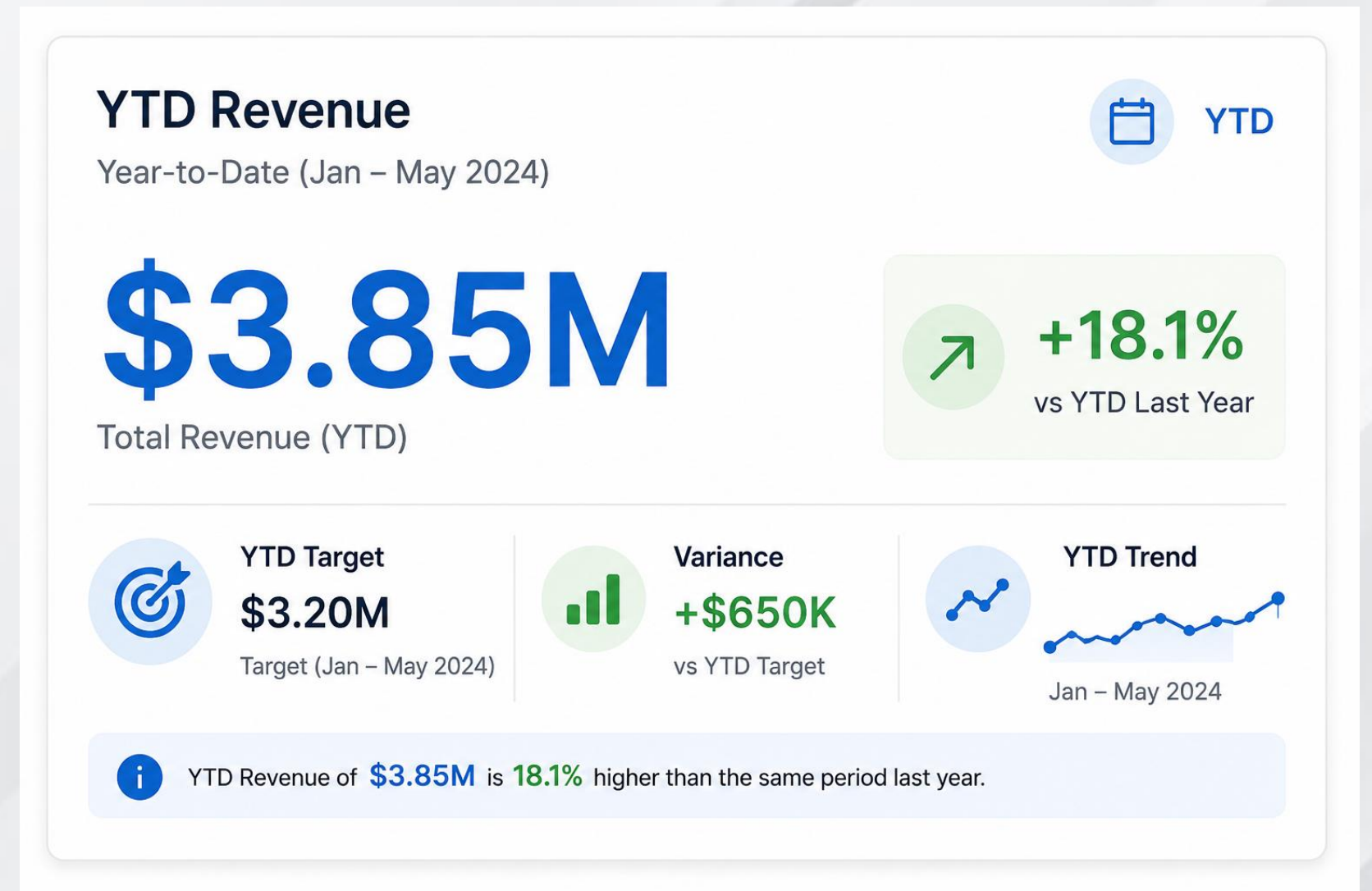
What is growth compared to last year?

Time Intelligence requires a proper Date Table

Total Revenue YTD

Revenue YTD = TOTALYTD([Total Revenue], 'Date Table'[Date])

- Use this to show:
 - Year-to-date sales
 - Cumulative performance
 - Progress toward annual target

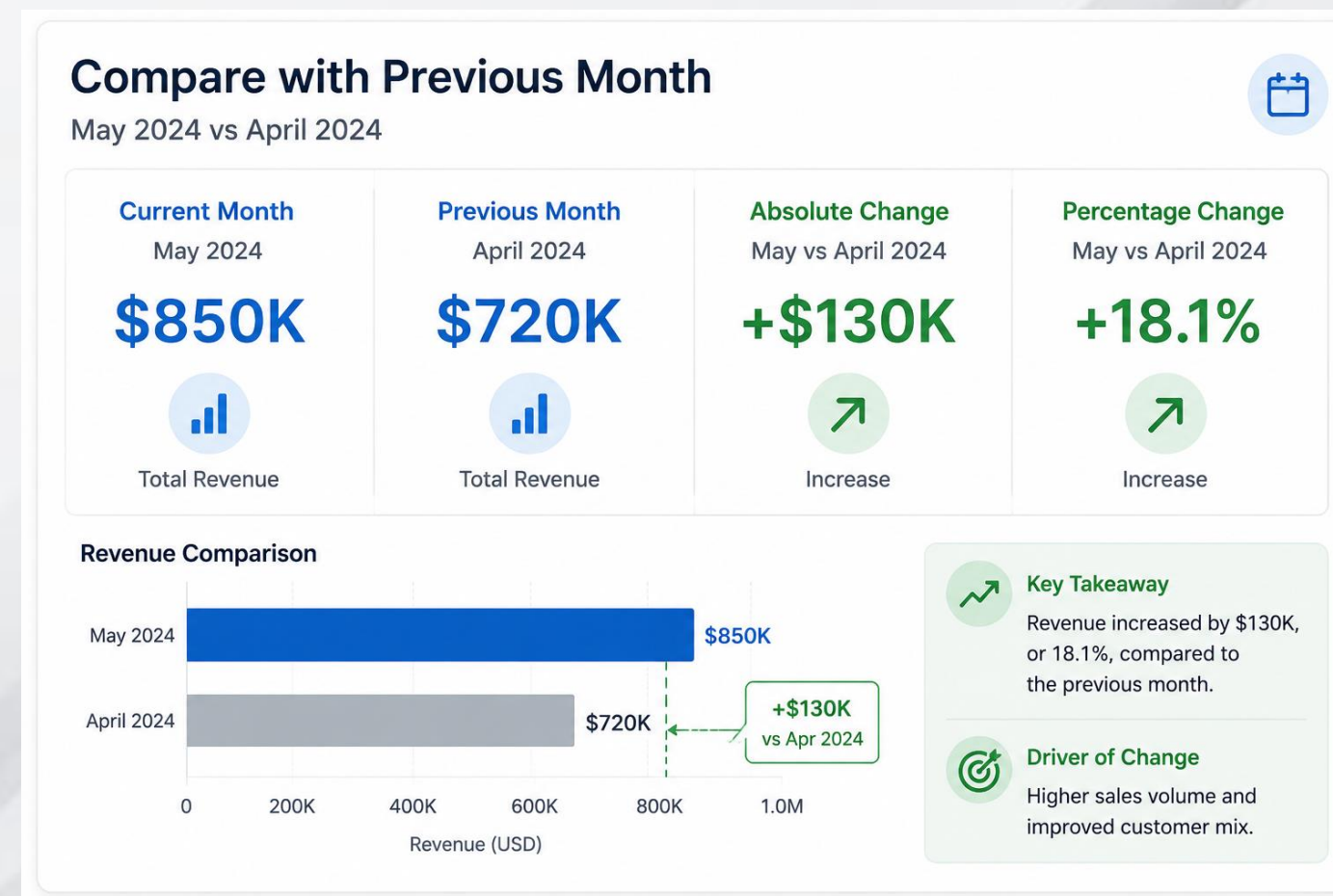


Previous Month Revenue

Previous Month Revenue =

`CALCULATE([Total Revenue], PREVIOUSMONTH('Date Table'[Date]))`

- Use to compare current month with the previous month.



Month-over-Month Revenue

MoM Growth =

[Total Revenue] - [Previous Month Revenue]

MoM Growth % =

DIVIDE([MoM Growth], [Previous Month Revenue])

- Business use:
 - Identify growth trends
 - Detect performance decline
 - Support monthly reviews



Creating Report-Level KPIs

Recommended KPI measures:

KPI	DAX Measure
Total Revenue	SUM Revenue
Total Profit	Revenue - Cost
Profit Margin	Profit / Revenue
Revenue Achievement %	Revenue / Target
MoM Growth %	Growth vs previous month

Improving Cards with Measures

- Use cards to display:
 - Total Revenue
 - Total Profit
 - Profit Margin
 - Revenue Achievement %
 - MoM Growth %
- Formatting Tips:
 - Use currency format
 - Use percentage format
 - Reduce decimals
 - Use clear titles

Using Measures in Charts

Measures make visuals more meaningful and business-focused.

Measures can be used in:

- Bar charts
- Column charts
- Line charts
- Tables
- Matrix visuals
- KPI visuals

Common DAX Mistakes

Mistake	Impact
Using columns instead of measures	Less flexible reporting
Wrong table references	Formula errors
Not formatting measures	Poor presentation
Dividing with / instead of DIVIDE	Possible errors
No Date Table	Weak time analysis

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Demo on Power BI DAX Features



Exercise: Create Core Measures

Using the same data set from last lecture
Create the following measures:

Measure	Formula
Total Revenue	= SUM(Sales[Revenue])
Total Quantity	= SUM(Sales[Quantity])
Number of Customers	= DISTINCTCOUNT(Sales[Custo mer ID])
Total Profit	= [Total Revenue] - [Total Cost]
Profit Margin	= DIVIDE([Total Profit], [Total Revenue])



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Exercise

Exercise: Build KPI Cards and Visuals

Create card visuals for:

- Total Revenue
- Total Profit
- Profit Margin
- Number of Customers
- Total Quantity

Create visuals:

- Revenue by Region
- Profit by Product Category
- Revenue by Customer Segment
- Monthly Revenue Trend
- Top Customers by Revenue



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Exercise

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05**Key Points**

DAX creates business calculations in Power BI.

Measures are essential for KPIs and dashboards.

SUM, SUMX, DIVIDE, COUNT, DISTINCTCOUNT, IF, and CALCULATE are core functions.

Measures respond dynamically to slicers and filters.

DAX improves reports by turning data into insights.

Lecture 06:

- Interactive Dashboards and User Experience



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Next Lecture

Thank You