

Lesson 9 — DAX Context, CALCULATE, Variables

1. What is row context? Give an example in a calculated column.

- **Row context** means DAX evaluates each row one by one.
- In a calculated column, row context happens automatically.

Example:

Total Price = Sales[Quantity] * Sales[UnitPrice]

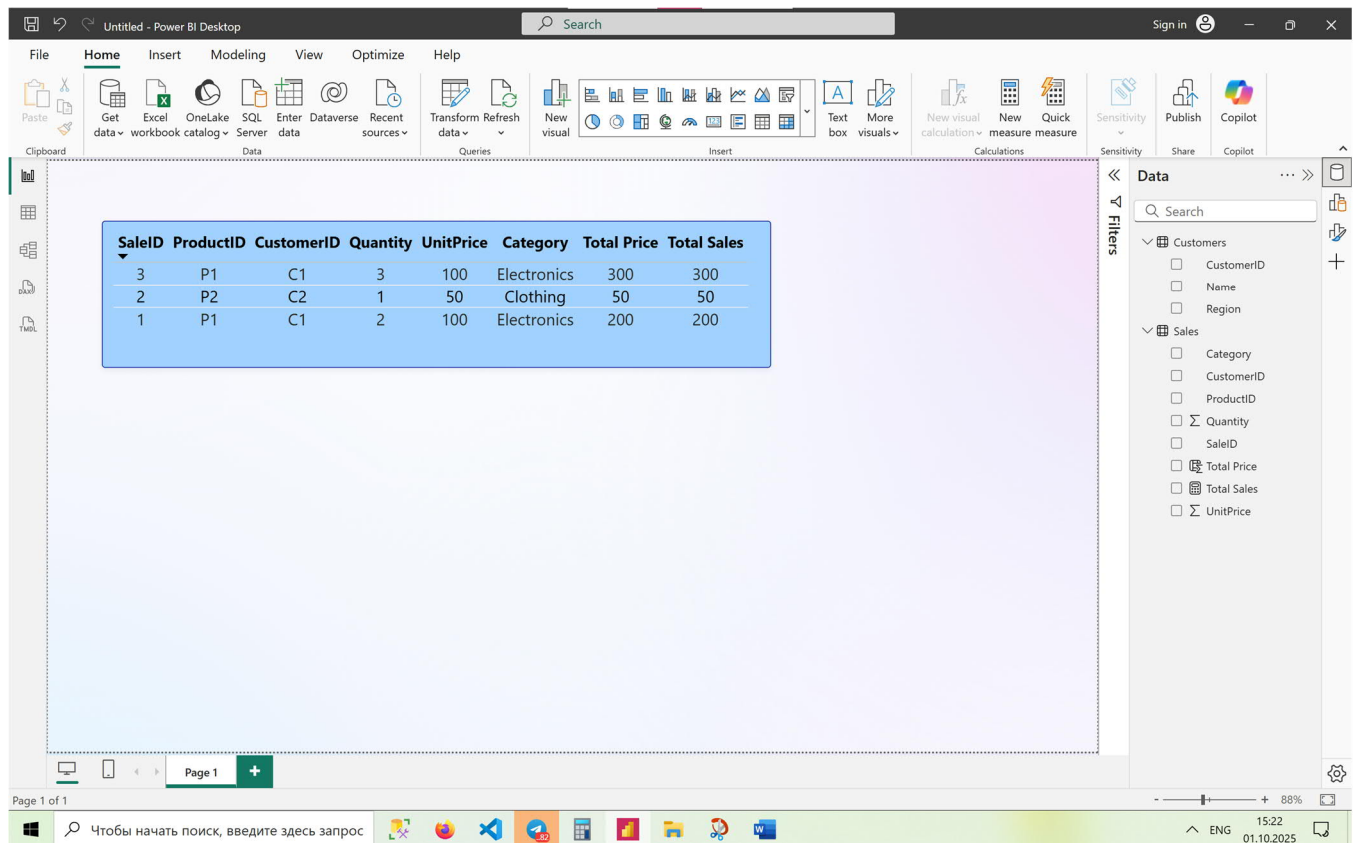
The screenshot shows the Microsoft Power BI Desktop interface. The 'Column tools' ribbon is active, displaying the formula bar with the DAX expression: `Total Price = Sales[Quantity] * Sales[UnitPrice]`. Below the formula bar, a table with 3 rows and 7 columns is visible. The columns are SalesID, ProductID, CustomerID, Quantity, UnitPrice, Category, and Total Price. The data is as follows:

SalesID	ProductID	CustomerID	Quantity	UnitPrice	Category	Total Price
1	P1	C1	2	100	Electronics	200
2	P2	C2	1	50	Clothing	50
3	P1	C1	3	100	Electronics	300

The right-hand pane shows the 'Data' view with a search bar and a list of fields. The 'Sales' table is expanded, showing fields: Category, CustomerID, ProductID, Quantity, SalesID, Total Price, and UnitPrice. The 'Total Price' field is selected. The bottom status bar indicates 'Table: Sales (3 rows) Column: Total Price (3 distinct values)'.

2. Write a measure that finds total sales

Total Sales = SUMX(Sales, Sales[Quantity] * Sales[UnitPrice])



There we can see the difference between Total price, which is created as new column, and Total Sales, which is a new measure

3. Use RELATED to fetch the Name from the Customers table into the Sales table
 CustomerName = RELATED(Customers[Name])

Untitled - Power BI Desktop

Search

File Home Help Table tools Column tools

Name Customer Name Format Text Summarization Don't summarize Data category Uncategorized

Data type Text

Structure

Formatting

Properties

Sort Sort by column

Groups

Relationships

Calculations

1 Customer Name = RELATED(Customers[Name])

2

SaleID	ProductID	CustomerID	Quantity	UnitPrice	Category	Total Price	Customer Name
1	P1	C1	2	100	Electronics	200	Alice
2	P2	C2	1	50	Clothing	50	Bob
3	P1	C1	3	100	Electronics	300	Alice

Data

Customers

- CustomerID
- Name
- Region

Sales

- Category
- Customer Name
- CustomerID
- ProductID
- Quantity
- SaleID
- Total Price
- Total Sales
- UnitPrice

Table: Sales (3 rows) Column: Customer Name (2 distinct values)

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ENG 17:22 01.10.2025

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Search

File Home Insert Modeling View Optimize Help Format Data / Drill

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Get data

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SQL

Server

Enter data

Dataverse

Recent sources

Transform

Refresh data

Queries

New visual

Insert

Text box

More visuals

New visual calculation

New measure

Quick measure

Sensitivity

Publish

Copilot

Clipboard

Data

Table: Sales (3 rows) Column: Customer Name (2 distinct values)

SaleID	ProductID	CustomerID	Quantity	UnitPrice	Category	Total Price	Total Sales	Customer Name
3	P1	C1	3	100	Electronics	300	300	Alice
2	P2	C2	1	50	Clothing	50	50	Bob
1	P1	C1	2	100	Electronics	200	200	Alice

Data

Customers

- CustomerID
- Name
- Region

Sales

- Category
- Customer Name
- CustomerID
- ProductID
- Quantity
- SaleID
- Total Price
- Total Sales
- UnitPrice

Page 1 of 1

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4. What does

CALCULATE(SUM(Sales[Quantity]), Sales[Category] = "Electronics")
return?

- It returns the sum of Quantity only for rows where Category = "Electronics".
 📌 the sample table: 2 + 3 = 5.

5. Explain the difference between VAR and RETURN in DAX

- VAR = stores a temporary value (a number, a table, or an expression).
- RETURN = defines what the measure will output.

Example:

Average Price per Quantity =

VAR TotalQty = SUM(Sales[Quantity])

VAR TotalSales = SUMX(Sales, Sales[Quantity] * Sales[Price])

RETURN

DIVIDE(TotalSales, TotalQty)

The screenshot shows the Power BI Desktop interface. The DAX editor on the left contains the following code:

```

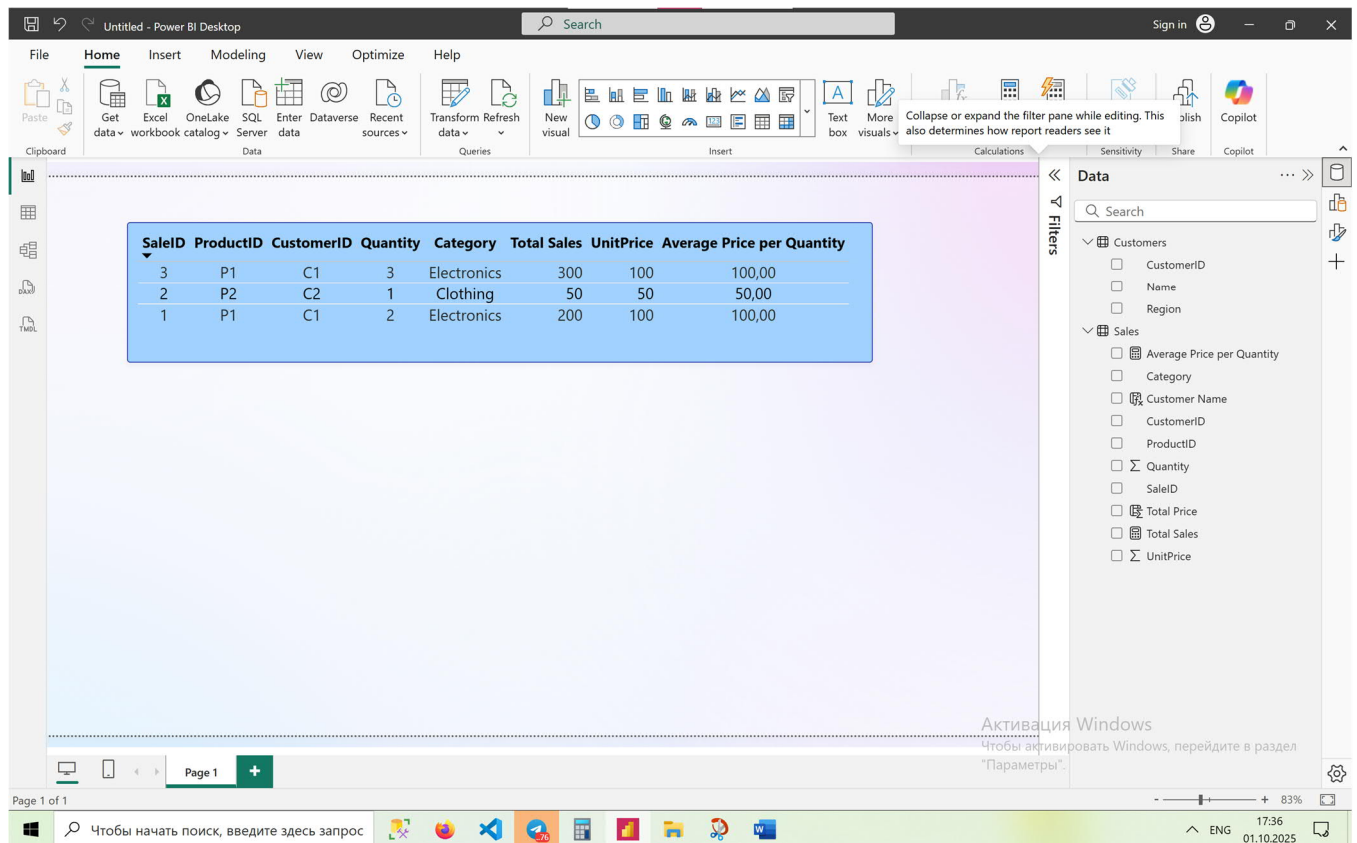
1 Average Price per Quantity =
2 VAR TotalQty = SUM(Sales[Quantity])
3 VAR TotalSales = SUMX(Sales, Sales[Quantity] * Sales[UnitPrice])
4 RETURN
5 DIVIDE(TotalSales, TotalQty)
6

```

Below the code, a table is displayed with the following data:

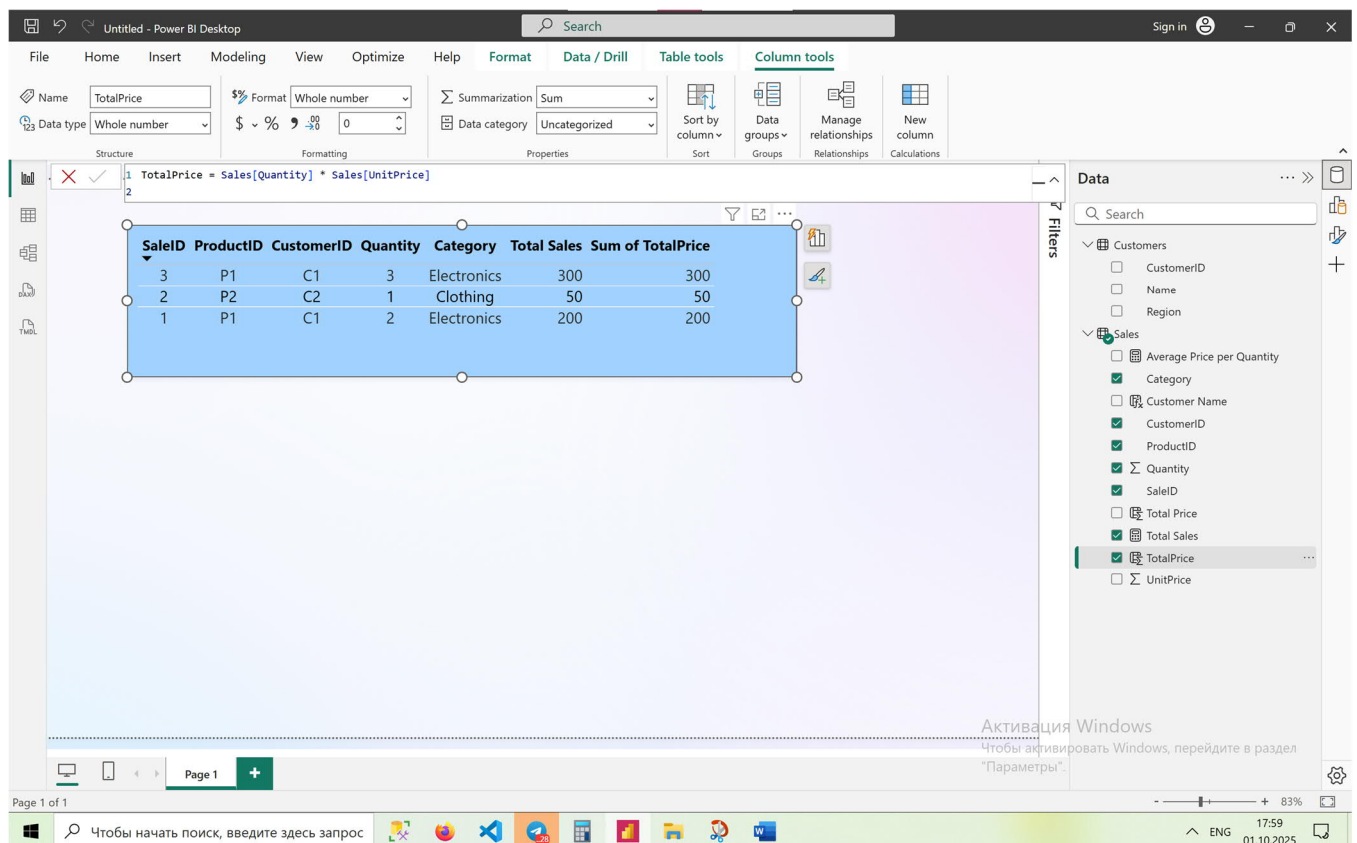
3	P1	C1	3	Electronics	300	100
2	P2	C2	1	Clothing	50	50
1	P1	C1	2	Electronics	200	100

The right-hand pane shows the 'Data' view with the 'Sales' table selected. The fields listed are: CustomerID, Name, Region, Category, Customer Name, ProductID, Quantity, SaleID, Total Price, Total Sales, and UnitPrice. The 'Average Price per Quantity' measure is also listed.



6. Create a calculated column in Sales called TotalPrice using row context

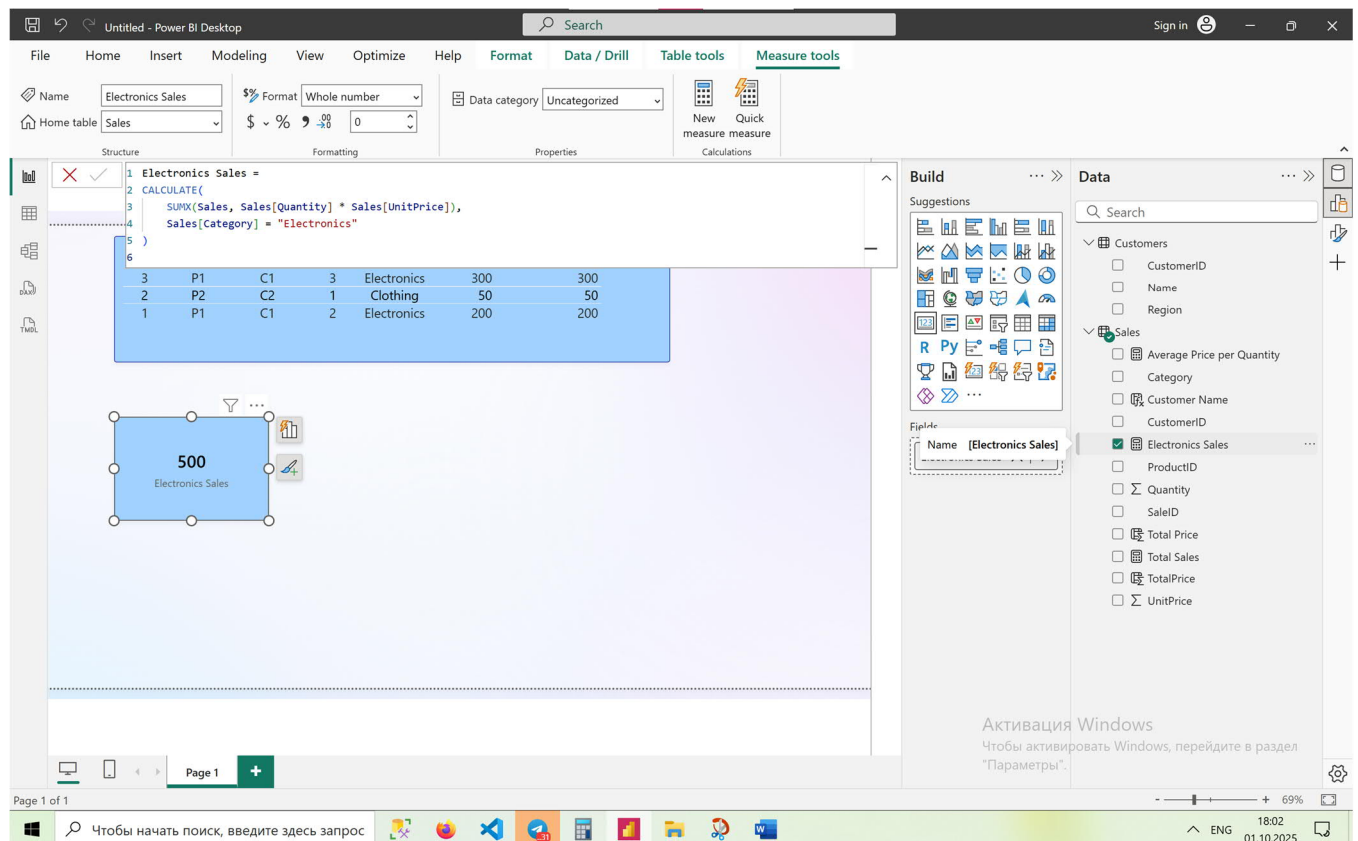
$\text{TotalPrice} = \text{Sales}[\text{Quantity}] * \text{Sales}[\text{UnitPrice}]$



7. Write a measure Electronics Sales using CALCULATE

Electronics Sales =

```
CALCULATE(  
    SUMX(Sales, Sales[Quantity] * Sales[UnitPrice]),  
    Sales[Category] = "Electronics"  
)
```



8. Use ALL(Sales[Category]) in a measure to show total sales ignoring category filters

Total Sales Ignore Category =

```
CALCULATE(  
    SUMX(Sales, Sales[Quantity] * Sales[UnitPrice]),  
    ALL(Sales[Category])  
)
```

Untitled - Power BI Desktop

Search

File Home Insert Modeling View Optimize Help Table tools Measure tools

Name Measure Format \$ % \$ % 9 -00 Auto

Home table Sales Data category Uncategorized

Structure Formatting Properties Calculations

Build Suggestions

Data

Customers

- ☐ CustomerID
- ☐ Name
- ☐ Region

Sales

- ☐ Average Price per Quantity
- ☐ Category
- ☐ Customer Name
- ☐ CustomerID
- ☐ Electronics Sales
- ☒ Measure
- ☐ ProductID
- ☐ Quantity
- ☐ SaleID
- ☐ Total Price
- ☐ Total Sales
- ☐ TotalPrice
- ☐ UnitPrice

1 Total Sales (Ignore Category) =
2 CALCULATE(
3 SUMX(Sales, Sales[Quantity] * Sales[UnitPrice]),
4 ALL(Sales[Category])
5)
6

3	P1	C1	3	Electronics	300	300
2	P2	C2	1	Clothing	50	50
1	P1	C1	2	Electronics	200	200

500
Electronics Sales

Page 1 of 1

Page 1

Активация Windows
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Lesson_9 - Power BI Desktop

Search

File Home Insert Modeling View Optimize Help

Paste Get data Excel OneLake SQL Enter data Dataverse Recent sources Transform Refresh data New visual

Clipboard Data Queries Insert

Format

Filters

Page information

Canvas settings

Canvas background

Wallpaper

Filter pane

Filter cards

Data

Customers

- ☐ CustomerID
- ☐ Name
- ☐ Region

Sales

- ☐ Average Price per Quantity
- ☐ Category
- ☐ Customer Name
- ☐ CustomerID
- ☐ Electronics Sales
- ☐ ProductID
- ☐ Quantity
- ☐ SaleID
- ☐ Total Price
- ☐ Total Sales
- ☐ Total Sales (Ignore Category)
- ☐ TotalPrice
- ☐ UnitPrice

Category	Total Sales	Total Sales (Ignore Category)
Clothing	50	550
Electronics	500	550

550
Total Sales

Page 1 of 1

Page 1

Активация Windows
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19:23
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9. Fix this error: A calculated column in Sales uses RELATED(Customers[Region]) but returns blanks

- The cause: there is **no active relationship** between Sales[CustomerID] and Customers[CustomerID].

✓ **Fix:** Create or activate the relationship in the data model.

The screenshot shows the Power BI Desktop interface. The formula bar at the top displays the formula: `Region = RELATED(Customers[Region])`. Below the formula bar, a yellow error message states: "The column 'Customers[Region]' either doesn't exist or doesn't have a relationship to any table available in the current context." The main data table has the following columns: SaleID, ProductID, CustomerID, Quantity, UnitPrice, Category, Total Price, Customer Name, TotalPrice, and Region. The data rows are:

SaleID	ProductID	CustomerID	Quantity	UnitPrice	Category	Total Price	Customer Name	TotalPrice	Region
1	P1	C1	2	100	Electronics	200	#ERROR	200	#ERROR
2	P2	C2	1	50	Clothing	50	#ERROR	50	#ERROR
3	P1	C1	3	100	Electronics	300	#ERROR	300	#ERROR

The right-hand pane shows the Data view with a search bar and a list of fields from the Customers and Sales tables. The bottom status bar indicates: "Table: Sales (3 rows) Column: Region (0 distinct values)".

The screenshot shows the Power BI Desktop interface with the data model view. The left-hand pane displays the data model with two tables: Customers and Sales. The Customers table has fields: CustomerID, Name, and Region. The Sales table has fields: Category, Customer Name, CustomerID, ProductID, Quantity, Region, SaleID, Total Price, TotalPrice, UnitPrice, Average Price per Quantity, Electronics Sales, Total Sales, and Total Sales (Ignore Category). The right-hand pane shows the Properties view for the selected table, with the 'Cards' section expanded. The 'Show the database in the header when applicable' option is set to 'No', and the 'Show related fields when card is collapsed' option is set to 'Yes'. The bottom status bar indicates: "All tables +".

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File Home Help

Clipboard Data

Get data SQL Server Recent sources

Customers

CustomerID
Name
Region

Collapse

New relationship

Select tables and columns that are related.

From table

Category	CustomerID	ProductID	Quantity	SaleID	Total Price	TotalPrice
Electronics	C1	P1	2	1	200	200
Clothing	C2	P2	1	2	50	50
Electronics	C1	P1	3	3	300	300

To table

CustomerID	Name	Region
C1	Alice	North
C2	Bob	South

Cardinality: Many to one (*:1)

Cross-filter direction: Single

☒ Make this relationship active

☐ Assume referential integrity

☐ Apply security filter in both directions

Save Cancel

Q&A Language Linguistic schema Sensitivity Publish

Data

Tables Model

Search

Customers

CustomerID
Name
Region

Sales

Average Price per Quantity
Category
Customer Name
CustomerID
Electronics Sales
ProductID
Region
SaleID
Total Price
Total Sales
Total Sales (Ignore Category)
TotalPrice
UnitPrice

Активация Windows

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19:33 01.10.2025

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File Home Help

Clipboard Data

Get data SQL Server Recent sources

Transform Refresh data Queries

Manage relationships Relationships

New measure column Calculations

New table

Calendar options Calendars

New parameter Parameters

Manage roles Security

View as

Q&A Language Linguistic schema Sensitivity Publish

Customers

CustomerID
Name
Region

Collapse

Sales

Category
Customer Name
CustomerID
ProductID
Quantity
Region
SaleID
Total Price
TotalPrice
UnitPrice
Average Price per Quantity
Electronics Sales
Total Sales
Total Sales (Ignore Category)

Collapse

Properties

Relationship

Table: Sales Column: CustomerID

Cardinality: Many to one (*:1)

Table: Customers Column: CustomerID

Make this relationship active: Yes

Cross-filter direction: Single

Apply security filter in both directions: No

Apply changes

Open relationship editor

Data

Tables Model

Search

Customers

CustomerID
Name
Region

Sales

Average Price per Quantity
Category
Customer Name
CustomerID
Electronics Sales
ProductID
Region
SaleID
Total Price
Total Sales
Total Sales (Ignore Category)
TotalPrice
UnitPrice

Активация Windows

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Search

File Home Help Table tools Column tools

Name: Region

Data type: Text

Format: Text

Summarization: Don't summarize

Data category: Uncategorized

Sort by column: Sort

Data groups: Groups

Manage relationships: Relationships

New column: Calculations

Structure: 1 Region = RELATED(Customers[Region])

SaleID	ProductID	CustomerID	Quantity	UnitPrice	Category	Total Price	Customer Name	TotalPrice	Region
1	P1	C1	2	100	Electronics	200	Alice	200	North
2	P2	C2	1	50	Clothing	50	Bob	50	South
3	P1	C1	3	100	Electronics	300	Alice	300	North

works!

Активация Windows
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Table: Sales (3 rows) Column: Region (2 distinct values)

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10. Why does CALCULATE override existing filters?

- Because CALCULATE evaluates the expression in a **modified filter context**. It either replaces or adds filters to the current context.

11. Write a measure that returns average unit price of products

Average Unit Price = AVERAGE(Sales[UnitPrice])

Lesson 9 - Power BI Desktop

Search

File Home Help Table tools Column tools

Name: Average Unit Price

Data type: Decimal number

Format: Whole number

Summarization: Sum

Data category: Uncategorized

Sort by column

Data groups

Manage relationships

New column

Structure

Formatting

Properties

Sort

Groups

Relationships

Calculations

1 Average Unit Price = AVERAGE(Sales[UnitPrice])

SaleID	ProductID	CustomerID	Quantity	UnitPrice	Category	Total Price	Customer Name	TotalPrice	Region	Average Unit Price
1	P1	C1	2	100	Electronics	200	Alice	200	North	83
2	P2	C2	1	50	Clothing	50	Bob	50	South	83
3	P1	C1	3	100	Electronics	300	Alice	300	North	83

Data

Search

- Customers
 - CustomerID
 - Name
 - Region
- Sales
 - Average Price per Quantity
 - Average Unit Price
 - Category
 - Customer Name
 - CustomerID
 - Electronics Sales
 - ProductID
 - Quantity
 - Region
 - SaleID
 - Total Price
 - Total Sales
 - Total Sales (Ignore Category)
 - TotalPrice
 - UnitPrice

Активация Windows

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Table: Sales (3 rows) Column: Average Unit Price (1 distinct values)

12. Use VAR to store a temporary table of high-quantity sales (Quantity > 2), then count rows

High Quantity Sales Count =

VAR HighQty = FILTER(Sales, Sales[Quantity] > 2)

RETURN COUNTROWS(HighQty)

👉 the example table, result = **1 row** (SaleID = 3).

Lesson_9 - Power BI Desktop

File Home Help Table tools Measure tools

Name: Measure

Format: \$ %

Data category: Uncategorized

Home table: Sales

Structure

```

1 High Quantity Sales Count =
2 VAR HighQtySales =
3     FILTER(Sales, Sales[Quantity] > 2)
4 RETURN
5     COUNTROWS(HighQtySales)
6

```

Formatting

Properties

Calculations

Data

Customers

- CustomerID
- Name
- Region

Sales

- Average Price per Quantity
- Average Unit Price
- Category
- Customer Name
- CustomerID
- Electronics Sales
- Measure
- ProductID
- Quantity
- Region
- SaleID
- Total Price
- Total Sales
- Total Sales (Ignore Category)
- TotalPrice
- UnitPrice

SaleID	ProductID	CustomerID	Quantity	UnitPrice	Category	Total Price	Customer Name	TotalPrice	Region	Average Unit Price
1	P1	C1	2	100	Electronics	200	Alice	200	North	83
2	P2	C2	1	50	Clothing	50	Bob	50	South	83
3	P1	C1	3	100	Electronics	300	Alice	300	North	83

Table: Sales (3 rows) Column: Measure (0 distinct values)

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File Home Insert Modeling View Optimize Help

Clipboard

Get data

Excel

OneLake

SQL

Enter data

Data

Recent sources

Transform

Refresh

Queries

New visual

Format

Page information

Canvas settings

Canvas background

Wallpaper

Filter pane

Filter cards

Build

Suggestions

Data

+Add data

Data

Customers

- CustomerID
- Name
- Region

Sales

- Average Price per Quantity
- Average Unit Price
- Category
- Customer Name
- CustomerID
- Electronics Sales
- High Quantity Sales Count
- ProductID
- Quantity
- Region
- SaleID
- Total Price
- Total Sales
- Total Sales (Ignore Category)
- TotalPrice
- UnitPrice

Category

Category	Total Sales	Total Sales (Ignore Category)
Clothing	50	550
Electronics	500	550

1

High Quantity Sales Count

Активация Windows
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Page 1 of 1

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13. Write a measure % of Category Sales

% of Category Sales =
DIVIDE(

```

SUMX(Sales, Sales[Quantity] * Sales[UnitPrice]),
CALCULATE(
    SUMX(Sales, Sales[Quantity] * Sales[UnitPrice]),
    ALLEXCEPT(Sales, Sales[Category])
)
)

```

Lesson_9 - Power BI Desktop

File Home Help Table tools Measure tools

Name % of Category Sales Format General Data category Uncategorized

Home table Sales \$ % 0.00 Auto

Structure Formatting Properties Calculations

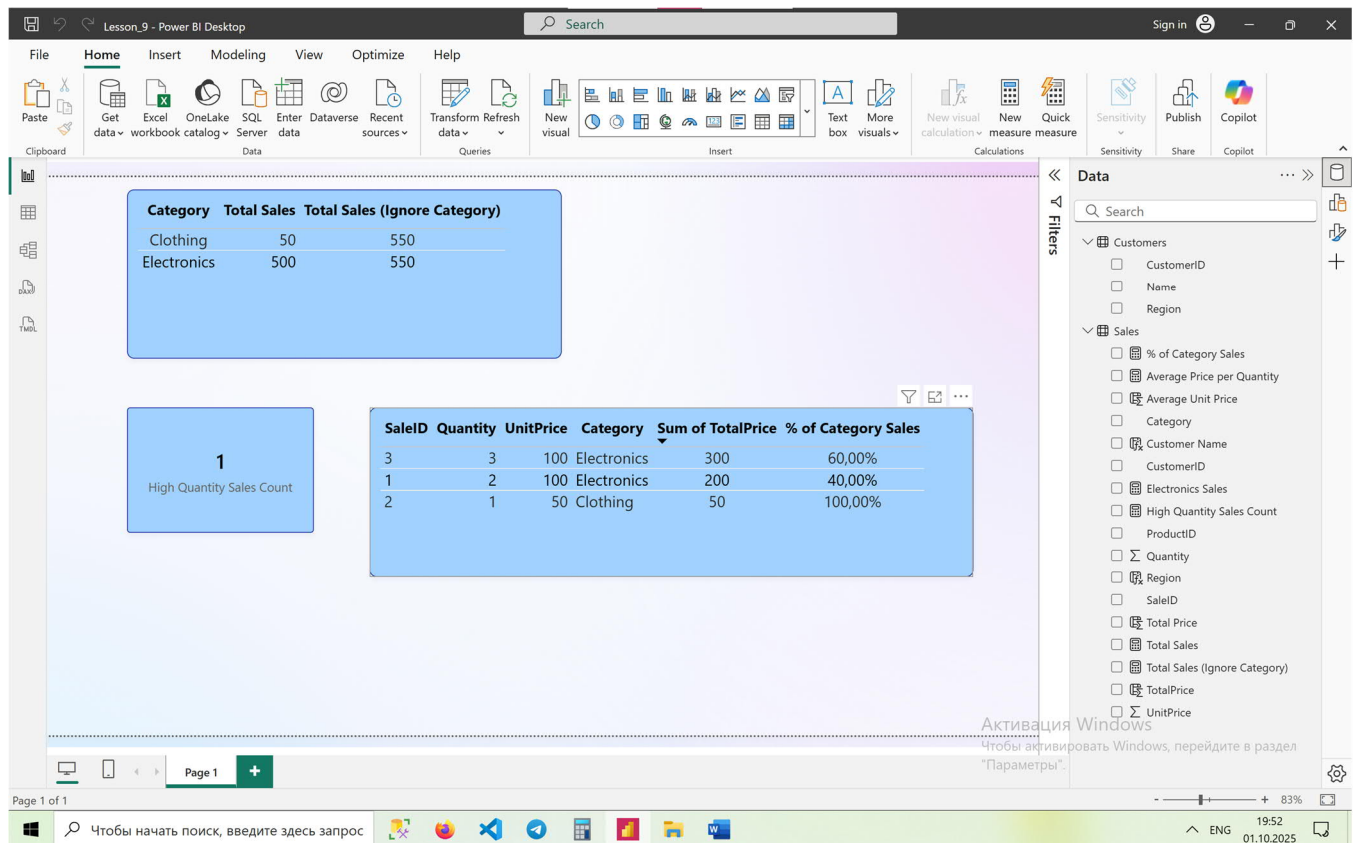
1 % of Category Sales =
2 DIVIDE(
3 SUMX(Sales, Sales[Quantity] * Sales[UnitPrice]),
4 CALCULATE(
5 SUMX(Sales, Sales[Quantity] * Sales[UnitPrice]),
6 ALLEXCEPT(Sales, Sales[Category])
7)
8)
9)

SaleID	ProductID	CustomerID	Quantity	UnitPrice	Category	Total Price	Customer Name	TotalPrice	Region	Average Unit Price
1	P1	C1	2	100	Electronics	200	Alice	200	North	83
2	P2	C2	1	50	Clothing	50	Bob	50	South	83
3	P1	C1	3	100	Electronics	300	Alice	300	North	83

Table: Sales (3 rows) Column: % of Category Sales (0 distinct values)

Активация Windows
Чтобы активировать Windows, перейдите в раздел "Параметры".

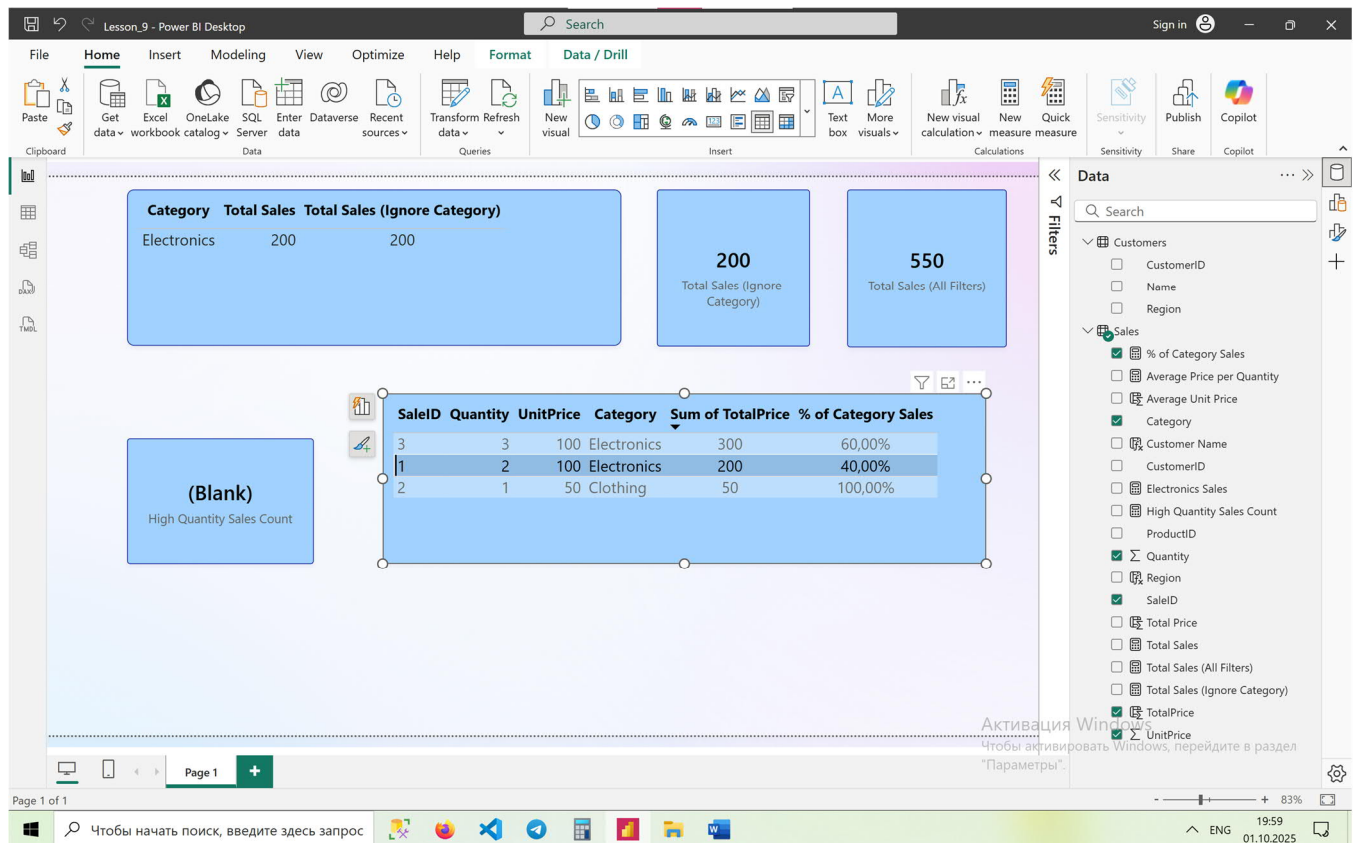
ENG 19:45 01.10.2025



14. Simulate a "remove filters" button using ALL in a measure

Sales Remove Filters =

```
CALCULATE(
    SUMX(Sales, Sales[Quantity] * Sales[UnitPrice]),
    ALL(Sales)
)
```



15. Troubleshoot: A CALCULATE measure ignores a slicer. What's the likely cause?

- The likely cause is that the measure uses `ALL()` or `REMOVEFILTERS()`, which **remove slicer filters**.
- Check the measure: it may be designed to ignore slicers.

Lesson_9 - Power BI Desktop

Search

Sign in

FileHomeInsertModelingViewOptimizeHelp

Paste

Get data

Excel workbook

OneLake catalog

SQL Server

Enter data

Dataverse

Recent sources

Transform data

Refresh data

New visual

Visuals

Text box

More visuals

New visual calculation

New measure

Quick measure

Sensitivity

Share

Copilot

Clipboard

Data

Queries

Insert

Calculations

Sensitivity

Share

Copilot

Category

Total Sales

Electronics Sales

Clothing

50

500

Electronics

500

500

550

Total Sales (Ignore Category)

550

Total Sales (All Filters)

SaleID

Quantity

UnitPrice

Category

Sum of TotalPrice

% of Category Sales

2

1

50

Clothing

50

100,00%

Build

Filters

Visuals

Table

Card

Matrix

Form

Diagram

Relationship

Table

Card

Matrix

Form

Diagram

Relationship

Search

Customers

CustomerID

Name

Region

Sales

% of Category Sales

Average Price per Quantity

Average Unit Price

Category

Customer Name

CustomerID

Electronics Sales

High Quantity Sales Count

ProductID

Quantity

Region

SaleID

Total Price

Total Sales

Total Sales (All Filters)

Total Sales (Ignore Category)

TotalPrice

UnitPrice

Page 1

69%

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20:09

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