POWER BI – DASHBOARD CREATION

Complete Structured Guide
(For Data Analyst + Data Science learners, tech + non-tech)

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0. LEARNING OBJECTIVES

By the end of this notes, you should be able to:

1. Understand **what dashboards are**, types, and when to use each.
2. Connect to different datasets and clean them in **Power Query**.
3. Create **visuals**, choose the right charts, apply filters, slicers, bookmarks.
4. Build **Professional Dashboards** following best practices.
5. Know **domain-based KPIs** for DA/DS interviews.
6. Deliver **end-to-end dashboard** from raw data → insights → storytelling.

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1. WHAT IS A DASHBOARD?

A **dashboard** is a *visual summary of key metrics* that answers a business question.

- It converts data → insights → decisions.
- It highlights KPIs, trends, exceptions, segment performance.

3 major characteristics:

- **At a glance summary** (executive view)
- **Interactive** (filters, drill-downs)
- **Storytelling** (logical flow)

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2. TYPES OF DASHBOARDS

1. Operational Dashboard

- **Real-time, day-to-day monitoring**
- Used by front-line teams
- Example KPIs: daily orders, ticket handling, real-time sales.

2. Analytical Dashboard

- **Deep-dive analysis**
- Trend analysis, pattern identification
- Used by data analysts, business analysts.

3. Strategic (Executive) Dashboard

- **High-level KPIs for leadership**
- Focus: growth, revenue, performance indicators
- Monthly/quarterly summary.

4. Exploratory Dashboard

- Used by DA/DS for **exploratory data analysis (EDA)**
- Helps find relationships, patterns, outliers.

5. Storytelling Dashboard

- Linear flow
- Used in presentations, pitch decks, client demos.

In interviews, always mention:
"Type of dashboard depends on business question and audience."

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3. WORKFLOW FOR CREATING A DASHBOARD (End-to-End Process)

Step 1: Understand the Requirement

Ask:

- What business question are we solving?
- Who is the end user?
- What KPIs matter?

Step 2: Get the Data

Sources:

- CSV, Excel, SQL Server/MySQL, API, Web.

Step 3: Power Query Cleaning

- Remove nulls
- Change data types
- Remove duplicates

- Create new calculated columns
- Date table creation

Step 4: Data Modeling

- Create relationships
- Star Schema (Fact + Dimension)
- Set correct cardinality

Step 5: DAX Measures

- SUM(), COUNT(), AVERAGE(), DISTINCTCOUNT()
- CALCULATE(), FILTER(), TIME INTELLIGENCE

Step 6: Layout & Visualization

- Use grids
- Choose correct chart type
- Use theme & consistent colors
- Add slicers, bookmarks, filters

Step 7: Publish

- Power BI Service
- Workspace → App
- Row-level security (if needed)

LIVE DEMO STRUCTURE

1. Connect Excel file (Orders dataset)
2. Clean data in Power Query
3. Create Date Table
4. Build relationship model
5. Create **Top 10 Customers** measure
6. Add slicers (Year, Category, Region)
7. Build visuals
8. Format dashboard
9. Publish

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4. CHART + KPI SELECTION GUIDE

Rember **which chart to use when**:

Purpose	Best Visual
Trend Over Time	Line chart
Comparison between categories	Bar / Column
Part of Whole	Donut / Pie (only 2–4 categories)
Ranking	Bar (sorted)
Distribution	Histogram
Correlation	Scatter plot
Time Period Movement	Area Chart
Map	Filled map / bubble map

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5. DASHBOARD LAYOUT BEST PRACTICES

Golden Rules (Industry Standard)

- Left to right → Top to bottom
- Summary KPIs at the top
- Key filters at left or top
- Avoid too many colors
- Avoid chart junk
- Add titles & legends
- Use spacing and alignment
- Use tooltips for more info

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6. DOMAIN-SPECIFIC KPIs (MOST ASKED FOR DA/DS JOBS)

A. SALES & MARKETING DASHBOARD

KPIs

- Total Sales
- Total Revenue

- Profit Margin %
- Average Order Value
- Customer Acquisition Cost
- Customer Lifetime Value
- Sales by Region / Category
- Top 10 Customers
- YoY Growth

What data comes?

- Orders
- Customers
- Products
- Discounts
- Region, Shipping, Payment

Dashboards to create:

- Sales Performance Dashboard
- Revenue Trend Dashboard
- Marketing Efficiency Dashboard

B. E-COMMERCE DASHBOARD

KPIs

- Number of Orders
- Revenue
- Conversion Rate
- Cart Abandonment Rate
- Repeat Customer %
- Return Rate
- Delivery Time
- Traffic Source Performance

Dashboards

- E-commerce Performance Dashboard
- Customer Trend Dashboard

C. FINANCE DASHBOARD

KPIs

- Total Revenue
- Net Profit
- Operating Cost
- Cash Flow
- AR / AP aging
- Budget vs Actual
- Profitability by segment

Dashboards

- Financial Overview
- Budget Tracking Dashboard

D. HR ANALYTICS DASHBOARD

KPIs

- Employee Count
- Attrition Rate
- Training Hours
- Hiring Funnel
- Employee Satisfaction
- Diversity Ratio
- Attendance %

Dashboards

- Workforce Dashboard
- Attrition Prediction Dashboard (for DS)

E. SUPPLY CHAIN DASHBOARD

KPIs

- Inventory Turnover
- Stockout %
- Lead Time
- Fulfillment Rate
- On-time Delivery %
- Vendor Reliability
- Freight Cost

Dashboards

- Logistics Dashboard
- Inventory Management Dashboard

F. HEALTHCARE ANALYTICS DASHBOARD

KPIs

- Number of Patients
- Bed Occupancy
- Treatment Success Rate
- Readmission Rate
- Average Wait Time
- Revenue per Patient

Dashboards

- Hospital Performance
- Patient Care Quality

G. EDUCATION / EDTECH DASHBOARD

KPIs

- Enrollments
- Completion Rate

- Dropout Rate
- Active Users
- Session Time
- Learning Path Progress

Dashboards

- Student Performance Dashboard
- Course Analytics Dashboard

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7. WHAT INTERVIEWERS ASK (Dashboard Round)

Prepare yourself with these:

Q1: Explain your dashboard-making process.

Q2: How do you choose KPIs?

Q3: What type of dashboard did you create?

Q4: Show me how you used DAX.

Q5: What modeling techniques did you use?

Q6: Difference between table, matrix, card.

Q7: When to use star schema?

Q8:What challenges you faced and how you overcome those challanges?

Q9:What data cleaning steps you did?

Ready answer:
“Dashboard depends on business requirement, audience, and KPIs.

I follow: requirement → data cleaning → modeling → DAX → visuals → formatting → publishing.”

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8. MINI ASSIGNMENTS

1. Build **Sales Dashboard** from provided Excel file.
2. Create **3 KPIs** using DAX.
3. Use slicers for Year, Category.
4. Add trend line & top customer view.

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9. END-TO-END STRUCTURED FLOW FOR PREPARATION

PART 1 — THEORY

- What is a dashboard
- Types of dashboards
- KPIs per domain
- Chart selection
- Best practices

PART 2 — PRACTICAL DEMO

- Data loading
- Power Query cleaning
- Modeling
- DAX creation
- Dashboard building
- Formatting

PART 3 — INTERVIEW PREP

- Common questions
- KPI selection tips
- Dashboard explanation template

PART 4 — HANDS-ON WORK

- Take dataset
- Create dashboards
- Review and present

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10. DATA STORYTELLING FRAMEWORK (MANDATORY FOR DA/DS JOBS)

A dashboard is NOT charts — it is a **story with data**.

Learn this 4-step storytelling framework:

1. Context:

What problem are we solving?
Who is the audience?

What time period?
What is the business objective?

2. Insight:

What are the meaningful patterns?
(e.g., “South region grew 18%, highest among all regions”)

3. Cause:

Why did this happen?
(Seasonality? Discount? Supply issue?)

4. Action:

What should the business do next?
(“Increase stock in South before Diwali season”)

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11. PAGE NAVIGATION + BOOKMARKS (ADVANCED)

1. Home → Overview → Deep-dive → Insights

Make 3 pages:

- Overview KPIs
- Sales breakdown
- Customer Analysis

2. Add bookmarks:

- Light view
- Dark view
- Before/After filter state

3. Add buttons:

- Back
- Next
- Reset filters

This gives a **professional dashboard look**, like company dashboards.

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12. DRILL-DOWN, DRILL-THROUGH & TOOLTIP PAGES

This is a *high-value skill*.

A. Drill-down

E.g., click → Year → Quarter → Month → Day.

B. Drill-through page

Right-click → "Customer Details"
Shows only that customer's data.

C. Tooltip Page

When hovered on a point → show mini-chart or extra KPIs.

Interview line:
"I used drill-through for customer-level analysis and tooltip pages for micro insights."

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13. TIME INTELLIGENCE DAX —

Learn this DAX:

1. YTD Sales

Sales YTD = TOTALYTD([Total Sales], 'Date'[Date])

2. YoY Growth

YoY Growth =

DIVIDE([Sales] - [Sales LY], [Sales LY])

3. Running Total

Running Sales = CALCULATE([Sales], FILTER(ALL('Date'), 'Date'[Date] <= MAX('Date'[Date])))

4. Month-over-Month %

MoM % = ([Sales] - [Sales PM]) / [Sales PM]

These are frequently asked in interviews.

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14. PROFESSIONAL THEME & COLOR THEORY

- Choose **3-color palette** only.
- Blue/Green for performance, Red for negative.
- Use corporate themes from **Power BI Themes Gallery**.
- Fix fonts: Segoe UI, Calibri, Arial.

Learn:
"Color is not decoration; it carries meaning."

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15. PERFORMANCE OPTIMIZATION (Advanced but useful)

Many dashboards become slow. Learn this tips:

1. Disable Auto Date/Time

Improves model performance.

2. Reduce Columns

Only keep required fields.

3. Avoid calculated columns (Prefer Measures)

4. Use Variables in DAX

5. Avoid High-cardinality fields in visuals

Interview Note:
"How do you optimize a slow dashboard?" is a common question.

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16. DATA MODELING DEEP-DIVE (Short but powerful)

Learn this two models:

A. Star Schema

Fact + Dimensions (recommended).

B. Snowflake Schema

Dimension tables broken into multiple tables.

- FACT: Transaction tables
- DIM: Lookup tables
- Relationship directions
- Cardinality (1:* or *:1)

Interview line:
"For accurate slicers and filters, I always use single-direction relationships."

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17. HOW TO PRESENT A DASHBOARD

Teach this **7-step presentation template:**

1. **Objective:** What problem are we solving?

2. **KPIs:** What matters?
3. **Summary:** 3 key insights at the top
4. **Deep-dive:** Sales/Customer/Category/Region
5. **Trends:** Show time-based behavior
6. **Exceptions:** Outliers or anomalies
7. **Action items:** 2–3 recommendations

This is highly useful for client-facing roles.

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18. MOST ASKED INTERVIEW QUESTIONS (Add-on list)

1. What's the difference between Report and Dashboard?
2. What is the difference between DirectQuery and Import?
3. What is a semantic model?
4. What is RLS?
5. What is the difference between Calculated Column vs Measure?
6. How do you pick the right KPI?
7. How do you pick the right chart?
8. What are your data modeling principles?
9. What is filter propagation?
10. When do you use CALCULATE()?

These are expected in DA/DS interviews.

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19. REAL-WORLD DASHBOARD

1. Retail Sales Performance Dashboard

KPIs: Sales, Profit, AOV, Returns
Pages: Summary → Region → Category → Customer → Product

2. HR Dashboard

KPIs: Attrition %, Hiring Funnel, Tenure Analysis
Pages: Overview → Department → Monthly Trend

3. Supply Chain Dashboard

KPIs: Stockout %, Lead Time, On-time Delivery
Pages: Warehouse → Vendor → Shipment

4. Finance Dashboard

KPIs: Profit, Margin %, Cash Flow
Pages: Month → Quarter → Year

Guide to create Dashboard from Powerbi Sample financial data

Prepared by: SAKIR MANSURI

1) Quick plan (pages)

- **Page 1 — Executive Overview (single-page, executive-ready)**
  KPIs, slicers, combo time-series, top products bar, country map, discount impact, segment donut, matrix summary.
- **Page 2 — Deep Dive (product/segment detail)**
  Product performance, profit waterfall or ranking, table + drill-through.
- **Optional Page 3 — Exercises & Drill-through**
  Bookmarks, tooltips, challenge tasks for students.

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2) Pre-build (Data prep) — what to do first (if using learn from sample data else clean the file as showed in class)

1. Open **Power BI Desktop** → Home → **Get data** → **Excel** → choose Financial Sample.xlsx → **Load** the Sheet1 table.(OR learn from sample data and load)
2. In **Fields** pane right-click table → **Edit query** → Power Query Editor:
    - Ensure data types:
        - Date → Date
        - Year → Whole Number
        - Month Number → Whole Number
        - Month Name → Text
        - Numeric columns → Decimal Number/Whole Number appropriately (Sales, Profit, Units Sold, Discounts, COGS)
    - Create **Discount Clean** column to handle blanks:
        - Add Column → **Custom Column** → name Discount Clean:
        - if [Discount Band] = null then "None" else [Discount Band]
    - Close & Apply.
3. In Model / Data view, create helpful calculated measures (Home or Modeling → New measure):
    - Total Sales = SUM(Financials[Sales])
    - Total Profit = SUM(Financials[Profit])
    - Total Units = SUM(Financials[Units Sold])

- Total Discounts = SUM(Financials[Discounts])
- Profit Margin % = DIVIDE([Total Profit], [Total Sales], 0)
- Average Discount = AVERAGE(Financials[Discounts])
- COGS % = DIVIDE(SUM(Financials[COGS]), [Total Sales], 0)
- Profit Category = IF(SUM(Financials[Profit])>0, "Positive", "Negative") *(as measure or calculated column depending on use; for row-level use calculated column.)*

4. Ensure **Month Name** is sorted by **Month Number**:
   - Select Month Name column → Column tools → Sort by column → Month Number.

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3) Page 1 — Executive Overview (step-by-step clicks)

Layout grid recommendation

- Canvas: Portrait / Landscape as preferred. Use 3 rows:
  1. KPI row (4–5 cards)
  2. Slicer row (Year, Country, Segment, Product)
  3. Main area: left = combo line chart (wide), right top = top products bar, right bottom = country map
  4. Bottom: Discount band column + Segment donut + Matrix summary (wide)

Build KPIs (top)

- Insert → **Card** → add [Total Sales] → format: Title Off / Data label format as currency (Modeling formatting or Format pane).
- Duplicate for [Total Profit], [Total Units], [Total Discounts], [Profit Margin %] (format percent, 1–2 decimals).
- Align horizontally (View → Snap to grid).

Add Slicers (below KPIs)

- Visualizations → **Slicer** → add Year
- Add Slicer → Country
- Add Slicer → Segment
- Optional small slicer → Product

Format each slicer to single/multi-select.

Combo line chart — Sales, Profit, Units over Month (center-left, main visual)

- Visualizations → **Line and clustered column chart** or just **Line chart** (we want 3 lines so use **Line chart**).
- Axis → Month Name
- Values → drag Total Sales, Total Profit, Total Units (if Total Units scale vs Sales differs, use secondary axis: use **Line and clustered column** to show Sales on column, Profit & Units as lines OR use separate axes).
- Format → Legend on top, Data labels off initially.
- Sorting → Month Name order maintained by Month Number.

Top products bar (right top)

- Visualizations → **Stacked bar / clustered bar** (use horizontal bar)
- Axis → Product
- Values → Total Sales (or make a measure switcher using a small Measure Switch slicer for Sales/Profit/Units if time permits)
- Sort descending by value.
- Format → Show data labels (short numbers).

Country map (right bottom)

- Visualizations → **Map / Filled Map** (choose Filled Map for country coloring)
- Location → Country
- Size/Color → Total Profit
- Format → Map controls (zoom) and tooltip to show Sales/Profit/Units.

Discount Impact column chart (bottom-left)

- Visual → Clustered column
- Axis → Discount Clean (the column you created)
- Values → Total Sales (or Total Profit)
- Format → Sort options; show None, Low, Medium, High order (if you need custom order, create numeric sort column).

Segment donut (bottom-center)

- Visual → Donut
- Legend → Segment
- Values → Total Sales or Total Profit
- Format → Show percent.

Matrix summary (bottom-right wide)

- Visual → **Matrix**
- Rows → Product
- Columns → Year
- Values → Total Sales, Total Profit, Total Units, Profit Margin %
- Format → Turn on Stepped layout = Off; subtotals on/off as per neatness..

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4) Page 2 — Deep Dive (step-by-step clicks)

Product performance page

- Duplicate Page 1 → rename Product Deep Dive
- Remove map, keep Top Products (expand)
- Add **Table** with columns: Product, Segment, Country, Sales, Profit, Units, Profit Margin %, Discounts.
- Add **Drill-through**:
    - Create a new page Drillthrough target for Product:
        - New page → Visual-level Filters → add Product to Drillthrough field.
        - Put a detailed table and a line chart (Date by Sales).

Optional: Waterfall for Profit contributors

- Visual → **Waterfall chart**
- Category → Product or Country
- Values → Profit (shows positive/negative contributors)

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5) Chart-by-chart Guide

KPI Cards: “These are the headline metrics executives ask for — total Sales, Profit, Units, Discounts, and Profit Margin. Keep them bold and centered.”

- **Slicers:** “Use slicers to filter the entire page. Year and Country are the most common; Segment and Product for deeper cuts.”
- **Combo Line Chart (Time Series):** “Shows trends over time — look for seasonality, peaks, dips, and alignment between Sales and Profit.”
- **Top Products Bar:** “Quickly reveals winners. Use Top N to focus on the products that matter.”
- **Map:** “Geographic performance — which markets drive profit? Hover for details; be careful with small denominators.”
- **Discount Band Chart:** “Shows the effect of discount strategy. Compare Sales vs Profit — high discounts may lift sales but reduce profit.”
- **Segment Donut:** “Who contributes most — Government, Enterprise — helps prioritize go-to-market.”
- **Matrix:** “Gives a compact cross-tab for comparison and exports.”

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6) Ready text for titles & notes (copy-paste)

Page title options (pick one):

- Financial Executive Overview — Sales, Profit & Units
- Executive Summary: Financial Performance (2013–2014)
- Company Financial Snapshot — Sales, Profit, Units

Section headers (to place as Text boxes):

- KPIs — Executive Summary
- Trend: Sales vs Profit vs Units
- Top Products
- Geo: Profit by Country
- Discount Impact
- Segment Contribution
- Product × Year Summary

Tooltips / small notes :

- Note: "Discount Clean" contains 'None' for missing Discount Band values.

- Tip: Sort Month by Month Number to maintain chronological order.
- Insight: High sales do not always equal high profit — always compare both.

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8) Practice questions

Basic (5):

1. Which country had the highest Sales in 2014?
2. Which product has the highest Profit Margin?
3. Which Discount Band (including None) generated the highest Units Sold?
4. Which month shows the highest Sales overall?
5. Which segment contributes most to Profit?

Intermediate (5):

6. Create a measure Profit Margin % and show the top 3 products by margin.
7. Show Top 5 products by Sales and create a drillthrough to see monthly trends for each product.
8. Compare Sales in 2013 vs 2014 and highlight % change in the matrix.
9. Create a visual to show correlation between Discounts and Profit (scatter or line).
10. Add a tooltip page that shows Sales, Profit, Units and Discounts when hovering over a product.

Advanced (5):

11. Create a measure to flag negative-profit transactions and count how many exist per product.
12. Build a bookmark to toggle page between Sales view and Profit view (same page, different visuals).
13. Build a small KPI trend sparklines column in the matrix for Sales across months.
14. Create a calculated column Profit Category (“Positive”/“Negative”) and show a stacked bar of products by category.
15. Build a Power BI report page-level filter to exclude records with Sales < 5000 and explain its impact.

Power Query - The Data Cleaning

Part 1: Data Cleaning (The most important)

0. Split Column: The Segment-Country column is not useful.

1.Change Data Type,

2. Remove Empty Rows

3. Replace Values & Standardize Text:

Replace Values to change "USA" back to "United States of America".

Also “3” to 3

4.Conditional Column

Add Column > Conditional Column.

New column name: Discount Category

If Discounts is greater than 0 then "Discounted" else "Full Price"

Part 2: Data Modeling (The Foundation)

Create a Date Table: Time intelligence.

Go to the Data view.

Home > New Table and paste this DAX formula:

```
DateTable =
ADDCOLUMNS (
    CALENDAR (DATE(2013,1,1), DATE(2014,12,31)),
    "Year", YEAR([Date]),
    "MonthNumber", FORMAT([Date], "MM"),
    "MonthName", FORMAT([Date], "MMMM"),
    "Quarter", "Q" & QUARTER([Date]),
    "YearQuarter", FORMAT([Date], "YYYY") & "-Q" & QUARTER([Date])
```

)

Mark this DateTable as the official Date Table (Right-click > Mark as date table).

Part 3 : Create the Dimension Table(optional)

1. On the **Home** ribbon, click **Enter Data**.
2. Create a table with two columns: `Product` and `Category`.
3. Assign a category to each product

```
Product, Category;
Amarilla, City Bikes ;
Carretera, Road Bikes;
Montana, Mountain Bikes;
Paseo, Touring Bikes;
Velo, Racing Bikes;
VTT, All-Terrain Bikes
```

Name the table **Product Details** and click **Load**.

Create Relationships:

Go to the Model view.

Drag the Date field from the Financial Sample table and drop it on the `Date` field in the DateTable. This creates a relationship

Create the relationships by dragging and dropping: Drag Product from Product Details onto Product in the main table.

Part 4: DAX Measures

DAX measures perform calculations on the fly.

1. Total Sales:

```
Total Sales = SUM('Financial Sample'[Sales])
```

2. Total Profit:

Total Profit = SUM('Financial Sample'[Profit])

3. Profit Margin %:

Profit Margin % = DIVIDE([Total Profit], [Total Sales], 0)

After creating this measure, select it and in the "Measure tools" ribbon, change the format to **Percentage**.

4. Total Units Sold:

Total Units Sold = SUM('Financial Sample'[Units Sold])

5. Sales PY (Previous Year - Introduction to Time Intelligence):

Sales PY = CALCULATE([Total Sales], SAMEPERIODLASTYEAR('DateTable'[Date]))

6. Sales Growth %:

Sales Growth % = DIVIDE([Total Sales] - [Sales PY], [Sales PY], 0)