Lesson 18: Visual Calculations with clear explanations and ready-to-use DAX.

(Assumptions: table Sales with columns like Product, Category, Country, Region, City, OrderID, Sales (amount), Quantity, OrderDate; a proper Date table related to Sales[OrderDate].)

Puzzle 1 — Confusing Totals (ratio columns)

Why totals differ?

Row cells use row context (ratio per product), but the total row recomputes the measure in total filter context—usually giving (Total Sales / Total Quantity), not the sum of per-row ratios.

Two correct options (pick the intent):

```
-- a) Overall ratio (recommended for totals)
Sales ÷ Qty (Overall) := DIVIDE ( [Total Sales], [Total Quantity] )

-- b) Sum of row ratios (to match row-level “Sales/Quantity” total)
Sales ÷ Qty (Sum of Rows) :=
SUMX (
    VALUES ( Sales[Product] ),
    DIVIDE ( [Total Sales], [Total Quantity] )
)
```

Base helpers:

```
Total Sales    := SUM ( Sales[Sales] )
Total Quantity := SUM ( Sales[Quantity] )
```

Puzzle 2 — Filtered vs Unfiltered totals (bar by Category)

```
-- Per-category (respects axis/category filter)
Total Sales (Per Category) := [Total Sales]

-- Ignore category filter (same number on every bar)
Total Sales (All Categories) :=
CALCULATE ( [Total Sales], ALL ( Sales[Category] ) )

-- % of total
% of Total :=
DIVIDE ( [Total Sales (Per Category)], [Total Sales (All Categories)] )
```

Puzzle 3 — Slicers change cards (Country)

Why the card changes?

Slicers add filters to the report; your measure respects filter context, so [Total Sales] changes.

Version that ignores the Country slicer:

```
Total Sales (Ignore Country) :=
CALCULATE ( [Total Sales], ALL ( Sales[Country] ) )
```

(You can also use REMOVEFILTERS(Sales[Country]).)

Puzzle 4 — “Misleading” Average in visuals

Average Sales = [Total Sales] / [Total Orders] can be correct overall, but visuals often aggregate regions and then average again (average of averages problem).

Correct approach: average at the order grain, then aggregate:

```
Order Sales := SUMX ( VALUES ( Sales[OrderID] ), CALCULATE ( [Total Sales] ) )

Avg Sales per Order :=
AVERAGEX ( VALUES ( Sales[OrderID] ), CALCULATE ( [Total Sales] ) )
```

Use [Avg Sales per Order] in the visual; totals will be the true average over orders in context.

Puzzle 5 — Highlight top product per category (matrix)

```
Rank in Category :=
VAR r =
   RANKX (
      ALL ( Sales[Product] ),
      [Total Sales],
      ,
      DESC,
      DENSE
   )
RETURN r
```

Add visual-level filter on the matrix: Rank in Category is 1.

(If your model has a separate Product table, use ALLEXCEPT(Sales, Sales[Category]) or rank over ALL ('Product'[Product]) + keep current category with KEEPFILTERS.)

Puzzle 6 — Unexpected blanks: Sales in France

```
Sales in France :=
CALCULATE ( [Total Sales], Sales[Country] = "France" )
```

Why blanks?

For customers who never bought in France, the filter removes all rows → BLANK.

If you want 0 instead of blank:

```
Sales in France (0 if none) := COALESCE ( [Sales in France], 0 )
```

If you expect values but still see blanks, check relationships: if the visual uses Customers[CustomerID], ensure a relationship to Sales. If Country is in a dimension (e.g., 'Geo'[Country]), filter via the dimension:

```
Sales in France (Dim filter) :=
CALCULATE ( [Total Sales], KEEPFILTERS ( 'Geo'[Country] = "France" ) )
```

Puzzle 7 — Previous Month Sales (line)

```
Sales := [Total Sales]

Sales PM :=
CALCULATE ( [Sales], DATEADD ( 'Date'[Date], -1, MONTH ) )
```

Edge cases

First month → BLANK() (no prior month). Use COALESCE ([Sales PM], 0) for display if desired.

Missing months → ensure a complete Date table, relate it to Sales, set the X-axis to Continuous, and enable Show items with no data.

Puzzle 8 — Row-level calculation (discounts)

```
Total Discount :=
SUMX (
   Sales,
   Sales[Quantity] * Sales[Discount per Unit]
```

```
)
```

Why SUMX?

Because discount per unit varies by row. SUM(Quantity) * SUM(Discount per Unit) assumes uniform discount and overstates/understates totals. SUMX multiplies per row, then sums—correct at any filter grain.

Puzzle 9 — Rank with ties (+ direction toggle)

```
-- optional parameter table 'SortDirection' with values "DESC" / "ASC"
Rank by Sales (Ties) :=
VAR dir = SELECTEDVALUE ( SortDirection[Value], "DESC" )
VAR expr = [Total Sales]
RETURN
SWITCH (
   dir,
   "ASC",  RANKX ( ALL ( Sales[City] ), expr, , ASC,  DENSE ),
         RANKX ( ALL ( Sales[City] ), expr, , DESC, DENSE )
)
```

Put City, [Total Sales], and Rank by Sales (Ties) in the table.

If you want rank within a selection, use ALLSELECTED (Sales[City]) instead of ALL.

Puzzle 10 — Dynamic titles & KPIs

```
Title – Country Aware :=
"Sales for " & SELECTEDVALUE ( Sales[Country], "All Countries" )

KPI – Sales vs PM % :=
VAR pm = [Sales PM]
RETURN DIVIDE ( [Sales] - pm, pm )
```

Use Title – Country Aware as the visual's Title (fx → Field value).

Show KPI – Sales vs PM % in a Card, add a target (e.g., 0%) to a KPI visual if you prefer.