# Puzzle 1: Confusing Totals

**Issue**:
In a table:
`Sales / Quantity` works per row but totals incorrectly.

**Why?**
DAX does **not aggregate row-by-row** when calculating totals. It **re-evaluates** the expression in **total context**, causing `SUM(Sales) / SUM(Quantity)` instead of `SUM(Sales/Quantity per row)`.

**Fix using SUMX:**

```
True Avg Price Per Unit =

SUMX(Sales, Sales[Sales] / Sales[Quantity])
```

# Puzzle 2: Filtered vs. Unfiltered Totals

**Measures:**

1. Total Sales per Category:

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

2. Total Sales (All Categories):

```
Total Sales (All Categories) =
CALCULATE([Total Sales], ALL(Sales[Category]))
```

**Bonus – % of Total:**

```
% of Total =
DIVIDE([Total Sales], [Total Sales (All Categories)])
```

# Puzzle 3: Changing Context with Slicers

**Card Measure:**

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

**Why it changes**:
Slicers apply **filter context**. Selecting a country filters the table and updates measures.

**Ignore slicer (new measure):**

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

# Puzzle 4: Misleading Average

**Incorrect:**

```
Average Sales = [Total Sales] / [Total Orders]
```

**Why wrong?**
In a table, this divides **total sales in all rows** by **total orders in all rows**, not per row.

**Fix with `AVERAGEX`:**

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

# Puzzle 5: Highlight Top Product per Category (Matrix)

**Solution:**

1. Create a Rank Measure:

```
Product Rank =
RANKX(
    FILTER(ALL(Sales), Sales[Category] = MAX(Sales[Category])),
    [Total Sales],
    ,
    DESC
)
```

2. Add `Product Rank` to the matrix as a visual-level filter:
    - Keep only rows where `Product Rank = 1`

# Puzzle 6: Unexpected Blank Values

**Measure:**

```
dax
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Sales in France =
CALCULATE(SUM(Sales[Sales]), Sales[Country] = "France")
```

**Why blanks?**
Some customers never bought in France → the measure returns **blank**, not 0.

**Fix: Add default value with `+ 0`:**

```
Sales in France =
CALCULATE(SUM(Sales[Sales]), Sales[Country] = "France") + 0
```

# Puzzle 7: Time Intelligence Confusion

**Measure:**

```
Previous Month Sales =
CALCULATE(
    [Total Sales],
    PREVIOUSMONTH(DateTable[Date])
)
```

**Edge Cases:**

- First month: PREVIOUSMONTH returns blank
- Missing months: ensure a **continuous Date table** using `CALENDARAUTO()` and link to `Sales[OrderDate]`

# Puzzle 8: Row-Level Calculation

**Why use `SUMX`:**

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

Because `Quantity` × `Discount per Unit` must be evaluated **row-by-row**. Simple multiplication wouldn't apply the logic at the row level.

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# Puzzle 9: Rank with Ties

**Measure:**

```
City Rank =
RANKX(
    ALL(Sales[City]),
    [Total Sales],
    ,
    DESC,
    Dense
)
```

- `Dense` handles ties by giving the **same rank** to equal values.

# Puzzle 10: Dynamic Titles and KPIs

**Dynamic Title:**

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