

## **Dynamic Spilled Array Formulas:**

1. The formula lives in the top cell.
2. Spilled values spill down and to the right.
3. To edit a dynamic spilled array formula, you edit the formula in the top left cell.
4. Cells below the top cell do not contain values. All values emanate from the top cell.
5. Even though the values below the top cell do not live in the cell, you can refer to a value in any of the spilled range with a cell reference.
6. If a cell in the path of the spilled values contains a value, you will get a #SPILL! error
7. You refer to a spilled range of values using the top cell address and the spilled range operator: # symbol, like E5#
8. The most amazing characteristic of dynamic spilled array formulas is that when the source data changes and the resultant array expands (or contracts), the spilled range dynamically updates.
9. Not all worksheet functions can spill results. Aggregate functions like SUM, AVERAGE, AND, OR, and SUMPRODUCT cannot deliver spilled arrays.
10. Spilled array formulas are not allowed in Excel Tables.
11. Advantages of Dynamic Spilled Array Formulas:
  - 1) Usually do not have to lock cell references
  - 2) Do not have to manually copy formulas
  - 3) Editing formula is easy and only done in top cell

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XLOOKUP(lookup\_value,lookup\_array,return\_array,[if\_not\_found],[match\_mode],[search\_mode])

- 1** lookup\_value = item used to find match in lookup\_array
- 2** lookup\_array = yields relative position to be used to retrieve item in return\_array
- 3** return\_array = contains items that you want to lookup or retrieve  
\* lookup\_array and return\_array must be the same size.
- 4** [if\_not\_found] = what to put in cell if lookup\_value is not found in lookup\_array

**5** [match\_mode] =

0 - Exact match	Return the index of the Exact match, if none return #N/A
-1 - Exact match or next smaller item	
1 - Exact match or next larger item	
2 - Wildcard character match	
0 - Exact match	
-1 - Exact match or next smaller item	Return the index of the Exact match, if not found return the index of the next smaller item
1 - Exact match or next larger item	
2 - Wildcard character match	
0 - Exact match	
-1 - Exact match or next smaller item	
1 - Exact match or next larger item	Return the index of the Exact match, if not found return the index of the next larger item
2 - Wildcard character match	
0 - Exact match	
-1 - Exact match or next smaller item	
1 - Exact match or next larger item	
2 - Wildcard character match	Return the index of a wildcard match where *, ? and ~ have special meaning

**0 - Exact Match** = Default. "Quad" matches "Quad". "Quad " does NOT match "Quad". If no match and nothing in 4th argument, #N/A.

**-1 - Exact Match or Next Smaller** = Use for items like tax rates and commission rates. Values do not have to be sorted.

**1 - Exact Match or Next Bigger** = Use for items like square footage. Values do not have to be sorted.

**2 - Wildcards** => \* = zero or more characters, ? = single character. "Quad\*" finds anything that begins with "Quad". "\*?" finds any text.

## 6 [search\_mode] =

1 - Search first-to-last	Perform a search starting at the first item
-1 - Search last-to-first	
2 - Binary search (sorted ascending order)	
-2 - Binary search (sorted descending order)	
1 - Search first-to-last	
-1 - Search last-to-first	Perform a reverse search starting at the last item
2 - Binary search (sorted ascending order)	
-2 - Binary search (sorted descending order)	
1 - Search first-to-last	
-1 - Search last-to-first	
2 - Binary search (sorted ascending order)	Perform a binary search that relies on lookup_array being sorted in ascending order.
-2 - Binary search (sorted descending order)	
1 - Search first-to-last	
-1 - Search last-to-first	
2 - Binary search (sorted ascending order)	
-2 - Binary search (sorted descending order)	Perform a binary search that relies on lookup_array being sorted in descending order.

**1 - Search First to Last** = Default. When there are duplicates, it gets **FIRST ONE!**

**-1 - Search Last To First** = When there are Duplicates, it gets **LAST ONE!**

**2 - Binary search for Smallest To Biggest Sort** = Column must be sorted. Like old VLOOKUP and MATCH Approximate Match Lookup.

**2 - Binary search for Biggest To Smallest Sort** = Column must be sorted. Like old MATCH -1 Approximate Match Lookup.

**Data Analysis** = Convert raw data into useful information to gain insight and make decisions.

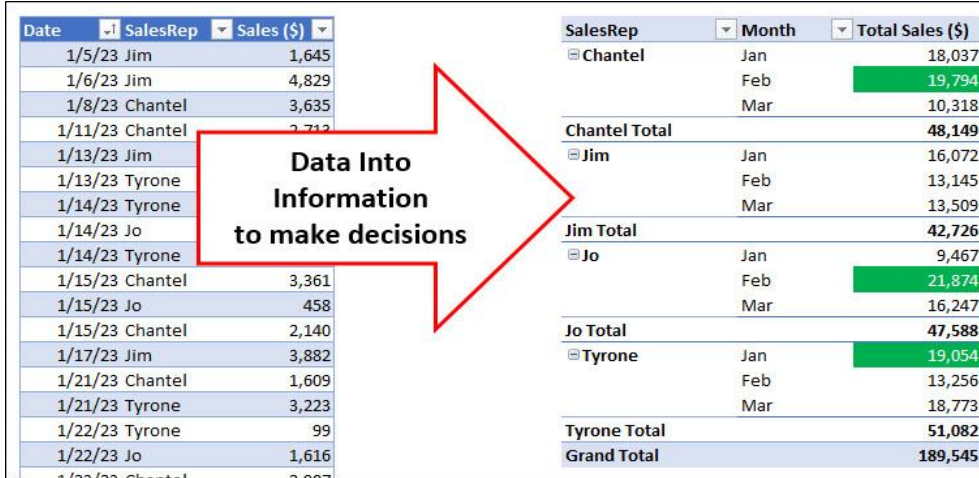
Synonyms: Data Analytics, Analytics, Business Intelligence, Data Science, Data Analysis

Goal: help make data-driven decisions, which tend to be more accurate & help to achieve goals more consistently

Examples:

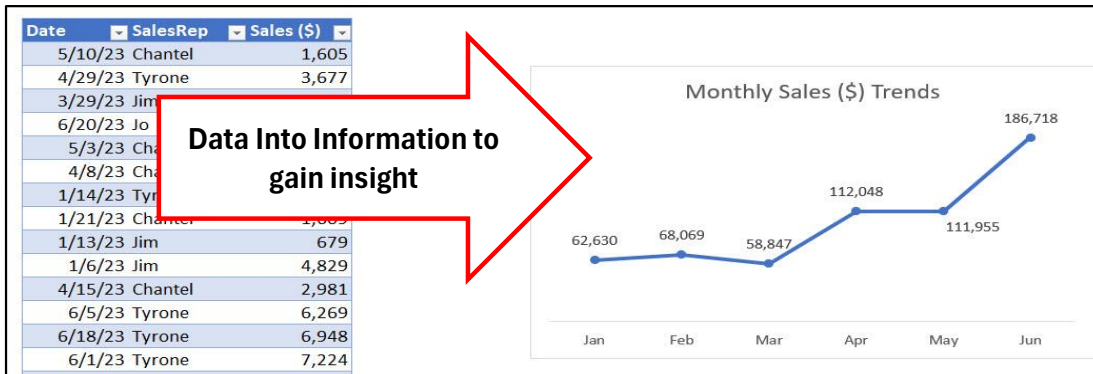
1) Sales data in a table converted into a Monthly SalesRep Sales Report. What are top 3 sales amounts?

Q: If a bonus is given for the 3 biggest monthly sales amounts, who gets bonus? A: Chantel, Jo, Tyrone.



2) Sales data in a Table converted into a Monthly Sales Trends Chart. What is the trend?

Q: What were sales trends over last six months? A: Mostly up.



**Raw Data** = data stored in its smallest form in a cell

Not Raw Data:

Date, Person, Sales
01/05/2023, Jim, \$1,645.01

Raw Data:

Date	Person	Sales
1/5/2023	Jim	\$1,645.01

**Proper Data Set = Data Set = Table**

Table is made up of:

**Field** = column in table

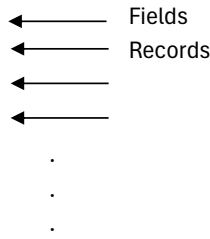
**Field Name** = name at top of field that describes what data goes into field

**Record** = one row in table

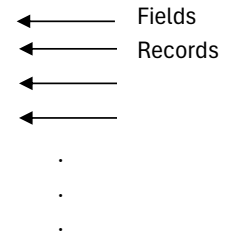
Table requirements in Excel:

- 1) Field names in first row
- 2) Records of related data in subsequent rows
- 3) Empty cells or Excel Row/Column Headers, all the way around table

Date	Person	Sales
1/5/2023	Jim	1,645
1/6/2023	Jim	4,829
1/8/2023	Chantel	3,635
1/11/2023	Chantel	2,713
1/13/2023	Jim	679
1/13/2023	Tyrone	1,527



Survey Data
Yes
Yes
No
Yes
No
No



## PivotTable Notes

- To use a PivotTable, your data must be in a table structure: column headers (fields) in first row and records in subsequent rows.
- PivotTables create summary reports that contain calculations with conditions or criteria from tables of data.
- To create a PivotTable:
  1. Click in one cell in table of data.
  2. Insert Ribbon Tab, Tables group, PivotTable dropdown arrow, From Table/Range (Keyboard = Alt, N, V, T).
  3. From Field List, drag field name to Rows area or Columns area or Filter area. These are the conditions/criteria for the calculation in the Values area of the PivotTable.
    - Fields in the Rows area add a condition/criterion to the row
    - Fields in the Columns area add a condition/criterion to the column
    - Fields in the Filter area add a condition/criterion to the entire PivotTable.
  4. From Field List drag the field you would like to make a calculation on to values area.
    - Number fields default to a SUM calculation (add numbers)
    - Text fields default to a COUNTA calculation (count non-empty cells)
  5. With a cell selected in the PivotTable, click on PivotTable Tools Design Ribbon Tab, go to the Layout group, click drop-down for Report Layout and then click on “Show in Tabular Form” or “Show in Outline Form”. These Layouts shows the Field Names in your Report.
    - To set the layout default for all PivotTable, click on File menu, Options button, in the Excel Options dialog box, click the Data tab on the left, click the Edit Default Layout button, then in Report Layout check box, select “Show in Tabular Form” or “Show in Outline Form”.
  6. To add Number Formatting to the Values area of the PivotTable, click in one cell in the Values area of the PivotTable, Right-click the cell and click on “Number Format...”, then in the Number Formatting dialog box select the Number Formatting that you would like and then click OK.
  7. If you want to change the summary calculation in the Values area, right-click the Values area in the PivotTable Report, point to one of these two options:
    - “Summarize Values By” and then select an aggregate calculation such as “Average”, or “Max”, or “More Options”.
    - “Show Values As” and then select a calculation such as “% of Column Total”, “% of Grand Total”, “% of Row Total”, or other calculations.
  8. Standard PivotTable Cached Data When you create a Standard PivotTable, Excel creates a copy of the source data and stores it in the Pivot Cache. The Pivot Cache is stored in Excel’s memory. This is why the PivotTable does not update when source data changes. If source data changes, you can right-click the PivotTable and click Refresh, or use the Refresh button in the Data Ribbon Tab.

Power Query does these things:

- 1) Import data from outside Excel: text files, other Excel files, databases
- 2) Clean Data like changing column names or adding data types (like Decimal or Text)
- 3) Transform data like remove unwanted columns, calculate new columns or combine multiple tables into one table
- 4) Load data to the Worksheet, PivotTable Cache or the Data Model
- 5) Power Query features are in the Data Ribbon tab, Get & Transform Data and Queries & Connections groups.
- 6) Power Query, the import, clean, transform and load data tool, is in both **Excel & Power BI Desktop**

