

Intermediate Excel Formulas and Other Tips and Tricks

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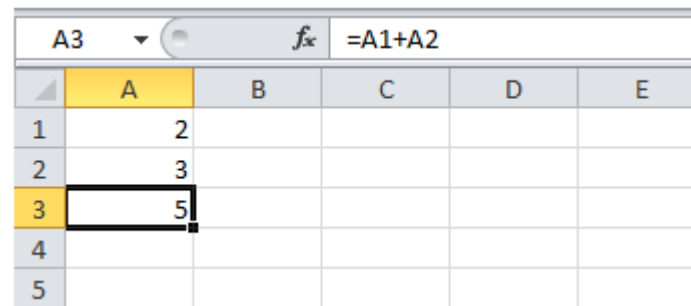


Objectives

- Back to Basics
 - Formulas and Functions
 - Excel Tables
 - Dynamic vs. Static
 - VLOOKUP Functions
 - SUMIFS Functions
 - COUNTIFS Functions
 - Example Spreadsheet Templates/Model
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Back to Basics – Formulas and Functions

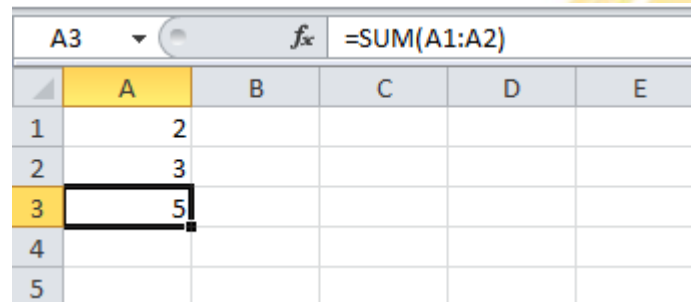
- A formula is an expression which calculates the value of a cell.



The image shows an Excel spreadsheet with a grid of cells. The active cell is A3, which contains the formula `=A1+A2`. The formula bar at the top shows the formula. The spreadsheet data is as follows:

	A	B	C	D	E
1	2				
2	3				
3	5				
4					
5					

- Functions are predefined formulas and are already available in Excel.

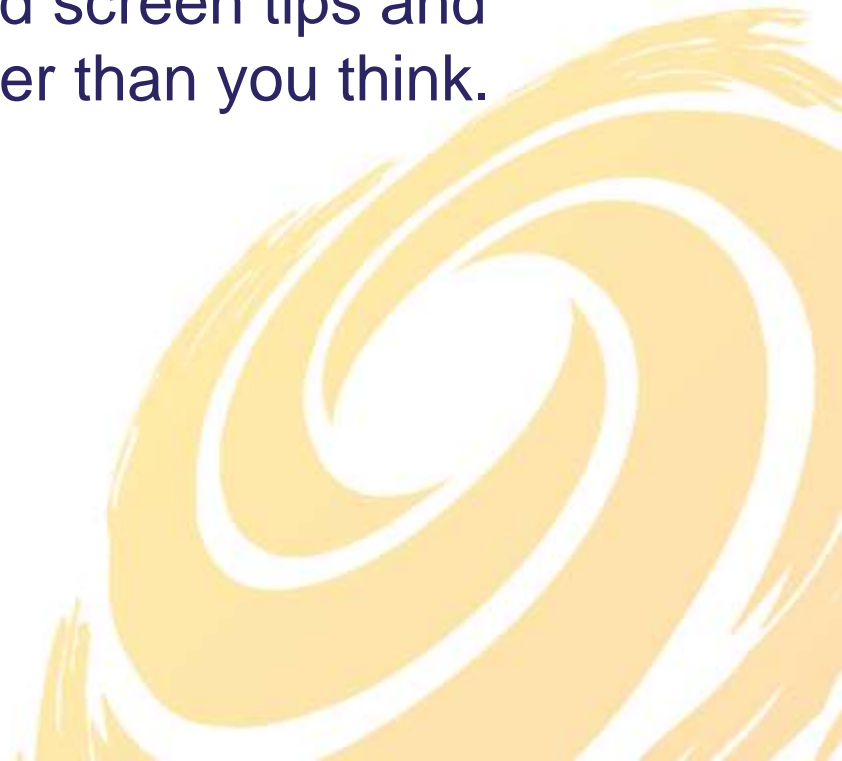


The image shows an Excel spreadsheet with a grid of cells. The active cell is A3, which contains the formula `=SUM(A1:A2)`. The formula bar at the top shows the formula. The spreadsheet data is as follows:

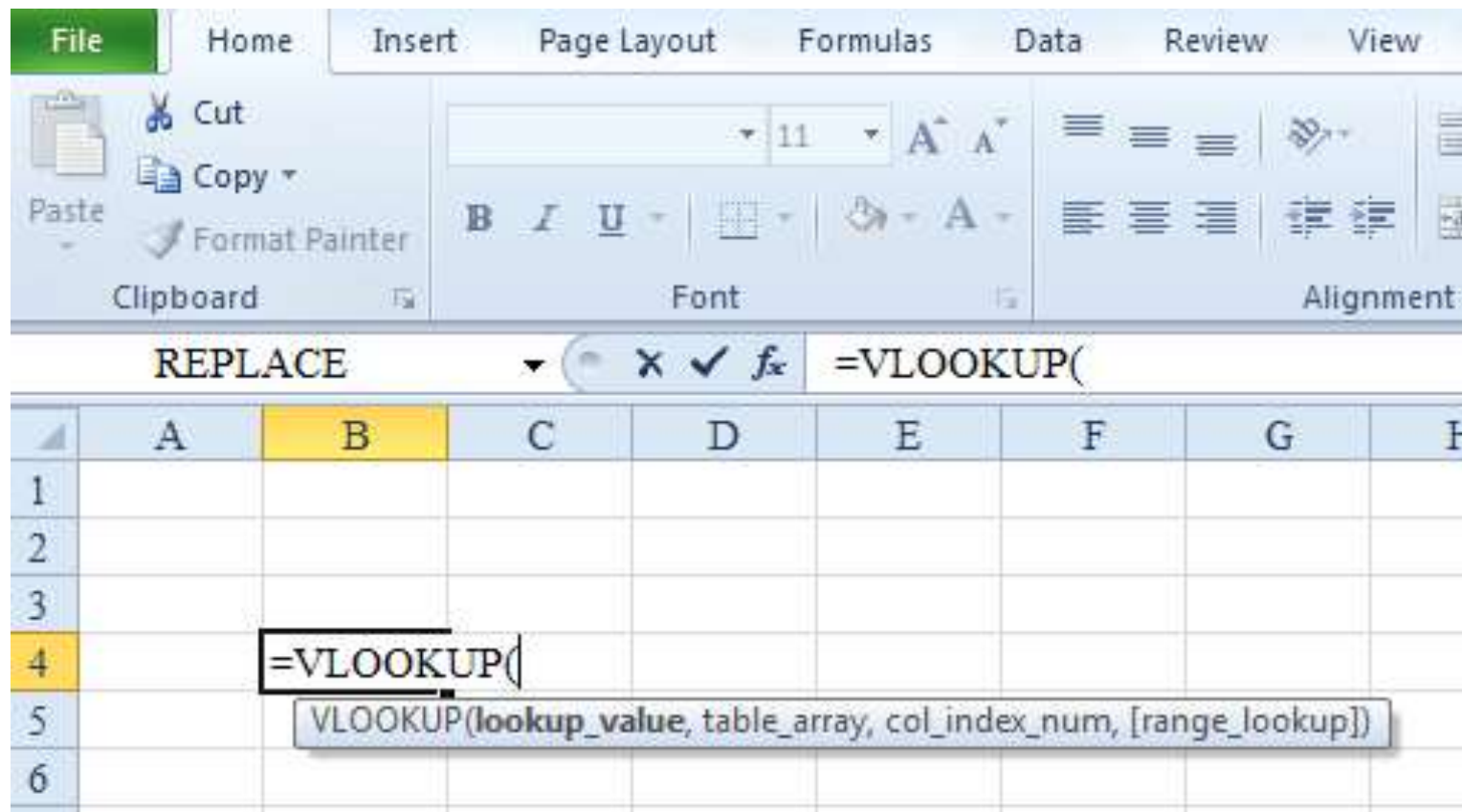
	A	B	C	D	E
1	2				
2	3				
3	5				
4					
5					

Back to Basics – Formulas and Functions

- Functions require one or more arguments.
- Arguments are separated by a comma(,).
- Functions can be edited manually using the Excel Formula AutoComplete. Detailed screen tips and predictive typing make this easier than you think.

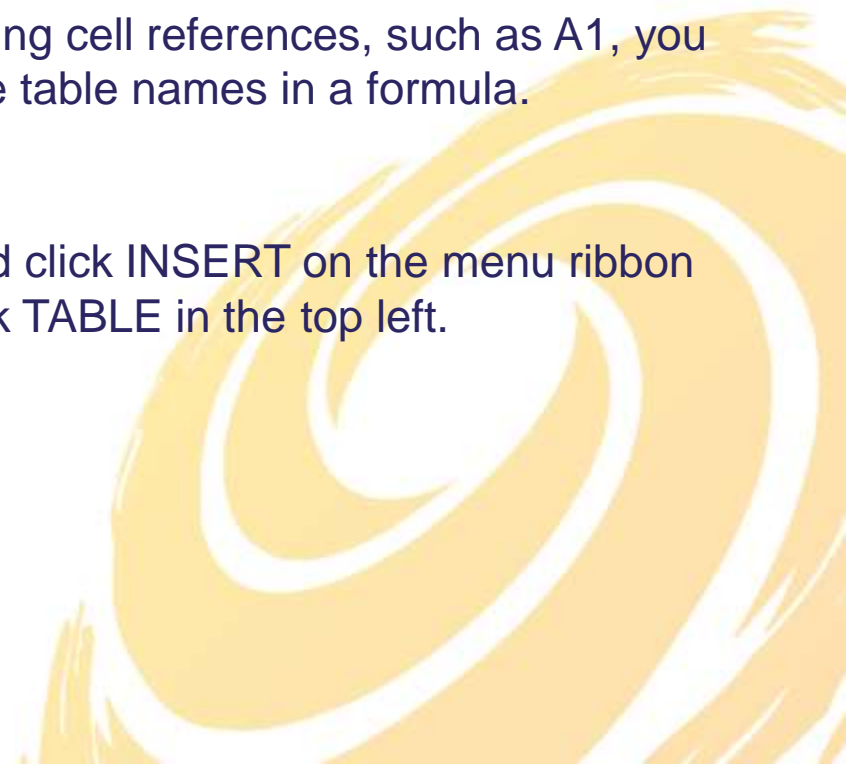


Back to Basics – Formulas and Functions

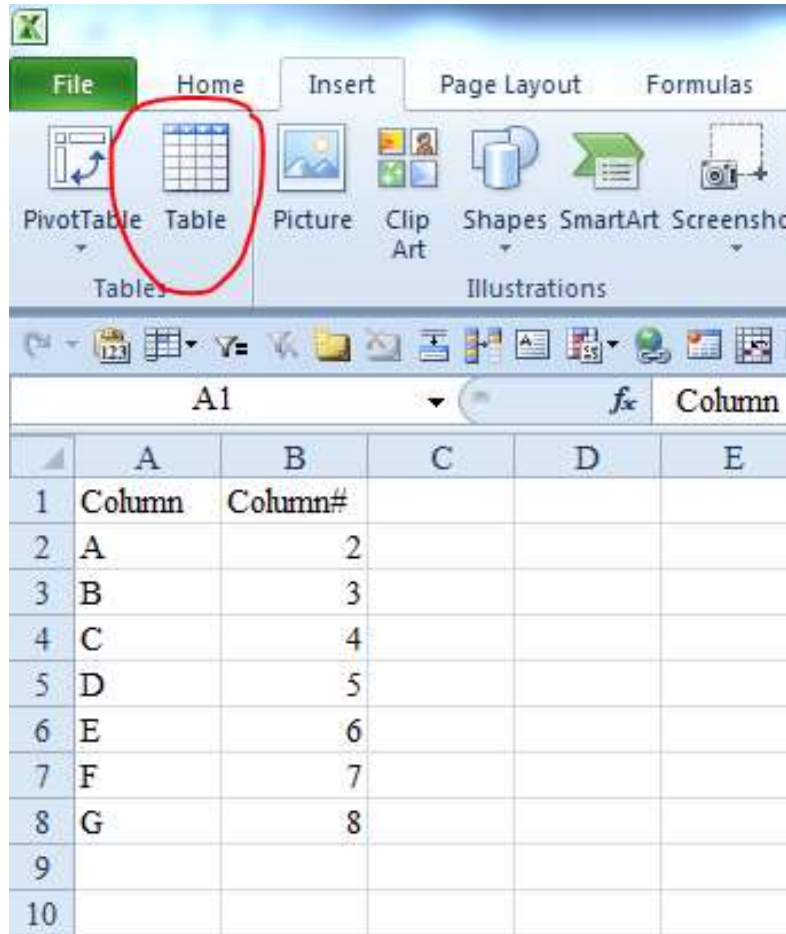


The image shows a screenshot of the Microsoft Excel interface. The ribbon at the top includes 'File', 'Home', 'Insert', 'Page Layout', 'Formulas', 'Data', 'Review', and 'View'. The 'Formulas' ribbon is active, showing the 'REPLACE' dropdown menu, a 'Cancel' button (X), a 'Check' button (checkmark), and a 'Function Wizard' button (fx). The formula bar contains the text '=VLOOKUP('. Below the formula bar, a spreadsheet grid is visible with columns A through H and rows 1 through 6. Cell B4 is selected and contains the text '=VLOOKUP('. A tooltip box is displayed below the formula bar, containing the text 'VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])'. The background of the slide features a decorative yellow and white swirl pattern on the right side.

Back to Basics – Excel Tables

- **Formatting table data** You can quickly format table data by applying a predefined or custom table style.
 - **Calculated columns** By entering a formula in one cell in a table column, you can create a calculated column in which that formula is instantly applied to all other cells in that table column.
 - **Using structured references** Instead of using cell references, such as A1, you can use structured references that reference table names in a formula.
 - **Dynamic** Tables are dynamic.
 - To create a Table, select a range of cells and click INSERT on the menu ribbon at top of the Excel application, and then click TABLE in the top left.
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Back to Basics – Excel Tables



The screenshot displays the Microsoft Excel interface. The 'Insert' ribbon is active, and the 'Table' button is highlighted with a red circle. The spreadsheet below shows a table with the following data:

	A	B	C	D	E
1	Column	Column#			
2	A	2			
3	B	3			
4	C	4			
5	D	5			
6	E	6			
7	F	7			
8	G	8			
9					
10					

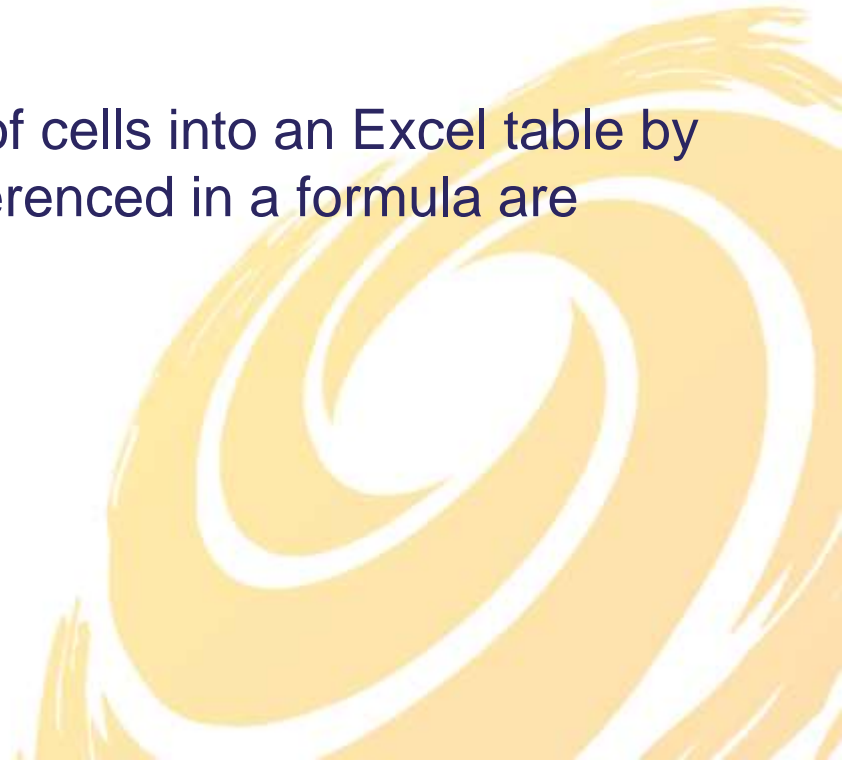
Back to Basics – Dynamic vs. Static

- A static range is explicit and does not change when rows or columns are added to the referenced range.
- A dynamic range will change automatically as rows and columns are added to a named table.
 - A named table (Table1) can be used in a function in place of a static range like `A1:B50`.
- Avoid using static data within formulas.
 - In this example, the formulas in B2:B5 are ideal because they reference cell B1 instead of the static 0.9. This makes the worksheet more dynamic and easier to modify in the event we want to change 0.9 to 0.5.

	A	B
1		0.9
2		
3	2	=A3*\$B\$1
4	3	=A4*\$B\$1
5	4	=A5*\$B\$1
6		
7	2	=A7*0.9
8	3	=A8*0.9
9	4	=A9*0.9
10		

What is VLOOKUP?

- You can use the **VLOOKUP** function to search the first column of a range of cells or a table, and then return a value from any cell on the same row of the range.
 - *Range:* Two or more cells on a sheet (\$A\$1:\$B\$50). Ranges used in a formula are static.
 - *Table:* You can convert a range of cells into an Excel table by formatting as a table. Tables referenced in a formula are dynamic.



What is VLOOKUP?

- VLOOKUP Function Syntax:
 - VLOOKUP(**lookup_value**, table_array, col_index_num, [range_lookup])
 - **lookup_value** Required. The value to search in the first column of the table or range. The **lookup_value** argument can be a value or a cell reference.
 - If the value you supply for the **lookup_value** argument is smaller than the smallest value in the first column of the **table_array** argument or does not exist in the first column of the **table_array**, **VLOOKUP** returns the #N/A error value.

What is VLOOKUP?

- VLOOKUP Function Syntax:
 - VLOOKUP(lookup_value, **table_array**, col_index_num, [range_lookup])
 - **table_array** Required. The range of cells or the table that contains the data. You can use a reference to a range (for example, **A2:D8**), or a range/table name. The values in the first column of **table_array** are the values searched by **lookup_value**.
 - These values can be text, numbers, or logical values. Uppercase and lowercase text are equivalent.



What is VLOOKUP?

- VLOOKUP Function Syntax:
 - VLOOKUP(lookup_value, table_array, **col_index_num**, [range_lookup])
 - **col_index_num** Required. The column number in the *table_array* argument from which the matching value must be returned. A **col_index_num** argument of 1 returns the value in the first column in the *table_array*; a **col_index_num** of 2 returns the value in the second column in the *table_array*, and so on.
 - If the **col_index_num** argument is:
 - Less than 1, **VLOOKUP** returns the #VALUE! error value.
 - Greater than the number of columns in the *table_array*, **VLOOKUP** returns the #REF! error value.


What is VLOOKUP?

- VLOOKUP Function Syntax:
 - VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])
 - **range_lookup** Optional. A logical value that specifies whether you want **VLOOKUP** to find an exact match or an approximate match:
 - If **range_lookup** is either TRUE or is omitted, an exact or approximate match is returned. If an exact match is not found, the next largest value that is less than **lookup_value** is returned.
 - **Important** If **range_lookup** is either TRUE or is omitted, the values in the first column of **table_array** must be placed in ascending sort order; otherwise, **VLOOKUP** might not return the correct value.
 - If the **range_lookup** argument is FALSE, **VLOOKUP** will find only an exact match. If there are two or more values in the first column of the **table_array** that match the **lookup_value**, the first value found is used. If an exact match is not found, the error value #N/A is returned.

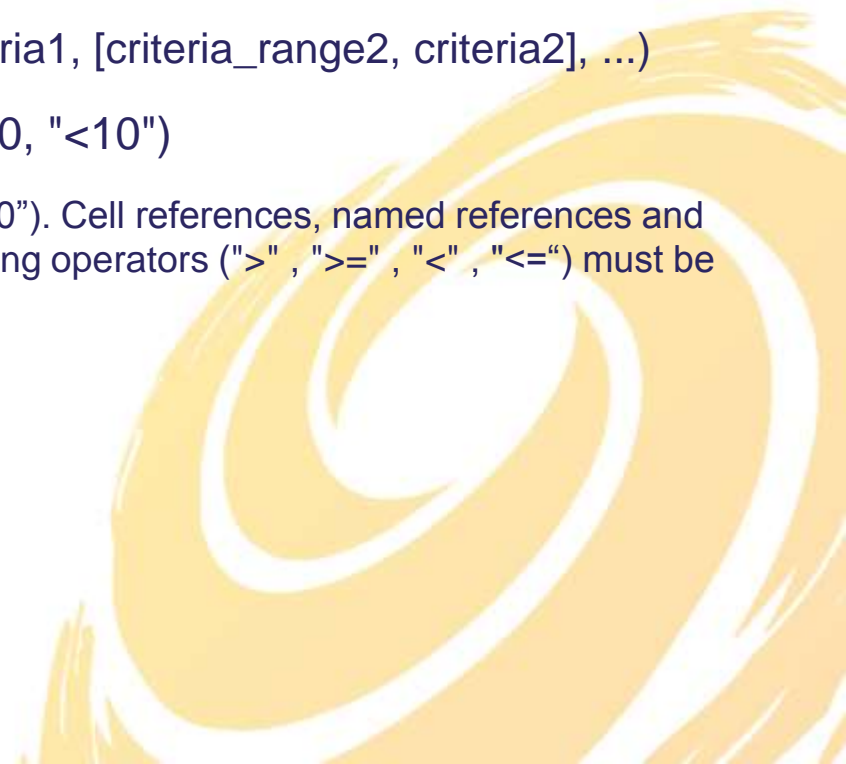
What is VLOOKUP?

- Additional tips to avoid incorrect or unexpected results:
 - When searching text values in the first column of **table_array**, ensure that the data in the first column of **table_array** does not contain leading spaces or trailing spaces.
 - If this issue is present, use the TRIM function.
 - When searching number or date values, ensure that the data in the first column of the **table_array** is not stored as text values.
 - A common error occurs when numbers stored as number values are compared to numbers stored as text values.
 - Remember, the function is searching only in the left most column of your **table_array** for the **lookup_value**.
 - If you copy your VLOOKUP formula down a column, use absolute references (or a named range/table) to refer to the **table_array** argument.

Why use VLOOKUP?

- Quickly add information from one list or table to another.
 - Reduce time consuming manual data entry, and reduce related data input errors.
 - Compare two lists to identify information present in one list and not the other.
 - The function remains dynamic rather than static, so that large amounts of information can be quickly changed with minimal data entry.
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What is SUMIFS?

- Adds the cells in a range that meet one or multiple criteria. For example, if you want to sum the numbers in the range A1:A20 only if the corresponding numbers in B1:B20 are greater than zero (0) and the corresponding numbers in C1:C20 are less than 10, you can use the following formula:
 - SUMIFS(sum_range, criteria_range1, criteria1, [criteria_range2, criteria2], ...)
 - =SUMIFS(A1:A20, B1:B20, ">0", C1:C20, "<10")
 - Make note of the text qualifier quotations (“>0”). Cell references, named references and numbers do not require quotes. Text, including operators (“>”, “>=”, “<”, “<=”) must be in quotes.
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What is SUMIFS?

- SUMIFS Function Syntax:

- SUMIFS(sum_range, criteria_range1, criteria1, [criteria_range2, criteria2], ...)
 - **sum_range** Required. One or more cells to sum, including numbers or names, ranges, or cell references (cell reference: The set of coordinates that a cell occupies on a worksheet. For example, the reference of the cell that appears at the intersection of column B and row 3 is B3.) that contain numbers. Blank and text values are ignored.
 - **criteria_range1** Required. The first range in which to evaluate the associated criteria.
 - **criteria1** Required. The criteria in the form of a number, expression, cell reference, or text that define which cells in the **criteria_range1** argument will be added. For example, criteria can be expressed as 32, ">32", B4, "apples", or "32."
 - **criteria_range2, criteria2, ...** Optional. Additional ranges and their associated criteria. Up to 127 range/criteria pairs are allowed.

What is COUNTIFS?

- Applies criteria to cells across one or multiple ranges and counts the number of times all criteria are met.
- COUNTIFS Function Syntax:
 - COUNTIFS(criteria_range1, criteria1, [criteria_range2, criteria2]...)
 - **criteria_range1** Required. The first range in which to evaluate the associated criteria.
 - **criteria1** Required. The criteria in the form of a number, expression, cell reference, or text that define which cells will be counted. For example, criteria can be expressed as 32, ">32", B4, "apples", or "32".
 - **criteria_range2, criteria2, ...** Optional. Additional ranges and their associated criteria. Up to 127 range/criteria pairs are allowed.

Example Applications




- Lookup employee salaries from a salary schedule.
 - Create a template or model to accurately project the impact of contemplated base and step increases in future years.
 - Additional Tips – Keep the Spreadsheet Dynamic
 - Minimize the number of cells that require value input. This will allow the spreadsheet to be edited for various scenarios quickly and accurately. Use a cell fill color to make only those cells that require input stand out.
 - Maximize the use of formatting cell ranges as tables.
 - When creating formulas, design it in a way so that it can be used in multiple columns. This is accomplished by absolute and relative cell references (A1:B50 vs. \$A\$1:\$B\$50 vs. A\$1:B50, etc.) or by copying and pasting a formula to another cell and simply editing the copied formula.

Example Applications



- Maintain a census of employee insurance enrollment.
- Create a template or model to accurately project the impact of premium increases and changes to the employee's share in future years.
- Calculate premium cost for employee share and board share.

Take-Away Points

- Dynamic spreadsheets that require minimal data input can maximize the usefulness and efficiency of storing, processing and analyzing data in Excel.
 - Gaining an understanding and implementing the use of Excel functions such as VLOOKUP, COUNTIFS and SUMIFS will make your spreadsheets more dynamic, save you time and potentially reduce errors.
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Questions

