Intermediate Excel
Formulas and Other Tips and Tricks

Presented by:
Brian Garland, CPA
Brian.Garland@reacpa.com
www.youtube.com/reaassociatesohio

Rea & associates
a brighter way
Objectives

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

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

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

![Excel screenshot showing the use of the VLOOKUP function](image)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example Formula:**

`=VLOOKUP()`

**Syntax:**

`VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])`
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.
# Back to Basics – Excel Tables

![Excel Tables](image)

<table>
<thead>
<tr>
<th></th>
<th>Column</th>
<th>Column#</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Column</td>
<td>Column#</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>B</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>C</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>D</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>E</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>F</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>G</td>
<td>8</td>
</tr>
</tbody>
</table>

![Excel Table](image)
### 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.
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.
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:
  - $$\text{SUMIFS}(\text{sum\_range}, \text{criteria\_range1, criteria1, [criteria\_range2, criteria2], ...})$$
  - $$=\text{SUMIFS}(A1:A20, B1:B20, ">0", C1:C20, "<10")$$
  - 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.
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.
Questions