Topic 06: Excel Lookup Functions

Excel provides several functions for looking up data in tables or ranges. The most commonly used lookup functions are VLOOKUP, HLOOKUP, XLOOKUP, and LOOKUP. Below, I'll give an overview of each, along with detailed examples.

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1. VLOOKUP Function (Vertical Lookup)

Purpose:

VLOOKUP is used to search for a value in the first column of a range (vertical column) and return a corresponding value from another column in the same row.

Syntax:

VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

- **lookup_value**: The value to search for in the first column.
- **table_array**: The range of cells containing the data.
- **col_index_num**: The column number in the range from which to return the value.
- **[range_lookup]**: Optional. TRUE (approximate match) or FALSE (exact match).

Example:

You have the following table:

A	B	C
Product	Price	Stock
Apple	1.5	200
Banana	1.0	150
Cherry	2.0	120

If you want to look up the price of Banana, you would use:

=VLOOKUP("Banana", A2:C4, 2, FALSE)

Explanation:

- "Banana" is the lookup_value.
- A2:C4 is the table_array.
- 2 is the column index for the price (Price is in the second column).
- FALSE ensures an exact match.

Result: The formula will return 1.0 (the price of Banana).

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2. HLOOKUP Function (Horizontal Lookup)

Purpose:

HLOOKUP is similar to VLOOKUP, but it searches for a value in the first row (horizontal row) and returns a corresponding value from a specified row below it.

Syntax:

HLOOKUP(lookup_value, table_array, row_index_num, [range_lookup])

- **lookup_value**: The value to search for in the first row.
- **table_array**: The range of cells containing the data.
- **row_index_num**: The row number in the range from which to return the value.
- **[range_lookup]**: Optional. TRUE (approximate match) or FALSE (exact match).

Example:

You have the following table:

A	B	C
Product	Apple	Banana
Price	1.5	1.0
Stock	200	150

If you want to find the price of Banana, you would use:

=HLOOKUP("Banana", A1:C3, 2, FALSE)

Explanation:

- "Banana" is the lookup_value.
- A1:C3 is the table_array.
- 2 is the row index for the price (Price is in the second row).
- FALSE ensures an exact match.

Result: The formula will return 1.0 (the price of Banana).

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3. XLOOKUP Function (Newer Lookup)

Purpose:

XLOOKUP is a more powerful and flexible lookup function introduced in Excel 365 and Excel 2021. It can replace both VLOOKUP and HLOOKUP, offering several advantages like the ability to search both vertically and horizontally, return multiple values, and handle errors better.

Syntax:

XLOOKUP(lookup_value, lookup_array, return_array, [if_not_found], [match_mode], [search_mode])

- **lookup_value**: The value to search for.
- **lookup_array**: The range or array to search.
- **return_array**: The range or array containing the values to return.
- **[if_not_found]**: Optional. The value to return if no match is found.
- **[match_mode]**: Optional. Defines match criteria (0 for exact match, 1 for next larger, -1 for next smaller).
- **[search_mode]**: Optional. Defines search direction (1 for search from first to last, -1 for search from last to first).

Example:

You have the following table:

A	B	C
Product	Apple	Banana
Price	1.5	1.0
Stock	200	150

To find the price of Banana, you would use:

=XLOOKUP("Banana", A1:C1, A2:C2, "Not found")

Explanation:

- "Banana" is the lookup_value.
- A1:C1 is the lookup_array (where the products are listed).
- A2:C2 is the return_array (where the prices are listed).
- "Not found" is the value to return if "Banana" is not found.

Result: The formula will return 1.0 (the price of Banana).

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4. LOOKUP Function

Purpose:

The LOOKUP function is used to search for a value in a one-row or one-column range and return a value from the same position in a second one-row or one-column range.

Syntax:

LOOKUP(lookup_value, lookup_vector, result_vector)

- **lookup_value**: The value to search for.
- **lookup_vector**: The range of values to search in.
- **result_vector**: The range containing the values to return.

Example:

You have the following table:

A	B
Product	Price
Apple	1.5
Banana	1.0
Cherry	2.0

To find the price of Banana, you would use:

=LOOKUP("Banana", A2:A4, B2:B4)

Explanation:

- "Banana" is the lookup_value.
- A2:A4 is the lookup_vector (where the products are listed).
- B2:B4 is the result_vector (where the prices are listed).

Result: The formula will return 1.0 (the price of Banana).

Key Differences Between Lookup Functions

Function	Use Case	Column/Row Orientation	Approximate Match Support	Error Handling
VLOOKUP	Vertical lookup in a table	Vertical	Yes (if TRUE)	Returns #N/A for no match
HLOOKUP	Horizontal lookup in a table	Horizontal	Yes (if TRUE)	Returns #N/A for no match
XLOOKUP	Flexible, vertical/horizontal	Both	Yes (if TRUE), Exact and Approximate	Returns custom error message with [if_not_found]
LOOKUP	Search for a value in a row/column	One column or row	Yes	Returns last value if no exact match

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Conclusion

- **VLOOKUP** and **HLOOKUP** are older functions that work well for simple lookups.
- **XLOOKUP** is the most flexible and powerful option, recommended for most lookup needs in modern Excel versions.
- **LOOKUP** is more limited in flexibility but can still be useful in specific scenarios.

Choose the function that best fits your data structure and needs. If you're using Excel 365 or Excel 2021, XLOOKUP is the most versatile option.