

# Excel® Formulas & Functions

## Quick Reference Guide

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### About Formulas and Functions

#### Formulas and Functions Terminology

**Formulas** are expressions that combine values, cell references, operators, and functions to perform calculations. They always start with an equal sign (=) and can include various elements such as numbers, text, cell references, and operators. For example, the formula **=A1+B1** adds the values in cells A1 and B1.

**Functions** are predefined formulas built into Excel that perform specific operations or calculations. Functions are expressed as: **function\_name(arguments)**, where "function\_name" represents the specific function to use, and "arguments" are the inputs or data on which the function operates. For example, to write a formula using the SUM function to add the values of cells A1 through A5, type **=SUM(A1:A5)**.

**Arguments** are the values used by a function. Arguments can refer to individual cells or cell ranges and must be enclosed within parentheses. Separate multiple arguments for a function with commas. An argument can also be another function (creating a nested function).

**Constants** are unchanging values. For example, the formula **=SUM(A1:A5)\*10** always multiplies the sum of cell values in cells A1 through A5 by the value 10, which is the constant.

**Operators** are symbols specifying a calculation to perform, like addition, subtraction, or multiplication.

**References** identify either a cell, cell range, or named range of cell values to calculate. A single cell range is referred to by its upper-left and lower-right cell address, separated by a colon symbol. E.g. **A1:A5** refers to cells A1 through A5. Separate multiple, non-adjacent cell references with commas. E.g. **A1,B5:C7** refers to cells A1 and also B5 through C7.

#### Basic Formula Structure

Use **simple formula syntax** to perform multiple mathematical calculations on multiple cells. Use **ranged formula syntax** to perform a single mathematical function over multiple cells.

#### Simple Formula Syntax

**=B2+B3+B4+B5**

- 1 "Equal" Sign (starts every formula)
- 2 Mathematical Operators
- 3 Argument (Cell Addresses)

**Mathematical Operators:**

- + Addition
- Subtraction
- \* Multiplication
- / Division
- % Percentage
- ^ Exponentiation

[ ] Determines the order of precedence. Designated operations are performed from left to right with anything in parentheses calculated first, then exponentiation, then multiplication and division, and finally addition and subtraction.

#### Ranged Formula Syntax

**=SUM(B2:B5)**

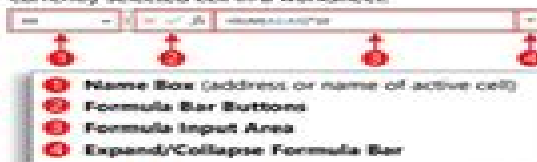
- 1 "Equal" Sign (starts every formula)
- 2 Function (Sum, Average, Min, Max, etc.)
- 3 Argument (Cell Range) (in parentheses)

##### Additional Symbol Syntax:

- 1 Used to separate the first and last cells in a range
- 2 Used to separate items in a list. E.g. **A1:B3, C4:D5**
- 3 Used to denote an absolute reference

#### The Formula Bar

The Formula Bar appears below the Ribbon in Excel and is used to input, edit, and view formulas in the currently selected cell in a worksheet.



#### Creating a Formula

1. Select the cell in which to enter the formula.
2. Type the equal sign (=) to start the formula.
3. Type the rest of the formula.
4. Press the "Enter" key or the "Enter" button in the Formula Bar.

### Cell Referencing and Naming

#### Standard Cell Referencing

To reference a cell manually in a worksheet, type the column and row intersection that references the cell, without spaces. For example, the cell at the intersection of column A, row 10, is referred to as A10.

#### Relative vs. Absolute Cell References

**A relative reference** (e.g. B2) changes when copied and pasted to a new location and maintains the relative position of the referenced cell(s) to the formula cell. Example: If a formula in cell H5 that adds cells "C5" through "G5" is copied and pasted into cell H6, it would add cells "C6" through "G6."

**An absolute reference** (e.g. \$A\$1) remains the same when copied and pasted to a new location and references the original cells. Change any cell reference in a formula into an absolute reference by placing a dollar sign (\$) in front of both the column letter and the row number in the cell reference.

To toggle between absolute, mixed, and relative references, select a cell reference and press "F4."

#### Referencing Cells in Different Worksheets

Use **3D formula syntax** to calculate information from multiple worksheets. Exclamation points separate sheet names from cell references. For example, to sum the values of cell B2 in Sheet1, Sheet2, and Sheet3:

**=SUM(Sheet1:Sheet3!B2)**

- 1 "Equal" Sign (starts every formula)
- 2 Function (Sum, Average, Min, Max, etc.)
- 3 Cell Range (always enclosed in parentheses)
- 4 Sheet Reference (sheet name)

##### Additional 3D Formula Syntax Symbols:

- 1 Used to separate sheet name from cell reference
- 2 Used to denote an absolute value
- 3 Used to separate sheet names in ranged 3D formulas
- 4 Used to separate individual sheet/cell references from each other. E.g. **=SUM(Sheet1!B2,Sheet2!B2,Sheet3!B2)**

#### Naming Cells and Cell Ranges

Name a cell or range of cells to enhance the clarity and readability of formulas, more easily reference and understand data, and simplify formula creation. For example, **=AVERAGE(Cos)** is clearer than **=AVERAGE(C512:C612)**.

#### Creating a Named Range

##### Name rules:

1. Must begin with a letter, underscore, or backslash.
2. Remaining characters must be alphanumeric, a period, or an underscore.
3. No spaces or cell references.
4. 255 maximum characters.
5. Names are not case sensitive.

##### To create a name:

1. Select the cell(s) to be named.
2. Type the name into the Name Box in the Formula Bar and press "Enter," or click the "Define Name" button in the "Defined Names" group on the "Formulas" tab in the Ribbon, type a name, and click the "OK" button.

#### Limiting the Scope of a Name

By default, you can reference a named range on any worksheet within a workbook. Use scope to limit the use of the named range to a single worksheet.

1. Select the cell(s) to be named.
2. Click the "Define Name" button in the "Defined Names" group on the "Formulas" tab in the Ribbon.
3. Select the worksheet to which to limit the name from the "Scope" drop-down, enter the name, and click the "OK" button.

#### Creating Multiple Names at Once

Use row or column labels to create named ranges.

1. Select the data and the labels.
2. Click the "Create from Selection" button in the "Defined Names" group on the "Formulas" tab in the Ribbon.
3. Select which values to use as names ("Top row," "Left column," etc.) and click "OK."



Creates seven named ranges. One for each column and row of data, plus "YTDSales" for B2 through D4.

#### Selecting a Named Range

Click the arrow to the right of the Name Box in the Formula Bar and select the name.

#### Using a Range Name in a Formula

Type the name directly into the formula. Or, press the "F3" key, select the name, and click "OK." Or, click the "Use in Formula" button in the "Defined Names" group on the "Formulas" tab in the Ribbon, then select the name.

#### Managing Range Names

1. Click the "Name Manager" button in the "Defined Names" group on the "Formulas" tab.
2. To sort names, click the column headings to switch between ascending and descending order.
3. To filter names, click the "Filter" button and select a filter. To remove it, select "Clear Filter."
4. To change the cells to which the name refers, select the name, make changes in the "Refers to" field, then click the "Accept" button.
5. To change a name, select it, click the "Edit" button, make changes, then click "OK."
6. To delete a name, select it, click the "Delete" button, then click "OK" to confirm.
7. Click the "Close" button.

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