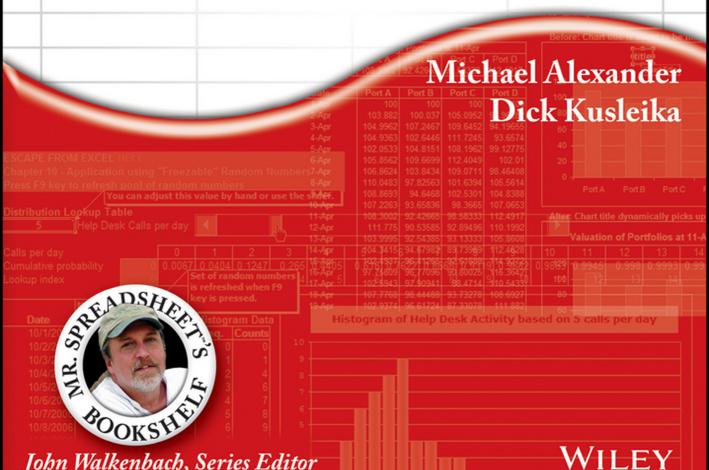
101 Ready-to-Use Exce Formulas



John Walkenbach, Series Editor

101 Ready-to-Use Excel® Formulas

101 Ready-to-Use Excel® Formulas

by Michael Alexander and Dick Kusleika

WILEY

101 Ready-to-Use Excel® Formulas

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INTRODUCTION

Formulas are the true engines of Excel. Employing various Excel functions, formulas enable Excel analysts to create aggregated reporting, complex calculation engines, clever dashboard models, and much more. Indeed, Excel analysts become more productive as their proficiency with Excel functions and formulas improves.

But building proficiency with Excel functions and formulas takes time. Given that Excel contains more than 400 functions, you could spend months, even years, learning which functions are best for certain tasks and which functions can be combined with others functions.

Unfortunately, many analysts don't have the luxury of taking a few weeks' time-out to learn all they need to know about Excel functions and formulas. The scenarios and issues they face require solutions now.

This is where 101 Ready-to-Use Excel Formulas comes in. This book approaches Excel formulas with the assumption that "learning" comes with accomplishing core tasks. Instead of offering the usual general overview of Excel formula writing, this book provides 101 of the most commonly used, real-world Excel formulas.

For each formula covered, we outline a common problem that needs to be solved and provide the actual Excel formula to solve the problem, along with detailed explanations of how the formula works. This approach lets you use this book as a handy reference for finding a formula that solves a common problem.

After reading about a given formula, you should be able to

- ➤ Immediately implement the needed Excel formula
- Understand how the formula works
- ➤ Reuse the formula in other workbooks

What You Need to Know

To get the most out of this book, you need to have established certain skills before diving in. The ideal candidate for this book has experience working with data in Excel along with familiarity with the basic concepts of data analysis such as working with tables, aggregating data, performing calculations, and creating charts.

What You Need to Have

You need the following to be able to download and use the examples highlighted in this book:

- ➤ A licensed copy of Excel 2010 or Excel 2013
- ➤ An Internet connection in order to download the sample files

How This Book Is Organized

We've grouped this book into nine chapters that are chock-full of tips, techniques, and formulas dedicated to a particular topic.

Chapter 1: Introducing Excel Formulas

Chapter 1 serves as an introduction to Excel formulas, giving you an understanding of how Excel formulas work and some of the ground rules for working with formulas.

Chapter 2: Common Mathematical Operations

In Chapter 2, you gain insight into some of the fundamental mathematical operations every Excel analyst should know. The formulas found here serve as the foundation for all kinds of advanced data analysis.

Chapter 3: Manipulating Text with Formulas

Chapter 3 focuses on the transformation and shaping of text strings. In this chapter, you explore some of the common text transformation exercises an Excel analyst performs, and in the process, you get a feel for many of the text-based functions Excel has to offer.

Chapter 4: Working with Dates and Times

Chapter 4 gives you a solid understanding of how Excel handles time-based data. Through the prism of the most commonly used date formulas, you discover how to more effectively utilize the dates and times within your data sets.

Chapter 5: Performing Conditional Analysis

In Chapter 5, you take a look at a wide array of conditional analysis formulas that add flexibility to your analytical processes. With the formulas found here, you'll be able to save time, organize your analytical processes, and enhance your data-crunching power.

Chapter 6: Using Lookup Formulas

Chapter 6 focuses on Excel's powerful, sometimes intimidating, Lookup formula. The formulas demonstrated in this chapter provide the foundation you need to add depth and power to your Excel data models.

Chapter 7: Common Business and Financial Formulas

Chapter 7 demonstrates a host of business and financial formulas that leverage Excel's flexible spreadsheet environment to create key business and financial metrics used in virtually every industry.

Chapter 8: Common Statistical Analysis

Chapter 8 takes you beyond simple mathematical operation and into the realm of statistical analysis. With the help of the formulas found here, you quickly get up to speed on fundamental statistical concepts, even if you've never taken a course in statistics.

Chapter 9: Using Formulas with Conditional Formatting

Chapter 9 rounds out the book's 101 formulas with a look at how you can leverage formulas to enhance conditional formatting. Here, you take in a few examples of how integrating your own custom formulas can help add a visual layer to your data analysis.

Conventions in This Book

We present menu command sequences in this book by using an arrow (□) between commands. For example, File□ Open means go to the File menu, click it, and select Open on the list that appears.

Formulas usually appear on a separate line in monospace font, like so:

=AVERAGE (A1:A3)

Excel function names appear in uppercase and other formula elements are all lowercase. Text that we tell you to type appears in *bold*.

What the icons mean



We use Tip icons to indicate a pointer that you should file away for future reference. Tips usually make your life easier.



The Note icon indicates something that you should pay special attention to.



This icon refers you to related or additional material found in the book.



We use Caution icons to flag an issue that can cause you trouble.

About the Sample Files

Each chapter in this book has an associated sample file with a separate tab for each formula outlined in this book. These sample files give you the ability to see the formula working, as well as the ability to copy the formula for your own use elsewhere.

You can download the sample files from the Wiley website at the following URL:

www.wiley.com/go/101excelformula



Introducing Excel Formulas

Microsoft Excel is, at its core, a calculation engine. Like a calculator, it accepts a question (such as 2+2) and gives you an answer. When you're working with a calculator, these questions are called mathematical operations. In Excel, you call these formulas.

Excel allows you to use formulas to perform not only mathematical operations but also a myriad of other complex actions, such as parsing textual values, searching for certain values in a range of data, performing recursive calculations, and much more.

To leverage the full power of Excel formulas, you need to understand how Excel formulas work as well as some of the ground rules for working with formulas. The goal of this chapter, therefore, is for you to get acquainted with the fundamentals of using Excel formulas.



Feel free to skip over this chapter if you already have a solid understanding of formula mechanics and want to get right into real-world examples, which start in Chapter 2.



You can download the files for all the formulas at www.wiley.com/go/ 101excelformula.

Creating and Editing Excel Formulas

An Excel spreadsheet is simply a collection of cells that you can use to enter data. Each cell is given a name based on its position in the spreadsheet. The top-leftmost cell is called cell A1. It's the cell located in column A, row 1. When you enter a value in cell A1 (for example, the number 5), that cell's value becomes 5. If you enter the number 10 in cell B1, that cell's value becomes 10. You can use then use these values in a formula.

For instance, you can click cell C1 and begin typing =A1+B1, as shown in Figure 1-1. Note how you can see your formula in both the cell you're typing in and the Formula Bar above the column headings.

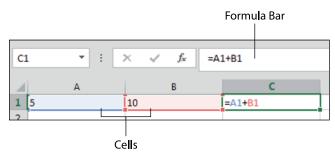


Figure 1-1: Entering a basic formula.

After you press the Enter key on your keyboard, Excel recognizes what you're asking and performs the calculation that gives you the result of 15 (5+10 = 15).

The reason Excel recognizes that you were entering a formula and not just another value is the equal sign (=). Entering the equal sign followed by other values tells Excel that you're starting a formula. In this example, we used what are known as cell references (A1 and B1). These cell references are just one of the types of values that you can use in your formulas.

Excel formulas accept the following types of values:

- ➤ Constants: You can use hard-coded numbers directly in a formula. For example, you can enter =5+10 directly into a cell to get the answer 15.
- ➤ Operators: These include symbols that perform addition (+), symbols that perform multiplication (*), symbols that compare values (>), and symbols that join values together (&). For example, entering =15>10 into a cell returns TRUE as the result because 15 is indeed greater than 10.
- ➤ Cell references: These include any value that points back to a single cell or range of cells. As you've already seen, entering =A1+B1 in a cell tells Excel to use the values in those two cells in the formula.
- ➤ **Text strings:** Any text string can be used as an argument in a formula as long as it's wrapped in quotation marks. For example, entering ="Microsoft"&"Excel" in any cell results in the joined text Microsoft Excel.

Methods for entering formulas

You have several ways to actually enter a formula into a cell:

- ➤ Enter the formula directly into a cell: Simply click a cell, begin typing your formula, and then press the Enter key on your keyboard.
- ➤ Enter the formula into the Formula Bar: Click inside the Formula Bar found above the column headers, type your formula, and then press the Enter key on your keyboard.

- ➤ Enter the formula using the mouse: If your formula involves cell references, you can use the mouse to help reduce the amount of typing you need to do. For instance, instead of typing =A1+B1, you can type the equal symbol, use your mouse to click cell A1, type the plus symbol, use the mouse to click cell B1, and then press the Enter key.
- ➤ Enter the formula using the arrow keys: If your formula involves cell references, you can use the arrow keys on your keyboard to help reduce the amount of typing you need to do. For instance, instead of typing =A1+B1, you can type the equal symbol, use the arrow keys on your keyboard to move the cursor to cell A1, type the plus (+) symbol, use the arrow keys on your keyboard to move the cursor to cell B1, and then press the Enter key.

Editing a formula

If you find that you need to edit a formula, you can do so in three ways:

- ➤ Edit directly in the Formula Bar: Select the cell that contains your formula, go up to the Formula Bar, and start editing the formula there.
- ➤ **Double-click the formula cell:** You can edit the formula directly in the cell it's in by double-clicking the cell. Double-clicking the cell gets you into Edit mode, where you can edit the formula as needed.
- ➤ Press F2: Select the cell that contains your formula and then press F2 on your keyboard to get into Edit mode. As stated previously, you can then edit the formula as needed.

Using Formula Operators

As mentioned earlier in this chapter, you can use symbols known as operators to define the operation your formula will accomplish. Some of these operators are mathematical operators that simply add, subtract, and multiply. Other operators allow you to perform more complex actions such as comparing values. For example, you can determine whether an employee has met his or her quota by using a comparison operator to see if actual sales are greater than or equal to a predetermined quota.

Table 1-1 lists the operators you can use in your Excel formulas.

Table 1-1: Operators for Excel Formulas

Operator	What It Does
+	The plus symbol adds two or more numeric values.
-	The hyphen symbol subtracts two or more numeric values.
/	The forward slash symbol divides two or more numeric values.
*	The asterisk symbol divides two or more numeric values.

continued

Table 1-1: Operators for Excel Formulas (continued)

Operator	What It Does
%	The percent symbol indicates a numeric percent. Entering a percent sign after a whole number divides the number by 100 and formats the cell as a percentage.
&	The ampersand symbol is used to join or concatenate two or more textual values.
٨	The carat symbol is used as an exponentiation operator.
=	The equal symbol is used to evaluate whether one value is equal to another value
>	The greater-than symbol is used to evaluate whether one value is greater than another value.
<	The less-than symbol is used to evaluate whether one value is less than another value.
>=	The greater-than symbol used in conjunction with the equal symbol evaluates whether one value is greater than or equal to another value.
<=	The less-than symbol used in conjunction with the equal symbol evaluates whether one value is less than or equal to another value.
<>	The less-than symbol used in conjunction with the greater-than symbol evaluates whether one value is not equal to another value.

Understanding the order of operator precedence

It's important to understand that when you create a formula with several operators, Excel evaluates and performs the calculation in a specific order. For instance, Excel always performs multiplication before addition. This order is called the *order of operator precedence*. You can force Excel to override the built-in operator precedence by using parentheses to specify which operation to evaluate first.

Consider this basic example. The correct answer to (2+3)*4 is 20. However, if you leave off the parentheses, as in 2+3*4, Excel performs the calculation like this: 3*4 = 12 + 2 = 14. Excel's default order of operator precedence mandates that Excel perform multiplication before addition. Entering 2+3*4 gives you the wrong answer. Because Excel evaluates and performs all calculations in parentheses first, placing 2+3 inside parentheses ensures the correct answer.

The order of operations for Excel is as follows:

Evaluate items in parentheses.

Evaluate ranges (:).

Evaluate intersections (spaces).

Evaluate unions (,).

Perform negation (-).

Convert percentages (%).

Perform exponentiation (^).

Perform multiplication (*) and division (/), which are of equal precedence.

Perform addition (+) and subtraction (-), which are of equal precedence.

Evaluate text operators (&).

Perform comparisons (=, <>, <=, >=).



Operations that are equal in precedence are performed left to right.

Here is another widely demonstrated example. If you enter 10^2, which represents the exponent 10 to the 2nd power as a formula, Excel returns 100 as the answer. If you enter -10^2, you would expect -100 to be the result. Instead, Excel returns 100 yet again. The reason is that Excel performs negation before exponentiation, meaning that Excel is converting 10 to -10 before the exponentiation, effectively calculating -10*-10, which indeed equals 100. Using parentheses in the formula -(10^2) ensures that Excel calculates the exponent before negating the answer, giving you -100.

Remembering the order of operations and using parentheses where appropriate will ensure that you avoid miscalculating your data.

Using nested parentheses

It's a best practice to use parentheses whenever you can in formulas, even if the use of parentheses seem to be superfluous. The liberal use of parentheses can not only help you avoid calculation errors but also help you better understand what the formula is doing.

You can even nest parentheses in formulas. Nesting means putting parentheses inside of other parentheses. When a formula contains nested parentheses, Excel evaluates the most deeply nested operations first and works its way out. The following formula uses nested parentheses:

```
= ((A1*B1) + (C1*D1))*E1
```

This formula has three sets of parentheses. Excel will evaluate the two nested sets of parentheses first, then will add those two results together. The added result will then be multiplied by the value in E1.



Every open parenthesis must have a matching close parenthesis. You can imagine that when you start adding lots of parentheses to your formula, determining which open parenthesis has a matching close parenthesis can get difficult. For its part, Excel offers some help by color coding the parentheses while you're in Edit mode. Matching open and close parentheses will have the same color.