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5th Edition

Microsoft® Excel® Formulas & Functions

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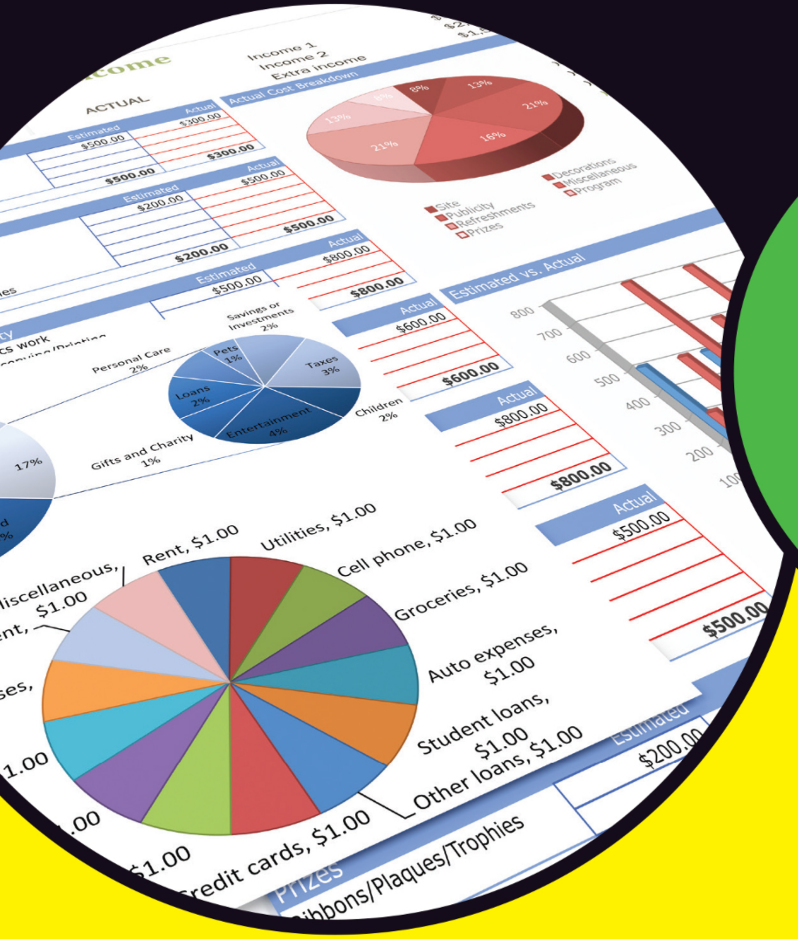
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Estimated vs. Actual
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Ken Bluttman

Author of all editions of *Excel Formulas & Functions For Dummies*

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Introduction

Excel worksheets are used in many walks of life: business, education, home finances, and even hobbies (such as keeping track of your baseball-card collection). In my house, we use Excel for a lot, from our taxes (boring!) to our ever-growing recipe collection (yummy!). Often, I use Excel in place of a calculator. After all, Excel is like a calculator on steroids!

In the workplace, Excel is one of the most commonly used analysis and reporting tools. Financial statements, sales reports, inventory, project scheduling, customer activity — so much of this stuff is kept in Excel. The program's capability to manipulate and give feedback about the data makes it attractive. Excel's flexibility in storing and presenting data is like magic.

About This Book

This book is about the number-crunching side of Excel. Formulas are the keystone to analyzing data — that is, digging out nuggets of important information. What is the average sale? How many times did we do better than average? How many days are left on the project? How much progress have we made? That sort of thing.

Formulas calculate answers, straight and to the point. But that's not all. Excel has dozens of built-in functions that calculate everything from a simple average to a useful analysis of your investments to complex inferential statistics. But you don't have to know it all or use it all; just use the parts that are relevant to your work.

This book discusses more than 150 of these functions. But rather than just show their syntax and list them alphabetically, I assemble them by category and provide real-world examples of how to use them alone, and in formulas, along with step-by-step instructions and illustrations of the results.

Foolish Assumptions

I assume that you have a PC with Excel 2019 loaded. That's a no-brainer! Nearly all the material is relevant for use with earlier versions of Excel as well. I also assume that you know how to navigate with a keyboard and mouse. Last, I assume that you have used Excel before, even just once. I do discuss basics in Chapter 1, but not all of them. If you really need to start from scratch, I suggest that you read the excellent *Excel 2019 For Dummies*, by Greg Harvey (John Wiley & Sons, Inc.).

Other than that, this book is written for Excel 2019, but just between you and me, it works fine with older versions of Excel. There could be a function or two that isn't in an older version or works slightly differently. But Microsoft has done an excellent job of maintaining compatibility between versions of Excel, so when it comes to formulas and functions, you can be confident that what works in one version works in another.

How to Use This Book

You do not have to read the book sequentially from start to finish, although you certainly can. Each chapter deals with a specific category of functions — financial in one chapter, statistical in another, and so on. Some categories are split over two or more chapters. I suggest two ways for you to use this book:

- Use the table of contents to find the chapters that are of interest to you.
- Use the index to look up specific functions you are interested in.

Icons Used in This Book

TIP

A Tip gives you a little extra piece of info on the subject at hand. It may offer an alternative method. It may lead you to a conclusion. It may, well, give you a tip (just no stock tips — sorry).

REMEMBER

The Remember icon holds some basic concept that is good to keep tucked somewhere in your brain.

WARNING

As it implies, a Warning is serious stuff. This icon tells you to be careful — usually because you can accidentally erase your data or some such horrible event.

TECHNICAL STUFF

Once in a while, some tidbit is interesting to the tech-head types, but not to anyone else. You can read these items or ignore them as you see fit.

Where to Go from Here

Roll up your sleeves, take a deep breath, and then forget all that preparing-for-a-hard-task stuff. Using Excel is easy. You can hardly make a mistake without Excel's catching it. If you need to brush up on the basics, go to Chapter 1. This chapter is also the best place to get your first taste of formulas and functions. After that, it's up to you. The book is organized more by area of focus than anything else. If finance is what you do, go to Part 2. If working with dates is what you do, go to Part 4. Seek, and you will find.

1

Getting Started with Formulas and Functions

IN THIS PART . . .

Get to know formula and function fundamentals.

Discover the different ways to enter functions.

Understand array-based formulas and functions.

Find out about formula errors and how to fix them.

IN THIS CHAPTER

- Getting the skinny on the Excel basics
- Writing formulas
- Working with functions in formulas

Chapter 1

Tapping Into Formula and Function Fundamentals

Excel is to computer programs what a Ferrari is to cars: sleek on the outside and a lot of power under the hood. Excel is also like a truck. It can handle all your data — lots of it. In fact, in Excel 2019, a single worksheet has 17,179,869,184 places to hold data. Yes, that's what I said — more than 17 *billion* data placeholders. And that's on just *one* worksheet!

TIP

Opening files created in earlier versions of Excel may show just the number of worksheet rows and columns available in the version the workbook was created with.

Excel is used in all types of businesses. And you know how that's possible? By being able to store and work with any kind of data. It doesn't matter whether you're in finance or sales, whether you run an online e-commerce store or organize wilderness trips, or whether you're charting party RSVPs or tracking the scores of your favorite sports teams — Excel can handle all of it. Its number-crunching ability is just awesome! And so easy to use!

Just putting a bunch of information on worksheets doesn't crunch the data or give you sums, results, or analyses. If you want to just store your data somewhere, you can use Excel or get a database program instead. In this book, I show you how to build formulas and how to use the dozens of built-in functions that Excel provides. That's where the real power of Excel is — making sense of your data.

Don't fret that this is a challenge and that you may make mistakes. I did when I was ramping up. Besides, Excel is very forgiving. It won't crash on you. Excel usually tells you when you made a mistake, and sometimes it even helps you correct it. How many programs do that? But first, the basics. This first chapter gives you the springboard you need to use the rest of the book. I wish books like this were around when I was introduced to computers. I had to stumble through a lot of this.

Working with Excel Fundamentals

Before you can write any formulas or crunch any numbers, you have to know where the data goes and how to find it again. I wouldn't want your data to get lost! Knowing how worksheets store your data and present it is critical to your analysis efforts.

Understanding workbooks and worksheets

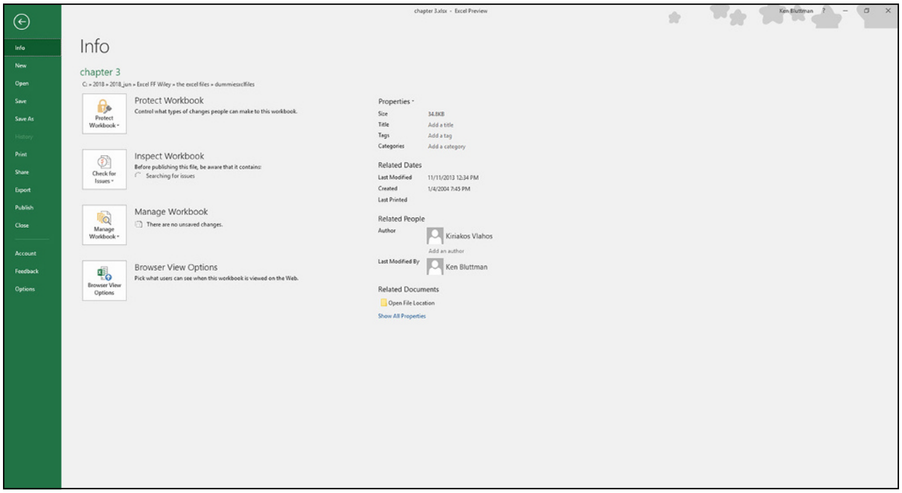
In Excel, a *workbook* is the same as a file. Excel opens and closes workbooks, just as a word processor program opens and closes documents. When you start up Excel, you are presented with a selection of templates to use, the first one being the standard blank workbook. Also there is a selection of recent files to select from. After you open a new or already created workbook, click the File tab to view basic functions such as opening, saving, printing, and closing your Excel files (not to mention a number of other nifty functions to boot!). Figure 1-1 shows the contents presented on the Info tab.

TIP

Excel 2019 (also Excel 2016, Excel 2013, Excel 2010, and Excel 2007) files have the default `.xlsx` extension. Older-version Excel workbook files have the `.xls` extension.

Start Excel and double-click the Blank Workbook icon to create a new blank workbook. When you have more than one workbook open, you pick the one you want to work on by clicking it on the Windows Taskbar.

A worksheet is where your data actually goes. A workbook contains at least one worksheet. If you didn't have at least one, where would you put the data? Figure 1-2 shows an open workbook that has two sheets, aptly named Sheet1 and Sheet2. To the right of these worksheet tabs is the New Sheet button (looks like a plus sign), used to add worksheets to the workbook.


chapter 3.xlsx - Excel Preview
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Info
New
Open
Save
Save As
History
Print
Share
Export
Publish
Close
Account
Feedback
Options
Protect Workbook
Check for Issues
Manage Workbook
Browser View Options

Info

chapter 3

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Protect Workbook

Control what types of changes people can make to this workbook.

Inspect Workbook

Before publishing this file, be aware that it contains:

Searching for issues

Manage Workbook

There are no unsaved changes.

Browser View Options

Pick what users can see when this workbook is viewed on the Web.

Properties

Size 34.8KB
Title Add a title
Tags Add a tag
Categories Add a category

Related Dates

Last Modified 11/11/2013 12:34 PM
Created 1/4/2004 7:45 PM
Last Printed

Related People

Author Kiriakos Vlahos
Add an author
Last Modified By Ken Bluttman

Related Documents

Open File Location
Show All Properties

FIGURE 1-1: Seeing how to use basic Excel program functions.

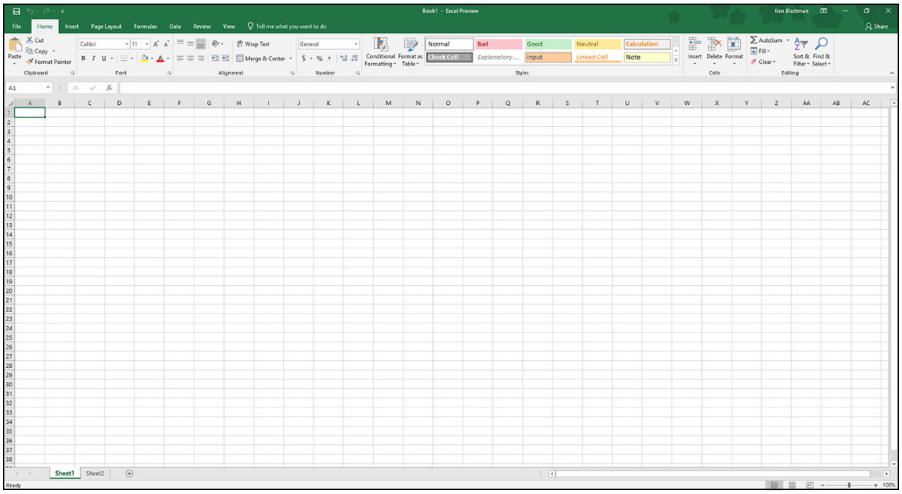

Book1 - Excel Preview
Ken Bluttman
File
Home
Insert
Page Layout
Formulas
Data
Review
View
Tell me what you want to do
Share
Sheet1
Sheet2
Ready

FIGURE 1-2: Looking at a workbook and worksheets.

At any given moment, one worksheet is always on top. In Figure 1-2, Sheet1 is on top. Another way of saying this is that Sheet1 is the *active* worksheet. There is always one and only one active worksheet. To make another worksheet active, just click its tab.

TIP

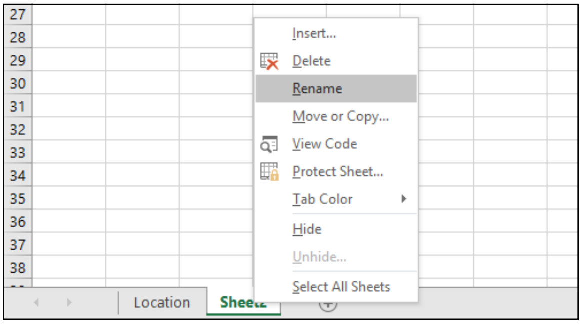
Worksheet, *spreadsheet*, and just plain old *sheet* are used interchangeably to mean the worksheet.

What's really cool is that you can change the name of the worksheets. Names like Sheet1 and Sheet2 are just not exciting. How about Baseball Card Collection or Last Year's Taxes? Well, actually, Last Year's Taxes isn't too exciting, either.

The point is, you can give your worksheets meaningful names. You have two ways to do this:

- Double-click the worksheet tab and then type a new name.
- Right-click the worksheet tab, select Rename from the menu, and then type a new name.

Figure 1-3 shows one worksheet name already changed and another about to be changed by right-clicking its tab.


27
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35
36
37
38
Insert...
Delete
Rename
Move or Copy...
View Code
Protect Sheet...
Tab Color
Hide
Unhide...
Select All Sheets
Location
Sheet2

FIGURE 1-3: Changing the name of a worksheet.

You can try changing a worksheet name on your own. Do it the easy way:

1. **Double-click a worksheet's tab.**
2. **Type a new name and press Enter.**

   The name cannot exceed 31 characters.

You can change the color of worksheet tabs. Right-click the tab and select Tab Color from the menu. Color coding tabs provides a great way to organize your work.

To insert a new worksheet into a workbook, click the New Sheet button, which is located after the last worksheet tab. Figure 1-4 shows how. To delete a worksheet, just right-click the worksheet's tab and select Delete from the menu.

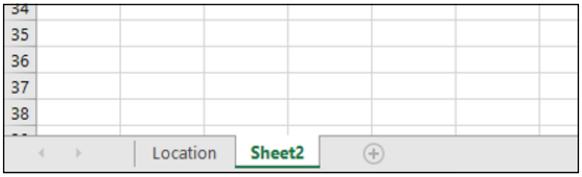

34
35
36
37
38
Location
Sheet2

FIGURE 1-4: Inserting a new worksheet.

WARNING

Don't delete a worksheet unless you really mean to. You cannot get it back after it is gone. It does not go into the Windows Recycle Bin.

You can insert many new worksheets. The limit of how many is based on your computer's memory, but you should have no problem inserting 200 or more. Of course, I hope you have a good reason for having so many, which brings me to the next point.

Worksheets organize your data. Use them wisely, and you will find it easy to manage your data. For example, say that you are the boss (I thought you'd like that!), and over the course of a year you track information about 30 employees. You may have 30 worksheets — one for each employee. Or you may have 12 worksheets — one for each month. Or you may just keep it all on one worksheet. How you use Excel is up to you, but Excel is ready to handle whatever you throw at it.

TIP

You can set how many worksheets a new workbook has as the default. To do this, click the File tab, click Options, and then click the General tab. Under the When Creating New Workbooks section, use the Include This Many Sheets spinner control to select a number.

Introducing the Formulas Tab

Without further ado, I present the Formulas tab of the Ribbon. The Ribbon sits at the top of Excel. Items on the Ribbon appear as menu headers along the top of the Excel screen, but they actually work more like tabs. Click them, and no menus appear. Instead, the Ribbon presents the items that are related to the clicked Ribbon tab.

Figure 1-5 shows the top part of the screen, in which the Ribbon displays the items that appear when you click the Formulas tab. In the figure, the Formulas tab is set to show formula-based methods. At the left end of the tab, functions are categorized. One of the categories is opened to show how you can access a particular function.

These groups are along the bottom of the Formulas tab:

- **Function Library:** This includes the Function Wizard, the AutoSum feature, and the categorized functions.
- **Defined Names:** These features manage named areas, which are sections on worksheets that you give a meaningful name to for easy reference.

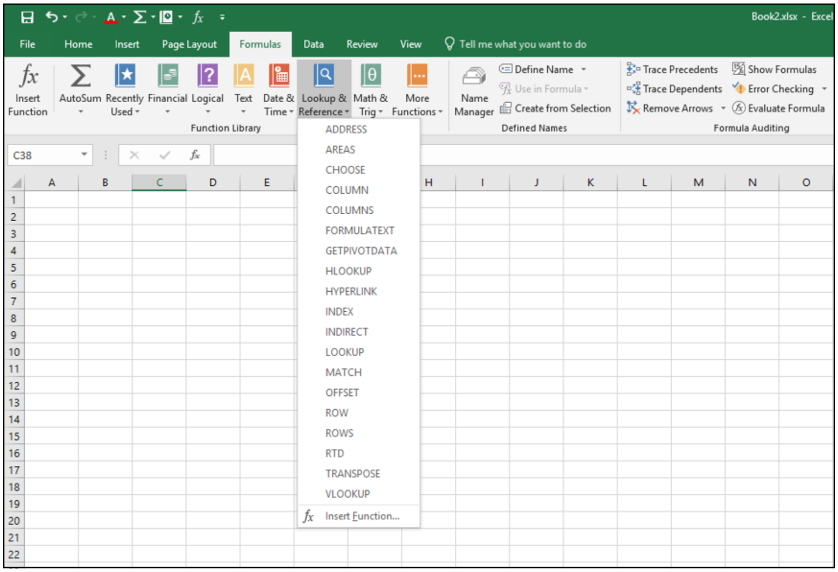
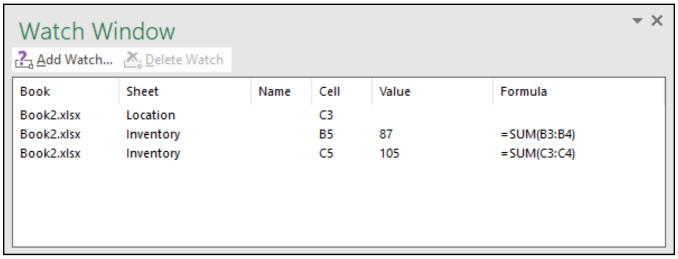

Book2.xlsx - Excel
File
Home
Insert
Page Layout
Formulas
Data
Review
View
Tell me what you want to do
Insert Function
AutoSum
Recently Used
Financial
Logical
Text
Date & Time
Lookup & Reference
Math & Trig
More Functions
Function Library
Name Manager
Define Name
Use in Formula
Create from Selection
Defined Names
Trace Precedents
Trace Dependents
Remove Arrows
Show Formulas
Error Checking
Evaluate Formula
Formula Auditing
C38
ADDRESS
AREAS
CHOOSE
COLUMN
COLUMNS
FORMULATEXT
GETPIVOTDATA
HLOOKUP
HYPERLINK
INDEX
INDIRECT
LOOKUP
MATCH
OFFSET
ROW
ROWS
RTD
TRANSPOSE
VLOOKUP
Insert Function...

FIGURE 1-5: Getting to know the Ribbon.

- **Formula Auditing:** These features for checking and correcting formulas have been through many Excel incarnations, but never before have the features been so prominent. Also here is the Watch Window, which lets you keep an eye on the values in designated cells, but within one window. In Figure 1-6 you can see that a few cells have been assigned to the Watch Window. If any values change, you can see this in the Watch Window. Note how the watched cells are on sheets that are not the current active sheet. Neat! By the way, you can move the Watch Window around the screen by clicking the title area of the window and dragging it with the mouse.
- **Calculation:** This is where you manage calculation settings, such as whether calculation is automatic or manual.


Watch Window
Add Watch...
Delete Watch

Book	Sheet	Name	Cell	Value	Formula
Book2.xlsx	Location		C3		
Book2.xlsx	Inventory		B5	87	=SUM(B3:B4)
Book2.xlsx	Inventory		C5	105	=SUM(C3:C4)

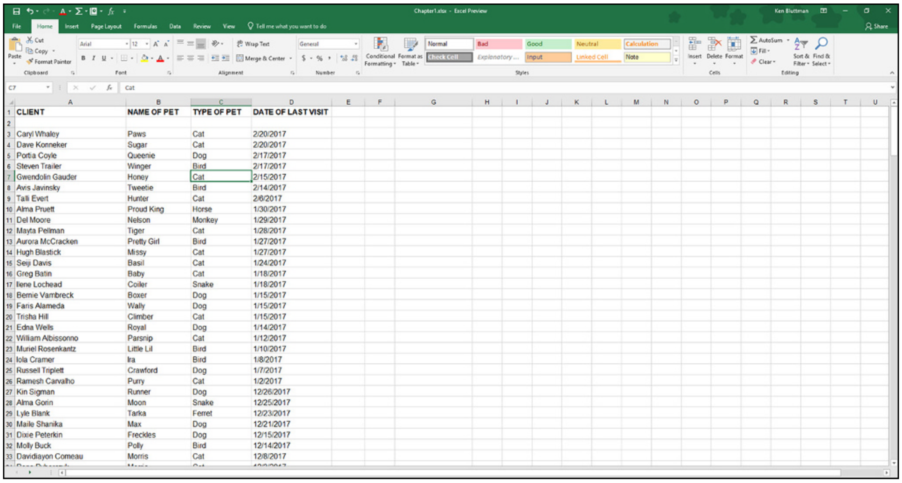
FIGURE 1-6: Eyeing the Watch Window.

TIP

Another great feature that goes hand in hand with the Ribbon is the Quick Access Toolbar. (So there is a toolbar after all!) In Figure 1-5, the Quick Access Toolbar sits just above the left side of the Ribbon. On it are icons that perform actions with a single click. The icons are ones you select by using the Quick Access Toolbar tab in the Excel Options dialog box. You can put the toolbar above or below the Ribbon by clicking the Customize Quick Access Toolbar drop-down arrow on the Quick Access Toolbar and choosing an option. In this area too are the other options for the Quick Access Toolbar.

Working with rows, column, cells, ranges, and tables

A *worksheet* contains cells. Lots of them. Billions of them. This might seem unmanageable, but actually it's pretty straightforward. Figure 1-7 shows a worksheet filled with data. Use this to look at a worksheet's components. Each *cell* can contain data or a formula. In Figure 1-7, the cells contain data. Some, or even all, cells could contain formulas, but that's not the case here.



CLIENT	NAME OF PET	TYPE OF PET	DATE OF LAST VISIT
Caryl Whaley	Paws	Cat	2/20/2017
Dave Konneker	Sugar	Cat	2/20/2017
Portia Coyle	Queenie	Dog	2/17/2017
Steven Trailer	Winger	Bird	2/17/2017
Gwendolin Gauder	Honey	Cat	2/15/2017
Avis Javinsky	Tweetie	Bird	2/14/2017
Talli Evert	Hunter	Cat	2/6/2017
Alma Pruett	Proud King	Horse	1/30/2017
Del Moore	Nelson	Monkey	1/29/2017
Mayta Pellman	Tiger	Cat	1/28/2017
Aurora McCracken	Pretty Girl	Bird	1/27/2017
Hugh Blastick	Missy	Cat	1/27/2017
Seiji Davis	Basil	Cat	1/24/2017
Greg Batin	Baby	Cat	1/18/2017
Ilene Lochead	Coiler	Snake	1/18/2017
Bernie Vambreck	Boxer	Dog	1/15/2017
Faris Alameda	Wally	Dog	1/15/2017
Trisha Hill	Climber	Cat	1/15/2017
Edna Wells	Royal	Dog	1/14/2017
William Albissonno	Parsnip	Cat	1/12/2017
Muriel Rosenkantz	Little Lil	Bird	1/10/2017
Iola Cramer	Ira	Bird	1/8/2017
Russell Triplett	Crawford	Dog	1/7/2017
Ramesh Carvalho	Purry	Cat	1/2/2017
Kin Sigman	Runner	Dog	12/26/2017
Alma Gorin	Moon	Snake	12/25/2017
Lyle Blank	Tarka	Ferret	12/23/2017
Maile Shanika	Max	Dog	12/21/2017
Dixie Peterkin	Freckles	Dog	12/15/2017
Molly Buck	Polly	Bird	12/14/2017
Davidiayon Comeau	Morris	Cat	12/8/2017

FIGURE 1-7: Looking at what goes into a worksheet.

Columns have letter headers — A, B, C, and so on. You can see these listed horizontally just above the area where the cells are. After you get past the 26th column, a double lettering system is used — AA, AB, and so on. After all the two-letter combinations are used up, a triple-letter scheme is used. Rows are listed vertically down the left side of the screen and use a numbering system.

You find cells at the intersection of rows and columns. Cell A1 is the cell at the intersection of column A and row 1. A1 is the cell's *address.* There is always an *active* cell — that is, a cell in which any entry would go into should you start typing. The active cell has a border around it. Also, the contents of the active cell appear in the *Formula Box.*

REMEMBER

When I speak of, or reference, a *cell*, I am referring to its address. The address is the intersection of a column and row. To talk about cell D20 means to talk about the cell that you find at the intersection of column D and row 20.

In Figure 1-7, the active cell is C7. You have a couple of ways to see this. For starters, cell C7 has a border around it. Also notice that the column head C is shaded, as well as row number 7. Just above the column headers are the Name Box and the Formula Box. The Name Box is all the way to the left and shows the active cell's address of C7. To the right of the Name Box, the Formula Box shows the contents of cell C7.

TIP

If the Formula Bar is not visible, choose File ➪ Options, and click the Advanced tab. Then, in the Display section in the Excel Options dialog box, select the Show Formula Bar check box to make it visible.

TECHNICAL STUFF

GETTING TO KNOW THE FORMULA BAR

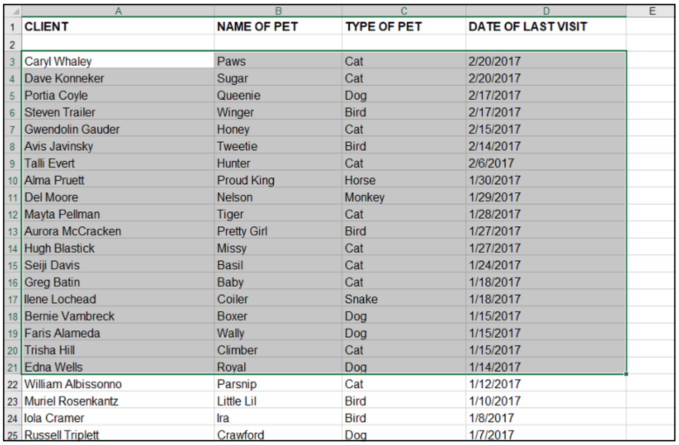
Taken together, the Formula Box and the Name Box make up the Formula Bar. You use the Formula Bar quite a bit as you work with formulas and functions. The Formula Box is used to enter and edit formulas. The Formula Box is the long entry box that starts in the middle of the bar. When you enter a formula into this box, you can click the little check-mark button to finish the entry. The check-mark button is visible only when you are entering a formula. Pressing Enter also completes your entry; clicking the X cancels the entry.

An alternative is to enter a formula directly into a cell. The Formula Box displays the formula as it is being entered into the cell. When you want to see just the contents of a cell that has a formula, make that cell active and look at its contents in the Formula Box. Cells that have formulas do not normally display the formula, but instead display the result of the formula. When you want to see the actual formula, the Formula Box is the place to do it. The Name Box, on the left side of the Formula Bar, is used to select named areas in the workbook.

A *range* is usually a group of adjacent cells, although noncontiguous cells can be included in the same range (but that's mostly for rocket scientists and those obsessed with treating data like jigsaw puzzle pieces). For your purposes, assume a range is a group of continuous cells. Make a range right now! Here's how:

1. **Position the mouse pointer over the first cell where you want to define a range.**
2. **Press and hold the left mouse button.**
3. **Move the pointer to the last cell of your desired area.**
4. **Release the mouse button.**

Figure 1-8 shows what happened when I did this. I selected a *range* of cells. The address of this range is A3:D21.



	A	B	C	D	E
1	CLIENT	NAME OF PET	TYPE OF PET	DATE OF LAST VISIT	
2					
3	Caryl Whaley	Paws	Cat	2/20/2017	
4	Dave Konneker	Sugar	Cat	2/20/2017	
5	Portia Coyle	Queenie	Dog	2/17/2017	
6	Steven Trailer	Winger	Bird	2/17/2017	
7	Gwendolin Gauder	Honey	Cat	2/15/2017	
8	Avis Javinsky	Tweetie	Bird	2/14/2017	
9	Talli Evert	Hunter	Cat	2/6/2017	
10	Alma Pruett	Proud King	Horse	1/30/2017	
11	Del Moore	Nelson	Monkey	1/29/2017	
12	Mayta Pellman	Tiger	Cat	1/28/2017	
13	Aurora McCracken	Pretty Girl	Bird	1/27/2017	
14	Hugh Blastick	Missy	Cat	1/27/2017	
15	Seiji Davis	Basil	Cat	1/24/2017	
16	Greg Batin	Baby	Cat	1/18/2017	
17	Ilene Lochead	Coiler	Snake	1/18/2017	
18	Bernie Vambreck	Boxer	Dog	1/15/2017	
19	Faris Alameda	Wally	Dog	1/15/2017	
20	Trisha Hill	Climber	Cat	1/15/2017	
21	Edna Wells	Royal	Dog	1/14/2017	
22	William Albissonno	Parsnip	Cat	1/12/2017	
23	Muriel Rosenkantz	Little Lil	Bird	1/10/2017	
24	Iola Cramer	Ira	Bird	1/8/2017	
25	Russell Triplett	Crawford	Dog	1/7/2017	

FIGURE 1-8: Selecting a range of cells.

REMEMBER

A range address looks like two cell addresses put together, with a colon (:) in the middle. And that's what it is! A range address starts with the address of the cell in the upper left of the range, then has a colon, and ends with the address of the cell in the lower right.

One more detail about ranges: You can give them a name. This is a great feature because you can think about a range in terms of what it is used for, instead of what its address is. Also, if I did not take the extra step to assign a name, the range would be gone as soon as I clicked anywhere on the worksheet. When a range is given a name, you can repeatedly use the range by using its name.

Say you have a list of clients on a worksheet. What's easier — thinking of exactly which cells are occupied, or thinking that there is your list of clients?

Throughout this book, I use areas made of cell addresses and ranges, which have been given names. It's time to get your feet wet creating a *named area*. Here's what you do:

1. **Position the mouse pointer over a cell, click and hold the left mouse button, and drag the pointer around.**
2. **Release the mouse button when you're done.**

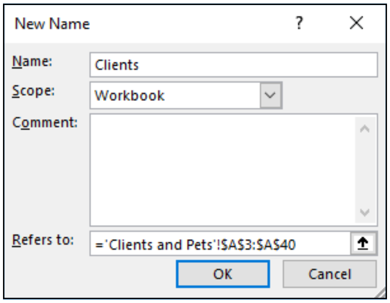
   You've selected an area of the worksheet.
3. **Click Define Name in the Defined Names group on the Formulas tab.**

   The New Name dialog box appears. Figure 1-9 shows you how it looks so far.
4. **Name the area or keep the suggested name. You can change the suggested name as well.**

   Excel guesses that you want to name the area with the value it finds in the top cell of the range. That may or may not be what you want. Change the name if you need to. In Figure 1-9, I changed the name to Clients.

   TIP

   An alternative method of naming an area is to select it, type the name in the Name Box (left of the Formula Bar), and press Enter.
5. **Click OK.**



Name: Clients

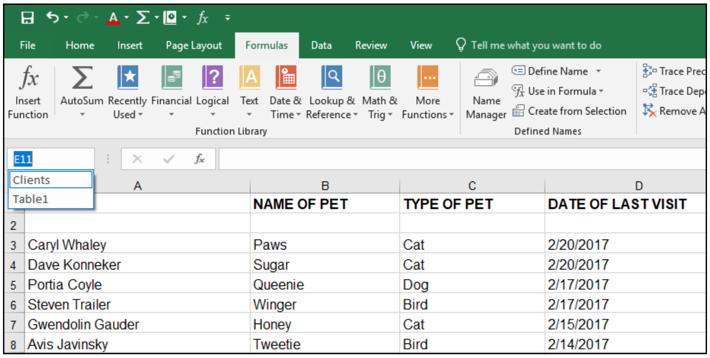
Scope: Workbook

Refers to: ='Clients and Pets'!$A$3:$A$40

FIGURE 1-9: Adding a name to the workbook.

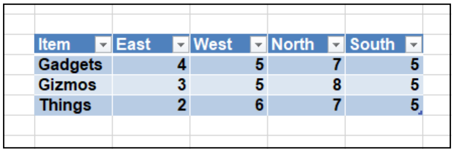
That's it. Hey, you're already on your way to being an Excel pro! Now that you have a named area, you can easily select your data at any time. Just go to the Name Box and select it from the list. Figure 1-10 shows how to select the Clients area.

Tables work in much the same manner as named areas. Tables have a few features that are unavailable to simple named areas. With tables you can indicate that the top row contains header labels. Further, tables default to have filtering ability. Figure 1-11 shows a table on a worksheet, with headings and filtering ability.


File
Home
Insert
Page Layout
Formulas
Data
Review
View
Tell me what you want to do
Insert Function
AutoSum
Recently Used
Financial
Logical
Text
Date & Time
Lookup & Reference
Math & Trig
More Functions
Function Library
Name Manager
Define Name
Use in Formula
Create from Selection
Defined Names
Trace Prec
Trace Dep
Remove A
E11
Clients
Table1

	A	B	C	D
1		NAME OF PET	TYPE OF PET	DATE OF LAST VISIT
2				
3	Caryl Whaley	Paws	Cat	2/20/2017
4	Dave Konneker	Sugar	Cat	2/20/2017
5	Portia Coyle	Queenie	Dog	2/17/2017
6	Steven Trailer	Winger	Bird	2/17/2017
7	Gwendolin Gauder	Honey	Cat	2/15/2017
8	Avis Javinsky	Tweetie	Bird	2/14/2017

FIGURE 1-10: Using the Name Box to find the named area.



Item	East	West	North	South
Gadgets	4	5	7	5
Gizmos	3	5	8	5
Things	2	6	7	5

FIGURE 1-11: Trying a table.

With filtering, you can limit which rows show, based on which values you select to display.

TIP

The Tables group in the Insert tab contains the Table button for inserting a table.

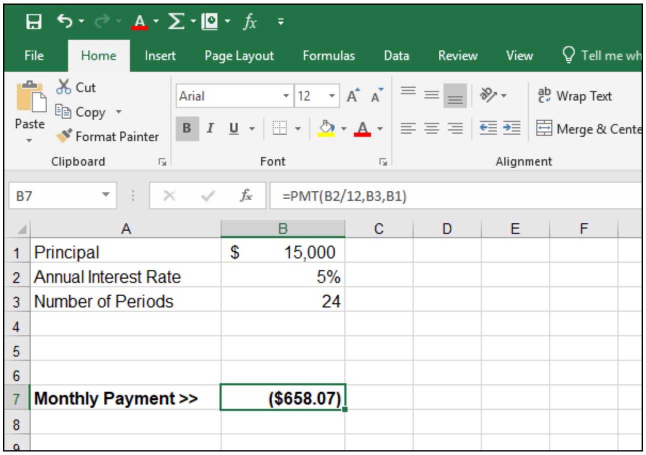
Formatting your data

Of course, you want to make your data look all spiffy and shiny. Bosses like that. Is the number 98.6 someone's temperature? Is it a score on a test? Is it 98 dollars and 60 cents? Is it a percentage? Any of these formats is correct:

- 98.6
- $98.60
- 98.6%

Excel lets you format your data in just the way you need. Formatting options are on the Home tab of the Ribbon, in the Number group.

Figure 1-12 shows how formatting helps in the readability and understanding of a worksheet. Cell B1 has a monetary amount and is formatted with the Accounting style. Cell B2 is formatted as a percentage. The actual value in cell B2 is .05. Cell B7 is formatted as currency. The currency format displays a negative value in parentheses. This is just one of the formatting options for currency. Chapter 5 explains further about formatting currency data.


File
Home
Insert
Page Layout
Formulas
Data
Review
View
Tell me wh
Cut
Copy
Format Painter
Paste
Clipboard
Arial
12
Font
Wrap Text
Merge & Cente
Alignment

B7 =PMT(B2/12,B3,B1)

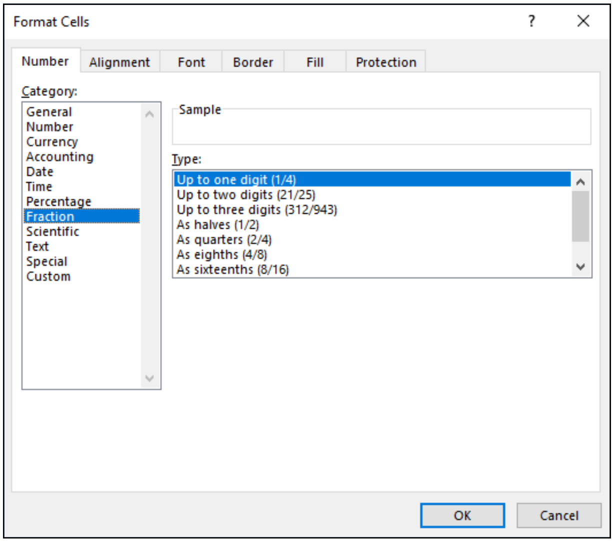
	A	B
1	Principal	$ 15,000
2	Annual Interest Rate	5%
3	Number of Periods	24
4		
5		
6		
7	**Monthly Payment >>**	**($658.07)**
8		

FIGURE 1-12: Formatting data.

Besides selecting formatting on the Home tab of the Ribbon, you can use the familiar (in previous versions) Format Cells dialog box. This is the place to go for all your formatting needs beyond what's available on the Home tab of the Ribbon. You can even create custom formats. You can display the Format Cells dialog box two ways:

- On the Home tab, click the drop-down menu in the Number group and then click More Number Formats.
- Right-click any cell and select Format Cells from the pop-up menu.

Figure 1-13 shows the Format Cells dialog box. I discuss this dialog box and formatting more extensively in Chapter 5.


Format Cells
?
Number
Alignment
Font
Border
Fill
Protection
Category:
General
Number
Currency
Accounting
Date
Time
Percentage
Fraction
Scientific
Text
Special
Custom
Sample
Type:
Up to one digit (1/4)
Up to two digits (21/25)
Up to three digits (312/943)
As halves (1/2)
As quarters (2/4)
As eighths (4/8)
As sixteenths (8/16)
OK
Cancel

Category: Fraction
Type: Up to one digit (1/4)

FIGURE 1-13: Using the Format Cells dialog box for advanced formatting options.

Getting help

Excel is complex; you can't deny that. And lucky for all of us, help is just a key press away. Yes, literally one key press — just press the F1 key. Try it now.

This starts the Help system. From there you can search on a keyword or browse through the Help table of contents. Later on, when you are working with Excel functions, you can get help on specific functions directly by clicking the Help on This Function link in the Insert Function dialog box. Chapter 2 covers the Insert Function dialog box in detail.

Gaining the Upper Hand on Formulas

Okay, time to get to the nitty-gritty of what Excel is all about. Sure, you can just enter data and leave it as is, and even generate some pretty charts from it. But getting answers from your data, or creating a summary of your data, or applying what-if tests — all of this takes formulas.

To be specific, a formula in Excel calculates something or returns some result based on data in one or more worksheets. These worksheets can be in more than one workbook A formula is placed in cells and must start with an equal sign (=) to tell Excel that it is a formula and not data. Sounds simple, and it is.

REMEMBER

All formulas start with an equal (=) sign.

Look at some very basic formulas. Table 1-1 shows a few formulas and tells you what they do.

TABLE 1-1 Basic Formulas

Formula	What It Does
`=2 + 2`	Returns the number 4.
`=A1 + A2`	Returns the sum of the values in cells A1 and A2, whatever those values may be. If either A1 or A2 has text in it, an error is returned.
`=D5`	The cell that contains this formula ends up displaying the value that is in cell D5. If you try to enter this formula into cell D5 itself, you create a circular reference. That is a no-no. See Chapter 4.
`=SUM(A2:A5)`	Returns the sum of the values in cells A2, A3, A4, and A5.This formula uses the SUM function to sum up all the values in the range.

TIP

I use the word *return* to refer to the result of the formula or function calculation. So saying "The formula returns a 7" is the same as saying "The formula calculated the answer to be 7."

Entering your first formula

Ready to enter your first formula? Make sure Excel is running and a worksheet is in front of you, and then follow these steps:

1. **Click an empty cell.**
2. **Type** = 10 + 10**.**
3. **Press Enter.**

That was easy, wasn't it? You should see the *result* of the formula — the number 20.

Try another. This time you create a formula that adds the value of two cells:

1. **Click any cell.**
2. **Type any number.**
3. **Click another cell.**
4. **Type another number.**
5. **Click a third cell.**

   This cell will contain the formula.

6. **Type =.**
7. **Click the first cell.**

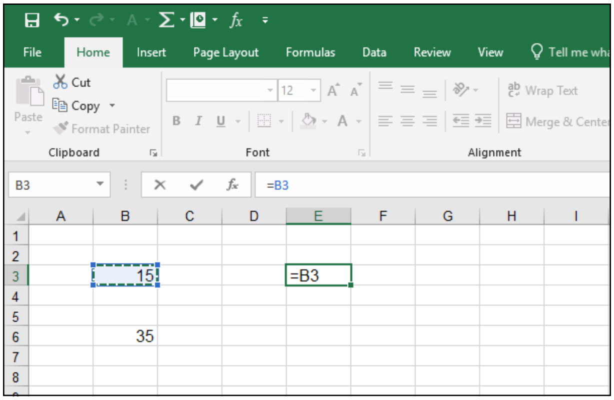
   This is an important point in the creation of the formula. The formula is being written by both your keyboard entry and your clicks of the mouse. The formula should look about half complete, with an equal sign immediately followed by the address of the cell you just clicked. Figure 1-14 shows what this looks like. In the example, the value 15 has been entered into cell B3 and the value 35 into cell B6. The formula was started in cell E3. Cell E3 so far has =B3 in it.

8. **Type** +**.**
9. **Click the cell that has the second entered value.**

   In this example, this is cell B6. The formula in cell E3 now looks like this: =B3 + B6. You can see this in Figure 1-15.

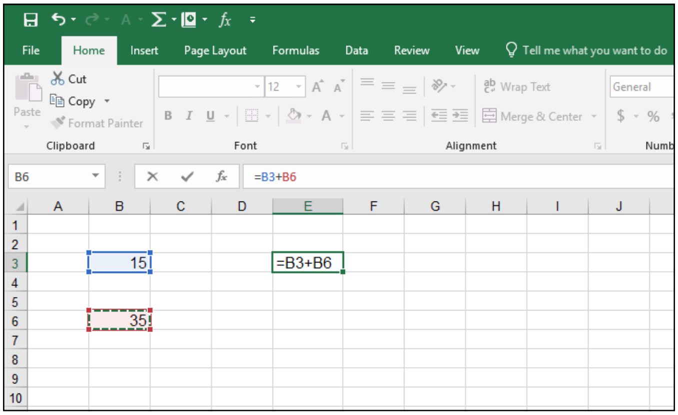
10. **Press Enter.**

    This ends the entry of the function. All done! Congratulations!


File
Home
Insert
Page Layout
Formulas
Data
Review
View
Tell me wha
Cut
Copy
Format Painter
Paste
Clipboard
Font
Alignment
Wrap Text
Merge & Cente
A
B
C
D
E
F
G
H
I
1
2
3
4
5
6
7
8
15
=B3
35

B3 =B3

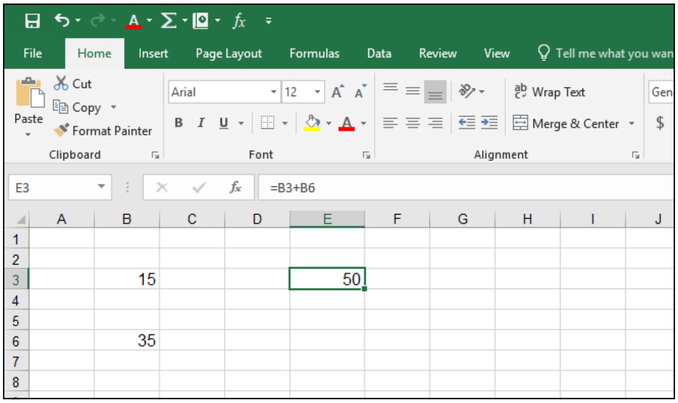
FIGURE 1-14: Entering a formula that references cells.


File
Home
Insert
Page Layout
Formulas
Data
Review
View
Tell me what you want to do
Cut
Copy
Format Painter
Paste
Clipboard
Font
Alignment
Numb
Wrap Text
Merge & Center
General
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9
10
15
=B3+B6
35

B6 =B3+B6

FIGURE 1-15: Completing the formula.

Figure 1-16 shows how the example ended up. Cell E3 displays the result of the calculation. Also notice that the Formula Bar displays the content of cell E3, which really is the formula.


File
Home
Insert
Page Layout
Formulas
Data
Review
View
Tell me what you wan
Cut
Copy
Format Painter
Paste
Clipboard
Arial
12
Font
Alignment
Wrap Text
Merge & Center
Gen
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
15
50
35

E3 =B3+B6

FIGURE 1-16: A finished formula.

Understanding references

References abound in Excel formulas. You can reference cells. You can reference ranges. You can reference cells and ranges on other worksheets. You can reference cells and ranges in other workbooks. Formulas and functions are at their most useful when you're using references, so you need to understand them.

And if that isn't enough to stir the pot, you can use three types of cell references: relative, absolute, and mixed. Okay, one step at a time here. Try a formula that uses a range.

Formulas that use ranges often have a function in the formula, so use the SUM function here:

1. **Enter some numbers in many cells going down one column.**
2. **Click another cell where you want the result to appear.**
3. **Type** =SUM(**to start the function.**
4. **Click the first cell that has an entered value, hold the left mouse button down, and drag the mouse pointer over all the cells that have values.**
5. **Release the mouse button.**

   The range address appears where the formula and function are being entered.
6. **Type a closing parenthesis:**).
7. **Press Enter.**

   Give yourself a pat on the back!

TIP

Wherever you drag the mouse to enter the range address into a function, you can also just type the address of the range, if you know what it is.

Excel is *dynamic* when it comes to cell addresses. If you have a cell with a formula that references a different cell's address, and you copy the formula from the first cell to another cell, the address of the reference inside the formula changes. Excel updates the reference inside the formula to match the number of rows and/or columns that separate the original cell (where the formula is being copied from) from the new cell (where the formula is being copied to). This may be confusing, so try an example so you can see this for yourself:

1. **In cell B2, type** 100**.**
2. **In cell C2, type** =B2 * 2**.**
3. **Press Enter.**

   Cell C2 now returns the value `200`.

4. **If C2 is not the active cell, click it once.**
5. **Press Ctrl + C, or click the Copy button in the Clipboard group on the Home tab of the Ribbon.**
6. **Click cell C3.**
7. **Press Ctrl + V, or click the Paste button in the Clipboard group on the Home tab of the Ribbon.**
8. **If you see a strange moving line around cell C2, press the Esc key.**

   Cell C3 should be the active cell, but if it is not, just click it once. Look at the Formula Bar. The contents of cell C3 are `=B3 * 2`, and not the `=B2 * 2` that you copied.

TIP

Did you see a moving line around a cell? That line's called a *marquee*. It's a reminder that you are in the middle of a cut or copy operation, and the marquee goes around the cut or copied data.

What happened? Excel, in its wisdom, assumed that if a formula in cell C2 references the cell B2 — one cell to the left — the same formula put into cell C3 is supposed to reference cell B3 — also one cell to the left.

When you're copying formulas in Excel, relative addressing is usually what you want. That's why it is the default behavior. Sometimes you do not want relative addressing, but *absolute* addressing. This is making a cell reference fixed to an absolute cell address so that it does not change when the formula is copied.

In an absolute cell reference, a dollar sign ($) precedes both the column letter and the row number. You can also have a mixed reference in which the column is absolute and the row is relative, or vice versa. To create a mixed reference, you place the dollar sign in front of just the column letter or row number. Here are some examples:

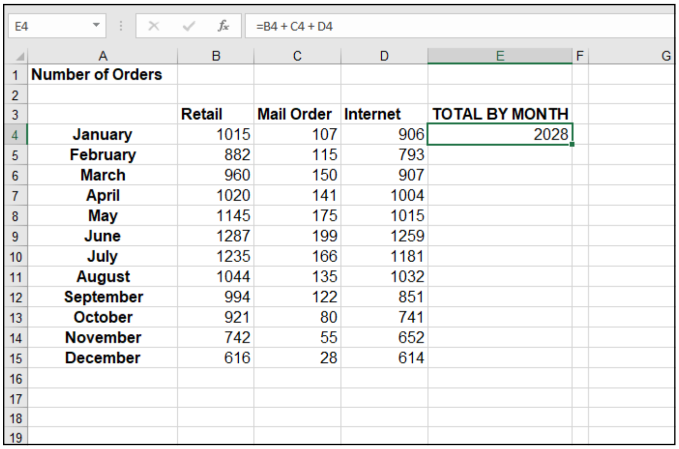
Reference Type	Formula	What Happens After Copying the Formula
Relative	`=A1`	Either, or both, the column letter A and the row number 1 can change.
Absolute	`=$A$1`	The column letter A and the row number 1 do not change.
Mixed	`=$A1`	The column letter A does not change. The row number 1 can change.
Mixed	`=A$1`	The column letter A can change. The row number 1 does not change.

Copying formulas with the fill handle

As long as I'm on the subject of copying formulas around, take a look at the fill handle. You're gonna love this one! The fill handle is a quick way to copy the contents of a cell to other cells with just a single click and drag.

The active cell always has a little square box in the lower-right side of its border. That is the fill handle. When you move the mouse pointer over the fill handle, the mouse pointer changes shape to a cross. If you click and hold the mouse button, you can drag up, down, or across over other cells. When you let go of the mouse button, the contents of the active cell automatically copies to the cells you dragged over.

A picture is worth a thousand words, so take a look at Figure 1-17, which shows a worksheet that adds some numbers. Cell E4 has this formula: `=B4 + C4 + D4`. This formula needs to be placed in cells E5 through E15. Look closely at cell E4. The fill handle is in the lower-right corner. I am about to use the fill handle to drag the formula to the other cells. Clicking and holding the left mouse button down and then dragging down to E15 does the trick.



E4 =B4 + C4 + D4

	A	B	C	D	E	F	G
1	**Number of Orders**						
2							
3		**Retail**	**Mail Order**	**Internet**	**TOTAL BY MONTH**		
4	**January**	1015	107	906	2028		
5	**February**	882	115	793			
6	**March**	960	150	907			
7	**April**	1020	141	1004			
8	**May**	1145	175	1015			
9	**June**	1287	199	1259			
10	**July**	1235	166	1181			
11	**August**	1044	135	1032			
12	**September**	994	122	851			
13	**October**	921	80	741			
14	**November**	742	55	652			
15	**December**	616	28	614			
16							
17							
18							
19							

FIGURE 1-17: Getting ready to drag the formula down.

Figure 1-18 shows what the worksheet looks like after the fill handle is used to get the formula into all the cells. This is a real time-saver. Also, you can see that the formula in each cell of column E correctly references the cells to its left. This is the intention of using relative referencing. For example, the formula in cell E15 ended up with this formula: `=B15 + C15 + D15`.