

The ultimate in-depth reference

Hundreds of timesaving solutions

Supremely well-organized, packed  
with expert advice



# Microsoft Excel Inside **OUT**

(Office 2021 and Microsoft 365)

**Bill Jelen**

FREE SAMPLE CHAPTER

SHARE WITH OTHERS



# Microsoft Excel Inside Out

## (Office 2021 and Microsoft 365)

**Bill Jelen**

*MrExcel*

Microsoft Excel Inside Out (Office 2021 and Microsoft 365)  
Published with the authorization of Microsoft Corporation by:  
Pearson Education, Inc.

Copyright © 2022 by Pearson Education, Inc.

All rights reserved. This publication is protected by copyright, and permission must be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or likewise. For information regarding permissions, request forms, and the appropriate contacts within the Pearson Education Global Rights & Permissions Department, please visit [www.pearson.com/permissions](http://www.pearson.com/permissions).

No patent liability is assumed with respect to the use of the information contained herein. Although every precaution has been taken in the preparation of this book, the publisher and author assume no responsibility for errors or omissions. Nor is any liability assumed for damages resulting from the use of the information contained herein.

ISBN-13: 978-0-13-755953-4

ISBN-10: 0-13-755953-4

Library of Congress Control Number: 2021948291

ScoutAutomatedPrintCode

### **Trademarks**

Microsoft and the trademarks listed at <http://www.microsoft.com> on the “Trademarks” webpage are trademarks of the Microsoft group of companies. All other marks are property of their respective owners.

### **Warning and disclaimer**

Every effort has been made to make this book as complete and as accurate as possible, but no warranty or fitness is implied. The information provided is on an “as is” basis. The author, the publisher, and Microsoft Corporation shall have neither liability nor responsibility to any person or entity with respect to any loss or damages arising from the information contained in this book or from the use of the programs accompanying it.

### **Special sales**

For information about buying this title in bulk quantities, or for special sales opportunities (which may include electronic versions; custom cover designs; and content particular to your business, training goals, marketing focus, or branding interests), please contact our corporate sales department at [corpsales@pearsoned.com](mailto:corpsales@pearsoned.com) or (800) 382-3419.

For government sales inquiries, please contact [governmentsales@pearsoned.com](mailto:governmentsales@pearsoned.com).

For questions about sales outside the U.S., please contact [intlcs@pearson.com](mailto:intlcs@pearson.com).

**Editor-in-Chief:** Brett Bartow

**Executive Editor:** Loretta Yates

**Assistant Sponsoring Editor:** Charvi Arora

**Development Editor:** Rick Kughen

**Managing Editor:** Sandra Schroeder

**Project Editor:** Charlotte Kughen

**Copy Editor:** Rick Kughen

**Indexer:** Ken Johnson

**Proofreader:** Sarah Kearns

**Technical Editor:** Bob Umlas

**Editorial Assistant:** Cindy Teeters

**Cover Designer:** Twist Creative, Seattle

**Compositor:** Bronkella Publishing, LLC

# Pearson's Commitment to Diversity, Equity, and Inclusion

Pearson is dedicated to creating bias-free content that reflects the diversity of all learners. We embrace the many dimensions of diversity, including but not limited to race, ethnicity, gender, socioeconomic status, ability, age, sexual orientation, and religious or political beliefs.

Education is a powerful force for equity and change in our world. It has the potential to deliver opportunities that improve lives and enable economic mobility. As we work with authors to create content for every product and service, we acknowledge our responsibility to demonstrate inclusivity and incorporate diverse scholarship so that everyone can achieve their potential through learning. As the world's leading learning company, we have a duty to help drive change and live up to our purpose to help more people create a better life for themselves and to create a better world.

Our ambition is to purposefully contribute to a world where:

- Everyone has an equitable and lifelong opportunity to succeed through learning.
- Our educational products and services are inclusive and represent the rich diversity of learners.
- Our educational content accurately reflects the histories and experiences of the learners we serve.
- Our educational content prompts deeper discussions with learners and motivates them to expand their own learning (and worldview).

While we work hard to present unbiased content, we want to hear from you about any concerns or needs with this Pearson product so that we can investigate and address them.

- Please contact us with concerns about any potential bias at <https://www.pearson.com/report-bias.html>.

*To Tom Vansweden and Bill & Katie Cullen. Thanks for being great neighbors.*



# Contents at a Glance

<b>Part I</b>	
<b>The Excel interface</b>	
Chapter 1	
What's new in Microsoft 365 Excel . . . . .	3
Chapter 2	
Using the Excel interface. . . . .	21
Chapter 3	
Customizing Excel. . . . .	49
Chapter 4	
Keyboard shortcuts . . . . .	63
<b>Part II</b>	
<b>Calculating with Excel</b>	
Chapter 5	
Understanding formulas. . . . .	93
Chapter 6	
Controlling formulas . . . . .	115
Chapter 7	
Understanding functions . . . . .	133
Chapter 8	
Using everyday functions: math, date and time, and text functions . . . . .	147
Chapter 9	
Using powerful functions: logical, lookup, and database functions. . . . .	211
Chapter 10	
Using names, LET, LAMBDA, and Data Types in Excel . . . . .	253
Chapter 11	
Connecting worksheets and workbooks . . . . .	283
Chapter 12	
Dynamic array formulas and names in Excel . . . . .	297
<b>Part III</b>	
<b>Data analysis with Excel</b>	
Chapter 13	
Transforming data with Power Query. . . . .	321
Chapter 14	
Summarizing data using subtotals or filter. . . . .	339
Chapter 15	
Using pivot tables to analyze data. . . . .	369
Chapter 16	
Using slicers and filtering a pivot table . . . . .	393
Chapter 17	
Mashing up data with Power Pivot . . . . .	409
Chapter 18	
Using What-If, Scenario Manager, Goal Seek, and Solver . . . . .	429
Chapter 19	
Automating repetitive functions using VBA macros . . . . .	445
Chapter 20	
More tips and tricks for Excel . . . . .	485
<b>Part IV</b>	
<b>Excel visuals</b>	
Chapter 21	
Formatting worksheets. . . . .	499
Chapter 22	
Using data visualizations and conditional formatting. . . . .	543
Chapter 23	
Graphing data using Excel charts. . . . .	573
Chapter 24	
Using 3D Maps . . . . .	587
Chapter 25	
Using sparklines. . . . .	607
Chapter 26	
Formatting spreadsheets for presentation. . . . .	623
Chapter 27	
Printing. . . . .	651
Chapter 28	
Collaborating in Excel . . . . .	673
<b>Part V</b>	
<b>Appendixes</b>	
Appendix A	
Excel functions. . . . .	699
Appendix B	
Excel functions with DAX or Power Query equivalents . . . . .	755
Appendix C	
Adding functionality to Excel with add-ins. . . . .	765
Index . . . . .	777





# Table of Contents

<b>Introduction</b> .....	<b>.xxvii</b>
Who this book is for .....	xxvii
Assumptions about you .....	xxvii
How this book is organized .....	xxvii
About the companion content .....	xxvii
Acknowledgments .....	xxviii
Support and feedback .....	xxix
Errata, updates, and book support .....	xxix
Stay in touch .....	xxix

## **Part I      The Excel interface**

<b>Chapter 1</b>	<b>What's new in Microsoft 365 Excel</b> .....	<b>3</b>
	Excel opens faster .....	3
	Unhide multiple worksheets .....	3
	Performance improvements .....	4
	Stock data automatic refresh every five minutes .....	5
	Show changes from last 60 days .....	6
	Browse during Save As .....	7
	Searching while opening workbooks .....	8
	Find dialog box shows all options on open .....	8
	Smooth scrolling for tall or wide cells .....	9
	Arrange All in Windows 11 .....	10
	Collapsible tasks panes now support pivot tables .....	10
	Accessibility tab in ribbon and the navigation pane .....	11
	New Lambda helper functions .....	12
	LAMBDA functions now support optional arguments .....	14
	The ribbon has rounded edges .....	14
	Cut-out people .....	14
	Image transparency .....	15
	Save any object as picture .....	16
	Write data using the Action Pen .....	16
	New features introduced tomorrow .....	17
	Other new features .....	18



<b>Chapter 2</b>	<b>Using the Excel interface</b>	<b>21</b>
	Using the ribbon	21
	Using flyout menus and galleries	22
	Rolling through the ribbon tabs	22
	Revealing more commands using dialog box launchers, task panes, and "More" commands	22
	Using collapsing task panes	23
	Resizing Excel changes the ribbon	24
	Activating the Developer tab	24
	Activating contextual ribbon tabs	25
	Finding lost commands on the ribbon	25
	Shrinking the ribbon	26
	Using the Quick Access Toolbar	27
	Adding icons to the QAT	27
	Removing commands from the QAT	28
	Customizing the QAT	28
	Formatting superscripts and subscripts	29
	Using the full-screen File menu	30
	Pressing the Esc key to close Backstage view	32
	Using the new Home screen	32
	Recovering unsaved workbooks	32
	Clearing the Recent Workbooks list	32
	Getting information about the current workbook	33
	Marking a workbook as final to prevent editing	33
	Finding hidden content using the Document Inspector	34
	Avoiding nagging about CSV files	34
	Adding whitespace around icons using Touch mode	35
	Using the new Sheet icon to add worksheets	35
	Navigating through many worksheets using the controls in the lower left	35
	Using the mini toolbar to format selected text	36
	Expanding the formula bar	36
	Zooming in and out on a worksheet	37
	Using the status bar to add numbers	38
	Switching between Normal view, Page Break preview, and Page Layout view modes	39
	Unselecting a cell with Ctrl+click	39
	Cleaning data with Flash Fill	40
	Coaching Flash Fill with a second example	41
	Flash Fill will not automatically fill in numbers	41
	Using formatting with dates	41
	Troubleshooting Flash Fill	41
	Sorting data	43
	Sorting by color or icon	43
	Factoring case into a sort	44
	Reordering columns with a left-to-right sort	44
	Sorting into a unique sequence by using custom lists	45
	One-click sorting	46
	Fixing sort problems	46

<b>Chapter 3</b>	<b>Customizing Excel</b> . . . . .	<b>49</b>
	Performing a simple ribbon modification . . . . .	49
	Adding a new ribbon tab . . . . .	51
	Sharing customizations with others . . . . .	52
	Questions about ribbon customization . . . . .	53
	Using the Excel Options dialog box . . . . .	53
	Getting help with a setting . . . . .	54
	Recent new options in Excel . . . . .	55
	Using AutoRecover options . . . . .	58
	Controlling image sizes . . . . .	58
	Working with protected view for files originating from the Internet . . . . .	59
	Working with Trusted Document settings . . . . .	59
	Options to consider . . . . .	59
	Five Excel oddities . . . . .	60
<b>Chapter 4</b>	<b>Keyboard shortcuts</b> . . . . .	<b>63</b>
	Using keyboard accelerators . . . . .	63
	Selecting icons on the ribbon . . . . .	64
	Selecting options from a gallery . . . . .	65
	Navigating within drop-down menu lists . . . . .	66
	Backing up one level through a menu . . . . .	66
	Dealing with keyboard accelerator confusion . . . . .	66
	Selecting from legacy dialog boxes . . . . .	68
	Using the shortcut keys . . . . .	68
	Using my favorite shortcut keys . . . . .	77
	Quickly move between worksheets . . . . .	77
	Jumping to the bottom of data with Ctrl+arrow . . . . .	77
	Selecting the current region with Ctrl+* . . . . .	77
	Jumping to the next corner of a selection . . . . .	78
	Pop open the right-click menu using Shift+F10 . . . . .	78
	Crossing tasks off your list with Ctrl+5 . . . . .	78
	Date stamp or time stamp using Ctrl+; or Ctrl+: . . . . .	78
	Repeating the last task with F4 . . . . .	78
	Adding dollar signs to a reference with F4 . . . . .	79
	Choosing items from a slicer . . . . .	79
	Finding the one thing that takes you too much time . . . . .	79
	Using Excel 2003 keyboard accelerators . . . . .	79
	Invoking an Excel 2003 Alt shortcut . . . . .	80
	Determining which commands work in legacy mode . . . . .	81
<b>Part II</b>	<b>Calculating with Excel</b>	
<b>Chapter 5</b>	<b>Understanding formulas</b> . . . . .	<b>93</b>
	Getting the most from this chapter . . . . .	93
	Introduction to formulas . . . . .	94
	Formulas versus values . . . . .	94

- Entering your first formula ..... 95
  - Building a formula ..... 95
  - The relative nature of formulas ..... 96
  - Overriding relative behavior: absolute cell references ..... 96
  - Using mixed references to combine features of relative and absolute references .. 98
  - Using the F4 key to simplify dollar sign entry ..... 99
  - Using F4 after a formula is entered ..... 101
  - Using F4 on a rectangular range ..... 101
- Three methods of entering formulas ..... 103
  - Enter formulas using the mouse method ..... 103
  - Entering formulas using the arrow key method ..... 104
- Entering the same formula in many cells ..... 106
  - Copying a formula by using Ctrl+Enter ..... 106
  - Copying a formula by dragging the fill handle ..... 107
  - Double-click the fill handle to copy a formula ..... 107
- Use the Table tool to copy a formula ..... 108
- Entering one formula and spilling many results ..... 110
  - Understanding the #SPILL! error ..... 111
  - Using implicit intersection is more complicated than before ..... 111
  - Referring to an entire array with the # operator ..... 112

**Chapter 6 Controlling formulas ..... 115**

- Formula operators ..... 115
  - Order of operations ..... 116
  - Unary minus example ..... 116
  - Addition and multiplication example ..... 117
  - Stacking multiple parentheses ..... 117
- Understanding error messages in formulas ..... 118
- Using formulas to join text ..... 121
  - Joining text and a number ..... 121
- Copying versus cutting a formula ..... 122
- Automatically formatting formula cells ..... 124
- Specifying implicit intersection using the @ operator ..... 124
- Using date math ..... 125
- Troubleshooting formulas ..... 126
  - Seeing all formulas ..... 126
  - Highlighting all formula cells ..... 126
  - Editing a single formula to show direct precedents ..... 126
  - Using formula auditing arrows ..... 127
  - Tracing dependents ..... 128
  - Using the Watch Window ..... 128
  - Evaluate a formula in slow motion ..... 129
  - Evaluating part of a formula ..... 130

**Chapter 7 Understanding functions ..... 133**

- Working with functions ..... 133
  - The Formulas tab in Excel ..... 134
  - Finding the function you need ..... 135

Using Tab to AutoComplete functions .....	135
Using the Insert Function dialog box to find functions .....	136
Getting help with Excel functions .....	136
Using on-grid ToolTips .....	137
Using the Function Arguments dialog box .....	137
Using Excel Help .....	139
Using AutoSum .....	140
Potential problems with AutoSum .....	141
Special tricks with AutoSum .....	142
Using AutoAverage or AutoCount .....	144
Function reference chapters .....	145
<b>Chapter 8 Using everyday functions: math, date and time, and text functions ..</b>	<b>147</b>
Examples of math functions .....	147
Using SUM to add numbers .....	147
Using AGGREGATE to ignore error cells or filtered rows .....	149
Rounding numbers .....	153
Using SUBTOTAL instead of SUM with multiple levels of totals .....	155
Totaling visible cells using SUBTOTAL .....	156
Using RAND, RANDARRAY, and RANDBETWEEN to generate random numbers and data .....	156
Using =ROMAN to finish movie credits and =ARABIC to convert back to digits .....	158
Using ABS to figure out the magnitude of error .....	159
Using GCD and LCM to perform seventh-grade math .....	159
Using MOD to find the remainder portion of a division problem .....	160
Using SQRT and POWER to calculate square roots and exponents .....	162
Using SUMIFS, AVERAGEIFS, COUNTIFS, MAXIFS, and MINIFS to conditionally calculate .....	163
Dates and times in Excel .....	165
Understanding Excel date and time formats .....	168
Examples of date and time functions .....	171
Using NOW and TODAY to calculate the current date and time or current date .....	171
Using YEAR, MONTH, DAY, HOUR, MINUTE, and SECOND to break a date/time apart ..	173
Using DATE to calculate a date from year, month, and day .....	173
Using TIME to calculate a time .....	175
Using DATEVALUE to convert text dates to real dates .....	176
Using TIMEVALUE to convert text times to real times .....	177
Using WEEKDAY to group dates by day of the week .....	178
Using WEEKNUM or ISOWEEKNUM to group dates into weeks .....	179
Calculating elapsed time .....	180
Using EOMONTH to calculate the end of the month .....	183
Using WORKDAY or NETWORKDAYS or their international equivalents to calculate workdays .....	183
Using international versions of WORKDAY or NETWORKDAYS .....	185
Examples of text functions .....	187
Joining text with TEXTJOIN .....	187
Using LOWER, UPPER, or PROPER to convert text case .....	188
Using TRIM to remove leading and trailing spaces .....	189

- Using the CHAR or UNICHAR function to generate any character . . . . . 193
- Using the CODE or UNICODE function to learn the character number  
for any character . . . . . 195
- Using LEFT, MID, or RIGHT to split text . . . . . 195
- Using LEN to find the number of characters in a text cell . . . . . 198
- Using SEARCH or FIND to locate characters in a particular cell . . . . . 198
- Using SUBSTITUTE to replace characters . . . . . 202
- Using REPT to repeat text multiple times . . . . . 202
- Using EXACT to test case . . . . . 204
- Using TEXT to format a number as text. . . . . 204
- Using the T and VALUE functions. . . . . 207
- Introducing TEXTSPLIT and other text manipulation functions. . . . . 207

**Chapter 9 Using powerful functions: logical, lookup, and database functions. . . 211**

- Examples of logical functions . . . . . 211
  - Using the IF function to make a decision . . . . . 211
  - Using the AND function to check for two or more conditions. . . . . 213
  - Using OR to check whether one or more conditions are met. . . . . 214
  - Using the NOT function to simplify the use of AND and OR. . . . . 217
  - Using the IFERROR or IFNA function to simplify error checking . . . . . 217
- Examples of information functions . . . . . 219
  - Using the ISFORMULA function with conditional formatting to mark  
formula cells . . . . . 219
  - Using IS functions to test for types of values . . . . . 220
  - Using the N function to add a comment to a formula . . . . . 221
  - Using the NA function to force charts to not plot missing data. . . . . 221
  - Using the CELL function to return the worksheet name . . . . . 223
- Examples of lookup and reference functions . . . . . 223
  - Using the CHOOSE function for simple lookups. . . . . 224
  - Moving from VLOOKUP to XLOOKUP . . . . . 225
  - Using FORMULATEXT to document a worksheet . . . . . 232
  - Using numbers with OFFSET to describe a range. . . . . 234
  - Using INDIRECT to build and evaluate cell references on the fly . . . . . 237
  - Using the HYPERLINK function to add hyperlinks quickly . . . . . 239
  - Using the TRANSPOSE function to formulaically turn data. . . . . 240
  - Using GETPIVOTDATA to retrieve one cell from a pivot table . . . . . 241
- Examples of database functions . . . . . 243
  - Using DSUM to conditionally sum records from a database. . . . . 245
  - Using the DGET function. . . . . 250

**Chapter 10 Using names, LET, LAMBDA, and Data Types in Excel. . . . . 253**

- Using names in Excel. . . . . 253
  - Using the Name Box for quick navigation . . . . . 255
  - Avoiding problems by using worksheet-level scope . . . . . 256
  - Using named ranges to simplify formulas . . . . . 257
  - Retroactively applying names to formulas . . . . . 258
  - Adding many names at once from existing labels and headings . . . . . 259
  - Using a name to avoid an absolute reference. . . . . 260

Storing intermediate formula results using LET .....	260
Storing logic in LAMBDA functions .....	264
Creating a simple LAMBDA function for the hypotenuse of a right triangle .....	265
Sharing LAMBDA functions with other workbooks .....	267
Using LAMBDA helper functions .....	269
Performing calculations for each row or column .....	269
Performing calculations for each item in an array .....	270
Performing calculations for each item in an array and returning a single value ...	271
Performing calculations for each item in an array and returning each intermediate value .....	273
Making an array using MAKEARRAY .....	273
Testing for optional arguments using ISOMITTED .....	275
Using Data Types in Excel .....	275
Dealing with Data Type formulas that return an array .....	277
Drilling down through the data card to find an array .....	278
Using stock or currency Data Types .....	280
Retrieving historical stock prices using STOCKHISTORY .....	281
<b>Chapter 11 Connecting worksheets and workbooks .....</b>	<b>283</b>
Connecting two worksheets .....	283
Excel in practice: seeing two worksheets of the same workbook side by side .....	284
Creating links between worksheets .....	286
Creating links using the Paste Options menu .....	286
Creating links using the right-drag menu .....	287
Building a link by using the mouse .....	289
Links to external workbooks default to absolute references .....	290
Building a formula by typing .....	291
Creating links to unsaved workbooks .....	291
Using the Links tab on the Trust Center .....	292
Opening workbooks with links to closed workbooks .....	293
Dealing with missing linked workbooks .....	293
Updating links when a workbook is renamed or moved .....	293
Preventing the Update Links dialog box from appearing .....	294
<b>Chapter 12 Dynamic array formulas and names in Excel .....</b>	<b>297</b>
Using dynamic array functions to return many results .....	297
Sorting with a formula .....	301
Filtering with a formula .....	305
Using FILTER to select a subset of columns .....	307
Extracting unique values with a formula .....	308
Generating a sequence of numbers .....	310
Generating an array of random numbers with a formula .....	313
Refer to the entire array .....	313
Learning about new functions and features .....	313
Using power formula techniques .....	313
Using 3D formulas to spear through many worksheets .....	314
Referring to the previous worksheet .....	316

## Part III Data analysis with Excel

<b>Chapter 13</b>	<b>Transforming data with Power Query</b> .....	<b>321</b>
	Using Power Query .....	321
	Establishing a workflow .....	322
	Loading data using Power Query .....	322
	Loading data from a single Excel workbook .....	323
	Transforming data in Power Query .....	324
	Unpivoting data in Power Query .....	326
	Adding columns in Power Query .....	328
	Reviewing the query .....	328
	Loading and refreshing the data .....	329
	Splitting each delimiter to a new row .....	330
	Appending one worksheet from every workbook in a folder .....	331
	Appending worksheets from one workbook .....	332
	Creating a custom data type in Excel .....	335
<b>Chapter 14</b>	<b>Summarizing data using subtotals or filter</b> .....	<b>339</b>
	Adding automatic subtotals .....	339
	Working with the subtotals .....	341
	Showing a one-page summary with only the subtotals .....	342
	Sorting the collapsed subtotal view with the largest customers at top .....	342
	Copying only the subtotal rows .....	344
	Formatting the subtotal rows .....	345
	Removing subtotals .....	346
	Subtotaling multiple fields .....	347
	Subtotaling daily dates by month .....	348
	Filtering records .....	348
	Using a filter .....	349
	Selecting one or multiple items from the filter drop-down .....	351
	Identifying which columns have filters applied .....	352
	Combining filters .....	352
	Clearing filters .....	353
	Refreshing filters .....	353
	Resizing the filter drop-down .....	353
	Filtering by selection—hard way .....	353
	Filtering by selection—easy way .....	354
	Filtering by color or icon .....	356
	Handling date filters .....	357
	Using special filters for dates, text, and numbers .....	358
	Totaling filtered results .....	360
	Formatting and copying filtered results .....	360
	Using the Advanced Filter command .....	360
	Excel in practice: using formulas for Advanced Filter criteria .....	362
	Advanced Filter criteria .....	362
	Replacing Advanced Filter with a dynamic array formula .....	363
	Using Remove Duplicates to find unique values .....	364
	Combining duplicates and adding values .....	366

<b>Chapter 15</b>	<b>Using pivot tables to analyze data</b> . . . . .	<b>369</b>
	Creating your first pivot table . . . . .	370
	Using artificial intelligence for inspiration with pivot tables . . . . .	371
	Starting with a blank pivot table . . . . .	373
	Adding fields to your pivot table using the field list . . . . .	373
	Changing the pivot table report by using the field list . . . . .	374
	Dealing with the compact layout . . . . .	376
	Rearranging a pivot table . . . . .	377
	Finishing touches: numeric formatting and removing blanks . . . . .	378
	Three things you <b>must</b> know when using pivot tables . . . . .	379
	Your pivot table is in manual calculation mode until you click Refresh! . . . . .	380
	If you click outside the pivot table, all the pivot table tools disappear . . . . .	380
	You cannot change, move a part of, or insert cells in a pivot table . . . . .	380
	Calculating and roll-ups with pivot tables . . . . .	381
	Grouping daily dates to months, quarters, and years . . . . .	381
	Adding calculations outside the pivot table . . . . .	382
	Changing the calculation of a field . . . . .	383
	Showing percentage of total using Show Value As settings . . . . .	385
	Showing running totals and rank . . . . .	386
	Using a formula to add a field to a pivot table . . . . .	388
	Formatting a pivot table . . . . .	389
	Setting defaults for future pivot tables . . . . .	390
	Finding more information on pivot tables . . . . .	392
<b>Chapter 16</b>	<b>Using slicers and filtering a pivot table</b> . . . . .	<b>393</b>
	Filtering using the row label filter . . . . .	393
	Clearing a filter . . . . .	395
	Filtering using the check boxes . . . . .	395
	Filtering using the Label Filters fly-out . . . . .	396
	Filtering using the date filters . . . . .	397
	Filtering to the top 10 . . . . .	398
	Filtering using slicers . . . . .	399
	Adding slicers . . . . .	399
	Arranging the slicers . . . . .	400
	Using the slicers in Excel . . . . .	401
	Filtering dates . . . . .	405
	Filtering oddities . . . . .	405
	Autofiltering a pivot table . . . . .	405
	Replicating a pivot table for every customer . . . . .	407
	Sorting a pivot table . . . . .	407
<b>Chapter 17</b>	<b>Mashing up data with Power Pivot</b> . . . . .	<b>409</b>
	Joining multiple tables using the Data Model . . . . .	410
	Preparing data for use in the Data Model . . . . .	410
	Creating a relationship between two tables in Excel . . . . .	411
	Creating a relationship using Diagram view . . . . .	412
	Building a pivot table from the Data Model . . . . .	413



Unlocking hidden features with the Data Model.....	414
Counting distinct in a pivot table .....	414
Including filtered items in totals .....	416
Creating Median in a pivot table using DAX Measures .....	418
Time intelligence using DAX.....	421
Converting your pivot table to formulas for use on a dashboard.....	423
Overcoming limitations of the Data Model.....	424
Enjoying other benefits of Power Pivot.....	426
Learning more.....	426
<b>Chapter 18 Using What-If, Scenario Manager, Goal Seek, and Solver.....</b>	<b>429</b>
Using What-If .....	429
Creating a two-variable What-If table.....	431
Modeling a random scenario using a data table .....	433
Using Scenario Manager .....	435
Creating a Scenario Summary report .....	438
Adding multiple scenarios.....	438
Using Goal Seek .....	438
Using Solver.....	440
Installing Solver .....	441
Solving a model using Solver.....	441
<b>Chapter 19 Automating repetitive functions using VBA macros.....</b>	<b>445</b>
Checking security settings before using macros .....	446
Recording a macro .....	446
Case study: macro for formatting for a mail merge .....	447
How not to record a macro: the default state of the macro recorder .....	449
Relative references in macro recording .....	450
Starting the macro recorder.....	451
Running a macro .....	453
Everyday-use macro example: formatting an invoice register .....	454
Using the Ctrl+Down-Arrow key to handle a variable number of rows .....	455
Making sure you find the last record.....	455
Recording the macro in a blank workbook .....	455
Editing a macro.....	457
Understanding VBA code—an analogy .....	458
Comparing object.method to nouns and verbs.....	459
Comparing collections to plural nouns.....	459
Comparing parameters to adverbs .....	460
Accessing VBA help.....	462
Comparing adjectives to properties .....	462
Using the analogy while examining recorded code .....	463
Using simple variables and object variables .....	463
Using R1C1-style formulas.....	464
Entering spillable formulas in macros .....	466
Fixing Autosum errors in macros.....	466
Customizing the everyday-use macro example: GetOpenFileName and GetSaveAsFileName .....	467

From-scratch macro example: loops, flow control, and referring to ranges . . . . .	468
Finding the last row with data . . . . .	468
Looping through all rows . . . . .	469
Referring to ranges . . . . .	470
Combining a loop with FinalRow . . . . .	471
Making decisions by using flow control . . . . .	471
Putting together the from-scratch example: testing each record in a loop . . . . .	473
A special case: deleting some records . . . . .	474
Combination macro example: creating a report for each customer . . . . .	477
Using the Advanced Filter for unique records . . . . .	479
Using AutoFilter . . . . .	481
Selecting Visible Cells Only . . . . .	482
Combination macro example: putting it all together . . . . .	483
<b>Chapter 20 More tips and tricks for Excel . . . . .</b>	<b>485</b>
Watching the results of a distant cell . . . . .	485
Calculating a formula in slow motion . . . . .	486
Inserting a symbol in a cell . . . . .	487
Editing an equation . . . . .	487
Protecting a worksheet . . . . .	488
Repeat the last command with F4 . . . . .	489
Bring the active cell back into view with Ctrl+Backspace . . . . .	489
Separating text based on a delimiter . . . . .	489
Auditing worksheets using Inquire . . . . .	491
Inserting and exploring 3D models . . . . .	491
Using the inking tools and the Action Pen . . . . .	493
Seeing Workbooks Statistics and Smart Lookup . . . . .	495
<b>Part IV Excel visuals</b>	
<b>Chapter 21 Formatting worksheets . . . . .</b>	<b>499</b>
Why format worksheets? . . . . .	499
Using traditional formatting . . . . .	501
Changing numeric formats by using the Home tab . . . . .	503
Changing numeric formats by using built-in formats in the Format Cells dialog box . . . . .	505
Using numeric formatting with thousands separators . . . . .	506
Displaying currency . . . . .	506
Displaying dates and times . . . . .	507
Displaying fractions . . . . .	507
Displaying ZIP Codes, telephone numbers, and social security numbers . . . . .	508
Changing numeric formats using custom formats . . . . .	509
Using the four zones of a custom number format . . . . .	510
Controlling text and spacing in a custom number format . . . . .	511
Controlling decimal places in a custom number format . . . . .	511
Using conditions and color in a custom number format . . . . .	512
Using dates and times in a custom number format . . . . .	512
Displaying scientific notation in custom number formats . . . . .	513

Aligning cells	514
Changing font size	515
Changing font typeface	515
Applying bold, italic, and underline	516
Using borders	517
Coloring cells	517
Adjusting column widths and row heights	519
Using merge and center	520
Rotating text	523
Formatting with styles	525
Understanding themes	527
Choosing a new theme	528
Creating a new theme	529
Reusing another theme's effects	530
Saving a custom theme	530
Using a theme on a new document	531
Sharing a theme with others	531
Other formatting techniques	531
Formatting individual characters	531
Changing the default font	532
Wrapping text in a cell	533
Justifying text in a range	534
Adding cell notes	535
Copying formats	538
Pasting formats	538
Pasting conditional formats	539
Using the Format Painter	539
Copying formats to a new worksheet	540
<b>Chapter 22 Using data visualizations and conditional formatting</b>	<b>543</b>
Using data bars to create in-cell bar charts	544
Creating data bars	545
Customizing data bars	546
Showing data bars for a subset of cells	548
Using color scales to highlight extremes	549
Using icon sets to segregate data	550
Setting up an icon set	551
Moving numbers closer to icons	552
Mixing icons or hiding icons	554
Using the top/bottom rules	554
Using the highlight cells rules	556
Highlighting cells by using greater than and similar rules	557
Comparing dates by using conditional formatting	559
Identifying duplicate or unique values by using conditional formatting	560
Using conditional formatting for text containing a value	561
Tweaking rules with advanced formatting	562
Using a formula for rules	564
Getting to the formula box	564

	Working with the formula box.....	564
	Finding cells within three days of today.....	565
	Finding cells containing data from the past 30 days.....	565
	Highlighting data from specific days of the week.....	566
	Highlighting an entire row.....	566
	Highlighting every other row without using a table.....	567
	Combining rules.....	568
	Extending the reach of conditional formats.....	569
	Special considerations for pivot tables.....	570
<b>Chapter 23</b>	<b>Graphing data using Excel charts.....</b>	<b>573</b>
	Choosing from recommended charts.....	573
	Using the paintbrush icon for styles.....	574
	Deleting extraneous data using the funnel.....	575
	Changing chart options using the plus icon.....	576
	Easy combo charts.....	577
	Creating a frequency distribution with a histogram chart.....	577
	Showing financial data with a waterfall chart.....	579
	Mapping geographic data with a filled map chart.....	580
	Saving time with charting tricks.....	580
	Adding new data to a chart by pasting.....	580
	Dealing with small pie slices.....	583
	Saving a favorite chart style as a template.....	584
<b>Chapter 24</b>	<b>Using 3D Maps.....</b>	<b>587</b>
	Examples of 3D Maps.....	587
	Adding color information for categories.....	589
	Zooming in.....	589
	Animating over time.....	591
	Going ultra-local.....	592
	Getting your data into a 3D Map.....	594
	Techniques when using 3D Maps.....	598
	Tipping, rotating, and zooming the map.....	598
	Adding a photo to a point.....	598
	Combining layers.....	599
	Changing column size or color.....	599
	Resizing the various panes.....	600
	Adding a satellite photograph.....	600
	Showing the whole earth.....	600
	Understanding the time choices.....	601
	Controlling map labels.....	602
	Building a tour and creating a video.....	603
	Using an alternate map.....	603
	Preparing the store image.....	603
	Specifying a custom map.....	604

<b>Chapter 25</b>	<b>Using sparklines</b>	<b>607</b>
	Fitting a chart into the size of a cell with sparklines	607
	Understanding how Excel maps data to sparklines	608
	Creating a group of sparklines	610
	Built-in choices for customizing sparklines	612
	Controlling axis values for sparklines	614
	Setting up Win/Loss sparklines	616
	Showing detail by enlarging the sparkline and adding labels	618
	Other sparkline options	620
<b>Chapter 26</b>	<b>Formatting spreadsheets for presentation</b>	<b>623</b>
	Using SmartArt	624
	Elements common in most SmartArt	625
	Inserting SmartArt	626
	Changing existing SmartArt to a new style	627
	Adding images to SmartArt	628
	Special considerations for organizational charts and hierarchical SmartArt	629
	Using shapes to display cell contents	630
	Working with shapes	632
	Using WordArt for interesting titles and headlines	632
	Using text boxes to flow long text passages	633
	Using pictures and clip art	635
	Getting your picture into Excel	635
	Inserting a picture from your computer	635
	Inserting multiple pictures at once	635
	Inserting a picture from stock images	636
	Adjusting the picture using the ribbon tab	637
	Resizing the picture to fit	637
	Adjusting the brightness and contrast	639
	Adjusting picture transparency so cell values show through	640
	Adding interesting effects using the picture styles gallery	640
	Applying artistic effects	642
	Removing the background	642
	Inserting screen clippings	645
	Selecting and arranging pictures	645
	Inserting icons, stickers, illustrations, and cut-out people	647
	Examining 3D models	648
<b>Chapter 27</b>	<b>Printing</b>	<b>651</b>
	Printing in one click	651
	Finding print settings	652
	Previewing the printed report	654
	Using the Print Preview on the print panel	654
	Using full-screen Print Preview	656
	Making the report fit on the page	656
	Setting worksheet paper size	657
	Adjusting worksheet orientation	657
	Adjusting worksheet margins	657

Repeating the headings on each page .....	658
Excluding part of your worksheet from the print range .....	659
Forcing more data to fit on a page .....	660
Working with page breaks .....	660
Manually adding page breaks .....	660
Manual versus automatic page breaks .....	661
Using Page Break Preview to make changes .....	661
Removing manual page breaks .....	661
Adding headers or footers to the printed report .....	662
Adding an automatic header .....	662
Adding a custom header .....	663
Inserting a picture or a watermark in a header .....	663
Using different headers and footers in the same document .....	664
Scaling headers and footers .....	665
Printing from the File menu .....	666
Choosing a printer .....	666
Choosing what to print .....	667
Changing printer properties .....	668
Changing some of the Page Setup settings .....	668
Using Page Layout view .....	668
Exploring other page setup options .....	669
Printing gridlines and headings .....	669
Centering a small report on a page .....	669
Replacing error values when printing .....	670
Printing comments .....	670
Controlling the first page number .....	670
<b>Chapter 28 Collaborating in Excel .....</b>	<b>673</b>
The rise of working remotely in 2020 .....	673
Storing documents in the cloud .....	674
Sharing documents with others .....	675
Sharing during the initial save .....	675
Sharing using the Share button .....	676
Sharing by mentioning in a modern comment .....	677
Seeing who has access to the workbook .....	677
Knowing when someone shares a workbook with you .....	678
Editing the same workbook at the same time .....	680
Seeing who else is editing using presence .....	680
Etiquette for editing at the same time .....	681
Avoiding the dreaded veto .....	681
Filtering and sorting with Sheet Views .....	683
Using threaded comments, mentions, and assigning tasks .....	686
Tracking who did what in the workbook .....	690
Seeing who changed what with Show Changes .....	690
Catching up .....	692
Rolling back using Version History .....	692

**Part V      Appendixes**

<b>Appendix A</b>	<b>Excel functions</b> .....	<b>699</b>
	Financial functions in Excel .....	699
	Logical functions in Excel .....	704
	Text functions .....	705
	Text functions for double-byte languages .....	708
	Date and time functions .....	709
	Lookup and reference functions .....	711
	Math and trig functions .....	714
	Statistical functions .....	719
	Engineering functions .....	729
	Cube functions .....	731
	Information functions .....	732
	Web functions .....	734
	Database functions .....	735
	Add-in functions .....	736
	Compatibility functions .....	736
	Alphabetical cross-reference .....	738
<b>Appendix B</b>	<b>Excel functions with DAX or Power Query equivalents</b> .....	<b>755</b>
	Excel functions and DAX equivalents .....	755
	Excel functions with Power Query M equivalents .....	760
<b>Appendix C</b>	<b>Adding functionality to Excel with add-ins</b> .....	<b>765</b>
	Understanding three types of add-ins and how to activate .....	765
	Find optimal solutions with Solver .....	768
	Audit workbooks with Inquire .....	768
	Get descriptive statistics with the Analysis ToolPak .....	769
	Find near matches with Fuzzy Lookup .....	771
	Perform science projects with Data Streamer .....	772
	Perform Euro conversions with Euro Currency Tools .....	772
	Generate diagrams from data with Visio Data Visualizer .....	772
	Perform sentiment analysis using Azure Machine Learning .....	772
	Generate a chart with people using People Graph .....	773
	Generate fake data .....	773
	Test brilliant new functions for Excel with Fast Excel .....	774
	<b>Index</b> .....	<b>777</b>

# About the author

**Bill Jelen**, Excel MVP and the host of MrExcel.com, has been using spreadsheets since 1985, and he launched the MrExcel.com website in 1998. He has produced more than 2,400 episodes of his daily video podcast, *Learn Excel from MrExcel*. He is the author of 64 books about Microsoft Excel and writes the monthly Excel column for *Strategic Finance* magazine. Before founding MrExcel.com, Bill Jelen spent 12 years in the trenches—working as a financial analyst for finance, marketing, accounting, and operations departments of a \$500 million public company. When he is not geeking out about Excel, you will find him kayaking Sykes Creek or photographing rocket launches from Cape Canaveral. Check out his photography at WeReportSpace.com. He lives in Merritt Island, Florida, with his wife, Mary Ellen.

## Inside OUT

*You can find my favorite tricks in the Inside Out sidebars throughout this book.*

If you have a favorite Excel trick or technique that is not in this book, consider sending it via email to [InsideTips@MrExcel.com](mailto:InsideTips@MrExcel.com). Anyone sending in a tip that is new to me will win bragging rights and a collectible Excel Guru patch, designed by the same people who design the NASA mission patches.







# Introduction

Microsoft 365 Excel is now the dominant way to purchase Excel. Microsoft did a good job of offering more value to Microsoft 365. They are reluctantly releasing a perpetual edition of Excel 2021, but they say that it is only for specific scenarios where people do not have access to the Internet.

Those people without the Internet will be paying quite a premium for an obsolete version of Excel without any of the connected features. The price for the perpetual version of Office increased by 10% to \$440 per device for Office 2021. In contrast, you can license Microsoft 365 for five devices for \$99 per year.

The Excel team has been responsive to items requested through the [Excel.UserVoice.com](https://www.exceluservoice.com) website, and many small features and improvements have happened since the last edition of this book.

- You can now unhide multiple worksheets at once.
- The Conditional Formatting Rules Manager dialog box is now resizable.
- Scroll horizontally with Ctrl+Shift+Wheel.
- Increased the 218-character file limit.
- When copying a worksheet, added a Yes To All option for dealing with Name conflicts.
- The Excel team added a new padlock icon to the sheet tabs to indicate if a sheet was protected. When this was met with a chorus of complaints, the lock icon was promptly removed.
- The SINGLE function, used to trigger implicit intersection, was replaced with the @ operator.
- You can insert new icons and cut-out people in Excel.
- Images can easily be set to semi-transparent so you can see the data behind an image.
- Right-click any object and choose Save As Image to create an image of a chart, SmartArt, shape, and so on.
- You can “write” data using the Action Pen.
- Multiple task panes now collapse into a single strip at the right side of Excel.
- There is a new Accessibility Checker tab in the ribbon.
- Several performance improvements make Excel faster.

There are also several large changes made to Excel:

- Co-authoring continues to improve. You can now @Mention people in comments and create tasks. Excel will allow each person to have their own version of the data with filters and sorting that only they can see. The new Show Changes feature lets you see changes made to your worksheet in the last 60 days. Read more in Chapter 28, “Collaborating in Excel.”
- A new XLOOKUP function is designed to improve on VLOOKUP and INDEX/MATCH functions. Excel also offers XMATCH. See Chapter 9, “Using powerful functions: logical, lookup, and database functions.”
- New LET and LAMBDA functions let you store logic in a formula. See Chapter 10, “Using names, LET, LAMBDA, and Data Types in Excel.”
- There are new features in Power Query (found in the Get & Transform group on the Data tab). You can now import from PDF files. You can also define your own custom data types. Read about Power Query in Chapter 13, “Transforming data with Power Query.”
- Data types improve with the ability to return photos and arrays. There are several new categories from Wolfram including weather history for all cities. See Chapter 10, “Using names, LET, LAMBDA, and Data Types in Excel.”
- The artificial-intelligence Ideas feature is re-branded as “Analyze Data.” The new version will create dynamic array formulas and allow you to ask a question about your data. Excel analyzes up to 250,000 cells of data and uses artificial intelligence to provide more than 30 charts. For now, this feature is exclusive to Office 365. See Chapter 15, “Using pivot tables to analyze data.”
- Although this book covers VBA as the macro language, there is one new interesting feature in programmability: A new TypeScript macro language is available for Excel Online.

The Excel team continues to innovate, with several new features planned for the upcoming years.

## Who this book is for

This book is for anyone who uses Excel twenty hours a week or more. Whether you use Excel for organizing your to-do list or to analyze 5 million rows of call center data every day, this book includes the information you need to solve problems quickly and easily.

### Assumptions about you

I like to believe most of my readers use Excel 40 hours a week, and those are the weeks you are on vacation. At the very least, I'm assuming you regularly use Excel for your job. You are comfortable using Excel formulas beyond AutoSum. You likely know and use VLOOKUP and Pivot Tables regularly. You are looking for the fastest and most efficient ways to finish tasks in Excel.

## How this book is organized

This book gives you a comprehensive look at the various features you will use. This book is structured in a logical approach to all aspects of using the Windows-based versions of Excel, with some mentions of Excel Online when there is important functionality available only in Excel Online.

Part I, "The Excel interface," covers the ribbon, customizing Excel, and keyboard shortcuts.

Part II, "Calculating with Excel," covers all Excel calculation functions.

Part III, "Data analysis with Excel," covers Power Query, pivot tables, and other features that help you perform data analysis.

Part IV, "Excel visuals," covers charting, 3D Map, and collaborating in Excel.

## About the companion content

I have included the Excel workbooks I used to create the screenshots in this book to enrich your learning experience. You can download this book's companion content from the following page:

*[MicrosoftPressStore.com/Excel365insideout/downloads](https://MicrosoftPressStore.com/Excel365insideout/downloads)*

The companion content includes the following:

- Workbooks used to create the examples in the workbook
- Sample data that you can use to practice the concepts in the book
- VBA macros from Chapter 19

## Acknowledgments

Thanks to all the Excel project managers who were happy to take the time to discuss the how or why behind a feature. At various times, Sonia Atchinson, Andrew Becker, Darcy Cain, Elisabetta Caldesi, Howie Dickerman, Mar Gines, Sharon Grimshaw, Chris Gross, Urmi Gupta, Curt Hagenlocher, Guy Hunkin, Brian Jones, Aimee Leong, Vashisht Mahana, Michelle Maislen, Joe McDaid, David Monroy, Micah Myerscough, Meenakshi Naren, Jeet Mukeshkumar Patel, Eric Patterson, Cuong Pham, Sudhi Ramamurthy, Prash Shirolkar, Rochelle Sonnenberg, Allie Wieczorek, and Bill Wu pitched in to help with a particular issue. Thanks to Tracy Syrstad, Barb Jelen, Mary Ellen Jelen, Zeke Jelen, and Suat Ozgur for making up the MrExcel.com team.

Other Excel MVPs often offered their take on potential bugs. I could send a group email over a weekend, and someone like Ken Puls, Roger Govier, Liam Bastick, Jon Peltier, Jan-Karel Pieterse, Charles Williams, Brad Yundt, Nabil Mourad, Wyn Hopkins, David Benaim, Oz du Soleil, or Ingeborg Hawighorst would usually respond. I particularly loved launching a missive just after the Microsoft crew in Building 36 went home on Friday evening, knowing they would return on Monday morning with 40 or 50 responses to the conversation. Without any Excel project managers to temper the discussion, we would often have designed massive improvements that we would have liked to have implemented in Excel. Someone would show up on Monday and tell us why that could never be done.

Thanks to the people who frequently leave constructive comments at my MrExcel.com YouTube channel: Mike Girvin, Rico S, Wayne Edmonson, Darryl Morgan, ExcelLambda, Matt Schoular, Patrick Schardt, John Borg, Oz du Soleil, Nader Mounir, Prakash Ravikumar, Paul Sparrow, Chris M, Bradford Myers, Oakley Turvey, DRSteele, Celia Alves, TSSC, Brian Spiller, Jonathan, and Jeff Davis. Several Excel problems have been solved by suggestions from this group.

Bob Umlas is the smartest Excel guy that I know, and I was thrilled to have him as the technical editor for this book.

Putting together a book requires careful coordination with editors, proofreaders, and compositors. My sincere thanks to Charlotte and Rick Kughen for guiding this book to completion. Thanks to Sarah Kearns for having the attention to detail in proofreading and to Tricia Bronkella for her awesome compositor skills.

I've been writing books for Loretta Yates since 2004. If my spreadsheet is correct, this is our 30th project. Thanks for 17 years of trusting me with your books.

At the MrExcel website, Suat Ozgur manages the database of more than 1 million Excel posts and makes sure that Google likes our content.

I wrote this book at the Kola Mi Writing Camp. The staff there was fantastic.

Mary Ellen Jelen did a great job of keeping me on track with this book.

# Support and feedback

The following sections provide information on errata, book support, feedback, and contact information.

## Errata, updates, and book support

We've made every effort to ensure the accuracy of this book and its companion content. You can access updates to this book—in the form of a list of submitted errata and their related corrections—at:

*[MicrosoftPressStore.com/Excel365insideout/errata](http://MicrosoftPressStore.com/Excel365insideout/errata)*

If you discover an error that is not already listed, please submit it to us at the same page.

For additional book support and information, please visit *[MicrosoftPressStore.com/Support](http://MicrosoftPressStore.com/Support)*.

Please note that product support for Microsoft software and hardware is not offered through the previous addresses. For help with Microsoft software or hardware, go to *<http://support.microsoft.com>*.

## Stay in touch

Let's keep the conversation going! We're on Twitter:

*<http://twitter.com/MicrosoftPress>*

*<http://twitter.com/MrExcel>*





Performing a simple ribbon modification 49

Adding a new ribbon tab 51

Sharing customizations with others 52

Questions about ribbon customization 53

Using the Excel Options dialog box 53

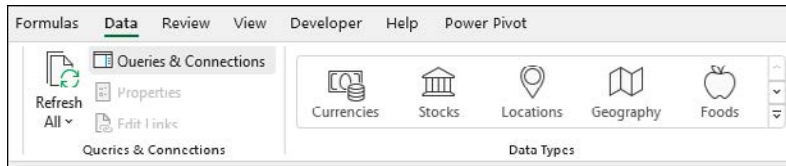
Options to consider 59

Five Excel oddities 60

The Excel Options dialog box offers hundreds of changes you can make in Excel. This chapter walks you through examples of customizing the ribbon and discusses some of the important option settings available in Excel.

## Performing a simple ribbon modification

Suppose that you generally like the ribbon, but there is one icon that seems to be missing. You can add icons to the ribbon to make it customized to your preference. If you feel the Data tab would be perfect with the addition of a pivot table icon, you can add it (see Figure 3.1).



**Figure 3.1** Decide where the new command should go on the ribbon.

To add the pivot table command to the Data tab, follow these steps:

1. Right-click the ribbon and select **Customize The Ribbon**.
2. In the right list box, expand the Data tab by clicking the + sign next to Data.
3. Click the **Sort & Filter** entry in the right list box. The new group will go after this entry.
4. Click the **New Group** button at the bottom of the right list box. A **New Group (Custom)** item appears after **Sort & Filter**, as shown in Figure 3.2.



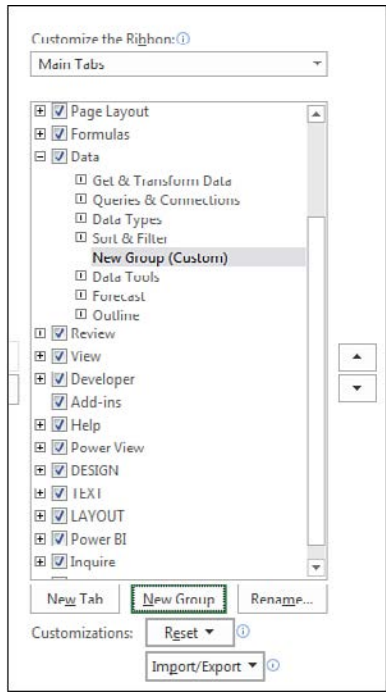


Figure 3.2 Commands must be added to a new group.

5. While the New Group is selected, click the Rename button at the bottom of the list box. The Rename dialog box appears.
6. The Rename dialog box offers to let you choose an icon and specify a name for the group. The icon is shown only when the Excel window is too small to display the whole group. Choose any icon and type a display name of **Pivot**. Click OK.
7. The left list box shows the popular commands. You could change Popular Commands to All Commands and scroll through 2,400 commands. However, in this case, the commands you want are on the Insert tab. Choose All Tabs from the top-left drop-down menu.
8. Expand the Insert tab, and then expand Tables. Click PivotTable in the left list box.
9. Click the Add button in the center of the dialog box to add PivotTable to the new custom Pivot group on the ribbon. Excel automatically advances to the next icon of Recommended PivotTables. Click Add again.
10. In the drop-down menu above the left list box, select All Commands. The left list box changes to show an alphabetical list of all commands.

11. Scroll through the left list box until you find PivotTable And PivotChart Wizard. This is the obscure entry point to create Multiple Consolidation Range pivot tables. Select that item in the left list box. Click Add. At this point, the right side of the dialog box should look like Figure 3.3.

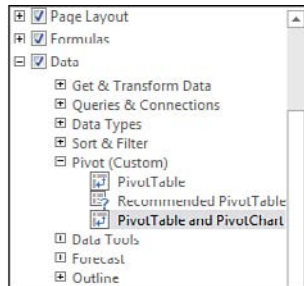


Figure 3.3 Three new icons have been added to a new custom group on the Data tab.

12. Click OK.

Figure 3.4 shows the new group in the Data tab of the ribbon.

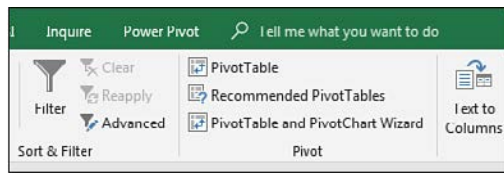


Figure 3.4 The results appear in the ribbon.

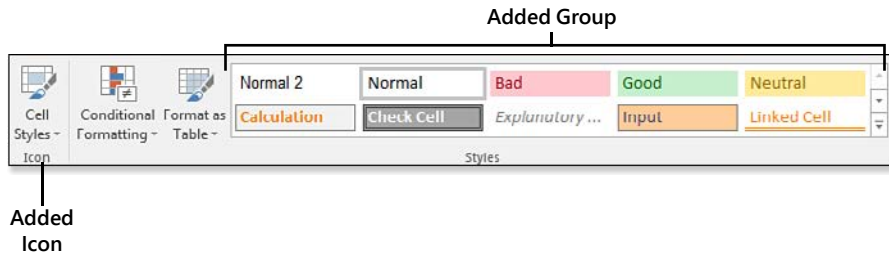
## Adding a new ribbon tab

To add a new ribbon tab, follow these basic steps:

1. Right-click the ribbon and select Customize The Ribbon.
2. Click New Tab and rename the tab.
3. Add New Group(s) to the new tab.
4. Add commands to the new groups.

As you go through the steps to add a new ribbon tab, you will discover how absolutely limiting the ribbon customizations are. You have no control over which items appear with large icons and which appear with small icons. This applies even to galleries. If you add the Cell Styles

gallery to a group on the ribbon, it always appears as an icon instead of a gallery, even if it is the only thing on the entire ribbon tab (see the left icon in Figure 3.5). The workaround is to add an entire built-in group to the tab. On the right of Figure 3.5, the entire Styles group was added. The Cell Styles gallery is now allowed to appear as a gallery.



**Figure 3.5** When added to a custom group, a gallery is reduced to a single icon with a drop-down menu.

## TROUBLESHOOTING

**When customizing the ribbon using this interface, you cannot control which icons appear large and which appear small in the ribbon.**

The Excel ribbon contains a logical mix of large icons for important features and small icons for minor features. If you would like to create a new group, you cannot control which icons will be small and which will be large.

You can either learn RibbonML or use a third-party tool such as Ribbon Commander to create custom ribbon tabs. Try a free trial of Ribbon Commander at <https://mrx.cl/ribboncommander>.

## Sharing customizations with others

If you have developed the perfect ribbon customization and you want everyone in your department to have the same customization, you can export all the ribbon customizations.

To export the changes, follow these steps:

1. Right-click the ribbon and select Customize The Ribbon.
2. Below the right list box, select Import/Export, Export All Customizations.
3. Browse to a folder and provide a name for the customization file. The file type will be .exportedUI. Click OK.
4. In Windows Explorer, find the .exportedUI file. Copy it to a coworker's computer.

5. On the coworker's computer, repeat step 1. In step 2, select Import Customization File. Find the file and click OK.

### NOTE

This is an all-or-nothing proposition. You cannot export your changes to one custom tab without exporting your changes to the Data and Home tabs.

## Questions about ribbon customization

### Can the customizations apply only to a certain workbook?

No. The Customize the Ribbon command in Excel applies to all workbooks.

### Can I reset my customizations and go back to the original ribbon?

Right-click the ribbon and select Customize The Ribbon. Below the right list box, select Reset > Reset All Customizations.

### How can I get complete control over the ribbon?

Learn RibbonX and write some VBA to build your own ribbon.

- For more information on building your own ribbon, see *RibbonX: Customizing the Office 2007 Ribbon*, by Robert Martin, Ken Puls, and Teresa Hennig (Wiley, ISBN 0470191112).

### These ribbon customizations are really lacking. Is there another option that doesn't require me to write a program?

Yes, some third-party ribbon customization programs are available. For example, check out a free one from Excel MVP Andy Pope at [https://andypope.info/vba/ribboneditor\\_2010.htm](https://andypope.info/vba/ribboneditor_2010.htm).

## Using the Excel Options dialog box

Open the File menu and select Options from the left navigation pane to open the Excel Options dialog box. The dialog box has categories for General, Formulas, Data, Proofing, Save, Language, Ease Of Access, Advanced, Customize Ribbon, Quick Access Toolbar, Add-Ins, and Trust Center. The Trust Center leads to another 13 categories.

To the Excel team's credit, they tried to move the top options to the General category. Beyond those 19 settings, though, are hundreds of settings spread throughout 24 categories in the Excel Options and Trust Center. Table 3.1 gives you a top-level view of where to start looking for settings.

**Table 3.1** Excel Options dialog box settings

Category	Types of Settings
General	The most commonly used settings, such as user interface settings, the default font for new workbooks, number of sheets in a new workbook, customer name, and Start screen.
Formulas	All options for controlling calculation, error-checking rules, and formula settings. Note that options for multithreaded calculations are currently considered obscure enough to be on the Advanced tab rather than on the Formulas Tab.
Data	The data category is new in 2017. It offers the new Edit Default Layout for pivot tables, several other pivot table options, and then a series of checkboxes to bring back the legacy Get Data categories. When Power Query replaced Get Data on the Data tab of the ribbon, the old legacy icons were removed.
Proofing	Spell-check options and a link to the AutoCorrect dialog box.
Save	The default method for saving, AutoRecovery settings, legacy colors, and web server options.
Language	Choose the editing language, ToolTip language, and Help language.
Ease of Access	Options available are Provide Feedback With Sound, Provide Feedback With Animation, Screen Tip Style, and the default document font size.
Advanced	All options that Microsoft considers advanced, spread among 15 headings.
Customize Ribbon	Icons to customize the ribbon.
Quick Access Toolbar	Icons to customize the Quick Access Toolbar (QAT).
Add-Ins	A list of available and installed add-ins. New add-ins can be installed from the button at the bottom of this category.
Trust Center	Links to the Microsoft Trust Center, with 13 additional categories.

## Getting help with a setting

Many settings appear with a small *i* icon. If you hover the mouse near this icon, Excel displays a super ToolTip for the setting. The ToolTip explains what happens when you choose the setting. It also provides some tips about what you need to be aware of when you turn on the setting. For example, the ToolTip in Figure 3.6 shows information about the calculation settings. It also explains that you should use the F9 key to invoke a manual calculation.

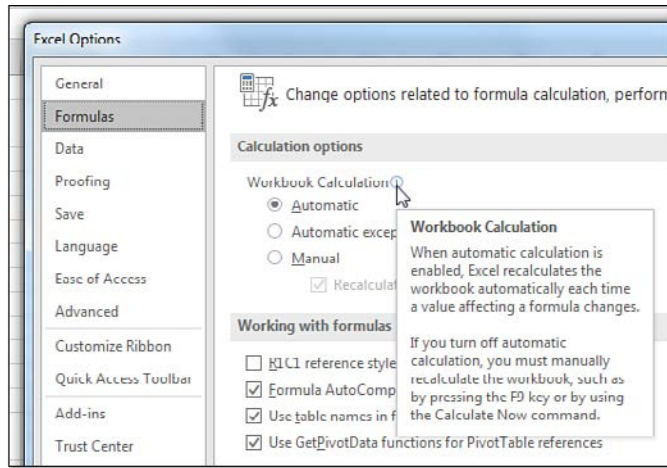


Figure 3.6 The *i* button explains many settings.

## Inside OUT

*The Excel team is actively listening to ideas suggested by their customers. Several of the settings in the following section were suggested by customers.*

If you have a great idea that would make Excel easier, post your idea to [Excel.UserVoice.com](http://Excel.UserVoice.com). Create a good title and use a slightly humorous tone when writing up how your idea would make the work life of millions of people easier.

After posting your idea, others can vote for your idea. As others browsing <https://msfeedbackprod.powerappsportals.com/feedback/> read your idea, they can vote. If you get above the 200-vote level, it is likely that your idea will be added to a future release of Office 365.

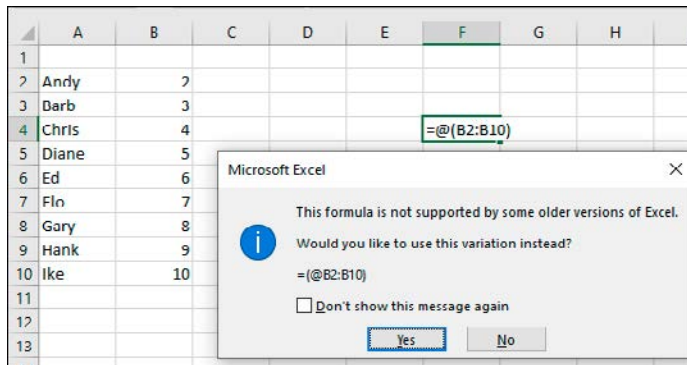
## Recent new options in Excel

Excel today offers several new settings:

1. When Using Multiple Displays is found in the General category. Excel now supports newer High DPI displays, but many people might have two-monitor setups with one High DPI display and one older display. If you have problems when moving Excel between displays, choose Optimize For Compatibility from this setting.
2. Excel introduced data types for stocks, currency, geography, and more. In an effort to make the feature discoverable, if you enter city names into a few cells, Excel can offer to convert those cells to a Geography Data Type. This is great at first, but if it becomes

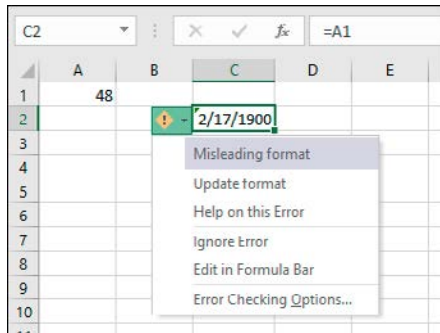
bothersome, unselect Show Convert To Data Types When Typing from the General category.

3. Excel offers a Search box in the title bar. This is designed for finding commands when you can't find them on the ribbon. If you think the Search box is taking up too much space, select Collapse The Microsoft Search Box By Default. It is found in the General category.
4. Microsoft added a dark mode to Excel. Use the Office Theme drop-down menu in the General category.
5. Near the bottom of the General category, you can assign which file extensions will open in Excel and ask Excel to notify you if it is not the default program for .XLSX and .XLSM files.
6. With the introduction of Dynamic Arrays, the Implicit Intersection behavior is different. If you attempt to write a formula with @ in the wrong places, Excel can warn you that the formula is not compatible with older versions of Excel. It offers to change the formula so it is backward compatible, as shown in Figure 3.7. To check any random formula, enter =@ (the formula) and see if Excel shows a dialog box. To turn off this behavior, on the Formulas category, unselect Suggest Formula Variations That Are Supported By Older Versions of Excel.



**Figure 3.7** The @ will make sure that a formula designed to return a single value won't return an array in earlier versions of Excel.

7. There are two new error-checking options in the Formulas category. A warning about a Misleading Number Format appears if your formula points to a numeric cell, but the formula is formatted as a date, as shown in Figure 3.8. By choosing Update Format, the number format from the source cell will be copied to the formula cell. Another new error-checking option is Cells Containing Data Types That Couldn't Refresh. This alerts you if the linked data type cell could not be refreshed.



**Figure 3.8** If a cell formatted as a date is pointing to cells formatted as a number, the Misleading Number Format warning displays.

8. Default PivotTable Layout is found in the new Data category. Change the default layout for all future pivot tables. Several items in the new Data category were moved to the Data category from the Advanced category.
9. Show Legacy Data Import Wizards is a series of seven choices in the new Data category. The Power Query tools debuted in Excel 2016 on the Data tab of the ribbon. These tools became so popular, Microsoft decided to remove the old Get External Data group from the ribbon, but some people had specific reasons why they liked the old icons. You can now add those old icons back by choosing From Access, From Web, From Text, From SQL Server, From OData Data Feed, From XML Data Import, or From Data Connection. If you choose something from this area, it will appear hidden on the ribbon. Look in Data, Get Data, Legacy Wizards.
10. Show Data Loss Warning when Editing Comma Delimited Files (\*.csv) is found in the Save category. Excel used to nag you whenever you opened a file in CSV format. If you did not save the file as XLSX, it would warn you that you are about to lose formulas and formatting. A lot of people were tired of the nagging, and Microsoft turned off the nagging by default. If you need to be nagged, you can turn it back on here.
11. A new Cache Settings in the Save category controls how many days to keep files in the Office document cache and lets you empty the cache.
12. The Ease Of Access category is new in Excel 2019. You can choose to Provide Feedback With Sound and choose a Modern or Classic sound scheme. The new part is the Modern sound scheme. The annoying Classic Sound Scheme was previously the only choice in the Advanced category. You can turn off Animations. The choice to control whether Screen Tips are shown is repeated here from the General category. You can set the Default Font Size used in the document, and you can choose to turn off the calculation Function Screen Tips.



13. Use Pen To Select and Interact By Default is new in the Advanced category. If you prefer using a touchscreen, you can change the default behavior of touch.
14. Hyperlinks to Excel files stored in the cloud might open in Excel Online. If you prefer them to open in the desktop version of Excel, there is a new setting. The Link Handling subcategory is the third subcategory in the Advanced category. Choose Open Supported Hyperlinks To Office Files In Desktop Apps.
15. Excel lets you control how many recent files appear when you choose File > Open. The new Find Show This Number Of Recent Unpinned settings controls how many recent folders will be shown.

## Using AutoRecover options

For many versions, Excel periodically saves a copy of your work every 10 minutes. If your computer crashes, the recovery pane offers to let you open the last AutoRecovered version of the file. This feature is sure to save you from retyping data that might have otherwise been lost.

Another painful situation occurs when you do not save changes and then close Excel. Yes, Excel asks if you want to save changes for each open document, but this question usually pops up at 5:00 p.m. when you are in a hurry to get out of the office. If you are thinking about what you need to do after work and not paying attention to which files are still open, you might click No to the first document and then click No again and again without noticing that the fifth open document was one that should have been saved.

Another scenario involves leaving an Excel file open overnight only to discover that Windows Update decided to restart the computer at 3 AM. After being burned a dozen times, you can change the behavior of Windows Update to stop doing this. However, if Windows Update closed Excel without saving your documents, you can lose those AutoRecovered documents.

A setting introduced in Excel 2010 has Excel save the last AutoRecovered version of each open file when you close without saving. This setting is on the Save category of Excel Options and is called Keep The Last AutoRecovered Version If I Close Without Saving.

## Controlling image sizes

An Image Size & Quality section appears in the Advanced category. Most people add a photo to dress up the cover page of a document. However, you probably don't need an 8-megapixel image being saved in the workbook. By default, Excel compresses the image before saving the file. You can control the target output size using the drop-down menu in Excel options. Choices include 96ppi, 150ppi, and 220ppi. The 96ppi setting will look fine on your display. Use 220ppi for images you will print. If you want to keep your images at the original size, you can select the Do Not Compress Images In File setting.

You should also understand the Discard Editing Data check box. Suppose that you insert an image in your workbook and then crop out part of the photograph. If you do not enable Discard Editing Data, someone else can come along and uncrop your photo. This can be an embarrassing situation—just ask the former TechTV co-host who discovered certain bits of photographs were still hanging around after she cropped them out.

## Working with protected view for files originating from the Internet

Starting in Excel 2010, files from the Internet or Outlook initially open in protected mode. This mode gives you a chance to look at the workbook and formulas without having anything malicious happen. Unfortunately, you cannot view the macro code while the workbook is in protected view.

If you only want to view or print the workbook, protected mode works great. One statistic says that 40% of the time, people simply open a document and never make changes to it.

After you click Enable Editing, Excel will skip protected mode the next time you open the file.

## Working with Trusted Document settings

By default, Excel warns you about all sorts of things. If you open a workbook with macros, links, external data connections, or even the new `WEBSERVICE` function, a message bar appears above the worksheet to let you know that Excel disabled those “threats.”

If you declare a folder on your hard drive to be a trusted folder, you can open those documents without Excel warning you about the items. Visit File, Options, Trust Center, Trust Center Settings, Trusted Locations to set up a trusted folder.

Starting in Excel 2010, if you open a file from your hard drive and enable the content, Excel automatically enables that content the next time. The inherent problem here is that if you open a file and discover the macros are bad, you will not want those macros to open the next time automatically. There is no way to untrust a single document other than deleting, renaming, or moving it. Instead, you have to go to the Trusted Documents category of the Trust Center where you can choose to clear the entire list of trusted documents.

## Options to consider

Although hundreds of Excel options exist, this section provides a quick review of options that might be helpful to you:

1. Save Files In This Format in the Save category. If you regularly create macros, choose the Excel Macro-Enabled Workbook as the default format type.
2. Update your Default Local File Location on the Save tab. Excel always wants to save new documents in your My Documents folder. However, if you always work in the `C:\AccountingFiles\` folder, update the default folder to match your preferred location.

3. Show This Number Of Recent Workbooks has been enhanced dramatically since Excel 2003. Whereas legacy versions of Excel showed up to nine recent workbooks at the bottom of the File menu, Excel allows you to see up to 50 recent workbooks in the Open category of the File menu. You can change this setting by visiting the Display section of the Advanced category.
4. Edit Custom Lists has been moved to the General section of the Advanced category. Custom lists add functionality to the fill handle, allow custom sort orders, and control how fields are displayed in the label area of a pivot table. Type a list in the correct sequence in a worksheet. Edit Custom Lists and click Import. Excel can now automatically extend items from that list, the same as it can extend January into February, March, and so on.
5. Make Excel look less like Excel by hiding interface elements in the three Display sections of the Advanced category. You can turn off the formula bar, scrollbars, sheet tabs, row and column headers, and gridlines. You can customize the ribbon to remove all main tabs except the File menu. The point is that if you design a model to be used by someone who never uses Excel, the person can open the model, plug in a few numbers, and get the result without having to see the entire Excel interface.
6. Show A Zero In Cells That Have Zero Value is in the Display Options For This Worksheet section of the Advanced category. Occasionally people want zeros to be displayed as blanks. Although a custom number format of 0; -0; ; will do this, you can change the setting globally by clearing this option.
7. Group Dates in the AutoFilter Menu is in the Display Options For This Workbook section of the Advanced category. Starting with Excel 2007, date columns show a hierarchical view of years, months, and days in the AutoFilter drop-down menu. If you like the old behavior of showing each date, turn off this setting.
8. Add a folder on your local hard drive as a trusted location. Files stored in a trusted location automatically have macros enabled and external links updated. If you can trust that you will not write malicious code, then define a folder on your hard drive as a trusted location. From Excel Options, select the Trust Center category and then Trust Center Settings. In the Trust Center, select Trusted Locations, Add New Location.

## Five Excel oddities

You might rarely need any of the features presented in this section. However, in the right circumstance, they can be time-savers.

1. Adjust the gridline color in the Display section of the Advanced category. If you are tired of gray gridlines, you can get a new outlook with bright red gridlines. I've met people who have changed the gridline color and can attest that nothing annoys an old accountant more than seeing bright red gridlines.

2. Allow negative time by switching to the 1904 date system in the General section of the Advanced category. Excel never allows a time to return a negative time. However, if you are tracking comp time and you allow people to borrow against future comp time, it might be nice to allow negative time. In this case, switch to the 1904 date system to have up to four years of negative time. Use caution when changing this setting. All existing dates in the workbook will shift by approximately four years.
3. Put an end to the green triangles on your account numbers stored as text. Most of the green triangle indicators are useful. However, if you have a column of text account numbers in which most values are numbers, seeing thousands of green triangles can be annoying. Also, the green triangles can hide other, more serious problems. Clear the Numbers Formatted As Text or Preceded By An Apostrophe in the Error Checking Rules check box in the Formulas category.
4. Automatically Insert A Decimal Point replicates the antique adding machines that were office fixtures in the 1970s. When working with a manual adding machine, it was frustrating to type decimal points. You could type 123456, and the adding machine would interpret the entry as 1,234.56. If you find that you are doing massive data entry of numbers in dollars and cents, you can have Excel replicate the old adding machine functionality. After enabling this setting, you can indicate how many digits of the number should be interpreted as being after the decimal point. The only hassle is that you need to enter \$5 as 500. The old adding machines actually had a 00 key, but those are long since gone.
5. Change Dwight to Diapers using AutoCorrect Options. If you were a fan of the NBC sitcom *The Office*, you might remember the 2007 episode in which Jim allegedly put a macro on Dwight's computer that automatically changed the typed word Dwight to Diapers. However, this doesn't require a macro. From Excel Options, choose the Proofing Category and then click the AutoCorrect Options button. On the AutoCorrect tab, you can type new correction pairs. In this example, you would type Dwight into the Replace box and Diapers into the With box. The next time someone types Dwight and then a space, the word will automatically change to Diapers. You can also remove correction pairs by selecting the pairs and then pressing Delete. For example, if you hate that Microsoft converts (c) to ©, you can delete that entry from the list.





# Index

## Symbols

**&** (ampersand) operator, joining text, 121

**\*** wildcard, 397

**@** (at) operator, implicit intersections, 124

**@Mentions**, sharing workbooks, 677, 687, 692

**\$\$** (absolute references), 96-98  
avoiding with names, 260  
external workbook links, 290

**\$** (dollar signs)  
adding to references, 79  
simplifying with F4 key, 99-101

**...** (ellipsis), "More" command, 23

**()** (parentheses)  
functions, 133  
multiple sets of, 117-118  
overriding order of operations, 116  
stacking, 117-118

**#####** errors, 119

**#FIELD!** errors, 119

**#CALC** errors, 119

**#DIV/0!** errors, 118

**#N/A** errors, 134

**#N/A!** errors, 119, 120

**#NULL!** errors, 119

**#NUM!** errors, 134

**#REF!** errors, 118

**# Spilled Range Operator**, 112

**#SPILL!** errors, 111, 119

**#VALUE!** errors, 118, 134

**? wildcard**, 397

**2D arrays**, 208

**3D Maps**  
alternate maps, 603  
animating  
lines between points, 601  
over time, 591  
color, 589  
column charts, 588  
combining layers, 599

custom maps, 604-605  
data entry, 594-597  
Flat Map option, 600  
heat maps, 588  
labels, 602  
photos, 598-600  
resizing  
columns, 599  
panes, 600  
rotating, 598  
satellite photos, 600  
shaded area maps, 587  
store maps, 603  
time choices, 601  
tipping, 598  
tours, 603  
world maps, 600  
zooming in/out, 589-594, 598

**3D Models**, 491-492, 624, 648-649

**30 days. finding cell data from past**, 565-566

## A

**ABS function**, 159

**absolute recording, macros**, 447

**absolute references (\$\$)**, 96-98  
avoiding with names, 260  
external workbook links, 290

**accelerators, keyboard**  
confusion, 66-68  
drop-down menu lists, 66  
Excel 2003  
accelerators, 79-80  
Alt shortcuts, 80-81  
KeyTips, 63, 64  
menus, backing up one level, 66  
selecting  
dialog boxes, 68  
gallery options, 65  
icons on ribbon, 64-65

**accessibility**  
Accessibility Checker, 11-12

**QAT**  
adding icons, 27  
customizing, 28-29  
KeyTips, 63-64  
removing icons, 28  
resequencing icons, 29  
separating icons, 29

**Slicers**, 66

**VBA, Help**, 462

**workbooks**, 677-678

**Action Pen**, 16-17, 493

**active cells, bringing back into view**, 489

**add-in functions**, 736

**adding**  
automatic subtotals, 339-341  
columns with Power Query, 328  
comments to formulas with N function, 221  
dollar signs (\$) to references, 79  
fields in pivot tables, 373-374  
headers/footers, 662-664  
hyperlinks, 239  
icons to QAT, 27  
images to SmartArt, 628  
multiple names at once, 259  
numbers  
AutoSum, 140-144  
with status bar, 38-39  
SUM function, 147-148  
page breaks, 660  
photos to 3D Maps, 598-600  
pictures to headers, 663-664  
slicers to pivot tables, 399-400  
values, 366-367  
watermarks to headers, 663-664  
whitespace to icons, 35  
worksheets, 35

**add-ins**  
Analysis ToolPak, 769-771  
Azure Machine Learning, 772  
browsing, 766

- COM, 766
- Data Streamer, 772
- downloading, 766
- Euro Currency Tools, 772
- fake data, 773-774
- Fast Excel, 774-775
- Fuzzy Lookup, 771
- Inquire, 768-769
- Office Add-ins store, 767
- People Graph, 773
- Solver, 768
- VBA, 765
- Visio Data Visualizer, 772
- addition/subtraction operations, order in formulas, 117**
- adjectives, VBA properties as, 462**
- advanced filter, 360-361**
  - adding values, 366-367
  - combining duplicates, 366-367
  - criteria, 362-363
  - formulas, 362
  - removing duplicate results, 364-365
  - for unique records, 479-481
- advanced formatting rules, 562-563**
- adverbs, VBA parameters as, 460-462**
- AGGREGATE function, 149-151**
- aligning cells, 514**
- alphabetical cross-reference list of functions, 738-753**
- alternate 3D Maps, 603**
- Alt shortcuts, Excel 2003, 80-81**
- ampersand operator (&), joining text, 121**
- analysis**
  - Analysis ToolPak, 769-771
  - Monte Carlo, 444
  - sentiment analysis, Azure Machine Learning, 772
- AND function, 213, 247**
- animating**
  - 3D Maps over time, 591
  - lines between points in 3D Maps, 601
- appending worksheets**
  - one worksheet
    - from every workbook in folder, 331-332
    - from one workbook, 332-333
  - Power Query, 331-333
- applications, VBA, 445**
  - add-ins, 765
  - coding analogy, 458
  - collections, 459
  - examining recorded code, 463
  - object.method, 459
  - parameters, 460-462
  - properties, 462
  - collections, 459
  - Help, 462
  - macro recorder
    - default state, 449-450
    - parameters, 461-462
  - macros
    - advanced filters for unique records, 479-481
    - AutoFilter, 481-482
    - AutoSum errors, 466
    - customer reports, 477-484
    - customizing, 467-468
    - debugging, 476
    - deleting records from loops, 474-476
    - editing, 457
    - everyday-use macros, 467-468
    - finding last rows with data, 468-469
    - flow control, 471-473
    - GetOpenFilename, 467-468
    - GetSaveAsFilename, 467-468
    - If-End If constructs, 471-472
    - invoice register example, 454-456
    - looping through rows, 469
    - loops with FinalRow, 471
    - mail merges, 447-449
    - R1C1-style formulas, 464-465
    - range references, 470
    - recording, 446-452, 455-456
    - Relative References, 450
    - running, 453-454
    - running at full speed, 477
    - running in slow motion, 476
    - Select Case constructs, 472-473
    - selecting visible cells, 482-483
    - spillable formulas, 466
    - starting macro recorder, 451-452
    - testing records in loops, 473-474
    - troubleshooting, 477
    - variables, 463-464
  - object.method, 459
  - parameters, 460-462
  - properties, 462
  - R1C1-style formulas, 464-465
  - security, 446
  - spillable formulas, 466
  - variables, 463-464
- applied filters, columns, 352**
- ARABIC function, 158**
- argument arrays, 240**

**arguments**

AGGREGATE function, 149-150  
 DATEDIF function, 180  
 DATE function, 174  
 DAYS function, 183  
 DSUM function, 245  
 EOMONTH function, 183  
 EXACT function, 204  
 FIND function, 201  
 Function Arguments dialog box, 137-139  
 GETPIVOTDATA table, 242-243  
 HYPERLINK function, 239  
 INDIRECT function, 238  
 LAMBDA functions, 14  
 LEFT function, 196  
 MID function, 197  
 NETWORKDAYS function, 185  
 OFFSET function, 234  
 order in functions, 133  
 PROPER function, 189  
 REPT function, 203  
 RIGHT function, 196  
 SEARCH function, 201-202  
 SUBSTITUTE function, 202  
 testing, 275  
 TEXT function, 205  
 TIME function, 175  
 WEEKDAY function, 178  
 WEEKNUM function, 180  
 XLOOKUP function, 226-227

**Arrange All, Windows 11, 10****arranging**

pictures, 645-647  
 slicers in pivot tables, 400-401

**arrays**

2D arrays, 208  
 argument arrays, 240  
 creating, 273-274  
 data types  
   finding, 278-279  
   returning, 277  
 dynamic arrays  
   formulas, 297-300  
   functions, 301-313  
 LAMBDA function  
   calculations, 270-273  
   creating arrays, 273-274  
 random numbers, generating, 313  
 references  
   to entire arrays, 313  
   Spilled Range Operator (#), 112, 313

**arrow key method, formula entry, 103-105****arrows, Formula Auditing, 127-128****art****Clip Art**

arranging, 645-647  
 Artistic Effects, 642  
 Aspect Ratio, 638  
 brightness, 639-640  
 contrast, 639-640  
 cropping, 639  
 file sizes, 644  
 formatting with Ribbon tab, 637  
 inserting into Excel, 636-637  
 Picture Styles gallery, 640-642  
 removing backgrounds, 642-643  
 resizing, 637  
 rounded corners, 639  
 selecting, 645-647  
 sharpness, 639-640  
 transparency, 640

**illustrations, 624****SmartArt, 623**

adding images, 628  
 changing existing SmartArt to new styles, 627  
 common elements, 625  
 Hierarchical SmartArt, 629-630  
 inserting, 626-627  
 organization charts, 629-630  
 styles, 624-625  
 stickers, 624  
 WordArt, 623-633

**artificial intelligence as inspiration for pivot tables, 371-373****Artistic Effects, 642****Aspect Ratio, pictures, 638****assigning names, 254****at (@) operator, implicit intersections, 124****auditing**

Formula Auditing arrows, 127-128  
 workbooks, Inquire add-in, 768-769  
 worksheets with Inquire, 491

**AutoAverage, 144-145****autocompleting functions, 135-136****AutoCount, 144-145****AutoFilter**

macros and, 481-482  
 pivot tables, 405-407

**automatically formatting formula cells, 124****automatic headers, 662****automatic page breaks, 660-661****automatic subtotals, adding, 339-341****AutoSave, 694**



**AutoSum, 140. See also SUM function**

- errors, macros, 466
- potential problems, 141-142
- special tricks, 142-144

**AVERAGEIFS function, 163-164****axis values, sparklines, 614-615****AZ button, sorting data, 43****Azure Machine Learning, 772****B****backgrounds, removing from pictures, 642****backing up one level in menus, 66****Backstage view, File menu, 30-32****BASE function, 206-207****Bing Images, inserting into Excel, 637****blank criteria ranges, returning all records with DSUM function, 246****blank pivot tables, 373, 378-379****blank rows, pivot tables, 380****blank workbooks, recording macros in, 455-456****bold text, 516-517****borders, 517****bottom of data, jumping to, 77****brightness, pictures, 639-640****browsing**

- add-ins, 766
- during Save As, 7

**building**

- cell references with INDIRECT function, 237-238
- formulas, 95
- pivot tables with Power Pivot (Data Model), 413

**built-in choices, sparklines, 612-614****built-in numeric formatting, 505****BYCOL function, 269****BYROW function, 269****C****Cache Settings, 57****CALCULATE function, 421-422****calculating**

- AVERAGEIFS function, 163-164
- COUNTIFS function, 163-164
- data with shortcut keys, 73-77
- dates/time
  - DATEDIF function, 180-182
  - DATE function, 173-175
  - DATEVALUE function, 176-177
  - DAY function, 173
  - DAYS function, 183
  - EOMONTH function, 183

**HOUR function, 173****ISOWEEKNUM function, 179****MINUTE function, 173****MONTH function, 173****NETWORKDAYS function, 184-186****NOW function, 171-172****SECOND function, 173****TIME function, 175****TIMEVALUE function, 177-178****TODAY function, 171-172****WEEKDAY function, 178-179****WEEKNUM function, 180****WORKDAY function, 183-185****YEARFRAC function, 180****YEAR function, 173****Excel as calculator, 131****exponents with POWER function, 162****formulas, 116**

- addition/subtraction operations, 117
- multiplication/division operations, 117
- parts of formulas, 130
- slow motion, 129, 486-487
- unary minus, 116

**MAXIFS function, 163-164****MINIFS function, 163-164****pivot tables, 381**

- adding outside calculations, 382-383
- changing field calculations, 383-385
- square roots with SQRT function, 162-163
- SUMIFS function, 163-165

**case (text)**

- converting, 188-189
- sorting data, 44
- testing with EXACT function, 204

**Catch Up button, 692****CEILING function, 154****CEILING.MATH function, 154****CELL function, 223****cells**

- active cells, bringing back into view, 489
- aligning, 514
- AutoAverage, 144-145
- AutoCount, 144-145
- AutoSum, 141-144
- Cell Styles, 525-527
- centering, 520-523
- column input cells, 431
- conditional formatting, ISFORMULA function, 219-220
- converting Geography Data Type, 55
- dates, formatting, 125
- direct precedents, showing, 126-127
- displaying contents with shapes, 630-632

- distant cells, watching results of, 485-486
- error cells, ignoring with AGGREGATE function, 149-151
- finding
  - with data from past 30 days, 565-566
  - within three days of today, 565
- formatting
  - aligning cells, 514
  - automatically, 124
  - Cell Styles, 525-527
  - dates, 125
  - Format Cells dialog box, 502-505
  - wrapping text, 533-534
- formula cells, ISFORMULA function, 219-220
- formulas, entering in many cells, 106
- highlighting, 126
  - Greater Than, 557-559
  - Highlight Cells Rules, 556
- implicit intersections, 102-112, 124
- in-cell bar charts, 544-545
- last records, finding with Ctrl+Down-Arrow key, 455
- merging cells, 4, 520-523
- names, 253
  - adding multiple names at once, 259
  - assigning, 254
  - navigating with Name dialog box, 255
  - valid names, 254-255
  - workbook-level names, 256-257
- notes, 535-538
- On-Grid ToolTips, 137
- pivot tables
  - changing cells, 380
  - formatting cells, 379
  - retrieving cells with GETPIVOTDATA function, 241-243
- ranges, describing with numbers, 234-237
- references
  - building/evaluating with INDIRECT function, 237-238
  - returning with XLOOKUP function, 232
- row input cells, 431
- selecting shortcut keys, 71-72
- subsets, showing data bars, 548
- symbols, inserting, 487
- tall cells, smooth scrolling, 9
- text cells
  - finding number of characters with LEN function, 198
  - locating characters in particular cells, 198-202
- tracing dependents, 128
- unselecting, 39-40
- visible cells
  - selecting with macros, 482-483
  - totaling with SUBTOTAL function, 156
- Watch Window, 129
  - wide cells, smooth scrolling, 9
  - wrapping text, 533-534
- centering**
  - cells, 520-523
  - reports on page, 669-670
- changing**
  - cells, pivot tables, 380
  - default fonts, 532-533
  - field calculations, pivot tables, 383-385
  - font size/typeface, 515
  - margins (worksheets), 657
  - Page Setup settings, 668
  - pivot tables
    - cell changes, 380
    - reports with field lists, 374-376
  - printer properties, 668
  - ribbon, resizing Excel, 24
  - rolling back changes, Version History, 692-693
  - Show Changes within last 60 days, 6
  - SmartArt (existing) to new styles, 627
  - themes, 528
  - tracking changes
    - Catch Up button, 692
    - Show Changes, 690
    - Version History, 690-693
- CHAR function, 192-195**
- characters (text)**
  - generating with
    - CHAR function, 192-195
    - SUBSTITUTE function, 192
    - UNICHAR function, 192-195
  - individual characters, formatting, 531-532
  - replacing with SUBSTITUTE function, 202
  - viewing character codes, 195
- charts**
  - column charts, 588, 607, 617
  - combo charts, 577
  - creating, 573-574
  - filled map charts, geographic data, 580
  - formatting, 576
  - funneling data, 575
  - histogram charts, frequency distribution, 577-578
  - line charts, sparklines, 607
  - missing data, forcing not to plot with NA function, 221-223
  - organizational charts, 629-630
  - paintbrush icon, 574-575
  - Pareto charts, 578
  - pasting new data, 580-583
  - people charts, People Graph, 773
  - pie charts, small pie slices, 583-584
  - plotting, forcing not to plot missing data with NA function, 221-223

plus icon, 576

Recommended Charts, choosing from, 573-574

stacked column charts, sparklines, 617

styles, 574-575, 584-585

waterfall charts, financial data, 579

Win/Loss charts, sparklines, 607, 613, 616

X Y Scatter charts, 581-583

**check boxes, filtering pivot tables, 395-396**

**Check For Errors, 4**

**CHOOSE function, 216-217, 224**

**CHOOSECOLS function, 208**

**CHOSEROWS function, 208**

**choosing**

from Recommended Charts, 573-574

paper size, printing, 657

printers, 666

random items from lists, INDEX function, 158

shape styles, 632

slicer items, 79

themes, 528

what to print, 667

**cleaning data, Flash Fill, 40-41**

**clearing**

filters, 353

pivot table filters, 395

Recent Workbooks list, 32

**Clip Art**

arranging, 645-647

Artistic Effects, 642

Aspect Ratio, 638

brightness, 639-640

contrast, 639-640

cropping, 639

file sizes, 644

formatting with ribbon tab, 637

inserting into Excel, 636-637

Picture Styles gallery, 640-642

removing backgrounds, 642-643

resizing, 637

rounded corners, 639

selecting, 645-647

sharpness, 639-640

transparency, 640

**clipboard, pasting from, 4**

**closed workbooks, opening with links, 293**

**closing**

Backstage view, File menu, 32

VBA Editor, 5

**cloud computing, storing workbooks, 674**

**CODE function, 195**

**Code pane, VBE, 457**

**coding analogy, VBA, 458**

collections, 459

examining recorded code, 463

object.method, 459

parameters, 460-462

properties, 462

**collaboration, 673**

access to workbooks, viewing, 677-678

criteria for success, 674

editing

etiquette, 681

multiple editors, same workbook, 680

presence, 680-681

vetoed, 681-682

filtering workbook data, Sheet Views, 683-686

presence, 680-681

sharing workbooks

@Mentions, 677, 687, 692

comments, 677, 687, 692

finding shared workbooks, 679-680

Notes, 689

notifications, 678-680

threaded comments, 688-689

tracking changes, Catch Up button, 692

tracking changes, Show Changes, 690

tracking changes, Version History, 690-693

sorting workbook data, Sheet Views, 683-686

success, criteria for, 674

user access, 677-678

workbooks

cloud storage, 674

OneDrive, 674

sharing during initial saves, 675

sharing, setting with expiration dates, 676-677

sharing with Share button, 676

**collapsed subtotal view, sorting with largest customers at top, 342-343**

**collapsing task panes, 23**

**collections, VBA, 459**

**color**

3D Maps, 589

cells, formatting in, 517-519

color scales, highlighting extremes, 549-550

custom numeric formatting, 512

data bars

creating, 545-546

customizing, 546-547

in-cell bar charts, 544-545

showing for subsets of cells, 548

Filter by Color, 356-357

heat maps, 543, 588

- sorting data by, 43
  - sparklines, 614
  - themes, 529
- column charts, 588, 607, 617**
- column input cells, 431**
- columns**
  - 2D arrays, 208
  - 3D Maps, resizing columns, 599
  - adding with Power Query, 328
  - applied filters, 352
  - CHOOSECOLS function, 208
  - inserting Filtered Data, 4
  - LAMBDA function calculations, 269
  - reordering sorting data, 44
  - repeating, 658
  - subsets, selecting with FILTER function, 307
  - TOCOL function, 208
  - VECTORWRAP function, 208
  - widths, formatting, 519-520
- COM add-ins, 766**
- combining**
  - duplicates, 366-367
  - filters, 352
  - formatting rules, 568-569
  - layers of 3D Maps, 599
- combo charts, 577**
- commands**
  - KeyTips, 63, 64
  - last command, repeating, 489
  - legacy keyboard commands, 81-89
  - "More" command, 22-23
- comments**
  - formulas, adding with N function, 221
  - legacy comments, 689
  - Notes, 689
  - printing, 670
  - sharing workbooks, 677, 687-689, 692
  - threaded comments, 688-689
- comparing**
  - dates, conditional formatting, 559-560
  - international text comparisons, 4
- comparison operators, 212**
- compatibility functions, 736-738**
- conditional formatting**
  - date comparisons, 559-560
  - duplicate values, identifying, 560-561
  - extending reach of, 569
  - finding cells
    - with data from past 30 days, 565-566
    - within three days of today, 565
  - Greater Than, 557-559
  - Highlight Cells Rules, 556
  - highlighting
    - data from specific days of the week, 566
    - entire rows, 566-567
    - every other row, 567-568
  - ISFORMULA function, 219-220
  - pasting, 539
  - pivot tables, 570-571
  - rules
    - based on formulas, 564-565
    - combining, 568-569
    - top/bottom rules, 554-555
  - text containing values, 561-562
  - top/bottom rules, 554-555
  - unique values, identifying, 560-561
- condition checks**
  - AND function , 213
  - OR function , 214
- condition codes, custom numeric formatting, 512**
- conditionally sum records, DSUM function, 245-246**
- contextual ribbon tabs, 25**
- contrast, pictures, 639-640**
- controls, worksheets, 35**
- converting**
  - 2D arrays to a single column/row, 208
  - cells, Geography Data Type, 55
  - columns to 2D arrays, 208
  - Euro Currency Tools add-in, 772
  - formulas to values, right-drag menu, 289
  - numbers to text with BASE function, 207
  - pivot tables to dashboard formulas, 423, 424
  - rows to 2D arrays, 208
  - text case, 188-189
  - text dates
    - to real dates, DATEVALUE function, 176-177
    - to real times, TIMEVALUE function, 177-178
- copying**
  - filtered results, 360
  - formatting to new worksheets, 540-541
  - formulas, 122-123, 538
    - double-clicking fill handle, 107
    - dragging fill handle, 107
    - Table tool (Ctrl+T), 108-109
    - with Ctrl+Enter key combination, 106
  - pivot tables for each customer, 407
  - sparklines, 620
  - subtotal rows only, 344-345
  - worksheets to new workbooks, 541
- corner of selections, jumping to, 78**
- COUNT function, 152**
- COUNTA function, 152**

**COUNTIFS function, 163-164****counting distinct pivot tables, 414-416****creating**

- charts, 573-574
- data bars, 545-546
- sparklines, 608-612
- themes
  - color, 529
  - fonts, 530
  - reusing effects, 530
  - saving, 530

**criteria, DSUM function**

- dates as criteria, 248
- joining, 247-248
- numbers as criteria, 248
- ranges
  - blank ranges, returning all records, 246
  - miracle ranges, 249-250
  - simple ranges, 246

**cropping pictures, 639****crossing tasks off lists, 78****.CSV files, turning on/off reminders, 34-35****Ctrl+Backspace key combination, bringing active cells back into view, 489****Ctrl+click key combination, unselecting cells, 39-40****Ctrl+Down-Arrow key combination, handling variable numbers of rows, 455-456****Ctrl+Enter key combination, copying formulas, 106****Ctrl+T key combination (Table tool), copying formulas, 108-109****Ctrl+Up-Arrow key combination, finding last records, 455****Ctrl shortcut keys, 69****cube functions, 731-732****currency**

- conversion, Euro Currency Tools add-in, 772
- data types, 280
- displaying, 506

**current ranges, selecting, 77****customers**

- largest customers, sorting collapsed subtotal view, 342-343
- reports, creating, 477-484

**customizing**

- 3D Maps, 604-605
- data bars, 546-547
- data types, 335-337
- headers, 663
- lists, sorting data, 45
- macros, everyday-use macros, 467-468
- numeric formatting, 509-510
  - color, 512
  - condition codes, 512

- dates, 512-513
- decimal spaces, 511
- scientific notation, 513
- spaces, 511
- text, 511
- times, 512-513

**pivot tables, 374-376****QAT, 28-29****sparklines, 612-614****text**

- bold text, 516-517
- font size, 515
- font typeface, 515
- italic text, 516-517
- rotating, 523-524
- underline text, 516-517
- vertical text, 523-524

**Cut-out People, 14-15, 624, 647-648****cutting formulas, 122-123****D****daily dates**

- subtotaling by month, 348
- summarizing daily dates into months, quarters, years, 381-382

**dark mode, 56****dashboard formulas, converting pivot tables to formulas, 423-424****data bars**

- creating, 545-546
- customizing, 546-547
- in-cell bar charts, 544-545
- subsets of cells, 548

**database functions, 243, 735**

- DGET function, 250-251
- DSUM function, 244
  - blank criteria ranges returning all records, 246
  - conditionally sum records, 245-246
  - dates/numbers as criteria, 248
  - joining criteria, 247-248
  - miracle criteria ranges, 249-250
  - simple criteria ranges, 246

**data cards, finding arrays, 278-279****data diagrams, Visio Data Visualizer, 772****data entry**

- 3D Maps, 594-597
- shortcut keys, 73-77

**Data Model (Power Pivot), 409**

- additional information, 426
- benefits of, 426
- Diagram view, 412

- hidden features, unlocking, 414
- joining multiple tables, 410-411
- limitations/workarounds, 424-426
- pivot tables
  - building, 413
  - converting to formulas, 423-424
  - counting distinct, 414-416
  - creating medians with DAX measures, 418-421
  - including filtered items in totals, 416-418
  - time intelligence, DAX measures, 421-423
  - relationships between tables, creating, 411-412
- Data Streamer, 772**
- Data Table command, single variable changes, 433**
- data tables, what-if analyses, 433-434**
- data types, 275-276**
  - Currency data type, 280
  - custom data types, 335-337
  - finding arrays, 278-279
  - returning arrays, 277
  - Stock data type, 280
- data visualizations**
  - color scales, highlighting extremes, 549-550
  - data bars
    - creating, 545-546
    - customizing, 546-547
    - in-cell bar charts, 544-545
    - showing for subsets of cells, 548
  - heat maps, 543
  - icon sets
    - hiding icons, 554
    - mixing icons, 554
    - moving numbers closer to icons, 552-553
    - segregating data, 550-551
    - setting up, 551-552
- DATEDIF function, 180-182**
- dates/time, 165**
  - as criteria, DSUM function, 248
  - comparing, conditional formatting, 559-560
  - custom numeric formatting, 512-513
  - daily dates, subtotaling by month, 348
  - date and time functions, 709-711
  - date fields, filtering pivot tables, 405
  - Date Filters fly-out, pivot tables, 397
  - DATE function, 173-175
  - DATEDIF function, 180-182
  - DATEVALUE function, 176-177
  - DAY function, 173
  - DAYS function, 183
  - displaying, 507
  - elapsed time, calculating with
    - DATEDIF function, 180-182
    - DAYS function, 183
    - EOMONTH function, 183
    - YEARFRAC function, 180
  - expiration dates, setting in workbooks, 676-677
  - filters, 357-359
  - formatting, 41, 125, 168-170
  - grouping
    - dates into weeks, ISOWEEKNUM function, 179
    - dates into weeks, WEEKNUM function, 180
    - by day of the week, WEEKDAY function, 178, 179
  - HOUR function, 173
  - ISOWEEKNUM function, 179
  - joining text with, 121-122
  - MINUTE function, 173
  - MONTH function, 173
  - NETWORKDAYS function, 184-186
  - NOW function, 171-172
  - potential problems, 166-167
  - SECOND function, 173
  - stamps, 78
  - TIME function, 175
  - TIMEVALUE function, 177-178
  - TODAY function, 171-172
  - troubleshooting, 166-167
  - WEEKDAY function, 178-179
  - WEEKNUM function, 180
  - workdays, calculating with
    - NETWORKDAYS function, 184-186
    - WORKDAY function, 183-185
  - YEAR function, 173
  - YEARFRAC function, 180
- DAX (Data Analysis Expressions)**
  - functions, 755-759
  - measures
    - medians, creating for pivot tables, 418-421
    - time intelligence, 421-423
- DAY function, 173**
- DAYS function, 183**
- days of the week (specific), highlighting data from, 566**
- debugging macros, 476**
- decimal places, custom numeric formatting, 511**
- decision making with IF function, 211-217**
- declaring workbook-level names, 256-257**
- default fonts, changing, 532-533**
- definitions**
  - ranges as tables, 108
  - text, viewing with Insights (Smart Lookup), 495-496

**deleting**

- ranges with merged cells, 4
- records in loops, 474-476

**delimiters**

- separating text, 489-490
- splitting in new rows, 330-331

**dependents, tracing, 128****describing ranges with numbers, OFFSET function, 234-237****descriptive statistics, Analysis ToolPak, 769-771****Developer tab, ribbon, 24****DGET function, 250-251****diagrams**

- Diagram view, Power Pivot (Data Model), 412
- Visio Data Visualizer, 772

**dialog box launcher, 22-23****dialog boxes, selecting, 68****direct precedents, showing, 126-127****disabling macros with notifications, 446****displaying**

- cell contents with shapes, 630-632
- currency, 506
- dates, 507
- fractions, 507
- phone numbers, 508
- scientific notation, 513
- Social Security numbers, 509
- times, 507
- ZIP Codes, 508-509

**distant cells, watching results of, 485-486****distinct counting, pivot tables, 414-416****distributions (frequency), histogram charts, 577-578****division operations, order in formulas, 117****division problems, finding remainders with MOD function, 160-162****Document Inspector, finding hidden content, 34****documenting worksheets, FORMULATEXT function, 232-234****dollar signs (\$)**

- absolute references (\$\$), 96-98
- avoiding with names, 260
- external workbook links, 290
- adding to references, 79
- simplifying entries with F4 key, 99-101

**Double-Byte text functions, 708****double-clicking fill handle, copying formulas, 107****downloading add-ins, 766****dragging fill handle, copying formulas, 107****drawing**

- Action Pen, 493
- inking tools, 494-495

**drop-down menus**

- lightning bolt, 109
- navigating, 66

**DSUM function, 244**

- conditionally sum records, 245-246
- criteria ranges
  - blank ranges returning all records, 246
  - miracle version, 249-250
  - simple ranges, 246
- dates/numbers as criteria, 248
- joining criteria
  - AND function, 247
  - OR function, 247-248

**duplicates**

- combining, 366-367
- removing from filtered results, 364-365
- values, identifying with conditional formatting, 560-561

**dynamic arrays, 56**

- formulas, 102, 297-300
- functions
  - FILTER function, 305-307, 363-364
  - RANDARRAY function, 304-305, 313
  - SEQUENCE function, 310-312
  - SORTBY function, 303-304
  - SORT function, 301-305
  - UNIQUE function, 309-310

**E****editing**

- equations, 487, 488
- formulas, showing direct precedents, 126-127
- macros, 457
- text, returning to original text with T function, 207
- VBA Editor, 5
- VBE, 457
- workbooks, 33
  - etiquette, 681
  - multiple editors, same workbook, 680
  - presence, 680-681
  - vetoed, 681-682

**effects (themes), reusing, 530****elapsed time, calculating**

- DATEDIF function, 180-182
- DAYS function, 183
- EOMONTH function, 183
- YEARFRAC function, 180

**ellipsis (...), More commands, 23****engineering functions, 729-731****enlarging sparklines, 618-620**

**entering**

- data, shortcut keys, 73-77
- formulas
  - arrow key method, 103-105
  - mouse method, 103
  - same formulas in many cells, 106
  - spilling, 110-111

**EOMONTH function, 183****equations, editing, 487-488****error handling**

- ##### errors, 119
- #CALC errors, 119
- Check For Errors, 4
- #DIV/0! errors, 118
- #FIELD! errors, 119
- formulas, 56
- IFERROR function, 217-219
- IFNA function, 219
- ignoring error cells with AGGREGATE function, 149-151
- magnitude of error, determining with ABS function, 159
- #N/A errors, 134
- #N/A! errors, 119-120
- #NULL! errors, 119
- #NUM! errors, 134
- #REF! errors, 118
- replacing error values when printing, 670
- #SPILL! errors, 111, 119
- Trace Error, 120
- #VALUE! errors, 118, 134

**etiquette, editing workbooks, 681****Euro Currency Tools add-in, 772****evaluating**

- cell references, INDIRECT function, 237-238
- formulas, 116
  - addition/subtraction operations, 117
  - multiplication/division operations, 117
  - parts of formulas, 130
  - slow motion, 129
  - unary minus, 116

**everyday-use macros, customizing, 467-468****EXACT function, 204****Excel**

- as calculator, 131
- Excel 2003
  - Alt shortcuts, 80-81
  - keyboard accelerators, 79-80
- Excel 2016, upgrading from, 18-19
- Help functions, 139-140
- Microsoft 365 Excel, improvements to performance, 4
- options, printing, 654

**excluding parts of worksheets from printing, 659****expanding formula bar, 36-37**

- exponents, calculating with POWER function, 162
- extending selections, keyboard shortcuts, 72-73
- external workbook links, absolute references, 290
- extracting unique values with formulas, 308-310
- extremes, highlighting with color scales, 549-550

**F****F4 key**

- rectangular ranges, 101-102
- repeating last command, 489
- simplifying dollar sign entries, 99-101

**F6 loops, 66****fake data add-in, 773-774****Fast Excel add-in, 774-775****field lists, changing pivot table reports, 374-376****fields**

- multiple fields, subtotaling, 347
- pivot tables
  - adding fields, 373-374
  - changing calculations, 383-385

**file extensions, opening, 56****File menu**

- Backstage view, 30-32
- opening full screen, 30
- Print panel, 652, 666

**files**

- recent files, opening, 58
- picture file sizes, 644

**filled map charts, geographic data, 580****fill handle, copying formulas, 107****filtering**

- adding values, 366-367
- advanced filters, 360-361
  - adding values, 366-367
  - combining duplicates, 366-367
  - criteria, 362-363
  - formulas, 362
  - removing duplicate results, 364-365
  - unique records, 479-481

**AutoFilter**

- macros and, 481-482
- pivot tables, 405-407
- by color, 356-357
- by selection, 353-356
- clearing filters, 353
- columns, applied filters, 352
- combining
  - duplicates, 366-367
  - filters, 352



- copying filtered results, 360
- data, inserting columns, 4
- dates, 357-359
- drop-down menu, resizing, 353
- features of, 349
- filtered rows, ignoring with AGGREGATE function, 149-151
- FILTER function, 305-307, 363-364
- formatting filtered results, 360
- formulas, 305-306
- numbers, 358-359
- pivot tables
  - AutoFiltering, 405-407
  - check boxes, 395-396
  - clearing filters, 395
  - Date Filters fly-out, 397
  - dates, 405
  - including filtered items in totals, 416-418
  - Label Filter fly-out, 396-397
  - row label filter, 393-395
  - slicers, 399-404
  - Top 10 Filter dialog box, 398-399
- reapplying filters, 353
- refreshing filters, 353
- removing duplicates from filtered results, 364-365
- selecting multiple items, 351-352
- text, 358-359
- totaling filtered results, 360
- using, 349-350
- workbook data, Sheet Views, 683-686

**finalizing workbooks, 33**

**FinalRow, loops, 471**

**financial data, waterfall charts, 579**

**financial functions, 699-704**

**finding**

- arrays, data types, 278-279
- cells
  - with data from past 30 days, 565-566
  - within three days of today, 565
- characters in text cells
  - with FIND function, 198-201
  - with SEARCH function, 200-202
- Find dialog box, showing all options, 8
- FIND function, locating characters in text cells, 198-201
- functions
  - in Formulas tab, 135
  - with Insert Function dialog box, 136
- hidden content with Document Inspector, 34
- last rows with data, 468-469
- lost ribbon commands, 25-26
- near matches with Fuzzy Lookup, 771
- number of characters in text cells with LEN function, 198

- printing settings, 652-653
- shared
  - documents, 680
  - workbooks, 679

**first page numbers, controlling, 670****Flash Fill**

- cleaning data, 40-41
- formatting dates, 41
- mathematical transformations, 41
- numbers, filling in, 41
- troubleshooting, 41, 42

**Flat Map option, 3D Maps, 600****FLOOR function, 154****FLOOR.MATH function, 154****flow control, macros**

- If-End If constructs, 471-472
- Select Case constructs, 472-473

**flowing text in ranges, 633-634****fly-out menus, 22****fonts**

- default fonts, changing, 532-533
- size, changing, 515
- themes, 530
- typeface, changing, 515

**footers/headers**

- adding pictures/watermarks, 663-664
- automatic headers, 662
- custom headers, 663
- different headers/footers in same document, 664-665
- scaling, 665

**formatting, 499**

- 3D Models, 624, 648-649
- advanced formatting rules, 562-563
- cells

- aligning cells, 514
- Cell Styles, 525-527
- centering, 520-523
- color, 517-519
- merging, 520-523
- wrapping text, 533-534

- charts, 576

- column widths, 519-520

**conditional formatting**

- combining rules, 568-569
- date comparisons, 559-560
- extending reach of, 569
- finding cells with data from past 30 days, 565-566
- finding cells within three days of today, 565
- Greater Than, 557-559
- Highlight Cells Rules, 556
- highlighting data from specific days of the week, 566

- highlighting rows, entire rows, 566-567
- highlighting rows, every other row, 567-568
- identifying duplicate/unique values, 560-561
- ISFORMULA function, 219-220
- pasting, 539
- pivot tables, 570-571
- rules based on formulas, 564-565
- text containing values, 561-562
- top/bottom rules, 554-555
- copying to new worksheets, 540-541
- Cut-out People, 624-648
- data, shortcut keys, 73-77
- dates/time, 41, 125, 168-170
- filtered results, 360
- Format Cells dialog box, 502-505
- Format Painter, 539-540
- formula cells automatically, 124
- green bar formatting, 162
- icons, 624, 647-648
- illustrations, 624, 647-648
- invoice registers, 454-456
- macros, mail merges, 447-449
- numbers
  - as text with TEXT function, 204-205
  - currency, 506
  - custom formats, 509-513
  - dates, 507
  - fractions, 507
  - leading zeroes, adding with BASE function, 206-207
  - phone numbers, 508
  - Social Security numbers, 509
  - times, 507
  - with built-in numeric formatting, 505
  - with Format Cells dialog box, 505
  - with Home tab, 503-505
  - with thousands separators, 506
  - ZIP Codes, 508-509
- pictures, 624
  - arranging, 645-647
  - Artistic Effects, 642
  - Aspect Ratio, 638
  - brightness, 639-640
  - contrast, 639-640
  - cropping, 639
  - file sizes, 644
  - inserting Bing Images, 637
  - inserting Clip Art, 636-637
  - inserting from your computer, 635
  - inserting into Excel, 635
  - inserting multiple pictures at once, 635
  - inserting Stock Images, 636-637
  - Picture Styles gallery, 640-642
  - removing backgrounds, 642-643
  - resizing, 637
  - ribbon tab, 637
  - rounded corners, 639
  - Screen Clippings, 645
  - selecting, 645-647
  - sharpness, 639-640
  - transparency, 640
- pivot tables
  - cells, 379
  - numeric fields, 378-379
- quick formatting, 562-563
- row heights, 519-520
- rules, combining, 568-569
- shapes, 623
  - choosing styles, 632
  - displaying cell contents, 630-632
- SmartArt, 623
  - adding images, 628
  - changing existing SmartArt to new styles, 627
  - common elements, 625
  - Hierarchical SmartArt, 629-630
  - inserting, 626-627
  - organizational charts, 629-630
  - styles, 624-625
- stickers, 624, 647-648
- subscripts, 29
- subtotal rows, 345-346
- superscripts, 29
- text
  - containing values, 561-562
  - returning to original text with T function, 207
  - Text That Contains formatting rule, 561-562
  - with mini toolbar, 36
- text boxes, 623, 633-634
- themes
  - changing, 528
  - choosing, 528
  - color, 529
  - components of, 528
  - creating, 529-530
  - fonts, 530
  - Office themes, 527-529
  - reusing effects, 530
  - saving, 530
- time/dates, 168-170
- traditional formatting, 501-503
- WordArt, 623, 632-633

## worksheets

- aligning cells, 514
- bold text, 516-517
- borders, 517
- cell color, 517-519
- cell notes, 535-538
- Cell Styles, 525-527
- centering cells, 520-523
- changing default fonts, 532-533
- column widths, 519-520
- conditional formatting, 539
- copying formatting to new worksheets, 540-541
- copying formulas, 538
- font size, 515
- font typeface, 515
- Format Painter, 539-540
- italic text, 516-517
- justifying text in ranges, 534-535
- merging cells, 520-523
- need for, 499-501
- numeric formatting, built-in, 505
- numeric formatting, currency, 506
- numeric formatting, custom formats, 509-513
- numeric formatting, dates, 507
- numeric formatting, Format Cells dialog box, 505
- numeric formatting, fractions, 507
- numeric formatting, Home tab, 503-505
- numeric formatting, phone numbers, 508
- numeric formatting, Social Security numbers, 509
- numeric formatting, thousands separators, 506
- numeric formatting, times, 507
- numeric formatting, ZIP Codes, 508-509
- pasting formulas, 538-539
- rotating text, 523-524
- row heights, 519-520
- saving, 530
- text, individual characters, 531-532
- themes, 527-530
- traditional formatting, 501-503
- underline text, 516-517
- vertical text, 523-524
- wrapping text, 533-534

**Formula Auditing arrows, 127-128****Formula AutoComplete, 135-136****formula bar, expanding, 36-37****formulas**

- ##### errors, 119
- absolute references (\$\$), 96-98
  - avoiding with names, 260
  - external workbook links, 290
- advanced filter, 362

## arrays

- random numbers, generating, 313
- references, Spilled Range Operator (#), 112

## auditing, Formula Auditing arrows, 127-128

## building, 95

## #CALC errors, 119

## calculating, 116

- addition/subtraction operations, 117
- multiplication/division operations, 117
- parts of formulas, 130
- slow motion, 129
- unary minus, 116

## cells

- dates, 125
- formatting automatically, 124
- highlighting, 126
- ISFORMULA function, 219-220
- showing direct precedents, 126-127
- tracing dependents, 128
- Watch Window, 129

## comments, adding with N function, 221

## conditional formatting rules, 564-565

## converting to values with right-drag menu, 289

## copying, 122-123, 538

- double-clicking fill handle, 107
- dragging fill handle, 107
- Table tool (Ctrl+T), 108-109
- with Ctrl+Enter key combination, 106

## cutting, 122, 123

## data types, returning arrays, 277

## #DIV/0! errors, 118

## dollar signs (\$)

- absolute references (\$\$), 96-98, 260, 290
- adding to references, 79
- simplifying with F4 key, 99-101

## dynamic array formulas, 102, 297-300

## editing, showing direct precedents, 126-127

## entering

- arrow key method, 103-105
- first formula, 95
- mouse method, 103
- same formula in many cells, 106
- spilling, 110-111

## error checking, 56

## evaluating, 116

- addition/subtraction operations, 117
- multiplication/division operations, 117
- parts of formulas, 130
- slow motion, 129
- unary minus, 116

- F4 key
    - rectangular ranges, 101-102
    - simplifying dollar sign entries, 99-101
  - #FIELD! errors, 119
  - filtering, 305-306
  - formatting cells automatically, 124
  - highlighting cells, 126
  - implicit intersections, 102, 111-112, 124
  - incompatible, 56
  - joining text, 121-122
  - links, creating, 291
  - mixed references, 98-99
  - #N/A! errors, 119-120
  - names
    - applying retroactively, 258-259
    - simplifying formulas with named ranges, 257-258
  - #NULL! errors, 119
  - operators, 115-116
  - order of operations, 116-118
  - pasting, 538-539
  - pivot tables, converting to dashboard formulas, 423-424
  - R1C1-style formulas, macros, 464-465
  - rectangular ranges, F4 key, 101-102
  - #REF! errors, 118
  - relative references, 96, 122-123
  - retroactively applying names to formulas, 258-259
  - seeing all formulas, 126
  - Show Formulas mode, 126
  - simplifying with named ranges, 257-258
  - slow motion calculations, 486-487
  - sorting, 301-305
  - spearing formulas, 148
  - #SPILL! errors, 111, 119
  - spilling, 110-111, 466
  - storing results with LET function, 260-264
  - troubleshooting
    - evaluating in slow motion, 129
    - evaluating parts of formulas, 130
    - Formula Auditing arrows, 127-128
    - highlighting cells, 126
    - seeing all formulas, 126
    - showing direct precedents, 126-127
    - tracing dependents, 128
    - Watch Window, 129
  - turning data, TRANSPOSE function, 240
  - unique values, extracting, 308-310
  - unsupported, 56
  - #VALUE! errors, 118
  - values versus, 94
- Formulas tab, 134-136**
- FORMULATEXT function, 232-234**
- fractions, displaying, 507**
- frequency distributions, histogram charts, 577-578**
- FREQUENCY function, 577**
- full screen File menu, opening, 30**
- full speed, running macros in, 477**
- Function Arguments dialog box, 137-139**
- functions**
- ABS function, 159
  - add-in functions, 736
  - AGGREGATE function, 149-151
  - alphabetical cross-reference list, 738-753
  - AND function, 213, 247
  - ARABIC function, 158
  - arguments, order of, 133
  - AutoAverage, 144-145
  - autocompleting, 135-136
  - AutoCount, 144-145
  - AutoSum, 140-144. *See also* SUM function
  - AVERAGEIFS function, 163-164
  - BASE function, 206-207
  - BYCOL function, 269
  - BYROW function, 269
  - CALCULATE function, 421-422
  - CEILING function, 154
  - CEILING.MATH function, 154
  - CELL function, 223
  - CHAR function, 192-195
  - CHOOSE function, 216-217, 224
  - CHOOSECOLS function, 208
  - CHOOSEROWS function, 208
  - CODE function, 195
  - compatibility, 736-738
  - COUNT function, 152
  - COUNTA function, 152
  - COUNTIFS function, 163-164
  - cube functions, 731-732
  - database functions, 243, 735
    - DGET function, 250-251
    - DSUM function, 244-250
  - date and time functions, 709-711
  - DATE function, 173, 174, 175
  - DATEDIF function, 180-182
  - DATEVALUE function, 176-177
  - DAX functions, 755-759
  - DAY function, 173
  - DAYS function, 183
  - DGET function, 250-251
  - Double-Byte text, 708
  - DSUM function, 244
    - blank criteria ranges returning all records, 246
    - conditionally sum records, 245-246

- dates/numbers as criteria, 248
  - joining criteria, AND function, 247
  - joining criteria, OR function, 247-248
  - miracle criteria ranges, 249-250
  - simple criteria ranges, 246
- dynamic array functions
  - FILTER function, 305-307, 363-364
  - RANDARRAY function, 304-305, 313
  - SEQUENCE function, 310-312
  - SORTBY function, 303-304
  - SORT function, 301-305
  - UNIQUE function, 309-310
- engineering, 729-731
- EOMONTH function, 183
- EXACT function, 204
- FILTER function, 305-307, 363-364
- financial functions, 699-704
- FIND function, 198-201
- finding
  - in Formulas tab, 135
  - with Insert Function dialog box, 136
- FLOOR function, 154
- FLOOR.MATH function, 154
- Formulas tab, 134
  - autocompleting functions, 135-136
  - finding functions, 135
  - Insert Function dialog box, 136
- FORMULATEXT function, 232-234
- FREQUENCY function, 577
- GCD function, 159-160
- GETPIVOTDATA function, 241-243
- help
  - Excel Help, 139-140
  - Function Arguments dialog box, 137-139
  - On-Grid ToolTips, 137
- HOUR function, 173
- HSTACK function, 207
- HYPERLINK function, 239
- IFERROR function, 217-219
- IF function, 211-217
- IFNA function, 219
- IFS function, 215-217
- INDEX function, 158
- INDIRECT function, 237-238
- information functions, 732-733
  - CELL function, 223
  - ISFORMULA function, 219-220
  - IS functions, 220
  - NA function, 221-223
  - N function, 221
- ISOMITTED function, 275
- ISOWEEKNUM function, 179
- LAMBDA function
  - array calculations, 270-273
  - array creation, 273-274
  - BYCOL function, 269
  - BYROW function, 269
  - column calculations, 269
  - helper functions, 12-13
  - hypotenuse of right triangles, 265-267
  - ISOMITTED function, 275
  - loops, 267-268
  - MAKEARRAY function, 273-274
  - MAP function, 270
  - optional arguments, 14
  - REDUCE function, 270-272
  - row calculations, 269
  - SCAN function, 270, 273
  - sharing between workbooks, 267-268
  - storing logic, 264-265
  - testing optional arguments, 275
- LCM function, 160
- LEFT function, 196
- LEN function, 191, 198
- LET function, 260-264
- logical functions, 704-705
  - AND function, 213
  - CHOOSE function, 216-217
  - comparison operators, 212
  - IF function, 211-217
  - IFERROR function, 217-219
  - IFNA function, 219
  - IFS function, 215-217
  - NOT function, 217
  - OR function, 214
  - SWITCH function, 215-217
- lookup and reference functions, 711-714
- LOWER function, 188-189
- MAKEARRAY function, 273-274
- MAP function, 270
- math functions
  - ABS function, 159
  - AGGREGATE function, 149-151
  - ARABIC function, 158
  - AVERAGEIFS function, 163-164
  - CEILING function, 154
  - CEILING.MATH function, 154
  - COUNT function, 152
  - COUNTA function, 152
  - COUNTIFS function, 163-164
  - FLOOR function, 154
  - FLOOR.MATH function, 154

- GCD function, 159-160
- INDEX function, 158
- LCM function, 160
- MAXIFS function, 163-164
- MINIFS function, 163-164
- MOD function, 160-162
- MROUND function, 153
- POWER function, 162
- RAND function, 156
- RANDARRAY function, 157
- RANDBETWEEN function, 157
- ROMAN function, 158
- ROUND function, 153-154
- ROUNDDOWN function, 153
- ROUNDUP function, 153
- SORTBY function, 157
- SQRT function, 162-163
- SUBTOTAL function, 155-156
- SUM function, 140-142, 147-148. *See also* AutoSum
- SUMIFS function, 163-165
- trig functions, 714-718
- MAXIFS function, 163-164
- MID function, 197
- MINIFS function, 163-164
- MINUTE function, 173
- MOD function, 160-162
- MONTH function, 173
- MROUND function, 153
- N function, 221
- #N/A errors, 134
- NA function, 221-223
- nested functions, Function Arguments dialog box, 139
- NETWORKDAYS function, 184-186
- new functions, 18-19
- NOT function, 217
- NOW function, 171-172
- #NUM! errors, 134
- OFFSET function, 234-237
- OR function, 214, 247-248
- parentheses ( ), 133
- POWER function, 162
- Power Query M functions, 760-763
- PROPER function, 189
- RAND function, 156
- RANDARRAY function, 157, 304-305, 313
- RANDBETWEEN function, 157
- RANK.AVG function, 388
- RANK.EQ function, 388
- REDUCE function, 270-272
- REPT function, 202-204
- RIGHT function, 196
- ROMAN function, 158
- ROUND function, 153-154
- ROUNDDOWN function, 153
- ROUNDUP function, 153
- SCAN function, 270, 273
- SEARCH function, 200-202
- SECOND function, 173
- SEQUENCE function, 310-312
- SLUGIFY function, 267
- SORTBY function, 157, 303-304
- SORT function, 301-305
- SQRT function, 162-163
- SQRTPI function, 162
- statistical functions, 719-729
- STOCKHISTORY function, 281
- SUBSTITUTE function, 192, 202
- SUBTOTAL function, 155-156
- SUM function, 140-142, 147-148. *See also* AutoSum
- SUMIFS function, 4, 163-165
- SWITCH function, 215-217
- syntax of, 133
- testing with Fast Excel, 774-775
- text functions
  - BASE function, 206-207
  - CHAR function, 192-195
  - CHOOSECOLS function, 208
  - CHOOSEROWS function, 208
  - CODE function, 195
  - EXACT function, 204
  - FIND function, 198-201
  - HSTACK function, 207
  - LEFT function, 196
  - LEN function, 191, 198
  - LOWER function, 188-189
  - MID function, 197
  - PROPER function, 189
  - REPT function, 202-204
  - RIGHT function, 196
  - SEARCH function, 200-202
  - SUBSTITUTE function, 192, 202
  - T function, 207
  - TEXT function, 204-205, 704-705
  - TEXTAFTER function, 207
  - TEXTBEFORE function, 207
  - TEXTJOIN function, 187-188
  - TEXTSPLIT function, 207
  - TOCOL function, 208
  - TOROW function, 208
  - TRIM function, 189-193
  - UNICHAR function, 192-195
  - UNICODE function, 195

UPPER function, 188-189  
 VALUE function, 207  
 VECTORWRAP function, 208  
 VLOOKUP function, 190, 218, 225-227, 260  
 VSTACK function, 207  
 TIME function, 175  
 TIMEVALUE function, 177-178  
 TOCOL function, 208  
 TODAY function, 171-172  
 TOROW function, 208  
 TRANSPOSE function, 240  
 TRIM function, 189-193  
 UDF function, 5  
 UNICHAR function, 192-195  
 UNICODE function, 195  
 UNIQUE function, 309-310  
 UPPER function, 188-189  
 #VALUE! errors, 134  
 VALUE function, 207  
 VBA user-defined function, 5  
 VECTORWRAP function, 208  
 VLOOKUP function, 190, 218, 225-227, 260  
 VSTACK function, 207  
 web functions, 734  
 WEEKDAY function, 178-179, 566  
 WEEKNUM function, 180  
 WORKDAY function, 183-185  
 XLOOKUP function, 225-227  
   matching lists, 230  
   returning cell references, 232  
   returning multiple values, 228-229  
   sideways searches, 229-230  
   twisted XLOOKUP, 230  
   two-way lookups, 230-231  
 XMATCH function, 230  
 YEAR function, 173  
 YEARFRAC function, 180  
**funneling chart data, 575**  
**Fuzzy Lookup add-in, 771**

## G

**galleries, 22, 65**  
**gaps in data, sparklines, 620**  
**GCD function, 159-160**  
**generating**  
   data diagrams with Visio Data Visualizer, 772  
   fake data, add-ins, 773-774  
**geographic data, filled map charts, 580**  
**Geography Data Type, 55**  
**GetOpenFileName, customizing macros, 467-468**

**GETPIVOTDATA function, 241-243**  
**GetSaveAsFileName, customizing macros, 467-468**  
**Goal Seek, 438-440**  
**greatest common denominators, GCD function, 159-160**  
**green bar formatting, 162**  
**gridlines, printing, 669**  
**grouping**  
   daily dates, pivot tables, 381-382  
   dates  
     by day of the week, WEEKDAY function, 178-179  
     into weeks, ISOWEEKNUM function, 179  
     into weeks, WEEKNUM function, 180  
   sparklines, 610-612

## H

**hand-drawn shapes, 18**  
**Header & Footer tools Design tab, ribbon, 653, 662-665**  
**headers/footers**  
   adding pictures/watermarks, 663-664  
   automatic headers, 662  
   custom headers, 663  
   different headers/footers in same document, 664-665  
   scaling, 665  
**headings**  
   names, adding multiple names from labels, 259  
   repeating on each page, 658  
**headlines, WordArt, 632-633**  
**heat maps, 543, 588**  
**heights (rows), formatting, 519-520**  
**help**  
   functions  
     Excel Help, 139-140  
     Function Arguments dialog box, 137-139  
     On-Grid ToolTips, 137  
   VBA, 462  
**hidden content, finding with Document Inspector, 34**  
**hiding icons in icon sets, 554**  
**Hierarchical SmartArt, 629-630**  
**High DPI displays, 55**  
**highlighting**  
   cells, 126  
   data, from specific days of the week, 566  
   extremes with color scales, 549-550  
   Greater Than, 557-559  
   Highlight Cells Rules, 556  
   rows  
     entire rows, 566-567  
     every other row, 567-568  
**histogram charts, frequency distribution, 577-578**  
**historical stock quotes, STOCKHISTORY function, 281**  
**Home screen, navigating, 32**

Home tab, formatting numbers, 503-505  
**HOUR** function, 173  
**HSTACK** function, 207  
 hyperlinks  
   adding with **HYPERLINK** function, 239  
   storing, 58  
**hypotenuse of right triangles**, **LAMBDA** function, 265-267

## I

**icons**, 624, 647-648  
   Cut-out People, 14-15  
   **QAT**  
     adding icons to **QAT**, 27  
     removing icons from **QAT**, 28  
     resequencing icons in **QAT**, 29  
     separating icons in **QAT**, 29  
   ribbon, selecting icons, 64-65  
   sorting data by, 43  
   whitespace, adding, 35  
**icon sets**  
   hiding icons, 554  
   mixing icons, 554  
   moving numbers closer to icons, 552-553  
   segregating data, 550-551  
   setting up, 551-552  
**IF** function, 211-217  
**If-End If** constructs, macro flow control, 471-472  
**IFERROR** function, 217-219  
**IFNA** function, 219  
**IFS** function, 215-217  
 ignoring  
   error cells, 149-151  
   filtered rows, 149-151  
**illustrations**, 624, 647-648  
**images**  
   adding to SmartArt, 628  
   transparency, 15-16  
**implicit intersections**, 56, 102, 111-112, 124  
**in-cell bar charts**, 544-545  
**incompatible formulas**, 56  
**INDEX** function, 158  
**indexing with SUMIFS** function, 4  
**INDIRECT** function, 237-238  
**individual characters, formatting**, 531-532  
**information functions**, 732-733  
   **CELL** functions, 223  
   **IS** functions, 220  
   **ISFORMULA** function, 219-220  
   **N** function, 221  
   **NA** functions, 221-223

**initial saves, sharing workbooks during**, 675  
**inking tools**, 494-495  
**Inquire**, 491 768-769  
**Insert Function** dialog box, finding functions, 136  
**inserting**  
   3D Models, 491-492  
   columns, Filtered Data, 4  
   Cut-out People, 647-648  
   icons, 647-648  
   illustrations, 647-648  
   pictures  
     Bing Images, 637  
     Clip Art, 636-637  
     from your computer, 635  
     into Excel, 635  
     multiple pictures at once, 635  
     Stock Images, 636-637  
   SmartArt, 626-627  
   stickers, 647-648  
   symbols into cells, 487  
**Insights (Smart Lookup)**, 495-496  
**intermediate formula results, storing with LET** function, 260-264  
**international text comparisons**, 4  
**invoice registers, formatting**, 454-456  
**IS** functions, 220  
**ISFORMULA** function, 219-220  
**ISOMITTED** function, 275  
**ISOWEEKNUM** function, 179  
**italic text**, 516-517

## J

**joining**  
   criteria with **DSUM** function  
     **AND** function, 247  
     **OR** function, 247-248  
   tables with Power Pivot (Data Model), 410-411  
   text  
     ampersand operator (&), 121  
     dates/time, 121-122  
     **TEXTJOIN** function, 121, 187-188  
     with numbers, 121-122  
**jumping**  
   to bottom of data, 77  
   to next corner of selections, 78  
**justifying text in ranges**, 534-535



**K****keyboards**

## accelerators

- backing up one level in menus, 66
- confusion, 66-68
- Excel 2003 accelerators, 79-80
- Excel 2003 Alt shortcuts, 80-81
- KeyTips, 63-64
- navigating drop-down menu lists, 66
- selecting dialog boxes, 68
- selecting gallery options, 65
- selecting icons on ribbon, 64-65

## legacy commands, 81-89

## shortcuts, 68

- accessing Slicers, 66
- adding dollar signs (\$) to references, 79
- calculating data, 73-77
- choosing slicer items, 79
- crossing tasks off lists, 78
- Ctrl shortcut keys, 69
- data entry, 73-77
- date/time stamps, 78
- extending selections, 72-73
- F6 loops, 66
- formatting data, 73-77
- jumping to bottom of data, 77
- jumping to next corner of selections, 78
- moving between worksheets, 77
- navigation shortcut keys, 70-71
- opening right-click menus, 78
- repeating last task, 78
- selecting cells, 71-72
- selecting current ranges, 77
- selecting data, 71-73

**key combinations**

- Ctrl+Backspace key combination, bringing active cells back into view, 489
- Ctrl+click key combination, unselecting cells, 39-40
- Ctrl+Down-Arrow key combination, handling variable numbers of rows, 455-456
- Ctrl+Enter key combination, copying formulas, 106
- Ctrl+T key combination (Table tool), copying formulas, 108-109
- Ctrl+Up-Arrow key combination, finding last records, 455

**KeyTips, 63-64****L****Label Filter fly-out, filtering pivot tables, 396-397****labels**

- 3D Maps, 602
- multiple names, adding from labels, 259
- sparklines, 618-620

**LAMBDA function**

- array calculations, 270
  - returning intermediate values, 273
  - returning single values, 271-272
- arrays, creating, 273-274
- BYCOL function, 269
- BYROW function, 269
- column calculations, 269
- helper functions, 12-13
- hypotenuse of right triangles, 265-267
- ISOMITTED function, 275
- loops, 267-268
- MAKEARRAY function, 273-274
- MAP function, 270
- optional arguments, 14, 275
- REDUCE function, 270-272
- row calculations, 269
- SCAN function, 270, 273
- sharing between workbooks, 267-268
- storing logic, 264, 265

**landscape orientation, printing, 657****largest customers, sorting collapsed subtotal view, 342-343****last command, repeating, 489****last records, finding with Ctrl+Up-Arrow key, 455****last rows with data, finding, 468-469****last task, repeating, 78****layers (3D Maps), combining, 599****LCM function, 160****leading/trailing spaces (text), removing**

- LEN function, 191
- TRIM function, 189-193
- VLOOKUP function, 190

**leading zeroes, adding to numbers with BASE function, 206-207****least common multiples, LCM function, 160****LEFT function, 196****legacy comments. See Notes****legacy dialog boxes, selecting, 68****legacy keyboard commands, 81-89****LEN function, 191, 198****LET function, 260-264****lightning bolt drop-down menu, 109****line charts, sparklines, 607****lines, animating between points in 3D Maps, 601**

**links**

## creating

- mouse, 289-290
- Paste Options menu, 286-287
- right-drag menu, 287-289
- to unsaved workbooks, 291
- with formulas, 291
- external workbook links, absolute references, 290
- Links tab, Trust Center, 292-293
- missing workbook links, 293
- opening closed workbooks, 293
- Update Links dialog box, preventing from appearing, 294-295
- updating, 293-294

**lists**

- crossing tasks off, 78
- matching, 230

**loading data, Power Query, 329-330**

- single workbook, 323-324
- sources, 322

**load times, 3****locating**

- arrays, data types, 278-279
- cells
  - with data from past 30 days, 565-566
  - within three days of today, 565
- characters in text cells
  - with FIND function, 198-201
  - with SEARCH function, 200-202
- Find dialog box, showing all options, 8
- FIND function, locating characters in text cells, 198-201
- functions
  - in Formulas tab, 135
  - with Insert Function dialog box, 136
- hidden content with Document Inspector, 34
- last rows with data, 468-469
- lost ribbon commands, 25-26
- near matches with Fuzzy Lookup, 771
- number of characters in text cells with LEN function, 198
- printing settings, 652-653
- shared
  - documents, 680
  - workbooks, 679

**logic, storing with LAMBDA function, 264-265****logical functions, 704-705**

- AND function, 213
- CHOOSE function, 216-217
- comparison operators, 212
- IFERROR function, 217-219
- IF function, 211-213
  - nesting, 214-217

- IFNA function, 219
- IFS function, 215-217
- NOT function, 217
- OR function, 214
- SWITCH function, 215-217

**long text passages, flowing into ranges, 633-634****lookup/reference functions, 711-714**

- CHOOSE function, 224
- FORMULATEXT function, 232-234
- GETPIVOTDATA function, 241-243
- HYPERLINK function, 239
- INDIRECT function, 237-238
- OFFSET function, 234-237
- TRANSPOSE function, 240
- XLOOKUP function, 225-227
  - matching lists, 230
  - returning cell references, 232
  - returning multiple values, 228-229
  - sideways searches, 229-230
  - twisted XLOOKUP, 230
  - two-way lookups, 230-231
- XMATCH function, matching lists, 230

**lookups**

- simple lookups, CHOOSE function, 224
- two-way lookups, XLOOKUP function, 230-231

**loops**

- deleting records, 474-476
- F6 loops, 66
- FinalRow, combining with, 471
- LAMBDA function, 267-268
- rows, 469
- testing records, 473-474

**lost ribbon commands, finding, 25-26****lowercase text, sorting data, 44****LOWER function, 188-189****M****macros**

- advanced filters for unique records, 479-481
- AutoFilter, 481-482
- cells, selecting, 482-483
- customer reports, creating, 477-484
- customizing, 467-468
- debugging, 476
- disabling notifications, 446
- editing, 457
- everyday-use macros, customizing, 467-468
- flow control
  - If-End If constructs, 471-472
  - Select Case constructs, 472-473
- formatting, mail merges, 447-449

GetOpenFileName, 467-468  
 GetSaveAsFileName, 467-468  
 If-End If constructs, 471-472  
 invoice register example, 454-456

#### loops

deleting records, 474-476  
 testing records, 473-474  
 with FinalRow, 471

#### macro recorder

default state, 449-450  
 parameters, 461-462  
 starting, 451-452

mail merges, 447-449

notifications, disabling, 446

R1C1-style formulas, 464-465

range references, 470

recording, 446-447

in blank workbooks, 455-456  
 macro recorder, default state, 449-450  
 macro recorder, parameters, 461-462  
 macro recorder, starting, 451-452  
 Relative References, 450

#### rows

finding last rows with data, 468-469  
 looping through rows, 469

running, 453-454

security, 446

Select Case constructs, 472-473

slow motion, running in, 476-477

spillable formulas, 466

troubleshooting, 477

variables, 463-464

#### VBA

macros, 5  
 security, 446

**magnitude of error, determining with ABS function, 159**

**mail merges, formatting macros, 447-449**

**MAKEARRAY function, 273-274**

**managing workbook access, 677-678**

**Manual Calculation mode, pivot tables, 380**

**manual page breaks, 660-661**

**MAP function, 270**

#### mapping

3D Maps, 587

alternate maps, 603  
 animating lines between points, 601  
 animating over time, 591  
 color, 589  
 column charts, 588  
 combining layers, 599  
 custom maps, 604-605

data entry, 594-597

Flat Map option, 600

heat maps, 588

labels, 602

photos, 598-600

resizing columns, 599

resizing panes, 600

rotating, 598

satellite photos, 600

shaded area maps, 587

store maps, 603

time choices, 601

tipping, 598

tours, 603

world maps, 600

zooming in/out, 589-594, 598

data to sparklines, 608-609

geographic data with filled map charts, 580

**margins (worksheets), changing, 657**

#### matching

lists, 230

near matches, finding with Fuzzy Lookup, 771

**mathematical operators, formulas, 115-116**

**mathematical transformations, Flash Fill, 41**

#### math functions

ABS function, 159

AGGREGATE function, 149-151

ARABIC function, 158

AVERAGEIFS function, 163-164

CEILING function, 154

CEILING.MATH function, 154

COUNTA function, 152

COUNT function, 152

COUNTIFS function, 163-164

FLOOR function, 154

FLOOR.MATH function, 154

GCD function, 159-160

INDEX function, 158

LCM function, 160

MAXIFS function, 163-164

MINIFS function, 163-164

MOD function, 160-162

MROUND function, 153

POWER function, 162

RANDARRAY function, 157

RANDBETWEEN function, 157

RAND function, 156

ROMAN function, 158

ROUNDDOWN function, 153

ROUND function, 153-154

ROUNDUP function, 153

SORTBY function, 157  
 SQRT function, 162-163  
 SUBTOTAL function  
     multiple levels of totals, 155  
     totaling visible cells, 156  
 SUM function, 140-142, 147-148. *See also* AutoSum  
 SUMIFS function, 163-165  
 trig functions, 714-718  
**MAXIFS function, 163-164**  
**medians (pivot tables), creating with DAX measures, 418-421**  
**menus**  
     backing up one level, 66  
     lightning bolt drop-down menus, 109  
     right-click menus, opening, 78  
**merging**  
     cells, 4, 520-523  
     workbooks, 438  
**methods, VBA, 459**  
**Microsoft 365 Excel, improvements to performance, 4**  
**MID function, 197**  
**MINIFS function, 163-164**  
**mini toolbar, formatting selected text, 36**  
**MINUTE function, 173**  
**miracle criteria ranges, DSUM function, 249-250**  
**missing**  
     data  
         not plotting in charts, 221-223  
         sparklines, 620  
     linked workbooks, 293  
**mixing**  
     icons in icon sets, 554  
     references, 98-99  
**MOD function, 160-162**  
**monitors, two-monitor setups, 55**  
**Monte Carlo analysis, 444**  
**MONTH function, 173**  
**months**  
     daily dates, subtotaling by months, 348  
     pivot table summaries, 381-382  
**More commands, 22-23**  
**mouse links, creating, 289-290**  
**mouse method, formula entry, 103**  
**moving**  
     between worksheets, 77  
     numbers closer to icons in icon sets, 552-553  
**MROUND function, 153**  
**multiple fields, subtotaling, 347**  
**multiple names, adding at once, 259**  
**multiple pictures, inserting into Excel at once, 635**  
**multiple sets of parentheses ( ( ) ), 117-118**

**multiple task panes, opening at once, 11**  
**multiple values, returning with XLOOKUP function, 228-229**  
**multiple worksheets, unhiding, 3**  
**multiplication/division operations, order in formulas, 117**

## N

**N function, 221**  
**NA function, 221-223**  
**Name dialog box, navigating cells with, 255**  
**names**  
     absolute references, avoiding, 260  
     adding multiple names at once, 259  
     assigning, 254  
     formulas  
         applying retroactively, 258-259  
         simplifying with named ranges, 257-258  
     headings, adding multiple names from labels, 259  
     labels, adding multiple names from labels, 259  
     navigating with Name dialog box, 255  
     ranges, simplifying formulas, 257-258  
     retroactively applying to formulas, 258-259  
     workbook-level names, 256-257  
     worksheets, returning names with CELL function, 223  
**navigating**  
     Backstage view, File menu, 31  
     bottom of data, jumping to, 77  
     cells by name with Name dialog box, 255  
     drop-down menu lists, 66  
     Home screen, 32  
     menus, backing up one level, 66  
     ranges by name with Name dialog box, 255  
     ribbon, 22  
     shortcut keys, 70-71  
     worksheets, 35  
**navigation pane, Accessibility Checker, 11-12**  
**near matches, finding with Fuzzy Lookup, 771**  
**nested functions**  
     Function Arguments dialog box, 139  
     IF function, 214-217  
**NETWORKDAYS function, 184-186**  
**new functions, 18-19**  
**next corner of selection, jumping to, 78**  
**Normal view, 39**  
**NOT function, 217**  
**notes**  
     in cells, 535-538  
     sharing workbooks, 689  
**notifications**  
     disabling macros, 446  
     sharing workbooks, 678-680

**nouns**

- object.method as, 459
- plural noun comparisons to collections, 459

**NOW function, 171-172****numbers**

## adding

- AutoSum, 140-144
- SUM function, 147-148
- with status bar, 38-39

Arabic numbers, ARABIC function, 158

as criteria, DSUM function, 248

calculating, 163-165

converting to text, VALUE function, 207

currency, displaying, 506

dates/time, 165

- comparing, conditional formatting, 559-560

- custom numeric formatting, 512-513

- DATEDIF function, 180-182

- DATE function, 173-175

- DATEVALUE function, 176-177

- DAY function, 173

- DAYS function, 183

- displaying, 507

- EOMONTH function, 183

- formatting, 168-170

- HOUR function, 173

- ISOWEEKNUM function, 179

- MINUTE function, 173

- MONTH function, 173

- NETWORKDAYS function, 184-186

- NOW function, 171-172

- potential problems, 166-167

- SECOND function, 173

- TIME function, 175

- TIMEVALUE function, 177-178

- TODAY function, 171-172

- troubleshooting, 166-167

- WEEKDAY function, 178-179

- WEEKNUM function, 180

- WORKDAY function, 183-185

- YEAR function, 173

- YEARFRAC function, 180

exponents, calculating with POWER function, 162

filling in Flash Fill, 41

filters, 358-359

## formatting

- as text with TEXT function, 204-205

- currency, 506

- custom formats, 509-513

- dates, 507

- fractions, 507

- leading zeroes, adding with BASE function, 206-207

- phone numbers, 508

- Social Security numbers, 509

- times, 507

- with Format Cells dialog box, 505

- with Home tab, 503-505

- with thousands separators, 506

- ZIP Codes, 508-509

fractions, displaying, 507

greatest common denominators, GCD function, 159-160

joining text with, 121-122

least common multiples, LCM function, 160

magnitude of error, determining with ABS function, 159

moving closer to icons in icon sets, 552-553

page numbers, 656, 670

phone numbers, displaying, 508

pivot tables, formatting numeric fields, 378-379

## random numbers

- choosing with INDEX function, 158

- generating arrays with, 313

- generating, RANDARRAY function, 157

- generating, RANDBETWEEN function, 157

- generating, RAND function, 156

- sorting with SORTBY function, 157

range descriptions, OFFSET function, 234-237

remainders of division problems, finding with MOD function, 160-162

Roman numbers, ROMAN function, 158

## rounding

- CEILING function, 154

- CEILING.MATH function, 154

- FLOOR function, 154

- FLOOR.MATH function, 154

- MROUND function, 153

- ROUNDDOWN function, 153

- ROUND function, 153-154

- ROUNDUP function, 153

scientific notation, displaying, 513

sequences generating, 310-312

Social Security numbers, displaying, 509

square roots, calculating with SQRT function, 162-163

time/dates, 165

- custom numeric formatting, 512-513

- DATE function, 173-175

- DATEDIF function, 180-182

- DATEVALUE function, 176-177

- DAY function, 173

- DAYS function, 183

- displaying, 507

- EOMONTH function, 183

- formatting, 168-170

HOUR function, 173  
 ISOWEEKNUM function, 179  
 MINUTE function, 173  
 MONTH function, 173  
 NETWORKDAYS function, 184-186  
 NOW function, 171-172  
 potential problems, 166-167  
 SECOND function, 173  
 TIME function, 175  
 TIMEVALUE function, 177, 178  
 TODAY function, 171-172  
 troubleshooting, 166-167  
 WEEKDAY function, 178-179  
 WEEKNUM function, 180  
 WORKDAY function, 183-185  
 YEAR function, 173  
 YEARFRAC function, 180  
 totaling with SUBTOTAL function  
   multiple levels of totals, 155  
   visible cells, 156  
 ZIP Codes, displaying, 508-509

## O

**object.method, VBA, 459**  
**objects**  
   saving as pictures, 16  
   VBA, 459  
**object variables, VBA, 463-464**  
**Office Add-Ins store, 767**  
**Office themes, 527-529**  
**OFFSET function, 234-237**  
**one-click printing, 651-652**  
**one-click sorting, 46**  
**OneDrive, storing workbooks, 674**  
**one-page summaries, showing with subtotals, 342**  
**On-Grid ToolTips, functions, 137**  
**Online Pictures, 624**  
   arranging, 645-647  
   Artistic Effects, 642  
   Aspect Ratio, 638  
   brightness, 639-640  
   contrast, 639-640  
   cropping, 639  
   file sizes, 644  
   formatting with ribbon tab, 637  
   inserting into Excel, 636-637  
   Picture Styles gallery, 640-642  
   removing backgrounds, 642-643  
   resizing, 637  
   rounded corners, 639  
   selecting, 645-647

  sharpness, 639-640  
   transparency, 640  
**opening**  
   Backstage view, File menu, 30  
   file extensions, 56  
   File menu, full screen, 30  
   multiple task panes at once, 11  
   recent files, 58  
   right-click menus, 78  
   workbooks  
     searching while opening, 8  
     UDF, 4

**operators**  
   comparison operators, 212  
   formula operators, 115-116  
**optional arguments, LAMBDA functions, 14**  
**order of operations, formulas, 116-118**  
**OR function, 214, 247-248**  
**organizational charts, 629-630**  
**orientation, printing, 657**  
**original text, returning edited text to with T function, 207**  
**overriding order of operations with parentheses ( ) , 116**

## P

**page breaks, 661**  
   automatic page breaks, 660  
   manual page breaks, 660  
   Page Break Preview, 39, 654  
**Page Layout tab, ribbon, 652, 657**  
**Page Layout view, 39, 652, 657, 662-665, 668-669**  
**page numbers, 656, 670**  
**Page Setup dialog box, 652, 657, 668**  
**paintbrush icon, charts, 574-575**  
**panes (3D Maps), resizing, 600**  
**parameters, VBA, 460-462**  
**parentheses ( )**  
   functions, 133  
   multiple sets of, 117-118  
   overriding order of operations, 116  
   stacking, 117-118  
**Pareto charts, 578**  
**parts of formulas, evaluating, 130**  
**parts of worksheets, excluding from printing, 659**  
**past 30 days, finding cells with data, 565-566**  
**Paste Options menu, creating links, 286-287**  
**pasting**  
   conditional formatting, 539  
   formulas, 538-539  
   from clipboard, 4  
   new data to charts, 580-583  
**.PDF, worksheets as, 671**

**People Graph, 773****percentages of totals, showing in pivot tables, 385-386****performance**

- load times, 3
- Microsoft 365 Excel improvements, 4
- ribbon, 14
- stock data, 5-6
- VBA Editor, 5

**phone numbers, displaying, 508****pictures, 624**

- 3D Maps, 598-600
- adding to headers, 663-664
- arranging, 645-647
- Artistic Effects, 642
- Aspect Ratio, 638
- backgrounds, 642-643
- brightness, 639-640
- contrast, 639-640
- cropping, 639
- file sizes, 644
- formatting with ribbon tab, 637
- inserting
  - Bing Images, 637
  - Clip Art, 636-637
  - from your computer, 635
  - into Excel, 635
  - multiple pictures at once, 635
  - Stock Images, 636-637
- Picture Styles gallery, 640-642
- removing backgrounds, 642-643
- resizing, 637
- rounded corners, 639
- saving objects as, 16
- Screen Clippings, 645
- selecting, 645-647
- sharpness, 639-640
- transparency, 640

**pie charts, small pie slices, 583-584****pivot tables**

- adding
  - fields, 373-374
  - outside calculations, 382-383
- artificial intelligence as inspiration, 371-373
- blank pivot tables, 373
- blank rows, 380
- blanks, removing, 378-379
- building, Power Pivot (Data Model), 413
- calculations, 381
  - adding outside calculations, 382-383
  - changing field calculations, 383-385

- changing
  - cells, 380
  - reports by field lists, 374-376
- collapsible task panes, 10
- conditional formatting, 570-571
- converting to dashboard formulas, 423-424
- copying for each customer, 407
- counting distinct, 414-416
- creating, 373-374
- customizing, 374-376
- data views, 369
- development of, 369-370
- drop zones, 377-378
- fields
  - adding, 373-374
  - changing calculations, 383-385
- filtering
  - AutoFiltering, 405-407
  - check boxes, 395-396
  - clearing, 395
  - Date Filters fly-out, 397
  - dates, 405
  - including filtered items in totals, 416-418
  - Label Filter fly-out, 396-397
  - row label filter, 393-395
  - slicers, 399-404
  - Top 10 Filter dialog box, 398-399
- formatting
  - cells, 379
  - numeric fields, 378-379
- Manual Calculation mode, 380
- medians, creating with DAX measures, 418-421
- missing tools, recovering, 380
- months, 381-382
- percentages of totals, showing, 385-386
- quarters, 381-382
- rankings, 386-387
- refreshing, 380
- replicating for each customer, 407
- retrieving cells, GETPIVOTDATA function, 241-243
- roll-ups, 381-382
- row label filter, 393-395
- running totals, showing, 386-387
- showing
  - percentages of totals, 385-386
  - running totals, 386-387
  - tools, 380
- slicers, filtering with
  - adding slicers, 399-400
  - arranging slicers, 400-401
  - using slicers, 401-404

- sorting, 407
  - summarizing, daily dates into months, quarters, years, 381-382
  - troubleshooting, 25, 380
  - viewing changes, 380
  - years, 381-382
  - plural nouns, comparing to collections, 459**
  - plus icon, charts, 576**
  - PMT function, 429-430**
  - POWER function, 162**
  - Power Pivot (Data Model), 370, 409**
    - additional information, 426
    - benefits of, 426
    - Diagram view, 412
    - hidden features, unlocking, 414
    - joining multiple tables, 410-411
    - limitations/workarounds, 424-426
    - pivot tables
      - building, 413
      - converting to formulas, 423-424
      - counting distinct, 414-416
      - creating medians with DAX measures, 418-421
      - including filtered items in totals, 416-418
      - time intelligence, DAX measures, 421-423
    - relationships between tables, creating, 411-412
  - Power Query, 321**
    - columns, adding, 328
    - custom data types, creating, 335-337
    - functions, 760-763
    - loading data, 329-330
      - single workbook, 323-324
      - sources, 322
    - profiling data, 334
    - refreshing data, 330
    - reviewing queries, 328-329
    - splitting delimiters in new rows, 330-331
    - transforming data, 324-326
    - unpivoting data, 326-327
    - workflows, establishing, 322
    - worksheets, appending
      - one worksheet from every workbook in folder, 331-332
      - one worksheet from one workbook, 332-333
  - presence, collaboration, 680-681**
  - previous versions, rolling back with Version History, 692, 693**
  - printing**
    - as .PDF, 671
    - centering reports on page, 669-670
    - changing
      - Page Setup settings, 668
      - printer properties, 668
    - choosing
      - printers, 666
      - what to print, 667
    - comments, 670
    - Excel Options, 654
    - excluding parts of worksheets from printing, 659
    - finding settings, 652, 653
    - gridlines, 669
    - Header & Footer tools Design tab, ribbon, 653, 662-665
    - headings, repeating on each page, 658
    - margins, 657
    - one-click printing, 651-652
    - orientation, 657
    - Page Break Preview, 654, 661
    - Page Layout tab, ribbon, 652, 657
    - Page Layout view, 652, 657, 662-665, 668-669
    - page numbers, 656, 670
    - Page Setup dialog box, 652, 657, 668
    - paper size, 657
    - Printer Properties dialog box, 654
    - Print panel, File menu, 652, 666-667
    - Print Preview Full Screen, 654-656
    - Print Preview, Print panel, 654-656
    - Print What gallery, 667
    - Quick Print, 651-652
      - replacing error values, 670
      - scaling data to fit pages, 660
  - profiling data with Power Query, 334**
  - Project pane, VBE, 457**
  - PROPER function, 189**
  - properties**
    - Properties pane, VBE, 457
    - VBA, 462
  - protecting worksheets, 488-489**
- ## Q
- QAT (Quick Access Toolbar)**
    - adding icons, 27
    - customizing, 28-29
    - KeyTips, 63-64
    - mouse method, formula entry, 104
    - Quick Print, 651-652
    - removing icons, 28
    - resequencing icons, 29
    - separating icons, 29
  - quarters, pivot table summaries, 381-382**
  - queries, reviewing with Power Query, 328-329**
  - Quick Access Toolbar, 14**
  - quick formatting, 562-563**
  - Quick Print, 651-652**



**R**

**R1C1-style formulas, macros, 464-465**

**RANDARRAY function, 304-305, 313**

**random numbers, generating arrays, 313**

**random numbers/data**

choosing with INDEX function, 158

generating

RANDARRAY function, 157

RANDBETWEEN function, 157

RAND function, 156

sorting with SORTBY function, 157

**ranges**

criteria ranges, DSUM function

miracle ranges, 249, 250

returning all records with blank ranges, 246

simple ranges, 246

current ranges, selecting, 77

defining as tables, 108

deleting ranges with merged cells, 4

describing with numbers, OFFSET function, 234-237

flowing long text passages in, 633-634

justifying text, 534-535

names, 253

navigating with Name dialog box, 255

simplifying formulas, 257-258

workbook-level names, 256-257

references, macros, 470

Spilled Range Operator (#), 112, 313

**rankings, pivot tables, 386-387**

**reapplying filters, 353**

**recent files, opening, 58**

**Recent Workbooks list, clearing, 32**

**Recommended Charts, choosing from, 573-574**

**recording macros, 446-447**

in blank workbooks, 455-456

macro recorder

default state, 449-450

parameters, 461-462

starting, 451-452

Relative References, 450

**records**

AutoFilter, 481, 482

conditionally sum records, DSUM function, 245-246

filtering

advanced filter, 360-367

clearing filters, 353

columns with applied filters, 352

combining filters, 352

copying results, 360

dates, 357-359

features of, 349

Filter by Color, 356-357

Filter by Selection, 353-356

formatting results, 360

numbers, 358-359

reapplying filters, 353

refreshing filters, 353

resizing drop-down menu, 353

selecting multiple items, 351-352

text, 358-359

totaling results, 360

using, 349, 350

loop records

deleting, 474-476

testing, 473-474

returning with blank criteria ranges, 246

summing, DSUM function, 245-246

unique records, advanced filters, 479-481

**recovering unsaved workbooks, 32**

**rectangular ranges, F4 key, 101-102**

**REDUCE function, 270-272**

**reference functions**

CHOOSE function, 224

FORMULATEXT function, 232-234

GETPIVOTDATA function, 241-243

HYPERLINK function, 239

INDIRECT function, 237-238

OFFSET function, 234-237

TRANSPOSE function, 240

XLOOKUP function, 225-227

matching lists, 230

returning cell references, 232

returning multiple values, 228-229

sideways searches, 229-230

twisted XLOOKUP, 230

two-way lookups, 230-231

XMATCH function, matching lists, 230

**references**

absolute references (\$\$), 96-98

avoiding with names, 260

external workbook links, 290

arrays

entire arrays, 313

Spilled Range Operator (#), 112, 313

cells

building/evaluating with INDIRECT function, 237-238

returning with LOOKUP function, 232

dollar signs (\$)

adding to references, 79

absolute references (\$\$), 96-98, 260, 290

- lookup and reference functions, 711-714
- workbook-level names, 257
- refreshing**
  - data, Power Query, 330
  - filters, 353
  - pivot tables, 380
  - stock data, 5, 6
- relationships, tables, 411-412**
- relative references, 122-123**
  - formulas, 96
  - recording macros, 447, 450
- remainders of division problems, finding with MOD function, 160-162**
- reminders (CSV files), turning on/off, 34-35**
- remote working. See collaboration**
- removing**
  - backgrounds from pictures, 642-643
  - blanks from pivot tables, 378-379
  - duplicates from filtered results, 364-365
  - icons from QAT, 28
  - leading/trailing spaces (text)
    - LEN function, 191
    - TRIM function, 189-193
    - VLOOKUP function, 190
  - manual page breaks, 661
  - page breaks, 661
  - subtotals, 346
- reordering columns, sorting data, 44**
- repeating**
  - columns, 658
  - headings on each page, 658
  - last command, 489
  - last tasks, 78
  - rows, 658
  - text with REPT function, 202-204
- replacing**
  - error values when printing, 670
  - text characters with SUBSTITUTE function, 202
- replicating pivot tables for each customer, 407**
- reports**
  - customer reports, creating, 477-484
  - excluding parts of reports from printing, 659
  - headers/footers
    - adding pictures/watermarks, 663-664
    - automatic headers, 662
    - custom headers, 663
    - different headers/footers in same document, 664-665
    - scaling, 665
  - headings, repeating on each page, 658
  - margins, 657
  - orientation, 657
  - page breaks, 660-661
  - pivot table reports, changing with field lists, 374-376
  - printing
    - as PDF, 671
    - centering reports on page, 669-670
    - changing Page Setup settings, 668
    - changing printer properties, 668
    - choosing printers, 666
    - comments, 670
    - controlling first page numbers, 670
    - gridlines, 669
    - page numbers, 656
    - paper size, 657
    - previewing, 654-656
    - Print panel, File menu, 666
    - replacing error values, 670
    - what to print, 667
  - saving as PDF, 671
  - scaling data to fit pages, 660
  - Scenario Summary reports, 438
- REPT function, 202-204**
- resequencing icons in QAT, 29**
- resizing**
  - columns, 3D Maps, 599
  - Excel, ribbon changes, 24
  - Filter drop-down menu, 353
  - formula bar, 36-37
  - panes, 3D Maps, 600
  - pictures, 637
- results of distant cells, watching, 485-486**
- retrieving cells from pivot tables with GETPIVOTDATA function, 241-243**
- retroactively applying names to formulas, 258-259**
- returning**
  - arrays, data types, 277
  - cell references with XLOOKUP function, 232
  - intermediate values in arrays with REDUCE function, 273
  - multiple values with XLOOKUP function, 228-229
  - records with blank criteria ranges, 246
  - single values in arrays with REDUCE function, 271-272
  - to original text with T function, 207
- reusing theme effects, 530**
- reviewing queries with Power Query, 328-329**
- ribbon**
  - Accessibility Checker, 11-12
  - changes from resizing Excel, 24
  - contextual tabs, 25
  - Developer tab, 24
  - dialog box launcher, 22-23
  - finding lost commands, 25-26
  - fly-out menus, 22

- formatting pictures, 637
- galleries, 22
- Header & Footer tools Design tab, 653, 662-665
- icons, selecting, 64-65
- navigating, 22
- Page Layout tab, 652, 657
- performance, 14
- rounded edges, 14
- scrolling through tabs, 22
- shrinking, 26
- sizing, 26
- task panes, 22-23
- updates, 21
- VBA tools, 24

**right-click menus, opening, 78**

**right-drag menu**

- formulas, converting to values, 289
- links, creating, 287-289

**RIGHT function, 196**

**right triangles, hypotenuse of, 265-267**

**rolling back changes, Version History, 692-693**

**roll-ups, pivot tables, 381-382**

**ROMAN function, 158**

**rotating**

- 3D Maps, 598
- 3D Models, 492
- text, 523-524

**rounded corners, pictures, 639**

**rounded edges, ribbon, 14**

**rounding numbers, 153-154**

**row input cells, 431**

**rows**

- 2D arrays, 208
- blank rows, pivot tables, 380
- CHOOSEROWS function, 208
- delimiters, splitting in new rows, 330-331
- filtered rows, ignoring with AGGREGATE function, 149-151
- FinalRow, loops, 471
- heights, formatting, 519-520
- highlighting
  - entire rows, 566-567
  - every other row, 567-568
- LAMBDA function calculations, 269
- last rows with data, finding, 468-469
- loops, 469
- pivot tables, row label filter, 393-395
- repeating, 658
- row label filter, pivot tables, 393-395
- subtotal rows
  - copying only, 344-345
  - formatting, 345-346

TOROW function, 208

variable number of rows, handling with Ctrl+Down-Arrow key combination, 455

VECTORWRAP function, 208

**rules**

- advanced formatting, 562, 563
- conditional formatting, rules based on formulas, 564-565
- formatting rules, combining, 568-569
- Highlight Cells Rules, 556
- Text That Contains formatting rule, 561-562
- top/bottom rules, conditional formatting, 554-555

**running**

- macros, 453-454
- totals, showing in pivot tables, 386-377

## S

**satellite photos, 3D Maps, 600**

**Save As, browsing during, 7**

**saving**

- AutoSave, 694
- chart styles as templates, 584-585
- objects as pictures, 16
- themes, 530
- workbooks, sharing during initial saves, 675
- worksheets as PDF, 671

**scaling**

- data to fit pages, printing, 660
- headers/footers, 665
- sparklines, 610

**SCAN function, 270, 273**

**Scenario Manager**

- comparing results, 435
- loading values, 435
- multiple scenarios, adding, 438
- Scenario Summary reports, 438
- Scenario Values dialog box, 437
- setting up scenarios, 436-437
- using, 435-437
- workbooks, merging, 438

**Scenario Summary reports, 438**

**science projects, Data Streamer, 772**

**scientific notation, displaying, 513**

**Screen Clippings, 645**

**scrolling tabs in ribbon, 22**

**searches**

- Bing Images, 637
- from title bar, 56
- SEARCH function, locating characters in text cells, 200-202
- sideways searches, XLOOKUP function, 229-230
- Stock Images, 636
- workbooks, while opening, 8

**SECOND function, 173**

**security, macros, 446**

**seeing**

all formulas, 126

direct precedents, 126-127

**segregating data, icon sets, 550-551**

**Select Case constructs, macro flow control, 472-473**

**selecting**

cells

shortcut keys, 71-72

with macros, 482-483

current ranges, 77

data

extending selections shortcut keys, 72-73

shortcut keys, 71-72

dialog boxes, 68

Filter by Selection, 353-356

gallery options, 65

icons on ribbon, 64-65

legacy dialog boxes, 68

multiple Filter items, 351-352

next corner of selections, jumping, 78

pictures, 645-647

subsets of columns with FILTER function, 307

**sentiment analysis, Azure Machine Learning, 772**

**separating**

icons from QAT, 29

text with delimiters, 489-490

**sequences**

numbered sequences, generating, 310-312

SEQUENCE function, 310-312

unique sequences, sorting data, 45

**setting expiration dates when sharing workbooks, 676-677**

**setting up icon sets, 551-552**

**shaded area maps, 587**

**shapes, 623**

choosing styles, 632

displaying cell contents, 630-632

hand-drawn, 18

**sharing**

LAMBDA function between workbooks, 267-268

themes, 531

workbooks

comments, 677, 687, 692

during initial saves, 675

expiration dates, 676-677

finding shared workbooks, 679-680

@Mentions, 677, 687, 692

Notes, 689

notifications, 678-680

threaded comments, 688-689

tracking changes, Catch Up button, 692

tracking changes, Show Changes, 690

tracking changes, Version History, 690-693

with Share button, 676

**sharpness, pictures, 639-640**

**Sheet Views, filtering/sorting data, 683-686**

**shortcuts, keyboard, 68**

calculating data, 73-77

choosing slicer items, 79

crossing tasks off lists, 78

Ctrl shortcut keys, 69

data entry, 73-77

date/time stamps, 78

dollar signs (\$), adding to references, 79

extending selections, 72-73

F6 loops, 66

formatting data, 73-77

jumping

to bottom of data, 77

to next corner of selections, 78

moving between worksheets, 77

navigation shortcut keys, 70-71

opening right-click menus, 78

repeating last task, 78

selecting

cells, 71-72

current ranges, 77

data, 71-73

slicers, accessing, 66

**Show Changes, 6, 690**

**Show Formulas mode, 126**

**showing**

access to workbooks, 677-678

all options in Find dialog box, 8

data bars for subsets of cells, 548

financial data, waterfall charts, 579

pivot tables

running totals, 386-387

tools, 380

sparkline details, 618-620

subtotals, one-page summaries, 342

**shrinking ribbon, 26**

**side by side view, worksheets, 284-285**

**sideways searches, XLOOKUP function, 229-230**

**simple criteria ranges, DSUM function, 246**

**simple lookups, CHOOSE function, 224**

**simple variables, VBA, 463-464**

**simplifying formulas, named ranges, 257-258**

**sizing**

columns, 3D Maps, 599

panes, 3D Maps, 600

paper, printing, 657

pictures, 637

ribbon, 26

### slicers

accessing, 66

choosing items from, 79

pivot tables

adding slicers, 399-400

arranging slicers, 400-401

using slicers, 401-404

### slow motion

formulas

calculations, 486-487

evaluating, 129

running macros in, 476

### SLUGIFY function, 267

### small pie slices, pie charts, 583-584

### small reports, centering on page, 669-670

### SmartArt, 623

adding images, 628

changing existing SmartArt to new styles, 627

common elements, 625

Hierarchical SmartArt, 629-630

inserting, 626-627

organizational charts, 629-630

styles, 624-625

### Smart Lookup (Insights), 495

### smooth scrolling cells, 9

### Social Security numbers, displaying, 509

### Solver, 440, 768

installing, 441

Monte Carlo analysis, 444

premium versions, 443

solving models, 441-443

using, 441-443

### SORT function, 301-305

### SORTBY function, 303-304

### sorting

collapsed subtotal view with largest customers at top,  
342-343

data

AZ/ZA buttons, 43

by color, 43

by icons, 43

case-sensitive text, 44

custom lists, 45

lowercase/uppercase text, 44

one-click sorting, 46

reordering columns, 44

troubleshooting, 46-47

unique sequences, 45

workbook data, Sheet Views, 683-686

formulas, 301-305

pivot tables, 407

### spaces

custom numeric formatting, 511

text, removing trailing spaces

with LEN function, 191

with TRIM function, 189-193

with VLOOKUP function, 190

### sparklines

axis values, 614-615

built-in choices, 612-614

color, 614

column charts, 607, 617

copying, 620

creating, 608-612

customizing, 612-614

enlarging, 618-620

gaps in data, 620

groups, 610-612

labels, 618-620

line charts, 607

mapping data to, 608-609

missing data, 620

scaling, 610

showing details, 618-620

stacked column charts, 617

Win/Loss charts, 607, 613, 616

### spearing formulas, 148

### specific days of the week, highlighting data from, 566

### specifying custom 3D Maps, 604-605

### spillable formulas, macros, 466

### Spilled Range Operator (#), 112, 313

### spilling formulas, 110-111

### splitting

delimiters in new rows, 330-331

text, 195

LEFT function, 196

MID function, 197

RIGHT function, 196

TEXTSPLIT function, 207

### SQRT function, 162-163

### SQRTPI function, 162

### square roots, calculating with SQRT function, 162-163

### stacked column charts, sparklines, 617

### stacking parentheses ( ( ) ), 117-118

### stamps, date/time, 78

**statistics**

- Analysis ToolPak, 769-771
- functions, 719-729
- workbooks, viewing, 495

**status bar, adding numbers, 38-39****stickers, 624, 647-648****stock data, 5-6, 280****STOCKHISTORY function, 281****Stock Images, inserting into Excel, 636-637****store maps, 3D Maps, 603****storing**

- formula results with LET function, 260-264
- hyperlinks, 58
- logic with LAMBDA function, 264-265
- workbooks, 674

**styles**

- chart styles, 574-575, 584-585
- formatting cells, 525-527
- pictures
  - Artistic Effects, 642
  - Picture Styles gallery, 640-642
- shapes, choosing, 632
- SmartArt, 624-627

**subscripts, formatting, 29****subsets**

- cells, showing data bars, 548
- columns, selecting subsets with FILTER function, 307

**SUBSTITUTE function**

- generating text characters, 192
- replacing text characters, 202

**subtotals**

- automatic subtotals, adding, 339-341
- collapsed subtotal view, sorting with largest customers at top, 342-343
- daily dates by month, 348
- multiple fields, 347
- one-page summaries, showing subtotals, 342
- removing, 346

**rows**

- copying only rows, 344-345
- formatting, 345-346

**SUBTOTAL function**

- multiple levels of totals, 155
- totaling visible cells, 156

**subtraction operations, order in formulas, 117****SUM function, 140-142, 147-148. See also AutoSum****SUMIFS function, 4, 163-165****summarizing data**

- daily dates, pivot tables, 381-382
- date filters, 357-359
- filtering, 349-350

adding values, 366-367

advanced filter, 360-367

clearing filters, 353

columns with applied filters, 352

combining duplicates, 366-367

combining filters, 352

copying filtered results, 360

formatting filtered results, 360

Filter by Color, 356-357

Filter by Selection, 353-356

number filters, 358-359

reapplying filters, 353

refreshing filters, 353

removing duplicates from filtered results, 364-365

resizing drop-down menu, 353

selecting multiple items, 351-352

totaling filtered results, 360

one-page summaries, showing with subtotals, 342

**subtotals**

automatic subtotals, 339-341

copying only subtotal rows, 344-345

daily dates by month, 348

formatting rows, 345-346

multiple fields, 347

removing, 346

showing in one-page summaries, 342

sorting collapsed subtotal view with largest customers at top, 342-343

text filters, 358-359

**summing records, DSUM function, 245-246****superscripts, formatting, 29****SWITCH function, 215-217****switching**

between views, 39

task panes, 23

**symbols, inserting into cells, 487****T****T function, 207****tables**

data tables, what-if analyses, 433-434

joining, Power Pivot (Data Model), 410-411

ranges, defining as tables, 108

relationships, creating with Power Pivot (Data Model), 411-412

what-if-tables

modeling random scenarios using data tables, 433-434

two-variable what-if tables, 431-432

**Table tool (Ctrl+T), copying formulas, 108-109**

**tabs, ribbon**

- contextual tabs, 25
- Developer tab, 24
- scrolling through, 22

**tall cells, smooth scrolling, 9****task panes, 22**

- collapsible task panes, 10, 23
- multiple task panes, opening at once, 11
- switching, 23

**telephone numbers, displaying, 508****templates, saving chart styles as, 584-585****testing**

- arguments, 275
- functions, Fast Excel, 774-775
- records in loops, 473-474
- text case, EXACT function, 204
- value types, IS functions, 220

**text**

- bold text, 516-517
- case-sensitive text
  - converting, 188-189
  - sorting data, 44
  - testing with EXACT function, 204
- cell notes, 535-538
- characters
  - finding number of in text cells, LEN function, 198
  - generating, 192-195
  - locating in text cells, 198-202
  - replacing with SUBSTITUTE function, 202
  - viewing character codes, 195
- CHOOSECOLS function, 208
- CHOSEROWS function, 208
- columns, 208
- containing values, conditional formatting, 561-562
- converting numbers to text with VALUE function, 207
- customizing
  - bold text, 516-517
  - font size, 515
  - font typeface, 515
  - italic text, 516-517
  - numeric formatting, 511
  - rotating text, 523-524
  - underline text, 516-517
  - vertical text, 523-524
- definitions, viewing with Insights (Smart Lookup), 495-496
- filters, 358-359
- flowing into ranges, 633-634
- fonts
  - changing default fonts, 532-533
  - changing size, 515

- changing typeface, 515

- themes, 530

**formatting**

- individual characters, 531-532
- numbers as text with TEXT function, 204-205
- numbers with leading zeroes, BASE function, 206-207
- returning to original text with T function, 207
- text containing values, 561-562
- with mini toolbar, 36

- HSTACK function, 207

- individual characters, formatting, 531-532

- international text comparisons, 4

- italic text, 516-517

**joining**

- ampersand operator (&), 121
- dates/time, 121-122
- TEXTJOIN function, 121, 187-188
- with numbers, 121-122

- justifying in ranges, 534-535

- leading/trailing spaces, removing, 189-193

- long text passages, flowing into ranges, 633-634

- lowercase text, sorting data, 44

- repeating with REPT function, 202-204

- rotating, 523-524

- rows, 208

- separating with delimiters, 489-490

- splitting, 195

- LEFT function, 196

- MID function, 197

- RIGHT function, 196

- TEXTSPLIT function, 207

- TEXTAFTER function, 207

- TEXTBEFORE function, 207

- Text That Contains formatting rule, 561-562

- TOCOL function, 208

- TOROW function, 208

- underline text, 516-517

- uppercase text, sorting data, 44

- VECTORWRAP function, 208

- vertical text, 523-524

- VLOOKUP function, 218, 225-227, 260

- VSTACK function, 207

- WordArt, 623, 632-633

- wrapping in cells, 533-534

**text boxes, 623, 633-634****text dates, converting to real dates, 176-177****text functions**

- BASE function, 206-207

- CHAR function, 192-195

- CHOOSECOLS function, 208

- CHOSEROWS function, 208

CODE function, 195  
 EXACT function, 204  
 FIND function, 198-201  
 HSTACK function, 207  
 LEFT function, 196  
 LEN function, 191, 198  
 LOWER function, 188-189  
 MID function, 197  
 PROPER function, 189  
 REPT function, 202-204  
 RIGHT function, 196  
 SEARCH function, 200-202  
 SUBSTITUTE function, 192, 202  
 T function, 207  
 TEXT function, 204-205, 704-705  
 TEXTAFTER function, 207  
 TEXTBEFORE function, 207  
 TEXTJOIN function, 187-188  
 TEXTSPLIT function, 207  
 TOCOL function, 208  
 TOROW function, 208  
 TRIM function, 189-193  
 UNICHAR function, 192-195  
 UNICODE function, 195  
 UPPER function, 188-189  
 VALUE function, 207  
 VECTORWRAP function, 208  
 VLOOKUP function, 190, 218, 225-227, 260  
 VSTACK function, 207  
**TEXTJOIN function, 121**  
**text times, converting to real times, 177-178**  
**themes, 527**  
   changing, 528  
   choosing, 528  
   color, 529  
   components of, 528  
   creating  
     color, 529  
     fonts, 530  
     reusing effects, 530  
   effects, reusing, 530  
   fonts, 530  
   Office themes, 527-529  
   saving, 530  
   sharing, 531  
   using on new documents, 531  
**thousands separators, numeric formatting, 506**  
**threaded comments, sharing workbooks, 688-689**  
**three days of today, finding cells, 565**

**time/dates, 165-166**  
   3D Map time choices, 601  
   custom numeric formatting, 512-513  
   date and time functions, 709-711  
   DATE function, 173-175  
   DATEDIF function, 180-182  
   DATEVALUE function, 176-177  
   DAX measures, 421-423  
   DAY function, 173  
   DAYS function, 183  
   displaying, 507  
   elapsed time, calculating, 180-183  
   EOMONTH function, 183  
   formatting, 168-170  
   grouping  
     dates into weeks, 179-180  
     days of the week, 178-179  
   HOUR function, 173  
   ISOWEEKNUM function, 179  
   joining text with, 121-122  
   load times, 3  
   MINUTE function, 173  
   MONTH function, 173  
   NETWORKDAYS function, 184-186  
   NOW function, 171-172  
   potential problems, 166-167  
   SECOND function, 173  
   TIME function, 175  
   timestamps, 78  
   TIMEVALUE function, 177-178  
   TODAY function, 171-172  
   troubleshooting, 166-167  
   WEEKDAY function, 178-179  
   WEEKNUM function, 180  
   WORKDAY function, 183-185  
   workdays, calculating, 183-186  
   YEAR function, 173  
   YEARFRAC function, 180  
**tipping 3D Maps, 598**  
**title bar, searching from, 56**  
**titles, WordArt, 632-633**  
**TOCOL function, 208**  
**TODAY function, 171-172**  
**toolbars**  
   mini toolbar, formatting selected text, 36  
   QAT, 14  
     adding icons, 27  
     customizing, 28-29  
     KeyTips, 63-64  
     removing icons, 28



- resequencing icons, 29
- separating icons, 29
- status bar, adding numbers, 38-39
- ToolTips, 137**
- Top 10 Filter dialog box, pivot tables, 398-399**
- top/bottom rules, conditional formatting, 554-555**
- TOROW function, 208**
- totals**
  - filtered results, 360
  - numbers with SUBTOTAL function
    - multiple levels of totals, 155
    - visible cells, 156
  - pivot tables
    - including filtered items in totals, 416-418
    - percentages of totals, 385-386
- Touch mode, adding whitespace to icons, 35**
- tours, 3D Maps, 603**
- Trace Error, 120**
- tracing dependents, 128**
- tracking changes**
  - Catch Up button, 692
  - Show Changes, 690
  - Version History, 690-693
- traditional formatting, 501-503**
- trailing spaces/leading (text), removing, 189-193**
- transforming data with Power Query, 324-326**
- transparent images, 15-16, 640**
- TRANSPOSE function, 240**
- triangles (right), hypotenuse of, 265-267**
- trig functions, 714-718**
- TRIM function, 189-193**
- troubleshooting**
  - AutoSum errors, macros, 466
  - contextual ribbon tabs, 25
  - dates/time, 166-167
  - Flash Fill, 41-42
  - formulas
    - evaluating in slow motion, 129
    - evaluating parts of formulas, 130
    - Formula Auditing arrows, 127-128
    - highlighting cells, 126
    - seeing all formulas, 126
    - showing direct precedents, 126-127
    - tracing dependents, 128
    - Watch Window, 129
  - macros, 466, 477
  - pivot tables, 25, 380
  - PMT function, 430
  - Power Query M functions, 760
  - sorting data, 46-47
  - time/dates, 166-167

- Trust Center, Links tab, 292-293
- turning data with TRANSPOSE function, 240
- turning on/off CSV file reminders, 34-35
- twisted XLOOKUP, 230
- two-monitor setups, 55
- two-variable what-if tables, 431-432
- two-way lookups, XLOOKUP function, 230-231
- typeface (font), changing, 515
- TypeScript, 445

## U

- UDF (user-defined function), 4-5**
- unary minus, order of operations, 116**
- underline text, 516-517**
- unhiding multiple worksheets, 3**
- UNICHAR function, 192-195**
- UNICODE function, 195**
- UNIQUE function, 309-310**
- unique records, advanced filters, 479-481**
- unique sequences, sorting data, 45**
- unique values**
  - extracting with formulas, 308-310
  - identifying with conditional formatting, 560-561
- unit values, DATEDIF function, 181**
- unpivoting data with Power Query, 326-327**
- unsaved workbooks**
  - linking to, 291
  - recovering, 32
- unselecting cells, 39-40**
- unsupported formulas, 56**
- Update Links dialog box, preventing from appearing, 294-295**
- updating**
  - links, 293-294
  - ribbon, 21
- upgrading from Excel 2016, 18-19**
- uppercase text, sorting data, 44**
- UPPER function, 188-189**
- user access, collaboration, 677-678**

## V

- valid names, 254-255**
- VALUE function, 207**
- values**
  - adding, 366-367
  - axis values, sparklines, 614-615
  - converting formulas to values with right-drag menu, 289
  - duplicate values, identifying with conditional formatting, 560-561
  - error values, replacing when printing, 670

- formulas versus, 94
- testing with IS functions, 220
- text containing values, conditional formatting, 561-562
- unique values
  - extracting with formulas, 308-310
  - identifying with conditional formatting, 560, 561
- variable number of rows, handling with Ctrl+Down-Arrow key, 455**
- variables, 463-464**
- VBA (Visual Basic for Applications), 445**
  - add-ins, 765
  - coding analogy, 458
  - collections, 459
    - examining recorded code, 463
    - object.method, 459
    - parameters, 460-462
    - properties, 462
  - collections, 459
  - Help, 462
  - macros, 5
    - advanced filters for unique records, 479-481
    - AutoFilter, 481-482
    - AutoSum errors, 466
    - customer reports, 477-484
    - customizing, 467-468
    - debugging, 476
    - deleting records from loops, 474-476
    - editing, 457
    - everyday-use macros, 467-468
    - finding last rows with data, 468-469
    - flow control, 471-473
    - GetOpenFileName, 467-468
    - GetSaveAsFileName, 467-468
    - If-End If constructs, 471-472
    - invoice register example, 454-456
    - looping through rows, 469
    - loops with FinalRow, 471
    - macro recorder, default state, 449-450
    - macro recorder, parameters, 461-462
    - macro recorder, starting, 451-452
    - mail merges, 447-449
    - R1C1-style formulas, 464-465
    - range references, 470
    - recording, 446-452
    - recording, in blank workbooks, 455-456
    - recording, Relative References, 450
    - running, 453-454
    - running at full speed, 477
    - running in slow motion, 476
    - Select Case constructs, 472-473
    - selecting visible cells, 482-483
    - spillable formulas, 466
    - testing records in loops, 473-474
    - troubleshooting, 477
    - variables, 463-464
    - object.method, 459
    - parameters, 460-462
    - properties, 462
    - R1C1-style formulas, 464-465
    - ribbon, 24
    - security, 446
    - spillable formulas, 466
    - variables, 463-464
  - VBA Editor, 5**
  - VBE (Visual Basic Editor), 457**
  - VECTORWRAP function, 208**
  - verbs, object.method as, 459**
  - Version History, 690-693**
  - vertical text, 523-524**
  - vetoed, editing workbooks, 681-682**
  - viewing**
    - access to workbooks, 677-678
    - all formulas, 126
    - all options in Find dialog box, 8
    - Backstage view, File menu, 30-32
    - cells
      - bringing active cells back into view, 489
      - Watch Window, 129
    - dark mode, 56
    - definitions (text) with Insights (Smart Lookup), 495-496
    - direct precedents, 126-127
    - Normal view, 39
    - Page Break preview, 39
    - Page Layout view, 39
    - pivot tables
      - changes, 380
      - data, 369
    - sparkline details, 618-620
    - subtotals, one-page summaries, 342
    - switching between views, 39
    - workbook statistics, 495
    - worksheets, side by side, 284-285
  - visible cells**
    - selecting with macros, 482-483
    - totaling with SUBTOTAL function, 156
  - Visio Data Visualizer, 772**
  - visualizations, data**
    - color scales, highlighting extremes, 549-550
    - data bars
      - creating, 545-546
      - customizing, 546-547

- in-cell bar charts, 544-545
  - showing for subsets of cells, 548
- heat maps, 543
- icon sets
  - hiding icons, 554
  - mixing icons, 554
  - moving numbers closer to icons, 552-553
  - segregating data, 550-551
  - setting up, 551-552

**VLOOKUP function**, 190, 218, 225-227, 260

**VSTACK function**, 207

## W

**Watch Window**, 129, 485-486

**watching results of distant cells**, 485-486

**waterfall charts, financial data**, 579

**watermarks, adding to headers**, 663-664

**web functions**, 734

**WEEKDAY function**, 566

**WEEKNUM function**, 180

**weeks, grouping dates by**

- day of the week, WEEKDAY function, 178-179
- ISOWEEKNUM function, 179
- WEEKNUM function, 180

**what-if analyses**

- modeling random scenarios using data tables, 433-434
- two-variable what-if tables, 431-432
- using, 429-430

**whitespace, adding to icons**, 35

**wide cells, smooth scrolling**, 9

**widths (columns), formatting**, 519-520

**wildcards, Label Filter fly-out**, 397

**Windows 11, Arrange All**, 10

**Win/Loss charts, sparklines**, 607, 613, 616

**WordArt**, 623, 632-633

**workbooks**

- access, viewing, 677-678
- auditing, Inquire add-in, 768-769
- AutoSave, 694
- closed workbooks, opening with links, 293
- collaboration
  - @Mentions, 677, 687, 692
  - cloud storage, 674
  - comments, 677, 687, 692
  - editing, etiquette, 681
  - editing, multiple editors with same workbook, 680
  - editing, presence, 680-681
  - editing, vetoes, 681-682
  - filtering data, Sheet Views, 683-686
  - finding shared notebooks, 679-680

Notes, 689

OneDrive, 674

sharing during initial saves, 675

sharing notifications, 678-680

sharing, setting expiration dates, 676-677

sharing with Share button, 676

sorting data, Sheet Views, 683-686

threaded comments, 688-689

tracking changes, Catch Up button, 692

tracking changes, Show Changes, 690

tracking changes, Version History, 690-693

user access, 677-678

copying worksheets to new workbooks, 541

editing, 33

etiquette, 681

multiple editors, same workbook, 680

presence, 680-681

vetoes, 681-682

filtering data, Sheet Views, 683-686

finalizing, 33

getting information, 33

LAMBDA function, sharing between workbooks, 267-268

links

creating to unsaved workbooks, 291

creating with formulas, 291

creating with mouse, 289-290

creating with Paste Options menu, 286-287

creating with right-drag menu, 287-289

external workbook links, absolute references, 290

Links tab, Trust Center, 292-293

missing linked workbooks, 293

opening closed workbooks, 293

Update Link dialog box, preventing from appearing, 294-295

updating, 293-294

macros, recording in blank workbooks, 455-456

merging, 438

names, 256-257

opening

searching while opening, 8

UDF, 4

Power Query, loading data from single workbook, 323-324

previous versions, Version History, 692-693

Recent Workbooks list, clearing, 32

recovering, 32

rolling back changes, Version History, 692-693

saving

AutoSave, 694

sharing during initial saves, 675

searching while opening, 8

- sharing
  - comments, 677, 687, 692
  - during initial saves, 675
  - expiration dates, 676-677
  - finding shared workbooks, 679-680
  - @Mentions, 677, 687, 692
  - Notes, 689
  - notifications, 678-679
  - threaded comments, 688-689
  - tracking changes, Catch Up button, 692
  - tracking changes, Show Changes, 690
  - tracking changes, Version History, 690-693
  - with Share button, 676
  - workbooks, 680
- Sheet Views, filtering/sorting data, 683-686
- statistics, viewing, 495
- storing, 674
- UDF, 4
- unsaved workbooks
  - linking to, 291
  - recovering, 32
- workdays, calculating**
  - NETWORKDAYS function, 184-186
  - WORKDAY function, 183-185
- workflows, establishing with Power Query, 322**
- working remotely. See collaboration**
- worksheets**
  - 3D Models, 624, 648-649
  - adding, 35
  - appending
    - one worksheet from every workbook in folder, 331-332
    - one worksheet from one workbook, 332-333
    - Power Query, 331-333
  - auditing with Inquire, 491
  - controls, 35
  - copying to new workbooks, 541
  - Cut-out People, 624, 647-648
  - documenting with FORMULATEXT function, 232-234
  - excluding parts of worksheets from printing, 659
  - formatting
    - aligning cells, 514
    - bold text, 516-517
    - borders, 517
    - cell color, 517-519
    - cell notes, 535-538
    - Cell Styles, 525-527
    - centering cells, 520-523
    - changing default fonts, 532-533
    - column widths, 519-520
    - conditional formatting, 539
    - copying formatting to new worksheets, 540-541
    - copying formulas, 538
    - font size, 515
    - font typeface, 515
    - Format Painter, 539-540
    - italic text, 516-517
    - justifying text in ranges, 534-535
    - merging cells, 520-523
    - need for, 499-501
    - numeric formatting, built-in, 505
    - numeric formatting, currency, 506
    - numeric formatting, custom formats, 509-513
    - numeric formatting, dates, 507
    - numeric formatting, Format Cells dialog box, 505
    - numeric formatting, fractions, 507
    - numeric formatting, Home tab, 503-505
    - numeric formatting, phone numbers, 508
    - numeric formatting, Social Security numbers, 509
    - numeric formatting, thousands separators, 506
    - numeric formatting, times, 507
    - numeric formatting, ZIP Codes, 508-509
    - pasting formulas, 538-539
    - rotating text, 523-524
    - row heights, 519-520
    - text, individual characters, 531-532
    - themes, 527-530
    - traditional formatting, 501-503
    - underline text, 516-517
    - vertical text, 523-524
    - wrapping text, 533-534
  - headers/footers
    - adding pictures/watermarks, 663-664
    - automatic headers, 662
    - custom headers, 663
    - different headers/footers in same document, 664-665
    - scaling, 665
  - headings, repeating on each page, 658
  - icons, 624, 647-648
  - illustrations, 624, 647-648
  - links
    - creating with formulas, 291
    - creating with mouse, 289-290
    - creating with Paste Options menu, 286-287
    - creating with right-drag menu, 287-289
    - Links tab, Trust Center, 292-293
  - margins, 657
  - moving between, 77
  - multiple worksheets, unhiding, 3
  - names, returning with CELL function, 223
  - navigating, 35
  - Online Pictures, 624, 636-637
  - orientation, 657

page breaks, 660-661  
 pictures, 624
 

- arranging, 645-647
- Artistic Effects, 642
- Aspect Ratio, 638
- brightness, 639-640
- contrast, 639-640
- cropping, 639
- file sizes, 644
- formatting with ribbon tab, 637
- inserting Bing Images, 637
- inserting Clip Art, 636-637
- inserting from your computer, 635
- inserting into Excel, 635
- inserting multiple pictures at once, 635
- inserting Stock Images, 636-637
- Picture Styles gallery, 640-642
- removing backgrounds, 642-643
- resizing, 637
- rounded corners, 639
- Screen Clippings, 645
- selecting, 645-647
- sharpness, 639-640
- transparency, 640

 printing
 

- as PDF, 671
- centering worksheets on page, 669-670
- changing Page Setup settings, 668
- changing printer properties, 668
- choosing printers, 666
- choosing what to print, 667
- comments, 670
- controlling first page numbers, 670
- gridlines, 669
- page numbers, 656
- paper size, 657
- previewing, 654-656
- Print panel, File menu, 666
- replacing error values, 670

 protecting, 488-489  
 scaling data to fit pages, 660  
 shapes, 623
 

- choosing styles, 632
- displaying cell contents, 630-632

 side by side, viewing, 284-285

SmartArt, 623
 

- adding images, 628
- changing existing SmartArt to new styles, 627
- common elements, 625
- Hierarchical SmartArt, 629-630
- inserting, 626-627
- organizational charts, 629-630
- styles, 624-625

 stickers, 624, 647-648  
 text boxes, 623, 633-634  
 unhiding multiple worksheets, 3  
 WordArt, 623, 632-633  
 zooming in/out, 37-38  
**world maps, 600**  
**wrapping text in cells, 533-534**  
**writing data with Action Pen, 16-17**

## X

**XLOOKUP function, 225-227**

- matching lists, 230
- returning
  - cell references, 232
  - multiple values, 228-229
- sideways searches, 229-230
- twisted XLOOKUP, 230
- two-way lookups, 230-231

**XMATCH function, matching lists, 230**  
**XY Scatter charts, 581-583**

## Y

**YEARFRAC function, 180**  
**YEAR function, 173**  
**years, pivot table summaries, 381-382**

## Z

**ZA button, sorting data, 43**  
**zeroes (leading), adding to numbers with BASE function, 206-207**  
**ZIP Codes, 508-509**  
**zooming in/out**

- 3D Maps, 589-594, 598
- worksheets, 37-38