You can create two types of data bars in Excel 2013: solid fill and gradient fill. When data bars were introduced in Excel 2007, they filled cells with a color band that decreased in intensity as it moved across the cell. This gradient fill pattern made it a bit difficult to determine the relative length of two data bars because the end points weren't as distinct as they would have been if the bars were a solid color. In Excel 2013, you can choose between a solid fill pattern, which makes the right edge of the bars easier to discern, and a gradient fill, which you can use if you share your workbook with colleagues who use Excel 2007.

Excel also draws data bars differently than was done in Excel 2007. Excel 2007 drew a very short data bar for the lowest value in a range and a very long data bar for the highest value. The problem was that similar values could be represented by data bars of very different lengths if there wasn't much variance among the values in the conditionally formatted range. In Excel 2013, data bars compare values based on their distance from zero, so similar values are summarized by using data bars of similar lengths.

TIP Excel 2013 data bars summarize negative values by using bars that extend to the left of a baseline that the program draws in a cell. You can control how your data bars summarize negative values by clicking the Negative Value And Axis button, which can be accessed from either the New Formatting Rule dialog box or the Edit Formatting Rule dialog box.

Color scales compare the relative magnitude of values in a cell range by applying colors from a two-color or three-color set to your cells. The intensity of a cell's color reflects the value's tendency toward the top or bottom of the values in the range.

Distribution Capacity	
Northeast	47%
Atlantic	75%
Southeast	39%
North Central	54%
Midwest	40%
Southwest	73%
Mountain West	51%
Northwest	69%
Central	41%

Icon sets are collections of three, four, or five images that Excel displays when certain rules are met.

Distribution Capacity	
Northeast	47%
Atlantic	75%
Southeast	39%
North Central	54%
Midwest	40%
Southwest	73%
Mountain West	51%
Northwest	69%
Central	41%

When icon sets were introduced in Excel 2007, you could apply an icon set as a whole, but you couldn't create custom icon sets or choose to have Excel 2007 display no icon if the value in a cell met a criterion. In Excel 2013, you can display any icon from any set for any criterion or display no icon.

When you click a color scale or icon set in the Conditional Formatting Rules Manager and then click the Edit Rule button, you can control when Excel applies a color or icon to your data.

IMPORTANT Be sure that you do not include cells that contain summary formulas in your conditionally formatted ranges. The values, which could be much higher or lower than your regular cell data, could throw off your comparisons.

In this exercise, you'll create a series of conditional formats to change the appearance of data in worksheet cells that display the package volume and delivery exception rates of a regional distribution center.

SET UP **You need the Dashboard workbook located in the Chapter04 practice file folder to complete this exercise. Open the workbook, and then follow the steps.**

1 Select cells **C4:C12**.

2 On the **Home** tab, in the **Styles** group, click **Conditional Formatting**. On the menu, point to **Color Scales**, and then in the top row of the palette, click the second pattern from the left to apply the format to the selected range.

Package Exception Rate	
Northeast	0.003%
Atlantic	0.008%
Southeast	0.013%
North Central	0.004%
Midwest	0.018%
Southwest	0.001%
Mountain West	0.045%
Northwest	0.002%
Central	0.038%

3 Select cells **F4:F12**.

4 On the **Home** tab, in the **Styles** group, click **Conditional Formatting**. On the menu, point to **Data Bars**, and then, in the **Solid Fill** group, click the orange data bar format to apply the format to the selected range.

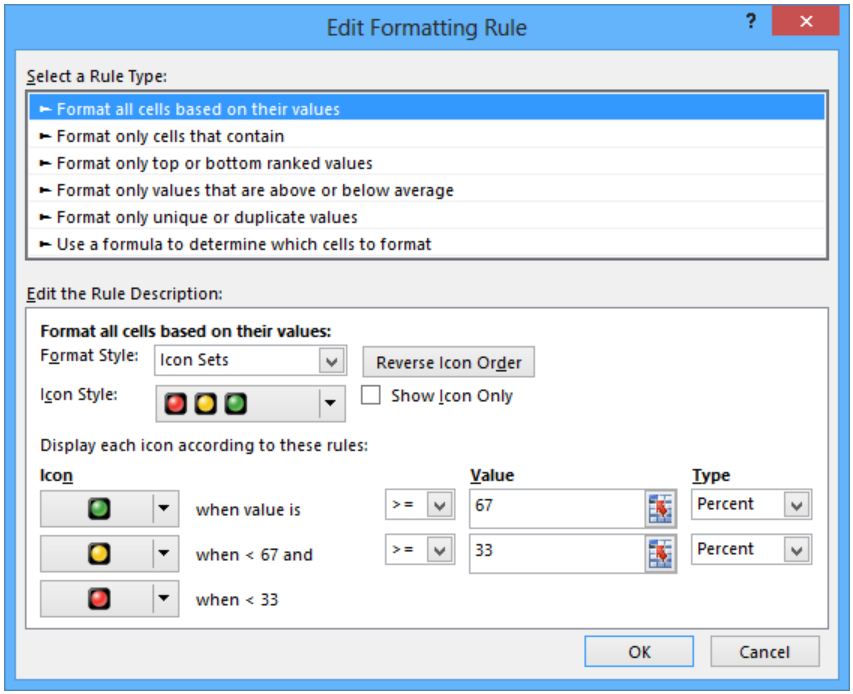
5 Select cells **I4:I12**.

6 On the **Home** tab, in the **Styles** group, click **Conditional Formatting**. On the menu, point to **Icon Sets**, and then in the left column of the list of formats, click the three traffic lights that have black borders to apply that format to the selected cells.

Distribution Capacity	
Northeast	47%
Atlantic	75%
Southeast	39%
North Central	54%
Midwest	40%
Southwest	73%
Mountain West	51%
Northwest	69%
Central	41%

7 With the range **I4:I12** still selected, on the **Home** tab, in the **Styles** group, click **Conditional Formatting**, and then click **Manage Rules** to open the **Conditional Formatting Rules Manager**.

8 Click the **Icon Set** rule, and then click **Edit Rule** to open the **Edit Formatting Rule** dialog box.



9 Click the **Reverse Icon Order** button to reconfigure the rules so the red light icon is at the top and the green light icon is at the bottom.

10 In the red light icon's row, in the **Type** list, click **Number**.

11 In the red light icon's **Value** field, enter **0.7**.

12 In the yellow light icon's row, in the **Type** list, click **Number**.

13 In the yellow light icon **Value** field, enter **0.5**.

14 Click **OK** twice to close the **Edit Formatting Rule** dialog box and the **Conditional Formatting Rules Manager** to apply the format to the selected cell range.

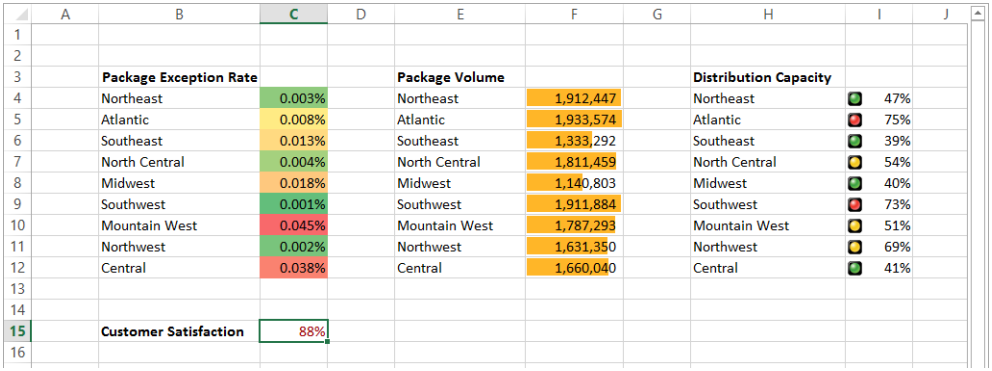
15 Click cell **C15**.

16 On the **Home** tab, in the **Styles** group, click **Conditional Formatting**. On the menu, point to **Highlight Cells Rules**, and then click **Less Than** to open the **Less Than** dialog box.

17 In the left field, enter **96%.**

18 In the **With** list, click **Red text**.

19 Click **OK** to close the **Less Than** dialog box. Excel displays the text in cell **C15** in red.



	A	B	C	D	E	F	G	H	I	J
1										
2										
3		**Package Exception Rate**			**Package Volume**			**Distribution Capacity**		
4		Northeast	0.003%		Northeast	1,912,447		Northeast	47%	
5		Atlantic	0.008%		Atlantic	1,933,574		Atlantic	75%	
6		Southeast	0.013%		Southeast	1,333,292		Southeast	39%	
7		North Central	0.004%		North Central	1,811,459		North Central	54%	
8		Midwest	0.018%		Midwest	1,140,803		Midwest	40%	
9		Southwest	0.001%		Southwest	1,911,884		Southwest	73%	
10		Mountain West	0.045%		Mountain West	1,787,293		Mountain West	51%	
11		Northwest	0.002%		Northwest	1,631,350		Northwest	69%	
12		Central	0.038%		Central	1,660,040		Central	41%	
13										
14										
15		**Customer Satisfaction**	88%							
16										

CLEAN UP **Close the Dashboard workbook, saving your changes if you want to.**

Adding images to worksheets

Establishing a strong corporate identity helps customers remember your organization in addition to the products and services you offer. Setting aside the obvious need for sound management, two important physical attributes of a strong retail business are a well-conceived shop space and an eye-catching, easy-to-remember logo. After you or your graphic artist has created a logo, you should add the logo to all your documents, especially any that might be viewed by your customers. Not only does the logo mark the documents as coming from your company, it also serves as an advertisement, encouraging anyone who views your worksheets to call or visit your company.

One way to add a picture to a worksheet is to display the Insert tab, and then in the Illustrations group, click Picture. Clicking Picture displays the Insert Picture dialog box, from which you can locate the picture you want to add from your hard disk. When you insert a picture, the Format tool tab appears on the ribbon. You can use the tools on the Format tool tab to change the picture's contrast, brightness, and other attributes. With the controls in the Picture Styles group, you can place a border around the picture, change the picture's shape, or change a picture's effects (such as shadow, reflection, or three-dimensional effects). Other tools, found in the Arrange and Size groups, enable you to rotate, reposition, and resize the picture.

	A	B	C	D	E	F	G	H	I
1									
2		**Call Volume**							
3		Northeast	13,769						
4		Atlantic	19,511						
5		Southeast	11,111						
6		North Central	24,972						
7		Midwest	11,809						
8		Southwest	20,339						
9		Mountain West	20,127						
10		Northwest	12,137						
11		Central	20,047						
12									
13									

You can also resize a picture by clicking it and then dragging one of the handles that appears on the graphic. If you accidentally resize a graphic by dragging a handle, just click the Undo button to remove your change.

Excel 2013 includes a built-in capability that you can use to remove the background of an image you insert into a workbook. To do so, click the image and then, on the Format tool tab, in the Adjust group, click Remove Background. When you do, Excel attempts to identify the foreground and background of the image.

You can drag the handles on the inner square of the background removal tool to change how the tool analyzes the image. When you have adjusted the outline to identify the elements of the image you want to keep, click the Keep Changes button on the Background Removal tool tab to complete the operation.

If you want to generate a repeating image in the background of a worksheet to form a tiled pattern behind your worksheet's data, you can display the Page Layout tab, and then in the Page Setup group, click Background. In the Insert Pictures dialog box, click Browse to open the Sheet Background dialog box, navigate to the folder that contains the image you want to serve as the background for your worksheet, click the image, and click OK.

TIP To remove a background image from a worksheet, display the Page Layout tab, and then in the Page Setup group, click Delete Background.

To achieve a watermark-type effect that has words displayed behind the worksheet data, save the watermark information as an image, and then use the image as the sheet background; you could also insert the image in the header or footer, and then resize or scale it to position the watermark information where you want it.

In this exercise, you'll add an image to an existing worksheet, change its location on the worksheet, reduce the size of the image, and then set another image as a repeating background for the worksheet.

SET UP **You need the CallCenter workbook and the phone and texture images located in the Chapter04 practice file folder to complete this exercise. Open the workbook, and then follow the steps.**

1. On the **Insert** tab, in the **Illustrations** group, click **Pictures** to open the **Insert Picture** dialog box.
2. Navigate to the **Chapter04** practice file folder, and then double-click the **phone** image file to add the image to your worksheet.
3. On the **Format** tool tab, in the **Adjust** group, click **Remove Background** to have Excel attempt to separate the image's foreground from its background.
4. Drag the handles at the upper-left and lower-right corners of the outline until the entire phone, including the cord, is within the frame.

5 On the **Background Removal** tab, click **Keep Changes** to remove the highlighted image elements.

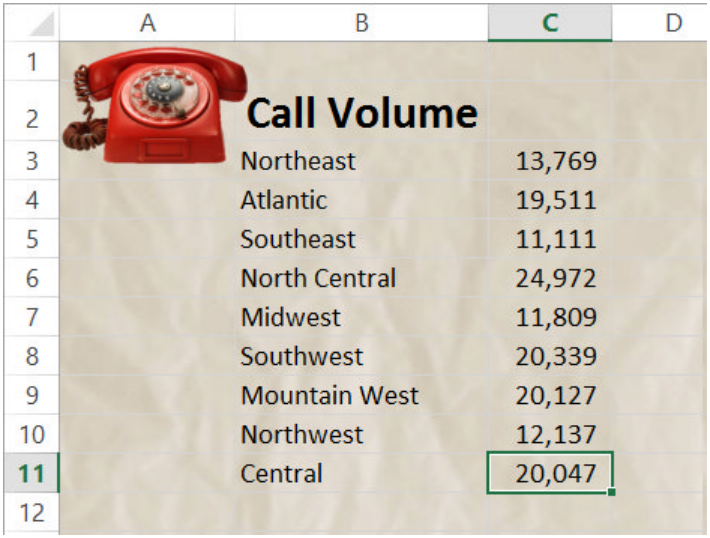
6 Move the image to the upper-left corner of the worksheet, click and hold the handle at the lower-right corner of the image, and drag it up and to the left until the image no longer obscures the **Call Volume** label.

	A	B	C	D
1				
2		**Call Volume**		
3		Northeast	13,769	
4		Atlantic	19,511	
5		Southeast	11,111	
6		North Central	24,972	
7		Midwest	11,809	
8		Southwest	20,339	
9		Mountain West	20,127	
10		Northwest	12,137	
11		Central	20,047	
12				

7 On the **Page Layout** tab, in the **Page Setup** group, click **Background** to open the **Insert Pictures** dialog box.

8 Next to **From a File**, click **Browse** to open the **Sheet Background** dialog box.

9 Navigate to the **Chapter04** practice file folder, and then double-click the **texture** image file to repeat the image as a background pattern.



10 On the **Page Layout** tab, in the **Page Setup** group, click **Delete Background** to remove the background image.

CLEAN UP **Close the CallCenter workbook, saving your changes if you want to.**

Key points

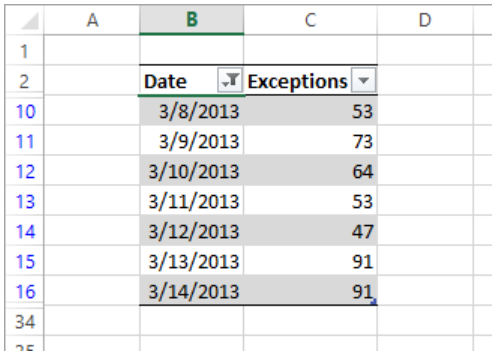
- If you don't like the default font in which Excel displays your data, you can change it.
- You can use cell formatting, including borders, alignment, and fill colors, to emphasize certain cells in your worksheets. This emphasis is particularly useful for making column and row labels stand out from the data.
- Excel comes with several existing styles that you can use to change the appearance of individual cells. You can also create new styles to make formatting your workbooks easier.

- If you want to apply the formatting from one cell to another cell, use the Format Painter to copy the format quickly.
- You can choose from quite a few built-in document themes and Excel table formats to apply to groups of cells. If you find one you like, use it and save yourself lots of formatting time.
- Using conditional formats, you can set rules so that Excel changes the appearance of a cell's contents based on its value.
- Adding images can make your worksheets more visually appealing and make your data easier to understand. Excel 2013 greatly enhances your ability to manage your images without leaving Excel.

Chapter at a glance

Restrict

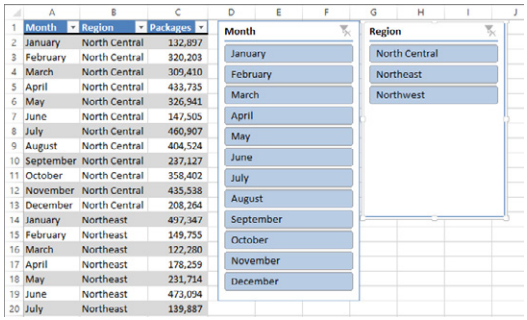
Limit data that appears on your screen, page 146



	A	B	C	D
1				
2		Date	Exceptions	
10		3/8/2013	53	
11		3/9/2013	73	
12		3/10/2013	64	
13		3/11/2013	53	
14		3/12/2013	47	
15		3/13/2013	91	
16		3/14/2013	91	
34				

Filter

Filter Excel table data by using slicers, page 153



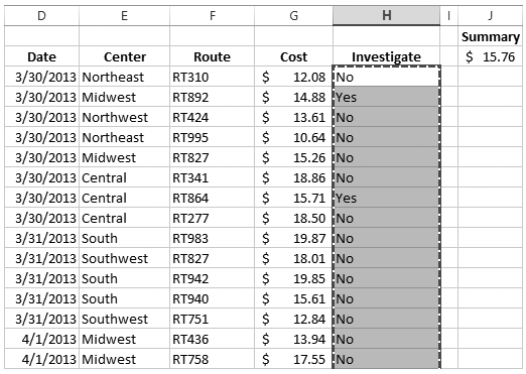
	A	B	C
1	Month	Region	Packages
2	January	North Central	132,897
3	February	North Central	320,203
4	March	North Central	309,410
5	April	North Central	433,735
6	May	North Central	326,941
7	June	North Central	147,505
8	July	North Central	460,907
9	August	North Central	404,524
10	September	North Central	237,127
11	October	North Central	358,402
12	November	North Central	435,538
13	December	North Central	208,264
14	January	Northeast	497,347
15	February	Northeast	149,755
16	March	Northeast	122,280
17	April	Northeast	178,259
18	May	Northeast	231,714
19	June	Northeast	473,094
20	July	Northeast	139,887

Month: January, February, March, April, May, June, July, August, September, October, November, December

Region: North Central, Northeast, Northwest

Manipulate

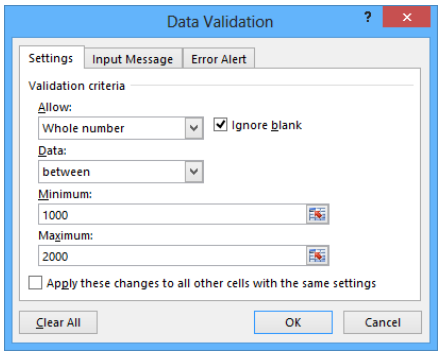
Manipulate worksheet data, page 158



D	E	F	G	H	I	J
						Summary
Date	Center	Route	Cost	Investigate		$ 15.76
3/30/2013	Northeast	RT310	$ 12.08	No		
3/30/2013	Midwest	RT892	$ 14.88	Yes		
3/30/2013	Northwest	RT424	$ 13.61	No		
3/30/2013	Northeast	RT995	$ 10.64	No		
3/30/2013	Midwest	RT827	$ 15.26	No		
3/30/2013	Central	RT341	$ 18.86	No		
3/30/2013	Central	RT864	$ 15.71	Yes		
3/30/2013	Central	RT277	$ 18.50	No		
3/31/2013	South	RT983	$ 19.87	No		
3/31/2013	Southwest	RT827	$ 18.01	No		
3/31/2013	South	RT942	$ 19.85	No		
3/31/2013	South	RT940	$ 15.61	No		
3/31/2013	Southwest	RT751	$ 12.84	No		
4/1/2013	Midwest	RT436	$ 13.94	No		
4/1/2013	Midwest	RT758	$ 17.55	No		

Define

Define valid sets of values for ranges of cells, page 166



Focusing on specific data by using filters

5

IN THIS CHAPTER, YOU WILL LEARN HOW TO

- Limit data that appears on your screen.
- Filter Excel table data by using slicers.
- Manipulate worksheet data.
- Define valid sets of values for ranges of cells.

With Microsoft Excel 2013, you can manage huge data collections, but storing more than 1 million rows of data doesn't help you make business decisions unless you have the ability to focus on the most important data in a worksheet. Focusing on the most relevant data in a worksheet facilitates decision making, whether that data represents the 10 busiest days in a month or revenue streams that you might need to reevaluate. Excel offers a number of powerful and flexible tools with which you can limit the data displayed in your worksheet. When your worksheet displays the subset of data you need to make a decision, you can perform calculations on that data. You can discover what percentage of monthly revenue was earned in the 10 best days in the month, find your total revenue for particular days of the week, or locate the slowest business day of the month.

Just as you can limit the data displayed by your worksheets, you can create validation rules that limit the data entered into them as well. By setting rules for data entered into cells, you can catch many of the most common data entry errors, such as entering values that are too small or too large, or attempting to enter a word in a cell that requires a number. If you add a validation rule to worksheet cells after data has been entered into them, you can circle any invalid data so that you know what to correct.

In this chapter, you'll limit the data that appears on your screen, manipulate worksheet data, and create validation rules that limit data entry to appropriate values.

PRACTICE FILES To complete the exercises in this chapter, you need the practice files contained in the Chapter05 practice file folder. For more information, see "Download the practice files" in this book's Introduction.

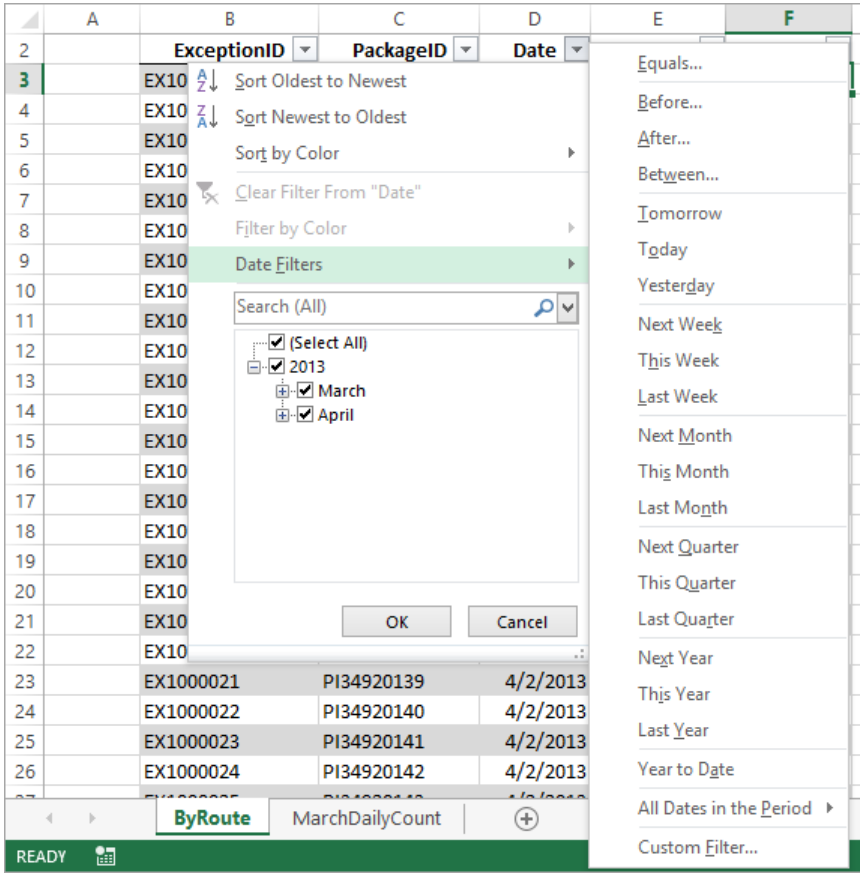
Limiting data that appears on your screen

Excel spreadsheets can hold as much data as you need them to, but you might not want to work with all the data in a worksheet at the same time. For example, you might want to review the revenue figures for your company during the first third, second third, and final third of a month. You can limit the data shown on a worksheet by creating a filter, which is a rule that selects rows to be shown in a worksheet.

To create a filter, you click a cell in the data you want to filter and then, on the Home tab, in the Editing group, click Sort & Filter and then click Filter. When you do, Excel displays a filter arrow at the right edge of the top cell in each column of the data. The arrow indicates that the Excel AutoFilter capability is active.

IMPORTANT When you turn on filtering, Excel treats the cells in the active cell's column as a range. To ensure that the filtering works properly, you should always have a label at the top of the column you want to filter. If you don't, Excel treats the first value in the list as the label and doesn't include it in the list of values by which you can filter the data.

Clicking the filter arrow displays a menu of filtering options and a list of the unique values in the column. The first few commands in the list are sorting commands, followed by the Clear Filter command and then the Filter By Color command. The next command that appears in the list depends on the type of data in the column. For example, if the column contains a set of dates, the command will be Date Filters. Clicking the command displays a list of commands specific to that data type.



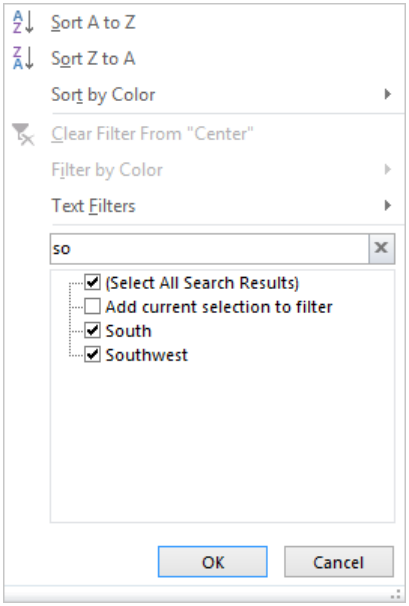
TIP When a column contains several types of data, the filter command becomes Number Filters.

When you click a filtering option, Excel displays a dialog box in which you can define the filter's criteria. As an example, you could create a filter that displays only dates after 3/31/2013.

	A	B	C	D	E	F
2		ExceptionID	PackageID	Date	Center	Route
16		EX1000014	PI34920132	4/1/2013	Midwest	RT436
17		EX1000015	PI34920133	4/1/2013	Midwest	RT758
18		EX1000016	PI34920134	4/1/2013	Midwest	RT529
19		EX1000017	PI34920135	4/1/2013	Northeast	RT243
20		EX1000018	PI34920136	4/1/2013	Northeast	RT189
21		EX1000019	PI34920137	4/1/2013	Northwest	RT714
22		EX1000020	PI34920138	4/2/2013	Central	RT151
23		EX1000021	PI34920139	4/2/2013	Midwest	RT543
24		EX1000022	PI34920140	4/2/2013	Southwest	RT208
25		EX1000023	PI34920141	4/2/2013	South	RT145
26		EX1000024	PI34920142	4/2/2013	Central	RT250
27		EX1000025	PI34920143	4/2/2013	Midwest	RT852

If you want to display the highest or lowest values in a data column, you can create a Top 10 filter. Choosing the Top 10 command from the menu doesn't just limit the display to the top 10 values. Instead, it opens the Top 10 AutoFilter dialog box. From within this dialog box, you can choose whether to show values from the top or bottom of the list, define the number of items you want to display, and choose whether the number in the middle box indicates the number of items or the percentage of items to be shown when the filter is applied. By using the Top 10 AutoFilter dialog box, you can find your top 10 salespeople or identify the top 5 percent of your customers.

Excel 2013 includes a capability called the *search filter*, which you can use to type a search string that Excel uses to identify which items to display in an Excel table or a data list. To use a search filter, click a column's filter arrow and start entering a character string in the Search box. As you enter the character string, Excel limits the items displayed at the bottom of the filter panel to those that contain the character or characters you've entered. When the filter list's items represent the values you want to display, click OK.



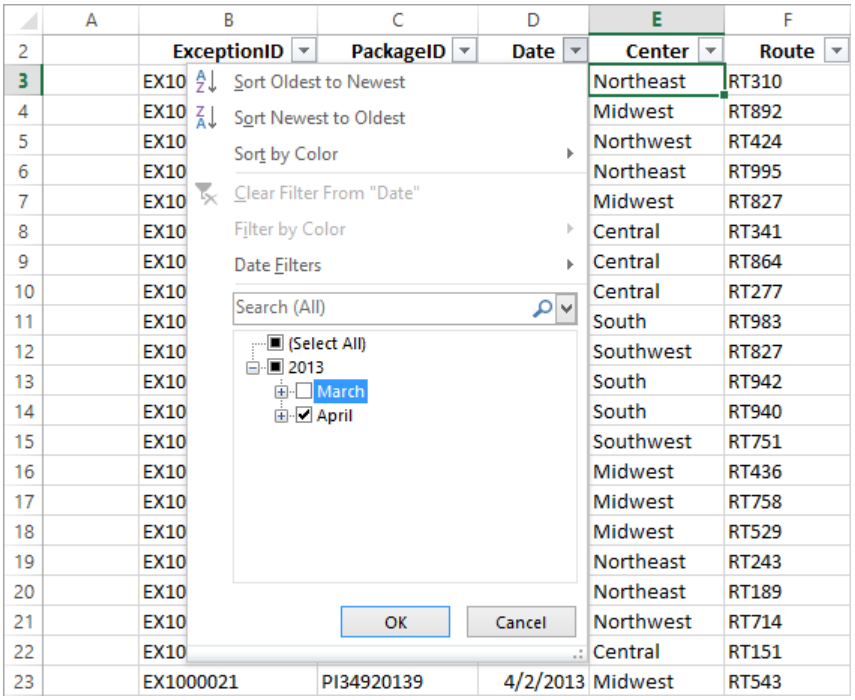
When you point to Text Filters (or Date Filters for date values or Number Filters for number values) and then click Custom Filter, you can define a rule that Excel uses to decide which rows to show after the filter is applied. For instance, you can create a rule that determines that only days with package volumes of less than 100,000 should be shown in your worksheet. With those results in front of you, you might be able to determine whether the weather or another factor resulted in slower business on those days.

Excel indicates that a column has a filter applied by changing the appearance of the column's filter arrow to include an icon that looks like a funnel. After you finish examining your data by using a filter, you can remove the filter by clicking the column's filter arrow and then clicking Clear Filter. To turn off filtering entirely and remove the filter arrows, display the Home tab and then, in the Editing group, click Sort & Filter and then click Filter.

In this exercise, you'll filter worksheet data by using a series of AutoFilter commands, create a filter showing the five days with the highest delivery exception counts in a month, create a search filter, and create a custom filter.

SET UP **You need the PackageExceptions workbook located in the Chapter05 practice file folder to complete this exercise. Open the workbook, and then follow the steps.**

1. On the **ByRoute** worksheet, click any cell in the cell range **B2:F27**.
2. On the **Home** tab, in the **Editing** group, click **Sort & Filter**, and then click **Filter** to display a filter arrow in each column's header cell.
3. Click the **Date** column filter arrow and then, from the menu that appears, clear the **March** check box. When you do, Excel removes the check from the **March** check box and changes the state of the **Select All** and **2013** check boxes to indicate that some items within those categories have been filtered.



	A	B	C	D	E	F
2		ExceptionID	PackageID	Date	Center	Route
3		EX10			Northeast	RT310
4		EX10			Midwest	RT892
5		EX10			Northwest	RT424
6		EX10			Northeast	RT995
7		EX10			Midwest	RT827
8		EX10			Central	RT341
9		EX10			Central	RT864
10		EX10			Central	RT277
11		EX10			South	RT983
12		EX10			Southwest	RT827
13		EX10			South	RT942
14		EX10			South	RT940
15		EX10			Southwest	RT751
16		EX10			Midwest	RT436
17		EX10			Midwest	RT758
18		EX10			Midwest	RT529
19		EX10			Northeast	RT243
20		EX10			Northeast	RT189
21		EX10			Northwest	RT714
22		EX10			Central	RT151
23		EX1000021	PI34920139	4/2/2013	Midwest	RT543

4 Click **OK** to hide all rows that contain a date from the month of March.

5 Click the **Center** column filter arrow and then, from the menu that appears, clear the **Select All** check box to clear all the check boxes in the list.

6 Select the **Midwest** check box, and then click **OK** to display only those exceptions that occurred in the Midwest distribution center during the month of April.

A	B	C	D	E	F
	ExceptionID	PackageID	Date	Center	Route
	EX1000014	PI34920132	4/1/2013	Midwest	RT436
	EX1000015	PI34920133	4/1/2013	Midwest	RT758
	EX1000016	PI34920134	4/1/2013	Midwest	RT529
	EX1000021	PI34920139	4/2/2013	Midwest	RT543
	EX1000025	PI34920143	4/2/2013	Midwest	RT852

7 On the **Home** tab, in the **Editing** group, click **Sort & Filter**, and then click **Clear** to clear all active filters but leave the filter arrows in place.

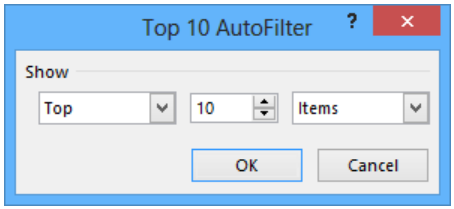
8 Click the **Route** column header's filter arrow, and then enter **RT9** in the **Search** box to narrow the filter list so it displays only those routes with an identifier that includes the characters *RT9*.

9 Click **OK** to apply the filter and display exceptions that occurred on routes with identifiers that contain the string *RT9*.

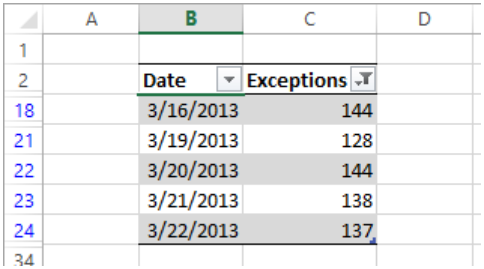
10 Click the **MarchDailyCount** sheet tab to display its worksheet.

11 Click any cell in the Excel table.

12 Click the **Exceptions** column filter arrow, point to **Number Filters**, and then click **Top 10** to open the **Top 10 AutoFilter** dialog box.



13 In the middle field, enter **5** and then click **OK** to display the table rows that contain the five highest values in the **Exceptions** column.



	A	B	C	D
1				
2		Date	Exceptions	
18		3/16/2013	144	
21		3/19/2013	128	
22		3/20/2013	144	
23		3/21/2013	138	
24		3/22/2013	137	
34				

14 Click the **Exceptions** column filter arrow, and then click **Clear Filter from "Exceptions"** to remove the filter.

15 Click the **Date** column filter arrow, point to **Date Filters**, and then click **Custom Filter** to open the **Custom AutoFilter** dialog box.

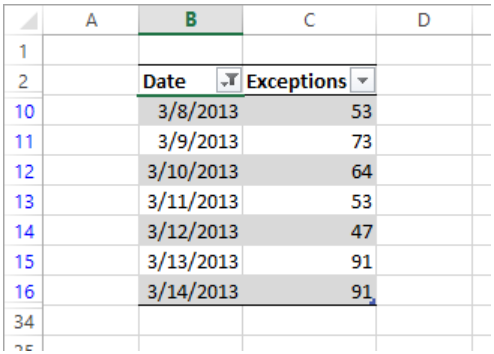
16 In the upper-left list, click **is after or equal to**.

17 In the upper-right list, click **3/8/2013**.

18 In the lower-left list, click **is before or equal to**.

19 In the lower-right list, click **3/14/2013**.

20 Click **OK**. Because you left the **And** option selected, Excel displays all table rows that contain a date from 3/8/2013 to 3/14/2013, inclusive.



	A	B	C	D
1				
2		Date	Exceptions	
10		3/8/2013	53	
11		3/9/2013	73	
12		3/10/2013	64	
13		3/11/2013	53	
14		3/12/2013	47	
15		3/13/2013	91	
16		3/14/2013	91	
34				

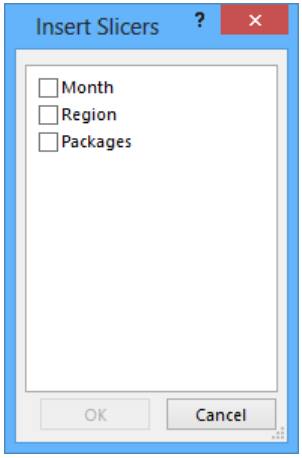
21 On the **Quick Access Toolbar**, click the **Undo** button to remove your filter and restore the table to its unfiltered state.

CLEAN UP **Close the PackageExceptions workbook, saving your changes if you want to.**

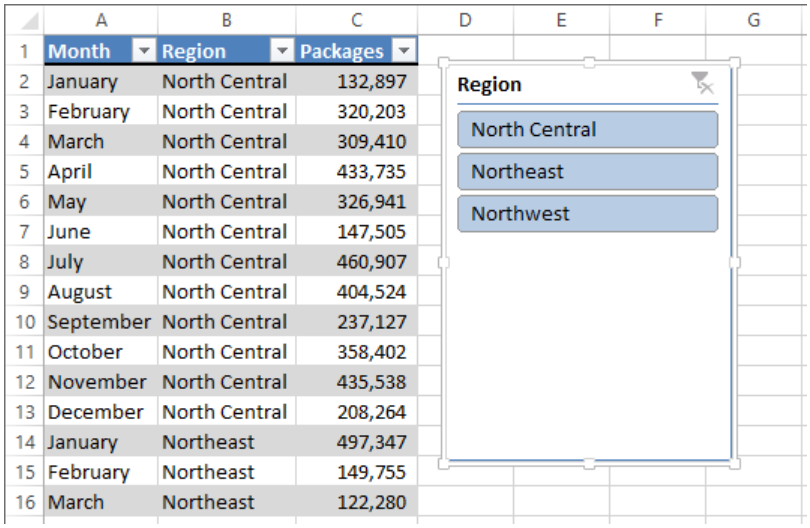
Filtering Excel table data by using slicers

In versions of Excel prior to Excel 2013, the only visual indication that you have applied a filter to an Excel table column is the indicator added to a column's filter arrow. The indicator lets users know that there is an active filter applied to that column but provides no information about which values are displayed and which are hidden. Beginning with Excel 2010, you could use slicers to provide a visual indication of which items are currently displayed or hidden in a PivotTable. Excel 2013 extends that ability to filtering an Excel table.

To create a slicer, click any cell in an Excel table and then, on the Insert tab, in the Filters group, click Slicer to display the Insert Slicers dialog box.



Select the check box next to the columns for which you want to create a slicer, and click OK. When you do, Excel displays a slicer for each column you identified.



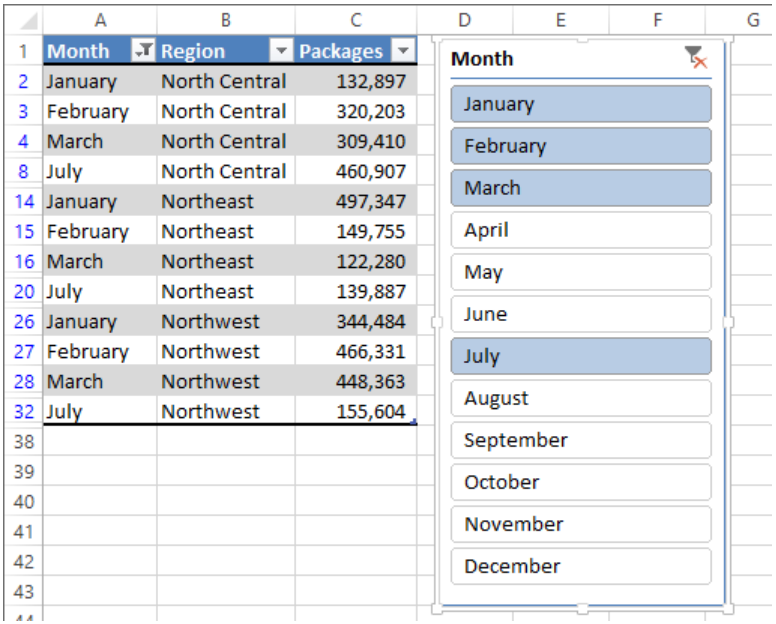
	A	B	C
1	Month	Region	Packages
2	January	North Central	132,897
3	February	North Central	320,203
4	March	North Central	309,410
5	April	North Central	433,735
6	May	North Central	326,941
7	June	North Central	147,505
8	July	North Central	460,907
9	August	North Central	404,524
10	September	North Central	237,127
11	October	North Central	358,402
12	November	North Central	435,538
13	December	North Central	208,264
14	January	Northeast	497,347
15	February	Northeast	149,755
16	March	Northeast	122,280

TIP If you have already applied a filter to the column for which you display a slicer, the slicer reflects the filter's result.

A slicer displays the values within the Excel table column you identified. Any value displayed in color (or gray if you select a gray-and-white color scheme) appears within the table. Values displayed in light gray or white do not appear in the table.

Clicking an item in a slicer changes that item's state—if a value is currently displayed in a table, clicking the value hides it. If it's hidden, clicking its value in the slicer displays it in the table. As with other objects in an Excel workbook, you can use the Shift and Ctrl keys to help define your selections. For example, suppose you create a slicer for the Month column while every month is displayed.

If you want to hide every month except January, February, and March, you click the January item to hide every month except January. Then hold down the Shift key and click March to have Excel display just the data for the months of January, February, and March. You can then add another month, such as July, to the filter by holding down the Ctrl key and clicking July in the slicer.



	Month	Region	Packages
2	January	North Central	132,897
3	February	North Central	320,203
4	March	North Central	309,410
8	July	North Central	460,907
14	January	Northeast	497,347
15	February	Northeast	149,755
16	March	Northeast	122,280
20	July	Northeast	139,887
26	January	Northwest	344,484
27	February	Northwest	466,331
28	March	Northwest	448,363
32	July	Northwest	155,604

To use a slicer to remove a filter, click the Clear Filter button in the upper-right corner of the slicer. If you want to resize a slicer, you can do so by dragging the resize handle in the lower-right corner of the slicer. To delete the slicer, right-click its title bar and then click the menu command that starts with the word *Remove*. For example, the Month column's menu command would be Remove Month.

TIP You can change a slicer's formatting by clicking the slicer and then, on the Slicer Tools Options tool tab, clicking a style in the Slicer Styles gallery.

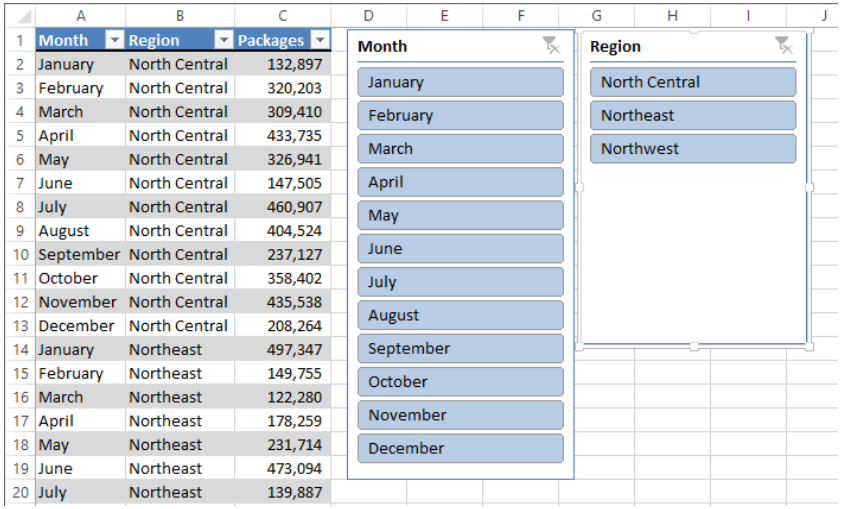
In this exercise, you'll filter the contents of an Excel table by using a slicer.

SET UP **You need the Slicers workbook located in the Chapter05 practice file folder to complete this exercise. Open the workbook, and then follow the steps.**

1 Click any cell in the Excel table.

2 On the **Insert** tab of the ribbon, click the **Slicer** button to display the **Insert Slicers** dialog box.

3 Select the **Month** and **Region** check boxes, and then click **OK** to add slicers for the **Month** and **Region** columns.



	A	B	C
1	Month	Region	Packages
2	January	North Central	132,897
3	February	North Central	320,203
4	March	North Central	309,410
5	April	North Central	433,735
6	May	North Central	326,941
7	June	North Central	147,505
8	July	North Central	460,907
9	August	North Central	404,524
10	September	North Central	237,127
11	October	North Central	358,402
12	November	North Central	435,538
13	December	North Central	208,264
14	January	Northeast	497,347
15	February	Northeast	149,755
16	March	Northeast	122,280
17	April	Northeast	178,259
18	May	Northeast	231,714
19	June	Northeast	473,094
20	July	Northeast	139,887

4 In the **Month** slicer, click the **January** item and then, holding down the **Shift** key, click the **April** item. Excel updates your table to display values for the months of January, February, March, and April.

5 In the **Region** slicer, click the **North Central** item and then, holding down the **Ctrl** key, click the **Northwest** item. Excel updates your table to display values for the North Central and Northwest regions.

6 Right-click the **Region** slicer and then click **Remove "Region"** to delete it. Excel deletes the slicer and removes its filter from the table.

7 In the **Month** slicer, click the **June** item to display results for the month of June.

8 In the **Month** slicer, click the **Clear Filter** button to remove the filter and display the entire table.

9 Right-click the **Month** slicer and then click **Remove "Month"** to delete it.

CLEAN UP **Close the Slicers workbook, saving your changes if you want to.**

Manipulating worksheet data

Excel offers a wide range of tools you can use to summarize worksheet data. This section shows you how to select rows at random by using the *RAND* and *RANDBETWEEN* functions, how to summarize worksheet data by using the *SUBTOTAL* and *AGGREGATE* functions, and how to display a list of unique values within a data set.

Selecting list rows at random

In addition to filtering the data that is stored in your Excel worksheets, you can choose rows at random from a list. Selecting rows randomly is useful for choosing which customers will receive a special offer, deciding which days of the month to audit, or picking prize winners at an employee party.

To choose rows randomly, you can use the *RAND* function, which generates a random value between 0 and 1, and compare the value it returns with a test value included in the formula. As an example, suppose Consolidated Messenger wanted to offer approximately 30 percent of its customers a discount on their next shipment. A formula that returns a *TRUE* value 30 percent of the time would be *RAND<=0.3*; that is, whenever the random value was between 0 and 0.3, the result would be *TRUE*. You could use this formula to select each row in a list with a probability of 30 percent. A formula that displays *TRUE* when the value is equal to or less than 30 percent, and *FALSE* otherwise, would be *=IF(RAND()<=0.3,"True","False")*.

If you recalculate this formula 10 times, it's very unlikely that exactly three *TRUE* results and seven *FALSE* results would occur. Just as flipping a coin can result in the same result 10 times in a row by chance, so can the *RAND* function's results appear to be off if you only recalculate it a few times. However, if you were to recalculate the function 10,000 times, it is extremely likely that the number of *TRUE* results would be very close to 30 percent.

TIP Because the *RAND* function is a volatile function (it recalculates its results every time you update the worksheet), you should copy the cells that contain the *RAND* function in a formula and paste the formulas' values back into their original cells. To do so, select the cells that contain the *RAND* formulas and press Ctrl+C to copy the cell's contents. Then, on the Home tab, in the Clipboard group, in the Paste list, click Paste Values to replace the formula with its current result. If you don't replace the formulas with their results, you will never have a permanent record of which rows were selected.

The *RANDBETWEEN* function generates a random whole number within a defined range. For example, the formula *=RANDBETWEEN(1,100)* would generate a random integer value from 1 to 100, inclusive. The *RANDBETWEEN* function is very useful for creating sample data collections for presentations. Before the *RANDBETWEEN* function was introduced, you had to create formulas that added, subtracted, multiplied, and divided the results of the *RAND* function, which are always decimal values between 0 and 1, to create your data.

Summarizing worksheets by using hidden and filtered rows

The ability to analyze the data that's most vital to your current needs is important, but there are some limitations to how you can summarize your filtered data by using functions such as *SUM* and *AVERAGE*. One limitation is that any formulas you create that include the *SUM* and *AVERAGE* functions don't change their calculations if some of the rows used in the formula are hidden by the filter.

Excel provides two ways to summarize just the visible cells in a filtered data list. The first method is to use AutoCalculate. To use AutoCalculate, you select the cells you want to summarize. When you do, Excel displays the average of the values in the cells, the sum of the values in the cells, and the number of visible cells (the count) in the selection. You'll find the display on the status bar at the lower edge of the Excel window.

When you use AutoCalculate, you aren't limited to finding the sum, average, and count of the selected cells. To display the other functions you can use, right-click the status bar and select the function you want from the shortcut menu. If a check mark appears next to a function's name, that function's result appears on the status bar. Clicking a selected function name removes that function from the status bar.

AutoCalculate is great for finding a quick total or average for filtered cells, but it doesn't make the result available in the worksheet. Formulas such as *=SUM(C3:C26)* always consider every cell in the range, regardless of whether you hide a cell's row by right-clicking the row's header and then clicking Hide, so you need to create a formula by using either the *SUBTOTAL* function or the *AGGREGATE* function to summarize just those values that are visible in your worksheet. With the *SUBTOTAL* function, you can summarize every value in a range or summarize only those values in rows you haven't manually hidden. The *SUBTOTAL* function has this syntax: *SUBTOTAL(function_num, ref1, ref2, ...)*. The *function_num* argument holds the number of the operation you want to use to summarize your data. (The operation

numbers are summarized in a table later in this section.) The *ref1*, *ref2*, and further arguments represent up to 29 ranges to include in the calculation.

As an example, assume you have a worksheet where you hid rows 20 through 26 manually. In this case, the formula *=SUBTOTAL(9, C3:C26, E3:E26, G3:G26)* would find the sum of all values in the ranges C3:C26, E3:E26, and G3:G26, regardless of whether that range contained any hidden rows. The formula *=SUBTOTAL(109, C3:C26, E3:E26, G3:G26)* would find the sum of all values in cells C3:C19, E3:E19, and G3:G19, ignoring the values in the manually hidden rows.

IMPORTANT Be sure to place your *SUBTOTAL* formula in a row that is even with or above the headers in the range you're filtering. If you don't, your filter might hide the formula's result!

The following table lists the summary operations available for the *SUBTOTAL* formula. Excel displays the available summary operations as part of the Formula AutoComplete functionality, so you don't need to remember the operation numbers or look them up in the Help system.

Operation number (includes hidden values)	Operation number (ignores values in manually hidden rows)	Function	Description
1	101	AVERAGE	Returns the average of the values in the range
2	102	COUNT	Counts the cells in the range that contain a number
3	103	COUNTA	Counts the nonblank cells in the range
4	104	MAX	Returns the largest (maximum) value in the range
5	105	MIN	Returns the smallest (minimum) value in the range
6	106	PRODUCT	Returns the result of multiplying all numbers in the range

Operation number (includes hidden values)	Operation number (ignores values in manually hidden rows)	Function	Description
7	107	STDEV.S	Calculates the standard deviation of the values in the range by examining a sample of the values
8	108	STDEV.P	Calculates the standard deviation of the values in the range by using all the values
9	109	SUM	Returns the result of adding all numbers in the range together
10	110	VAR.S	Calculates the variance of the values in the range by examining a sample of the values
11	111	VAR.P	Calculates the variance of the values in the range by using all of the values

As the previous table shows, the *SUBTOTAL* function has two sets of operations. The first set (operations 1 through 11) represents operations that include hidden values in their summary, and the second set (operations 101 through 111) represents operations that summarize only values visible in the worksheet. Operations 1 through 11 summarize all cells in a range, regardless of whether the range contains any manually hidden rows. By contrast, operations 101 through 111 ignore any values in manually hidden rows. What the *SUBTOTAL* function doesn't do, however, is change its result to reflect rows hidden by using a filter.

The *AGGREGATE* function extends the capabilities of the *SUBTOTAL* function. With it, you can select from a broader range of functions and use another argument to determine which, if any, values to ignore in the calculation. *AGGREGATE* has two possible syntaxes, depending on the summary operation you select. The first syntax is *=AGGREGATE(function_num, options, ref1...)*, which is similar to the syntax of the *SUBTOTAL* function. The other possible syntax, *=AGGREGATE(function_num, options, array, [k])*, is used to create *AGGREGATE* functions that use the *LARGE*, *SMALL*, *PERCENTILE.INC*, *QUARTILE.INC*, *PERCENTILE.EXC*, and *QUARTILE.EXC* operations.

The following table summarizes the summary operations available for use in the *AGGREGATE* function.

Number	Function	Description
1	AVERAGE	Returns the average of the values in the range.
2	COUNT	Counts the cells in the range that contain a number.
3	COUNTA	Counts the nonblank cells in the range.
4	MAX	Returns the largest (maximum) value in the range.
5	MIN	Returns the smallest (minimum) value in the range.
6	PRODUCT	Returns the result of multiplying all numbers in the range.
7	STDEV.S	Calculates the standard deviation of the values in the range by examining a sample of the values.
8	STDEV.P	Calculates the standard deviation of the values in the range by using all the values.
9	SUM	Returns the result of adding all numbers in the range together.
10	VAR.S	Calculates the variance of the values in the range by examining a sample of the values.
11	VAR.P	Calculates the variance of the values in the range by using all of the values.
12	MEDIAN	Returns the value in the middle of a group of values.
13	MODE.SNGL	Returns the most frequently occurring number from a group of numbers.
14	LARGE	Returns the k-th largest value in a data set; k is specified by using the last function argument. If k is left blank, Excel returns the largest value.
15	SMALL	Returns the k-th smallest value in a data set; k is specified by using the last function argument. If k is left blank, Excel returns the smallest value.
16	PERCENTILE.INC	Returns the k-th percentile of values in a range, where k is a value from 0 to 1, inclusive.

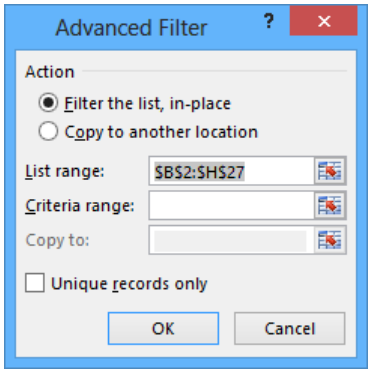
Number	Function	Description
17	QUARTILE.INC	Returns the quartile value of a data set, based on a percentage from 0 to 1, inclusive.
18	PERCENTILE.EXC	Returns the k-th percentile of values in a range, where k is a value from 0 to 1, exclusive.
19	QUARTILE.EXC	Returns the quartile value of a data set, based on a percentage from 0 to 1, exclusive.

With the second argument, *options*, you can select which items the *AGGREGATE* function should ignore. These items can include hidden rows, errors, and *SUBTOTAL* and *AGGREGATE* functions. The following table summarizes the values available for the *options* argument and the effect they have on the function's results.

Number	Description
0	Ignore nested *SUBTOTAL* and *AGGREGATE* functions
1	Ignore hidden rows and nested *SUBTOTAL* and *AGGREGATE* functions
2	Ignore error values and nested *SUBTOTAL* and *AGGREGATE* functions
3	Ignore hidden rows, error values, and nested *SUBTOTAL* and *AGGREGATE* functions
4	Ignore nothing
5	Ignore hidden rows
6	Ignore error values
7	Ignore hidden rows and error values

Finding unique values within a data set

Summarizing numerical values can provide valuable information that helps you run your business. It can also be helpful to know how many different values appear within a column. For example, you might want to display all of the countries in which Consolidated Messenger has customers. If you want to display a list of the unique values in a column, click any cell in the data set, display the Data tab and then, in the Sort & Filter group, click Advanced to display the Advanced Filter dialog box.



In the List Range field, enter the reference of the cell range you want to examine for unique values, select the Unique Records Only check box, and then click OK to have Excel display the row that contains the first occurrence of each value in the column.

IMPORTANT Excel treats the first cell in the data range as a header cell, so it doesn't consider the cell as it builds the list of unique values. Be sure to include the header cell in your data range!

In this exercise, you'll select random rows from a list of exceptions to identify package delivery misadventures to investigate, create an *AGGREGATE* formula to summarize the visible cells in a filtered worksheet, and find the unique values in one column of data.

SET UP **You need the ForFollowUp workbook located in the Chapter05 practice file folder to complete this exercise. Open the workbook, and then follow the steps.**

1. Select cells **G3:G27**. When you do, the average of the values in the selected cells, the number of cells selected, and the total of the values in the selected cells appear in the **AutoCalculate** area of the status bar.
2. In cell **J2**, enter the formula **=AGGREGATE(1,1,G3:G27)**. The value *$15.76* appears in cell **J2**.

3 On the **Data** tab, in the **Sort & Filter** group, click **Advanced** to open the **Advanced Filter** dialog box.

4 In the **List range** field, enter **E2:E27**.

5 Select the **Unique records only** check box, and then click **OK** to display the rows that contain the first occurrence of each different value in the selected range.

TIP Remember that you must include cell E2, the header cell, in the List Range field so that the filter doesn't display two occurrences of Northeast in the unique values list. To test what happens when you don't include the header cell, try changing the range in the List Range field to E3:E27, selecting the Unique Records Only check box, and clicking OK.

	B	C	D	E	F	G	H	I	J	K
2	**ExceptionID**	**PackageID**	**Date**	**Center**	**Route**	**Cost**	**Investigate**		$ 15.76	
3	EX1000001	PI34920119	3/30/2013	Northeast	RT310	$ 12.08				
4	EX1000002	PI34920120	3/30/2013	Midwest	RT892	$ 14.88				
5	EX1000003	PI34920121	3/30/2013	Northwest	RT424	$ 13.61				
8	EX1000006	PI34920124	3/30/2013	Central	RT341	$ 18.86				
11	EX1000009	PI34920127	3/31/2013	South	RT983	$ 19.87				
12	EX1000010	PI34920128	3/31/2013	Southwest	RT827	$ 18.01				
28										

6 On the **Data** tab, in the **Sort & Filter** group, click **Clear** to remove the filter.

7 In cell **H3**, enter the formula **=IF(RAND()<0.15,"Yes","No")**, and press **Enter**. A value of *Yes* or *No* appears in cell **H3**, depending on the *RAND* function result.

8 Select cell **H3**, and then drag the fill handle down until it covers cell **H27** to copy the formula into every cell in the range **H3:H27**.

9 With the range **H3:H27** still selected, on the **Home** tab, in the **Clipboard** group, click the **Copy** button. Excel copies the cell range's contents to the Microsoft Office Clipboard.

10 Click the **Paste** arrow, and then in the **Paste** gallery that appears, click the first icon in the **Paste Values** group to replace the cells' formulas with the formulas' current results.

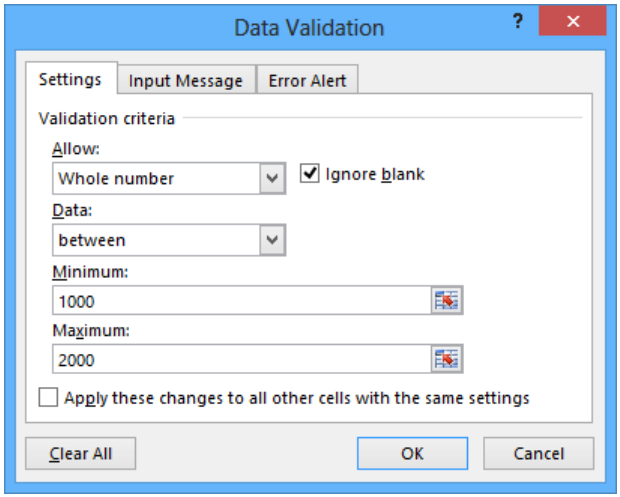
D	E	F	G	H	I	J
						Summary
Date	Center	Route	Cost	Investigate		$ 15.76
3/30/2013	Northeast	RT310	$ 12.08	No		
3/30/2013	Midwest	RT892	$ 14.88	Yes		
3/30/2013	Northwest	RT424	$ 13.61	No		
3/30/2013	Northeast	RT995	$ 10.64	No		
3/30/2013	Midwest	RT827	$ 15.26	No		
3/30/2013	Central	RT341	$ 18.86	No		
3/30/2013	Central	RT864	$ 15.71	Yes		
3/30/2013	Central	RT277	$ 18.50	No		
3/31/2013	South	RT983	$ 19.87	No		
3/31/2013	Southwest	RT827	$ 18.01	No		
3/31/2013	South	RT942	$ 19.85	No		
3/31/2013	South	RT940	$ 15.61	No		
3/31/2013	Southwest	RT751	$ 12.84	No		
4/1/2013	Midwest	RT436	$ 13.94	No		
4/1/2013	Midwest	RT758	$ 17.55	No		

CLEAN UP **Close the ForFollowUp workbook, saving your changes if you want to.**

Defining valid sets of values for ranges of cells

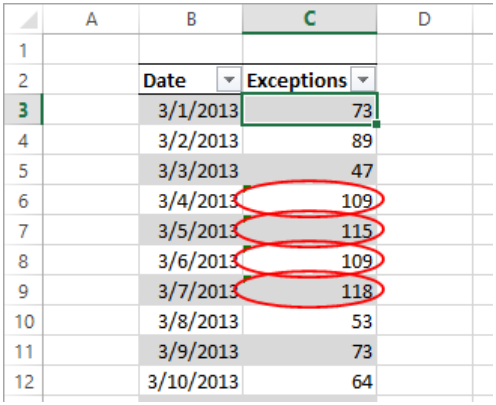
Part of creating efficient and easy-to-use worksheets is to do what you can to ensure the data entered into your worksheets is as accurate as possible. Although it isn't possible to catch every typographical or transcription error, you can set up a validation rule to make sure that the data entered into a cell meets certain standards.

To create a validation rule, display the Data tab on the ribbon and then, in the Data Tools group, click the Data Validation button to open the Data Validation dialog box. You can use the controls in the Data Validation dialog box to define the type of data that Excel should allow in the cell and then, depending on the data type you choose, to set the conditions data must meet to be accepted in the cell. For example, you can set the conditions so that Excel knows to look for a whole number value between 1,000 and 2,000.



Setting accurate validation rules can help you and your colleagues avoid entering a customer's name in the cell designated to hold the phone number or setting a credit limit above a certain level. To require a user to enter a numeric value in a cell, display the Settings page of the Data Validation dialog box, and, depending on your needs, choose either Whole Number or Decimal from the Allow list.

If you want to set the same validation rule for a group of cells, you can do so by selecting the cells to which you want to apply the rule (such as a column in which you enter the credit limit of customers of Consolidated Messenger) and setting the rule by using the Data Validation dialog box. One important fact you should keep in mind is that, with Excel, you can create validation rules for cells in which you have already entered data. Excel doesn't tell you whether any of those cells contain data that violates your rule at the moment you create the rule, but you can find out by having Excel circle any worksheet cells containing data that violates the cell's validation rule. To do so, display the Data tab and then, in the Data Tools group, click the Data Validation arrow. On the menu, click the Circle Invalid Data button to circle cells with invalid data.



	A	B	C	D
1				
2		Date	Exceptions	
3		3/1/2013	73	
4		3/2/2013	89	
5		3/3/2013	47	
6		3/4/2013	109	
7		3/5/2013	115	
8		3/6/2013	109	
9		3/7/2013	118	
10		3/8/2013	53	
11		3/9/2013	73	
12		3/10/2013	64	

When you're ready to hide the circles, in the Data Validation list, click Clear Validation Circles.

Of course, it's frustrating if you want to enter data into a cell and, when a message box appears that tells you the data you tried to enter isn't acceptable, you aren't given the rules you need to follow. With Excel, you can create a message that tells the user which values are expected before the data is entered and then, if the conditions aren't met, reiterate the conditions in a custom error message.

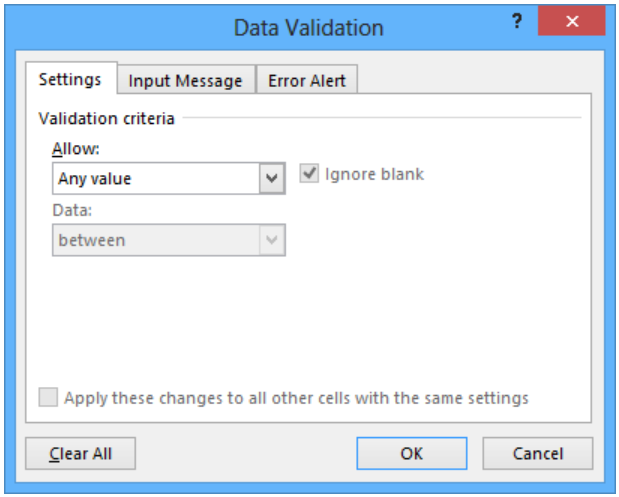
You can turn off data validation in a cell by displaying the Settings page of the Data Validation dialog box and clicking the Clear All button in the lower-left corner of the dialog box.

In this exercise, you'll create a data validation rule that limits the credit line of Consolidated Messenger customers to $25,000, add an input message mentioning the limitation, and then create an error message if someone enters a value greater than $25,000. After you create your rule and messages, you'll test them.

SET UP **You need the Credit workbook located in the Chapter05 practice file folder to complete this exercise. Open the workbook, and then follow the steps.**

1 Select the cell range **J4:J7**. Note that cell **J7** is currently blank; you will add a value to it later in this exercise.

2 On the **Data** tab, in the **Data Tools** group, click **Data Validation** to open the **Data Validation** dialog box, which displays the **Settings** page.



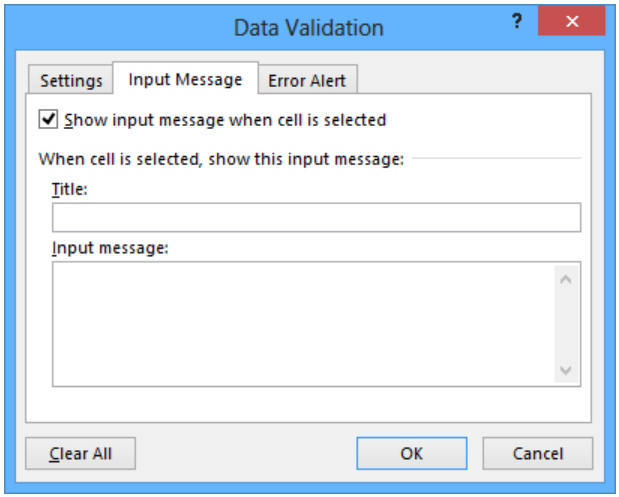
3 In the **Allow** list, click **Whole Number**. Boxes labeled **Minimum** and **Maximum** appear below the **Data** box.

4 In the **Data** list, click **less than or equal to** remove the **Minimum** box.

5 In the **Maximum** box, enter **25000**.

6 Clear the **Ignore blank** check box.

7 Click the **Input Message** tab to display the **Input Message** page.

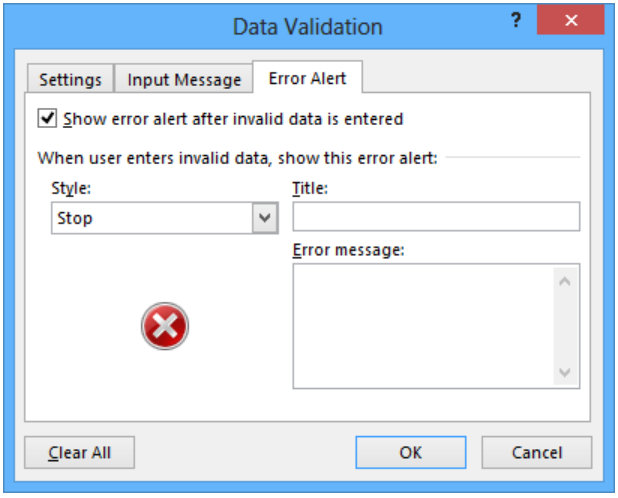


8 In the **Title** box, enter **Enter Limit**.

9 In the **Input Message** box, enter **Please enter the customer's credit limit, omitting the dollar sign and any commas.**

10 Click the **Error Alert** tab to display the **Error Alert** page.

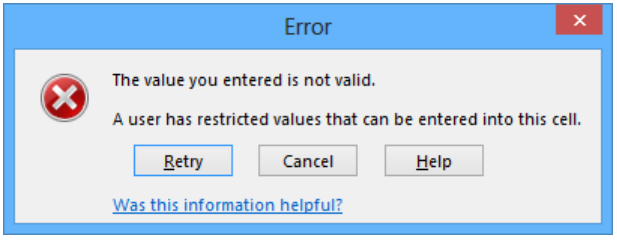
11 In the **Style** list, click **Stop** to change the icon that appears on your message box.



12 In the **Title** box, enter **Error**, and then click **OK**.

13 Click cell **J7**. When you do, a ScreenTip with the title *Enter Limit* and the text *Please enter the customer's credit limit, omitting the dollar sign and any commas* appears near cell **J7**.

14 Enter **25001**, and press **Enter**. A stop box with the title **Error** opens. Leaving the **Error message** box blank in step 12 causes Excel to use its default message.



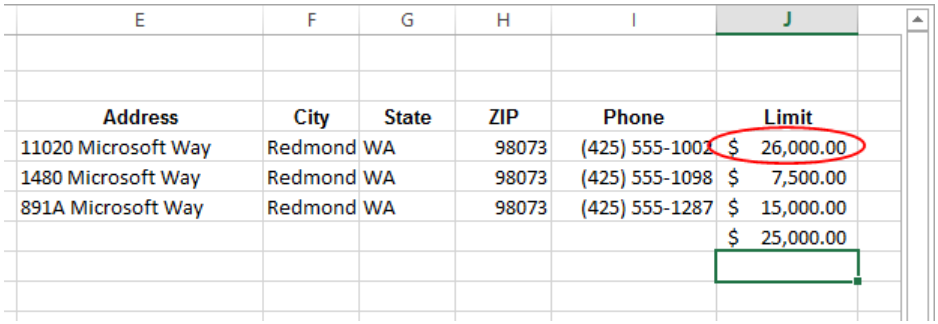
15 Click **Cancel** to close the error box.

IMPORTANT By clicking Retry, you can edit the bad value, whereas clicking Cancel deletes the entry.

16 Click cell **J7** to make it the active cell and display the ScreenTip.

17 Enter **25000**, and press **Enter**.

18 On the **Data** tab, in the **Data Tools** group, click the **Data Validation** arrow and then, in the list, click **Circle Invalid Data**. A red circle appears around the value in cell **J4**.



	E	F	G	H	I	J
	Address	City	State	ZIP	Phone	Limit
	11020 Microsoft Way	Redmond	WA	98073	(425) 555-1002	$ 26,000.00
	1480 Microsoft Way	Redmond	WA	98073	(425) 555-1098	$ 7,500.00
	891A Microsoft Way	Redmond	WA	98073	(425) 555-1287	$ 15,000.00
						$ 25,000.00

19 In the **Data Validation** list, click **Clear Validation Circles** to remove the red circle from around the value in cell **J4**.

CLEAN UP **Close the Credit workbook, saving your changes if you want to.**

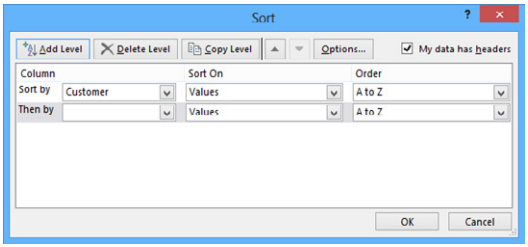
Key points

- A number of filters are defined in Excel. (You might find that the one you want is already available.)
- Filtering an Excel worksheet based on values in a single column is easy to do, but you can create a custom filter to limit your data based on the values in more than one column as well.
- With the search filter capability, you can limit the data in your worksheets based on characters the terms contain.
- Don't forget that you can get a running total (or an average, or any one of several other summary operations) for the values in a group of cells. Just select the cells and look on the status bar: the result will be there.
- Use data validation techniques to improve the accuracy of data entered into your worksheets and to identify data that doesn't meet the guidelines you set.

Chapter at a glance

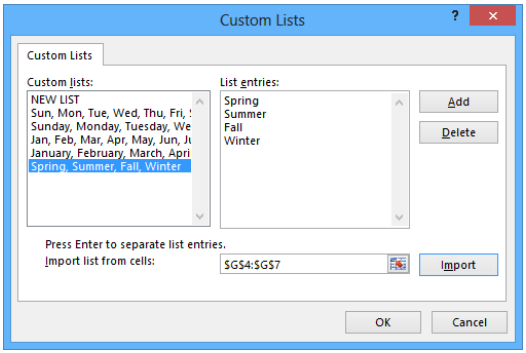
Sort

Sort worksheet data,
page 174



Customize

Sort data by using custom lists,
page 179



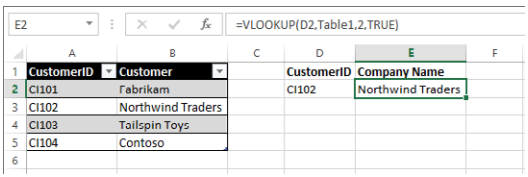
Organize

Organize data into levels,
page 183

	A	B	C	D
1	Year	Quarter	Month	Package Volume
2	2012	1	January	5,213,292
3	2012	1	February	2,038,516
4	2012	1	March	2,489,601
5	2012	2	April	9,051,231
6	2012	2	May	5,225,156
7	2012	2	June	3,266,644
8	2012	3	July	2,078,794
9	2012	3	August	1,591,434
10	2012	3	September	8,518,985
11	2012	4	October	1,973,050
12	2012	4	November	7,599,195
13	2012	4	December	9,757,876
14	2012 Total			58,803,774
15	2013	1	January	5,304,039

Find

Look up information in a worksheet,
page 189



E2: =VLOOKUP(D2,Table1,2,TRUE)

	A	B	C	D	E	F
1	CustomerID	Customer		CustomerID	Company Name	
2	CI101	Fabrikam		CI102	Northwind Traders	
3	CI102	Northwind Traders				
4	CI103	Tailspin Toys				
5	CI104	Contoso				
6						

Reordering and summarizing data

6

IN THIS CHAPTER, YOU WILL LEARN HOW TO

- Sort worksheet data.
- Sort data by using custom lists.
- Organize data into levels.
- Look up information in a worksheet.

Most of the time, when you enter data in a Microsoft Excel worksheet, you will enter it in chronological order. For example, you could enter hourly shipment data in a worksheet, starting with the first hour of the day and ending with the last hour. The data would naturally be displayed in the order you entered it, but that might not always be the best arrangement to answer your questions. For instance, you might want to sort your data so that the top row in your worksheet shows the day of the month with the highest package volume, with subsequent rows displaying the remaining days in decreasing order of package volumes handled. You can also sort data based on the contents of more than one column. A good example is sorting package handling data by week, day, and then hour of the day.

After you have sorted your data into the order you want, you can find partial totals, or subtotals, for groups of cells within a given range. Yes, you can create formulas to find the sum, average, or standard deviation of data in a cell range, but you can do the same thing much more quickly by having Excel calculate the total for rows that have the same value in one of their columns. For example, if your worksheet holds sales data for a list of services, you can calculate subtotals for each product category.

When you calculate subtotals in a worksheet, Excel creates an outline that marks the cell ranges used in each subtotal. For example, if the first 10 rows of a worksheet contain overnight shipping data, and the second 10 rows contain second-day shipping data, Excel divides the rows into two units. You can use the markers on the worksheet to hide or display the rows used to calculate a subtotal; in this case, you can hide all the rows that contain overnight shipping data, hide all the rows that contain second-day shipping data, hide both, or show both.

Excel also has a capability you might expect to find only in a database program—you can enter a value in a cell and have Excel look in a named range to find a corresponding value. For instance, you can have a two-column named range with one column displaying customer identification numbers and the second column displaying the name of the company assigned each number. When you use a VLOOKUP formula that references the named range, colleagues using your workbook can enter a customer identification number in a cell and have the name of the corresponding company appear in the cell that has the formula.

In this chapter, you'll sort your data by using one or more criteria, calculate subtotals, organize your data into levels, and look up information in a worksheet.

PRACTICE FILES To complete the exercises in this chapter, you need the practice files contained in the Chapter06 practice file folder. For more information, see "Download the practice files" in this book's Introduction.

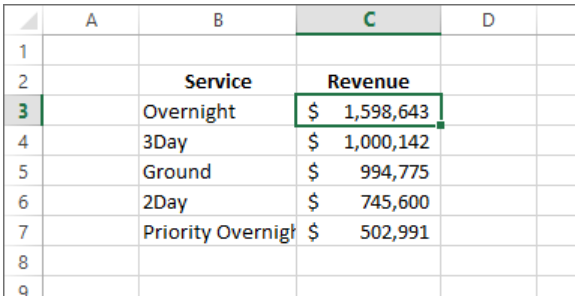
Sorting worksheet data

Although Excel makes it easy to enter your business data and to manage it after you've saved it in a worksheet, unsorted data will rarely answer every question you want to ask it. For example, you might want to discover which of your services generates the most profits or which service costs the most for you to provide. You can discover that information by sorting your data.

When you sort data in a worksheet, you rearrange the worksheet rows based on the contents of cells in a particular column or set of columns. For instance, you can sort a worksheet to find your highest-revenue services.

You can sort a group of rows in a worksheet in a number of ways, but the first step is to identify the column that will provide the values by which the rows should be sorted. In the revenue example, you could find the highest revenue totals by sorting on the cells in the Revenue column. First you would select the cells in the Revenue column and display the

Home tab. Then, in the Editing group, in the Sort & Filter list, click Sort Largest To Smallest. Clicking Sort Largest To Smallest makes Excel put the row with the highest value in the Revenue column at the top of the worksheet and continue down to the lowest value.



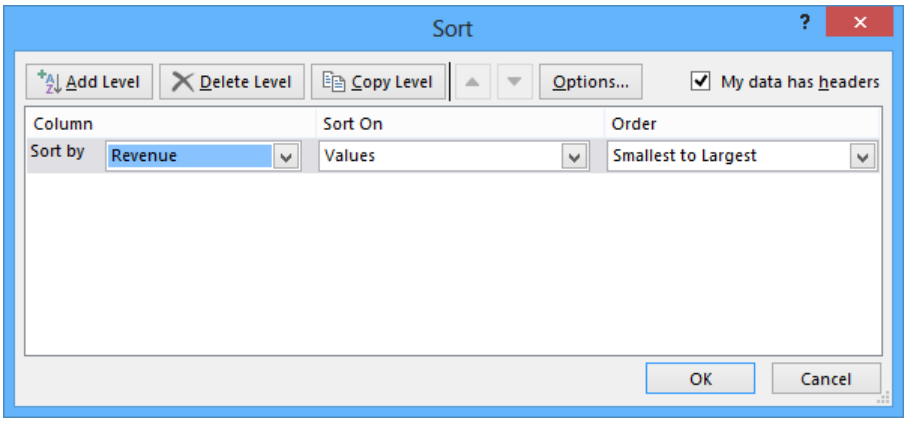
	A	B	C	D
1				
2		**Service**	**Revenue**	
3		Overnight	$ 1,598,643	
4		3Day	$ 1,000,142	
5		Ground	$ 994,775	
6		2Day	$ 745,600	
7		Priority Overnigh	$ 502,991	
8				
9				

If you want to sort the rows in the opposite order, from the lowest revenue to the highest, select the cells in the Revenue column and then, in the Sort & Filter list, click Sort Smallest To Largest.

TIP The exact set of values that appears in the Sort & Filter list changes to reflect the data in your column. If your column contains numerical values, you'll find the options Sort Largest To Smallest, Sort Smallest To Largest, and Custom List. If your column contains text values, the options are Sort A To Z (ascending order), Sort Z To A (descending order), and Custom List. And if your column contains dates, the options are Sort Newest To Oldest, Sort Oldest To Newest, and Custom List.

By using the Sort Smallest To Largest and Sort Largest To Smallest options, you can sort rows in a worksheet quickly, but you can use these options only to sort the worksheet based on the contents of one column, even though you might want to sort by two columns. For example, you might want to order the worksheet rows by service category and then by total so that you can display the customers that use each service category most frequently. You can sort rows in a worksheet by the contents of more than one column by using the Sort dialog box, in which you can pick any number of columns to use as sort criteria and choose whether to sort the rows in ascending or descending order.

To open the Sort dialog box, click Custom Sort in the Sort & Filter list.



If your data has a header row, select the My Data Has Headers check box so the column headers will appear in the Sort By list. After you identify the column by which you want to sort, you can use the options in the Sort On list to select whether you want to sort by a cell's value (the default), a cell's fill color, a cell's font color, or an icon displayed in the cell.

SEE ALSO For more information about creating conditional formats that change a cell's formatting or display an icon to reflect the cell's value, see "Changing the appearance of data based on its value" in Chapter 4, "Changing workbook appearance."

Finally, from the Order list, you can select how you want Excel to sort the column values. As with the Sort & Filter button's list, the exact values that appear in the Order list change to reflect the data to be sorted.

Adding, moving, copying, and deleting sorting levels are a matter of clicking the appropriate button in the Sort dialog box. To add a second level to your sort, click the Add Level button.

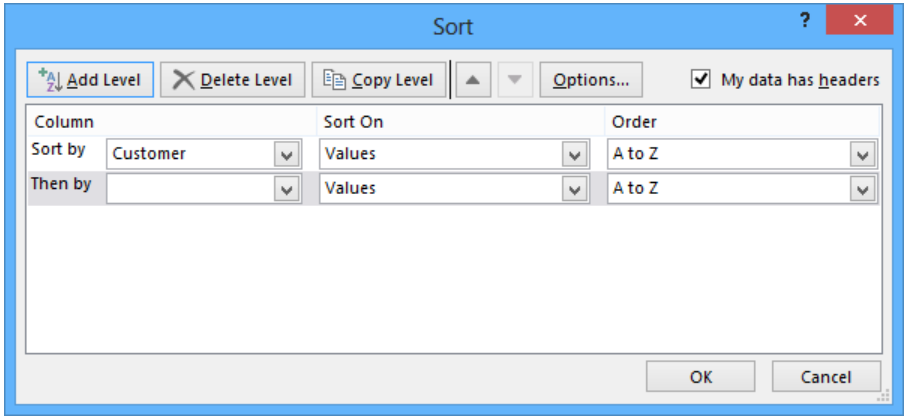
TIP In Excel 2003 and earlier versions of the program, you could define a maximum of three sorting levels. Beginning with Excel 2007, you can create up to 64 sorting levels.

To delete a level, click the level in the list, and then click Delete Level. By clicking the Copy Level button, you can put all the settings from one rule into another, saving yourself some work if you need to change only one item. By clicking the Move Up and Move Down buttons, which display an upward-pointing arrow and a downward-pointing arrow, respectively, you can change a sorting level's position in the order. Finally, clicking the Options button opens the Sort Options dialog box, which you can use to make a sorting level case sensitive and to change the orientation of the sort.

In this exercise, you'll sort worksheet data, sort by multiple criteria, change the order in which sorting criteria are applied, and sort data by color.

SET UP **You need the ShippingSummary workbook located in the Chapter06 practice file folder to complete this exercise. Open the workbook, and then follow the steps.**

1. Click cell **C3**. On the **Home** tab, in the **Editing** group, click the **Sort & Filter** button and then, in the list, click **Sort A to Z**. Excel sorts the data by season, with the seasons listed in alphabetical order.
2. In the **Sort & Filter** list, click **Custom Sort** to open the **Sort** dialog box and display the parameters of the sort you just applied.
3. If it's not already selected, select the **My data has headers** check box.
4. In the **Column** list, click **Customer**. If necessary, in the **Sort On** list, click **Values**; then in the **Order** list, click **A to Z**.
5. Click **Add Level** to create a new sorting level.



6 In the new **Column** list, click **Revenue**.

7 In the new **Order** list, click **Largest to Smallest**.

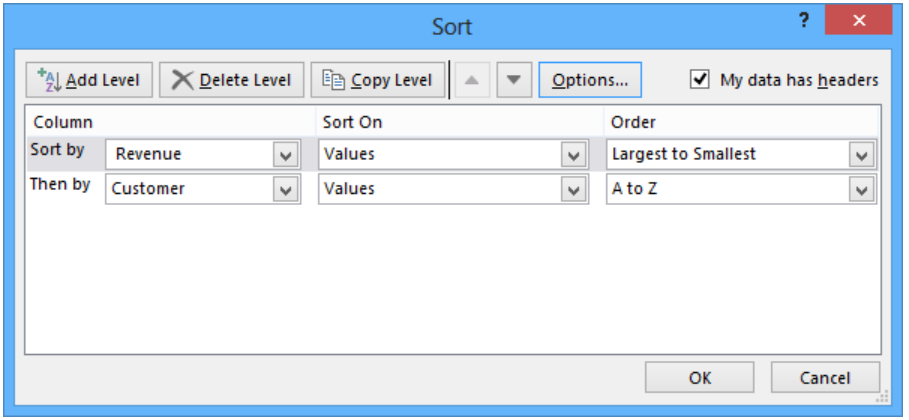
8 Click **OK** to close the **Sort** dialog box and sort the data list.

	A	B	C	D	E
1					
2		**Customer**	**Season**	**Revenue**	
3		Contoso	Spring	$201,438.00	
4		Contoso	Winter	$183,651.00	
5		Contoso	Fall	$118,299.00	
6		Contoso	Summer	$114,452.00	
7		Fabrikam	Fall	$255,599.00	
8		Fabrikam	Summer	$183,632.00	
9		Fabrikam	Spring	$139,170.00	
10		Fabrikam	Winter	$100,508.00	
11		Northwind Traders	Fall	$188,851.00	
12		Northwind Traders	Winter	$174,336.00	
13		Northwind Traders	Summer	$129,732.00	
14		Northwind Traders	Spring	$120,666.00	
15					

9 In the **Sort & Filter** list, click **Custom Sort** to open the **Sort** dialog box.

10 Click **Then by**, which selects the **Revenue** sorting rule.

11 Click the **Move Up** button to move the **Revenue** sorting rule above the **Customer** sorting rule.



12 Click **OK** to close the **Sort** dialog box and sort the data list.

13 Click cell **C3**. Then on the **Home** tab, in the **Editing** group, click **Sort & Filter**, and click **Custom Sort** to open the **Sort** dialog box.

14 In the **Sort by** row, in the **Column** list, click **Revenue**.

15 In the **Sort on** list, click **Cell Color**.

16 In the new list control that appears in the **Sort by** row, click **On Bottom** to have Excel put the **Revenue** cells that have no cell color on the bottom.

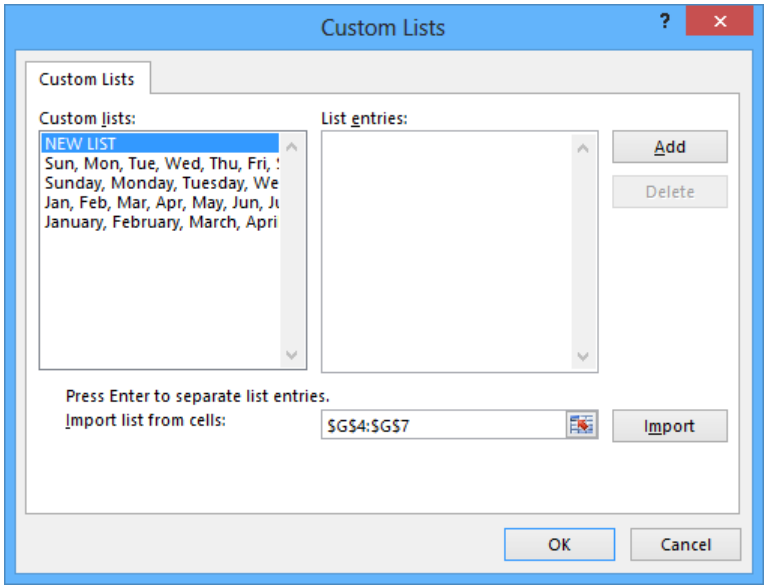
17 Click **OK** to have Excel sort the data list.

CLEAN UP **Close the ShippingSummary workbook, saving your changes if you want to.**

Sorting data by using custom lists

The default setting for Excel is to sort numbers according to their values and to sort words in alphabetical order, but that pattern doesn't work for some sets of values. One example in which sorting a list of values in alphabetical order would yield incorrect results is the months of the year. In an alphabetical calendar, April is the first month and September is the last! Fortunately, Excel recognizes a number of special lists, such as days of the week and months of the year. You can have Excel sort the contents of a worksheet based on values in a known list; if needed, you can create your own list of values. For example, the default lists of weekdays in Excel start with Sunday. If you keep your business records based on a Monday-through-Sunday week, you can create a new list that has Monday as the first day and Sunday as the last.

To create a new list, enter the list of values you want to use as your list into a contiguous cell range, select the cells, click the File tab, and then click Options. On the Advanced page of the Excel Options dialog box, in the General group near the bottom of the page, click the Edit Custom Lists button to open the Custom Lists dialog box.



The selected cell range's reference appears in the Import List From Cells field. To record your list, click the Import button.

If you prefer, you can enter the list in the List Entries box, to the right of the Custom Lists box.

TIP Another benefit of creating a custom list is that dragging the fill handle of a list cell that contains a value causes Excel to extend the series for you. For example, if you create the list *Spring, Summer, Fall, Winter*, then enter *Summer* in a cell and drag the cell's fill handle, Excel extends the series as *Fall, Winter, Spring, Summer, Fall*, and so on.

To use a custom list as a sorting criterion, open the Sort dialog box, click the rule's Order arrow, click Custom List, and select your list from the dialog box that opens.

TIP The Data tab of the ribbon also contains a Sort & Filter group with controls you can use to sort and filter your data.

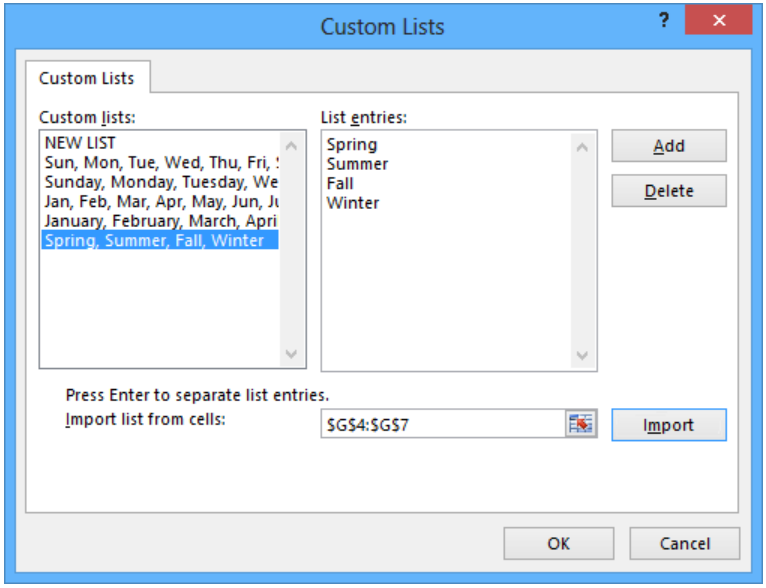
In this exercise, you'll sort data by using a custom list.

SET UP **You need the ShippingCustom workbook located in the Chapter06 practice file folder to complete this exercise. Open the workbook, and then follow the steps.**

1 Select cells **G4:G7**, click the **File** tab, and then click **Options** to open the **Excel Options** dialog box.

2 On the **Advanced** page, in the **General** group toward the bottom of the page, click **Edit Custom Lists** to open the **Custom Lists** dialog box.

3 Verify that the cell range **$G$4:$G$7** appears in the **Import list from cells** field, and then click **Import** to add the new list to the **Custom Lists** box.



4 Click **OK** twice to close the **Custom Lists** dialog box and the **Excel Options** dialog box.

5 Click cell **C3**.

6 On the **Home** tab, in the **Editing** group, click **Sort & Filter**, and then click **Custom Sort** to open the **Sort** dialog box.

7 Click the rule in the **Sort by** row, and then click **Delete Level** to remove the sorting rule.

8 If necessary, in the new **Sort by** row, in the **Column** list, click **Season**.

9 In the same row, in the **Order** list, click **Custom List** to open the **Custom Lists** dialog box.

10 In the **Custom lists** box, click **Spring, Summer, Fall, Winter**.

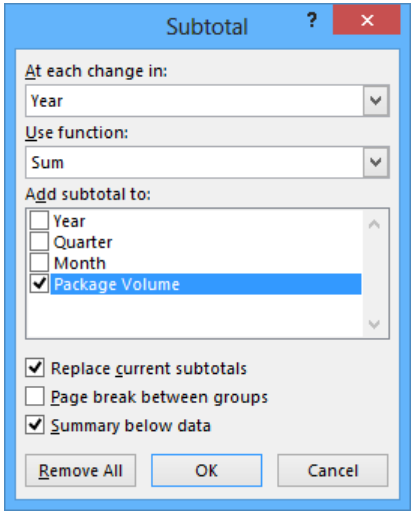
11 Click **OK** twice to close the **Custom Lists** dialog box and the **Sort** dialog box so that Excel sorts the data list.

	A	B	C	D	E
1					
2		**Customer**	**Season**	**Revenue**	
3		Contoso	Spring	$201,438.00	
4		Fabrikam	Spring	$139,170.00	
5		Northwind Traders	Spring	$120,666.00	
6		Contoso	Summer	$114,452.00	
7		Fabrikam	Summer	$183,632.00	
8		Northwind Traders	Summer	$129,732.00	
9		Contoso	Fall	$118,299.00	
10		Fabrikam	Fall	$255,599.00	
11		Northwind Traders	Fall	$188,851.00	
12		Contoso	Winter	$183,651.00	
13		Fabrikam	Winter	$100,508.00	
14		Northwind Traders	Winter	$174,336.00	
15					

CLEAN UP **Close the ShippingCustom workbook, saving your changes if you want to.**

Organizing data into levels

After you have sorted the rows in an Excel worksheet or entered the data so that it doesn't need to be sorted, you can have Excel calculate subtotals or totals for a portion of the data. In a worksheet with sales data for three different product categories, for example, you can sort the products by category, select all the cells that contain data, and then open the Subtotal dialog box. To open the Subtotal dialog box, display the Data tab and then, in the Outline group, click Subtotal.



In the Subtotal dialog box, you can choose the column on which to base your subtotals (such as every change of value in the Year column), the summary calculation you want to perform, and the column or columns that have values to be summarized. After you define your subtotals, they appear in your worksheet.