Working with Data

In this part, you'll find tips related to working with data of all types. There's an excellent chance that the tips here will improve your overall efficiency.

Tips and Where to Find Them

Selecting Cells Efficiently

Many Excel users think that the only way to select a range of cells is to drag over the cells with the mouse. Although selecting cells with a mouse works, it's rarely the most *efficient* way to accomplish the task. A better way is to use your keyboard to select ranges.

Selecting a range by using the Shift and arrow keys

The simplest way to select a range is to press (and hold) Shift and then use the arrow keys to highlight the cells. For larger selections, you can use PgDn or PgUp while pressing Shift to move in larger increments.

You can also use the End key to quickly extend a selection to the last non-empty cell in a row or column. To select the range B3:B8 (see Figure 53-1) by using the keyboard, move the cell pointer to B3 and then press the Shift key while you press End followed by the down-arrow key. Similarly, to select B3:D3, press the Shift key while you press End, followed by the right-arrow key.

	A	B	C	D	E	F
1						
2						
3		82	87	69		
4		30	74	19		
5		79	79	40		
6		56	56	67		
7		25	35	91		
8		17	24	90		
9						
10						
11						

Figure 53-1: A range of cells.

Selecting the current region

Often, you need to select a large rectangular selection of cells — the *current region*. To select the entire block of cells, move the cell pointer anywhere within the range and press Ctrl+A.

If the cell pointer is within a table (created by using Insert➜Tables➜Table), pressing Ctrl+A selects only the data. Press Ctrl+A a second time to select the table's Header row and Total row.

Selecting a range by Shift+clicking

When you're selecting a very large range, using the mouse may be the most efficient method — but dragging is not required. Select the upper-left cell in the range. Then scroll to the lower-right corner of the range, press Shift, and click the lower-right cell.

Selecting noncontiguous ranges

Most of the time, your range selections are probably simple rectangular ranges. In some cases, you may need to make a *multiple selection* — a selection that includes nonadjacent cells or ranges. For example, you may want to apply formatting to cells in different areas of your worksheet. If you make a multiple selection, you can apply the formatting in one step to all selected ranges. Figure 53-2 shows an example of a multiple selection.

	A	B	C	D	E	F
1						
2						
3		82	87	69		
4		30	74	19		
5		79	79	40		
6		56	56	67		
7		25	35	91		
8		17	24	90		
9						
10						
11						

Figure 53-2: A multiple selection that consists of noncontiguous ranges.

You can select a noncontiguous range by using either the mouse or the keyboard.

Press Ctrl as you click and drag the mouse to highlight individual cells or ranges.

From the keyboard, select a range as described previously (by using the Shift key). Then press Shift+F8 to select another range without canceling the previous range selection. Repeat this action as many times as needed. When you're finished, press Shift+F8 again to return to normal selecting mode.

Selecting entire rows

To select a single row, click a row number along the left of the worksheet. Or select any cell in the row and press Shift+spacebar.

To select multiple adjacent rows, click and drag in the row number area. Or select any cell in the first (or last) row and press Shift+spacebar to select the row. Then press Shift and use the arrow keys to extend the row selection down (or up).

To select multiple nonadjacent rows, press Ctrl while you click the row numbers for the rows you want to include.

Selecting entire columns

To select a single column, click a column letter along the top of the worksheet. Or select any cell in the column and press Ctrl+spacebar.

To select multiple adjacent columns, click and drag in the column letter section. Or select any cell in the first (or last) column and press Ctrl+spacebar to select the column. Then press Shift and use the arrow keys to extend the selection to the right (or left).

To select multiple nonadjacent columns, press Ctrl while you click the column letters for the columns you want to include.

Selecting multisheet ranges

In addition to two-dimensional ranges on a single worksheet, ranges can extend across multiple worksheets to be three-dimensional ranges.

Figure 53-3 shows a simple example of a multisheet workbook. The workbook has four sheets, named Totals, Operations, Marketing, and Manufacturing. The sheets are laid out identically.

	A	B	C	D	E	F	G	H
1	Budget Summary							
2								
3		Q1	Q2	Q3	Q4	Year Total		
4	Salaries	286,500	286,500	286,500	290,500	1,150,000		
5	Travel	40,500	42,525	44,651	46,884	174,560		
6	Supplies	59,500	62,475	65,599	68,879	256,452		
7	Facility	144,000	144,000	144,000	144,000	576,000		
8	Total	530,500	535,500	540,750	550,263	2,157,013		
9								
10								
11								
12								
13								
14								

Totals | Operations | Marketing | Manufacturing ...

Figure 53-3: Each worksheet in this workbook is laid out identically.

Assume that you want to apply the same formatting to all sheets — for example, you want to make the column headings bold with background shading. Selecting a multisheet range is the best approach. When the ranges are selected, the formatting is applied to all sheets.

In general, selecting a multisheet range is a simple two-step process:

1. Select the range in one sheet.
2. Select the worksheets to include in the range.

To select a group of contiguous worksheets, press Shift and click the sheet tab of the last worksheet that you want to include in the selection. To select individual worksheets, press Ctrl and click the sheet tab of each worksheet that you want to select. When you make the selection, the sheet tabs of the selected sheets appear with a white background, and Excel displays [Group] on the title bar. When you finish working with the multisheet range, click any sheet tab to leave Group mode.

Automatically Filling a Range with a Series

If you need to fill a range with a series of values, one approach is to enter the first value, write a formula to calculate the next value, and copy the formula. For example, Figure 54-1 shows a series of consecutive numbers in column A. Cell A1 contains the value 1, and cell A2 contains this formula, which was copied down the column:

```
=A1+1
```

	A	B	C	D
1	1			
2	2			
3	3			
4	4			
5	5			
6	6			
7	7			
8	8			
9	9			
10	10			
11	11			
12				
13				

Figure 54-1: Excel offers an easy way to generate a series of values like these.

Another approach is to let Excel do the work by using the handy AutoFill feature:

1. Enter 1 into cell A1.
2. Enter **2** into cell A2.
3. Select A1:A2.
4. Move the mouse cursor to the lower-right corner of cell A2 (the cell's *fill handle*), and when the mouse pointer turns into a black plus sign, drag down the column to fill in the cells.

You can turn this behavior on and off. If cells don't have a fill handle, choose File➜ Options and click the Advanced tab in the Excel Options dialog box. Select the check box labeled Enable Fill Handle and Cell Drag-And-Drop.

The data entered in Steps 1 and 2 provide Excel with the information it needs to determine which type of series to use. If you entered 3 in cell A2, the series will consist of odd integers: 1, 3, 5, 7, and so on.

When you release the mouse button after dragging, Excel displays an Auto Fill Options drop-down list. Click to select other options. The list of options is particular helpful with dates. Figure 54-2 shows

the Auto Fill Options when working with a date series. You can quickly create a series of weekdays, months, or years.

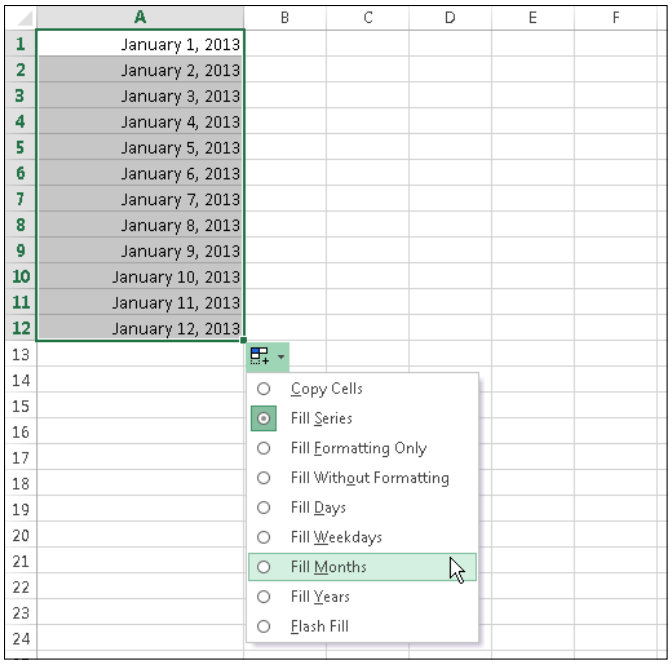


Figure 54-2: Use the Auto Fill Options drop-down list to change the type of fill.

Here's another AutoFill trick: If the data you start with is irregular, Excel completes the AutoFill action by doing a linear regression and fills in the predicted values. Figure 54-3 shows a worksheet with monthly sales values for January through July. If you use AutoFill after selecting C2:C8, Excel extends the best-fit linear sales trend and fills in the missing values. Figure 54-4 shows the predicted values, along with a chart.

	A	B	C	D	E
1		**Month**	**Sales**		
2		Jan	15,932		
3		Feb	18,933		
4		Mar	16,930		
5		Apr	19,387		
6		May	16,981		
7		Jun	22,553		
8		Jul	24,902		
9		Aug			
10		Sep			
11		Oct			
12		Nov			
13		Dec			
14					

Figure 54-3: Use AutoFill to perform a linear regression and predict sales values for August through December.

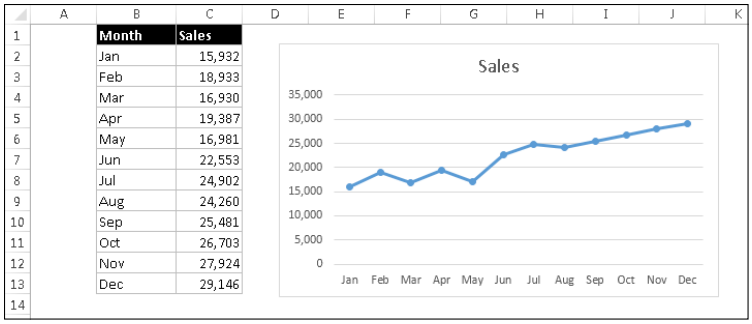


Figure 54-4: The sales figures, after using AutoFill to predict the next five months.

AutoFill also works with dates and even a few text items — day names and month names. The following table lists a few examples of the types of data that can be autofilled.

First Value	Autofilled Values
Sunday	Monday, Tuesday, Wednesday, and so on
Quarter-1	Quarter-2, Quarter-3, Quarter-4, Quarter-1, and so on
Jan	Feb, Mar, Apr, and so on
January	February, March, April, and so on
Month 1	Month 2, Month 3, Month 4, and so on

You can also create your own lists of items to be autofilled. To do so, open the Excel Options dialog box and click the Advanced tab. Then scroll down and click the Edit Custom Lists button to display the Custom Lists dialog box. Enter your items in the List Entries box (each on a new line). Then click the Add button to create the list. Figure 54-5 shows a custom list of region names that use Roman numerals.

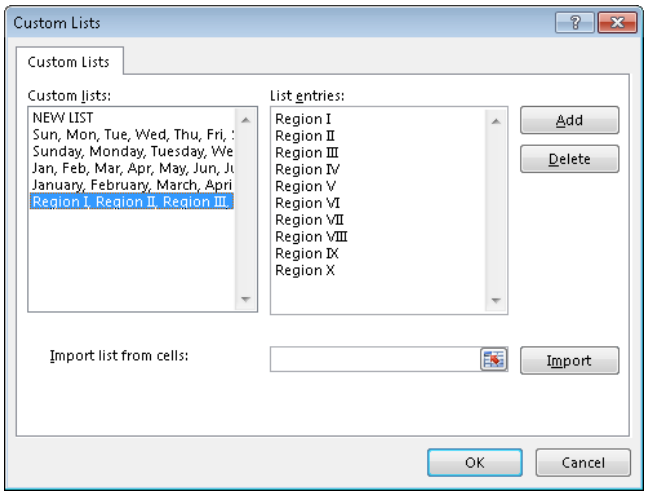


Figure 54-5: These region names work with the Excel AutoFill feature.

Fixing Trailing Minus Signs

Imported data sometimes displays negative values with a trailing minus sign. For example, a negative value may appear as **3,498-** rather than the more common **-3,498**. Excel doesn't convert these values. In fact, it considers them to be non-numeric text.

The solution is so simple it may surprise you:

1. Select the data that has the trailing minus signs. The selection can also include positive values.
2. Choose Data➜Data Tools➜Text to Columns.
3. When the Text to Columns dialog box appears, click Finish.

This procedure works because of a default setting in the Advanced Text Import Settings dialog box (which you don't even see, normally). To display this dialog box, shown in Figure 55-1, go to Step 3 in the Text to Columns Wizard dialog box and click Advanced.

Or you can use Flash Fill to fix the trailing minus signs. If the range contains any positive values, you may need to provide several examples. See Tip 64 for information about the Flash Fill feature.

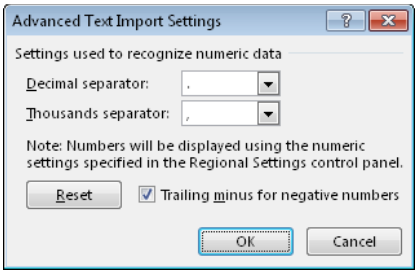
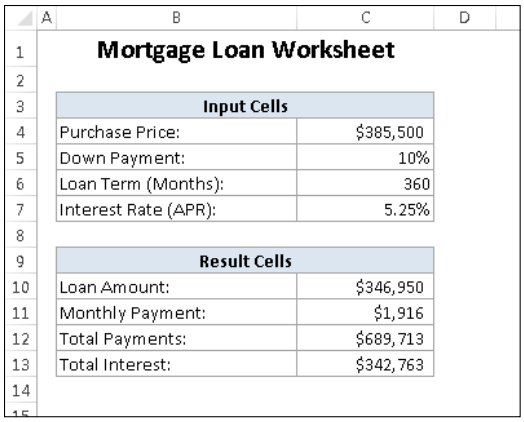


Figure 55-1: The Trailing Minus for Negative Numbers option makes it very easy to fix trailing minus signs in a range of data.

Restricting Cursor Movement to Input Cells

A common type of worksheet uses two types of cells: input cells and formula cells. The user enters data into the input cells, and the formulas calculate and display the results.

Figure 56-1 shows a simple example. The input cells are in the range C4:C7. These cells are used by the formulas in C10:C13. To prevent the user from accidentally typing over formula cells, it's useful to limit the cursor movement so that the formula cells can't even be selected.



	A	B	C	D
1		**Mortgage Loan Worksheet**		
2				
3		**Input Cells**		
4		Purchase Price:	$385,500	
5		Down Payment:	10%	
6		Loan Term (Months):	360	
7		Interest Rate (APR):	5.25%	
8				
9		**Result Cells**		
10		Loan Amount:	$346,950	
11		Monthly Payment:	$1,916	
12		Total Payments:	$689,713	
13		Total Interest:	$342,763	
14				

Figure 56-1: This worksheet has input cells at the top and formula cells below.

Setting up this sort of arrangement is a two-step process: Unlock the input cells and then protect the sheet. The following specific instructions are for the example shown in Figure 56-1:

1. Select C4:C7.
2. Press Ctrl+1 to display the Format Cells dialog box.
3. In the Format Cells dialog box, click the Protection tab, deselect the Locked check box, and click OK.

   By default, all cells are locked.
4. Choose Review➜Changes➜Protect Sheet.

   The Protect Sheet dialog box appears.
5. Deselect the Select Locked Cells check box and make sure that the Select Unlocked Cells check box is selected.
6. (Optional) Specify a password that will be required to unprotect the sheet.
7. Click OK.

After you perform these steps, only the unlocked cells can be selected. If you need to make any changes to your worksheet, you need to unprotect the sheet first, by choosing Review➜Changes➜ Unprotect Sheet.

Although this example used a contiguous range of cells for the input, that isn't necessary for the steps to work. The input cells can be scattered throughout your worksheet.

Protecting a worksheet with a password isn't a security feature. This type of password is easily cracked.

Transforming Data with and Without Using Formulas

Often, you have a range of cells containing data that must be transformed in some way. For example, you might want to increase all values by five percent. Or you might need to divide each value by two. This tip describes two ways to perform these types of transformations.

Transforming data without formulas

The following steps assume that you have values in a range and you want to increase all values by five percent. For example, the range can contain a price list and you're raising all prices by five percent:

1. Activate any empty cell and enter **1.05**.

   You will multiply the values by this number, which results in an increase of five percent.

2. Press Ctrl+C to copy that cell.
3. Select the range to be transformed.

   The range can include values, formulas, or text.

4. Choose Home➜Clipboard➜Paste➜Paste Special to display the Paste Special dialog box (see Figure 57-1).
5. In the Paste Special dialog box, click the Multiply option.
6. Click OK.
7. Press Esc to cancel Copy mode.

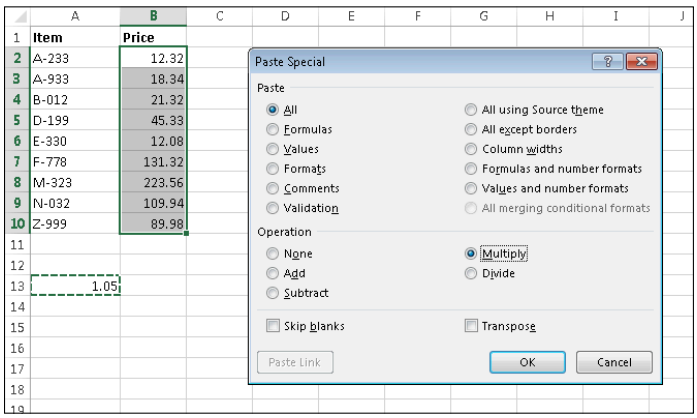


Figure 57-1: Using the Paste Special dialog box to multiply a range by a value.

The values in the range are multiplied by the copied value (1.05), and cells that contain text are ignored. Formulas in the range are modified accordingly. Assume that the range originally contained this formula:

```
=SUM(B18:B22)
```

After you perform the Paste Special operation, the formula is converted to

```
=(SUM(B18:B22))*1.05
```

This technique is limited to the four basic math operations: add, subtract, multiply, and divide.

For more versatility, keep reading to learn how to use formulas to transform values.

Transforming data by using temporary formulas

The previous section describes how to perform simple mathematical transformations on a range of numeric data. This tip describes the much more versatile method of transforming data (numerical or text) by using temporary formulas.

Figure 57-2 shows a worksheet with names in column A. These names are in all uppercase letters, and the goal is to convert them to proper case (only the first letter of each name is uppercase).

	A	B	C
1	**Name**	**Balance**	
2	SHIRLEY THOMAS	630.53	
3	ROBERT HARRIS	998.25	
4	ERIC HERNANDEZ	940.71	
5	MARTIN JACKSON	954.26	
6	WILLIAM CHAVEZ	928.43	
7	JERRY RUSSELL	308.75	
8	STANLEY WARD	714.30	
9	JANICE DAVIS	830.20	
10	TOD FISHER	655.37	
11	PHILLIP CARTER	896.46	
12	ANDREA PARKER	973.46	
13	ERIC HOBBS	909.49	
14	ELIZABETH MORALES	359.33	
15	MARY POWERS	262.92	
16	EDWARD SMITH	76.45	
17	NETA JONES	939.58	
18	JUSTIN ROSE	339.23	
19			

Figure 57-2: The goal is to transform the names in column A to proper case.

Follow these steps to transform the data in column A:

1. Create a temporary formula in an unused column.

   For this example, enter this formula in cell C2:

   ```
   =PROPER(A2)
   ```

2. Copy the formula down the column to accommodate all cells to be transformed.
3. Select the formula cells (in column C).
4. Press Ctrl+C.
5. Select the original data cells (in column A).
6. Choose Home➜Clipboard➜Paste➜Paste Values (V).

   The original data is replaced with the transformed data (see Figure 57-3).

7. Press Esc to cancel Copy mode.
8. When you're satisfied that the transformation happened as you intended, you can delete the temporary formulas in column C.

	A	B	C	D
1	**Name**	**Balance**		
2	Shirley Thomas	630.53	Shirley Thomas	
3	Robert Harris	998.25	Robert Harris	
4	Eric Hernandez	940.71	Eric Hernandez	
5	Martin Jackson	954.26	Martin Jackson	
6	William Chavez	928.43	William Chavez	
7	Jerry Russell	308.75	Jerry Russell	
8	Stanley Ward	714.30	Stanley Ward	
9	Janice Davis	830.20	Janice Davis	
10	Tod Fisher	655.37	Tod Fisher	
11	Phillip Carter	896.46	Phillip Carter	
12	Andrea Parker	973.46	Andrea Parker	
13	Eric Hobbs	909.49	Eric Hobbs	
14	Elizabeth Morales	359.33	Elizabeth Morales	
15	Mary Powers	262.92	Mary Powers	
16	Edward Smith	76.45	Edward Smith	
17	Neta Jones	939.58	Neta Jones	
18	Justin Rose	339.23	Justin Rose	
19		(Ctrl)		
20				
21				

Figure 57-3: The formula results from column C replace the original data in column A.

You can adapt this technique for just about any type of data transformation you need. The key, of course, is constructing the proper transformation formula in Step 1.

Creating a Drop-Down List in a Cell

Most Excel users probably assume that some advanced feature (such as a VBA macro) is required to display a drop-down list in a cell. But it's not. You can easily display a drop-down list in a cell — no macros required.

Figure 58-1 shows an example. Cell B2, when selected, displays a down arrow. Click the arrow, and you get a list of items (in this case, month names). Click an item, and it appears in the cell. The drop-down list can contain text, numeric values, or dates. Your formulas, of course, can refer to cells that contain a drop-down list. The formulas always use the value that's currently displayed.

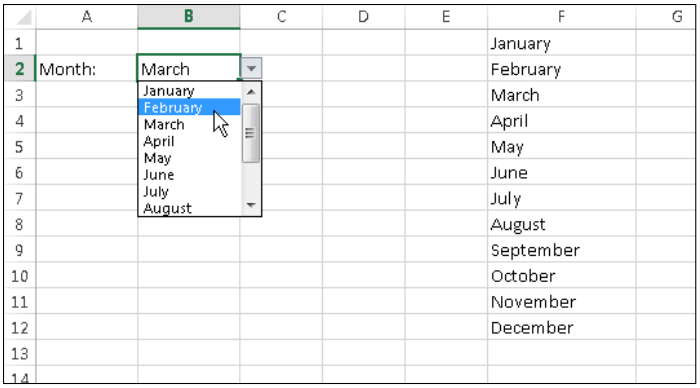


Figure 58-1: Creating a drop-down list in a cell is easy and doesn't require macros.

The trick to setting up a drop-down list is to use the data validation feature. The following steps describe how to create a drop-down list of items in a cell:

1. Enter the list of items in a range.

   In this example, the month names are in the range F1:F12.

2. Select the cell that will contain the drop-down list (cell B2, in this example).
3. Choose Data➜Data Tools➜Data Validation.
4. In the Data Validation dialog box, click the Settings tab.
5. In the Allow drop-down list, select List.
6. In the Source box, specify the range that contains the items.

   In this example, the range is E1:E12.

7. Make sure that the In-Cell Dropdown option is checked (see Figure 58-2) and click OK.

If your list is short, you can avoid Step 1. Rather, just type your list items (separated by commas) in the Source box in the Data Validation dialog box.

If you plan to share your workbook with others who use Excel 2007 or earlier, make sure that the list is on the same sheet as the drop-down list. Alternatively, you can put the list on any sheet, as long as it's a named range. For example, you can choose Formulas➜Defined Names➜Define Name to define the name *MonthNames* for E1:E12. Then, in the Data Validation dialog box, enter **=MonthNames** in the Source box.

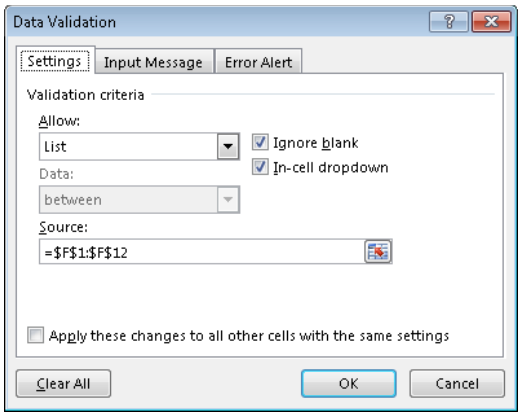


Figure 58-2: Using the Data Validation dialog box to create a drop-down list.

Comparing Two Ranges by Using Conditional Formatting

A common task is comparing two lists of items to identify differences between the two lists. Doing it manually is far too tedious and error-prone, but Excel can make it easy. This tip describes a method that uses conditional formatting.

Figure 59-1 shows an example of two multicolumn lists of names. Applying conditional formatting can make the differences in the lists become immediately apparent. These list examples contain text, but this technique also works with numeric data.

	A	B	C
1	**Old List**		**New List**
2	Jamaal O. Davis		Beatrice Jones
3	Marcy Brown		Beverlee Lewis
4	Warren Lee		Carola Rogers
5	Dana E. Turner		Cody Hendrix
6	Steven Y. Webb		Daniel A. Williams
7	Nichole Anderson		Eunice Coleman
8	John Aguilar		Jamaal O. Davis
9	John Stevens		Jessica Ford
10	Tracy S. Brooks		John Aguilar
11	Jessica Ford		John Coleman
12	Daniel A. Williams		John Stevens
13	Beverlee Lewis		Linda Logan
14	Cody Hendrix		Marvin Williams
15	Marvin Williams		Nichole Anderson
16	John Coleman		Stephen Harris
17	Etta Andrews		Stephen M. Rich
18	Stephen Harris		Steven Y. Webb
19	Tina Golden		Tracy S. Brooks
20	Beatrice Jones		Warren Lee
21			

Figure 59-1: You can use conditional formatting to highlight the differences in these two ranges.

The first list is in A2:A20, and this range is named *OldList*. The second list is in C2:C20, and the range is named *NewList*. The ranges were named by using the Formulas➜Defined Names➜Define Name command. Naming the ranges isn't necessary, but it makes them easier to work with.

Start by adding conditional formatting to the old list:

1. Select the cells in the *OldList* range.
2. Choose Home➜Conditional Formatting➜New Rule to display the New Formatting Rule dialog box.
3. In the New Formatting Rule dialog box, click the option labeled Use a Formula to Determine Which Cells to Format.

4. Enter this formula in the dialog box (see Figure 59-2):

```
=COUNTIF(NewList,A2)=0
```

   When using this technique with your own data, substitute the actual range address (or name) for NewList, and substitute the address of the top left selected cell for A2.

5. Click the Format button and specify the formatting to apply when the condition is true.

   A different fill color is a good choice.

6. Click OK.

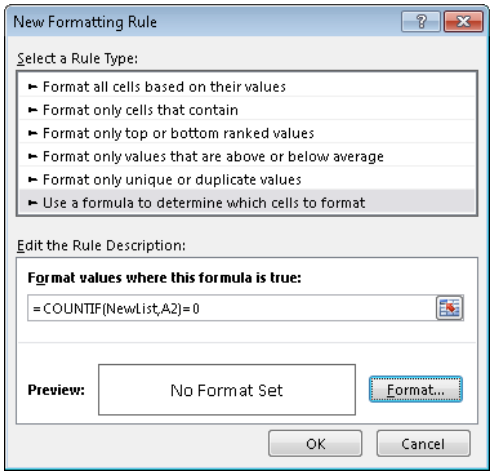


Figure 59-2: Applying conditional formatting.

The cells in the *NewList* range use a similar conditional formatting formula.

1. Select the cells in the *NewList* range.
2. Choose Home➜Conditional Formatting➜New Rule to display the New Formatting Rule dialog box.
3. In the New Formatting Rule dialog box, click the option labeled Use a Formula to Determine Which Cells to Format.
4. Enter this formula in the dialog box:

```
=COUNTIF(OldList,C2)=0
```

   When using this technique with your own data, substitute the actual range address (or name) for OldList, and substitute the address of the top left selected cell for C2.

5. Click the Format button and specify the formatting to apply when the condition is true (a different fill color).
6. Click OK.

Figure 59-3 shows the result. Names that are in the old list but not in the new list are highlighted. In addition, names in the new list that aren't in the old list are highlighted in a different color. Names that aren't highlighted appear in both lists.

	A	B	C	D
1	**Old List**		**New List**	
2	Jamaal O. Davis		Beatrice Jones	
3	Marcy Brown		Beverlee Lewis	
4	Warren Lee		Carola Rogers	
5	Dana E. Turner		Cody Hendrix	
6	Steven Y. Webb		Daniel A. Williams	
7	Nichole Anderson		Eunice Coleman	
8	John Aguilar		Jamaal O. Davis	
9	John Stevens		Jessica Ford	
10	Tracy S. Brooks		John Aguilar	
11	Jessica Ford		John Coleman	
12	Daniel A. Williams		John Stevens	
13	Beverlee Lewis		Linda Logan	
14	Cody Hendrix		Marvin Williams	
15	Marvin Williams		Nichole Anderson	
16	John Coleman		Stephen Harris	
17	Etta Andrews		Stephen M. Rich	
18	Stephen Harris		Steven Y. Webb	
19	Tina Golden		Tracy S. Brooks	
20	Beatrice Jones		Warren Lee	
21				

Figure 59-3: Conditional formatting causes differences in the two lists to be highlighted.

Both of these conditional-formatting formulas use the COUNTIF function. This function counts the number of times a particular value appears in a range. If the formula returns 0, it means that the item doesn't appear in the range. Therefore, the conditional formatting kicks in and the cell's background color is changed.

Finding Duplicates by Using Conditional Formatting

You might find it helpful to identify duplicate values within a range of cells. For example, take a look at Figure 60-1. Are any of the values duplicated?

One approach to identifying duplicate values is to use conditional formatting. After applying a conditional formatting rule, you can quickly spot duplicated cell values.

	A	B	C	D	E	F	G	H
1	1518	135	131	1244	348	1557	893	
2	430	558	154	1980	1254	874	313	
3	1845	1426	1830	1099	113	292	1780	
4	1503	1964	1929	577	1837	199	1825	
5	1988	1172	1130	1332	1113	1471	432	
6	284	180	1104	653	389	501	834	
7	1147	1042	1445	616	249	975	1452	
8	1657	852	1491	1539	1936	908	523	
9	1248	873	1541	1263	921	1722	128	
10	101	1697	717	1891	1180	434	602	
11	1697	1542	1793	521	1428	187	1708	
12	787	1669	1748	105	1422	167	594	
13	1083	229	1553	829	1304	1207	1610	
14	1472	1828	320	409	1865	1518	209	
15	698	629	489	1103	1704	1336	1016	
16	1754	1385	340	1439	509	1323	795	
17	944	1838	277	148	286	1927	1978	
18	1830	853	1830	876	1783	1135	132	
19	155	844	1740	1969	498	933	477	
20	1362	888	790	1218	723	612	1829	
21	413	230	175	215	824	746	1170	
22	1926	265	1590	111	677	1856	212	
23								

Figure 60-1: You can use conditional formatting to quickly identify duplicate values in a range.

Here's how to set up the conditional formatting:

1. Select the cells in the range (in this example, A1:G22).
2. Choose Home➜Conditional Formatting➜New Rule to display the Conditional Formatting dialog box.
3. In the Conditional Formatting dialog box, select the option labeled Use a Formula to Determine Which Cells to Format.

4. For this example, enter this formula (change the range references to correspond to your own data):

```
=COUNTIF($A$1:$G$22,A1)>1
```

5. Click the Format button and specify the formatting to apply when the condition is true.

   Changing the fill color is a good choice.

6. Click OK.

Figure 60-2 shows the result. The seven highlighted cells are the duplicated values in the range.

	A	B	C	D	E	F	G	H
1	1518	135	131	1244	348	1557	893	
2	430	558	154	1980	1254	874	313	
3	1845	1426	1830	1099	113	292	1780	
4	1503	1964	1929	577	1837	199	1825	
5	1988	1172	1130	1332	1113	1471	432	
6	284	180	1104	653	389	501	834	
7	1147	1042	1445	616	249	975	1452	
8	1657	852	1491	1539	1936	908	523	
9	1248	873	1541	1263	921	1722	128	
10	101	1697	717	1891	1180	434	602	
11	1697	1542	1793	521	1428	187	1708	
12	787	1669	1748	105	1422	167	594	
13	1083	229	1553	829	1304	1207	1610	
14	1472	1828	320	409	1865	1518	209	
15	698	629	489	1103	1704	1336	1016	
16	1754	1385	340	1439	509	1323	795	
17	944	1838	277	148	286	1927	1978	
18	1830	853	1830	876	1783	1135	132	
19	155	844	1740	1969	498	933	477	
20	1362	888	790	1218	723	612	1829	
21	413	230	175	215	824	746	1170	
22	1926	265	1590	111	677	1856	212	
23								

Figure 60-2: Conditional formatting causes the duplicated cells to be highlighted.

You can extend this technique to identify entire rows within a list that are identical. The trick is to add a new column and use a formula that concatenates the data in each row. For example, if your list is in A2:G500, enter this formula in cell H2:

```
=A2&B2&C2&D2&E2&F2&G2
```

Copy the formula down the column and then apply the conditional formatting to the formulas in column H. In this case, the conditional formatting formula is

```
=COUNTIF($H$2:$H$500,H2)>1
```

Highlighted cells in column H indicate duplicated rows.

You can use Data➜Data Tools➜Remove Duplicates to remove duplicate rows. That command, however, doesn't identify the duplicates before deleting them.

Working with Credit Card Numbers

If you've ever tried to enter a 16-digit credit card number into a cell, you may have discovered that Excel always changes the last digit to a zero. Even worse, maybe you *didn't* discover the changed credit card number until it was too late.

Why does Excel change your numbers? The reason is that Excel can handle only 15 digits of numerical accuracy.

Entering credit card numbers manually

If you need to store credit card numbers in a worksheet, you have three options:

- **Precede the credit card number with an apostrophe.** Excel then interprets the data as a text string rather than as a number.
- **Preformat the cell or range by using the Text number format.** Select the range, choose Home➜Number and then select Text from the Number Format drop-down control.
- **Enter the card number with dashes or spaces.** Embedding a dash character (or any other non-numeric character) forces Excel to interpret the entry as text.

This tip, of course, also applies to other long numbers (such as part numbers) that aren't used in numeric calculations.

Importing credit card numbers

If you're importing credit card numbers from a CSV text file, Excel will import the credit card numbers as values — and erroneously change the last digit to zero. To avoid this, don't use File➜Open to import the text. Rather, use Data➜Connections➜Get External Data➜From Text. When you use this command, Excel displays the TextImport Wizard. In Step 3 of the wizard, make sure that you specify Text as the column data format for the credit card numbers. See Figure 61-1.

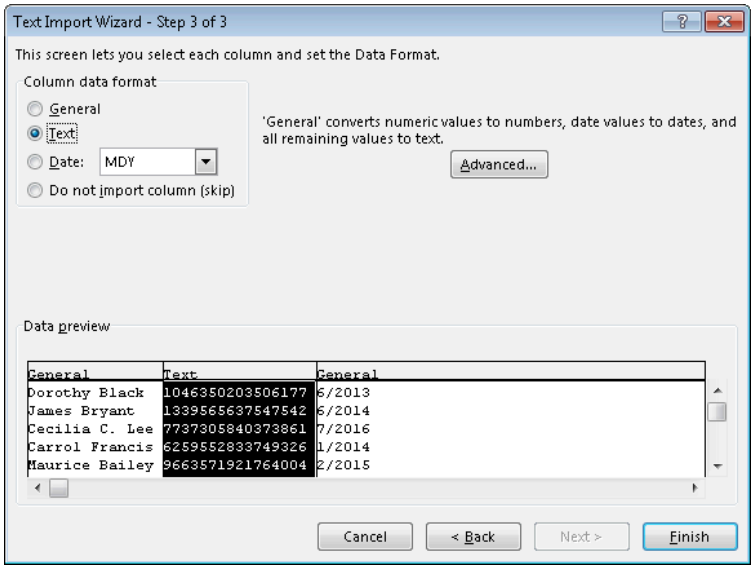


Figure 61-1: Using the TextImport Wizard to ensure that credit card numbers are imported as text.

Identifying Excess Spaces

A common type of spreadsheet error involves something that you can't even see: a space character. Consider the example shown in Figure 62-1. Cell B2 contains a formula that looks up the color name in cell B1 and returns the corresponding code from a table. The formula is

```
=VLOOKUP(B1,D2:E9,2,FALSE)
```

	A	B	C	D	E	F
1	Enter a color name:	Green		Color	Code	
2	The code:	65280		Black	0	
3				Blue	16711680	
4				Cyan	16776960	
5				Green	65280	
6				Magenta	16711935	
7				Red	255	
8				White	16777215	
9				Yellow	65535	
10						

Figure 62-1: A simple lookup formula returns the code for a color entered in cell B1.

In Figure 62-2, the formula in cell B2 returns an error — indicating that *Red* wasn't found in the table. Hundreds of thousands of Excel users have spent far too much time trying to figure out why this sort of thing doesn't work. In this case, the answer is simple: Cell D7 doesn't contain the word *Red*. Rather, it contains the word *Red* followed by a space. To Excel, these text strings are completely different.

	A	B	C	D	E	F
1	Enter a color name:	Red		Color	Code	
2	The code:	#N/A		Black	0	
3				Blue	16711680	
4				Cyan	16776960	
5				Green	65280	
6				Magenta	16711935	
7				Red	255	
8				White	16777215	
9				Yellow	65535	
10						

Figure 62-2: The lookup formula can't find the word *Red* in the table.

If your worksheet contains thousands of text entries — and you need to perform comparisons using that text — you may want to identify the cells that contain excess spaces and then fix those cells. The term *excess spaces* means a text entry that contains any of the following:

- One or more leading spaces
- One or more trailing spaces
- Two or more consecutive spaces within the text

One way to identify this type of cell is to use conditional formatting. To set up conditional formatting to identify excess spaces, follow these steps:

1. Select all text cells to which you want to apply conditional formatting.
2. Choose Home➜Conditional Formatting➜New Rule to display the New Formatting Rule dialog box.
3. In the top part of the dialog box, select the option labeled Use a Formula to Determine Which Cells to Format.
4. Enter a formula like the following in the bottom part of the dialog box (see Figure 62-3):

   ```
   =A1<>TRIM(A1)
   ```

   Note: This formula assumes that cell A1 is the upper-left cell in the selection. If that's not the case, substitute the address of the upper-left cell in the selection you made in Step 1.
5. Click the Format button to display the Format Cells dialog box and select the type of formatting you want for the cells that contain excess spaces — for example, a yellow fill color.
6. Click OK to close the Format Cells dialog box, and click OK again to close the New Formatting Rule dialog box.

After you complete these steps, each cell that contains excess spaces and is within the range you selected in Step 1 is highlighted with the formatting of your choice. You can then easily spot these cells and remove the spaces.

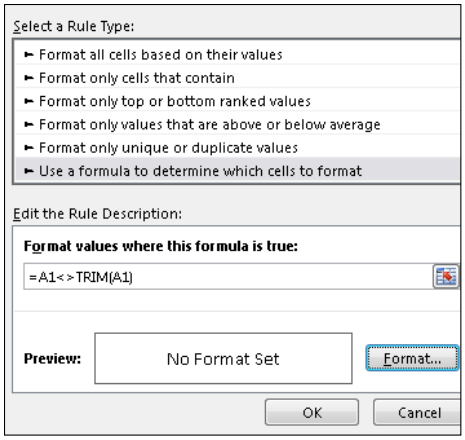


Figure 62-3: Using conditional formatting to identify cells that contain excess spaces.

Because of the way the TRIM function works, the formula in Step 4 also applies the conditional formatting to all numeric cells. A slightly more complex formula that doesn't apply the formatting to numeric cells is

```
=IF(NOT(ISNONTEXT(A1)),A1<>TRIM(A1))
```

Transposing a Range

You may have a range of data that should be transposed. Transposing a range is essentially making the rows columns, and the columns rows. Figure 63-1 shows an example. The original data is in A1:H9, and the transposed data is in A12:I19.

This tip describes two methods to transpose a range of data.

	A	B	C	D	E	F	G	H	I	J
1	**Account**	**January**	**February**	**March**	**April**	**May**	**June**	**Average**		
2	**A-329**	789	823	851	875	864	868	845		
3	**D-024**	633	653	646	681	714	701	671		
4	**C-732**	15	16	17	13	15	15	15		
5	**L-329**	331	329	412	415	419	444	392		
6	**J-332**	97	101	77	73	58	66	79		
7	**M-772**	105	119	100	108	127	98	110		
8	**D-666**	335	320	313	292	321	314	316		
9	**Total**	2,305	2,361	2,416	2,457	2,518	2,506	2,427		
10										
11										
12	**Account**	**A-329**	**D-024**	**C-732**	**L-329**	**J-332**	**M-772**	**D-666**	**Total**	
13	**January**	789	633	15	331	97	105	335	2,305	
14	**February**	823	653	16	329	101	119	320	2,361	
15	**March**	851	646	17	412	77	100	313	2,416	
16	**April**	875	681	13	415	73	108	292	2,457	
17	**May**	864	714	15	419	58	127	321	2,518	
18	**June**	868	701	15	444	66	98	314	2,506	
19	**Average**	845	671	15	392	79	110	316	2,427	
20										

Figure 63-1: Data before and after being transposed.

Using Paste Special

To transpose a range of data by copying and pasting, follow these steps:

1. Select the range to be transposed.
2. Press Ctrl+C to copy the range.
3. Select the cell that will be the upper-left cell for the transposed range.
4. Choose Home➜Clipboard➜Paste➜Paste Special to display the Paste Special dialog box.
5. Choose the Transpose option.
6. Click OK.

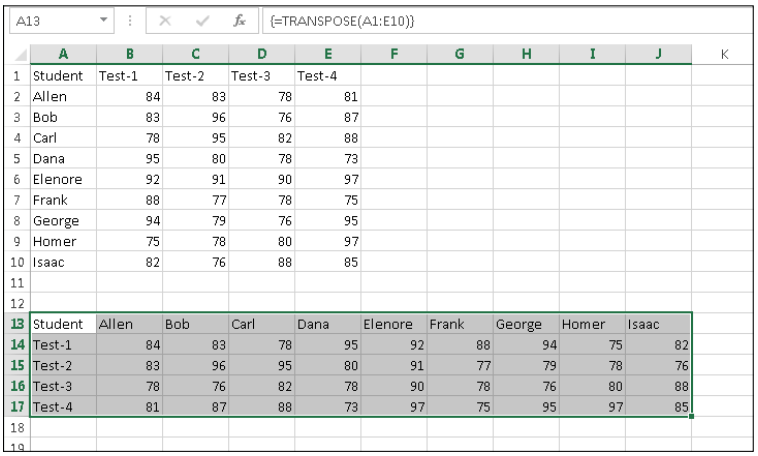
Excel pastes the copied data, but reoriented.

If the original range contains formulas, the formulas will be adjusted so they continue to refer to the correct cells.

If the original range is in a table (created with Insert➜Tables➜Table), this technique has a few caveats. The original selection cannot include the Total Row or columns that contain a formula. You can still paste the transposed data, but you must choose the Values option in the Paste Special dialog box. The transposed range will include the values (but not the formulas).

Using the TRANSPOSE function

In some cases, you may want the transposed range to be linked to the original range. In such a situation, changes made to the original range also appear in the transposed range. Here's how to set up a transposed range that's linked to the original source. Refer to Figure 63-2.



	A	B	C	D	E	F	G	H	I	J	K
1	Student	Test-1	Test-2	Test-3	Test-4						
2	Allen	84	83	78	81						
3	Bob	83	96	76	87						
4	Carl	78	95	82	88						
5	Dana	95	80	78	73						
6	Elenore	92	91	90	97						
7	Frank	88	77	78	75						
8	George	94	79	76	95						
9	Homer	75	78	80	97						
10	Isaac	82	76	88	85						
11											
12											
13	Student	Allen	Bob	Carl	Dana	Elenore	Frank	George	Homer	Isaac	
14	Test-1	84	83	78	95	92	88	94	75	82	
15	Test-2	83	96	95	80	91	77	79	78	76	
16	Test-3	78	76	82	78	90	78	76	80	88	
17	Test-4	81	87	88	73	97	75	95	97	85	
18											

Figure 63-2: A13:J17 contains a multicell array formula, linked to the source range.

1. Make a note of the number of rows and columns in the source range.

   In this example, the source range (A1:E10) has 10 rows and 5 columns.

2. Select a range of blank cells that has the same number of rows as source range columns, and the same number of column as source range rows.

   In this example, the selection should be 5 rows and 10 columns. For example, you can put the transposed range in A13:J17.

3. Type a formula that uses the TRANSPOSE function, with the source range address as its argument.

   In this example, the formula is

   ```
   =TRANSPOSE(A1:E10)
   ```

4. Press Ctrl+Shift+Enter (not just Enter) to create a multicell array formula in all of the selected cells.

Any changes made in the source range also appear in the transposed range.

Using Flash Fill to Extract Data

When you import data, it's often necessary to clean up some of the text. For example, names may appear in uppercase that they should be in proper case. One approach is to use formulas to modify the text (see Tip 57). Another approach uses a feature introduced in Excel 2013: Flash Fill.

Flash Fill uses pattern recognition to extract data (and also concatenate data) from adjoining columns. Just enter a few examples in a column that's adjacent to the data, and then choose Data➜Data Tools➜Flash Fill (or press Ctrl+E). Excel analyzes the examples you typed and attempts to fill in the remaining cells. If Excel didn't recognize the pattern you had in mind, press Ctrl+Z, add another example or two, and try again.

Changing the case of text

Figure 64-1 shows a list of U.S. presidents in column A. Column B shows the result of using Flash Fill to convert the text to proper case.

Start by providing a few examples: Type **George Washington** in cell B1 and **John Adams** in cell B2. You'll notice that Excel kicks in as soon as you start typing John Adams. It recognizes your pattern (which is "make all text proper case") and fills the column with the transformed text (in a light gray color). You can press Enter to keep Excel's suggestion, or continue typing more examples. At any time, you can press Ctrl+E to have Excel fill the column.

	A	B
1	GEORGE WASHINGTON	George Washington
2	JOHN ADAMS	John Adams
3	THOMAS JEFFERSON	Thomas Jefferson
4	JAMES MADISON	James Madison
5	JAMES MONROE	James Monroe
6	JOHN QUINCY ADAMS	John Quincy Adams
7	ANDREW JACKSON	Andrew Jackson
8	MARTIN VAN BUREN	Martin Van Buren
9	WILLIAM HENRY HARRISON	William Henry Harrison
10	JOHN TYLER	John Tyler
11	JAMES KNOX POLK	James Knox Polk
12	ZACHARY TAYLOR	Zachary Taylor
13	MILLARD FILLMORE	Millard Fillmore
14	FRANKLIN PIERCE	Franklin Pierce
15	JAMES BUCHANAN	James Buchanan
16	ABRAHAM LINCOLN	Abraham Lincoln
17	ANDREW JOHNSON	Andrew Johnson

Figure 64-1: Flash Fill quickly converted the names in Column A to proper case.

Extracting last names

In this example, we want to extract the last name of each president, so the list can be sorted by last name. This is a simple job for Flash Fill. It takes only two examples, and the pattern is recognized.

Figure 64-2 shows the worksheet after Excel extracted the last names. Now, you can sort the list by column C, so the name will be in alphabetical order, by last name.

	B	C
1	George Washington	Washington
2	John Adams	Adams
3	Thomas Jefferson	Jefferson
4	James Madison	Madison
5	James Monroe	Monroe
6	John Quincy Adams	Adams
7	Andrew Jackson	Jackson
8	Martin Van Buren	Buren
9	William Henry Harrison	Harrison
10	John Tyler	Tyler
11	James Knox Polk	Polk
12	Zachary Taylor	Taylor
13	Millard Fillmore	Fillmore
14	Franklin Pierce	Pierce
15	James Buchanan	Buchanan

Figure 64-2: Flash Fill extracted the last names.

Extracting first names

You'll find that Flash Fill is equally adept at extracting first names. Figure 64-3 shows the list of presidents after using Flash Fill to extract the first names in Column D. Again, it took only two examples before Excel identified the pattern.

	B	C	D
1	George Washington	Washington	George
2	John Adams	Adams	John
3	Thomas Jefferson	Jefferson	Thomas
4	James Madison	Madison	James
5	James Monroe	Monroe	James
6	John Quincy Adams	Adams	John
7	Andrew Jackson	Jackson	Andrew
8	Martin Van Buren	Buren	Martin
9	William Henry Harrison	Harrison	William
10	John Tyler	Tyler	John
11	James Knox Polk	Polk	James
12	Zachary Taylor	Taylor	Zachary

Figure 64-3: Flash Fill extracted the first names.

Extracting middle names

Some (but not all) of the presidents on the list have a middle name. Can Flash Fill extract the middle names?

The answer: Sort of. I provided several examples of middle names, and Flash Fill successfully extracted the other middle names. But for names without a middle name, it extracted the first name. No matter what I tried, I could not get Flash Fill to ignore names that had no middle name.

Extracting domain names from URLs

Here's another example of using Flash Fill. Say you have a list of URLs and need to extract the filename (the text that follows the last slash character).

Figure 64-4 shows a list of URLs. Flash Fill required just one example of a filename entered in column B. I pressed Ctrl+E, and Excel filled in the remaining rows. Flash fill worked equally well removing the filename from the URL, in column C.

	A	B	C
1	http://example.com/assets/images/horse.jpg	horse.jpg	http://example.com/assets/images/
2	http://spreadsheetpage.com/graphics/old/screenshot.jpg	screenshot.jpg	http://spreadsheetpage.com/graphics/old/
3	http://spreadsheetpage.com/graphics/jw.jpg	jw.jpg	http://spreadsheetpage.com/graphics/
4	http://j-walk.com/excel/examples/game.xls	game.xls	http://j-walk.com/excel/examples/
5	www.brr98.edu/index.htm	index.htm	www.brr98.edu/
6	http://pets4898.net/uploads/pets/dogs/puppies/spot332.jpg	spot332.jpg	http://pets4898.net/uploads/pets/dogs/puppies/
7	http://adsfkj9ki89.com/sjd48utt/adp/fopf/99/32/12/index.jpg	index.jpg	http://adsfkj9ki89.com/sjd48utt/adp/fopf/99/32/12/
8			

Figure 64-4: Flash Fill extracted the filenames from URLs.

Potential problems

Flash Fill is a great feature, but if you use it for important data, you should be aware of some potential problems:

- **Sometimes it just doesn't work.** Extracting middle names seems like a simple pattern, but Flash Fill was not capable of recognizing the pattern.
- **It's not always accurate.** With a small set of data, it's usually easy to check to ensure that Flash Fill worked as you intended it to work. But if you use Flash Fill on thousands of rows of data, you can't be assured that it worked perfectly unless you examine every row. Flash Fill works best with data that is very consistent.
- **It's not dynamic.** If you change any of the information that Flash Fill used, the changes are not reflected in the filled column.
- **There is no "audit trail."** If you use formulas to extract data, the formulas provide documentation so anyone can figure out how the data was extracted. Using Flash Fill, on the other hand, provides no such audit trail. There is no way to see which rules Excel used to extract the data.

Using Flash Fill to Combine Data

Tip 64 described how to extract data using the Excel 2013 Flash Fill feature. This tip looks at the other side of Flash Fill: combing data.

If you need to combine the data in two or more columns, you can write a formula that uses the concatenation operator (&). For example, this formula combines the contents of cells A1, B1, and C1:

```
=A1&B1&C1
```

For more complicated types of combinations, Flash Fill might be able to do the job and save you the trouble of creating (and debugging) a formula.

Figure 65-1 shows a worksheet with first names in column A and last names in column B. I used Flash Fill to create e-mail addresses (in Column C) for the domain example.com. The e-mail addresses consist of the first initial, an underscore, and the last name — all lowercase.

	A	B	C
1	Kenneth	Smith	k_smith@example.com
2	Lara	Hamilton	l_hamilton@example.com
3	Frances	Hawkins	f_hawkins@example.com
4	Leonard	Peterson	l_peterson@example.com
5	Beverly	Gonzalez	b_gonzalez@example.com
6	Richard	Wagner	r_wagner@example.com
7	Blanche	Davis	b_davis@example.com
8	James	Collins	j_collins@example.com
9	Mary	Garcia	m_garcia@example.com
10	Martha	Stewart	m_stewart@example.com
11	Andrew	Walker	a_walker@example.com
12	Maurice	Pena	m_pena@example.com
13	Marion	Curtis	m_curtis@example.com
14	Ryan	Torres	r_torres@example.com
15	Austin	Nelson	a_nelson@example.com
16	Steven	Pierce	s_pierce@example.com
17	Steven	Watkins	s_watkins@example.com
18	James	Burns	j_burns@example.com
19	James	Johnson	j_johnson@example.com
20	Claude	Watkins	c_watkins@example.com

Figure 65-1: Flash Fill can quickly convert these names into e-mail addresses.

It took only two examples before Flash Fill recognized the pattern and filled in the rest of the column.

Flash Fill is simpler than composing this equivalent formula:

```
=LOWER(LEFT(A1,1)&"_"&B1&"@example.com")
```

Figure 65-2 shows another example. Column A:D hold the original data, and the text in column E was filled in using Flash Fill, after providing two examples. The equivalent formula to generate the text in column E is

```
=A4&" "&B4&": "&TEXT(D4,"$0")&" due on 10/"&C4&"/2013"
```

	A	B	C	D	E
3	**First**	**Last**	**Day**	**Amount**	
4	Vicki	Wright	3	$475	Vicki Wright: $475 due on 10/3/2013
5	Michael	Adams	5	$574	Michael Adams: $574 due on 10/5/2013
6	Floyd	Mitchell	5	$93	Floyd Mitchell: $93 due on 10/5/2013
7	Amy	Kim	7	$575	Amy Kim: $575 due on 10/7/2013
8	Dennis	Young	8	$491	Dennis Young: $491 due on 10/8/2013
9	Rebekah	Wilson	11	$509	Rebekah Wilson: $509 due on 10/11/2013
10	Barbara	Flores	12	$133	Barbara Flores: $133 due on 10/12/2013
11	Carol	Jackson	14	$311	Carol Jackson: $311 due on 10/14/2013
12	Edward	Dawson	14	$554	Edward Dawson: $554 due on 10/14/2013
13	Rachelle	Wright	14	$33	Rachelle Wright: $33 due on 10/14/2013
14	John	Davis	15	$514	John Davis: $514 due on 10/15/2013
15	Lillian	Browning	17	$374	Lillian Browning: $374 due on 10/17/2013
16	Kurtis	Evans	18	$315	Kurtis Evans: $315 due on 10/18/2013
17	Janet	Adams	20	$405	Janet Adams: $405 due on 10/20/2013
18	Regina	Willis	20	$30	Regina Willis: $30 due on 10/20/2013
19	Susan	Caldwell	22	$332	Susan Caldwell: $332 due on 10/22/2013
20	Paul	Miller	23	$558	Paul Miller: $558 due on 10/23/2013
21	Stefani	Young	24	$432	Stefani Young: $432 due on 10/24/2013

Figure 65-2: Flash Fill generated the text in column E.

Inserting Stock Information

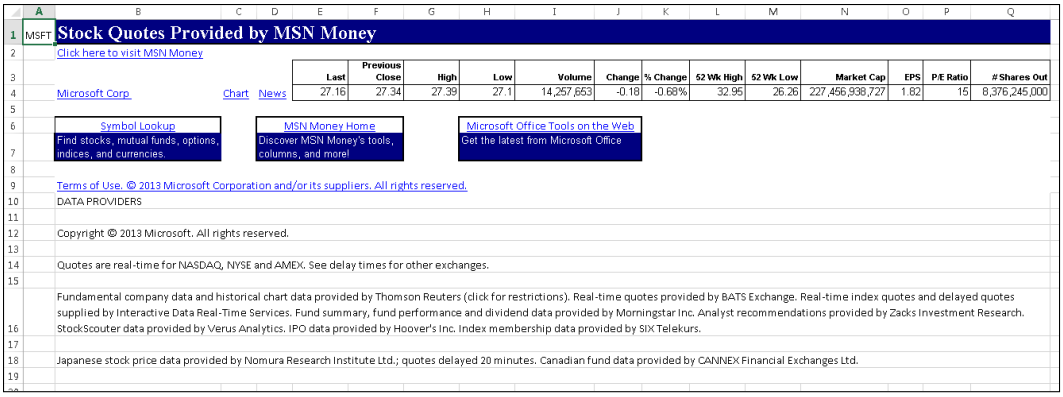
This tip describes how to insert refreshable stock data into a worksheet. For some reason, Microsoft makes this feature rather difficult to find.

Here's how to do it:

1. Make sure that you're connected to the Internet.
2. Type a stock symbol into a cell — for example, **MSFT** for Microsoft. Make sure the characters are all uppercase.
3. Right-click the cell and choose Addition Cell Actions➜Insert Refreshable Stock Price from the shortcut menu.

   The Insert Stock Price dialog box appears.
4. Specify the location for the information (on a new sheet, or starting at a particular cell).
5. Click OK.

Excel retrieves current information about the stock and inserts data that occupies 18 rows and 16 columns (see Figure 66-1).



MSFT **Stock Quotes Provided by MSN Money**

Click here to visit MSN Money

	Last	Previous Close	High	Low	Volume	Change	% Change	52 Wk High	52 Wk Low	Market Cap	EPS	P/E Ratio	# Shares Out
Microsoft Corp Chart News	27.16	27.34	27.39	27.1	14,257,653	-0.18	-0.68%	32.95	26.26	227,456,938,727	1.82	15	8,376,245,000

Symbol Lookup — Find stocks, mutual funds, options, indices, and currencies.

MSN Money Home — Discover MSN Money's tools, columns, and more!

Microsoft Office Tools on the Web — Get the latest from Microsoft Office

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DATA PROVIDERS

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Quotes are real-time for NASDAQ, NYSE and AMEX. See delay times for other exchanges.

Fundamental company data and historical chart data provided by Thomson Reuters (click for restrictions). Real-time quotes provided by BATS Exchange. Real-time index quotes and delayed quotes supplied by Interactive Data Real-Time Services. Fund summary, fund performance and dividend data provided by Morningstar Inc. Analyst recommendations provided by Zacks Investment Research. StockScouter data provided by Verus Analytics. IPO data provided by Hoover's Inc. Index membership data provided by SIX Telekurs.

Japanese stock price data provided by Nomura Research Institute Ltd.; quotes delayed 20 minutes. Canadian fund data provided by CANNEX Financial Exchanges Ltd.

Figure 66-1: Refreshable stock information inserted into a worksheet.

You can refresh the information at any time. Select any cell in the table, right-click, and choose Refresh from the shortcut menu. If your worksheet has information for multiple stocks, you can refresh them all by choosing Data➜Connections➜Refresh All.

Hiding irrelevant rows and columns

Notice that, of the 18 rows, only one of them contains actual data. The other rows are links and disclaimers. Unfortunately, there is no direct way to retrieve the information without all of the extraneous information. But you can hide the irrelevant rows and columns — and the hidden rows and columns remain hidden when you refresh the information.

Figure 66-2 shows a worksheet that has information for four stocks. I hid the irrelevant rows and columns, for a concise display.

	A	D	E	F	G	H	I	J	K	L
3										
4		Last	Previous Close	High	Low	Volume	Change	% Change	52 Wk High	52 Wk Low
5	Google Inc	766.8	770.17	778.81	765.87	1,378,846	-3.37	-0.44%	776.6	556.52
25	Microsoft Corp	27.16	27.34	27.39	27.1	14,375,007	-0.18	-0.66%	32.95	26.26
44	Apple Inc	457.33	454.7	463.76	454.12	8,368,622	2.63	0.58%	705.07	435
63	Starbucks Corp	55.38	56.05	56.06	55.15	1,855,127	-0.67	-1.19%	62	43.04

Figure 66-2: Information for four stocks, after hiding irrelevant rows and columns.

Behind the scenes

Using the Addition Cell Actions➜Insert Refreshable Stock Price shortcut menu item is just a quick way of performing a web query and retrieving data from Microsoft's MSN Money site. You can retrieve the same information by performing a web query. Choose Data➜Get External Data➜From Web and use this URL:

```
http://moneycentral.msn.com/investor/external/excel/quotes.asp?symbol=MSFT
```

The URL retrieves information for Microsoft. You can replace MSFT with a different stock symbol. Figure 66-3 shows the New Web Query dialog box before the information is inserted into a worksheet.

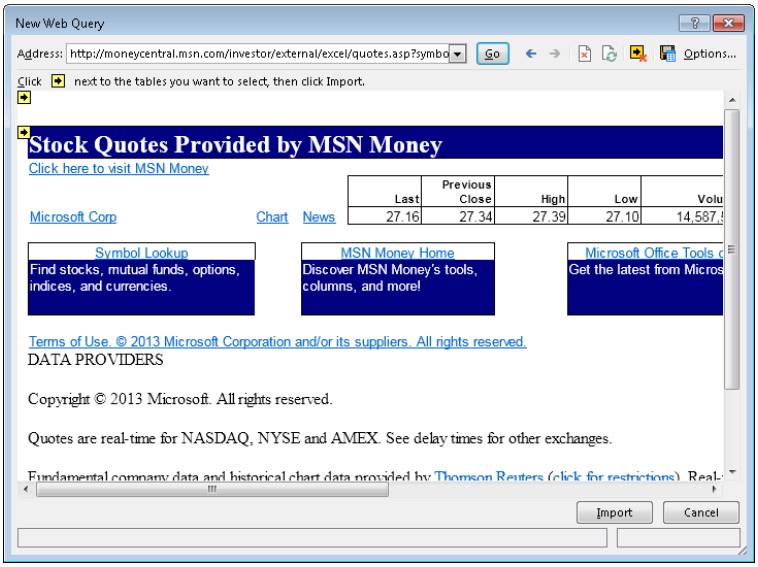


Figure 66-3: Using the New Web Query dialog box to retrieve stock information.

See Tip 67 for more information about web queries.

Getting Data from a Web Page

This tip describes three ways to capture data contained on a web page:

- Paste a static copy of the information.
- Create a refreshable link to the site.
- Open the page directly in Excel.

Pasting static information

One way to get data from a web page into a worksheet is to simply highlight the text in your browser, press Ctrl+C to copy it to the Clipboard, and then paste it into a worksheet. The results will vary, depending on what browser you use and how the web page is coded.

If pasting doesn't yield the results you want, choose Home➜Clipboard➜Paste➜Paste Special and then try various paste options.

Figure 67-1 shows some currency exchange rates, pasted from a web page at msn.com. As you can see, even the hyperlinks are pasted.

	A	B	C	D
1	**Currency**	**In US dollars**	**Per US Dollar**	
2	Argentine Peso	0.2006	4.985	
3	Australian Dollar	1.02923	0.9716	
4	Brazilian Real	0.50841	1.9669	
5	British Pound	1.56961	0.6371	
6	Canadian Dollar	1.00166	0.99834	
7	Chinese Yuan	0.16046	6.2322	
8	Euro	1.33941	0.7466	
9	Hong Kong Dollar	0.12895	7.75473	
10	Indian Rupee	0.01879	53.23	
11	Japanese Yen	0.01072	93.29002	
12	Korean Won	0.00092	1,092.02	
13	Mexican Peso	0.07848	12.742	
14	Russian Ruble	0.0331	30.2117	
15	Swedish Krona	0.15562	6.42603	
16	Swiss Franc	1.09012	0.91733	
17	US Dollar	1	1	
18				

Figure 67-1: A table of exchange rates copied from a website and pasted to a worksheet.

Pasting refreshable information

If you need to regularly access updated data from a web page, create a web query. Figure 67-1 shows a website that contains currency exchange rates in a three-column table.

The term web query is a bit misleading because this operation is not limited to the web. You can perform a web query on a local HTML file, a file stored on a network server, or a file stored on a web server on the Internet. To retrieve information from a web server, you must be connected to the Internet. After the information is retrieved, an Internet connection is not required to work with the information (unless you need to refresh the query).

These steps create a web query that allows this information to be retrieved and then refreshed at any time with a single mouse click:

1. Choose Data➜Get External Data➜From Web to display the New Web Query dialog box.
2. In the Address field, enter the URL of the website and click Go.

   For this example, the URL for the web page shown in Figure 67-2 is

   ```
   http://investing.money.msn.com/investments/exchange-rates
   ```

   Notice that the New Web Query dialog box contains a web browser (Internet Explorer). You can click links and navigate the website until you locate the data you're interested in.

   When a web page is displayed in the New Web Query dialog box, you see one or more yellow boxes with an arrow, which correspond to tables defined in the web page — plus another yellow box that will retrieve the entire page.
3. Click a yellow box, and it turns into a green check box, which indicates that the data in that table will be imported.

   Unfortunately, the table in the example is not selectable, so the only choice is to retrieve the entire page.
4. Click the Import button to display the Import Data dialog box.
5. In the Import Data dialog box, specify the location for the imported data.

   It can be a cell in an existing worksheet or a new worksheet.
6. Click OK, and Excel imports the data.

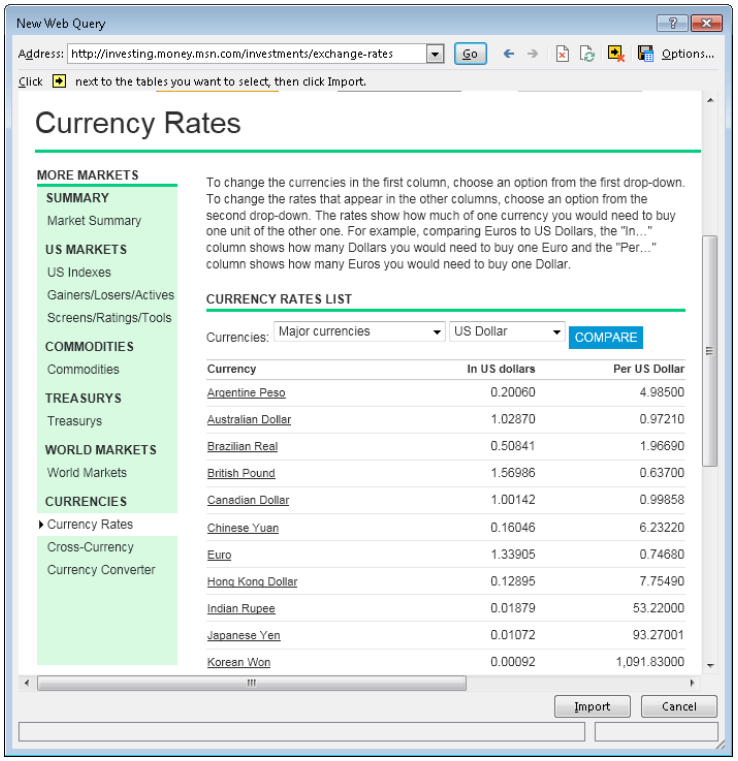


Figure 67-2: Using the New Web Query dialog box to specify the data to be imported.

Part of the results is shown in Figure 67-3. Although I was interested only in the 17-row and 3-column currency table, this web query retrieved 145 rows of mostly irrelevant information.

By default, the imported data is a web query. To refresh the information, right-click any cell in the imported range and choose Refresh from the shortcut menu.

If you don't want to create a refreshable query, specify this choice in Step 5 of the preceding step list. In the Import Data dialog box, click the Properties button and deselect the Save Query Definition check box.

Excel's Web query feature works by identifying tables (specified using the HTML <TABLE> tag) in the document. Increasingly, website designers use cascading style sheets (CSS) to display tabular information. As demonstrated in this example, Excel doesn't recognize these as tables and, therefore, doesn't display a yellow arrow so you can retrieve only the table. Therefore, you may have to retrieve the entire document and then delete (or hide) everything except the table that you want.

	A	B	C	D	E	F	G	H	I	J	K
102											
103	To change the currencies in the first column, choose an option from the first drop-down. To change the rates that appear in the other columns, choose an option from the										
104	**CURRENCY RATES LIST**										
105	Currencies:										
106	**Currency**	**In US dollars**	**Per US Dollar**								
107	Argentine Peso	0.2006	4.985								
108	Australian Dollar	1.0287	0.9721								
109	Brazilian Real	0.50787	1.969								
110	British Pound	1.57159	0.6363								
111	Canadian Dollar	1.00122	0.99878								
112	Chinese Yuan	0.16046	6.2322								
113	Euro	1.33851	0.7471								
114	Hong Kong Dollar	0.12895	7.7549								
115	Indian Rupee	0.01879	53.23								
116	Japanese Yen	0.01073	93.24001								
117	Korean Won	0.00092	1,092.14								
118	Mexican Peso	0.0785	12.739								
119	Russian Ruble	0.03313	30.1847								
120	Swedish Krona	0.15554	6.42911								
121	Swiss Franc	1.08993	0.91749								
122	US Dollar	1	1								
123	DATA PROVIDERS										
124											
125	Copyright © 2013 Microsoft. All rights reserved.										
126											
127	Quotes are real-time for NASDAQ, NYSE and AMEX. See delay times for other exchanges.										
128											
129	Fundamental company data and historical chart data provided by Thomson Reuters (click for restrictions). Real-time quotes provided by BATS Exchange. Real-time index										
130											
131	Japanese stock price data provided by Nomura Research Institute Ltd.; quotes delayed 20 minutes. Canadian fund data provided by CANNEX Financial Exchanges Ltd.										
132											
133	Ad ChoiceFeedback										

Figure 67-3: Information retrieved from a web query.

Opening the web page directly

Another way to get web page data into a worksheet is to open the URL directly, by using Excel's File➜Open command. Just enter the complete URL into the File Name field and click Open.

The results will vary, depending on how the web page is laid out. Most of the time, you'll get satisfactory results. In some cases, you'll retrieve quite a bit of extraneous information. Also, note that the information is not refreshable. If the data on the web page changes, you'll need to close the workbook and use the File➜Open command again.

Importing a Text File into a Worksheet Range

If you need to insert a text file into a specific range in a worksheet, you may think that your only choice is to import the text into a new workbook (by choosing Office➜Open) and then to copy the data and paste it to the range where you want it to appear. However, you can do it in a more direct way.

Figure 68-1 shows a small CSV (*c*omma *s*eparated *v*alue) file. The following instructions describe how to import this file, named monthly.csv, beginning at cell C3.

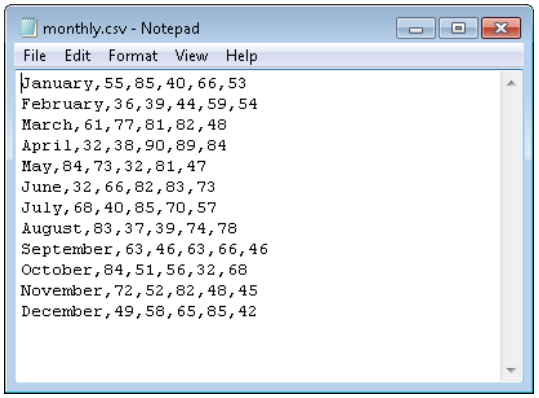


Figure 68-1: This CSV file will be imported into a range.

1. Choose Data➜Get External Data➜From Text to display the Import Text File dialog box.
2. Navigate to the folder that contains the text file.
3. Select the file from the list and then click the Import button to display the Text Import Wizard.
4. Use the Text Import Wizard to specify how the data will be imported.

   For a CSV file, specify Delimited, with a Comma Delimiter.
5. Click the Finish button.

   The Import Data dialog box appears.
6. Click the Properties button, and the External Data Range Properties dialog box appears.
7. Deselect the Save Query Definition check box and click OK to return to the Import Data dialog box.

8. Here, specify the location for the imported data.

   It can be a cell in an existing worksheet or a new worksheet.

9. Click OK, and Excel imports the data (see Figure 68-2).

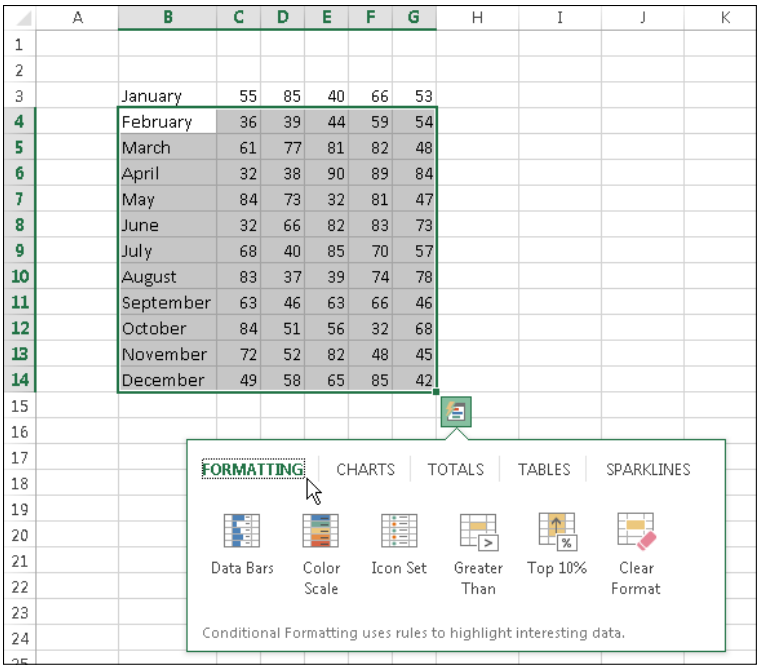
You can ignore Step 7 if the data you're importing will be changing. By saving the query definition, you can quickly update the imported data by right-clicking any cell in the range and choosing Refresh.

	A	B	C	D	E	F	G	H	I	J
1										
2										
3			January	55	85	40	66	53		
4			February	36	39	44	59	54		
5			March	61	77	81	82	48		
6			April	32	38	90	89	84		
7			May	84	73	32	81	47		
8			June	32	66	82	83	73		
9			July	68	40	85	70	57		
10			August	83	37	39	74	78		
11			September	63	46	63	66	46		
12			October	84	51	56	32	68		
13			November	72	52	82	48	45		
14			December	49	58	65	85	42		
15										

Figure 68-2: This range contains data imported directly from a CSV file.

Using the Quick Analysis Feature

One of the new features in Excel 2013 is Quick Analysis. When you select a range of data, Excel displays a Quick Analysis button in the lower-right corner of the range. Click the button to view some options, shown in Figure 69-1. You can also press Ctrl+Q on the keyboard to display the Quick Analysis options.



January	55	85	40	66	53
February	36	39	44	59	54
March	61	77	81	82	48
April	32	38	90	89	84
May	84	73	32	81	47
June	32	66	82	83	73
July	68	40	85	70	57
August	83	37	39	74	78
September	63	46	63	66	46
October	84	51	56	32	68
November	72	52	82	48	45
December	49	58	65	85	42

Figure 69-1: Quick Analysis options for the selected range.

The words along the top (Formatting, Charts, Totals, Tables, and Sparklines) are menu items. Click an item and a different set of icons appears. When you hover your mouse over an icon, Excel sometimes displays a preview of how the option will appear.

The options available depend on the type of data in the selected range. For example, if the range contains only text, the Sparklines option will not be available.

Figure 69-2 shows an example of a range of numbers in column C, with a preview of the Quick Analysis option to create running totals in column D.

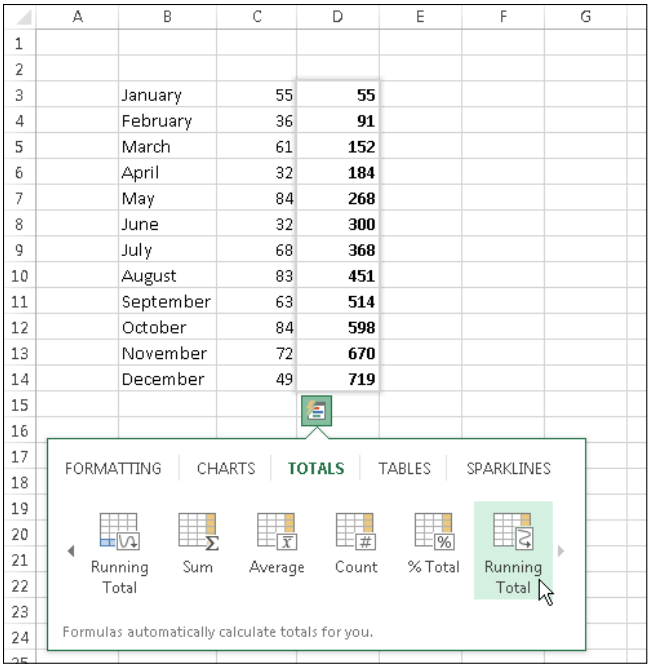


Figure 69-2: A preview of Quick Analysis running totals.

Figure 69-3 shows another example. The range A2:G7 is selected, and Quick Analysis is previewing the Line Sparklines option in column H.

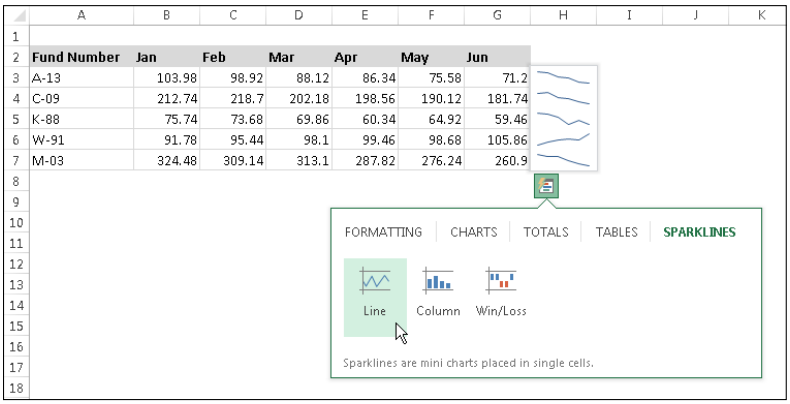


Figure 69-3: A preview of Quick Analysis Sparklines.


Note

The Quick Analysis options don't enable you to do anything that you can't do using Excel's normal commands. But sometimes it can you save a bit of time. If you find the Quick Analysis button annoying, turn if off in the General tab of the Excel Options dialog box. Deselect the check box labeled Show Quick Analysis Options on Selection.

Filling the Gaps in a Report

When you import data, you can sometimes end up with a worksheet that looks something like the one shown in Figure 70-1. This type of report formatting is common. As you can see, an entry in column A applies to several rows of data. If you sort this type of list, the missing data messes things up, and you can no longer tell who sold what when.

	A	B	C	D	E
1					
2	**Sales Rep**	**Month**	**Units Sold**	**Amount**	
3	Jane	Jan	182	$15,101	
4		Feb	3350	$34,230	
5		Mar	114	$9,033	
6	George	Jan	135	$8,054	
7		Feb	401	$9,322	
8		Mar	357	$32,143	
9	Beth	Jan	509	$29,239	
10		Feb	414	$38,993	
11		Mar	53	$309	
12	Dan	Jan	323	$9,092	
13		Feb	283	$12,332	
14		Mar	401	$32,933	
15					

Figure 70-1: This report contains gaps in the Sales Rep column.

If your list is small, you can enter the missing cell values manually or by using a series of Home➜Editing➜Fill➜Down commands (or its Ctrl+D shortcut). But if you have a large list that's in this format, you need a better way of filling in those cell values. Here's how:

1. Select the range that has the gaps (A3:A14, in this example).
2. Choose Home➜Editing➜Find & Select➜Go To Special.

   The Go To Special dialog box appears.
3. Select the Blanks option and click OK.

   This action selects the blank cells in the original selection.
4. On the Formula bar, type an equal sign (=) followed by the address of the first cell with an entry in the column (**=A3,** in this example) and press Ctrl+Enter.
5. Reselect the original range and press Ctrl+C to copy the selection.
6. Choose Home➜Clipboard➜Paste➜Paste Values to convert the formulas to values.

After you complete these steps, the gaps are filled in with the correct information, and your worksheet looks similar to the one shown in Figure 70-2. Now it's a normal list, and you can do whatever you like with it — including sorting.

	A	B	C	D	E
1					
2	**Sales Rep**	**Month**	**Units Sold**	**Amount**	
3	Jane	Jan	182	$15,101	
4	Jane	Feb	3350	$34,230	
5	Jane	Mar	114	$9,033	
6	George	Jan	135	$8,054	
7	George	Feb	401	$9,322	
8	George	Mar	357	$32,143	
9	Beth	Jan	509	$29,239	
10	Beth	Feb	414	$38,993	
11	Beth	Mar	53	$309	
12	Dan	Jan	323	$9,092	
13	Dan	Feb	283	$12,332	
14	Dan	Mar	401	$32,933	
15					

Figure 70-2: The gaps are gone, and this list can now be sorted.

Performing Inexact Searches

If you have a large worksheet with lots of data, locating what you're looking for can be difficult. The Excel Find and Replace dialog box is a useful tool for locating information, and it has a few features that many users overlook.

Access the Find and Replace dialog box by choosing Home➜Editing➜Find & Select➜Find (or by pressing Ctrl+F). If you're replacing information, you can use Home➜Editing➜Find & Select➜Replace (or Ctrl+H). The only difference is which of the two tabs is displayed in the dialog box. Figure 71-1 shows the Find and Replace dialog box after clicking the Options button, which expands the dialog box to show additional options.

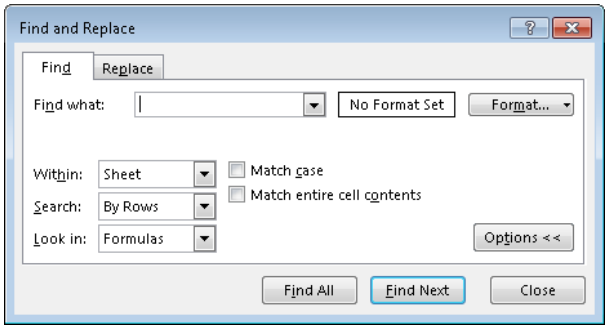


Figure 71-1: The Find and Replace dialog box with the Find tab selected.

In many cases, you want to locate "approximate" text. For example, you may be trying to find data for a customer named Stephen R. Rosencrantz. You can, of course, search for the exact text: *Stephen R. Rosencrantz*. However, there's a reasonably good chance that the search will fail. The name may have been entered differently, as Steve Rosencrantz or S.R. Rosencrantz, for example. It may have even been misspelled as Rosentcrantz.

The most efficient search for this name is to use a wildcard character and search for st*rosen* and then click the Find All button. In addition to reducing the amount of text that you enter, this search is practically guaranteed to locate the customer, if the record is in your worksheet. The search may also find some records that you aren't looking for, but that's better than not finding anything.

The Find and Replace dialog box supports two wildcard characters:

- ? matches any single character.
- * matches any number of characters.

Wildcard characters also work with values. For example, searching for 3* locates all cells that contain an entry that begins with 3. Searching for 1?9 locates all three-digit entries that begin with 1 and end with 9.


Note

To search for a question mark or an asterisk, precede the character with a tilde character (~). For example, the following search string finds the text *NONE*:

```
~*NONE~*
```

If you need to search for the tilde character, use two tildes.

If your searches don't seem to be working correctly, double-check these three options (which sometimes have a way of changing on their own):

- **Match Case:** If this check box is selected, the case of the text must match exactly. For example, searching for smith does not locate Smith.
- **Match Entire Cell Contents:** If this check box is selected, a match occurs if the cell contains only the search string (and nothing else). For example, searching for Excel doesn't locate a cell that contains Microsoft Excel.
- **Look In:** This drop-down list has three options: Values, Formulas, and Comments. If, for example, Values is selected, searching for 900 doesn't find a cell that contains 900 if that value is generated by a formula.

Remember that searching operates on the selected range of cells. If you want to search the entire worksheet, select only one cell before you begin your search.

Also, remember that searches do not include numeric formatting. For example, if you have a value that uses currency formatting so that it appears as $54.00, searching for $5* doesn't locate that value.

Working with dates can be a bit tricky because Excel offers many ways to format dates. If you search for a date by using the default date format, Excel locates the dates even if they're formatted differently. For example, if your system uses the m/d/y date format, the search string 10/*/2013 finds all dates in October 2013, regardless of how the dates are formatted.

You can also use an empty Replace With field. For example, to quickly delete all asterisks from your worksheet, enter **~*** in the Find What field and leave the Replace With field blank. When you click the Replace All button, Excel finds all the asterisks and replaces them with nothing.

Proofing Your Data with Audio

Excel 2002 introduced a handy feature: text-to-speech. In other words, Excel is capable of speaking to you. You can have this feature read back a specific range of cells, or you can set it up so that it reads the data as you enter it.

For some reason, this feature appears to be missing in action, beginning with Excel 2007. You can search the Ribbon all day and not find a trace of the text-to-speech feature. But the feature is still available — you just need to spend a few minutes to make it accessible.

Adding speech commands to the Ribbon

Following are instructions to add these commands to a new group in the Review tab of the Ribbon:

1. Right-click the Ribbon and then choose Customize the Ribbon from the shortcut menu.

   The Customize Ribbon tab of the Excel Options dialog box appears.

2. In the list box on the right, select Review and click New Group.
3. Click Rename and overwrite the default name with a more descriptive name, such as Text To Speech.
4. Click the drop-down list on the left and choose Commands Not in the Ribbon.
5. Scroll down the list, and you find five items that begin with the word *Speak;* select each one and then click Add.

   They're added to the newly created group (see Figure 72-1).

6. Click OK to close the Excel Options dialog box.

After you perform these steps, the Review tab displays a new group with five new icons (see Figure 72-2).

Using the speech commands

To read a range of cells, select the range first and then click the Speak Cells button. You can also specify the orientation (By Rows or By Columns). To read the data as it's entered, click the Speak On Enter button.

Some people (myself included) find the voice in this "love it or hate it" feature much too annoying to use for any extended period. And, if you enter the data at a relatively rapid clip, the voice simply cannot keep up with you.

You have a small bit of control over the voice used in the Excel Text To Speech feature. To adjust the voice, open the Windows Control Panel and display the Text to Speech tab of the Speech Properties dialog box. You can adjust the speed and select a different voice (if other voices are installed). Click the Preview Voice button to help make your choices.

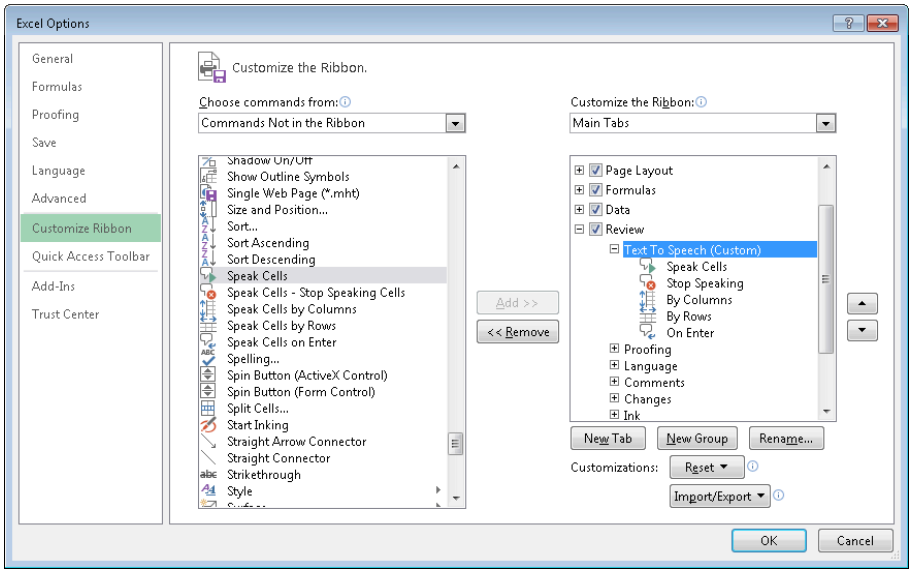


Figure 72-1: Adding the speech commands to the Ribbon.

Figure 72-2: Speech commands added to the Ribbon.

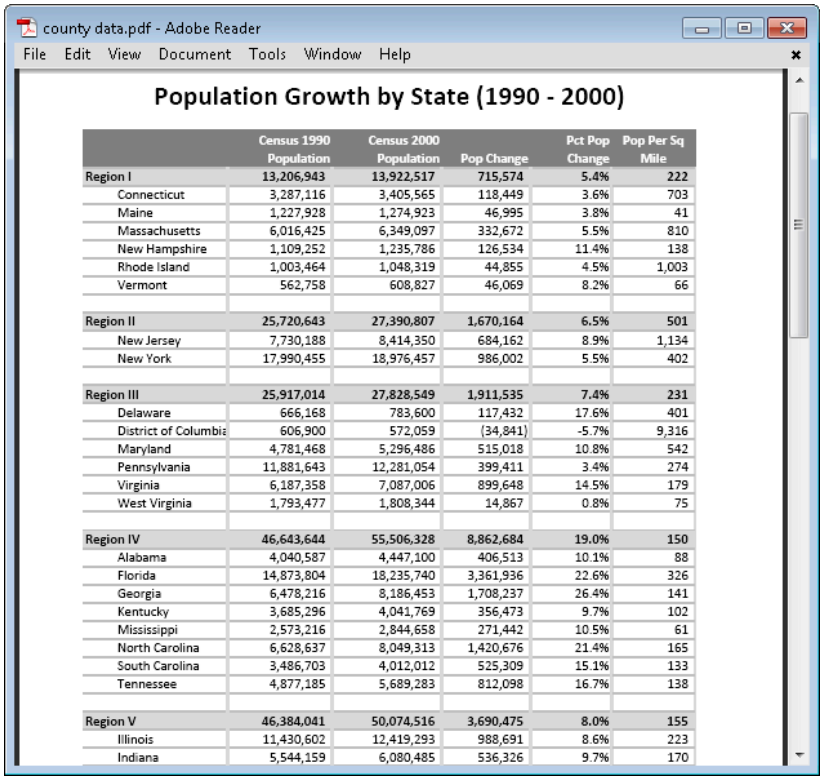
Getting Data from a PDF File

A PDF file is a document format that displays text or graphics in a way that's independent of the hardware and operating system used to create the document. PDF files are very common, and just about everyone has software that can read PDF files.

Excel can export a worksheet (or workbook) as a PDF file, but it cannot open PDF files. This tip describes two ways to get data from a PDF file into an Excel worksheet.

Using copy and paste

Figure 73-1 shows a PDF file displayed in Adobe Reader. I selected the table of data and pressed Ctrl+C to copy it to the Clipboard. Then I activated Excel and pressed Ctrl+V to copy the Clipboard contents. The result is shown in Figure 73-2.



Population Growth by State (1990 - 2000)

	Census 1990 Population	Census 2000 Population	Pop Change	Pct Pop Change	Pop Per Sq Mile
Region I	13,206,943	13,922,517	715,574	5.4%	222
Connecticut	3,287,116	3,405,565	118,449	3.6%	703
Maine	1,227,928	1,274,923	46,995	3.8%	41
Massachusetts	6,016,425	6,349,097	332,672	5.5%	810
New Hampshire	1,109,252	1,235,786	126,534	11.4%	138
Rhode Island	1,003,464	1,048,319	44,855	4.5%	1,003
Vermont	562,758	608,827	46,069	8.2%	66
Region II	25,720,643	27,390,807	1,670,164	6.5%	501
New Jersey	7,730,188	8,414,350	684,162	8.9%	1,134
New York	17,990,455	18,976,457	986,002	5.5%	402
Region III	25,917,014	27,828,549	1,911,535	7.4%	231
Delaware	666,168	783,600	117,432	17.6%	401
District of Columbia	606,900	572,059	(34,841)	-5.7%	9,316
Maryland	4,781,468	5,296,486	515,018	10.8%	542
Pennsylvania	11,881,643	12,281,054	399,411	3.4%	274
Virginia	6,187,358	7,087,006	899,648	14.5%	179
West Virginia	1,793,477	1,808,344	14,867	0.8%	75
Region IV	46,643,644	55,506,328	8,862,684	19.0%	150
Alabama	4,040,587	4,447,100	406,513	10.1%	88
Florida	14,873,804	18,235,740	3,361,936	22.6%	326
Georgia	6,478,216	8,186,453	1,708,237	26.4%	141
Kentucky	3,685,296	4,041,769	356,473	9.7%	102
Mississippi	2,573,216	2,844,658	271,442	10.5%	61
North Carolina	6,628,637	8,049,313	1,420,676	21.4%	165
South Carolina	3,486,703	4,012,012	525,309	15.1%	133
Tennessee	4,877,185	5,689,283	812,098	16.7%	138
Region V	46,384,041	50,074,516	3,690,475	8.0%	155
Illinois	11,430,602	12,419,293	988,691	8.6%	223
Indiana	5,544,159	6,080,485	536,326	9.7%	170

Figure 73-1: Data in a PDF file that needs to be transferred to a worksheet.

	A	B	C	D
1	Census 1990 Population			
2	Census 2000 Population			
3	Pop Change			
4	Pct Pop Change			
5	Pop Per Sq Mile			
6	Region I			
7	13,206,943			
8	13,922,517			
9	715,574			
10	5.40%			
11	222			
12	Connecticut			
13	3,287,116			
14	3,405,565			
15	118,449			
16	3.60%			
17	703			
18	Maine			
19	1,227,928			
20	1,274,923			
21	46,995			
22	3.80%			

Figure 73-2: Using copy and paste doesn't work very well.

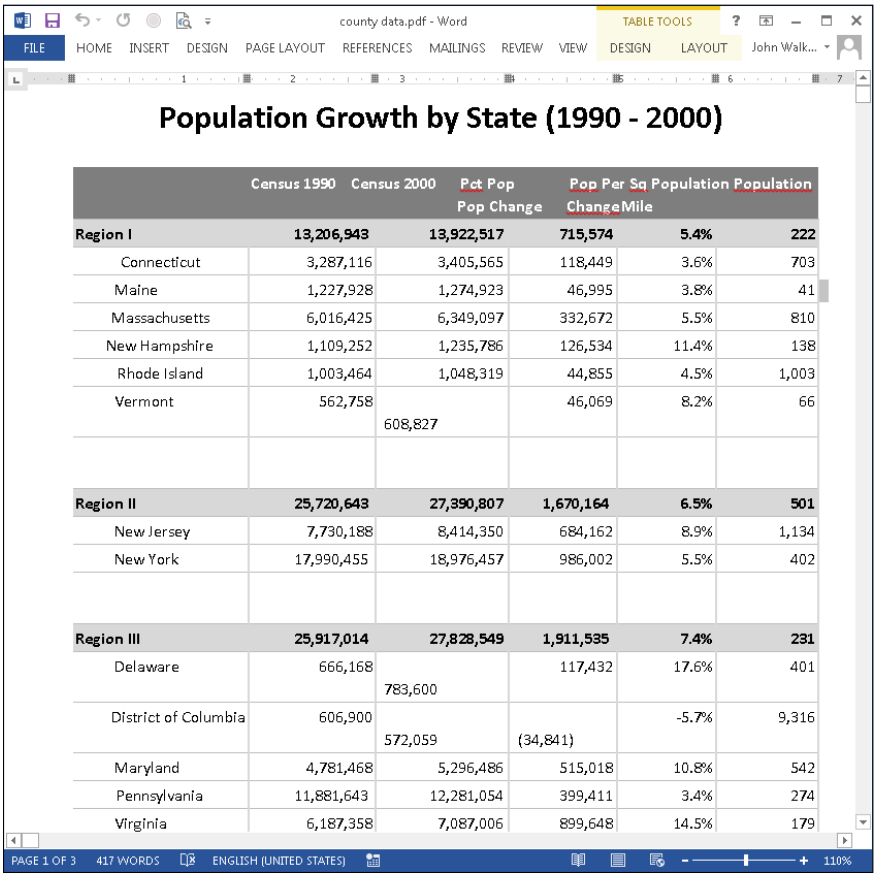
The data is copied, but it's all in a single column. I could spend some time and rearrange the data, but there's a more efficient way to transfer the PDF file data to Excel.

When coping from a PDF file and pasting to a worksheet, the actual results will vary, depending on the layout of the PDF file. In some cases, the pasted text is usable. But in most cases, it's not.

Using Word 2013 as an intermediary

Excel can't open PDF files, but Word 2013 can. Figure 73-3 shows a Word document after importing the PDF file. The information can be copied and pasted to an Excel worksheet — and the result will require minimal reformatting (see Figure 73-4).

After making a few minor edits, the table looks perfect.



	Census 1990	Census 2000	Pct Pop Change	Pop Per Sq Change	Population Mile	Population
Region I	**13,206,943**	**13,922,517**	**715,574**	**5.4%**		**222**
Connecticut	3,287,116	3,405,565	118,449	3.6%		703
Maine	1,227,928	1,274,923	46,995	3.8%		41
Massachusetts	6,016,425	6,349,097	332,672	5.5%		810
New Hampshire	1,109,252	1,235,786	126,534	11.4%		138
Rhode Island	1,003,464	1,048,319	44,855	4.5%		1,003
Vermont	562,758	608,827	46,069	8.2%		66
Region II	**25,720,643**	**27,390,807**	**1,670,164**	**6.5%**		**501**
New Jersey	7,730,188	8,414,350	684,162	8.9%		1,134
New York	17,990,455	18,976,457	986,002	5.5%		402
Region III	**25,917,014**	**27,828,549**	**1,911,535**	**7.4%**		**231**
Delaware	666,168	783,600	117,432	17.6%		401
District of Columbia	606,900	572,059	(34,841)	-5.7%		9,316
Maryland	4,781,468	5,296,486	515,018	10.8%		542
Pennsylvania	11,881,643	12,281,054	399,411	3.4%		274
Virginia	6,187,358	7,087,006	899,648	14.5%		179

Figure 73-3: A PDF file, imported into World 2013.

	A	B	C	D	E	F	G
1	**Population Growth by State (1990 - 2000)**						
2		Census 1990	Census 2000	Pct Pop	Pop Per Sq Population	Population Pop Change	Change Mile
3	**Region I**	**13,206,943**	**13,922,517**	**715,574**	**5.40%**	**222**	
4	Connecticut	3,287,116	3,405,565	118,449	3.60%	703	
5	Maine	1,227,928	1,274,923	46,995	3.80%	41	
6	Massachusetts	6,016,425	6,349,097	332,672	5.50%	810	
7	New Hampshire	1,109,252	1,235,786	126,534	11.40%	138	
8	Rhode Island	1,003,464	1,048,319	44,855	4.50%	1,003	
9	Vermont	562,758	608,827	46,069	8.20%	66	
10							
11	**Region II**	**25,720,643**	**27,390,807**	**1,670,164**	**6.50%**	**501**	
12	New Jersey	7,730,188	8,414,350	684,162	8.90%	1,134	
13	New York	17,990,455	18,976,457	986,002	5.50%	402	
14							
15	**Region III**	**25,917,014**	**27,828,549**	**1,911,535**	**7.40%**	**231**	
16	Delaware	666,168	783,600	117,432	17.60%	401	
17	District of Columbia	606,900	572,059	-34,841	-5.70%	9,316	
18	Maryland	4,781,468	5,296,486	515,018	10.80%	542	
19	Pennsylvania	11,881,643	12,281,054	399,411	3.40%	274	
20	Virginia	6,187,358	7,087,006	899,648	14.50%	179	

Figure 73-4: A Word 2013 document pasted into an Excel worksheet.

The ability to open PDF files is new to Word 2013, so this method won't work with other previous versions of Word.

Tables and Pivot Tables

This part contains tips that deal with two of Excel's most useful features: tables and pivot tables. If you work with large amounts of structured data, you owe it to yourself to understand these features.

Tips and Where to Find Them

Understanding Tables

An important but often underutilized feature in Excel is tables. This tip describes when to use a table and also lists the advantages and disadvantages.

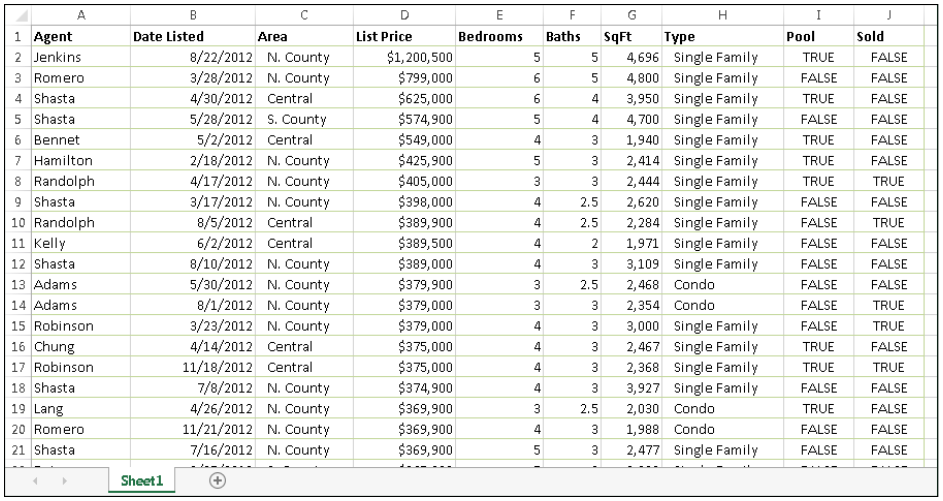
Understanding what a table is

A *table* is a rectangular range of structured data. Each row in the table corresponds to a single entity. For example, a row can contain information about a customer, a bank transaction, an employee, or a product. Each column contains a specific piece of information. For example, if each row contains information about an employee, the columns can contain data, such as name, employee number, hire date, salary, or department. Tables have a header row at the top that describes the information contained in each column.

You've probably created ranges that meet this description. The magic happens when you tell Excel to convert a range of data into an "official" table. You do so by selecting any cell within the range and then choosing Insert➜Tables➜Table.

When you explicitly identify a range as a table, Excel can respond more intelligently to the actions you perform with that range. For example, if you create a chart from a table, the chart expands automatically as you add new rows to the table. If you create a pivot table from a table, refreshing the pivot table will include any new data that you added to the table.

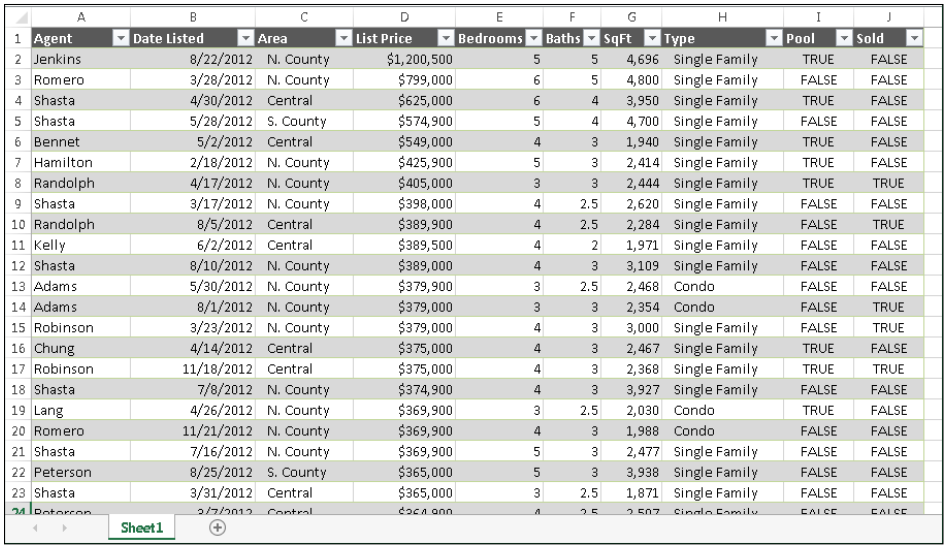
Figure 74-1 shows a range before it was converted to a table, and Figure 74-2 shows the range after it was converted to a table.



	A	B	C	D	E	F	G	H	I	J
1	Agent	Date Listed	Area	List Price	Bedrooms	Baths	SqFt	Type	Pool	Sold
2	Jenkins	8/22/2012	N. County	$1,200,500	5	5	4,696	Single Family	TRUE	FALSE
3	Romero	3/28/2012	N. County	$799,000	6	5	4,800	Single Family	FALSE	FALSE
4	Shasta	4/30/2012	Central	$625,000	6	4	3,950	Single Family	TRUE	FALSE
5	Shasta	5/28/2012	S. County	$574,900	5	4	4,700	Single Family	FALSE	FALSE
6	Bennet	5/2/2012	Central	$549,000	4	3	1,940	Single Family	TRUE	FALSE
7	Hamilton	2/18/2012	N. County	$425,900	5	3	2,414	Single Family	TRUE	FALSE
8	Randolph	4/17/2012	N. County	$405,000	3	3	2,444	Single Family	TRUE	TRUE
9	Shasta	3/17/2012	N. County	$398,000	4	2.5	2,620	Single Family	FALSE	FALSE
10	Randolph	8/5/2012	Central	$389,900	4	2.5	2,284	Single Family	FALSE	TRUE
11	Kelly	6/2/2012	Central	$389,500	4	2	1,971	Single Family	FALSE	FALSE
12	Shasta	8/10/2012	N. County	$389,000	4	3	3,109	Single Family	FALSE	FALSE
13	Adams	5/30/2012	N. County	$379,900	3	2.5	2,468	Condo	FALSE	FALSE
14	Adams	8/1/2012	N. County	$379,000	3	3	2,354	Condo	FALSE	TRUE
15	Robinson	3/23/2012	N. County	$379,000	4	3	3,000	Single Family	FALSE	TRUE
16	Chung	4/14/2012	Central	$375,000	4	3	2,467	Single Family	TRUE	FALSE
17	Robinson	11/18/2012	Central	$375,000	4	3	2,368	Single Family	TRUE	TRUE
18	Shasta	7/8/2012	N. County	$374,900	4	3	3,927	Single Family	FALSE	FALSE
19	Lang	4/26/2012	N. County	$369,900	3	2.5	2,030	Condo	TRUE	FALSE
20	Romero	11/21/2012	N. County	$369,900	4	3	1,988	Condo	FALSE	FALSE
21	Shasta	7/16/2012	N. County	$369,900	5	3	2,477	Single Family	FALSE	FALSE

Sheet1

Figure 74-1: A range of data that's not an official table.



	A	B	C	D	E	F	G	H	I	J
1	Agent	Date Listed	Area	List Price	Bedrooms	Baths	SqFt	Type	Pool	Sold
2	Jenkins	8/22/2012	N. County	$1,200,500	5	5	4,696	Single Family	TRUE	FALSE
3	Romero	3/28/2012	N. County	$799,000	6	5	4,800	Single Family	FALSE	FALSE
4	Shasta	4/30/2012	Central	$625,000	6	4	3,950	Single Family	TRUE	FALSE
5	Shasta	5/28/2012	S. County	$574,900	5	4	4,700	Single Family	FALSE	FALSE
6	Bennet	5/2/2012	Central	$549,000	4	3	1,940	Single Family	TRUE	FALSE
7	Hamilton	2/18/2012	N. County	$425,900	5	3	2,414	Single Family	TRUE	FALSE
8	Randolph	4/17/2012	N. County	$405,000	3	3	2,444	Single Family	TRUE	TRUE
9	Shasta	3/17/2012	N. County	$398,000	4	2.5	2,620	Single Family	FALSE	FALSE
10	Randolph	8/5/2012	Central	$389,900	4	2.5	2,284	Single Family	FALSE	TRUE
11	Kelly	6/2/2012	Central	$389,500	4	2	1,971	Single Family	FALSE	FALSE
12	Shasta	8/10/2012	N. County	$389,000	4	3	3,109	Single Family	FALSE	FALSE
13	Adams	5/30/2012	N. County	$379,900	3	2.5	2,468	Condo	FALSE	FALSE
14	Adams	8/1/2012	N. County	$379,000	3	3	2,354	Condo	FALSE	TRUE
15	Robinson	3/23/2012	N. County	$379,000	4	3	3,000	Single Family	FALSE	TRUE
16	Chung	4/14/2012	Central	$375,000	4	3	2,467	Single Family	TRUE	FALSE
17	Robinson	11/18/2012	Central	$375,000	4	3	2,368	Single Family	TRUE	TRUE
18	Shasta	7/8/2012	N. County	$374,900	4	3	3,927	Single Family	FALSE	FALSE
19	Lang	4/26/2012	N. County	$369,900	3	2.5	2,030	Condo	TRUE	FALSE
20	Romero	11/21/2012	N. County	$369,900	4	3	1,988	Condo	FALSE	FALSE
21	Shasta	7/16/2012	N. County	$369,900	5	3	2,477	Single Family	FALSE	FALSE
22	Peterson	8/25/2012	S. County	$365,000	5	3	3,938	Single Family	FALSE	FALSE
23	Shasta	3/31/2012	Central	$365,000	3	2.5	1,871	Single Family	FALSE	FALSE

Sheet1

Figure 74-2: A range of data that has been designated a table.

Range versus table

What's the difference between a standard range and a range that has been converted to a table?

- Activating any cell in the table gives you access to a new Table Tools context tab on the Ribbon.
- You can quickly apply background color and text color formatting by choosing from a gallery. This type of formatting is optional.
- Each column header contains a filter button that, when clicked, lets you easily sort the rows or filter the data by hiding rows that don't meet your criteria.
- A table can have "slicers," which makes it easy for novices to quickly apply filters to a table.
- If you scroll down the sheet so that the header row disappears, the table headers replace the column letters in the worksheet header. In other words, you don't need to freeze the top row to keep the column labels visible.
- If you create a chart from data in a table, the chart automatically expands if you add new rows to the end of the table.
- If you create a name for a column in a table, the "refers to" range for the name adjusts as you add new rows to the table.
- Tables support calculated columns. A single formula entered in a cell is automatically propagated to all cells in the column (see Tip 75).
- Tables support structured references in formulas outside of the table. Rather than use cell references, formulas can use table names and column headers.
- When you move your mouse pointer to the lower-right corner of the lower-right cell, you can click and drag to extend the table's size, either horizontally (add more columns) or vertically (add more rows).
- Selecting rows and columns within the table is simplified.

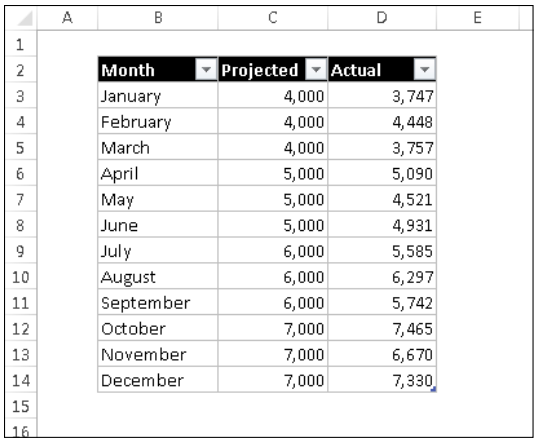
Limitations of using a table

If a workbook contains at least one table, a few Excel features are not available:

- For some reason, when a workbook contains at least one table, Excel doesn't allow you to use the Custom Views feature (choose View➜Workbook Views➜Custom Views).
- You cannot share a workbook (using Review➜Changes➜Share) if the workbook contains a table.
- You can't insert automatic subtotals within a table (by choosing Data➜Outline➜Subtotal).
- You cannot use array formulas within a table.

Using Formulas with a Table

This tip describes some ways to use formulas with a table. The example uses a simple sales summary table with three columns: Month, Projected, and Actual, as shown in Figure 75-1. I entered the data and then converted the range to a table by using the Insert➜Tables➜Table command. Note that I didn't define any names, but the data area of the table is named Table1 by default.



Month	Projected	Actual
January	4,000	3,747
February	4,000	4,448
March	4,000	3,757
April	5,000	5,090
May	5,000	4,521
June	5,000	4,931
July	6,000	5,585
August	6,000	6,297
September	6,000	5,742
October	7,000	7,465
November	7,000	6,670
December	7,000	7,330

Figure 75-1: A simple table with three columns.

Working with the Total row

If you want to calculate the total projected and total actual sales, you don't even need to write a formula. Just click a button to add a row of summary formulas to the table:

1. Activate any cell in the table.
2. Select the Table Tools➜Design➜Table Style Options➜Total Row command and check the Total Row check box.
3. Activate a cell in the Total row and select a summary formula from the drop-down list (see Figure 75-2).

   For example, to calculate the sum of the Actual column, select SUM from the drop-down list in cell D15. Excel creates this formula:

```
=SUBTOTAL(109,[Actual])
```

For the SUBTOTAL function, 109 is an enumerated argument that represents SUM. The second argument for the SUBTOTAL function is the column name, in square brackets. Using the column name within brackets is a way to create structured references within a table.

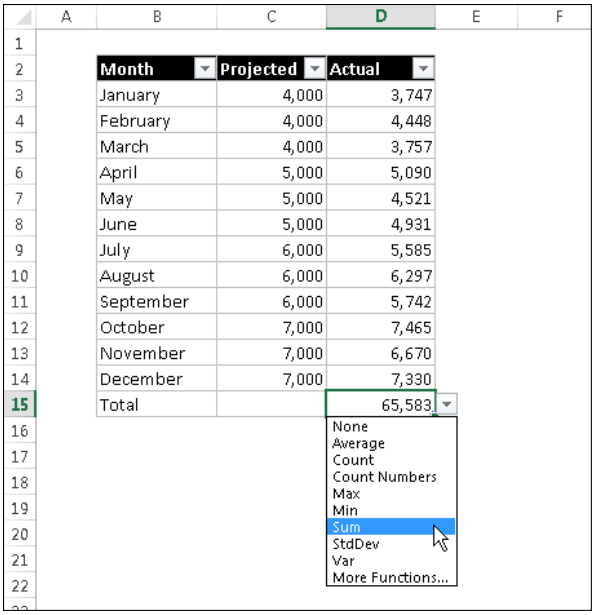


Figure 75-2: A drop-down list enables you to select a summary formula for a table column.

You can toggle the Total row display on and off by choosing Table Tools➜Design➜Table Style Options➜Total Row. If you turn it off, the summary options you selected are remembered when you turn it back on.

Using formulas within a table

In many cases, you want to use formulas within a table. For example, in the table shown in Figure 75-1, you may want a column that shows the difference between the actual and projected amounts for each month. As you can see, Excel makes this process very easy:

1. Activate cell E2 and type **Difference** for the column header.

   Excel automatically expands the table for you.

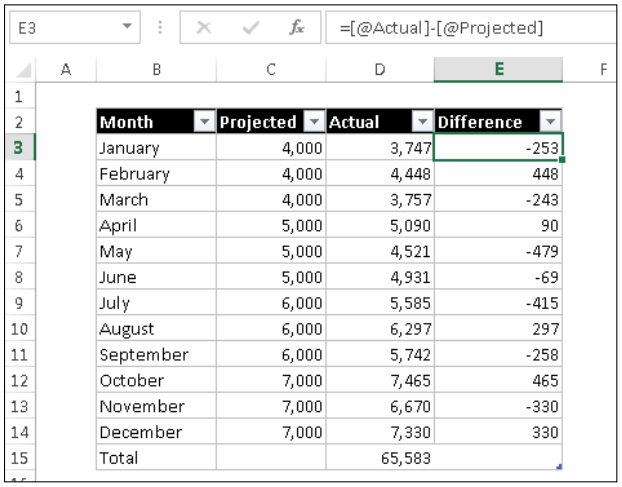
2. Move to cell E3 and type an equal sign (=) to signal the beginning of a formula.
3. Press the left-arrow key to point to the corresponding value in the Actual column.
4. Type a minus sign (–) and then press the left-arrow key twice to point to the corresponding value in the Projected column.

5. Press Enter to end the formula.

   The formula is entered into the other cells in the column, and the Formula bar displays this formula:

```
=[@Actual]-[@Projected]
```

Figure 75-3 shows the table with the new column.



	A	Month	Projected	Actual	Difference	F
1						
2						
3		January	4,000	3,747	-253	
4		February	4,000	4,448	448	
5		March	4,000	3,757	-243	
6		April	5,000	5,090	90	
7		May	5,000	4,521	-479	
8		June	5,000	4,931	-69	
9		July	6,000	5,585	-415	
10		August	6,000	6,297	297	
11		September	6,000	5,742	-258	
12		October	7,000	7,465	465	
13		November	7,000	6,670	-330	
14		December	7,000	7,330	330	
15		Total		65,583		

Figure 75-3: The Difference column contains a formula.

Although the formula was entered into the first row of the table, that's not necessary. Anytime a formula is entered into an empty table column, it propagates to the other cells in the column. If you need to edit the formula, edit any formula in the column, and the change is applied to the other cells in the column.

Propagating a formula to other cells in a table column is actually one of Excel's AutoCorrect options. To turn off this feature, click the icon that appears when you enter a formula and choose Stop Automatically Creating Calculated Columns.

The preceding set of steps uses the column names to create the formula. Alternatively, you can enter the formula by using standard cell references. For example, you can enter the following formula in cell E3:

```
=D3-C3
```

If you type the cell references, Excel still automatically copies the formula to other cells in the column.

Referencing data in a table

Formulas that are outside of a table can refer to data within a table by using the table name and column headers. You don't need to create names for these items. The table itself has a name (for example, Table1), and you can refer to data within the table by using column headers.

You can, of course, use standard cell references to refer to data in a table, but using table references has a distinct advantage: The names adjust automatically if the table size changes by adding or deleting rows.

Refer to the table shown earlier in Figure 75-1. This table was given the name Table1 when it was created. To calculate the sum of all data in the table, use this formula:

```
=SUM(Table1)
```

This formula always returns the sum of all the data, even if rows or columns are added or deleted. And, if you change the name of Table1, Excel automatically adjusts formulas that refer to that table. For example, if you rename Table1 as AnnualData (by using the Name Manager), the preceding formula changes to

```
=SUM(AnnualData)
```

Most of the time, you want to refer to a specific column in the table. The following formula returns the sum of the data in the Actual column (but ignores the total row):

```
=SUM(Table1[Actual])
```

Notice that the column name is enclosed in square brackets. Again, the formula adjusts automatically if you change the text in the column heading.

Even better, Excel provides some helpful assistance when you create a formula that refers to data within a table. Figure 75-4 shows the Formula AutoComplete feature helping to create a formula by showing a list of the elements in the table.

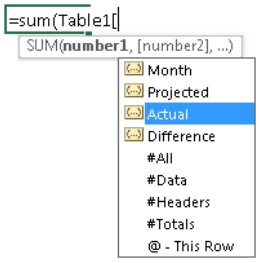
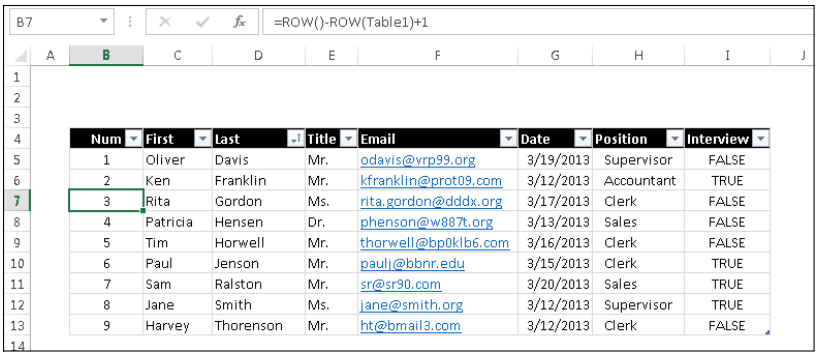


Figure 75-4: The Formula AutoComplete feature is useful when creating a formula that refers to data in a table.

Numbering Table Rows Automatically

In some situations, you may want a table to include sequential row numbers. This tip describes how to take advantage of the calculated column feature (explained in Tip 75) and create a formula that numbers table rows automatically.

Figure 76-1 shows a table (named *Table1*) with information about job applicants. The first column of the table, labeled *Num*, displays sequential numbers.



Num	First	Last	Title	Email	Date	Position	Interview
1	Oliver	Davis	Mr.	odavis@vrp99.org	3/19/2013	Supervisor	FALSE
2	Ken	Franklin	Mr.	kfranklin@prot09.com	3/12/2013	Accountant	TRUE
3	Rita	Gordon	Ms.	rita.gordon@dddx.org	3/17/2013	Clerk	FALSE
4	Patricia	Hensen	Dr.	phenson@w887t.org	3/13/2013	Sales	FALSE
5	Tim	Horwell	Mr.	thorwell@bp0klb6.com	3/16/2013	Clerk	FALSE
6	Paul	Jenson	Mr.	paulj@bbnr.edu	3/15/2013	Clerk	TRUE
7	Sam	Ralston	Mr.	sr@sr90.com	3/20/2013	Sales	TRUE
8	Jane	Smith	Ms.	jane@smith.org	3/12/2013	Supervisor	TRUE
9	Harvey	Thorenson	Mr.	ht@bmail3.com	3/12/2013	Clerk	FALSE

Figure 76-1: The numbers in column B are generated with a formula.

The calculated column formula, which you can enter into any cell in the *Num* column, is

```
=ROW()-ROW(Table1)+1
```

When you enter the formula, it's automatically propagated to all other cells in the *Num* column.

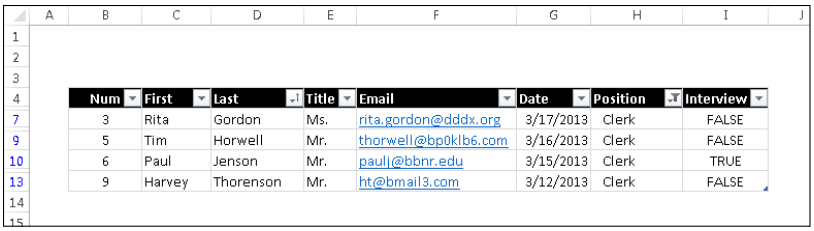
The ROW function, when used without an argument, returns the row that contains the formula. When the ROW function has an argument that consists of a multirow range, it returns the first row of the range.


Note

A table's name does not include the header row of the table. So, in this example, the first row of Table1 is row 5.

The numbers are table row numbers, not numbers that correspond to a particular row of data. For example, if you sort the table, the numbers will remain consecutive — and they will no longer be associated with the same row of data.

If you filter the table, rows that don't meet the filter criteria will be hidden. In such a case, some table row numbers will not be visible. Figure 76-2 shows the table after filtering to display only the Clerk positions.



Num	First	Last	Title	Email	Date	Position	Interview
3	Rita	Gordon	Ms.	rita.gordon@dddx.org	3/17/2013	Clerk	FALSE
5	Tim	Horwell	Mr.	thorwell@bp0klb6.com	3/16/2013	Clerk	FALSE
6	Paul	Jenson	Mr.	paulj@bbnr.edu	3/15/2013	Clerk	TRUE
9	Harvey	Thorenson	Mr.	ht@bmail3.com	3/12/2013	Clerk	FALSE

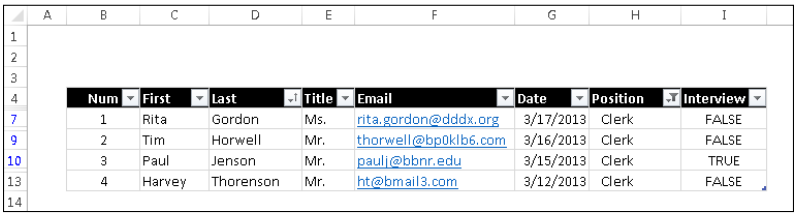
Figure 76-2: When the table is filtered, the row numbers are no longer consecutive.

If you want the table row numbers to remain consecutive when the table is filtered, a different formula is required. Referring to the example in Figure 76-1, enter this formula in cell B5, and it will be propagated to the other rows:

```
=SUBTOTAL(3,C$5:C5)
```

This formula uses the SUBTOTAL function, with a first argument of 3 (which corresponds to COUNTA). The SUBTOTAL function ignores hidden rows, so only visible rows are counted. Notice that the formula refers to a different column — which is necessary to avoid a circular reference error.

Figure 76-3 shows the filtered table using the SUBTOTAL formula in column B.



Num	First	Last	Title	Email	Date	Position	Interview
1	Rita	Gordon	Ms.	rita.gordon@dddx.org	3/17/2013	Clerk	FALSE
2	Tim	Horwell	Mr.	thorwell@bp0klb6.com	3/16/2013	Clerk	FALSE
3	Paul	Jenson	Mr.	paulj@bbnr.edu	3/15/2013	Clerk	TRUE
4	Harvey	Thorenson	Mr.	ht@bmail3.com	3/12/2013	Clerk	FALSE

Figure 76-3: When the table is filtered, the row numbers remain consecutive.

Identifying Data Appropriate for a Pivot Table

A pivot table requires that your data is in the form of a rectangular database table. You can store the database in either a worksheet range (which can be a table or just a normal range) or an external database file. And although Excel can generate a pivot table from any database, not all databases benefit.

Figure 77-1 shows part of a simple database table that has five columns and 3,144 rows (one row for each county). This data is appropriate for a pivot table. For example, a pivot table can instantly calculate the total population by state or by region and display the values in a nicely formatted table.

	A	B	C	D	E	F
1	**County**	**State**	**Region**	**1990 Population**	**2000 Population**	
2	Abbeville	South Carolina	Region IV	23,862	26,167	
3	Acadia Parish	Louisiana	Region VI	55,882	58,861	
4	Accomack	Virginia	Region III	31,703	38,305	
5	Ada	Idaho	Region X	205,775	300,904	
6	Adair	Kentucky	Region IV	15,360	17,244	
7	Adair	Oklahoma	Region VI	18,421	21,038	
8	Adair	Missouri	Region VII	24,577	24,977	
9	Adair	Iowa	Region VII	8,409	8,243	
10	Adams	Pennsylvania	Region III	78,274	91,292	
11	Adams	Mississippi	Region IV	35,356	34,340	
12	Adams	Illinois	Region V	66,090	68,277	
13	Adams	Ohio	Region V	25,371	27,330	
14	Adams	Indiana	Region V	31,095	33,625	
15	Adams	Wisconsin	Region V	15,682	18,643	
16	Adams	Iowa	Region VII	4,866	4,482	
17	Adams	Nebraska	Region VII	29,625	31,151	
18	Adams	Colorado	Region VIII	265,038	363,857	
19	Adams	North Dakota	Region VIII	3,174	2,593	
20	Adams	Washington	Region X	13,603	16,428	
21	Adams	Idaho	Region X	3,254	3,476	
22	Addison	Vermont	Region I	32,953	35,974	
23	Aiken	South Carolina	Region IV	120,940	142,552	
24	Aitkin	Minnesota	Region V	12,425	15,301	
25	Alachua	Florida	Region IV	181,596	217,955	
26	Alamance	North Carolina	Region IV	108,213	130,800	

Figure 77-1: This data is appropriate for a pivot table.

Generally speaking, fields in a database table consist of two types of information:

- **Data:** Contains a value or data to be summarized. For this example, the 1990 Population and the 2000 Population fields are data fields.
- **Category:** Describes the data. For this example, the Country, State, and Region fields are category fields because they describe the two data fields.

The data versus category distinction can be blurry at times. Often a pivot table will display counts of items within a category. In such a case, a category is serving as a data field.


Note

A database table that's appropriate for a pivot table is said to be normalized. In other words, each row contains information that describes the data in the row.

A single database table can have any number of data fields and category fields. When you create a pivot table, you usually want to summarize one or more of the data fields. Conversely, the values in the category fields appear in the pivot table as rows, columns, or filters.

Figure 77-2 shows a pivot table created from the example. This pivot table displays the 2000 Population values, totaled by state.

Row Labels	Sum of 2000 Population
Alabama	4,447,100
Alaska	632,143
Arizona	5,130,632
Arkansas	2,673,400
California	33,871,648
Colorado	4,301,261
Connecticut	3,405,565
Delaware	783,600
District of Columbia	572,059
Florida	18,235,740
Georgia	8,186,453
Hawaii	1,211,537
Idaho	1,293,953
Illinois	12,419,293
Indiana	6,080,485
Iowa	2,926,324
Kansas	2,688,418
Kentucky	4,041,769
Louisiana	4,468,976
Maine	1,274,923

Figure 77-2: A pivot table created from the data.

Figure 77-3 shows an example of an Excel range that is *not* appropriate for a pivot table. Although the range contains descriptive information about each value, it does *not* consist of normalized data, and you cannot create a useful pivot table from it. In fact, this range actually resembles a pivot table summary, but it's much less flexible.

State	Jan	Feb	Mar	Apr	May	Jun
California	1,118	1,960	1,252	1,271	1,557	1,679
Washington	1,247	1,238	1,028	1,345	1,784	1,574
Oregon	1,460	1,954	1,726	1,461	1,764	1,144
Arizona	1,345	1,375	1,075	1,736	1,555	1,372
New York	1,429	1,316	1,993	1,832	1,740	1,191
New Jersey	1,735	1,406	1,224	1,706	1,320	1,290
Massachusetts	1,099	1,233	1,110	1,637	1,512	1,006
Florida	1,705	1,792	1,225	1,946	1,327	1,357
Kentucky	1,109	1,078	1,155	1,993	1,082	1,551
Oklahoma	1,309	1,045	1,641	1,924	1,499	1,941
Missouri	1,511	1,744	1,414	1,243	1,493	1,820
Illinois	1,539	1,493	1,211	1,165	1,013	1,445
Kansas	1,973	1,560	1,243	1,495	1,125	1,387

Figure 77-3: This range is not appropriate for a pivot table.

Figure 77-4 shows the same data, but normalized. This range contains 78 rows of data — one for each of the six monthly sales values for the 13 states. Notice that each row contains category information for the sales value. This table is an ideal candidate for a pivot table and contains all information necessary to summarize the information by region or quarter.

Figure 77-5 shows a pivot table created from the normalized data. As you can see, it's virtually identical to the non-normalized data shown in Figure 77-3. Working with normalized data provides ultimate flexibility in designing reports.

	A	B	C	D	E	F
1	**State**	**Region**	**Month**	**Qtr**	**Sales**	
2	California	West	Jan	Qtr-1	1,118	
3	California	West	Feb	Qtr-1	1,960	
4	California	West	Mar	Qtr-1	1,252	
5	California	West	Apr	Qtr-2	1,271	
6	California	West	May	Qtr-2	1,557	
7	California	West	Jun	Qtr-2	1,679	
8	Washington	West	Jan	Qtr-1	1,247	
9	Washington	West	Feb	Qtr-1	1,238	
10	Washington	West	Mar	Qtr-1	1,028	
11	Washington	West	Apr	Qtr-2	1,345	
12	Washington	West	May	Qtr-2	1,784	
13	Washington	West	Jun	Qtr-2	1,574	
14	Oregon	West	Jan	Qtr-1	1,460	
15	Oregon	West	Feb	Qtr-1	1,954	
16	Oregon	West	Mar	Qtr-1	1,726	
17	Oregon	West	Apr	Qtr-2	1,461	
18	Oregon	West	May	Qtr-2	1,764	
19	Oregon	West	Jun	Qtr-2	1,144	
20	Arizona	West	Jan	Qtr-1	1,345	
21	Arizona	West	Feb	Qtr-1	1,375	
22	Arizona	West	Mar	Qtr-1	1,075	
23	Arizona	West	Apr	Qtr-2	1,736	
24	Arizona	West	May	Qtr-2	1,555	
25	Arizona	West	Jun	Qtr-2	1,372	
26	New York	East	Jan	Qtr-1	1,429	
27	New York	East	Feb	Qtr-1	1,316	

Figure 77-4: This range contains normalized data and is appropriate for a pivot table.

	A	B	C	D	E	F	G	H	I
1									
2									
3	**Sum of Sales**	**Colum**							
4	**Row Labels**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Grand Total**	
5	Arizona	1,345	1,375	1,075	1,736	1,555	1,372	8,458	
6	California	1,118	1,960	1,252	1,271	1,557	1,679	8,837	
7	Florida	1,705	1,792	1,225	1,946	1,327	1,357	9,352	
8	Illinois	1,539	1,493	1,211	1,165	1,013	1,445	7,866	
9	Kansas	1,973	1,560	1,243	1,495	1,125	1,387	8,783	
10	Kentucky	1,109	1,078	1,155	1,993	1,082	1,551	7,968	
11	Massachusetts	1,099	1,233	1,110	1,637	1,512	1,006	7,597	
12	Missouri	1,511	1,744	1,414	1,243	1,493	1,820	9,225	
13	New Jersey	1,735	1,406	1,224	1,706	1,320	1,290	8,681	
14	New York	1,429	1,316	1,993	1,832	1,740	1,191	9,501	
15	Oklahoma	1,309	1,045	1,641	1,924	1,499	1,941	9,359	
16	Oregon	1,460	1,954	1,726	1,461	1,764	1,144	9,509	
17	Washington	1,247	1,238	1,028	1,345	1,784	1,574	8,216	
18	**Grand Total**	**18,579**	**19,194**	**17,297**	**20,754**	**18,771**	**18,757**	**113,352**	
19									
20									

Figure 77-5: A pivot table created from normalized data.

Using a Pivot Table Instead of Formulas

The Excel PivotTable feature is incredibly powerful, and you can often create pivot tables in lieu of creating formulas. This tip describes a specific problem and provides three different solutions.

Figure 78-1 shows a range of data that contains student test scores. The goal is to calculate the average score for all students plus the average score for each gender.

	A	B	C
1	**Student**	**Score**	**Gender**
2	Anne	90	Female
3	Billy	96	Male
4	Chuck	87	Male
5	Darlene	75	Female
6	Ella	84	Female
7	Frank	89	Male
8	George	85	Male
9	Hilda	97	Female
10	Ida	77	Female
11	John	93	Male
12	Keith	89	Male
13	Larry	77	Male
14	Mary	85	Female
15	Nora	100	Female
16	Opie	71	Male
17	Peter	89	Male
18	Quincy	83	Male
19	Rhoda	91	Female
20	Sally	87	Female
21	Tim	97	Male
22	Ubella	83	Female
23	Vince	86	Male
24	Walter	83	Male
25	Xavier	78	Male
26	Yolanda	100	Female
27	Zola	84	Female
28			

Figure 78-1: What's the best way to calculate the average test score for males versus females?

Inserting subtotals

The first solution involves automatically inserting subtotals. To use this method, the data must be sorted by the column that will trigger the subtotaling. In this case, you need to sort by the Gender column. Follow these steps:

1. Select any cell in column C.
2. Right-click and choose Sort➜Sort A to Z from the shortcut menu.
3. Choose Data➜Outline➜Subtotal.

   The Subtotal dialog box appears.

4. Specify At Each Change in Gender, Use Function Average, and Add Subtotal to Score.

The result of adding subtotals is shown in Figure 78-2. Notice that Excel also creates an outline, so you can hide the details and view just the summary.

The formulas inserted by Excel use the SUBTOTAL function, with 1 as the first argument (1 represents average). Here are the formulas:

```
=SUBTOTAL(1,B2:B13)
=SUBTOTAL(1,B15:B28)
=SUBTOTAL(1,B2:B28)
```

The formula in cell B30 calculates the Grand Average and uses a range that includes the other two SUBTOTAL formulas in cells B14 and B29. The SUBTOTAL function ignores cells that contain other SUBTOTAL formulas.

	A	B	C	D
1	**Student**	**Score**	**Gender**	
2	Anne	90	Female	
3	Darlene	75	Female	
4	Ella	84	Female	
5	Hilda	97	Female	
6	Ida	77	Female	
7	Mary	85	Female	
8	Nora	100	Female	
9	Rhoda	91	Female	
10	Sally	87	Female	
11	Ubella	83	Female	
12	Yolanda	100	Female	
13	Zola	84	Female	
14		87.75	**Female Average**	
15	Billy	96	Male	
16	Chuck	87	Male	
17	Frank	89	Male	
18	George	85	Male	
19	John	93	Male	
20	Keith	89	Male	
21	Larry	77	Male	
22	Opie	71	Male	
23	Peter	89	Male	
24	Quincy	83	Male	
25	Tim	97	Male	
26	Vince	86	Male	
27	Walter	83	Male	
28	Xavier	78	Male	
29		85.92857143	**Male Average**	
30		86.76923077	**Grand Average**	

Figure 78-2: Excel adds subtotals automatically.

Using formulas

Another method of creating averages is to use formulas. The formula to calculate the average of all students is simple:

```
=AVERAGE(B2:B27)
```

To calculate the average of the genders, you can use the AVERAGEIF function and create these formulas:

```
=AVERAGEIF(C2:C27,"Female",B2:B27)
=AVERAGEIF(C2:C27,"Male",B2:B27)
```

Using Excel's PivotTable feature

A third method of averaging the scores is to create a pivot table. Many users avoid creating pivot tables because they consider this feature too complicated. As you can see, it's simple to use:

1. Select any cell in the data range and choose Insert➜Tables➜PivotTable.

   The Create PivotTable dialog box appears.

2. Verify that Excel selected the correct data range and specify a cell on the existing worksheet as the location.

   Cell E1 is a good choice.

3. Click OK.

   Excel displays the PivotTable Fields task pane.

4. Drag the Gender item to the Rows section, at the bottom.

5. Drag the Score item to the Values section.

   Excel creates the pivot table but calculates the sum of the scores rather than the average.

6. To change the summary function that's used, right-click any of the values in the pivot table and choose Summarize Data By➜Average from the shortcut menu.

Figure 78-3 shows the pivot table and the PivotTable Fields task pane.

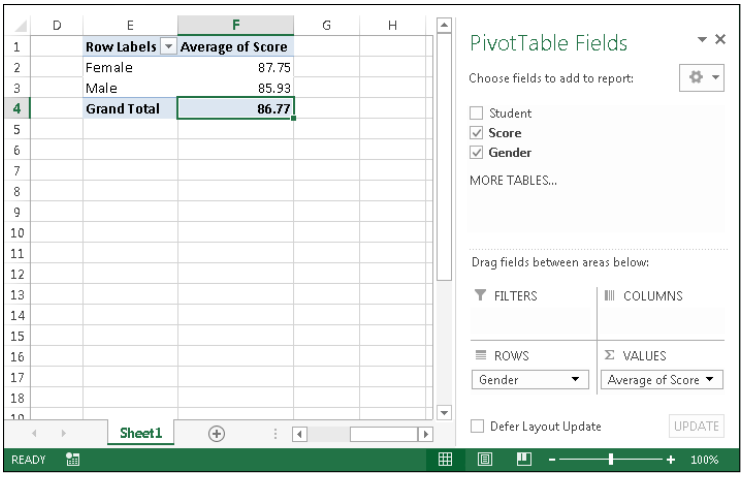


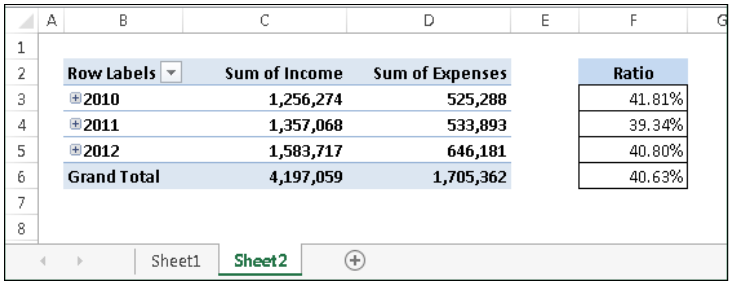
Figure 78-3: This pivot table calculates the averages without using formulas.

Unlike a formula-based solution, a pivot table doesn't update itself automatically if the data changes. If the data changes, you must refresh the pivot table. Just right-click any cell in the pivot table and choose Refresh from the shortcut menu.

The pivot table in this example is extremely simple, but it's also very easy to create. Pivot tables can be much more complex, and they can summarize massive amounts of data in just about any way you can think of — without using any formulas.

Controlling References to Cells Within a Pivot Table

In some cases, you may want to create a formula that references one or more cells within a pivot table. Figure 79–1 shows a simple pivot table that displays income and expense information for three years. In this pivot table, the Month field is hidden, so the pivot table shows the year totals.



Row Labels	Sum of Income	Sum of Expenses	Ratio
⊞2010	1,256,274	525,288	41.81%
⊞2011	1,357,068	533,893	39.34%
⊞2012	1,583,717	646,181	40.80%
Grand Total	4,197,059	1,705,362	40.63%

Sheet1 Sheet2

Figure 79-1: The formulas in column F reference cells in the pivot table.

Column F contains formulas, and this column is not part of the pivot table. These formulas calculate the expense-to-income ratio for each year. I created these formulas by pointing to the cells. You may expect to see this formula in cell F3:

```
=D3/C3
```

In fact, the formula in cell F3 is

```
=GETPIVOTDATA("Sum of Expenses",$B$2,"Year",2010)
/GETPIVOTDATA("Sum of Income",$B$2,"Year",2010)
```

When you use the pointing technique to create a formula that references a cell in a pivot table, Excel replaces those simple cell references with a much more complicated GETPIVOTDATA function. If you type the cell references manually (rather than pointing to them), Excel does not use the GETPIVOTDATA function.

The reason? Using the GETPIVOTDATA function helps ensure that the formula will continue to reference the intended cells if the pivot table layout is changed.

Figure 79-2 shows the pivot table after expanding the years to show the month detail. As you can see, the formulas in column F still show the correct result even though the referenced cells are in a different location. For example, the summary row for 2011 was originally row 4. After expanding the years, the summary row for 2011 is row 16. Had I used simple cell references, the formula would have returned incorrect results after expanding the years.

Row Labels	Sum of Income	Sum of Expenses	Ratio
2010	**1,256,274**	**525,288**	41.81%
Jan	98,085	42,874	39.34%
Feb	98,698	44,167	40.80%
Mar	102,403	43,349	40.63%
Apr	106,044	43,102	
May	105,361	45,005	
Jun	105,729	44,216	
Jul	105,557	43,835	
Aug	109,669	41,952	
Sep	107,233	44,071	
Oct	105,048	43,185	
Nov	107,446	44,403	
Dec	105,001	45,129	
2011	**1,357,068**	**533,893**	
Jan	109,699	46,245	
Feb	109,146	45,672	
Mar	106,576	44,143	
Apr	108,911	43,835	
May	108,011	44,114	
Jun	111,361	44,648	

Sheet1 Sheet2

Figure 79-2: After expanding the pivot table, formulas that used the GETPIVOTDATA function continue to display the correct result.

Using the GETPIVOTDATA function has one caveat: The data that it retrieves must be visible in the pivot table. If you modify the pivot table so that the value used by GETPIVOTDATA is no longer visible, the formula returns an error.

You may want to prevent Excel from using the GETPIVOTDATA function when you point to pivot table cells when creating a formula. If so, choose PivotTable Tools➜Analyze➜PivotTable➜Options➜Generate GetPivot Data (this command is a toggle).

Creating a Quick Frequency Tabulation

This tip describes a quick method for creating a frequency tabulation for a single column of data. Figure 80-1 shows a small part of a range that contains more than 20,000 rows of city and state data. The goal is to tally the number of times each state appears in the list.

Although you can tally the states in a number of ways, a pivot table is the easiest choice for this task.

	A	B	C
1	**City**	**State**	
2	Bellevue	WA	
3	Simsbury	CT	
4	Washington	DC	
5	Campbell	CA	
6	Los Angelese	CA	
7	Sterling	IL	
8	Bloomington	IN	
9	Gastonia	NC	
10	Chicago	IL	
11	Wilmington	DE	
12	New York	NY	
13	San Jose	CA	
14	Toledo	OH	
15	New York	NY	
16	Norman	OK	
17	Longmeadow	MA	
18	Boulder	CO	
19	San Jose	CA	
20	Winter Haven	FL	
21	Gainesville	FL	
22	Ankeny	IA	
23	Tacoma	WA	
24	West Windsor	NJ	

Figure 80-1: You can use a pivot table to generate a frequency tabulation for these state abbreviations.

Before you get started on this task, make sure that your data column has a heading. In this example, it's in cell B1.

Activate any cell in the column A or B and then follow these steps:

1. Choose Insert➜Tables➜PivotTable.

   The Create PivotTable dialog box appears.

2. If Excel doesn't correctly identify the range, change the Table/Range setting.
3. Specify a location for the PivotTable.
4. Click OK.

   Excel creates an empty pivot table and displays the PivotTable Fields task pane.
5. Drag the State field into the Rows section.
6. Drag the State field into the Values section.

Excel creates the pivot table, which shows the frequency of each state (see Figure 80-2).

	A	B	C	D	E	F	G
1	City	State		Row Labels	Count of State		
2	Bellevue	WA		CA	3150		
3	Simsbury	CT		TX	1745		
4	Washington	DC		NY	1191		
5	Campbell	CA		FL	1001		
6	Los Angelese	CA		IL	954		
7	Sterling	IL		NJ	816		
8	Bloomington	IN		PA	738		
9	Gastonia	NC		OH	723		
10	Chicago	IL		MI	652		
11	Wilmington	DE		WA	646		
12	New York	NY		VA	645		
13	San Jose	CA		MA	603		
14	Toledo	OH		GA	577		
15	New York	NY		NC	523		
16	Norman	OK		MD	517		
17	Longmeadow	MA		CO	408		
18	Boulder	CO		CT	388		
19	San Jose	CA		OR	369		
20	Winter Haven	FL		AZ	363		
21	Gainesville	FL		IN	348		
22	Ankeny	IA		MN	348		
23	Tacoma	WA		MO	300		
24	West Windsor	NJ		WI	291		

Figure 80-2: A quick pivot table shows the frequency of each state abbreviation.

This pivot table can be sorted, by using the Home➜Editing➜Sort & Filter command. In addition (as shown in Figure 80-3), you can even create a pivot chart to display the counts graphically. Just select any cell in the pivot table and choose PivotTable Tools➜Analyze➜Tools➜PivotChart.

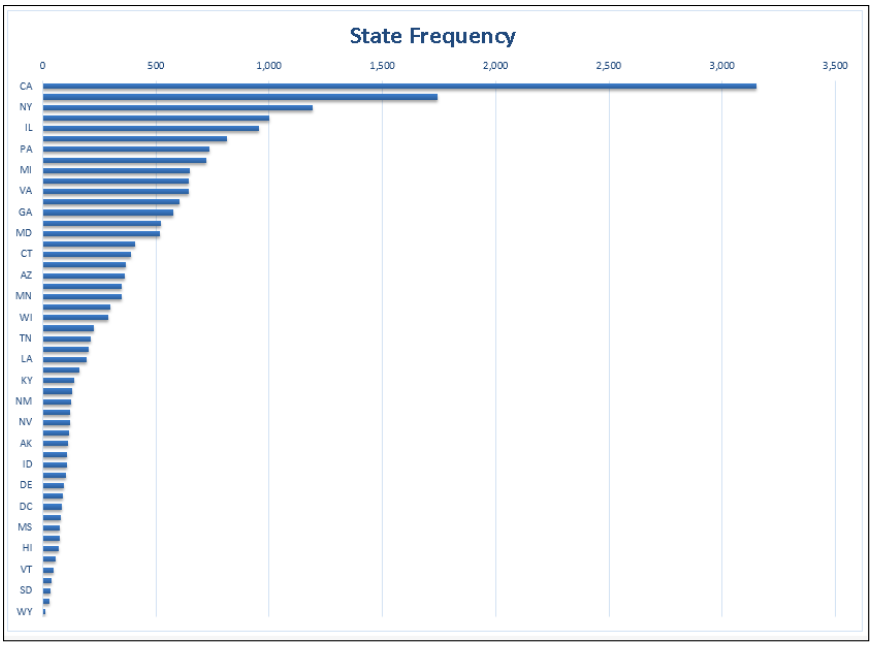


Figure 80-3: A few mouse clicks creates a chart from the pivot table.

Grouping Items by Date in a Pivot Table

One of the more useful features of a pivot table is the ability to combine items into groups. Grouping items is simple: Select them and choose PivotTable Tools➜Options➜Group➜Group Selection.

You can go a step further, though. When a field contains dates, Excel can create groups automatically. Many users overlook this helpful feature. Figure 81-1 shows a portion of a table that has two columns of data: Date and Sales. This table has 731 rows and covers dates between January 1, 2012, and December 31, 2013. The goal is to summarize the sales information by month.

	A	B	C	D
1	Date	Sales		
2	1/1/2012	3,830		
3	1/2/2012	3,763		
4	1/3/2012	4,362		
5	1/4/2012	3,669		
6	1/5/2012	3,942		
7	1/6/2012	4,488		
8	1/7/2012	4,416		
9	1/8/2012	3,371		
10	1/9/2012	3,628		
11	1/10/2012	4,548		
12	1/11/2012	5,493		
13	1/12/2012	5,706		
14	1/13/2012	6,579		
15	1/14/2012	6,333		
16	1/15/2012	6,101		
17	1/16/2012	5,289		
18	1/17/2012	5,349		
19	1/18/2012	5,814		
20	1/19/2012	6,501		
21	1/20/2012	6,513		
22	1/21/2012	5,970		
23	1/22/2012	5,791		
24	1/23/2012	5,478		

Figure 81-1: You can use the PivotTable feature to summarize the sales data by month.

Figure 81-2 shows part of a pivot table (in columns D:E) created from the data. Not surprisingly, it looks exactly like the input data because the dates haven't been grouped.

To group the items by month, right-click any cell in the Date column of the pivot table and select Group from the shortcut menu. You see the Grouping dialog box, shown in Figure 81-3. In the By list box, select Months and Years and verify that the starting and ending dates are correct. Click OK.

The Date items in the pivot table are grouped by years and by months (as shown in Figure 81-4).


Note

The Group command is available only if every item in the field is a date (or a time). Even a single blank cell will make it impossible to group by date.

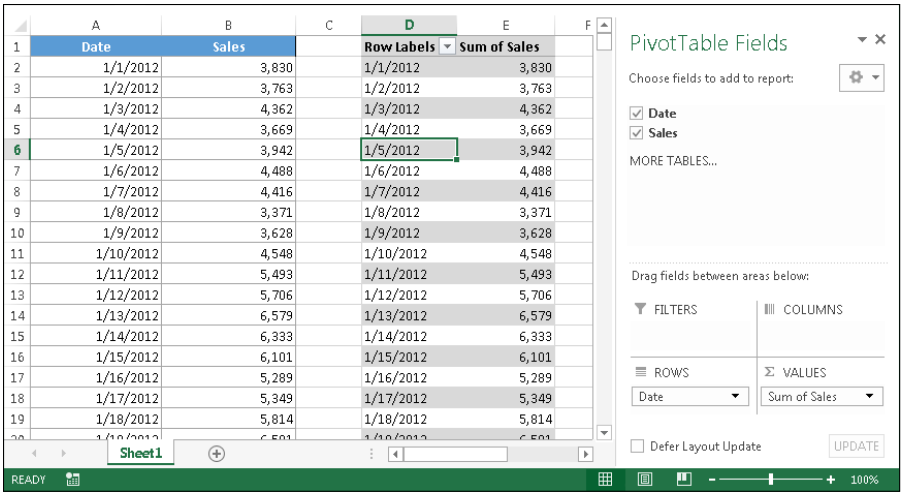


Figure 81-2: The pivot table, before grouping by months and years.

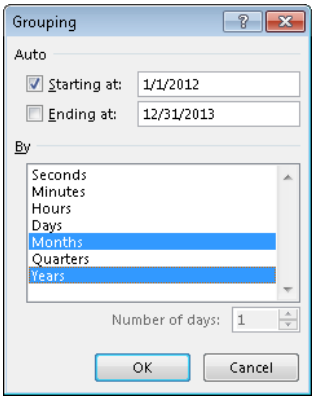


Figure 81-3: Use the Grouping dialog box to group items in a pivot table.


Note

If you select only Months in the Grouping list box, months in different years are combined. For example, the June item would display sales for both 2012 and 2013.

	A	B	C	D	E	F
1	Date	Sales		Row Labels	Sum of Sales	
2	1/1/2012	3,830		2012		
3	1/2/2012	3,763		Jan	167,624	
4	1/3/2012	4,362		Feb	137,825	
5	1/4/2012	3,669		Mar	214,896	
6	1/5/2012	3,942		Apr	100,872	
7	1/6/2012	4,488		May	158,005	
8	1/7/2012	4,416		Jun	117,649	
9	1/8/2012	3,371		Jul	295,248	
10	1/9/2012	3,628		Aug	518,966	
11	1/10/2012	4,548		Sep	612,673	
12	1/11/2012	5,493		Oct	699,854	
13	1/12/2012	5,706		Nov	863,085	
14	1/13/2012	6,579		Dec	970,441	
15	1/14/2012	6,333		2013		
16	1/15/2012	6,101		Jan	974,625	
17	1/16/2012	5,289		Feb	969,696	
18	1/17/2012	5,349		Mar	1,081,596	
19	1/18/2012	5,814		Apr	983,306	
20	1/19/2012	6,501		May	1,044,322	
21	1/20/2012	6,513		Jun	930,076	
22	1/21/2012	5,970		Jul	961,557	
23	1/22/2012	5,791		Aug	938,433	
24	1/23/2012	5,478		Sep	975,503	
25	1/24/2012	6,564		Oct	948,120	
26	1/25/2012	6,642		Nov	950,493	
27	1/26/2012	7,083		Dec	906,389	
28	1/27/2012	6,468		Grand Total	16,521,254	
29	1/28/2012	6,801				
30	1/29/2012	5,651				

Figure 81-4: The pivot table, after grouping by months and years.

Notice that the Grouping dialog box contains other time-based units. For example, you can group the data into quarters. Figure 81-5 shows the data grouped by quarters and years.

	A	B	C	D	E	F
1	Date	Sales		Row Labels	Sum of Sales	
2	1/1/2012	3,830		2012		
3	1/2/2012	3,763		Qtr1	520,345	
4	1/3/2012	4,362		Qtr2	376,526	
5	1/4/2012	3,669		Qtr3	1,426,887	
6	1/5/2012	3,942		Qtr4	2,533,380	
7	1/6/2012	4,488		2013		
8	1/7/2012	4,416		Qtr1	3,025,917	
9	1/8/2012	3,371		Qtr2	2,957,704	
10	1/9/2012	3,628		Qtr3	2,875,493	
11	1/10/2012	4,548		Qtr4	2,805,002	
12	1/11/2012	5,493		Grand Total	16,521,254	
13	1/12/2012	5,706				
14	1/13/2012	6,579				

Figure 81-5: The pivot table, after grouping by quarters and years.

Creating Pivot Tables with Multiple Groupings

If you've created multiple pivot tables from the same data source, you may have noticed that grouping a field in one pivot table affects the other pivot tables. Specifically, all the other pivot tables automatically use the same grouping. Sometimes, this is exactly what you want. Other times, it's not at all what you want. For example, you may want to see two pivot table reports: one that summarizes data by month and year, and another that summarizes the data by quarter and year.

The reason grouping affects other pivot tables is because all the pivot tables are using the same pivot table *cache*. Unfortunately, there's no direct way to force a pivot table to use a new cache. But there *is* a way to trick Excel into using a new cache. The trick involves assigning multiple range names to the source data.

For example, if your source range is named *Table1*, give the same range a second name: *Table2*. The easiest way to name a range is to use the Name box, to the left of the Formula bar. Select the range, type a name in the Name box, and press Enter. Then, with the range still selected, type a different name, and press Enter. Excel will display only the first name, but you can verify that both names exist by choosing Formulas➜Define Names➜Name Manager (see Figure 82-1).

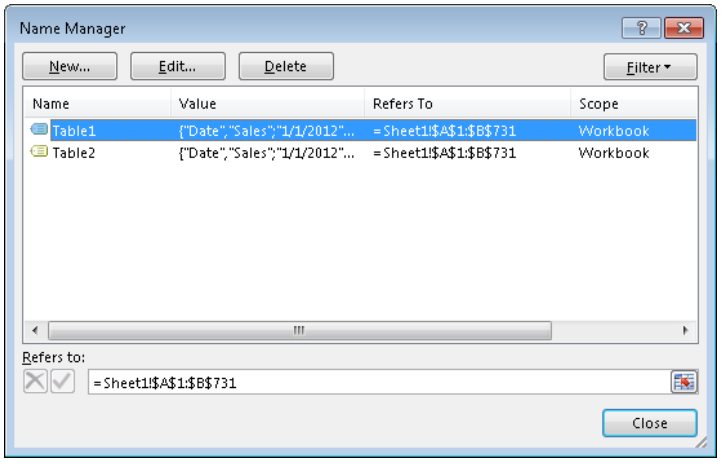


Figure 82-1: A range has two names.

When you create the first pivot table, specify *Table1* as the Table/Range in the Create PivotTable dialog box (see Figure 82-2). When you create the second pivot table, specify *Table2* as the Table/Range. Each pivot table will use a separate cache, and you can create groups in one pivot table, independent of the other pivot table.

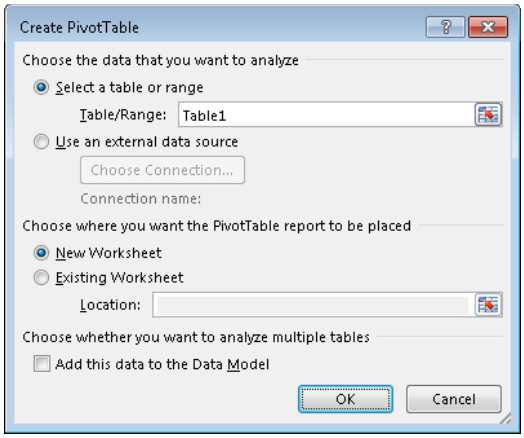


Figure 82-2: Using a named range as the Table/Range.

You can use this trick with existing pivot tables. Make sure that you give the data source a different name. Then select the pivot table and choose PivotTable Tools➜Analyze➜Data➜Change Data Source. In the Change PivotTable Data Source dialog box, type the new name that you gave to the range. This will cause Excel to create a new pivot cache for the pivot table.

Figure 82-3 shows two pivot tables (with different groupings) created from the same data source. One pivot table is grouped by quarters and years, and the other is grouped by months and years.

	C	D	E	F	G	H	I
1		**Row Labels**	**Sum of Sales**		**Row Labels**	**Sum of Sales**	
2		**2012**			**2012**		
3		Qtr1	520,345		Jan	167,624	
4		Qtr2	376,526		Feb	137,825	
5		Qtr3	1,426,887		Mar	214,896	
6		Qtr4	2,533,380		Apr	100,872	
7		**2013**			May	158,005	
8		Qtr1	3,025,917		Jun	117,649	
9		Qtr2	2,957,704		Jul	295,248	
10		Qtr3	2,875,493		Aug	518,966	
11		Qtr4	2,805,002		Sep	612,673	
12		**Grand Total**	**16,521,254**		Oct	699,854	
13					Nov	863,085	
14					Dec	970,441	
15					**2013**		
16					Jan	974,625	
17					Feb	969,696	
18					Mar	1,081,596	
19					Apr	983,306	
20					May	1,044,322	

Figure 82-3: These pivot tables were created from the same data source, but use different groupings.

Using Pivot Table Slicers and Timelines

If you've worked with pivot tables, filtering data in a pivot table is fairly easy. Just click the filter button for a field, and remove the check mark from items that you don't want to see. This tip describes two ways to simplify pivot table filtering: slicers and timelines. These methods are most useful when the worksheet will be viewed by novices, or for those who prefer things very simple.

Using slicers

Figure 83-1 shows an unfiltered pivot table that summarizes bank account information by three fields: Customer Type (either New or Existing), Branch (either Central, North County, or Westside), and OpenedBy (either New Accts or Teller).

	A	B	C	D	E
1	Customer Type	(All)			
2					
3	**Sum of Amount**	**Column Labels**			
4	**Row Labels**	**Central**	**North County**	**Westside**	**Grand Total**
5	**New Accts**	**2,047,032**	**1,487,516**	**861,511**	**4,396,059**
6	CD	1,006,474	927,216	451,611	2,385,301
7	Checking	418,030	206,845	137,738	762,613
8	IRA	59,285	42,554	10,000	111,839
9	Savings	563,243	310,901	262,162	1,136,306
10	**Teller**	**1,068,893**	**644,699**	**426,121**	**2,139,713**
11	CD	352,911	210,695	196,938	760,544
12	Checking	384,373	185,671	155,257	725,301
13	IRA	9,095	91,820		100,915
14	Savings	322,514	156,513	73,926	552,953
15	**Grand Total**	**3,115,925**	**2,132,215**	**1,287,632**	**6,535,772**
16					

Figure 83-1: The normal way to filter items in a pivot table.

A *slicer* is an interactive control that makes it easy to apply simple filters to data in a pivot table. Figure 83-2 shows a pivot table with three slicers. Each slicer represents a particular field in the pivot table. In this case, the pivot table is displaying data for existing customers, opened by tellers at the Central branch.

The same type of filtering can be accomplished by using the field labels in the pivot table, but slicers are intended for those who might not understand how to filter data in a pivot table. Slicers can also be used to create an attractive and easy-to-use interactive *dashboard*.

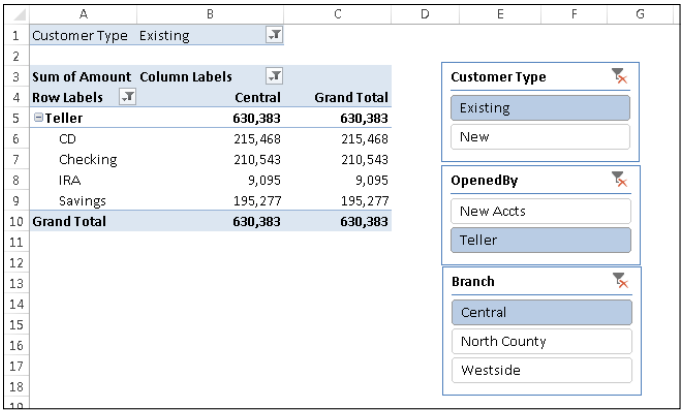


Figure 83-2: Using slicers to filter the data displayed in a pivot table.

To add one or more slicers to a worksheet, start by selecting any cell in a pivot table. Then choose Insert➜Filter➜Slicer. The Insert Slicers dialog box appears, with a list of all fields in the pivot table. Place a check mark next to the slicers you want, and then click OK.

In Excel 2013, slicers aren't limited to pivot tables. You can also use slicers with a table (created with Insert➜Tables➜Table).

Slicers float on the worksheet's drawing layer, and they can be moved and resized. You can change the look and also specify multiple columns of buttons.

To use a slicer to filter data in a pivot table, just click a button in the slicer. To display multiple values, press Ctrl while you click the buttons. Press Shift and click to select a series of consecutive buttons.

To remove the effects of filtering by a particular slicer, click the icon in the slicer's upper-right corner.

Figure 83-3 shows a pivot table with two slicers to enable filtering the data (by State and by Month). In this case, the pivot table and pivot chart show only the data for California, Oregon, and Washington for the months of January through March. Slicers provide a quick-and-easy way to create an interactive chart.

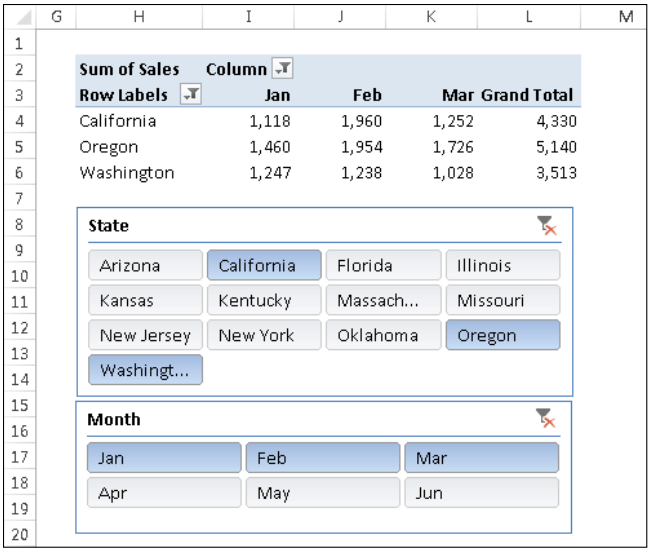


Figure 83-3: Using slicers to filter a pivot table by state and by month.

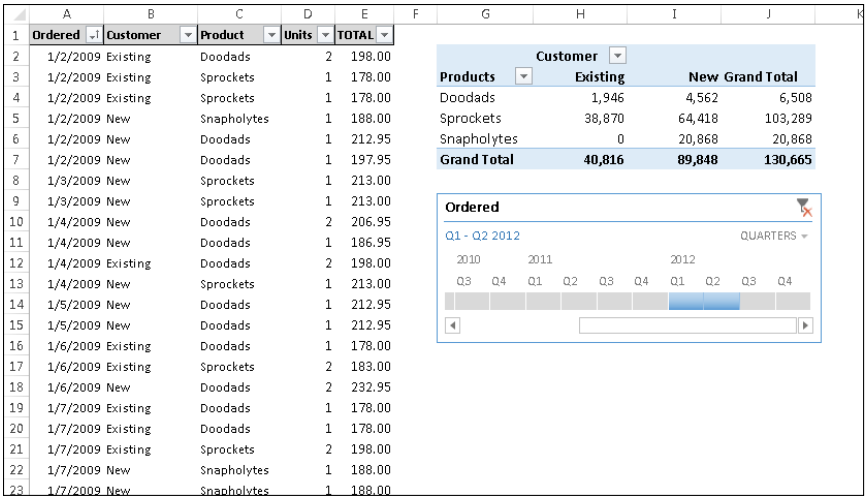
Using a timeline

A *timeline* is conceptually similar to a slicer, but this control is designed to simplify time-based filtering in a pivot table. Timelines are new to Excel 2013, and (unlike slicers) this feature is for pivot tables only.

A timeline is relevant only if your pivot table has a field that's formatted as a date. This feature does not work with times. To add a timeline, select a cell in a pivot table and choose Insert➜Filter➜Timeline. A dialog box appears listing all date-based fields. If your pivot table doesn't have a field formatted as a date, Excel displays an error.

Figure 83-4 shows a pivot table created from the data in columns A:E. This pivot table uses a timeline, set to allow date filtering by quarters. Click a button that corresponds to the quarter you want to view, and the pivot table is updated immediately. To select a range of quarters, press Shift while you click the buttons. Other filtering options (selectable from the drop-down in the upper-right corner) are Year, Month, and Day. In the figure, the pivot table displays data from the first two quarters of 2012.

You can, of course, use both slicers and a timeline for a pivot table. A timeline has the same type of formatting options as slicers, so you can create an attractive interactive dashboard that simplifies pivot table filtering.



Ordered	Customer	Product	Units	TOTAL
1/2/2009	Existing	Doodads	2	198.00
1/2/2009	Existing	Sprockets	1	178.00
1/2/2009	Existing	Sprockets	1	178.00
1/2/2009	New	Snapholytes	1	188.00
1/2/2009	New	Doodads	1	212.95
1/2/2009	New	Doodads	1	197.95
1/3/2009	New	Sprockets	1	213.00
1/3/2009	New	Sprockets	1	213.00
1/4/2009	New	Doodads	2	206.95
1/4/2009	New	Doodads	1	186.95
1/4/2009	Existing	Doodads	2	198.00
1/4/2009	New	Sprockets	1	213.00
1/5/2009	New	Doodads	1	212.95
1/5/2009	New	Doodads	1	212.95
1/6/2009	Existing	Doodads	1	178.00
1/6/2009	Existing	Sprockets	2	183.00
1/6/2009	New	Doodads	2	232.95
1/7/2009	Existing	Doodads	1	178.00
1/7/2009	Existing	Doodads	1	178.00
1/7/2009	Existing	Sprockets	2	198.00
1/7/2009	New	Snapholytes	1	188.00
1/7/2009	New	Snapholytes	1	188.00

	Customer		
Products	Existing	New	Grand Total
Doodads	1,946	4,562	6,508
Sprockets	38,870	64,418	103,289
Snapholytes	0	20,868	20,868
Grand Total	**40,816**	**89,848**	**130,665**

Figure 83-4: Using a timeline to filter a pivot table by date.

Charts and Graphics

A well-conceived chart can make a range of incomprehensible numbers make sense. The tips in this part deal with various aspects of chart making, and also covers topics related to other types of graphics.

Tips and Where to Find Them

Understanding Recommended Charts

One of the new features in Excel 2013 is Recommended Charts. Select your data, choose Insert➜Charts➜Recommended Charts, and Excel responds by displaying the Recommended Charts of the Insert Chart dialog box (see Figure 84-1). This dialog box displays a preview of your data using several chart type options.

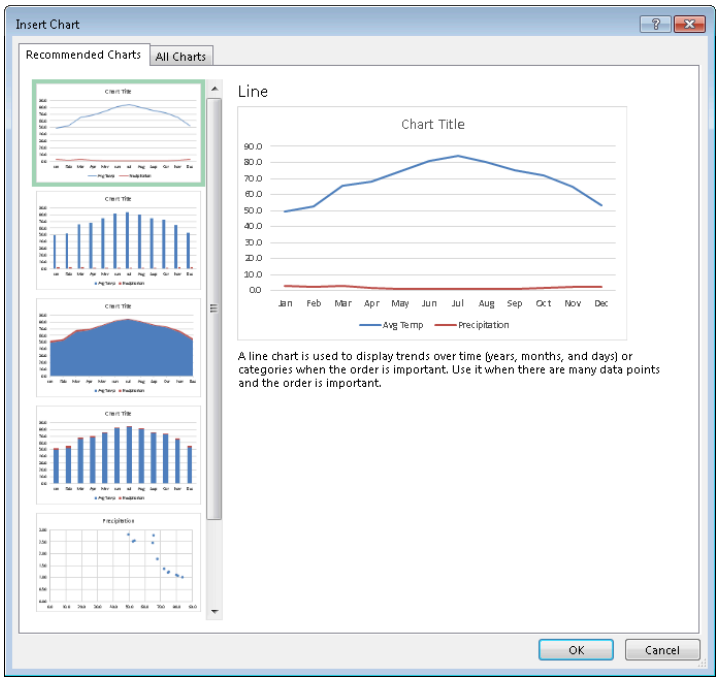


Figure 84-1: The Recommended Charts feature displays your data using several different chart types.

How does it work? According to the Excel Help:

Want us to recommend a good chart to showcase your data? Select data in your worksheet and click this button to get a customized set of charts that we think will fit best with your data.

Don't believe it. Excel uses some simple algorithms to make its suggestions, but don't expect any advanced artificial intelligence. In other words, you will probably never see a recommended chart that will make you say, "Why didn't *I* think of that!"

The recommended charts seem to be limited to the basic chart types: column charts, line charts, area charts, bar charts, pie charts, and scatter charts.

The recommendations don't seem to take the magnitude of the data into account. For example, if you select two data series that vary drastically in scale, a combination chart would be a good recommendation. But I've never seen Excel recommend a combination chart. Rather, it recommends a column or line chart in which one of the data series is so close to the axis that it may not even be visible.

Even when data is perfectly suited (and labeled) for a stock market chart, that chart is never recommended. But it does offer some recommendations that are clearly inappropriate.

But the recommended charts feature is not completely useless. For example, if a data series has more than eight data points, Excel will not recommend a pie chart. That's certainly good advice because pie charts are often used inappropriately to display too much data. Also, Excel will never recommend a 3D chart. That's also good advice because a 3D chart is almost never the best choice.

Excel's Recommended Charts feature is certainly a good idea, but the current implementation leaves much to be desired. The main problem is this feature is intended for novice users — and many of them will actually believe that a recommended chart is an appropriate way to present their data.

Bottom line: Don't trust Excel's chart recommendations, except for very simple data sets. Instead, take some time and become familiar with Excel's chart types. Strive for simplicity and clarity, and you won't be tempted to take bad advice from a computer program.

Customizing Charts

If you've ever been frustrated when trying to customize a chart, here's some good news: Excel 2013 makes this task easier than ever.

When you click on a chart in Excel 2013, you see three buttons at the upper-right of the chart. These buttons are the key to quick and easy chart customization.

Adding or removing chart elements

Figure 85-1 shows the options available when you click the Chart Elements button. Note that each item can be expanded to show additional options. To expand an item in the Chart Elements list, hover your mouse over the item and click the arrow that appears.

When you display the options for a button, hover the mouse over the item to get a preview of how the chart will look if you select (or deselect) an item.

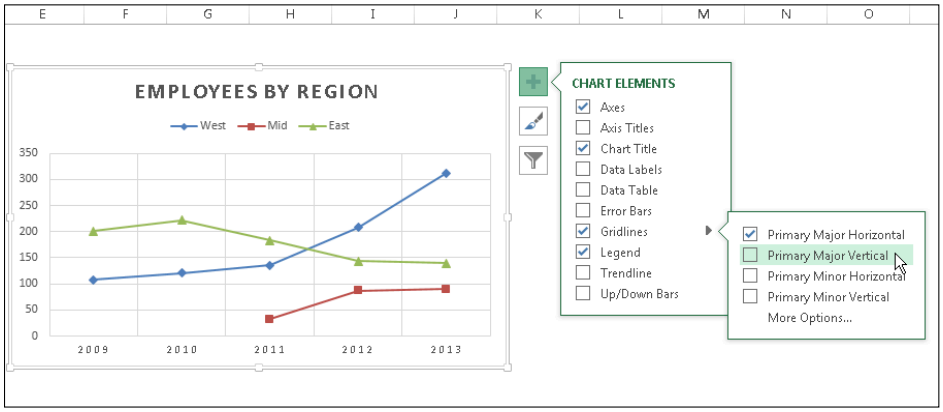


Figure 85-1: Options available from the Chart Elements button.

Modifying a chart style or colors

Figure 85-2 shows the options available when you click the Chart Styles button.

Notice that there's a two-item menu at the top: Style and Color. Click the Color item, and you can choose a different color palette for your chart.

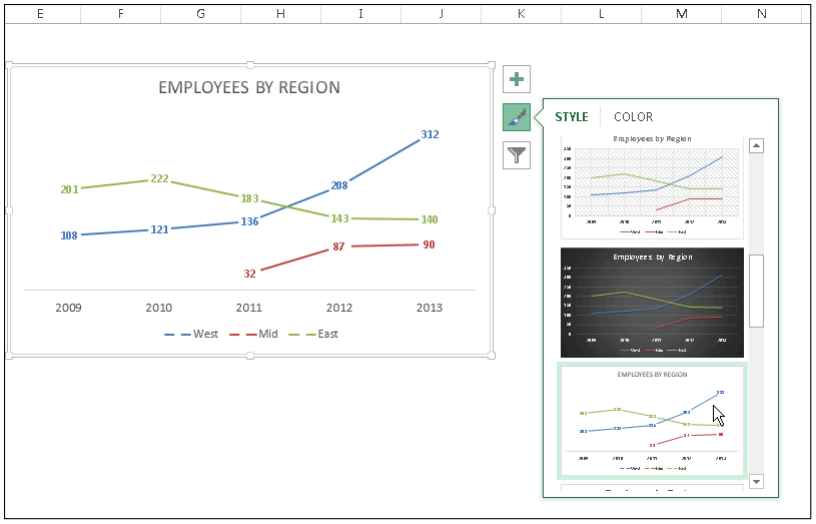


Figure 85-2: Options available from the Chart Styles button.

Filtering chart data

Options for the third button, Chart Filters, are shown in Figure 85-3. These options enable you to quickly hide one or more charts series or even data points within a chart series.

Note that previewing works differently for these options, and you must click the Apply button to see the effect of filtering.

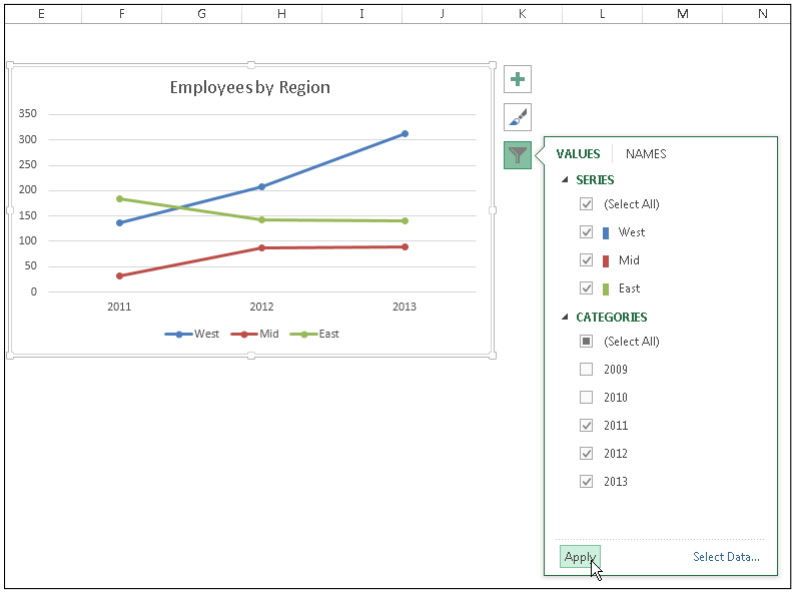
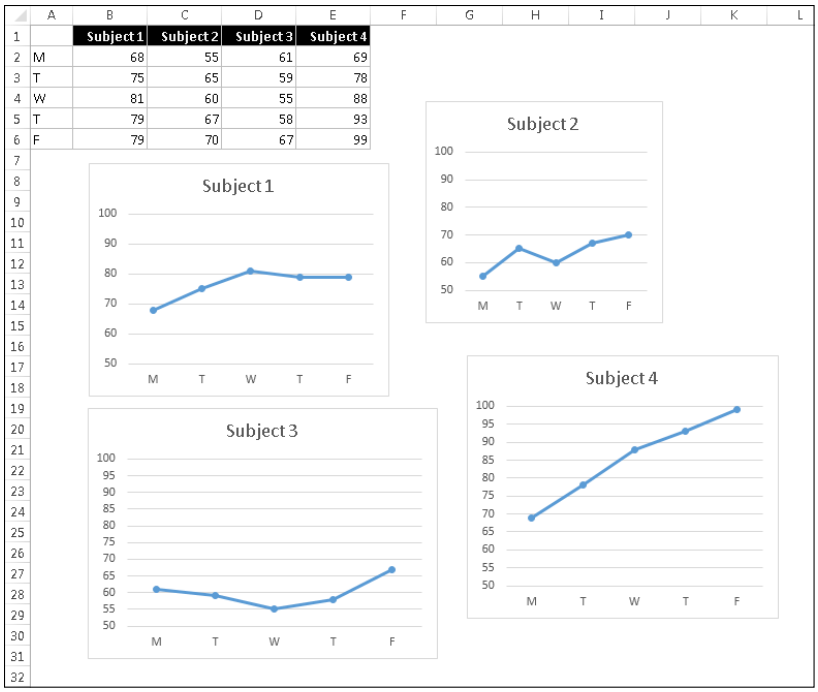


Figure 85-3: Options available from the Chart Filters button.

Making Charts the Same Size

If you have several embedded charts on a worksheet, you might want to make them all exactly the same size. Figure 86-1 shows a worksheet with four charts that would look better if they were all the same size and aligned.



	Subject 1	Subject 2	Subject 3	Subject 4
M	68	55	61	69
T	75	65	59	78
W	81	60	55	88
T	79	67	58	93
F	79	70	67	99

Figure 86-1: These charts would look better if they were all the same size.

To make all the charts the same size, first identify the chart that is already the size you want. In this case, you want to make all the charts the same size as the Subject 2 chart in the upper-right area.

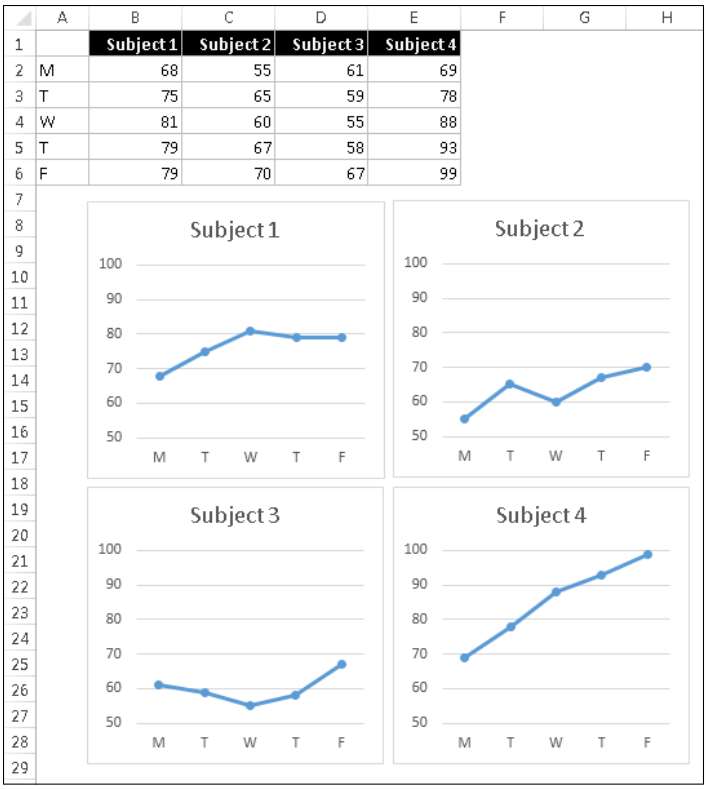
1. Click the chart to select it.
2. Choose Chart Tools➜Format.

   You see the Height and Width settings in the Size group.
3. Make a note of the Height and Width settings.
4. Press Ctrl while you click the other three charts (so that all four are selected).
5. Choose Drawing Tools➜Format, enter the Height and Width settings that you noted in Step 3 and then click OK.

   The charts are now exactly the same size.

You can align the charts manually, or you can use the Chart Tools➜Format➜Arrange➜Align commands. Figure 86-2 shows the result.

Note that if you Ctrl+click a chart, you select it as a graphic object so that you can use the arrow keys to move the chart. Using the arrow keys moves the chart one pixel at a time and allows more control than dragging it with your mouse.



	Subject 1	Subject 2	Subject 3	Subject 4
M	68	55	61	69
T	75	65	59	78
W	81	60	55	88
T	79	67	58	93
F	79	70	67	99

Figure 86-2: Four charts, resized and aligned.

Creating a Chart Template

If you find that you're continually making the same types of customizations to your charts, you can probably save some time by creating a template. Many users avoid this feature because they think that it's too complicated. Creating a chart template is actually very simple.

Figure 87-1 shows a highly customized chart that will be saved as a template so it can be used for future charts. This chart includes a shape and a text box, and both of these added elements are included in the template.

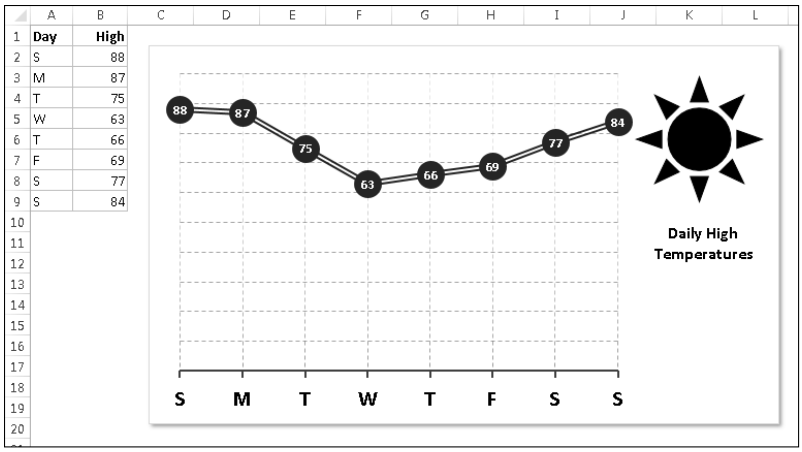


Figure 87-1: This chart will be saved as a template.

Creating a template

To create a chart template, follow these steps:

1. Create a chart to serve as the basis for your template.

   The data you use for this chart isn't critical, but for best results, it should be typical of the data that you will eventually plot with your custom chart type.

2. Apply any formatting and customizations that you like.

   This step determines the appearance of the charts created from the template.

3. Activate the chart; then right-click and choose Save as Template from the shortcut menu. (The Excel 2013 Ribbon doesn't have a command to create a chart template.)

   The Save Chart Template dialog box appears.

4. Provide a name for the template and click Save.

Chart templates are stored as `*.crtx` files. You can create as many chart templates as you need.

Using a template

To create a chart based on a template you've created, follow these steps:

1. Select the data to be used in the chart.
2. Choose Insert➜Charts➜Recommended Charts.

   The Insert Chart dialog box appears.
3. At the top of the Insert Chart dialog box, choose the All Charts tab.
4. Choose Templates from the list on the left.

   Excel displays a preview image (using the selected data) for each custom template that has been created (see Figure 87-2).
5. Click the image that represents the template you want to use and click OK.

   Excel creates the chart based on the template you selected.

You can also apply a template to an existing chart. Select the chart and choose Chart Tools➜ Design➜Change Chart Type. That command displays a dialog box that's exactly the same as the Insert Chart dialog box. Choose the All Charts tab and then choose Templates from the list on the left.

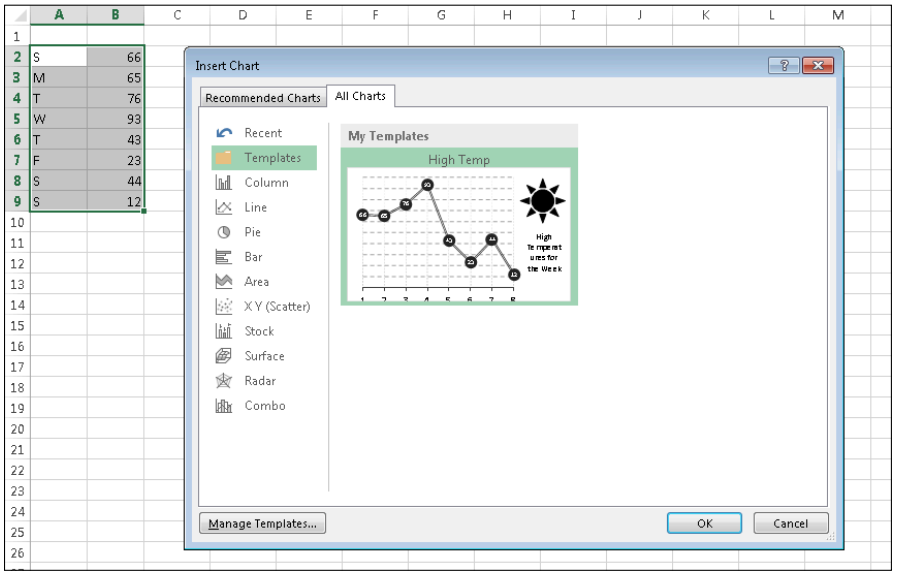


Figure 87-2: Choosing a chart template.

Creating a Combination Chart

A combination chart combines two chart types in a single chart. A combination chart may use a secondary vertical axis. In the past, creating a combination chart in Excel was relatively complicated and required some non-intuitive steps. Excel 2013 finally gets it right: creating a combination chart is easy.

Figure 88-1 shows a column chart with two data series: Temperature and Precipitation. Because these two measures have drastically different scales, the columns for the precipitation data are hardly visible. This is a good candidate for a combination chart.

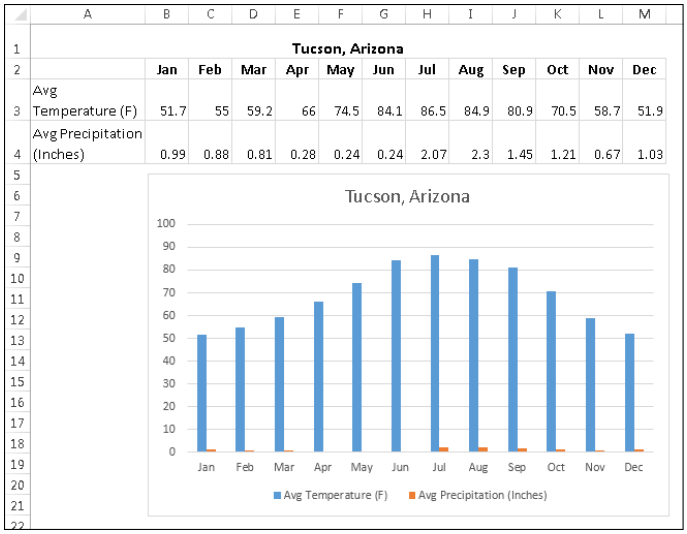


Figure 88-1: The two data series in this chart use drastically different scales.

Inserting a preconfigured combination chart

The following steps describe how to create a combination chart from the data in range A2:M4. The chart will display temperature as columns, and precipitation as a line. In addition, the precipitation series will use a secondary vertical axis.

1. Select the range A2:M4.
2. Choose Insert➜Charts➜Combo.

   This command expands to display three icons (see Figure 88-2). Hover your mouse over the icons, and you'll see a preview.

3. Choose the second icon: Clustered Column — Line on Secondary Axis.

   Excel creates the chart shown on Figure 88-3.

Figure 88-2: Excel proposes three preconfigured combination charts.

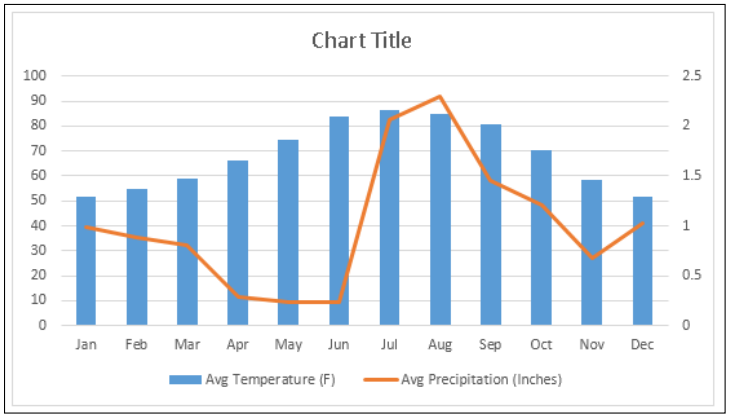


Figure 88-3: Excel created this combination chart with just a few mouse clicks.

The chart clearly shows both data series. The primary axis (on the left) is for the Avg Temperature series (columns). The secondary axis (on the right) is for the Avg Precipitation series (the line). You may want to add axis labels to make it easier to distinguish the two axes.

Customizing a combination chart

In some cases, none of the preconfigured combination charts will be exactly what you want. But creating a customized combination chart is a simple matter.

Choose Insert➜Charts➜Combo➜Create Custom Combo Chart, and the Insert Chart dialog box appears with the Combo section displayed (see Figure 88-4). Use the controls at the bottom of the All Charts tab of the Insert Chart dialog box to specify the chart type for each data series. Use the check boxes to indicate which (if any) of the series will use a secondary axis.

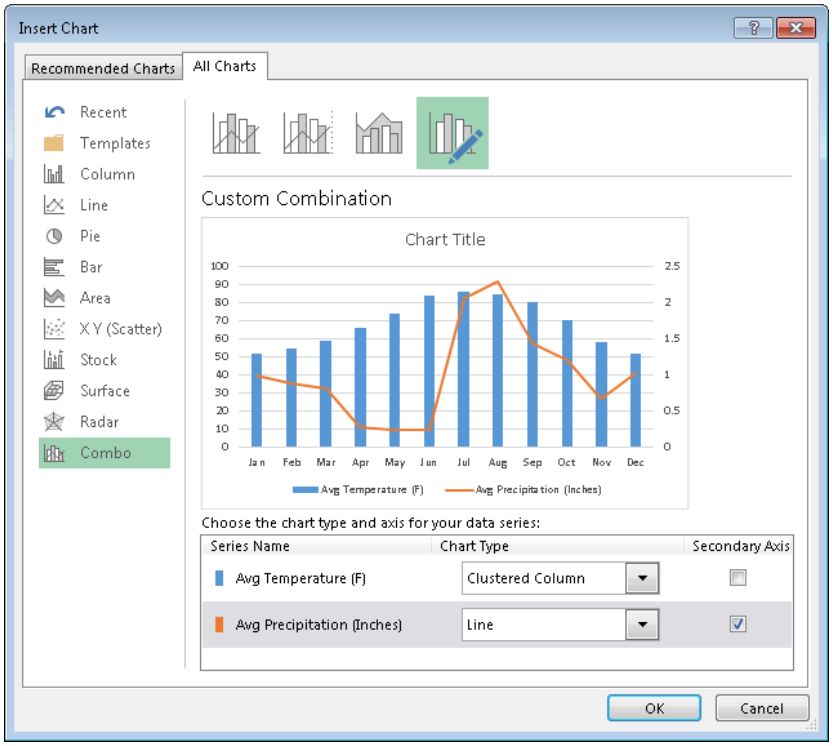


Figure 88-4: Use the controls at the bottom of this dialog box to customize a combination chart.

You have a great deal of control in customizing combination charts. But just because Excel allows you to create a certain combination chart doesn't mean it's a good idea. Figure 88-5 shows a custom combination chart that uses bars and columns — and it's not a good example of an effective chart.

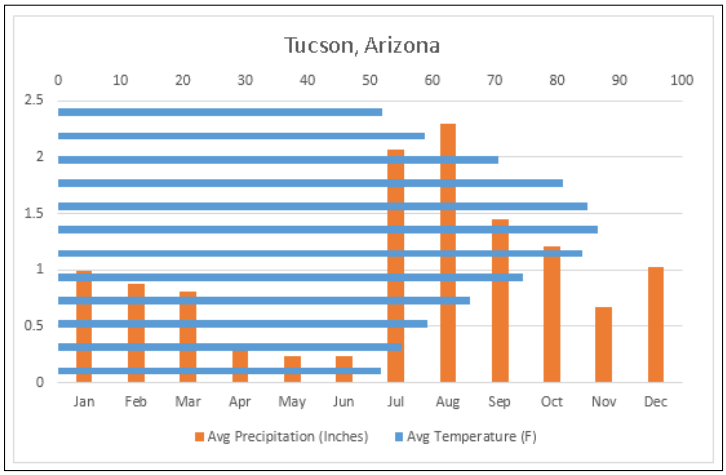
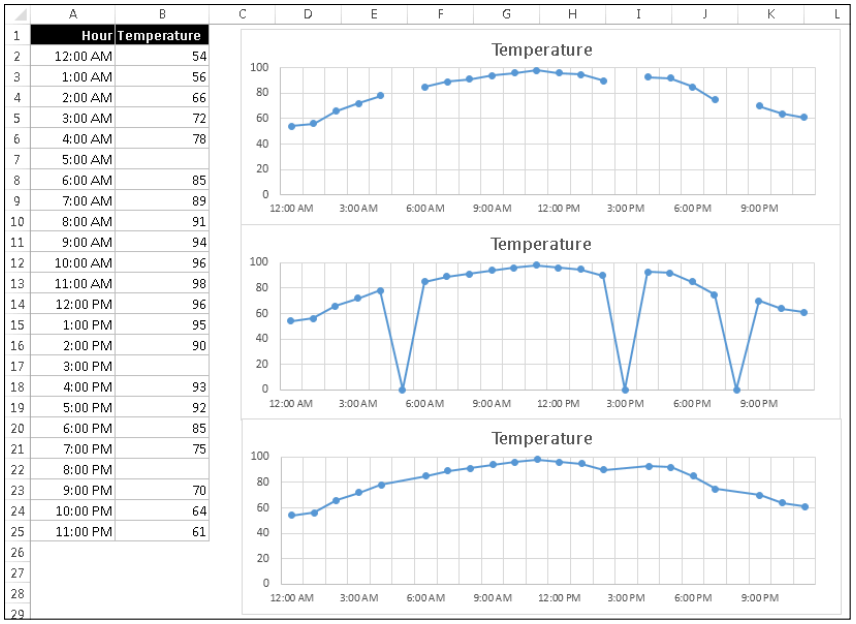


Figure 88-5: An example of a poorly conceived custom combination chart.

Handling Missing Data in a Chart

Sometimes, data that you're charting may be missing one or more data points. As shown in Figure 89-1, Excel offers three ways to handle the missing data:

- **Gaps:** Missing data is simply ignored, and the data series will have a gap. This is the default way missing data is handled in a chart.
- **Zero:** Missing data is treated as zero.
- **Connect Data Points with Line:** Missing data is interpolated, calculated by using data on either side of the missing point(s). This option is available for line charts, area charts, and XY charts only.



Hour	Temperature
12:00 AM	54
1:00 AM	56
2:00 AM	66
3:00 AM	72
4:00 AM	78
5:00 AM	
6:00 AM	85
7:00 AM	89
8:00 AM	91
9:00 AM	94
10:00 AM	96
11:00 AM	98
12:00 PM	96
1:00 PM	95
2:00 PM	90
3:00 PM	
4:00 PM	93
5:00 PM	92
6:00 PM	85
7:00 PM	75
8:00 PM	
9:00 PM	70
10:00 PM	64
11:00 PM	61

Figure 89-1: Three options for dealing with missing data.

To specify how to deal with missing data for a chart, choose Chart Tools➜Design➜Data➜Select Data. In the Select Data Source dialog box, click the Hidden and Empty Cells button. The Hidden and Empty Cell Settings dialog box appears, as shown in Figure 89-2. Make your choice in the dialog box.

The option that you choose applies to the entire chart, and you can't set a different option for different series in the same chart.

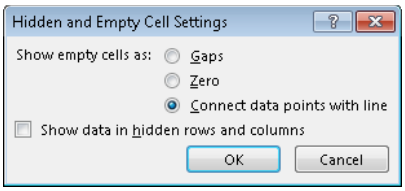


Figure 89-2: The Hidden and Empty Cell Settings dialog box.

Normally, a chart doesn't display data that's in a hidden row or column. You can use the Hidden and Empty Cell Settings dialog box to force a chart to use hidden data, though.

Using High-Low Lines in a Chart

Excel supports a number of stock market charts, which are normally used to display stock market data. For example, you can create a chart that shows a stock's daily high, low, and closing prices. That particular chart type requires three data series.

But stock market charts aren't just for stock prices. Figure 90-1 shows a chart that depicts daily temperatures for a month. The vertical lines (called *high-low lines*) show the temperature range for the day.

This chart was created with a single command. I selected the range A3:D34, chose Insert➜Charts➜Other Charts, and selected the High-Low-Close option. You can, of course, format the high-low lines any way you like. And you may prefer to have the average temperatures connected with a line.

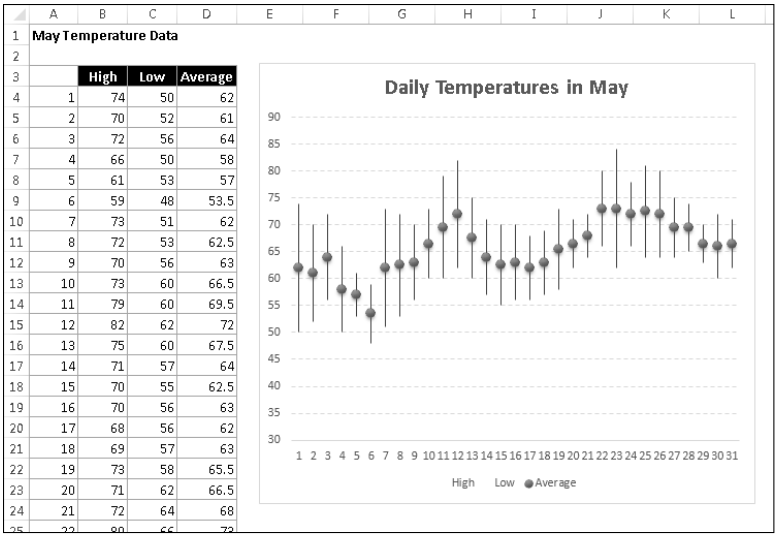


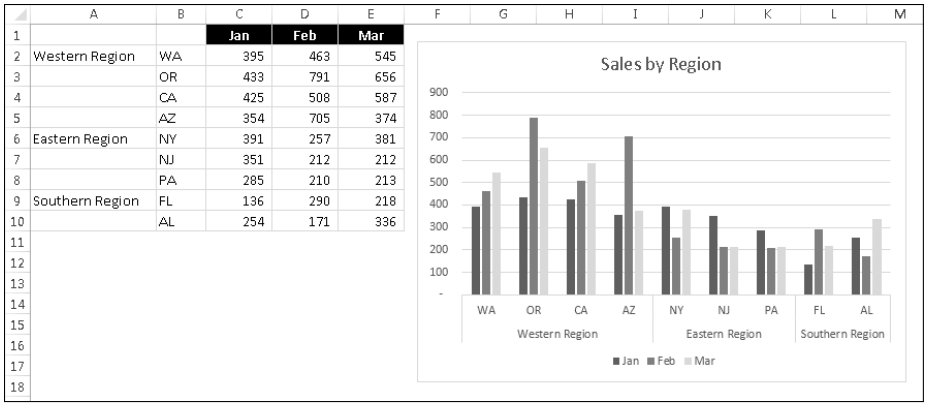
Figure 90-1: Using a stock market chart to plot temperature data.

When creating stock market charts, the order of the data for the chart series is critical. Because I chose the High-Low-Close chart type, the series must be arranged in that order. In this case, the "Close" data corresponds to Average temperatures.

Using Multi-Level Category Labels

Most users don't realize it, but when you create a chart, you can display multi-level category labels. You don't have to do anything special. Just select all of the data before you create the chart. Excel takes care of the details for you.

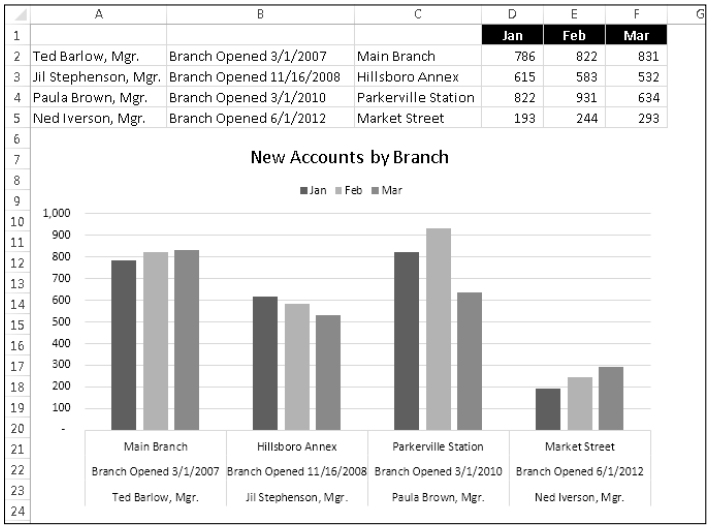
Figure 91-1 shows an example of a chart that uses two columns for the category labels. Here, the first level is the region, and the second level is the state. Notice that the Region labels in column A aren't repeated for each state. The blank regions cause the region name to appear once in the chart.



			Jan	Feb	Mar
Western Region	WA		395	463	545
	OR		433	791	656
	CA		425	508	587
	AZ		354	705	374
Eastern Region	NY		391	257	381
	NJ		351	212	212
	PA		285	210	213
Southern Region	FL		136	290	218
	AL		254	171	336

Figure 91-1: A chart that uses two columns for category labels.

Figure 91-2 shows another example, which uses three columns for the category axis labels. In this example, the additional lines of text are used to provide more information about each of the four branches.



				Jan	Feb	Mar
Ted Barlow, Mgr.	Branch Opened 3/1/2007	Main Branch		786	822	831
Jil Stephenson, Mgr.	Branch Opened 11/16/2008	Hillsboro Annex		615	583	532
Paula Brown, Mgr.	Branch Opened 3/1/2010	Parkerville Station		822	931	634
Ned Iverson, Mgr.	Branch Opened 6/1/2012	Market Street		193	244	293

Figure 91-2: A chart that uses three columns for category labels.

You can apply formatting to the category axis labels, but the formatting is applied to all of the text. In other words, you can't apply different formatting for each level.

Figure 91-3 shows a variation of the previous example. After creating the chart with a multi-level category axis, I selected the category axis and pressed Ctrl+1 to display the Format Axis task pane. In the Axis Options➜Labels section, I specified the Label Position to be High. I also deselected the Multi-level Category Labels option, which has the effect of making the lines closer together.

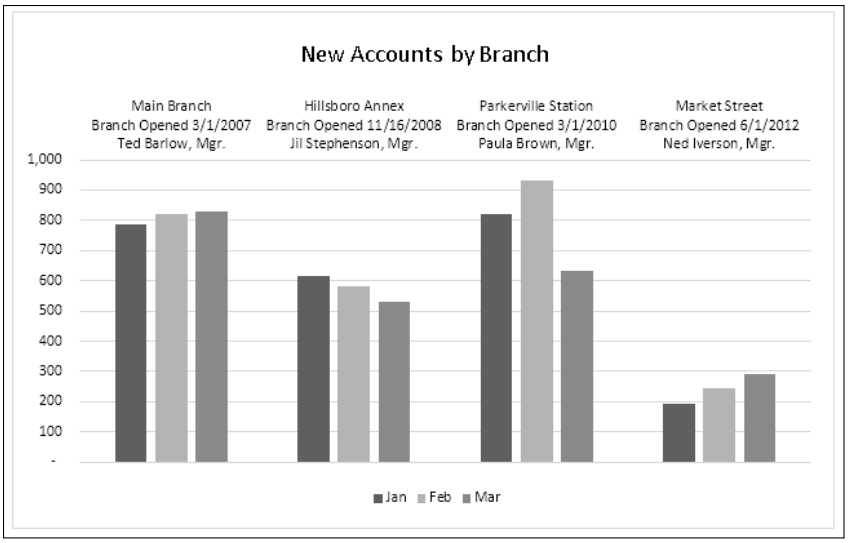


Figure 91-3: A chart that displays category labels at the top.

Linking Chart Text to Cells

When you create a chart, you may want to have some of the chart's text elements linked to cells. That way, when you change the text in the cell, the corresponding chart element is updated. You can even link chart text elements to cells that contain a formula. For example, you might link the chart title to a cell that contains a formula that returns the current date.

You can create a link to a cell for the chart title, the axis titles, and individual data labels.

1. Select the chart element that will contain the cell link.
2. Click the Formula bar.
3. Type an equal sign (=).
4. Click the cell that will be linked to the chart element.
5. Press Enter.

Figure 92-1 shows a chart title being linked to cell A1.

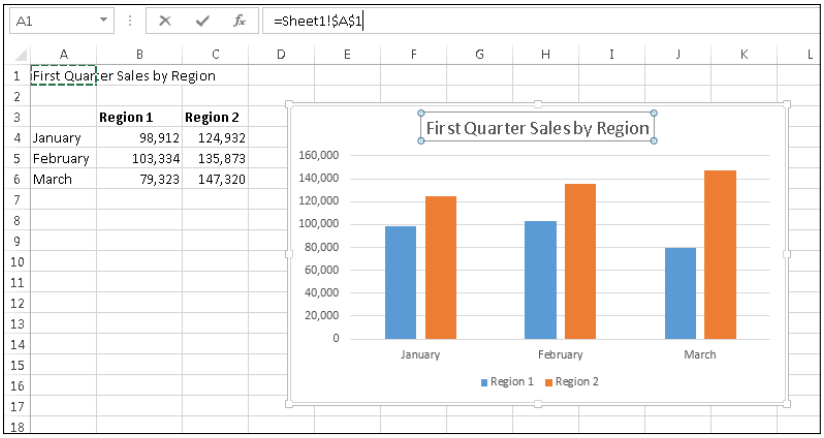


Figure 92-1: Adding a cell link to a chart title.

Oddly, this technique doesn't work if the cell has a name. Excel displays an error claiming that the formula contains an error. If you must link the chart element to a named cell, override the name with the sheet name and cell address. For example:

```
=Sheet1!A12
```

In addition, you can add a linked text box (or a linked shape) to a chart:

1. Select the chart.
2. Choose Insert➜Text➜Text Box. Or choose Insert➜Illustrations➜Shapes and choose a shape that supports text.
3. Click inside the chart to add an empty text box (or shape).
4. Click the Formula bar.
5. Type an equal sign (=).
6. Click the cell that will be linked to the object.
7. Press Enter.

Freezing a Chart

Normally, an Excel chart uses data stored in a range. Change the data, and the chart is updated automatically. Usually, that's a good thing. But sometimes you want to "unlink" the chart from its data range to produce a *static* chart — a snapshot of a chart that never changes. For example, if you plot data generated by various what-if scenarios, you may want to save a chart that represents a baseline so that you can compare it with other scenarios. You can freeze a chart in two ways:

- Convert the chart to a picture.
- Convert the range references to arrays.

Converting a chart into a picture

To convert a chart to a static picture, follow these steps:

1. Create the chart as usual and format it the way you want.
2. Click the chart to activate it.
3. Choose Home➜Clipboard➜Copy➜Copy As Picture.

   The Copy Picture dialog box appears.
4. Accept the default settings and click OK.
5. Click any cell to deselect the chart.
6. Press Ctrl+V to paste the picture at the cell you selected in Step 5.

The result is a picture of the original chart. This chart can be edited as a picture, but not as a chart. In other words, you can no longer modify properties such as chart type and data labels. It's a dead chart — just what you wanted.

When you select the picture, Excel displays its Picture Tools contextual menu. You can use all of the tools in Picture Tools➜Format, plus those available in the Format Picture dialog box (displayed when you press Ctrl+1). Figure 93-1 shows a few examples of picture styles applied to a chart that was copied as a picture.

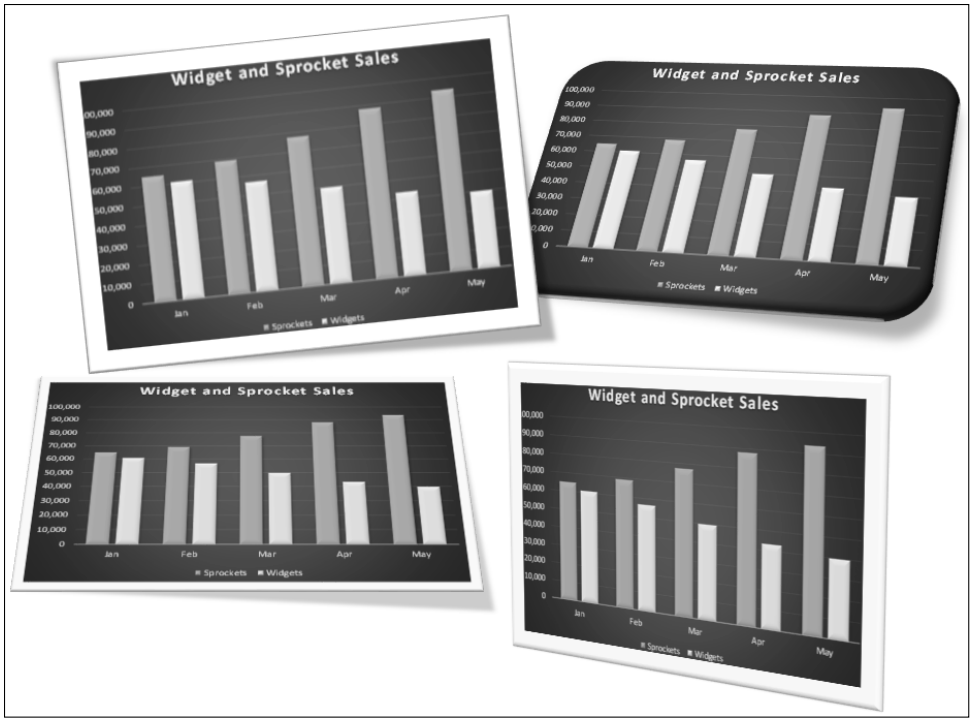


Figure 93-1: Applying picture styles to a chart that was copied as a picture.

Converting range references into arrays

The other way to unlink a chart from its data is to convert the SERIES formula range references to arrays. Follow these steps:

1. Activate your chart.
2. Click a chart series.

   The Formula bar displays the SERIES formula for the selected data series.
3. Click the Formula bar.
4. Press F9 and then press Enter.

Repeat these steps for each series in the chart.

Figure 93-2 shows a pie chart that has been unlinked from its data range. Notice that the Formula bar displays arrays, not range references. The original data SERIES formula was

```
=SERIES(,Sheet3!$A$1:$A$6,Sheet3!$B$1:$B$6,1)
```

The converted SERIES formula is

```
=SERIES(,{"Work","Sleep","Commute","Eat",
"Play Banjo","Other"},{8,7,2,1,3,3},1)
```

Excel places a limit on the length of a SERIES formula. Therefore, this method may not work if the series consists of a large number of data points.

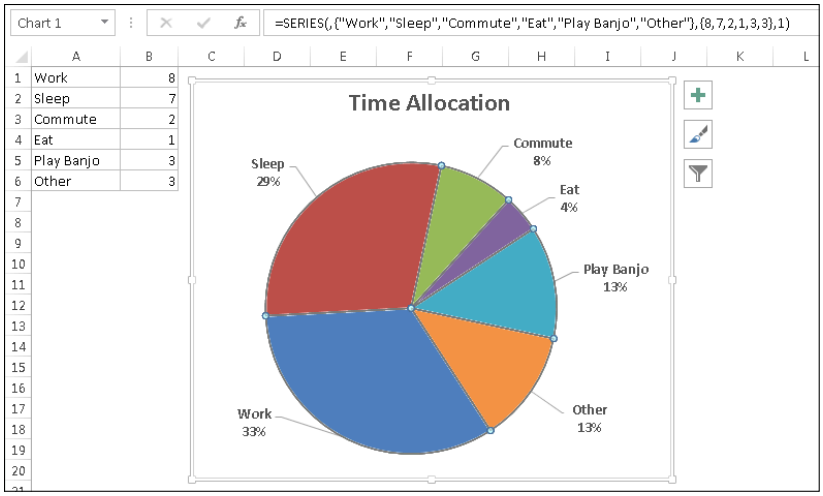


Figure 93-2: This chart is no longer linked to a data range.

Creating a Chart Directly in a Range

This tip describes two ways to display a bar chart directly in a range of cells:

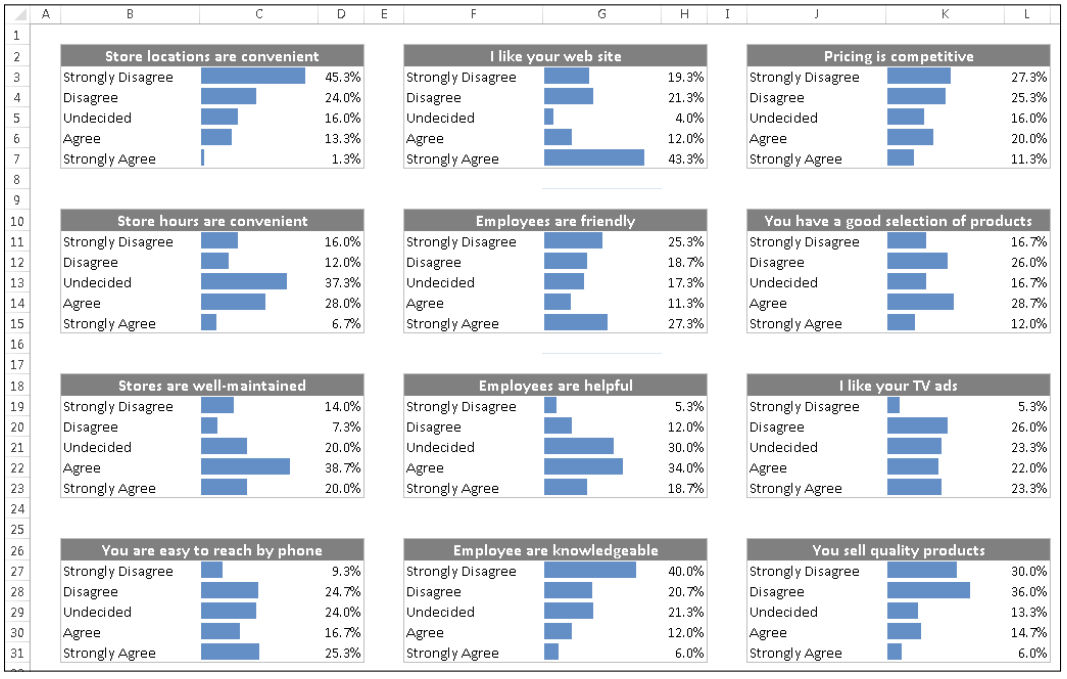
- Using conditional formatting data bars
- Using formulas that display repeating characters

These "non-chart" charts often serve as a quick way to display lots of data graphically, without creating actual charts.

Using conditional formatting data bars

Using the data bars conditional formatting option can sometimes serve as a quick alternative to creating a chart. The data bars conditional format displays horizontal bars directly in the cell. The length of the bar is based on the value of the cell, relative to the other values in the range. When you adjust the column width, the bar lengths adjust accordingly. The differences among the bar lengths are more prominent when the column is wider.

Figure 94-1 shows results from a survey, using data bars to visualize the distribution for each survey item.



Store locations are convenient	
Strongly Disagree	45.3%
Disagree	24.0%
Undecided	16.0%
Agree	13.3%
Strongly Agree	1.3%

I like your web site	
Strongly Disagree	19.3%
Disagree	21.3%
Undecided	4.0%
Agree	12.0%
Strongly Agree	43.3%

Pricing is competitive	
Strongly Disagree	27.3%
Disagree	25.3%
Undecided	16.0%
Agree	20.0%
Strongly Agree	11.3%

Store hours are convenient	
Strongly Disagree	16.0%
Disagree	12.0%
Undecided	37.3%
Agree	28.0%
Strongly Agree	6.7%

Employees are friendly	
Strongly Disagree	25.3%
Disagree	18.7%
Undecided	17.3%
Agree	11.3%
Strongly Agree	27.3%

You have a good selection of products	
Strongly Disagree	16.7%
Disagree	26.0%
Undecided	16.7%
Agree	28.7%
Strongly Agree	12.0%

Stores are well-maintained	
Strongly Disagree	14.0%
Disagree	7.3%
Undecided	20.0%
Agree	38.7%
Strongly Agree	20.0%

Employees are helpful	
Strongly Disagree	5.3%
Disagree	12.0%
Undecided	30.0%
Agree	34.0%
Strongly Agree	18.7%

I like your TV ads	
Strongly Disagree	5.3%
Disagree	26.0%
Undecided	23.3%
Agree	22.0%
Strongly Agree	23.3%

You are easy to reach by phone	
Strongly Disagree	9.3%
Disagree	24.7%
Undecided	24.0%
Agree	16.7%
Strongly Agree	25.3%

Employee are knowledgeable	
Strongly Disagree	40.0%
Disagree	20.7%
Undecided	21.3%
Agree	12.0%
Strongly Agree	6.0%

You sell quality products	
Strongly Disagree	30.0%
Disagree	36.0%
Undecided	13.3%
Agree	14.7%
Strongly Agree	6.0%

Figure 94-1: These tables use data bars conditional formatting.

To add data bars to a range, select the range and choose Home➜Conditional Formatting➜Data Bars and select one of the fill options.

Excel provides quick access to 12 data bar styles via Home➜Styles➜Conditional Formatting➜Data Bars. For additional choices, click the More Rules option, which displays the New Formatting Rule dialog box. Use this dialog box to do the following:

- ➤ Show the bar only (hide the numbers).
- ➤ Specify Minimum and Maximum values for the scaling.
- ➤ Change the appearance of the bars.
- ➤ Specify how negative values and the axis are handled.
- ➤ Specify the direction of the bars.

Using formulas to display repeating characters

Figure 94-2 shows an example of a chart created by using formulas.

	A	B	C	D
1				
2		**Month**	**Employees**	**Graphic**
3		January	60	**********
4		February	64	**********
5		March	62	**********
6		April	67	**********
7		May	71	**********
8		June	72	**********
9		July	77	**********
10		August	79	**********
11		September	79	**********
12		October	80	**********
13		November	81	**********
14		December	89	**********
15				

Figure 94-2: A histogram created directly in a range of cells.

Column D contains formulas that incorporate the rarely used REPT function, which repeats a text string a specified number of times. For example, the following formula displays five asterisks:

```
=REPT("*",5)
```

In the example shown in Figure 94-2, cell D3 contains this formula, which was copied down the column:

```
=REPT("*",C3/2)
```

Notice that the formula divides the value in column B by 2. This is a way to scale the chart. Instead of displaying 60 asterisks, the cell displays 30 asterisks. For improved accuracy, you can use the ROUND function:

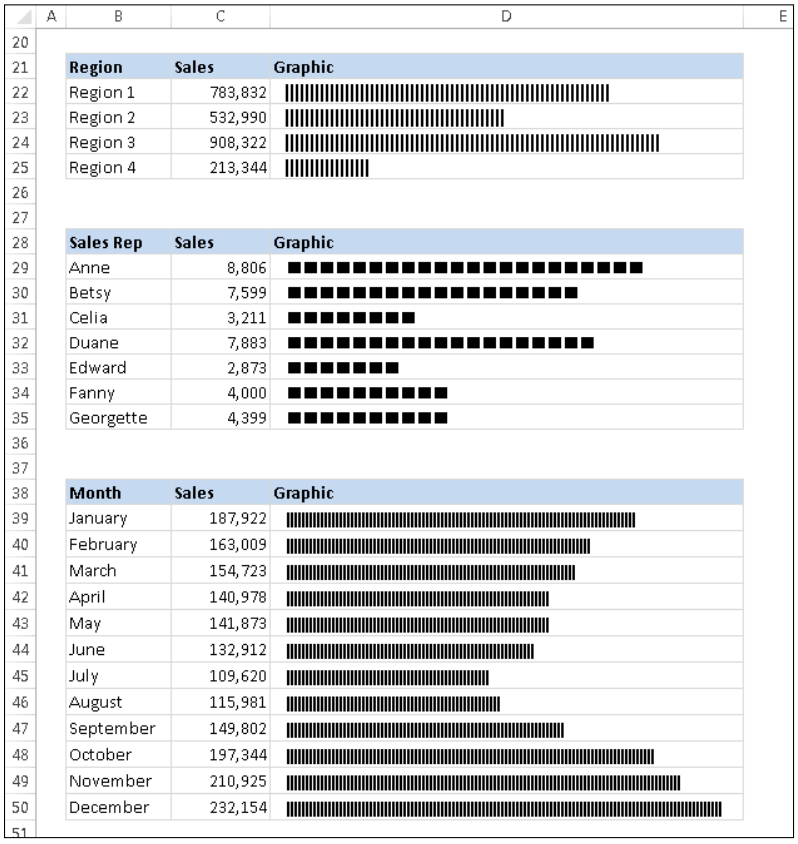
```
=REPT("*",ROUND(C3/2,0))
```

Without the ROUND function, the formula *truncates* the result of the division (disregards the decimal part of the argument). For example, the value 67 in column B displays 33 characters in column D. Using ROUND rounds up the result to 34 characters.

You can use this type of graphical display in place of a column chart. As long as you don't require strict accuracy (because of rounding errors), this type of nonchart might fit the bill.

Figure 94-3 shows some other examples that use different characters and fonts. The chart that displays the solid bars (beginning in row 39) uses the pipe character of the Script font. On most keyboards, the pipe character is generated when you press Shift+backslash. The formula in cell D39 is

```
=REPT("|",C39/2000)
```



Region	Sales	Graphic
Region 1	783,832	
Region 2	532,990	
Region 3	908,322	
Region 4	213,344	

Sales Rep	Sales	Graphic
Anne	8,806	
Betsy	7,599	
Celia	3,211	
Duane	7,883	
Edward	2,873	
Fanny	4,000	
Georgette	4,399	

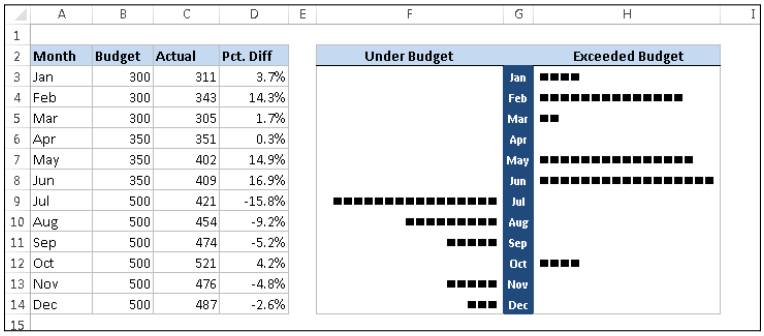
Month	Sales	Graphic
January	187,922	
February	163,009	
March	154,723	
April	140,978	
May	141,873	
June	132,912	
July	109,620	
August	115,981	
September	149,802	
October	197,344	
November	210,925	
December	232,154	

Figure 94-3: Examples of in-cell charting using the REPT function.

The example in Figure 94-4 uses formulas in columns F and H to graphically depict monthly budget variances by displaying a series of characters. You can then easily see which budget items are under or over budget. This pseudo bar chart uses the character `n`, which appears as a small square in the Wingdings font.

The key formulas are

```
F3: =IF(D3<0,REPT("n",-ROUND(D3*100,0)),"")
G3: =A3
H3: =IF(D3>0,REPT("n",-ROUND(D3*-100,0)),"")
```



Month	Budget	Actual	Pct. Diff
Jan	300	311	3.7%
Feb	300	343	14.3%
Mar	300	305	1.7%
Apr	350	351	0.3%
May	350	402	14.9%
Jun	350	409	16.9%
Jul	500	421	-15.8%
Aug	500	454	-9.2%
Sep	500	474	-5.2%
Oct	500	521	4.2%
Nov	500	476	-4.8%
Dec	500	487	-2.6%

Figure 94-4: Displaying monthly budget variances by using the REPT function.

For this example, follow these steps to set up the bar chart after entering the preceding formulas:

1. Assign the Wingdings font to cells F3 and H3.
2. Copy the formulas down columns F, G, and H to accommodate all the data.
3. Right-align the text in column E and adjust any other formatting.

Depending on the numerical range of your data, you may need to change the scaling. Experiment by replacing the 100 value in the formulas. You can substitute any character you like for the `n` in the formulas to produce a different character in the chart.

Creating Minimalistic Charts

Effective charts don't always have to be complicated. In fact, simpler charts that convey a clear message are almost always preferable to more complex charts.

This tip presents some simple charts that demonstrate various ways to provide a different visual experience, compared to the standard chart types. The point is to help you realize that, with a bit of creativity, you can create charts that don't look like everyone else's charts.

Simple column charts

Figure 95-1 shows four charts, each of which uses only one data point. This data could be displayed in a single chart, but using four charts provides a different, cleaner look.

These are very minimalistic charts. The only chart elements displayed are the single data point series, the data label for that data point, and the chart tile (displayed on the left, and rotated). The single column fills the entire width of the plot area.

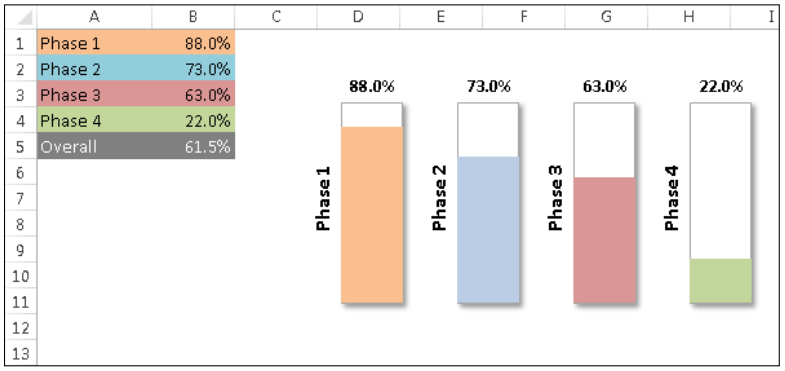


Figure 95-1: Four minimalistic column charts.

Simple pie charts

Figure 95-2 shows the same data, plotted as four pie charts. These charts were adjusted such that the angle of the first slice is 0 degrees. That step makes it easy to make comparisons across the four charts.

The chart titles are linked to the cells in column E (see Tip 92). Each title is generated with a formula that uses the original data. For example, the formula in cell E2 is

```
=A2&" ("&TEXT(B2,"0%")&")"
```

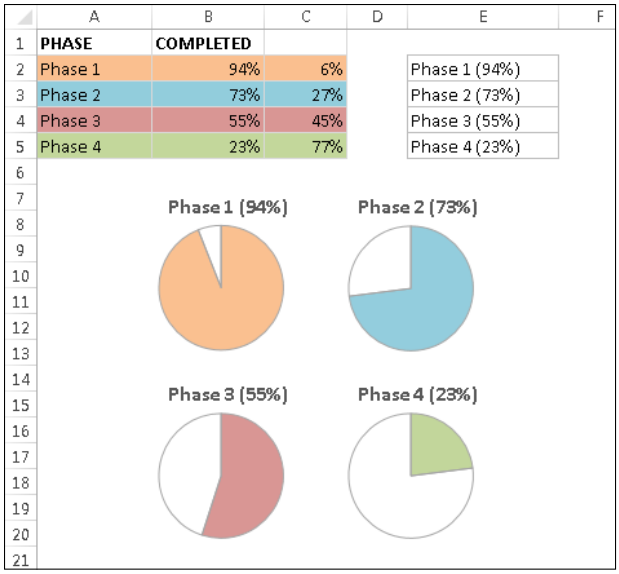


Figure 95-2: Four pie charts.

Simple line charts

Figure 95-3 shows four line charts, with all chart elements removed except for the series and the data labels. Importantly, all four charts use the same vertical scale values (0 through 50). If you allowed Excel to calculate the scale bounds, comparisons among the charts would be difficult.

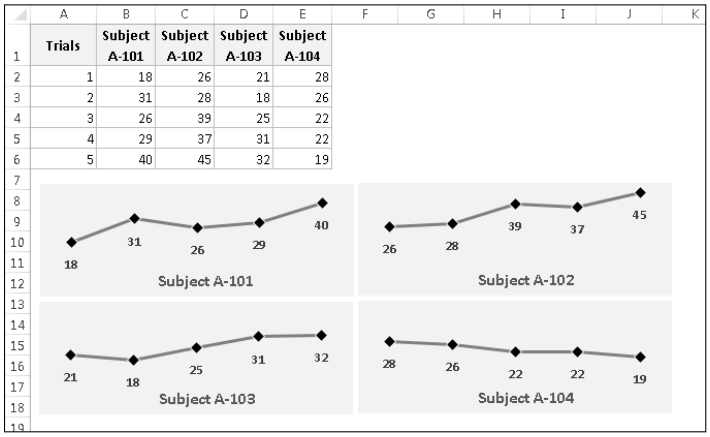


Figure 95-3: Four line charts.

Using four charts makes it very easy to spot trends. The alternative, four series in a single chart, is shown in Figure 95-4.

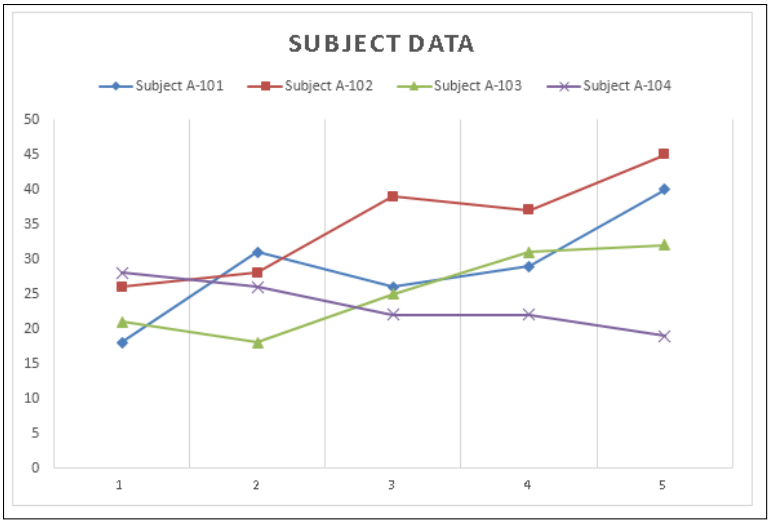


Figure 95-4: A line chart with four series.

Another option is to use Sparkline graphics — perhaps the ultimate in minimal charts. Sparklines are small graphics that display directly in a cell.

A gauge chart

Figure 95-5 shows a chart based on a single cell. It's a pie chart set up to resemble a gauge. Although this chart displays only one value (entered in cell B1), it actually uses three data points (in A4:A6).

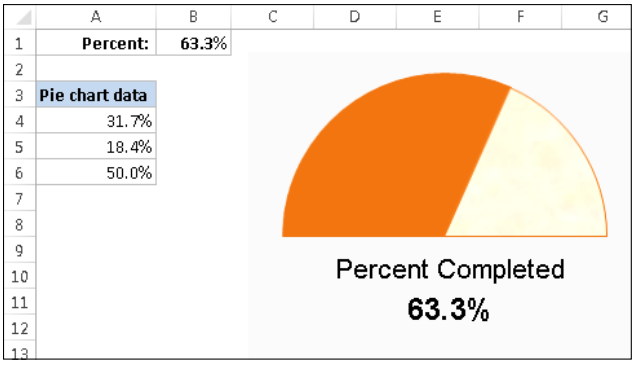


Figure 95-5: This chart resembles a speedometer gauge and displays a value between 0 and 100 percent.

One slice of the pie — the slice at the bottom — always consists of 50 percent. I rotated the pie so that the 50-percent slice was at the bottom. Then I hid that slice by specifying No Fill and No Border for the data point. The other two slices are apportioned based on the value in cell B1. The formula in cell B4 is

```
=MIN(B1,100%)/2
```

This formula uses the MIN function to display the smaller of two values: either the value in cell B1 or 100 percent. It then divides this value by 2 because only the top half of the pie is relevant. Using the MIN function prevents the chart from displaying more than 100 percent.

The formula in cell A5 simply calculates the remaining part of the pie — the part to the right of the gauge's *needle:*

```
=50%-A4
```

The chart's title (Percent Completed) was moved below the half-pie. A linked text box displays the percent completed value in cell B1.

Applying Chart Data Labels from a Range

Excel 2013 introduced a feature that's been on the wish lists of many users for at least 15 years: the ability to specify an arbitrary range to be used as data labels for a series.

Figure 96-1 shows an XY scatter chart that uses data labels stored in a range to identify the data points. In previous versions of Excel, adding these data labels had to be done manually, or with the assistance of a macro.

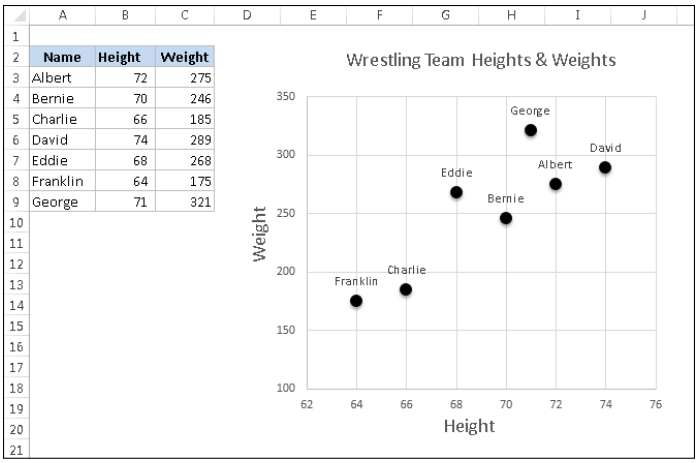


Figure 96-1: Excel 2013 can add data labels from an arbitrary range.

To specify data labels from a range:

1. Activate the chart and select the series that will contain data labels.
2. Click the Chart Elements icon (to the right of the chart) and add data labels.

   Excel displays default data labels for the series.
3. Select the data labels and press Alt+1 to display the Format Data Labels task pane.
4. In the Label Options section of Format Data Labels task pane, deselect any check boxes that are selected and select the Values from Cells check box.

   The Data Label Range dialog box appears, as shown in Figure 96-2.
5. Specify the range that contains the labels and click OK.

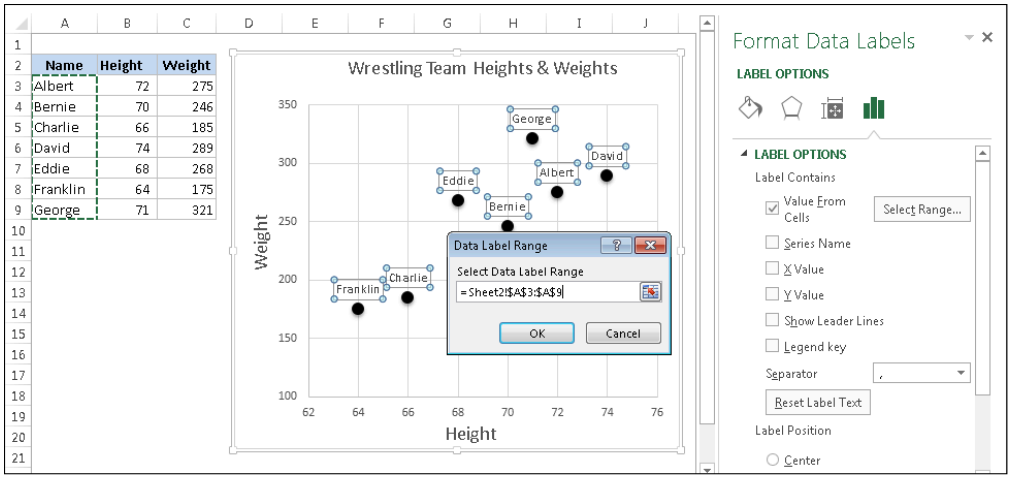


Figure 96-2: Specifying a range to be used as data labels.

When the data labels are placed on the chart, you can fine-tune the location of each one, if necessary. Click one data label to select them all; then click a single data label and drag it to its new position.

Grouping Charts and Other Objects

If you create a number of charts, you may want to be able to work with them all as a group. For example, move them all, or resize them all. The solution is to group the charts into a single object.

Grouping charts

Start by creating the charts that you'd like to group and then arrange and size them as you like. Then press Shift and click each chart. When the charts are selected, right-click any one of them and choose Group➜Group.

Figure 97-1 shows six charts that have been grouped. The group name (*Group 14*) appears in the Name box.

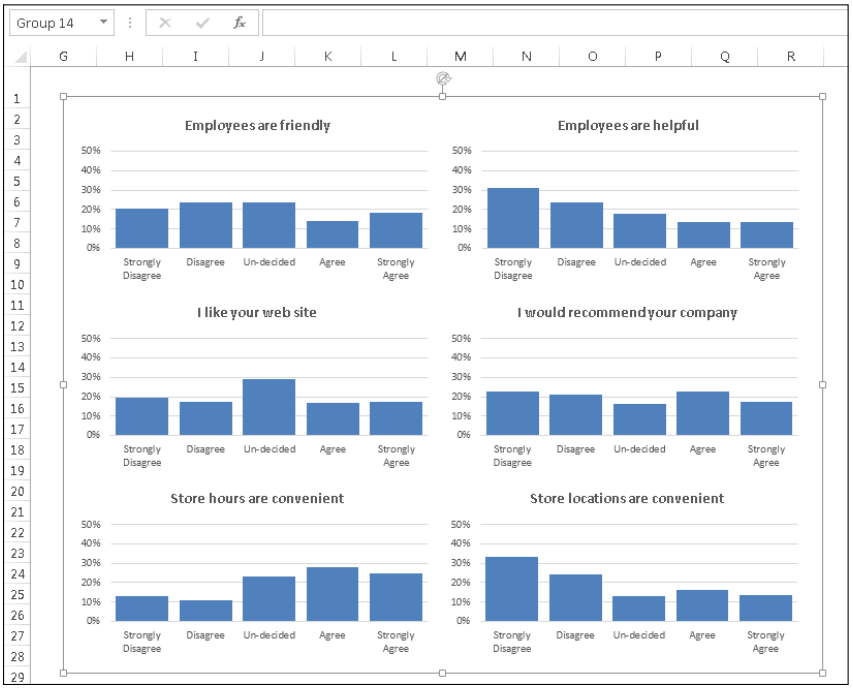


Figure 97-1: Six charts, combined into a group.

To move the entire group, click anywhere in the group and drag.


Note

If the group is already selected when you click and drag, you will select a particular chart in the group and change its position. Most of the time, this is not what you want. Press Ctrl+Z to undo.

To resize the entire group, click anywhere in the group to select the group. Then drag any of the resizing handles that appear in the group's outline.

Figure 97-2 shows the grouped charts after I resized the entire group.

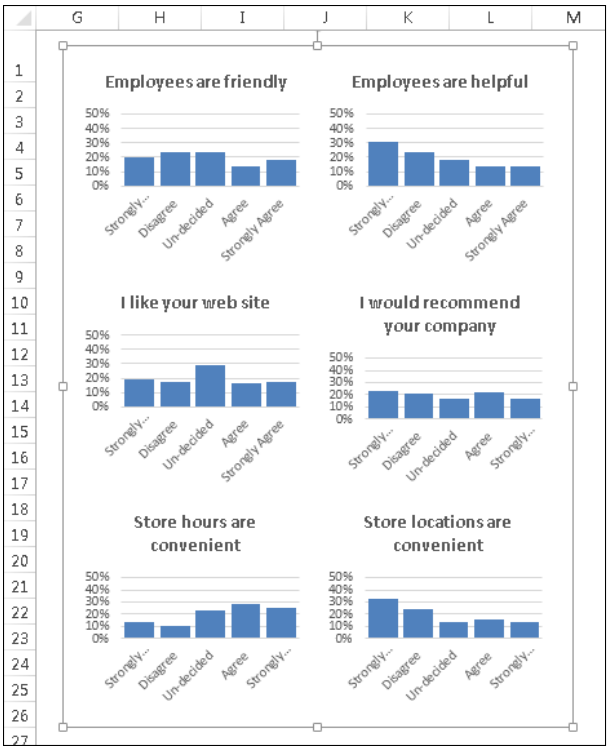


Figure 97-2: Grouped charts, after resizing the group.

Even though charts are grouped, you can still work with a particular chart in a group — and charts that are in a group can still be moved and resized individually. To work with a single chart in a group, click anywhere in the group to select the group; then click the chart you want to work on.

To ungroup the objects in the group, right-click anywhere in the group and choose Group➜ Ungroup.

Grouping other objects

You can combine various types of objects into a group. Figure 97-3 shows a group that consists of a shape (which serves as the background), a text box, and a chart. Figure 97-4 shows the group after I resized it to change the proportions. Resizing a group is much easier than resizing three separate objects.


Note

When combining objects that overlap, you'll often need to adjust the stack order. Right-click an object and use the Bring to Front or Send to Back commands.

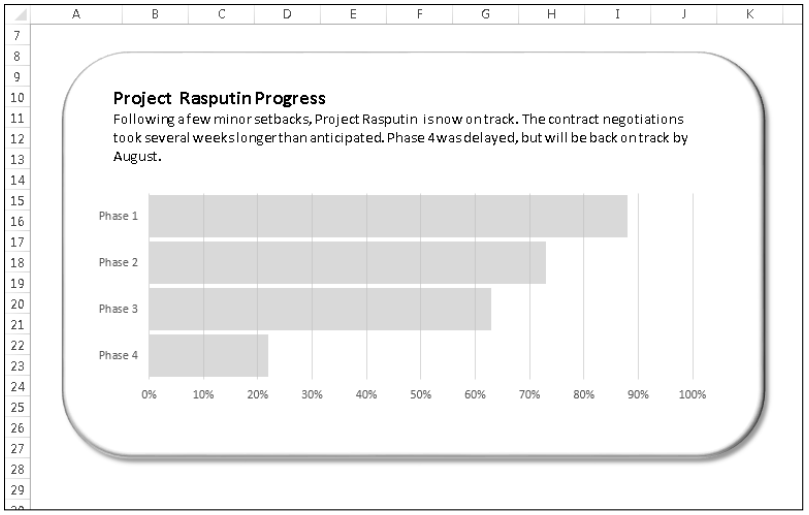


Figure 97-3: Three objects in a group.

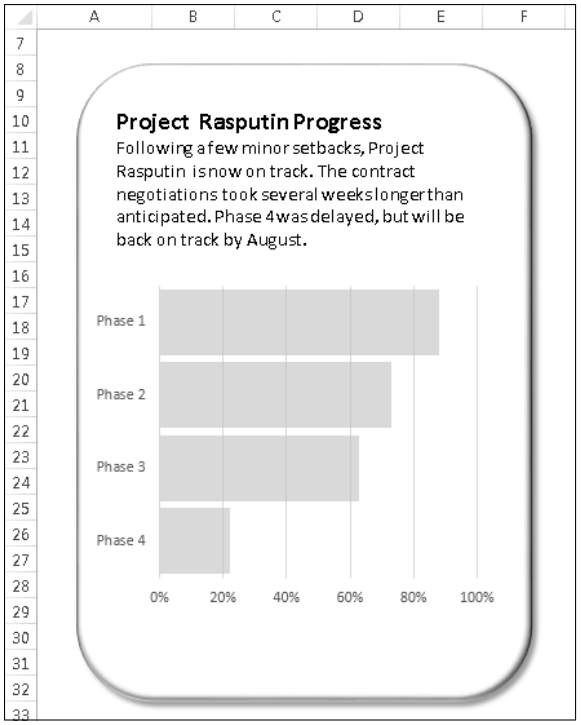


Figure 97-4: The object group, after resizing.

Taking Pictures of Ranges

Excel makes it easy to convert a range of cells into a picture. The picture can either be a *static* image (it doesn't change if the original range changes) or a *live* picture (which reflects changes in the original range). The range can even contain objects, such as charts or shapes.

Creating a static image of a range

To create a snapshot of a range, start by selecting a range of cells and then press Ctrl+C to copy the range to the Clipboard. Then choose Home➜Clipboard➜Paste➜Other Paste Options➜Picture (U). The result is a graphic image of the original range, pasted on top of the original range. Just click and drag to move the picture to another location. When you select this image, Excel displays its Picture Tools context menu — which means that you can apply some additional formatting to the picture.

Figure 98-1 shows a range of cells (B2:E9), along with a picture of the range after I applied one of the built-in styles from the Picture Tools➜Format➜Picture Styles gallery. It's a static picture, so changes made within the range B2:E9 aren't shown in the picture.


Note

If you want to include a graphic that shows information from another (non-Excel) window, choose Insert➜Illustrations➜Screenshot. You can capture an entire window or just a portion of a window (by choosing Screen Clipping). The copied information is pasted as a picture in the active worksheet.

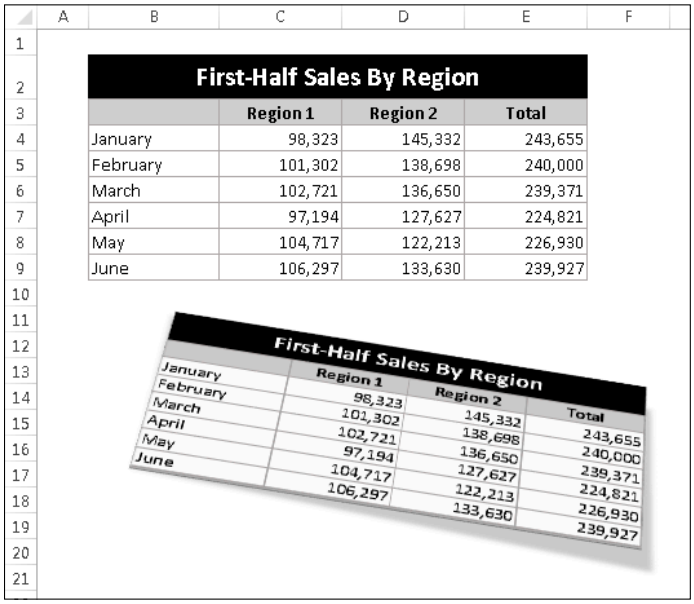


Figure 98-1: A picture of a range, after applying some picture formatting.

Creating a live image of a range

To create an image that's linked to the original range of cells, select the cells and press Ctrl+C to copy the range to the Clipboard. Then choose Home➜Clipboard➜Paste➜Other Paste Options➜Linked Picture (I). Excel pastes a picture of the original range, and the picture is linked — if you make changes to the original, those changes are shown in the linked picture.

Notice that when you select the linked picture, the Formula bar displays the address of the original range. You can edit this range reference to change the cells that are displayed in the picture. To unlink the picture, just delete the formula on the Formula bar.

As with an unlinked picture, you can use Excel's Picture Tools context menu to modify the appearance of the linked picture.

You can also cut and paste this picture to a different worksheet, if you like. Doing so makes it easy to refer to information on a different sheet.

Figure 98-2 shows a linked picture of a range placed on top of a shape, which has lots of interesting formatting capabilities. Placing a linked picture on top of a shape is a good way to make a particular range stand out.

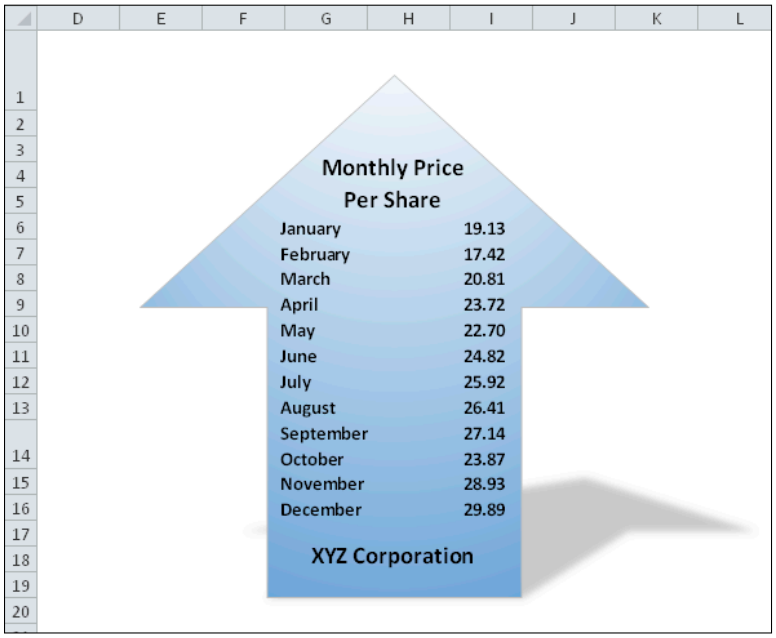


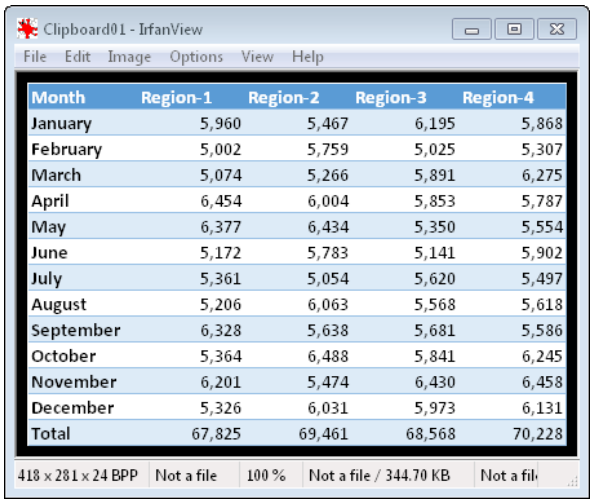
Figure 98-2: A linked picture of a range, placed on top of a shape.

Saving a range as a graphic image

If you need to save a range as a graphic image, the best approach is to use one of several screen capture programs that are available. This type of software makes it easy to capture complete windows or just a portion of a window. After you capture the screen, click a button to save it as a graphics image in the format you choose (GIF, PNT, TIF, and so on).

If you don't have a screen capture program, you probably have some other type of graphics software. When you copy a range of cells, that range is stored on the Windows Clipboard in several different formats. One of those formats is a graphic image. Therefore, you can copy a range, activate your graphics software, and press Ctrl+V to paste the range as a graphic. Then save the graphics file in your desired format.

Figure 98-3 shows a range after it was copied and pasted into a freeware program named IrfanView.



Month	Region-1	Region-2	Region-3	Region-4
January	5,960	5,467	6,195	5,868
February	5,002	5,759	5,025	5,307
March	5,074	5,266	5,891	6,275
April	6,454	6,004	5,853	5,787
May	6,377	6,434	5,350	5,554
June	5,172	5,783	5,141	5,902
July	5,361	5,054	5,620	5,497
August	5,206	6,063	5,568	5,618
September	6,328	5,638	5,681	5,586
October	5,364	6,488	5,841	6,245
November	6,201	5,474	6,430	6,458
December	5,326	6,031	5,973	6,131
Total	67,825	69,461	68,568	70,228

Figure 98-3: A range of data, ready to be saved as a graphic image.

Copying a range is a what-you-see-is-what-you-get thing. For example, if the selected range contains a chart, the chart will also appear in the image.

For another method to save a range as a graphic image, see Tip 101.

Changing the Look of Cell Comments

Cell comments are useful for a variety of purposes. But sometimes you just get tired of looking at the same old yellow rectangle. This tip describes three tricks that you can use to make your comments stand out:

- Format a comment.
- Change the shape of a comment.
- Add an image to a comment.

All of these changes require that the cell comment is visible. If the comment isn't visible, right-click the cell and choose Show/Hide Comments from the shortcut menu.

Setting up your Quick Access toolbar

The operations described in this tip require commands that aren't normally available in the Ribbon when a comment is selected. So the first step is to add three commands to your Quick Access toolbar:

1. Right-click the Quick Access toolbar and choose Customize Quick Access Toolbar.

   The Customization section of the Excel Options dialog box appears.
2. From the Choose Commands From drop-down list, select All Commands.
3. In the list on the left, select Format Shape and then click the Add button.
4. In the list on the left, select Change Shape and then click the Add button.
5. In the list on the left, select Picture Fill and then click the Add button.
6. Click OK to close the Excel Options dialog box.

After you complete these steps, your Quick Access toolbar has three new icons.

Formatting a comment

To change the formatting of a comment, Ctrl+click the comment (to select it as a shape) and then click the Format Shape icon in your Quick Access toolbar, or you can press Ctrl+1. Either of these actions displays the Format Comment dialog box. This dialog box has eight tabs that enable you to change just about any aspect of the comment.

Figure 99-1 shows a normal cell comment, and the same comment after changing the font, alignment, fill color, text color, and border width and style.

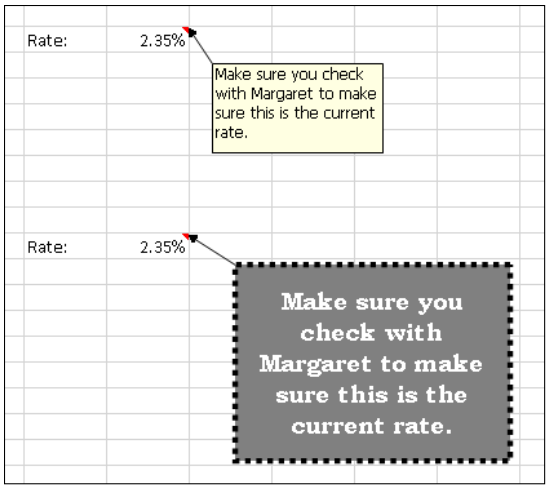


Figure 99-1: A normal cell comment and a comment with different formatting.

Changing the shape of a comment

Comments don't have to display as a rectangular box. Figure 99-2 shows a cell comment, after applying a different shape.

To change the shape of a comment, Ctrl+click the comment (to select it as a shape). Click the Change Shape button on the Quick Access toolbar and choose a new shape for the comment from the Shape gallery.

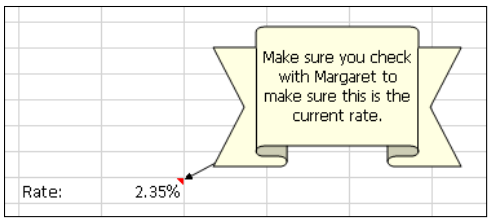


Figure 99-2: A cell comment that uses a nonstandard shape.

Adding an image to a cell comment

Most users don't realize it, but a cell comment can display an image. The image can reside in a file or can come from the Office.com Clip Art collection. You can't use shapes or clip art images that are copied to the Clipboard.

To add an image to a comment, Ctrl+click the comment to select it as a shape and then click the Picture Fill icon in the Quick Access toolbar. Excel displays the Insert Pictures dialog box, in which you can select or search for an image.

Figure 99-3 shows a comment that contains a clip art image. Using an image in a comment increases the size of your workbook, so keep that in mind before you go overboard with images.

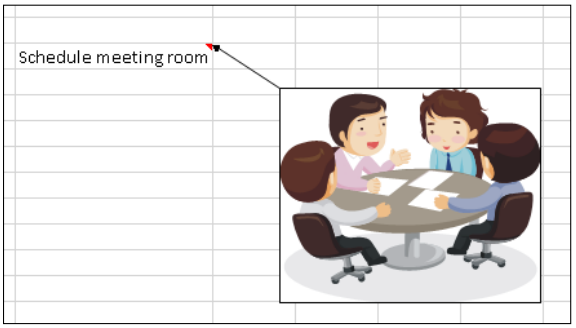


Figure 99-3: Displaying an image in a cell comment.

Enhancing Images

A set of features that you might overlook is image enhancement. These tools allow you to modify and enhance images that you insert on a worksheet. This doesn't mean you can uninstall your favorite image editing software, but you may be surprised at the type of enhancements you can perform without even leaving Excel.

To embed an image on a worksheet, choose Insert➜Illustrations➜Pictures (for an image stored on your hard drive) or Insert➜Illustrations➜Online Pictures (to search for and retrieve an image from an online source).

When you select an embedded image, use the tools in the Picture Tools➜Format➜Adjust group to work it. The tools include the following:

- **Remove Background:** Makes it very easy to remove an extraneous background from a photo.
- **Corrections:** Sharpen or soften the image or adjust the brightness and contrast.
- **Color:** Adjust the color saturation and color tone or convert the image to use just a few colors.
- **Artistic Effects:** Apply some Photoshop-like filters to the image.
- **Compress Pictures:** Make your images smaller.
- **Change Picture:** Substitute a different image for the selected image.
- **Reset Picture:** Undo all modifications you've made.

In most cases, you get a live preview of the effect when you move your mouse pointer over the icon. Just click to apply it. For more control over the enhancements, right-click the image and choose Format Picture. Then use the controls in the Format Picture task pane to adjust the parameters.

Figure 100-1 shows a photo before and after I removed the background. The parts of the image that are removed become transparent. This feature works surprisingly well.

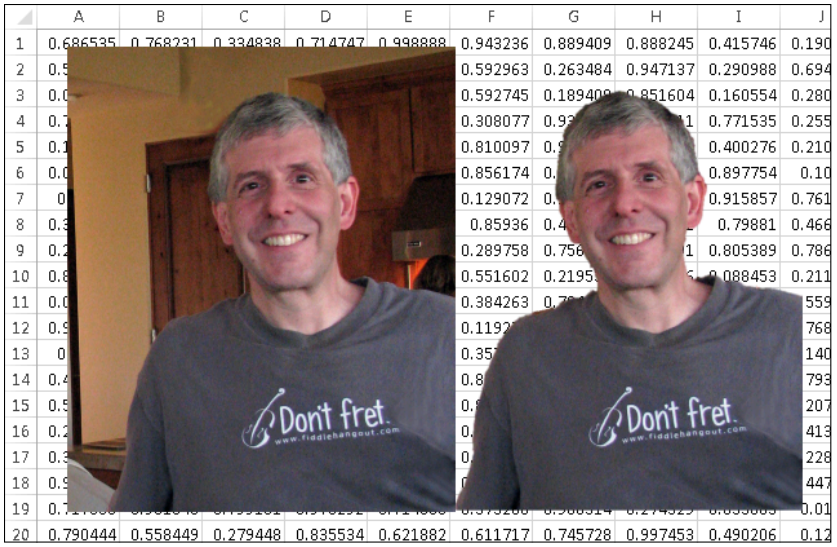


Figure 100-1: The result of using the Remove Background command.

Figure 100-2 shows a clipart image before and after I applied the Pencil Grayscale effect.

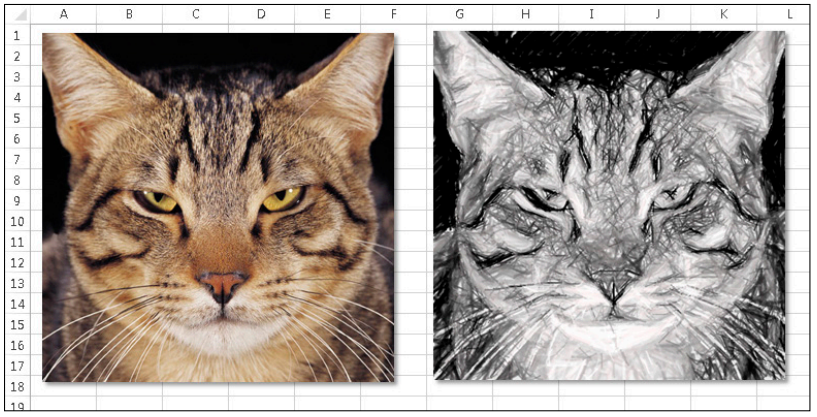


Figure 100-2: Applying an artistic effect to a photo.

Even if you have no need to adjust images, you might enjoy playing around with these features when you need a break from number crunching.

Saving Shapes, Charts, and Ranges as Images

Excel supports quite a few types of graphics, but it doesn't provide a way to save the graphic as a separate file for use in another program. For example, you may want a separate PNG or GIF file created from a chart, a shape, SmartArt, or even a range pasted as a picture (see Tip 98).

Although Excel doesn't provide a direct way to export a graphic, here's a useful trick you can use. First, a bit of set-up work is required:

1. Right-click the Quick Access toolbar and choose Customize the Quick Access Toolbar.

   The Quick Access Toolbar tab of the Excel Options dialog box appears.
2. In the upper-left drop-down control, choose Commands Not in the Ribbon.
3. In the list box, scroll down and select Web Options and then click the Add button.
4. In the list box, select Web Page Preview and click the Add button.
5. Click OK to close the Excel Options dialog box.

   Your Quick Access toolbar now has two new buttons.

Here's how to use these tools to export graphic objects (including charts) from a worksheet.

1. Make sure that your graphics appear the way you want.
2. Click the Web Page Preview button in the Quick Access toolbar.

   A copy of your workbook is converted to an HTML file and is displayed in your default browser.
3. In the browser, right-click a graphic object, choose Save Image As, and specify a location for the file.

   Your browser may have a different, but equivalent, command. Or you can just drag the graphic image to your desktop.

If the quality of the images in your browser is lacking, click the Web Options button in your Quick Access toolbar. The Web Options dialog box is shown in Figure 101-1.

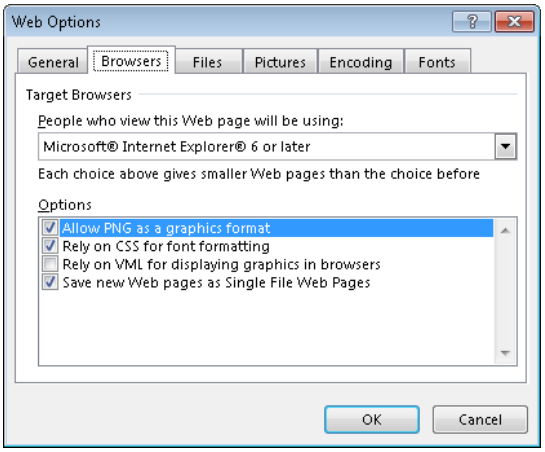


Figure 101-1: The Web Options dialog box.

In the Web Options dialog box, click the Browsers tab and make sure Allow PNG as a Graphics Format is enabled. If graphics don't appear in your browser at all, remove the check mark from Rely on VML for Displaying Graphics in Browser. Next, click the Pictures tab and choose the 120 Pixels Per Inch option. Click OK and do the web preview again. You should see higher-quality graphics (transparent PNG files).

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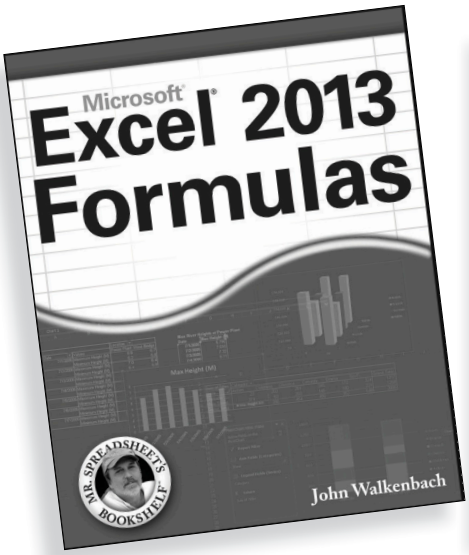

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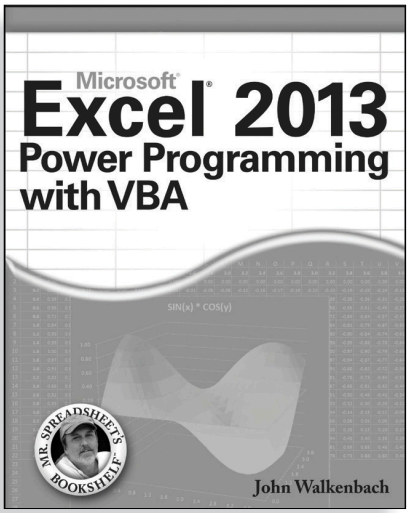

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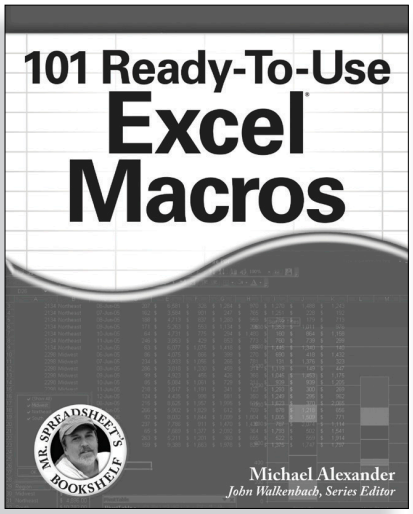

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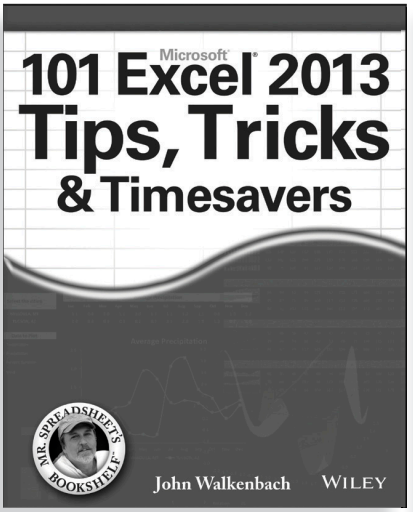

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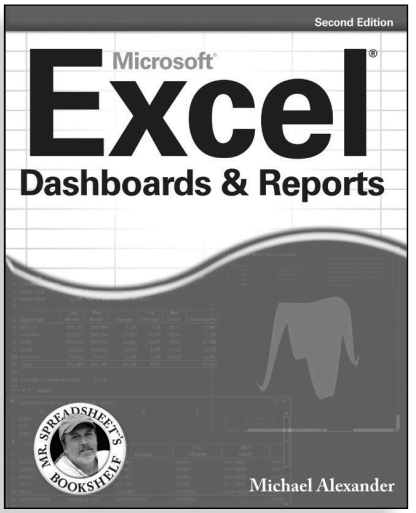

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