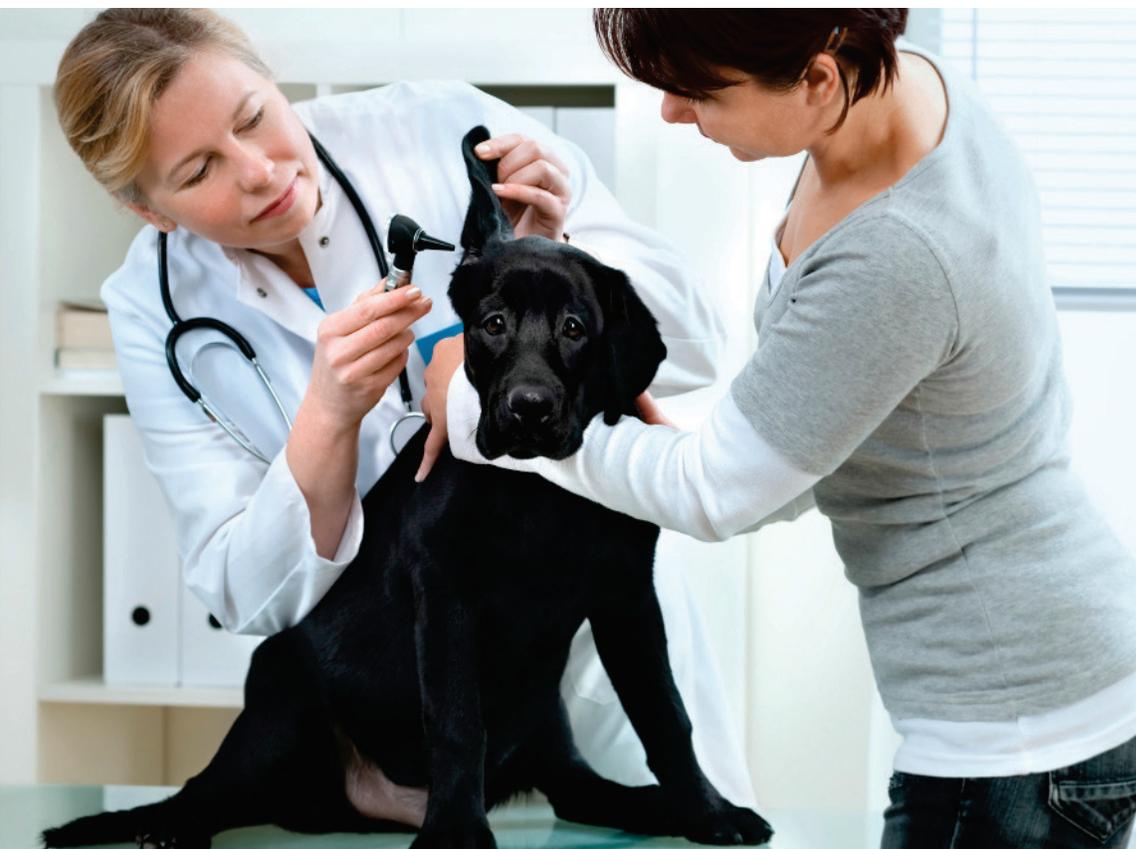


# Working with Data and Macros 9

## LESSON SKILL MATRIX

Skills	Exam Objective	Objective Number
Importing Data	Open non-native files directly in Excel.	1.1.4
	Import files.	1.1.3
	Append data to worksheets.	2.1.1
Ensuring Your Data's Integrity	Set data validation.	1.3.8
Sorting Data		
Filtering Data		
Outlining and Subtotaling Data	Create outlines.	2.3.5
	Collapse groups of data in outlines.	2.3.6
	Insert subtotals.	2.3.7

*(continued on next page)*



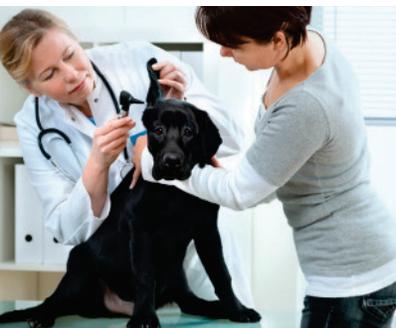
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## KEY TERMS

- auto-outline
- AutoFilter
- collapse
- criterion
- data file
- database
- delimiter
- filter
- grouping
- macro
- outline
- outline symbol
- parse
- quick format
- slicer
- subtotal
- table
- validation

**LESSON SKILL MATRIX (continued)**

Skills	Exam Objective	Objective Number	
Setting Up Data in a Table Format	Apply styles to tables.	3.2.1	
	Band rows and columns.	3.2.2	
	Remove styles from tables.	3.2.4	
	Define titles.	3.1.3	
	Insert total rows.	3.2.3	
	Add and remove cells within tables.	3.1.2	
	Filter records.	3.3.1	
	Sort data on multiple columns.	3.3.2	
	Change the sort order.	3.3.3	
	Remove duplicates.	3.3.4	
	Move between tables and ranges.	3.1.1	
	Saving Work with Macros	Assign shortcut keys.	1.4.12
		Record simple macros.	1.4.7
Manage macro security.		1.4.5	



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You've been hired to keep the books at a local veterinary clinic. Its clientele is a bit unusual in terms of bookkeeping. Although the patients have characteristics that your co-workers need to keep track of, none of them are paying customers. Those who pay on your patients' behalf might be responsible for more than one patient at a time.

Although Excel technically is not a database manager program, it's used for database management purposes in more offices than any other program. People appreciate the convenience of keeping individual records aligned by single rows, so everything you need to record about a certain feline or canine patient, for example, is recorded in a single row. This way, you can have Excel sort an entire database by patients' names or show only certain records whose contents meet criteria that you specify (only the cats, for instance, or only the spaniels) without disrupting the integrity of the database itself or changing the workbook.

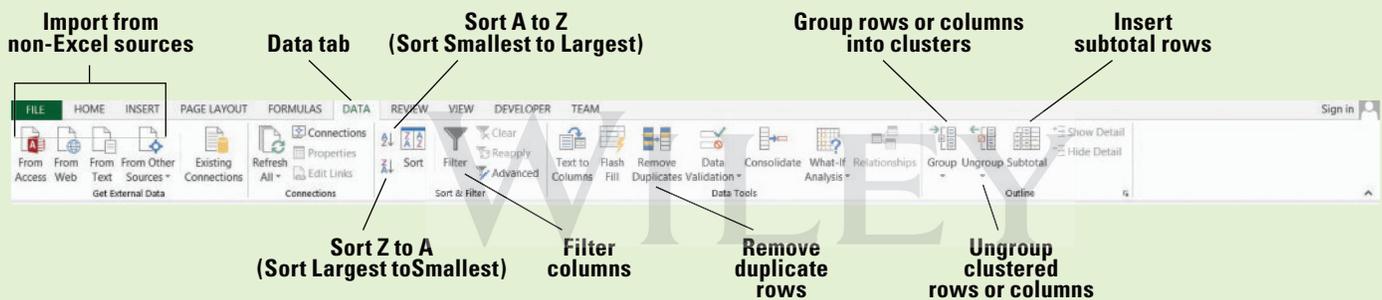
## SOFTWARE ORIENTATION

### Data Tab

Most of the exercises in this lesson use the DATA tab. Although spreadsheet programs such as Excel were originally intended to serve as calculation engines, it's often convenient to have recordkeeping and calculation in the same program. Although you might imagine data entry tasks as about as dull and repetitive as a marathon of city council meetings on public access television, Excel actually makes data easy to import from sources other than your own fingertips, and it makes it easy to arrange and manage that data properly once you bring it into a workbook.

**Figure 9-1**  
The DATA tab

Figure 9-1 shows the DATA tab on a maximized Excel window, with many of the features you use in this lesson pointed out.



## IMPORTING DATA

### Bottom Line

When you work with a workbook that requires a large amount of data, one thing you can fervently wish for is that the data already exists in some form and that you don't have to type it manually. If the data you need for a workbook is sourced outside of Excel, then what Excel needs is to be able to receive that data in such a way that it can make sense of where cells begin and end and where records begin and end. Even simple text files where values are separated (delimited) by commas can be imported, because commas act like fence posts, and Excel recognizes fence posts. Complex relational databases are comprised of multiple tables, and thus can't be imported directly. So the trick is to be able to open a connection to the database (such as a communications channel) and stream the specific tables you need into Excel, in a manner that Excel can readily **parse** (interpret character-by-character).

### Opening Non-Native Files Directly in Excel

Excel has two main data formats: an older one that was owned and operated by Microsoft and whose files end with the .XLS extension and a newer, XML-based .XLSX format whose specifications have been shared publicly. Because the newer format is public, there are more programs and services now that publish data to a format that Excel accepts. But not all of them do; many services provide data in a basic XML format that Excel can import. In that case, there's no guarantee that the columns will all be aligned properly or that the headings will be in the place Excel expects them to be for a table. The "lowest common denominator" for file compatibility is the .CSV file, which is straight text that uses certain characters, such as commas and quotation marks, as **delimiters**—characters that separate data entries from one another—and that Excel will not interpret as part of a cell entry.

## STEP BY STEP

## Open a Non-Native File Directly in Excel



GET READY. Before you begin these steps, LAUNCH Microsoft Excel.



1. If the active workbook is not a new, blank workbook, then click the **FILE** tab. In Backstage, click **New**, and then click the thumbnail marked **Blank workbook**.
2. On the **DATA** tab, in the Get External Data group, click **From Text**.
3. In the Import Text File dialog box, locate and click **09 NA-EST2012-01.csv**. Click **Import**.
4. In Step 1 of the Text Import Wizard, notice the preview at the bottom (see Figure 9-2). This is Excel's best guess, for the moment, as to how the data should be formatted. There are population figures rendered in "quotation marks" with commas between each figure. Here, each comma acts as the delimiter, and it's difficult to judge whether each figure between the commas will be the same length. Under Choose the file type that best describes your data, choose **Delimited**, and select **My data has headers**.

Figure 9-2

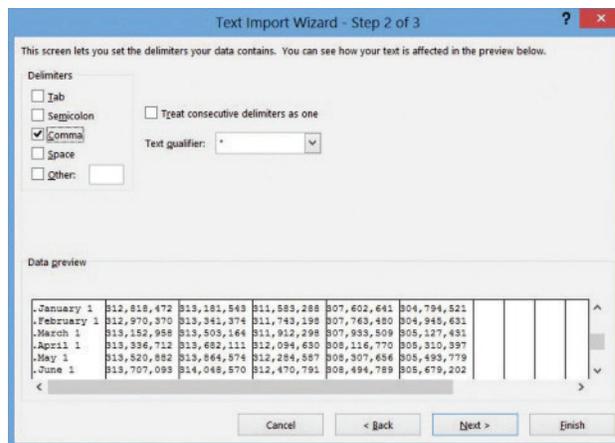
Text Import Wizard, step 1



5. The preview shows the headers starting on row 3. Thus, for the Set import at row option, choose **3**. Click **Next**.
6. In Step 2 of the wizard, shown in Figure 9-3, uncheck **Tab** because the preview does not indicate long spaces between the figures. Check **Comma**. Set Text qualifier to " (quotation mark). Scroll down the **Data preview** pane, and notice now that Excel has found the column separations between figures. Click **Next**.

Figure 9-3

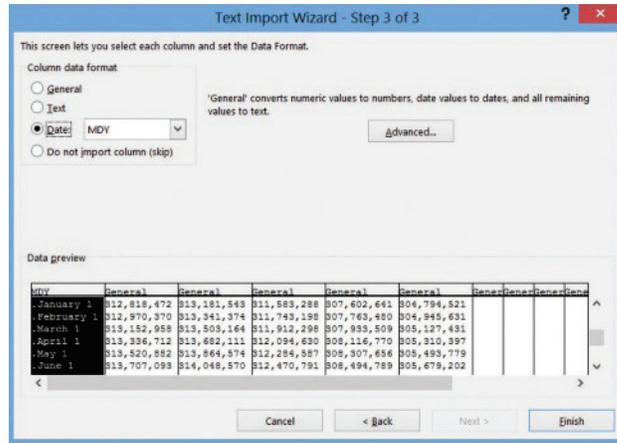
Text Import Wizard, step 2



7. Step 3 of the wizard, shown in Figure 9-4, lets you establish the data type for each discovered column. Click the first column in the **Data preview** pane. Then, under Column data format, click **Date**. Click **Finish**.

Figure 9-4

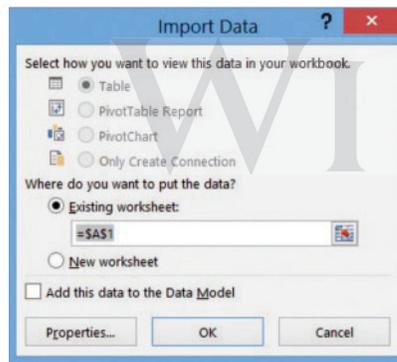
Text Import Wizard, step 3



- In the Import Data dialog box that appears next (see Figure 9-5), leave Where do you want to put the data? set to **Existing worksheet**. Click **OK**.

Figure 9-5

Import Data dialog box



- Shorten the width of column A to 16.
- The worksheet that Excel has generated, shown in Figure 9-6, shows United States population estimates for each month from April 2010 to December 2012. Excel could not make sense of the dates in column A, so it left the data type set to General for most of the cells. However, it did make an error in attempting to convert the year in cell A25. To correct it, begin by deleting rows 2, 12, and 25.

**CERTIFICATION READY? 1.1.4**

How do you open a non-native file directly in Excel?

Figure 9-6

Freshly imported census data worksheet

	A	B	C	D	E	F
1	Year and Month	Resident Population	Resident Population Plus Armed Forces Overseas	Civilian Population	Civilian Noninstitutionalized Population	Household Population
2	2010					
3	.April 1	308,747,508	309,180,459	307,517,564	303,524,026	300,758,251
4	.May 1	308,937,636	309,361,879	307,702,883	303,710,326	300,944,721
5	.June 1	309,122,451	309,544,899	307,889,928	303,898,353	301,125,879
6	.July 1	309,326,225	309,745,660	308,091,141	304,100,547	301,325,995
7	.August 1	309,540,608	309,956,285	308,313,027	304,322,798	301,538,796
8	.September 1	309,768,270	310,173,518	308,531,330	304,541,466	301,764,876
9	.October 1	309,994,453	310,395,556	308,761,399	304,771,900	301,989,477
10	.November 1	310,179,397	310,589,914	308,957,140	304,968,006	302,172,839
11	.December 1	310,353,742	310,774,403	309,141,425	305,152,656	302,345,602
12	2011					
13	.January 1	310,544,109	310,951,978	309,326,771	305,338,367	302,534,387
14	.February 1	310,704,719	311,109,109	309,479,260	305,491,221	302,693,415
15	.March 1	310,851,993	311,268,198	309,638,124	305,650,450	302,839,107
16	.April 1	311,035,995	311,444,450	309,811,745	305,824,436	303,021,527
17	.May 1	311,220,789	311,624,208	309,994,764	306,007,820	303,204,739
18	.June 1	311,387,209	311,805,500	310,171,775	306,185,196	303,369,577
19	.July 1	311,587,816	312,004,661	310,370,316	306,384,095	303,568,593
20	.August 1	311,794,537	312,210,438	310,578,786	306,593,494	303,774,526
21	.September 1	312,017,861	312,422,810	310,794,410	306,810,047	303,997,062
22	.October 1	312,232,049	312,640,035	311,021,669	307,038,235	304,210,462
23	.November 1	312,427,243	312,829,503	311,211,110	307,228,605	304,404,868
24	.December 1	312,619,619	313,009,235	311,394,871	307,413,295	304,596,456
25	2/1/2021					
26	.January 1	312,818,472	313,181,543	311,583,288	307,602,641	304,794,521
27	.February 1	312,970,370	313,341,374	311,743,198	307,763,480	304,945,631
28	.March 1	313,152,958	313,503,164	311,912,298	307,933,509	305,127,431
29	.April 1	313,336,712	313,682,111	312,094,630	308,116,770	305,310,397
30	.May 1	313,520,882	313,864,374	312,284,587	308,307,656	305,493,779

11. Click cell **A2**, type **April 2010**, and press **Enter**.
12. Drag the fill handle from cell **A2** down to cell **A34** and release. Excel changes the entries in column A to proper months.
13. Delete rows **35** through **40**.
14. **SAVE** the workbook in the Lesson 9 folder as **09 Monthly Census Data Solution**.

CLOSE the workbook and leave Excel open for the next exercise.

## Getting External Data

In the world of computers, there are databases and data files. Because databases are typically stored in files, a rational question is, “What’s the difference?” A **data file** stores a series of records in a relatively simple format, and Excel is a program that uses data files in this manner. A **database** is a comparatively complex system that can store a large amount of related data, which requires a program to be able to assess and render that data. So when Excel imports data from a database as opposed to a data file (as in the previous exercise), it actually launches a program, begins a communications process with that program, and instructs the program to stream the data it requires.

**Take Note** In this exercise, you use a file from Microsoft Access, although you do not need Access installed on your computer to follow along.

### STEP BY STEP

### Get External Data

**CERTIFICATION  
READY?** **1.1.3**

How do you import files?

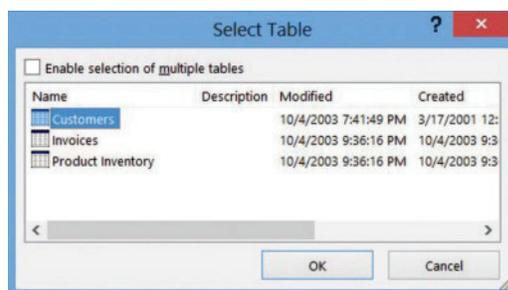


GET READY. LAUNCH Excel if it is not already running.

1. If the active workbook is not a new, blank workbook, then click the **FILE** tab. In Backstage, click **New**, and then click the thumbnail marked **Blank workbook**.
2. On the **DATA** tab, in the Get External Data group, click **From Access**.
3. In the Select Data Source dialog box, locate the **09 GMcC Customer contacts.accdb** database file. Select it and click **Open**.
4. In the Select Table dialog box shown in Figure 9-7, click **Customers** (the table we want to import), and then click **OK**.

**Figure 9-7**

Select Table dialog box



5. In the Import Data dialog box (refer to Figure 9-5), click **Table**. Under Where do you want to put the data, click **Existing Worksheet** and ensure the text box reads **=!\$A\$1**.
6. Click **OK**. Excel takes a moment to query the database. Soon, it displays a fully formatted table (see Figure 9-8), complete with AutoFilter buttons in the headers, which you learn more about later in this lesson in “Using AutoFilter.”

Figure 9-8

Mismatched, freshly imported XML data

	A	B	C	D	E	F	G	H	I
8	Wika	Kim	7908 Maple Ave.	Edmond	OK	73115		849-1515	
9	Hu	Jim	220 Ave Street	Oklahoma City	OK	73104		976-3976	
10	Woo	Lily	667 Vista Drive	Oklahoma City	OK	73101		288-1024	
11	Loc	Wu	6467 Riverside Drive	Del City	OK	73120		257-1023	
12	Jonas	Mikala	2141 E 21st Street	Oklahoma City	OK	73104		875-0214	
13	Whitney	Corinne	3011 Fair Court	Moore	OK	73158		254-8948	
14	Whitney	Antonia	2414 Hickox Valley Rd.	Del City	OK	73121		297-8505	
15	Walters	Myco	808 Hill Ct.	Edmond	OK	73159		291-0614	
16	Russell	Malissa	1325 Ritchey Dr.	Oklahoma City	OK	73139		946-2141	
17	Rae	Justin	7509 Wilpa Way	Oklahoma City	OK	73154		391-9876	
18	Horbin	Vanessa	683 Towel Hill	Moore	OK	73158		242-8821	
19	Scott	Nate	121 Dean Rd.	Oklahoma City	OK	73136		253-1495	
20	Leannigan	Carl	8012 Fox Court	Oklahoma City	OK	73101		853-1948	
21	Owners								
22	Owners								
23	Owners								
24	Owners								
25	Owners								
26	Owners								
27	Owners								
28	Owners								
29	Owners								
30	Owners								
31	Owners								
32	Owners								
33	Owners								
34	Owners								
35	Owners								
36	Owners								

7. SAVE the workbook in the Lesson 9 folder as **09 2005 Customers Solution**.

CLOSE the workbook and leave Excel open for the next exercise.

## Appending Data to a Worksheet

After you import data from another format or database into a worksheet, you'll probably spend a good deal of time reconciling that data with existing records. In the previous two exercises, you were lucky enough to import data into blank worksheets. In a more real-life situation, you'll bring data from other sources into a full worksheet and make the effort to make it fit somehow.

### STEP BY STEP

### Append Data to a Worksheet

GET READY. OPEN the **09 Owners.xls** workbook for this lesson.



CERTIFICATION  
READY? 2.1.1

How do you append data  
to a worksheet?

1. Click cell **A21**.
2. On the **DATA** tab, in the **Get External Data** group, click **From Other Sources**, and then click **From XML Data Import**.
3. In the **Select Data Source** dialog box, locate and select the **09 2010\_Owners.xml** data file. Click **Open**.
4. In the **Import Data** dialog box, click **Existing worksheet**, and then click **OK**. Although a list of customers is appended to the end of the worksheet, the columns don't line up, as Figure 9-9 clearly indicates. This is typical of appended data. A dialog marked **Error in XML** might appear at this point. If so, click **OK** to dismiss the dialog box and proceed.



### Troubleshooting

In the course of history, the folders where old data files used to reside may cease to exist. This is indeed the case with the original XML file from which you imported data into the worksheet. Some versions of the Microsoft XML parser will see this as an "error," and others will not. Any number of factors may contribute to which XML parser your PC actually has. In either case, it isn't really an error, and you don't need to worry about it.

Figure 9-9

Mismatched, freshly imported XML data

Row	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I
8	Wika	Kim	7908 Maple Ave.	Edmond	OK	73115	846-1915		
9	Hu	Jim	229 Allen Street	Oklahoma City	OK	73101	976-3976		
10	Woo	Lily	667 Vista Drive	Oklahoma City	OK	73101	280-4924		
11	Lee	Wu	6467 Riverside Drive	Del City	OK	73120	257-4203		
12	Jonas	Mikala	2141 E 21st Street	Oklahoma City	OK	73134	875-0214		
13	Whitney	Christine	3281 Fern Court	Moore	OK	73150	254-8968		
14	Whitney	Antonia	2414 Hickox Valley Rd.	Del City	OK	73121	291-8505		
15	Walters	Myco	808 Hill Ct.	Edmond	OK	73159	291-0614		
16	Russell	Mikissa	1325 Ritchey Dr.	Oklahoma City	OK	73139	946-2141		
17	Ryan	Justin	7500 Wilco Way	Midwest City	OK	73154	391-3876		
18	Horton	Vanessa	681 Towel Hill	Moore	OK	73150	242-8021		
19	Scott	Nate	181 Dean Rd.	Oklahoma City	OK	73136	253-1495		
20	Leahyness	Carl	8012 Fern Court	Oklahoma City	OK	73101	853-1948		
21	Owners								
22	Owners								
23	Owners	sd	12 W. 89th	Moore	Rls	1	1 Alvarez	542-1894	OK
24	Owners	sd	416 Hoover	Oklahoma City	Liso	2	2 Arzate	875-0125	OK
25	Owners	sd	4923 Whittier Ave.	Oklahoma City	Mikala	3	3 Astrom	975-0069	OK
26	Owners	sd	9480 Men. Act. E.	Oklahoma City	Stewa	4	4 Broussard	946-7878	OK
27	Owners	sd	14059 Senator Way	Midwest City	Nathul	5	5 Darnil	844-8977	OK
28	Owners	sd	1901 Cloud St.	Oklahoma City	Hylo	6	6 Eccles	946-1854	OK
29	Owners	sd	1032 Pine Drive	Oklahoma City	Stevay	7	7 Echart	946-3125	OK
30	Owners	sd	1171 Meridian Ave.	Del City	Jyok	8	8 Echols	575-6487	OK
31	Owners	sd	2141 Oak Street	Moore	Itaty	9	9 Edwards	872-1594	OK
32	Owners	sd	4954 Warden Wood Lane	Oklahoma City	Kalathia	10	10 Flynn	542-0021	OK
33	Owners	sd	987 Acacia Way	Edmond	Holly	11	11 Harshaw	257-1849	OK
34	Owners	sd	8123 Maple Ave.	Moore	Freen	12	12 Hassan	722-1487	OK
35	Owners	sd	225 Allen Street	Oklahoma City	Joe	13	13 Hu	975-2415	OK
36	Owners	sd	2141 E 21st Street	Oklahoma City	Mikala	14	14 Jonee	875-0214	OK

- To correct the problem, begin by moving the first names from cell range **E23:E75** to **B23:B75**. Overwrite the existing contents in column B.
- Move the last names from cell range **H23:H75** to **A23:A75**. Overwrite the existing contents in column A.
- Repeat the process for the states in column **J** that should be in column **E**, the ZIP codes in column **K** that should be in column **F**, and the phone numbers in column **I** that should be in column **G**.
- Delete columns **H** through **L**.
- Delete rows **21** and **22**.
- Replace all 11 instances of **Del City** in column D with **Del City**.

SAVE the workbook in the Lesson 9 folder as **09 Car Owners Solution.xlsx**. CLOSE the workbook and leave Excel open for the next exercise.



## Workplace Ready

### WORKING WITH DATABASES

The most commonly distributed definition for the word “database” is “an organized collection of data.” Technically, that’s wrong. If this definition was correct, any book could be a database because books contain data—even blank books.

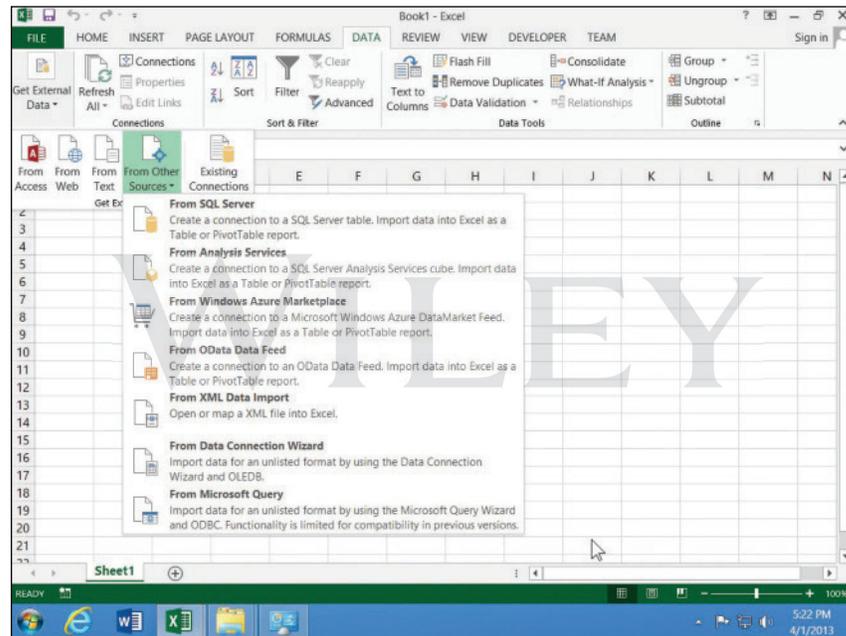
The reason why this matters is because you will likely acquire data from multiple sources for use in the worksheets you produce. To be accurate, a database is anything you can use as a *source* for data. When you import data from a database into an Excel spreadsheet, if that data is stored by a relational database manager, it might not actually exist as a file yet. So the file you “import” into Excel might communicate with the database manager to produce the data that ends up appearing in your worksheet.

This is important, because a financial database manager usually produces information in real-time—meaning, as close to “right now” as possible. So you might import data into a worksheet that’s actually accurate up-to-the-second.

However, depending on how the database is set up, it might produce separate files that serve as “snapshots” of the data’s state for a given point in time. When you import this type of data, you need to know if it’s old and just how old it is. On occasion, you might not actually be able to im-

port files because the database manager program has locked them to prevent inadvertent loss of data. In these situations, you might need to have the person overseeing the database export a separate file for you to import. While you're at it, you can ask for that export file to be in a regular format, such as comma-separated values (CSV) or even a worksheet format such as Excel's old XLS.

The example you used in “Getting External Data” involves a kind of snapshot file produced by Microsoft Access, a database manager that's part of some versions of Office. In a real-world setting, even though such a file exists, it might not always be available, for the reasons just explained. In these cases, you need to ask for help—perhaps for someone in the IT department to produce an export file and meet you halfway.



## ENSURING YOUR DATA'S INTEGRITY

### Bottom Line

It isn't obvious on the surface, but an Excel workbook is actually a kind of program in itself. You don't just feed it data, run off a few formulas, and tabulate the result. You actually can create rules for each workbook, which Excel might enforce, helping you and others to enter the right data properly. When typing in new data from paper—especially several records at once—it's easy for anyone to type the wrong digits or characters, especially in a field where a single character denotes a *type*, such as a senior citizen or a child, or such as a dog or a cat. Quickly, ask yourself this: Should “C” in a vet clinic stand for “cat” or “canine?” **Validation** ensures data gets entered correctly, before it gets processed incorrectly. Excel's data validation tools can help you set up rules that keep you or anyone else from entering invalid or unusable data, or from failing to enter data when it's required.

### Restricting Cell Entries to Certain Data Types

Perhaps the most common form of rule you'll create for Excel workbooks will set certain expectations for data being typed in. For example, in North America (where local business clients will tend to reside anyway), a telephone area code has three digits. You can set up a rule that pings the user whenever he types a two- or four-digit code by mistake. The user may then respond by dismissing the message and starting over, or cancelling altogether if the problem is that the user didn't mean to type anything into this cell in the first place.

## STEP BY STEP Restrict Cell Entries to Certain Data Types

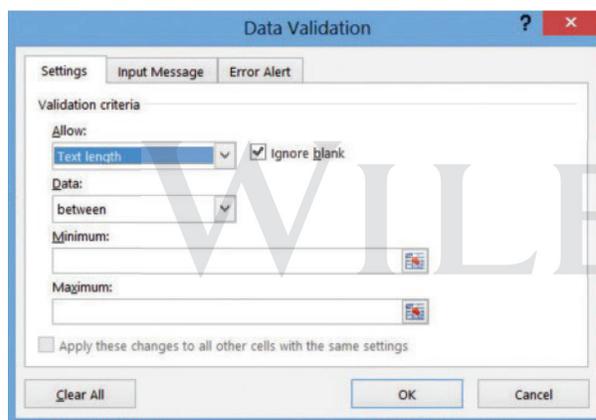


GET READY. OPEN the *09 Vet Clinic Patients* workbook for this lesson.

1. Click the **FILE** tab and select **Save As**. SAVE the workbook in the Lesson 9 folder as *09 Vet Clinic Patients (Active) Solution*.
2. Freeze rows **1** through **5** in both worksheets in the workbook.
3. In the Client list worksheet, select column **L** (Area Code).
4. On the **DATA** tab, in the Data Tools group, click **Data Validation**. The Data Validation dialog box opens.
5. Click the **Settings** tab.
6. In the Allow list box, choose **Text length**. This is the first step in the creation of a rule governing how many characters each new entry should contain. The dialog box should now appear as depicted in Figure 9-10.

**Figure 9-10**

Set up validation rules for input data



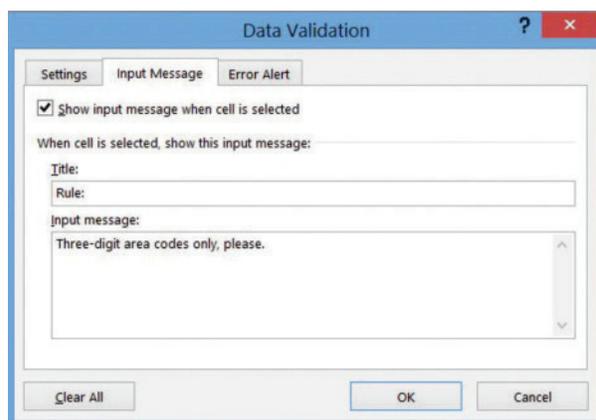
7. In the Data list box, choose **equal to**.
8. Click the **Length** box and type **3**.
9. Click the **Input Message** tab. This tab displays a ScreenTip whenever you select a cell in this specially validated area.
10. Click the **Title** box and type **Rule:**
11. Click the **Input message** box and type **Three-digit area codes only, please**. The Data Validation dialog box should now appear as shown in Figure 9-11.

**CERTIFICATION READY?** 1.3.8

How do you set data validation?

**Figure 9-11**

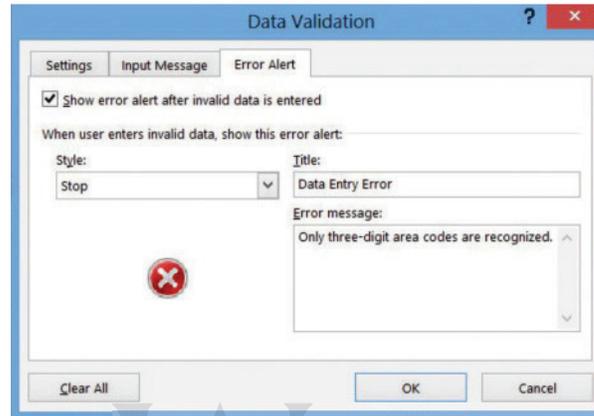
Have Excel notify the user about your validation rule



12. Click the **Error Alert** tab. Excel notifies a user who missed your ScreenTip that the data he has entered is invalid.
13. Click the **Title** box and type **Data Entry Error**.
14. Click the **Error message** box and type **Only three-digit area codes are recognized**. This message is displayed in a dialog box whenever an invalid entry is made in column L. The dialog box should now appear as shown in Figure 9-12.

**Figure 9-12**

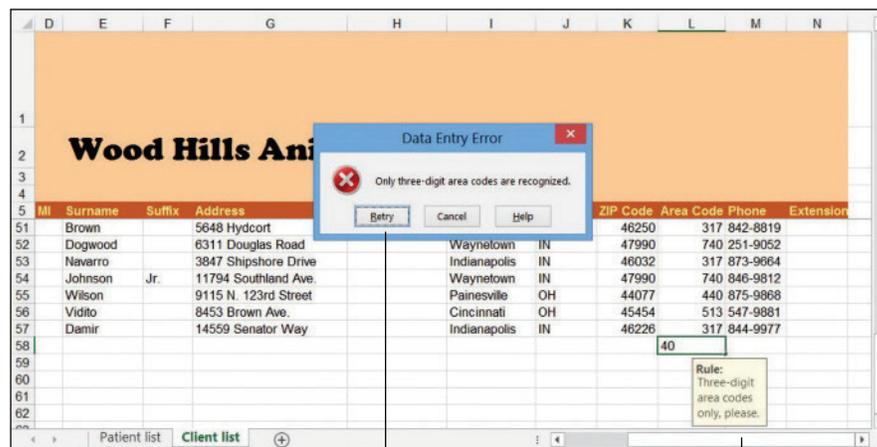
Set up a warning for when the validation rule is violated.



15. Click **OK**.
16. To test the new validation rule, click cell **L58**. You should see the notification message you typed into the Input Message tab.
17. Type **40** and press **Enter**. Excel displays an alert dialog box with the message you created (see Figure 9-13).

**Figure 9-13**

Worksheet with validation rule enforced



Validation error alert

Validation input message

18. Click **Cancel**. The partial entry in cell L58 is erased.

PAUSE. SAVE the workbook and leave it open to use in the next exercise.

**Take Note**

Excel's validation rules pertain to only new data as you enter it into the workbook, not to data that existed in the workbook prior to creating the rules. Don't rely on validation rules to correct errors that might already exist, but to catch any new errors that might arise.

## Allowing Only Specific Values to Be Entered in Cells

A typical piece of information you'll find in a database is often a single letter that represents a characteristic, such as gender or political party affiliation or the work shift to which one is assigned. In data entry, it's easy for someone to slip and enter an invalid character. If that error isn't caught and the person who entered the data is replaced, would her replacement be able to rectify it? You can preempt events like this by building a rule that restricts entry to a handful of valid characters.

### STEP BY STEP

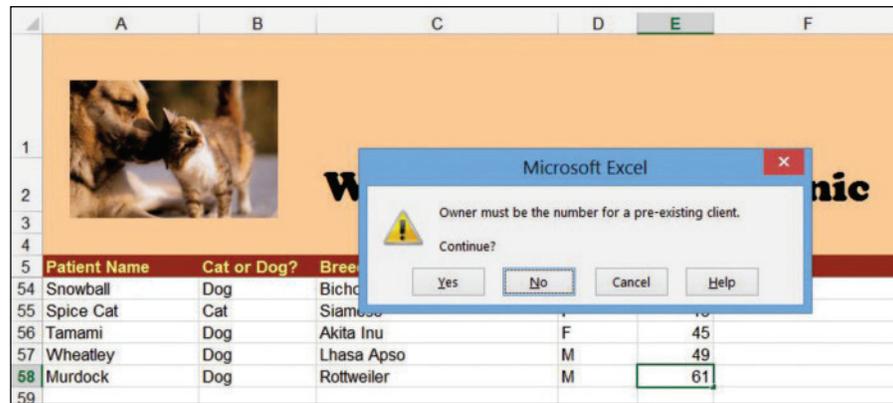
#### Allow Only Specific Values to Be Entered in Cells

GET READY. USE the workbook from the previous exercise.

1. Click the **FILE** tab and select **Save As**. SAVE the workbook in the Lesson 9 folder as **09 Vet Clinic Patients (Active) Solution 2**.
2. Click the **Patient list** tab.
3. Select column **D**.
4. On the **DATA** tab, in the Data Tools group, click **Data Validation**.
5. In the Data Validation dialog box, click the **Settings** tab.
6. In the Allow list box, choose **List**. The Source box appears at the bottom of the dialog box.
7. Click the **Source** box. Type **M,F,N** being careful to include the commas.
8. Uncheck the **Ignore blank** box.
9. Click the **Input Message** tab. Click the **Input message** box and type **Male, Female, or Neutered**.
10. Click **OK**. Now anyone entering a new patient into the database must specify the animal's gender.
11. Select column **E** (Owner #).
12. In the Data Tools group, click **Data Validation**.
13. Click the **Settings** tab. In the Allow list box, click **List**.
14. On the right side of the Source box, click the **Collapse Dialog** button.
15. With the Data Validation dialog box collapsed, click the **Client list** worksheet tab.
16. Select column **A** (Client #).
17. At the end of the Source box, click the **Expand Dialog** button. The full dialog box returns, and the Source box should now read **=Client list'!\$A:\$A**.
18. Unselect the **Ignore blank** and **In-cell dropdown** boxes.
19. Click the **Error Alert** tab. Choose **Warning** from the Style box.
20. In the Error message box, type **Owner must be the number for a pre-existing client**.
21. Click **OK**. Now the Owner # column may contain only numbers for clients who appear in the Client # column of the Client list worksheet.
22. To make sure your new validation rules are working, in the Patient list worksheet, at the bottom of the list, click cell **A58** and attempt to type the following data:  
**Murdock   Dog   Rottweiler   B   61**
23. After you attempt to enter **B** into column D, respond to the error dialog box by clicking **Retry** and by typing **M**.
24. After you attempt to enter **61** into column E, respond to the error dialog box shown in Figure 9-14 by clicking **No** and typing **31**.

Figure 9-14

Excel attempts to enforce a validation rule.



PAUSE. SAVE the workbook and leave it open to use in the next exercise.

### Take Note

It's still feasible for an invalid value to remain in a worksheet after the user has been warned that it's invalid. For example, in the previous step if you were to click Yes instead of No, the value 61 would remain in column E, even though there is no client numbered 61 in column A of the Client list worksheet. Conceivably, this way you can purposefully enter a new canine patient into the list without an owner, if you intend to add the owner's information later.

## Removing Duplicate Rows from a Worksheet

In many databases, it's important that each record (each row of an Excel database table) is unique. If an entry appears twice, Excel might treat them as separate entries even if they somehow (especially by accident) contain identical information. The difficulty then comes when you try to reconcile any other records or subsequent data that might refer to either of these duplicate entries. As a means of cleansing your database, you can have Excel search for duplicate entries and purge them before too much damage is done.

### STEP BY STEP

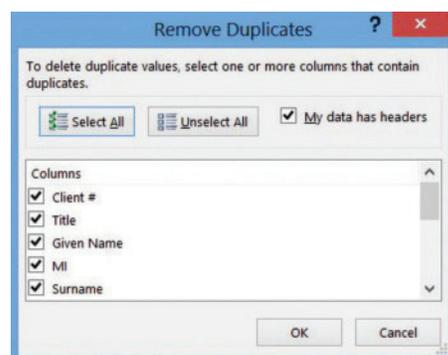
#### Remove Duplicate Rows from a Worksheet

GET READY. USE the workbook from the previous exercise.

1. SAVE the current workbook as **09 Vet Clinic Patients (Active) Solution 3**.
2. Click the **Client list** worksheet tab.
3. Click cell **A58** and in row 58, type the following data in the appropriate columns:  
**Mrs. Mary Jane Brink 704 Fairway Drive Cincinnati OH 255-1655**
4. Select the cell range **A5:N58**.
5. On the DATA tab, in the Data Tools group, click **Remove Duplicates**. The Remove Duplicates dialog box appears (see Figure 9-15).

Figure 9-15

Remove Duplicates dialog box



6. In the Columns list, remove the check beside **Client #**. If duplicate names and addresses appear in the list, it's likely their client index numbers were not duplicated.
7. Leave the **My data has headers** box checked. This way, Excel won't treat row 5 as though it contains data.
8. Click **OK**. Excel responds with a dialog box stating one duplicate value set (the one you just entered) was removed.
9. Click **OK** to dismiss the dialog box. Note the second (lowermost) instance of the duplicate entry was removed, from row 58.

PAUSE. SAVE the workbook and leave it open to use in the next exercise.

## SORTING DATA

### Bottom Line

After you enter data into a data range or, as you see later in this lesson, a formal database table, the number of the row each record appears on doesn't matter at all. In fact, it's important for you to remember that data entries in Excel are not indexed by their row numbers, because they're subject to change. Sorting a data range helps *you* to locate the precise data you need. In a few respects, it can also help Excel to look up certain data for inputs into formulas (see Lesson 5), but for the most part sorting is for your benefit. You might want, for example, to keep people sorted in a table by their surname rather than some arbitrary customer number you won't remember. So when you enter a new customer whose surname begins with something earlier than "Z," you might find it easier to enter the name at the bottom of the list, and then resort alphabetically. This way, you don't have to manually insert a blank row in the middle of the worksheet, at the appropriate alphabetical location.

### Sorting Data on a Single Criterion

You've probably heard the word "criteria" more often than its singular form, **criterion**. Both words relate to elements that are referred to in the course of executing a function. For instance, the White Pages of a telephone directory is sorted by phone owners' last names (or rather, in this more culturally expansive society, by their surnames). The surname is one criterion of the sort. Because many people share the same surname, lists of surname-sharing phone owners are then sorted by their first names (given names), and then by their middle initials when they're used. This leads to three different criteria for such a sort. When individuals in a database are indexed by number, however, and that number is guaranteed to be unique, it forms a single criterion for a common sort operation.

## STEP BY STEP

### Sort Data on a Single Criterion

GET READY. USE the workbook from the previous exercise.



#### Another Way

You can also quickly sort the data in a range in alphabetical order, even without selecting the entire range first, by right-clicking one cell in the column you want to sort, clicking Sort, and then clicking Sort A to Z (or Sort Smallest to Largest).

1. SAVE the current workbook as **09 Vet Clinic Patients (Active) Solution 4**.
2. In the **Patient list** worksheet, click cell **E6**. Note this is the top row of the Owner # column and its entries are all numerical.
3. Hold the **Shift** key down while clicking cell **A58**. This selects the entire range you wish to sort.
4. On the DATA tab, in the Sort & Filter group, click the **Sort Smallest to Largest** button (with A on top of Z, and an arrow pointing down). The list is now sorted in ascending numerical order (despite the presence of the alphabet on the button) by Order #, which was the first column you clicked in when selecting the range.
5. Click cell **A6**.
6. Hold the **Shift** key down while clicking cell **E58**.
7. Click the sorting button again, whose ScreenTip is now the **Sort A to Z** button (because you're sorting alphanumeric text). This time, the list is sorted by Patient Name, and

again, the first column you clicked in when selecting the range. Murdock the Rottweiler, which you previously added to row 58, now appears on row 45.

**PAUSE.** SAVE the workbook and leave it open to use in the next exercise.

**Take Note** The Sort A to Z button (also known as Sort Smallest to Largest) and Sort Z to A button (also known as Sort Largest to Smallest) assume that the column you wish to use as your sorting criterion is the one that contains the active cell. In selecting a range, whether you hold down Shift to select the opposite corner (as you did in this exercise) or whether you drag the pointer from one corner to the opposite corner, the (or Sort Smallest to Largest) the cell that you clicked on first.



### Troubleshooting

Before sorting a range, make sure you select the entire range first, including the rightmost column(s). Excel leaves any contents outside the selected sort range exactly as they are, which leaves you with out-of-order contents should you fail to select the entire width of the range.

## Sorting Data on Multiple Criteria

A proper database containing records of people divides each element of their names into, at the very least, last and first names, and preferably includes optional elements such as middle initials and prefixes and suffixes. For this reason, any time you sort a database, range, or table by names, you want to sort by multiple criteria.

### STEP BY STEP

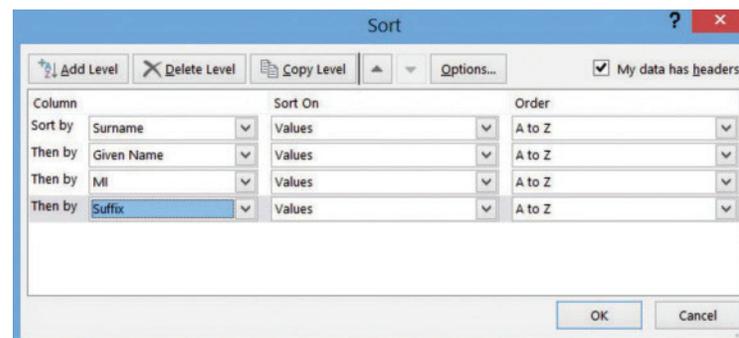
#### Sort Data on Multiple Criteria

GET READY. USE the workbook from the previous exercise.

1. Click the **Client list** tab.
2. Select the range **A5:N57**.
3. Name the range **Clients**.
4. On the DATA tab, in the Sort & Filter group, click **Sort**. The Sort dialog box appears.
5. In the Sort by list box, under Column, choose **Surname**.
6. Click **Add Level**.
7. In the Then by list box that appears, choose **Given Name**.
8. Click **Add Level**.
9. In the next Then by list box, choose **MI** (middle initial).
10. Click **Add Level** again.
11. In the next Then by list box, choose **Suffix**. The dialog box should now appear as depicted in Figure 9-16.

**Figure 9-16**

Sort dialog box



12. Leave **My data has headers** checked, so that Excel won't treat the headers row as a data entry.

13. Click **OK**. The clients list is now sorted alphabetically, with people sharing the same surname sorted alphabetically by first name. Although the client numbers appear all out of sort, the data is unchanged and the database itself retains its full integrity.

PAUSE. SAVE the workbook and leave it open to use in the next exercise.

## Sorting Data Using Cell Attributes

In Lesson 6, you saw how Excel can apply special formatting to cells based on their ascertained contents (for example, shading a temperature column extra-red when the number climbs above 90 degrees). Excel is capable of sorting records based on the conditional formatting that is applied to their cells. This is important because Excel does not have a “conditional sort” feature, where you create a rule or a formula that Excel evaluates to group or arrange rows. Instead, you create rules that apply specific formats or graphics to cells based on their contents. Then Excel can sort and group those records whose cells have these special formats applied to them.

### STEP BY STEP

#### Sort Data Using Cell Attributes

GET READY. USE the workbook from the previous exercise.

1. On the Patient list worksheet, select column **E**.
2. Right-click the column, and then click **Insert** in the shortcut menu.
3. With column **E** selected, on the DATA tab, in the Data Tools group, click **Data Validation**.
4. In the Data Validation dialog box, click **Clear All**. Click **OK**.



#### Troubleshooting

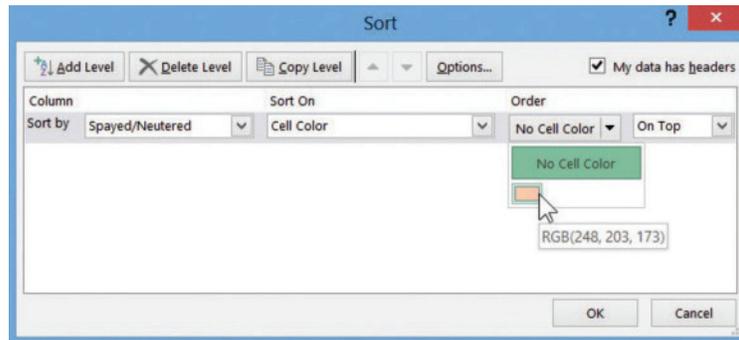
When creating a new column to the right of one governed by a data validation rule, the new column acquires that same rule even if it's intended for a different purpose. To clear this rule, select the new column, bring up the Data Validation dialog box, and click Clear All as demonstrated previously.

5. Click cell **E5** and type **Spayed/Neutered**.
6. In column E, type **S** for the following row numbers: 7, 22, 23, 26, 35, 38, 47, and 51.
7. In column E, type **N** for the following row numbers: 6, 8, 9, 10, 11, 13, 14, 16, 17, 18, 20, 21, 25, 28, 30, 31, 32, 33, 36, 37, 39, 42, 43, 44, 46, 48, 49, 50, 53, 55, 56, 57, and 58.
8. Select column **E**.
9. On the DATA tab, in the Data Tools group, click **Data Validation**.
10. In the Data Validation dialog box, click the **Settings** tab. Under Allow, choose **List**.
11. In the Source box, type **N,S**.
12. Click the **Input Message** tab. In the Input message box, type **S = Spayed, N = Neutered**. Click **OK**.
13. Select the range **E6:E100**. On the HOME tab, in the Styles group, click **Conditional Formatting**. Click **New Rule**.
14. In the New Formatting Rule dialog box, choose **Format only cells that contain** in the Select a Rule Type list.
15. In the list box, under Format only cells with, choose **No Blanks**.
16. Click **Format**.
17. In the Format Cells dialog box, click the **Fill** tab. Choose the sixth color swatch from the left in the third row. Click **OK**.
18. Click **OK**. Now both spayed and neutered animals should appear shaded.
19. Select the range **A5:F58**. Name the range **Patients**.
20. On the DATA tab, in the Sort & Filter group, click **Sort**.
21. In the Sort dialog box, in the Sort by list, choose **Spayed/Neutered**.
22. In the Sort On list, choose **Cell Color**.

23. Click the down arrow next to **No Cell Color**. As Figure 9-17 shows, the list box that appears shows only those colors that are actually in use for conditional formatting—in this case, only one swatch. Click the color swatch.

Figure 9-17

Sort dialog box showing conditional format color choice



24. Click **OK**. The sorted worksheet should now appear as shown in Figure 9-18. All the “N” and “S” animals are grouped together at the top, with the two types mingling among each other. All the non-operated-on animals are bunched toward the bottom.

Figure 9-18

Worksheet with conditional format-based sort applied

	A	B	C	D	E	F	G
1	[Image of a dog]		<b>Wood Hills Animal Clinic</b>				
2							
3							
4							
5	Patient Name	Cat or Dog?	Breed	Sex	Spayed/ Neutered	Owner #	
36	Nikki	Cat	DSH	F	N	4	
37	Pearl	Dog	Pug	F	S	8	
38	Pyewackett	Cat	DSH	M	N	51	
39	Rahjah	Cat	Persian	M	N	50	
40	Rayna	Dog	Great Dane	F	N	11	
41	Sagwa	Cat	Siamese	F	S	47	
42	Shamrock	Dog	Labrador Retriever	M	N	20	
43	Snowball	Dog	Bichon Frise	M	N	21	
44	Spice Cat	Cat	Siamese	F	N	13	
45	Tamami	Dog	Akita Inu	F	N	45	
46	Wheatley	Dog	Lhasa Apso	M	N	49	
47	Bogart	Cat	British SH	M		48	
48	Demi	Dog	Newfoundland	F		34	
49	Gizmo	Dog	Yorkshire Terrier	M		17	
50	Hazel	Cat	DSH	F		37	
51	Kahlua	Cat	Russian Blue	F		38	
52	Kayto	Cat	Siamese	F		43	
53	Kwanzaa	Cat	DSH	M		34	
54	Mai Tai	Cat	Himalayan	M		42	
55	Maimoto	Cat	Korat	M		39	

PAUSE. SAVE the workbook and leave it open to use in the next exercise.



### Troubleshooting

Any table you intend for Excel to sort must not contain merged cells (see Lesson 6). For Excel to be able to exchange cell contents between positions evenly, each row must have an identical number of cells. Each of the cells in a column may be formatted differently, though their widths may not vary.

### FILTERING DATA

#### Bottom Line

When you search for information online, what you expect to happen is for the search engine to return the most relevant data to your search at the top of the list. Similarly with any database, when you make a request or a query for just the records that meet particular criteria, you expect to

see only the relevant data, and for irrelevant or non-matching data to be filtered out. With Excel, there's a way for you to formally specify the boundaries of your database table—to say, “*This* part of my worksheet is to be treated like a database”—and to then have Excel **filter** out just those rows that don't pertain to what you're searching for. This does not change the database, and you don't delete any rows with a filter. You just hide them temporarily.

## Using AutoFilter

An **AutoFilter** is the quickest means for you to set up a table so that it displays only rows that meet simple criteria (for example, just the clients who live in-state, or just the clients who have signed up for monthly newsletters). If the criteria for your search involves information that is readily assessable through a simple read of the existing data in the cells, you can use an AutoFilter to set up your search with very little trouble. There are ways for you to set up more complex, advanced filters that replicate data to a separate location (often a new worksheet) using advanced criteria based on formulas. But for simple assessments of the data, an AutoFilter requires much less effort. This converts the headings row of your table into a set of controls, which you then use to choose your criteria and select the data you want to see.

### STEP BY STEP

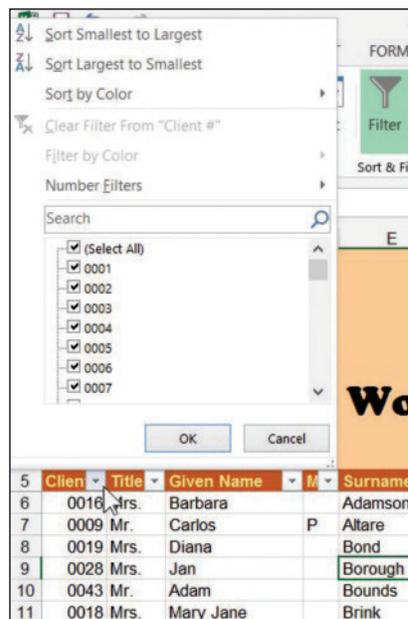
#### Use AutoFilter

GET READY. USE the workbook from the previous exercise.

1. SAVE the current workbook as **09 Vet Clinic Patients (Active) Solution 5**.
2. Click the **Client list** worksheet tab. In the Name box, type **Clients** and press **Enter**. Excel highlights the data range for the Clients table.
3. On the DATA tab, in the Sort & Filter group, click **Filter**. Excel adds down arrow buttons to the field names in all of the columns in the list.
4. Click the down arrow beside the **Client #** heading in column A. Excel displays the AutoFilter menu shown in Figure 9-19.

Figure 9-19

AutoFilter menu for a numeric column

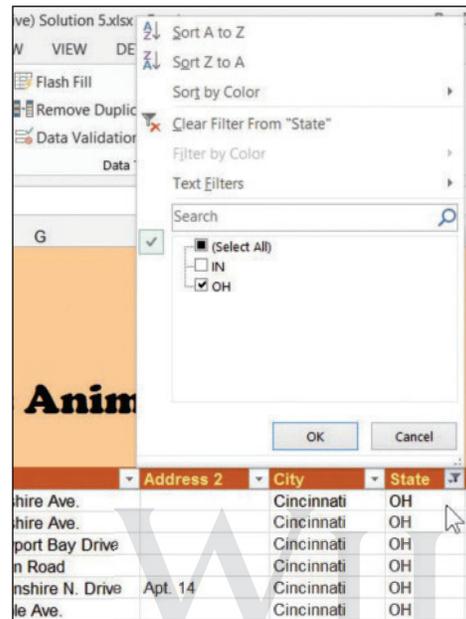


5. To sort the table by client number, click **Sort Smallest to Largest**. This gives you a shortcut for sorting that bypasses the menu.

6. To show just the clients with addresses in Ohio, click the down arrow beside **State**. In the AutoFilter menu that appears (shown in Figure 9-20), uncheck the **(Select All)** box to clear all check boxes, and then check **OH** and click **OK**.

Figure 9-20

AutoFilter menu for a text column

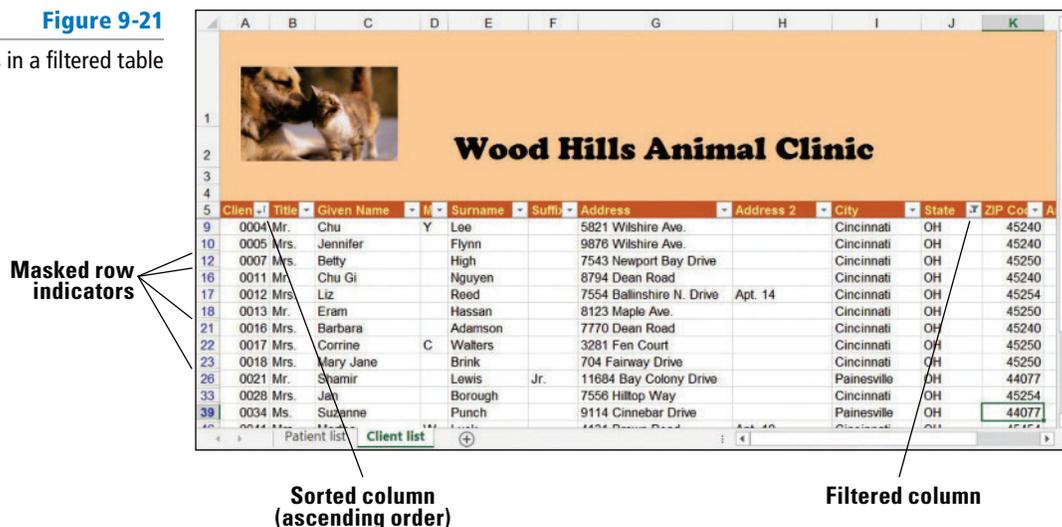


PAUSE. SAVE the workbook and leave it open to use in the next exercise.

When an AutoFilter is active, so that you see filtered results rather than the complete table, Excel applies special notation to the AutoFilter buttons and to the row numbers. As Figure 9-21 shows, the button for the column used in the sort now contains a long up-arrow, whereas the button for the column used in the filter contains a funnel symbol, like the thing you pour motor oil through.

Figure 9-21

Symbols in a filtered table



Also, notice the row numbers are colored blue and are not consecutive. If you look closely, you'll see that where nonmatching rows are hidden, Excel puts a double-border between the numbers for matching rows—for instance, between rows 18 and 21 and between 47 and 55.

## Creating a Custom AutoFilter

A custom AutoFilter uses a rule that you create, instructing Excel how to evaluate the entries in each row. The result of that evaluation determines whether rows are displayed or filtered out. With a simple AutoFilter, Excel looks for contents based on actual samples from the column. For example, with the previous task, Ohio (OH) and Indiana (IN) were choices because both were featured in the State column; no other states were listed. By contrast, with a custom AutoFilter, you can devise a rule instructing the worksheet to display only records whose values in one given column are above or below a certain amount. Essentially, your rule tells Excel to compare each value in the column against something else. Whether that value is displayed depends on the terms of the comparison—is it equal? Higher? Lower? Is it among the ten highest or lowest? The custom AutoFilter is among Excel's most powerful tools.

### STEP BY STEP

#### Create a Custom AutoFilter

GET READY. USE the workbook from the previous exercise.

1. Insert a new column into the Patient list worksheet, between the existing columns **D** and **E**.
2. Clear the validation rules from the new column **E**.
3. Add the title **Hepatitis inoculation** to row 5.
4. Type the following dates into the cells shown:
 

E9	1/18/2012
E12	8/16/2011
E14	5/15/2012
E19	3/1/2009
E23	10/19/2010
E27	7/5/2012
E33	2/2/2011
E38	8/15/2012
E39	7/14/2011
E44	9/1/2012
5. Select the **Patients** data range. The range should have automatically stretched to include the new column.
6. On the **DATA** tab, in the **Sort & Filter** group, click **Filter**.
7. Click the down arrow beside **Hepatitis inoculation**. In the menu, click **Date Filters**, and then click **Custom Filter**. The Custom AutoFilter dialog box opens.
8. In the first list box just below **Hepatitis inoculation**, choose **is before**. In the box to the right, type **1/1/2012**.
9. Click the **Or** button between the two rows of list boxes.
10. In the second list box below **Or**, choose **equals**. Leave the list box blank (literally meaning "blank" or "nothing"). The dialog box should now appear as depicted in Figure 9-22.

**Figure 9-22**

Custom AutoFilter dialog box



11. Click **OK**. After the dialog box disappears, Excel filters out all entries in the patient list where the patient is known to have had a hepatitis inoculation in 2012 or later. What

remains are both the animals known to have been inoculated in 2011 or earlier, or whose inoculation dates are not known.

12. Click the filter button beside Hepatitis inoculation again. In the menu, click **Date Filters**, and then click **Custom Filter**.
13. In the second list box that currently reads equals, choose the blank entry at the top of the list. The box should now be empty.
14. Click **OK**. The list should now show only the five animals known to have been inoculated in 2011 or earlier (see Figure 9-23).

**Figure 9-23**

Worksheet with custom filter applied

Patient Name	Cat or Dog	Breed	Sex	Hepatitis inoculation	Spayed/Neuter	Owner
Bon Chat	Cat	Himalayan	F	8/16/2011	N	44
Harlow	Cat	DSH	F	3/1/2009	S	44
K'ao Kung	Cat	Balinese	N	10/19/2010	N	28
Marshall	Cat	Maine Coon	M	2/2/2011	N	31
Rahjah	Cat	Persian	M	7/14/2011	N	50

15. Click the filter button beside **Hepatitis inoculation** again. In the menu, choose **Clear Filter from "Hepatitis inoculation"**.

PAUSE. SAVE the workbook and leave it open to use in the next exercise.

### Filtering Data Using Cell Attributes

When conditional formatting is applied to a column of cells, that formatting is something that Excel can “get a handle on.” In other words, it’s just as good as a value in giving the filtering system something to look for. So you can easily have a filter hide rows where cells in a column don’t have a particular format, such as a shaded background or a font color.

## STEP BY STEP

### Filter Data Using Cell Attributes

GET READY. USE the workbook from the previous exercise.

1. In the Patient list worksheet, click the **Spayed/Neutered** button down arrow.
2. In the menu, click **Filter by Color**.
3. In the popup menu, choose the **pink swatch**. Excel now shows only those animals that have been spayed or neutered.

PAUSE. SAVE the workbook and leave it open for the next exercise.

### OUTLINING AND SUBTOTALING DATA

#### Bottom Line

Up to this point, you’ve been working with data that’s arranged as tables full of records, where each row represents an entry of related elements. Another purpose for worksheets is to serve as lists of values and their related descriptions. Imagine an inventory list showing the sale price of items arranged by department. In its most basic form, you need only two columns: one for the description and the other for the price. For this list to be useful to you, however, you’ll want a way to break

down items into their respective departments—for example, by listing their location on the shelf. These descriptive categories help subdivide data into groups, and then **collapse** those groups into single-row headings called **outlines**. Excel uses outlines to generate reports that provide you with meaningful data about the items in each group collectively. The most important, and probably the most frequently used of these reports shows you **subtotals** for the values that are grouped together.

## Grouping and Ungrouping Data

The simplest form of data **grouping** involves taking a row of cells that have one related attribute, clustering them together, and then collapsing the cluster like a folder that can be reopened later. The point of doing this is to reduce the size of long reports to make them easier to read. The trick to doing this properly is leaving behind one row, after the group is collapsed, to represent the group as a whole so someone reading the worksheet will know what to open later.

Whenever you group rows together or perform an operation (such as auto-outlining or auto-subtotaling) in which groups are automatically created, Excel adds controls next to the row and column headings. Excel calls these controls **outline symbols**.

Boxes marked with minus and plus symbols are placed at the bottom of grouped rows or to the right of grouped columns. Each one acts like a clasp that can collapse or expand the group's contents. In the upper left corner are number buttons that let you show or hide all of the group contents for a particular level. When you have two groups that are just beside one another, you have only two levels: the collapsed view and the expanded one. But you can have groups within groups, and for each grouping level you create, Excel adds another number to this bank of outline symbols.

**Take Note** The rows and columns that you enroll into a group should be those that you do *not* want to see when the group is collapsed. Field name rows that identify cells and total rows that include subtotals should not be included in groups.

### STEP BY STEP

#### Group and Ungroup Data

GET READY. USE the workbook from the previous exercise.

1. SAVE the current workbook as **09 Vet Clinic Patients 130114 Solution**. Grouping data is best reserved for final reports and not for active databases where new data might be entered later.

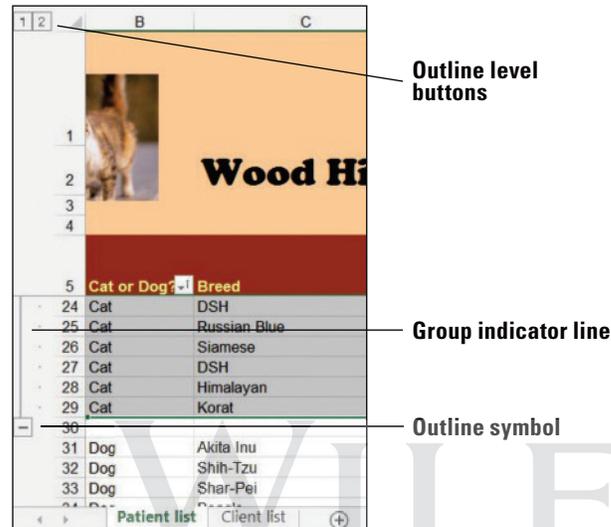
**Take Note** Enrolling a set of records into a group changes the behavior of AutoFilters that might incorporate that group. For example, when you try to sort a column, only the records that are not members of a group are sorted. Once records are grouped, their order is fixed and their usefulness as parts of an active database is reduced, especially if you add subtotal rows to the middle. For this reason, you should reserve grouping and outlining for workbooks that are presented as final (unchanging) reports for a particular point in time.

2. With the Patient list worksheet active, on the DATA tab, in the Sort & Filter group, click **Clear**.
3. Next to Cat or Dog?, click the **down arrow button**. In the menu, click **Sort A to Z**. Now, all the cats are clustered together at the top, and dogs at the bottom.
4. Right-click the heading for row 30, the row where the first dog appears. Click **Insert** in the shortcut menu.
5. Select cell **H30**. Type **Number of cats**.
6. Select cell **G30**. On the HOME tab, in the Font group, click the **Bold** button. This makes this particular number stand out.
7. On the HOME tab, in the Editing group, click the **AutoSum** down arrow. In the menu, click **Count Numbers**, and then press **Enter**. Excel inserts a function into the cell that counts the number of contiguous cells in the column just above it that contains numbers—in this case, the owner numbers for clients.

8. Add a similar function for counting the number of dogs to row 60. (Bypass the validation rule by clicking **Yes** in the dialog box.)
9. Select rows 6 through 29 (all the cats).
10. On the DATA tab, in the Outline group, click the **Group** button. A group indicator line is added to the left of the row markers and an outline symbol on the row just below the end of the group (see Figure 9-24).

Figure 9-24

Worksheet with groups applied

**Another Way**

To collapse all the groups in a worksheet, select the entire worksheet first, and then click Hide Detail in the Outline group of the DATA menu tab. To expand all groups, click Show Detail.

11. Repeat the process in Steps 9 and 10 for the dogs in rows 31 through 59. Format cell G60 as **Bold**. In cell H60, type **Number of dogs**.
12. To collapse the cats group, click the minus box (shown in Figure 9-24) beside row 30, which contains the cats count. The control becomes a plus box, indicating that when you click on it, it expands to show hidden rows.
13. Collapse the dogs group with the minus box in row 60. The worksheet now appears fully collapsed (see Figure 9-25).

Figure 9-25

Worksheet with collapsed groups



14. Click the **Select All** button. On the DATA tab, in the Outline group, click **Show Detail**.
15. Select columns B through F.
16. In the Outline group, click the **Group** button. A new column group is created.
17. Click the minus box over column G to collapse the column group. Click the plus box that takes its place to expand it.
18. Select columns B through G.
19. In the Outline group, click the **Ungroup** button. The columnar group disappears.

SAVE and CLOSE the workbook. Leave Excel open for use in the next exercise.

### Auto-Outlining Data

Grouping data is an easy process when you have only a few groups in your worksheet that really matter, such as cats and dogs. For a complex report, such as a balance sheet with assets and liabilities broken down into departments and sub-departments, the task gets much more tedious. For this reason, Excel has offered to make things somewhat simpler. Suppose you inserted total value cells along the bottom rows of related cells, or along the right column beside related cells—or perhaps both. You probably need to do this anyway for a formal balance sheet, or for a table with names of salespeople in rows and sales for days of the week in columns—here, you total for each salesperson along the right column, and for each day along the bottom row. Excel can detect when and why you set up your worksheet like this, so when you **auto-outline** a table or a worksheet full of tables, it creates the groups automatically and spares you the trouble.

#### STEP BY STEP

#### Auto-Outline Data



GET READY. OPEN the *09 Critical Care Expenses* workbook for this lesson.

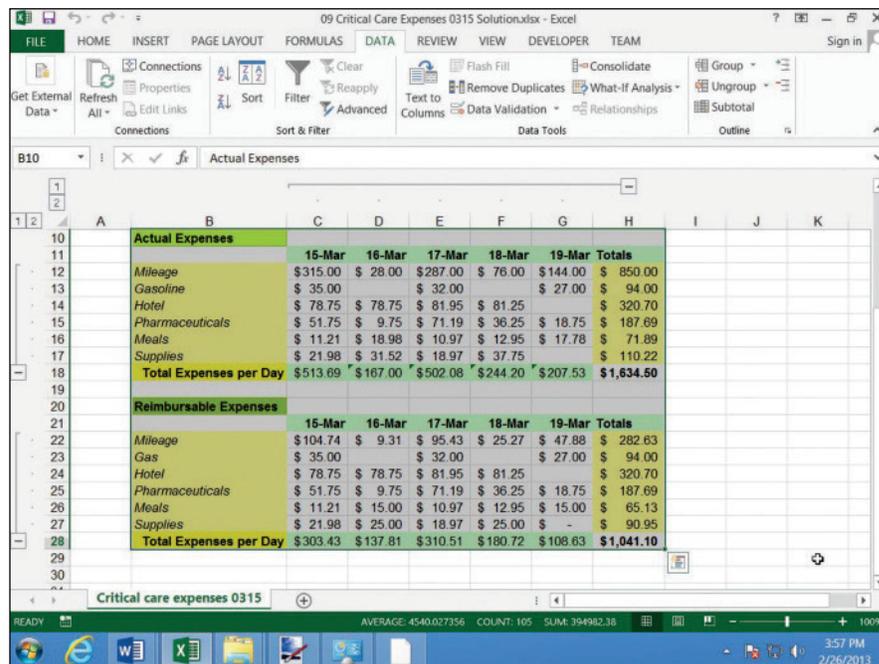
1. SAVE the workbook in the Lesson 9 folder as *09 Critical Care Expenses 0315 Solution*.
2. Select cell **H18**. On the HOME tab, in the Font group, click the **Bold** button. Then, in the Editing group, click the **AutoSum** button and press **Enter**. The grand total appears as bold in the cell.
3. Repeat the grand total process for cell **H28** and apply **Bold** to the cell.
4. Select the cell range **B10:H28**, covering both groups of expenses in their entirety.
5. On the DATA tab, in the Outline group, click the down arrow next to **Group**. In the menu, click **Auto Outline**. As Figure 9-26 shows, Excel automatically groups rows 12 through 17 and rows 22 through 27, having spotted the Total Expenses row along the bottom of each cluster. Excel also groups together the columns for March 15 through 19, having spotted the weekly totals columns along the right.

CERTIFICATION READY? 2.3.5

How do you create outlines?

Figure 9-26

Outlined worksheet



SAVE the workbook and LEAVE Excel open for the next exercise.

## Collapsing Groups of Data in an Outline

When you create an outline around groups of data in a worksheet, outline symbols appear for each group of rows and columns. You use these devices to collapse and then expand the outline, thus switching between summary and detailed views of the worksheet.

### STEP BY STEP

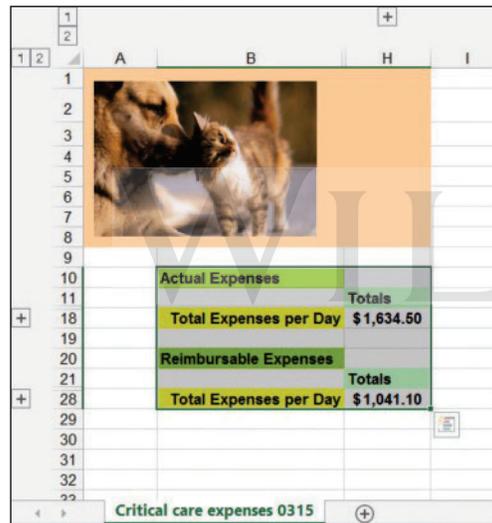
#### Collapse Groups of Data in an Outline

GET READY. USE the workbook from the previous exercise.

1. Click all three minus boxes to collapse their respective groups. The worksheet should now appear shrunken to just the grand totals cells you created with the appropriate labels (see Figure 9-27).

**Figure 9-27**

Outlined worksheet with collapsed groups



2. Click any of the plus boxes (which replaced the minus boxes) to expand the group to which it's attached.
3. To remove the outline entirely, on the DATA tab, in the Outline group, click the **Ungroup** button arrow. In the menu, click **Clear Outline**.

SAVE and CLOSE the workbook. Leave Excel open for the next exercise.

**CERTIFICATION  
READY?** 2.3.6

How do you collapse groups of data in an outline?

## Subtotaling Data in Outlines

Suppose a worksheet serves as a report of certain activity that takes place on given days with respect to specific divisions of the company in particular regions of the country. These three categories represent levels of information. When you sort a worksheet so that these levels are in a precise order, as you've already seen how to do, then Excel can accept each of these levels as tiers in an outline. An outline gives you the complete summary while hiding the details until you request them.

### STEP BY STEP

#### Subtotal Data in Outlines



GET READY. OPEN the **09 Server Usage Stats** workbook for this lesson.

1. SAVE the workbook in the Lesson 9 folder as **09 Server Usage Stats 130831 Solution**.
2. Select the range **A5:G140**.
3. On the DATA tab, in the Sort & Filter group, click **Sort**.

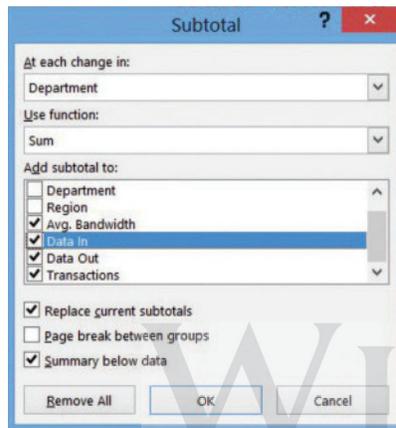
**CERTIFICATION  
READY? 2.3.7**

How do you insert  
subtotals?

4. In the Sort dialog box, in the Sort by line, choose **Date, Oldest to Newest**. Click **OK**.
5. On the DATA tab, in the Outline group, click **Subtotal**. The Subtotal dialog box appears.
6. In the At each change in list box, click **Department**.
7. If necessary, in the Use function list box, choose **Sum**.
8. In the list of columns marked Add subtotal to, select the boxes for **Avg. Bandwidth**, **Data In**, **Data Out**, and **Transactions**.
9. Check the **Summary below data** and **Replace current subtotals** check boxes, if necessary. The dialog box should now appear as depicted in Figure 9-28.

**Figure 9-28**

Subtotal dialog box



10. Click **OK**. Excel inserts subtotal rows for each company division, grouping together data consumption values for all three corporate regions. It places each of these division row clusters into groups. It then creates a broader group for the entire range and adds a grand total row at the bottom. The result is a subtotal-endowed worksheet with a three-tier outline (see Figure 9-29).

**Figure 9-29**

Automatically subtotaled  
worksheet with three-tier  
outline

1	2	3	A	B	C	D	E	F	G	H
					<b>Usage statistics</b>					
			Hosting - Management - Warehousing		Giant Frog Supermarkets - District # 0855					
					Period of 1 July - 31 August 2013					
			Date	Department	Region	Kb/sec Avg. Bandwidth	Mb Data In	Mb Data Out	Transactions	
6	1 Jul		Accounting	Central		214.7	3169	21661	81355	
7	1 Jul		Accounting	North		114.5	2601	12359	64135	
8	1 Jul		Accounting	South		84.6	1684	9467	46810	
9			Accounting Total			413.8	7454	43487	192300	
10	1 Jul		Distribution	Central		12.4	674	943	4121	
11	1 Jul		Distribution	North		38.6	1551	2064	9102	
12	1 Jul		Distribution	South		16.4	876	1643	8460	
13			Distribution Total			67.4	3101	4650	21683	
14	1 Jul		Merchandising	Central		51.6	495	2943	9103	
15	1 Jul		Merchandising	North		56.5	518	3106	10312	
16	1 Jul		Merchandising	South		48.5	406	2674	8513	
17			Merchandising Total			156.6	1419	8723	27928	
18	1 Jul		Point of sale	Central		109.9	1974	15464	65467	
19	1 Jul		Point of sale	North		213.9	3164	26492	103454	
20	1 Jul		Point of sale	South		184.0	2649	19733	78669	
21			Point of sale Total			507.8	7787	61689	247590	
22	1 Jul		Purchasing	Central		89.1	1064	3946	29431	
23	1 Jul		Purchasing	North		110.4	1304	6103	35406	
24	1 Jul		Purchasing	South		59.8	964	4766	25164	
25			Purchasing Total			259.3	3332	14815	90001	
26	8 Jul		Accounting	Central		205.6	3024	20461	79404	
27	8 Jul		Accounting	North		106.4	2564	11643	62164	
28	8 Jul		Accounting	South		88.5	1794	9501	46795	
29			Accounting Total			400.5	7382	41605	188363	

SAVE and CLOSE the workbook. Leave Excel open for the next exercise.

**Take Note** When you remove an outline from an automatically subtotaled range, the subtotal rows that Excel inserted automatically remain. So to return a worksheet to its pre-subtotaled state, you must delete each subtotal row manually.

## SETTING UP DATA IN A TABLE FORMAT

### Bottom Line

Up to now in this lesson, you might think most of the data you used in worksheets has been, for all intents and purposes, tables. How could they not be tables? They have headings along the top, they have unique entries that identify rows, and some even have indexes. From a typesetting perspective, they're certainly tables. But Excel has a special relevance for a class of data that it formally calls a **table**. When you format a single, rectangular range with a row of headers along the top, and columns beneath the headers, converting that range to a table enables Excel to treat it like a database. Processing a table's data is faster, including for sorting. And Excel can apply an elaborate **quick format** that makes the table look sleek and professional. When you compose formulas, formal tables let you refer to field names explicitly (for example, "Price" and "Markup") rather than by their cell reference (for example, B7).

### Formatting a Table with a Quick Style

Let's be honest: Big worksheets are hard to read. When you look at a well-laid out document that contains a table full of figures, you can see how typesetters apply graphic tools to make the table easier to read—tools such as alternating bands across every other line. You can (meticulously) apply such a style to a normal range, but what would happen when you sorted the range? The cell formatting would move along with the cells, and your alternating bands would be jumbled up. By denoting which part of a worksheet is a table, Excel can apply some formatting independently of contents. So a properly banded table *stays* properly banded when you sort the table, or when you insert and delete rows.

## STEP BY STEP

### Format a Table with a Quick Style



GET READY. OPEN the **09 Pet Pharma Sales** workbook for this lesson.

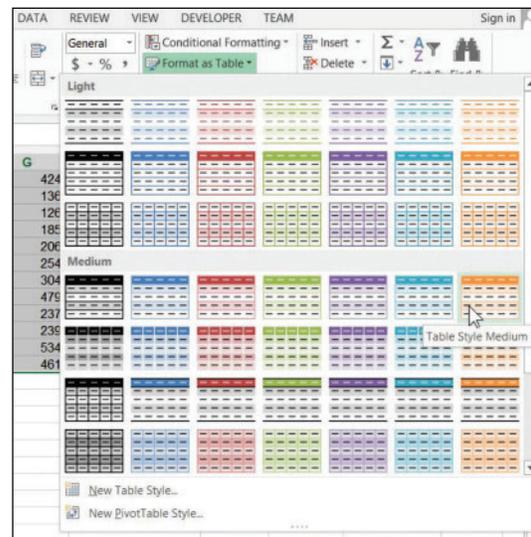
1. SAVE the workbook in the Lesson 9 folder as **09 Pet Pharma Sales August Solution**.
2. In the August Sales worksheet, select the data range **A6:K93**.
3. On the HOME tab, in the Styles group, click **Format as Table**. Excel brings up a colorful menu full of sample layouts (see Figure 9-30).

**Figure 9-30**

Table format menu

**CERTIFICATION  
READY?** 3.2.1

How do you apply styles to tables?



- Click the sample in row 4, column 7 (**Table Style Medium 7**). The Format As Table dialog box appears (see Figure 9-31).

Figure 9-31

Format As Table dialog box

**Take Note**

You can change the format of a table at any time using the Format as Table command. You only see the Format As Table dialog box the *first* time you format a table, which effectively changes a standard range to a table. Afterwards, you only need to select a cell inside the table to tell Excel which table you want to reformat.

**CERTIFICATION  
READY?** 3.2.2

How do you band rows and columns?

- Because the cell reference under Where is the data for your table? is accurate, don't make any changes and click **OK**. Excel converts the data range into a formal table and applies the style you chose, which includes automatically banded rows that maintain their banding even when rows become sorted. AutoFilter controls are also added to the field names row.
- To automatically boldface the rightmost column in the table (Total Sales), click any cell inside the table. On the DESIGN tab, in the Table Style Options group, click **Last Column**.

**Take Note**

The Table Style Options group also contains an option for banding columns instead of rows. Uncheck Banded Rows from this group, and then check Banded Columns.

SAVE the workbook and LEAVE it open for the next exercise.

**Take Note**

When you scroll down a data table so that the field names row disappears, as long as the active cell stays within the table area, the usual column headings (A, B, C, and so on) are replaced with the complete field names, as Figure 9-32 depicts. The AutoFilter buttons also move to the headings row. This way, you don't need to freeze the field names row in place to keep the names themselves visible. When you move the active cell outside the table area, the standard column headings reappear.

Figure 9-32

Field names display in the headings row.

Drug	For use on	To treat	No. of Cases	Items per Case	Loose Items	Items on Hand	Items Remaining	No. Sold	Item Price	Total Sales
27 Deramaxx	Anti-inflammatory	Dog	10	12	8	128	67	61	\$ 82.50	\$ 3,812.00
28 Droncit Tapewormer	De-wormer	Dog or Cat	6	100	88	888	432	256	\$ 28.95	\$ 7,411.20
29 Droncil Alwormer	Cat		8	100	98	898	318	580	\$ 8.50	\$ 4,930.00
30 Droncil Alwormer	De-wormer	Puppy	6	25	9	159	127	32	\$ 9.50	\$ 304.00
31 Droncil Alwormer	De-wormer	Dog	8	18	7	151	131	20	\$ 68.30	\$ 1,366.00

Field names replace column labels

## Removing Styles from a Table

If you're at a point where you want to create a custom style for your table, or for multiple tables in your workbook, you might want to begin by removing the formatting that's already present. The table style removal feature in Excel is a bit buried and needs to be uncovered to be used.

## STEP BY STEP

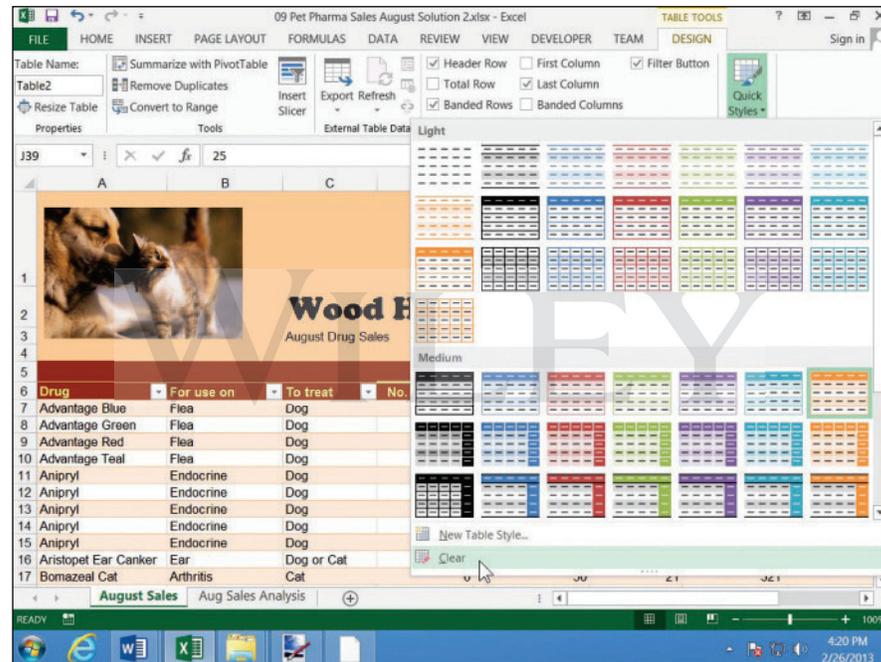
## Remove Styles from a Table

CERTIFICATION  
READY? 3.2.4How do you remove styles  
from tables?

GET READY. USE the workbook from the previous exercise.

1. SAVE the workbook in the Lesson 9 folder as **09 Pet Pharma Sales August Solution 2**.
2. In the August Sales worksheet, click anywhere inside the table.
3. On the DESIGN tab, in the Table Styles group, click the **More** down arrow button. (Or if you see only the **Quick Styles** button, click that instead.)
4. In the menu, as indicated in Figure 9-33, click **Clear**. The automatic formatting is removed.

Figure 9-33

Table Styles menu on the  
DESIGN tab

## Troubleshooting

There are two places to find the table styles menu in Excel. One is under the Format as Table button on the HOME tab. The other is in the Table Styles group of the DESIGN menu tab. At first, both menus look the same. But only the one on the DESIGN tab has the Clear button to remove styles from a table.

5. To change the table style to something that contrasts against the others in this series, bring up the Quick Styles menu again, and this time, choose **Table Style Light 6** (upper right corner).
6. To automatically apply boldface to the rightmost column, in the Table Style Options group, ensure **Last Column** is checked. To do the same for the leftmost column, check **First Column**.

SAVE the workbook and LEAVE it open for the next exercise.

## Defining a Title for a Table

Up to now, you've seen some nuanced and subtle differences between tables and ordinary data ranges. The one big difference between the two lay with the table's ability to be given a title, so that it and its constituent columns can be referred to by name instead of by reference location. This changes everything when you write formulas that refer to parts of the table, because now you don't have to know where they're located, just what they're called.

Once a table is given a title, all the names of its columns can be used in place of cell references in a formula. The result is not only a formula that's easier to conceive, but easier to read and even easier to type. So instead of an absolute cell reference such as `$B$2:$B$55` (which starts on the second row, of course, because the headers are always on the first row), you can use a reference such as `Inventory[Sales Price]`. Excel already knows not to treat the first row as values, and whenever records are added to the table, the results of the formula are adjusted without the formula itself even having to change its appearance.

The syntax of a reference to fields in an Excel table is as follows:

**TableName** [**FieldName**]

Component	Meaning
TableName	An arbitrary name you give to a table, in place of its reference as a range. You can have more than one table on a worksheet, although it might not always be convenient. Examples: Customers, Back Orders, Comics issues
FieldName	The field name from the header row of the table. The name refers to the set of all cells that comprise the named column in the table. You do not need to specify the start and end cell. The field name is always denoted with [square brackets]. Examples: Surname, Issue date, Sale price

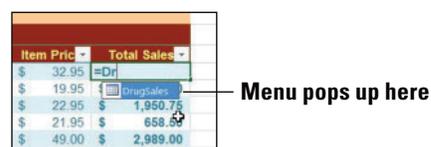
Note: Excel recognizes four constants that refer to the same general area of a table, which you may use here when applicable to replace the field name:

#All	The set of all cells in the table
#Data	The set of all cells that contain data, excluding the header row at the top and any total or subtotal rows that might appear at the bottom
#Headers	The set of all cells in the first row in the table
#Totals	The set of all cells where totals appear, usually the rightmost column of the table where a SUM function is employed

When you type a table-style reference inside a formula, Excel gives you a shortcut. After you type the second character of the table name, Excel displays a list of names you can add to the formula (including named ranges). Figure 9-34 shows you what it looks like. Instead of typing in the rest of the name, you can use the arrow keys on the keyboard to navigate this menu until the name you want (the table name) is highlighted, and then you press Tab. The entire name is entered into the formula, saving you a few seconds of time.

**Figure 9-34**

IntelliSense menu for the table name



With the table name entered, when it's time to refer to a field name in the table, you can start with the left square bracket ( `[` ). Excel displays a list of all the field names already in the table. You use

the arrow keys to highlight the one you're looking for, and then press Tab. Then type the right square bracket ( ] ) to complete the reference.

Similarly, whenever you want to use one of the four constants (#All, #Data, #Headers, or #Totals), you just start with the pound sign #. Excel displays the list, and then you highlight the one you want and press Tab. Microsoft markets this feature as *IntelliSense*, and you see it referred to as such in the Help system.



### Troubleshooting

When you highlight the entry you want on the IntelliSense menu, make sure to press Tab, not Enter. The Enter key tells Excel the formula is complete, and at this point, it's often not.

### Take Note

When referring to a field name by name in a formula that's used inside the same table as the field name, you can omit the table name. For example, the reference Customers[Surname] can be substituted with just Surname when the reference is inside the Customers table.

## STEP BY STEP

### Define a Title for a Table

GET READY. USE the workbook from the previous exercise.

1. SAVE the workbook in the Lesson 9 folder as **09 Pet Pharma Sales August Solution 3**.
2. In the August Sales worksheet, click anywhere inside the table.
3. On the DESIGN tab, in the Properties group, click the text box under Table Name.
4. Type **DrugSales** (all one word) and press **Enter**. You have given a name to the table. Now you can replace the strange-looking formulas at the bottom of the August Sales worksheet with formulas that are easier to read, yet yield the same results.
5. Select cell **D97** (Total Sales).
6. Type **=sum(Dr**
7. When DrugSales appears in the list, press **Tab**.
8. Type **[** (left square bracket).
9. Use the arrow keys to select **Total Sales** from the list, and then press **Tab**.
10. Type **]** (right square bracket), followed by **)** (right parenthesis) and **Enter**. If you enter the formula properly, the result should be identical to what was there before.
11. Replace the formula in cell **D98** with the following:  
**=SUMIF(DrugSales[To treat], "Dog", DrugSales[Total Sales])**
12. Replace the formula in cell **D99** with one based on the formula in **D98**, but searching for **Cat** instead of **Dog**.

SAVE the workbook and leave it open for the next exercise.

### Using the Total Row Command in a Table

Once Excel recognizes a formal table, it can automatically place an automatic totals row along the bottom. It's not the same as a subtotal row that falls after a group. However, once you choose a table style, Excel automatically applies boldface to the totals row to make it stand out—so it's obvious from a distance that it contains totals, and so it serves as a “bookend” for all the data in the middle.

## STEP BY STEP

### Use the Total Row Command in a Table

GET READY. USE the workbook from the previous exercise.

1. Select any cell in the table. Excel adds the DESIGN tab to the ribbon.
2. With the August Sales worksheet active, on the DESIGN tab, in the Table Style Options group, select the **Total Row** box. Excel adds a total row to the bottom, as shown in

### CERTIFICATION READY? 3.1.3

How do you define titles in a table?

### CERTIFICATION READY? 3.2.3

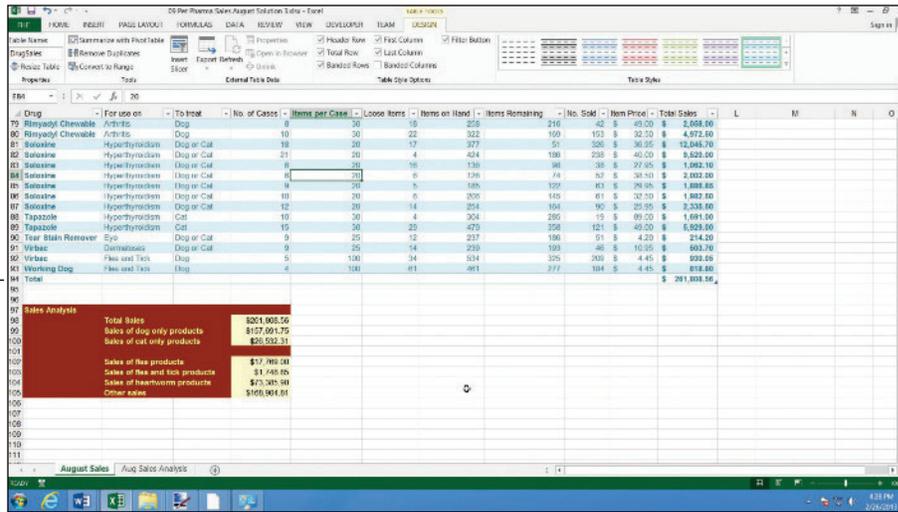
How do you insert total rows in a table?

Figure 9-35, with a label in the leftmost column and the grand total in the rightmost column.

Figure 9-35

Total row added below table

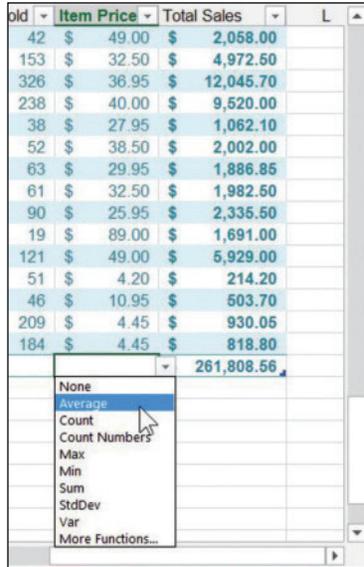
Total row



- To add other subtotals or formulas to the Total Row, you can choose one from a drop-down menu. Click the cell in the total row at the bottom of the Item Price column.
- Click the down arrow that appears to the right of the blank cell. In the popup menu (see Figure 9-36), click **Average**. Excel calculates the average price per sales item.

Figure 9-36

Adding formulas to the total row



- Repeat the process to find the maximum number of items sold in one order by choosing the **Max** function for the **No. Sold** column.

SAVE the workbook and leave it open for the next exercise.

## Adding and Removing Rows or Columns in a Table

Databases are never *finished*. When you maintain data in an ordinary range, one problem you frequently face is how and where to insert a new row. There's no rule that says you have to insert a new record in alphabetical order, when the range is sorted alphabetically. You can add it to the end and sort again. Here's the problem: If you've named your range already, when you add the record to the end, you might need to reassign the range name. With a formal table, not only does the range for the table stay named properly, but when you insert rows (as well as delete them) the named range covered by the table is adjusted to fit automatically. And any formulas you use inside each of the rows in the table are copied and adjusted to the new rows you add.

### STEP BY STEP

#### Add and Remove Rows and Columns in a Table

GET READY. USE the workbook from the previous exercise.



#### Another Way

To insert multiple contiguous rows in a table, start by selecting a block of cells that's as tall as the number of rows you want to insert.

#### CERTIFICATION READY? 3.1.2

How do you add and remove cells within tables?

1. SAVE the workbook in the Lesson 9 folder as **09 Pet Pharma Sales August Solution 4**.
2. In the August Sales worksheet, select cell **A88** (in the Drug column).
3. On the HOME tab, in the Cells group, click the **Insert** down arrow. In the menu, click **Insert Table Rows Above**.
4. Type the following values into cells **A88:F88**:  

Soloxine	Hyperthyroidism	Dog or Cat	7	20	2
----------	-----------------	------------	---	----	---
5. Note that the value in the Items on Hand column is automatically updated, because Excel copied the formula into the new row.
6. Select cell **H88** (in the Items Remaining column) and type the value **41**. Cell I88 is updated.
7. Select cell **J88** (in the Item Price column) and type the value **25.95**. Cell K88 is updated.
8. Select any cell in row **32**.
9. On the HOME tab, in the Cells group, click the **Delete** down arrow. In the menu, click **Delete Table Rows**. Row 32 is deleted, and the table shrinks to fit.
10. Select any cell in column **I** (No. Sold).
11. On the HOME tab, in the Cells group, click the **Delete** down arrow, and then click **Delete Table Columns**. Column I is removed, and for the time being, #REF! errors are generated throughout the Total Sales column, which contain formulas that referred to No. Sold.
12. With a cell in column **I** still selected, click the down arrow next to Insert in the Cells group, and in the menu, click **Insert Table Columns to the Left**.
13. Change the header in cell **I6** to read **No. Sold**.
14. Click cell **I7** and enter the formula **=[Items on Hand]-[Items Remaining]**. Use the "IntelliSense" menus when you type each left bracket [ to expedite your entry. Notice when you press **Enter** that Excel automatically copies the formula down the remainder of the column. You normally don't have to do this manually for a table.
15. Click cell **K7** and enter the formula **=[No. Sold]\*[Item Price]**. This time when you press **Enter**, Excel does *not* fill the formula down the column, because it will not autofill over nonblank cells.
16. Fill the new Total Sales formula down to row **93**, making sure to stop short of the total row. The grand total formula in cell K94 is now fixed.
17. Click cell **L7**, outside the table.
18. Enter the formula **=[Total Sales]/AVERAGE([Total Sales])**. Notice you don't get the "IntelliSense" menus this time, because the active cell is not inside the table. After you press **Enter**, Excel not only creates the formula but extends the table one column to the right, and copies the formula down the entire column L. For now, Excel gives the new column the temporary name *Column1* (see Figure 9-37).

Figure 9-37

Appended column to a table

Starting Inventory		Ending Inventory		No. Sol	Item Pric	Total Sales	Column
Items per Case	Loose Item	Items on Han	Items Remaining				
20	6	246	218	28	\$ 32.95	\$ 922.60	0
25	14	564	268	296	\$ 19.95	\$ 5,905.20	2
20	19	319	234	85	\$ 22.95	\$ 1,950.75	1
25	21	221	191	30	\$ 21.95	\$ 658.50	0
20	11	171	110	61	\$ 49.00	\$ 2,989.00	1
20	4	184	135	49	\$ 60.00	\$ 2,940.00	1
20	4	204	171	33	\$ 50.00	\$ 1,650.00	1
20	19	259	152	107	\$ 53.00	\$ 5,671.00	2
20	6	246	202	44	\$ 55.00	\$ 2,420.00	1
50	24	424	171	253	\$ 3.90	\$ 986.70	0
50	21	321	268	53	\$ 17.15	\$ 908.95	0

Automatically generated column

**Take Note** Excel doesn't apply its autofill IntelliSense feature for table field names while you enter data outside the table.

19. Rename the new column **% of Avg.**
20. Select cell range **L7:L93** and give the range a percent style. Excel does not automatically copy custom cell styles down a column, so you must select the range manually first. Note how Excel has moved the last column's boldfaced format from Total Sales to % of Avg.
21. Click any cell in **% of Avg.**, and then click the down arrow next to **Delete**. Click **Delete Table Columns**. As the appended column disappears, the boldfacing is returned to Total Sales.

SAVE the workbook and leave it open for the next exercise.

### Filtering Records in a Table

The filtering/sorting buttons that appear beside the field names at the top row of a table work the same way as the filtering/sorting buttons for a range where AutoFilter is applied. The big difference with tables concerns the total row. The values in a subtotal row change to reflect only what's visible in the table after the filter is applied.

#### STEP BY STEP

#### Filter Records in a Table

CERTIFICATION  
READY? 3.3.1

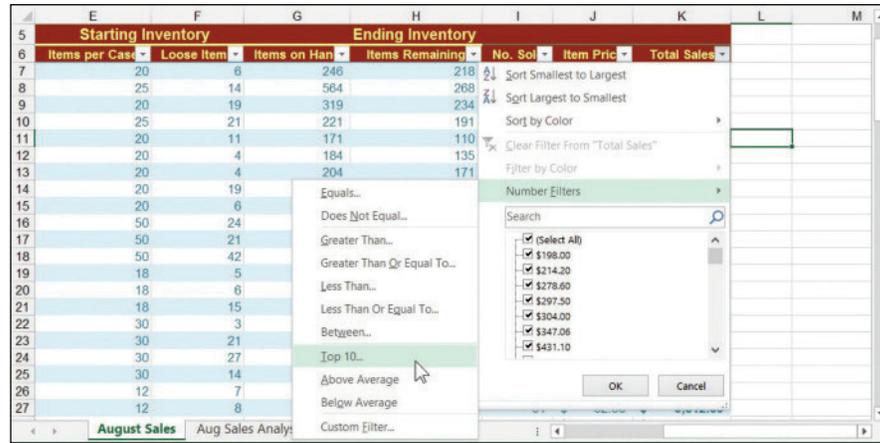
GET READY. USE the workbook from the previous exercise.

How do you filter records in a table?

1. In the August Sales worksheet, click the **Total Sales** down arrow.
2. In the menu (see Figure 9-38), click **Number Filters**, and then click **Top 10**. The Top 10 AutoFilter dialog box appears.

Figure 9-38

AutoFilter menu for records in a table



**Another Way**

A quick way to filter a column by the contents of one of the visible cells in that column is to right-click that cell, click Filter in the menu, and then click Filter by Selected Cell's Value.

3. Leave the choices set at **Top 10 items**, and then click **OK**. The table is filtered down to the 10 items with the highest sales.

SAVE and CLOSE the workbook and leave Excel open for the next exercise.

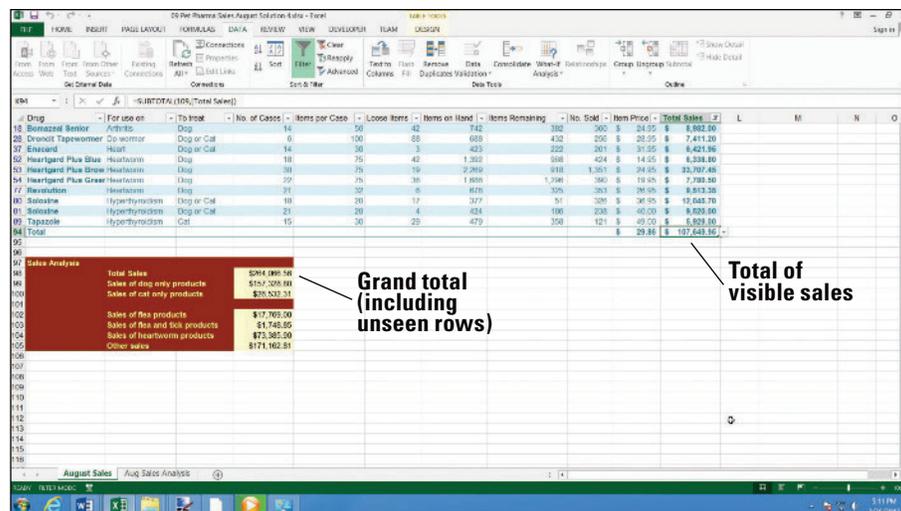
**Take Note**

The Top 10 items filter always results in 10 items displayed (unless the table has fewer than 10 records to begin with). By comparison, the Top 10 percent filter displays however many records comprise the top 10 percent of the values in the filtered column.

The total row of a filtered table adjusts its contents so that its formulas reflect only the visible (filtered) cells. As Figure 9-39 demonstrates, the averaging formula in cell J94 is adjusted to show the average item price among just the top 10. However, look further down at the analysis section. The formulas for Total Sales, Sales of dog only products, and so on, still refer to the *entire table*, not just the filtered portion. So any analysis you want to perform using filtering should be entered on a total row, which is included within the filtered area.

Figure 9-39

Changed and unchanged filtered table



**Troubleshooting**

The exceptions to the rule about references to a table outside a filtered table are the # constants. If the formula in cell D98 of the example is =SUM(DrugSales[#Totals]) instead of =SUM(DrugSales[Total Sales]), the formula would adjust itself to tally only the visible, filtered records.

## Sorting Data on Multiple Columns in a Table

With a table, as with an AutoFiltered range, you can apply a filter and a sort order at the same time; for instance, you can show only the records that contain a particular entry (all motorcycles, all dogs, and so on), sorted in alphabetical order by name.

### STEP BY STEP

#### Sort Data on Multiple Columns in a Table

GET READY. RE-OPEN the *09 Car Owners Solution* workbook from earlier in this lesson.

1. SAVE the workbook in the Lesson 9 folder as *09 Car Owners Solution 2*.
2. Select the range **A1:G73**.
3. On the HOME tab, in the Styles group, click **Format as Table**. In the menu, click **Table Style Medium 14**.
4. In the Format As Table dialog box, click **OK**.
5. Because this range contains data appended from an outside source (see the “Appending Data to a Worksheet” section earlier in this lesson), the query data related to that outside source is still attached to the range. Click **Yes** in the dialog box to have Excel remove those connections.
6. Click the **Name** box and rename the table **Owners**.
7. Resize columns **B**, **E**, and **F** to more appropriately fit their contents.
8. Change the font for the entire table to **Cambria, 11 pt**.
9. Left-justify column **G**.
10. With the Owners table selected, on the DATA tab, in the Sort & Filter group, click **Sort**. The Sort dialog box appears (refer to Figure 9-16).
11. In the Sort by list box under Column, choose **Last Name**.
12. Click **Add Level**.
13. In the Then by list box that appears under Column, choose **First Name**. Click **OK**.

SAVE the workbook and leave it open for the next exercise.

## Changing Sort Order in a Table

Once you set the sort order for a table, you can change it in two ways. First, any sorting choice you make with the AutoFilter buttons override the current sort order, including when the table is sorted by multiple columns. Second, in the Sort dialog box, delete the existing order and enter a new one.

### STEP BY STEP

#### Change Sort Order in a Table

GET READY. USE the workbook from the previous exercise.

1. With the active cell in the Owners table, on the DATA tab, in the Sort & Filter group, click **Sort**.
2. In the Sort dialog box, click **Delete Level**, and then click **Delete Level** again, to remove the existing sort order.
3. Click **Add Level**.
4. In the Sort by list box that appears, click **ZIP**. Click **OK**.

SAVE the workbook and leave it open for the next exercise.

#### CERTIFICATION READY? 3.3.2

How do you sort data on multiple columns in a table?

#### CERTIFICATION READY? 3.3.3

How do you change the sort order in a table?

## Removing Duplicates in a Table

When you import data and append it to the end of an existing table or range, you might end up with duplicate entries—cases where a person appears twice, or perhaps more. Rather than go through the list by hand, Excel has a way to excise duplicate entries from a table more intelligently.

### STEP BY STEP

#### Remove Duplicates in a Table

GET READY. USE the workbook from the previous exercise.

**CERTIFICATION  
READY?** 3.3.4

How do you remove  
duplicates in a table?



#### Another Way

After Excel finds duplicate rows, it removes the lowermost duplicates from the table, leaving the row on top. This is important when you remove rows based on some, not all, the fields in the rows. Excel does not automatically reconcile the contents of rows deemed to be duplicates, so any data in the lowermost rows that does not appear in the uppermost duplicate row will be deleted without asking you first.

1. Click any cell inside the table.
2. On the DESIGN tab, in the Tools group, click **Remove Duplicates**.
3. The Remove Duplicates dialog box (refer to Figure 9-15) lets you determine how much of a record needs to be duplicated before it qualifies as a duplicate. For instance, two or more customers might have the same name, though they probably don't share the same address or phone number. In the Columns list, uncheck **City**, **State**, and **ZIP**.
4. Click **OK**. Excel shows a dialog box reporting how many duplicate entries were removed. Click **OK** to dismiss.

SAVE and CLOSE the workbook and leave Excel open for the next exercise.

## Using a Slicer to View Table Data

There are two ways to filter a table so that it shows only records containing a certain object. One way is through the AutoFilter. Another makes the table more easily accessible to a novice user. It's called the **slicer**, and it's a selection panel that floats above a worksheet (the way a chart does). This panel includes buttons labeled with each of the contents of one of the columns in the table. When you click a button, the table is filtered to show only rows that match the selection. When designing the worksheet, each slicer is like a window with a title bar. You can relocate a slicer by dragging it by its title bar, which you need to do because it begins its life in the middle of the worksheet. Each slicer also has white handles along its edges. You drag one of these handles to resize the slicer in the direction you're dragging.

### STEP BY STEP

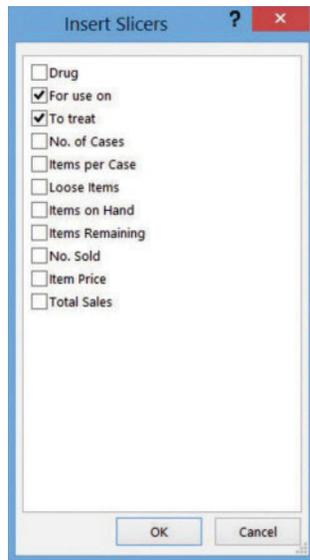
#### Use a Slicer to View Table Data

GET READY. RE-OPEN the *09 Pet Pharma Sales August Solution 4* workbook for this lesson.

1. SAVE the workbook in the Lesson 9 folder as *09 Pet Pharma Sales August Solution 5*.
2. On the DATA tab, in the Sort & Filter group, click **Clear**. Click any cell inside the table.
3. On the DESIGN tab, in the Tools group, click the **Insert Slicer** button.
4. The Insert Slicers dialog box contains empty check boxes for each of the fields for which you can create buttons (see Figure 9-40). Click **For use on** and **To treat**.

Figure 9-40

Insert Slicers dialog box



5. Click **OK**. As the dialog box disappears, the two slicer tools appear as graphic objects in the center of the worksheet. They're not actually inside the table.
6. Relocate the **For use on** slicer by dragging its title bar toward the upper right of the worksheet. As you drag toward the edge of the window, the worksheet automatically scrolls to reveal space where you can drop the slicer. Drop the slicer when it's to the right of the table, just beneath the headers row.
7. Repeat the process with the **To treat** slicer, dragging it below the For use on slicer. The worksheet should look similar to Figure 9-41.

Figure 9-41

Worksheet with slicers added

Drug	For use on	To treat	No. of Cases	Items per Case	Loose Items	Items on Hand	Items Remaining	No. Sold	Item Price	Total Sales
Advantage Blue	Yes	Dog	22	76	6	240	315	20	\$27.00	\$522.00
Advantage Green	Yes	Dog	22	25	14	564	268	296	\$19.45	\$5,805.20
Advantage Red	Yes	Dog	15	20	10	319	234	65	\$22.95	\$1,850.75
Advantage Teal	Yes	Dog	8	25	21	221	19	20	\$21.15	\$408.00
Aspirin	Endocrine	Dog	8	20	11	171	110	61	\$49.00	\$2,899.00
Aspirin	Endocrine	Dog	9	20	4	184	135	49	\$60.00	\$2,840.00
Aspirin	Endocrine	Dog	10	20	4	204	175	31	\$50.00	\$1,665.00
Aspirin	Endocrine	Dog	12	20	10	250	152	107	\$53.00	\$6,871.00
Aspirin	Endocrine	Dog	12	20	6	246	200	44	\$59.00	\$2,420.00
Aspirin	Endocrine	Dog	12	20	6	246	175	263	\$3.00	\$666.70
Antisept Bar Carbine	Yes	Dog or Cat	8	50	24	424	375	263	\$1.15	\$608.85
Bonasaal Cat	Anti-Infl.	Cat	8	50	21	303	298	33	\$1.15	\$608.85
Bonasaal Senior	Anti-Infl.	Dog	10	50	42	442	282	360	\$2.05	\$6,807.00
Clonixam	Anxiety	Dog	7	10	5	131	103	25	\$25.00	\$612.00
Clonixam	Anxiety	Dog	9	10	5	109	149	19	\$39.00	\$741.00
Clonixam	Anxiety	Dog	10	10	10	205	187	83	\$34.00	\$2,822.00
Cosequin Chewable	Joint	Dog	8	30	3	243	215	25	\$47.00	\$1,341.20
Cosequin Double	Joint	Dog	8	30	21	261	188	93	\$40.00	\$4,600.00
Cosequin for Cats	Joint	Cat	8	30	27	267	152	115	\$24.00	\$2,802.00
Cosequin Regular	Joint	Dog	4	30	14	134	81	53	\$27.00	\$1,478.20
Danemasa	Anti-inflammatory	Dog	7	12	7	115	88	26	\$38.45	\$699.70
Danemasa	Anti-inflammatory	Dog	10	12	6	136	107	61	\$82.00	\$3,812.00
Dronolt Tapewormer	De-wormer	Dog or Cat	6	100	05	605	432	256	\$5.95	\$7,411.20
Dronolt Allowormer	De-wormer	Cat	8	100	06	696	318	590	\$8.00	\$4,830.00
Dronolt Allowormer	De-wormer	Phony	6	25	5	159	127	32	\$9.00	\$304.00
Dronolt Allowormer	De-wormer	Dog	8	18	7	151	131	20	\$68.30	\$1,366.00
Dronolt Allowormer	De-wormer	Cat	20	18	0	360	235	71	\$7.30	\$618.20
Edenwinch 3X	Yes	Dog or Cat	39	12	9	307	274	63	\$15.05	\$1,523.85
Enasand	Heart	Dog or Cat	10	30	14	314	158	156	\$39.05	\$5,183.20
Enasand	Heart	Dog or Cat	8	30	8	306	176	67	\$43.00	\$2,852.00
Enasand	Heart	Dog or Cat	6	22	8	143	116	24	\$30.00	\$720.00

8. To see just the treatments that apply to dogs only, click **Dog** on the To treat slicer. Note that the AutoFilter button for the To treat column shows a filter has been applied.
9. To show just the treatments that apply to the endocrine system, click **Endocrine** on the For use on slicer. Note that the filters from both slicers apply simultaneously, so you should see endocrine system treatments for dogs only. The slicer highlights only the criterion in use for the current filter.
10. To clear the filters using the slicers, click the **Clear Filter** button in the upper right corner of each slicer.

SAVE and CLOSE the workbook and leave Excel open for the next exercise.

**Troubleshooting**

When an AutoFilter button for a column is used to filter a table and a slicer exists for that same column, the slicer shows the criteria currently in use for that filter. However, the Clear Filter button for the slicer is disabled. To clear this filter, you have to use the AutoFilter button.

## Converting a Table into a Range

To append more data to a table from an outside source, it might be convenient for you to remove the “table-ness” from the table, if only temporarily, and reapply it once the new data is imported and the data is cleaned up. Also, before you export a workbook file to a new format (for instance, for importing by someone else into a database), you might need to convert tables to ranges, because Excel treats data stored in tables differently than data stored in ordinary worksheets.

**STEP BY STEP****Convert a Table to a Range**

GET READY. RE-OPEN the *09 2005 Customers Solution* workbook for this lesson.

**CERTIFICATION  
READY?** 3.1.1

How do you move between  
tables and ranges?

1. Near the top of the Excel window, respond to the security warning by clicking **Enable Content**.
2. **SAVE** the workbook in the Lesson 9 folder as *09 2005 Customers Solution 2*.
3. Click any cell inside the table.
4. On the **DESIGN** tab, in the Tools group, click **Convert to Range**.
5. Excel opens a dialog box to verify this conversion is what you want. Click **OK**. The AutoFilter buttons are removed from the header row and entries are left sorted as they were. Subtotals and total rows remain (if applicable), and formatting is left as it was. The **DESIGN** tab is no longer displayed.

**SAVE** and **CLOSE** the workbook and leave Excel open for the next exercise.

## SAVING WORK WITH MACROS

**Bottom Line**

Some of the first spreadsheet programs used lists of functions, typed down some tucked away column in an unseen edge of the sheet as multiple-step calculations that had the added virtue of executing commands automatically. These were the first macros, and the fact that they were considered “big functions” is how they got their name. Over the years, the number of different categories of macros that Excel can execute has grown, and the categories themselves vary so widely that a complete discussion of them would require another book. For the purposes of this lesson, we concentrate on one type: a recording of a sequence of commands and typed entries that you can then replay elsewhere in the worksheet. This way, you can perform the same sequences of commands in different places, cutting down the time it takes to complete redundant work.

## Recording a Basic Macro

What makes a recorded macro useful is the fact that it can be replayed on whatever cell is the active cell. A recorded **macro** is a series of steps that can be repeated and that you might want to repeat frequently to save you time. As you’ve seen, there are ways to automate the formatting of cells that are actually easier than recording and playing back macros. So the kinds of steps you want to record are the repetitious kind that you would otherwise have to repeat yourself dozens of times or more.

**Troubleshooting**

Excel records only those steps that have a direct impact on the contents of the worksheet. To be accurate, it records the impact those steps have, not actually the commands that led to the impact. For example, if you select several rows and columns, Excel records the act of the rows and columns being grouped. But if you expand or collapse that group, it does not record that fact because doing so does not impact the worksheet itself. Exceptions include filtering and sorting ranges and tables, which Excel does record.



## Workplace Ready

### PLANNING TO RECORD A MACRO

To ensure that the macro you record is useful to you in a variety of situations, you should consider whether you need it to record absolute or relative cell references. This is because Excel keeps track of every change in the position of the active cell during macro recording. When that change is made, Excel needs to know whether it's more important for it to know the exact address of the new cell's location (absolute) or the number of cells left or right or up or down that the pointer was moved from its previous location (relative).

When you're recording absolute references, record a macro, and then click on cell A5, the recording always moves to A5. But if you use the arrow keys on the keyboard to move to another cell instead, the recording takes note of each arrow key pressed. So if you record the macro on A5 and use the down arrow key to move two cells down, and the macro replays from cell Y5, the macro moves to Y7.

By comparison, when you record relative references and then click a new location on the worksheet, Excel records the distance to the new cell. This makes the starting cell location critical to the macro. If you start with a cell selected in column D, and you click on a cell on the same row in column A, Excel records a movement three cells to the left. That is *not* the same thing as moving to the leftmost column, which you normally can do by pressing the Home key. However, in relative recording mode, pressing Home records the distance covered in getting to column A. So when you replay this macro, you could end up starting in a cell in column F and end up moving to column C when you expect to move to column A. Or, you can start in column B and trip an error condition when Excel tries to move too far to the left of column A.

For this reason, it's important to map out your precise cell movements (if any) prior to recording a macro, and then slowly repeat that sequence during the recording process. The recording does not account for how much time you take, so if you're nice and slow, the playback won't be any slower.

```

Sub CustomSubtotals()
    CustomSubtotals Macro
    Keyboard Shortcut: Ctrl+Shift+S

    Application.WindowState = xlMinimized
    Application.WindowState = xlNormal
    ActiveCell.Range("A1:A2").Select
    Selection.EntireRow.Insert
    Application.WindowState = xlMinimized
    Application.WindowState = xlNormal
    ActiveCell.Select
    Application.WindowState = xlMinimized
    Application.WindowState = xlNormal
    ActiveCell.FormulaR1C1 = "=SUM(R[-16]C:R[-1]C)"
    ActiveCell.Offset(0, 1).Range("A1").Select
    Application.WindowState = xlMinimized
    Application.WindowState = xlNormal
    ActiveCell.FormulaR1C1 = "=MAX(R[-16]C[-1]:R[-1]C[-1])"
    ActiveCell.Offset(0, 1).Range("A1").Select
    Application.WindowState = xlMinimized
    Application.WindowState = xlNormal
    ActiveCell.Offset(0, -1).Range("A1").Select
    Selection.Style = "Currency"
    Application.WindowState = xlMinimized
    Application.WindowState = xlNormal
End Sub

```

## STEP BY STEP

## Record a Basic Macro



GET READY. OPEN the *09 4Strong Tour Revenues* workbook for this lesson.

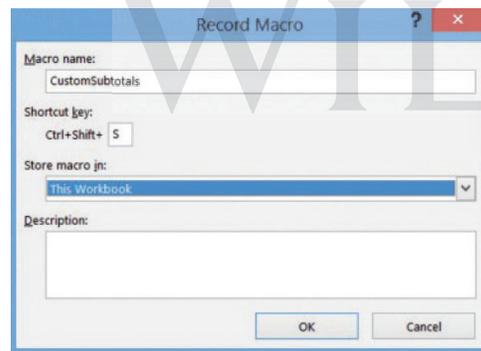
1. Click the **FILE** tab, and then click **Options**.
2. In the Excel Options dialog box, click **Customize Ribbon**.
3. In the Main Tabs list on the right, check the **Developer** box if it is not already checked. This adds the DEVELOPER tab to Excel, enabling you to record macros. Click **OK**.
4. The macro that you record creates a custom subtotal row at the place you define, rather than at some place Excel determines. The rule you follow is that the user (you) must select the cell where you want the subtotal to appear, and then run the macro. So to prepare for recording, click cell **D21**.
5. On the DEVELOPER tab, in the Code group, find **Use Relative References**. If it is not highlighted, click to select it. You want relative references for this macro.
6. In the Code group, click **Record Macro**.
7. In the Record Macro dialog box, click the **Macro name** box and type **CustomSubtotals**.
8. In the Shortcut key box beside Ctrl +, type the capital **S**. This changes the shortcut key to Ctrl + Shift + S. Leave Store macro in set to This Workbook. The dialog box should now appear as depicted in Figure 9-42.

**CERTIFICATION  
READY?** 1.4.12

How do you assign a  
shortcut key?

**Figure 9-42**

Record Macro dialog box



9. Click **OK**. You are now recording a macro.



### Troubleshooting

If you mess up a step during the macro recording, don't worry. Click Stop Recording in the Code group of the DEVELOPER tab. Then start again from Step 6. Use the same name, and when Excel asks whether you want to overwrite the existing macro with the same name, respond with Yes.

10. Press **Shift + Down Arrow**.
11. On the HOME tab, in the Cells group, click the **Insert arrow**. In the menu, click **Insert Sheet Rows**.
12. Press **Shift + Up Arrow**.
13. In the Editing group, click **AutoSum**. Do not press Enter yet.
14. In the Clipboard, click **Copy**.
15. Press **Tab**.
16. Type the partial formula **=max(**.
17. In the Clipboard group, click **Paste**.
18. Type **)** (end parenthesis) and press **Tab**.
19. Press **Left Arrow**.
20. Click **\$** (Accounting Number Format) in the Number group.
21. On the DEVELOPER tab, in the Code group, click **Stop Recording**.

**CERTIFICATION  
READY?** 1.4.7

How do you record a simple  
macro?

- Now that you're not recording, adjust the width of column E to fit its contents. As Figure 9-43 shows, the macro generates a total for the bottom of the arbitrary cluster of records, and also tabulates the highest value in that cluster in the cell adjacent to the subtotal.

Figure 9-43

Custom subtotals generated with macro

	A	B	C	D	E	F
7	5/10/2013	Cleveland	Clothing	\$ 375,814.52		
8	5/10/2013	Cleveland	Accessories	\$ 265,978.41		
9	5/12/2013	Indianapolis	Tickets	\$ 47,500.00		
10	5/12/2013	Indianapolis	Concessions	\$ 28,734.25		
11	5/12/2013	Indianapolis	Clothing	\$ 360,382.00		
12	5/12/2013	Indianapolis	Accessories	\$ 205,198.10		
13	5/14/2013	Chicago	Tickets	\$ 84,000.00		
14	5/14/2013	Chicago	Concessions	\$ 39,415.82		
15	5/14/2013	Chicago	Clothing	\$ 684,991.25		
16	5/14/2013	Chicago	Accessories	\$ 312,948.71		
17	5/15/2013	Cincinnati	Tickets	\$ 32,950.00		
18	5/15/2013	Cincinnati	Concessions	\$ 21,435.00		
19	5/15/2013	Cincinnati	Clothing	\$ 275,118.00		
20	5/15/2013	Cincinnati	Accessories	\$ 192,412.32		
21				\$ 3,017,122.32	\$684,991.25	
22						
23	5/17/2013	Louisville	Tickets	\$ 41,883.00		
24	5/17/2013	Louisville	Concessions	\$ 29,147.31		
25	5/17/2013	Louisville	Clothing	\$ 325,184.82		
26	5/17/2013	Louisville	Accessories	\$ 215,948.63		
27	5/21/2013	Dayton	Tickets	\$ 28,552.00		
28	5/21/2013	Dayton	Concessions	\$ 18,045.18		

Custom subtotals generated with macro



**Another Way**

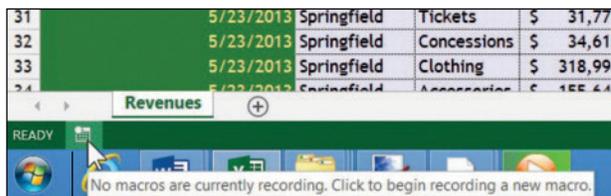
In the green status bar along the bottom of the Excel window, there's an icon that looks like a worksheet with a dot in the upper left corner, as shown in Figure 9-44. Click this to bypass the ribbon and immediately start recording a new macro. Click the same spot again to stop recording.

- Click the **FILE** tab, and then click **Save As**.
- In Backstage, locate the Lesson 9 folder.
- In the Save As dialog box, under Save as type, choose **Excel Macro-Enabled Workbook (\*.xlsm)**.

SAVE the workbook as **09 4Strong Tour Revenues Solution.xlsm** and leave it open for the next exercise.

Figure 9-44

Alternate record macro button



**Record macro**

For security reasons, Excel no longer saves macros in its regular .XLS and .XLSX files. This is due to how often the macros feature was maliciously used by people sending Excel workbooks to others via e-mail attachments. Now, the only way to save a macro-enabled workbook is to give it the special .XLSM file type. This way, companies that want to avoid any possibility of spreading malware can enforce policies preventing .XLSM files from being attached to or received within e-mails.

**Running a Macro**

A recorded macro follows the steps you gave Excel during the recording process. For that reason, it's up to you to prepare the worksheet and select the cell you want before you begin. You can play back any macro by selecting it from the Macro dialog box. But it's generally easier to assign it to a keystroke, as you did in the previous exercise, and simply launch it from the keyboard.

**STEP BY STEP****Run a Macro**

GET READY. USE the workbook from the previous exercise.

1. Click cell **D39**.
2. On the DEVELOPER tab, in the Code group, click **Macros**.
3. In the Macro dialog box, click **CustomSubtotals**. Click **Run**. The custom subtotals row is added immediately, with a one-row gap between the clusters.
4. Click cell **D57**.
5. Press **Ctrl + Shift + S**. The custom subtotals row appears here immediately.

SAVE the workbook and leave it open for the next exercise.

**Managing Macro Security**

Because of the proliferation of malicious software, Microsoft has set up Excel so that after it's installed, you cannot execute macros from a file you open (even an explicitly macro-enabled workbook) until you read the notification and click Enable Content. If you never plan to run macros or if you're skeptical about your office colleagues, you can turn off macros completely. You can also turn off the notifications and enable all macros, if you work in an office such as a financial services provider where macros are in use constantly, you trust the source of the Excel workbooks, and notifications would only get in the way.

**STEP BY STEP****Manage Macro Security**

**CERTIFICATION  
READY?** 1.4.5

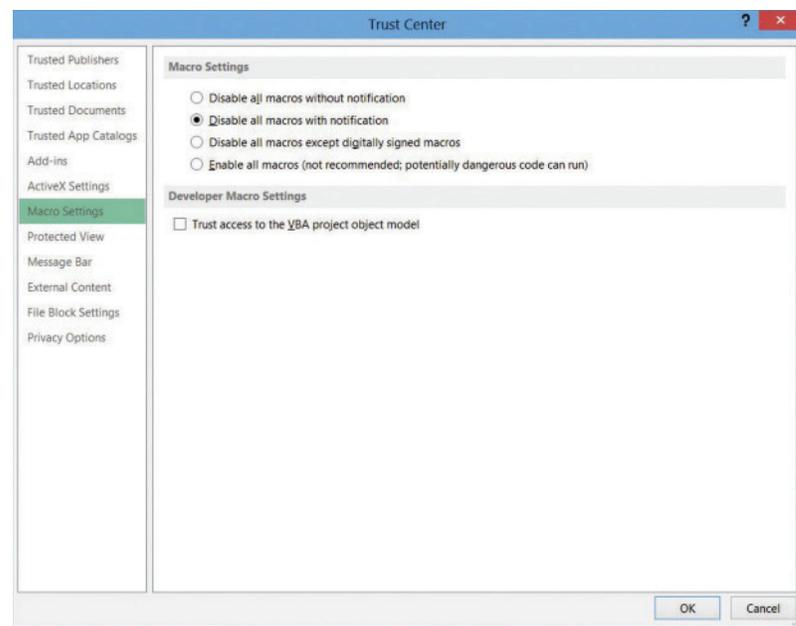
How do you manage macro security?

GET READY. USE the workbook from the previous exercise.

1. On the DEVELOPER tab, in the Code group, click **Macro Security**.
2. In the Trust Center dialog box (see Figure 9-45), click **Disable all macros with notification** to have Excel warn you whenever an opened workbook contains macros, enabling you to turn those macros on or off based on your decision.

**Figure 9-45**

Trust Center with macro protection settings



3. Click **OK**.

CLOSE the workbook. CLOSE Excel.

## SKILL SUMMARY

In this lesson you learned how:	Exam Objective	Objective Number
To import data.	Open non-native files directly in Excel.	1.1.4
	Import files.	1.1.3
	Append data to worksheets.	2.1.1
To ensure your data's integrity.	Set data validation.	1.3.8
To sort data.		
To filter data.		
To outline and subtotal data.	Create outlines.	2.3.5
	Collapse groups of data in outlines.	2.3.6
	Insert subtotals.	2.3.7
To set up data in a table format.	Apply styles to tables.	3.2.1
	Band rows and columns.	3.2.2
	Remove styles from tables.	3.2.4
	Define titles.	3.1.3
	Insert total rows.	3.2.3
	Add and remove cells within tables.	3.1.2
	Filter records.	3.3.1
	Sort data on multiple columns.	3.3.2
	Change sort order.	3.3.3
	Remove duplicates.	3.3.4
To save work with macros.	Move between tables and ranges.	3.1.1
	Assign shortcut keys.	1.4.12
	Record simple macros.	1.4.7
	Manage macro security.	1.4.5

## Knowledge Assessment

### Multiple Choice

Select the best response for the following statements.

- Which of the following procedures is *not* a way to sort a table by the contents of one column?
  - Click the Sort button in the Sort & Filter group of the DATA tab.
  - Click an AutoFilter button in the total row.
  - Click an AutoFilter button in the field names row.
  - Click the Filter button in the Sort & Filter group of the DATA tab.

2. Which is a valid reason you'd want to convert a table to a range?
  - a. To clear the sorting criteria and start over.
  - b. To prepare for deleting a column.
  - c. To prepare for importing new data from a non-Excel file.
  - d. To prepare to change its conditional formatting.
3. Which of the following is the difference between an Auto Outlined worksheet and a worksheet with multiple groups?
  - a. None.
  - b. Only an Auto Outlined worksheet may contain total rows.
  - c. An Auto Outlined worksheet contains only one button for collapsing and expanding.
  - d. Only a multi-grouped worksheet can cluster rows and columns.
4. Which of the following is a correct reference to the cell in the Total Sale column on the rightmost side of a table called Auction Items?
  - a. Table[Auction Items(Total Sale)]
  - b. Auction Items(Total Sale)
  - c. Auction Items[#Totals]
  - d. #Totals[Total Sale]
5. Which of the following procedures is *not* a way to filter a table by the contents of one column?
  - a. Click the criterion button on the slicer.
  - b. Right-click the cell whose contents you want for the criterion, and click Filter in the menu.
  - c. Click the Filter button in the Sort & Filter group of the DATA tab.
  - d. Click the AutoFilter button in the total row at the bottom.
6. Which of the following attributes is *not* a potential criterion for an AutoFilter sort?
  - a. Font color
  - b. Font style
  - c. Cell color
  - d. Cell icon
7. Which is the difference between an AutoFiltered range of records in a list and a table?
  - a. None.
  - b. A table maintains its sort order after you close and then open it again.
  - c. A table given a title enables its field names to be used in formulas in place of cell references.
  - d. A table enables special subtotal functions for total rows.
8. Which characters may not be used to begin a field name in a table?
  - a. = @ -
  - b. \$ = (
  - c. % { [
  - d. \$ % @
9. Which is the reason you would want to record a macro with absolute references rather than relative?
  - a. You want to preserve the integrity of any cells referenced by formulas in the macro.
  - b. You want the values of any cells copied to the macro to be accurate.
  - c. You want the results of any formulas produced by the macro to be accurate.
  - d. You want the macro to reproduce its results in the same place each time.
10. From which of the following does Excel *not* have features for importing data?
  - a. An active database
  - b. A Web page
  - c. A Web search
  - d. An XML file

### True / False

Circle T if the statement is true or F if the statement is false.

- T F** 1. You remove duplicate rows from a table the same way you would for a named range of AutoFiltered records.
- T F** 2. You cannot sort a table in alphabetical or numerical order for one column and by conditional formatting for another column at the same time.

- T F 3.** When importing data from a text file, you can tell Excel to recognize a character other than a comma as a field delimiter.
- T F 4.** You can have no more than two criteria in a custom AutoFilter.
- T F 5.** Immediately after you group together a cluster of adjacent rows, Excel prompts you to create a total row beneath it.
- T F 6.** Once you remove an automatic style from a table, it is no longer a table.
- T F 7.** The title given to a table appears above the field names row.
- T F 8.** The @ character is required before any reference to a specific value in a named row.
- T F 9.** Field names in a table, as opposed to a named range, must begin with an alphabetic character.
- T F 10.** Excel will not let any macro run in a worksheet without the user's direct approval, unless the option for that notification is explicitly turned off.

## Competency Assessment

### Project 9-1: Home Buying Comparison

You've created a list of homes available for sale in your neighborhood with some important characteristics you want to compare with one another. You're wondering whether your realtor is asking as much for your house as she could be asking. In this project, you'll generate a table, filter the table by multiple criteria, and calculate the average asking price for homes in the neighborhood that meet the criteria.

GET READY. LAUNCH Excel if it is not already open.



1. OPEN **09 Homes for Sale** from the files for this lesson.
2. SAVE the workbook as **09 Homes for Sale 3-19 Solution**.
3. Click any cell in the data range. On the HOME tab, in the Styles group, click **Format as Table**. Give the table the style **Table Style Light 19**. Click **OK**.
4. On the DESIGN tab, in the Table Style Options group, click **First Column**.
5. Click cell **A23**.
6. On the HOME tab, in the Editing group, click the down arrow button next to **AutoSum**. In the menu, click **Average**.
7. Click the filter button for **Fireplace**. In the menu, clear the checked boxes and then check the box for **Y**. Click **OK**.
8. Repeat this process for the **Great Room** column.
9. Click the down arrow beside **Sq. Ft.** In the menu, click **Number Filters**, and then click **Greater Than Or Equal To**.
10. In the Custom AutoFilter dialog box, next to is greater than or equal to, type **1900**. Click **OK**. The table now shows all homes for sale in the neighborhood with a fireplace and a great room, and with 1,900 square feet or more. The total row shows the average asking price for only the six houses shown.

SAVE and CLOSE this workbook. Leave Excel open for the next project.

### Project 9-2: Fundraising Revenue Summary

You're a volunteer for a charity that generates money for worthwhile causes by gathering together famous athletes for public events. In this project, you will generate collapsible subtotal rows for a list of moneys raised at various tour stops.

GET READY. LAUNCH Excel if it is not already open.



1. OPEN **09 4Strong Tour Revenues.xlsx** from the files for this lesson. Note that this is *not* the *.xism* solution file you created during the Recording a Basic Macro exercise.
2. SAVE the workbook as **09 4Strong Tour Revenues Summary Solution.xlsx**.
3. Select the range **A4:D232**.
4. On the DATA tab, in the Outline group, click **Subtotal**.
5. In the Subtotal dialog box, set **At each change in** to **Tour Stop Date**. Set **Use function** to **Sum**. Check only the **Sales** box under **Add subtotal to**. Check **Summary below data**. Click **OK**.
6. After the groups are all added, in the Outline group, click **Hide Detail**.
7. Expand column **D** if necessary to make room for the Grand Total at the bottom.

SAVE and CLOSE this workbook. Leave Excel open for the next project.

## Proficiency Assessment

### Project 9-3: Hot Sauce Sales Report

You work in the accounting department of a nonprofit organization that manufactures jars of various recipes of homemade hot sauce, for resale by charity groups. In this project, you combine three sheets worth of data into a single sheet that can be expanded and collapsed, and that shows subtotals for each month.

GET READY. LAUNCH Excel if it is not already open.



1. OPEN **09 Hot Sauce Sales Q1** from the files for this lesson.
2. SAVE the workbook as **09 Hot Sauce Sales Q1 Report Solution**.
3. Click the **February** tab.
4. Select cell range **A6:J30**.
5. Copy the range to the **January** worksheet starting at cell **A32**.
6. Adjust the formulas in Gross Sales for the copied region to point to the correct cells in the **Unit Prices** worksheet, starting with cell **B9**.
7. Repeat the process, copying the range in the **March** worksheet to **January**, with the top left cell in **A58**. Be sure to correct the Gross Sales formulas.
8. Adjust the height of rows with column headers to more appropriately fit their contents.
9. Click cell **B4** and type **First quarter 2013**.
10. Click cell **A6** and type **January**. Repeat this for the respective cells in the other two months' tables.
11. Delete the **February** and **March** worksheets.
12. Rename the **January** worksheet **First quarter**.
13. Select row **17** and insert a new row.
14. Create AutoSum formulas for January Unit Sales columns **B** through **J**, giving a special boldface to **J17**.
15. Copy row **17** and insert it below the Unit Sales tables for the other two months.
16. Create AutoSum formulas for January Gross Sales columns **B** through **I**. Copy these formulas to February and March.
17. Select rows **8** through **16**. On the DATA tab, in the Outline group, click the **Group** button.
18. Repeat this process for the remaining five tables.
19. Select columns **B** through **I**. Click the **Group** button.

20. Select the entire worksheet. In the Outline group, click **Hide Detail**. Both rows and columns are collapsed to reveal just the sales summaries. Widen column J, if necessary.

SAVE and CLOSE this workbook. Leave Excel open for the next project.

### Project 9-4: Employee Archive Rescue

You're helping a colleague to restore some lost data, by reconstructing it from old backups. One of these backup files is an .MDB format database file. In this project, you'll import the data from that file into an Excel table, and correcting the formulas inside that table.

GET READY. LAUNCH Excel if it is not already open.

1. OPEN a **Blank workbook**.
2. On the DATA tab, in the Get External Data group, click **From Access**.
3. In the Select Data Source dialog box, locate and select **09CMKPAY.mdb**. Click **Open**.
4. In the Import Data dialog box, leave the settings for a new Table in an Existing worksheet. Set the target location to the upper left corner cell. Click **OK**.
5. After the table is imported, use the Name Manager dialog box to rename the table from **Table\_\_09\_CMKPAY** to **Employees**.
6. Change all the contents of columns **D** through **L** to Accounting number format.
7. Insert a new column between **LTD** and **NET\_PAY** and name it **Total Deductions**.
8. Click cell **L2** and type the following formula:  
`=SUM(Employees[@[FED_TAX]:[LTD]])`
9. Note how the colon in-between the two field names FED\_TAX and LTD makes this reference into a range, just as it would if you entered D2:K2. The formula you entered automatically fills down the rest of the column.
10. For cell **M2**, type the following formula:  
`= [GROSS_PAY] - [Total deductions]`
11. Note that when the formula is used *inside* the table, which is the case here, you can omit the @ prefix from the reference, which otherwise means "on this row."
12. Because the rest of the column is nonblank, use the fill handle to fill the new formula down to cell **M11**.
13. Group columns **E** through **K** together and collapse them.

SAVE the workbook as **09 Charter Employees Solution**. Leave the workbook open for the next project.

## Mastery Assessment

### Project 9-5: Macro for Table Reconciliation

The remainder of the employees file you're trying to reconstruct resides in an old Excel worksheet. The problem is that the data in that worksheet is all comprised of totals from consolidation formulas, and each employee record is a header for a collapsed group. When you copy the records, you end up copying everything except the data used in the consolidation, resulting in a sheet full of #REF! errors. You need a copying function that Excel doesn't have. In this project, you'll record a macro that fulfills the job of copying just the data you need, saving you the hassle of copying all the errors and weeding them out.

GET READY. USE the workbook from the previous project.

1. OPEN **09 2006+ Employees.xls** from the data files for this lesson. Dismiss the usual security warning.



2. Arrange the **2006+ Employees** and **Charter Employees** windows side-by-side.
3. In the 2006+ Employees window, click the **Sheet1** tab. Click cell **A7** (ID).
4. In the Charter Employees window, create a new worksheet **Sheet2**. Click cell **A1**.
5. In the Charter Employees window, on the DEVELOPER tab, click the **Code** group to ensure **Use Relative References** is highlighted.
6. In the Code group, click **Record Macro**.
7. In the Record Macro dialog box, name the macro **CopyValRecord**. Assign it the keystroke **Ctrl + Shift + C**. Click **OK** to begin recording.
8. Switch to the **2006+ Employees** window.
9. Hold down **Shift** and click cell **P7** to select the entire row.
10. On the HOME tab, in the Clipboard group, click **Copy**.
11. Switch to the **Charter Employees** window.
12. In the Clipboard group, click **Paste Values**. The headings row should appear in the worksheet.
13. Press **Left Arrow**, and then press **Down Arrow**. Cell **A2** should be the active cell.
14. Switch to the **2006+ Employees** window. Press **Left Arrow**, and then press **Down Arrow**.
15. Switch to the **Charter Employees** window. On the DEVELOPER tab, in the Code group, click **Stop Recording**.
16. To test the macro's effectiveness, leave the same cells selected in both worksheets, and press **Ctrl + Shift + C**. In a moment, Excel should have copied over the next row, ID# 38448, which is actually three rows down in the old employees' worksheet.
17. Keep pressing **Ctrl + Shift + C** until the last customer, ID #55412, has been copied into row **36**.

SAVE the newly loaded workbook as **09 Charter Employees Solution.xlsx**. CLOSE the 2006+ Employees workbook and leave Charter Employees open for the next project.

## Project 9-6: Reconciling Tables

You now have two employee tables of different ages imported into separate worksheets. You need to reconcile them into a single table, but the problem is that you need to keep some aspects of both tables and discard certain aspects of others. The solution is to make the tables structurally equivalent to one another, copy the data from one into the other, and then trim any unwanted parts from the product.

GET READY. USE the **09 Charter Employees Solution.xlsx** workbook from the previous project.

1. OPEN **Sheet2**. Change the number formats for cell ranges **F2:L36** and **N2:P36** to **Accounting**. Change the number formats for **M2:M36** to **Percentage with two decimal places**.
2. OPEN **Sheet1** and expand the group. Change the heading for column **J** to **401K**. Add a new column to the left of 401K named **401K rate**. Add three columns to the right of Employee Name called **Title**, **First name**, and **Last name**. Move **Employee ID** to column **B**. Rename the **REGULAR\_HO** column **Hours**. Add a column to the right of Hours named **Rate**. Delete the **Total Deductions** column. Leave **NET\_PAY** erroneous for the moment.
3. Copy the contents of **Sheet2** to the end of the table in **Sheet1** so that their **Employee ID** fields align with one another.
4. Relocate the rows with full-name entries in the **Employee Name** column to the bottom of the table in **Sheet1**, so that the relocated cells are automatically given the table format.
5. Click any cell in the table. On the DATA tab, in the Data Tools group, click **Remove Duplicates**.
6. In the Remove Duplicates dialog box, deselect all fields except the unique **Employee ID** number. Click **OK**. Excel reports the number of duplicate employee records that were removed. Click **OK** to dismiss the notice.

7. Because all the old employees were apparently duplicated, delete the **Employee Name** column.
8. Re-insert the **Total deductions** column and just before the NET\_Pay column, type its formula, this time being careful to omit **401K rate** from the calculation.
9. Enter a new formula for the **NET\_PAY** column starting at the top row and filling down, subtracting **Total deductions** from **GROSS\_PAY**.
10. Widen any partly-visible columns if necessary.
11. Apply boldface to the final column of the table.

SAVE the workbook as **09 Charter Employees Solution 2.xlsm**. CLOSE Excel.

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## Circling Back 2

The Graphic Design Institute tracks many different types of data on its students, such as name, country of origin, the general type of program (accelerated or regular), tuition costs, and the month in which the student starts his or her program. In addition, instructors must maintain grade books, which track grades for each student for each course taken. In this set of projects, you apply formatting to cells and entire worksheets, search and replace text in individual worksheets and across a workbook, and sort, filter, and subtotal data tables.

### Project 1: Formatting Cells and Ranges

In this project, you format cells using character attributes, cell styles, and a number of other techniques to give the Student Roster workbook a professional finish.

GET READY. LAUNCH Excel if it is not already running.



1. OPEN *Student Roster*.
2. Select cells **A1:E1**. On the HOME tab, in the Alignment group, click the **Merge & Center** button.
3. Select cells **A2:E2**. On the HOME tab, in the Alignment group, click the **Merge & Center** button.
4. Select cells **A3:E3**. Right-click and select **Delete**. In the Delete dialog box, ensure **Shift cells up** is selected and click **OK**.
5. Select cells **A3:E3**. On the HOME tab, in the Font group, click the **Bold** button.
6. Select columns **C** and **D**. On the HOME tab, in the Alignment group, click the **Center** button.
7. Click cell **A1**. On the HOME tab, in the Styles group, click the **Cell Styles** button arrow to display the gallery.
8. Select the **Title** style.
9. Select cell **A2**. On the HOME tab, in the Styles group, click the **Cell Styles** button arrow, and then under Themed Cell Styles, select **Accent1**.
10. Apply bold to cell **A2**.
11. Select cells **D4:D46**. On the HOME tab, in the Number group, open the **Number Format** drop-down menu and select **Accounting**.
12. In the Number group, click the **Decrease Decimal** button until no decimal places display.
13. Click cell **A4**. Click the **VIEW** tab, and in the Window group, click the **Freeze Panes** button arrow and select **Freeze Panes**.
14. SAVE the workbook as *Student Roster 1 Solution* in the Circling Back folder.

LEAVE the workbook open for the next project.

### Project 2: Formatting Worksheets

Apply the formatting skills you learned in Lesson 6 to adjust the size of rows and columns in the Student Roster worksheet, add a header and footer, and fix the formatting of a repeated word using the Replace feature.

GET READY. USE the workbook you saved in the previous project.

1. Double-click the border between the rows 1 and 2 headings to automatically resize row 1 to fit the contents.

2. Select row **2**. On the HOME tab, in the Cells group, click the **Format** button arrow, select **Row Height**, in the Row Height text box, type **18.75**, and then click **OK**.
3. Double-click the border between the columns D and E headings to automatically resize column D to fit the contents.
4. Click the **PAGE LAYOUT** tab, and in the Themes group, click the **Themes** button arrow to open the gallery. Select the **Integral** theme.
5. Click cell **A1**. Click the **HOME** tab, and in the Font group, change the font size to **24**.
6. Change the font size of the content in cell A2 to **14**.
7. Select cells **A3:E46**. Change the font size to **12**.
8. Adjust the size of each column as follows:  
 Column A: **20**  
 Column B: **15**  
 Column C: **12**  
 Column D: **10**  
 Column E: **13**
9. Click the **VIEW** tab, and in the Window group, click the **Freeze Panes** button arrow, and then select **Unfreeze Panes**.
10. Click the **INSERT** tab, and in the Text group, click the **Header & Footer** button.
11. Click the **HEADER & FOOTER TOOLS DESIGN** tab, in the Header & Footer group, click the **Header** button arrow, and then select **Sheet1, Confidential, Page 1**.
12. Click anywhere in the header. On the **HEADER & FOOTER TOOLS DESIGN** tab, in the Navigation group, click the **Go to Footer** button.
13. In the Header & Footer group, click the **Footer** button arrow and select the **file name** option, which is the sixth option in the list.
14. Press **Ctrl + H** to open the Find and Replace dialog box to the Replace tab. In the Find What box, type **accelerated** and press **Tab**. In the Replace With box, type **Accelerated**. Click the **Options** button and select the **Match case** checkbox. Click the **Replace All** button. After the words are replaced, click **OK**, and then click **Close**.
15. On the status bar, click the **Normal** view button to return to Normal view.
16. **SAVE** the workbook as **Student Roster 2 Solution** in the Circling Back folder, and then **CLOSE** the file.

LEAVE Excel open for the next project.

### Project 3: Managing Worksheets

In this project, you help an instructor add the GPA worksheet to a grade book and reorganize the worksheets within the grade book. You will also show the instructor how easy it is to find and replace data across worksheets in a workbook.

GET READY. LAUNCH Excel if it is not already running.



1. OPEN **Grade Book** and **GPA**.
2. In the **GPA** workbook, right-click **Sheet1** and select **Move or Copy**.
3. In the Move or Copy dialog box, open the **To Book** drop-down menu and select **Grade Book.xlsx**.
4. Under Before Sheet, select **(move to end)** and click **OK**. The GPA worksheet is added to the Grade Book workbook, and the GPA workbook closes.
5. In the **Grade Book** workbook, right-click the **Sheet1** tab, select **Rename**, and type **Graphic Design 1**.
6. Rename the Sheet2 tab to **Digital Media 1**.
7. Rename the Sheet3 tab to **Typography 1**.

8. Rename the last sheet tab to **GPA**.
9. Click and hold the **Digital Media 1** tab. Drag and drop it after the **Typography 1** tab.
10. Right-click the **GPA** sheet tab, point to **Tab Color**, and under Standard Colors, select the **Purple color** box.
11. You must replace every instance of Herp in the Last Name column and Jesper in the First Name column with **Byham** and **Richard A.**, respectively. The change must be made to the first three worksheets. To do so, select the **Graphic Design 1**, **Typography 1**, and **Digital Media 1** sheet tabs. You can select all of them by pressing the **Shift** key while you click each sheet tab.
12. Press **Ctrl + H** to open the Find and Replace dialog box to the Replace tab.
13. In the Find What box, type **Herp**. In the Replace With box, type **Byham**. Click **Replace All** and then click **OK**.
14. In the Find and Replace dialog box, in the Find What box, type **Jesper** and in the Replace With box, type **Richard A**. Click **Replace All** and then click **OK**. Click **Close** to close the Find and Replace dialog box.
15. Right-click any of the grouped sheet tabs and select **Ungroup Sheets**.
16. Click each of the three sheet tabs and verify that the names were replaced appropriately.
17. SAVE the workbook as **Grade Book Solution** in the Circling Back folder, and then CLOSE the file.

LEAVE Excel open for the next project.

#### Project 4: Working with Data

The chief financial officer created a new worksheet based on the Contributions worksheet. She would like you to create two groups—one for organizations and another for individuals. In each group, she wants you to sort by the type of fund and then the contribution amount (highest to lowest), and provide subtotals for each fund in both groups.

GET READY. LAUNCH Excel if it is not already running.



1. OPEN **Contributions 2**.
2. Before row 4, insert a blank row. In cell A4, type **Organizations** and press **Enter**.
3. Insert two blank rows before row 23 (just before the row that contains “Voss, Florian”). In cell A24, type **Individuals** and press **Enter**.
4. Bold the content in cell **A24**. Select **A24:C24**. If necessary, click the **HOME** tab, in the Clipboard group, click the **Format Painter** button. Copy the formatting from cells **A24:C24** to **A4:C4**.
5. Select rows **4:22**.
6. Click the **DATA** tab, and in the Outline group, click the **Group** button. A group indicator line is added to the left of the row markers and an outline symbol on the row just below the end of the group.
7. Select rows **24** through **35** (all of the individuals in the Contributions worksheet).
8. On the **DATA** tab, in the Outline group, click the **Group** button.
9. Select rows **5:22**.
10. On the **DATA** tab, in the Sort & Filter group, click **Sort**.
11. In the Sort dialog box, clear the **My Data has Headers** check box if it is selected. In the Sort By drop-down menu, select **Column B**. In the Order drop-down menu, ensure **A to Z** appears. Click the **Add Level** button. In the Then By drop-down menu, select **Column C**, and in the Order drop-down menu, select **Largest to Smallest**. Click **OK**.
12. Select rows **25:35** and repeat steps 10 and 11.
13. Select rows **3:35**. Be sure the column headings (in row 3) are included in the selection.

14. On the DATA tab, in the Outline group, click **Subtotal**. The Subtotal dialog box appears.
15. In the At Each Change In list box, select **Fund**.
16. In the Use Function list box, verify that **Sum** appears.
17. In the Add Subtotal To list box, verify that only **Amount** is selected.
18. Near the bottom of the dialog box, verify that only **Replace Current Subtotals** and **Summary Below Data** are selected.
19. Click **OK**. Excel inserts subtotal rows after each type of fund in both groups.
20. Highlight row **45** (the Total Contributions row). Use the Format Painter to copy formatting from row **45** to row **44**.
21. Delete row **45**.
22. SAVE the workbook as **Contributions Sorted Solution** in the Circling Back folder, and then CLOSE the file.

CLOSE Excel.

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