EXCEL 2013

Using LOOKUP Functions, Pivot Tables, and Macros

n this lesson, you will learn about Excel features that can help you perform sophisticated data analyses. These features include the VLOOKUP and HLOOKUP functions, PivotTables, and PivotCharts. With the VLOOKUP and HLOOKUP functions, you use one piece of information to obtain another within a list. PivotTables let you summarize worksheet data dynamically so it can be viewed in various ways. PivotCharts provide this same power and flexibility within charts. Additionally, since many Excel workbooks are used on a recurring basis, with the same tasks being performed repeatedly, you will also create macros that can automate repetitive tasks.

LEARNING OBJECTIVES

After studying this lesson, you will be able to:

- Create a lookup formula to locate a value or text in a list
- Create PivotTables and change their fields
- Create PivotCharts from PivotTable and worksheet data
- Set macro security to protect workbook data
- Record and run macros to automate tasks

LESSON TIMING

- Concepts/Develop Your Skills: 2 hrs 00 min
- Concepts Review: 15 min
- Total: 2 hrs 15 min

CASE STUDY: ANALYZING DATA EFFICIENTLY

Green Clean, a janitorial product supplier and cleaning service contractor, works in conjunction with select charitable entities to raise funds for environmental causes. You would like to evaluate the overall performance of the company's fundraising team leaders. You would also like to examine the results of specific fundraising efforts that were overseen by these team leaders during the current year. You will use powerful data analysis tools—including the VLOOKUP function, PivotTables, and PivotCharts—to perform this analysis. You will also record macros to automate processes that will facilitate the analysis.

Introducing Lookup Functions

The lookup functions VLOOKUP (Vertical Lookup) and HLOOKUP (Horizontal Lookup) are used to retrieve a piece of data from a lookup table located within the same worksheet, a separate worksheet, or a different workbook.

- 4	E	F
	Over	
	(Under)	Award
15	Goal	Rate
16	(\$100,000)	0%
17	(\$5,000)	1%
18	\$0	3%
19	\$5,000	5%
20	\$10,000	7%

	А	В	С	D	E	F
15	Over (Under) Goal	(\$100,000)	(\$5,000)	\$0	\$5,000	\$10,000
16	Award Rate	0%	1%	3%	5%	7%

The same data arranged in a vertical lookup table (left) and a horizontal lookup table (right)

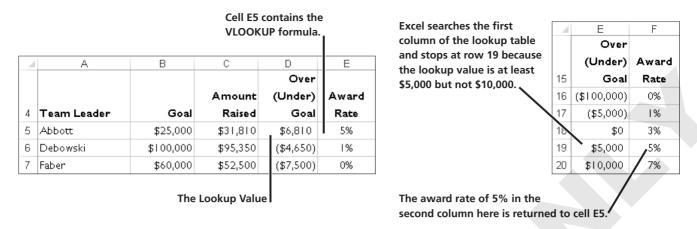
LOOKUP Function Syntax

The structure of the VLOOKUP and HLOOKUP functions is VLOOKUP or HLOOKUP (lookup value,table array,column (or row) index number,[range lookup]).

VLOOKUP FUNCTION	VLOOKUP FUNCTION ARGUMENTS					
Argument Description						
Lookup value	ookup value The value in the worksheet to be looked up in the first column of the table array					
Table array	The cell range containing the lookup table, which may be expressed as absolute cell references or a defined name					
Column index number	The column number in the table array that contains the corresponding data to be retrieved					
Range lookup	Optional; a logical value that specifies a search for an exact or approximate value in the table array (TRUE, the default) or an exact match only (FALSE)					

How the VLOOKUP Function Works

In the formula = VLOOKUP(D5, Award Table, 2), cell D5 contains the lookup value, the defined name Award Table indicates the table array in which the search takes place, and the number 2 (the column index number) indicates that the corresponding award rate will be retrieved from the second column of the lookup table. The search is conducted down the first column of the table array until the highest value not greater than the lookup value is located.



When a lookup formula will be copied to other cells, the cell range of the table array should be expressed in the formula as a defined name or absolute cell references.

Specifying the Range Lookup Argument

In our example, Excel uses the default range lookup argument TRUE so the search is conducted in the first column of the table array for either an exact match of \$6,810 or the closest value not greater than \$6,810. At times, you may want to search only for an exact match of the lookup value. The formula = VLOOKUP(D5, Award Table, 2, FALSE) includes the FALSE range lookup argument. This restricts the search to an exact match. Using our example, since the first column of the table array (\$E\$16:\$F\$20) does not contain the exact lookup value of \$6,810, Excel would display #N/A in the formula cell.

Sorting a Table Array

The rows in the table array must be sorted in lowest to highest (A to Z) order in the first column when the TRUE range lookup argument is used. This way, you can be assured that VLOOKUP will stop at the proper row and return the correct value. Sorting the table array is not required when the FALSE range lookup argument is used.

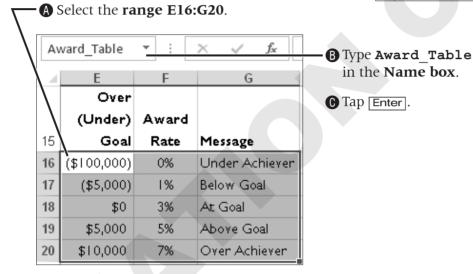
DEVELOP YOUR SKILLS EX01-D01

Use VLOOKUP

Before You Beegin: Navigate to the student resource center to download the student exercise files for this book.

- 1. Open EX01-D01-Awards from the EX2013 Lesson 01 folder and save it as EX01-D01-Awards-[FirstInitialLastName]
- **2.** Display the **December** worksheet. Complete the table array in the range E15:G20 by entering the numbers and text shown.
- **3.** Follow these steps to create the range name:

4	Е	F	G
	Over		
	(Under)	Award	
15	Goal	Rate	Message
16	(\$100,000)	0%	Under Achiever
17	(\$5,000)	1%	Below Goal
18	\$0	3%	At Goal
19	\$5,000	5%	Above Goal
20	\$10,000	7%	Over Achiever



- 4. Select cell E5 and enter the formula =VLOOKUP (D5, Award Table, 2).
- **5.** Use **AutoFill** to copy the formula from **cell E5** down to the **range E6:E12**.
- **6.** Select **cell E7** and review the formula in the Formula Bar.
- 7. Type = C5 * E5 in cell F5 and use AutoFill to copy the commission formula to the range F6:F12.

8. Select cell G5, enter the function = VLOOKUP (D5, Award Table, 3), and use AutoFill to copy the quota message formula to the range G6:G12.

	А	В	С	D	Е	F	G
				Over			
			Amount	(Under)	Award	Award	Achieved
4	Team Leader	Goal	Raised	Goal	Rate	Points	Goal?
5	Abbott	\$25,000	\$31,810	\$6,810	5%	1,591	Above Goal
6	Debowski	\$100,000	\$95,350	(\$4,650)	1%	954	Below Goal
7	Faber	\$60,000	\$52,500	(\$7,500)	0%	- <	Under Achiever
8	Lemus	\$100,000	\$110,350	\$10,350	7%	7,725	Over Achiever
9	Martinez	\$70,000	\$66,000	(\$4,000)	1%	660	Below Goal
10	Nguyen	\$45,000	\$48,000	\$3,000	3%	1,440	At Goal
11	Park	\$30,000	\$31,680	\$1,680	3%	950	At Goal
12	Weinstein	\$70,000	\$67,000	(\$3,000)	1%	670	Below Goal
13							
14							
					Over		
					(Under)	Award	
15					Goal	Rate	Message
16					(\$100,000)	0%	Under Achiever
17					(\$5,000)	1%	Below Goal
18					\$0	3%	At Goal
19					\$5,000	5%	Above Goal
20					\$10,000	7%	Over Achiever

- **9.** Select **cell F16** and change the rate to **1%**.
- **10.** Click **Undo** to change the entry back to 0% in cell F16.
- 11. Select cell G16 and change the message to Counsel.
- **12.** Click **Undo** to change the entry back to *Under Achiever*.
- **13.** Save and then close the file.

Creating PivotTables

PivotTables are powerful data analysis tools. They let you summarize data in various ways and instantly change the view you use. A PivotTable not only subtotals groups of related data; it also compares one group to another.

Arranging the Source Data

You create PivotTables from columns or from a table in an Excel worksheet. The data should contain no blank rows or columns. Converting a list to a table is recommended when records will be added after the PivotTable is created. The additional table data are included automatically within the PivotTable when it is refreshed or updated. Data in a list are not included automatically. The following examples explain two PivotTables based on the worksheet list partially shown here.

	А	В	С	D	Е	F
3	Pledge Level	Team Leader	Sponsor Category	Sponsor Name	Year I	Year 2
4	Level 5	Abbott	Organization Contribution	Accountancy Association	0	15,000
5	Level 4	Faber	Corporate Sponsorship	Accurate Biomedical	10,000	10,000
6	Level I	Lemus	Federal Government Grant	Admin for Children & Fam	5,129,874	8,075,333
7	Level 3	Faber	Corporate Sponsorship	Alpha Supplies Corp.	125,000	50,000
8	Level 6	Nguyen	Individual Contribution	Andres Padilla	0	500

The worksheet data

PivotTable Example 1

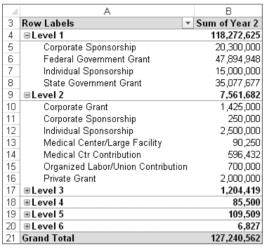
You can sort the preceding table by pledge level or sponsor category, but you cannot easily compare totals for the various pledge levels in each sponsor category. A PivotTable can summarize some or all data in any number of ways, and it creates grand totals. Each column in a PivotTable is a field. Examine the PivotTable and notice that the Sponsor Category field from the table is used for the row labels, the Pledge Level field for the column labels, and the Year 2 field for the data area and grand totals. Each row displays the amount given by each sponsor group in the various pledge levels.

Sum of Year 2	Column Label	s 🔻					
Row Labels	▼ Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Grand Total
Corporate Grant		1,425,000		0			1,425,000
Corporate Sponsorship	20,300	,000 250,000	350,000	22,500	28,750		20,951,250
Federal Government Grant	47,894	,948					47,894,948
Individual Contribution					4,100	2,080	6,180
Individual Sponsorship	15,000	,000 2,500,000	413,579	15,000	4,475	595	17,933,649
Local Business Contribution					2,634	992	3,626
Local Government Grant			243,500				243,500
Medical Center/Large Facility		90,250					90,250
Medical Ctr Contribution		596,432	122,340				718,772
Organization Contribution			50,000	28,000	39,050	3,160	120,210
Organized Labor/Union Contributio	n	700,000					700,000
Physician Office Contribution			25,000	20,000	30,500		75,500
Private Grant		2,000,000	0				2,000,000
State Government Grant	35,077	,677					35,077,677
Grand Total	118,272	,625 7,561,682	1,204,419	85,500	109,509	6,827	127,240,562

This PivotTable summarizes contributions by sponsor category.

PivotTable Example 2

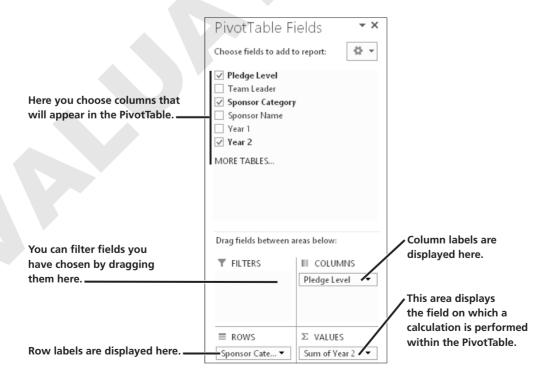
In this example, data is summarized first by pledge level and then by sponsor category. To create this type of view, the PivotTable layout shown in the following illustration contains the Pledge Level and then Sponsor Category fields for row labels, no column labels, and the Year 2 field for the data area and totals.



This PivotTable layout summarizes contributions first by pledge level and then by sponsor category.

How PivotTables Work

Each area of a PivotTable plays a role in data organization. The PivotTable Fields task pane displays after you define the worksheet range to be used. The areas of the task pane are explained in the following illustration, which displays the settings for PivotTable Example 1.

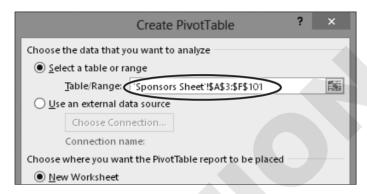


Where you place fields within the PivotTable Fields task pane determines how the PivotTable summarizes the data. By choosing different fields or dragging and dropping a field, you can quickly compare data in various ways. You may choose from several functions—such as SUM, COUNT, and AVERAGE—to calculate fields containing values.

DEVELOP YOUR SKILLS EX01-D02

Create PivotTables

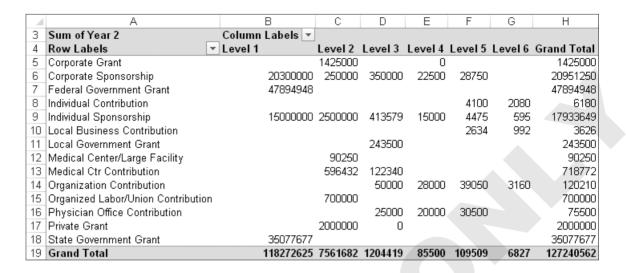
- 1. Open EX01-D02-Sponsors from the EX2013 Lesson 01 folder and save it as EX01-D02-Sponsors-[FirstInitialLastName].
- 2. Select cell **B4** and choose **Insert**→**Tables**→**PivotTable**
- **3.** Verify that the table/range agrees with the one displayed here, and then click **OK**.



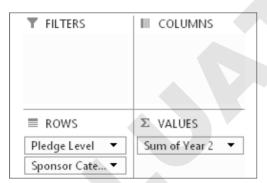
- 4. Rename Sheetl to PivotTable by Sponsor Category, and then select cell A1.
- **5.** Select **cell A3** to restore the task pane.
- **6.** Follow these steps to define the PivotTable in the task pane:

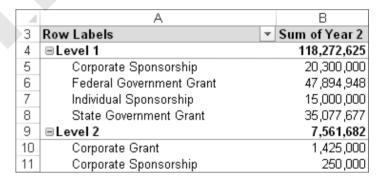


B Drag the **Pledge Level** field to the **Columns** area.



- 7. Choose PivotTable Tools→Analyze→PivotTable→Options.
- **8.** Type **BySponsorCategory** in the PivotTable name text box and tap [Enter].
- **9.** Display the **Sponsors Table** worksheet.
- **10.** With any table cell selected, choose **Insert**→**Tables**→**PivotTable**, verify that the suggested range is the **Sponsors Table**, and click **OK**.
- 11. Rename the new sheet PivotTable by Pledge Level. In the PivotTable Fields task pane, place a checkmark next to field names in this order: Pledge Level, Sponsor Category, Year 2.

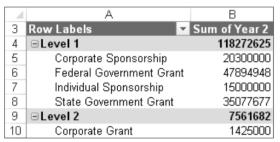




- **12.** Choose **PivotTable Tools**→**Analyze**→**PivotTable**→**Options**.
- **13.** Type **ByPledgeLevel** in the PivotTable name text box and tap [Enter].
- **14.** Save the file and leave it open; you will modify it throughout this lesson.

Formatting a PivotTable

Values and subtotals in a PivotTable do not automatically display the formatting from the original worksheet cells. You may select and format one or more specific cells in the PivotTable using standard Ribbon commands. Alternatively, the PivotTable Tools Design contextual tab contains a large selection of PivotTable styles that can be used to quickly apply color, shading, and gridlines. The report layout displays in Compact Form by default, but you may choose from two other layouts. The subtotals may be displayed at the top or bottom of each group, or can be hidden.



	Α	В	С
3	Pledge Level 💌	Sponsor Category	Sum of Year 2
4	⊟Level 1	Corporate Sponsorship	20300000
5		Federal Government Grant	47894948
6		Individual Sponsorship	15000000
7		State Government Grant	35077677
8	Level 1 Total		118272625
9	∃Level 2	Corporate Grant	1425000
10		Corporate Sponsorship	250000

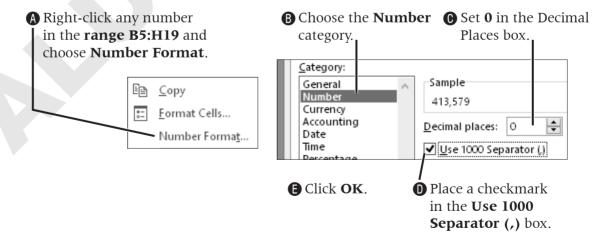
Compact form

Tabular form

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Format a PivotTable

- 1. Save your file as EX01-D03-Sponsors-[FirstInitialLastName].
- 2. Display the **PivotTable by Sponsor Category** worksheet, select the **range B4:H4**, and right-align the labels.
- **3.** Choose **PivotTable Tools**→**Design**→**Layout**→**Grand Totals**. Experiment by choosing each option and observing its result, and then choose **On for Rows and Columns**.
- **4.** Select any cell in the PivotTable.
- **5.** Follow these steps to format the Year 2 contribution numbers:



- **6.** Display the **PivotTable by Pledge Level** worksheet.
- 7. Click in the PivotTable, choose **PivotTable Tools**→**Design**→**PivotTable Styles**→**More** ▼, and choose **Pivot Style Medium 9**.

- 8. Choose PivotTable Tools

 Design

 Layout

 Report Layout

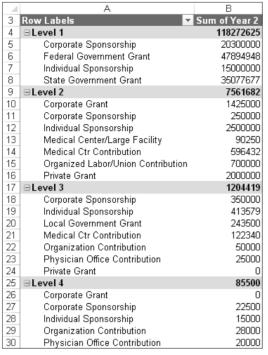
 Show in Outline Form.
- 9. Choose PivotTable Tools -> Design -> Layout -> Report Layout -> Show in Tabular Form.
- 10. Choose PivotTable Tools \rightarrow Design \rightarrow Layout \rightarrow Report Layout \rightarrow Show in Compact **Form** to return to the original layout.
- **11.** Save the file and leave it open.

Changing PivotTable Fields

You may add or remove fields on a PivotTable simply by adding or removing the checkmark next to the field name in the PivotTable Fields task pane. The PivotTable will automatically reconfigure to display the new data. You may also change the order of fields within the row and column areas. One of the most powerful ways of manipulating data is to move a field from the row area to the column area or vice versa. This is called *pivoting the field* (hence the name PivotTable). The display of the data field rotates to give you an entirely different view of your data, as illustrated in the two PivotTables you created in the previous exercise. There, you positioned the Pledge Level field to display as columns in the first PivotTable and as rows in the second.

	А	В	С	D	Е	F	G	Н
3	Sum of Year 2 Co	lumn Labels						
4	Row Labels ▼	Leve	1 Level 2	Level 3	Level 4	Level 5	Level 6	Grand Total
5	Corporate Grant		1,425,000		0			1,425,000
6	Corporate Sponsorship	20,300,0	00 250,000	350,000	22,500	28,750		20,951,250
7	Federal Government Grant	47,894,9	48					47 ,894 ,948
8	Individual Contribution					4,100	2,080	6,180
9	Individual Sponsorship	15,000,0	00 2,500,000	413,579	15,000	4,475	595	17,933,649
10	Local Business Contribution					2,634	992	3,626
11	Local Government Grant			243,500				243,500
12	Medical Center/Large Facility		90,250					90,250
13	Medical Ctr Contribution		596,432	122,340				718,772
14	Organization Contribution			50,000	28,000	39,050	3,160	120,210
15	Organized Labor/Union Contribution		700,000					700,000
16	Physician Office Contribution			25,000	20,000	30,500		75,500
17	Private Grant		2,000,000	0				2,000,000
18	State Government Grant	35,077,6	77					35,077,677
19	Grand Total	118,272,6	25 7,561,682	1,204,419	85,500	109,509	6,827	127,240,562

Pledge Level fields displayed as columns

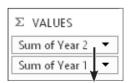


Pledge Level fields displayed as rows

DEVELOP YOUR SKILLS EX01-D04

Change PivotTable Fields

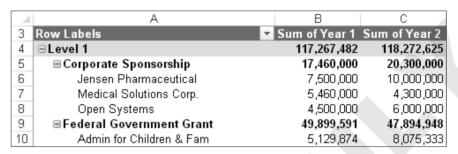
- 1. Save your file as EX01-D04-Sponsors-[FirstInitialLastName].
- **2.** Display the **PivotTable by Pledge Level** worksheet.
- **3.** Place a checkmark next to **Year 1** in the task pane to add this field to the PivotTable.
- 4. Right-click any cell in the Sum of Year 1 column of the PivotTable and choose Number Format.
- **5.** In the Format Cells dialog box, choose the **Number** category, set **0** decimal places, check the **Use 1000 Separator (,)** option, and click **OK**.
- **6.** Repeat **steps 4–5** to format the **Sum of Year 2** column.
- **7.** Drag **Sum of Year 2** below Sum of Year 1 in the Values area.



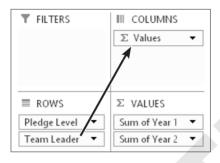
	А		В	C
3	Row Labels	+	Sum of Year 1	Sum of Year 2
4	⊟Level 1		117,267,482	118,272,625
5	Corporate Sponsorship		17,460,000	20,300,000
6	Federal Government Grant		49,899,591	47,894,948
7	Individual Sponsorship		12,500,000	15,000,000
8	State Government Grant		37,407,891	35,077,677
9	⊟Level 2		6,254,063	7,561,682
10	Corporate Grant		1,250,000	1,425,000
11	Corporate Sponsorship		250,000	250,000

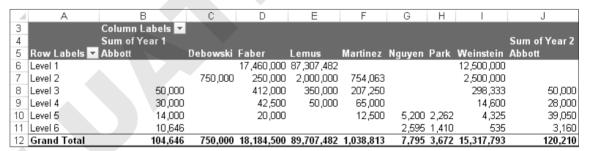
8. Place a checkmark by the **Sponsor Name** field in the top section of the PivotTable Fields task pane.





- **9.** Remove the checkmark by the **Sponsor Category** and **Sponsor Name** fields in the PivotTable Fields task pane; add a checkmark next to **Team Leader**.
- **10.** Drag the **Team Leader** field from the Rows area to the **Columns** area below the Values field.

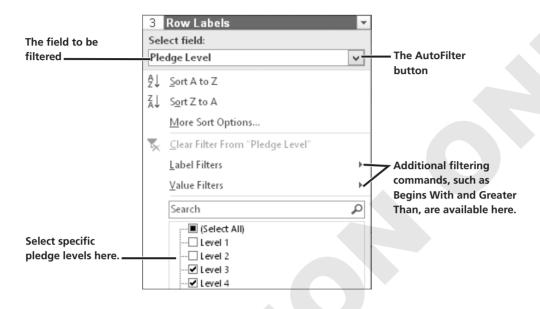




- **11. Undo** 5 the pivot.
- **12.** Save the file and leave it open.

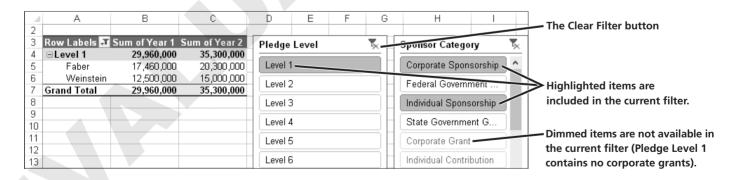
Filtering a PivotTable with AutoFilter

You may set the PivotTable to filter, or include, specific items in the data summaries. The totals and subtotals are recalculated for the selected items. The Row Labels and Column Labels headings have an AutoFilter button that displays the same sorting and filtering options that are available on the columns of worksheet lists and tables.



Filtering PivotTables with Slicers

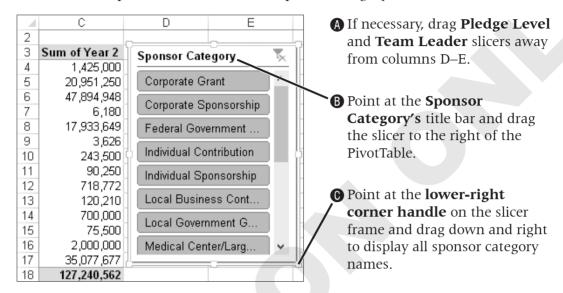
Slicers are menu frames displayed on worksheets that contain all filtering choices in one field. Selected items are highlighted in slicers, making it easy to identify currently applied criteria. Slicer frames may be resized, moved, and formatted with styles for a consistent appearance. Slicers may also be shared in other worksheets of the same workbook for use with multiple PivotTables based on the same data set. Changing the filtering selections in a shared slicer causes all connected PivotTables to update automatically.



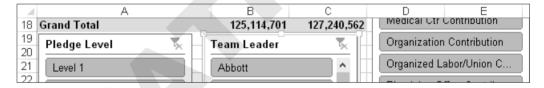
DEVELOP YOUR SKILLS EX01-D05 Filter a PivotTable with Slicers

- 1. Save your file as EX01-D05-Sponsors-[FirstInitialLastName].
- **2.** Display the **PivotTable with Slicers** worksheet.

- **3.** Select any cell in the PivotTable and choose **PivotTable Tools**→**Analyze**→**Filter**→**Insert** Slicer.
- 4. Place a checkmark next to **Pledge Level, Team Leader,** and **Sponsor Category**; click **OK**.
- **5.** Select **cell A1** to hide the PivotTable Fields task pane, if still displayed.
- **6.** Follow these steps to move and resize the Sponsor Category slicer:



7. Drag the **Pledge Level** and **Team Leader** slicers to **row 19**.



- 8. Click the **Pledge Level** title to display the slicer's frame, and then hold down Shift and click the **Team Leader** title.
- **9.** Choose **Slicer Tools** \rightarrow **Options** \rightarrow **Buttons** \rightarrow **Columns** | and change the number of columns to 2.
- **10.** Click the **Sponsor Category** title in the slicer at the right of the PivotTable, choose **Slicer Tools**→**Options**→**Slicer Styles**→**More**, and choose any style.
- **11.** Apply the styles of your choice to the **Pledge Level** and **Team Leader** slicers.
- **12.** Choose **Level 2** in the Pledge Level slicer.



- **13.** Click the **Clear Filter** button on the Pledge Level slicer.
- **14.** Select **Corporate Sponsorship** in the Sponsor Category slicer, hold down [Ctrl], and select Individual Sponsorship.
- **15.** Save the file and leave it open.

Editing PivotTable Calculations

You are not limited to summing values in a PivotTable, and you may create formulas within PivotTables when necessary.

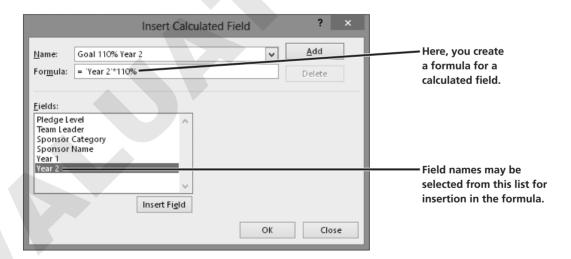
Changing the Function for a Values Area Item

By default, the subtotals and grand totals in a PivotTable sum the values in a field. You may change the SUM function to a different function, such as AVERAGE, MAX, or COUNT.

If the Values area of the PivotTable Fields task pane contains only one entry, all SUM columns will change to the function you selected. If multiple entries exist in the Values area, you may change the function for one entry at a time.

Creating a Calculated Field

Some functions are not available on the Summarize Values By tab of the Value Field Settings dialog box. These functions may be typed in the Insert Calculated Field dialog box. A calculated field contains a formula using values from one or more existing fields. For example, the formula could subtract the value in one field from another to find the difference.



Converting Column Data to a Calculation

The Show Values As tab of the Value Field Settings dialog box can be used to create formulas employing preset options. For example, you can calculate percentages of a total, the difference between values in two columns, a running total, or a ranked order. If you want to display the original column data along with the converted data, simply drag and drop the field name from the field list to the Values area to create a duplicate field.

Refreshing PivotTable Data

PivotTables are often created with data from sources external to the Excel workbook containing the PivotTables. After you change the source data even if in a worksheet range or table within the same workbook—you must refresh the PivotTables manually. You may refresh just the active PivotTable or all PivotTables in the workbook. You may also set a PivotTable option to refresh data from external sources when the workbook is opened.

FROM THE RIBBON

PivotTable Tools→ Analyze→Data→ Refresh ▼→Refresh or Refresh All

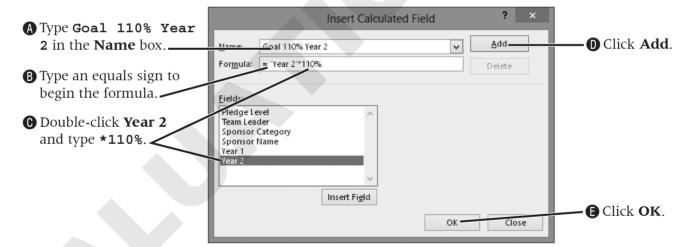
FROM THE KEYBOARD

Ctrl + Alt + F5 t0 refresh all data sources

DEVELOP YOUR SKILLS EX01-D06

Change PivotTable Calculations

- 1. Save your file as EX01-D06-Sponsors-[FirstInitialLastName].
- 2. Display the **PivotTable by Pledge Level** worksheet.
- **3.** Select a number cell in **column B** of the PivotTable, and then choose **PivotTable** Tools→Analyze→Active Field→Field Settings.
- **4.** Select **Average** on the **Summarize Values By** tab and click **OK**.
- **5.** Choose PivotTable Tools \rightarrow Analyze \rightarrow Calculations \rightarrow Fields, Items, & Sets \rightarrow Calculated Field.
- **6.** Follow these steps to create a calculated field:



		Α	В	С	D
3	3 6	Row Labels 🔽	Average of Year 1	Sum of Year 2	Sum of Goal 110% Year 2
Z	1, 6	∃Level 1	13,029,720	118,272,625	130,099,888
- 5	5	Faber	5,820,000	20,300,000	22,330,000
8	3	Lemus	17,461,496	82,972,625	91,269,888
7	7	Weinstein	12,500,000	15,000,000	16,500,000

- **7.** Display the **Sponsors Table** worksheet.
- 8. In cell F98 change 250,000 to 200000, and then display the PivotTable by Pledge Level worksheet.
- 9. Choose PivotTable Tools \rightarrow Analyze \rightarrow Data \rightarrow Refresh menu \checkmark \rightarrow Refresh All.
- **10.** Save the file and leave it open.

Creating PivotCharts

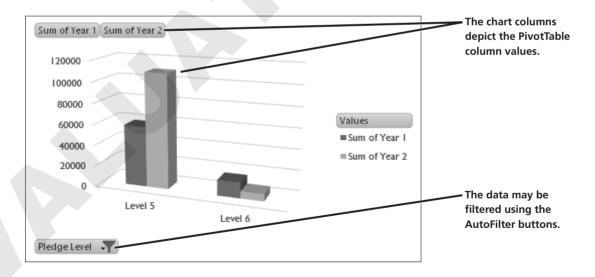
A PivotChart presents data from a PivotTable. There are two ways to create a PivotChart.

- 1. Chart an existing PivotTable by choosing a chart type from the Insert tab, as you would do for a normal Excel chart.
- **2.** Use the PivotChart command to create a PivotTable and PivotChart from the source data at the same time. The chart builds as you choose fields in the PivotTable Fields task pane.

The fields in the values area of the PivotTable are displayed as data series in the chart. The row labels in the PivotTable are used as the axis labels in the chart; the column labels are the data series in the chart legend.

Filtering PivotCharts

The PivotChart may be filtered using the AutoFilter buttons on the chart, AutoFilter buttons on the PivotTable, or slicers added to the worksheet. The filtering is applied to the related PivotTable as well.



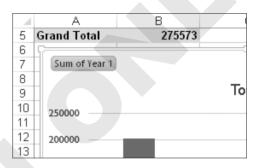
Formatting and Printing PivotCharts

You format PivotCharts using the same Ribbon commands as you do for normal Excel charts. Some chart formatting, such as data labels, is not preserved after a PivotChart is refreshed.

DEVELOP YOUR SKILLS EX01-D07

Create a PivotChart

- 1. Save your file as EX01-D07-Sponsors-[FirstInitialLastName].
- **2.** Display the **PivotChart** worksheet.
- **3.** Select any cell within the PivotTable, and then choose **Insert** → **Charts** → **Insert Column** Chart→2-D Column→Clustered Column.
- **4.** Point at the chart frame and drag the chart just below the PivotTable.
- **5.** Place a checkmark next to **Year 2** in the PivotChart Fields list.
- **6.** To filter the PivotChart, choose the **Pledge Level AutoFilter** button at the lower-left corner of the PivotChart, remove the checkmark next to **Level 4**. and click **OK**.



- 7. Select the chart, choose **PivotChart Tools**→**Design**→**Type**→**Change Chart** Type→Column→3-D Clustered Column, and click OK.
- **8.** Save and close the file.

Changing Macro Security

A macro is a recorded set of mouse and keyboard actions that can be played back at any time. Macros are useful for automating routine tasks, especially if those tasks are lengthy. Macros can contain viruses, so be cautious about opening workbooks containing macros that you receive from others.

Security Levels

You change macro security in the Trust Center section within Excel Options. Your setting there is in effect for all Excel workbooks that you open on your computer. The setting is not embedded in any workbooks that you save and share with others. You may choose among four different levels of security in Excel that control whether macros in an opened workbook are available or disabled.

FROM THE RIBBON

File→Options→Trust Center→Trust Center Settings→Macro Settings

- **Enable all macros:** You are not protected from potentially unsafe macros. This option is not recommended for general use.
- **Disable all macros except digitally signed macros:** This option automatically disables unsigned macros and enables macros from publishers previously added to the trusted publishers list in the Trust Center.

- **Disable all macros with notification:** This is the default option that displays a message allowing you to enable macros in the specified workbook or use the workbook without enabling macros.
- **Disable all macros without notification:** Only macros in workbooks that you placed in a trusted location of the Trust Center will run. All other digitally signed and unsigned macros are disabled.

If you have antivirus software installed, the file will be scanned for viruses before it is opened regardless of the security level set. Also, note that your network system administrator may set macro security and prevent users from changing it.

DEVELOP YOUR SKILLS EX01-D08

Verify Macro Security

- **1.** Choose **File**→**Options**→**Trust Center**.
- 2. Click the Trust Center Settings button, choose the Macro Settings category, and choose **Disable All Macros with Notification** (if necessary).
- **3.** Choose the **Message Bar** category from the left side of the window. Verify that the **Show the Message Bar...** option is selected.
- **4.** Click **OK** twice to close both dialog boxes.
- **5.** Open **EX01-D08-MacroTest** from the **EX2013 Lesson 01** folder.
- **6.** Click **Enable Editing** below the Ribbon if necessary. Save the file as **EX01-D08-**MacroTest-[FirstInitialLastName].
- **7.** Click the **Enable Content** button, if necessary.
- **8.** Click the **Sort by Leader** button.
- **9.** Close the file without saving changes.

Recording Macros

Excel's macro recording feature is similar to a video camera. You turn it on, press a button to start recording, and press a button to stop recording when finished. You may replay the recording as many times as you want, during which macros play back recorded keystrokes and mouse actions.

•	After the Record Macro
ш	After the Record Macro button is clicked in the
	Status Bar, the Stop Recording button appears
	Recording button appears.

Naming a Macro

You can name your macros, or use Excel's default names (Macro1, Macro2, etc.). Macro names may not contain spaces but may include capital letters and underscores.

Recording Macro Steps

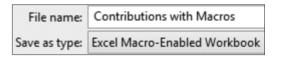
Most actions you perform are recorded in a macro. These include mouse actions, choosing Ribbon commands, selecting options in dialog boxes, using arrow keys to navigate the worksheet, and typing text. Any mistakes and corrections you make during recording are also saved in the macro. If the final result is correct, you can choose to include mistakes and corrections and not bother to rerecord the macro, as there would be no benefit to doing so.

Storing Macros

Macros are available only in the workbook in which you create them unless you assign them to the Personal Macro Workbook. Some macros are useful only in a particular workbook. For these macros, you would choose the This Workbook storage option. Other macros can benefit multiple workbooks. So that they will be available for all workbooks, these macros are assigned to a Personal Macro Workbook, which is a hidden file used to make macros available to all open workbooks.

Saving a Workbook Containing Macros

If you attempt to save a workbook containing macros using the normal Excel Workbook file format, Excel displays the message "The following features cannot be saved in macro-free workbooks: VB Project." Clicking No in the message box displays the Save As



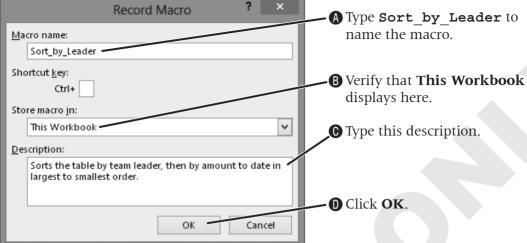
dialog box, where you should choose the Excel Macro-Enabled Workbook file format. The file is saved with the extension .xlsm to indicate that it contains a macro.

DEVELOP YOUR SKILLS EX01-D09

Record a Macro

- 1. Open EX01-D09-Contributions from the EX2013 Lesson 01 folder and save it as EX01-D09-Contributions-[FirstInitialLastName].
- **2.** Click the **Record Macro** button on the Status Bar at the bottom-left corner of the window.

3. Follow these steps to name the macro and begin the recording process: Record Macro



- **4.** Select **cell B4** in the table, and then choose **Data** \rightarrow **Sort** & **Filter** \rightarrow **Sort**.
- **5.** Follow these steps to set the sort parameters and initiate the sort:
- A Click the Sort By menu button and choose Team Leader.. Sort Copy Level Add Level ➤ <u>D</u>elete Level Options... ✓ My data has headers Column Sort On Order **B** Click **Add Level**. Sort by Team Leader Values A to Z v Then by To Date Values Largest to Smallest **O** Choose **Largest ©** Choose **To Date** for Click **OK**. the Then By options. to Smallest here.
 - **6.** Click **Stop Recording** on the Status Bar.
 - **7.** Click **Save**. Click **No** in the dialog box, and then choose **Computer**→**Browse** if necessary.
 - 8. Edit the filename to EX01-D09-ContsWithMacros-[FirstInitialLastName], choose **Excel Macro-Enabled Workbook** from the Save as Type list, and click **Save**. Keep the file open.

Running Macros

You may run a macro from within the Macro dialog box. However, macros are more accessible if you assign them to shortcut keys, custom buttons or graphics on a worksheet, or buttons on the Ouick Access toolbar. You then run a macro by issuing the shortcut key or clicking the object to which it is assigned.

FROM THE RIBBON

View→Macros→View Macros

FROM THE KEYBOARD

Alt + F8 to view

DEVELOP YOUR SKILLS EX01-D10

Run an Unassigned Macro

- 1. Save your file as EX01-D10-ContsWithMacros-[FirstInitialLastName].
- 2. Select cell D4 and choose Data→Sort & Filter→Sort A to Z 🔠
- **3.** Choose **View** → **Macros** → **View Macros** , choose the **Sort** by **Leader** macro, and click Run.
- **4.** Save the file and leave it open.

Assigning Macros

Macros can be assigned to shortcut keys, or to either custom buttons or graphics within a worksheet.

Assigning Macros to Shortcut Keys

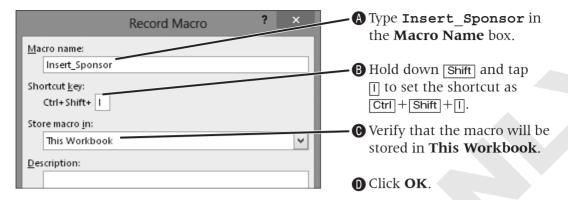
Excel lets you assign a macro to a shortcut key as you name the macro. You must use Ctrl or [Ctrl]+[Shift] as part of the shortcut key combination. Any shortcut you assign will override an existing Excel command shortcut. For example, if you assign [Ctrl]+[B] to a macro, that combination would no longer apply bold formatting.

DEVELOP YOUR SKILLS EX01-D11

Assign a Macro to a Shortcut Key

- 1. Save your file as EX01-D11-ContsWithMacros-[FirstInitialLastName].
- **2.** Click **Record Macro** and on the Status Bar.

3. Follow these steps to name a new macro:



- **4.** Select **cell A4**, and then choose **Home**→**Cells**→**Insert**.
- **5.** Select the **range A5:G5**, choose **Home→Clipboard→Format Painter** , and select **cell A4** to apply the cell formatting from row 5 to the blank row 4.
- **6.** Select **cell A4** again to position the pointer for data entry.
- **7.** Click **Stop Recording** .
- **8.** Delete the blank **row 4** that you inserted while creating the macro, then use Ctrl + Shift + 1 to run the Insert Sponsor macro.
- 9. Add this sponsor to the table. Tap Tab after entering the Year 2 value to have the To Date value calculate automatically.

3	Pledge	Team Leader	Sponsor Category	Sponsor Name	Year I	Year 2	To Date
4	Level 6	Weinstein	Individual Contribution	Raul T. Garcia	0	500	500

10. Run the **Insert Sponsor** macro again and add this sponsor to the table.

3	Pledge	Team Leader	Sponsor Category	Sponsor Name	Year I	Year 2	To Date
4	Level 6	Weinstein	Individual Contribution	Wayne Zobe	0	300	300

- **11.** Choose **View**→**Macros**→**View Macros**
- **12.** Choose the **Sort** by **Leader** macro, and then click **Options**.
- **13.** In the Shortcut Key text box, press Shift, and tap [L] to set the shortcut key to Ctrl + Shift + L; click **OK**.
- **14.** Click **Cancel** to exit the Macro dialog box, then use Ctrl + Shift + L to run the macro.
- **15.** Save the file and leave it open.

Assigning Macros to Custom Buttons

A macro assigned to a custom button is run whenever the button is clicked. The easiest way to create a custom button is to add a shape to the worksheet. You then assign a macro to the button. A custom button may also contain a descriptive label to help identify its function or the macro that is assigned to it.

You create custom buttons using the Insert Controls tool on the Developer tab. To display this tab, choose File→Options, click Customize Ribbon, place a checkmark next to Developer in the Main Tabs list at the right, and click OK.

DEVELOP YOUR SKILLS EX01-D12

Assign Macros to Shapes

- Save your file as EX01-D12-ContsWithMacros-[FirstInitialLastName].
- **2.** Choose Insert \rightarrow Illustrations \rightarrow Shapes \rightarrow Rectangles \rightarrow Rectangle \square .
- **3.** Drag the mouse to draw a rectangle on **cell D1**. Copy and paste the button to **cell E1**.
- **4.** Select the first rectangle and type **Insert Sponsor** (don't tap **Enter**), select the second rectangle, and type Sort by Leader.
- **5.** Click outside the rectangle to deselect it. Then, use Shift to select both rectangles and choose **Drawing** $Tools \rightarrow Format \rightarrow Arrange \rightarrow Align Objects \rightarrow$ Align Middle.
- **6.** Deselect the two rectangles.
- 7. Right-click the **Insert Sponsor** rectangle, choose **Assign Macro**, choose **Insert Sponsor**, and click **OK**.
- **8.** Assign the **Sort** by **Leader** macro to its rectangle.
- **9.** Deselect the rectangle.
- **10.** Click the **Insert Sponsor** rectangle to run the Insert Sponsor macro.
- **11.** Add this sponsor to the new row:

3	Pledge	Team Leader	Sponsor Category	Sponsor Name	Year I	Year 2	To Date
4	Level 3	Abbott	Organization Contribution	Kelsey Foundation	0	50,000	50,000

- **12.** Click the **Sort by Leader** rectangle to run the Sort by Leader macro.
- **13.** Save and then close the file.

Concepts Review

To check your knowledge of the key concepts introduced in this lesson, complete the Concepts Review quiz on the student resource center.