MASTERY SERIES

Microsoft®
Excel 2019 & 365

LEVEL 3 OF 3

ALEX SCOTT
Conestoga College

LABYRINTH
LEARNING™

Microsoft Excel 2019 & 365: Level 3

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Labyrinth Learning
PO Box 2669
Danville, CA 94526
800.522.9746
On the web at lablearning.com

President:
Brian Favro

Product Manager:
Jason Favro

Development Manager:
Laura Popelka

Senior Editor:
Alexandra Mummery

Editor:
Alexandria Henderson

Developmental Editing
Laura Popelka

Production Manager:
Debra Grose

Compositor:
Happenstance Type-O-Rama

Indexing:
BIM Creatives, LLC

Cover Design:
Sam Anderson Design

Interior Design:
Debra Grose

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Excel Chapter 14:
Data Management for Business

Excel Chapter 15:
Workbook Completion

Preface

This textbook is part of our new approach to learning for introductory computer courses. We've kept the best elements of our proven, easy-to-use instructional design and added interactive elements and assessments that offer enormous potential to engage learners in a new way.

Why Did We Write This Content?

In today's digital world, knowing how to use the most common software applications is critical, and those who don't are left behind. Our goal is to simplify the entire learning experience and help every student develop the practical, real-world skills needed to be successful at work and in school. Using a combination of text, videos, interactive elements, and assessments, we begin with fundamental concepts and take learners through a systematic progression of exercises to achieve mastery.

What Key Themes Did We Follow?

We had conversations with dozens of educators at community colleges, vocational schools, and other learning environments in preparation for this textbook. We listened and adapted our learning solution to match the needs of a rapidly changing world, keeping the following common themes in mind:

Keep it about skills. Our content focus is on critical, job-ready topics and tasks, with a relentless focus on practical, real-world skills and common sense. We use step-by-step instructional design to ensure that learners stay engaged from the first chapter forward. We've retained our proven method of progressively moving learners through increasingly independent exercises to ensure mastery—an approach that has successfully developed skills for more than 25 years.

Keep it simple. Our integrated solutions create a seamless experience built on a dynamic instructional design that brings clarity to even the most challenging topics. We focus our content on the things that matter most and present it in the easiest way possible. Concise chunks of text are combined with visually engaging and interactive elements to increase understanding for all types of learners.

Keep it relevant. Fresh, original, and constantly evolving content helps educators keep pace with today's student and work environments. We reviewed every topic for relevancy and updated it where needed to offer realistic examples and projects for learners.

How Do I Use This Book?

Our comprehensive learning solution consists of a print textbook, a groundbreaking interactive ebook, and our easy-to-use eLab course management tool featuring additional learning content, such as overviews and video tutorials, and assessment content. Our interactive ebook contains learning content delivered in ways that will engage learners.

The eLab assessment solution includes Project Grader exercises for most chapters that are automatically graded by the system, in addition to clear feedback and analytics on student actions.

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Included with Your Textbook Purchase

Depending on your purchase option, some or all of the following are included with your textbook:

Interactive ebook: A dynamic, engaging, and truly interactive textbook that includes elements such as videos, self-assessments, slide shows, GIFs, and other interactive features. Highlighting, taking notes, and searching for content is easy.

eLab Course Management System: A robust tool for accurate assessment, tracking of learner activity, and automated grading that includes a comprehensive set of instructor resources. eLab can be fully integrated with your LMS, making course management even easier.

Instructor resources: This course is also supported on the Labyrinth website with a comprehensive instructor support package that includes detailed lesson plans, lecture notes, PowerPoint presentations, a course syllabus, test banks, additional exercises, and more.

Student Resource Center: The exercise files that accompany this textbook can be found within eLab and in the Student Resource Center, which may be accessed from the ebook or online at: **labyrinthelab.com/office19**

We're excited to share this innovative, new approach with you, and we'd love you to share your experience with us at: lablearning.com/share

Visual Conventions

This book uses visual and typographic cues to guide students through the lessons. Some of these cues are described below:

Cue Name	What It Does
`Type this text`	Text you type at the keyboard is printed in this typeface.
Action words	The important action words in exercise steps are presented in boldface.
Ribbon	Glossary terms are highlighted with a yellow background.
Note! *Tip!* *Warning!*	Tips, notes, and warnings are called out with special icons.
	Videos, WebSims, and other ebook or online content are indicated by this icon.
Command→Command→Command→Command	Commands to execute from the Ribbon are presented like this: Ribbon Tab→Command Group→Command→Subcommand.
Design→Themes→Themes	These notes present shortcut steps for executing certain tasks.

Display Settings

Multiple factors, including screen resolution, monitor size, and window size, can affect the appearance of the Microsoft Ribbon and its buttons. In this textbook, screen captures were taken at the native (recommended) screen resolutions in Office 2019 running Windows 10, with ClearType enabled.

Acknowledgements

EXCEL

11

Working with Tables

I n this chapter, you will explore the table tools available in Excel as you discover the advantages of creating and using tables. You will also create formulas that use structured references and insert sparklines for quick and simple data trend analysis.

LEARNING OBJECTIVES

▸ Manage data using a table
▸ Create a custom filter
▸ Name a table
▸ Use structured references in a formula
▸ Create sparklines

📂 Project: Analyzing Exam Performance

You are an instructor at LearnFast College. Your business students completed their final exams recently, and you are reviewing the grades. To help you assess individual exam grades and find the class average, you are going to create a table and use the table tools. For further analysis, you will create a series of formulas that use structured references to the table data and insert sparklines to show trends in the exam grades.

Working with Tables

Tables can be a valuable feature in Excel if they are used properly. An Excel table is comprised of a group of related data within a defined range. Formatting the data as a table enables the use of the table features.

Tables are useful, not only for managing and organizing data, but also when it comes to creating advanced formulas and analyzing data. In addition, table features allow you to manage the data in the table rows and columns independently from the data in other rows and columns on the worksheet. You can create a table by converting existing data into a table, or you can start by creating a blank table and then fill in the information later. You can even create multiple tables on the same worksheet.

Last Name ▼	First Name ▼	State ▼	Q1 ▼	Q2 ▼	Q3 ▼	Q4 ▼
McGee	Olivia	MA	317,000	513,000	709,000	905,000
Fernandez	Maria	MA	228,000	216,000	204,000	192,000
Hasan	Taz	CA	446,000	120,000	206,000	132,000
Krebb	Lin	IL	234,000	560,000	886,000	1,212,000
Stafford	Dan	CO	162,000	151,000	140,000	129,000
Williams	Shaun	CO	210,000	340,000	470,000	600,000
Martinez	Carlos	FL	450,000	450,000	450,000	450,000
Mathis	Gerhardt	CA	156,000	160,000	164,000	168,000
Total			2,203,000	2,510,000	3,229,000	3,788,000

This table of sales data displays the header row, banded rows (alternating colors), and a total row.

Insert and Delete Table Rows and Columns

Generally, working with a table is not very different from working with a regular data range. You can add rows or columns into the middle of a table just as you would with a normal range—by selecting a cell below the desired location of the new row, or to the right of the location of the new column, and using the Insert command. To delete a row or column, you use the Delete command.

The simplest way to add rows, however, is to add them at the bottom of the table, as entering new data in the row directly below a table will automatically expand the table to include the new row. Likewise, if you add new data in the column to the right, it will be included in the table as well. Table formatting will also be automatically applied to any new rows or columns to stay consistent with the rest of the table.
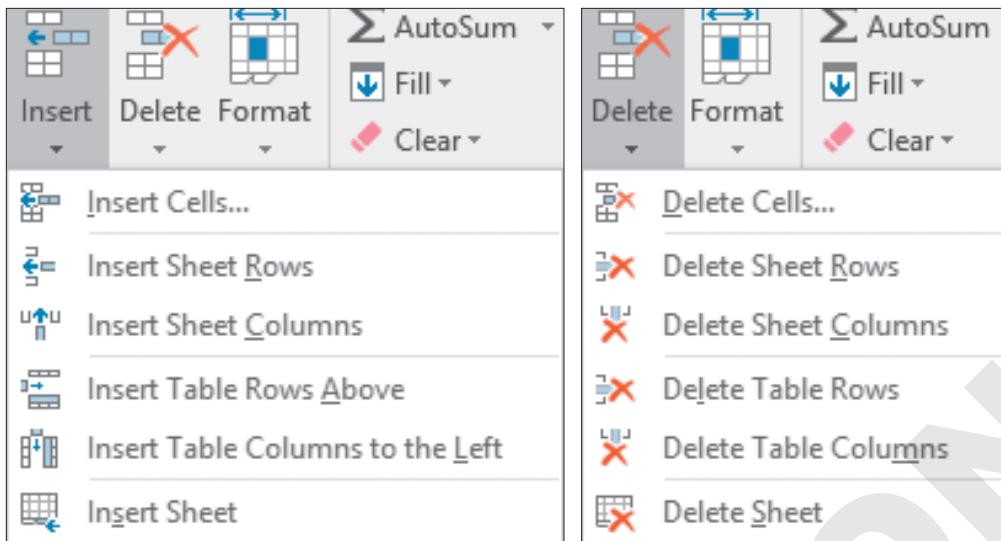
When a table is selected, the Insert and Delete menus have the additional table options to Insert/Delete Table Rows or Columns.

The difference between inserting a table row/column or a sheet row/column is that the Table commands do not affect the rest of the worksheet. For example, inserting a table row will insert the row into the table only, but inserting a sheet row will insert the row for the table and the entire worksheet.

Tip! *If the table includes a total row, you can insert a new row at the bottom but above the total row by selecting the bottom-right table cell and pressing* `Tab`.

Calculated Columns

Table columns can contain text values, numerical values, or formulas. When you enter a formula into a table cell, it will automatically become a ==calculated column==, which instantly copies the formula to all cells in the column. In the same fashion, editing a formula in one cell will update the formula for the entire column. This eliminates the need to use the fill handle to copy your formula, making the task quick and easy.

Apply a Sort or Filter

Another advantage of tables is the ability to quickly sort and filter the information contained in them. A sort will arrange all the information in the table according to your preference, and a filter allows you to decide which data to display and which to hide. Sorts and filters can be performed on both a normal range or a table, but a table automatically displays a filter button at the top of each column. Depending on the actions taken in that column, the filter button may show the down-arrow, the filter symbol, a sort arrow, or some combination of these.

Last Name	First Name	State	Q1	Q2	Q3	Q4	
McGee	Olivia	MA	317,000	513,000	709,000	905,000	
Fernandez	Maria	MA	228,000	216,000	204,000	192,000	

≡ Insert→Tables→Table 🔲

≡ Home→Cells→Insert 🔲 *or* Delete 🔲

Working with Tables **275**

DEVELOP YOUR SKILLS: E11-D1

In this exercise, you will create a table from existing data (the exam grades) and then edit and sort the students' exam data.

Before You Begin: *Download the student exercise files from your eLab course or the Student Resource Center (labyrinthelab.com/office19) and determine your file storage location before beginning this exercise.*

1. Start Excel, open **E11-D1-Exam** from your **Excel Chapter 11** folder, and save it as:
   E11-D1-ExamRevised

2. Select **cell A5** and choose **Insert→Tables→Table** 🏢.

   The Create Table dialog box suggested range is A5:J17 (as an absolute reference), which is correct. The My Table Has Headers box has a checkmark to indicate there are headers.

3. Click **OK** to create the table.

   The table is created. Notice the filter buttons beside each heading and the formatting changes. The Table Tools Design tab is activated on the Ribbon.

4. Select **cell D5** and choose **Home→Cells→Insert** 🔲 **menu button** ▾ →**Insert Table Columns to the Left**.

   Notice the inserted column does not affect the data in the range A20:D22.

5. Type **Date** to replace *Column1* in **cell D5**.

6. In **cell D6**, enter **=$A$3** to copy the date from **cell A3** using an absolute reference.

   After you complete the formula entry in cell D6, the formula is automatically added to all other cells in the table column. The results display only the #### symbols because the column needs to be resized.

7. Select the **range D6:D17**, change the number format to **Short Date**, and then autofit the width of **column D**.

8. Set the width of **column I** to: **6**

9. Select **cell K17** and tap [Tab].

   A new row is added to the bottom of the table in row 18.

10. Enter the information for another student in the new table row:

	First ▼	Last ▼	Program ▼	Date ▼	Pt. 1 ▼	Pt. 2 ▼	Pt. 3 ▼	Pt. 4 ▼	Pt. 5 ▼	Tota ▼
18	Justin	Patrick	Honors	7/18/2020	20	38	19	12	28	89

   Notice that the Date and Total column formulas for Justin are automatically added for you.

11. Use the **Total filter** button ▾ to sort the students by their total mark, **Smallest to Largest**.

12. Sort the students by program, from **A to Z**.

    Because you already sorted by the totals first, the students are still arranged lowest to highest within the Applied group and Honors group.

13. Save the file.

Note! *Always leave your file open at the end of an exercise unless instructed to close it.*

Special Table Features

The special features of a table include the ability to rename the table for quick reference to its data, the <mark>header row</mark> (used to label columns of information), and the total row (summarizes table data). You can also quickly adjust the formatting of a table by applying a table style, and you can modify table styles by adding or removing options such as banded rows, banded columns, or special first/ last column formatting. For other formatting changes, you can select a table row or column with one click without selecting the rest of the worksheet.

Note! *The Table Tools tab is a contextual Ribbon tab; you must have a cell within the table selected to prompt it.*

Table Name

The default name for the first table in a workbook is *Table1*, the second is *Table2*, and so on. Although you can keep the default names, more descriptive names can be useful, especially if the table data will be used in formulas. You can change a table name by editing the name directly in the Table Tools Properties menu. As with defining names for a cell or range, table names cannot contain spaces but may include underscores.
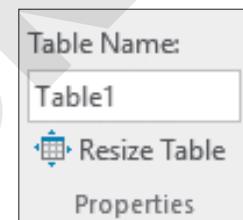
Header Row

Most tables will contain categories of information in columns, so including a header row at the top of the table provides a label for each column. It's good practice to limit each column to one piece of information, such as having two separate columns for first name and last name, to enable full sorting and filtering. Each column heading in a table should be unique.

Warning! *Avoid the characters @, #, [ ], and ' in column headings because they have special meanings in formulas.*

When scrolling through a large table, a table's header row will remain visible across the top of the worksheet, eliminating the need to freeze the top row. The headings replace the normal worksheet column headings A, B, C, etc.

Last Name	First Name	Region	State	Q1	Q2
13 Krebb	Lin	Central	IL	234,000	560,000
14 Stafford	Dan	Central	CO	162,000	151,000
15 Williams	Shaun	Central	CO	210,000	340,000
16 Martinez	Carlos	Eastern	FL	450,000	450,000
17 Mathis	Gerhardt	Western	CA	156,000	160,000

You can drag the table resize handle to add and remove columns and rows.

Table Style Options

You can add and remove table formatting using the Table Style Options checkboxes. These options can help make the information easier to read by differentiating certain rows and columns. Clear the Filter Button checkbox to hide the filter buttons in the header row.

☑ Header Row   ☑ First Column   ☑ Filter Button
☑ Total Row   ☑ Last Column
☑ Banded Rows ☑ Banded Columns
Table Style Options
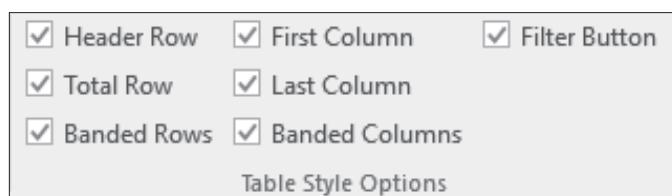
Total Row

Checking the Total Row option in the Table Style Options group will automatically add a row to the bottom of your table with the text *Total* in the left column and a sum in the far-right column. Although a total row is often used to sum the values in a column, there are other summary functions that can be used as well. The total row is formatted to match the style of the rest of the table but may be a different shade to stand out from the other data.

Williams	Shaun	Central	CO	210,000	340,000
Martinez	Carlos	Eastern	FL	450,000	450,000
Mathis	Gerhardt	Western	CA	156,000	160,000
Total					4,252,000

This total row adds a sum in the last column on the right, but if the last column contained text or dates, it would simply count the populated cells.

Selecting a cell in the total row will display a menu button ▼ that shows a list of the available summary formulas. For example, rather than a sum, you may wish to display the average of the column data.

Williams	Shaun	Central	CO	210,000	340,000
Martinez	Carlos	Eastern	FL	450,000	450,000
Mathis	Gerhardt	Western	CA	156,000	160,000
Total					327,077 ▼

None
Average
Count
Count Numbers
Max
Min
Sum

≡ Table Tools→Design→Properties

≡ Table Tools→Design→Table Style Options

DEVELOP YOUR SKILLS: E11-D2

In this exercise, you will rename the table and add a total row to calculate the average exam grades for the students.

1. Save your file as: **E11-D2-ExamRevised**

2. Go to **Table Tools→Design→Properties** and click in the **Table Name** box to select the existing name, type **Exams** to replace that, and tap Enter.

   The new table name is now saved as part of the table properties.

3. Scroll down on the worksheet so **row 6** is the first visible row. (You may need to use the up/down arrows on the scroll bar to move up/down one row at a time to get the worksheet to display precisely this way.)

   The table headers now replace the worksheet column headers.

	First ▼	Last ▼	Program ↓↑	Date ▼	Pt. 1 ▼	Pt. 2 ▼	Pt. 3 ▼	Pt. 4 ▼	Pt. 5 ▼	Tota ▼
6	John	Aikens	Applied	7/18/2020	15	22	18	14	16	69
7	Ashley	Ronayne	Applied	7/18/2020	18	29	17	12	24	76

4. Point to the First table header, which changes your pointer to the table column selector arrow.

5. Drag one column to the right, to the **Last** table header, to select both table columns.

Notice that the selection does not include the cells below the table.

6. Apply **Bold** formatting to the selection.

7. Add a total row by going to **Table Tools→Design→Table Style Options** and clicking the **Total Row** checkbox.

The total row is added to the bottom of the table. The number 0 appears in the bottom-right cell because there is no data in the % column yet (the sum for that column is zero).

8. Select **cell A19** and replace the text *Total* with: **Average**

9. Select the cell that contains the zero in the total row, **cell K19**, under the % heading.

10. Use the **menu** button ▼ to select **None** from the drop-down list, which removes the *0*.

11. Move one cell to the left, to **cell J19** below the exam totals.

12. To find the average exam grade, click the **menu** button ▼ and select **Average** from the drop-down list.
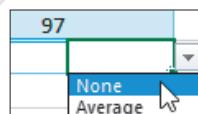
13. Decrease the decimal places to show only one decimal.

14. Go to **Table Tools→Design** and in the Table Style Options group, click the **Last Column** checkbox and change the table style to **Blue, Table Style Medium 13**.
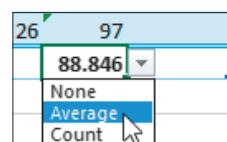
Only certain table styles have different last column shading, Medium 13 being one of them.

15. Save your work.

Structured References

A structured reference is created when you use a formula with cell/range references to data contained in a table. The advantage of structured references is that they adjust formula results automatically when new rows or columns are added to a table. They also make it easier to identify the data source because the reference name includes information such as the table name and header name. The reference name, once used in a formula, will also update automatically if you rename the table or column header.

The <mark>syntax</mark> for a structured reference varies depending on whether it is a reference to a cell, an entire column, or even an entire table.

Last Name	First Name	Region	St	Q1	Q2	Q3	Q4	Q42
Martinez	Carlos	Eastern	FL	450000	450000	450000	450000	=AVERAGE(Table1[@[Q1]:[Q4]])
Mathis	Gerhardt	Western	CA	156000	160000	164000	168000	=AVERAGE(Table1[@[Q1]:[Q4]])
		Highest Q1 Sales	=MAX(Table1[Q1])					

A formula with a structured reference to the column Q1 in Table1

A formula with a structured reference to one row of data in the range from Q1:Q4 in Table1

View the video "Creating Formulas with Structured References."

Formulas with Structured References

The best way to create structured references is to use the point-and-click method to select the table cell or column, which adds all the appropriate formatting/syntax based on the cell or range selected. Trying to type a structured reference manually is much more difficult and can lead to mistakes in your formula.

Compare the formulas in the following illustrations. The formula in the left figure was typed in, and the formula in the right figure was created by clicking on the cells in the Q1 and Q2 columns. In the formula on the right, it's easy to see that the information from Q1 and Q2 is being added together, whereas the formula on the left would require finding the cells H5 and I5 first to understand the meaning.

✕	✓	fx	=H5+I5
Q1		Q2	Total
340,000		700,000	1,040,000

✕	✓	fx	=[@Q1]+[@Q2]
Q1		Q2	Total
340,000		700,000	1,040,000

DEVELOP YOUR SKILLS: E11-D3

In this exercise, you will create formulas that use structured references to calculate the percentage grades, fix the total calculation, and insert summary calculations below the table.

1. Save your file as: **E11-D3-ExamRevised**

   You will create a formula to find the percent each student scored by dividing the total mark by 150.

2. Select **cell K6** in the first row below the % table header.

3. Type **=** and use the mouse to select **cell J6**, one cell to the left, below the Total table header.

   The cell reference is automatically inserted as a structured reference. Due to the dark fill color in the column (the image shows a lighter blue for visibility), you may not be able to see the text in the cell. If that's the case, check the Formula Bar.

4. Type **/150** and complete the formula entry.

   The formula is calculated in cell K6, the result is 0.46, and the formula is automatically copied down to the rest of the column.

Total	%	L
69	=[@[Total /150]]	

5. Point to the % column header, click to select the table column, and apply **Bold** and the **Percent Style** number format.

   You may notice the marks seem unusually low, and you may have already noticed an error in the Total column, which you will fix now.

6. Select **cell J6**, the first cell below the Total header.

    The sum formula finds the total for the range E6:H6, and the error indicates that there are adjacent cells omitted from the formula. Rather than edit the formula, you will reenter the SUM formula using AutoSum.

7. Choose **Home→Editing→AutoSum** Σ.

Pt. 1 ▾	Pt. 2 ▾	Pt. 3 ▾	Pt. 4 ▾	Pt. 5 ▾	Tota ▾	% ▾	L
15	22	18	14	16	=SUM(Exams[@[Pt. 1]:[Pt. 5]])		

The new formula calculates the SUM using a structured reference that includes the table name Exams *and the table column headers in the range reference @[Pt. 1]:[Pt. 5].*

8. Complete the formula entry, which again automatically updates all formulas in the column as well as the % grades in the next column.

9. Select **cell K19** in the total row below % and add the **Average** calculation for the % column.

    Now you will enter some additional formulas outside of the table that use structured references to the table data.

10. Select **cell D21** in the box beside *Highest Exam Grade*.

    To find the highest exam grade, you will use the MAX function referring to the % table column.

11. Type **=MAX(** and then use the mouse to select the **range K6:K18**. Complete the formula while keeping **cell D21** active.

    The formula converts the range reference to Exams[%]*, and the formula bar displays* =MAX(Exams[%]).

12. Apply the **Percent Style** number format.

13. In **cell D22**, enter the formula **=COUNTIF(Exams[Program],"Honors")** and then use the mouse to select the program information (starting in **cell C6**, below the heading).

    The result shows there are eight Honors students.

14. In **cell D23**, enter this formula using the mouse to select the table ranges, program information, and the marks for each criteria range:
    =COUNTIFS(Exams[Program],"Honors",Exams[%],">80%")

    The result shows two Honors students scored higher than 80% on the exam. Notice the criteria ranges and corresponding criteria are easier to understand than a regular cell reference: The program must be Honors and the percentage score must be greater than 80%.

15. Save the file.

Creating Sparklines

In addition to creating charts and adding conditional formatting, Excel has another tool for visualizing data trends. A sparkline is a miniature chart inserted as an object into an individual cell. Sparklines are smaller, simpler versions of charts, and any changes made to the data are immediately updated in the sparklines, just as with a normal chart. Each sparkline can contain data for only one column or row at a time.

Last Name ▾	First Name ▾	State ▾	Q1 ▾	Q2 ▾	Q3 ▾	Q4 ▾	
Zain	Elizabeth	CA	340,000	700,000	960,000	1,120,000	
Alvizo	Alex	CA	620,000	622,000	628,000	662,000	
Clayton	Taneisha	IL	230,000	120,000	180,000	100,000	
Cray	Karen	WA	123,000	130,000	127,000	144,000	
Hill	Patricia	IL	120,000	180,000	180,000	270,000	

Creating Sparklines   281
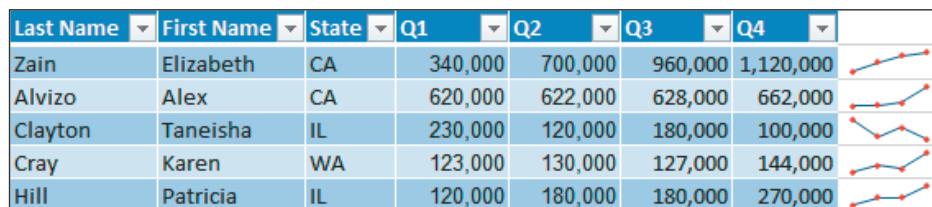
Sparkline types include Line, Column, or Win/Loss, and you can change the type even after the sparkline has been created. Formatting changes can be made with the Sparkline tools. Changes made to one sparkline are applied to all of the sparklines in the same group automatically.

☰ Insert→Sparklines

DEVELOP YOUR SKILLS: E11-D4

In this exercise, you will insert sparklines to spot trends in the students' exam marks.

1. Save your file as: **E11-D4-ExamRevised**
2. Select the **range L6:L18** immediately to the right of the table.
3. Choose **Insert→Sparklines→Line** 📈 to open the Create Sparklines dialog box.
4. Click in the **Data Range** box and then use the mouse to select the **range E6:I18**.

Create Sparklines	?
Choose the data that you want	
Data Range: E6:I18	
Choose where you want the sparklines to be placed	
Location Range: $L$6:$L$18	
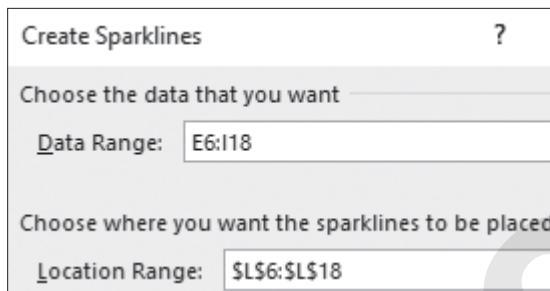
Because you already selected the desired range, the Location Range is already entered.

5. Click **OK** to insert the sparklines.

   The sparklines are displayed in column L and show a comparison for each student, displaying the trends for the marks across the five different parts of the exam.

6. Go to **Sparkline Tools→Design→Show** and check the **Markers** option to display the markers on the sparklines.
7. Select **cell K20** and choose **Insert→Sparklines→Column** 📊.
8. Select the **range K6:K18** as the data range, ensure K20 shows as the location, and click **OK**.
9. Go to **Sparkline Tools→Design→Show** and check the options for **High Point** and **Low Point**.

   The columns with the highest and lowest marks are indicated in red.

10. Save the file and close Excel.

Self-Assessment

⚠ Check your knowledge of this chapter's key concepts and skills using the Self-Assessment in your ebook or online (eLab course or Student Resource Center).

📌 Reinforce Your Skills

REINFORCE YOUR SKILLS: E11-R1

Work with Table Features

In this exercise, you will create a table of the Kids for Change student volunteer hours and use the table features to sort and clean up the data.

1. Start Excel, open **E11-R1-Hours** from your **Excel Chapter 11** folder, and save it as:
   E11-R1-HSHours

   You will begin by inserting the table.

2. Choose **Insert→Tables→Table** 📊.

3. Accept the suggested range, ensure **My Table Has Headers** is checked, and click **OK**.

   You need to remove the data for the college and university students, keeping only the high school students' data. To do this, you must first sort the data by school.

4. Click the **School filter** button ▾ and choose **Sort A to Z**.

5. Select the **range C15:C27** and choose **Home→Cells→Delete** 📊 **menu button** ▾→ **Delete Table Rows**.

   There are no hours to enter for April, so you can delete this column as well.

6. Select **cell G4** and choose **Home→Cells→Delete** 📊 **menu button** ▾→**Delete Table Columns**.

   Notice that deleting the table columns does not affect the merged titles in rows 1 and 2 on the worksheet.

7. In **cell G5**, use AutoSum to enter a formula that finds the sum of the Jan, Feb, and Mar hours.

   The function uses structured references to the data in the Hours columns; it's automatically copied to the whole column.

8. Click the **Total filter** button ▾ and choose **Sort Smallest to Largest**.

9. Save your work.

REINFORCE YOUR SKILLS: E11-R2

Use Total Row and Structured References

In this exercise, you will add sparklines, averages, and other formulas to the data for the Kids for Change student volunteer hours.

1. Save your file as: **E11-R2-HSHours**

   Students receive 20% extra credit if they volunteer more than 100 total hours over the three months. You will create a new table column to calculate this.

2. Enter the heading **Extra Credit** in **cell H4** and wrap the text.

   Notice the table is extended to include column H and the table formatting is applied.

3. In **cell H5**, enter this formula (be sure to select the total amount in cell G5 to create the two structured references; type the rest of the formula):
   =IF([@Total]>100,([@Total]-100)*20%,0)

4. Go to **Table Tools→Design→Table Style Options** and click the **Total Row** checkbox.

The total row is added, inserting a sum for the Extra Credit column. However, you want to remove this and add an average for the three months.

5. Select **cell H15** and use the **menu** button ▼ to select **None** from the drop-down list to remove the sum.

6. Select **cell A15** and type: **Average**

7. Select **cell D15** and use the **menu** button ▼ to select **Average** from the drop-down list.

8. Insert the Average function in the total row for the February and March hours.

9. Use the Table Styles gallery (in **Table Tools→Design**) to change the style to **Plum, Table Style Medium 9**.

10. Select the **range I5:I14** and choose **Insert→Sparklines→Line** 📈.

11. For the data range, select the **range D5:F14** and click **OK**.

12. Use the Style gallery (**Sparkline Tools→Design**) to change the sparkline style to **Plum, Sparkline Style Accent 1, Darker 25%**.

13. In **cell B17**, type: **Most Hours in One Month:**

14. Using the mouse to select the table data for all three months, enter this formula in **cell D17**:
    =MAX(Table1[[Jan Hours]:[Mar Hours]])

15. Use the Format Painter to copy the format from **cell A15** to the **range B17:F17** and then merge and center the **range D17:F17**.

16. Save your work and close the file.

REINFORCE YOUR SKILLS: E11-R3

Work with the Donor List

In this exercise, you will add a record for a new donor and insert additional analysis tools for the Donor List using sparklines and summary formulas.

1. Open **E11-R3-Donors** from your **Excel Chapter 11** folder and save it as:
   E11-R3-DonorsRevised

2. Go to **Table Tools→Design→Table Style Options** and click the **Total Row** checkbox.

The total is calculated for lifetime donations, and you also want to add a total to the annual donations for this year.

3. Select **cell F20** and use the **menu** button ▼ to select **Sum** from the drop-down list.

Now you will add a new record to the table for a new donor.

4. Select **cell G19**, tap ⬚Tab⬚, and enter this data in the new row:

You won't have to enter the years of support in column E, as the formula is automatically inserted, so once you enter the first donation date in column D, the formula will update the number for you. Depending on when this exercise is completed, the result may not be zero.

20	Dawn	Verne	555-0188	2/17/2019		0	$400	$400

5. Sort the table by the **Total Annual Donation** column from Smallest to Largest.

6. Select the **range F22:G22** and choose **Insert→Sparklines→Column** 📊.

7. For the data range, select the **range F5:G20** and click **OK**.

8. Select any cell inside the table and modify the table name

   Hint: Choose Table Tools→Design→Properties) to be: Donor_List

9. In **cell A23**, insert the text: **Donations This Year From Donors >15 Years Support**

10. In **cell E23**, insert a SUMIF function with these arguments:

SUMIF		
Range	"Donor_List[Years of Support]"	⬆
Criteria	">15"	⬆
Sum_range	"Donor_List[Total Annual Donat	⬆
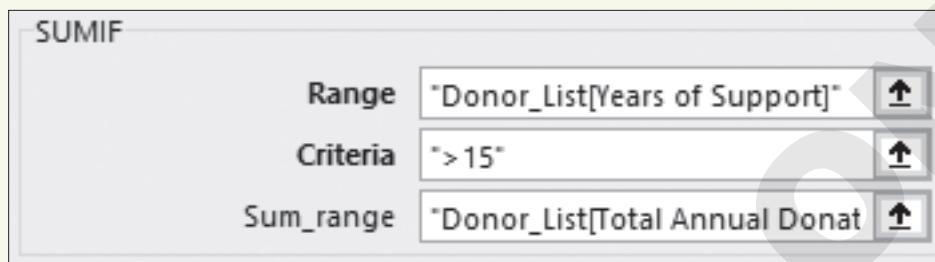
   As with other formulas, be sure to use the point-and-click method to insert the Range and Sum_Range arguments in order to create the proper structured references to the Years of Support and Total Annual Donations table column data.

11. Apply the Heading 3 cell style to the **range A23:E23**.

12. Apply the Currency number format to **cell E23** and remove both decimals.

13. Save your work and close Excel.

EXCEL

✎ Apply Your Skills

Modify a Price List

In this exercise, you will turn the Universal Corporate Events price list of services into a table to make it easier to modify the list and calculate the new prices.

1. Start Excel, open **E11-A1-Prices** from your **Excel Chapter 11** folder, and save it as:
   E11-A1-PkgPrices
2. Insert a table that contains all of the service descriptions, prices, and deposit amounts.
3. Change the table style to **Light Yellow, Table Style Light 19**.
4. Insert a new table row above *Transportation and lodging* and enter this data:

8	Photographer, videographer		200		50

5. In the same row, select **cell C8** and enter the formula: **=[@[Old Price]]*108%**
6. Sort the table by **New Price**, Smallest to Largest.
7. Add a total row to the table.
8. Change the text in **cell A13** to: **Complete Package Subtotal:**
9. Add a Sum formula to the New Price column.
10. Hide **column B** from the worksheet.
11. Change the number format for the **range C5:D13** to Currency with no decimals.
12. Convert the table name to: **Prices**
13. Save your work.

Calculate Customer Discounts

In this exercise, you will create formulas with structured references to calculate the package discount if customers order all of the services in their package.

1. Save your file as: **E11-A2-PkgPrices**
2. In **cell A14**, enter: **Complete Package Discount:**
3. In **cell C14**, type **=** and select **cell C13** (in the total row below *New Price)*, and then type: ***15%**

   The formula should read: =Prices[[#Totals],[New Price]]*15%

   Notice the syntax Prices[[#Totals],[New Price]], *indicating the formula refers to the new price, in the total row, of the Prices table.*
4. In **cell A15**, enter: **Complete Package Total:**
5. In **cell C15**, enter this formula, taking care to use the mouse to select the table data:
   =Prices[[#Totals],[New Price]]-C14

6. In **cell A16**, enter: **Total Services in Package:**

7. In **cell C16**, enter this formula, using the mouse to select the table data:
   =COUNT(Prices[New Price])

8. Select **cell D15** and insert a Line sparkline for the data in the **range C13:C15**.

9. Add markers to the sparkline and change the style to **Blue, Sparkline Style Accent 1, Darker 25%**.

10. Save your work and close the file.

APPLY YOUR SKILLS: E11-A3

Analyze Client Feedback

In this exercise, you will use the table tools to analyze the client feedback data and add a total row and sparklines.

1. Open **E11-A3-Feedback** from your **Excel Chapter 11** folder and save it as:
   E11-A3-FeedbackRevised

2. Sort the table by event date from oldest to newest.

3. Select the dates for all June events and delete those rows from the table.

4. Change the name of the table to: **Ratings**

5. Select **cell H5** and modify the formula to use structured cell references.

6. Add a total row and insert the Average function for the last four table columns.

7. Select the **range E22:H22** and apply the Number format.

8. Edit the text in **cell A22** to be: **Overall Average Ratings**

9. Select the **range I5:I21** and insert Column sparklines for the data in the **range E5:H21**.

10. Change the sparkline style to **Gold, Sparkline Style Accent 4, (no dark or light)**.

11. Save your work and close Excel.

Project Grader

If your class is using eLab (labyrinthelab.com), you may upload your completed Project Grader assignments for automatic grading. You may complete these projects even if your class doesn't use eLab, though you will not be able to upload your work.

PROJECT GRADER: E11-P1

Enhance Item Sales Data with Table Features

Taylor Games would like to convert its annual item sales data to be used in a table in order to take advantage of table features. In this exercise, you will convert the item sales data into a table so you can add a total row for easy calculation, apply sorting, leverage structured references, and improve readability. You will also add a sparkline to quickly view sales trends throughout the year.

1. Download and open your Project Grader starting file.
   - *Using eLab:* Download **E11_P1_eStart** from the Assignments page. You *must* start with this file or your work cannot be automatically graded.
   - *Not using eLab:* Open **E11_P1_Start** from your **Excel Chapter 11** folder.
2. Create a table using these guidelines:
   - Use the **range A6:I21** of the **Item Sales** worksheet as the table data.
   - Ensure the **My table has headers** option is selected.
3. Change the table name to: **ItemSales**
4. Add a total row.
5. Use AutoSum to insert a SUM function in **cell H22**.
6. In **cell H22**, apply the Comma Style number format and decrease the decimals so that no decimals display.
7. Apply the table style **Light Blue, Table Style Light 20** (the third option in the Table Styles list).
8. Update the formula in **cell H7**, substituting the cell references with structured references to the same data.
9. Update the formula in **cell I7**, substituting the cell references with structured references to the same data.
10. Insert a table column to the left of the *Annual Units* column.
11. Change the column heading label from *Column1* to: **Trend**
12. Use these guidelines to insert a Line sparkline:
    - Data Range: **D7:G21**
    - Location Range: **H7:H21**
    - Show Markers.
13. Sort the **Annual Revenue** column from largest to smallest.
14. Set the width of **Column J** to: **20**
15. Remove the **Filter Button** table style option.

16. Save your workbook.

- *Using eLab:* Save it to your **Excel Chapter 11** folder as **E11_P1_eSubmission** and attach the file to your eLab assignment for grading.
- *Not using eLab:* Save it to your **Excel Chapter 11** folder as: **E11_P1_Submission**

PROJECT GRADER: E11-P2

Calculating Appreciation using Structured References

Classic Cars Club would like to calculate the total, yearly average, and overall average appreciation of each club member's car. In this exercise, you will calculate the total and average yearly appreciation for each car using structured references, add a total row with average functions, and apply additional table style formatting.

1. Download and open your Project Grader starting file.

- *Using eLab:* Download **E11_P2_eStart** from the Assignments page. You *must* start with this file or your work cannot be automatically graded.
- *Not using eLab:* Open **E11_P2_Start** from your **Excel Chapter 11** folder.

2. Change the name of the table in the **Car Values** worksheet to: **CarValues**

3. Insert a table column to the right of the *Current Value* column.

4. In the new column, change the column heading label from *Column1* to: **Appreciation**

5. In **cell J8**, use a formula with structured references to calculate the appreciation (Current Value minus Original Value).

6. Delete the formulas from **cells J28**, **J39**, and **J40**.

7. Insert a table column to the right of the *Appreciation* column.

8. Change the column heading label from *Column1* to: **AVG per Year**

9. In **cell K8**, use a formula with structured references to calculate the average per year (Appreciation divided by Age).

10. Delete the formulas from **cells K28**, **K39**, and **K40**.

11. Apply the table style **White, Table Style Medium 1** (the fifth option in the Table Styles list).

12. Set these table style options:

- Use the **Last Column** option.
- Add a total row.
- Remove the filter button.

13. In **cell J41**, use an AVERAGE function for the **range J8:J38**.

14. Make these changes to the Total row:

- Remove the text in **cell A41**.
- Enter the text **Average** in **cell G41**.
- Use **Align Right** cell alignment on **cell G41**.

15. Save your workbook.

- *Using eLab:* Save it to your **Excel Chapter 11** folder as **E11_P2_eSubmission** and attach the file to your eLab assignment for grading.
- *Not using eLab:* Save it to your **Excel Chapter 11** folder as: **E11_P2_Submission**

✈ Extend Your Skills

These exercises challenge you to think critically and apply your new skills in a real-world setting. You will be evaluated on your ability to follow directions, completeness, creativity, and the use of proper grammar and mechanics. Save files to your chapter folder. Submit assignments as directed.

E11-E1 That's the Way I See It

You are shopping for a new computer and want to make a table comparing your options. Open a new workbook and save it as: **E11-E1-Computers**

Create a table with the headers *Brand, Model, Price,* and *My Rating.* Identify at least three computer brands and three different models for each; go online to look up prices for each computer. Insert appropriate data into the table and add your own personal rating from one to ten for each computer. Add a total row to calculate the average price and sort the table from highest to lowest by your My Rating column.

E11-E2 Be Your Own Boss

It's the end of the year and you are analyzing the numbers for Blue Jean Landscaping. You have already calculated the revenue and expenses for each month, and now you want to summarize the data in a table. Open **E11-E2-RevandExp** and save it as: **E11-E2-RevandExpTable**

Insert a table using the appropriate data and add a total row. Change the *Total* to *Net Profit* and add a sum below each month. Add a new column at the far right of the table and insert an annual total for the three rows. In column O, insert sparklines for the three rows of data from January to December. Resize the columns and adjust the worksheet formatting as appropriate.

E11-E3 Demonstrate Proficiency

The sales of Stormy BBQ's three flavors of popular BBQ sauce are saved in an Excel sheet, and you would like to analyze the data further. Open **E11-E3-SauceSales** and save it as: **E11-E3-SauceSalesAnalysis**

Insert a table to include all the sales data and then insert a new column to the right to find the total sales for each month. Insert sparklines in the first column beside the table to show the sales trend for each type of sauce each month. Add a total row to the bottom and summarize with the average monthly sales for each sauce type. Below the table, insert one row to show the highest and another to show the lowest month of sales for each flavor, using structured references in the formulas. Be sure to include an appropriate row label for each row of the summary data.

EXCEL

12

PivotTables and PivotCharts

PivotTables and PivotCharts are powerful, interactive Excel features that help you deal with large worksheets because they allow you to analyze your data in different ways. In this chapter, you will create and format PivotTables and PivotCharts. You will also filter data, add slicers, and create calculated fields.

LEARNING OBJECTIVES

- ▶ Create PivotTables
- ▶ Modify and format PivotTables
- ▶ Apply a filter to a PivotTable
- ▶ Insert a slicer to filter a PivotTable
- ▶ Create a calculated field
- ▶ Create PivotCharts

📂 **Project: Analyzing Sales Data**

You work with Airspace Travel, which provides luxurious vacation packages to tropical destinations. You have been given an Excel file containing all the sales information for Airspace Travel's employees for Q3 (July through September). To analyze the employees' performance, you will create a variety of PivotTables and PivotCharts to highlight important details within the data.

Creating PivotTables

A PivotTable is a powerful and cooperative Excel tool used to summarize complex information. Pivot-Tables make it easy to understand large amounts of information by creating a summary report of your data. They are created by taking existing data in a worksheet and organizing the various fields into columns and rows, which can then be used to display different results. The purpose of a Pivot-Table is to take large amounts of data and to help you determine, for example, which products are selling the best, which employees are performing the best, which day of the week or time of day you need to have more staff on hand to reduce wait times for customers, etc.

To create a PivotTable, you can start with a blank table and add fields, or you can use one of the recommended PivotTables that Excel suggests based on your data.

☁ View the video "Making a PivotTable."

What Is a PivotTable?

A PivotTable combines some of the features of both tables and outlines, along with additional unique features that make it extremely flexible. You can arrange your data in different ways, which is where the term *pivot* (to turn or rotate) comes from, and you can quickly switch between the different views rather than creating a separate table each time. PivotTables are made up of rows and columns that contain field labels, and the value fields are then summarized within. PivotTable fields can be used to subtotal, compare, count, or perform other calculations on your data, as well.

The following PivotTable uses this data (only a small part of the worksheet data is shown) to compare the sum of product and service sales side by side for the employees, who are grouped by position:

Last Name	First Name	Position	Region	State	Date	Type	Amount
Louis	Lin	Senior Account Mgr	Central	IL	2-May	Service	234,000
Darko	David	Sales Account Mgr	Central	CO	3-May	Product	162,000
Lemmon	LaShaun	Sales Account Mgr	Central	CO	3-May	Product	210,000
Tavares	Taneisha	Sales Rep	Central	IL	4-May	Service	230,000
Plumlee	Patricia	Sales Rep	Central	IL	4-May	Product	120,000
Louis	Lin	Senior Account Mgr	Central	IL	5-May	Service	560,000
Darko	David	Sales Account Mgr	Central	CO	6-May	Service	151,000
Lemmon	LaShaun	Sales Account Mgr	Central	CO	6-May	Product	340,000
Tavares	Taneisha	Sales Rep	Central	IL	6-May	Service	120,000
Plumlee	Patricia	Sales Rep	Central	IL	6-May	Product	170,000

The Row Labels field also includes a filter button to apply a Sort or Filter to the rows in the PivotTable.

The values for product and service sales are shown in two columns.

The Row Labels include position and last name.

Rows are grouped by position, and each group can be collapsed or expanded as needed.

Row Labels	Sum of Product	Sum of Service
⊟ Sales Account Mgr	1,386,000	1,527,000
Darko	162,000	151,000
Eggles	340,000	700,000
Lemmon	210,000	340,000
Mandel	228,000	216,000
Tucker	446,000	120,000
⊞ Sales Rep	769,000	710,000
⊞ Senior Account Mgr	1,603,000	2,145,000
Grand Total	3,758,000	4,382,000

Arranging the Source Data

To create a PivotTable, you must know where to get the source data and what state the data has to be in. Because a PivotTable summarizes data, the source data should not be summarized in any way. You can also think of this as being the *raw* data.

Typically, you want the source data to have fields (column headings) listed across the top, and then each row in the worksheet should contain a unique list entry. For example, the source should not have a list of employees and then list a summary of sales for each month in the same row. Rather, the source should be the raw sales data with a separate row for each individual sale.

The source can be a list of data formatted as either a normal range or a table. The source should not contain any blank rows or columns, or duplicate values.

Remove Duplicates

When entering data or combining data from different sources, there is a chance of having the same information listed twice. This duplicate information can cause your information to be incorrect, which in turn causes incorrect evaluations, analysis, and perhaps important decisions based on flawed data. To check for and remove duplicates, you can use the Remove Duplicates command. For the tool to determine whether a record is considered a duplicate, you indicate which columns must match. In some cases, it requires only one or two columns to determine that a record is a duplicate; for other data, you may want to match all columns.

≡ Data→Data Tools→Remove Duplicates

Adding PivotTable Fields

Whether you start with a blank PivotTable or use a recommended one, you can add and remove fields to manipulate the table data after it's created. The PivotTable Fields pane allows you to quickly add and remove fields by either clicking or dragging.

Choose from the list of field names to be included in the PivotTable; these are the column names from the source data.

Fields added here can be quickly filtered.

Fields added here are displayed in the Column Labels; in this example no field was added to columns, so the column labels are the Values fields.

Row Labels	Sum of Product	Sum of Service
⊟ Sales Account Mgr	1,386,000	1,527,000
Darko	162,000	151,000
Eggles	340,000	700,000
Lemmon	210,000	340,000
Mandel	228,000	216,000
Tucker	446,000	120,000
⊞ Sales Rep	769,000	710,000
⊞ Senior Account Mgr	1,603,000	2,145,000
Grand Total	3,758,000	4,382,000

Fields added here are displayed in the Row Labels; note in the PivotTable on the right that position comes first, followed by last names.

This area displays the Value fields added to the PivotTable and the function being performed.

≡ Insert→Tables

DEVELOP YOUR SKILLS: E12-D1

In this exercise, you will check the source data for duplicates, insert a blank PivotTable, and add fields to the PivotTable to show a summary of sales for each location.

1. Start Excel, open **E12-D1-Sales** from your **Excel Chapter 12** folder, and save it as:
   E12-D1-SalesTargets

2. Begin by quickly scrolling down through the worksheet to verify the data.

   You want to ensure there are no blank rows separating the data. Note that the data ends at row 93. Considering there are that many rows, you likely didn't find any duplicates visually, so you will check for them now.

3. Choose **Data→Data Tools→Remove Duplicates** 📊.

   In some cases, you may want to match only one or two fields to remove duplicates, but in this case, each record could have a repeated value such as name, position, or month. If all the fields match—including target, sales, and commissions—you know there is a true duplicate.

4. Leave all columns checked and click **OK**.

   You will see a dialog box telling you that four duplicates were found and 86 values remain.

5. Click **OK** to close the dialog box.

6. Quickly navigate to the last row of data by pressing ⌈Ctrl⌉+⌈↓⌉ and notice the data stops at row 89.

   Now you are ready to insert a PivotTable. You will start with a blank PivotTable.

7. Choose **Insert→Tables→PivotTable** 🔳.

   The Create PivotTable dialog box selects all adjacent data, and the PivotTable will be created on a new worksheet by default.
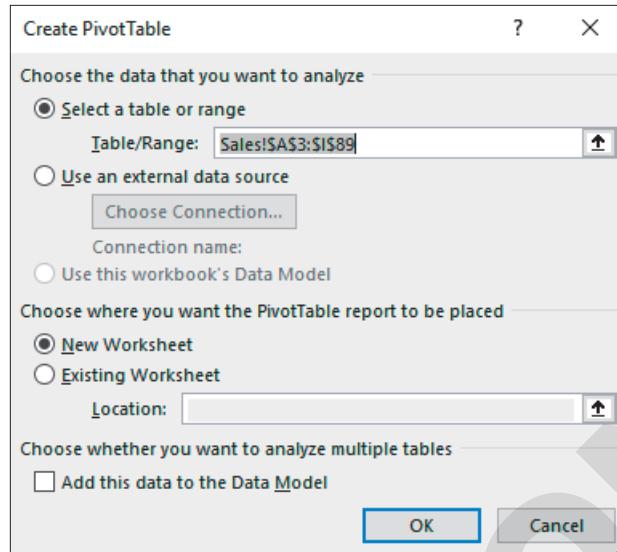
8. Confirm the range is *Sales!$A$3:$I$89* and click **OK** to create the PivotTable.

   The next step is to add the fields to the PivotTable. You will first add the rows, then the columns, and finally the values.

9. Click the **Location** and **Position** checkboxes (in that order) in the PivotTable Fields pane to add those fields as row labels and then drag the **Month** field into the Columns box.
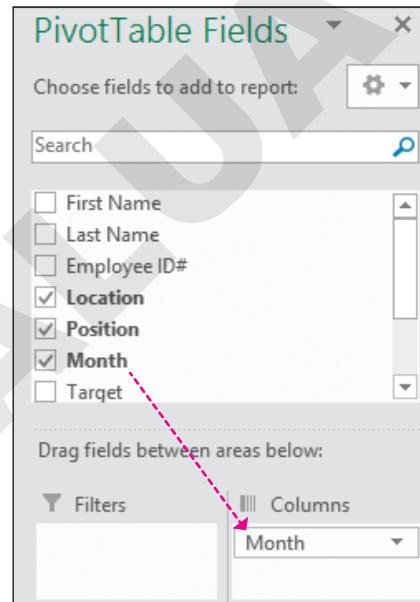
Note! *Adding row labels can be done with a simple click, but column labels are usually added by dragging or right-clicking.*

10. Click the **Sales** checkbox (scroll down the field list as necessary) in the PivotTable Fields pane to add that field to the Values area.
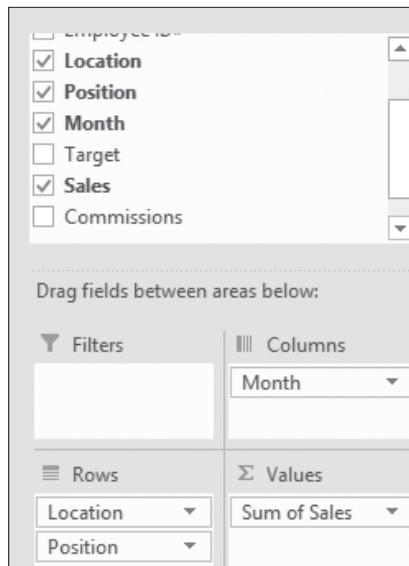
Because the Sales field contains numerical data, it is automatically added to the Values area rather than the Rows area, and the default function is to find the sum of Sales values.

Sum of Sales	Column Labels			
Row Labels	Jul	Aug	Sep	Grand Total
Los Angeles	50223	47986	45450	143659
Agent	39714	37888	35250	112852
Manager	10509	10098	10200	30807
Miami	98409	95789	102700	296898
Agent	58331	54487	60725	173543
Manager	40078	41302	41975	123355

Your PivotTable shows a sum of the sales for each location for each month, with each location also showing a breakdown of sales by agents and sales by managers. A grand total is automatically added on the right side to sum all three months and at the bottom to sum all locations.

11. Rename the worksheet: **Sum of Sales by Location**

12. Save the file.

Using PivotTables for Analysis

After you have created a PivotTable, you can modify it at any time by adding or removing fields, or by changing the positioning and order of fields. This is done by checking/unchecking the boxes next to the field names or by dragging the field names in and out of the various areas. Each time you make a change, the PivotTable automatically reconfigures to display the new data.

Note! *Checking a box next to a field name places it in the default location, usually rows for text and values for numeric data. If you drag a text field into the Values area, Excel will use the COUNT function instead of SUM since text cannot be added!*

Changing the order of fields in either the row or column area creates different data groupings, and this can be done by dragging and dropping the field names into the new positioning. Or you might want to switch a field label from row to column or column to row—pivoting the data.

Sum of Product	Column Labels			
Row Labels	Central	Eastern	Western	Grand Total
⊟Sales Account Mgr	372000	228000	786000	1386000
Darko	162000			162000
Eggles			340000	340000
Lemmon	210000			210000
Mandel		228000		228000
Tucker			446000	446000
⊞Sales Rep	350000	140000	279000	769000
⊞Senior Account Mgr	234000	767000	602000	1603000
Grand Total	956000	1135000	1667000	3758000

Here, product sales are grouped by position and then last name in the rows, while the columns are organized by region.

Row Labels	Sum of Product
⊟Central	956000
⊟Sales Account Mgr	372000
Darko	162000
Lemmon	210000
⊞Sales Rep	350000
⊞Senior Account Mgr	234000
⊟Eastern	1135000
⊟Sales Account Mgr	228000
Mandel	228000
⊞Sales Rep	140000
⊞Senior Account Mgr	767000
⊟Western	1667000
⊟Sales Account Mgr	786000
Eggles	340000
Tucker	446000
⊞Sales Rep	279000
⊞Senior Account Mgr	602000
Grand Total	3758000

Now the PivotTable shows the product sales with rows grouped by region, then position, then last name. It's the same data, it's just organized differently.

Arranging fields appropriately is perhaps the most important skill for working with PivotTables because each change in the data's organization tells a new story. It is important to practice organizing your fields in a variety of ways to see how the information can be shaped to answer different questions.

View the video "Changing a PivotTable."

Formatting PivotTables

Changing the PivotTable's format can help make the information easier to read and understand. Similar to tables, there are a number of styles to choose from in the gallery on the Design tab. There are also a number of layout and style options to choose from.

Report Layout options include Compact, Outline, and Tabular. Subtotals can either be displayed at the top or bottom of each category or group or turned off altogether, and grand totals can also be turned on or off for rows and columns.

Using PivotTables for Analysis   **297**

Number formatting does not automatically transfer from the source data, but you can quickly change the number format for an entire value field by selecting a value and using the Field Settings command or by right-clicking a value and choosing Number Format.

Sum of Product		Region			
Position	Last Name	Central	Eastern	Western	Grand Total
⊟ Sales Account Mgr		$372,000	$228,000	$786,000	$1,386,000
	Darko	$162,000			$162,000
	Eggles			$340,000	$340,000
	Lemmon	$210,000			$210,000
	Mandel		$228,000		$228,000
	Tucker			$446,000	$446,000
⊞ Sales Rep		$350,000	$140,000	$279,000	$769,000
⊞ Senior Account Mgr		$234,000	$767,000	$602,000	$1,603,000
Grand Total		$956,000	$1,135,000	$1,667,000	$3,758,000

This PivotTable has a style and number formatting applied. The report layout is displayed in outline form, which takes up more space but makes it easier to see the row labels.

Changing Value Field Settings

For each value field, the settings can be changed to better suit the information you want to show. The field name can be customized, the number format can be modified, and a function other than Sum can be used to summarize values. For example, instead of showing the sum of sales for each region, you might want to show the average sales by region. Then, instead of *Average of Product*, you could adjust the custom name to *Avg Product Sales* and the number format to Currency.
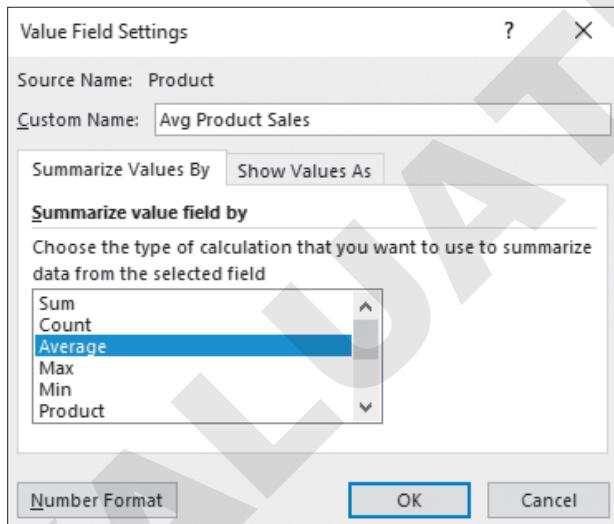
Avg Product Sales		Region		
Position	Last Name	Central	Eastern	Western
⊟ Sales Account Mgr		$186,000	$228,000	$393,000
	Darko	$162,000		
	Eggles			$340,000
	Lemmon	$210,000		
	Mandel		$228,000	
	Tucker			$446,000
⊞ Sales Rep		$175,000	$140,000	$139,500
⊞ Senior Account Mgr		$234,000	$383,500	$602,000
Grand Total		$191,200	$283,750	$333,400

Value Field Settings dialog box:

Source Name: Product

Custom Name: Avg Product Sales

Summarize Values By | Show Values As

Summarize value field by

Choose the type of calculation that you want to use to summarize data from the selected field

- Sum
- Count
- **Average**
- Max
- Min
- Product

Number Format | OK | Cancel

DEVELOP YOUR SKILLS: E12-D2

In this exercise, you will create another PivotTable and adjust the fields and value field settings to show the average by position for commissions, sales, and targets.

1. Save your file as: **E12-D2-SalesTargets**
2. Go to the **Sales** worksheet and choose **Insert→Tables→Recommended PivotTables** 📊.

   The dialog box gives a list of suggested PivotTables on the left and a preview of the selected PivotTable on the right.

3. Select the third option on the left, **Sum of Commissions, Sum of Sales and Sum of Target by Location**, and click **OK** to insert the PivotTable.

4. Uncheck the **Location** box in the PivotTable Fields pane to remove the Location field from the PivotTable.

5. Now check the **Position** box in the Fields pane to add that field.

Row Labels	Sum of Commissions	Sum of Sales	Sum of Target
⊟Adam	805.479	14647	15000
Manager	805.479	14647	15000
⊟Alexander	1083.608	17471	15000
Agent	1083.608	17471	15000
⊟Cam	4189.56	68904	75000
Agent	4189.56	68904	75000

The PivotTable shows employees by first name and then lists their data again in a separate row with their positions, which does not make the information displayed very useful at the moment!

6. Drag the **Position** field above the First Name field in the Rows area to change the order of the fields.

Row Labels	Sum of Commissions	Sum of Sales	Sum of Target
⊟Agent	31288.38	504496	471000
Alexander	1083.608	17471	15000
Cam	4189.56	68904	75000
Cassie	1804.5	26250	24000
Cynthia	2384.273	41188	30000
Debra	2893.21	54870	45000

Now the PivotTable shows the results for each employee grouped by position, which is much more useful. Next you will make another change to see a different result.

7. Check the **Month** box to add that field and then remove the **First Name** field by dragging it out of the Rows area and onto the worksheet (this is an alternative to removing the checkmark).

| Row Labels	Sum of Commissions	Sum of Sales	Sum of Target
⊟Agent	31288.38	504496	471000
Jul	9466.241	158462	156000
Aug	11183	176881	156000
Sep	10639.139	169153	159000
⊟Manager	29018.726	464380	459000
Jul	9587.954	150754	153000
Aug	8974	150612	153000
Sep	10456.772	163014	153000
Grand Total	60307.106	968876	930000

This PivotTable shows a different story by displaying the monthly results for agents and managers separately. Next you will apply a new PivotTable style to change the colors of the table.

8. Choose **PivotTable Tools→Design→PivotTable Styles→Dark Blue, Pivot Style Dark 20**.

Now you will adjust the field name and number format for the three value fields.

9. In the Values area, click **Sum of Commissions** and choose **Value Field Settings…**.

The full field name may be cut off from view; hover the mouse pointer over the field to see the full name.
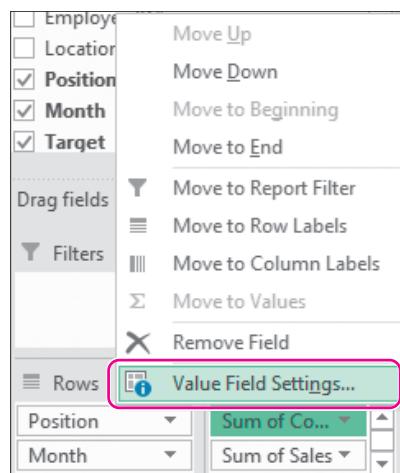
10. Follow these steps to change the field settings:
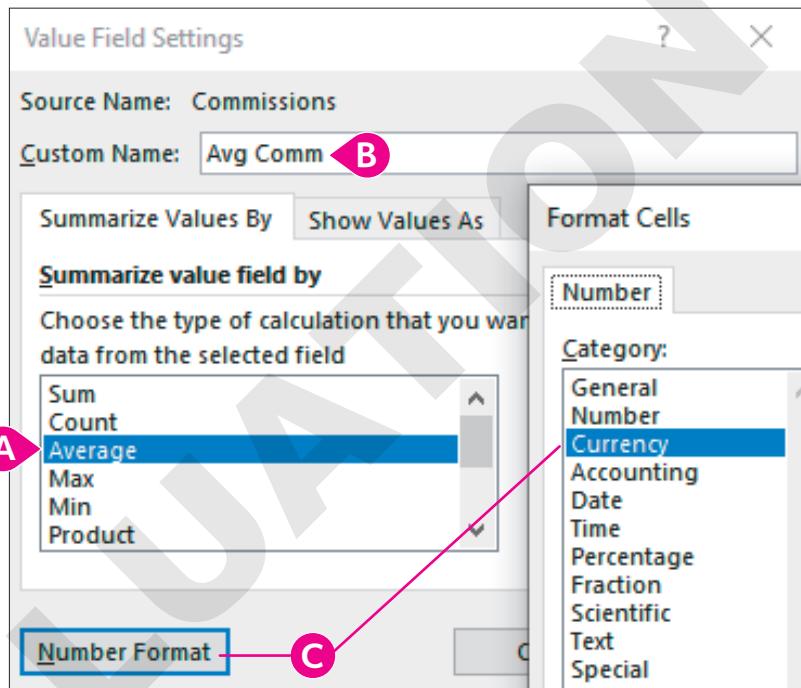
Ⓐ Choose **Average** in Summarize Value Field By.

Ⓑ In the Custom Name box, type: **Avg Comm**

Ⓒ Click **Number Format** and then choose **Currency** and click **OK**.

11. Click **OK** to close the Value Field Settings dialog box.

12. Repeat this process for the Sum of Sales and Sum of Target fields, including using the **Average** summary function and the **Currency** number format. Use the custom names: **Avg Sales** and **Avg Target**

13. Choose **PivotTable Tools→Design→Layout→Report Layout→Show in Outline Form**.

Position	Month	Avg Comm	Avg Sales	Avg Target
⊟ Agent		**$711.10**	**$11,465.82**	**$10,704.55**
	Jul	$676.16	$11,318.71	$11,142.86
	Aug	$745.53	$11,792.07	$10,400.00
	Sep	$709.28	$11,276.87	$10,600.00
⊟ Manager		**$690.92**	**$11,056.67**	**$10,928.57**
	Jul	$684.85	$10,768.14	$10,928.57
	Aug	$641.00	$10,758.00	$10,928.57
	Sep	$746.91	$11,643.86	$10,928.57
Grand Total		**$701.25**	**$11,266.00**	**$10,813.95**

14. Rename the worksheet: **Averages by Position**

15. Save your work.

Filtering a PivotTable

You can filter a PivotTable to remove unnecessary data and focus on the data that is important. To add a filter you can use AutoFilter, add a filter field, or add a slicer. Each time you filter a PivotTable, the totals and subtotals instantly recalculate throughout the table.

Filtering with AutoFilter

The row labels and column labels have an AutoFilter menu button ▾ that provides the same sorting and filtering options available in worksheet lists and tables.


This PivotTable has been filtered to show the Sales Account Mgr and Senior Account Mgr positions only, and to sort those positions alphabetically.

Filtering with a Filter Field

Adding a field to the Filters area simplifies the process of filtering the data to display one or more categories of data at a time. To turn on the option for showing more than one category, click the

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Select Multiple Items checkbox in the filter menu. The filtered field and the current filter setting will always display directly above the PivotTable.
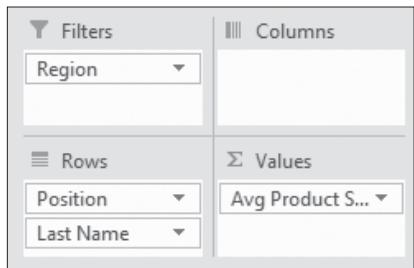
Adding the Region field to the Filters area displays that filter above the PivotTable (next figure).

This PivotTable has been filtered to show only the Eastern region.

Filtering with Slicers

Slicers are menu frames placed on a worksheet that contain all filtering choices for one field. Selected items are highlighted in the slicer, making it easy to identify the applied criteria. To select multiple fields in a slicer, you can use the Multi-Select feature or use the Ctrl key.

Slicers are appealing because they can be moved around, resized, and styled to match the PivotTable, but the real benefit is that slicers can be shared with other sheets in the same workbook for other PivotTables that use the same source data. Changing the filtered selections in a shared slicer automatically updates all connected PivotTables.

The PivotTable with a slicer used to display only the Central and Eastern region data

DEVELOP YOUR SKILLS: E12-D3

In this exercise, you will add filters to the existing PivotTables using two different methods.

1. Save your file as: **E12-D3-SalesTargets**

   Ensure the PivotTable on the Averages by Position worksheet is selected and the Fields list is visible.

2. Drag the **Location** field into the Filters area.
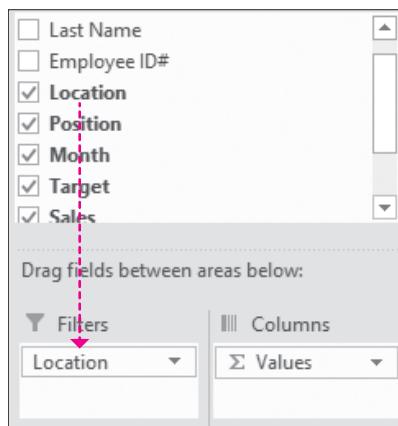
You will now see the field name Location *in cell A1. The filter in cell B1 displays* (All), *indicating all data is showing with no filter applied.*

3. Click the **Location filter** button ▾ above the PivotTable, select **New York** to display the information for New York only, and then click **OK**.
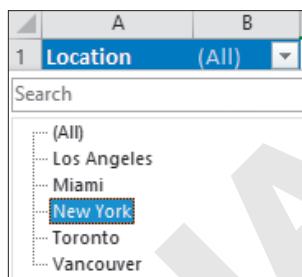
*The filter now shows* New York, *and the data in the PivotTable show the averages for the New York location only.*

Next you will adjust the Sum of Sales by Location PivotTable by adding a slicer for Position.

4. Go to the **Sum of Sales by Location** sheet and, if necessary, select any cell in the PivotTable.

5. Click the **Position** field in the Rows area and choose **Remove Field**.

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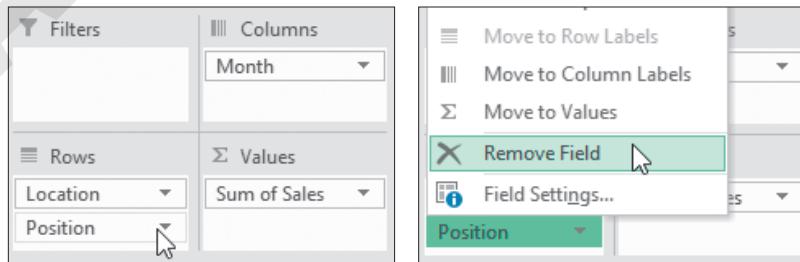
6. Choose **PivotTable Tools→Analyze→Filter→Insert Slicer** 📊.

7. In the Insert Slicers dialog box, click the **Position** checkbox and then click **OK**.
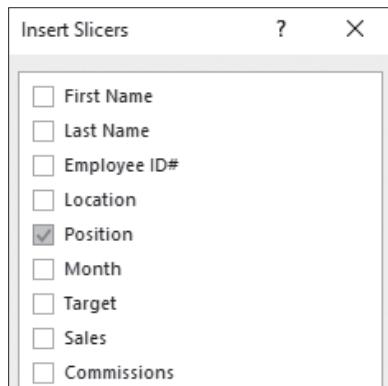
The slicer window is displayed on the sheet, and the Slicer Tools are displayed on the Ribbon.
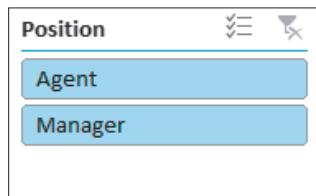
8. Drag the slicer window directly beside the PivotTable, with the tops of both roughly aligned.

9. Go to **Slicer Tools→Options→Size** and resize the slicer to exactly **1"** high and **1.5"** wide.

10. Apply the **Light Blue, Slicer Style Dark 5** style (**Slicer Tools→ Options→Slicer Styles**) to the slicer.

11. Click **Agent** in the slicer window to display the sales data for agents only.

Now you will adjust the number format for sales values.

12. Right-click **cell E5** and choose **Number Format…**, then choose **Currency**, set to zero decimals, and click **OK**.

Notice the entire range of values is now formatted with the Currency style.

13. Select **Manager** in the slicer window to display the sales data for managers only.

14. Save the file.
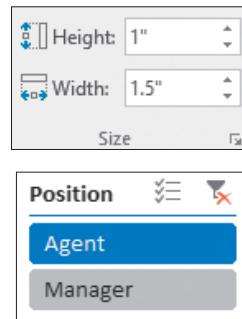
Creating Calculated Fields

You may want to create your own calculations and add them to your PivotTables. A *calculated field* uses a formula containing values from one or more of the existing fields. For example, you could take Sales values and multiply by 5% or take the Cost field from a PivotTable and subtract the Sales field.

In this example, a calculated field is created by taking Product field values and multiplying them by 105% to get the expected product sales growth, which is 5% above the current product value.

Insert Calculated Field	
Name:	Product Sales Growth
Formula:	=Product*105%

≡ PivotTable Tools→Analyze→Calculations→Fields, Items, & Sets

Show Values As

Another option for displaying PivotTable values is to use comparison operations, which are also available from the Value Field Settings dialog box. There are options already created to determine calculations such as a percentage of a grand total, the difference between values in two fields, or a ranking order.

Value Field Settings	
Source Name: Product	
Custom Name: Product Sales %	
Summarize Values By | **Show Values As**	
Show values as	
% of Grand Total	
No Calculation	
% of Grand Total	
% of Column Total	
% of Row Total	
% Of	
% of Parent Row Total	
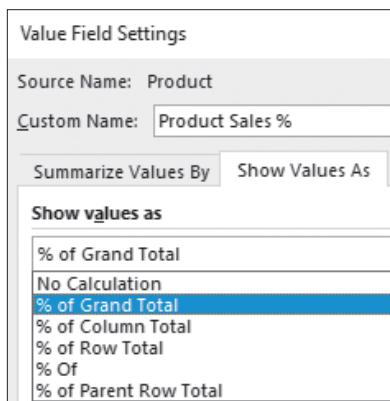
Position	Last Name	Product Sales	Product Sales %
⊟ Sales Account Mgr		$1,386,000	36.88%
	Darko	$162,000	4.31%
	Eggles	$340,000	9.05%
	Lemmon	$210,000	5.59%
	Mandel	$228,000	6.07%
	Tucker	$446,000	11.87%
⊞ Sales Rep		$769,000	20.46%
⊞ Senior Account Mgr		$1,603,000	42.66%
Grand Total		**$3,758,000**	**100.00%**

This PivotTable shows each employee's sales in dollars and as a percentage of the grand total.

Refreshing PivotTable Data

Whenever you change the source data, you must also refresh your PivotTable to reflect the updated data. You can refresh only the current PivotTable or all of them at once. You can also set up an option to refresh the data each time the file is opened.

≡ PivotTable Tools→Analyze→Data→Refresh

Referencing PivotTable Data

Extracting data from a PivotTable requires using the GETPIVOTDATA function. This function is much easier to use than most functions because it can be created with just a click. Using the point-and-click method to create a reference to data in a PivotTable inserts the function *and* all the required arguments simultaneously.

DEVELOP YOUR SKILLS: E12-D4

In this exercise, you will create a new PivotTable that shows which employees achieved their sales targets.

1. Save your file as: **E12-D4-SalesTargets**
2. Go to the **Sales** sheet and create a new PivotTable using the default values.
3. Rename the new sheet: **% of Target**

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4. Add the **Location**, **Position**, and **Last Name** fields to the Rows area, in that order.

5. Add **Sales** and **Target** to the Values area, in that order.

Values are automatically added to the Columns area as well.
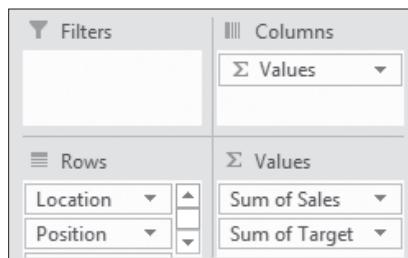
6. In the Values area, adjust the value field settings of each to **Currency** with no decimals and use the custom names: **Total Sales** and **Total Target**

7. Choose **PivotTable Tools→Analyze→Calculations→Fields, Items, & Sets** 🔲→**Calculated Field…**.

8. Follow these steps to create a calculated field:

Ⓐ In the Name box, enter: **% of Target**

Ⓑ Delete the number **0** in the Formula box, select **Sales** and click **Insert Field**

Ⓒ Type **/** and then select **Target** and click **Insert Field**.

9. Click **OK** to create the calculated field, which will divide sales by the target and be displayed in the Values quadrant.

The calculated field will only display mostly 1s until the number format is changed.

10. Right-click **cell D4** and open the Value Field Settings for the calculated field, change the name to **Total % of Target** and the Number Format to **Percentage** with two decimal places.

Now the calculated field displays percentages above and below 100%, where 100% represents reaching their target.

11. Click the collapse buttons for the Agent and Manager labels to display locations and positions only.

Row Labels	Total Sales	Total Target	Total % of Target
⊟ Los Angeles	$143,659	$141,000	101.89%
⊟ Agent	$112,852	$111,000	101.67%
Bryant	$43,948	$36,000	122.08%
Owens	$68,904	$75,000	91.87%
⊟ Manager	$30,807	$30,000	102.69%
Curry	$30,807	$30,000	102.69%

Row Labels	Total Sales	Total Target	Total % of Target
⊟ Los Angeles	$143,659	$141,000	101.89%
⊞ Agent	$112,852	$111,000	101.67%
⊞ Manager	$30,807	$30,000	102.69%

12. Change the PivotTable style to **Dark Blue, Pivot Style Dark 20**.

13. Now go to the **Sales** sheet and select **cell H7**.

New sales information has come in for Sarah Mckinnon for July, so you will enter the new information.

14. Enter the correct information by typing **12900** in **cell H7**.

15. Return to the **% of Target** sheet and choose **PivotTable Tools→Analyze→Data→Refresh** 🔄 **menu button** ▾ **→Refresh All**.

The data in all PivotTables is now updated to reflect the correction.

16. Save the file.

Creating PivotCharts

PivotCharts are charts based on PivotTable data. PivotCharts can be created simultaneously with the PivotTable or after the PivotTable has been created, but a PivotChart must have an associated PivotTable. The fields on the Values area of the PivotTable are displayed as data series on the chart. The row labels are used as the axis labels, and the column labels are used in the chart legend. The PivotChart Tools tab contains all of normal options for chart formatting, in addition to the Analyze options for PivotTables.

Filtering PivotCharts

A PivotChart also includes AutoFilter buttons directly in the chart for quick and easy access to filter options. Filtering the PivotChart also filters the associated PivotTable, and vice versa. If a slicer has been added to the PivotTable, filtering can also be performed with the slicer for the PivotChart.

The PivotTable Legend values indicate the columns being displayed.

| Sum of Service	Region		
Position	Central	Eastern	Western
Sales Account Mgr	491000	216000	820000
Senior Account Mgr	560000	963000	622000
Grand Total	1051000	1179000	1442000
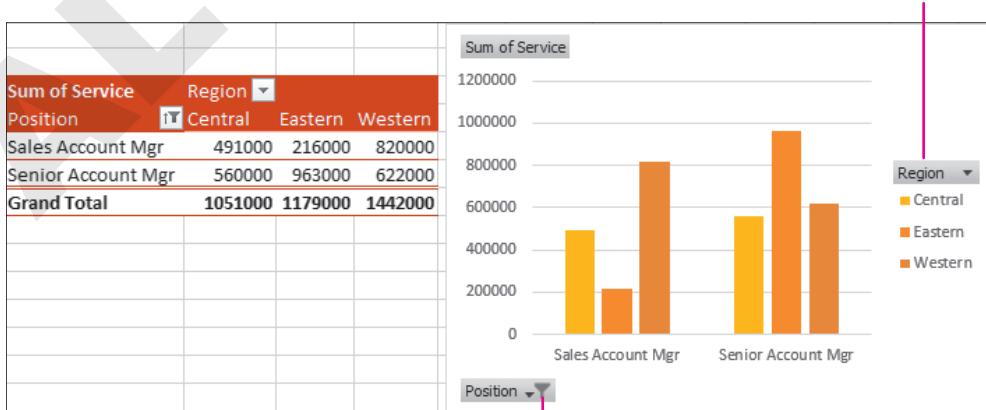
Filter buttons can be used to filter the data; in this example, the filter for position displays the Sales and Senior Account Mgr positions but hides the Sales Reps.

DEVELOP YOUR SKILLS: E12-D5

In this exercise, you will insert a PivotChart for an existing PivotTable and then build a new PivotChart while creating the adjoined PivotTable at the same time.

1. Save your file as: **E12-D5-SalesTargets**

2. Go to the **Sum of Sales by Location** sheet.

3. Select the pivot table, if necessary, and then choose **PivotTable Tools→Analyze→Tools→ PivotChart** 📊.

4. Click **OK** to insert the clustered column chart.

5. Drag the chart so it is directly below the PivotTable.

6. In the slicer, click the **Multi-Select** 📋 button and then click **Agent** to display data for both positions in the chart.

7. Go to the **Sales** worksheet and choose **Insert→Charts→PivotChart** 📊.

8. In the Create PivotChart dialog box, click **OK**.

9. In the PivotChart Fields pane, add **Location** to the Axis area, **Month** to the Legend area, and **Commissions** to the Values area.

   Use whatever method you prefer to add fields, as long as they are added to the correct area.

10. In the PivotChart legend, click the **Month** button, click to remove the checkmark from **Sep**, and click **OK**.

    In the PivotChart, the September data is removed and only July and August are displayed.

11. Rename the worksheet: **Commissions by Month**

12. Drag the chart so it is directly below the PivotTable.

13. Save your work and close the file.

Self-Assessment

Check your knowledge of this chapter's key concepts and skills using the Self-Assessment in your ebook or online (eLab course or Student Resource Center).

📌 Reinforce Your Skills

Create a PivotTable

In this exercise, you will use the data from the Kids for Change fundraising receipts to create a PivotTable summary to show the amounts received by Category, Type, and Date.

1. Open **E12-R1-ReceiptsData** from your **Excel Chapter 12** folder and save it as:
   E12-R1-ReceiptsSummary
2. Choose **Data→Data Tools→Remove Duplicates** 📊 to check for duplicates, leave all columns checked, and click **OK**.

   Three duplicate values are found and removed, and 43 unique values remain.
3. Click **OK**.
4. Choose **Insert→Tables→PivotTable** 📑, confirm the range is **Receipts!$A$4:$F$47**, and click **OK**.
5. Click the checkboxes for **Category** and **Type** in the PivotTable Fields pane to add both fields to the Rows area.
6. Add the **Date** field to the Column area.

   Notice that Excel automatically adds a Months *label to the Columns area to group the dates by month for January–March.*
7. Click the **Amount** checkbox to add that field to the Values area.

▼ Filters	||| Columns
	Months ▾
	Date ▾
≡ Rows	Σ Values
Category ▾	Sum of Amou... ▾
Type ▾	
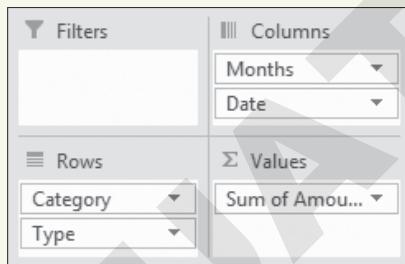
8. Choose **PivotTable Tools→Design→PivotTable Styles→Light Blue, Pivot Style Medium 9**.
9. Choose **PivotTable Tools→Design→Layout→Report Layout→Show in Outline Form**.
10. Choose **PivotTable Tools→Analyze→Active Field→Field Settings**.
11. In the Value Field Settings dialog box, change the custom name to **Receipts Summary** and change the number format to Currency with no decimals.
12. Rename the worksheet to **Receipts Summary** and then save the file.

Filter a PivotTable and Add a Calculated Field

In this exercise, you will use the Receipts Summary PivotTable to filter by employee, add a calculated field to estimate the Q2 receipts, and create a PivotChart.

1. Save your file as: **E12-R2-ReceiptsSummary**
2. Create a copy of the **Receipts Summary** worksheet, renaming it: **Receipts Q2 Est.**

3. On the **Receipts Q2 Est.** sheet, drag the **Employee** field into the Filters area.

4. Click the **Employee filter** button ⌄ above the PivotTable, check the box for **Select Multiple Items**, and then clear the check from the **All** box to deselect all employees at once.

5. Click to select **Bowers**, **Burke**, and **Drew** from the list to display the information for those employees and click **OK**.

6. Choose **PivotTable Tools→Analyze→Calculations→Fields, Items, & Sets→Calculated Field**.

7. In the Insert Calculated Field dialog box, enter **Q2 Est.** in the Name box.

8. Insert the formula **=Amount*1.05** and click **OK**.

   The Q2 growth is expected to be 5%, so the calculated field adds 5% by taking the amount and multiplying by 1.05.

9. Remove the **Months** and **Date** fields from the Columns area.

10. Open the Value Field Settings for the **Receipts Summary** field.

11. Click the **Show Values As** tab, select **% of Grand Total** from the Show Values As menu, and click **OK**.

12. Use the **Employee** filter to display all employees.

13. To insert a PivotChart, choose **PivotTable Tools→Analyze→Tools→PivotChart** 📊.

14. Select the **Combo** chart and adjust the Chart Type and Secondary Axis settings as shown, clicking **OK** when finished:

Choose the chart type and axis for your data series:

Series Name	Chart Type	Secondary Axis
▍ Receipts Summary	Line ⌄	☑
▍ Sum of Q2 Est.	Clustered Column ⌄	☐
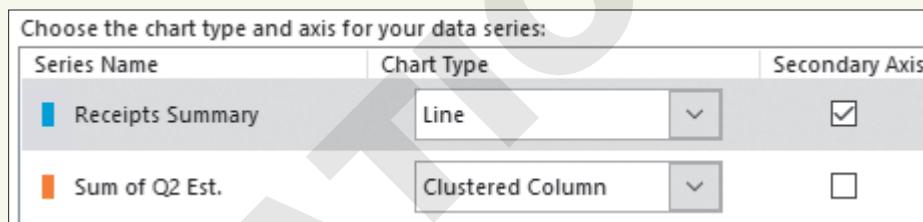
15. Use the **Category** filter on the PivotChart to display the **Corporate** values only.

16. Drag the PivotChart to directly below the PivotTable.

17. Save your work and close the file.

REINFORCE YOUR SKILLS: E12-R3

Create a Volunteer Hour Summary

In this exercise, you will create a summary of the Kids for Change volunteer hours to show the average funds raised per hour for all volunteers.

1. Open **E12-R3-Hours** from your **Excel Chapter 12** folder and save it as:
   E12-R3-HoursSummary

2. Choose **Insert→Tables→Recommended PivotTables** 🔲, select **Sum of Hours by Name (+)** (the fourth option on the left), and click **OK**.

3. Add the **Funds** field to the Values area.

4. Choose **PivotTable Tools→Design→PivotTable Styles→Dark Blue, Pivot Style Dark 2**.

5. Choose **PivotTable Tools→Design→Layout→Report Layout→Show in Outline Form**.

6. Autofit the widths of **columns A–D**.

7. Select a cell in the Sum of Funds column and choose **PivotTable Tools→Analyze→Active Field→Field Settings**.

8. In the Value Field Settings dialog box, change the custom name to **Total Funds** and the number format to Currency with no decimals.

9. Rename the worksheet: **Summary**

10. Insert a new calculated field named **Average** that uses the formula: **=Funds/Hours**

11. Select a cell in the Sum of Average column and edit the Value Field Settings by changing the custom name to **Avg Per Hour** and the number format to Currency with two decimals.

12. Choose **PivotTable Tools→Analyze→Filter→Insert Slicer** 📊.

13. In the Insert Slicers dialog box, select **Month**, click **OK**, and then move the slicer to the right of the PivotTable.

14. In the **Month** slicer, click the **Multi-Select** ⊟ button and then click **Jan**, **Feb**, and **Mar** to display data for April to June only.

15. Go to the **Hours** sheet, insert a new row above **row 29**, and fill it in as follows:

| 29 | Jessica Banderas | 20 | May | Regular | $1,250 |

16. Return to the **Summary** sheet, click any cell in the PivotTable, and choose **PivotTable Tools→Analyze→Data→Refresh**.

Jessica's sum of hours has increased from 39 to 59.

17. Choose **PivotTable Tools→Analyze→Tools→PivotChart** 📊.

18. Choose the **Combo** chart, adjust the Chart Type and Secondary Axis settings as shown, and click **OK** when finished:

Choose the chart type and axis for your data series:

Series Name	Chart Type	Secondary Axis
▮ Sum of Hours	Clustered Column	☑
▮ Total Funds	Clustered Column	☐
▮ Avg Per Hour	Line	☑
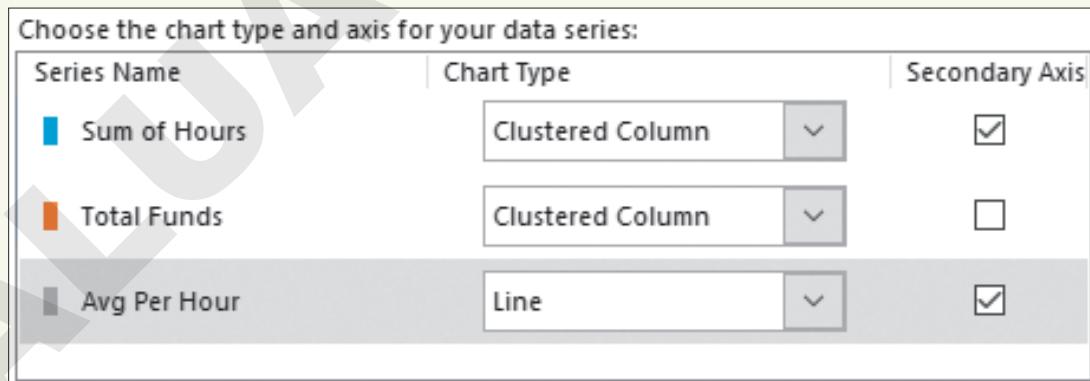
19. Drag the chart directly below the PivotTable.

20. Save your work and close the file.

EXCEL

📎 Apply Your Skills

APPLY YOUR SKILLS: E12-A1

Create an Event Summary

In this exercise, you will create a PivotTable to show the events sold by each of the Universal Corporate Events staff, for each event type.

1. Open **E12-A1-Q3Events** from your **Excel Chapter 12** folder and save it as: **E12-A1-Q3EventsSummary**

2. Use the Recommended PivotTables to insert the **Count of Client by Salesperson (+) and Event** PivotTable.

3. Rename the PivotTable sheet: **Events by Salesperson**

4. Add the **Fee** field to the Values area and adjust its field settings to display the name **Fees** and the number format in Currency with no decimals.

5. Adjust the **Count of Client** field settings to display the name: **# Clients**

6. Apply **Light Yellow, Pivot Style Medium 12** to the PivotTable.

7. Show the report layout in Outline form.

8. AutoFit the column widths.

9. Use the **Event filter** button ⏷ to remove staff parties, displaying team building and training events only.

APPLY YOUR SKILLS: E12-A2

Compare Sales by Category with a PivotChart

In this exercise, you will create a new PivotTable to show the percentage of sales for each event type and create a PivotChart to display the results.

1. Save your file as: **E12-A2-Q3EventsSummary**

2. Go to the **Q3 Events** sheet; insert a new, blank PivotTable; and apply **Light Yellow, Pivot Style Medium 12**.

3. Add **Event** to the Rows area, **Salesperson** to the Columns area, and **Fee** to the Values area.

4. Adjust the **Fee** value field settings to show values as **% of Grand Total**.

5. Insert a PivotChart using the default column chart option and position it directly below the PivotTable.

6. With the chart area still selected, apply the shape style **Moderate Effect — Gold, Accent 4**.

   Hint: Go to PivotChart Tools→Format→Shape Styles.

7. Use the PivotChart **Salesperson** filter to display the data for David Sutton only.

8. Save your work and close the file.

Summarize Client Feedback

In this exercise, you will use the feedback to create a PivotTable and PivotChart showing the average feedback that Universal Corporate Events received for each event type.

1. Open **E12-A3-Feedback** from your **Excel Chapter 12** folder and save it as:
   E12-A3-FeedbackSummary
2. Insert a PivotChart based on the **range A4:G36** into a new worksheet.
3. Add the **Event** field to the Axis area and add **Staff Rating**, **Experience Rating**, and **Facility Rating** to the Values area.
4. Adjust the three Values area fields to calculate averages, use the Number format with one decimal place, and edit the names to: **Staff**, **Experience**, and **Facility**
5. Insert a slicer to filter by **client**, positioning it directly below the PivotTable.
6. Use the slicer's **Multi-Select** button to remove **Green Clean** and **iJams** only.
7. Format the PivotTable with **Light Yellow, Pivot Style Medium 12** and the slicer with **Light Yellow, Slicer Style Dark 4**.
8. Add the **Fee** field to the Values area, modifying its name to **Rank by Fee** and showing values as **Rank Largest to Smallest**.
9. If necessary, move the chart to the right of the PivotTable.
10. Save your work and close Excel.

EXCEL

📑 Project Grader

PROJECT GRADER: E12-P1

Analyzing Quarterly Sales Data with PivotTables

Taylor Games is tracking distributor sales for the first quarter of the new year. This year, they would like to analyze sales data using PivotTables and PivotCharts instead of creating formulas and manipulating data directly in the worksheet. In this exercise, you will display first-quarter sales data for game and toy stores. You will first remove duplicate data and create a new PivotTable worksheet. Then, you will create a calculated field and add a PivotChart. Last, you will filter the data and enhance the worksheet's appearance.

1. Download and open your Project Grader starting file.
   - *Using eLab:* Download **E12_P1_eStart** from the Assignments page. You *must* start with this file or your work cannot be automatically graded.
   - *Not using eLab:* Open **E12_P1_Start** from your **Excel Chapter 12** folder.
2. Use the default settings in the Remove Duplicates tool to remove six duplicate rows from the worksheet.
3. Create a PivotTable using these guidelines:
   - Use the **range A6:H42** of the **Distributor Sales Q1** worksheet as the data you want to analyze.
   - Place the PivotTable in a new worksheet.
4. Rename the PivotTable worksheet: **Toy-Game Store Sales**
5. Add the **Category** field to the Rows area.
6. In **cell A3**, change the *Row Labels* display name to: **Category**
7. Add the **January**, **February**, and **March** fields to the Values area.
8. Make these text changes:
   - **Cell B3**: **January Sales**
   - **Cell C3**: **February Sales**
   - **Cell D3**: **March Sales**
9. Apply the Accounting number format to the **range B4:D8**.
10. Add a Calculated Field to the PivotTable using these guidelines:
    - Name: **Q1 Total**
    - Formula: **=January+February+March**
11. In **cell E3**, change the *Sum of Q1 Total* display name to: **Q1 Total Sales**
12. Apply the PivotTable style **Light Yellow, Pivot Style Yellow 19** (the sixth option in the PivotTable Styles list).
13. Insert a 3-D Clustered Bar PivotChart and position it just below the PivotTable.

14. Set the PivotChart's height to **4.5"** and its width to **10"**.

15. Use the PivotChart Category filter to only display chart data for the **Game/Hobby Store** and **Toy Store** categories.

16. Apply **Chart Style 6** to the PivotChart.

17. Save your workbook.
    - *Using eLab:* Save it to your **Excel Chapter 12** folder as **E12_P1_eSubmission** and attach the file to your eLab assignment for grading.
    - *Not using eLab:* Save it to your **Excel Chapter 12** folder as: **E12_P1_Submission**

PROJECT GRADER: E12-P2

Analyzing Future Value Using a PivotTable and PivotChart

Classic Cars Club would like to estimate future car values for members. They would also like the data presented in a PivotTable in order to quickly filter the data. In this exercise, you will create a new worksheet containing a PivotTable and PivotChart that displays the estimated value 20 years from now of member-owned cars with a status of classic.

1. Download and open your Project Grader starting file.
   - *Using eLab:* Download **E12_P2_eStart** from the Assignments page. You *must* start with this file or your work cannot be automatically graded.
   - *Not using eLab:* Open **E12_P2_Start** from your **Excel Chapter 12** folder.

2. In the **CarValues** worksheet, insert a PivotTable using these guidelines:
   - Use **CarValues** as the table/range.
   - Place the PivotTable in a new worksheet.

3. Rename the PivotTable worksheet as: **20 Year Estimate - Classics**

4. Add the **Last Name** and **Car Year** fields to the Rows area.

5. In **cell A3**, change the *Row Labels* display name to: **Members**

6. Add the **Current Value** field to the Values area.

7. In **cell B3**, change the *Sum of Current Value* display name to: **Current Values**

8. Apply the Accounting number format to the **range B4:B61** and then decrease the decimal places so no decimals display.

9. Add a calculated field to the PivotTable using these guidelines:
   - Name: **Estimated Value**
   - Formula: **='Current Value'+('AVG per Year'*20)**

10. In **cell C3**, change the display name to: **20 Year Estimate**

11. Modify the PivotTable layout as follows:
    - Subtotals: Do not show subtotals.
    - Report Layout: Show in tabular form.

12. Apply the PivotTable style **Light Yellow, Pivot Style Light 18** (the fifth option in the PivotTable Styles list).

13. Insert a slicer using these guidelines:

- Slicer to Insert: **Status**
- Height: **1.1"**
- Width: **1.25"**
- Filter by: **Classic**
- Position it below the PivotTable.

14. Insert a 3-D Area PivotChart.

15. Set the PivotChart height to **5"** and the width to **10"**.

16. Close the PivotTable Fields pane and then position the PivotChart to the right of the PivotTable.

17. Save your workbook.

- *Using eLab:* Save it to your **Excel Chapter 12** folder as `E12_P2_eSubmission` and attach the file to your eLab assignment for grading.
- *Not using eLab:* Save it to your **Excel Chapter 12** folder as: `E12_P2_Submission`

✈ Extend Your Skills

These exercises challenge you to think critically and apply your new skills in a real-world setting. You will be evaluated on your ability to follow directions, completeness, creativity, and the use of proper grammar and mechanics. Save files to your chapter folder. Submit assignments as directed.

E12-E1 That's the Way I See It

As a student, you're always looking for ways to save money, so you've been tracking all your expenses for the past three months. Now you want to create a PivotTable and PivotChart to analyze your spending habits. Open **E12-E1-PersonalExp** and save it as: **E12-E1-PersonalExpPT**

Create a PivotTable from the data on Sheet1 and organize the fields so you can see the monthly spending as well as a grand total for all three months, for each expense type. Create a slicer for the Type field, add a PivotChart of your choice, and apply other formatting as you see fit.

E12-E2 Be Your Own Boss

Blue Jean Landscaping keeps its revenue figures for the past six months in an Excel worksheet, and you want to compare the total numbers according to type and category. Open **E12-E2-Revenue** and save it as: **E12-E2-RevenuePT**

Create a PivotTable and set the fields as indicated. Create a calculated field called *Forecast* that will calculate a 5% increase in revenue and then add a slicer to filter by category. Apply any other formatting you feel is appropriate for a financial report.

Add These Fields	
Rows area	Type, Category
Columns area	Quarter
Values area	Revenue

E12-E3 Demonstrate Proficiency

You are analyzing Stormy's BBQ sauce sales data for the month of April. Open **E12-E3-Sales** and save it as: **E12-E3-SalesAnalysis**

Create a PivotChart based on the data on the Sales sheet, setting the fields as noted. Change the chart type to Pie, apply your choice of chart style, and modify the pie colors to match the company colors of red, gold, and black. Move and resize the chart appropriately. Finally, add a Sauce Type slicer and display the World Famous sauce.

Add These Fields	
Axis area	Location
Legend area	Sauce Type
Values area	Cases Ordered

EXCEL

EXCEL

13

Working with Macros
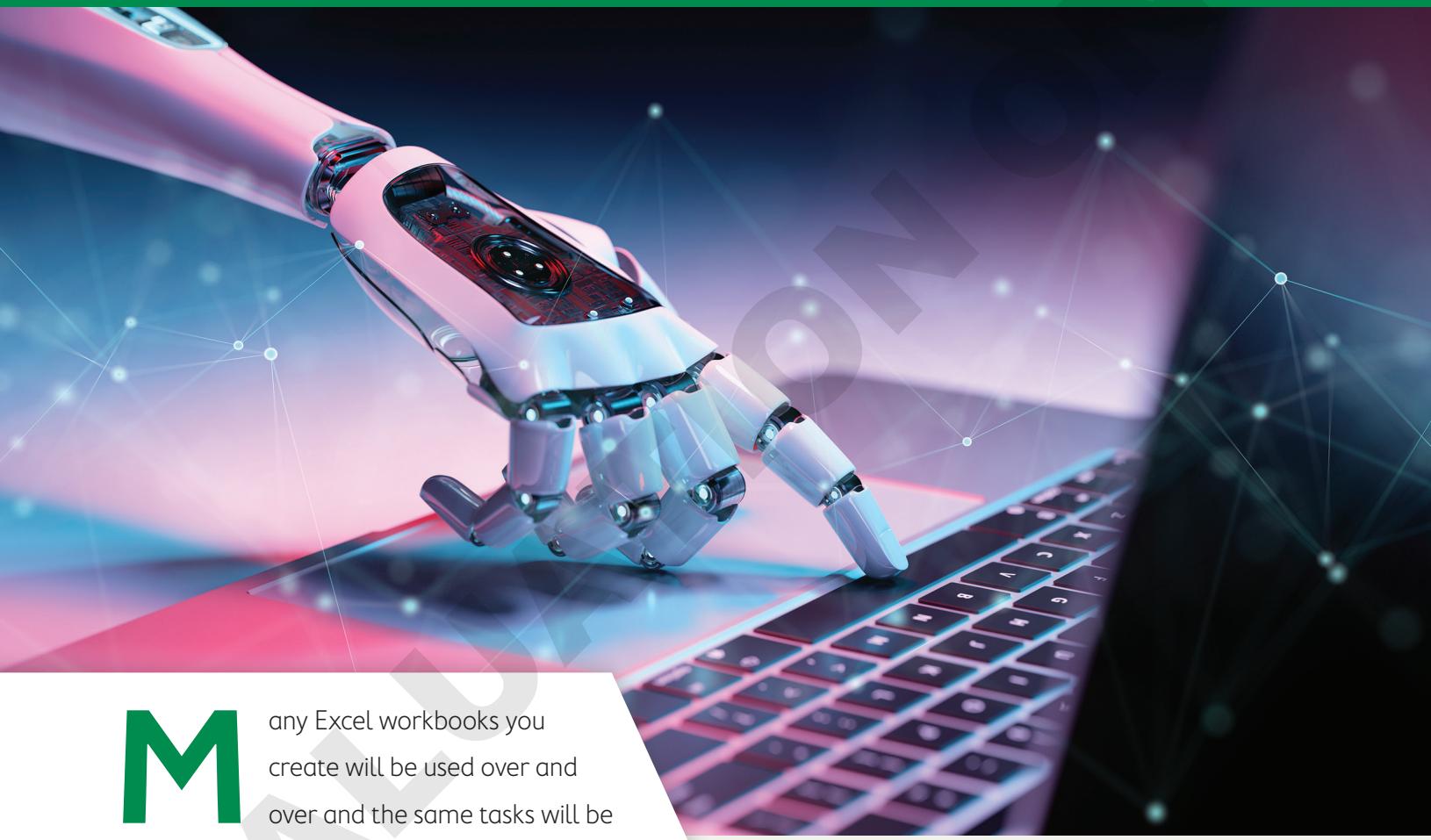
Many Excel workbooks you create will be used over and over and the same tasks will be performed repeatedly, like transferring data from one worksheet to another. Being able to automate certain tasks is more efficient and can reduce the risk of errors. In this chapter, you will change the security settings to allow macros in Excel that will enable you to automate common, repetitive tasks.

LEARNING OBJECTIVES

▸ Change the macro security settings

▸ Create macros to automate tasks

▸ Run macros

▸ Create macro buttons to run macros quickly

📂 **Project: Creating Macros to Simplify Tasks**

The sales data for Airspace Travel is used frequently and is often sorted in different ways to compare results. In order to make it quick and easy for any team member to use the data, you will create macros to do the sorting for you. You'll also create custom buttons so a complex sort can be done with just one click.

Introducing Macros

A macro is a recorded set of mouse and keyboard actions that can be played back at any time. Essentially, a macro records the actions so a repetitive series of tasks can be completed with a single click of the mouse. For example, if the first thing you do when you create a new workbook is enter the company name in the header and the date in the footer, you can create a macro that performs these actions with one click, saving you valuable time.

Changing Macro Security

Macros are a way of programming Excel to take shortcuts, but they can contain viruses, so you should be aware of the added security features associated with using macros. You can change macro security settings in the Trust Center, and these settings take effect for all Excel workbooks opened on that computer. There are four options for macro security:

▸ Disable all macros without notification

▸ Disable all macros with notification

▸ Disable all macros except digitally signed macros

▸ Enable all macros

Warning! *Choosing to enable all macros is not recommended due to potentially unsafe macros.*

Disabling all macros with a notification is the default and recommended option because this gives you the option of allowing or disabling macros as you see fit, each time you open a macro-enabled workbook.

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

DEVELOP YOUR SKILLS: E13-D1

In this exercise, you will verify the macro security settings and then open a workbook and enable the macros.

1. Start Excel and open a new, blank workbook.
2. Choose **File→Options→Trust Center**.
3. Click the **Trust Center Settings** button, choose the **Macro Settings** category, and if necessary choose **Disable all macros with notification**.
4. Choose the **Message Bar** category from the left side of the window and verify that the **Show the Message Bar...** option is selected.

5. Click **OK** twice to close both dialog boxes.

6. Open **E13-D1-MacroTest** from your **Excel Chapter 13** folder.

7. On the message bar, click the **Enable Content** button to enable the macros for this workbook.
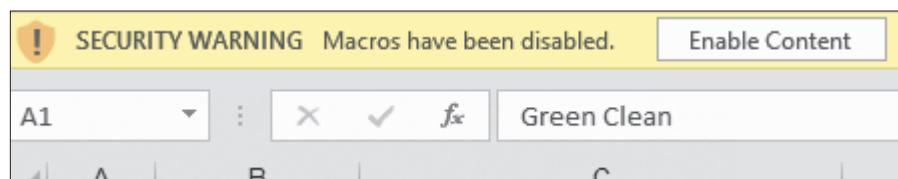
8. Save the file as: **E13-D1-Macro**

   Note the default file type is a macro-enabled workbook because it was saved that way previously.

   The workbook has macros in it, which enable the user to click a custom-made button to sort the data.

9. Click the **Sort by Leader** button at the top of the worksheet.

   The list is now sorted alphabetically (A–Z) by the Team Leader column.

Warning! *Running a macro cannot be reversed by clicking the Undo button.*

10. Save and close the file.

Recording Macros

To create a macro, you can record a series of actions that you perform in a way that's similar to using a video camera. You click a button to start recording and then click again to stop recording when finished. You can then run the macro again and again to repeat the same series of actions, including keystrokes and mouse clicks.

There are several options for recording macros. One quick method is the button on the status bar.
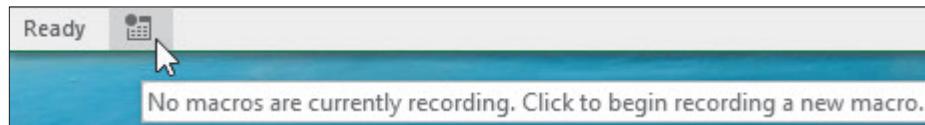
There's also a button on the Developer tab. (After the Record Macro button is clicked, the Stop Recording button will appear in both places.)
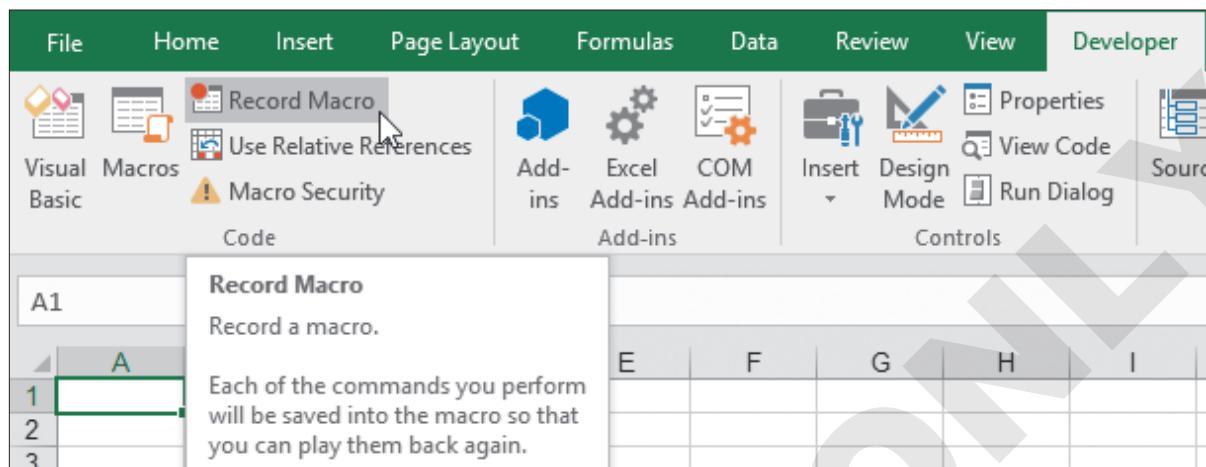
To view the Developer tab, right-click anywhere on the Ribbon and choose Customize the Ribbon. Under Customize the Ribbon (Excel Options window), click the box next to Developer and click OK.

Clicking the Record Macro button launches the Record Macro window, where you can rename the macro or retain the default (*Macro1*, *Macro2*, etc.) and assign a keyboard shortcut if desired. Macro names may not contain spaces.
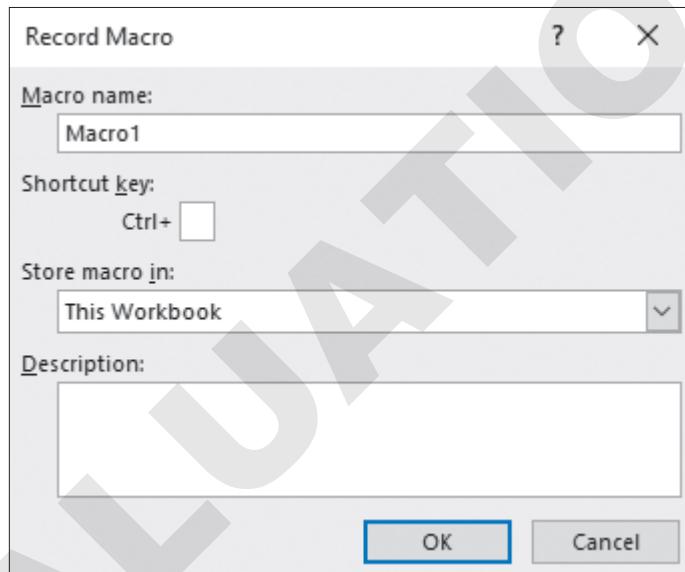
Recording the Macro Steps

Most actions you perform are recorded in the macro, including mouse actions, choosing Ribbon commands, selecting options in dialog boxes, using arrow keys to navigate the worksheet, and typing text. Any mistakes or corrections made during the recording are saved as part of the macro. As long as the final result is correct, you can keep the recording with the mistakes and corrections, rather than recording a new macro; the macro will still give the proper results when you run it. That said, it's a good idea to practice the steps before actually recording the macro.

Storing and Sharing Macros

The macro you record is saved only for that particular workbook, unless you assign it to the Personal Macro Workbook. Some macros are only useful for one specific workbook, but others may be useful

for any Excel file. The Personal Macro Workbook is a hidden folder, and any macros saved there are available to all open workbooks.
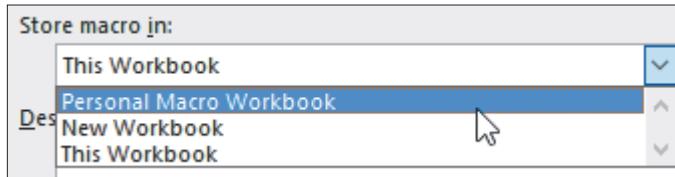
You can also copy a macro from one workbook to another. For example, you may initially create a macro for one workbook and then decide it would be useful in other workbooks as well. Copying a macro to another workbook requires opening both workbooks simultaneously and, with the Visual Basic editor open, dragging the macro from one to the other.

Saving a Workbook Containing Macros

To save a normal Excel file after recording and saving macros, you must use the Save As command and choose the Excel Macro-Enabled Workbook file type. If you use the Save command, Excel will display a warning message.
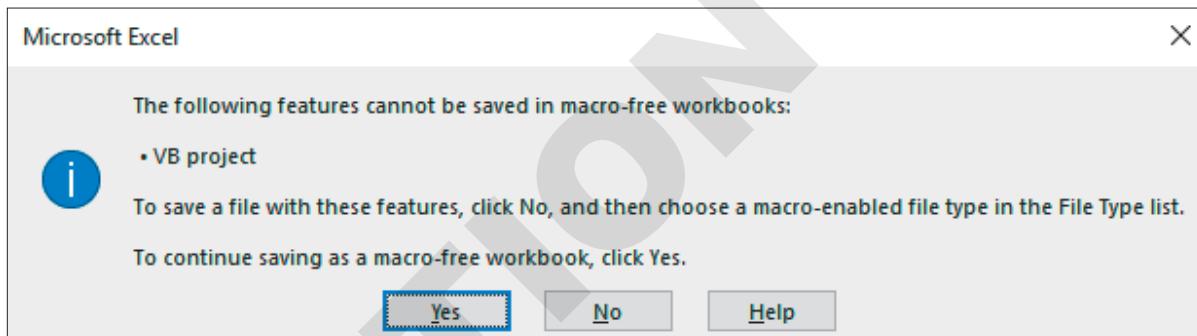
This is a safety feature that prevents you from accidentally losing the macros you create. Clicking No in the message window opens the Save As dialog box so you can change the file type. Files saved with the Excel Macro-Enabled Workbook file type have the extension *.xlsm* (the "m" is for "macro").

DEVELOP YOUR SKILLS: E13-D2

In this exercise, you will record a macro to sort the employee list by location, position, and first name, in that order. You will save the workbook in the macro-enabled file format.

1. Open **E13-D2-Sales** from your **Excel Chapter 13** folder and save it as:
   E13-D2-SalesReport

2. Click **Record Macro** 📇 on the status bar in the bottom-left corner of the Excel window.

   If the Record Macro button is not showing, right-click the status bar and select Macro Recording to add it to the status bar.

3. In the Record Macro dialog box, type **SortbyLocation** as the macro name and click **OK**.
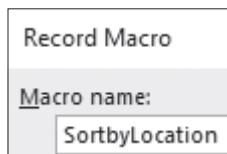
4. Ensure **cell A5** is selected and choose **Home→Editing→Sort & Filter→Custom Sort**.

5. Create this sort, using the **Add Level** button for each new sort type and clicking **OK** when finished:
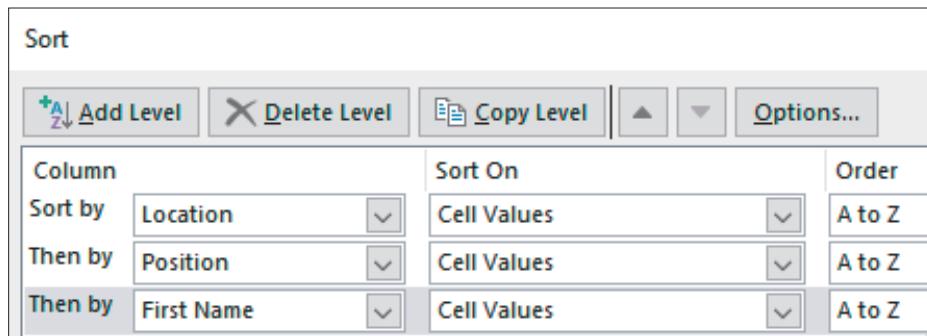
6. Click **Stop Recording** ▪ on the status bar.

The data is sorted. You want to save the macro so you can perform the same sort in the future by simply running the macro.

7. Click **Save**, which opens the warning to alert you that the macro will be lost unless you change the file type.

8. Click **No**, change the file type to **Excel Macro-Enabled Workbook**, and click **Save**.

Running and Assigning Macros

Running a macro is easy to do from the Macro dialog box. It's even easier if you assign a macro to a shortcut key, a custom button on a worksheet, or a custom button on the Quick Access toolbar. Running a macro then becomes as simple as clicking any other Ribbon button.

You can assign a macro to a shortcut key either when you initially create it or later by editing its options. Or you can insert a shape onto the worksheet and then assign a macro to that shape, creating a custom button.

To create a keyboard shortcut, the keys Ctrl or Ctrl+Shift must be part of the combination. A shortcut you assign will override any existing shortcut; keep this in mind when assigning shortcut keys. For example, if you assign Ctrl+B to a macro, you won't be able to use that shortcut to apply bold formatting. As a way around this, you can use Ctrl+Shift+B for the macro shortcut instead.

≡ View→Macros→Macros 🖼 | Developer→Code→Macros

DEVELOP YOUR SKILLS: E13-D3

In this exercise, you will run an unassigned macro, record a new macro and assign a shortcut to it, and then create custom buttons for the two macros.

1. Save your file as: **E13-D3-SalesReport**

2. Select **cell C5** and then choose **Home→Editing→Sort & Filter→Sort A to Z**.

    To re-sort the data by location, you will run the macro you recorded earlier.

3. Choose **View→Macros→Macros** 🖳.

4. Ensure **SortbyLocation** is selected (it should be the only macro listed) and click **Run**.

    The data is once again sorted by location, then position, then first name. Running the macro also closes the Macro window.

Assign a Macro to a Shortcut Key

To make it easier to run the macro, you will assign a shortcut key.

5. Choose **View→Macros→Macros** 🖳.

6. Ensure **SortbyLocation** is selected and choose **Options**.

7. With the insertion point in the Shortcut Key box, press Shift + D .

Macro Options
Macro name:
SortbyLocation
Shortcut key:
Ctrl+Shift+ D
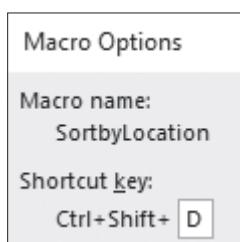
8. Click **OK** to close the dialog box and then close the Macro window.

9. Select **cell G5** and then choose **Home→Editing→Sort & Filter→Sort Smallest to Largest** to sort employees by number of sales.

10. Now press Ctrl + Shift + D to once again sort by location, position, and first name.

Create Custom Buttons

To make it easier to remember and run the macros, you will create custom buttons using shapes.

11. Click **Record Macro** 📇 on the status bar.

12. In the Record Macro dialog box, type **SalesbyPosition** under Macro Name and click **OK**.

13. Choose **Home→Editing→Sort & Filter→Custom Sort**.

14. Create this sort, removing a level and editing the levels as needed.

    Hint: Use the Delete Level button and note the order to sort by.

Sort					
⁺ᴬᐟ Add Level	✕ Delete Level	🖹 Copy Level	▲ ▼	Options...	☑ My data
Column		**Sort On**		**Order**	
Sort by	Position ∨	Cell Values ∨		A to Z	
Then by	Sales ∨	Cell Values ∨		Smallest to Largest	
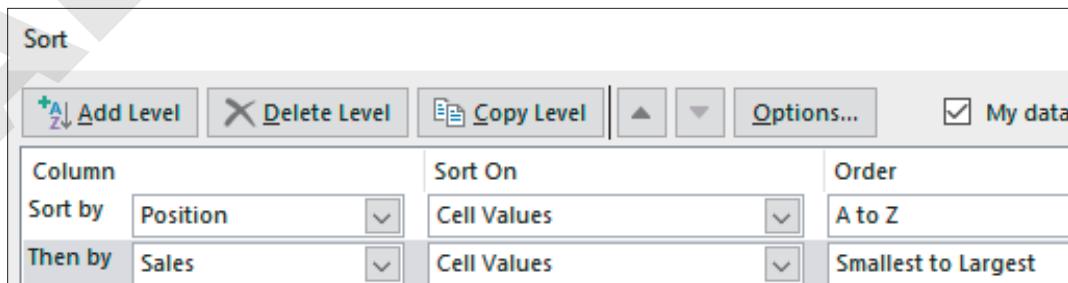
15. Click **OK** in the Sort dialog box then click **Stop Recording** ■ on the status bar.

    The data is sorted and the macro is saved. The Sales column should be arranged from largest to smallest for agents and then for managers.

16. Choose **Insert→Illustrations→Shapes** and select **Rectangle: Rounded Corners**.
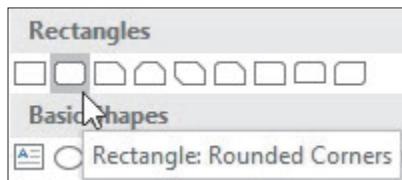
17. Draw the rectangle shape from **cell J3** to **cell K4**, approximately two rows high and two columns wide.

18. With the shape still selected type: **Sort by Location**

19. Insert another rounded rectangle shape, this time drawing the shape from **cell J6** to **cell K7**.

20. With the shape still selected, type: **Sort by Sales**

Your buttons need not exactly match the size and position shown here:
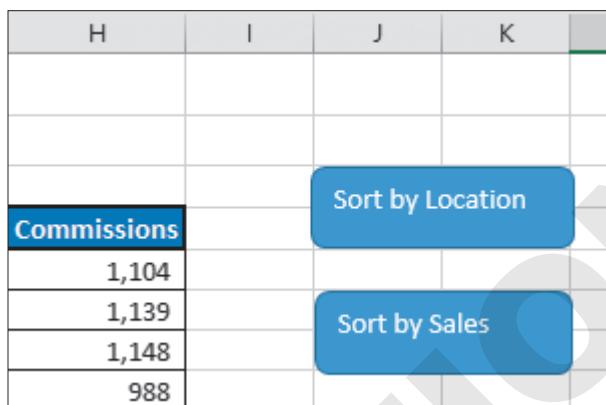
21. Right-click the **Sort by Location** shape and choose **Assign Macro…**.

22. In the Assign Macro dialog box, select the **SortbyLocation** macro and click **OK**.
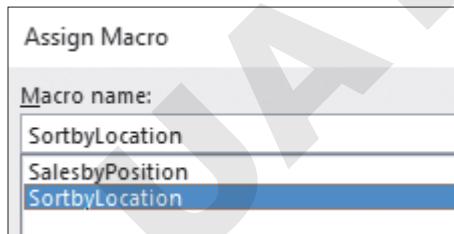
23. Right-click the **Sort by Sales** shape and assign the **SalesbyPosition** macro to it.

24. Deselect the shape by clicking any cell on the worksheet.

25. Point to the top shape and notice that the mouse pointer changes to a hand shape, then click the button to sort the data by location.

26. Point to the bottom shape and then click it to sort the data by sales.

27. Save the file and close Excel.

Self-Assessment

Check your knowledge of this chapter's key concepts and skills using the Self-Assessment in your ebook or online (eLab course or Student Resource Center).

📌 Reinforce Your Skills

REINFORCE YOUR SKILLS: E13-R1

Create and Use Macros

In this exercise, you will create a macro to insert today's date and assign a bib number to a new participant who is entering the Kids for Change charity race.

1. Start Excel, open **E13-R1-Race** from your **Excel Chapter 13** folder, and save it as a macro-enabled workbook named: **E13-R1-RaceEntries**
2. Click **Record Macro** 📇 on the status bar.
3. In the Record Macro dialog box, type **NewEntry** as the macro name, type **e** as the shortcut key, and click **OK**.
4. Right-click **row 6** and select **Insert** to insert a new row.
5. In **cell B6**, type **=TODAY()** and press ⌷Enter⌷.
6. Now copy **cell B6** and paste the contents into **cell B6**, but use Paste Options to only paste Values.

   This way, running the macro will always result in the current date being entered in the cell, without the formula.
7. Now select the **range E7:E8** and use the **fill handle** to drag up one row and fill in **cell E6** with a bib number for the new race entrant.
8. Click **Stop Recording** ▪ on the status bar.
9. Right-click **row 6** and select **Delete** to remove the new entry so you can test the macro.
10. Choose **View→Macros→Macros** 📇, ensure **NewEntry** is selected, and click **Run**.
11. Save your work.

REINFORCE YOUR SKILLS: E13-R2

Run and Assign a Macro

In this exercise, you will insert a shape and assign a macro to it that adds new participants with a single click.

1. Save your file as: **E13-R2-RaceEntries**
2. Press ⌷Ctrl⌷+⌷E⌷ to run the macro again.

   You should see today's date in cells B6 and B7 for two new entries, and bib numbers 417 and 418 in cells E7 and E6, respectively.
3. To insert a button to easily run the macro, choose **Insert→Illustrations→Shapes**, select **Rectangle**, and draw a rectangle just smaller than the size of the **range B1:B2**:
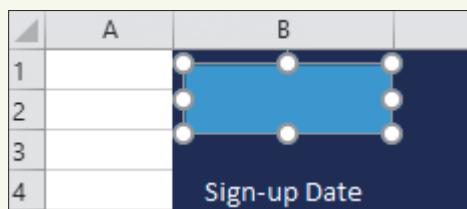
4. With the shape still selected, type: **New Entry**

5. Right-click the shape and choose **Assign Macro...**, select the **NewEntry** macro, and click **OK**.

6. From the Shape Styles gallery on the Format tab, choose the **Light 1 Outline, Colored Fill – Black, Dark 1** style.

7. Apply bold formatting, increase the font size to 12 points, and center-align the text in the shape.

8. Delete **rows 6–7** and then click the **New Entry** button twice to run the macro and again insert new entry dates and bib numbers for two participants.

9. Save the file.

REINFORCE YOUR SKILLS: E13-R3

Add Data to the Summary with a Macro

In this exercise, you will automate the task of copying information from one worksheet and inserting it into another worksheet.

1. Open **E13-R3-Receipt** from your **Excel Chapter 13** folder and save it as a macro-enabled workbook named: **E13-R3-ReceiptAuto**

2. Go to the **Donation Receipt** worksheet and enter this placeholder information into the receipt fields (row 5): **First**, **Last**, **555-1234**, **100**

3. Start recording a new macro (default storage location, no shortcut) named: **AddReceipt**

4. While the macro is recording, complete these steps in order:
   - Go to the **Donation Summary** sheet and insert a new row above **row 6**.
   - Go back to the **Donation Receipt** sheet, select the **range B5:F5**, and copy the data.
   - Go to the **Donation Summary** sheet and paste the values only into **cell B6**.
   - Select **cell G7** and use the **fill handle** to copy the formula up to **cell G6**.
   - Select **cell B6**.
   - Return to the **Donation Receipt** sheet, delete the entries in the **range B5:E5** (don't delete the date), and then select **cell B5** only.
   - Stop recording the macro.

5. Enter your own information into the receipt fields (or make it up) and **$200** for the donation amount.

6. Run the macro.

7. Go to the **Donation Summary** sheet to view the row with your name at the top and the new total calculated under Total Donations.

8. Delete **rows 6–7** with the two test entries you created and then go back to the **Donation Receipt** sheet.

9. Insert a rectangle shape in the **range E6:F7** and add the text **ADD RECEIPT** that is bold and center-aligned in the shape; apply the shape style of your choice.

10. Assign the **AddReceipt** macro to the shape.

11. Save your work and close Excel.

📎 Apply Your Skills

APPLY YOUR SKILLS: E13-A1

Automate the New Client Form

In this exercise, you will automate the process of copying the new client info from the Universal Corporate Events new client form into the client list.

1. Start Excel, open **E13-A1-Clients** from your **Excel Chapter 13** folder, and save it as a macro-enabled workbook named: **E13-A1-NewClients**

   Note the fields for the existing clients in the client list.

2. On the **Client Form** worksheet in the **range C4:C7**, enter this sample data: **ABC Co., Mike, 555-0000, mike@abc.com**

3. Record a macro named **AddClient** with these steps:
   - Copy the data from the **range C4:C8**.
   - Go to the **Client List** sheet and select **cell A4**.
   - Press ⎡Ctrl⎤+⎡↓⎤ to go to the bottom row of data.

4. Choose **Developer→Code→Use Relative References**.

   This ensures the data is always pasted at the bottom of the existing data, no matter how many clients are in the list.
   - Press ⎡↓⎤ to go down one row to the empty row.
   - Paste using the **Transpose** option. (Hint: **Home→Clipboard→Paste menu button ▾**.)
   - Select **cell E10**, copy the formula for today's date, and paste the value only into the same cell.
   - Choose **Developer→Code→Use Relative References** to turn it off.
   - Return to the **Client Form** sheet and delete the **range C4:C7**.
   - Stop recording.

5. In the **range C4:C7**, enter this sample data: **DEF Co., Molly, 555-0001, molly@def.com**

6. Run the macro to test it.

7. Save your work.

APPLY YOUR SKILLS: E13-A2

Automate Sorting the Client List

In this exercise, you will record two new macros for sorting Universal Corporate Events' client list and then create buttons for those macros for easy access.

1. Save your file as: **E13-A2-NewClients**

   You want to be able to quickly see your data in two ways: by contact name alphabetically and by date added, newest to oldest clients. You will create two macros to automate the sorting.

2. On the **Client List** sheet, record a new macro named **SortbyContact** that sorts the client list by contact name in **column B** from A to Z.

3. Record a second macro named **SortbyDate** that sorts the list by the date added (**column E**), newest to oldest.

4. Add two buttons to the right of the client list headings using the text **Contact** and **Date** and sizing/formatting them appropriately; assign the two macros to the buttons.

5. Test the **Contact** button and then the **Date** button.

   You should see the two new sample clients, Mike *and* Molly, *at the top of the list.*

6. Delete the two rows with the sample data.

7. On the **Client Form** sheet, insert a button with the text **Add Client** and format it as you did the buttons on the **Client List** sheet, position it appropriately below the form, and then assign the **AddClient** macro to it.

8. Save your work and close the file.

APPLY YOUR SKILLS: E13-A3

Count Guest Meal Choices

Universal Corporate Events is hosting one of the Kids for Change fundraising events! In this exercise, you will use macros to help you count and identify the number of guests who chose each meal option.

1. Open **E13-A3-Guests** from your **Excel Chapter 13** folder and save it as:
   E13-A3-GuestMeals

   The worksheet is already formatted to use a COUNTIF function and conditional formatting based on the contents of cell J6. There are also three buttons already created. You need to create the macros and then assign them to the correct buttons. Each button should automatically adjust the text in cell J6 and sort the data in column G to show the guests who chose that meal at the top.

2. Start recording a new macro named **Beef** with these steps:
   • Select **cell J6** and enter: **Beef**

   The COUNTIF function and conditional formatting are updated to reflect the count of meals for beef.

   • Select **cell G5** and perform a custom sort on the Meal Choice column to sort on cell color with the yellow color on top.
   • Click the **Chicken** button then use ⌈Ctrl⌉ to select the other two buttons, **Beef** and **Veg**, and apply the **Colored Fill — Orange, Accent 2** shape style.
   • Deselect the shapes, click the **Beef** button, and change the shape style to **Colored Fill – Gold, Accent 4**.
   • Stop recording the macro.

3. Repeat the previous steps twice, once to create a macro for the Chicken button and once for the Vegetarian button, adjusting the steps as necessary for each.

4. Assign the appropriate macro to each button and then test them to ensure they work correctly.

5. Save your work and close Excel.

📑 Project Grader

If your class is using eLab (labyrinthelab.com), you may upload your completed Project Grader assignments for automatic grading. You may complete these projects even if your class doesn't use eLab, though you will not be able to upload your work.

PROJECT GRADER: E13-P1

Using Macros to Apply Consistent Formatting

Taylor Games wants to apply consistent title and logo formatting to all future worksheets. You've been asked to create a macro that will allow future users to format the top of new worksheets with consistent rows, titles, and logos. First, you will create a new macro which contains the formatting you like and can be executed using a shortcut key. Then, you will test the macro on a new worksheet.

1. Download and open your Project Grader starting file.
   - *Using eLab:* Download **E13_P1_eStart** from the Assignments page. You *must* start with this file or your work cannot be automatically graded.
   - *Not using eLab:* Open **E13_P1_Start** from your **Excel Chapter 13** folder.

2. In the **Toy-Game Store Sales** worksheet, record a macro using these guidelines:
   - Macro name: **TG_Header**
   - Shortcut key: Ctrl + Shift + H
   - Store the macro in this workbook.
   - Insert three new sheet rows above **row 1**.
   - Reposition the Taylor Games logo to the top-left corner of the worksheet.
   - In **cell C3**, apply the **Calibri Light** font with **18 pt.** size.
   - Apply the **Title** cell style to **cell C3**.
   - Merge and center **cells C3–E3**.
   - Stop recording.

3. In **cell C3**, enter the text: **Q1 Toy-Game Store Sales**

4. Switch to the **Online-Club Sales** worksheet and run the **TG_Header** macro using the assigned shortcut key.

5. In **cell C3**, enter the text: **Q1 Online-Club Sales**

6. Save your workbook.
   - *Using eLab:* Save it to your **Excel Chapter 13** folder as a macro-enabled workbook named **E13_P1_eSubmission** and attach the file to your eLab assignment for grading.
   - *Not using eLab:* Save it to your **Excel Chapter 13** folder as a macro-enabled workbook named: **E13_P1_Submission**

PROJECT GRADER: E13-P2

Sorting and Calculating Using Macros

Classic Cars Club would like to calculate the annual dues for current members and add buttons for sorting. In this exercise, you will create macros that will sort the data by state and by term and create a macro that will calculate the dues for each member. You will then apply these macros to buttons you create and use an assigned shortcut key to quickly enter formulas for calculating dues.

1. Download and open your Project Grader starting file.
   - *Using eLab:* Download **E13_P2_eStart** from the Assignments page. You *must* start with this file or your work cannot be automatically graded.
   - *Not using eLab:* Open **E13_P2_Start** from your **Excel Chapter 13** folder.

2. Record a macro using these guidelines:
   - Macro name: **SortbyTerm**
   - Shortcut key: Do not assign a shortcut key.
   - Store the macro in this workbook.
   - Recording: Sort the Membership Dues list by **Term** (**column I**) from smallest to largest.
   - Stop recording.

3. Create a macro button using these guidelines:
   - Insert a **rectangle** shape (the first shape in the Rectangles category) above the *Dues* heading in **column L**.
   - Set the rectangle height to **0.25"** and the width to **1.5"**.
   - Position the rectangle over **cell L2**.
   - Enter the text **Sort by Term** in the rectangle.
   - Apply both **Center** and **Middle Align** cell alignments to the rectangle text.
   - Assign the **SortbyTerm** macro to the rectangle.

4. Record a macro using these guidelines:
   - Macro name: **SortbyState**
   - Shortcut key: Do not assign a shortcut key.
   - Store the macro in this workbook.
   - Recording: Sort the Membership Dues list by **State** (**column L**) from A to Z.
   - Stop recording.

5. Create a macro button using these guidelines:
   - Insert a **rectangle** shape above the *Dues* heading in **column L**.
   - Set the rectangle height to **0.25"** and the width to **1.5"**.
   - Position the rectangle over **cell L4**.
   - Enter the text **Sort by State** in the rectangle.
   - Apply both **Center** and **Middle Align** cell alignments to the rectangle text.
   - Assign the macro **SortbyState** to the rectangle.

6. Sort the Membership Dues list using the **Sort by Term** button.

7. In **cell L7**, record a macro using these guidelines:

   - Macro name: **CalculateDues**
   - Shortcut key: Ctrl + Shift + D
   - Recording: In **cell L7**, key the formula **=I7*$F$4** and complete the formula using the **Enter** ☑ button on the Formula Bar (do not use the keyboard Enter key).
   - Stop recording.

8. In **cell L8**, test the CalculateDues macro by running it using the shortcut key you assigned to it.

9. Save your workbook.

   - *Using eLab:* Save it to your **Excel Chapter 13** folder as a macro-enabled workbook named **E13_P2_eSubmission** and attach the file to your eLab assignment for grading.
   - *Not using eLab:* Save it to your **Excel Chapter 13** folder as a macro-enabled workbook named: **E13_P2_Submission**

EXCEL

◤ Extend Your Skills

These exercises challenge you to think critically and apply your new skills in a real-world setting. You will be evaluated on your ability to follow directions, completeness, creativity, and the use of proper grammar and mechanics. Save files to your chapter folder. Submit assignments as directed.

E13-E1 That's the Way I See It

You want to create a schedule every week in Excel to organize your work, class, and extracurricular activities. Open a new workbook and save it as: **E13-E1-Schedule**

Start with a title at the top of the sheet, such as *Weekly Schedule*. In column A, create a series of times, starting with 8:00 and counting either by the hour or half hour, depending on how precise you want to be. Leave two rows above the times, one for the day of the week and another for the date. Insert a series of days of the week starting in column B, Monday to Sunday, below the title but above the times. Insert the list of dates for the current week below the days of the week.

The last step is to automate updating the list of dates for the next week. Record a macro that uses a formula to add one day to the last date of the previous week, below Monday. Copy the formula and paste the values only back into the same cell, and then fill in the series of dates for the new week. Test the macro and then return the dates to the values for the current week. Format the worksheet appropriately.

E13-E2 Be Your Own Boss

Until now, you have been manually copying information for the Blue Jean Landscaping invoices into the summary worksheet. Now that you have learned about macros, you want to automate the copying process. Open **E13-E2-Invoices** and save it as: **E13-E2-InvoiceSummary**

Review the information on the two worksheets to plan your macro, which should insert a new row above row 5 on the Summary sheet, copy the information from the Invoice sheet into row 5, copy the Total Revenue formula, and copy the correct formatting from row 6 into row 5.

Test your macro by entering sample information on the Invoice sheet. Finally, create a button with suitable text and assign the macro to it.

E13-E3 Demonstrate Proficiency

Business is booming at Stormy BBQ, and as it grows you want to ensure all of the company's work-books contain similar information. Open **E13-E3-Sales** and save it as: **E13-E3-SalesSorting**

Record a macro and save it in the Personal Macro Workbook (so it can be used in any Excel file). The macro should insert the company name in the left header section and the date in the right header section. You also want to be able to quickly sort the current sales worksheet by invoice number, loca-tion, and sauce type, so record three more macros (with appropriate names) to perform these sorts. As an additional challenge, try changing the formatting of the column heading being sorted, as you record each macro. (Hint: You will have to reset formatting for all headings first and then adjust the formatting for the chosen column by changing font size, font color, or fill as you desire.) Finally, create suitable buttons and assign the macros to them.

EXCEL

14 | Data Management for Business

I n this chapter, you will explore some of the tools businesses use to manage vast amounts of data collected on customers, transactions, employees, and more. While not going into great depth, you will be introduced to the terminology, concepts, and tools available for analyzing and managing data.

LEARNING OBJECTIVES

▸ Import data from various sources

▸ Consolidate data from multiple sheets into one sheet

▸ Create a series of data using different methods

▸ Chart trends and save chart templates

▸ Use additional functions for lookups and logic

📂 Project: Working with Multiple Data Sources

You have been maintaining the quarter one (Q1) sales data for the five Airspace Travel office locations in individual files. Now you want to put it all in one file for better analysis and as a model for how data for the rest of the year should be organized. You will also be summarizing and analyzing the Q1 sales data to create projections for Q2.

Importing and Exporting Data

Excel is certainly useful, but companies also use many other apps for a variety of business-related tasks. This means that data needs to be transferable between apps that are used for different purposes; for example, a business might use accounting software to perform the bookkeeping tasks and then import the financial data from the accounting software into Excel to create financial forecasts.

To effectively work with data from different sources, you must understand common database terminology and functionality. Databases are typically made up of numerous tables, which are made up of fields and records. For example, a coffee shop might have a database with tables for inventory, customers, and employees. The employees table would have fields for employees' names, IDs, and contact information, and the information for each employee would be their record.

To work across different applications, you should save the data in one of several common formats that most programs understand. This allows you to import and export data in and out of various programs that are otherwise incompatible. Characters such as commas, spaces, and tabs can be used as delimiters, which are any characters used to specify a boundary between fields when working with data.

One of the more common file formats for importing and exporting data is CSV (.csv), which stands for *comma separated values*. Data in a CSV file typically comes from a database, where data from each field is separated by a comma. Text files (.txt) are also common and usually use either a tab or a space to separate values rather than a comma. Excel will normally recognize the character being used, but you can also choose which delimiter to use during the import process. You can use CSV files to import and export data between Word, Excel, Access, and many more programs, including most accounting and database software.

Importing

Importing data creates a query. A query is essentially a request for information from an external data source, which could be a CSV or XML file, a website, an Access table, or other various sources and databases. The query then creates a connection between the Excel workbook and the data source, and you can choose how the data is imported and managed. Sometimes you may want to import the data once only, and other times you may want to ensure the data is updated continuously.

After importing data with a query, you can edit the query with the Power Query Editor, enabling you to manipulate the data inside the query instead of on the worksheet. Since some sources contain huge amounts of raw data, the query can summarize the data and eliminate the need to store the information on a worksheet to create summary tables or PivotTables, or to conduct further data analysis.

Exporting

To export data, you can save any file as a CSV version from the Save as Type option in the Save As window. Saving a file as a CSV will only save the active worksheet, because the CSV format does not support multiple worksheets. Other formats in which to save an Excel file include PDF, for a read-only file, and HTML, to create a web page.

Mail Merge with Microsoft Word

You might want to send a custom letter or discount offer via snail mail to a large list of customers. To do this, you would perform a mail merge in Microsoft Word. A mail merge has a main document with the same message for everyone, and then personalized information for customers using fields for each recipient, such as name and address. The list of recipients and fields can be created in a program like Excel or Access then exported by saving as a CSV, imported into Word, and used to perform the merge. The merge then replaces the fields for each recipient to create a unique document for each customer.

≡ File→Save As→Save as Type

≡ Data→Get & Transform Data→Get Data 📊

DEVELOP YOUR SKILLS: E14-D1

In this exercise, you will import the February sales data from a separate file into your Q1 workbook. Once you have all data for the quarter in one file, you will be able to conduct analysis on it.

1. Start Excel, open **E14-D1-Q1** from your **Excel Chapter 14** folder, and save it as:
   E14-D1-Q1Summary

   There is some data in the January sheet already, but notice that all information is missing for February and March. The February data is contained in a CSV file.

2. Go to the **Feb** sheet and choose **Data→Get & Transform Data→From Text/CSV** 📋.

3. In the Import Data window, navigate to your **Excel Chapter 14** folder, select the **E14-D1-Q1 feb data** file, and click **Import**.

   A new window opens, displaying the contents of the CSV file. Note the Delimiter type is Comma.

   E14-D1-Q1 feb data.csv

File Origin	Delimiter	Data Type Detection
1252: Western European (Windows) ▾	Comma ▾	Based on first 200 rows ▾
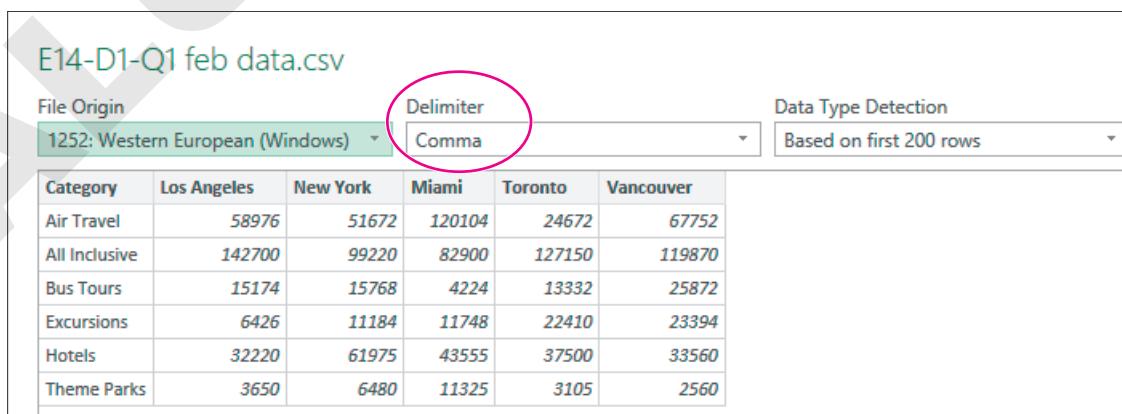
 | Category | Los Angeles | New York | Miami | Toronto | Vancouver |
   | --- | --- | --- | --- | --- | --- |
   | Air Travel | 58976 | 51672 | 120104 | 24672 | 67752 |
   | All Inclusive | 142700 | 99220 | 82900 | 127150 | 119870 |
   | Bus Tours | 15174 | 15768 | 4224 | 13332 | 25872 |
   | Excursions | 6426 | 11184 | 11748 | 22410 | 23394 |
   | Hotels | 32220 | 61975 | 43555 | 37500 | 33560 |
   | Theme Parks | 3650 | 6480 | 11325 | 3105 | 2560 |

   Rather than using the default settings, which would insert a new sheet in the workbook, you will change the load settings now.

4. Near the bottom of the window, click the **Load menu** button ▾ and choose **Load To…**.

In the Import Data window, you can see options for how and where the data will be inserted. Options for how to import include as a table, PivotTable, and PivotChart, any of which can be placed either on an existing or a new sheet. The other option is creating a data connection only and not actually pasting any information into the sheet.
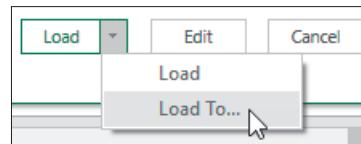
5. Leave **Table** selected, choose the option to put the data onto an existing worksheet, which will position it in cell A5 (the selected cell), and click **OK** to insert the data.
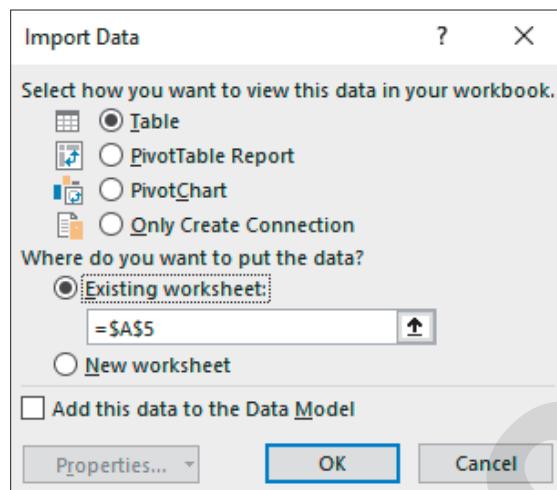
The data is inserted as a table, and the Queries & Connections pane opens on the right side of the Excel window, showing there is a query created to the E14-D1-Q1 feb data file.

In addition to the Table Tools contextual tab on the Ribbon, you will also see the Query Tools contextual tab, which allows you to edit, refresh, and perform other actions with the query.

6. Save your work.

Importing Tables from Microsoft Access

Information can be shared between Excel and Access without converting to a CSV, as the programs are directly compatible.

External Workbook References

If the data you need exists in another Excel workbook, the data can be referenced between workbooks without importing the data. Creating an external reference creates a link to the data, so if the source data changes, the information in the destination workbook will be updated automatically by

default. You can modify links, open the source, break links, as well as adjust other settings from the Edit Links dialog box.
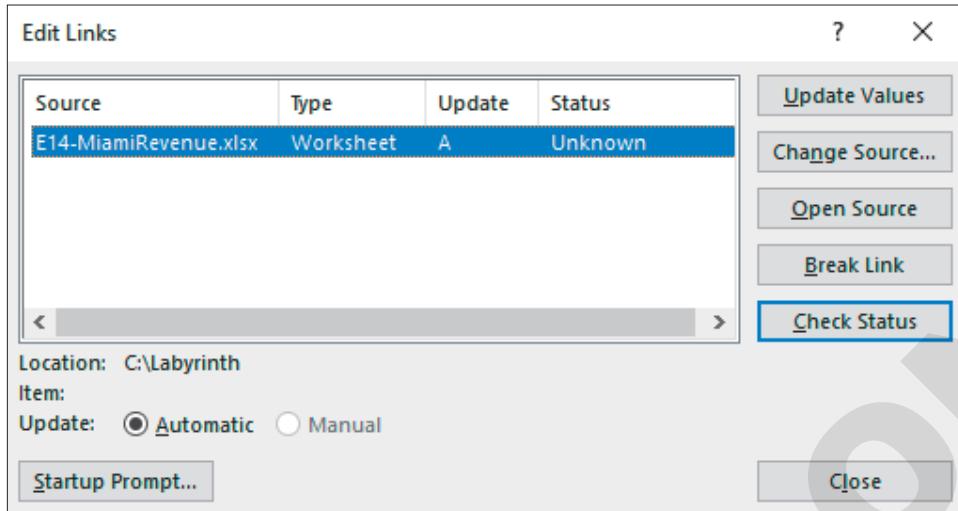
DEVELOP YOUR SKILLS: E14-D2

In this exercise, you will import the March data from an Access table. Then you will create a link to the data for Vancouver's January results, which is currently missing.

1. Save your file as: **E14-D2-Q1Summary**

2. Go to the **Mar** sheet and choose **Data→Get & Transform Data→Get Data** →**From Database→From Microsoft Access Database**.

3. In the Import Data window, navigate to your **Excel Chapter 14** folder, select **E14-D2-March data.accdb**, and click **Import**.

   A new window opens, displaying the name of the database file, with March Results below.

4. Click **March Results** to preview its contents.

5. Click the **Load menu** button ▼ and choose **Load To…**.

6. In the dialog box, choose to insert the data on an existing worksheet and click **OK**.

   The data for February and March is now complete, and you can see two items in the Queries & Connections pane.

   The last piece of missing information is the January Vancouver data. This data is in an Excel file and can be referenced directly.

7. Switch to the **Jan** sheet and then open **E14-D2-Vancouver** from your **Excel Chapter 14** folder.

8. Switch back to **E14-D2-Q1Summary** and select **cell F6**.

Tip! *You can switch between open windows in several ways: ⎡Alt⎤+⎡Tab⎤, the taskbar, or View→Window→ Switch Windows ⊞. Or, to have multiple workbooks visible at the same time, you can use View→Window→Arrange All ⊟.*

9. Type **=** to begin the formula, then switch to **E14-D2-Vancouver** and, on the **Jan** sheet, click **cell B6** and tap ⎡Enter⎤.

   The formula in cell F6 on the Jan sheet in E14-D2-Q1Summary is:
   ='[E14-D2-Vancouver.xlsx]Jan'!$B$6

   This formula includes a reference to the workbook, sheet, and cell. The result is $44,528.

Note! *References to other workbooks are absolute references by default.*

10. In **cell F7**, repeat the process from step 9 to create a reference to the January results for Vancouver All Inclusive sales.

11. Edit the reference in **cell F7** to make it relative.

    Hint: Click the Formula Bar to place the insertion point at the end of the reference and tap ⎡F4⎤ three times.

12. Copy the formula from **cell F7** down to **cell F11**.

13. Close the **E14-D2-Vancouver** file.

    The formulas and references in column F of the Q1Summary file now include the path to the Vancouver file's storage location on your computer.

    The data from the Vancouver file is linked and can be accessed, updated, or changed at any point via the Edit Links dialog box.

14. Save your work.

Summarizing Data

You can use PivotTables and 3D references to summarize data, but when working with different data sources across platforms, you may want to consider other options. In some cases, it may be necessary to import the data first; in other cases, you can use some of Excel's built-in tools or add-ons to get the job done:

▶ Queries

▶ Power Pivot

▶ Data models

▶ Cube functions

These require external data sources and extensive knowledge of the data you are working with. While a database is made up of fields and records, a data cube (like a PivotTable) summarizes the information across multiple groupings, such as dates, locations, and product categories. With a data model, such as a data cube, you can analyze data using cube functions instead of creating Pivot-Tables. For example, CUBEMEMBER, CUBESET, and CUBEVALUE are some of the functions used to pull information out of the data cube.

Data Consolidation

You can also summarize data using the Consolidate command on the Data tab. If your data has similar labels across multiple worksheets, such as income or expenses from several different company offices, you can combine the data into one range in a few simple steps.

> ≡ Data→Data Tools→Consolidate ▦

DEVELOP YOUR SKILLS: E14-D3

*In this exercise, you will consolidate the first quarter data from the Jan, Feb, and Mar sheets into the Q1 Summary sheet.*

1. Save your file as: **E14-D3-Q1Summary**
2. Go to the **Q1 Summary** sheet and choose **Data→Data Tools→Consolidate** ▦.

3. Follow these steps to consolidate the Q1 data:
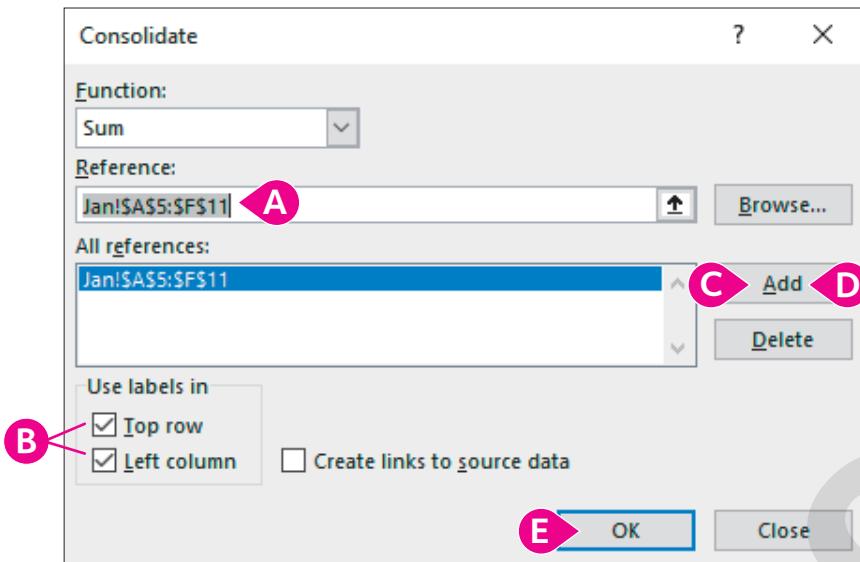
The desired function, Sum, is already selected.

Ⓐ Click in the **Reference** box and then go to the **Jan** sheet and select the **range A5:F11**.

Ⓑ Check the boxes beside **Top Row** and **Left Column**.

Ⓒ Click **Add** to add the selected range to the All References box.

Selecting additional sheets will automatically use the same cell locations on those sheets.

Ⓓ Click the **Feb** sheet, click **Add**, click the **Mar** sheet, and click **Add**.

Ⓔ Once all three references are added, click **OK**.
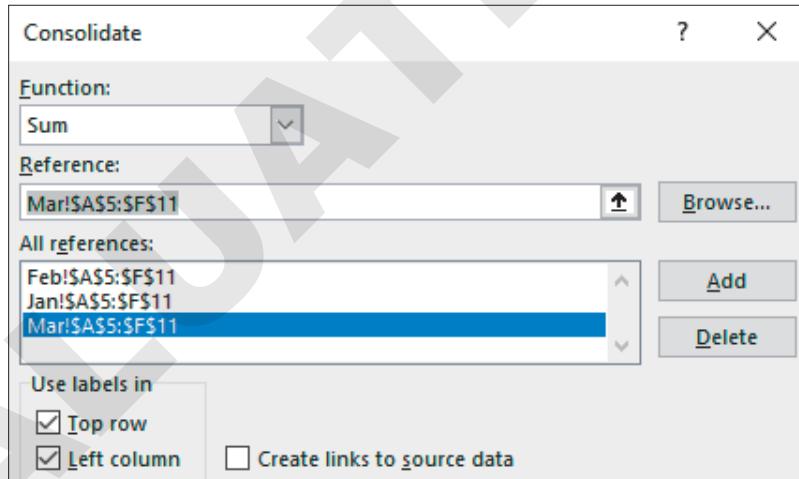
The consolidated data remains saved as part of the current worksheet and can be reused if desired.

4. In **cell A15**, enter the heading: **Q1 Averages**

5. Select the **range A3:G5** and then use **Format Painter** to copy the formatting and apply it to the **range A15:G17**.

6. Select **cell A17** and open the **Consolidate** tool, change the function to **Average**, and click **OK**.

7. Select the **range B18:F23** and change the number format to the **Comma Style** and remove the decimals.

8. Save your work.

Advanced Options for Filling a Data Series

Creating a series of values can be useful for making predictions and business decisions. You can create a data series based on existing data, past trends, or anticipated linear or exponential growth rates. For example, if a business examines costs and sees they have been increasing at a rate of 2% per year, they can create a set of data representing the expected costs for the next five years. Or, if they anticipate sales to increase from $10 million to $12 million in five years, they could create a set of data for that increase.

ABC Company					
Sales					
Current	Year 1	Year 2	Year 3	Year 4	Year 5
$10,000,000	$10,400,000	$10,800,000	$11,200,000	$11,600,000	$12,000,000
Expenses					
Current	Year 1	Year 2	Year 3	Year 4	Year 5
$ 8,000,000	$ 8,160,000	$ 8,323,200	$ 8,489,664	$ 8,659,457	$ 8,832,646

The values highlighted in yellow are created using the Fill Series command.

A linear series increases by the same number, while a growth series increases by the same percentage.

You can also select existing data and let Excel determine the trend for an increasing series of data. Or, start with a beginning value and an ending value, and let Excel fill in the missing values. There are many options; it all depends on how you want to use the information you do have to fill in the missing pieces of data.

▶ A series can be created in rows or columns.

▶ The series type can be linear, growth, date, or AutoFill.

▶ You can choose the step value (increase amount) for the series or choose to let Excel determine the trend.

≡ Home→Editing→Fill 🔽

DEVELOP YOUR SKILLS: E14-D4

In this exercise, you will use information from the first-quarter sales to set sales goals for the second quarter.

1. Save your file as: **E14-D4-Q1Summary**

2. Go to the **Q2 Projections** sheet and select the **range D6:G6**.

   After examining the Air Travel sales, you have determined a sales goal of 3% growth for the next three months.

3. Choose **Home→Editing→Fill** 🔽 **→Series…**.

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4. In the Series dialog box, choose **Growth** in the Type section, type **1.03** in the Step Value box, and click **OK**.

   1.03 is equal to 103%, or an increase of 3%.

   The goal for All Inclusive travel sales is to increase sales to $615,000 in June, with steady growth in April and May to reach that goal.

5. In **cell G7**, enter: **615000**

6. Select the **range D7:G7** and choose **Home→Editing→Fill** **→Series…**.
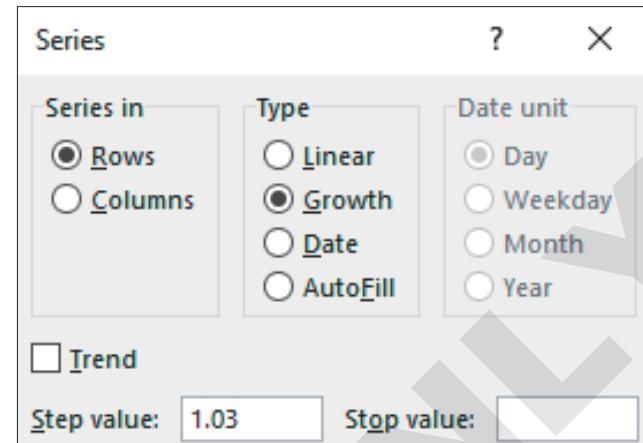
7. Leaving all settings as they are, note that the step value *11500* is identified and already entered and click **OK**.

   The values 592,000 and 603,500 are entered to fill in the missing months that represent an increase of 11,500 per month.

   Bus Tours and Excursions are seeing slower growth and unpredictable sales, so you want to be more conservative with these estimates.

8. Select the **range D8:G9** and fill in the two series using a **Linear** increase and a step value of: **3000**

   Based on your market research and increasing advertising efforts, you believe Hotels is going to be an excellent source of revenue and will continue its rapid growth for the next three months.

9. Select the **range C10:G10** (February and March data) and fill in the series using the **Growth** increase type and selecting the **Trend** option.

   The resulting series shows values between 210,000 and 243,000, increasing by roughly 7% per month.

10. Select the **range C11:G11** (February and March data) and fill in the series using the **Linear** trend.

11. Insert the heading **Total** in **cell H5** and then use AutoSum to insert totals for each category in the **range H6:H11**.

12. To make the data easier to read, select the **ranges B6:G6** and **H6:H11** and apply the **Accounting** number format with no decimals; apply the **Comma Style** number format with no decimals to the **range B7:G11**.

13. Save your work.
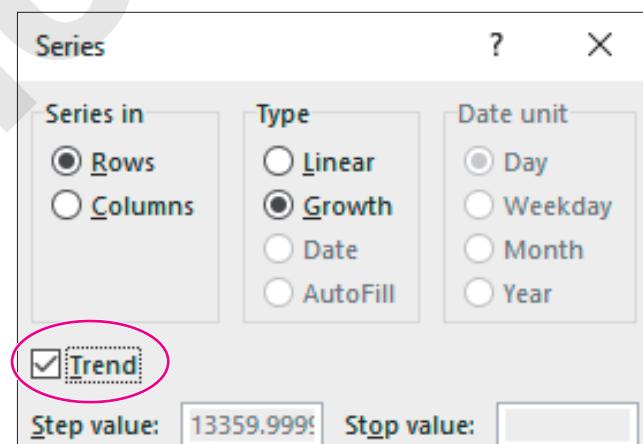
Additional Charts and Chart Tools

After creating sets of data, you may want to explore ways to visualize the information and make it easier to understand. In addition to the simpler column charts, bar charts, line charts and pie charts, there are many more charts to choose from.

A histogram chart can be useful for grouping large amounts of data and showing the distribution of the data in groups. For example, a list of a thousand or more employee salaries would not produce a very useful column chart; however, a histogram could group those salaries into a chart showing how many employees earn between $20,000 and $30,000, $30,000 and $40,000, and so on. The histogram groups are called *bins*. In this example, the bin width is $10,000 (and can be adjusted).

Another useful chart is the Pareto chart, which shows the significance of contributions of parts relative to the whole. For example, you could identify which sales categories contribute the most to the company's total revenue. The Pareto chart organizes the categories from highest to lowest, with a secondary axis and line indicating the increasing overall total.

Tip! *The Pareto principle (also commonly known as the 80/20 rule) states that 80% of your results come from 20% of your efforts!*
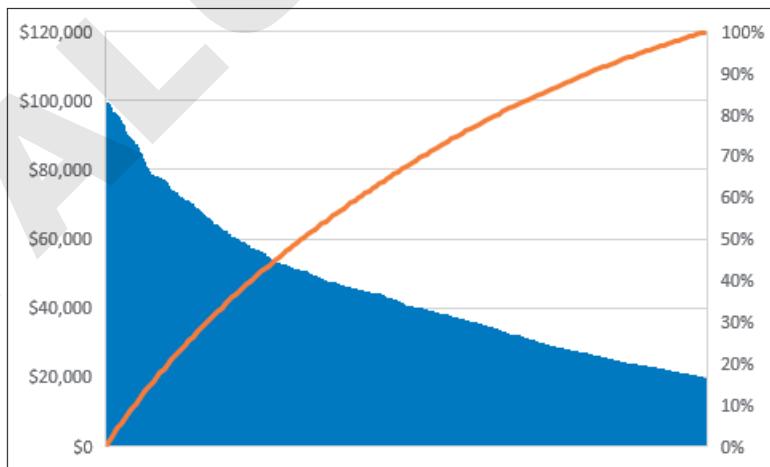
MORE CHART TYPES

Chart Name	Description
Waterfall	Displays cumulative effects of positive and negative values, such as cash flow
Funnel	Displays progressively declining values as part of a process, such as sales conversions through the sales process
Sunburst	Shows data proportionally across levels, displayed as rings for each level
Box and Whisker	Displays variations in a data set when there are many sets of related data, such as tracking stock prices
Stock	Similar to Box and Whisker but requires data to be organized in a specific way

Adding Trendlines

A trendline is an indicator of overall increases or decreases in data and can be useful to help create future projections; for example, this is particularly useful for predicting income or expenses for budget purposes. You can add trendlines using a number of methods, similar to creating a data series. The trendline can be linear or exponential, or it can be created as a linear forecast or moving average. When tracking stock prices, for example, a useful chart might include the 50-day or 200-day moving average.

Saving a Chart as a Template

Once you have created and modified a chart to suit your specific purpose, you may want to save the chart as a template. Saving a chart as a template allows you to insert a new chart using the same chart settings but with different data. This can be a significant time saver.

DEVELOP YOUR SKILLS: E14-D5

In this exercise, you will create a Pareto chart for all sales categories and then create a column chart and add a trendline.

1. Save your file as: **E14-D5-Q1Summary**
2. Select the **ranges A5:A11** and **H5:H11**.

   Hint: Use Ctrl *to select them.*

3. Choose **Insert→Charts→Insert Statistic Chart→Pareto**.
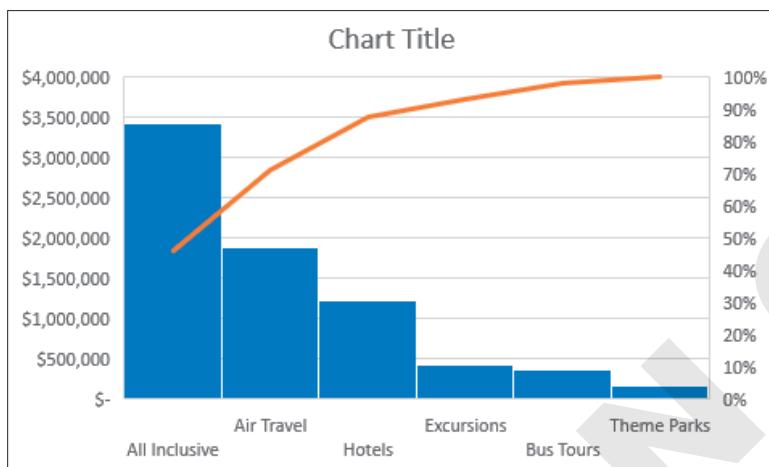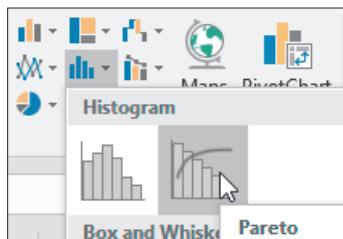
This chart shows the order of the sales categories from largest to smallest, with the line indicating the increasing percentage of the whole. The last category, Theme Parks, is the smallest, and adding it to all the other categories places the line at 100%.

4. Drag the chart to place it below the data and delete the chart title.

5. To create the next chart, select the **range A5:G7** and insert a 2-D clustered column chart.

6. Drag the chart and position it to the right of the data (if the Queries & Connections pane is still open, you can close it).

7. To add a trendline, choose **Chart Tools→Design→Chart Layouts→Add Chart Element→ Trendline→Linear**.

8. In the dialog box, choose **All Inclusive** and click **OK**.

9. Format the chart with **Style 14** and monochromatic colors of your choice, and then add the title:
   Projected Revenue

10. Right-click inside the chart area and choose **Save As Template**.

Tip! *You must point to the chart area, not a chart element like a column, line, or axis, to see the Save As Template option. The blank space to the left or right of the chart title is the easiest place to click.*

11. Save the chart template in the default location as: **Linear Trend**

12. For the next chart, select the **ranges A5:G5** and **A8:G9** and choose **Insert→Charts→ Recommended Charts**.

13. In the Insert Chart dialog box, click the **All Charts** tab, choose **Templates** on the left to display your saved Linear Trend template, and click **OK** to insert the chart.

14. Drag the chart to position it below the Projected Revenue chart and then edit the chart title to:
    Projected Revenue

15. Save your work.

Additional Charts and Chart Tools   **347**

Additional Lookup and Logical Functions

When you search for data in a large database, the VLOOKUP and HLOOKUP functions are useful, but they do have limitations: The data usually has to be sorted, and the functions can only look up values from left to right. There may be situations in which alternative methods are required.

Nesting the MATCH function inside the INDEX function allows for more flexibility in performing a data lookup. The INDEX function returns a value from a specified cell location, and the MATCH function determines what that location should be. For example, imagine you are looking for the first name of an employee whose ID number is 3572 (entered in cell G2) from a table where the first name is in column A and the ID number is in column D. The VLOOKUP function would not work because the ID column is to the right of the name column. However, you could use the formula *=INDEX(A2:A9,MATCH(G2,D2:D9))*.

As you can see in the Formula Bar, the MATCH function in this example looks in the range D2:D9 for the cell that matches the value in cell G2 and returns the matching row number; the INDEX function then returns the value from the range A2:A9 from that row, in this case *Jack* (result shown in cell G3).

Other Logical Functions

In many cases you can use the IF function to determine one of two possible outcomes, true or false, based on a logical test. For other situations you may need to use additional functions such as AND, OR, as well as NOT, either independently or combined with other functions to create even more possibilities.

The AND function simply checks whether *all* arguments are true and returns TRUE if they are and FALSE if they are not. The OR function, on the other hand, checks whether *any* of the arguments are true and returns TRUE if at least one is. The NOT function is used to reverse the results of a logical function so TRUE becomes FALSE and FALSE becomes TRUE.

DEVELOP YOUR SKILLS: E14-D6

In this exercise, you will look up the employee name from the list and determine which employees should have a salary review.

1. Save your file as: **E14-D6-Q1Summary**
2. Go to the **Employees** sheet.

   The Employee Lookup section has been completed for all fields except the Name field. Within this section, the formulas that return the position, location, and salary all use the ID#. You will create a formula to return the employee's name.

3. Enter this formula into **cell K6**: **=INDEX(A5:A33,MATCH(K5,C5:C33,0))**

   The formula returns the name Kristen. *The INDEX function returns the contents of the cell in the range A5:A33, in the position returned by the MATCH function; the MATCH function returns the correct position by finding the position of the contents of cell K5 in the range C5:C33 (the 0 argument means it must match exactly).*

   Now you want to determine if all the managers' salaries are at least $50,000.

4. Enter this formula into **cell H5**: **=AND(F5="Manager",G5<50000)**

   This formula checks if the position is Manager and salary is less than $50,000. If both conditions are met, it will return TRUE. *The result in cell H5 is* FALSE.

5. Copy the formula in **cell H5** down the column for all employees.

   Since TRUE and FALSE are not very useful, the AND function can be nested inside the IF function to return one result if the outcome is TRUE and another if FALSE.

6. Modify the formula in **cell H5** by nesting the AND function as follows:

   =IF(AND(F5="Manager",G5<50000),"Review"," ")

   Since the result of the first function was FALSE, the IF function returns the result for the value if false, which is a blank space; therefore, you will see nothing in cell H5 if the formula is entered correctly.

7. Copy the new formula down for all employees.
8. Use the **fill handle** to copy **cell G4** into **cell H4** and then edit the **column H** heading to: **Salary Review**
9. Save the file and close Excel.

Self-Assessment

Check your knowledge of this chapter's key concepts and skills using the Self-Assessment in your ebook or online (eLab course or Student Resource Center).

📌 Reinforce Your Skills

REINFORCE YOUR SKILLS: E14-R1

Import Data and Fill Series

In this exercise, you will import fundraising data for the Kids for Change Events through six months and then use the data to project fundraising for the next six months.

1. Start Excel, open **E14-R1-6monthresults** from your **Excel Chapter 14** folder, and save it as: **E14-R1-6MonthProjections**

2. Choose **Data→Get & Transform Data→From Text/CSV** 🗋.

3. In the Import Data window, navigate to your **Excel Chapter 14** folder, select **E14-R1-eventsdata**, and click **Import**.

4. In the next window, click **Load**.

   The data is loaded into a table on a new sheet.

5. Select the **range A2:G2** in the table, copy the data, and then switch to the **Summary** sheet and paste the values only into **cell A9**.

6. Hide **Sheet1**.

   Now that you have the data, you are ready to create some estimates. You are projecting that individual donations will continue rising similar to the increase between May and June, so you will fill in July through December based on that trend.

7. Select the **range F5:M5**, open the Series dialog box, and click **OK** without changing any of the default settings.

   The individual donations increase by 110 per month up to 6,260 in December. The corporate and door-to-door donations are expected to increase the same from June to December as they did between January and June, so you will calculate the December amount first and then fill in the rest.

8. In **cell M6**, enter this formula: **=G6-B6+G6**

   The difference between June and January is added to the amount from June, resulting in expected donations of 4,900 in December.

9. Copy the formula from **cell M6** to **cell M7**, select the **range G6:M7**, and fill the two series based on the trend.

   Hint: Check the Trend box but don't change any other settings.

   Funds raised by phone and events are expected to increase by an average of 2% per month.

10. Select the **range G8:M9** and fill in the series using a growth step value of: **1.02**

11. Edit the subtitle in **cell A2** to: **Fundraising Results & Projections**

12. Format the donations from individuals with the Accounting number format and no decimals and then format all data for July through December with the light blue fill of your choice.

13. Save your work.

REINFORCE YOUR SKILLS: E14-R2

Create Charts

In this exercise, you will create a chart to display the projected donations for the year.

1. Save your file as: **E14-R2-6MonthProjections**
2. Enter **Total** into **cell A10** and then apply italic formatting and right-alignment.
3. Select the **range B10:M10** and use AutoSum to insert totals.
4. Select the **range A4:M10** and insert a combo chart with the Total data series as a line chart on the secondary axis (for all other series use Clustered Column).
5. Move the chart to a new sheet named **Projected Annual Donations** and change the chart title to match the sheet name.
6. Format the chart using **Style 6** and a monochromatic color of your choice.
7. Change the color of the line to **Standard Red** so it stands out from the columns more.

   Hint: Right-click the line and choose the color from the Outline menu.
8. Add a linear trendline based on the Total series and format the line color with **Standard Yellow**.
9. Save the chart as a template called: **Annual Trend**
10. Save and close the file.

REINFORCE YOUR SKILLS: E14-R3

Insert a Histogram Chart and Functions

In this exercise, you will automate the task of copying information from one worksheet and inserting it into another worksheet.

1. Open a new, blank workbook and save it as: **E14-R3-StudentSummary**
2. Import the data from the **E14-R3-studentdata** file, located in your **Excel Chapter 14** folder, onto the existing sheet.
3. Replace the column headings with these:
   - **First**
   - **Last**
   - **School**
   - **January** through **December**
4. Rename the sheet: **Monthly Hours**
5. In **cell P1**, enter the heading **Total** and then use AutoSum to find the sum of volunteer hours for 12 months for each student.
6. Select the **ranges A1:A24** and **P1:P24** and insert a histogram chart.
7. Move the chart to a new sheet, renaming the chart title: **Volunteer Hours Distribution**
8. Right-click the horizontal axis and select **Format Axis…**.

9. In the Axis Options settings of the Format Axis pane, choose **Bin Width** and enter **30** in the box.

Format Axis

Axis Options ▼   Text Options

◢ **Axis Options**

Bins

○ By Category
○ Automatic
◉ Bin width   30.0
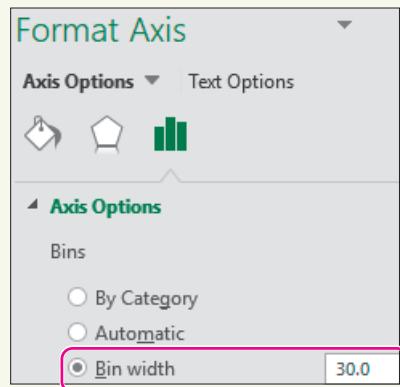
The two largest groups are between 360 and 390, and between 450 and 480.

10. Return to the **Monthly Hours** sheet and enter the heading **Award** in **cell Q1**.

11. In **cell Q2**, enter this formula: **=OR(COUNTIF(D2:O2,0)=0,SUM(D2:O2)>500)**

This formula checks to see if the student either had no months with zero volunteer hours or more than 500 total volunteer hours for the year. If either condition is met, the result is TRUE; these are the students who will receive an award.

12. Save your work and close Excel.

📎 Apply Your Skills

Consolidate Expense Data

In this exercise, you will import the expenses for two of the office locations at Universal Corporate Events and consolidate the data into one sheet.

1. Start Excel, open **E14-A1-HO_Expense** from your **Excel Chapter 14** folder, and save it as: **E14-A1-ExpenseSummary**

   The expenses for four quarters are listed for the head office. You need to import the same expenses for the other two offices in Seattle and Chicago.

2. Import the data from **E14-A1-SEAexpdata** (a CSV file), located in your **Excel Chapter 14** folder, into a new sheet using the default settings. Rename the sheet: **Seattle**

3. Import the data from **E14-A1-CHIexpdata** (an Access database file), located in your **Excel Chapter 14** folder, and load it into a new sheet using the default settings. Rename the sheet: **Chicago**

   The next step is to consolidate the data into one sheet.

4. Insert a new sheet, move it to the right of the Head Office sheet, and rename it: **Summary**

5. Consolidate the data from the **range A1:E11** on all three sheets, using the Sum function and the labels in the top row as well as the left column.

6. AutoFit the width of **column A** and apply cell style Accent 6 to the headings in **column A** and **row 1**. Center the headings in **row 1**.

7. Apply the Accounting style number format with no decimals to the **range B2:E2**, and Comma style with no decimals to the **range B3:E11**.

8. Save your work.

Look Up Expenses

In this exercise, you will create a formula that looks up an expense for any specified expense category and quarter.

1. Save your file as: **E14-A2-ExpenseSummary**

   First you will enter labels and sample data.

2. In the **range A16:A18**, enter these three labels, with the colon after each:
   - **Category:**
   - **Quarter:**
   - **Amount:**

3. Use the **Format Painter** to copy the format from **cell A11** and apply it to the **range A16:A18**.

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4. Enter this data into **cells B16** and **B17**:

- **Auto**
- **Q1**

Cell B18 is where you need to enter the functions to look up the expense amount for the category and quarter using the information entered into cells B16 and B17.

5. In **cell B18**, enter a formula that uses the INDEX function with these arguments:

Hint: Use the INDEX(array, row_num, [col_num]) function arguments.

- The Array is the data from the **range B2:E11**.
- The Row_Num must use the MATCH function and look up the category from **cell B16** with the category labels in the **range A2:A11**; the match type is zero for an exact match.
- The Column_Num must use the MATCH function again and look up the quarter from **cell B17** with the headings in the **range B1:E1**; the match type is zero for an exact match.

When complete, the result in cell B18 should show 86647. The complete function in the Formula Bar is: =INDEX(B2:E11,MATCH(B16,A2:A11,0),MATCH(B17,B1:E1,0))

Compare your formula to the one shown and make corrections if necessary.

6. Apply bold formatting and the Accounting number format with no decimals to **cell B18**.

7. Edit the category and quarter to look up a new expense amount for: **Travel** and **Q3**

The result shows an expense amount of $38,596.

8. Save your work and close the file.

APPLY YOUR SKILLS: E14-A3

Forecast Revenue

In this exercise, you will use existing data about sales from the current year to forecast revenue for next year. You will also chart the data.

1. Open **E14-A3-Revenue** from your **Excel Chapter 14** folder and save it as:
E14-A3-RevenueForecast

The data for the current year has been consolidated, and the average growth rate from quarter to quarter has already been calculated. Your first step is to fill in a data series for each revenue category.

2. Begin with the **Staff Party** category and, one by one, fill in the data series for each category for Q1–Q4 in 2020. Use the Q4 revenue in **column E** and the growth rates in **column J**.

Hint: Select Growth for the type and convert the Step value to a decimal. For example, Staff Party had a growth rate of 1.9%, so the step value is 1.019.

3. Insert a column to the left of **column F**, enter **Total** in **cell F4**, and then merge and center the **range F4:F5**.

4. Use AutoSum to calculate the 2019 totals in **column F**.

5. Select the **ranges A4:A10** and **F4:F10** and then insert a Pareto chart to display the totals.

6. Move the chart directly below the 2019 data and edit the chart title to: **2019**

The company wants to grow sales for each category to more than $1 million annually, so the marketing budget will increase for any category that is still less than $1 million if it also has a growth rate below 3%.

7. In **cell L4**, enter: **Increase Marketing Budget?**

8. Copy the format from the Growth Rate heading to **cell L4** and then widen the column to roughly 20 so the text is visible on two lines.

9. In **cell L6**, create a formula using the AND function to determine if the total in **cell F6** is less than $1,000,000 and the growth rate in **cell K6** is less than 3%. Copy the formula down the column for all categories.

10. Save your work and close Excel.

📋 Project Grader

This chapter does not include Project Grader exercises. Project Grader content is based on the learning objectives for a chapter, and sometimes those learning objectives cannot be accurately graded by the system. Objectives from this chapter that can be accurately graded may be included in later chapters, if applicable.

✈ Extend Your Skills

These exercises challenge you to think critically and apply your new skills in a real-world setting. You will be evaluated on your ability to follow directions, completeness, creativity, and the use of proper grammar and mechanics. Save files to your chapter folder. Submit assignments as directed.

E14-E1 That's the Way I See It

You are setting goals for yourself once you finish school, including visualizing your financial goals. Create a new workbook named: **E14-E1-SalaryGoals**

Set a goal for your annual salary starting next year; be realistic but also set the bar high! Add the year and the salary below that, and to the left a suitable heading. Think of at least one other financial goal, such as paying off a debt or saving money. Enter a heading for that goal in the next row and the first entry below next year. Add more goals if you choose. Use the fill handle to create the headings for the next five years across the top. Fill in a series for each goal for the next five years. Use at least two different Fill Series options (e.g., set a goal to increase your salary by 5% each year and reduce your debt from $12,000 to zero in five years). Finally, create a chart displaying the goals and add a trendline to at least one series. Format the chart and worksheet appropriately, including number formatting and adding a chart title.

E14-E2 Be Your Own Boss

Blue Jean Landscaping gives customers a discount for the hours they work on their own landscaping. The customer hours from the last year are saved in two CSV files, and you need to analyze and consolidate the information into one file. Create a new workbook named **E14-E2-ClientHours** and import **E14-E2-clientdata1** and **E14-E2-clientdata2** into new sheets. Rename Sheet1: **Summary**

Consolidate the data from both sheets into the Summary sheet, noting the labels at top and left. Delete the First Name and Category columns; insert a total column and calculate the total yearly hours for each client. Use the heading *Discount Rate* in a new column and use the OR function nested in an IF function to determine if the client worked more than 20 hours in at least three months or more than 200 hours total. If either condition is true, they get $17 per hour; if not, $15 per hour. (Hint: Build the function step by step. Start with =*COUNTIF(B2:N2,">20")*, determine if that result is greater than 2 or if N2>200, then nest that in an IF function.) Last, use the heading *Discount* in another column and multiply the rate by the total number of hours. Format the headings, client names, and dollar amounts so the Summary sheet looks professional.

E14-E3 Demonstrate Proficiency

Stormy BBQ tracks sales for each flavor of BBQ sauce and now, at the end of the year, you're analyzing the data. Open **E14-E3-SauceSales** and save it as: **E14-E3-SauceSalesAnalysis**

Create two Pareto charts, one for the month and monthly totals, and another for flavors and annual totals, to highlight the months and the flavors with the highest sales. Resize, reposition, and rename the charts appropriately. Create a lookup to find the number of bottles and the revenue for the flavor specified in cell G4. Begin by entering a flavor in cell G4 and then insert a column to the left of column H. In cell H4, use the MATCH function to find the position of the chosen flavor in the columns. (Hint: Find an exact match and use 0 for the third argument.) Insert the INDEX function in cells I4 and J4, the first to look up the number of bottles and the second to look up the price per bottle, which can be multiplied by the result in cell I4 to get revenue. (Hint: The INDEX function is looking for information in rows 4 and 18, so select the data for the array, then enter row 1, then use the result of the MATCH in cell H4 for the column argument in both.) Once the INDEX functions are entered, hide column H and test the formulas by entering a different flavor in cell G4.

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15

Workbook Completion
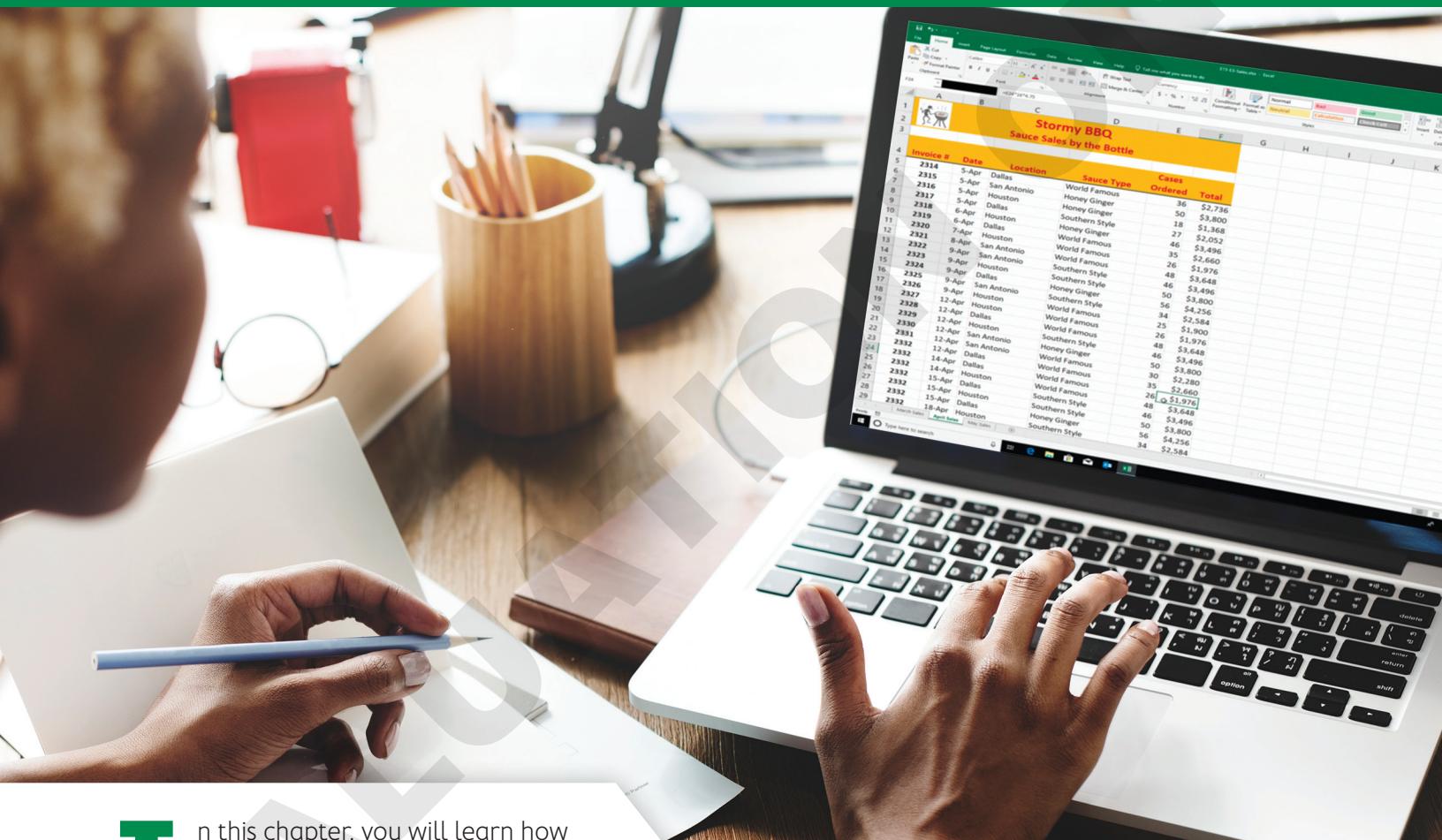
I n this chapter, you will learn how to put the finishing touches on a workbook before sharing or submitting your work.

LEARNING OBJECTIVES

▸ Create hyperlinks for navigation

▸ Insert comments

▸ Add alt text to objects

▸ Inspect your workbook for issues

▸ Create forms

▸ Protect your workbook

> 📂 # Project: Grade Book Submission
>
> Now that you have finished all the grading for the Business class at LearnFast College, you are ready to finalize your workbook before ultimately submitting the end-of-semester grades. You will create hyperlinks for easy navigation, add alt text to objects to ensure all users have access to the content in them, and then inspect and protect the workbook to finish your work.

Inserting Hyperlinks for Navigation

Hyperlinks (or *links*) are often used to create links to websites or email addresses. Hyperlinks can also be used for navigation in Excel. You can create hyperlinks to give the user a quick link to navigate to a cell in another workbook, worksheet, or just a cell in another area of the same worksheet. Rather than using Find or Go To, which require opening a dialog box and typing or selecting the desired destination, the hyperlink is created right on the worksheet, and clicking the link takes you to a predetermined location. You can add a hyperlink to any text, shape, or picture.

You can use the suggested link text to show or customize it for your needs.

You can add a ScreenTip to give more information about a link. ScreenTip text appears when a user hovers the mouse pointer over a link.

Choose what to link to first. The other options change depending on the type of link you create.
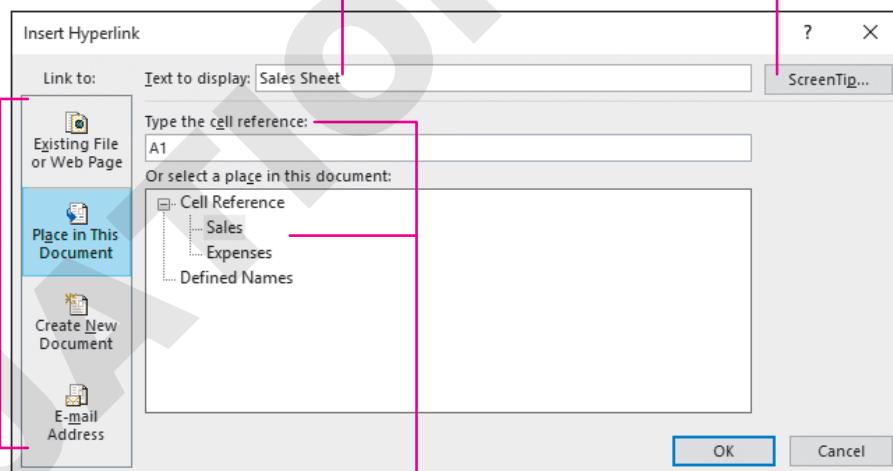
You can link to a specific cell or to a more general area, such as another sheet or a defined name.

You always have the option to edit or remove a hyperlink you have created, and it's as simple as right-clicking the cell, shape, or picture that contains the hyperlink and choosing Remove Hyperlink.

≡ Insert→Links→Link 🌐

DEVELOP YOUR SKILLS: E15-D1

In this exercise, you will insert hyperlinks to create shortcuts to each of the worksheets containing the different parts of each student's grades.

1. Start Excel, open **E15-D1-Grades** from your **Excel Chapter 15** folder, and save it as:
   E15-D1-GradesFinal

2. Click in the **Name** box, type **D5**, and tap Enter.

Cell D5 contains the heading for the overall quiz grades. You will create a hyperlink to the sheet that contains the individual quiz grades.

3. Choose **Insert→Links→Link** 🌐.

4. Select **Place in This Document** in the Link To section, select the **Quizzes** sheet on the right to create a link to that sheet, and click **OK**.

The text to display and cell reference can be left as they are.
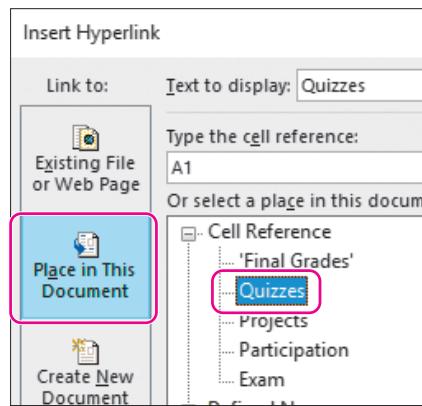
Notice that the word Quizzes *in cell D5 changes to a blue color with an underline to indicate the text is now linked.*

5. Point to **cell D5** and click with the mouse.

This takes you to the Quizzes worksheet.

6. Return to the **Final Grades** worksheet and select **cell E5**.

You may notice the word Quizzes *in cell D5 has changed to a purple color. The default workbook theme has different settings for the font color of hyperlinks (blue) and followed hyperlinks (purple).*

7. Choose **Insert→Links→Link** 🌐.

8. Ensure **Place in This Document** is selected in the Link To section, select the **Projects** sheet on the right to create a link to that sheet, and click **OK**.

9. Repeat this process to create hyperlinks for **cells F5** and **G5** to the **Participation** sheet and **Exam** sheet, respectively.

10. Save the file.

Inserting and Viewing Comments

Before sending a workbook to someone else to view or use, you may wish to include commentary about the file's contents. Comments make it easy to communicate with other people viewing the workbook data without cluttering up the normal view of the workbook. Comments can be shown or hidden individually or all at once; they can even be printed. If the workbook is large, or if you aren't

sure where the comments are located, you can use the Ribbon commands to navigate to the next (or previous) comment.

The image at left shows the options for a cell that does not contain a comment; the image at right shows how options change when a cell contains a comment.

The comment feature is a useful tool for collaborating with others working on the same file. You can use a comment to ask questions about the worksheet data, provide additional information, or explain complex data and formulas.

Comments are indicated by the red triangle in the upper-right corner of the cell. When you hover the mouse pointer over the cell, the comment and its author's name appear. You can reposition and resize a comment box as desired; when you do, the comment remains attached to the cell.

≡ Review→Comments→New Comment 🗨

DEVELOP YOUR SKILLS: E15-D2

In this exercise, you will insert comments for some of the students whose grades require additional work.

1. Save your file as: **E15-D2-GradesFinal**

   You need to review Project 1 with Pamela, so you want to insert a comment as a reminder to yourself.

2. Select **cell E15** and choose **Review→Comments→New Comment** 🗨.

   Alternatively, you can insert a comment from the shortcut menu by right-clicking a cell.

3. Type **Set up a time to review Project 1 with Pamela** and then click **cell E15**.

   If you move your mouse pointer off cell E15, you may notice that the comment is no longer visible but the red triangle remains in the upper-right corner. Moving back to that cell displays the comment again.
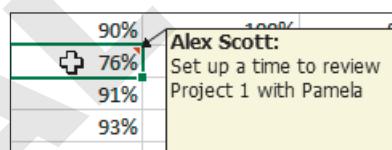
4. Right-click **cell G13** and choose **Insert Comment** 🗨.

5. Type **Schedule exam retake** and then click anywhere on the worksheet.

6. Hover the mouse pointer over **cell G13** to view the comment and then right-click and choose **Edit Comment**.

7. Type **for Oct. 1** to add the date to the end of the comment and then click anywhere on the worksheet to finish editing the comment.

8. Save your work.

Adding Alternative Text to Objects for Accessibility

To make your workbook accessible to individuals with visual impairments, you can add alternative text (or *alt text*) to the object properties. Alt text provides a descriptive representation of the information contained in charts, pictures, and shapes, which is useful for people who may not be able to see or understand the object otherwise.

For illustrations—including pictures, shapes, and SmartArt—you can access the Alt Text pane through the contextual tabs on the Ribbon; for example, the Drawing Tools Format tab. For other objects—like charts—you can access it via the shortcut (or context) menu that appears when you right-click the object. In the Alt Text pane, enter a brief description of what the object is or what information it contains. Good alt text is clear and concise and conveys the purpose of the visual element for someone who can't see it.

Tip! *If a picture or shape doesn't contain any useful or important information, it can be marked as decorative.*

≡ Drawing Tools→Format→Accessibility→Alt Text 🖼️

≡ Picture Tools→Format→Accessibility→Alt Text 🖼️

DEVELOP YOUR SKILLS: E15-D3

In this exercise, you will add alt text to illustrations in your workbook for people with visual impairments.

1. Save your file as: **E15-D3-GradesFinal**

2. Go to the **Exam** sheet and select the small picture in the upper-left corner.
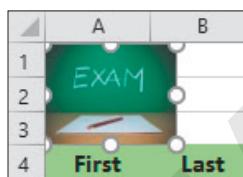
3. Choose **Picture Tools→Format→Accessibility→Alt Text** 🖼️.
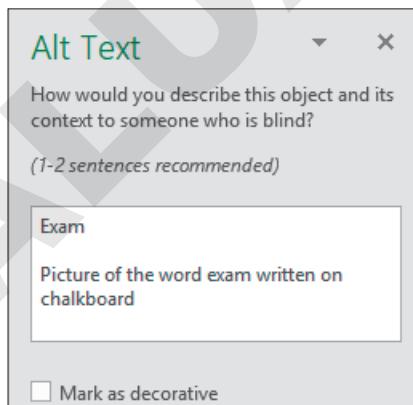
In the Alt Text pane on the right, notice that alt text is already added; a title and a description of the picture have been included.

4. Return to the **Final Grades** sheet and click in the chart area of the chart to select it.

Remember that the chart area is the empty space surrounding the title, plot area, and axes. The Alt Text pane is blank for this object.

Adding Alternative Text to Objects for Accessibility   **361**

5. Click in the **Alt Text** pane box and type: `Final Grade Line Chart`

6. Tap `Enter` twice and type: `The line chart shows the final grades for all students, ranging from 74% to 91%`

7. Close the Alt Text pane and then click **cell A7** to deselect the chart.

8. Save the file.

Inspecting Your Workbook

When you are finished editing a workbook, you might want others to see or use it. It's a good idea to check certain aspects of a workbook before sharing it. For example, you might want to check for personal information, accessibility issues, or compatibility. And if you will share your workbook with those in other parts of the world, you may want to set language options as well.

Inspect a Workbook for Hidden Properties or Personal Information

The Document Inspector searches your workbook for certain information you may not wish others to see. This table gives examples of data that you may include in a search, as well as items that will not be searched.

DOCUMENT INSPECTOR	
Items Included	**Items Not Included**
• Hidden worksheets, rows, columns, and names	• Data entered in remote areas of a worksheet
• Comments, ink annotations, and invisible content	• White text on a white background
• Document properties and personal information	• Data on a worksheet covered by a picture or shape
• Scenarios in the Scenario Manager	
• Headers and footers	

Before running the Document Inspector, it's a good idea to save a copy of your workbook. The Document Inspector will prompt you to save the file, but it's wise to have a backup. You also have the option of choosing which items to inspect and which to omit from the inspection.

After performing the inspection, the Document Inspector displays the search results. Nothing is removed until you choose to do so. Once you choose Remove All, however, the removal may be permanent. You cannot choose whether to keep or remove specific items within a category.
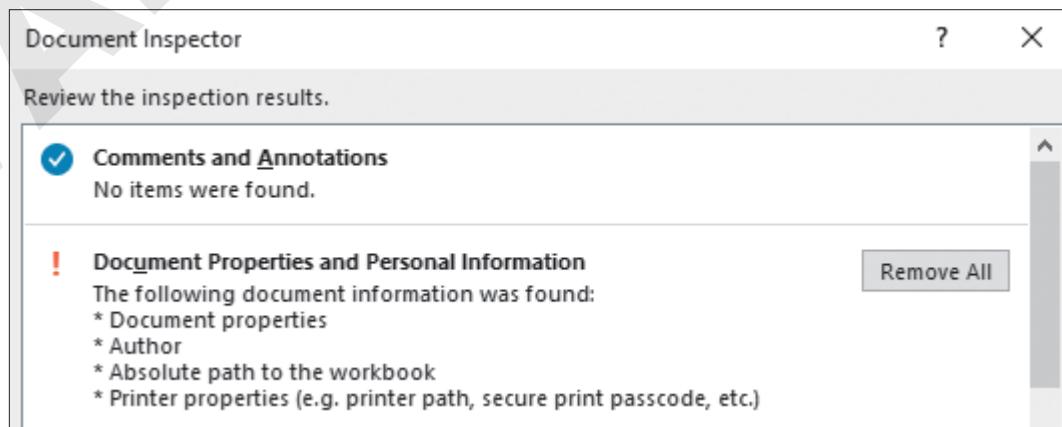
Inspect a Workbook for Accessibility

Similar to how the spelling checker tells you about possible spelling errors, the Accessibility Checker can alert you to possible accessibility issues in your workbook. You can then fix the identified issues so someone with an impairment can access and understand your content. Issues are classified into two groups:

▸ Errors: Content that will be very difficult for people with disabilities to understand

▸ Warnings: Content that might be difficult for people with disabilities to understand

Examples of issues you might find in your workbook include pictures without alt text, text that is similar in color to the background, blank sheets, or merged cells.

Inspect a Workbook for Compatibility

If you're sending a workbook to someone using an earlier version of Excel, you may want to first check to see whether there is content that won't be available to that person. You can select which version to check or just check all versions of Excel since 1997. The summary will indicate what might cause issues and how many occurrences there are of each issue.
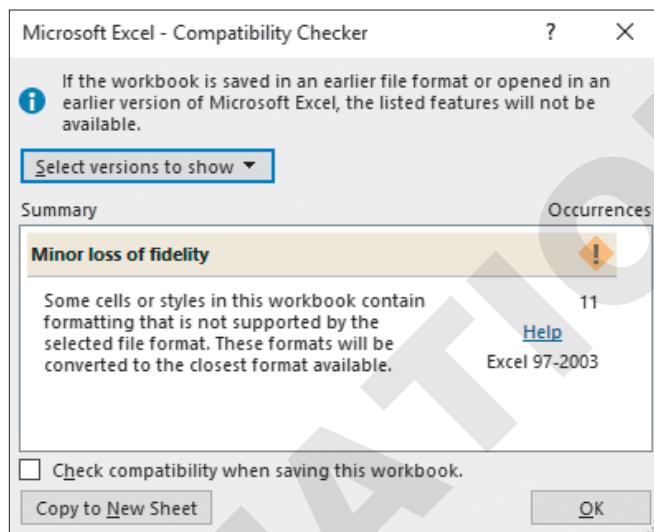
DEVELOP YOUR SKILLS: E15-D4

In this exercise, you will check the workbook for hidden properties and personal information, accessibility, and compatibility.

1. Save your file as: **E15-D4-GradesFinal**

2. Click the **File** tab and click the **Info** tab, if necessary.

   The Info tab shows the backstage options for protecting, inspecting, and managing your workbook. There is already a list of items below Inspect Workbook that you should be aware of, but you will inspect the workbook anyway to find exactly where these items or issues occur. Your screen may differ slightly.
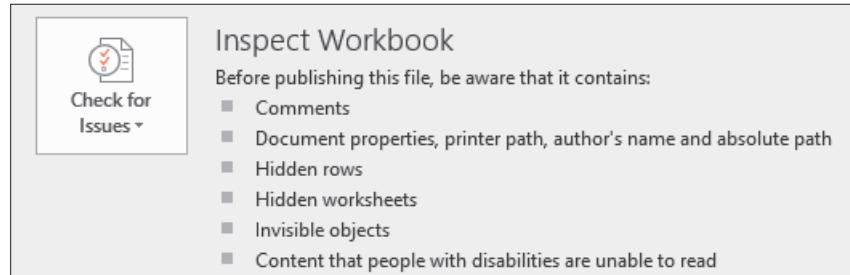
3. Choose **Check for Issues→Inspect Document**.

4. In the Document Inspector window, leave all options checked and click **Inspect**.

The report shows you any areas that might be of concern, including comments and document properties.

5. Scroll through the report and notice the results show the file contains comments, document properties, one hidden row, and one hidden sheet.

You will ignore the comments and hidden content.

6. Scroll back to the top and click **Remove All** next to *Document Properties and Personal Information*.

7. Click **Close** to finish using the Document Inspector.

Check for Accessibility Issues

8. Choose **File→Info→Check for Issues→Check Accessibility**.

The Accessibility Checker pane opens on the right side of the Excel window and shows a summary of errors and warnings for the workbook.
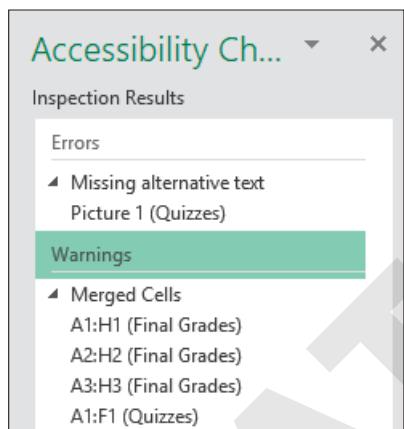
If necessary, click the arrows next to Errors and Warnings to expand them. There is one error for missing alt text and a list of warnings for several merged cells throughout the workbook. You will ignore the warnings but fix the error now.

9. Click the **Picture 1 (Quizzes)** item below *Errors*.

This brings you to the Quizzes worksheet and selects the picture.

10. Right-click the picture and choose **Edit Alt Text**.

11. In the Alt Text pane, type: **Cartoon picture of a quiz and pencil**

The error is removed from the Accessibility Checker pane.

12. Close the Alt Text and Accessibility Checker panes.

Check for Compatibility Issues

13. Choose **File→Info→Check for Issues→Check Compatibility**.

The Summary shows 13 occurrences that may cause minor loss of fidelity with formatting of certain cells for users who open the file with Excel 97–2003.
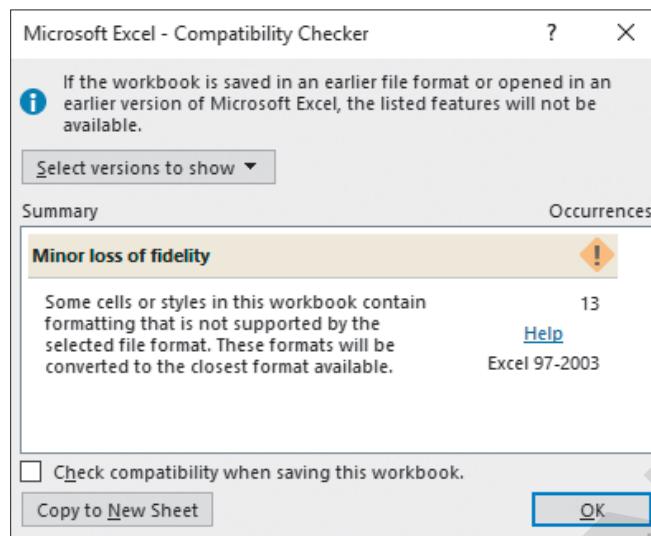
Because you won't be sharing the file with anyone using a version of Excel older than 2007, you don't need to make any changes.

14. Click **OK** to close the Compatibility Checker.

15. Save the file.

Configure Editing and Display Languages

When collaborating with people from different areas of the world, you may need to modify the language settings in Excel. Excel also has a tool that can translate selected text into another language.
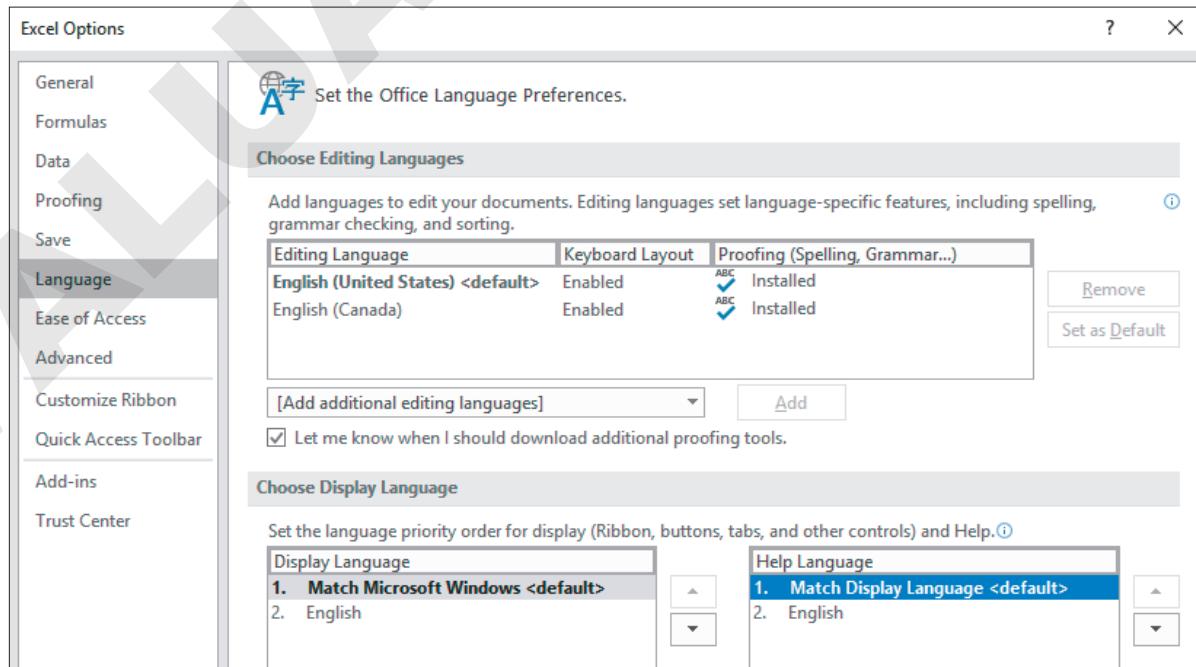
The Language section in Excel Options allows you to manage language settings.

Creating Forms

Another useful way of entering large amounts of data into Excel is through forms. You can create a form in Excel and then print it, complete with blank spaces for filling in data, or the user can fill it out directly in Excel. For example, when new clients come into the Raritan Clinic East office, they typically need to provide personal information. They could be given a form to fill out themselves on paper or it could be entered directly into the program by an assistant.

Data forms make it easier to enter information across a wide table without scrolling horizontally. Form tools like list boxes, checkboxes, spin buttons, and toggle buttons make data entry quick and easy—and less prone to error.

A data form for entering new client data.

Form controls and ActiveX controls are inserted from the Developer tab, which must be added to the Ribbon, and to use a data form you must add the Form command to either the Ribbon or Quick Access toolbar.

Tip! *You can customize the Ribbon and the Quick Access toolbar by right-clicking anywhere on the Ribbon.*

You can also protect your forms so users can only enter information in the appropriate places, and the rest of the workbook is inaccessible.

DEVELOP YOUR SKILLS: E15-D5

In this exercise, you will insert a form for adding new students into the class and create a list box to identify students who passed the course.

1. Save your file as: **E15-D5-GradesFinal**
2. Right-click the **Ribbon** and choose **Customize Quick Access Toolbar**.

3. Follow these steps to add the Form button to the Quick Access toolbar:
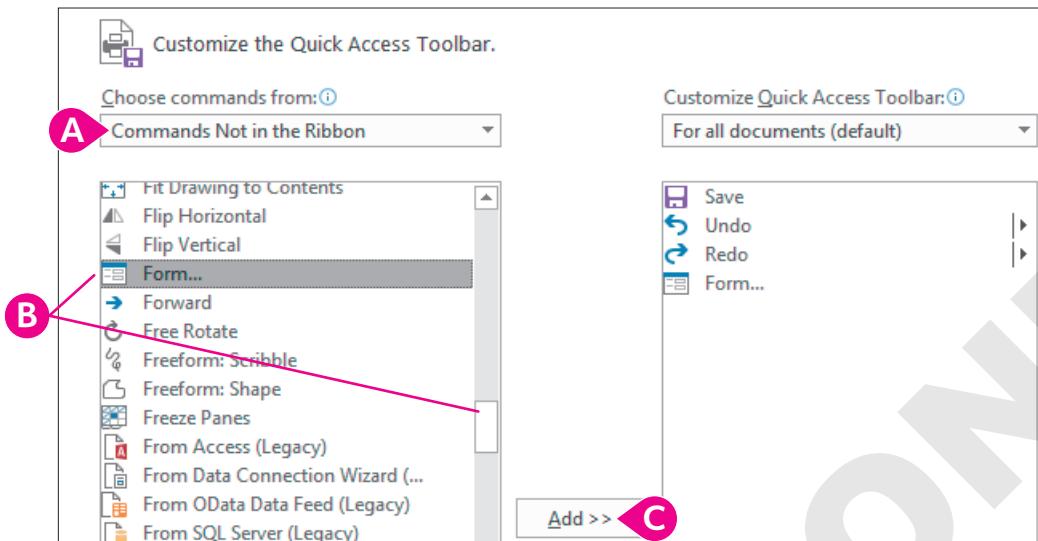
Ⓐ Choose **Commands Not in the Ribbon**.

Ⓑ Scroll down the list and choose **Form…**.

Ⓒ Click **Add**.

Ⓓ Click **OK** to close the Excel Options window.

The Form command is now visible on the Quick Access toolbar.

4. Go to the **Final Grades** sheet and ensure **cell A7** is selected.

5. Click the **Form** button on the Quick Access toolbar and then click **New** and enter this information for a new student:
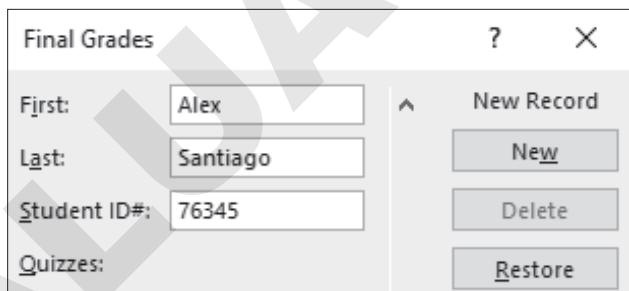
Note! *The fields for quizzes and other grades are not available because these columns contain formulas for calculating the grades.*

6. Click **Close** and see the new student's info in row 19, with zeros filling in the formulas. (Grades can be entered later, and this will update the formulas.)

7. The form controls are located on the Developer tab, so if necessary, right-click the **Ribbon** and add the Developer tab to it.

8. Enter **Pass** in **cell K7** and **Fail** in **cell K8**.

9. Choose **Developer→Controls→Insert→Combo Box (Form Control)**.

EXCEL

10. Starting in the top-left corner of **cell I7**, drag to insert a combo box roughly the same size as the cell (ensure the box fits entirely inside the cell).

11. To modify the combo box options, choose **Developer→Controls→Properties**.

12. Click in the **Input Range** box, select the **range K7:K8** in the worksheet, and click **OK**.

   Hint: You may need to drag or collapse the dialog box to see the range K7:K8.

13. Hide **column K** and then click the form control and select **Pass**.

14. Right-click the form control, copy the object, and paste it into **cell I8** (you may need to reposition it after pasting).

15. Copy the control again and repeat the pasting for each student.

16. Once each student has a form control in **column I**, select **cell H19** and set the form control for Alex Santiago to **Fail**. Until his grades are entered, he does not pass the course.

	First	Last	Student ID#	Quizzes	Projects	Participation	Exam	Final Grade		
7	Ashley	Ronayne	53844	91%	95%	100%	82%	89%	Pass	▼
8	Atif	Khalil	45894	96%	86%	100%	80%	87%	Pass	▼
9	Austin	Farrell	50572	85%	92%	90%	83%	87%	Pass	▼
10	Crystal	Robinson	47088	88%	88%	95%	88%	88%	Pass	▼
11	Felicia	Murray	45003	92%	85%	100%	87%	88%	Pass	▼
12	Jessica	McInnis	45537	93%	90%	95%	77%	86%	Pass	▼
13	John	Aikens	51028	85%	97%	95%	47%	74%	Pass	▼
14	Linda	Jefferies	39695	92%	90%	100%	89%	91%	Pass	▼
15	Pamela	Clark	46389	79%	76%	90%	88%	83%	Pass	▼
16	Pedro	Espinosa	37059	97%	91%	85%	87%	90%	Pass	▼
17	Robert	Moreira	53846	95%	93%	100%	87%	91%	Pass	▼
18	Sarah	Mullins	35742	94%	87%	100%	80%	87%	Pass	▼
19	Alex	Santiago	76345	0%	0%	0%	0%	0%	Fail	▼

17. Save your work.

Protecting Workbooks

Another option to consider is how to protect your workbook. When sending a workbook to another user, you may want to protect some aspects of the file from being changed, either accidentally or intentionally. There are many options to choose from that allow you to limit who has access to the file and what they can see and do with the file.

Protect Workbook Structure

To prevent structural changes from being made to the workbook, you can turn on Protect Workbook Structure. This prevents users from making such changes as adding, deleting, renaming, moving, or copying worksheets.

There is an optional password to turn off protection. If a password is not set, any user can turn off the protection, so it's highly recommended to use a password.

Warning! *Use a password you will remember (or write it down). If you forget the password, there is* no way *to recover it and regain access to the protected elements of the workbook.*
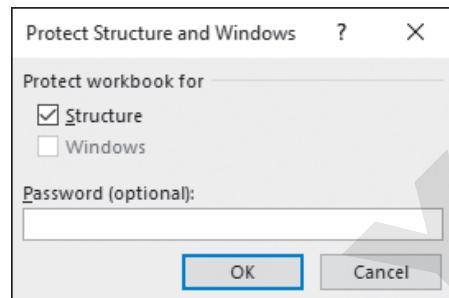
Be aware that protecting the workbook structure *does not* include worksheet protection, so the contents of each worksheet can still be edited, copied, or deleted. Protecting your data involves a separate process that you must perform.

Protect a Worksheet

To protect the data on your worksheets from changes, you can restrict edits using the options in the Restrict Access or Protect Worksheet commands. Restrict Access allows you to grant specific users access while removing their ability to edit, copy, or print. The simplest way to restrict edits is to use the Protect Sheet command. Worksheet protection must be done for each sheet you want to protect, one at a time. Again, setting a password is optional but highly recommended.

Additional options for worksheet protection include allowing certain actions, such as selecting cells or formatting cells. For example, you may want to allow users to select cells to view formulas without the ability to change them or prevent users from selecting cells at all. Or you might want to protect the worksheet data but allow format changes to be made.
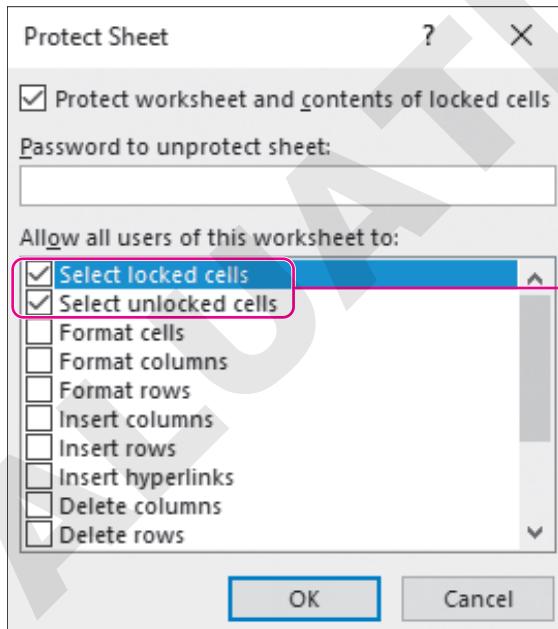
By default, the options to allow users to select locked and unlocked cells are checked. To change this option, simply remove the check.

Lock Cells and Hide Formulas

Another option is to allow users to edit *some* but not *all* cells. For example, you may want to send a workbook to someone to enter input data in one range but not allow changes to the formulas you have already entered in another range. You can do this by first unlocking the cells you want unlocked and then turning on worksheet protection. By default, all cells are locked until you unlock them, which is done in the Format Cells dialog box.

To hide the formulas on a worksheet, you can mark cells as hidden. This does not hide the results—only the formula remains hidden. (If the cell does not contain a formula, hiding it has no effect.)

Configure Formula Calculation Options

Normally you want Excel to recalculate all formulas automatically each time a value changes. This is the default Excel setting, but you can change this in Excel Options if necessary.
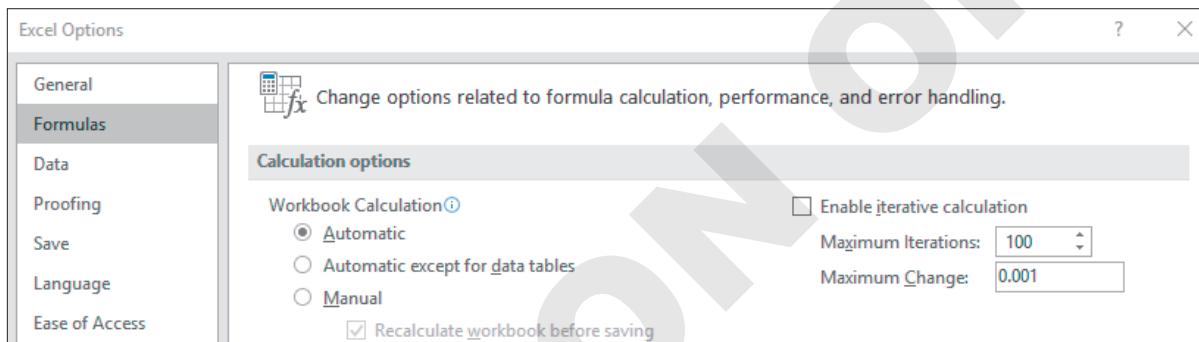

Manage Workbook Versions

It's always a good idea to save your work periodically. However, all Office apps, including Excel, have AutoRecover features that make it very rare that you would actually lose any unsaved work. Even if you close a workbook and accidentally forget to save it, you can still recover the file; the key is knowing where to look and how to recover the unsaved workbook versions.

In Excel Options you can view and/or modify where and how often AutoRecover files are saved.
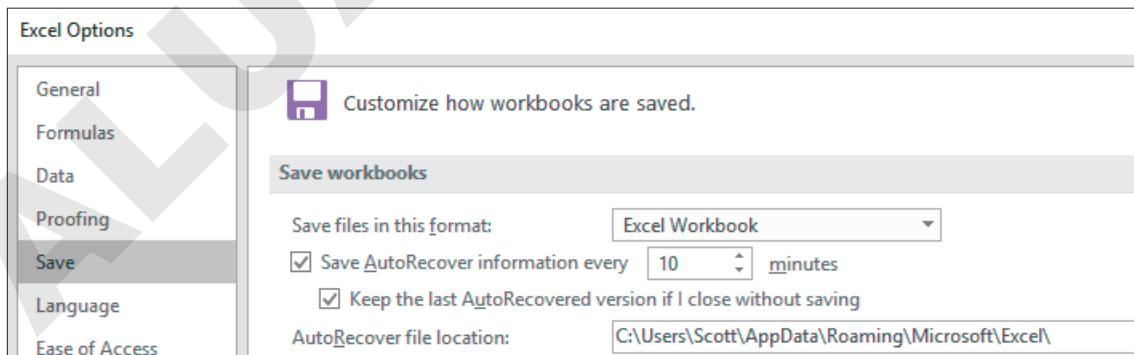
To recover an unsaved workbook after closing it, reopen Excel and go to Backstage view. On the Info tab, choose Manage Workbook. Note that you can also view a previous version of the current file. This might be useful if you make changes that cannot be reversed using the Undo command, such as deleting a worksheet!
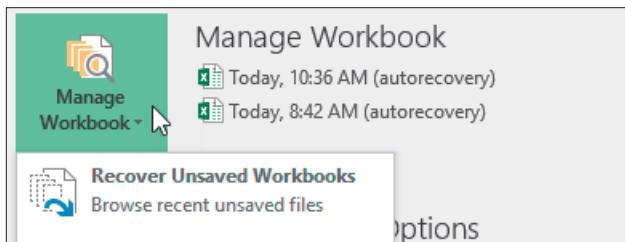
Mark as Final

If no more changes need to be made to a workbook, you can mark the document as final. This is perhaps the simplest method of protection because it allows no changes at all to the workbook, worksheets, or cells. However, any user can turn off this setting. You can tell a file is marked as final when the Mark as Final icon is displayed on the status bar.
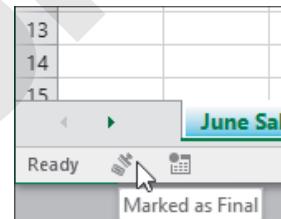
Encrypt with a Password

To prevent unauthorized access to your workbook, another simple method of protection is to encrypt the file with a password. This prevents anyone from accessing the file altogether without a password. Remember that passwords are not recoverable, so if you lose or forget the password, the file will be inaccessible even to the person who set the password!

≡ File→Info→Protect Workbook │ Review→Changes

DEVELOP YOUR SKILLS: E15-D6

In this exercise, you will add protection to the workbook and worksheet, unlock and hide cells, and mark the document as final.

1. Save your file as: **E15-D6-GradesFinal**
2. On the **Final Grades** worksheet, choose **Review→Changes→Protect Workbook** 🔲.
3. In the Protect Structure and Windows dialog box, type **abc123** for the password and click **OK**.

Tip! *For the purposes of this book, all DYS exercise passwords are the same, simple, and easy to remember. Of course, for true security, you should use different passwords and make them complex.*

Because the password you entered is not visible, the next step asks you to confirm what you just entered, before the protection is applied, to ensure you did not make a mistake when typing the password.

4. Type **abc123** again and click **OK**.

The workbook is now protected from any structural changes.

5. Right-click the **Final Grades** worksheet tab.

Notice the options to insert, delete, rename, move, or copy are no longer available.

6. From the context menu, choose **Protect Sheet** 🔲.

7. In the Protect Sheet dialog box, type **abc123** for the password.

8. Uncheck the boxes beside **Select Locked Cells** and **Select Unlocked Cells** and click **OK**.

9. Type **abc123** to confirm the password and click **OK**.

   If you click around on the worksheet, you will not be able to select any cells, meaning you cannot make changes to any cells. The exception is that the form controls are still accessible.

10. Choose **Review→Changes→Unprotect Sheet** 🔲.

11. Unprotect the worksheet using the password: **abc123**

    Now you will unlock some of the cells so the names and ID numbers can be edited if necessary.

12. Select the **range A7:C19**, right-click, and choose **Format Cells…**.

13. Click the **Protection** tab, uncheck **Locked**, and click **OK**.

Format Cells					
Number	Alignment	Font	Border	Fill	Protection

☐ Locked
☐ Hidden

Now you will hide the formula that calculates the final grades.

14. Select the **range H7:H19**, right-click, and choose **Format Cells…**.

15. Click the box next to **Hidden** to add a check so the cells are both Locked and Hidden; click **OK**.

Format Cells					
Number	Alignment	Font	Border	Fill	Protection

☑ Locked
☑ Hidden

16. Choose **Review→Changes→Protect Sheet** 🔲.

17. Type **abc123** for the password.

18. Check the box beside **Select Locked Cells**, which automatically adds a check to Select Unlocked Cells as well, and click **OK**.

19. Retype **abc123** and click **OK** to begin protection.

    Notice the Formula Bar is now blank but the results of the formulas still display in the range.

20. Type the letter **a** and notice the warning that pops up.

Microsoft Excel	✕
⚠️ The cell or chart you're trying to change is on a protected sheet. To make a change, unprotect the sheet. You might be requested to enter a password.	
OK	
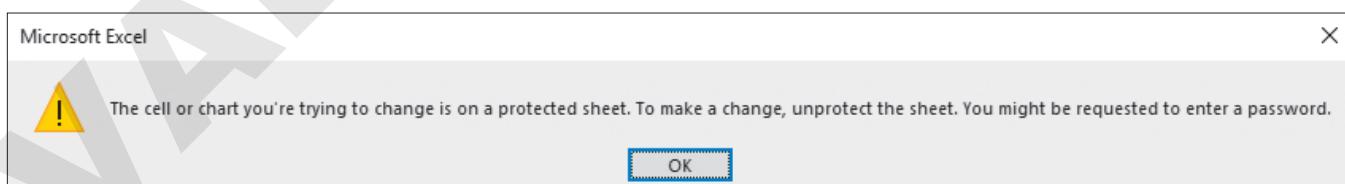
21. Click **OK** to close the warning.

22. Choose **File→Info→Protect Workbook→Mark as Final**.
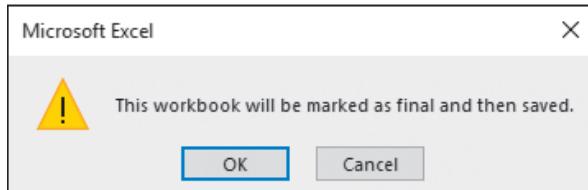
The warning box lets you know the file will be marked as final and saved.

23. Click **OK**. Another message box appears to provide more details about the process; click **OK** to close that message.

Notice you can no longer edit any of the workbook content, the Ribbon is collapsed, and Marked as Final *appears above the Formula Bar.*

24. Close the file without making any other changes.

Self-Assessment

Check your knowledge of this chapter's key concepts and skills using the Self-Assessment in your ebook or online (eLab course or Student Resource Center).

📌 Reinforce Your Skills

REINFORCE YOUR SKILLS: E15-R1

Add Hyperlinks, Comments, and Alt Text

In this exercise, you will review the Kids for Change race summary and add a few finishing touches to the sheet, including hyperlinks for navigating to each of the individual result sheets.

1. Open **E15-R1-RaceSummary** from your **Excel Chapter 15** folder and save it as: **E15-R1-RaceSummaryFinal**
2. Select **cell B15** on the Summary sheet and choose **Insert→Links→Link** 🌐.
3. Select **Place in This Document** in the Link To section, select the **New York** sheet on the right, and click **OK**.
4. Repeat this process to insert hyperlinks in **cells B16**, **B17**, **B18**, and **B19** to the sheets with the results for the corresponding city.
5. Select **cell C5** and choose **Review→Comments→New Comment** 🗨.
6. Type this comment in the comment box: **The goal next year is to have 7 cities**
7. Select the pie chart at the bottom of the **Summary** sheet.
8. Right-click the chart area and choose **Edit Alt Text**.
9. Insert this alt text: **Pie chart showing the funds raised for each of the 5 cities**
10. Close the Alt Text pane.
11. Save your work.

REINFORCE YOUR SKILLS: E15-R2

Inspect and Protect

In this exercise, you will inspect the Kids for Change results summary and then add protection to the worksheet.

1. Save your file as: **E15-R2-RaceSummaryFinal**
2. Choose **File→Info→Check for Issues→Inspect Document**.
3. Click **Inspect**.
4. Click **Remove All** beside *Document Properties and Personal Information* and then click **Close**.
5. Choose **File→Info→Check for Issues→Check Accessibility**.
6. Click the **Picture 1 (Summary)** item listed below *Errors*.

   This brings you to the Summary worksheet and selects the picture.
7. Right-click the picture, choose **Edit Alt Text**, and enter **Picture of runners crossing a finish line** for the alt text.

   The error is removed from the Accessibility Checker.
8. Without closing the Alt Text pane, copy the alt text and then click the **Picture 3 (Summary)** item in the Accessibility Checker.

9. Paste the copied text into the alt text box for this picture and then close the Alt Text pane and the Accessibility Checker.

10. Select the **range C5:C12**, right-click, and choose **Format Cells...**.

11. Click the **Protection** tab, if necessary; check **Hidden** to hide the formulas in the cells; and click **OK**.

12. Choose **Review→Changes→Protect Workbook** 🔒.

13. In the Protect Structure and Windows dialog box, type **abc123** for the password and click **OK**.

14. Type **abc123** to confirm the password and click **OK**.

15. Save your work and close the file.

REINFORCE YOUR SKILLS: E15-R3

Finalize the Savings Summary

In this exercise, you will make the Kids for Change Savings file final by inserting hyperlinks and comments and then inspecting and protecting the file.

1. Open the **E15-R3-Savings** file from your **Excel Chapter 15** folder and save it as:
    E15-R3-SavingsFinal

2. Choose **Home→Editing→Find & Select** 🔍 **→Go To**.

    In the Go To dialog box, you will see the name Company_Amt.

3. Select **Company_Amt** and click **OK**.

    You jump to the cell, which is hidden in row 5. You can see the cell contains the value 30% *by looking in the Formula Bar.*

    | Company... ▼ | ⋮ | ✕ | ✓ | *fx* | 30% |

    Although it's hidden, you can add a comment to the cell.

4. Choose **Review→Comments→New Comment** 💬 and add this comment: **Look at cost/benefit of increasing this to 40%**

5. Select **cell D16** and choose **Insert→Links→Link** 🌐.

    The cell is blank, so you need to add the text to display in the Insert Hyperlink dialog box.

6. Choose the **Place in This Document** link-to option, select the **2017** sheet, and insert the text to display as: **2017**
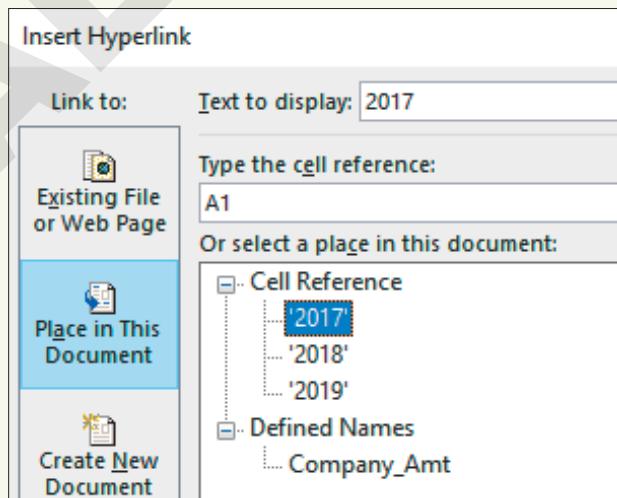
7. Insert a hyperlink in **cell E16** to the **2018** sheet with the text to display as: **2018**

8. Choose **File→Info→Check for Issues→Check Accessibility**.

9. Click the **Picture 1 (2019)** item listed below *Errors*.

10. Right-click the money picture beside the title, choose **Edit Alt Text**, and enter this alt text:
Picture of American money

The error is removed from the Accessibility Checker. You can ignore the warnings.

11. Close the Alt Text pane and the Accessibility Checker.

12. Choose **Review→Changes→Protect Workbook** 🔲.

13. In the Protect Structure and Windows dialog box, type **abc123** for the password and click **OK**.

14. Type **abc123** again and click **OK**.

The workbook is now protected from structural changes. However, the information for Q3 and Q4 can still be entered on the 2019 sheet.

15. Save your work and close the file.

📎 Apply Your Skills

APPLY YOUR SKILLS: E15-A1

Insert Hyperlinks and Comments

In this exercise, you will navigate a workbook, which contains Universal Corporate Events price listings, to insert comments and hyperlinks.

1. Open **E15-A1-Prices** from your **Excel Chapter 15** folder and save it as: **E15-A1-PricesFinal**

2. Use **Go To** to navigate to the **TPackage** cell and insert this comment: **Let's discuss reducing the Package Discount to 5%**

3. Use **Go To** again, this time to navigate to the **VIPPackage** cell, and insert this comment: **Let's discuss increasing the VIP Package Discount to 10%**

4. On the **VIP Price List** sheet, insert a hyperlink in **cell A3** to the **Price List** sheet and with the displayed text: **Regular Price List**

5. Reduce the font size of the hyperlink to 8 points.

6. On the **Price List** sheet, insert a hyperlink in **cell A3** with the displayed text **VIP Price List** to the **VIP Price List** sheet; again, reduce the font size of the hyperlink to 8 points.

7. Save your work.

APPLY YOUR SKILLS: E15-A2

Inspect and Mark as Final

In this exercise, you will inspect the workbook for personal information and accessibility and then protect the workbook by protecting the worksheets and marking it as final.

1. Save your file as: **E15-A2-PricesFinal**

2. Start the Document Inspector and use it to remove all document properties and personal information, as well as the hidden worksheets.

3. Leave the comments, hidden rows and columns, and any custom XML data if necessary, as they are and then close the Document Inspector.

4. Open the Accessibility Checker and select **5-Point Star 1 (VIP Price List)**.

5. Open the Alt Text pane and mark this shape as decorative.

6. Close the Alt Text pane and the Accessibility Checker.

7. Open the Compatibility Checker and review the results; close the Compatibility Checker.

8. Protect both sheets and then protect the workbook; use **abc123** as the password for all three passwords.

9. As the last step, mark the workbook as final and close the file.

APPLY YOUR SKILLS: E15-A3

Finalize the Client Feedback Results

In this exercise, you will finish up the Feedback Results workbook for Universal Corporate Events by adding a hyperlink to the bottom of the page, inspecting the document, and then protecting the worksheet.

1. Open the **E15-A3-Feedback** file from your **Excel Chapter 15** folder and save it as:
E15-A3-FeedbackFinal

2. Use the **Name** box to navigate to **cell A40**.

3. Insert a hyperlink with the displayed text **Back to Top** to **cell A4** on the same worksheet; edit the ScreenTip to: **Cell A4**
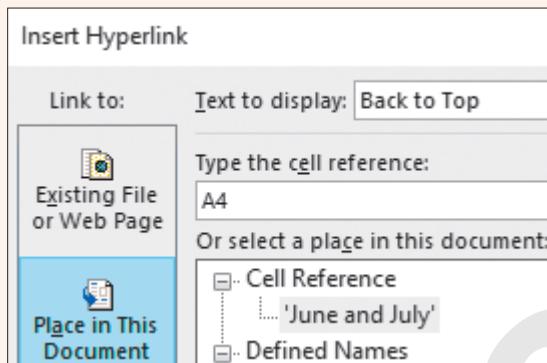
4. Click the **hyperlink** you just created.

5. Sort the **Coupon Offered** column from largest to smallest.

6. Add comments to the two cells that contain the coupon values for *$100* and *$200*; both comments should read: **Mailed on 9/23**

7. Inspect the workbook for accessibility issues then add this alt text to Picture 1: **Company logo, sun rising over the name Universal Corporate Events**

8. Protect the sheet from any further changes and set the password to: **abc123**

9. Save your work and close the file.

📑 Project Grader

This chapter does not include Project Grader exercises. Project Grader content is based on the learning objectives for a chapter, and sometimes those learning objectives cannot be accurately graded by the system.

✈ Extend Your Skills

These exercises challenge you to think critically and apply your new skills in a real-world setting. You will be evaluated on your ability to follow directions, completeness, creativity, and the use of proper grammar and mechanics. Save files to your chapter folder. Submit assignments as directed.

E15-E1   That's the Way I See It

Your friend Tobias has asked for your help again. He created an invoice in Excel and wants to allow his assistant to enter information in some of the cells while protecting any cells that contain formulas to calculate invoice amounts. Open **E15-E1-TBPSInvoice** and save it as: **E15-E1-TBPSInvoiceFinal**

Insert a comment in cell D4 that reads, *You should add the date due here.* Select cells A5, A7, and B7 and unlock them. Then check the workbook for accessibility and add appropriate alt text to the logo. Turn on protection for the sheet, using the password: **toby123**

E15-E2   Be Your Own Boss

After summarizing the annual revenue for Blue Jean Landscaping, you are now adding hyper-links for quick navigation to the quarterly results. Open **E15-E2-Revenue** and save it as: **E15-E2-RevenueFinal**

In cell A3, enter a hyperlink with the text *1st Quarter* to the Q1 sheet. In cells B3, C3, and D3, create similar hyperlinks to the Q2, Q3, and Q4 sheets. Inspect the file and remove all document properties and personal information. Finally, protect the workbook structure and set the password to: **blue123**

E15-E3   Demonstrate Proficiency

The sales tracking for Stormy BBQ needs some work, and you also want to protect the completed worksheets (March Sales and April Sales) to prevent unwanted changes while allowing users to update the May Sales worksheet with new sales information as needed. Open **E15-E3-Sales** and save it as: **E15-E3-SalesFinal**

Insert a hyperlink in cell A3 of the April Sales worksheet that uses the text *Prev* and that links to the previous month's sales results on the March Sales sheet. In cell F3, enter a similar hyperlink, with the text *Next*, to the May Sales worksheet. Then add a suitable alt text title and description for the picture in cell A1. Inspect the document and remove all comments as well as document properties and personal information. Finally, protect the March Sales and April Sales worksheets to prevent any changes using the password: **stormy123**

Glossary

calculated column Any column in an Excel table that contains a formula; typing new or editing existing formulas in any cell automatically updates the entire column

comment Note that can be attached to a cell

compatibility Determines whether files can be viewed in older versions of the same program

Consolidate (command) Allows you to summarize data from different ranges, consolidating the results into one output range

CSV Interchangeable file format in which values such as text and numbers are separated by commas

data form Type of form that makes it easy to enter information in a wide table without having to scroll across; can include list boxes, checkboxes, spin buttons, and toggle buttons to help ensure data accuracy

delimiter Character such as a comma, space, or tab used to specify a boundary between fields in a data table

Document Inspector Reviews workbooks for hidden data or personal information

field Group or category of information or data, such as last names or phone numbers

form Creates a user-friendly way to enter large amounts of data; can be printed and filled in manually or completed onscreen

header row First row in a table or external data source with text labels that describe the data in the columns below

histogram Chart type that shows a distribution of large amounts of data into groups ("bins"), such as inventory sales of 0–500, 501–1,000, 1,001–1,500, etc.

hyperlink Text or graphic that, when clicked, takes the user to another location in the same file, a different file, or a web page

Pareto Chart type that shows the significance of the contributions of parts to the overall whole, such as determining which variation of a product contributes most to the total sales of that product; categories are bars in order from highest to lowest and a line arcs to show the overall total

PivotChart Provides analysis based on a PivotTable; changes made to the PivotTable are instantly transferred to the PivotChart, and vice-versa

PivotTable Interactive, adaptable Excel report for summarizing large amounts of data in many different and useful ways

query Request for information from an external source

record Collection of details (fields) about an individual person, place, or thing, such as an employee record or a product record

sparkline Miniature charts in worksheet cells that illustrate the direction (increasing or decreasing) or data trend for a range of either one row or one column

structured reference Alternative to a standard cell reference; indicates the location of a cell or range in a table using the table name and column information; adjusts automatically when the table is edited

syntax Proper arrangement and order of the names, characters, and symbols used to create references, formulas, and functions

table Related collection of data about a subject stored in records (rows) and fields (columns) that allows for easy sorting, filtering, formatting, and calculations using structured references

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