Working with Formulas and Functions

CASE ▶ Grace Wong, vice president of finance at Quest Specialty Travel, needs to analyze tour expenses for the current year. She has asked you to prepare a worksheet that summarizes this expense data and includes some statistical analysis. She would also like you to perform some what-if analysis, to see what quarterly expenses would look like with various projected increases.

Unit Objectives

After completing this unit, you will be able to:

- Create a complex formula
- Insert a function
- Type a function
- Copy and move cell entries
- Understand relative and absolute cell references

- Copy formulas with relative cell references
- Copy formulas with absolute cell references
- Round a value with a function

Files You Will Need

EX B-1.xlsx
EX B-2.xlsx
EX B-3.xlsx
EX B-4.xlsx

Create a Complex Formula

A **complex formula** is one that uses more than one arithmetic operator. You might, for example, need to create a formula that uses addition and multiplication. In formulas containing more than one arithmetic operator, Excel uses the standard **order of precedence** rules to determine which operation to perform first. You can change the order of precedence in a formula by using parentheses around the part you want to calculate first. For example, the formula =4+2*5 equals 14, because the order of precedence dictates that multiplication is performed before addition. However, the formula =(4+2)*5 equals 30, because the parentheses cause 4+2 to be calculated first. **CASE** *You want to create a formula that calculates a 20% increase in tour expenses.*

STEPS

1. **Start Excel, open the file EX B-1.xlsx from the location where you store your Data Files, then save it as EX B-Tour Expense Analysis**

2. **Select the range B4:B11, click the Quick Analysis tool 📧, then click the Totals tab**
   The Totals tab in the Quick Analysis tool displays commonly used functions, as seen in **FIGURE B-1**.

3. **Click the AutoSum button 🔢 in the Quick Analysis tool**
   The newly calculated value displays in cell B12 and has a darker appearance than the figures in the selected range.

4. **Click cell B12, then drag the fill handle to cell E12**
   The formula in cell B12 is copied to cells C12:E12. The copied cells have the same dark appearance as that of cell B12.

5. **Click cell B14, type =, click cell B12, then type +**
   In this first part of the formula, you are using a reference to the total expenses for Quarter 1.

6. **Click cell B12, then type *.2**
   The second part of this formula adds a 20% increase (B12*.2) to the original value of the cell (the total expenses for Quarter 1).

7. **Click the Enter button ✔ on the formula bar**
   The result, 41789.556, appears in cell B14.

8. **Press [Tab], type =, click cell C12, type +, click cell C12, type *.2, then click ✔**
   The result, 41352.912, appears in cell C14.

9. **Drag the fill handle from cell C14 to cell E14**
   The calculated values appear in the selected range, as shown in **FIGURE B-2**. Dragging the fill handle on a cell copies the cell's contents or continues a series of data (such as Quarter 1, Quarter 2, etc.) into adjacent cells. This option is called **Auto Fill**.

10. **Save your work**

### Using Apps for Office to improve worksheet functionality

Excel has more functionality than simple and complex math computations. Using the Apps for Office feature (found in the Apps group in the INSERT tab), you can insert an app into your worksheet that accesses the web and adds functionality to your work. Many of the available apps are free and can be used to create an email, appointment, meeting, contact, or task, or be a reference source, such as the Mini Calendar and Date Picker. When you click the Apps for Office button, you'll see any Recently Used Apps. Click

See All to display the featured apps and to go to the Office store to view available apps. When you find an app you want, make sure you're logged in to Office.com (you may need to log in again), click the app, click Add, then follow the prompts to download the app. Click the Apps for Office button, click See All, click the app you just added, then click Insert. The app will display as an embedded object in your worksheet and will also appear in the Recently Used Apps palette when you click the Apps for Office button.

FIGURE B-1: Totals tab in the Quick Analysis tool
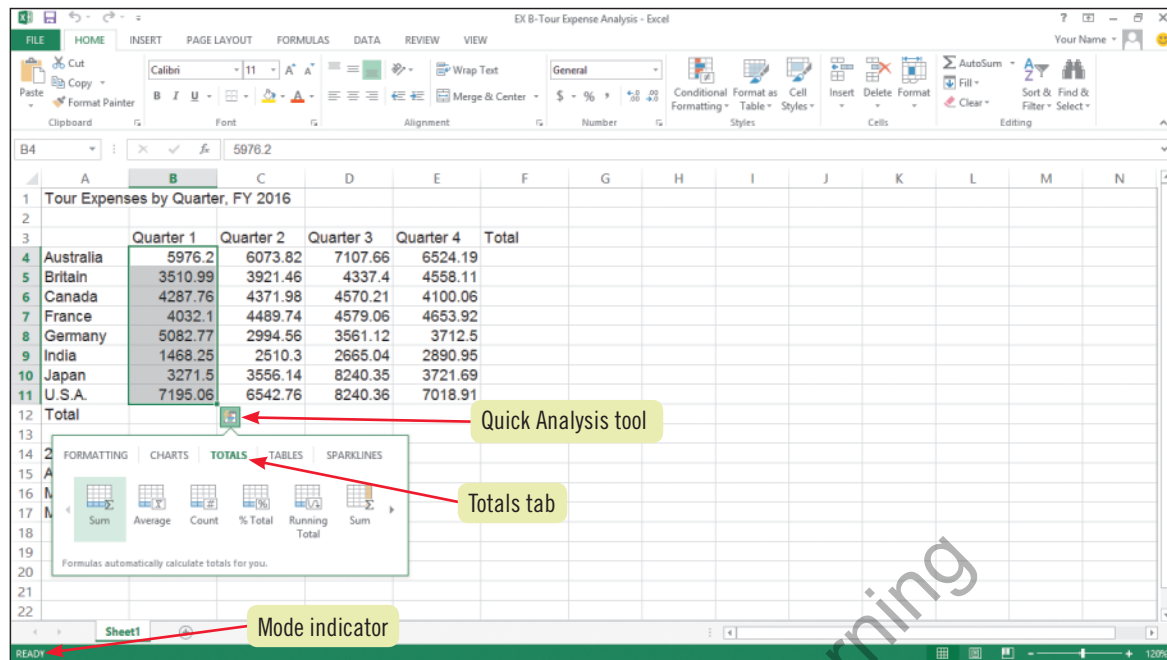
FIGURE B-2: Complex formulas in worksheet
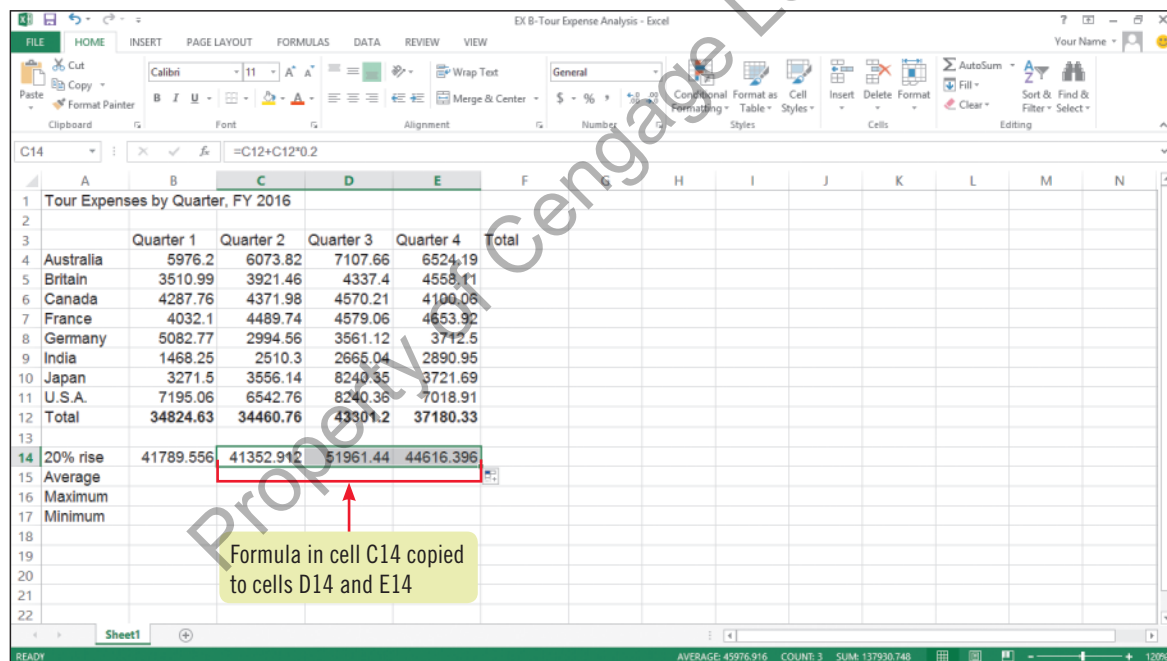
Reviewing the order of precedence

When you work with formulas that contain more than one operator, the order of precedence is very important because it affects the final value. If a formula contains two or more operators, such as 4+.55/4000*25, Excel performs the calculations in a particular sequence based on the following rules: Operations inside parentheses are calculated before any other operations. Reference operators (such as ranges) are calculated first. Exponents are calculated next, then any multiplication and division—progressing from left to right. Finally, addition and subtraction are calculated from left to right. In the example 4+.55/4000*25, Excel performs the arithmetic operations by first dividing .55 by 4000, then multiplying the result by 25, then adding 4. You can change the order of calculations by using parentheses. For example, in the formula (4+.55)/4000*25, Excel would first add 4 and .55, then divide that amount by 4000, then finally multiply by 25.

Insert a Function

Learning Outcomes
- Use the Insert Function button
- Select a range for use in a function
- Select a function from the AutoSum list arrow

Functions are predefined worksheet formulas that enable you to perform complex calculations easily. You can use the Insert Function button on the formula bar to choose a function from a dialog box. You can quickly insert the SUM function using the AutoSum button on the Ribbon, or you can click the AutoSum list arrow to enter other frequently used functions, such as AVERAGE. You can also use the Quick Analysis tool to calculate commonly used functions. Functions are organized into categories, such as Financial, Date & Time, and Statistical, based on their purposes. You can insert a function on its own or as part of another formula. For example, you have used the SUM function on its own to add a range of cells. You could also use the SUM function within a formula that adds a range of cells and then multiplies the total by a decimal. If you use a function alone, it always begins with an equal sign (=) as the formula prefix. **CASE** *You need to calculate the average expenses for the first quarter of the year, and decide to use a function to do so.*

STEPS

QUICK TIP
When using the Insert Function button or the AutoSum list arrow, it is not necessary to type the equal sign (=); Excel adds it as necessary.

1. **Click cell B15**

   This is the cell where you want to enter the calculation that averages expenses per country for the first quarter. You want to use the Insert Function dialog box to enter this function.

2. **Click the Insert Function button** ƒₓ **on the formula bar**

   An equal sign (=) is inserted in the active cell and in the formula bar, and the Insert Function dialog box opens, as shown in **FIGURE B-3**. In this dialog box, you specify the function you want to use by clicking it in the Select a function list. The Select a function list initially displays recently used functions. If you don't see the function you want, you can click the Or select a category list arrow to choose the desired category. If you're not sure which category to choose, you can type the function name or a description in the Search for a function field. The AVERAGE function is a statistical function, but you don't need to open the Statistical category because this function already appears in the Most Recently Used category.

QUICK TIP
To learn about a function, click it in the Select a function list. The arguments and format required for the function appear below the list.

3. **Click AVERAGE in the Select a function list if necessary, read the information that appears under the list, then click OK**

   The Function Arguments dialog box opens, in which you define the range of cells you want to average.

QUICK TIP
When selecting a range, remember to select all the cells between and including the two references in the range.

4. **Click the Collapse button** 🔢 **in the Number1 field of the Function Arguments dialog box, select the range B4:B11 in the worksheet, then click the Expand button** 🔳 **in the Function Arguments dialog box**

   Clicking the Collapse button minimizes the dialog box so you can select cells in the worksheet. When you click the Expand button, the dialog box is restored, as shown in **FIGURE B-4**. You can also begin dragging in the worksheet to automatically minimize the dialog box; after you select the desired range, the dialog box is restored.

5. **Click OK**

   The Function Arguments dialog box closes, and the calculated value is displayed in cell B15. The average expenses per country for Quarter 1 is 4353.0788.

6. **Click cell C15, click the AutoSum list arrow** Σ **in the Editing group on the HOME tab, then click Average**

   A ScreenTip beneath cell C15 displays the arguments needed to complete the function. The text "number1" is shown in boldface type, telling you that the next step is to supply the first cell in the group you want to average. You want to average a range of cells.

7. **Select the range C4:C11 in the worksheet, then click the Enter button** ✓ **on the formula bar**
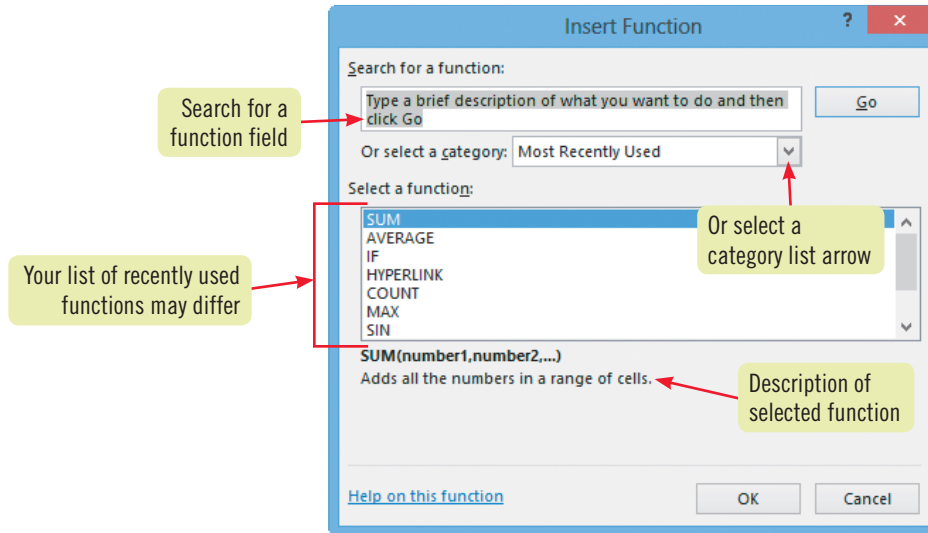
   The average expenses per country for the second quarter appears in cell C15.

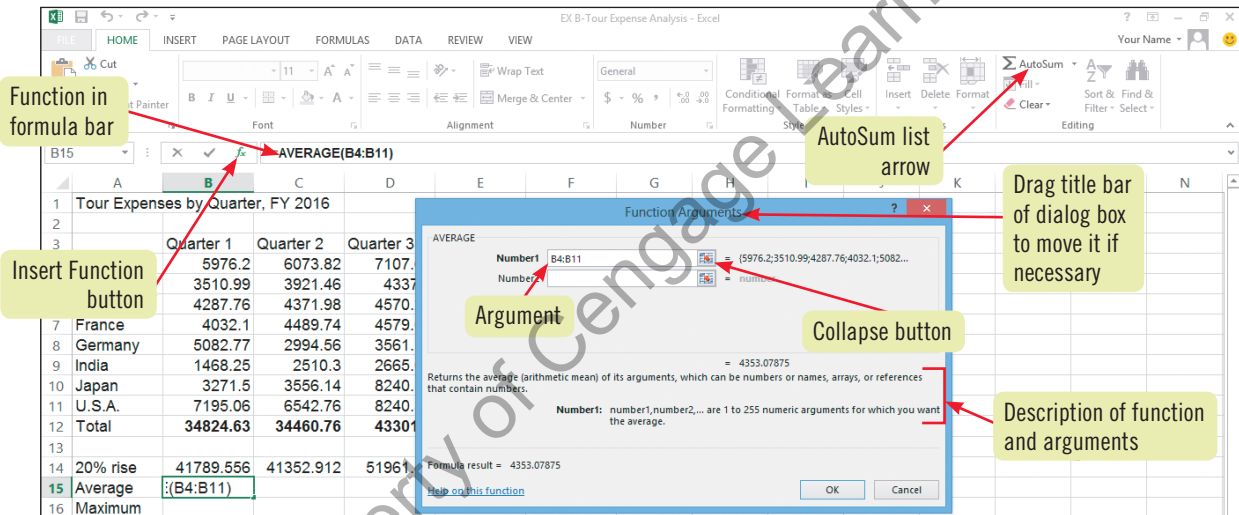8. **Drag the fill handle from cell C15 to cell E15**

   The formula in cell C15 is copied to the rest of the selected range, as shown in **FIGURE B-5**.
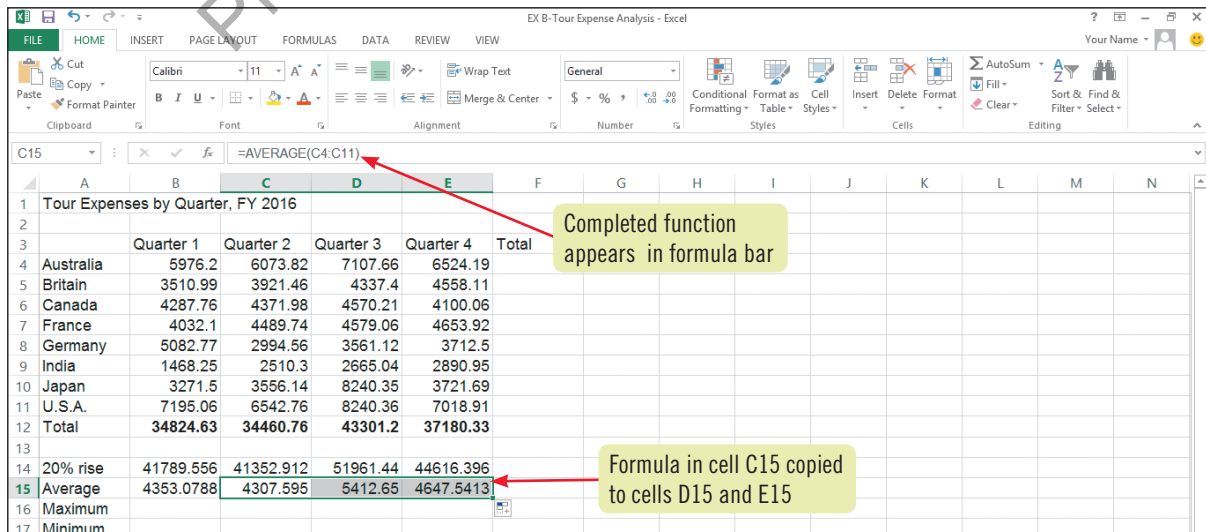
9. **Save your work**

FIGURE B-3: Insert Function dialog box

- Search for a function field
- Or select a category list arrow
- Your list of recently used functions may differ
- Description of selected function

FIGURE B-4: Expanded Function Arguments dialog box

- Function in formula bar
- AutoSum list arrow
- Drag title bar of dialog box to move it if necessary
- Insert Function button
- Argument
- Collapse button
- Description of function and arguments

FIGURE B-5: Average functions used in worksheet

- Completed function appears in formula bar
- Formula in cell C15 copied to cells D15 and E15

Type a Function

Learning Outcomes
- Select a function by typing
- Use AutoComplete to copy formulas

In addition to using the Insert Function dialog box, the AutoSum button, or the AutoSum list arrow on the Ribbon to enter a function, you can manually type the function into a cell and then complete the arguments needed. This method requires that you know the name and initial characters of the function, but it can be faster than opening several dialog boxes. Experienced Excel users often prefer this method, but it is only an alternative, not better or more correct than any other method. Excel's Formula AutoComplete feature makes it easier to enter function names by typing, because it suggests functions depending on the first letters you type. **CASE** ▶ *You want to calculate the maximum and minimum quarterly expenses in your worksheet, and you decide to manually enter these statistical functions.*

STEPS

1. **Click cell B16, type =, then type m**

   Because you are manually typing this function, it is necessary to begin with the equal sign (=). The Formula AutoComplete feature displays a list of function names beginning with "M" beneath cell B16. Once you type an equal sign in a cell, each letter you type acts as a trigger to activate the Formula AutoComplete feature. This feature minimizes the amount of typing you need to do to enter a function and reduces typing and syntax errors.

2. **Click MAX in the list**

   Clicking any function in the Formula AutoComplete list opens a ScreenTip next to the list that describes the function.

3. **Double-click MAX**

   The function is inserted in the cell, and a ScreenTip appears beneath the cell to help you complete the formula. See **FIGURE B-6**.

4. **Select the range B4:B11, as shown in FIGURE B-7, then click the Enter button ✓ on the formula bar**

   The result, 7195.06, appears in cell B16. When you completed the entry, the closing parenthesis was automatically added to the formula.

5. **Click cell B17, type =, type m, then double-click MIN in the list of function names**

   The MIN function appears in the cell.

6. **Select the range B4:B11, then press [Enter]**

   The result, 1468.25, appears in cell B17.

7. **Select the range B16:B17, then drag the fill handle from cell B17 to cell E17**

   The maximum and minimum values for all of the quarters appear in the selected range, as shown in **FIGURE B-8**.

8. **Save your work**

Using the COUNT and COUNTA functions

When you select a range, a count of cells in the range that are not blank appears in the status bar. For example, if you select the range A1:A5 and only cells A1, A4 and A5 contain data, the status bar displays "Count: 3." To count nonblank cells more precisely, or to incorporate these calculations in a worksheet, you can use the COUNT and COUNTA functions. The COUNT function returns the number of cells in a range that contain numeric data, including numbers, dates, and formulas. The COUNTA function returns the number of cells in a range that contain any data at all, including numeric data, labels, and even a blank space. For example, the formula =COUNT(A1:A5) returns the number of cells in the range that contain numeric data, and the formula =COUNTA(A1:A5) returns the number of cells in the range that are not empty. If you use the COUNT functions in the Quick Analysis tool, the calculation is entered in the cell immediately beneath the selected range.

FIGURE B-6: MAX function in progress

13					
14	20% rise	41789.556	41352.912	51961.44	44616.396
15	Average	4353.0788	4307.595	5412.65	4647.5413
16	Maximum	=MAX(			
17	Minimum	MAX(**number1**, [number2], ...)			

FIGURE B-7: Completing the MAX function

Closing parenthesis will automatically be added when you accept entry

FIGURE B-8: Completed MAX and MIN functions

Working with Formulas and Functions

Copy and Move Cell Entries

There are three ways you can copy or move cells and ranges (or the contents within them) from one location to another: the Cut, Copy, and Paste buttons on the HOME tab on the Ribbon; the fill handle in the lower-right corner of the active cell or range; or the drag-and-drop feature. When you copy cells, the original data remains in the original location; when you cut or move cells, the original data is deleted from its original location. You can also cut, copy, and paste cells or ranges from one worksheet to another. **CASE** *In addition to the 20% rise in tour expenses, you also want to show a 30% rise. Rather than retype this information, you copy and move the labels in these cells.*

STEPS

1. **Select the range B3:E3, then click the Copy button 📋 in the Clipboard group on the HOME tab**

   The selected range (B3:E3) is copied to the **Clipboard**, a temporary Windows storage area that holds the selections you copy or cut. A moving border surrounds the selected range until you press [Esc] or copy an additional item to the Clipboard.

2. **Click the dialog box launcher 🔲 in the Clipboard group**

   The Office Clipboard opens in the Clipboard task pane, as shown in **FIGURE B-9**. When you copy or cut an item, it is cut or copied both to the Clipboard provided by Windows and to the Office Clipboard. Unlike the Windows Clipboard, which holds just one item at a time, the Office Clipboard contains up to 24 of the most recently cut or copied items from any Office program. Your Clipboard task pane may contain more items than shown in the figure.

3. **Click cell B19, then click the Paste button in the Clipboard group**

   A copy of the contents of range B3:E3 is pasted into the range B19:E19. When pasting an item from the Office Clipboard or Clipboard into a worksheet, you only need to specify the upper-left cell of the range where you want to paste the selection. Notice that the information you copied remains in the original range B3:E3; if you had cut instead of copied, the information would have been deleted from its original location once it was pasted.

4. **Press [Delete]**

   The selected cells are empty. You have decided to paste the cells in a different row. You can repeatedly paste an item from the Office Clipboard as many times as you like, as long as the item remains in the Office Clipboard.

5. **Click cell B20, click the first item in the Office Clipboard, then click the Close button ✖ on the Clipboard task pane**

   Cells B20:E20 contain the copied labels.

6. **Click cell A14, press and hold [Ctrl], point to any edge of the cell until the pointer changes to ⬐, drag cell A14 to cell A21, release the mouse button, then release [Ctrl]**

   The copy pointer ⬐ continues to appear as you drag, as shown in **FIGURE B-10**. When you release the mouse button, the contents of cell A14 are copied to cell A21.

7. **Click to the right of 2 in the formula bar, press [Backspace], type 3, then press [Enter]**

8. **Click cell B21, type =, click cell B12, type *1.3, click the Enter button ✓ on the formula bar, then save your work**

   This new formula calculates a 30% increase of the expenses for Quarter 1, though using a different method from what you previously used. Anything you multiply by 1.3 returns an amount that is 130% of the original amount, or a 30% increase. Compare your screen to **FIGURE B-11**.
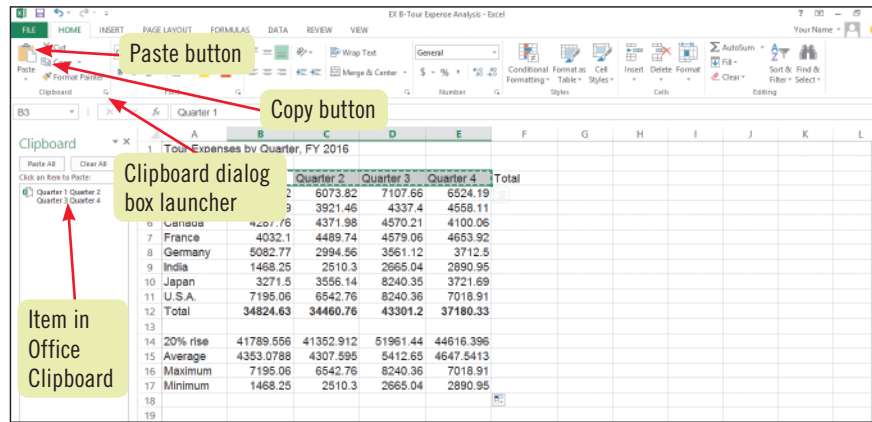
FIGURE B-9: Copied data in Office Clipboard

FIGURE B-10: Copying cell contents with drag-and-drop
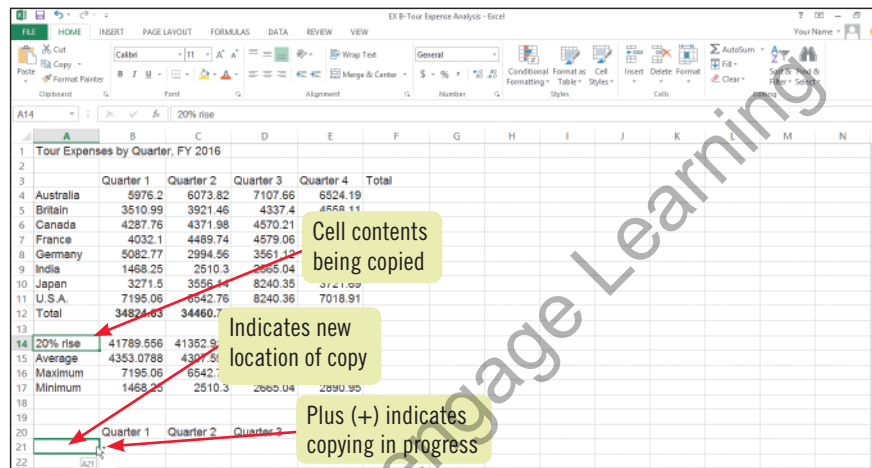
FIGURE B-11: Formula entered to calculate a 30% increase

Inserting and deleting selected cells

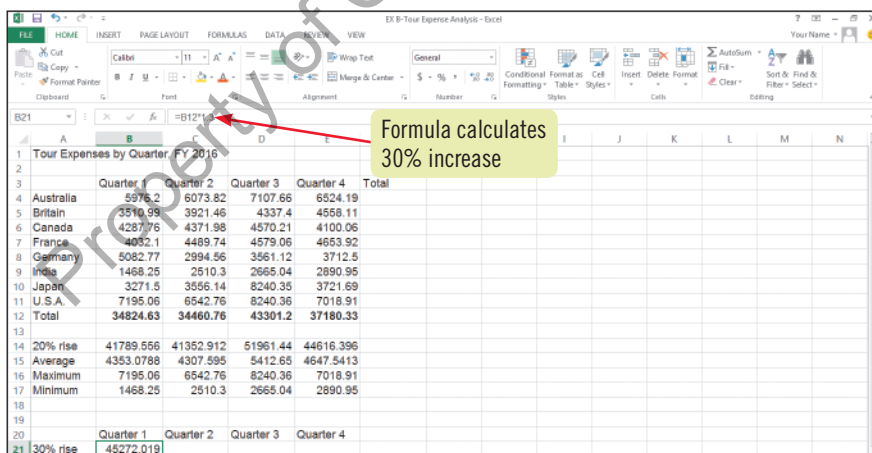As you add formulas to your workbook, you may need to insert or delete cells. When you do this, Excel automatically adjusts cell references to reflect their new locations. To insert cells, click the Insert list arrow in the Cells group on the HOME tab, then click Insert Cells. The Insert dialog box opens, asking if you want to insert a cell and move the current active cell down or to the right of the new one. To delete one or more selected cells, click the Delete list arrow in the Cells group, click Delete Cells, and in the Delete dialog box, indicate which way you want to move the adjacent cells. When using this option, be careful not to disturb row or column alignment that may be necessary to maintain the accuracy of cell references in the worksheet. Click the Insert button or Delete button in the Cells group to insert or delete a single cell.

Working with Formulas and Functions

Understand Relative and Absolute Cell References

As you work in Excel, you may want to reuse formulas in different parts of a worksheet to reduce the amount of data you have to retype. For example, you might want to include a what-if analysis in one part of a worksheet showing a set of sales projections if sales increase by 10%. To include another analysis in another part of the worksheet showing projections if sales increase by 50%, you can copy the formulas from one section to another and simply change the "1" to a "5". But when you copy formulas, it is important to make sure that they refer to the correct cells. To do this, you need to understand the difference between relative and absolute cell references. **CASE** ▶ *You plan to reuse formulas in different parts of your worksheets, so you want to understand relative and absolute cell references.*

DETAILS

Consider the following when using relative and absolute cell references:

• **Use relative references when you want to preserve the relationship to the formula location**

When you create a formula that references another cell, Excel normally does not "record" the exact cell address for the cell being referenced in the formula. Instead, it looks at the relationship that cell has to the cell containing the formula. For example, in **FIGURE B-12**, cell F5 contains the formula: =SUM(B5:E5). When Excel retrieves values to calculate the formula in cell F5, it actually looks for "the four cells to the left of the formula," which in this case is cells B5:E5. This way, if you copy the cell to a new location, such as cell F6, the results will reflect the new formula location, and will automatically retrieve the values in cells B6, C6, D6, and E6. These are **relative cell references**, because Excel is recording the input cells *in relation to* or *relative to* the formula cell.

   In most cases, you want to use relative cell references when copying or moving, so this is the Excel default. In **FIGURE B-12**, the formulas in F5:F12 and in B13:F13 contain relative cell references. They total the "four cells to the left of" or the "eight cells above" the formulas.

• **Use absolute cell references when you want to preserve the exact cell address in a formula**
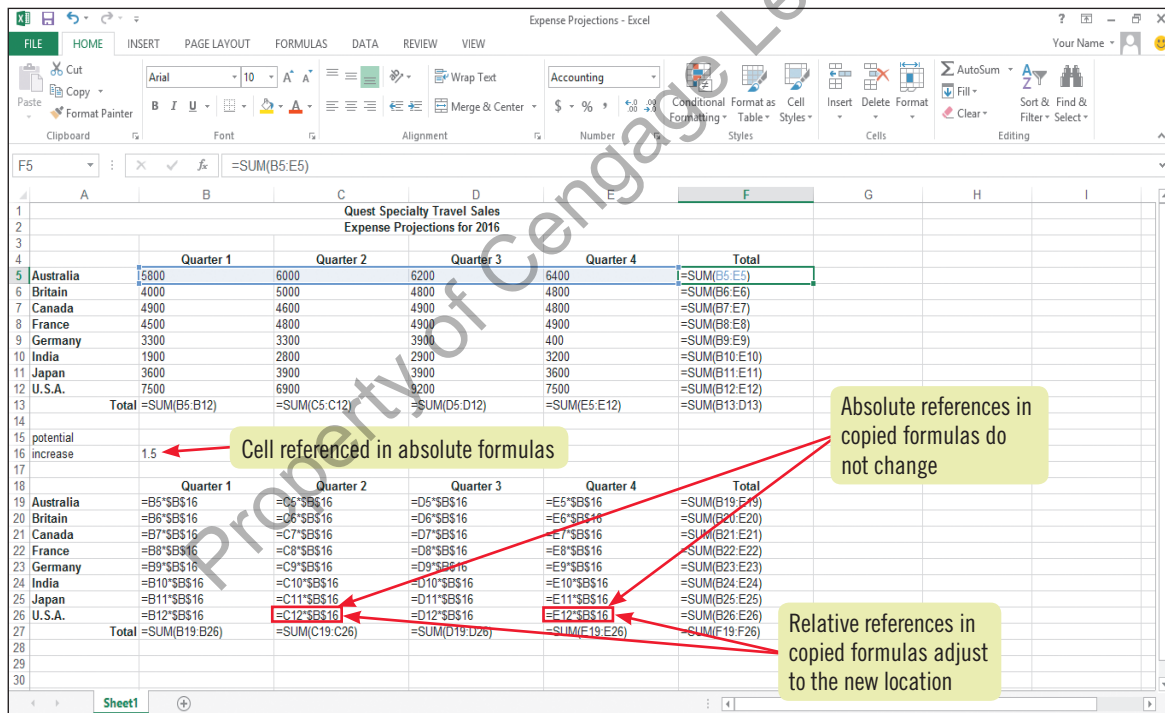
There are times when you want Excel to retrieve formula information from a specific cell, and you don't want the cell address in the formula to change when you copy it to a new location. For example, you might have a price in a specific cell that you want to use in all formulas, regardless of their location. If you use relative cell referencing, the formula results would be incorrect, because Excel would use a different cell every time you copy the formula. Therefore you need to use an **absolute cell reference**, which is a reference that does not change when you copy the formula.

   You create an absolute cell reference by placing a $ (dollar sign) in front of both the column letter and the row number of the cell address. You can either type the dollar sign when typing the cell address in a formula (for example, "=C12*B16"), or you can select a cell address on the formula bar and then press [F4] and the dollar signs are added automatically. **FIGURE B-13** shows formulas containing both absolute and relative references. The formulas in cells B19 to E26 use absolute cell references to refer to a potential sales increase of 50%, shown in cell B16.

FIGURE B-12: Formulas containing relative references

Formula containing relative references

Copied formulas adjust to preserve relationship of formula to referenced cells
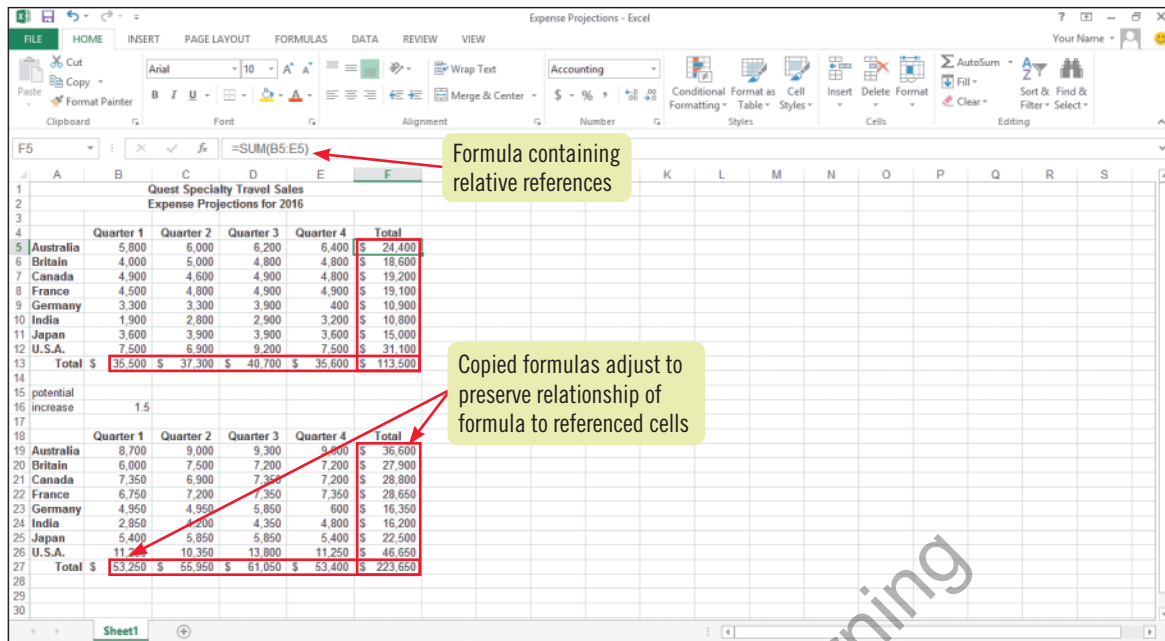
FIGURE B-13: Formulas containing absolute and relative references

Absolute references in copied formulas do not change

Cell referenced in absolute formulas

Relative references in copied formulas adjust to the new location

Using a mixed reference

Sometimes when you copy a formula, you want to change the row reference, but keep the column reference the same. This type of cell referencing combines elements of both absolute and relative referencing and is called a **mixed reference**. For example, when copied, a formula containing the mixed reference C$14 would change the column letter relative to its new location, but not the row number. In the mixed reference $C14, the column letter would not change, but the row number would be updated relative to its location. Like an absolute reference, a mixed reference can be created by pressing the [F4] function key with the cell reference selected. With each press of the [F4] key, you cycle through all the possible combinations of relative, absolute, and mixed references (C14, C14, C$14, and $C14).

Copy Formulas with Relative Cell References

Copying and moving a cell allows you to reuse a formula you've already created. Copying cells is usually faster than retyping the formulas in them and helps to prevent typing errors. If the cells you are copying contain relative cell references and you want to maintain the relative referencing, you don't need to make any changes to the cells before copying them. **CASE** ▶ *You want to copy the formula in cell B21, which calculates the 30% increase in quarterly expenses for Quarter 1, to cells C21 through E21. You also want to create formulas to calculate total expenses for each tour country.*

STEPS

1. **Click cell B21, if necessary, then click the Copy button 🖺 in the Clipboard group on the HOME tab**

   The formula for calculating the 30% expense increase during Quarter 1 is copied to the Clipboard. Notice that the formula =B12*1.3 appears in the formula bar, and a moving border surrounds the active cell.

2. **Click cell C21, then click the Paste button** *(not the list arrow)* **in the Clipboard group**

   The formula from cell B21 is copied into cell C21, where the new result of 44798.988 appears. Notice in the formula bar that the cell references have changed, so that cell C12 is referenced in the formula. This formula contains a relative cell reference, which tells Excel to substitute new cell references within the copied formulas as necessary. This maintains the same relationship between the new cell containing the formula and the cell references within the formula. In this case, Excel adjusted the formula so that cell C12—the cell reference nine rows above C21—replaced cell B12, the cell reference nine rows above B21.

3. **Drag the fill handle from cell C21 to cell E21**

   A formula similar to the one in cell C21 now appears in cells D21 and E21. After you use the fill handle to copy cell contents, the **Auto Fill Options button** appears, as seen in **FIGURE B-14**. You can use the Auto Fill Options button to fill the cells with only specific elements of the copied cell if you wish.

4. **Click cell F4, click the AutoSum button Σ in the Editing group, then click the Enter button ✓ on the formula bar**

5. **Click 🖺 in the Clipboard group, select the range F5:F6, then click the Paste button**

   See **FIGURE B-15**. After you click the Paste button, the **Paste Options button** appears, which you can use to paste only specific elements of the copied selection if you wish. The formula for calculating total expenses for tours in Britain appears in the formula bar. You would like totals to appear in cells F7:F11. The Fill button in the Editing group can be used to copy the formula into the remaining cells.

6. **Select the range F6:F11**

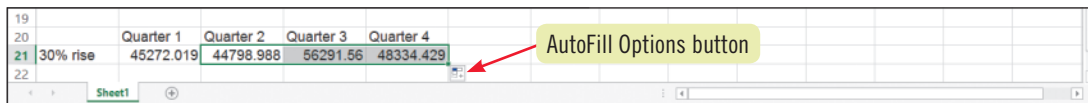7. **Click the Fill button 🖫 in the Editing group, then click Down**

   The formulas containing relative references are copied to each cell. Compare your worksheet to **FIGURE B-16**.
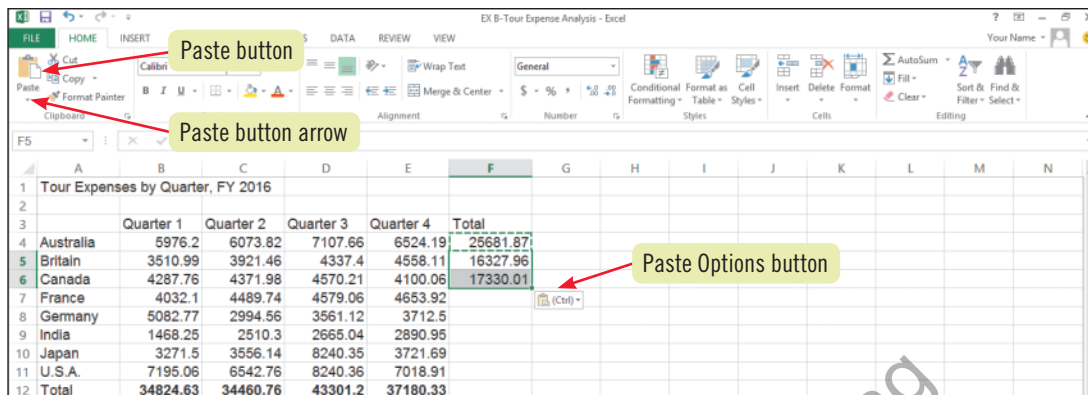
8. **Save your work**

FIGURE B-14: Formula copied using the fill handle

AutoFill Options button

FIGURE B-15: Formulas pasted in the range F5:F6

Paste button

Paste button arrow

Paste Options button

FIGURE B-16: Formula copied using Fill Down

Fill button

Filled cells
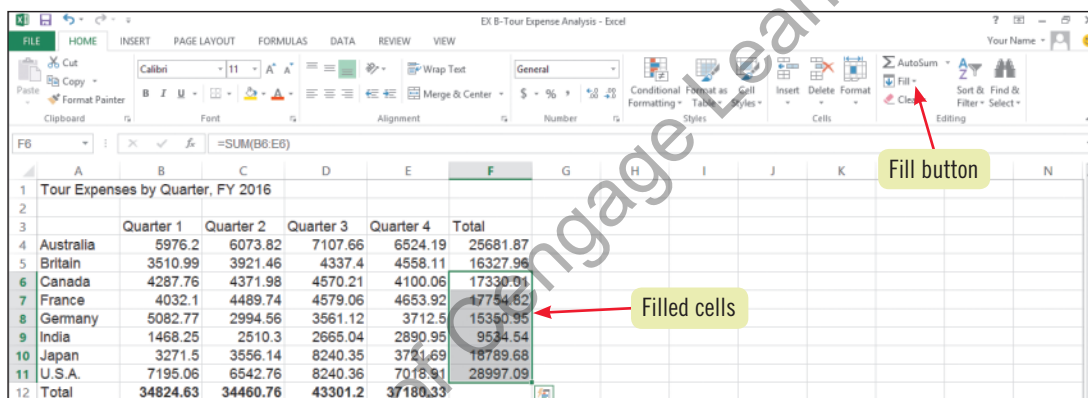
Using Paste Preview

You can selectively copy formulas, values, or other choices using the Paste list arrow, and you can see how the pasted contents will look using the Paste Preview feature. When you click the Paste list arrow, a gallery of paste option icons opens. When you point to an icon, a preview of how the content will be pasted using that option is shown in the worksheet. Options include pasting values only, pasting values with number formatting, pasting formulas only, pasting formatting only, pasting transposed data so that column data appears in rows and row data appears in columns, and pasting with no borders (to remove any borders around pasted cells).

Using Auto Fill options

When you use the fill handle to copy cells, the Auto Fill Options button appears. Auto Fill options differ depending on what you are copying. If you had selected cells containing a series (such as "Monday" and "Tuesday") and then used the fill handle, you would see options for continuing the series (such as "Wednesday" and "Thursday") or for simply pasting the copied cells. Clicking the Auto Fill Options button opens a list that lets you choose from the following options: Copy Cells, Fill Series (if applicable), Fill Formatting Only, Fill Without Formatting, or Flash Fill. Choosing Copy Cells means that the cell's contents and its formatting will be copied. The Fill Formatting Only option copies only the formatting attributes, but not cell contents. The Fill Without Formatting option copies the cell contents, but no formatting attributes. Copy Cells is the default option when using the fill handle to copy a cell, so if you want to copy the cell's contents and its formatting, you can ignore the Auto Fill Options button. The Flash Fill option allows you to create customized fill ranges on the fly, such as 2, 4, 6, 8, 10 by entering at least two values in a pattern: Excel automatically senses the pattern.

Copy Formulas with Absolute Cell References

When copying formulas, you might want one or more cell references in the formula to remain unchanged in relation to the formula. In such an instance, you need to apply an absolute cell reference before copying the formula to preserve the specific cell address when the formula is copied. You create an absolute reference by placing a dollar sign ($) before the column letter and row number of the address (for example, A1). **CASE** ▶ *You need to do some what-if analysis to see how various percentage increases might affect total expenses. You decide to add a column that calculates a possible increase in the total tour expenses, and then change the percentage to see various potential results.*

STEPS

1. **Click cell G1, type Change, then press [Enter]**

2. **Type 1.1, then press [Enter]**
   You store the increase factor that will be used in the what-if analysis in this cell (G2). The value 1.1 can be used to calculate a 10% increase: anything you multiply by 1.1 returns an amount that is 110% of the original amount.

3. **Click cell H3, type What if?, then press [Enter]**

4. **In cell H4, type =, click cell F4, type *, click cell G2, then click the Enter button ✓ on the formula bar**
   The result, 28250.1, appears in cell H4. This value represents the total annual expenses for Australia if there is a 10% increase. You want to perform a what-if analysis for all the tour countries.

5. **Drag the fill handle from cell H4 to cell H11**
   The resulting values in the range H5:H11 are all zeros, which is not the result you wanted. Because you used relative cell addressing in cell H4, the copied formula adjusted so that the formula in cell H5 is =F5*G3. Because there is no value in cell G3, the result is 0, an error. You need to use an absolute reference in the formula to keep the formula from adjusting itself. That way, it will always reference cell G2.

6. **Click cell H4, press [F2] to change to Edit mode, then press [F4]**
   When you press [F2], the range finder outlines the arguments of the equation in blue and red. The insertion point appears next to the G2 cell reference in cell H4. When you press [F4], dollar signs are inserted in the G2 cell reference, making it an absolute reference. See **FIGURE B-17**.

7. **Click ✓, then drag the fill handle from cell H4 to cell H11**
   Because the formula correctly contains an absolute cell reference, the correct values for a 10% increase appear in cells H4:H11. You now want to see what a 20% increase in expenses looks like.

8. **Click cell G2, type 1.2, then click ✓**
   The values in the range H4:H11 change to reflect the 20% increase. Compare your worksheet to **FIGURE B-18**.
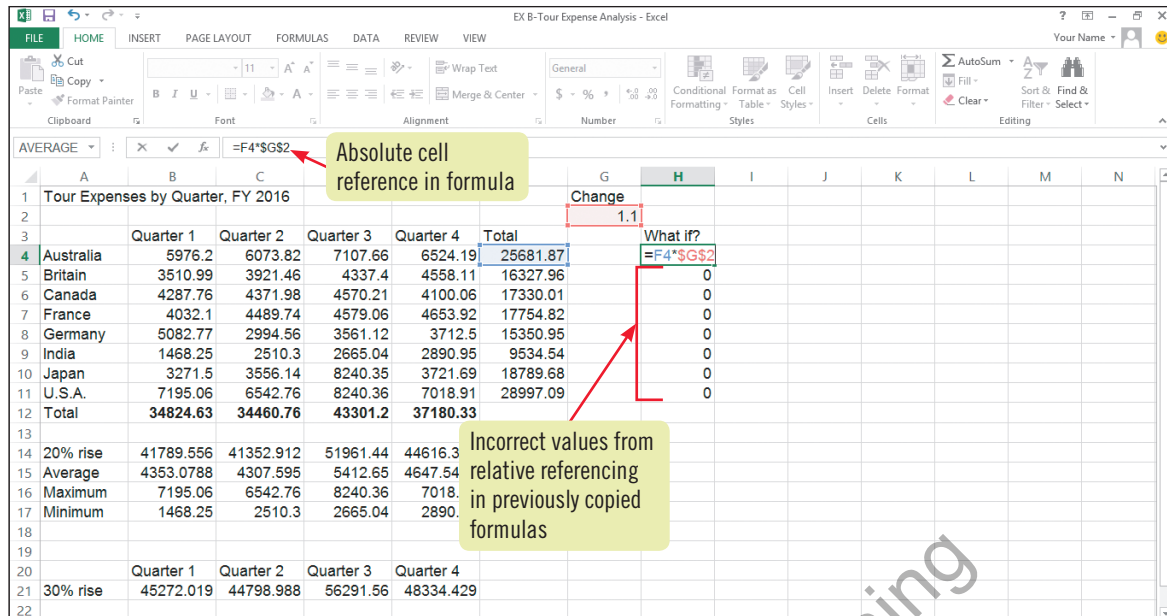
9. **Save your work**

FIGURE B-17: Absolute reference created in formula

Absolute cell reference in formula

Incorrect values from relative referencing in previously copied formulas

FIGURE B-18: What-if analysis with modified change factor

Modified change factor

Excel 2013
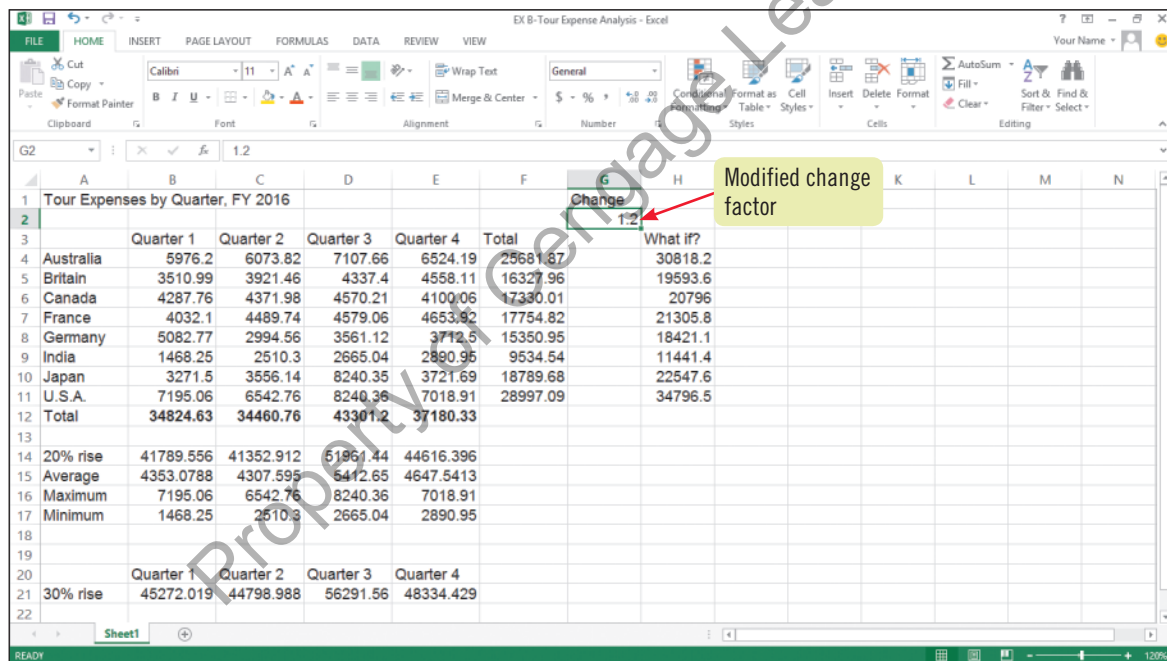
Using the fill handle for sequential text or values

Often, you need to fill cells with sequential text: months of the year, days of the week, years, or text plus a number (Quarter 1, Quarter 2,...). For example, you might want to create a worksheet that calculates data for every month of the year. Using the fill handle, you can quickly and easily create labels for the months of the year just by typing "January" in a cell. Drag the fill handle from the cell containing "January" until you have all the monthly labels you need. You can also easily fill cells with a date sequence by dragging the fill handle on a single cell containing a date. You can fill cells with a number sequence (such as 1, 2, 3,...) by dragging the fill handle on a selection of two or more cells that contain the sequence. To create a number sequence using the value in a single cell, press and hold [Ctrl] as you drag the fill handle of the cell. As you drag the fill handle, Excel automatically extends the existing sequence into the additional cells. (The content of the last filled cell appears in the ScreenTip.) To examine all the fill series options for the current selection, click the Fill button in the Editing group on the HOME tab, then click Series to open the Series dialog box.

Working with Formulas and Functions

Excel 39

Round a Value with a Function

The more you explore features and tools in Excel, the more ways you'll find to simplify your work and convey information more efficiently. For example, cells containing financial data are often easier to read if they contain fewer decimal places than those that appear by default. You can round a value or formula result to a specific number of decimal places by using the ROUND function. **CASE** ▸ *In your worksheet, you'd like to round the cells showing the 20% rise in expenses to show fewer digits; after all, it's not important to show cents in the projections, only whole dollars. You want Excel to round the calculated value to the nearest integer. You decide to edit cell B14 so it includes the ROUND function, and then copy the edited formula into the other formulas in this row.*

STEPS

1. **Click cell B14, then click to the right of = in the formula bar**

   You want to position the function at the beginning of the formula, before any values or arguments.

2. **Type RO**

   Formula AutoComplete displays a list of functions beginning with RO beneath the formula bar.

3. **Double-click ROUND in the functions list**

   The new function and an opening parenthesis are added to the formula, as shown in **FIGURE B-19**. A few additional modifications are needed to complete your edit of the formula. You need to indicate the number of decimal places to which the function should round numbers and you also need to add a closing parenthesis around the set of arguments that comes after the ROUND function.

4. **Press [END], type ,0), then click the Enter button ✓ on the formula bar**

   The comma separates the arguments within the formula, and 0 indicates that you don't want any decimal places to appear in the calculated value. When you complete the edit, the parentheses at either end of the formula briefly become bold, indicating that the formula has the correct number of open and closed parentheses and is balanced.

5. **Drag the fill handle from cell B14 to cell E14**

   The formula in cell B14 is copied to the range C14:E14. All the values are rounded to display no decimal places. Compare your worksheet to **FIGURE B-20**.

6. **Scroll down so row 25 is visible, click cell A25, type your name, then click ✓ on the formula bar**

7. **Save your work, preview the worksheet in Backstage view, then submit your work to your Instructor as directed**

8. **Exit Excel**

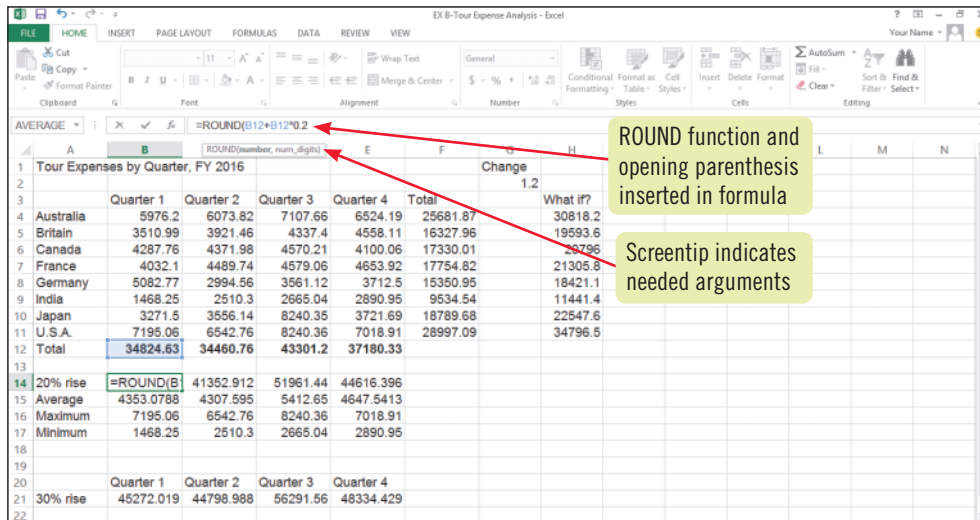FIGURE B-19: ROUND function added to an existing formula

ROUND function and opening parenthesis inserted in formula

Screentip indicates needed arguments

FIGURE B-20: Completed worksheet

Function surrounds existing formula

Calculated values with no decimals
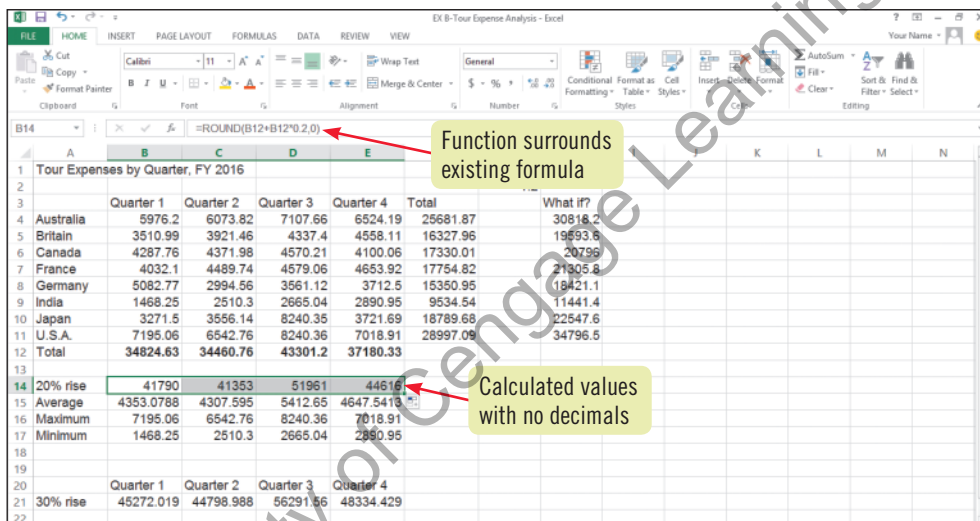
Creating a new workbook using a template

Excel **templates** are predesigned workbook files intended to save time when you create common documents such as balance sheets, budgets, or time cards. Templates contain labels, values, formulas, and formatting, so all you have to do is customize them with your own information. Excel comes with many templates, and you can also create your own or find additional templates on the Web. Unlike a typical workbook, which has the file extension .xlsx, a template has the extension .xltx. To create a workbook using a template, click the FILE tab, then click New on the navigation bar. The New pane in Backstage view lists templates available through Office.com. The Blank workbook template is selected by default and is used to create a blank workbook with no content or special formatting. A preview of the selected template appears in a separate window on top of the New pane. To select a template, click one of the selections in the New pane, then click Create. **FIGURE B-21** shows an Office.com template. (Your list of templates may differ.) When you click Create, a new

workbook is created based on the template; when you save the new file in the default format, it has the regular .xlsx extension. To save a workbook of your own as a template, open the Save As dialog box, click the Save as type list arrow, then change the file type to Excel Template.

FIGURE B-21: EXPENSE TRENDS template selected in Backstage view