10 Using Advanced Formulas

LESSON SKILL MATRIX

Skills	Exam Objective	Objective Number
Using Formulas to Conditionally Summarize Data	Perform logical operations by using the SUMIF function. Perform logical operations by using the COUNTIF function. Perform logical operations by using the AVERAGEIF function.	4.2.2 4.2.4 4.2.3
Adding Conditional Logic Functions to Formulas	Perform logical operations by using the IF function.	4.2.1
Using Formulas to Modify Text	Format text by using RIGHT, LEFT, and MID functions. Format text by using UPPER, LOWER, and PROPER functions. Format text by using the CONCATENATE function.	4.3.1 4.3.2 4.3.3

SOFTWARE ORIENTATION

The Formulas Tab

In this lesson, you use commands on the Formulas tab to create formulas and functions to conditionally summarize data, look up data, apply conditional logic, and modify text. The Formulas tab is shown in Figure 10-1.
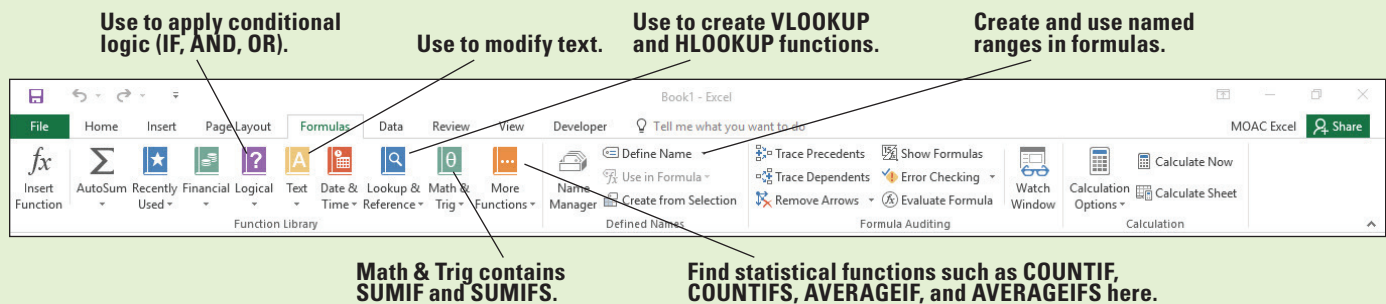

Figure 10-1

The Formulas tab

The Formulas tab contains the command groups you use to create and apply advanced formulas in Excel. Use this illustration as a reference throughout the lesson. Table 10-1 summarizes the functions covered in this lesson and specifies where the functions are located on the Formulas tab.

Table 10-1

Location and description of functions used in this lesson

Function	Category	Syntax	Description
SUMIF	Math & Trig	SUMIF(Range, Criteria, *Sum_range*)	Adds the cells in Range or *Sum_range* specified by a given Criteria.
SUMIFS	Math & Trig	SUMIFS(Sum_range, Criteria_range1, Criteria1, *Criteria_range2, Criteria2, ...*)	Adds the cells in Sum_range that meet multiple Criteria.
COUNTIF	More Functions > Statistical	COUNTIF(Range, Criteria)	Counts the number of cells within Range that meet the Criteria.
COUNTIFS	More Functions > Statistical	COUNTIFS(Criteria_range1, Criteria1, *Criteria_range2, Criteria2, ...*)	Counts the number of cells within multiple Criteria_range# that meet Criteria#.
AVERAGEIF	More Functions > Statistical	AVERAGEIF(Range, Criteria, *Average_range*)	Returns the arithmetic mean of cells in Range or *Average_range* that meet a Criteria.
AVERAGEIFS	More Functions > Statistical	AVERAGEIFS(Average_range, Criteria_range1, Criteria1, *Criteria_range2, Criteria2, ...*)	Returns the mean of cells in Average_range that meet multiple Criteria.
VLOOKUP	Lookup & Reference	VLOOKUP(Lookup_value, Table_array, Col_index_num, *Range_lookup*)	Searches for a value in the first column of Table_array and returns a value in the same row from Col_index_num.
HLOOKUP	Lookup & Reference	HLOOKUP(Lookup_value, Table_array, Row_index_num, *Range_lookup*)	Searches for a value in the top row of Table_array and returns a value in the same column from Row_index_num.
IF	Logical	IF(Logical_test, *Value_if_true, Value_if_false*)	When Logical_test is TRUE, returns *Value_if_true*; otherwise, it returns *Value_if_false*.
AND	Logical	AND(Logical1, *Logical2, ...*)	Returns TRUE if all arguments are TRUE; returns FALSE if any argument is FALSE.
OR	Logical	OR(Logical1, *Logical2, ...*)	Returns TRUE if any argument is TRUE; returns FALSE if all arguments are FALSE.
LEFT	Text	LEFT(Text, *Num_chars*)	Returns the left *Num_chars* from Text.
RIGHT	Text	RIGHT(Text, *Num_chars*)	Returns the right *Num_chars* from Text.
MID	Text	MID(Text, Start_num, Num_chars)	Returns Num_chars from the Text starting at Start_num.
TRIM	Text	TRIM(Text)	Removes spaces at beginning and end of text.
PROPER	Text	PROPER(Text)	Capitalizes the first letter in each word of text.
UPPER	Text	UPPER(Text)	Converts text to uppercase.
LOWER	Text	LOWER(Text)	Converts text to lowercase.
CONCATENATE	Text	CONCATENATE(Text1, *Text2, ...*)	Joins Text1, *Text2, ...*into a single text string.

USING FORMULAS TO CONDITIONALLY SUMMARIZE DATA

As you learned in Lesson 4, "Using Basic Formulas," a formula is an equation that performs calculations—such as addition, subtraction, multiplication, and division—on values in a worksheet. When you enter a formula in a cell, the formula is stored internally and the results are displayed in the cell. Formulas give results and solutions that help you assess and analyze data. As you learned in Lesson 6, "Formatting Cells and Ranges," you can use a conditional format—which changes the appearance of a cell range based on a criterion—to help you analyze data, detect critical issues, identify patterns, and visually explore trends.

Conditional formulas add yet another dimension to data analysis by summarizing data that meets one or more criteria. **Criteria** can be a number, text, or expression that tests which cells to sum, count, or average. A conditional formula is one in which the result is determined by the presence or absence of a particular condition. Conditional formulas used in Excel include the functions SUMIF, COUNTIF, and AVERAGEIF that check for one criterion, or their counterpoints SUMIFS, COUNTIFS, and AVERAGEIFS that check for multiple criteria.

Using SUMIF

The SUMIF function calculates the total of only those cells that meet a given criterion or condition. The syntax for the SUMIF function is SUMIF(Range, Criteria, *Sum_range*). The values that a function uses to perform operations or calculations in a formula are called **arguments**. Thus, the arguments of the SUMIF function are Range, Criteria, and *Sum_range*, which, when used together, create a conditional formula in which only those cells that meet a stated Criteria are added. Cells within the Range that do not meet the criterion are not included in the total. If you use the numbers in the range for the sum, the *Sum_range* argument is not required. However, if you are using the criteria to test which values to sum from a different column, then the range becomes the tested values and the *Sum_range* determines which numbers to total in the same rows as the matching criteria. In this chapter, optional arguments will be in italics.

STEP BY STEP   **Use the SUMIF Function**

Table 10-2 explains the meaning of each argument in the SUMIF syntax. Note that if you omit *Sum_range* from the formula, Excel evaluates and adds the cells in the range if they match the criterion.

Table 10-2

Arguments in the SUMIF syntax

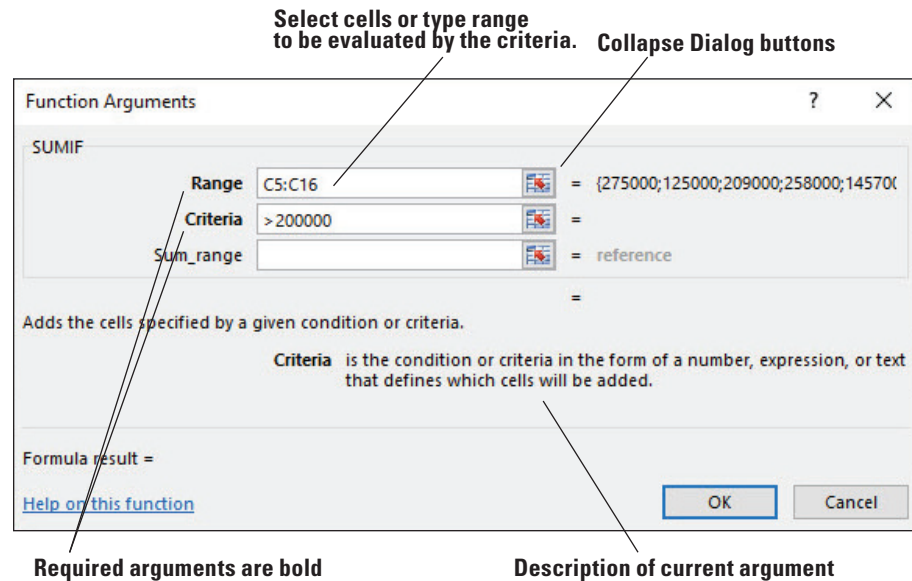| Argument	Explanation
Range	The range of cells that you want the function to evaluate. Also add the matched cells if the *Sum_range* is blank.
Criteria	The condition or criterion in the form of a number, expression, or text entry that defines which cells will be added.
Sum_range	The cells to add if the corresponding row's cells in the Range match the criteria. If this is blank, use the Range for both the cells to add and the cells to evaluate the criteria against.

GET READY. LAUNCH Excel.

1. **OPEN** the *10 Fabrikam Sales* file for this lesson, and **SAVE** it to your Excel Lesson 10 folder as *10 Fabrikam Sales Solution*.
2. Select **H5**. Click the **Formulas** tab and then in the Function Library group, click **Math & Trig**. Scroll to and click **SUMIF**. The *Function Arguments* dialog box opens with text boxes for the arguments, a description of the formula, and a description of each argument.
3. In the *Function Arguments* dialog box, click the **Collapse Dialog** button for the Range argument. This allows you to see more of the worksheet. Select the cell range **C5:C16**. Press **Enter**. By doing this, you apply the cell range that the formula will use in the calculation.

4. In the Criteria box, type **>200000** and then press **Tab**. Figure 10-2 shows that the Sum_ range text box is not bold. This means that this argument is optional. If you leave the Sum_range blank, Excel sums the cells you enter in the Range box. You now applied your criteria to sum all values that are greater than $200,000.

Select cells or type range to be evaluated by the criteria.   Collapse Dialog buttons

Figure 10-2

The Function Arguments dialog box guides you in building functions.

Function Arguments   ?   ✕

SUMIF

Range   C5:C16   ▦   = {275000;125000;209000;258000;145700(

Criteria >200000   ▦   =

Sum_range   ▦   = reference

                                         =

Adds the cells specified by a given condition or criteria.

            Criteria is the condition or criteria in the form of a number, expression, or text
                         that defines which cells will be added.

Formula result =

Help on this function   OK   Cancel

Required arguments are bold   Description of current argument

Take Note   It is not necessary to type dollar signs or commas when entering dollar amounts in the Function Arguments dialog box. If you type them, Excel removes them from the formula and returns an accurate value. The cells in column H where you will enter formulas have already been formatted for the data.

5. Click **OK** to accept the changes and close the dialog box. You see that $1,657,100 of Fabrikam's December revenue came from properties valued in excess of $200,000.

6. If for some reason you need to edit the formula, select the cell that contains the function, and on the Formulas tab, or in the Formula Bar, click the **Insert Function** button to return to the *Function Arguments* dialog box (see Figure 10-3).

Insert Function buttons   Excel adds quotation marks when
                                           it recognizes text or equations.

Figure 10-3

Insert Function buttons allow you to return to the Function Arguments dialog box.
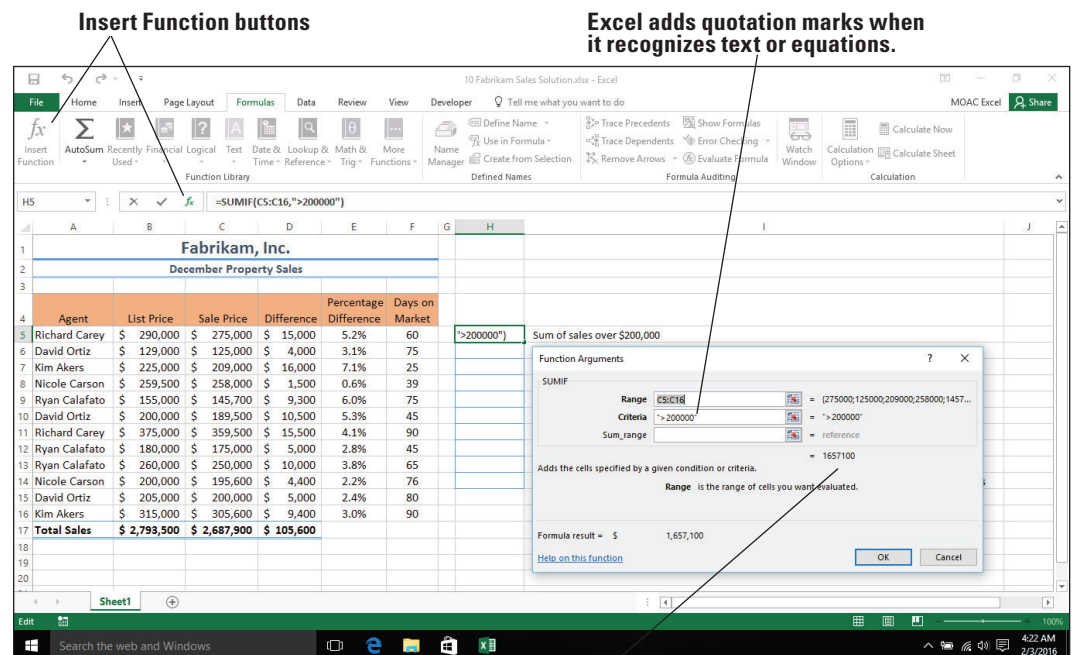
Preview of formula result

Take Note The result of the SUMIF formula in H5 does not include the property value in C15 because the formula specified values greater than $200,000. To include this value, the criterion needs to be >= (greater than or equal to).

7. Click **OK** or press **Esc** if you have no changes.

8. Select cell **H6**, and then in the Function Library group, click **Recently Used** and then click **SUMIF** to once again open the *Function Arguments* dialog box. The insertion point should be in the Range box.

Take Note When you click Recently Used, the last function that you used appears at the top of the list. Similarly, when you click Insert Function, the Insert Function dialog box opens with the last used function highlighted.

9. In the Range field, select cells **E5:E16**. The selected range is automatically entered into the text box. Press **Tab**.

Take Note You do not need to collapse the dialog box as you did in Step 3. You can directly highlight the range if the dialog box is not in the way. Another option is to move the dialog box by dragging the title bar.

10. In the Criteria box, type **<3%** and then press **Tab**. You enter the criteria to look at column E and find values less than 3%.

11. In the Sum_range field, select cells **C5:C16**. The formula in H6 is different than the formula in H5. In H6, the criteria range is different than the sum range. In H5, the criteria range and the sum range are the same. In H6, SUMIF checks for values in column E that are less than 3% (E8 is the first one) and finds the value in the same row and column C (C8 in this case) and adds this to the total. Click **OK** to accept your changes and close the dialog box. Excel returns a value of $1,134,200.

12. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

Using SUMIFS

The SUMIFS function adds cells in a range that meet multiple criteria. It is important to note that the order of arguments in this function is different from the order used with SUMIF. In a SUMIF formula, the *Sum_range* argument is the third argument; in SUMIFS, however, it is the first argument. In this exercise, you create and use two SUMIFS formulas, each of which analyzes data based on two criteria. The first SUMIFS formula adds the selling price of the properties that Fabrikam sold for more than $200,000 and that were on the market 60 days or less. The second formula adds the properties that sold at less than 3% difference from their listed price within 60 days.

STEP BY STEP   **Use the SUMIFS Function**

GET READY. **USE** the workbook from the previous exercise.

1. Click cell **H7**. On the Formulas tab, in the Function Library group, click **Insert Function**.

2. In the Search for a function box, type **SUMIFS** and then click **Go**. SUMIFS is highlighted in the Select a function box.

3. Click **OK** to accept the function.

4. In the *Function Arguments* dialog box, in the Sum_range box, select cells **C5:C16**. This adds your cell range to the argument of the formula.

5. In the Criteria_range1 box, select cells **F5:F16**. In the Criteria1 box, type **<=60**. This specifies that you want to calculate only those values that are less than or equal to 60. When you move to the next text box, notice that Excel places quotation marks around your criteria. It applies these marks to let itself know that this is a criterion and not a calculated value.

6. In the Criteria_range2 box, select cells **C5:C16**. You are now choosing your second cell range.

7. In the Criteria2 box, type **>200000**. Click **OK**. You now applied a second criterion that will calculate values greater than 200,000. Excel calculates your formula, returning a value of $742,000.

8. Select **H8** and then in the Function Library group, click **Recently Used**.

9. Select **SUMIFS**. In the Sum_range box, select **C5:C16**.

10. In the Criteria_range1 box, select cells **F5:F16**. Type **<=60** in the Criteria1 box.

11. In the Criteria_range2 box, select cells **E5:E16**. Type **<3%** in the Criteria2 box and then press **Tab**. To see all arguments, scroll back to the top of the dialog box (see Figure 10-4).

Figure 10-4

The SUMIFS function applies two or more criteria.

Preview indicates total will be 433000.

⚠️ **Troubleshooting** It is a good idea to press Tab after your last entry and preview the result of the function to make sure you entered all arguments correctly.

12. Click **OK**. After applying this formula, Excel returns a value of $433,000.

13. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

The formulas you use in this exercise analyze the data on two criteria. You can continue to add up to 127 criteria on which data can be evaluated.

Because the order of arguments is different in SUMIF and SUMIFS, if you want to copy and edit these similar functions, be sure to put the arguments in the correct order (first, second, third, and so on).

Using COUNTIF

The COUNTIF function counts the number of cells in a given range that meet a specific condition. The syntax for the COUNTIF function is COUNTIF(Range, Criteria). The Range is the

range of cells to be counted by the formula, and the Criteria are the conditions that must be met in order for the cells to be counted. The condition can be a number, expression, or text entry. In this exercise, you practice using the COUNTIF function twice to calculate the number of homes sold and listed >=200,000. The ranges you specify in these COUNTIF formulas are prices of homes. The criterion selects only those homes that are $200,000 or more.

STEP BY STEP   **Use the COUNTIF Function**

GET READY. **USE** the workbook from the previous exercise.

1. Select **H9**. In the Function Library group, click **More Functions**, select **Statistical**, and then click **COUNTIF**.

2. In the *Function Arguments* dialog box, in the Range box, select cells **B5:B16**.

3. In the Criteria box, type **>=200000** and then press **Tab**. Preview the result and then click **OK**. You set your criteria of values greater than or equal to $200,000. Excel returns a value of 9.

4. Select **H10** and then in the Function Library group, click **Recently Used**.

5. Select **COUNTIF**. In the *Functions Arguments* dialog box, in the Range box, select cells **C5:C16**.

6. In the Criteria box, type **>=200000** and then press **Tab**. Preview the result and then click **OK**. Excel returns a value of 7 when the formula is applied to the cell.

7. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

Using COUNTIFS

The COUNTIFS function counts the number of cells within a range that meet multiple criteria. The syntax is COUNTIFS(Criteria_range1, Criteria1, *Criteria_range2*, *Criteria2*, …). You can create up to 127 ranges and criteria. In this exercise, you perform calculations based on multiple criteria for the COUNTIFS formula.

STEP BY STEP   **Use the COUNTIFS Function**

GET READY. **USE** the workbook from the previous exercise.

1. Select **H11**. In the Function Library group, click **Insert Function**.

2. In the Search for a function box, type **COUNTIFS** and then click **Go**. COUNTIFS is highlighted in the Select a function box.

3. Click **OK** to accept the function and close the dialog box.

4. In the *Function Arguments* dialog box, in the Criteria_range1 box, type **F5:F16**. You selected your first range for calculation.

5. In the Criteria1 box, type **>=60** and then press **Tab**. The descriptions and tips for each argument box in the *Function Arguments* dialog box are replaced with the value when you move to the next argument box (see Figure 10-5). The formula result is also displayed, enabling you to review and make corrections if an error message occurs or an unexpected result is returned. You now set your first criterion. Excel shows the calculation up to this step as a value of 8.

Figure 10-5

Arguments and results for
the COUNTIFS function

Preview formula result. Watch this
change as each criterion is added.

6. In the Criteria_range2 box, select cells **E5:E16**. You selected your second range to be
   calculated.
7. In the Criteria2 box, type **>=5%** and then press **Tab** to preview. Click **OK**. Excel returns a
   value of 2.
8. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

A cell in the range you identify in the Function Arguments dialog box is counted only if all of the
corresponding criteria you specified are TRUE for that cell. If a criterion refers to an empty cell,
COUNTIFS treats it as a 0 value.

Take Note   When you create formulas, you can use the wildcard characters, question mark (?) and asterisk (*),
in your criteria. A question mark matches any single character; an asterisk matches any number
of characters. If you want to find an actual question mark or asterisk, type a grave accent (`) pre-
ceding the character.

Using AVERAGEIF

The AVERAGEIF function returns the arithmetic mean of all the cells in a range that meet a given
criteria. The syntax is similar to SUMIF and is AVERAGEIF(Range, Criteria, *Average_range*). In
the AVERAGEIF syntax, Range is the set of cells you want to average. For example, in this exer-
cise, you use the AVERAGEIF function to calculate the average number of days that properties
valued at $200,000 or more were on the market before they were sold. The range in this formula
is B5:B16 (cells that contain the listed value of the homes that were sold). The criterion is the con-
dition against which you want the cells to be evaluated, that is, >=200000. *Average_range* is the
actual set of cells to average—the number of days each home was on the market before it was sold.
As in the SUMIF formula, the last argument, *Average_range*, is optional if the range contains the
cells that both match the criteria and are used for the average. In this exercise, you first find the
average of all cells in a range and then find a conditional average.

Use the AVERAGEIF Function

GET READY. **USE** the workbook from the previous exercise.

1. Select **H12** and then in the Function Library group, click **More Functions**. Select **Statistical** and then click **AVERAGE**.
2. In the Number1 box, type **B5:B16** and then click **OK**. A mathematical average for this range is returned.
3. Select **H13** and then in the Function Library group, click **Insert Function**.
4. Select **AVERAGEIF** from the function list or use the function search box to locate and accept the AVERAGEIF function. The *Function Arguments* dialog box opens.
5. In the *Function Arguments* dialog box, in the Range box, select cells **B5:B16**.
6. In the Criteria box, type **>=200000**.
7. In the Average_range box, select **F5:F16** and then press **Tab** to preview the formula. In the preview, Excel returns a value of 63.33.
8. Click **OK** to close the dialog box.
9. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

Using AVERAGEIFS

An AVERAGEIFS formula returns the average (arithmetic mean) of all cells that meet multiple criteria. The syntax is AVERAGEIFS(Average_range, Criteria_range1, Criteria1, *Criteria_range2*, *Criteria2*, …). You learn to apply the AVERAGEIFS formula in the following exercise to find the average of a set of numbers where two criteria are met.

Use the AVERAGEIFS Function

GET READY. **USE** the workbook from the previous exercise.

1. Click cell **H14**. In the Function Library group, click **Insert Function**.
2. Type **AVERAGEIFS** in the Search for a function box and then click **Go**. AVERAGEIFS is highlighted in the Select a function box.
3. Click **OK** to accept the function and close the dialog box.
4. In the *Function Arguments* dialog box, in the Average_range box, select cells **F5:F16**. Press **Tab**.
5. In the Criteria_range1 box, select cells **B5:B16** and then press **Tab**. You selected your first criteria range.
6. In the Criteria1 box, type **<200000**. You set your first criteria.
7. In the Criteria_range2 box, select cells **E5:E16** and then press **Tab**. You have selected your second criteria range.
8. In the Criteria2 box, type **<=5%** and then press **Tab**. Click **OK**. Excel returns a value of 60.
9. **SAVE** the workbook and then **CLOSE** it.

PAUSE. **LEAVE** Excel open for the next exercise.

You entered only two criteria for the SUMIFS, COUNTIFS, and AVERAGEIFS formulas you created in the previous exercises. However, in large worksheets, you often need to use multiple criteria in order for the formula to return a value that is meaningful for your analysis. You can enter up to 127 conditions that data must match in order for a cell to be included in the conditional summary that results from a SUMIFS, COUNTIFS, or AVERAGEIFS formula.

The following statements summarize how values are treated when you enter an AVERAGEIF or AVERAGEIFS formula:

- If Average_range is omitted from the function arguments, the range is used.
- If a cell in Average_range is an empty cell, AVERAGEIF ignores it.
- If the entire range is blank or contains text values, AVERAGEIF returns the #DIV/0! error value.
- If no cells in the range meet the criteria, AVERAGEIF returns the #DIV/0! error value.

USING FORMULAS TO LOOK UP DATA IN A WORKBOOK

When worksheets contain long and sometimes cumbersome lists of data, you need a way to quickly find specific information within these lists. This is where Excel's lookup functions come in handy. **Lookup functions** are an efficient way to search for and insert a value in a cell when the desired value is stored elsewhere in the worksheet or even in a different worksheet or workbook. VLOOKUP and HLOOKUP are the two lookup functions that you use in this section. These functions can return the contents of the found cell. As you work through the following exercises, note that the term **table** refers to a range of cells in a worksheet that can be used by a lookup function.

Using VLOOKUP

The "V" in VLOOKUP stands for vertical. This formula is used when the comparison value is in the first column of a table. Excel goes down the first column until a match is found and then looks in one of the columns to the right to find the value in the same row. The VLOOKUP function syntax is LOOKUP(Lookup_value, Table_array, Col_index_num, *Range_lookup*). See Figure 10-6 for a graphical explanation of the function.

Figure 10-6

Vertical lookup (VLOOKUP)
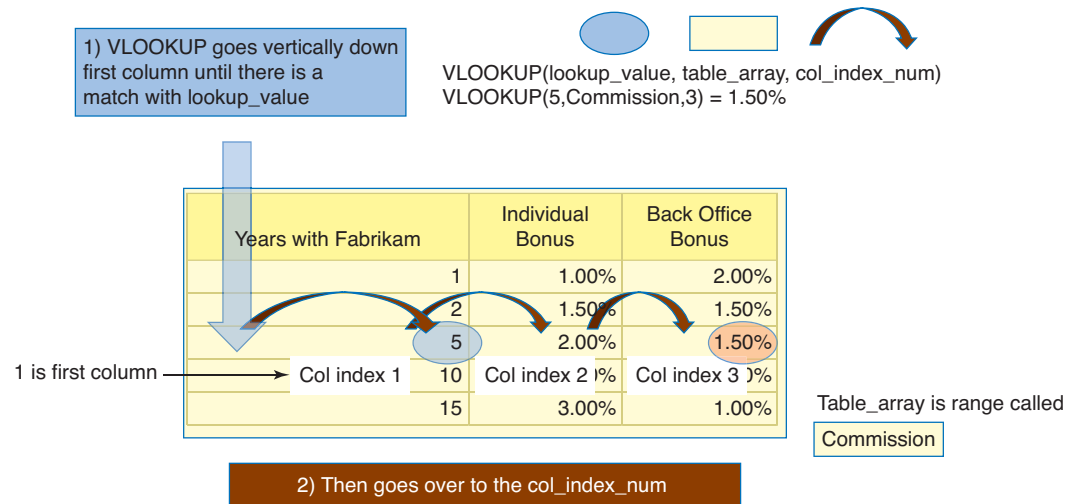
Table_array is a table of text, numbers, or values that you use for the formula. It can either be a range of cells (A1:D5) or a range name (Commission). The data in a **table array** must be arranged in rows and columns. In the next exercise, you apply this formula to calculate employee bonuses. When working with VLOOKUP functions and arguments, there are several key points to keep in mind:

- If Lookup_value is smaller than the smallest value in the first column of Table_array, VLOOKUP returns the #N/A error value.
- Table_array values can be text, numbers, or logical values. Uppercase and lowercase text is equivalent.
- The values in the first column of the Table_array selection must be placed in ascending sort order; otherwise, VLOOKUP might not give the correct value. The lookup table you use in this exercise lists years of service in ascending order.
- *Range_lookup* is an optional fourth argument not shown in Figure 10-6.
- If the *Range_lookup* argument is TRUE or omitted, an exact or approximate match is returned. If VLOOKUP cannot find an exact match, it returns the next largest value that is less than the value you specified in Lookup_value.
- If *Range_lookup* is FALSE, VLOOKUP finds only an exact match. If an exact match is not found, the error value #N/A is returned.

Take Note Range names or cell references used in VLOOKUP or HLOOKUP are not case sensitive, so you can type them in uppercase, lowercase, or any combination of uppercase and lowercase characters. Also, the VLOOKUP and HLOOKUP function names are not case sensitive.

STEP BY STEP **Use the VLOOKUP Function**

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

1. OPEN the *10 Fabrikam Bonus* file for this lesson. SAVE the workbook in the Excel Lesson 10 folder as *10 Fabrikam Bonus Solution*.
2. With the Performance sheet active, select cells **A15:C20** in the worksheet. Click the **Formulas** tab, and then in the Defined Names group, click **Define Name**. The *New Name* dialog box opens.
3. In the *New Name* dialog box, in the Name box, type **Bonus**. Click **OK** to close the dialog box. You defined the range name.
4. Click cell **E5**, and then in the Function Library group, click **Lookup & Reference** and select **VLOOKUP**.
5. In the Lookup_value text box, type **B5** and then press **Tab**. The insertion point moves to the Table_array box.
6. In the Defined Names group of the Formulas tab, click **Use in Formula** and then select **Bonus**. Press **Tab**. The insertion point moves to the next text box.
7. In the Col_index_num box, type **2**, which is the column containing the individual bonus amounts. Press **Tab**.
8. In the Range_lookup box, type **True**, which means that VLOOKUP can check for the nearest value that does not go over the number in the first column; the same bonus is paid for a range of years, so you enter **True** in the Range_lookup box so that a value will be returned for all agents. The *Function Arguments* dialog box should look similar to the one shown in Figure 10-7. Click **OK**. Excel returns a value of 2.5%.

Lookup_value is B5 (which is 12).

Figure 10-7

VLOOKUP Function
Arguments dialog box

**Look in Table_array
called Bonus.**

**Find in column number 2; value is in same
row as 10 (closest without going over 12).**

9. Using the fill handle in cell E5, copy the formula to the range **E6:E11**. This calculates
   bonus rates for the other sales agents. The #N/A error message appears in cell E11
   because a value is not available for agents who have been employed for less than one
   year. (Agents become eligible for a bonus only after a full year of service.)

10. Click in cell **F5** and type **=VLOOKUP(B5,Bonus,3)**. Notice that the ScreenTip gives you
    information and help as you go. This looks up values in the third column of the Bonus
    range. Press **Enter**.

11. Copy the formula from **F5** to the range **F6:F11**.

12. **SAVE** the workbook.

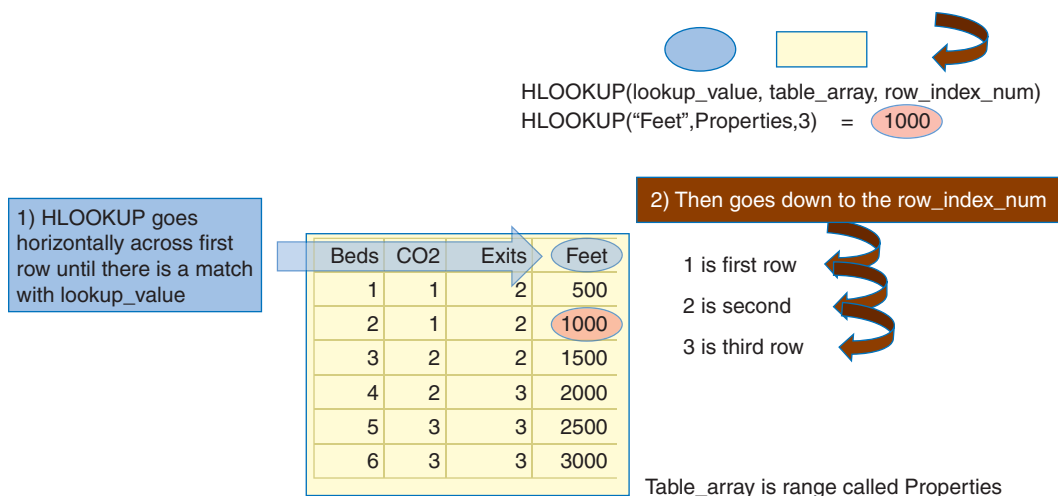**PAUSE**. **LEAVE** the workbook open for the next exercise.

Take Note Entering True as the Range_lookup argument returns the closest value. False returns only an
exact value. If you omit the Range_lookup argument, as in Step 10 in the previous exercise, Excel
assigns the True argument when you click OK (though it does not appear in the formula).

Using HLOOKUP

The "H" in HLOOKUP stands for horizontal. HLOOKUP searches horizontally for a value in
the top row of a table or an array and then returns a value in the same column from a row you
specify in the table or array. Use HLOOKUP when the comparison values are located in a row
across the top of a table of data and you want to look in a specified row (see Figure 10-8). In the
following exercise, you use an HLOOKUP formula to search standards for a house.

Figure 10-8

Horizontal lookup (HLOOKUP)

HLOOKUP(lookup_value, table_array, row_index_num)
HLOOKUP("Feet",Properties,3) = 1000

1) HLOOKUP goes horizontally across first row until there is a match with lookup_value

2) Then goes down to the row_index_num

Beds	CO2	Exits	Feet
1	1	2	500
2	1	2	1000
3	2	2	1500
4	2	3	2000
5	3	3	2500
6	3	3	3000

1 is first row

2 is second

3 is third row

Table_array is range called Properties

STEP BY STEP   **Use the HLOOKUP Function**

GET READY. **USE** the workbook from the previous exercise.

1. Click on the **Standards** worksheet tab to move to the Standards worksheet.
2. Click cell **F11**, and then in the Function Library group, click **Lookup & Reference** and select **HLOOKUP**.
3. In the Lookup_value text box, type **E11**. This is the cell you will change and the box previews to Feet because that is what is currently typed in cell E11.
4. In the Table_array text box, type **A1:D7**. This will be the range of cells you will look in.
5. In the Row_index_num text box, type **D11+1**. This currently evaluates to 3. If you refer to the number of beds in D11, you don't come down enough rows because of the labels in the first row of the Table_array. The number of beds is actually one row more than the number of beds because the labels (Beds, CO2, Exits, and Feet) count as the first row and row 2 is for 1 bed.
6. In the Range_lookup text box, type **FALSE** because you want an exact match. Click **OK**. In the following steps, you will change the values in D11 and E11 and see what happens when there are different values and when there is not an exact match.
7. In cell D11, type **5** and notice that the result in F11 changes to 2500.
8. In cell E11, type **CO2** and notice that the result changes to the result for the CO2 column for 5 beds, which is 3.
9. Click cell **D11** and then type **7**. Notice that you get a #REF! error because the table only goes up to five beds.
10. In cell D11, type **1**. Cell F11 displays a result of 1.
11. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

It might be difficult to remember the syntax for an HLOOKUP or VLOOKUP function. You can always use the Function Arguments dialog box to help you remember the order of the arguments for any and all functions. When you click in each field, review the tips that appear on the right side of each box, as well as the explanation below the argument boxes that tells the purpose of each argument in the function.

ADDING CONDITIONAL LOGIC FUNCTIONS TO FORMULAS

You can use the AND and OR functions to create **conditional formulas** that result in a logical value, that is, TRUE or FALSE. Such formulas test whether a series of conditions evaluate to TRUE or FALSE. In addition, you can use the IF conditional formula that checks if a calculation evaluates as TRUE or FALSE. You can then tell IF to return one value (text, number, or logical value) if the calculation is TRUE or a different value if it is FALSE.

Using IF

The result of a conditional formula is determined by the state of a specific condition or the answer to a logical question. An IF function sets up a conditional statement to test data. An IF formula returns one value if the condition you specify is true and another value if it is false. The IF function requires the following syntax: IF(Logical_test, *Value_if_true, Value_if_false*). In this exercise, you use an IF function to determine who achieved his goal and is eligible for the performance bonus.

STEP BY STEP   **Use the IF Function**

GET READY. USE the workbook from the previous exercise.

1. Click the **Performance** worksheet tab to make it the active worksheet.

2. Click cell **G5**. In the Function Library group, click **Logical** and then click **IF**. The *Function Arguments* dialog box opens.

3. In the Logical_test box, type **D5>=C5**. This component of the formula determines whether the agent has met his or her sales goal.

4. In the Value_if_true box, type **Yes**. This is the value returned if the agent met his or her goal.

5. In the Value_if_false box, type **No** and then click **OK**.

6. With G5 still selected, use the fill handle to copy the formula to **G6:G12**. Excel returns the result that three agents earned the performance award by displaying Yes in the cells.

Take Note   The entire company is evaluated on making the goal, and bonuses are awarded to the back office staff if the company goal is met. The result in G12 will be used for the formulas in column I. When you copy, the formatting is included.

7. Click the **Auto Fill Options** button in the lower-right corner of the range and choose **Fill Without Formatting**. See Figure 10-9.

IF function in the Formula Bar

Figure 10-9

Using the IF function

	A	B	C	D	E	F	G	H	I	J
				fx	=IF(D5>=C5,"Yes","No")					
1				Fabrikam, Inc.						
2				Standard and Performance Bonus						
3										
4	Agent	Years with Fabrikam	Sales Goal*	Actual Sales	Individual Bonus Rate	Back Office Bonus Rate	Goal Achieved	Agent Bonus	Back Office Bonus	Inc In Back Office
5	Carey, Richard	12	$ 3,375,000	$ 3,200,000	2.50%	1.00%	No			
6	Ortiz, David	12	$ 3,375,000	$ 3,500,000	2.50%	1.00%	Yes			
7	Calafato, Ryan	10	$ 2,875,000	$ 2,700,000	2.50%	1.00%	No			
8	Akers, Kim	5	$ 2,500,000	$ 2,600,000	2.00%	1.50%	Yes			
9	Carson, Nicole	4	$ 1,500,000	$ 1,224,000	1.50%	1.50%	No			
10	Moschell, Linda	1	$ 800,000	$ 925,000	1.00%	2.00%	Yes			
11	Nash, Michael	0.5	$ 300,000	$ 220,000	#N/A	#N/A	No			
12	Totals		$ 14,725,000	$ 14,369,000			No	$ -	$ -	

8. In cell H5, type **=IF(G5="Yes",E5*D5,0**. Before you complete the formula, notice the ScreenTip, the cells selected, and the colors. Move the mouse pointer to each of the

arguments and they become a hyperlink. E5 is the individual bonus rate and D5 is the actual sales. The bonus is the rate times the sales.

9. Press **Enter** to complete the formula.

Take Note   In some cases, Excel completes the formula. In Step 8, the closing parenthesis was not added, and Excel was able to complete the formula.

10. Click cell **H5** and use the fill handle to copy the formula to **H6:H11**.

11. In **I5**, type **=IF(G12="Yes",F5*D5,0)** and then press **Enter**.

12. Use the fill handle in I5 to copy the formula to **I6:I11**. Notice that Richard Carey, the Senior Partner, did not receive an Agent Bonus and there was no bonus for Back Office.

13. The final pending sale of $700,000 of the year came through. In D5, type **$3,900,000**. Notice that H5 and the amounts in column I go from 0 to bonuses (see Figure 10-10).

Figure 10-10

Bonuses change by adding sales to D5.

	Agent	Years with Fabrikam	Sales Goal*	Actual Sales	Individual Bonus Rate	Back Office Bonus Rate	Goal Achieved	Agent Bonus	Back Office Bonus	Inc In Back Office
					Fabrikam, Inc.					
					Standard and Performance Bonus					
5	Carey, Richard	12	$ 3,375,000	$ 3,900,000	2.50%	1.00%	Yes	$ 97,500	$ 39,000	
6	Ortiz, David	12	$ 3,375,000	$ 3,500,000	2.50%	1.00%	Yes	$ 87,500	$ 35,000	
7	Calafato, Ryan	10	$ 2,875,000	$ 2,700,000	2.50%	1.00%	No	$ -	$ 27,000	
8	Akers, Kim	5	$ 2,500,000	$ 2,600,000	2.00%	1.50%	Yes	$ 52,000	$ 39,000	
9	Carson, Nicole	4	$ 1,500,000	$ 1,224,000	1.50%	1.50%	No	$ -	$ 18,360	
10	Moschell, Linda	1	$ 800,000	$ 925,000	1.00%	2.00%	Yes	$ 9,250	$ 18,500	
11	Nash, Michael	0.5	$ 300,000	$ 220,000	#N/A	#N/A	No	$ -	#N/A	
12	Totals			$ 14,725,000	$ 15,069,000			Yes	$ 246,250	#N/A	

	Years with Fabrikam	Individual Bonus	Back Office Bonus
16	1	1.00%	2.00%
17	2	1.50%	1.50%
18	5	2.00%	1.50%
19	10	2.50%	1.00%
20	15	3.00%	1.00%

Actual Sales now exceed the Sales Goal.   **G12 now displays Yes.**

14. **SAVE** the workbook.

PAUSE. LEAVE the workbook open for the next exercise.

Using AND

The AND function returns TRUE if all its arguments are true, and FALSE if one or more arguments are false. The Syntax is AND(Logical1, *Logical2*, …). In this exercise, you use the AND function to determine whether Fabrikam's total annual sales met the strategic goal and whether the sales goal exceeded the previous year's sales by 5 percent.

**STEP BY STEP**   **Use the AND Function**

GET READY. USE the workbook from the previous exercise.

1. Click the **Annual Sales** worksheet tab. Click the **Formulas** tab if necessary.

2. Click cell **B6**. In the Function Library group, click **Logical** and then click the **AND** option. The *Function Arguments* dialog box opens with the insertion point in the Logical1 box.

3. Click cell **B16**, type **>=**, select cell **B3**, and then press **Enter**. This argument represents the first condition: Did actual sales equal or exceed the sales goal? Because this is the first year, only one logical test is entered.

4. Select cell **C6**, click the **Recently Used** button, and then click **AND**. In the Logical1 box, type **C16>=C3**. This is the same as the condition in Step 3 (sales exceed or equals sales goal).

5. In the Logical2 box, type **C16>=B16*1.05** and then press **Tab**. The preview of the formula returns TRUE, which means that both conditions in the formula have been met. See Figure 10-11.

Formula description

Figure 10-11

AND function arguments

Result to be returned
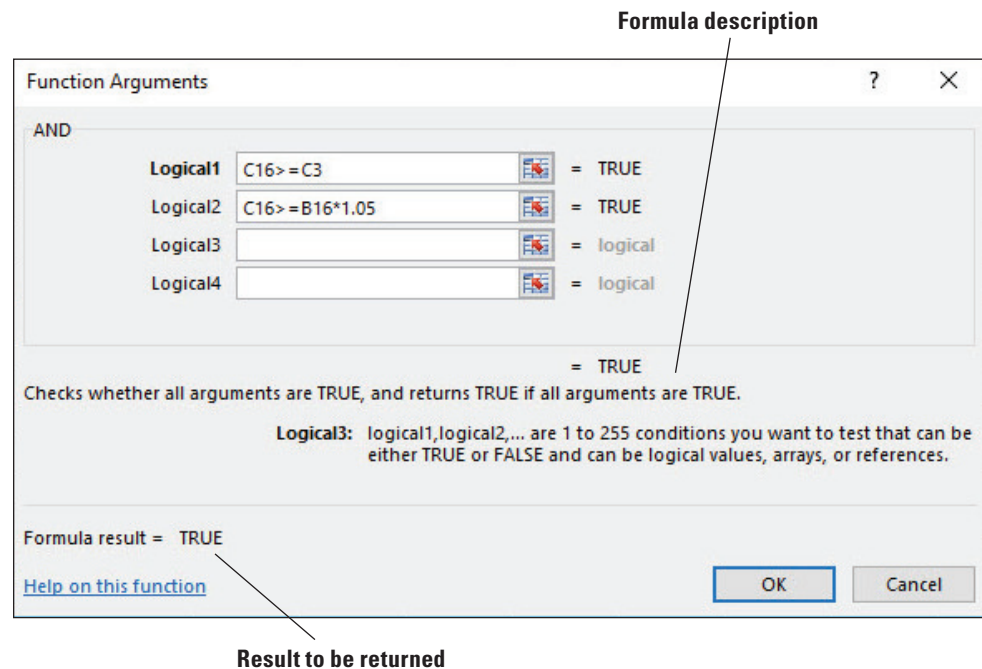
6. Click **OK** to complete the formula.
7. Select cell **C6** and copy the formula to **D6:F6**.
8. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

Again, the AND function returns a TRUE result only when both conditions in the formula are met. For example, consider the results you achieved in the preceding exercise. Sales in the second year exceeded sales for the previous year; therefore, the first condition is met. Year 2 sales also exceeded Year 1 sales by 5 percent. Because both conditions are met, the formula returns a TRUE result.

Now consider the arguments for the logical tests for Year 3 (the formula in D6). Sales did not exceed the sales goal; therefore, the first argument returns a FALSE value. However, sales did exceed the previous year's sales by 5 percent. When only one condition is met, the formula returns FALSE.

Using OR

Although all arguments in an AND function have to be true for the function to return a TRUE value, only one of the arguments in the OR function has to be true for the function to return a TRUE value. The syntax for an OR function is similar to that for an AND function. With this function, the arguments must evaluate to logical values such as TRUE or FALSE or references that contain logical values. In this exercise, you create a formula that evaluates whether sales agents are eligible for the back office bonus when they are new or when they did not get the sales bonus (less than 4 years with the company or did not get the agent bonus). The OR formula returns TRUE if either of the conditions are true.

Use the OR Function

GET READY. **USE** the workbook from the previous exercise.

1. Click on the **Performance** worksheet tab to activate this worksheet. Select **J5** and in the Function Library group, click **Logical**.

2. Click **OR**. The *Function Arguments* dialog box opens. You create a formula that answers the following question: Has Richard Carey worked with the company for less than 4 years?

3. In the Logical1 box, type **B5<4** and then press **Tab**.

4. In the Logical2 box, type **G5="No"** and then press **Tab**. This argument answers the second question: Did Richard Carey not achieve the sales goal? Each of the arguments evaluates to FALSE and so the entire function evaluates to FALSE.

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

6. Select cell **J5** and copy the formula to **J6** through **J11**.

7. Cell J7 is the first in the column that returns a TRUE value. To see each of the arguments, click cell **J7** and then click the **Insert Function** button and you return to the *Function Arguments* dialog box (see Figure 10-12).

Logical1 (B7<4) evaluates to FALSE.   Logical2 (G7="No") evaluates to TRUE.

Figure 10-12

OR function arguments

So, entire function evaluates to TRUE.
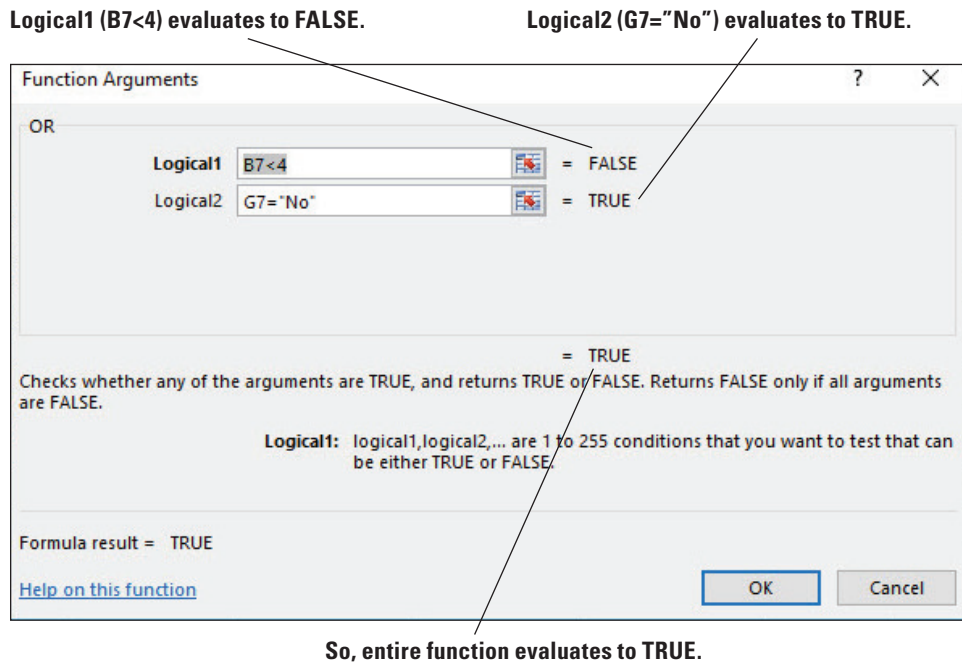
8. Click **OK** to close the dialog box and return to the workbook.

9. **SAVE** the workbook and then **CLOSE** it.

Take Note   As you add arguments, the Logical fields in the Function Arguments dialog box expand to allow you to enter multiple arguments.

PAUSE. **LEAVE** Excel open for the next exercise.

USING FORMULAS TO MODIFY TEXT

When you get files from other people or programs, you often have to manipulate the data before you can begin using it. For example, sometimes you receive files in a text format with commas separating what should go in columns. The text is often not in the format that you need to use in Excel. Some text can be combined into one long string or other text can be all in lowercase or uppercase.

You might be familiar with Microsoft Word's Change Case command that enables you to change the capitalization of text. Similarly, in Excel, you can use the PROPER, UPPER, and LOWER functions to capitalize the first letter in each word of a text string or to convert all characters in a text string to uppercase or lowercase. This section presents you with a text file from the alarm company. There is a lot of useful information in the file, but it is coded for the alarm system rather than for use in a spreadsheet. The company's president has asked you to keep the file confidential because it contains the codes for each employee, but he has also asked you to use your Excel knowledge to convert the information into a usable format.

Converting Text to Columns

You can use the Convert Text to Columns Wizard to separate simple cell content, such as first names and last names, into different columns. Depending on how your data is organized, you can split the cell contents based on a delimiter (divider or separator), such as a space or a comma, or based on a specific column break location within your data. In the following exercise, you convert the data in column A to two columns.

STEP BY STEP   **Convert Text to Columns**

GET READY. LAUNCH Excel if necessary.

1. **OPEN** the **10 Fabrikam Alarm Codes** workbook and then **SAVE** it to your Excel Lesson 10 folder as **10 Fabrikam Alarm Codes Solution**. Figure 10-13 shows what the file looks like before you convert the rows to columns and Figure 10-14 shows the same data after the conversion.

Comma-delimited data will convert into separate columns.

Figure 10-13

10 Fabrikam Alarm Codes original file

File is difficult to read.

2. Select cells **A2:A8**. Click the **Data** tab and then in the Data Tools group, click **Text to Columns**.
3. The Convert Text to Columns Wizard opens with Delimited selected as the default, because Excel recognizes that the data in the selected range is separated with commas. Click **Next** to move to the next step in the wizard.
4. Select **Comma** as the delimiter. If other delimiters are checked, deselect them.
5. Click **Next** and then click **Finish**.
6. Data is separated into seven columns. To help identify the columns, type the text shown in row 1 of Figure 10-14. Apply the **Heading 3** style to the range **A1:O1** (you will add data to columns H:O in later exercises). Increase the widths of columns **A:G** as necessary so you can see the cell contents.

Type and format column headers.   **Resize columns to fit the data.**

Figure 10-14

Text is converted to columns.

	A	B	C	D	E	F	G
1	ExtCodeEmpID	SpFirst	SpLast	Hire Date	Alarm	OCode1	OCode2
2	425oonp15210	david	ortiz	37291	lAaksdjbfl;akjsdfljkafapr	0000000000	O00000O00O
3	327sanp49612	kim	akers	39868	ljksAbdflb;jkasfmar	OOO00000O0O	000000O000
4	329sap151276	linda	moschell	41301	coiubasdfAjlkeaug	O00000O00O	00000000O0
5	330psp047373	michael	nash	41530	ozixcjAuadlbfkjedec	0000000000	00000000O0
6	328sanp37624	nicole	carson	40241	lkbbueoAiajdckljul	0000000000	00000000O0
7	424oonp77612	richard	carey	37367	Alajsdfljkasbdfjan	OOO00000O0O	000000O000
8	426esnp56690	ryan	calafato	38050	l;Ajdkfalsd;jkbmay	0000000000	O00000O00O

7. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

Using LEFT

The LEFT function evaluates a string and takes any number of characters on the left side of the string. The format of the function is LEFT(Text, *Num_chars*). The first string in the Alarm Data workbook contains the employee's phone extension and floor number, which you extract by using the LEFT function.

Use the LEFT Function

GET READY. **USE** the workbook from the previous exercise.

1. Click cell **H1**, type **Ext**, and then in **I1**, type **Floor** to label the columns.
2. Select cell **H2**.
3. Click the **Formulas** tab. In the Function Library group, click **Text** and choose **LEFT**. The *Function Arguments* dialog box opens.
4. In the Text box, click **A2** and then press **Tab**.
5. In the Num_chars box, type **3** and then press **Tab**. The preview of the result shows *425*.
6. Click **OK** and double-click on the fill handle in the lower-right corner of cell H2 to **copy** the formula in H2 to **H3:H8**.
7. Select cell **I2**, click the **Recently Used** button, and then select **LEFT**.
8. In the Text box, type **A2**, press **Tab**, and then in the Num_chars box, type **1**. Click **OK**.
9. Copy the formula in I2 to **I3:I8**.
10. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

Take Note   You can see the results of this and the following exercises in Figure 10-15, later in the lesson.

Using RIGHT

The RIGHT function is almost identical to the LEFT function except that the function returns the number of characters on the right side of the text string. In the Alarm codes file, the first converted column contains the five-digit employee ID at the end, and the Alarm code in column E contains the employee's birth month.

Use the RIGHT Function

GET READY. **USE** the workbook from the previous exercise.

   1. Click cell **J1** and then type **Birthday**. In cell K1, type **EmpID** to label the columns.
   2. Select cell **J2**.
   3. Click the **Formulas** tab and then in the Function Library group, click **Text** and choose **RIGHT**. The *Function Arguments* dialog box opens.
   4. In the Text box, click **E2** and then press **Tab**.
   5. In the Num_chars box, type **3** and then press **Tab**. The preview of the result shows *apr*.
   6. Click **OK** and copy the formula in J2 to **J3:J8**.
   7. Select cell **K2**, type **=RIGHT(A2,5)**, and then press **Enter**.
   8. Copy the formula in K2 to **K3:K8**.
   9. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

Using MID

Whereas LEFT and RIGHT return the number of the characters on either side of a text string, MID returns characters in the middle. For this reason, your arguments need to include the Text string and then a starting point (Start_num) and number of characters (Num_chars). In the first column of the Alarm file, there are codes indicating two different categories of employees.

Use the Mid Function

GET READY. **USE** the workbook from the previous exercise.

   1. Click cell **L1**, type **empcat1**, and then in cell M1, type **empcat2** to label the columns.
   2. Select cell **L2**.
   3. Click the **Formulas** tab and then in the Function Library group, click **Text** and choose **MID**. The *Function Arguments* dialog box opens.
   4. In the Text box, click **A2** and then press **Tab**.
   5. The starting point of the empcat1 value is the fourth character of (425oonp15210), so type a **4** in the Start_num text box.
   6. In the Num_chars box, type **2**. The preview of the result shows *oo*.
   7. Click **OK** and copy the formula in L2 to **L3:L8**.
   8. Select cell **M2**, type **=MID(A2,6,2)**, and then press **Enter**.
   9. Copy the formula in M2 to **M3:M8**.
  10. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

Using TRIM

Sometimes there are extra spaces in a cell—either at the end or the beginning of the string, especially after converting a text file like the Alarm file—see the SPFirst and SPLast columns. The TRIM function removes characters at both ends of the string. There is only one argument: Text. Thus the syntax of the function is TRIM(Text).

Use the TRIM Function

GET READY. **USE** the workbook from the previous exercise.

1. Click cell **N1**, type **first**, and then in cell O1, type **last** to label the columns.
2. Click cell **N2**.
3. Click the **Formulas** tab and then in the Function Library group, click **Text** and choose **TRIM**. The *Function Arguments* dialog box opens.
4. In the Text box, click **B2**. If you look closely, you see that the original value of cell B2 is "david" with a space before the first name.
5. Click **OK** and copy the formula in N2 to **N3:N8**.
6. Select cell **O2**, type **=TRIM(C2)**, and then press **Enter**.
7. Copy the formula in O2 to **O3:O8**.
8. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

Using PROPER

The PROPER function capitalizes the first letter in a text string and any other letters in text that follow any character other than a letter. All other letters are converted to lowercase. In the PROPER(Text) syntax, Text can be text enclosed in quotation marks, a formula that returns text, or a reference to a cell containing the text you want to capitalize. In this exercise, you use PROPER to change lowercase text to initial capitals.

Use the PROPER Function

GET READY. **USE** the workbook from the previous exercise.

1. Click cell **A11** and type **First**. In cell B11, type **Last**, and then in cell C11, type **Birthday** to label the columns. Apply the **Heading 3** cell style to these cells.
2. Click cell **A12**.
3. Click the **Formulas** tab and then in the Function Library group, click **Text** and choose **PROPER**. The *Function Arguments* dialog box opens.
4. In the Text box, click **N2**. You see that *david* is converted to *David*.
5. Click **OK** and copy the formula in A12 to cells **A12:B18** (both First and Last columns).
6. Select cell **C12**, type **=PROPER(J2)**, and then press **Enter**.
7. Copy the formula in C12 to **C13:C18**.
8. **SAVE** the workbook and then CLOSE the file.

PAUSE. **LEAVE** Excel open for the next exercise.

Take Note   The PROPER function capitalizes the first letter in each word in a text string. All other letters are converted to lowercase. If you have an apostrophe within the text, such as David's, Excel recognizes the apostrophe as a break and capitalizes the result as David'S.

Using UPPER

The UPPER function allows you to convert text to uppercase (all capital letters). The syntax is UPPER(Text), with Text referring to the text you want converted to uppercase. Text can be a reference or a text string. In this exercise, you convert the employee category (empcat1 and empcat2) to uppercase.

Use the UPPER Function

GET READY. Open THE *10 Fabrikam Alarm Codes 2* WORKBOOK.

1. **SAVE** the workbook as *10 Fabrikam Alarm Codes Solution 2*.
2. Click cell **D11**, type **EmpCat1**, and then in cell E11, type **EmpCat2** to label the columns.
3. Click cell **D12**.
4. Click the **Formulas** tab and then in the Function Library group, click **Text** and choose **UPPER**. The *Function Arguments* dialog box opens.
5. In the Text box, click **L2**. You see that *oo* is converted to *OO*.
6. Click **OK** and copy the formula in D12 to **D12:E18** (both EmpCat1 and EmpCat2 columns).
7. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

Using LOWER

The LOWER function converts all uppercase letters in a text string to lowercase. LOWER does not change characters in text that are not letters. You use the LOWER function in the following exercise to apply lowercase text in order to more easily tell an O (letter O) from a 0 (zero).

Use the LOWER Function

GET READY. USE the workbook from the previous exercise.

1. Click cell **F11** and type **oCode1**. In cell G11, type **oCode2** to label the columns.
2. Click cell **F12**.
3. Click the **Formulas** tab and then in the Function Library group, click **Text** and choose **LOWER**. The *Function Arguments* dialog box opens.
4. In the Text box, click **F2**. You see that *00O0O0O000* is converted to *00o0o0o000*.
5. Click **OK** and copy the formula in F12 from cell **F12** through **G18** (both oCode1 and oCode2 columns).
6. **SAVE** the workbook.

PAUSE. **LEAVE** the workbook open for the next exercise.

Using CONCATENATE

In some cases, you need to combine text strings together. Use CONCATENATE for this purpose. The syntax of the function is CONCATENATE(Text1, *Text2*, *Text3*, …). In this case, you combine the first and last names into two different formats for future mail merges. In the first format, you use a comma to separate the last and first name but because the character can change to a semi-colon or other character, you type the comma in a cell and use the cell reference in the CONCATENATE formula.

STEP BY STEP   **Use the CONCATENATE Function**

GET READY. USE the workbook from the previous exercise.

1. Click cell **H11** and type **,** (a comma followed by a space). In cell I11, type **First Last** to label the columns.

2. Click cell **H12**.

3. Click the **Formulas** tab and then in the Function Library group, click **Text** and choose **CONCATENATE**. The *Function Arguments* dialog box opens.

4. In the Text box, click cell **B12** and then press **Tab**. Click cell **H11**, press **Tab**, and then click **A12**. In the preview area, you see "Ortiz, David."

5. Click **OK** and copy the formula in cell H12 to **H13:H18**. The result is incorrect. Notice that the string gets longer and longer and Ortiz is in every string.

6. Click cell **H12**. In the Formula Bar, click the cell **H11** reference and then press **F4** (Absolute). Cell H11 should become H11.

7. Press **Enter** and copy the formula in cell H12 to **H13:H18** again. This time the formula is copied correctly.

8. Select cell **I12** and type **=CONCATENATE(A12," ",B12)**. Notice that the second argument is a quote, space, and a quote. This separates the first and last names.

9. Press **Enter** and copy the formula in cell I12 to **I13:I18**.

10. Apply the **Heading 3** cell style to the range **D11:I11**. Widen columns as necessary to display the data. Your worksheet should be similar to Figure 10-15.

Figure 10-15

The completed Fabrikam worksheet

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	ExtCodeEmpID	SpFirst	SpLast	Hire Date	Alarm	OCode1	OCode2	Ext	Floor	Birthday	EmpID	empcat1	empcat2	first	last
2	425oonp15210	david	ortiz	37291	lAaksdjbfl;akjsdfljkafapr	0000000000	O00000000O	425	4	apr	15210	oo	np	david	ortiz
3	327sanp49612	kim	akers	39868	ljksAbdflb;jkasfmar	OO00000000O0	000O00000	327	3	mar	49612	sa	np	kim	akers
4	329sap151276	linda	moschell	41301	coiubasdfAjlkeaug	O00000000O	000000000	329	3	aug	51276	sa	p1	linda	moschell
5	330psp047373	michael	nash	41530	ozixcjAuadlbfkjedec	0000000000	000000000	330	3	dec	47373	ps	p0	michael	nash
6	328sanp37624	nicole	carson	40241	lkbbueoAiajdckljul	0000000000	000000000	328	3	jul	37624	sa	np	nicole	carson
7	424oonp77612	richard	carey	37367	AlajsdfljkasbdfJan	OO00000000O0	000O00000	424	4	jan	77612	oo	np	richard	carey
8	426esnp56690	ryan	calafato	38050	l;Ajdkfalsd;jkbmay	0000000000	O00000000	426	4	may	56690	es	np	ryan	calafato
9															
10															
11	First	Last	Birthday	EmpCat1	EmpCat2	oCode1	oCode2	,	First Last						
12	David	Ortiz	Apr	OO	NP	000o000o000	o00000o0o	Ortiz, David	David Ortiz						
13	Kim	Akers	Mar	SA	NP	ooo000o00o0	0oo0oo00	Akers, Kim	Kim Akers						
14	Linda	Moschell	Aug	SA	P1	o00o00o0o	0o0oo0o0o	Moschell, Linda	Linda Moschell						
15	Michael	Nash	Dec	PS	P0	0o00o0000o	0o0oo00o0	Nash, Michael	Michael Nash						
16	Nicole	Carson	Jul	SA	NP	0o0o00000o	0o0o00o0o0	Carson, Nicole	Nicole Carson						
17	Richard	Carey	Jan	OO	NP	oo00o00o00	0oo0oo00	Carey, Richard	Richard Carey						
18	Ryan	Calafato	May	ES	NP	00o0o0o000	o00000o0o	Calafato, Ryan	Ryan Calafato						

11. **SAVE** the workbook.

PAUSE. **CLOSE** the workbook and then **CLOSE** Excel.

Knowledge Assessment

Multiple Choice

Select the best response for the following statements.

1. Which of the following functions automatically counts cells that meet multiple conditions?
   a. COUNTIF
   b. COUNT
   c. COUNTIFS
   d. SUMIFS

2. Which of the following functions automatically counts cells that meet a specific condition?
   a. COUNTIF
   b. COUNT
   c. COUNTIFS
   d. SUMIFS

3. In the formula =SUMIFS(C5:C16, F5:F16, "<=60", B5:B16, ">200000"), which of the following is the range of cells to be added?
   a. =C5:C16
   b. =F5:F16
   c. =B5:B16
   d. =C5:F16

4. In the formula =SUMIFS(C5:C16, F5:F16,"<=60", B5:B16, ">200000"), what does "<=60" mean?
   a. If the value in C5:C16 is greater than or equal to 60, the value in C5:C16 will be included in the total.
   b. If the value in F5:F16 is greater than or equal to 60, the value in C5:C16 will be included in the total.
   c. If the value in B5:B16 is less than or equal to 60, the value in C5:C16 will be included in the total.
   d. If the value in F5:F16 is less than or equal to 60, the value in C5:C16 will be included in the total.

5. What does criteria range in a formula refer to?
   a. The worksheet data to be included in the formula's results
   b. The range containing a condition that must be met in order for data to be included in the result
   c. The type of formula being used for the calculation
   d. The type of data contained in the cells to be included in the formula

6. Which of the following functions returns one value if a condition is true and a different value when the condition is *not* true?
   a. AND
   b. OR
   c. IF
   d. SUM

7. Which of the following functions returns a value if all conditions are met?
   a. AND
   b. OR
   c. IF
   d. SUM

8. Which of the following functions searches for a value in the first column of Table_array and returns a value in the same row from Col_index_num?
   a. AVERAGEIF
   b. VLOOKUP
   c. MID
   d. HLOOKUP

9. Which of the following functions converts text from uppercase to title case?
   a. UPPER
   b. PROPER
   c. LOWER
   d. TRIM

10. Which of the following functions joins two or more text strings into a single text string?
   a. AND
   b. MID
   c. TRIM
   d. CONCATENATE

Projects

Project 10-1: Separating Text into Columns

In this project, you will take a text file of student grades and separate the information into seven columns rather than one.

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

1. **OPEN** the *10 SFA Grades Import* file.
2. Select cells **A4:A41**. Click the **Data** tab and then in the Data Tools group, click **Text to Columns**.
3. The Convert Text to Columns Wizard opens with Delimited selected as the default, because Excel recognized that the data in the selected range is separated with delimiters. Click **Next**.
4. Select **Comma** and **Space** as the delimiters. If other delimiters are checked (such as Tab), deselect them and then click **Next**. Click **Finish**.
5. Label each of the columns in row 3 (A3 through G3): **Last**, **First**, **Initial**, **ID**, **Final**, **Quarter**, **Semester**.
6. Apply the **Heading 3** cell style to the column headings. Adjust the column widths to fit the data.
7. **SAVE** the workbook in the Excel Lesson 10 folder as *10 SFA Grades Import Solution*. **CLOSE** the workbook.

LEAVE Excel open for the next project.

Project 10-2: Creating SUMIF and SUMIFS Formulas to Conditionally Summarize Data

Salary information for Contoso, Ltd. has been entered in a workbook so the office manager can analyze and summarize the data. In this project, you will calculate sums with conditions.

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

1. **OPEN** the *10 Contoso Salaries* data file for this lesson.
2. Select cell **C35**. Click the **Formulas** tab and then in the Function Library group, click **Insert Function**.
3. If the SUMIF function is not visible, type **SUMIF** in the Search for a function box and then click **Go**. From the Select a function list, click **SUMIF**. Click **OK**.
4. In the *Function Arguments* dialog box, in the Range field select **C4:C33**.
5. In the Criteria box, type **>100000**.
6. Click **OK**. Because the range and sum range are the same, it is not necessary to enter a Sum_range argument.
7. Select **C36** and then click **Insert Function**. Select **SUMIFS** and then click **OK**.
8. In the *Function Arguments* dialog box, select **C4:C33** as the sum range.
9. Select **D4:D33** as the first criteria range.
10. Type **>=10** as the first criterion.
11. Select **C4:C33** as the second criteria range.
12. Type **<60000** as the second criterion. Click **OK** to finish the formula.
13. **SAVE** the workbook as *10 Contoso Salaries Solution*. **CLOSE** the file.

CLOSE Excel.