

Working with Formulas and Functions

In Excel, a *formula* calculates a value based on the values in other cells of the workbook. Excel displays the result of a formula in a cell as a numeric value.

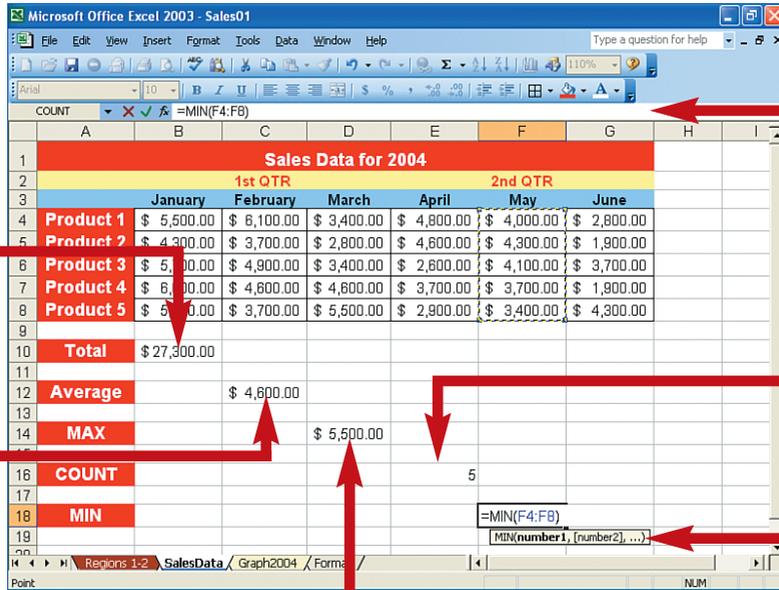
Functions are abbreviated formulas that perform a specific operation on a group of values. Excel provides more than 250 functions that can help you with tasks ranging from determining loan payments to calculating investment returns. For example, the SUM function automatically adds entries in a range. To use it, you first type =SUM(in either lower- or uppercase letters. Then you select the range. You end the function by typing), which tells Excel you are finished selecting the range.

The way you refer to a cell in a formula determines how the formula is affected when you copy it into a different cell. You can use three types of cell references: relative, absolute, and mixed. The formulas you create in this part contain *relative cell references*. When you copy a formula from one cell to another, the relative cell references in the formula change to reflect the new location of the formula.

An *absolute cell reference* does not change when you copy the formula to a new cell. In certain formulas, you might want an entry to always refer to one specific cell value. For example, you might want to calculate the interest on several different principal amounts. The interest percentage remains unchanged, or *absolute*, so you designate the entry in the formula that refers to the interest percentage as an absolute cell reference. The principal amounts do change, so they have relative cell reference entries in the formula. When you copy this formula, the interest cell reference always refers to the one cell that contains the interest percentage.

A *mixed cell reference* is a single cell entry in a formula that contains both a relative and an absolute cell reference. A mixed cell reference is helpful when you need a formula that always refers to the values in a specific column but the values in the rows must change, and vice versa.

Functions and Correcting Errors



Function box

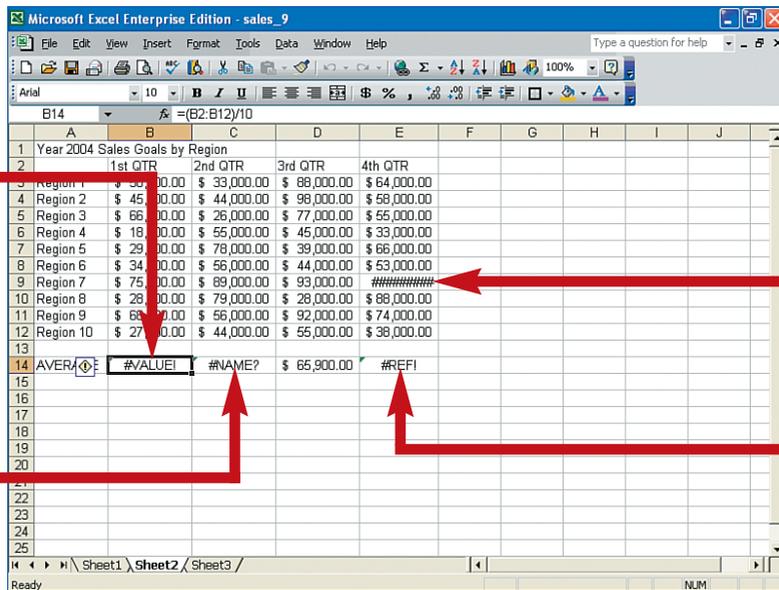
SUM function
(displays the total amount of a group of cells)

COUNT function
(displays the number of cells with data in a group of cells)

AVERAGE function
(displays the average of a group of cells)

MIN function
(displays the minimum number in a group of cells)

MAX function
(displays the maximum number in a group of cells)



This error means the formula contains nonnumeric data or cell or function names that cannot be used in the calculation

This error needs you to widen the column width

This error means there is a circular reference problem

This error might be a reference to a cell that isn't valid

Using AutoSum (SUM)

Start

Click 1

Click 2

Click 3

Click 4

Sales Data for 2004								
			1st QTR			2nd QTR		
			January	February	March	April	May	June
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00		
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00		
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00		
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00		
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00		
Total								

Formula bar: =SUM(B4:B9)

- 1 Click in the cell in which you want the result of the AutoSum operation to appear (this is called the *resultant cell*).
- 2 Click the **AutoSum** button on the Standard toolbar.
- 3 Excel selects the most obvious range of numbers and puts a dotted line around the cells. Press **Enter** to accept the range or use the mouse to select alternative cells.
- 4 Click the resultant cell to make it the active cell. Notice that the formula is displayed in the Formula bar.

End

INTRODUCTION

Excel can use formulas to perform calculations for you. Because a formula refers to cells rather than to the values those cells contain, Excel updates the sum whenever you change the values in the cells. You'll probably use the AutoSum formula a lot—it adds numbers in a range of cells.

TIP

Selecting specific AutoSum cells

If you don't want to use the range of cells that Excel selects for you, click on the first cell you want, hold down the **Ctrl** key, and click on each additional cell you would like to include in the calculation. When you finish selecting the cells you want to calculate, press **Enter** to see the result. Alternatively, if you let Excel select the cells for you but Excel doesn't select exactly the right set of cells, you can resize the selection by clicking the first cell to include, holding down the **Shift** key, and clicking the last cell to include.

Finding a Cell Average (AVERAGE)

Start

The screenshot shows two views of an Excel spreadsheet. The top view shows the 'Sales Data for 2004' spreadsheet with columns for quarters and products. The bottom view shows the same spreadsheet with the formula bar displaying `=AVERAGE(C4:C8)` and the result `$ 4,600.00` in cell C12.

Sales Data for 2004						
1st QTR						
	January	February	March	April		
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00		
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00		
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00		
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00		
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00		
Total	\$ 27,300.00					
Average						

Sales Data for 2004						
1st QTR			2nd QTR			
	January	February	March	April	May	June
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00
Total	\$ 27,300.00					
Average						\$ 4,600.00

- 1 Click the cell in which you want the result of the **AVERAGE** function to appear (this is called the *resultant cell*).
- 2 Click the **down arrow** next to the **AutoSum** button on the Standard toolbar and choose **Average** from the list that appears.
- 3 Excel selects the most obvious range of numbers and puts a dotted line around the cells. Press **Enter** to accept the range or use the mouse to select alternative cells.
- 4 Click the resultant cell to make it the active cell. Notice that the formula is displayed in the Formula bar.

End

INTRODUCTION

A *function* is one of Excel's many built-in formulas for performing a specialized calculation on the data in your worksheet. For example, instead of totaling your sales data, you can use Excel's AVERAGE function to determine the average of each quarter per region.

TIP

Selecting specific AutoSum cells

If you don't want to use the range of cells that Excel selects for you, click on the first cell you want, hold down the **Ctrl** key, and click on each additional cell you would like to include in the calculation. When you finish selecting the cells you want to calculate, press **Enter** to see the result. Alternatively, if you let Excel select the cells for you but Excel doesn't select exactly the right set of cells, you can resize the selection by clicking the first cell to include, holding down the **Shift** key, and clicking the last cell to include.

Finding the Largest Cell Amount (MAX)

Start

1 Click

2 Click

3

4 Click

Sales Data for 2004				
1st QTR				
	January	February	March	April
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00
Total	\$27,300.00			
Average		\$ 4,600.00		
MAX				

Sales Data for 2004						
1st QTR			2nd QTR			
	January	February	March	April	May	June
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00
Total	\$27,300.00					
Average		\$ 4,600.00				
MAX			\$ 5,500.00			

- 1 Click the cell in which you want the result of the **MAX** function to appear (this is called the *resultant cell*).
- 2 Click the **down arrow** next to the **AutoSum** button on the Standard toolbar and choose **Max** from the list that appears.
- 3 Excel selects the most obvious range of numbers and puts a dotted line around the cells. Press **Enter** to accept the range or use the mouse to select alternative cells.
- 4 Click the resultant cell to make it the active cell. Notice that the formula is displayed in the Formula bar.

End

You can use Excel's MAX function to, for example, determine the quarter in which you had the most sales.

TIP

Finding the minimum cell amount

In addition to enabling you to find the largest cell amount, you can also find the smallest cell amount. See the task "Finding the Smallest Cell Amount (**MIN**)" later in this part for more information.

Counting the Number of Cells (COUNT)

Start

1
Click



Sales Data for 2004				
1st QTR				
	January	February	March	April
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00
Total	\$ 27,300.00			
Average		\$ 4,600.00		
MAX			\$ 5,500.00	
COUNT				

Click



2

Sales Data for 2004						
1st QTR			2nd QTR			
	January	February	March	April	May	June
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00
Total	\$ 27,300.00					
Average		\$ 4,600.00				
MAX			\$ 5,500.00			
COUNT				5		



3

Click



4

- 1 Click the cell in which you want the result of the **COUNT** function to appear (this is called the *resultant cell*).
- 2 Click the **down arrow** next to the **AutoSum** button on the Standard toolbar and choose **Count** from the list that appears.
- 3 Excel selects the most obvious range of numbers and puts a dotted line around the cells. Press **Enter** to accept the range or use the mouse to select alternative cells.
- 4 Click the resultant cell to make it the active cell. Notice that the formula is displayed in the Formula bar.

End

INTRODUCTION

Suppose you want to know how many sales reps are associated with a specific region. In that case, you could use Excel's COUNT function to count the number of cells in a selected range.

TIP

COUNTIF

You can use the **COUNTIF** function to count the number of cells in a range that meet specific criteria. For example, instead of totaling your sales data, maybe you want to know how many regional quarters were under \$20,000.

Finding the Smallest Cell Amount (MIN)

Start

The screenshot shows the Excel interface with the following data:

Sales Data for 2004						
	1st QTR			2nd QTR		
	January	February	March	April	May	June
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00
Total	\$ 27,300.00					
Average		\$ 4,600.00				
MAX			\$ 5,500.00			
COUNT				5		
MIN						

The Formula bar shows the formula: `=MIN(F4:F8)`

The resultant cell (F18) displays the value: `$ 3,400.00`

- 1 Click the cell in which you want the result of the function to appear (this is called the *resultant cell*).
- 2 Click the **down arrow** next to the **AutoSum** button on the Standard toolbar and choose Min from the list that appears.
- 3 Excel selects the most obvious range of numbers and puts a dotted line around the cells. Press **Enter** to accept the range or use the mouse to select alternative cells.
- 4 Click the resultant cell to make it the active cell. Notice that the formula is displayed in the Formula bar.

End

INTRODUCTION

Suppose you want to know in which quarter you had the lowest sales. In that case, you could use Excel's MIN function, and thereby discover which regions need improvement.

TIP

Finding the maximum cell amount

In addition to enabling you to find the smallest cell amount, you can also find the largest cell amount. Refer to the task "Finding the Largest Cell Amount (MAX)" earlier in this part for more information.

Entering a Formula

Start

	A	B	C	D	E	F	G	H	
1	Sales Data for 2004								
2	1st QTR			2nd QTR					
3		January	February	March	April	May	June		
4	Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00		
5	Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00		
6	Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00		
7	Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00		
8	Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00		
9									
10	Total	\$ 27,300.00							
11									
12	Average		\$ 4,600.00						
13									
14	MAX			\$ 5,500.00					
15									
16	COUNT								
17									
18	MIN								
19									

Click

1

	A	B	C	D	E	F	G	H	
1	Sales Data for 2004								
2	1st QTR			2nd QTR					
3		January	February	March	April	May	June		
4	Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00		
5	Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00		
6	Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00		
7	Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00		
8	Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00		
9									
10	Total	\$ 27,300.00							
11									

2

	A	B	C	D	E	F	G	H	
1	Sales Data for 2004								
2	1st QTR			2nd QTR					
3		January	February	March	April	May	June		
4	Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00		
5	Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00		
6	Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00		
7	Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00		
8	Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00		
9									
10	Total	\$ 27,300.00					\$ 14,600.00		

Click

3

- 1 Click the cell in which you want the result of the formula to appear (this is called the *resultant cell*).
- 2 Type = (the equal sign) followed by the references of the cells containing the data you want to total (for example, **G4+G5+G6+G7+G8**), and then press **Enter**.
- 3 Click the resultant cell to make it the active cell; the values in the specified cells are added together.

End

INTRODUCTION

Another way to use a formula is to type it directly into the cell. You can include any cells in your formula; they do not have to be next to each other. Also, you can combine mathematic operations—for example, C3+C4-D5.

TIP

Canceling a formula

If you start to enter a formula and then decide you don't want to use it, you can cancel it by pressing the **Esc** key.

TIP

Order of operation

Excel first performs calculations within parentheses. Then it performs multiplication or division calculations from left to right. Finally, it performs any addition or subtraction from left to right.

Editing a Formula or Function

Start

Microsoft Office Excel 2003 - Sales01

File Edit View Insert Format Tools Data Window

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B10 =SUM(B4:B9)

Sales Data for 2004						
1st QTR			2nd QTR			
	January	February	March	April	May	June
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00
Total	\$ 27,300.00					\$ 14,600.00

Function Arguments

SUM

Number1: B4:B8 = {5500;4300;3700;6600;5200}

Number2: = number

Adds all the numbers in a range of cells.

Number 1: number1,number2,... are 1 to 30 numbers to sum. Logical values and text are ignored in cells, included if typed as arguments.

Formula result = \$ 27,300.00

Help on this function

OK Cancel

B10 =SUM(B4:B8)

Sales Data for 2004						
1st QTR			2nd QTR			
	January	February	March	April	May	June
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00
Total	\$ 27,300.00					\$ 14,600.00

- 1 Click the cell you want to edit; the function is displayed in the Formula bar.
- 2 Click the **Insert Function** button on the Formula bar to open the Function Arguments dialog box. (If a formula, the Insert Function dialog box will appear.)
- 3 Type the changes to your function. For example, change the cells being summed to B4–B8 instead of B4–B9. Then click **OK**.
- 4 The changes are made and the result appears in the cell.

End

After you enter a formula or function, you can change the values in the referenced cells, and Excel automatically recalculates the value based on the changes. You can include any cells in a formula or function; they do not have to be next to each other. Also, you can combine mathematical operations—for example, C3+C4–D5.

Pressing F2

Instead of using the Function Arguments dialog box to edit your formulas, you can press the F2 key and edit your formula just like you would regular text or data on the Formula bar.

Copying a Formula

Start

The screenshot shows the Excel interface with a worksheet titled 'Sales Data for 2004'. The formula bar shows `=SUM(B4:B8)` in cell B10. A hand icon with a red circle '1' points to cell B10. Another hand icon with a red circle '2' points to the Copy button on the Standard toolbar. A third hand icon with a red circle '3' points to the Total cell in a second worksheet. A fourth hand icon with a red circle '4' points to the Total cell in a third worksheet.

Sales Data for 2004						
1st QTR			2nd QTR			
	January	February	March	April	May	June
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00
Total	\$ 27,300.00					

Sales Data for 2004						
1st QTR			2nd QTR			
	January	February	March	April	May	June
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00
Total	\$ 27,300.00					

Sales Data for 2004						
1st QTR			2nd QTR			
	January	February	March	April	May	June
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00
Total	\$ 27,300.00	\$ 23,000.00	\$ 19,700.00	\$ 18,600.00	\$ 19,500.00	\$ 14,600.00

- 1 Click the cell that contains the function you want to copy.
- 2 Click the **Copy** button on the Standard toolbar; a line surrounds the cell you are copying.
- 3 Click the cell or cells into which you want to paste the formula.
- 4 Press **Enter** to paste the formula into each of the selected cells.

End

INTRODUCTION

When you build your worksheet, you might want to use the same data and formulas in more than one cell. With Excel's Copy command, you can create the initial data or formula once and then place copies in the appropriate cells. For example, suppose you want to find the average sales per quarter in other sales regions. To do so, create the formula for the first region, and copy it to cells for the other regions.

TIP

Increasing cell width

If you paste a copied formula, you might need to alter the size of your columns to accommodate the new size of the data in the cell. To automatically make an entire column (or multiple columns) fit the width of the widest cell in that column (or columns), move the cursor over the right side of the column header and double-click when the cursor changes to a two-headed arrow.

Assigning Names to a Cell or Range

Start

1 Select the cell or range you want to name.

2 Open the **Insert** menu, choose **Name**, and select **Define** to open the Define Name dialog box, which displays the range coordinates and suggests a name.

3 If you do not like the name Excel suggests, type a new name. When you are satisfied with the name, click **OK**.

4 Excel names the range. When the range is selected, the name appears in the Name box.

- 1** Select the cell or range you want to name.
- 2** Open the **Insert** menu, choose **Name**, and select **Define** to open the Define Name dialog box, which displays the range coordinates and suggests a name.
- 3** If you do not like the name Excel suggests, type a new name. When you are satisfied with the name, click **OK**.
- 4** Excel names the range. When the range is selected, the name appears in the Name box.

End

INTRODUCTION

You can create *range names* that make it easier to create formulas and move to that range. For example, a formula that refers to a range named Qtr1 is easier to understand than one named B4:B9. Not only is it easier to remember a name than the cell addresses, but Excel also displays the range name in the Name box—next to the Formula bar. You can name a single cell or a selected range in the worksheet.

TIP

Naming ranges

It's a good idea to begin the range name with a letter or underscore character. You can include upper- and lowercase letters, and you can include as many as 255 characters. Don't use a range name that looks like a cell reference and don't include spaces. To go to a named range, open the **Edit** menu and choose **Go To**. Click on the range name in the list, and then click **OK**.

Referencing Names in a Function

Start

	A	B	C	D	E	F	G
1	Sales Data for 2004						
2	1st QTR			2nd QTR			
3	January	February	March	April	May	June	
4	Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00
5	Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00
6	Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00
7	Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00
8	Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00
9							
10	Total	\$ 27,300.00	\$ 23,000.00	\$ 19,700.00	\$		
11							
12	Average		\$ 4,600.00				
13							

	A	B	C	D	E	F	G	
1	Sales Data for 2004							
2	1st QTR			2nd QTR				
3	January	February	March	April	May	June		
4	Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00	
5	Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00	
6	Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00	
7	Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00	
8	Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00	
9								
10	Total	\$ 27,300.00	\$ 23,000.00	\$ 19,700.00	\$ 18,600.00	\$ 19,500.00	\$ 14,600.00	
11								
12	Average	=AVERAGE(January)						
13								

	A	B	C	D	E	F	G
1	Sales Data for 2004						
2	1st QTR			2nd QTR			
3	January	February	March	April	May	June	
4	Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00
5	Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00
6	Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00
7	Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00
8	Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00
9							
10	Total	\$ 27,300.00	\$ 23,000.00	\$ 19,700.00	\$ 18,600.00	\$ 19,500.00	\$ 14,600.00
11							
12	Average	\$ 5,460.00	\$ 4,600.00				
13							

- 1 Click in the cell in which you want the result of the formula to appear (this is called the *resultant cell*).
- 2 Type the function in the cell using a named cell or range—for example, **=AVERAGE(January)**. The name appears in the same color as the border.
- 3 Press the **Enter** key.

End

INTRODUCTION

One of the reasons you create a name for a cell or group of cells is so that you can easily refer to that cell or range in a function. That way, rather than typing or selecting a range or cell, you can type the name or select it from the Paste Name dialog box.

TIP

Pasting the name

If you forget the name of a range while you are typing a formula, open the **Insert** menu, choose **Name**, select **Paste**, choose the correct range name, and click **OK**. The range name is automatically placed in the formula.

TIP

Deleting a name

To delete a name, open the **Insert** menu, choose **Name**, and select **Define**. In the Define Name dialog box, select the range you want to delete, and then click the **Delete** button. Click **OK** to confirm the deletion.

Using Functions Across Worksheets

Start

Microsoft Office Excel 2003 - Sales01

File Edit View Insert Format Tools Data Window Help

Standard toolbar: Sum, Average, Count, Max, Min, etc.

Worksheet: SalesData

Sales Data for 2004							
1st QTR				2nd QTR			
	January	February	March	April	May	June	[18 months]
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00	
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00	
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00	
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00	
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00	
Total	\$ 27,300.00	\$ 23,000.00	\$ 19,700.00	\$ 18,600.00	\$ 19,500.00	\$ 14,600.00	
Average	\$ 5,460.00	\$ 4,600.00	\$ 3,940.00	\$ 3,720.00	\$ 3,900.00	\$ 2,920.00	
MAX	\$ 6,600.00	\$ 6,100.00	\$ 5,500.00	\$ 4,800.00	\$ 4,300.00	\$ 4,300.00	
COUNT	5	5	5	5	5	5	
MIN	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 2,600.00	\$ 3,400.00	\$ 1,900.00	

Worksheet: Graph2004

Sales Data for 2004							
1st QTR				2nd QTR			
	January	February	March	April	May	June	[18 months]
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00	=SUM(B4:G4)+
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00	
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00	
Product 4	\$ 6,600.00	\$ 4,600.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00	
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00	
Total	\$ 27,300.00	\$ 23,000.00	\$ 19,700.00	\$ 18,600.00	\$ 19,500.00	\$ 14,600.00	
Average	\$ 5,460.00	\$ 4,600.00	\$ 3,940.00	\$ 3,720.00	\$ 3,900.00	\$ 2,920.00	
MAX	\$ 6,600.00	\$ 6,100.00	\$ 5,500.00	\$ 4,800.00	\$ 4,300.00	\$ 4,300.00	
COUNT	5	5	5	5	5	5	
MIN	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 2,600.00	\$ 3,400.00	\$ 1,900.00	

Formula bar: =SUM(B4:G4)+

Worksheet tabs: Regions 1-2, SalesData, Graph2004, Format, 2003

- 1 Click in the cell in which you want the result of the formula to appear (this is called the *resultant cell*).
- 2 Click the **AutoSum** button on the Standard toolbar. Excel selects the logical cells to sum.
- 3 In this example, we are going to add the sum of this operation to last year's data in another worksheet (2003), so type a **+** outside the right bracket.
- 4 Click the tab of the worksheet that contains the cell you want to reference in the calculation.

INTRODUCTION

You can use cell references from other worksheets in your calculations. For example, suppose you have two worksheets that contain the calculations for the total sales by region for a particular year. In a third worksheet, you want to calculate the total sales by region for the last two years. You can reference the cells in the first two worksheets that contain the totals and perform calculations on them in the third worksheet.

TIP

Worksheet name references

Instead of switching back and forth between worksheets, you can reference the worksheet name in your calculations. The location of a cell in a particular worksheet is the cell row and column location in addition to the sheet name—for example, **Sheet1!A1**.

The top screenshot shows the Excel interface with the formula bar containing `=SUM(B4:G4)+2003!B4`. A hand icon with the number 6 is pointing to cell B4. A red arrow points from cell B4 to the formula bar. A hand icon with the number 5 is pointing to the formula bar.

The bottom screenshot shows the Excel interface with the formula bar containing `=SUM(B4:G4)+2003!B4`. A hand icon with the number 7 is pointing to cell H4. A red arrow points from cell H4 to the formula bar.

Sales Data for 2004							
	1st QTR			2nd QTR			
	January	February	March	April	May	June	YTD
Product 1	\$ 5,500.00	\$ 6,100.00	\$ 3,400.00	\$ 4,800.00	\$ 4,000.00	\$ 2,800.00	\$ 79,800.00
Product 2	\$ 4,300.00	\$ 3,700.00	\$ 2,800.00	\$ 4,600.00	\$ 4,300.00	\$ 1,900.00	
Product 3	\$ 5,700.00	\$ 4,900.00	\$ 3,400.00	\$ 2,600.00	\$ 4,100.00	\$ 3,700.00	
Product 4	\$ 6,800.00	\$ 4,800.00	\$ 4,600.00	\$ 3,700.00	\$ 3,700.00	\$ 1,900.00	
Product 5	\$ 5,200.00	\$ 3,700.00	\$ 5,500.00	\$ 2,900.00	\$ 3,400.00	\$ 4,300.00	

- 5 Click the cell that you want to use in your calculation; it appears next to the worksheet name in the Formula bar.
- 6 Press the **Enter** key. Excel performs the calculation and returns you to the original worksheet.
- 7 Click the resultant cell to make it the active cell. Notice that the function is displayed in the Formula bar.

CAUTION

If you only reference one worksheet name in a formula, the cells referenced in the formula will all apply to the one referenced worksheet. For example, if you have the formula `=SUM(Sheet1!A1+B1)` in cell C3 of Sheet2, this will reference cell A1 from Sheet1 and B1 from Sheet1. If you need to reference a cell in another worksheet, you must include the worksheet name in the formula, like so: `=SUM(Sheet1!A1+Sheet2!B1)`.

End

Using AutoCalculate

Start

1 Select the cells that you want to AutoCalculate.

2 Right-click the Status bar and review the AutoCalculate options.

3 Click **Min** in the shortcut menu that appears. (Notice that the default AutoCalculate operation is to sum the numbers.)

4 The Status bar displays the lowest number in the selection (in this case, **\$18,000.00**).

		1st OTR	2nd OTR	3rd OTR	4th OTR
15	Region 11	\$ 30,000.00	\$ 33,000.00	\$ 88,000.00	\$ 64,000.00
16	Region 12	\$ 43,000.00	\$ 44,000.00	\$ 98,000.00	\$ 38,000.00
17	Region 13	\$ 66,000.00	\$ 26,000.00	\$ 77,000.00	\$ 33,000.00
18	Region 14	\$ 18,000.00	\$ 33,000.00	\$ 43,000.00	\$ 33,000.00
19	Region 15	\$ 29,000.00	\$ 78,000.00	\$ 39,000.00	\$ 66,000.00
20	Region 16	\$ 34,000.00	\$ 36,000.00	\$ 44,000.00	\$ 33,000.00
21	Region 17	\$ 73,000.00	\$ 89,000.00	\$ 93,000.00	\$ 108,000.00
22	Region 18	\$ 28,000.00	\$ 79,000.00	\$ 28,000.00	\$ 88,000.00
23	Region 19	\$ 68,000.00	\$ 36,000.00	\$ 92,000.00	\$ 74,000.00
24	Region 20	\$ 27,000.00	\$ 44,000.00	\$ 33,000.00	\$ 38,000.00

- 1** Select the cells that you want to AutoCalculate.
- 2** Right-click the Status bar and review the AutoCalculate options.
- 3** To find the lowest number in the selection, click **Min** in the shortcut menu that appears. (Notice that the default AutoCalculate operation is to sum the numbers.)
- 4** The Status bar displays the lowest number in the selection (in this case, **\$18,000.00**).

End

INTRODUCTION

Suppose you want to see a function performed on some of your data—in this example, to determine the lowest quarterly sales goal of any region in 2004—but you don't want to add the function directly into the worksheet. Excel's AutoCalculate feature can help.

TIP

Turning off AutoCalculate

You can turn off the AutoCalculate feature by selecting **None** from the AutoCalculate shortcut menu. Otherwise, it continues to display when you select cells.

TIP

AutoCalculate options

In addition to using AutoCalculate to find a minimum number, you can also select cells to be averaged (Average), count the total number of cells containing data (Count), count the total number of cells containing numeric data (Count Nums), find the largest number (Max), and sum a total (Sum).

Finding Functions

Start

1 Click

2

3 Click

4

Insert Function

Search for a function:
calculate a mortgage payment

Or select a category: Recommended

Select a function:

- IPMT
- RATE
- ISPMT
- FV
- PMT
- PPMT

IPMT(rate,per,nper,pv,fv,type)
Returns the interest payment for a given period for an investment, based on periodic, constant payments and a constant interest rate.

[Help on this function](#)

Function Arguments

PMT

Rate = number

Nper = number

Pv = number

Fv = number

Type = number

=

Calculates the payment for a loan based on constant payments and a constant interest rate.

Rate is the interest rate per period for the loan. For example, use 6%/4 for quarterly payments at 6% APR.

Formula result =

[Help on this function](#)

- 1** Click the **down arrow** next to the **AutoSum** button on the Standard toolbar and choose **More Functions** from the list that appears.
- 2** Type a description of the function you are looking for in the **Search for a function** text box and press **Enter** (or click the **Go** button).
- 3** Scroll through the list in the **Select a function** box and click a function to read a description of it. When you find the function you are looking for, click **OK**.
- 4** Excel walks you through the process of inputting the function's arguments in the Function Arguments dialog box.

End

INTRODUCTION

In the old days, you had to know the name of the function you wanted to use. Now, however, Excel makes it easy to find the function you need—all you have to know is what you want the function to do.

TIP

Function arguments help
If you need help while you are inputting your function arguments, click the **Help on this function** link in the bottom-left corner of the Function Arguments dialog box.

Calculating a Loan Payment (PMT)

Start

1 Click

2 Click

3 Click

4 Double-Click

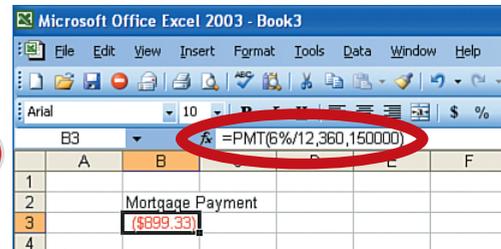
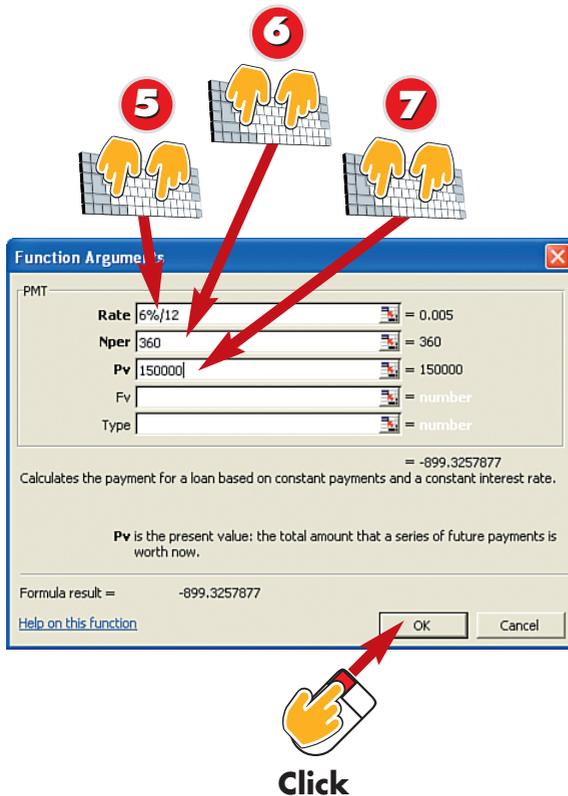
- 1** Click in the cell in which you want the result of the function to appear (this is called the *resultant cell*).
- 2** Click the **down arrow** next to the **AutoSum** button on the Standard toolbar and choose **More Functions** from the list that appears.
- 3** The Insert Function dialog box opens. Click the **down arrow** next to the **Or select a category** field and choose **Financial** from the list that appears.
- 4** A list of financial-related functions appears in the **Select a function** list. Scroll through the list to locate the **PMT** function, and double-click it.

Using Excel, you can determine a monthly loan payment based on a constant interest rate, a specific number of pay periods, and the current loan amount.

TIP

Function arguments help

If you need help while you are inputting your function arguments, click the **Help on this function** link in the bottom-left corner of the Function Arguments dialog box.



- 5 In the **Rate** field, type the interest rate per period. For example, type **6%/12** for monthly payments on a 6% annual percentage rate (APR).
- 6 In the **Nper** field, type the total number of loan payments. For example, type **360** if you'll be making 12 payments per year on a 30-year loan.
- 7 In the **Pv** field, type the present value of the loan—for example, **150,000**. Click **OK**.
- 8 Excel calculates the payment and inserts it in the resultant cell.

TIP

Negative payment

Your resulting payment is a negative number because payments are considered a debit.

TIP

Type argument

If you don't enter a number in the **Type** argument, it defaults to 0, which means that the last payment will pay off the mortgage loan (this is because mortgages are paid in arrears—at the end of the payment period). If you are calculating a car payment, you might put a 1 in the Type argument because you make your payments at the beginning of the payment period. A 1 versus a 0 makes a slight difference in the calculation because of the interest accrued.

End

Start

Performing a Logical Test Function (IF)

Student	Score	Grade
Sid Lewis	95	
Julie Sidhu	53	
Steve Roberts	89	
Kim Estes	93	
Mendy Hargedon	82	
Caroline Roop	71	
Gretchen Hoffman	66	
Nancy Price	28	

- 1 Click in the cell in which you want the result of the function to appear (this is called the *resultant cell*).
- 2 Click the **down arrow** next to the **AutoSum** button on the Standard toolbar and choose **More Functions** from the list that appears.
- 3 The Insert Function dialog box opens. Click the **down arrow** next to the **Or select a category** field and choose **Logical** from the list that appears.
- 4 A list of logical functions appears in the **Select a function** list. Scroll through the list to locate the **IF** function, and double-click it.

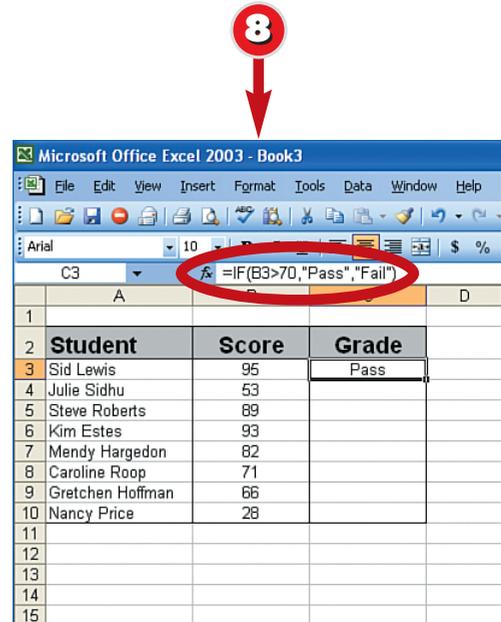
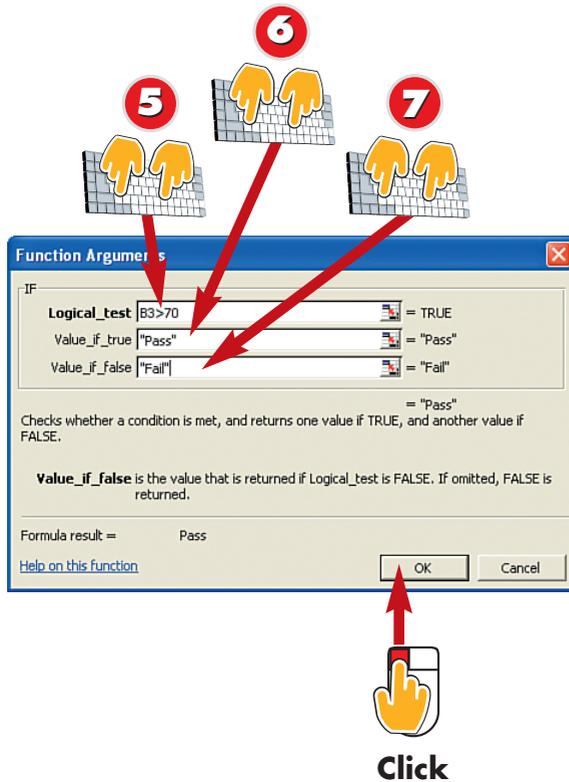
INTRODUCTION

Using Excel, you can perform a logical test function—for example, to indicate whether scores equal a passing or failing grade based on an established set of criteria.

TIP

Embedded IFs

You can set up embedded IF statements to use in your logical test. For example, suppose scores between 90–100 are an A, 80–89 are a B, 70–79 are a C, 60–69 are a D, and below 59 are an F. Your formula might look like this: `=IF(B3>89, "A", IF(B3>79, "B", IF(B3>69, "C", IF(B3>59, "D", "F")))`.



- 5 In the **Logical_test** field, type the condition to determine whether a grade is above 70. The logical test is if the cell is greater than 70, for example, **B3>70**.
- 6 In the **Value_if_true** field, type the value you want to use if the grade is above 70 (that is, a passing grade)—for example, **"Pass"**.
- 7 In the **Value_if_false** field, type the value you want to use if the grade is below 70 (that is, a failing grade)—for example, **"Fail"**. Click **OK**.
- 8 Excel performs the logical test and inserts the result in the resultant cell.

End

TIP

Copying a logical test

You can copy a logical test function in a cell and paste it so that you have the same function performed on all cells in a list—for example, if you need this pass/fail test performed on a set of student grades.

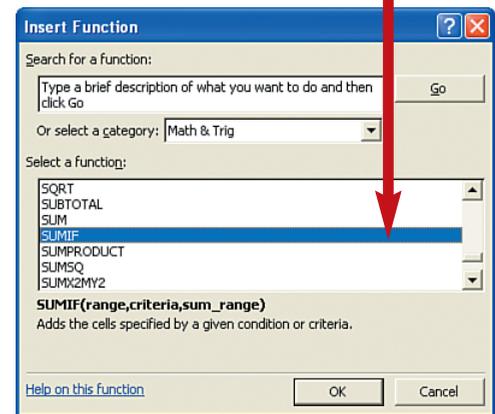
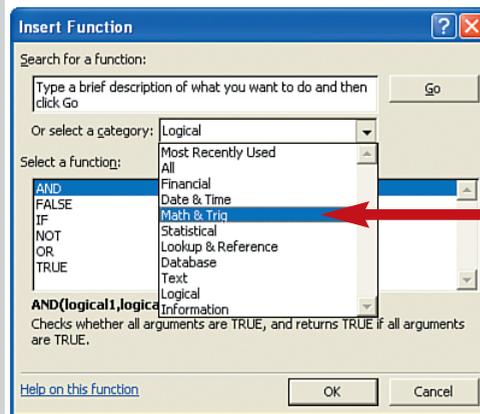
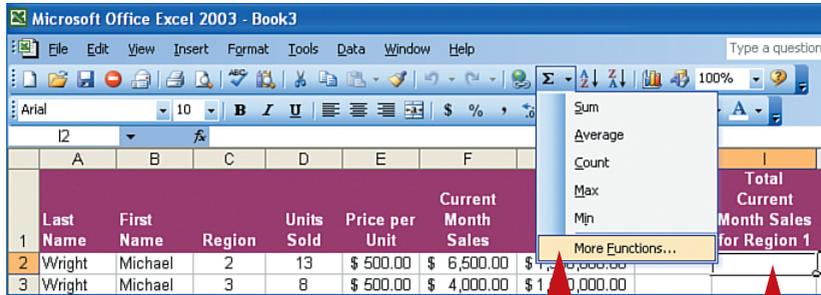
TIP

Function arguments help

If you need help while you are inputting your function arguments, click the **Help on this function** link in the bottom-left corner of the Function Arguments dialog box.

Adding a Range Given Criteria (SUMIF)

Start



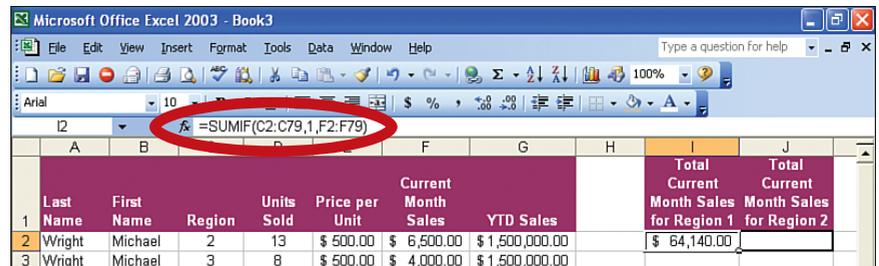
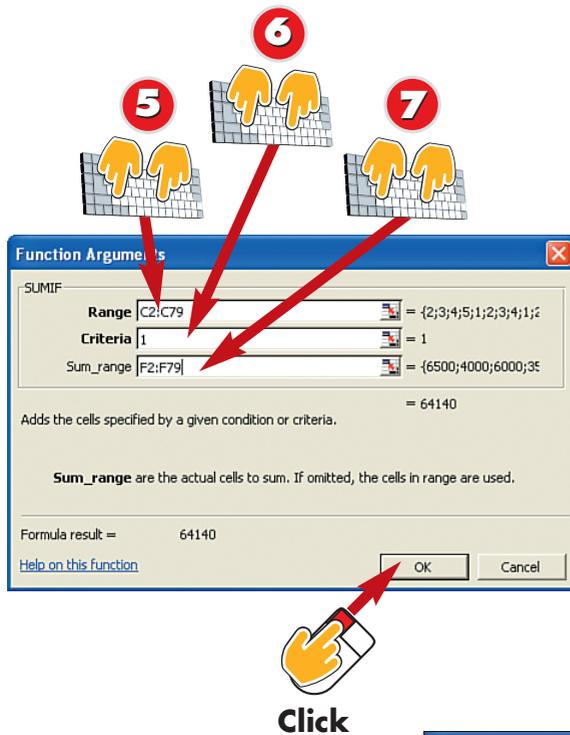
- 1 Click in the cell in which you want the result of the function to appear (this is called the *resultant cell*).
- 2 Click the **down arrow** next to the **AutoSum** button on the Standard toolbar and choose **More Functions** from the list that appears.
- 3 The Insert Function dialog box opens. Click the **down arrow** next to the **Or select a category** field and choose **Math & Trig** from the list that appears.
- 4 A list of math and trig functions appears in the **Select a function** list. Scroll through the list to locate the **SUMIF** function, and double-click it.

Using Excel, you can add the data in range, given certain criteria. This might be useful if, say, you needed to total the current monthly sales for all sales reps who match a specific criterion—for example, who are all in the same sales region.

TIP

Function arguments help

If you need help while you are inputting your function arguments, click the **Help on this function** link in the bottom-left corner of the Function Arguments dialog box.



- 5** In the **Range** field, type the range of cells whose contents you want to review—for example, **C2:C79**. (You can also click directly in the worksheet to select the cells.)
- 6** In the **Criteria** field, type the criterion you want to check in the range—in this case, type **"1"** because you want to add sales data from Region 1 only.
- 7** In the **Sum_range** field, type the range of cells that match your criterion—in this case, **F2:F79**, which contains the current month sales data. Click **OK**.
- 8** Excel adds the range given your criteria and inserts the result in the resultant cell.

End

TIP

Range selection

In addition to typing specific Range and Sum_range arguments, you can click in the worksheet and select each range of cells using the mouse.

TIP

COUNTIF

Instead of totaling cells that meet a criterion with **SUMIF**, you can use **COUNTIF** to count the number of cells in a range that meet a specific criterion. For example, instead of totaling your sales data, maybe you want to know how many regional quarters were under \$20,000.

Start

Finding the Future Value of an Investment (FV)

The screenshots show the following steps:

- Click in the cell in which you want the result of the function to appear (this is called the *resultant cell*).
- Click the **down arrow** next to the **AutoSum** button on the Standard toolbar and choose **More Functions** from the list that appears.
- The Insert Function dialog box opens. Click the **down arrow** next to the **Or select a category** field and choose **Financial** from the list that appears.
- A list of financial-related functions appears in the **Select a function** list. Scroll through the list to locate the **FV** function, and double-click it.

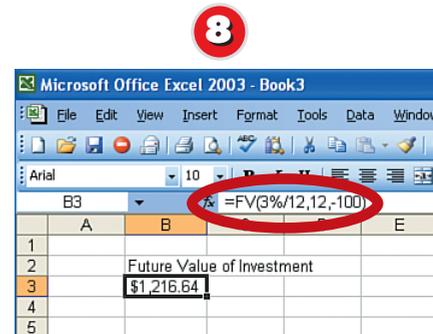
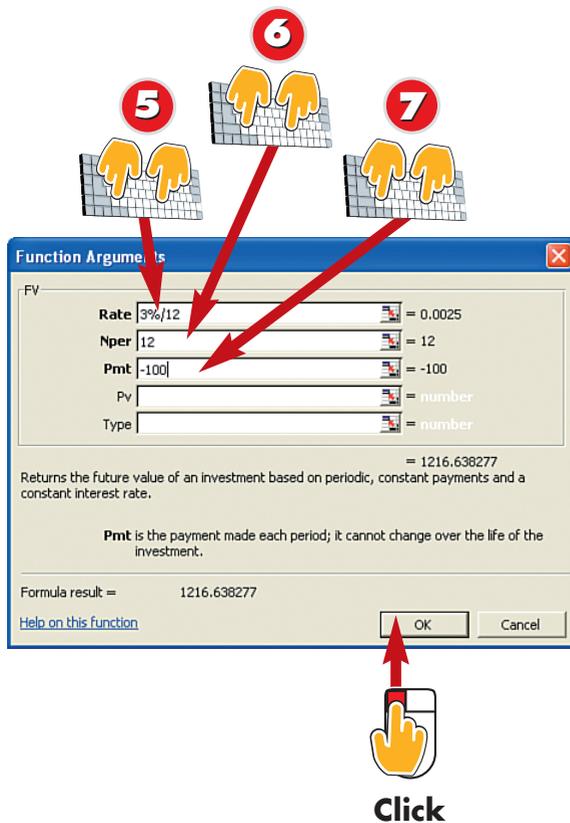
- 1 Click in the cell in which you want the result of the function to appear (this is called the *resultant cell*).
- 2 Click the **down arrow** next to the **AutoSum** button on the Standard toolbar and choose **More Functions** from the list that appears.
- 3 The Insert Function dialog box opens. Click the **down arrow** next to the **Or select a category** field and choose **Financial** from the list that appears.
- 4 A list of financial-related functions appears in the **Select a function** list. Scroll through the list to locate the **FV** function, and double-click it.

INTRODUCTION

If you open a 3% interest-bearing money market account with \$100 in January, and make deposits of \$100 each month, how much money will you have at the end of the year? Excel can help you calculate the future value of an amount of money, based on a constant interest rate, over a specific number of periods, in which you make a constant payment.

TIP

Function arguments help
If you need help while you are inputting your function arguments, click the **Help on this function** link in the bottom-left corner of the Function Arguments dialog box.



- 5 In the **Rate** field, type the interest rate per period. For example, type **3%/12** for monthly accrual on a 3% interest-bearing account.
- 6 In the **Nper** field, type the total number of payments for the investment (in this example, **12** deposits).
- 7 In the **Pmt** field, type the amount to be paid in each deposit—in this case, **-100**. Click **OK**.
- 8 Excel calculates the future investment value and inserts it in the resultant cell.

End



TIP

Negative payments

Because you are making a payment with each deposit, you need to make sure the **Pmt** argument is a negative value.

Start

Fixing the ##### Error

Microsoft Office Excel 2003 - Book3

	A	B	C	D	E	F
1						
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00	
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00	
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00	
6						
7	Total	\$ 58,000.00	\$ 76,000.00	#####	\$ 77,000.00	
8						
9						

Click & Drag

1

2 Drop

Microsoft Office Excel 2003 - Book3

	A	B	C	D	E	F
1						
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00	
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00	
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00	
6						
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00	
8						

- 1 If one of the cells in your worksheet contains the ##### error, click on the cell's column border and drag it to increase the column width.
- 2 Drop the column border and the error disappears, and the cell's actual data is displayed.

End

INTRODUCTION

Excel notifies you when there are errors in your data by displaying different error descriptions in the cell that contains the error. For example, when a cell contains the value #####, it means that the column that contains that value is not wide enough to display the actual data. Simply widen the column to see the cell's contents.

TIP

Beginning with larger columns

It is a good idea to start out with columns that are larger than you need. Then you can decrease their size while you are formatting the worksheet.

TIP

AutoFitting column widths

To automatically make an entire column (or multiple columns) fit the width of the widest cell in that column (or columns), move the cursor over the right side of the column header and double-click when the cursor changes to a two-headed arrow.

Fixing the #DIV/0! Error

Start

Microsoft Office Excel 2003 - Book3

	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00
8	Count	3	3	3	3
9	Average	=SUM(B7/B6)	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67
10					



Microsoft Office Excel 2003 - Book3

	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00
8	Count	3	3	3	3
9	Average	#DIV/0!	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67
10					
11					



Microsoft Office Excel 2003 - Book3

	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00
8	Count	3	3	3	3
9	Average	=SUM(B7/B8)	\$ 37,666.67	\$ 25,666.67	
10					
11					

3

Microsoft Office Excel 2003 - Book3

	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00
8	Count	3	3	3	3
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67
10					
11					

4

- 1 In the cell you want to use as the resultant cell, type a formula to obtain an average, for example, type **=SUM(B7/B6)** in cell B9 and press **Enter**.
- 2 If one of the cells in your worksheet now contains the **#DIV/0!** error, locate the empty cell referenced by the formula (in this case, cell **B6**).
- 3 Click on the resultant cell (here, **B9**), press **F2** on the keyboard, and retype the formula to omit the empty cell—in this case, **=(B7/B8)**—and press **Enter**.
- 4 The error disappears because it is no longer trying to divide a number by an empty cell.

End

Excel notifies you when there are errors in your data by displaying different error descriptions in the cell that contains the error. For example, when a cell contains the **#DIV/0!** error, it means that the formula is trying to divide a number by 0, or by an empty cell.

Pressing the Delete key
In this example, you could also press the **Delete** key in cell B9 to remove the formula.

Start

Fixing the #NAME? Error

	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00
8	Count	=CNT(B3:B5)	3	3	3
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67
10					



	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00
8	Count	#NAME?	3	3	3
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67
10					



	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00
8	Count	=COUNT(B3:B5)	3	3	3
9	Average	COUNT(value1, [value2], ...)	\$ 37,666.67	\$ 25,666.67	
10					

4

	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00
8	Count	3	3	3	3
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67
10					

- 1 In the cell you want to use as the resultant cell, type the formula you want to use in your calculation. For example, type **=CNT(B3:B5)** in cell B8 and press **Enter**.
- 2 In this case, you get the **#NAME?** error because **CNT** is not the correct spelling for the referenced function; it is **COUNT**.
- 3 Click on the resultant cell (here, **B8**), press **F2** on the keyboard, and retype the formula—in this case, **=COUNT(B3:B5)**—and press **Enter**.
- 4 The error disappears because the function is spelled correctly.

End

Excel notifies you when there are errors in your data by displaying different error descriptions in the cell that contains the error. For example, when a cell contains a #NAME? error, it means the formula contains an incorrectly spelled cell or function name.

TIP

Using the Paste Function dialog box

The Paste Function dialog box offers many functions. Practice using different functions and see the results you get from your calculations. As you experiment, you can move the Paste Function dialog box around or collapse it to see your cells.

Fixing the #VALUE! Error

Start

Microsoft Office Excel 2003 - Book3

File Edit View Insert Format Tools Data Window Help

Arial 10 B I U

	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	=SUM(B2+B3+B4+B5)		\$ 113,000.00	\$ 77,000.00
8	Count	3		3	3
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67
10					

1



3



Microsoft Office Excel 2003 - Book3

File Edit View Insert Format Tools Data Window Help

Arial 10 B I U

	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	=SUM(B3+B4+B5)		\$ 113,000.00	\$ 77,000.00
8	Count	3	3	3	3
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67
10					

Microsoft Office Excel 2003 - Book3

File Edit View Insert Format Tools Data Window Help

Arial 10 B I U

	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	#VALUE!	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00
8	Count	3	3	3	3
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67
10					
11					

2

4

Microsoft Office Excel 2003 - Book3

File Edit View Insert Format Tools Data Window Help

Arial 10 B I U

	A	B	C	D	E
1					
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00
6					
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00
8	Count	3	3	3	3
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67
10					

- 1 In the cell you want to use as the resultant cell, type the formula you want to use in your calculation. For example, type **=SUM(B2+B3+B4+B5)** in cell **B7**, and press **Enter**.
- 2 In this case, you get the **#VALUE!** error because the value in cell B2 is textual, not numeric. You won't get the error if you enter **=SUM(B2:B5)** instead of the plus signs.
- 3 Click on the resultant cell (here, **B7**), press **F2** on the keyboard, and retype the formula—in this case, **=SUM(B3+B4+B5)**—and press **Enter**.
- 4 The error disappears because all cells are numeric.

End

INTRODUCTION

Excel notifies you when there are errors in your data by displaying different error descriptions in the cell that contains the error. For example, when a cell contains a **#VALUE?** value, it means the formula contains nonnumeric data or cell or function names that cannot be used in the calculation.

TIP

Overwriting cells

See the task "Overwriting and Deleting Data" in Part 3 to make sure you are overwriting data in cells correctly.

Recognizing the #REF! Error

Start

The figure consists of four screenshots of Microsoft Office Excel 2003, illustrating the process of recognizing and resolving a #REF! error.

Step 1: The spreadsheet shows a formula `=SUM(B3+C3+D3+E3)` in cell G3. The data is as follows:

	A	B	C	D	E	F	G
1							
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter		TOTAL
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00		=SUM(B3+C3+D3+E3)
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00		
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00		

Step 2: A context menu is opened over column E, and 'Delete' is selected.

Step 3: The spreadsheet shows a #REF! error in cell G3.

	A	B	C	D	E	F	G
1							
2		1st Quarter	2nd Quarter	3rd Quarter	TOTAL		
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	#REF!		
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00			
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00			

Step 4: The error disappears after undoing the deletion.

	A	B	C	D	E	F	G
1							
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter		TOTAL
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00		\$ 105,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00		
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00		
6							
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00		
8	Count	3	3	3	3		
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67		
10							

- 1 In the cell you want to use as the resultant cell, type the formula you want to use in your calculation. For example, type `=SUM(B3+C3+D3+E3)` and press **Enter**.
- 2 Right-click one of the columns that contains a cell referenced in the formula you just typed (here, column **E**), and choose **Delete** from the shortcut menu that appears.
- 3 In this case, the **#REF!** error appears because the values in cells referenced in column **E** are no longer available in the formula. Click the **Undo** button to correct it.
- 4 The error disappears because the formula values are restored.

End

Excel notifies you when there are errors in your data by displaying different error descriptions in the cell that contains the error. For example, when a cell contains a #REF! error, it means the formula contains a reference to a cell that isn't valid. Frequently, this means you deleted a referenced cell. The best solution is to undo your action and review the cells involved in the formula.

TIP

Checking references

If after you undo what caused the #REF! error you want to find out what caused it, see the tasks "Checking for Formula References (Precedents)" and "Checking for Cell References (Dependents)" later in this part for more information on checking formula and cell references.

Recognizing Circular References

Start

1 Type the formula you want to use in your calculation. For example, type **=SUM(B4+C4+D4+E4+F4)** and press **Enter**.

2 Excel displays an error message, notifying you that the formula contains a circular reference. Click **OK**.

3 Click on the resultant cell, press **F2** on the keyboard, and retype your formula—in this case, **=SUM(B4+C4+D4+E4)**—and press **Enter**.

4 The error is fixed because the result cell no longer is in the calculation.

INTRODUCTION

Excel notifies you when there are errors in your data by displaying different error descriptions in the cell that contains the error. For example, you receive a circular reference error message when one of the cells you are referencing in your calculation is the cell in which you want the calculation to appear.

TIP

Circular reference toolbar
If you didn't intend to create a circular reference and you chose **OK** in the message box, the Circular Reference toolbar and Help will appear to assist you in correcting your actions.

End

Checking for Formula References (Precedents)

Start

1 Click

2 Click

3 Click

4

Click

	A	B	C	D	E	F	G
1							
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	TOTAL	
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00	\$ 105,000.00	
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00	\$ 110,000.00	
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00	\$ 109,000.00	
6							
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00	\$ 324,000.00	
8	Count	3	3	3	3		
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67	\$ 108,000.00	

	A	B	C	D	E	F	G
1							
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	TOTAL	
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00	\$ 105,000.00	
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00	\$ 110,000.00	
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00	\$ 109,000.00	
6							
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00	\$ 324,000.00	
8	Count	3	3	3	3		
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67	\$ 108,000.00	

	A	B	C	D	E	F	G
1							
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	TOTAL	
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00	\$ 105,000.00	
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00	\$ 110,000.00	
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00	\$ 109,000.00	
6							
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00	\$ 324,000.00	
8	Count	3	3	3	3		
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67	\$ 108,000.00	

- 1 Open the **Tools** menu, choose **Formula Auditing**, and select **Show Formula Auditing Toolbar**.
- 2 Click the cell you want to trace (this cell must contain a formula) and click the **Trace Precedents** button. Excel draws tracer arrows to the appropriate cells.
- 3 Click the **Trace Precedents** button again to see if there are any precedents for these calculations.
- 4 If additional precedents are present, Excel draws additional tracer arrows to the appropriate cells.

End

INTRODUCTION

One way to check a formula to see if it is referencing the correct cells is to select that formula and then trace all cells that are referenced in that formula. Cells that are referenced are called *precedents*.

TIP

Moving references

You can double-click the arrows to move from one reference to another. Click the **Remove Precedents Arrows** button on the Auditing toolbar to remove the arrows.

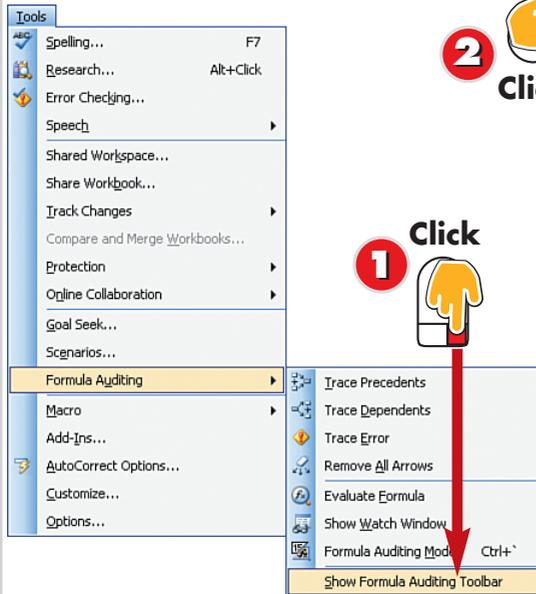
TIP

Closing the toolbar

Close the Auditing toolbar by clicking the **Close** button (x) in the upper-right corner of the toolbar.

Checking for Cell References (Dependents)

Start



	A	B	C	D	E	F
1						
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	TOTAL
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00	\$ 105,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00	\$ 110,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00	\$ 109,000.00
6						
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00	\$ 324,000.00
8	Count	3	3	3	3	
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67	\$ 108,000.00
10						
11						
12						
13						
14						



	A	B	C	D	E	F
1						
2		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	TOTAL
3	Region 1	\$ 15,000.00	\$ 14,000.00	\$ 44,000.00	\$ 32,000.00	\$ 105,000.00
4	Region 2	\$ 25,000.00	\$ 35,000.00	\$ 23,000.00	\$ 27,000.00	\$ 110,000.00
5	Region 3	\$ 18,000.00	\$ 27,000.00	\$ 46,000.00	\$ 18,000.00	\$ 109,000.00
6						
7	Total	\$ 58,000.00	\$ 76,000.00	\$ 113,000.00	\$ 77,000.00	\$ 324,000.00
8	Count	3	3	3	3	
9	Average	\$ 19,333.33	\$ 25,333.33	\$ 37,666.67	\$ 25,666.67	\$ 108,000.00
10						
11						
12						
13						
14						



- 1 Open the **Tools** menu, choose **Formula Auditing**, and select **Show Formula Auditing Toolbar**.
- 2 Click the cell you want to trace. This cell must *not* contain a formula.
- 3 Click the **Trace Dependents** button until the tracer arrows stop adding on to the appropriate cells.
- 4 Click the **Remove Dependents Arrows** button enough times to remove all the arrows (or click the **Remove All Arrows** button).

End

INTRODUCTION

When you trace a dependent, you start with a cell that is referenced in a formula and then trace all cells that reference this cell. This is another way to check if your formulas are correct. (If the cell is not referenced in a formula, you see an error message saying so.)

TIP

Closing the toolbar

Close the Auditing toolbar by clicking the **Close** button (x) in the upper-right corner of the toolbar.

TIP

Using Trace Errors

If the cell contains an error message, use the Trace Errors button to have Excel trace possible reasons for the error.