Referencing Cells Outside the Worksheet

Formulas can refer to cells in other worksheets —and the worksheets don't even have to be in the same workbook. Excel uses a special type of notation to handle these types of references.

Cells in Other Worksheets

To use a reference to a cell in another worksheet in the same workbook, use the following format:

SheetName!CellAddress

In other words, precede the cell address with the worksheet name, followed by an exclamation point. Here's an example of a formula that uses a cell on the Sheet2 worksheet:

=A1*Sheet2!A1

This formula multiplies the value in cell A1 on the current worksheet by the value in cell A1 on Sheet2.

If the worksheet name in the reference includes one or more spaces, you must enclose it in single quotation marks. For example, here's a formula that refers to a cell on a sheet named All Depts:

=A1*'All Depts'!A1

Cells in Other Workbooks

To refer to a cell in a different workbook, use this format:

=[WorkbookName]SheetName!CellAddress

In this case, the workbook name (in square brackets), the worksheet name, and an exclamation point precede the cell address. The following is an example of a formula that uses a cell reference in the Sheet1 worksheet in a workbook named Budget:

=[Budget.xls]Sheet1!A1

If the workbook name in the reference includes one or more spaces, you must enclose it (and the sheet name) in single quotation marks. For example, here's a formula that refers to a cell on Sheet1 in a workbook named Budget For 1999:

=A1*'[Budget For 1999]Sheet1'!A1

When a formula refers to cells in a different workbook, the other workbook doesn't need to be open. If the workbook is closed, you must add the complete path to the reference. Here's an example:

=A1*'C:\ MSOffice\Excel\[Budget For 1999]Sheet1'!A1

Absolute Versus Relative References

You need to be able to distinguish between *relative* and *absolute cell references*. By default, Excel creates relative cell references in formulas except when the formula includes cells in different worksheets or workbooks. The distinction becomes apparent when you copy a formula to another cell.

Relative References

Consider the formula, which uses default relative references, as follows:

Cell D2: =B2*C2

When you copy this formula to the two cells below it, Excel doesn't produce an exact copy of the formula; rather, it generates these formulas:

Cell D3: =B3*C3 **Cell D4:** =B4*C4 Excel adjusts the cell references to refer to the cells that are relative to the new formula. Think of it like this: The original formula contained instructions to multiply the value two cells to the left by the value one cell to the left. When you copy the cell, these *instructions* get copied, not the actual contents of the cell. Usually, this is exactly what you want. You certainly don't want to copy the formula verbatim; if you did, the new formulas would produce the same value as the original formula.

When you cut and paste a formula (move it to another location), the cell references in the formula aren't adjusted. Again, this is what you usually want to happen. When you move a formula, you generally want it to continue to refer to the original cells.

Absolute References

Sometimes, however, you *do* want a cell reference to be copied verbatim. In this example, cell B6 contains a sales tax rate. The formula in cell D2 is as follows:

=(B2*C2)*\$B\$6

Notice that the reference to cell B6 has dollar signs preceding the column letter and the row number. These dollar signs indicate to Excel that you want to use an absolute cell reference. When you copy this formula to the two cells below, Excel generates the following formulas:

Cell D3: =(B3*C3)*\$B\$6

Cell D4: =(B4*C4)*\$B\$6

In this case, the relative cell references were changed, but the reference to cell B6 wasn't changed, because it's an absolute reference.

Mixed References

An absolute reference uses two dollar signs in its address: one for the column letter and one for the row number. Excel also allows mixed references in which only one of the address parts is absolute.

Types of Cell Reference

Example Type

- A1 Relative reference
- \$A\$1 Absolute reference
- \$A1 Mixed reference (column letter is absolute)

A\$1 Mixed reference (row number is absolute)

When a Formula Returns an Error

Sometimes when you enter a formula, Excel displays a value that begins with a pound sign (#). This is a signal that the formula is returning an error value. You'll have to correct the formula (or correct a cell that the formula references) to get rid of the error display.

Excel often suggests a correction for an erroneous formula. If the entire cell is filled with pound characters, this means that the column isn't wide enough to display the value. You can either widen the column or change the number format of the cell.

Below is a list of the types of error values that may appear in a cell that has a formula. Formulas may return an error value if a cell to which they refer has an error value. This is known as the ripple effect —a single error value can make its way into lots of other cells that contain formulas that depend on the cell.

Excel Error Values

Liter Liter	
Error Value	Explanation
#DIV/0!	The formula is trying to divide by zero (an operation that's not allowed
	on this planet). This also occurs when the formula attempts to divide
	by a cell that is empty.
#NAME?	The formula uses a name that Excel doesn't recognize. This can
	happen if you delete a name that's used in the formula or if you have
	unmatched quotes when using text.
#N/A	The formula is referring (directly or indirectly) to a cell that uses the
	NA function to signal that data is not available.
#NULL!	The formula uses an intersection of two ranges that don't intersect (this
	concept is described later in the chapter).
#NUM!	A problem with a value exists; for example, you specified a negative
	number where a positive number is expected.
#REF!	The formula refers to a cell that isn't valid. This can happen if the cell
	has been deleted from the worksheet.
#VALUE!	The formula includes an argument or operand of the wrong type. An
	operand is a value or cell reference that a formula uses to calculate a
	result.

Advanced Naming Techniques

Sheet-Level Names

Usually, you can use a range name that you create anywhere within the workbook. In other words, names, by default, are "workbook level" names rather than "sheet level" names. But what if you have several worksheets in a workbook and you want to use the same name (such as Dept_Total) on each sheet? In this case, you need to create sheet-level names.

To define the name Dept_Total in more than one worksheet, activate the worksheet in which you want to define the name, choose

Insert Name Define

and then, in the Names in workbook box, precede the name with the worksheet name and an exclamation point. For example, to define the name Dept_Total on Sheet2, activate Sheet2 and enter the following in the Define Name dialog box:

Sheet2!Dept_Total

If the worksheet name contains at least one space, enclose the worksheet name in single quotation marks, like this:

'Adv Dept'!Dept_Total

You also can create a sheet-level name by using the Name box (located at the left side of the formula bar). Select the cell or range, click in the Name box, and enter the name, preceded by the sheet's name and an exclamation point (as shown previously). Press Enter to create the name.

When you write a formula that uses a sheet-level name on the sheet in which it's defined, you don't need to include the worksheet name in the range name (the Name box won't display the worksheet name either). If you use the name in a formula on a

different worksheet, however, you must use the entire name (sheet name, exclamation point, and name).

Only the sheet-level names on the current sheet appear in the Name box. Similarly, only sheet-level names in the current sheet appear in the list when you open the Paste Name or Define Name dialog boxes.

Using sheet-level names can become complicated if you have an identical book-level name and sheet-level name (yes, Excel does allow this). In such a case, the sheet-level name takes precedence over the book-level name —but only in the worksheet in which you defined the sheet-level name. For example, you might have defined a book-level name of Total for a cell on Sheet1. You also can define a sheet-level name of Total (in, say Sheet2). When Sheet2 is active, Total refers to the sheet-level name.

When any other sheet is active, Total refers to the book-level name. You can refer to a sheet-level name in a different worksheet, however, by preceding the name with the worksheet name and an exclamation point (such as Sheet1!Total). To make your life easier, just avoid using the same name at the book level and sheet level.

Using Multisheet Names

Names even can extend into the third dimension; that is, they can extend across multiple worksheets in a workbook. You can't simply select the multisheet range and enter a name in the Name box, however. Excel makes you do a little additional work to define a multisheet name.

You must use the Define Name dialog box to create a multisheet name, and you must enter the reference in the Refers to box manually. The format for a multisheet reference is as follows:

FirstSheet:LastSheet!RangeReference

After the name is defined, you can use it in formulas. This name won't appear in the Name box, however, or in the Go To dialog box. In other words, Excel lets you define the name, but it doesn't give you a way to select automatically the cells to which the name refers.

Naming Constants

Even many advanced Excel users don't realize that you can give a name to an item that doesn't even appear in a cell. For example, if formulas in your worksheet use a sales tax rate, you would probably insert the tax rate value into a cell and use this cell reference in your formulas. To make things easier, you would probably also name this cell something like SalesTax.

Here's another way to do it: Choose

Insert Name Define

(or press Ctrl+F3) to bring up the Define Name dialog box. Enter the name (in this case, **SalesTa**x) into the Names in workbook field. Then, click the Refers to box, delete its contents, and replace it with a value such as **.075**. Don't precede the constant with an equal sign. Click OK to close the dialog box.

You just created a name that refers to a constant rather than a cell or range. If you type =**SalesTax** into a cell, this simple formula returns .075 —the constant that you defined. You also can use this constant in a formula such as

=A1*SalesTax.

As with all names, named constants are stored with the workbook. They can be used on any worksheet in the workbook.

In the preceding example, the constant was a value. A constant also can be text, however. For example, you can define a constant for your company's name. If you work for Microsoft, you can define the name MS for Microsoft Corporation. Named constants don't appear in the Name box or in the Go To dialog box — which makes sense, because these constants don't reside anywhere tangible. They do appear in the Paste Names dialog box, however, which *does* make sense, because you'll use these names in formulas.

As you might expect, you can change the value of the constant by accessing the Define Name dialog box and simply changing the value in the Refers to box. When you close the dialog box, Excel uses the new value to recalculate the formulas that use this name.

Although this technique is useful in many situations, the value is rather difficult to change. Having a constant located in a cell makes it much easier to modify. If the value is truly a "constant," however, you won't need to change it.

Naming Formulas

This section takes the preceding section to the next logical level: naming formulas.

The name MonthlyRate refers to the following formula:

=Sheet3!\$B\$1/12

When you use the name MonthlyRate in a formula, it uses the value in B1 divided by 12. Notice that the cell reference is an absolute reference.

Naming formulas gets more interesting when you use relative references rather than absolute references. When you use the pointing technique to create a formula in the Refers to box, Excel always uses absolute cell references, which is unlike its behavior when you create a formula in a cell.

The name Power has been created for the following formula:

=Sheet1!A1^Sheet1!B1

Cell C1 is the active cell, which is very important. When you use this named formula in a worksheet, the cell references are always relative to the cell that contains the name. For example, if you enter

=POWER into cell D12, cell D12

displays the result of B12 raised to the power of the value contained in cell C12.