QUICK**FACTS**

UNDERSTANDING CELL REFERENCING TYPES

There are three basic methods and one extended method for referencing cells used in formulas that adhere to the Excel default "A1" cell reference scheme used in this book.

- **Relative references** in formulas move with cells as cells are copied or moved around a worksheet. This is the most flexible and common way to use cell references, and is the Excel default, displayed as A1 in the worksheet and Formula bar. For example, if you sum a list of revenue items for the first quarter, =SUM(B5:B8), and then copy and paste that summary cell to the summary cells for the other three quarters, Excel will deduce that you want the totals for the other quarters to be =SUM(C5:C8), =SUM(D5:D8), and =SUM(E5:E8). Figure 4-1 shows how this appears on the worksheet.

- **Absolute references** do not change cell addresses when you copy or move formulas. Absolute references are displayed in the worksheet and Formula bar with the dollar sign preceding the reference, for example, A1.

- **Mixed references** include one relative and one absolute cell reference. Such references are displayed in the worksheet and Formula bar with a dollar sign preceding the absolute reference but no dollar sign before the relative reference. For example, $A1 indicates absolute column, relative row; A$1 indicates relative column, absolute row.

- **External (or 3-D) references** are an extended form of relative, absolute, and mixed cell references. They are used when referencing cells from other worksheets or workbooks. Such a reference might look like this in the worksheet and Formula bar: [*workbook name*]*worksheet name*!A1.

Reference Cells

Formulas typically make use of data already entered in worksheets and need a scheme to locate, or *reference,* that data. Shortcuts are used to help you recall addresses as well as a *syntax*, or set of rules, to communicate to Excel how you want cells used.

Change Cell References

To change cell referencing:

1. Select the cell that contains the formula reference you want to change.

2. In the Formula bar, select the cell address, and press **F4** to switch the cell referencing, starting from a relative reference to the following in this order:

   - Absolute (A1)
   - Mixed (relative column, absolute row) (A$1)
   - Mixed (absolute column, relative row) ($A1)
   - Relative (A1)

   –Or–

   Edit the cell address by entering or removing the dollar symbol ($) in front of row and/or column identifiers.

Change to R1C1 References

You can change the A1 cell referencing scheme used by Excel to an older style that identifies both rows and columns numerically, starting in the upper-left corner of the worksheet, rows first, and adds a leading *R* and *C* for clarification. For example, cell B4 in R1C1 reference style is R4C2.

1. Click the **File** tab, click **Options**, and click the **Formulas** option.

2. Under Working With Formulas, click the **R1C1 Reference Style** check box.

3. Click **OK** when finished.
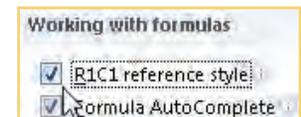
Working with formulas
☑ R1C1 reference style
☑ Formula AutoComplete

Name Cells

You can name a cell (MonthTotal, for example) or a range to refer to physical cell addresses, and then use the names when referencing the cell in formulas and functions. Names are more descriptive, easier to remember, and often quicker to enter than A1-style cell references. You can name a cell directly on the worksheet, use a dialog box and provide amplifying information, or use column or row names.

NAME A CELL OR RANGE DIRECTLY

1. Select the cells you want to reference.

2. Click the **Name** box at the left end of the Formula bar.
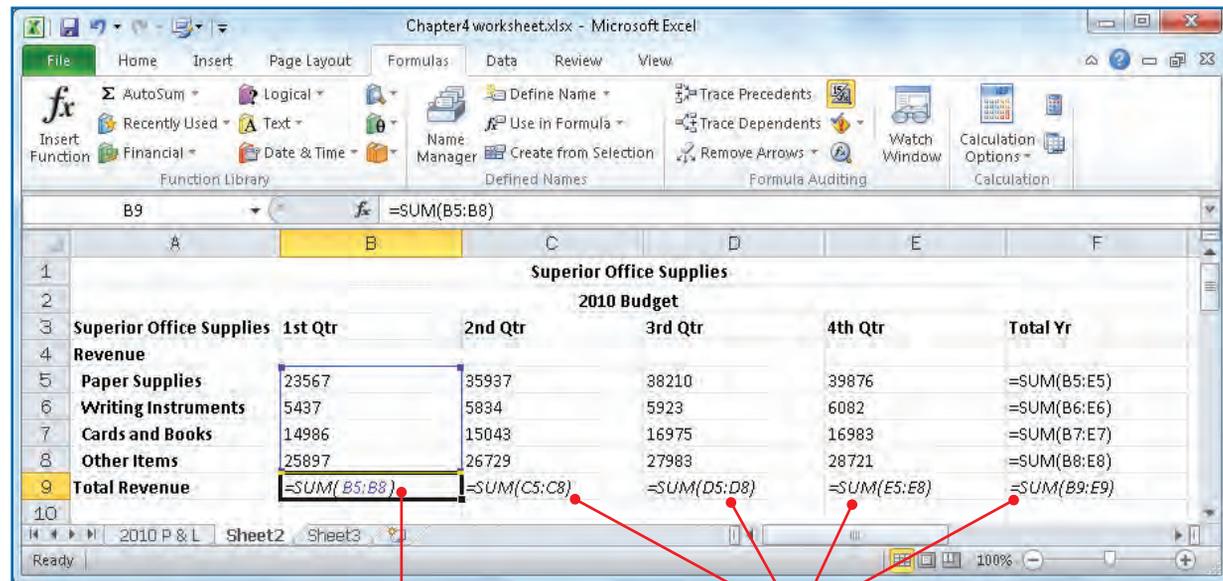
Copying B9, which sums B5 through B8…

…and pasting into C9, D9, E9, and F9 provides correct cell addresses for each column total

Figure 4-1: Using relative references, Excel logically assumes cell addresses in copied formulas.

TIP

Absolute cell references are typically used when you want to copy the values of cells and are not interested in applying their formulas to other cells, such as in a summary or report where the relative references would be meaningless. Though you can apply absolute reference syntax to each cell reference, a faster way is to right-click the destination cell. Under Paste Options, click the **Values** 123 option. See "Copy Formulas" later in the chapter for more information on copying and pasting formulas.

TIP

If a cell or range name is longer than what can be displayed in the Name box, increase the width of the Name box by dragging the circle in the arc forming its right boundary to the right.

CAUTION

Cell names need to adhere to a set of rules. Names are case-sensitive, and no spaces are allowed in a cell name, although multiple words can be joined by an underscore or period. Also, names must start with a letter, underscore (_), or backslash (\).

3. Type a name (see the accompanying Caution for naming rules), and press **ENTER**. (See "Use the Name Manager" for ways to modify cell names.)
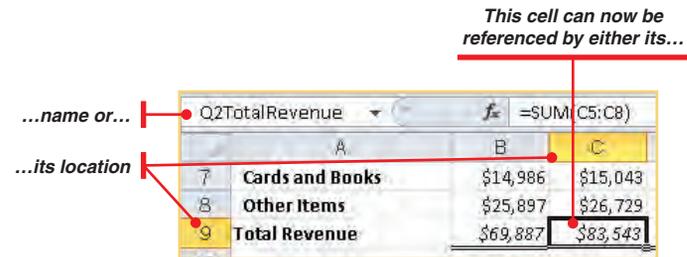
NAME A CELL OR RANGE IN A DIALOG BOX

1. Select the cells you want to reference.

2. In the Formulas tab Defined Names group, click **Define Name**.

–Or–

Right-click the selection and click **Define Name**.

In the either case, the New Name dialog box appears, shown in Figure 4-2.

3. Type a name for the cell or range (see the accompanying Caution for naming rules).

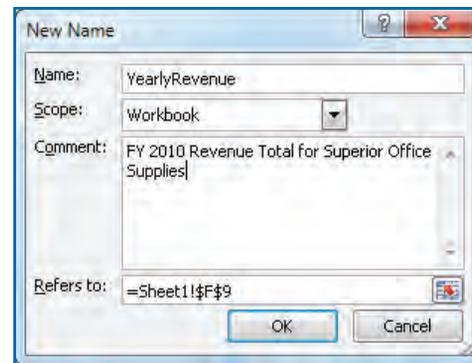**4.** Click the **Scope** down arrow, and select whether the name applies to the entire workbook or to one of its worksheets.

Figure 4-2: You can easily name cells and add descriptive information.

QUICKSTEPS

USING CELL REFERENCE OPERATORS

Cell reference operators (colons, commas, and spaces used in an address, such as E5:E10 E16:E17,E12) provide the syntax for referencing cell ranges, unions, and intersections.

REFERENCE A RANGE

A *range* defines a block of cells.

Type a colon (:) between the upper-leftmost cell and the lower-rightmost cell (for example, B5:C8).

REFERENCE A UNION

A *union* joins multiple cell references.

Type a comma (,) between separate cell references (for example, B5,B7,C6).

REFERENCE AN INTERSECTION

An *intersection* is the overlapping, or common, cells in two ranges.

Type a space (press the **SPACEBAR**) between two range-cell references (for example, B5:B8 B7:C8). B7 and B8 are the common cells (and are summed in this example).

5. If desired, type a comment that more fully explains the meaning of the named cells. Comments can be upwards of 1,000 characters and will appear as a tooltip when the name is used in formulas and functions.
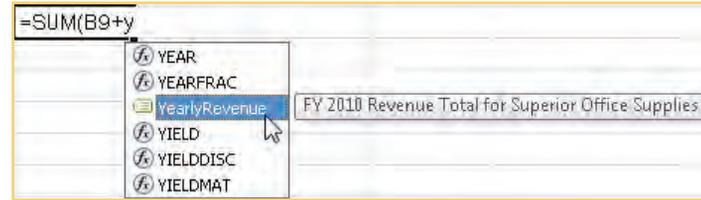
6. If you want to modify the cell or cells to be named, click the **Refers To** text box, and type the reference (starting with the equal [=] sign), or reselect the cells from the worksheet.

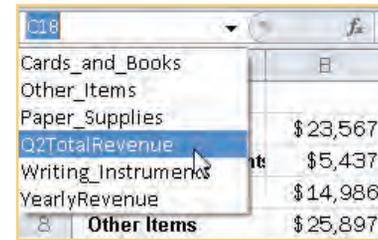**7.** Click **OK** when finished.

Go to a Named Cell

Named cells are quickly found and selected for you.

Click the **Name** box down arrow to open the drop-down list, and click the named cell or range you want to go to.

–Or–

In the Home tab Editing group, click **Find & Select** and click **Go To**. In the Go To dialog box, double-click the named cell or range you want to go to.

Use the Name Manager

Excel provides several related tools and a Name Manager to help you manage and organize your named cells. To open the Name Manager:

In the Formulas tab Defined Names group, click **Name Manager**. The Name Manager window opens, as shown in Figure 4-3, listing all named cells in the workbook.
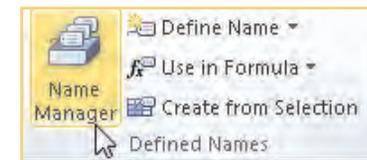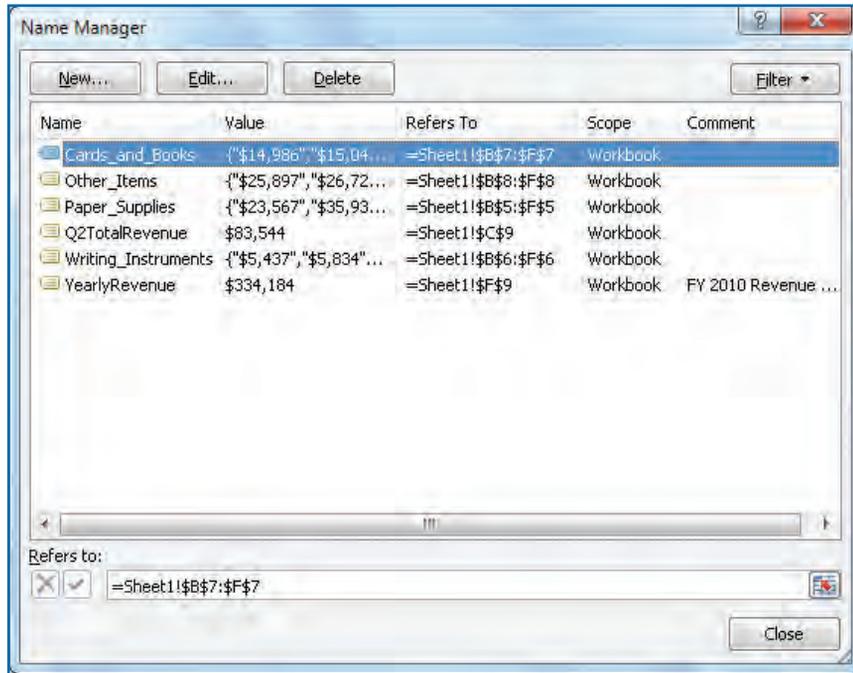
Figure 4-3: The Name Manager provides a central location for organizing, creating, and modifying named cells.

CHANGE CELL NAMES

1. Select the name of the cell reference whose parameters you want to change, and click **Edit**.

2. In the Edit Name dialog box, type a new name, add or change the comment, and/or modify the cell reference (you cannot change the scope). Click **OK** when finished.

DELETE NAMED CELLS

1. Select the name of the cell reference that you want to delete (to select more than one cell name to delete, hold down the **CTRL** key while clicking noncontiguous names in the list; or select the first name in a contiguous range, and hold down **SHIFT** while clicking the last name in the range).

**2.** Click **Delete** and click **OK** to confirm the deletion.

SORT AND FILTER NAMED CELLS

If you have several named cells in a workbook, you can easily view only the ones you are interested in.

1. To sort named cells, click a column heading to change the sort order from ascending (numerals first 0–9, then A–Z) to descending (Z–A, numerals last 9–0). Click the heading a second time to return to the original order.

–Or–

To see only specific categories of named cells, click **Filter** and click the category of named cells you want to see. Only named cells that belong in the category you select will appear in the list of cell names.
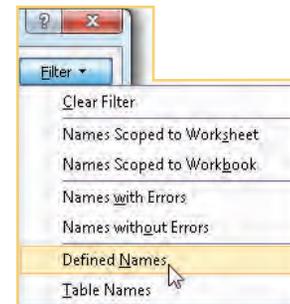
2. To return a filtered list to a complete list of named cells, click **Filter** and click **Clear Filter**.

TIP

To quickly open the Name Manager, press **CTRL**+**F3** or add the Name Manager icon to the Quick Access toolbar. (Chapter 1 describes how to add tools to the Quick Access toolbar.)

TIP

Excel provides several concessions for users who are transitioning to Excel from Lotus 1-2-3. For example, when creating a formula, you can type a plus sign (+) instead of the equal sign to denote a formula. Excel will change the plus sign to an equal sign if a number follows it, or Excel will add the equal sign to a plus sign that is followed by a cell reference. In any case, be sure not to type a leading space before either the plus or the equal sign, as the characters that follow will be interpreted as text instead of as a formula. To enable Lotus transitioning, click the **File** tab, click **Options**, and click the **Advanced** option. Under the two Lotus Compatibility areas at the bottom of the page, select the options you want and whether they apply to specific sheets or the entire workbook. Click **OK** when finished.

VIEW MORE DATA

The default width of the Name Manager and its columns might not readily display longer cell names, references, or comments.

- To increase a column width, drag the right border of the column heading to the right as far as you need.
- To increase the width of the window, drag either the window's right or left border to the left or right, respectively.

Build Formulas

Formulas are mathematical equations that combine *values* and *cell references* with *operators* to calculate a result. Values are actual numbers or logical values, such as True and False, or the contents of cells that contain numbers or logical values. Cell references point to cells whose values are to be used, for example, E5:E10, E12, and MonthlyTot. Operators, such as + (add), > (greater than), and ^ (use an exponent), tell Excel what type of calculation to perform or logical comparison to apply. Prebuilt formulas, or *functions*, that return a value also can be used in formulas. (Functions are described later in this chapter.)

Create a Formula

You create formulas by either entering or referencing values. The character that tells Excel to perform a calculation is the equal sign (=), and it must precede any combination of values, cell references, and operators.

Excel formulas are calculated from left to right according to an ordered hierarchy of operators. For example, exponents precede multiplication and division, which precede addition and subtraction. You can alter the calculation order (and results) by using parentheses; Excel performs the calculation within the innermost parentheses first. For example, =12+48/24 returns 14 (48 is divided by 24, resulting in 2; then 12 is added to 2). Using parentheses, =(12+48)/24 returns 2.5 (12 is added to 48, resulting in 60; then 60 is divided by 24).