

# Excel 2007 Cell References

## Cell References

Cell references are the basic building blocks of the formulas and functions you will use in Excel. Notice that each column of a spreadsheet is assigned a letter and each row of a spreadsheet is assigned a number. **Each cell in a spreadsheet can be uniquely identified by referring to the column letter and row number that the cell is in.**

	A	B	C
1	4	16	
2	8	23	
3	15	42	
4			

Figure 1

In this example, the number 42 is entered in **column B** and in **row 3**. The cell reference for this cell is **B3**.

The value stored in cell **A1** is 4. The value stored in cell **A2** is 8. **An Excel cell reference always names the column letter first, followed by the row number.**

Cell references can get a little more involved than this, but this is the basic idea: **You can refer to a cell by its column letter and row number.**

**You can use cell references as variables in the formulas and functions** that you set up in your spreadsheet, and the values stored in the referenced cells will be used in the calculation. The example in Figure 2 shows some formulas and functions that use cell references. Figure 3 shows the results of those formulas and functions.

	A	B	C
1	4	16	=B1/A1
2	8	23	=A2*B2
3	15	42	=(B3-A3)*10
4	=SUM(A1:A3)	=AVERAGE(B1:B3)	

Figure 2

	A	B	C
1	4	16	4
2	8	23	184
3	15	42	270
4	27	27	

Figure 3

Taking a closer look at some of what is going on here in Figure 2:

- The formula in cell **C1** says, "Take the contents of cell **B1** and divide it by the contents of cell **A1**, and display the results." The value 16 in cell **B1** is divided by the value 4 from cell **A1**, and the result, 4, is displayed in cell **C1**.
- The function in cell **B4** says, "Take the average of all the values stored within the range of cells that starts at cell **B1** and ends at cell **B3**, and display the results." The values in cell **B1**, **B2**, and **B3** (16, 23, and 42) are averaged, and the result, 27, is displayed in cell **B4**.

## The Different Types of Cell References

There are a few different types of cell references that you can use in Excel: **relative cell references**, **absolute cell references**, and **mixed cell references**. The differences between these different types of cell references only come into play when you are copying a formula or function to a new cell. If are entering a formula that is not going to be copied, it would not make any difference which cell reference type you chose.

## Relative Cell References

The most commonly used of the cell reference types is the relative cell reference. When you type a cell reference using just the column letter and row number, you are using a relative reference. When a formula with a relative reference in it is copied to a new cell, the reference “moves” the same distance that the copied formula moves. Look at the example in Figures 4 -7:

	A	B	C
1	4	16	=A1+B1
2	8	23	
3	15	42	

Figure 4

	A	B	C
1	4	16	20
2	8	23	
3	15	42	

Figure 5

	A	B	C
1	4	16	20
2	8	23	31
3	15	42	57

Figure 6

In Figure 4, The formula =A1+B1 is typed into cell C1. Figure 5 shows the result of that formula, 20. That formula is copied, using the fill handle, to cells C2 and C3. Figure 6 shows the results, after the formula has been copied.

	A	B	C
1	4	16	20
2	8	23	31
3	15	42	=A3+B3

Figure 7

In Figure 7, Notice that what ends up in the new cells isn't exactly what was originally typed. The formula =A1+B1 was typed in cell C1, but what ends up in cell C3 is the formula =A3+B3. The formula was copied down two cells, from cell C1 to cell C3. The cell references used in the formula moved down two cells also. A1 became A3, and B1 became B3.

When it comes to copying formulas, Excel understands a relative cell references like this: “Take the value stored two cells to the left of the current cell and add it to the value stored one cell to the left of the current cell, and display the results.” The “current cell” in the example is cell C1, the cell two to the left of that is cell A1, and the cell one to the left of that is cell B1. When the formula is copied to a new location, Excel references whatever cells are two to the left and one to the left of location the formula is copied to.

If you copy a formula three cells to the right, and two cells down, the relative cell references in the formula move three cells to the right, and two cells down. Everything stays the same relative distance from the cell with the formula in it.

**Tip:** Selecting a cell with a formula in it, and then clicking within the formula bar, highlights the cells that are referenced within the formula with different colored borders, as shown in Figures 4 and 7.

## Absolute Cell References

There are times when you are copying a formula that you do not want Excel to change certain cell references when the formula is pasted in the new location. Absolute Cell References don't change when a formula is copied and pasted; the location they refer to always stays the same even though the formula moves to a new cell. A dollar sign is typed before the column letter and before the row number to indicate that the cell reference is an absolute reference (for example: \$B\$2).

The example shown in Figures 8 – 11 on the next page gives a scenario where an absolute reference comes in handy. A company wants to give each employee a bonus this month. The bonus for each employee is calculated by multiplying their salary for the month times the bonus percentage.

	A	B	C
1	Bonus %	5%	
2	name	Salary	Bonus
3	Jones	3000	=B3*\$B\$1
4	Lee	3500	
5	Smith	3300	

Figure 8

	A	B	C
1	Bonus %	5%	
2	name	Salary	Bonus
3	Jones	3000	150
4	Lee	3500	
5	Smith	3300	

Figure 9

	A	B	C
1	Bonus %	5%	
2	name	Salary	Bonus
3	Jones	3000	150
4	Lee	3500	175
5	Smith	3300	165

Figure 10

In Figure 8, the formula =B3\*\$B\$1 is entered into cell C3. This formula uses one relative reference (B3), and one absolute reference (\$B\$1). Figure 9 shows the result of the formula, 150. That formula from cell C3 was copied to cells C4 and C5 using the fill handle. Figure 10 shows the results, after the formula has been copied.

	A	B	C
1	Bonus %	5%	
2	name	Salary	Bonus
3	Jones	3000	150
4	Lee	3500	175
5	Smith	3300	=B5*\$B\$1

Figure 11

Figure 11 shows the formula that ended up in cell C5. The cell reference B3 that was originally typed has changed to B5 when the formula was copied and pasted. The formula moved down two cells, so the relative cell reference moved down two cells. Because an absolute cell reference was used for cell B1, that cell reference stayed fixed in place when the formula moved.

	A	B	C
1	Bonus %	5%	
2	name	Salary	Bonus
3	Jones	3000	150
4	Lee	3500	#VALUE!
5	Smith	3300	9900000

Figure 12

Figure 12 shows what would have happened if an absolute reference had not been used in the original formula entered in cell C3. If the formula had just been entered as =B3\*B1, the result in cell C3 would have still been correct. But when the formula was copied to cells C4 and C5, you get incorrect results. The formula that ends up in cell C4 is =B4\*B2 (that's 3500 times the word Salary, which results in an error message). The formula that ends up in cell C5 is =B5\*B3 (that's Jones's salary times Smith's salary, giving Smith a bonus of 9900000).

## Mixed Cell References

With Mixed Cell References, you can set the column so that it stays fixed in place when the formula is copied and pasted, leaving the row free to move in relation where the formula has moved to. Or you can set the row so it stays fixed in place and leave the column free to move. A mixed reference is typed with column letter and row number with one dollar sign placed in front of either the letter or the number (Examples: \$A5 and B\$3).

When a formula containing the mixed cell reference \$A5 is copied to a new location, it will always refer to column A, but the row number will move the same distance the formula moved.

When a formula containing the mixed cell reference B\$3 is copied to a new location, it will always refer to row 3, but the column letter will move the same distance that the formula moved.

## Toggling Between Relative, Absolute, and Mixed References

Pressing the f4 key on your keyboard lets you toggle between the different types of cell references. Pressing the f4 key once changes a relative reference to an absolute reference. As you continue to press the f4 key, it toggles through the reference types (absolute, mixed, mixed, relative, absolute, etc.). Press

the F4 just after you have typed a cell reference, or position the cursor back on a cell reference you typed previously, to use F4 to change the reference type for that reference.

## Referencing a Cell from Another Worksheet

Excel allows you to build formulas and functions that reference data stored on different worksheets within the same Excel workbook. So you can be on Sheet2, and refer back to a cell on Sheet1. When referring to a cell on a different sheet, you type the name of the sheet followed by an exclamation point (!) and then the column letter and row number.

If you are on Sheet2 and want to refer back to cell C4 on Sheet 1, the reference would look like this: **Sheet1!C4**.

If you are on a sheet named July, and you want to refer back to cell B7 on a sheet named June, the reference would look like this: **June!B7**. If you wanted to make that an absolute reference, it would look like this: **June!\$B\$7**.

It can get a little cumbersome to type these references into a formula or function. Excel lets you select cells that you want to include in your formula, and enters in the proper cell reference for you. Once you have begun typing a formula by typing an equal sign in the cell, you can click on the tab to move to a different worksheet, and then select the cell on that worksheet that you want to reference. The cell reference, complete with sheet name, will be entered in the formula that you were working on.

## Referencing a Cell from Another Workbook

Excel also allows you to reference data that is stored on a sheet in a different workbook (a different Excel file).

A cell reference to a different Excel workbook looks like this:

**[Book1]Sheet1!\$E\$8**

That's the workbook name in brackets, the sheet name followed by an exclamation point, and then the cell reference.

Once you have begun typing a formula by typing an equal sign in a cell, you can switch to the workbook you want to reference, click on the sheet you want to reference, and click on the cell you want to reference; Excel will enter in the properly formatted cell reference for you.