

Lesson 2:

Using Formulas for Excel Calculations

The following activity provides further information about how to use formulas in Excel calculations. If you have access to the program, you should do the activities as you read. This will enhance your understanding of each step.

These exercises build on the *Example1* worksheet created in Lesson 1. If you do not have access to that worksheet, you should begin by creating the worksheet as shown in the figure in step 1.

1. Expanding the "sales" table in worksheet *Example1*.

Recall that our worksheet *Example1* computes the total sales for a six month period (see figure below). In the Lesson 2 activities, we will expand this table to include sales from three separate sales regions and then compute

- six-month totals for each region,
- totals from all regions for each month, and
- an overall total sales figure

We begin by changing the column heading to reflect our intended addition of data for sales in three regions. To do this we simply click in the appropriate cell (B2 in our example), then edit the text. The figure below illustrates.

Notice in the figure that we need to expand the available space for text in column B to accommodate the new label. To do that, we simply place the cursor at the boundary between column B and C in the column label row so that it becomes a double arrow icon, as illustrated in the figure. Then we just drag to the right to expand the column width.

	A	B	C	D	E	F	G
1							
2	Month	Sales- Region1					
3	Jan	\$ 22,876.00					
4	Feb	\$ 32,222.00					
5	Mar	\$ 14,321.00					
6	Apr	\$ 13,423.00					
7	May	\$ 15,532.00					
8	Jun	\$ 19,087.00					
9							
10	Total	\$117,461.00					
11							
12							

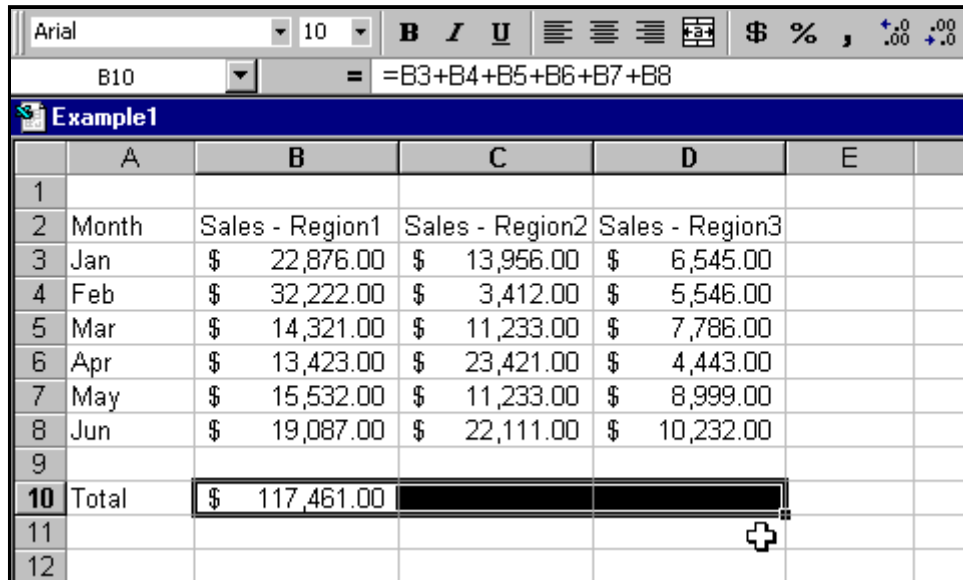
2. Adding additional data and expanding our six-month total formula.

The following figure shows more text and numerical data entered into our example worksheet. Notice that columns C and D have been widened (as was column B in Step 1) to accommodate the label text in row 2. Notice also that the newly entered numerical data has been formatted as currency (review Lesson 1 if necessary for this).

Now we wish to compute the six-month sales totals for Regions 2 and 3. We could enter formulas in a way similar to the way we entered the formula to compute the total in column B (in Lesson 1). However, there is a much easier and less error-prone way to accomplish this.

Note that the formulas for cells C10 and D10 are very similar to the formula in cell B10. The calculation to be performed is the same except for the column in which it occurs. The spreadsheet makes it easy to exploit this similarity. We can simply duplicate the formula in cell B10 within cells C10 and D10, with appropriate changes to reflect the change in column. This process is called **formula replication**, and it is one of the most important and fundamental spreadsheet operations.

To accomplish the required formula replication (to adjacent cells to the right), we first select the cell where the formula resides, then drag to the right selecting the "target" cells. This is illustrated in the figure below.

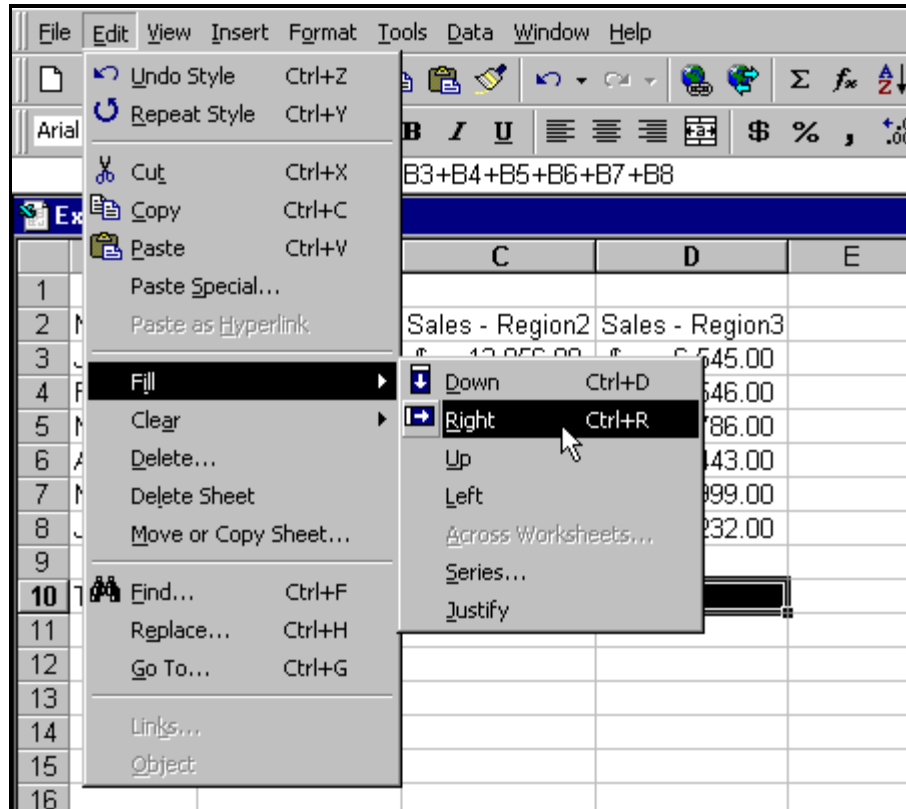


The screenshot shows a spreadsheet window titled "Example1". The formula bar at the top displays the formula `=B3+B4+B5+B6+B7+B8` for cell B10. The spreadsheet grid has columns A through E and rows 1 through 12. Row 10 is selected, and the data in that row is as follows:

	A	B	C	D	E
1					
2	Month	Sales - Region1	Sales - Region2	Sales - Region3	
3	Jan	\$ 22,876.00	\$ 13,956.00	\$ 6,545.00	
4	Feb	\$ 32,222.00	\$ 3,412.00	\$ 5,546.00	
5	Mar	\$ 14,321.00	\$ 11,233.00	\$ 7,786.00	
6	Apr	\$ 13,423.00	\$ 23,421.00	\$ 4,443.00	
7	May	\$ 15,532.00	\$ 11,233.00	\$ 8,999.00	
8	Jun	\$ 19,087.00	\$ 22,111.00	\$ 10,232.00	
9					
10	Total	\$ 117,461.00			
11					
12					

3. Completing the formula replication.

Once the source cell and target cells are selected as in the previous figure, it is an easy task to replicate the formula. With the appropriate cell selection active, we choose the **Fill/Right** commands under the **Edit** menu, as illustrated below.



4. The replicated formulas.

The following figure illustrates the results of the formula replication described above. Cell D10 is selected there so you can observe the formula as it was "copied" to that cell. Notice that the basic structure of the formula is exactly the same as the original formula in cell B10, but the **cell references** have been changed to reflect the move from column B to column D.

These changes in cell references are what makes such formula replication possible. The cell addresses in the original formula ($= B3 + B4 + B5 + B6 + B7 + B8$) are called **relative addresses** (this is the default reference mode -- we'll discuss the alternative mode in Lesson 4). This means that the formula in which they appear can be copied to another location with the new cell references having the same *relative* relationship to the new formula's home cell as did the original references to the original formula home cell.

Hence when a formula is moved two cells to the right, all relative cell addresses in that formula will have their column label increased by two. If we moved a formula four cells *downward*, the relative cell addresses would have their *row number increased* by 4, and so on.

Study this example carefully to make sure you understand the important principle of **replicating formulas employing relative cell addresses**.

Example1					
	A	B	C	D	E
1					
2	Month	Sales - Region1	Sales - Region2	Sales - Region3	
3	Jan	\$ 22,876.00	\$ 13,956.00	\$ 6,545.00	
4	Feb	\$ 32,222.00	\$ 3,412.00	\$ 5,546.00	
5	Mar	\$ 14,321.00	\$ 11,233.00	\$ 7,786.00	
6	Apr	\$ 13,423.00	\$ 23,421.00	\$ 4,443.00	
7	May	\$ 15,532.00	\$ 11,233.00	\$ 8,999.00	
8	Jun	\$ 19,087.00	\$ 22,111.00	\$ 10,232.00	
9					
10	Total	\$ 117,461.00	\$ 85,366.00	\$ 43,551.00	
11					
12					

5. A formula for summing monthly sales for all regions.

Next, we'll add formulas to calculate the total monthly sales for all three regions. The following figure illustrates entering the appropriate formula for computing the January total.

Example1					
	A	B	C	D	E
1					
2	Month	Sales - Region1	Sales - Region2	Sales - Region3	Totals
3	Jan	\$ 22,876.00	\$ 13,956.00	\$ 6,545.00	=B3+C3+D3
4	Feb	\$ 32,222.00	\$ 3,412.00	\$ 5,546.00	
5	Mar	\$ 14,321.00	\$ 11,233.00	\$ 7,786.00	
6	Apr	\$ 13,423.00	\$ 23,421.00	\$ 4,443.00	
7	May	\$ 15,532.00	\$ 11,233.00	\$ 8,999.00	
8	Jun	\$ 19,087.00	\$ 22,111.00	\$ 10,232.00	
9					
10	Total	\$ 117,461.00	\$ 85,366.00	\$ 43,551.00	
11					

6. Replicating the formula for other months and adding a grand total.

Mimic the procedure given in Steps 2-4 for replicating the formula in cell B10 to cells C10 and D10 to replicate the formula just entered in cell E3 to cells E4 through E8. Use the **Fill/Down** command under the **Edit** menu to accomplish this.

Now repeat this process to replicate the formula in cell D10 to cell E10 to compute the grand total of all sales.

The completed worksheet should have the following figures in it. Check your work against these numbers and correct any errors.

Example1						
	A	B	C	D	E	
1						
2	Month	Sales - Region1	Sales - Region2	Sales - Region3	Totals	
3	Jan	\$ 22,876.00	\$ 13,956.00	\$ 6,545.00	\$ 43,377.00	
4	Feb	\$ 32,222.00	\$ 3,412.00	\$ 5,546.00	\$ 41,180.00	
5	Mar	\$ 14,321.00	\$ 11,233.00	\$ 7,786.00	\$ 33,340.00	
6	Apr	\$ 13,423.00	\$ 23,421.00	\$ 4,443.00	\$ 41,287.00	
7	May	\$ 15,532.00	\$ 11,233.00	\$ 8,999.00	\$ 35,764.00	
8	Jun	\$ 19,087.00	\$ 22,111.00	\$ 10,232.00	\$ 51,430.00	
9						
10	Total	\$ 117,461.00	\$ 85,366.00	\$ 43,551.00	\$246,378.00	
11						