

Microsoft Excel 2003

Microsoft Excel is an electronic spreadsheet program. Electronic spreadsheet applications allow you to type, edit, and print spreadsheets. Excel can be used for financial, statistical, or list information.

Formulas

Learn how to use Excel to do the math for you by typing formulas into cells.

Mathematical Operators

Excel uses familiar signs to build formulas. **Note:** All formulas start with the '=' sign.

Add (+)	=10+5
Subtract (-)	=10-5
Multiply (*)	=10*5
Divide (/)	=10/5

Cell References

Cell references identify individual cells, rows, and/or columns in a worksheet. They tell Excel where to look for values to use in a formula.

Cell references	Refer to values in
A10	the cell in column A and row 10
A10,A20	cell A10 and cell A20
A10:A20	the range of cells in column A and rows 10 through 20
B15:E15	the range of cells in row 15 and columns B through E
A10:E20	the range of cells in columns A through E and rows 10 through 20

Entering a Formula

- Click in the cell where you want to enter a formula and **manually** enter your formula in that cell, i.e. =A2*B3, =SUM(G2:G27), =(S28-T28)/T29.



OR

- You can **select** individual cells that you want to include in your formula by clicking with your mouse in each cell. Then put formula signs on your keyboard. For example, to have formula =A2*B3, you would follow these steps below:
 - Enter '=' from your keyboard in the cell you want to enter formula
 - Click on cell A2 with your mouse
 - Enter '*' from your keyboard to have multiplication
 - Click on cell B3 with your mouse
- When you are done entering your formula hit the **Enter** key to finish it.

Note: For complex formulas, all operations within the parenthesis are calculated first!

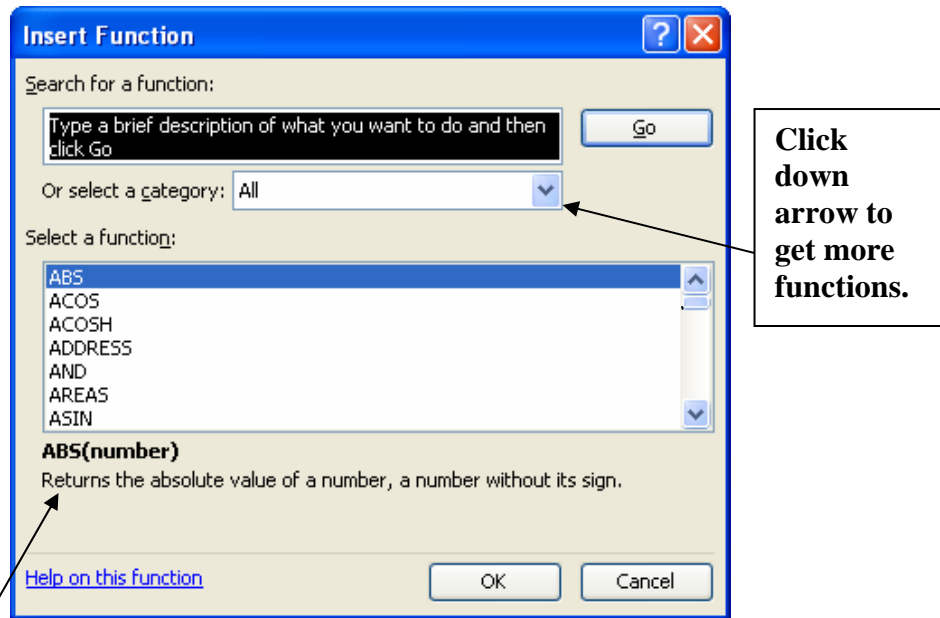
OR

Do one of the following:

1. Open the **Insert** menu and select **Function...**
2. Click the **AutoSum** button on the Standard toolbar. 
3. Click the **Insert Function** button next to the Formula Bar. 

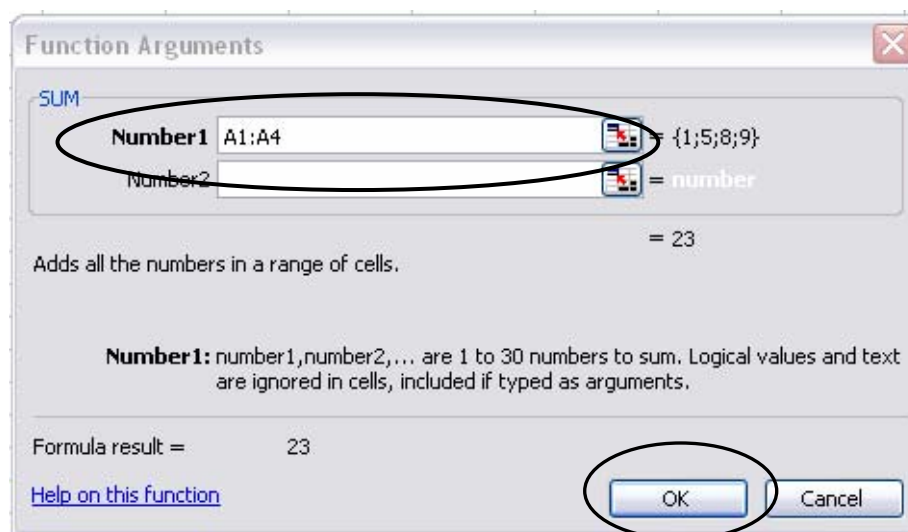
Insert Function

You may need to click the down arrow and select from a drop-down list.




The function will be explained at the bottom of the dialog box. It describes what is needed in your formula.

- Select your function and press **OK**. The **Functions Arguments** dialog box appears.
- Verify the values listed in the **Number 1** box and press **OK**. If the values are incorrect you can retype your values in this box.

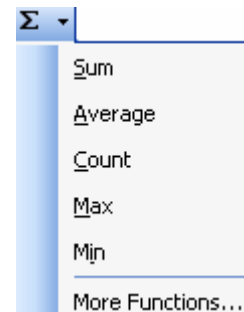


- Your results will appear on the worksheet in the active cell.

AutoSum

The **AutoSum**  button on the Standard toolbar will quickly create a formula with the **Sum** function.

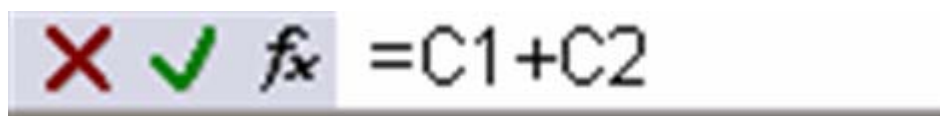
- Place the cursor in an active cell directly below a column of numbers or at the end of a row of numbers that you wish to add up.
- Click on the **AutoSum** button.
- The formula will automatically appear in the active cell. Press **Enter**.



You can click the down arrow next to the button and select other functions, such as Average, Count, and Maximum. Selecting **More Functions...** will cause the **Insert Function** dialog box to appear.

Formula Bar

The formula bar contains an **Insert Function** button that when clicked will cause the **Insert Function** dialog box to appear. In addition a **green checkmark** and a **red 'X'** will appear for accepting or canceling your formula respectively.



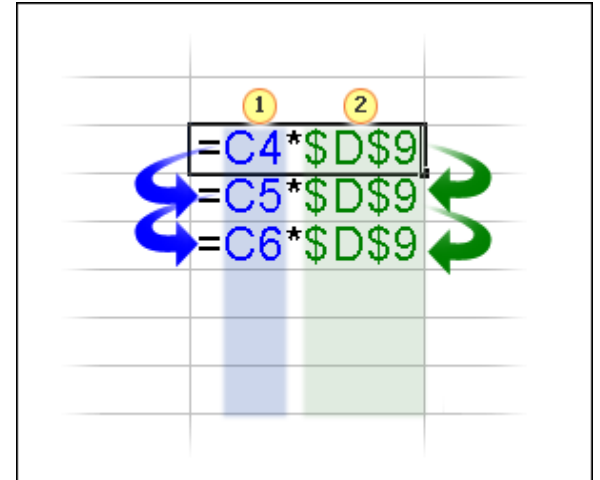
- Select the active cell where you would like formula results to appear.
- Select the **Insert Function** button where you will work with the **Insert Function** dialog box as previously explained.
- Press **OK** and your results will appear in the formula bar.
- Click the **green checkmark** to accept or the **red 'X'** to cancel your formula OR you can click OK to accept in dialog box or Cancel to cancel your formula.

Copying Formulas

Formulas can be copied to adjacent cells by dragging the fill handle down to those cells. Prior to copying formulas it is important that you understand what will occur to the formula as it is copied.

Relative and Absolute Cell References

Relative (1) Every relative cell reference in a formula automatically changes when the formula is copied down a column or across a row. As the example illustrated here shows, when the formula =C4*\$D\$9 is copied from row to row, the relative cell references change from C4 to C5 to C6.



Absolute (2) An absolute cell reference is fixed. Absolute references don't change if you copy a formula from one cell to another. Absolute references have dollar signs (\$) like this: \$D\$9. As the art shows, when the formula =C4*\$D\$9 is copied from row to row, the absolute cell reference remains as \$D\$9.


Example

Use absolute references to refer to cells that you don't want to change as the formula is copied. References are relative by default, so you would have to type dollar signs, as shown at number 2 in the example, to change the reference type to absolute.

Imagine that you receive a package of discount entertainment coupons offering a 7 percent discount for

	A	B	C	D
1		Jan	Feb	
2	Entertainment			
3	Cable TV	52.98	52.98	1
4	Video rentals	7.98	15.96	=C4*\$D\$9 2
5	Movies	16.00	32.00	=C5*\$D\$9
6	CDs	18.98	29.98	=C6*\$D\$9
7	Totals	95.94	130.92	
8				
9				0.07 3

video rentals, movies, and CDs. You wonder how much you could save in a month by using the discounts. You could use a formula to multiply those February expenses by 7 percent.

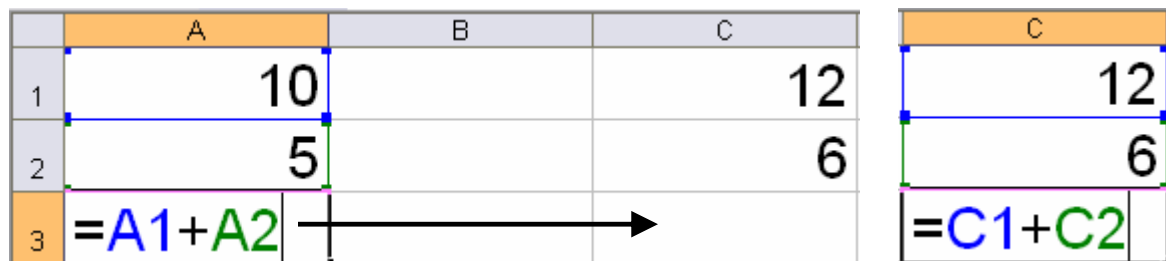
- Type the discount rate **0.07** in the empty cell D9 and then type a formula in cell D4, starting with **=C4***.
- Enter cell address **D9** and press the **F4 function key** to make an absolute reference to the cell (will add dollar signs). Your formula would multiply the value in cell C4 by the value in cell D9.
- Next, copy the formula from cell D4 to D5 by using the fill handle . As the formula is copied, the relative cell reference changes from C4 to C5, while the absolute reference to the discount in D9 does not change; it remains as \$D\$9 in each row it is copied to.

Note: Formulas can also be copied to non-adjacent cells:

- Select cell with formula
- Right-click on cell and select **Copy**
- Right-click on cell you would like to paste formula into and select **Paste**.
The formula will change to accommodate the numbers in the cells closest to the formula.

EXAMPLE:

When copying the formula from column A to column C, the relative values will change to accommodate the new values in column C.

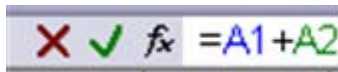


	A	B	C
1	10		12
2	5		6
3	=A1+A2		

	C
1	12
2	6
3	=C1+C2


Editing a Formula

- Go to the cell that has the formula that you would like to edit by:
 1. Double-clicking in the cell containing the formula
 2. Single-click on cell with formula and press **F2** key
- Use the arrow keys to move the cursor and type the changes that you want to the formula. Remember you can use the **Delete** or **Backspace** keys to erase one character at a time.
- Be sure to hit the **Enter** key to complete your changes and to display your results.
 3. Single-click on cell with formula to select the cell and click in the formula bar next to *fx* key and make changes.
- The formula bar will feature a green checkmark to accept changes and a red "x" to cancel changes you make to a formula.



Note: To erase the formula completely, simply click on the cell and press the **Delete** key on the keyboard.

Display formulas on your worksheet

- On the **Tools** menu, point to **Formula Auditing**, and then click **Formula Auditing Mode** .
- On the **File** menu, click **Print**.
- Under **Print what**, select an option to print the selection, the active sheet(s), or the entire workbook.

Note: If you want to show which formula belongs to which row and column headings, go to **File>Page Set up>Click on Sheet tab>Check on Row and Column headings box**. By doing so, you will be able to see row numbers and column names on your printout. It's not also a bad idea to check on **Gridlines** box on the same **Sheet tab** to clearly see each cell with distinctive formulas. See below in an example.

	A	B	C	D
1	Exercises 1, 2, 3, 4, & 5			
2		Jan	Feb	
3	Entertainment			
4	Cable TV	52.98	52.98	
5	Video rentals	=3.99*2	=11.97+3.99	
6	Movies	=8*2	=8*4	
7	CDs	=6.99+11.99	=12.99+16.99	
8	Totals	=SUM(B4:B7)	=SUM(C4:C7)	

If you want to print more than one worksheet at the same time, select the worksheets before you print by holding down the **Shift button** on your keyboard to select all adjacent sheets. For non-adjacent sheets, use **Control button** on your keyboard and click on individual sheets.

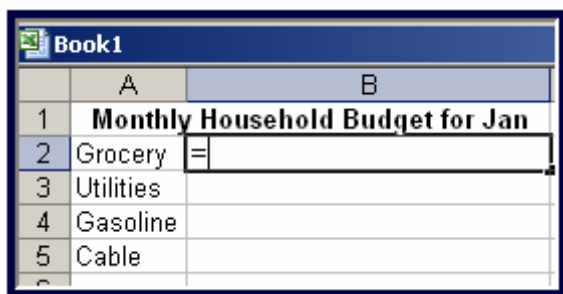
Linking Data

You can link data between cells, worksheets, and workbooks. This might be useful if you have data in one workbook that you would like to view in other areas. If you link the data, then changes you make to that data in the original workbook will be reflected in all of the workbooks or worksheets linked to it.

To link cells, worksheets, workbooks:

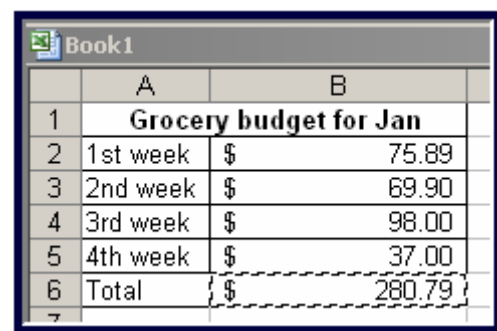
- Click within the cell that you want the link to appear (Destination cell) and type the equal sign.
- Then go to the cell, worksheet, or workbook that has the data (Source cell) that you want to link to. Click within the cell or type the cell address (**Note:** For a linked worksheet or workbook you need to type the entire path, so it is easier to just click within the cell). You will notice that Excel will highlight your *Source cell* at this time.
- Press **Enter** while your *Source cell* is still highlighted with marching ants around (**DO NOT CLICK ANYTHING ELSE**). You will immediately be back to the workbook or worksheet with destination cell and see your result instantly.

Destination Cell

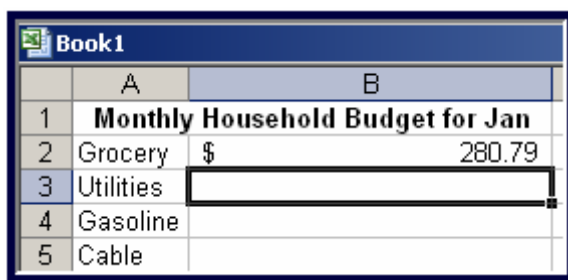


A screenshot of an Excel spreadsheet titled 'Book1'. The spreadsheet has two columns, A and B. Row 1 is the header 'Monthly Household Budget for Jan'. Row 2, column A is 'Grocery' and column B contains an equals sign (=). Row 3, column A is 'Utilities'. Row 4, column A is 'Gasoline'. Row 5, column A is 'Cable'.

Source Cell



A screenshot of an Excel spreadsheet titled 'Book1'. The spreadsheet has two columns, A and B. Row 1 is the header 'Grocery budget for Jan'. Row 2, column A is '1st week' and column B is '\$ 75.89'. Row 3, column A is '2nd week' and column B is '\$ 69.90'. Row 4, column A is '3rd week' and column B is '\$ 98.00'. Row 5, column A is '4th week' and column B is '\$ 37.00'. Row 6, column A is 'Total' and column B is '\$ 280.79'. The 'Total' row is highlighted with a dashed border.



A screenshot of an Excel spreadsheet titled 'Book1'. The spreadsheet has two columns, A and B. Row 1 is the header 'Monthly Household Budget for Jan'. Row 2, column A is 'Grocery' and column B is '\$ 280.79'. Row 3, column A is 'Utilities'. Row 4, column A is 'Gasoline'. Row 5, column A is 'Cable'.

If you make changes in your Source cell, changes will apply to Destination cell instantly.

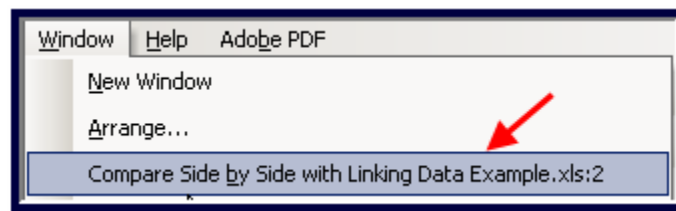
Seeing your Changes Side by Side in Two Windows

If you like to see your changes in two worksheets or two workbooks after linking data, follow the steps below.

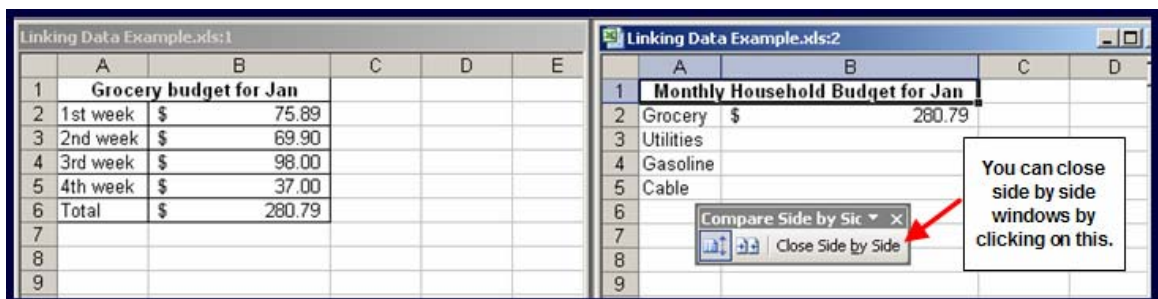
1. Click on **Window** on menu bar and select **New Window**. You will notice on your taskbar at the bottom of your screen that Excel opens a duplicate workbook by adding '2' at the end of the file name. See example below.



2. Next, click on **Window** on menu bar again and click on “**Compare side by side with filename.xls:2**” as shown below.



3. You will see two windows opened side by side *vertically* on your screen. If two windows opened *horizontally*, click on **Arrange** on your **Window** on menu bar and select **Vertical** from *Arrange Window* dialog box.




Note: Make sure one of your windows select the sheet with *Source cell* and the other, *Destination cell* for you to be able to see applied changes instantly.

Formula Exercises

Exercise 1: Using Formulas – [Click here for Using Formulas Worksheet](#)

Create a formula to add

Before you work with the data that's on the worksheet, create a formula in an empty cell in column A. Select cell A2, add 183 to 39, and press ENTER to display the result. Next, click cell A2 to see the formula in the **formula bar** .

Here's how Enter an equal sign (=), type **183** and the plus sign operator (+), type **39**, and then press ENTER. The answer is 222.

Note: If the formula bar is not at the top of the worksheet, on the **Tools** menu, click **Options**. Click the **View** tab, and select the **Formula bar** check box.


Create formulas for other arithmetic

In column A, enter three separate formulas in three separate cells. Enter a formula to subtract 39 from 183. Enter another formula to multiply 183 by 39. Finally, enter a formula to divide 183 by 39.

Here's how To subtract, **=183-39** (answer, 144); to multiply, **=183*39** (answer, 7137); to divide, **=183/39** (answer, 4.692307692).

Add up a column of numbers


Now you'll work with values that already exist in the worksheet. Use **AutoSum** to total the January values in column D.

Here's how Click in cell D8, click **AutoSum**  on the **Standard** toolbar, and then press ENTER. The total is 95.94.

Note: If the **AutoSum** button is not available, click the **Toolbar Options** arrow at the end of the **Standard** toolbar, then click **Show Buttons on Two Rows**.

Copy a formula

Copy the formula from cell D8 to cell E8.

Here's how Use the fill handle  to copy the formula in cell D8 to cell E8. The February total is 126.93.

1. Select cell D8, and then position the mouse pointer over the lower-right corner of cell D8 until the black cross (+) appears.
2. Then drag the fill handle over cell E8. When you release the fill handle, you should see the February total 126.93 in cell E8.

Add up a row of numbers

Now you'll try something new by totaling the numbers in a row rather than in a column. The procedure is the same. You just click in a different place. Use **AutoSum** to total the figures in row 6. **Here's how** Click in cell F6, click **AutoSum** on the **Standard** toolbar, and then press ENTER. The answer is 48.00.

Exercise 2: Cell References - [Click here for Cell References Worksheet](#)

Type cell references in a formula

In cell E9, type a formula using cell references to total January video rentals and February CD expenses.

Here's how In cell E9, type **=SUM(B5,C7)**. Notice that when you type **B5**, Excel highlights cell B5, and when you type **C7**, Excel highlights cell C7. Enter

the formula exactly as shown, and then press ENTER to display the formula result, which is 37.96.

Notes: You can get the same result by typing **=B5+C7**. The SUM function is most useful when you have more than a few values to add.

Select cell references for a formula

In cell E10, try entering the same formula by clicking cell references instead of typing them. Here's the formula: =SUM(B5,C7)


1. Type an equal sign in cell E10.
2. Then type **SUM** followed by an opening parenthesis.
3. Click cell B5, and then type a comma.
4. Click cell C7, type a closing parenthesis, and then press ENTER to get the result 37.96.

Use an absolute reference in a formula

In cell D11, recreate the example from the lesson by figuring out how much you'd save with a 7 percent discount on February's video rentals, movies, and CDs.


1. In cell D11 type the discount rate, **0.07**.
2. In cell D5 type **=C5*\$D\$11** (you can hit **F4 function key** after typing **D11** to turn that cell into absolute cell address **\$D\$11**) and then press ENTER. The result is 1.12.
3. Next copy the formula down through row 7 by selecting cell D5 and positioning the mouse pointer over the lower-right corner of that cell until the black cross (+) appears. Then drag the fill handle down the rows, releasing it in cell D7. The results are 2.24 in cell D6 and 2.10 in cell D7.

As the formula is copied, the relative cell references change from C5 to C6 to C7, while the absolute reference to cell D11 does not change. It remains as \$D\$11 in

each row it is copied to, as you will see if you click cells D6 and D7 and look at the result in the formula bar  near the top of the worksheet.

Add up several results

Total the savings from the previous exercise by entering a formula into cell D8.

Here's how Select cell D8 by clicking it, click **AutoSum**  on the **Standard** toolbar, and then press ENTER. The result is 5.46. You could also type **=SUM(D5:D7)**.

Change values and totals


See formula results automatically updated when you make a revision. In cell B6 change "16.00" to "28.00." The total in B8 will be updated, in this case to 107.94. If you want, change any other values to see the total updated again. **Note** If results are not updated, on the **Tools** menu, click **Options**. Click the **Calculation** tab, and select the **Automatic** check box.

Exercise 3: Functions and error values - [Click here for Functions Worksheet](#)

Excel needs very precise instructions. This means that formulas must be typed exactly as shown. Missing a comma or parenthesis, or misspelling a function name, will produce errors.

Find an average

In cell D8, find an average of the totals in column B and column C.

Here's how Select cell D8, click the arrow on the **AutoSum** button , and click **Average** in the list. Then press ENTER. The answer is 113.43.

Find the largest number

You don't need a formula to determine that 95.94 is the largest number in column B. But imagine that the list is long, in which case a formula would be useful. In cell B9, use a formula to find the largest number.

Here's how Select cell B9, click the arrow on the **AutoSum** button, and click **Max** in the list. Then press ENTER.

Before you go on to the next exercise, delete the result in cell B9.

Find the smallest number

Again, it's obvious that 15.96 is the smallest number in column C, but try using a formula anyway in cell C9 to find the smallest number in column C.

Here's how Select cell C9, click the arrow on the **AutoSum** button, and click **Min** in the list. Then press ENTER.

Before you go on to the next exercise, delete the result in cell C9.

Display and hide formulas

Display all the formulas in the worksheet, and then hide all the formulas.

Here's how On the **Tools** menu, point to **Formula Auditing**, and then click **Formula Auditing Mode**. To hide the formulas, click **Formula Auditing Mode** again. You can also press CTRL+` (next to the 1 key) to display and hide formulas.

Error values

To create an ##### error so that you can fix it, make column B narrower by dragging the column boundary until the ##### error appears. To do this, move the pointer over the column heading until the pointer changes to a dark cross with two arrow points. Double click on the arrow and Excel will adjust the column width just right. OR you can manually adjust the column width by dragging the column. You may have to drag the column boundary several times to make the column narrow enough to create the ##### error.

	A	B	↔ C
1			
2			
3			

Then resize the column again to make the formula result appear. The display is updated whenever you drop the column boundary in a new position, so it can take more than one try to make the column wide enough to display the formula result.

Error value #Name?

Here's another error you can create and fix. Use the SUM function, but misspell it.

In cell B8, delete the total 95.94 and then type **=SUME(B4:B7)** (notice the extra "E" typed in the function name). After you press ENTER you'll see #NAME? due to the spelling error.

To fix the error, select cell B8 and then place the pointer in the formula bar. Or double-click in the cell to display the formula and then edit it. Delete the "E" from "SUME" and press ENTER. The formula result will appear correctly.