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Microsoft Excel 2007

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

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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.

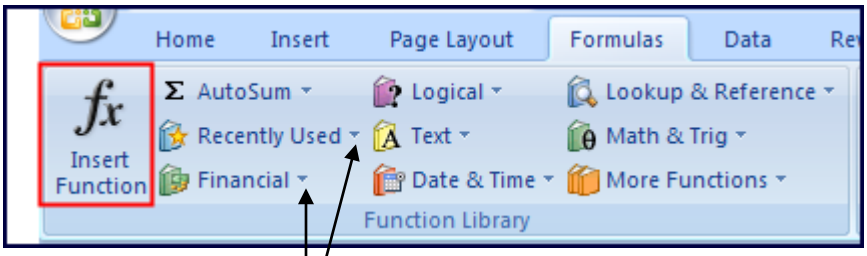
OR

- You can **select** individual cells that you want to include in your formula by clicking with your mouse in each cell. Then put in formula signs with 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.

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

OR

Do one of the following:



- Open the **Formulas** tab and select **Insert Function**
- Click on any of the drop-down arrows next to any Formula commands under the **Function Library** group and select **More Functions** or **Insert Function** at the bottom of the list
- Click the **Insert Function** button next to the Formula Bar.

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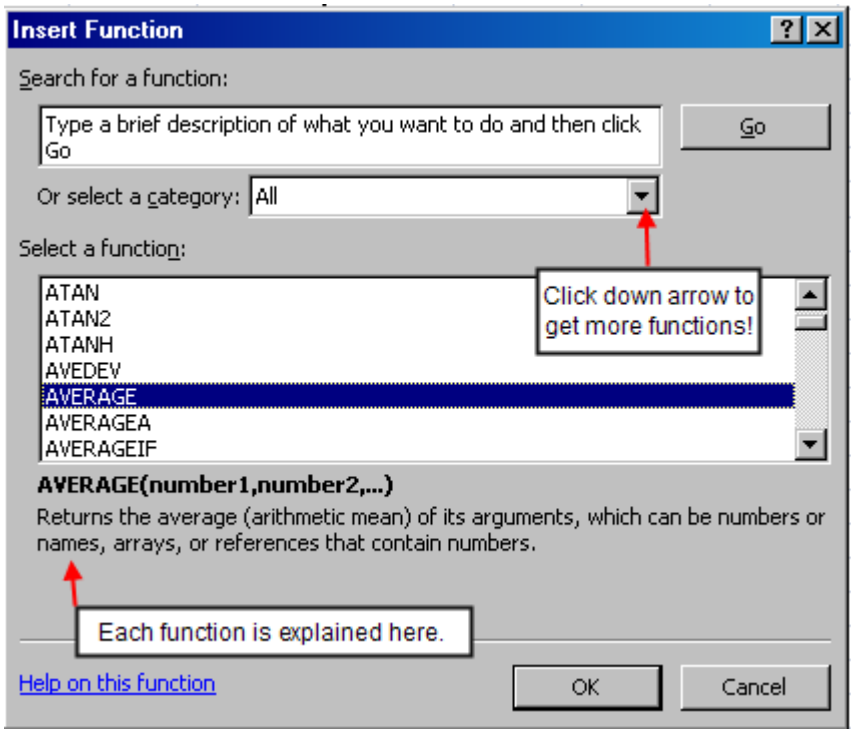
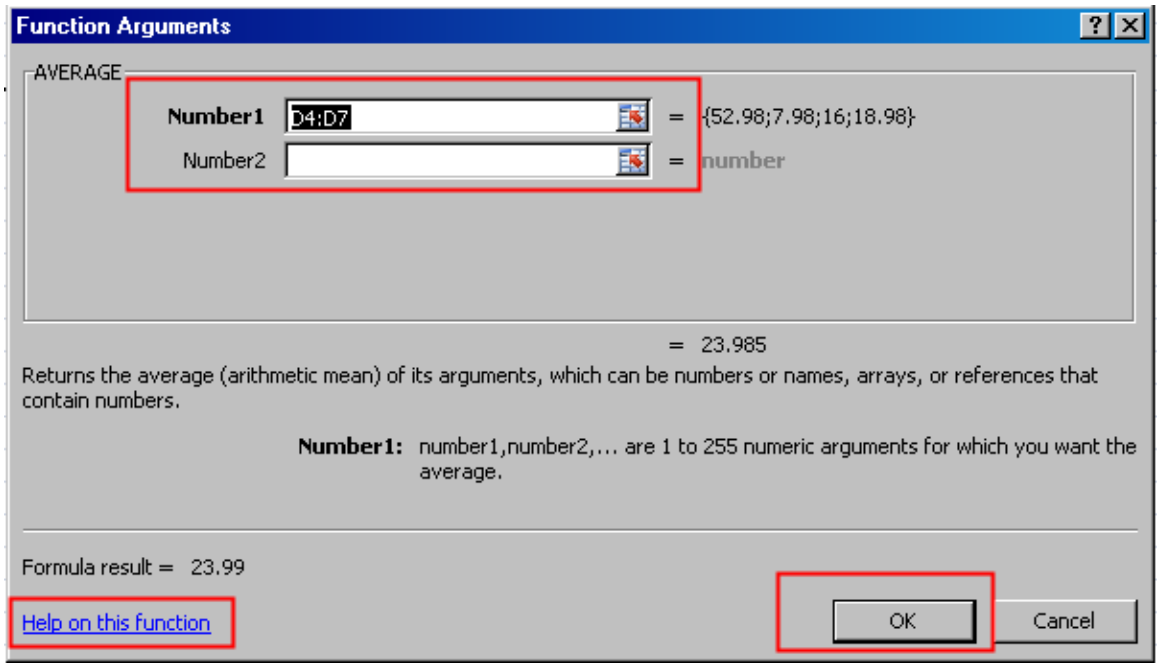
In any case, you will bring up the **Insert Function** dialog box shown below. Click the down arrow key and select from a drop-down list.

Each function will be explained at the bottom of the dialog box. It describes what is going to be done 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.

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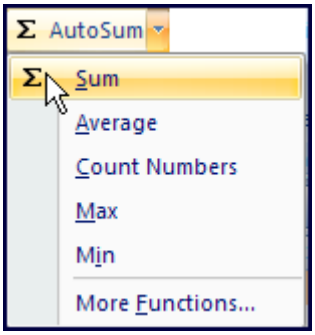
AutoSum



The **AutoSum** command under the **Formulas** tab 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** command.
- The formula will automatically appear in the active cell. Press **Enter.**
- You can also click the down arrow next to the button and select other functions, such as **Average, Count, Max,** and **Min.** Selecting **More Functions** will cause the **Insert Function** dialog box to appear.

Basic Functions

Functions are used in formulas to calculate a value for you. To insert a function, go to the **Formula** tab and make your selection. Also, to insert or edit a formula, you can click within the Formula Bar.	
AVERAGE	Finds the average within a range of cells.
COUNT	Finds the number of cells within a range of cells that contain values (numbers) in them.
COUNTA	The COUNTA function counts cells containing any type of information, including error values and empty text ("""). For example, if the range contains a formula that returns an empty string, the COUNTA function counts that value. The COUNTA function does not count empty cells.
COUNTBLANK	Counts empty cells in a specified range of cells.
MAXIMUM	Finds the largest number within a range of cells.
MINIMUM	Finds the smallest number within a range of cells.
SUM	Finds the total or sum within a range of cells.
Basic Date Functions	
NOW()	Displays the computer's current date and time. The formula will update the date and time next time the workbook is opened.
TODAY()	Displays the computer's current date. The formula will update the date next time the workbook is opened.

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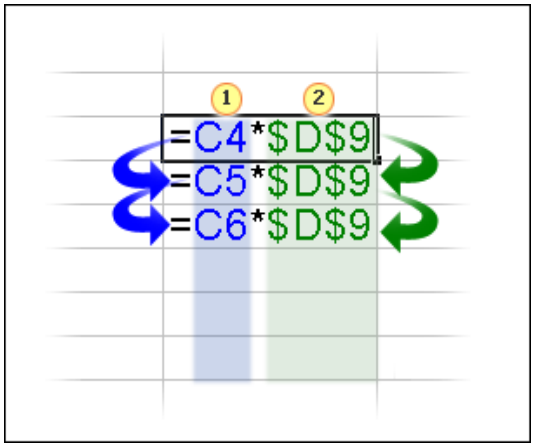
Copying Formulas

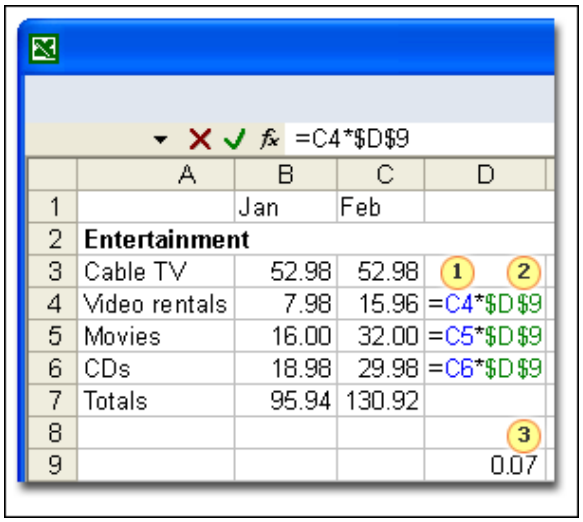
Formulas can be copied to adjacent cells by dragging the fill handle down/across to those cells. Prior to copying formulas it is important that you understand what will occur to the formula as it is copied.



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*D9 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: D9. As the art shows, when the formula =C4*D9 is copied from row to row, the absolute cell reference remains as D9.



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 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 D9 in each row it is copied to.

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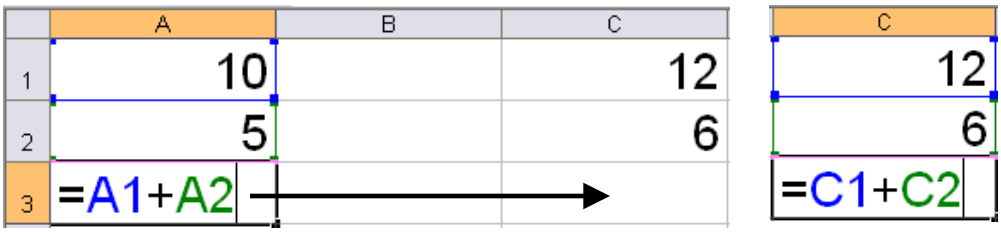
Note: Formulas can also be copied to non-adjacent cells:

- Select cell a with a 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.



Editing a Formula

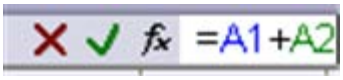
- Go to the cell that has the formula that you would like to edit by:

  1. Double-clicking in the cell containing the formula
  2. Single-click on the cell with the formula and press the **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.

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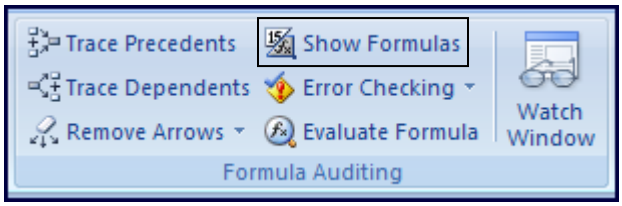
Display formulas on your worksheet

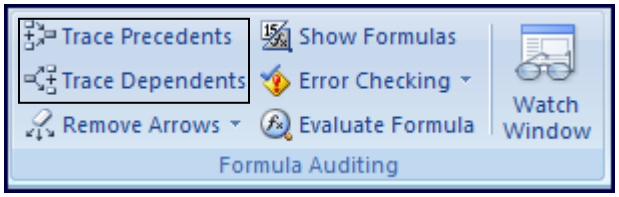


- Under the **Formulas** tab, in the **Formula Auditing** group, click on **Show Formulas** command. **Note**: Click this command again to hide formulas.
- Click on the **Office** Button; then click **Print**.
- Under **Print what**, select an option to print the selection, the active sheet(s), or the entire workbook.

Note: If you want to show which formula belongs to which row and column headings, go to **Page Layout>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 also not a bad idea to check the **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)	

Sometimes, checking **formulas** for accuracy or finding the source of an error can be difficult when the formula uses precedent or dependent cells:



- **Precedent cells** are cells that are referred to by a formula in another cell. For example, if cell B8 contains the formula =B5, cell B5 is a precedent to cell B8.
- **Dependent cells** contain formulas that refer to other cells. For example, if cell B8 contains the formula =B5, cell B8 is a dependent of cell B5.

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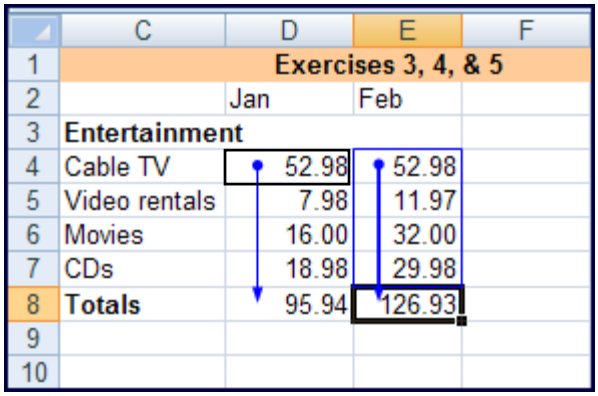
To assist you in checking your formulas, you can use the **Trace Precedents** and **Trace Dependents** commands to graphically display or trace the relationships between these cells and formulas with **tracer arrows**.

The example shows:

- Cell D4 is a precedent of Cell D8, meaning, Cell D8 is affected by the value of Cell D4.
  Formula: D8=SUM(D4:D7)

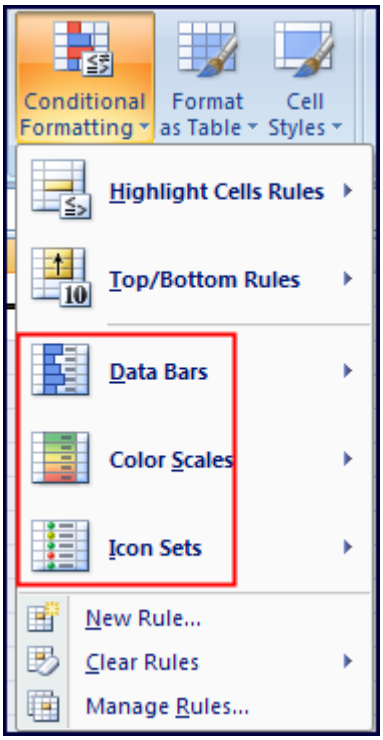
- On the other hand, Cell E4 through E7 affects the value of Cell E8. Cell E8 is a dependent of Cell E4 through E7.
  Formula: E8=SUM(E4:E7)



	C	D	E	F
1		Exercises 3, 4, & 5		
2		Jan	Feb	
3	**Entertainment**			
4	Cable TV	52.98	52.98	
5	Video rentals	7.98	11.97	
6	Movies	16.00	32.00	
7	CDs	18.98	29.98	
8	**Totals**	95.94	126.93	
9				
10				

Conditional Formatting

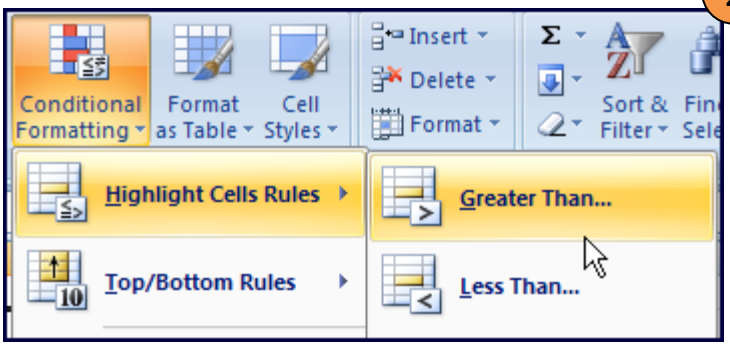
Conditional formatting under the **Home** tab helps you answer specific questions about your data. You can apply conditional formatting to a cell range or an Excel table. Use a conditional format to help you visually explore and analyze data, detect critical issues, and identify patterns and trends. Select your cell data first. (**Note:** Exclude exceptionally high value such as total values from your selection.) 1



1. You may use **Data Bars**, **Color Scales**, or **Icon Sets** to identify certain values by bar length, color, or icon shapes in the cells. For example, in **Data Bars,** the longer bar represents higher value in the cell compared to all other cells in the range.

2. You may also find values that are below or above your norm by using **Highlight Cells Rules** or **Top/Bottom Rules.**

2



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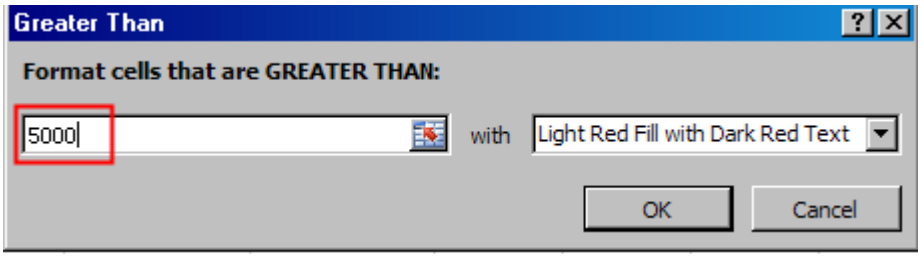
See Examples on next page.

1

	A	E	F	G
1		Car Rental	Meals	Total
2	John Close	$ 543.00	$ 3,029.00	$ 7,153.00
3	John Watkins	$ 450.00	$ 2,000.00	$ 4,890.00
4	Allison Charles	$ 375.00	$ 1,500.00	$ 3,865.00
5	Margie Lyons	$ 300.00	$ 1,105.00	$ 3,477.00
6	George Winkler	$ 200.00	$ 954.00	$ 2,945.00
7	Jean Lawson	$ 560.00	$ 2,500.00	$ 7,570.00
8	Harold Graening	$ 200.00	$ 600.00	$ 2,130.00
9	Julie Baker	$ 100.00	$ 500.00	$ 1,462.00
10	Carol Sundry	$ 255.00	$ 3,250.00	$ 6,360.00
11	Thomas Bernard	$ 230.00	$ 860.00	$ 2,157.00
12	Sandi McLean	$ 610.00	$ 2,950.00	$ 6,722.00
13	Linda Janes	$ 340.00	$ 250.00	$ 790.00
14	Christine Miller	$ 645.00	$ 3,725.00	$ 9,330.00
15	David Klein	$ 575.00	$ 3,200.00	$ 6,643.00
16	Robert Karns	$ 200.00	$ 250.00	$ 851.00
17	Dawn Elliot	$ 575.00	$ 1,750.00	$ 4,400.00
18	Jennifer Dillus	$ 359.00	$ 1,200.00	$ 2,832.00
19	Corrine Alexander	$ 200.00	$ 1,450.00	$ 4,125.00
20	Eric Forester	$ 250.00	$ 4,200.00	$ 12,000.00
21	Melissa Erickson	$ 375.00	$ 3,200.00	$ 6,550.00
22	Cassandra Patterson	$ 400.00	$ 1,600.00	$ 4,090.00
23	Robert Merriman	$ 680.00	$ 3,550.00	$ 8,766.00

A longer bar represents a higher value!

The following example shows how to highlight certain values in any range of cells by using “Greater than” under “Highlight Cell Rules”.



2

	A	E	F	G
1		Car Rental	Meals	Total
2	John Close	$ 543.00	$ 3,029.00	$ 7,153.00
3	John Watkins	$ 450.00	$ 2,000.00	$ 4,890.00
4	Allison Charles	$ 375.00	$ 1,500.00	$ 3,865.00
5	Margie Lyons	$ 300.00	$ 1,105.00	$ 3,477.00
6	George Winkler	$ 200.00	$ 954.00	$ 2,945.00
7	Jean Lawson	$ 560.00	$ 2,500.00	$ 7,570.00
8	Harold Graening	$ 200.00	$ 600.00	$ 2,130.00
9	Julie Baker	$ 100.00	$ 500.00	$ 1,462.00
10	Carol Sundry	$ 255.00	$ 3,250.00	$ 6,360.00
11	Thomas Bernard	$ 230.00	$ 860.00	$ 2,157.00
12	Sandi McLean	$ 610.00	$ 2,950.00	$ 6,722.00
13	Linda Janes	$ 340.00	$ 250.00	$ 790.00
14	Christine Miller	$ 645.00	$ 3,725.00	$ 9,330.00
15	David Klein	$ 575.00	$ 3,200.00	$ 6,643.00

Any value greater than 5000 is highlighted here!

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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 the destination cell and see your result instantly.

Destination Cell

	A	B
1	Monthly Household Budget for Jan	
2	Grocery	=
3	Utilities	
4	Gasoline	
5	Cable	
6		

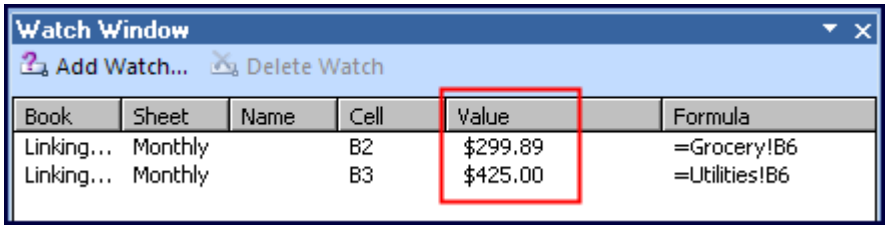
Source Cell

	A	B	
1	Grocery budget for Jan		
2	1st week	$	75.89
3	2nd week	$	89.00
4	3rd week	$	98.00
5	4th week	$	37.00
6	Total	$	299.89

	A	B	
1	Monthly Household Budget for Jan		
2	Grocery	$	299.89
3	Utilities		
4	Gasoline		
5	Cable		

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

You can also watch the changes made in those Source Cells instantly by using the **Watch Window** command in the **Formula Auditing** group under the **Home** tab. Click on **Watch Window** and add the cell(s) you intend to watch. In this case, adding the Destination Cells make sense if you want to see how it would affect the value if any of the cells in Source Table changes.



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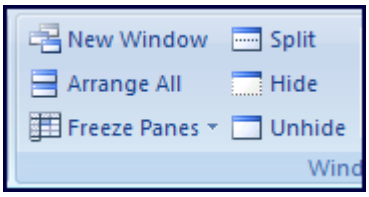
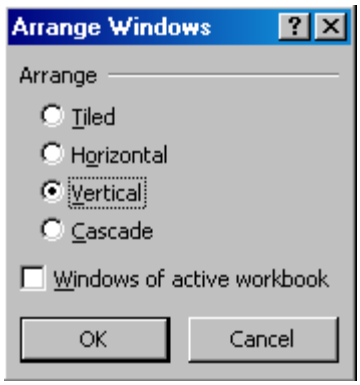
Seeing your Changes Side by Side in Two Windows

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

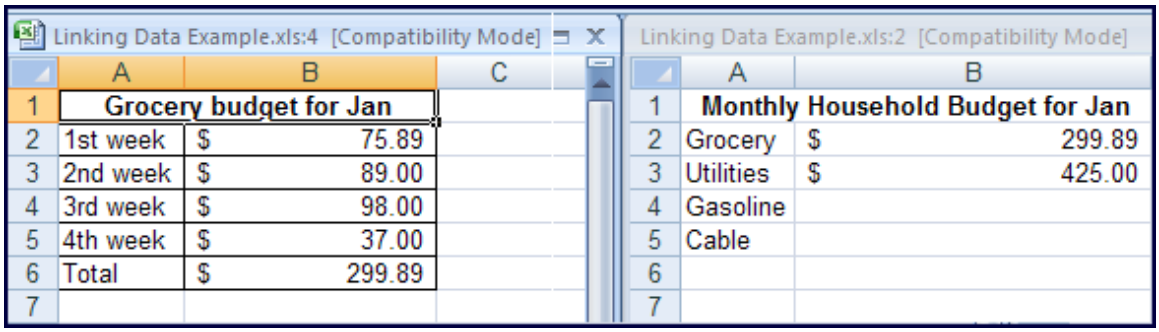
1. Click on the **View** tab and select **New Window.** You will notice on your taskbar at the bottom of your screen as well as on the top of the screen where Excel opens a duplicate workbook by adding '2' at the end of the file name. See the example below.



2. Next, click on **Arrange All** under the **View** tab and select horizontal or vertical to arrange windows.



3. You will see two windows opened side by side *vertically* on your screen.



Note: Make sure one of your windows selects the sheet with *Source cell* and the other, *Destination cell* for you to be able to see applied changes instantly. You can also use the **Hide** commands in same group to hide unnecessary worksheets and **Unhide** to recall them later. To close a worksheet, click on X on the worksheet.

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Formula Exercises

Note: Close the Excel Help window that popped up upon clicking any of the following 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** fx .

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, click on **View** tab and check **Formula Bar** box under **Show/Hide** group.

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** Σ in the **Editing** group under **Home** tab OR in the **Function Library** group under **Formulas** tab. Press ENTER. The total is 95.94.

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.

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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** Σ in the **Editing** group under **Home** tab OR in the **Function Library** group under **Formulas** tab. 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.

Note: 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*D11** (you can hit **F4 function key** after typing **D11** to turn that cell into absolute cell address **D11**) 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

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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 D11 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.

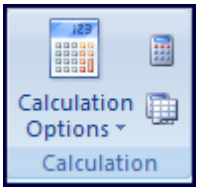
Add up several results

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** in the **Editing** group under **Home** tab OR in the **Function Library** group under **Formulas** tab. 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, under **Formulas** tab, click on drop-down arrow next to **Calculation Options** and check **Automatic**.



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.

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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.

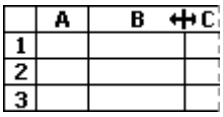
Display and hide formulas

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

Here's how Under the **Formulas** tab, in the **Formula Auditing** group, click on**.** To hide the formulas, click **Show Formulas** 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.



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.

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