Excel Introduction

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Abstract: This document introduces users to basic Excel tasks, such as creating, saving, and opening new Excel workbooks and worksheets; selecting, copying, and moving data; constructing formulas; formatting worksheets; and setting up worksheets for printing. It is used in conjunction with the *Excel Introduction* workshop.

Contents

Introduction

Excel is a spreadsheet program that allows users to create worksheets that store information in workbook files. The built-in functions allow users to create and edit formulas; copy and move data; format worksheets; and set up worksheets for printing.

Objectives

The goal of this workshop is to introduce participants to the introductory commands and features of the Excel program. After today's workshop, participants will be able to:

- Create, open, and save Excel workbooks
- Select, copy, and move data
- Create formulas using relative and absolute references
- Format worksheets
- Use Page Setup to set up worksheets for printing

Prerequisites

It is assumed that the participants in this workshop have basic computing skills and know how to use the *Windows* or *Mac OS X* operating system to maintain files and directories/subdirectories, open, close, and save files.

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Definitions

Term	Definition
Active Cell	A cell that is selected.
Cell	Cells form where rows and columns intersect. To refer to a cell, enter the column letter followed by the row number. For example, C15 refers to the cell at the intersection of column C and row 15.
Workbook	In Excel, a workbook is the file in which you work and store your data. Because each workbook can contain many sheets, you can organize various kinds of related information in a single file. By default, all new workbooks contain three worksheets.

Worksheet (Spreadsheet)	Worksheets consist of cells that are organized into alphabetical labeled columns and numerically labeled rows and are always located within workbooks. They are used to list, organize, and calculate data. Information can be linked from one worksheet to another in the same workbook or in different workbooks.

Creating and Opening Excel Workbooks

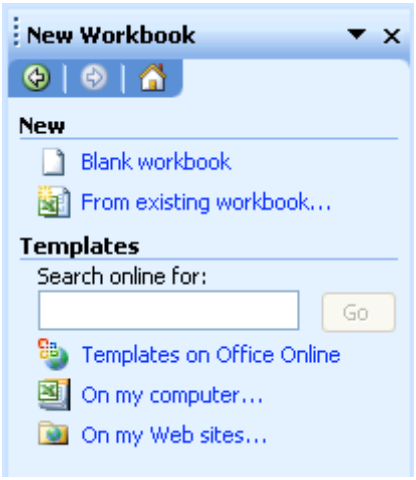
Opening Excel

When you first open the Excel program, a new workbook (named Book1) will be created automatically with three worksheets. The worksheets will be labeled Sheet1, Sheet2, and Sheet3. Worksheet tabs can be found at the bottom of the workbook window. To move from sheet to sheet, you can click the sheet tabs.

Each worksheet contains 65,536 rows and 256 columns. The columns are labeled alphabetically and run along the top of the worksheet. The rows are labeled numerically and run along the left side of the worksheet. Columns are labeled A through Z, AA through AZ, BA through BZ, etc. Rows are numbered from 1 through 65,536. A cell forms where a row and column intersect. The scroll bars on the right and along the bottom of the worksheet can be used to scroll to any location of the worksheet.

With Excel Open

If you already have Excel open and want to create a new plain workbook, you can click on the **New** button.  If you want to create a new workbook from a template, you can click on **File > New** to see Excel's built in templates or custom templates. This opens the New Workbook Task Pane, from which you can select a template or blank workbook.

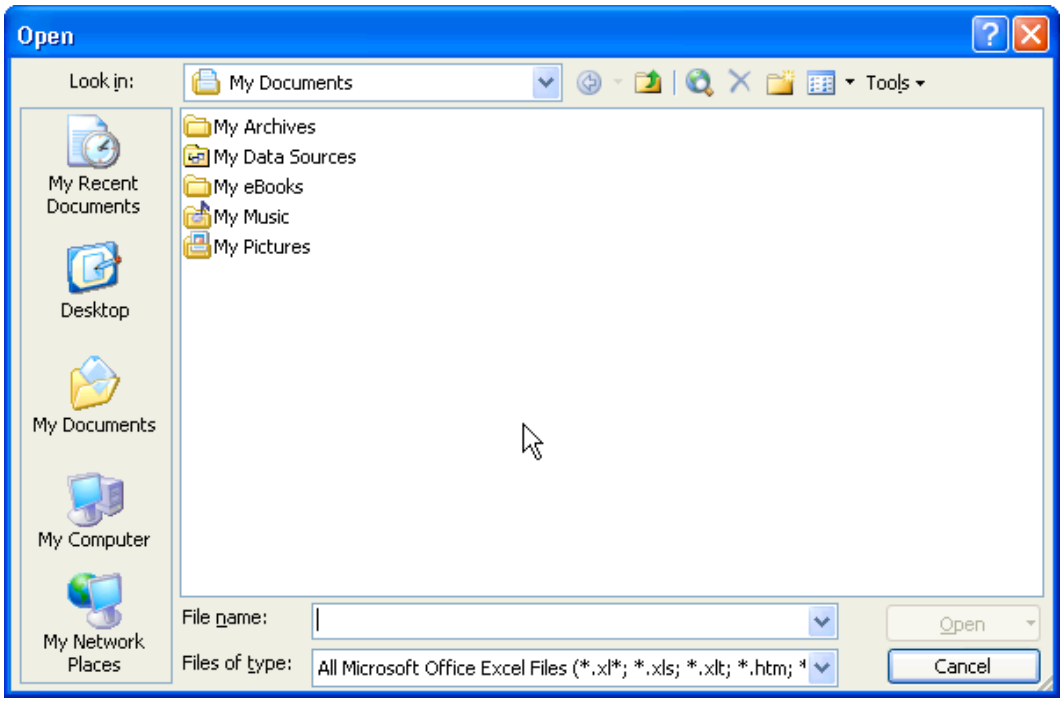


The New Workbook Task Pane

Opening An Existing Workbook

You can open existing workbook files as well. To do this:

1. Click on **File > Open** or click on the yellow **Open** folder  on the Standard toolbar.



2. Change the folder (if needed) to find the file you want.
3. Select the file name and double click on it or click on the **Open** button.

Inside an Excel Worksheet

Pointer Appearances

In an Excel spreadsheet, your pointer appearance will change depending on where you are in the worksheet. It is important to understand the distinction between these mouse pointer types:

Name	Appearance	Description
Selection cross		Used to select a cell or a range of cells.
I-Beam		Used to insert text into a cell or field. Click once when the cursor is this shape to begin inserting text.
Mouse Pointer		Used to interact with toolbars, move and resize windows, and move or copy information from cells.
AutoFill cross	+	Used to drag values across cells when using AutoFill.

Selecting Parts of a Worksheet

There are many occasions to select or click in different areas of your workbook. You select cells to enter, change, and delete information. You select cells in order to reference them in formulas. You also select cells to format their contents. Any time you select a cell, it is called the **active cell**.

Using the Mouse

There are many ways to use the mouse to select individual cells or ranges of cells:

To Select	How to Select
Cell	Click on the cell.
Cell Range	Use the selection cross to click and drag across the group of cells.
Row	Click on the row number.
Column	Click on the column letter.
Multiple Rows	Click and drag down the row numbers.
Multiple Columns	Click and drag across the column letters.
Entire Worksheet	Click the gray cell between column A and row 1.
Non-Contiguous Cells	Select the first cell or range of cells and then hold down the *Ctrl* key while selecting the remaining cells.

Using the Keyboard

You can make use of the keyboard to move around inside of Excel workbooks and worksheets. Here are just a few common keyboard shortcuts:

Key	Direction
Enter	Moves the active cell down, row to row.
Tab	Moves the active cell to the right, column to column.
Shift/Enter	Moves the active cell up, row to row.
Shift/Tab	Moves the active cell to the left, column to column.

Key	Direction
Ctrl/Home	Moves the active cell to **A1** (the top left of the spreadsheet).
Ctrl/End	Moves the active cell the last cell that contains data.
Ctrl/Page Down & Ctrl/Page Up	Moves from one worksheet to another.
F2 key (function key)	Opens the active cell for you to edit the data in it.
Alt/Enter	Enters a hard return inside of the active cell. This will automatically wrap your text and increase the size of the cell.

Cell Contents

Cells can contain one of four types of values: text, numbers, dates and times, and formulas. Each cell can hold up to 32,767 characters.

Text

Text is any combination of numbers, spaces, and nonnumeric characters. All cells that Excel considers to be text will be left aligned. In the following example, these entries would be treated as text:

1025A63N (this has numbers and letters)

123XYZ (this has numbers and letters)

10[72 (contains a non-numeric character)

123 456 (contains a space)

Numbers

Numbers include the numeric characters 0-9 and the following special characters:

, + - ( ) / E e $ % .

If a number is wider than the cell, ######## is displayed. To display the cell contents, resize the column. Excel stores numbers up to 15 digits of accuracy (but fewer digits may be displayed at any time). The largest positive number is $9.99999999999999 \times 10^{307}$ and the smallest positive number is 2.229×10^{-308}. By default, negative numbers are preceded by a minus sign. However, they can be formatted to be enclosed in parenthesis or displayed in red. Entering a dollar sign ($) before a number or a percent (%) symbol after changes the display of the number.

Dates and Times

Internally, Excel stores dates and times as numbers. They can be displayed, however, in several built-in formats. The way that a time or date is displayed on a worksheet depends on the format applied to the cell. When a date or time is entered into a cell, Excel automatically changes the cell's format from General to one of the built in date or time format. By default, dates and times are right aligned in a cell. If Excel cannot recognize the date or time format, the date or time is formatted as text, which is left aligned in the cell. Date and time can be mixed into one cell, however slashes and hyphens cannot be used to separate the date from the time. To type a date and time in the same cell, separate the date and time with a space.

To type a time based on the 12-hour clock, type a space followed by AM or PM (or A or P) after the time. Otherwise, Excel bases the time on the 24-hour clock. For example, if you type 3:00 instead of 3:00 PM, the time is stored as 3:00 AM.

Times and dates can be added, subtracted, and used in other calculations. To use a date or time in a formula, enter the date or time as text enclosed in quotation marks. For example, the following formula would display a difference of 68:

="5/12/94"-"3/5/94"

Note that to get meaningful results from date and time arithmetic, the format of the cell with the result should be a number format, not a date or time format. For example, the above subtraction would yield "3/8/1900" in a cell formatted for dates.

Some examples of date and time formats:

Date/Time Entry	Format
6/9/01	m/d/y
9-June-01	dd-mmmm-yy
June-01	mmmm-yy
9-June	dd-mmmm
7:00 AM	h:mm AM/PM
7:00:00 AM	h:mm:ss AM/PM
18:00	h:mm
6/9/01 7:00	m/dd/yy h:mm

Formulas

A formula calculates a new value from existing values. An Excel formula can contain a combination of constant values, cell references, range names, functions, and/or operators. Cell references are merely the address of a cell, expressed in the form a column label and then a row label. For example, A1 is the address of the first cell in a worksheet. Ranges

names are covered in more advanced Excel workshops. Formulas always begin with an equal sign (=). Here are a few examples:

Constant Values

=(456+57)*32

Cell References

=D3/F13

Range Names

=D3*Tax

Functions

Excel contains many predefined, or built-in functions. Functions can be used to perform simple or complex calculations. Some of the most frequently used function are the SUM, AVERAGE, PMT, DLOOKUP, and IF functions. Here is an example of the sum function using the cell range operator : (see the Reference

operators below).

=SUM(D3:D7)

Operators

Operators specify the type of calculation that you want to perform on the elements of a formula. Microsoft Excel includes four different types of calculation operators: arithmetic, comparison, text, and reference.

Arithmetic

Operator	Meaning
*	Multiplication
/	Division
+	Addition
-	Subtraction
%	Percent
^	Exponentiation

Comparison

Operator	Meaning
=	Equality
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
<>	Inequality

Text

Operator	Meaning
&	Ampersand—Concatenates, or combines, two values to produce one continuous text value.

Reference

Operator	Meaning
:	Colon—A range operator, which produces a single reference to a range of cells delimited by a start reference and an end reference. An example would be “D3:D7”, where “D3” is the start reference, “:” is the range operator, and “D7” is the end reference. All cells in between and including D3 and D7 are in the new single reference.
,	Comma—A union operator, which combines multiple individual references into one reference. An example would be “D3:D7,F15,B4”, where “D3:D7”, “F15”, and “B4” are the three individual references combined by the union operator. Note that this different from the range operator because no range is created from the references.

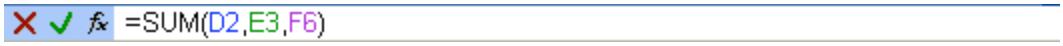
Creating Formulas

There are a couple of ways in which you can create a formula: type the formula into the formula bar or directly into the cell; use Excel's built in **Insert Function** utility**;** or use **AutoSum** to have Excel automatically create a summation formula to add a group or range of numbers.

Typing the Formula Directly in a Cell

If the formula you wish to enter is a simple one and you are familiar with any built-in functions that you are using, the quickest way to create a formula is to type it directly into the cell. To do this:

1. Make active by clicking on it the cell in which you want the results to appear.
2. Type in the = sign to begin the formula.
3. Type in the remaining parts of your formula.
4. When finished, press **Enter** on your keyboard or click on the **green** checkmark on the **Formula Bar**. If you wish to cancel the changes made to the cell, click on the **red** X.



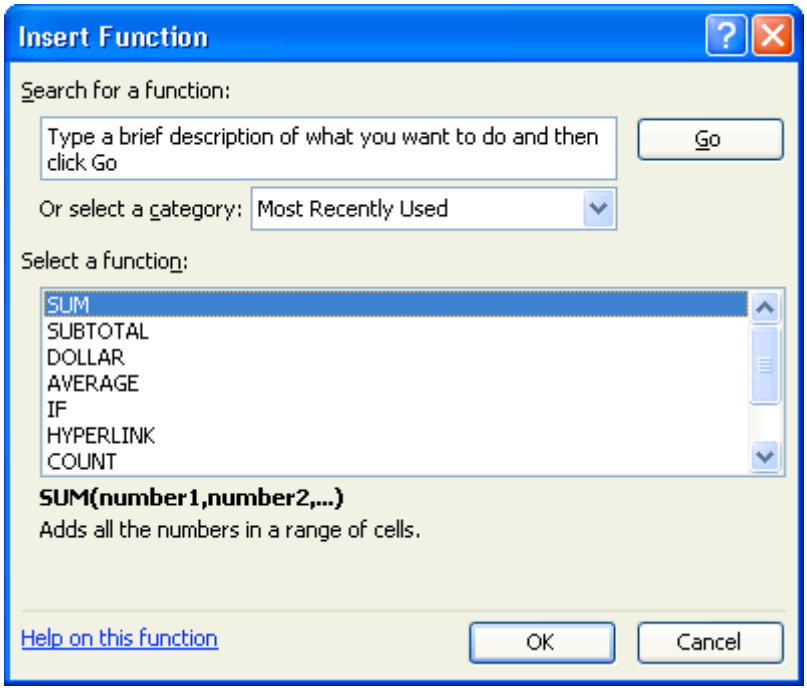
The Formula Bar and the Insert Function button f_x

Alternatively: You can achieve the same results by typing the formula into the **Formula Bar**. Anything you type here will become the contents of the active cell.

Insert Function

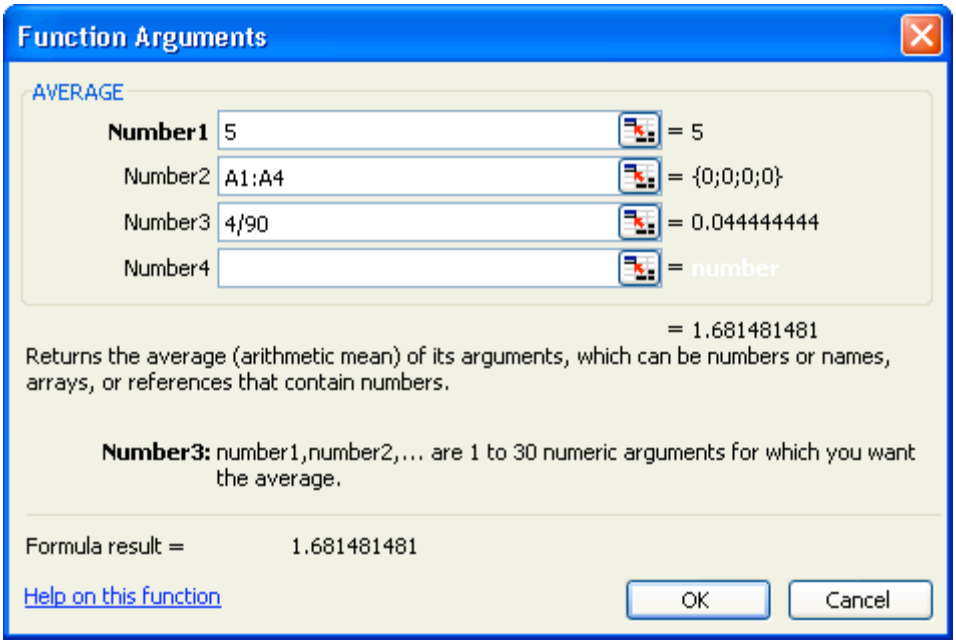
The **Insert Function** utility (which comes up when you click on the **Insert Function** button on the **Formula Bar**) can help you enter worksheet functions. The **Insert Function** utility provides such information as what functions calculate, what data they need to perform that calculation (called the **arguments**), and what the intermediate results are as you build the function. To display the **Insert Function** utility:

1. Make active by clicking on it the cell in which you want the results to appear.
2. Click on the **Insert Function** button .



The Insert Function utility

3. Choose the function you wish to use by either
   - Typing a description of the function and clicking **Go**, or
   - Selecting the category of the function from the drop-down.
4. Double click on the name of the function or click on **OK**.
5. The function's arguments appear. Some things to note about the **Function Arguments** window include:
   - When you click inside of the blank field beside each argument name, a description of that argument will appear at the bottom of the **Function Arguments** window. Also, a description of the function itself is located toward the bottom of the **Function Arguments** window.
   - Each argument can be a constant value (e.g. a number), a reference to another cell, or a result of another formula.
   - Some functions have a predefined number of arguments, while others can have a variable number of arguments. For those functions that can take a variable number of arguments, as you add another argument, Excel automatically provides you with a blank field for an additional argument.
   - The value of each individual argument is calculated and displayed to the right of the argument's input field, and the overall result of the function is displayed at the bottom next to **Formula Result** =.



*The **Function Arguments** window for the Average function. Note that the three arguments entered take the form of a number, a range reference, and a formula result, respectively. The value of each argument is displayed to the right of the input field.*

6. Fill in the arguments and click **OK**. The **Function Arguments** window will close and return you to your spreadsheet with the results in the active cell. The formula will appear in the **Formula Bar**.

Using AutoSum

Excel's **AutoSum** feature is a quick and easy way to build a summation formula for a group of numbers or range of cells. It is most commonly used to sum a contiguous set of cells on the same row or in the same column. To do this, simply make active the last cell after the contiguous set of cells to sum. Then click the **AutoSum** button Σ. Excel will make some reasonable assumptions about what you want to sum and will create the summation formula for you, placing the result in the cell you selected.

Editing & Deleting Formulas

After you have created formulas, Excel allows you to edit or delete them. To delete a formula, simply click on the cell that contains the formula, and press the **Delete** key on your keyboard. If you just need to alter the formula, do the following:

1. Make active by clicking on it the cell which you want to alter.
2. Just as there are a number of ways to create a formula, there are a number of ways to edit a formula
   - You can make edits in the **Formula Bar** by changing the contents directly, or you can make edits in the cell by clicking once more into the contents. This is the best method to edit formulas that don't make use of built-in Excel functions.

Be sure to press **Enter** or click on the **green** checkmark in the **Formula Bar** to commit the changes.

- Or you can click on the **Insert Function** button. This is the best method for cells that contain built-in Excel functions. This will take you directly to the **Function Arguments** window for the function you are editing, with the current argument values already in place for you to edit.

Note: If you click on the **Insert Function** button for an active cell that *does not* contain any built-in Excel functions, the **Insert Function** utility will appear, allowing you to choose a new function to add to the cell. The function will be combined with the current formula with the addition operator (i.e. its result will be **added** to the current result).

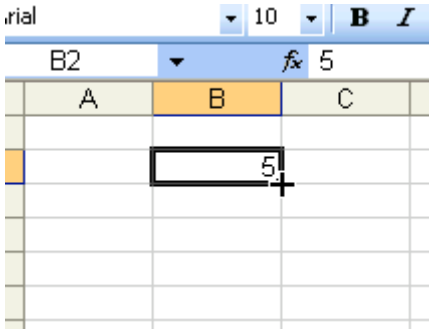
Copying Formulas and Values

There are several ways to copy and paste formulas or their values. You can always use the **copy** and **paste** buttons on your **Formatting** toolbar, but you can also use a feature unique to Excel called **AutoFill**.

AutoFill

AutoFill is a quick and easy way to copy a formula to adjacent cells. To use the **AutoFill** feature, do the following:

1. Click on the cell whose formula you want to copy.



An active cell, showing the AutoFill cursor

   Place your mouse in the lower right corner of the cell. Your selection cross will turn into the AutoFill cross.

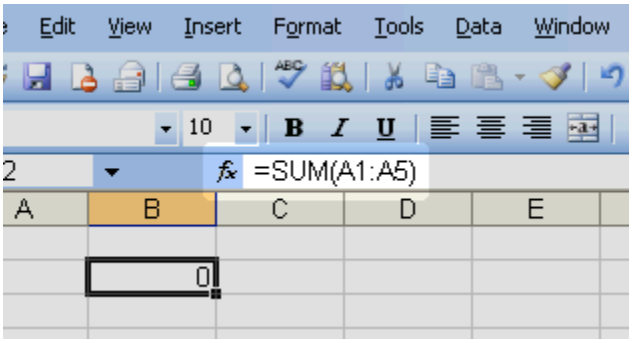
2. Click and drag with the AutoFill cursor to the adjacent cells where you want the formula to be copied.
3. When you release the click, the results will appear in each cell.

When you copy a formula to other cells using the **AutoFill** method, Excel may adjust the formula's references to data based on the relative position of the new copy. Excel only adjusts a reference if it is a ***relative*** reference; if a reference is an ***absolute*** reference, Excel does not change the reference based on the copied formula's new location.

Relative References

In relative references, the address used to refer to a cell or range of cells is based upon that cell's or range's position *relative* to the cell that contains the formula. When you copy a formula that uses relative references, Excel automatically adjusts the references in the pasted formula to refer to different cells that have the same position *relative* to the newly created formula. For example, the figure below shows the formula =SUM(A1:A5) located in cell B2. If you were to copy that formula to, say, cell D2, the references in the formula would be adjusted automatically by Excel and the new formula would read =SUM(C1:C5). The adjustment made by Excel is to keep the range reference (originally A1:A5) in the same position *relative* to the new location of the formula. Thus, since the formula has been moved to the right two cells (from B2 to D2), the cell range should be adjusted to the right by the same amount (from A1:A5 to C1:C5). Note that since the formula remains in the same row (row 2) there is no need to adjust the row references in the range reference, and this is why the 1 and 5 (in A1:A5) do not change upon copying.

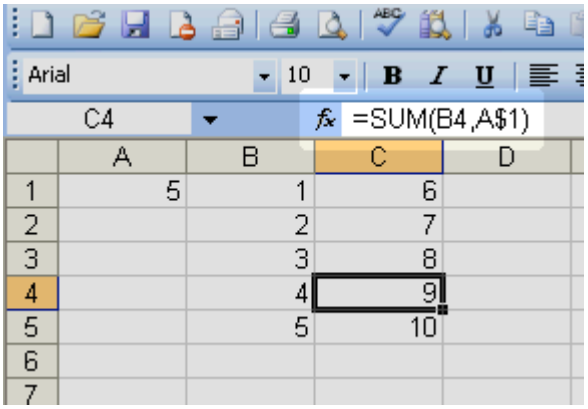
Relative references are used most commonly on data that is continuous. That is, if you have 20 numbers in column A and 20 in column B and you want column C to be the sum of each pair of numbers as you go down the row, then it is appropriate to use relative references in the summation formula. This is because the data change location in the same manner that the formulas will change location as you go down column C.



A relative reference in a formula.

Absolute References

It may not be desirable to have Excel adjust the references in your formula, however. For example, if you have a single value that you want to add to every number in a column, then relative references will not work upon copying the formula for the addition. To see why, consider: you type in the first formula in cell C1 to read =SUM(B1,A1); this formula has no problems, yet. When you copy the formula down the column, however, problems arise. Excel automatically adjusts the relative reference in this formula to read = SUM(B2,A2), =SUM(B3,A3), and so on down the column as you copy the formula. This is not what is desired; what is desired is to have the references to numbers in column B change as the formula is copied down, but the reference to cell A1 to remain the same, since is must be used in every formula.



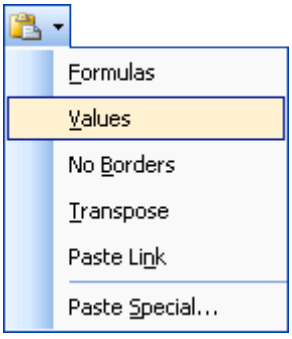
An absolute reference in a formula copied down a column.

To keep Excel from altering references when formulas are copied, you can insert a dollar signe ($) before either or both of the column or row number in the address of the cell. In the preceding example, we would change the reference in the formula to the 5 in cell A1 to be A$1, and thus the 1 would not be changed by Excel upon copying the formula. (You could put $ in front of the A as well, but it is not necessary since Excel will not change it as you copy the formula down column C). In the figure above, we see that the formula now has an *absolute* reference to row 1 in column A, and as is shown, that reference has not been changed after copying the formula down column C.

Copying Values

Sometimes, you might only want to copy the cell result or value instead of the formula. To do this, you can do the following:

1. Click on the cell whose value you want to copy.
2. Click on your **copy** button , **Edit > Copy**, or press Ctrl-C.
3. Activate the cell you want to copy the value to by clicking on it.
4. Click on the down arrow next to the past button on the **Standard** toolbar.



Special paste option menu.

5. Click on **Values.**
6. When you look in the formula bar, you should only see the value you just copied, not the formula.

Changing the Workbook or Worksheet Appearance

Excel allows you to change the appearance of worksheets and workbooks by renaming, moving, copying, inserting, and deleting worksheets; inserting and deleting cells, columns, and rows; and formatting the worksheet cells themselves.

Workbook Maintenance

Often times, you need to add, delete, rearrange, and name worksheets in your workbooks. Keeping your workbooks organized can help you find your information quickly and easily.

Renaming a worksheet using worksheet tabs.

Naming Worksheets

To name a worksheet something other than the default, you can do the following:

1. Place the mouse pointer directly on the worksheet tab you want to rename.
2. Double click to highlight the name of the sheet.
3. Type over the existing name and press **Enter** or click anywhere in the worksheet.

Adding Worksheets

To add a new worksheet to your workbook, do the following:

1. Click on the sheet tab before which you want the new worksheet.
2. Click on **Insert > Worksheet**.
3. The new worksheet will appear.
4. Rename the worksheet as needed.

Rearranging Worksheets

There are a couple of ways in which you can rearrange worksheets. One is to move it to a new location within the same workbook and another is to move or copy it to a different workbook.

Moving a sheet within a workbook

To move a worksheet to a different location in the same workbook, you can do the following:

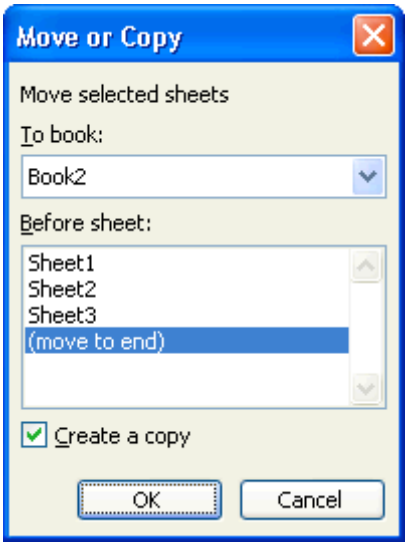
1. Point at the sheet tab you want to move with your mouse pointer.
2. Click and drag the sheet tab. As you do this, you will see an icon similar to a piece of paper under your mouse cursor, with a small black arrow indicating where the sheet will be placed.
3. Continue to drag the sheet until the arrow points to the place you want to move the sheet.

4. When you let go of the click, the sheet will be moved.

Copying (or moving) a sheet to an existing workbook

To copy or move a spreadsheet to an existing workbook, you can do the following:

1. Open the workbook whose sheet you want to move or copy.
2. Open the existing workbook to which you want to move or copy your spreadsheet.
3. Click on the **Window** menu and click the name of the workbook whose sheet you want to copy. This will switch you back to that workbook.
4. Click on the sheet tab you want to move or copy.
5. Click on **Edit > Move or Copy Sheet…**.



The Move or Copy sheet dialog box.

Note: To **copy** the sheet, but not move it, make sure you check the box that says **Create a copy**. Otherwise, you will move the sheet instead of copying it.

6. When the move or copy dialog box opens, choose the name of the workbook you want to move or copy your sheet to from the **To Book:** drop down list.
7. Click on the sheet name you want to want to move or copy the sheet in front of from the **Before Sheet:** box.
8. Click **OK**.
9. Excel will switch you to the other workbook. Make sure you save your changes before closing the book to which you just moved or copied the sheet.

Deleting Worksheets

You can also delete worksheets you no longer need from your workbooks. Make sure that you only delete sheets you know for sure you no longer need or want. When you delete an Excel spreadsheet, it is **permanent**. Here are the steps for that:

1. Click on the sheet tab of the worksheet you want to **permanently** delete.
2. Click on **Edit > Delete Sheet**. A dialog box will appear to confirm the deletion.
3. Click **OK** to **permanently** delete the entire worksheet. If you change your mind and decide not to delete the spreadsheet, click **Cancel**.

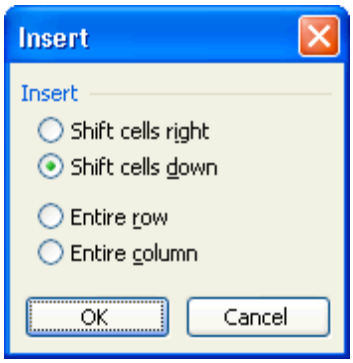
Worksheet Maintenance

There might be times when you need to add or delete cells, rows, or columns to your worksheets. All of these things can be easily done.

Adding or Deleting Cells

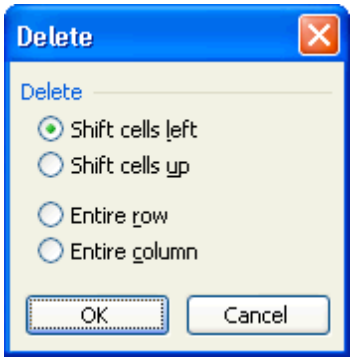
Sometimes you might find that you need to add or delete a cell or several cells from your worksheet. To do this, do the following:

1. Select the cell or range of cells before which you want to insert cells or you wish to delete.
2. To insert cells before these cells, click on **Insert > Cells…**.
   a) The **Insert** dialog box will open.



   b) Choose the option you want and click **OK**.

3. To delete cells before these cells, click on **Edit > Delete**.
    a) A **Delete** dialog box will open.



    b) Choose the option you want and click **OK**.

Adding or Deleting Rows and Columns

You can also choose to add or delete entire rows or columns from your spreadsheet. If this is what you need, do the following:

1. Select the entire column or row before which you want to insert an entire row or column or which you wish to delete.
2. To insert a **column** before the one you've chosen, click on **Insert > Column**. If you clicked on a row instead, click on **Insert > Row**.
3. To delete the column or row you've chosen, click on **Edit > Delete**.

Formatting Worksheets

There are several ways to format your Excel worksheets, whether you're trying to format the cells or the cell contents. One way is to the **Formatting** toolbar or the format dialog box. Another way is to use a feature called **AutoFormat**. The **AutoFormat** option is a great way to format your spreadsheet quickly. Even if you choose this option, you can still modify specific formatting afterwards.

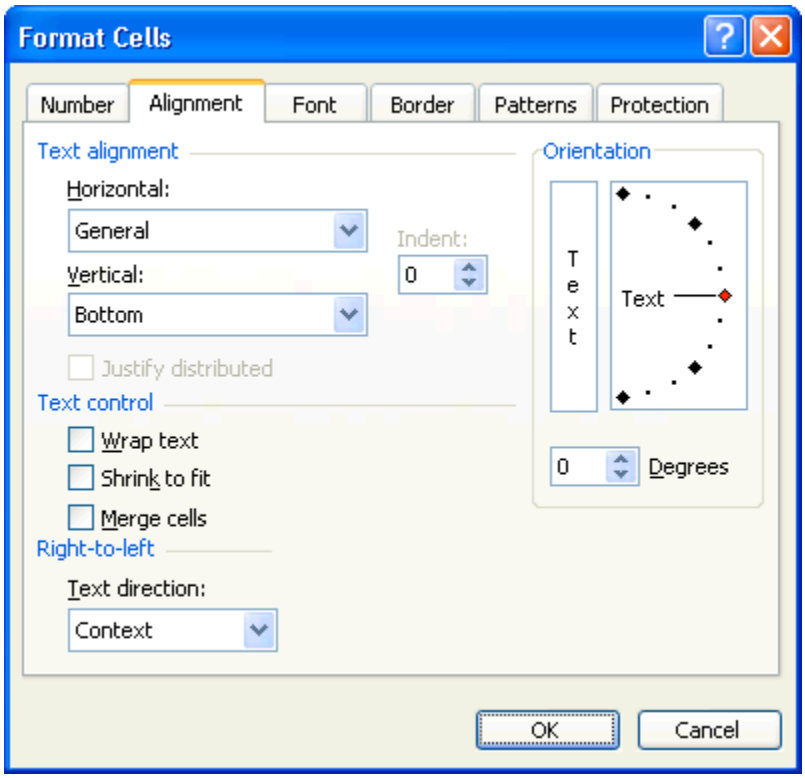
Formatting Toolbar and Dialog Box

The **Formatting** toolbar and dialog box are two ways to format your worksheet. Either option allows you to:

- Format numbers.
- Chang the font, color, size and alignment.
- Chang cell colors and/or patterns.
- Add borders to cells.

To use the features on the **Formatting** toolbar, simply make the cell or group of cells you want to format active by clicking on them, then click on the button(s) you want to use to make your changes. The **Formatting** toolbar looks like this:

If you want more options than what the **Formatting** toolbar offers, then use the **Format Cells** dialog box instead. Make sure you click on the cell or groups of cells you want to format and then click **Format > Cells…**. When the **Format Cells** dialog box opens, you will notice that there are six different tabs from which you can choose: *Number, Alignment, Font, Borders, Patterns,* and *Protection*. Make any changes you need to and then click on **OK**. Here is a picture of the *Alignment* tab in the **Format Cells** dialog box:



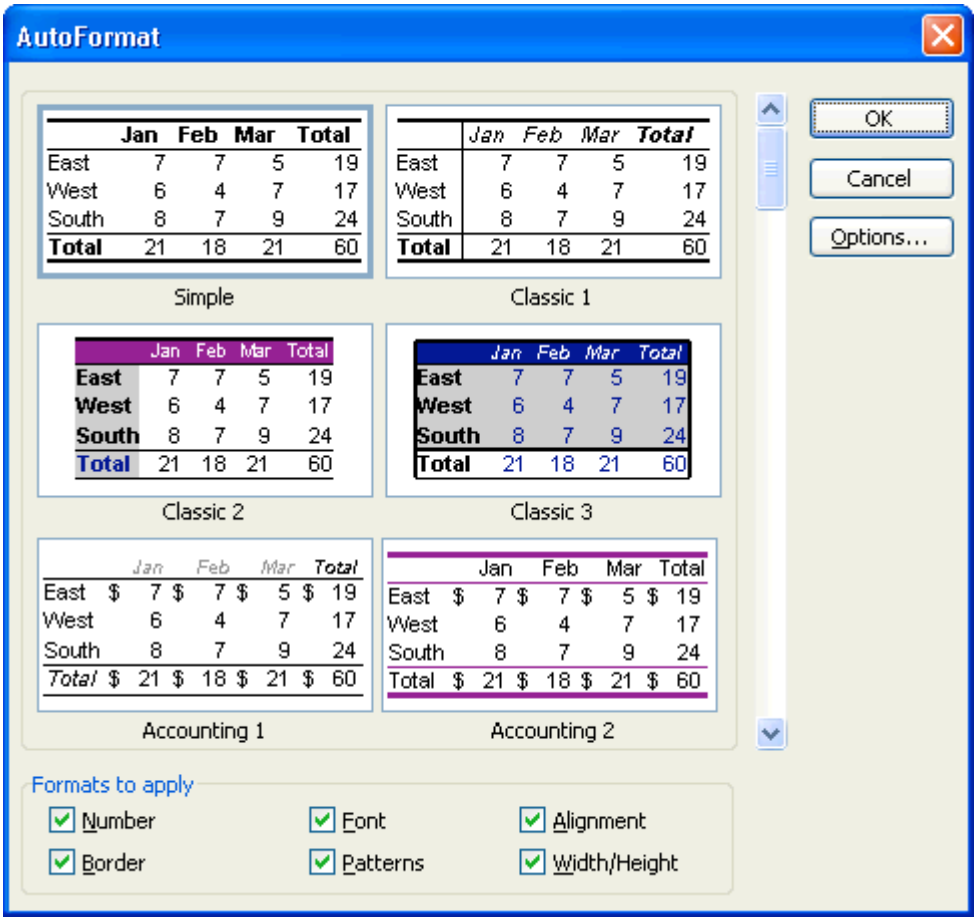
The Format Cells dialog box.

Note: On the *Protection* tab, you'll notice the note that says locking cells or hiding formulas will only work if the worksheet is protected. Protecting worksheets is not covered in this class. It will be covered in the **Excel: Functions and Data Analysis Tools** workshop.

AutoFormat

Excel's **AutoFormat** feature is a great way to quickly format your worksheet. To use it, do the following:

1. Select the group of cells you want to format.
2. Click **Format > AutoFormat…**.



3. The **AutoFormat** dialog box will open and allow you to change the format of your worksheet based on the schemes presented in the pictures.
4. If you want to change any of the formatting options, click on the **Options…** button in the **AutoFormat** dialog box.
5. Once you find a format you like, click on it and then click **OK** to format your cells and close the dialog box.

Clearing Formats

If you decide you don't like the format you've chosen for your cells, you can quickly clear the format without deleting the contents of the cells. To do this:

1. Select the groups of cells whose format you want to clear.
2. Click on **Edit > Clear > Formats**.

Note: Make sure you only choose **Formats**. If you choose **All** or **Contents**, you will delete the information as well. If this accidentally happens, just click on your **Undo** button or click **Edit > Undo** and everything will reappear.

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3. The format of your cells will be changed back to normal (no formatting applied) but the information will still be there.

Getting Additional Help

The Help Desk provides consulting and Q&A help in a variety of ways:

785/864-0200
question@ku.edu
www.ku.edu/~helpdesk

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