

Introduction to Microsoft® Excel

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&

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Short Course Introduction to Microsoft® Excel

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Introduction

As a spreadsheet application, **Microsoft® Excel** is used to enter text and numbers to be organized, calculated and analyzed. Entering formulas allow any changes in the original numbers to be automatically recalculated throughout an entire worksheet. Data may be formatted creating an attractive, readable presentation of tables or charts.

By following the steps outlined in this tutorial, a basic understanding of Microsoft® Excel should be achieved.



A spreadsheet is the computer equivalent of a paper ledger sheet. It consists of a grid made from columns and rows. It is an environment that can make number manipulation easy and somewhat painless.

	<i>paper ledger</i>			A	B	C
				1	computer ledger	
	<i>car loan</i>		<i>\$12,000</i>	2		
	<i>interest</i>		<i>9.6%</i>	3	car loan	\$12,000.00
	<i># of payments</i>		<i>60</i>	4	interest	9.60%
				5	# of payments	60
				6		
	<i>monthly payment</i>		<i>\$252.61</i>	7	Monthly Pmt.	\$252.61

The math that goes on behind the scenes on the paper ledger can be overwhelming. If you change the loan amount, you will have to start the math all over again (from scratch). But let's take a closer look at the computer version.

Looking at our previous example it seems pretty evenly matched. Right? **WRONG!** The nice thing about using a computer and spreadsheet is that you can experiment with numbers without having to RE-DO all the calculations.

Lets change the interest rate and then the number of months. **Let the COMPUTER do the calculations!** Once we have the formulas set up, we can change the variables that are called from the formula and watch the changes.

Change the Interest Rate				Change the Number of Months			
	A	B	C		A	B	C
1		computer ledger		1		computer ledger	
2				2			
3		car loan	\$12,000.00	3		car loan	\$12,000.00
4		interest	12.00%	4		interest	9.60%
5		# of payments	60	5		# of payments	36
6				6			
7		Monthly Pmt.	\$266.93	7		Monthly Pmt.	\$384.96

Do this on paper and you better get your calculator back out *and* get an Eraser *and* hope you punched all the right keys *and* in the right order. When properly set up, spreadsheets are instantly updated if one of the entries is changed.

NO erasers! NO new formulas! NO calculators!

Spreadsheets can be **very** valuable tools in business. They are often used to play out a series of *what-if* scenarios! (much like our car purchase here.)

Getting Started

Click on Start | Programs | Microsoft Excel



Screen Layout

Below are three toolbars located at the top of the Excel screen. If you don't see one of the toolbars, select View | Toolbars and select the missing toolbar.

Menu bar

Click any of the words on this row to see a menu of options in that category - File and Edit are some of the most commonly used for saving, opening files, copying, and pasting.



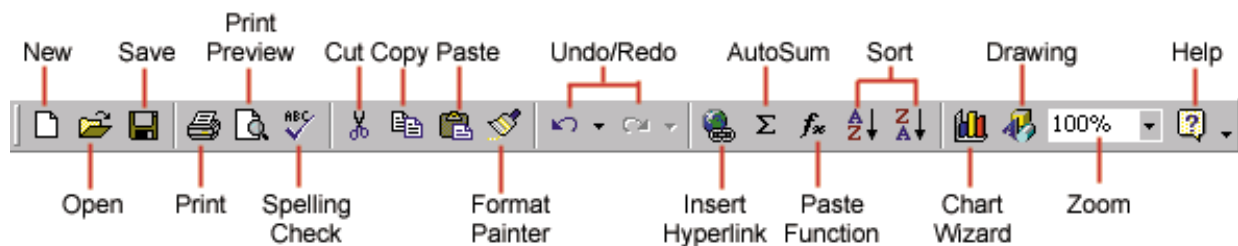
Standard toolbar

Icons in this row provide shortcuts to many tasks accessible through the menu bar (opening, printing, cutting, pasting) as well as handy functions (AutoSum, chart wizard, etc.).

For more information on what action an icon can perform, hover your mouse over top of that icon and a small description will appear after a few seconds (tool tips).



We have summarized these functions:



New - Select File | New from the menu bar, press CTRL+N, or click the New button to create a new workbook.

Open - Click File | Open from the menu bar, press CTRL+O, or click the Open folder button to open an existing workbook.

Save - The first time you save a workbook, select File | Save As and name the file. After the file is named click File | Save, CTRL+S, or the Save button on the standard toolbar.

Print - Click the Print button to print the worksheet.

Print Preview - This feature will allow you to preview the worksheet before it prints.

Spell Check - Use the spell checker to correct spelling errors on the worksheet.

Cut, Copy, Paste, and Format Painter - Useful for cutting/copying information and pasting it into a new location. Format Painter is used to copy the “look and feel” of a particular set of information and paste it (or paint it) onto a target set of information.

Undo and Redo - Click the backward Undo arrow to cancel the last action you performed, whether it be entering data into a cell, formatting a cell, entering a function, etc. Click the forward Redo arrow to cancel the undo action.

Insert Hyperlink - To insert a hyperlink to a web site on the Internet, type the text into a cell you want to be the link that can be clicked with the mouse. Then, click the Insert Hyperlink button and enter the web address you want the text to link to and click OK.

AutoSum, Function Wizard, and Sorting - These features are discussed in detail in the Functions tutorial.

Zoom - To change the size that the worksheet appears on the screen, choose a different percentage from the Zoom menu.

Formatting toolbar

This row controls the format of text in cells (font, font size, style, color, borders, alignments).



Workbooks and Worksheets

Excel allows you to create spreadsheets much like paper ledgers that can perform automatic calculations. Each Excel file is a **workbook** that can hold many **worksheets**. The worksheet is a grid of **columns** (designated by letters) and **rows** (designated by numbers).

The letters and numbers of the columns and rows (called **labels**) are displayed in gray buttons across the top and left side of the worksheet. The intersection of a column and a row is called a **cell**. Each cell on the spreadsheet has a **cell address** that is the column letter and the row number. Cells can contain either: text, numbers, or mathematical formulas.

Adding and Renaming Worksheets

The worksheets in a workbook are accessible by clicking the worksheet tabs just above the status bar. By default, three worksheets are included in each workbook. To add a sheet, select **Insert | Worksheet** from the menu bar. To rename the worksheet tab, right-click on the tab with the mouse and select **Rename** from the shortcut menu. Type the new name and press the **ENTER** key.

The Basics

So let's get started digging into what makes a spreadsheet work. Spreadsheets are made up of:

- » columns
- » rows
- » and their intersections are called cells

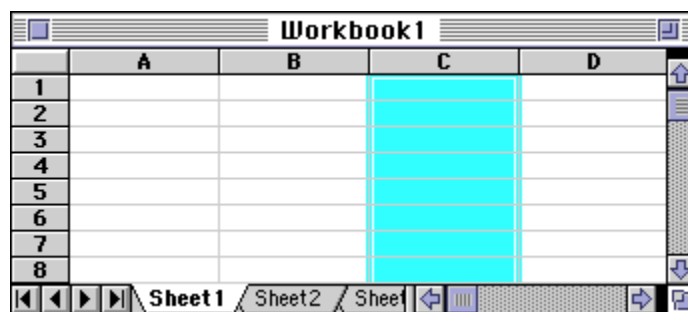
In each cell there may be the following types of data:

- » text (labels)
- » number data (constants)
- » formulas (mathematical equations that do all the work)

Let's take a look at the explanations of each of these.

Columns

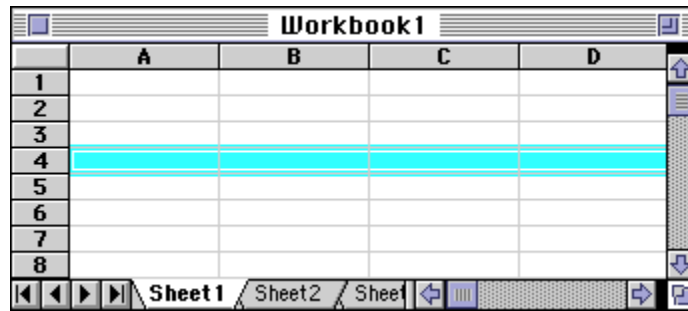
In a spreadsheet the **COLUMN** is defined as the vertical space that is going up and down the window. **Letters** are used to designate each **COLUMN'S** location.



In the above diagram the **COLUMN** labeled **C** is highlighted.

Rows

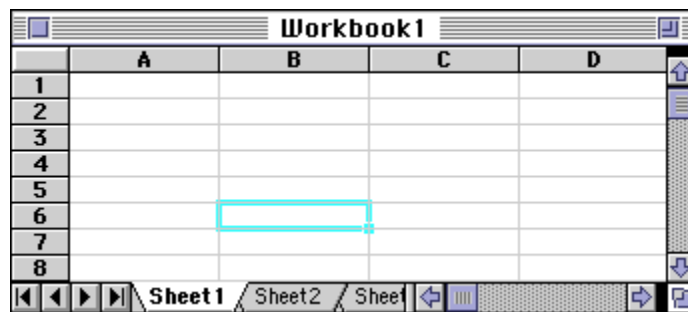
In a spreadsheet the **ROW** is defined as the horizontal space that is going across the window. **Numbers** are used to designate each **ROW'S** location.



In the above diagram the **ROW** labeled **4** is highlighted.

Cells

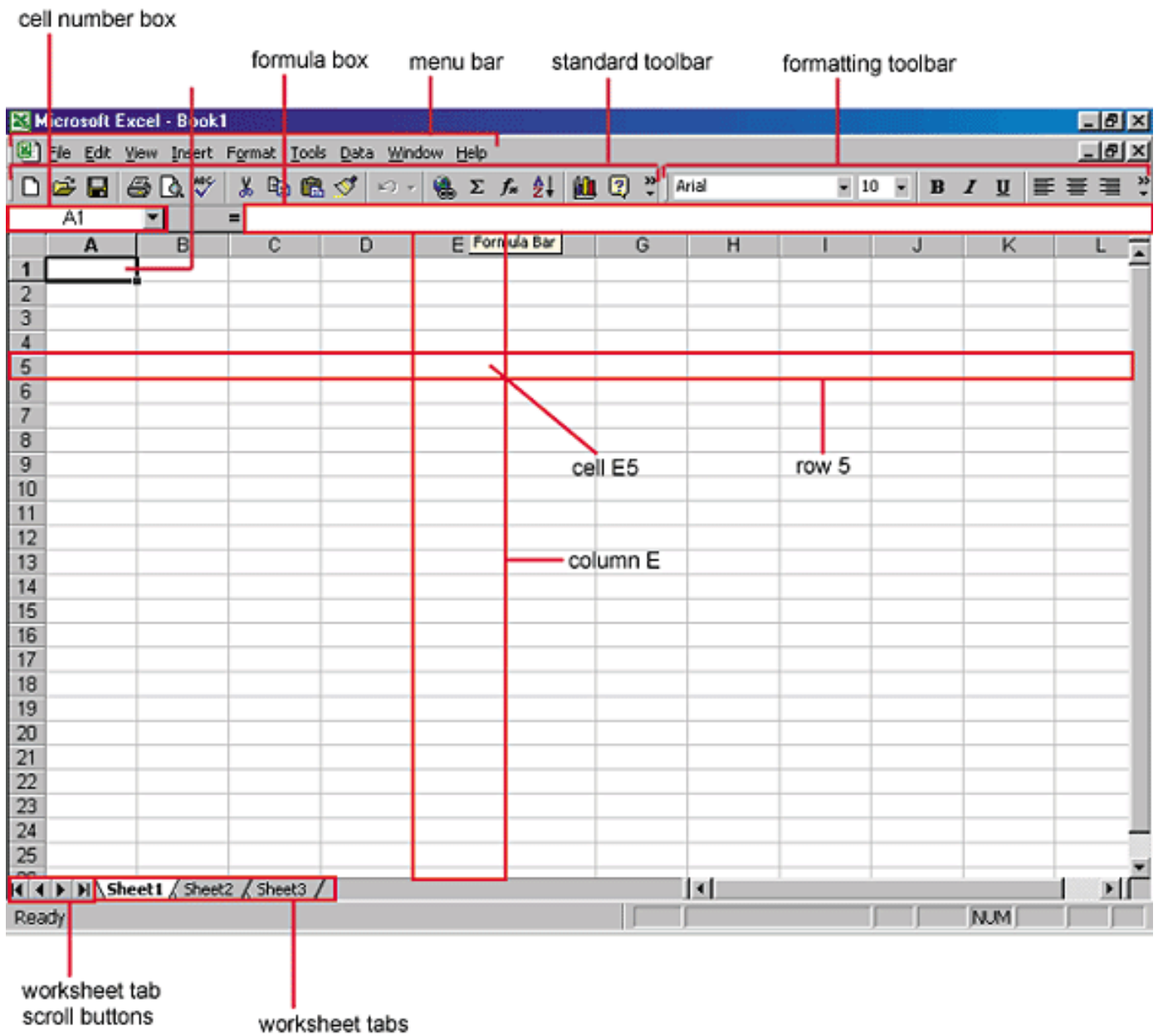
In a spreadsheet the **CELL** is defined as the space where a specified row and column intersect. Each **CELL** is assigned a name according to its **COLUMN letter** and **ROW number**.



In the above diagram the **CELL** labeled **B6** is highlighted. When referencing a cell, you put the column first and the row second.

Summary of the Basics

Here is a helpful summary of the most important elements that are important to using Excel.



Data Types

In a spreadsheet there are three basic types of data that can be entered.

- » labels - (text with no numerical value)
- » constants - (just a number – constant value)
- » formulas* - (a mathematical equation used to calculate)

Data Types	Examples	Descriptions
LABEL	Name or Wage or Days	anything that is just text
CONSTANT	5 or 3.75 or -7.4	any number
FORMULA	=5+3 or = 8*5+3	math equation

*ALL formulas **MUST** begin with an equal sign (=).

Labels

Labels are text entries. They do not have a value associated with them. We typically use labels to identify what we are talking about.

In our first example: the labels were

- » computer ledger
- » car loan
- » interest
- » # of payments
- » Monthly Pmt.

	A	B	C
1		computer ledger	
2			
3		car loan	\$12,000.00
4		interest	9.60%
5		# of payments	60
6			
7		Monthly Pmt.	\$252.61

Again, we use **labels** to help identify what we are talking about. The labels are NOT for the computer but rather for US so we can clarify what we are doing.

Constants

Constants are entries that have a specific fixed value. If someone asks you how old you are, you would answer with a specific answer. Sure, other people will have different answers, but it is a fixed value for each person.

In our first example: the constants were

- » \$12,000
- » 9.6%
- » 60

	A	B	C
1		computer ledger	
2			
3		car loan	\$12,000.00
4		interest	9.60%
5		# of payments	60
6			
7		Monthly Pmt.	\$252.61

As you can see from these examples there may be different types of numbers. Sometimes constants are referring to dollars, sometimes referring to percentages, and other times referring to a number of items (in this case 60 months). These are typed into the computer with just the numbers and are changed to display their type of number by formatting (*we will talk about this later*).

Again, we use **constants** to enter FIXED number data.

Formulas

Formulas are entries that have an equation that calculates the value to display. We DO NOT type in the numbers we are looking for; we type in the equation. This equation will be updated upon the change or entry of any data that is referenced in the equation.

In our first example, the solution was **\$252.61**.

This was NOT typed into Excel... this was CALCULATED.

The formula that was typed into the spreadsheet was: **=PMT(C4/12,C5,-C3)**

C4 (annual interest rate) was divided by 12

because there are 12 months in a year. Dividing by 12 will give us the interest rate for the payment period - in this case a payment period of one month.

	A	B	C
1		computer ledger	
2			
3		car loan	\$12,000.00
4		interest	9.60%
5		# of payments	60
6			
7		Monthly Pmt.	\$252.61

It is also important to type in the reference to the constants instead of the constants.

Had we entered `=PMT(.096,60,-12000)` our formula would only work for that particular set of data. If we were to change the months, the payment would not change.

Remember to enter the cell where the data is stored and NOT the data itself.

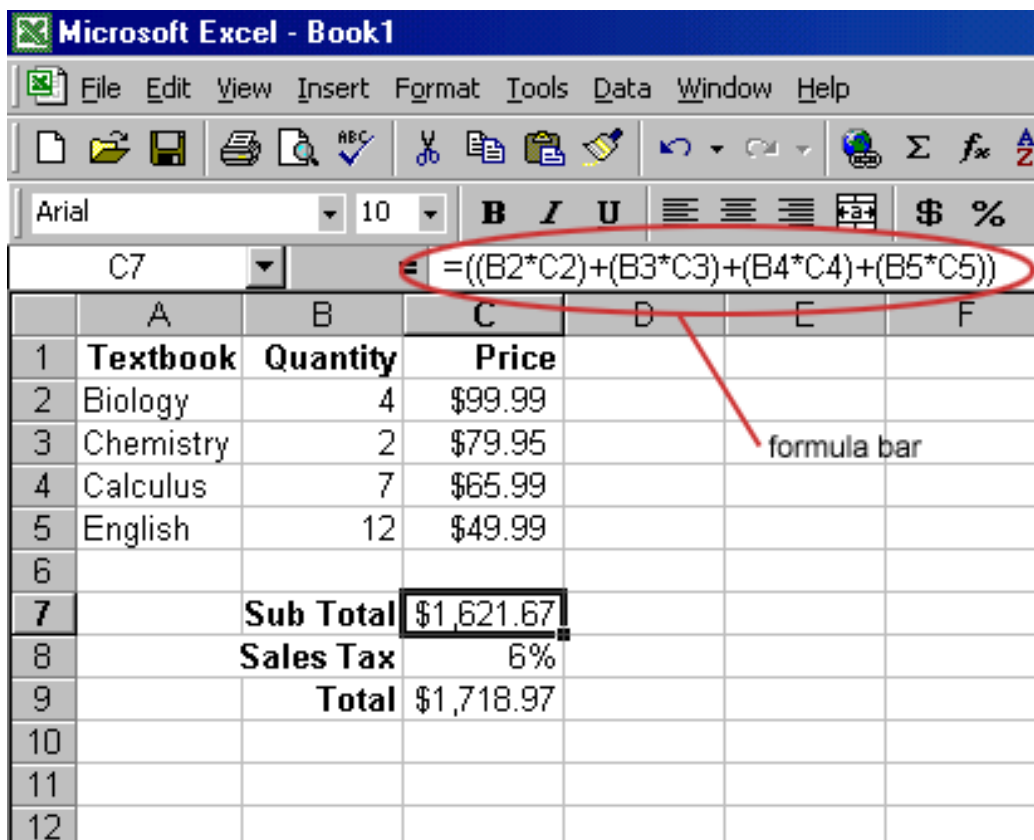
Formulas are mathematical equations. There is a list of the functions available within Excel under the **menu** Insert | Function....

Formulas OR Functions **MUST** begin with an equal sign (=).

Again, we use **formulas** to CALCULATE a value to be displayed.

Example

Let's look at the formula for calculating the sub total for a number of textbooks. The formula multiplies the quantity and price of each textbook and adds the subtotal for each book.



The screenshot shows the Microsoft Excel interface. The formula bar at the top displays the formula `=((B2*C2)+(B3*C3)+(B4*C4)+(B5*C5))`, which is circled in red. A red arrow points from the text "formula bar" to the formula bar. Below the formula bar is a table with the following data:

	A	B	C	D	E	F
1	Textbook	Quantity	Price			
2	Biology	4	\$99.99			
3	Chemistry	2	\$79.95			
4	Calculus	7	\$65.99			
5	English	12	\$49.99			
6						
7		Sub Total	\$1,621.67			
8		Sales Tax	6%			
9		Total	\$1,718.97			
10						
11						
12						

Basic Formulas

When we are entering formulas into a spreadsheet we want to make as many references as possible to existing data. If we **can reference that information** we **don't have to type it in again** AND more importantly if that OTHER information changes, we **DO NOT have to change the equations**.

If you work for 23 hours and make \$5.36 an hour, how much do you make? We can set up this situation using:

- » three labels
- » two constants
- » one equation

	A	B	
1	Hours	23	
2	Wage per hour	\$ 5.36	
3			
4	Total Pay	\$ 123.28	
5			
6			

Let's look at this equation in **B4**:

- a) = 23 * 5.36
- b) = B1 * B2

Both of these equations will produce the same answers, but one is much more useful than the other.

Do you know which is BEST and WHY?

It is BEST if we can **Reference** as much data as possible as opposed to typing data into equations.

** note: Excel does not recognize spaces in a formula (i.e., it skips right over them). You can feel free to include spaces to help you visually follow a function.

Ex. =B1*B2 + C1*(C2-C3) - 5

Changes in Formulas

In our last example, things were pretty straightforward. We had number of hours worked multiplied by wage per hour and we calculated our total pay. Once you have a working spreadsheet you can save your work and use it at a later time.

If we had referenced the actual cells (instead of typing the data into the equation) we could update the entire spreadsheet by just typing in the NEW Hours worked. And – you're done!

Let's look at the new spreadsheet:

- » hours have been changed to 34
- » wage is the same
- » total pay would now be = 34 * 5.36
- » but would still be = B1 * B2

	A	B
1	Hours	34
2	Wage per hour	\$ 5.36
3		
4	Total Pay	\$ 182.24

If we had typed in (= 23 * 5.36) the first time and just changed the hours worked, our equation in B4 would still be (= 23 * 5.36)

INSTEAD we typed in references to the data that we wanted to use in the equation.

We typed in (= B1 * B2). These are the locations of the data that we want to use in our equation.

It is BEST if we can **Reference** as much data as possible as opposed to typing data into equations.

Linking Worksheets

You may want to use the value from a cell in another worksheet within the same workbook in a formula. For example, the value of cell A1 in the current worksheet and cell A2 in the second worksheet can be added using the format "sheetname!celladdress". The formula for this example would be "=A1+Sheet2!A2" where the value of cell A1 in the current worksheet is added to the value of cell A2 in the worksheet named "Sheet2".

Basic Math Functions

Spreadsheets have many Math functions built into them. The most basic operations are the standard multiply, divide, add and subtract. These operations follow the order of operations (just like algebra). Let's look at some examples.

For these following examples let's consider the following data:

A1 (column A, row 1) = 5		A	B
A2 (column A, row 2) = 7			
A3 (column A, row 3) = 8	1	5	3
B1 (column B, row 1) = 3	2	7	4
B2 (column B, row 2) = 4			
B3 (column B, row 3) = 6	3	8	6

Operation	Symbol	Constant Data	Referenced Data	Answer
Multiplication	*	= 5 * 6	= A1 * B3	30
Division	/	= 8 / 4	= A3 / B2	2
Addition	+	= 4 + 7	= B2 + A2	11
Subtraction	-	= 8 - 3	= A3 - B1	5

Methods of Selecting Cells

Selecting cells in an equation is a very important concept of a spreadsheet. We need to know how to reference the data in other parts of the spreadsheet. When entering your selection you may use the keyboard or the mouse.

We can select several cells together if we can specify a starting cell and a stopping cell. This will select ALL the cells within this specified BLOCK of cells.

If the cells that we want to work with are not together (non-contiguous cells) we can use the comma to separate the cells or by holding down the control-key (command key on a MAC) and selecting cells or blocks of cells the comma will be inserted automatically to separate these chunks of data.

For the following examples lets consider the table below:

A1 (column A, row 1) = 5		A	B
A2 (column A, row 2) = 7			
A3 (column A, row 3) = 8	1	5	3
B1 (column B, row 1) = 3	2	7	4
B2 (column B, row 2) = 4			
B3 (column B, row 3) = 6	3	8	6

This is just a discussion of selection methods. If we wanted to add the cells in the **(To Select)** you would type in:

=SUM(Type In)

or

=SUM(Click On)

To Select	Type In	Click On
A1	A1	1) click on A1
A1, A2, A3	A1:A3	1) click on A1 2) with button down 3) drag to A3
A1, B1	A1:B1	1) click on A1 2) with button down 3) drag to B1
A1, B3	A1, B3	1) click on A1 2) type in comma (or hold down the control key on a PC) (or hold down the command key on a MAC) 3) click on B3
A1, A2, B1, B2	A1:B2	1) click on A1 2) with button down 3) drag to B2

Specific Formulas and Functions

There is a wide range of very powerful formulas and functions in Excel. We will discuss the most commonly used ones here. For a complete list of all the available functions, click on **Insert | Function...**

SUM

Probably the most popular function in any spreadsheet is the **SUM** function. The SUM function takes all of the values in each of the specified cells and totals their values. The syntax is:

» =SUM(first value, second value, etc)

In the first and second spots you can enter any of the following (constant, cell, range of cells).

Blank cells will return a value of zero to be added to the total.

Text cells can not be added to a number and will produce an error.

Lets use the table here for the discussion that follows:

We will look at several different specific examples that show how the typical function can be used! Notice that in A4 there is a TEXT entry. This has NO numeric value and can not be included in a total.

	A
1	25
2	50
3	75
4	test
5	

Example	Cells to ADD	Answer
=sum (A1:A3)	A1, A2, A3	150
=sum (A1:A3, 100)	A1, A2, A3 and 100	250
=sum (A1, A4)	A1, A4	#VALUE!
=sum (A1:A2, A5)	A1, A2, A5	75

AVERAGE

The **AVERAGE** function finds the average of the specified data (*this simplifies adding all of the indicated cells together and dividing by the total number of cells*). The syntax is as follows:

» =AVERAGE (first value, second value, etc.)

Text fields and blank entries are not included in the calculations of the Average Function.

Lets use the table here for the discussion that follows:
We will look at several different specific examples that show how the average function can be used!

	A
1	25
2	50
3	75
4	test
5	

Example	Cells to AVERAGE	Answer
=average (A1:A4)	A1, A2, A3, A4	62.5
=average (A1:A4, 300)	A1, A2, A3, A4 and 300	110
=average (A1:A5)	A1, A2, A3, A4, A5	62.5
=average (A1:A2, A4)	A1, A2, A4	58.33

MAX

The next function we will discuss is **MAX** (which stand for Maximum). This will return the largest (max) value in the selected range of cells.

Blank entries are not included in the calculations of the MAX Function.

Text entries are not included in the calculations of the MAX Function.

Lets use the table here for the discussion that follows.
We will look at several different specific examples that show how the Max functions can be used!

	A
1	10
2	20
3	30
4	test
5	

Example of MAX	Cells to look at	Ans. MAX
=max (A1:A4)	A1, A2, A3, A4	30
=max (A1:A4, 100)	A1, A2, A3, A4 and 100	100
=max (A1, A3)	A1, A3	30
=max (A1, A5)	A1, A5	10

MIN

The **MIN** function works identically to the MAX function, only instead of returning the Maximum value in a range of data, it returns the Minimum value.

IF

The next function we will discuss is **IF**. The IF function will check the logical condition of a statement and return one value if true and a different value if false.

The syntax is:

- » =IF (condition, value-if-true, value-if-false)
- » value returned may be either a number or text
- » if value returned is text, it must be in quotes

Lets use the table here for the discussion that follows. We will look at several different specific examples that show how the IF functions can be used!

	A	B
1	Price	Over a dollar?
2	\$.95	No
3	\$1.37	Yes
4	comparing #	returning #
5	14000	0.08
6	8453	0.05

Example of IF typed into column B	Compares	Answer
=IF (A2>1, "Yes", "No")	is (.95 > 1)	No
=IF (A3>1, "Yes", "No")	is (1.37 > 1)	Yes
=IF (A5>10000, .08, .05)	is (14000 > 10000)	.08
=IF (A6>10000, .08, .05)	is (8453 > 10000)	.05

PMT

The **PMT** function returns the periodic (in this case monthly) payment for an annuity (in this case a loan).

This is the PMT function that was used for the car purchase in the first example. There are a few things that we must know in order for this function to work. To calculate the loan we must know a combination of the following:

- » (rate) interest rate per period
- » (NPER) number of payments until repaid
- » (PV) present value of the loan (amount we are borrowing)
- » (FV) future value of the money (for saving or investing)
- » (type) enter 0 or 1 to indicate when payments are due.

=PMT(rate, NPER, PV, FV, type)

The equation goes into C7:

	A	B	C
1		computer ledger	
2			
3		car loan	\$12,000.00
4		interest	9.60%
5		# of payments	60
6			
7		Monthly Pmt.	\$252.61

=PMT(C4/12,C5,-C3)

C4 is the yearly interest and since it's compounded monthly we divide by 12.


C5 is the number of months (# of payments)

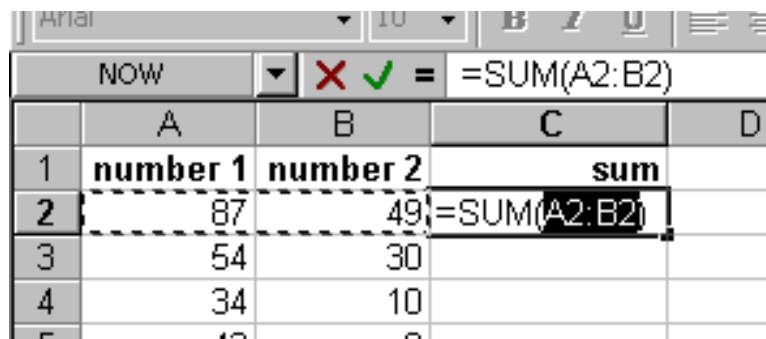
-C3 is the amount of money we have (borrow - negative)

Note that the rate is per period. If we have an annual interest rate of 9.6% and we are calculating monthly payments, we must divide the annual interest rate by 12 to calculate the monthly interest rate.

AutoSum

Use the **AutoSum** function to add the contents of a cluster of adjacent cells.

1. Select the cell that the sum will appear in that is outside the cluster of cells whose values will be added. Cell C2 was used in this example.
2. Click the **AutoSum** button (Greek letter sigma) on the standard toolbar.
3. Highlight the group of cells that will be summed (cells A2 through B2 in this example).
4. Press the **ENTER** key on the keyboard or click the green check mark button on the formula bar .



The screenshot shows the Excel interface with the formula bar containing "=SUM(A2:B2)". The spreadsheet has columns A, B, C, and D, and rows 1 through 5. Cell C2 is selected and contains the formula. The range A2:B2 is highlighted with a dashed border, indicating the cells being summed.

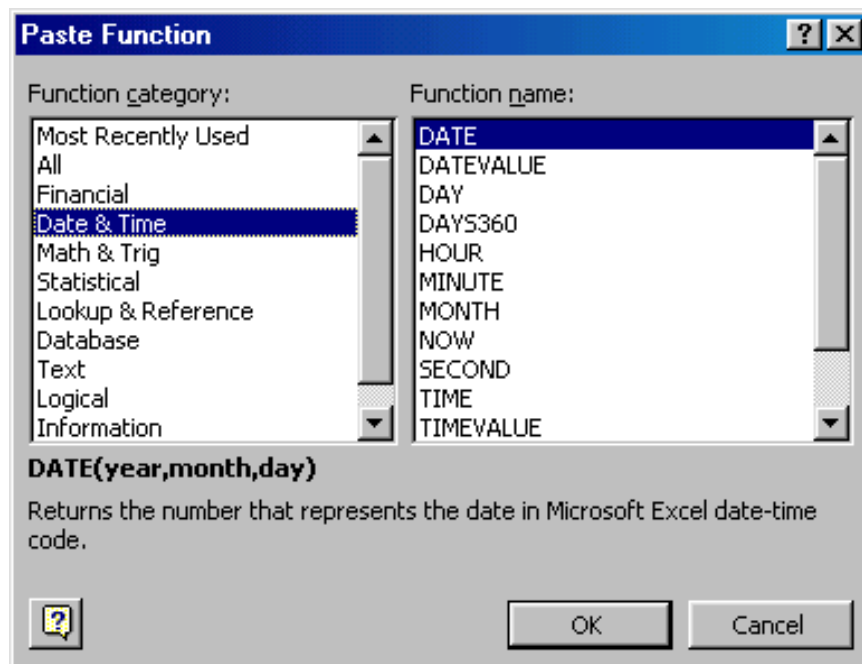
	A	B	C	D
1	number 1	number 2	sum	
2	87	49	=SUM(A2:B2)	
3	54	30		
4	34	10		
5	12	0		

The Function Wizard

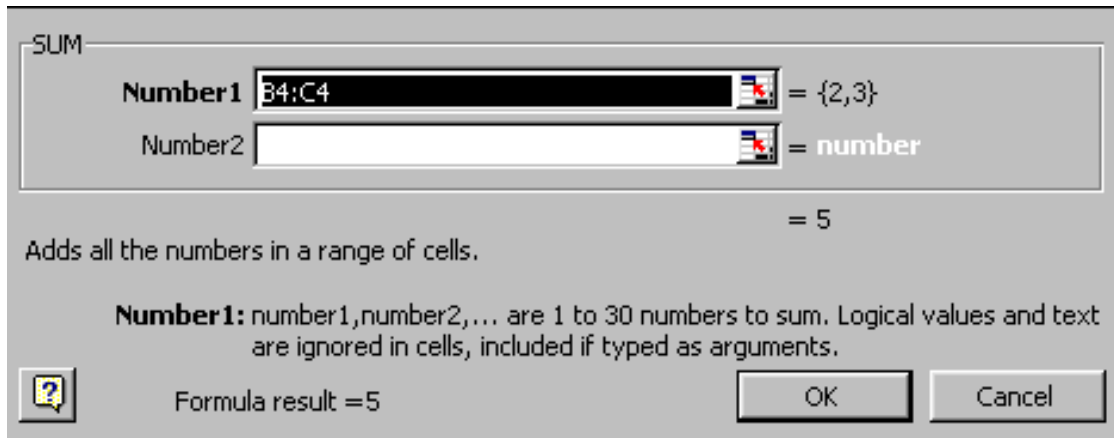
View all functions available in Excel by using the Function Wizard.



1. Activate the cell where the function will be placed and click the **Function Wizard** button on the standard toolbar.
2. From the **Paste Function** dialog box, browse through the functions by clicking in the **Function category** menu on the left and select the function from the **Function name** choices on the right. As each function name is highlighted a description and example of use is provided below the two boxes.



3. Click **OK** to select a function.
4. The next window allows you to choose the cells that will be included in the function. In the example below, cells B4 and C4 were automatically selected for the sum function by Excel. The cell values {2, 3} are located to the right of the **Number 1** field where the cell addresses are listed. If another set of cells, such as B5 and C5, needed to be added to the function, those cells would be added in the format "B5:C5" to the **Number 2** field.



5. Click **OK** to select a function.
6. The next window allows you to choose the cells that will be included in the function. In the example below, cells B4 and C4 were automatically selected for the sum function by Excel. The cell values {2, 3} are located to the right of the **Number 1** field where the cell addresses are listed. If another set of cells, such as B5 and C5, needed to be added to the function, those cells would be added in the format "B5:C5" to the **Number 2** field.
7. Click **OK** when all the cells for the function have been selected.

Summary of Functions

Functions can be a more efficient way of performing mathematical operations than formulas. For example, if you wanted to add the values of cells D1 through D10, you would type the formula "`=D1+D2+D3+D4+D5+D6+D7+D8+D9+D10`". A shorter way would be to use the SUM function and simply type "`=SUM(D1:D10)`". Several other functions and examples are given in the table below:

Function	Example	Description
SUM	<code>=SUM(A1:100)</code>	finds the sum of cells A1 through A100
AVERAGE	<code>=AVERAGE(B1:B10)</code>	finds the average of cells B1 through B10
MAX	<code>=MAX(C1:C100)</code>	returns the highest number from cells C1 through C100
MIN	<code>=MIN(D1:D100)</code>	returns the lowest number from cells D1 through D100
IF	<code>=IF(A1>1,"YES","NO")</code>	Returns a YES or NO depending on whether the contents of cell A1 is greater than 1.
PMT	<code>=PMT(C4/12,C5,-C3)</code>	returns the monthly payments given the annual interest rate, the number of payments, and an initial loan amount.
SQRT	<code>=SQRT(D10)</code>	finds the square root of the value in cell D10
TODAY	<code>=TODAY()</code>	returns the current date (leave the parentheses empty)

In Excel there is a help tool for functions called the Function Wizard.

There are two ways to get the function wizard. If you look at the **Standard Toolbar**, the function wizard icon looks like:



The other way to get to the function wizard is to go to the Menu **INSERT** and select **FUNCTION...**

Either way you get there, at this point Excel will list all of the functions available. Upon choosing the function, Excel will prompt you for the information it needs to complete the function. Mini descriptions are available for each of the cells. It is often necessary for you to understand the functions in order to be able to figure out these descriptions.

Relative, Absolute, and Mixed Referencing

Calling cells by just their column and row labels (such as "A1") is called **relative referencing**. When a formula contains relative referencing and it is copied from one cell to another, Excel does not create an exact copy of the formula. It will change cell addresses relative to the row and column they are moved to.

For example, if a simple addition formula in cell C1 " $=A1+B1$ " is copied to cell C2, the formula would change to " $=A2+B2$ " to reflect the new row. To prevent this change, cells must be called by **absolute referencing** and this is accomplished by placing dollar signs "\$" within the cell addresses in the formula.

Continuing the previous example, the formula in cell C1 would read " $=\$A\$1+\$B\1 " if the value of cell C2 should be the sum of cells A1 and B1. Both the column and row of both cells are absolute and will not change when copied. **Mixed referencing** can also be used where only the row OR column is fixed. For example, in the formula " $=A\$1+\$B2$ ", the row of cell A1 is fixed and the column of cell B2 is fixed.

Relative Referencing

Sometimes when we enter a formula, we need to repeat the same formula for many different cells. In the spreadsheet we can use the copy and paste command. The cell locations in the formula are **pasted** relative to the position we **copy** them from.

	A	B	C
1	5	3	$=A1+B1$
2	8	2	$=A2+B2$
3	4	6	$=A3+B3$
4	3	8	$=? + ?$

Cell information is copied from its relative position. In other words in the original cell (**C1**) the equation was (**A1+B1**). When we paste the function it will look to the two cells to the left. So the equation pasted into (**C2**) would be (**A2+B2**). And the equation pasted into (**C3**) would be (**A3+B3**).

If you have a lot of duplicate formulas you can also perform what is referred to as a FILL DOWN.

Absolute Referencing

Sometimes it is necessary to keep a certain position that is not relative to the new cell location. This is possible by inserting a **\$** before the Column letter or a **\$** before the Row number (or both). This is called Absolute Positioning.

	A	B	C
1	5	3	=\$A\$1+\$B\$1
2	8	2	=\$A\$1+\$B\$1
3	4	6	=\$A\$1+\$B\$1
4	3	8	=\$A\$1+\$B\$1

If we were to fill down with this formula we would have the exact same formula in all of the cells C1, C2, C3, and C4. The dollar signs **Lock** the cell location to a FIXED position. When it is copied and pasted it remains EXACTLY the same (no relative positioning).

Using absolute positioning allows us to create complex spreadsheets that are dependent on a core set of "locked" constants.

Sorting Your Data



Being able to quickly sort your data so that it is presented in a meaningful way can be done quickly and easily in Excel.

Basic Sorts

To execute a basic descending or ascending sort based on one column, highlight the cells that will be sorted and click the **Sort Ascending (A-Z)** button or **Sort Descending (Z-A)** button on the standard toolbar.

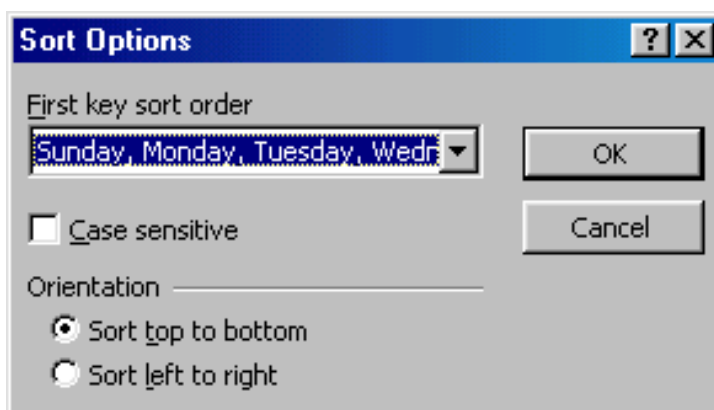
Complex Sorts

1. To sort by multiple columns, follow these steps:
2. Highlight the cells, rows, or columns that will be sorted.
3. Select **Data|Sort** from the menu bar.
4. From the **Sort** dialog box, select the first column for sorting from the **Sort By** drop-down menu and choose either ascending or descending.

5. Select the second column and, if necessary, the third sort column from the **Then By** drop-down menus.



1. If the cells you highlighted included the text headings in the first row, mark **My list has...Header row** and the first row will remain at the top of the worksheet.
2. Click the **Options** button for special non-alphabetic or numeric sorts such as months of the year and days of the week.



3. Click **OK** to execute the sort.

Autofill

The Autofill feature allows you to quickly fill cells with repetitive or sequential data such as chronological dates or numbers, and repeated text.

1. Type the beginning number or date of an incrementing series or the text that will be repeated into a cell.
2. Select the handle at the bottom, right corner of the cell with the left mouse button and drag it down as many cells as you want to fill.
3. Release the mouse button.

If you want to autofill a column with cells displaying the same number or date you must enter identical data to two adjacent cells in a column. Highlight the *two* cells and drag the handle of the selection with the mouse.

Alternating Text and Numbers with Autofill

The Autofill feature can also be used for alternating text or numbers. For example, to make a repeating list of the days of the week, type the seven days into seven adjacent cells in a column. Highlight the seven cells and drag down with the mouse.

Autofilling Functions

Autofill can also be used to copy functions. In the example below, column A and column B each contain lists of numbers and column C contains the sums of columns A and B for each row. The function in cell C2 would be "`=SUM(A2:B2)`". This function can then be copied to the remaining cells of column C by activating cell C2 and dragging the handle down to fill in the remaining cells. The autofill feature will automatically update the row numbers as shown below if the cells are reference relatively.

C2 = =SUM(A2:B2)				C11 = =SUM(A11:B11)					
	A	B	C	D		A	B	C	D
1	number 1	number 2	sum		1	number 1	number 2	sum	
2	87	49	136		2	87	49	136	
3	54	30			3	54	30	84	
4	34	10			4	34	10	44	
5	43	8			5	43	8	51	
6	24	23			6	24	23	47	
7	93	97			7	93	97	190	
8	40	32			8	40	32	72	
9	59	30			9	59	30	89	
10	82	87			10	82	87	169	
11	39	57			11	39	57	96	

Fill Down

Often we have several cells that need the same formula (in relationship) to the location it is to be typed into. There is a short cut that is called Fill Down. There are a number of ways to perform this operation. One of the ways is to:

- 1) select the cell that has the original formula
- 2) hold the shift key down and click on the last cell (in the series that needs the formula)
- 3) under the **edit** menu go down to **fill** and over to **down**

	A	B	C
1	5	3	=A1+B1
2	8	2	fill down
3	4	6	fill down
4	3	8	fill down

Cells information is copied from its relative position. In other words in the original cell (**C1**) the equation was (**A1+B1**). When we paste the function it will look to the two cells to the left. So the equation pasted into (**C2**) would be (**A2+B2**). And the equation pasted into (**C3**) would be (**A3+B3**). And the equation pasted into (**C4**) would be (**A4+B4**).

Fill Right

We can also fill right. We must select the original cell (and the cells to the right) and select from the Edit menu -- Fill and Right.

	A	B	C
1	=A2+\$B\$3	=B2+\$B\$3	=C2+\$B\$3
2	6	2	5
3	7	10	4
4	9	8	7

If we were to fill right from A1 to C1 we would get the formulas displayed to the left. Notice that the second part of the equation is FIXED or (ABSOLUTE REFERENCE so always references B3 which is 10).

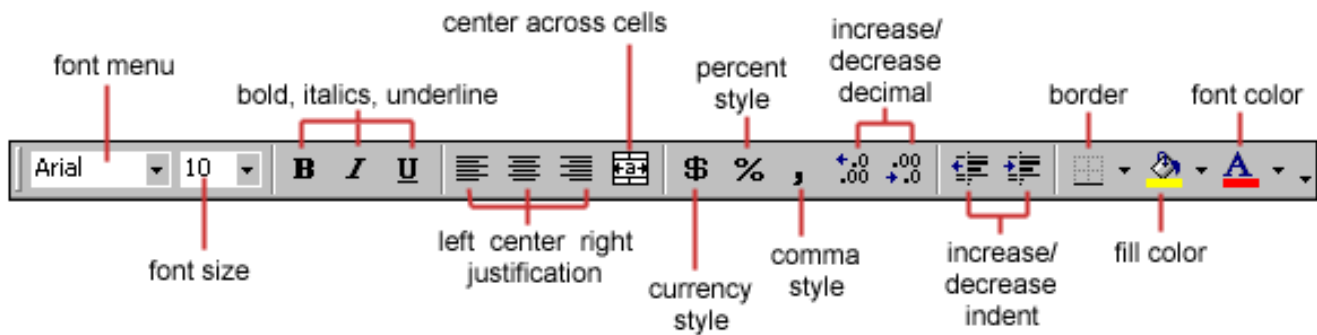
Answers would be A1=16, B1=12, C1=15.

Formatting

Although not essential to the operation of the spreadsheet, adding formatting can help you to more easily navigate your workspace.

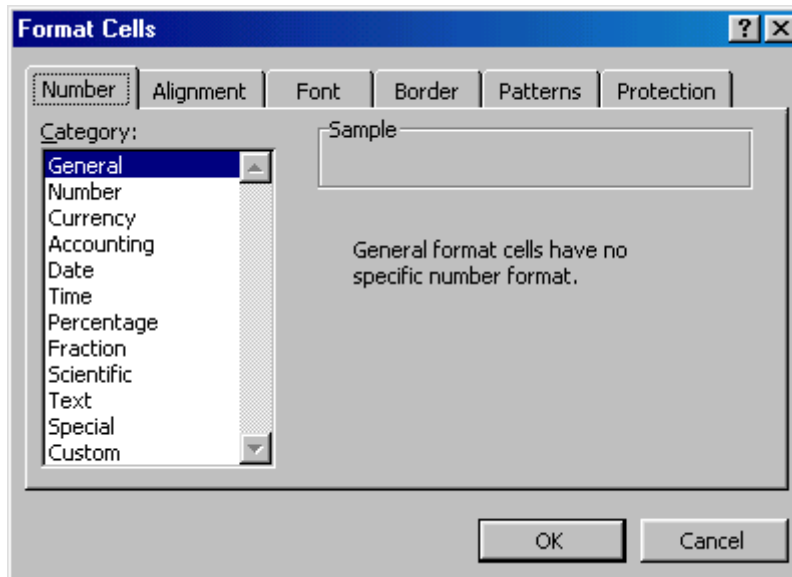
Formatting Toolbar

The contents of a highlighted cell can be formatted in many ways. Font and cell attributes can be added from shortcut buttons on the formatting bar. If this toolbar is not already visible on the screen, select **View | Toolbars | Formatting** from the menu bar.



Format Cells Dialog Box

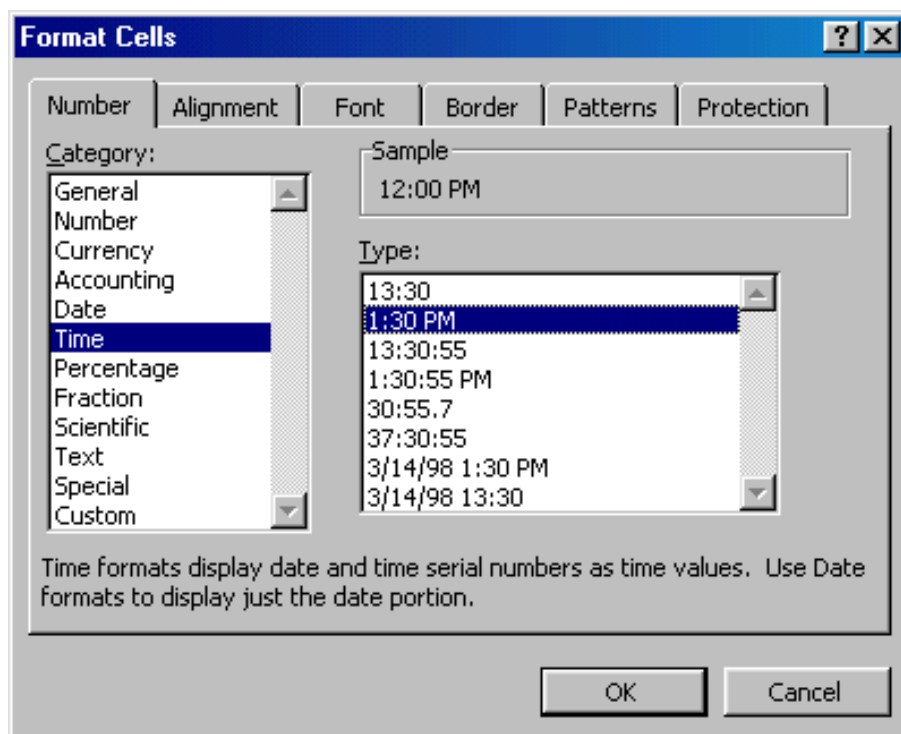
For a complete list of formatting options, right-click on the highlighted cells and choose **Format Cells** from the shortcut menu or select **Format | Cells** from the menu bar.



- » **Number tab** - The data type can be selected from the options on this tab. Select **General** if the cell contains text and number, or another numerical category if the cell is a number that will be included in functions or formulas.
- » **Alignment tab** - These options allow you to change the position and alignment of the data with the cell.
- » **Font tab** - All of the font attributes are displayed in this tab including font face, size, style, and effects.
- » **Border and Pattern tabs** - These tabs allow you to add borders, shading, and background colors to a cell.

Dates and Times

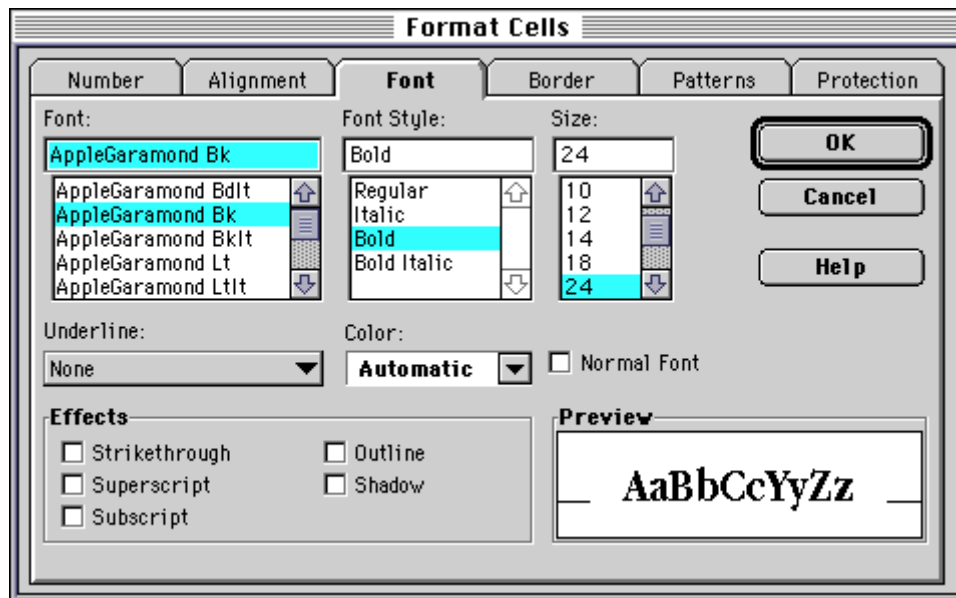
If you enter the date "January 1, 2001" into a cell on the worksheet, Excel will automatically recognize the text as a date and change the format to "1-Jan-01". To change the date format, select the **Number** tab from the **Format Cells** window. Select "Date" from the **Category** box and choose the format for the date from the **Type** box. If the field is a time, select "Time" from the **Category** box and select the type in the right box. Date and time combinations are also listed. Press **OK** when finished.



Formatting Text

Spreadsheets can be pretty dry, so we need some tools to dress them up a little. We can use most of the tricks in our word processor to do the formatting of text. We can use: bold face, italics, underline, change the color, align (left, right, center), font size, font, etc.

We need to **select** the **cell (or group of cells)** that we wish to change the formatting and then go from the FORMAT menu -- down to CELLS -- click on FONT. Here is a picture of what you will see there. Notice that you can choose to change the alignment as well as several other options.

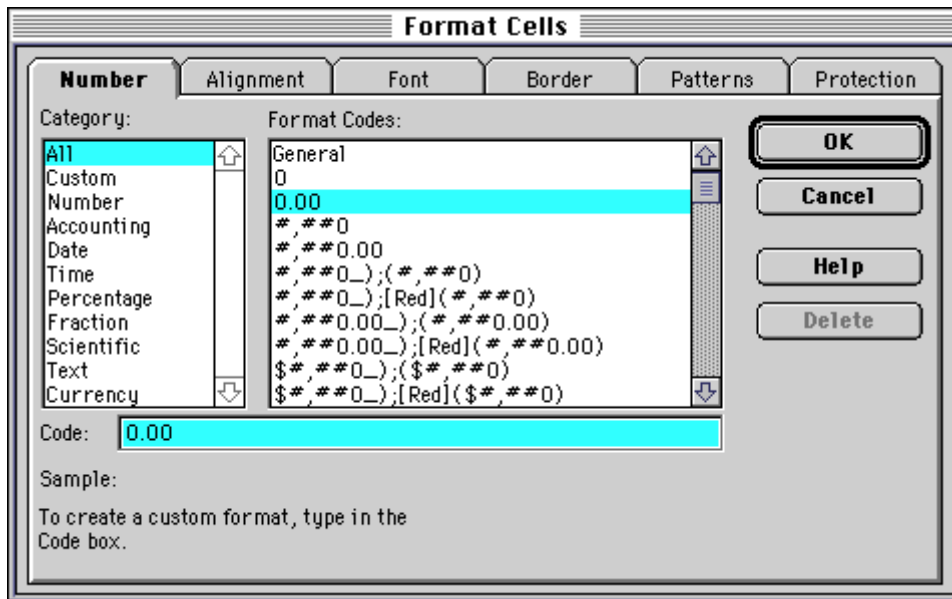


Formatting Numbers

We often need to format the numbers to display the appropriate number of decimals, dollar signs, percentage, **red** (for negative dollars), etc. It is best to keep numbers describing similar items as uniform as possible.

If we have the number 3.53262624672423, we would probably have to make the column wider and at the least bore most people. We need to set the number of decimal places to what is important. If this was a dollar figure that had calculated tax it should be \$3.53.

Here is a screen displaying what you would see if you **select** a **cell (or group of cells)** and from the FORMAT menu -- go down to format -- click on number.



Column Width

A question that everyone (who has ever worked on a spreadsheet) has asked at one time or another is, "Where did all my numbers go?" or same question, "Where did all of those ##### come from and why are they in my spreadsheet?"

The problem is the number trying to be displayed in a particular cell does not have enough width to display properly. To clear up the problem we just need to make the column wider. You can do this many ways.

Here are three ways to change the column width

- 1) Select the column (or columns) with the problem by clicking on their labels (letters). Then you choose the MENU FORMAT. Go down to COLUMN and over to WIDTH and type in a new number for the column width.
- 2) Move the arrow to the **right** side of the column label and click and drag the mouse to the right (to make wider) or left (to make smaller). Let up on the mouse button when the column is wide enough.
- 3) Move the arrow to the **right** side of the column label and double click when your cursor changes to a crosshair (this will automatically resize the column's width to show all content)

Notice the cursor changes to a vertical line with arrows pointing left and right (crosshair).



A small spreadsheet grid with columns labeled A, B, and C, and row 1. A vertical cursor with arrows pointing left and right is positioned over column B.

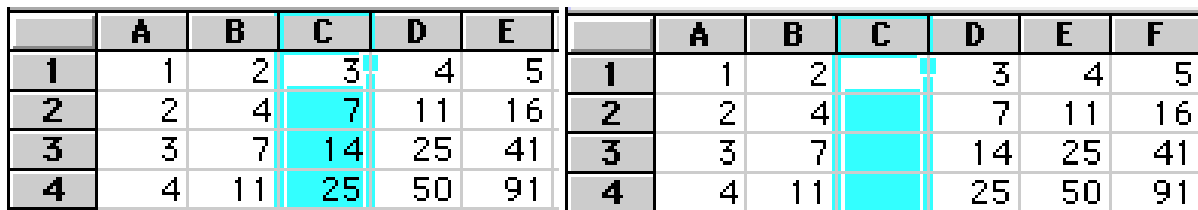
In many spreadsheets you can also change the vertical height of a row by moving the lower edge of the row title (number).

Manipulating Columns and Rows

Sometimes we (all) make mistakes or things change.

Inserting a Column

Sometimes we (all) make mistakes or things change. If you have a spreadsheet designed and you forgot to include some important information, you can insert a column into an existing spreadsheet. What you must do is click on the column label (letter) and choose in **Columns** from the **Insert** menu. This will insert a column **immediately left** of the selected column.



Two side-by-side spreadsheet grids. The left grid shows columns A through E with values in row 1: 1, 2, 3, 4, 5. The right grid shows columns A through F, with a new blank column C inserted between B and D. The values in row 1 are: 1, 2, (blank), 3, 4, 5. The data in the right grid is shifted one column to the right.

As you can see from this example there was a blank column inserted into the spreadsheet. You might wonder if this will affect your referenced formulas. Yes, the Referenced cells are **automatically** changed to their new locations.

For example:

- » Cell C4 was =C3+B4 and now is =D3+B4

Inserting a Row

Likewise, we can also insert rows. With the row label (number) selected you must choose the **Row** from the **Insert** menu. Again this will insert a row **before** the row you have selected.

	A	B	C	D	E
1	1	2	3	4	5
2	2	4	7	11	16
3	3	7	14	25	41
4	4	11	25	50	91

	A	B	C	D	E
1	1	2	3	4	5
2	2	4	7	11	16
3					
4	3	7	14	25	41
5	4	11	25	50	91


The formulas will be updated to their corresponding locations.

For example:

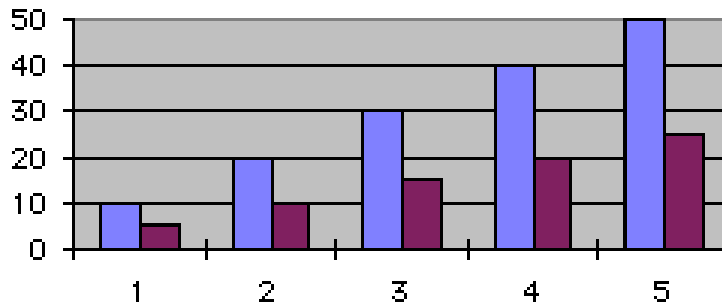
- » C3 was = C2+B3 and now is C4=C2+B4

Charts and Graphs

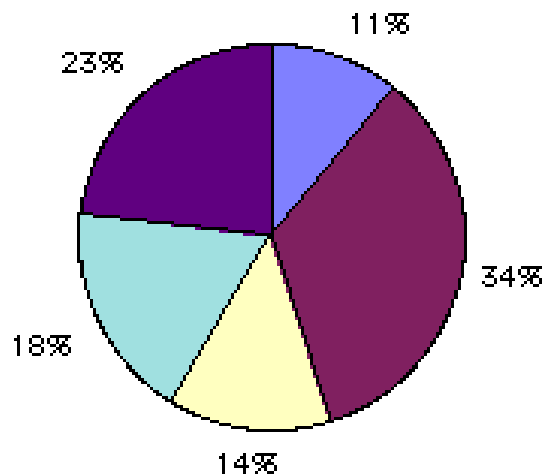
Numbers can usually be represented quicker and to a larger audience in a picture format.

Excel has a chart program built into its main program. The Chart Wizard will step you through questions that will (basically) draw the chart from the data that you have **selected**. There are many types of charts. Two popular graphs are the bar chart and the pie chart. 

The **BAR** Chart is usually used to display a change (growth or decline) over a time period. You can quickly compare the numbers of two different bar charts to each other.



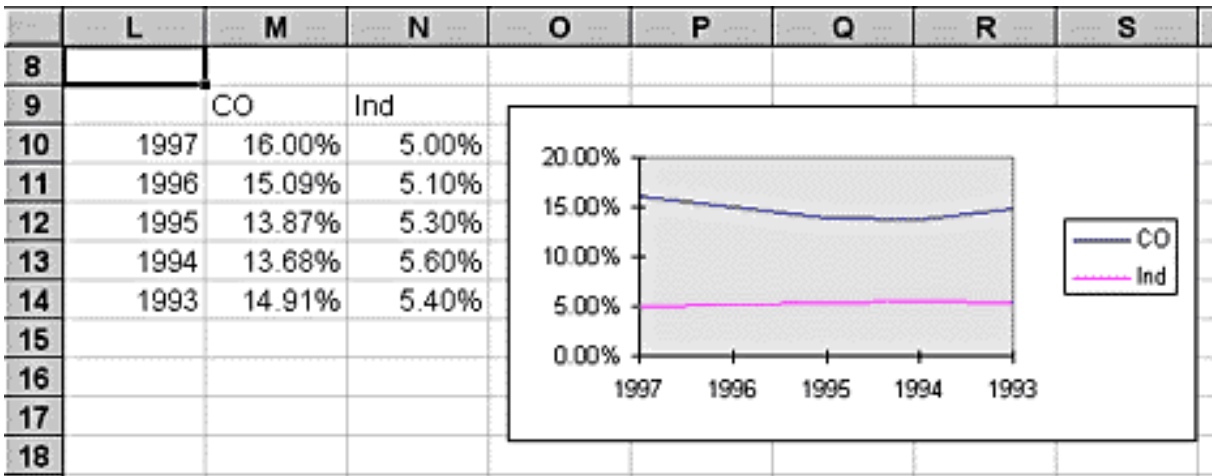
The **PIE** Chart is usually used to look at what makes up **a whole** *Something*. If you had a pie chart of where you spent your money you could look at the percentages of dollars spent on food (or any other category).



You can add legends, titles, and change many of the display variables.

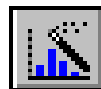
Charts and Graphs II: A Line Plot

Charts are visual representations of worksheet data. Various types of charts can be created in Excel, such as bar, line and pie charts. Charts can be used to clarify trends or relationships that might not be apparent in the worksheet data alone. Once a chart is created, as data on the worksheet is updated the chart automatically changes to reflect the updates.



To discuss charting data, let's consider the illustration above. We have a worksheet that contains data cells on the left and those same data cells charted on the right. To chart the data cell range L9:N14, do the following:

- 1) Select the range L9:N14 by clicking cell L9, holding the mouse button and dragging down and to the right to cell N14.
- 2) With the cell range highlighted, click the ChartWizard button on the toolbar above the worksheet. You will notice the cursor change to a crosshairs with a small chart.



- 3) Position the cursor on the worksheet where you want to place the chart and click the mouse. The ChartWizard dialog box appears.
- 4) You've already selected the range you want to chart, so click Next >.
- 5) As the type of chart, select Line and click Next >.

- 6) Select the angular line style with no data points as the format of the line chart and click Next >. Note that at any step you can click < Back and repeat previous steps.
- 7) The ChartWizard displays a sample line chart using your data. However, there is one small problem. Notice the box that reads: Use First 0 columns for Category (X) Axis Labels. In our illustration, the first column (years) is the label for the X Axis, so you want to enter 1 in this box. To do so, you can either overwrite the 0 that is in the box or click the up arrow to cycle the counter to 1. After doing so, you will notice the chart change automatically to a better representation of the chart in the illustration above. Click Next >.
- 8) The next step allows us to add a legend and define titles to the chart, as well as each axis. After specifying titles if you wish, click Finish.

Excel creates the chart on the worksheet and displays the Chart Toolbar. To hide the Chart Toolbar, click anywhere on the worksheet outside the chart.

Resizing the Chart

To resize the chart, click on its border and drag any of the nine black handles to change the size. Handles on the corners will resize the chart proportionally while handles along the lines will stretch the chart.

Moving the Chart

Select the border of the chart, hold down the left mouse button, and drag the chart to a new location. Elements within the chart such as the title and labels may also be moved within the chart. Click on the element to activate it, and use the mouse to drag the element to move it.

Chart Formatting Toolbar

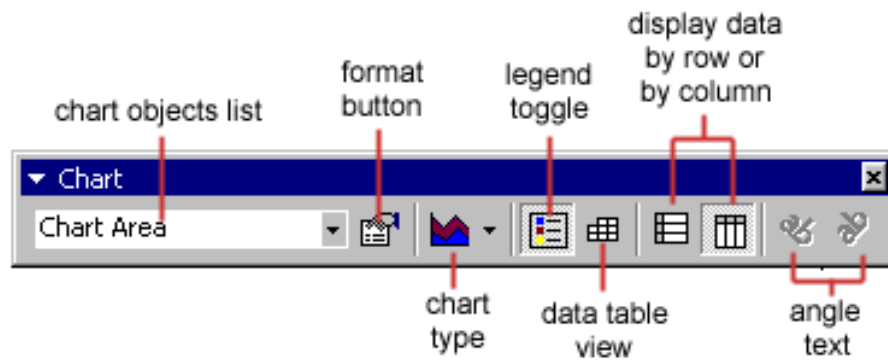


Chart Objects List - To select an object on the chart to format, click the object on the chart or select the object from the **Chart Objects List** and click the **Format button**. A window containing the properties of that object will then appear to make formatting changes.

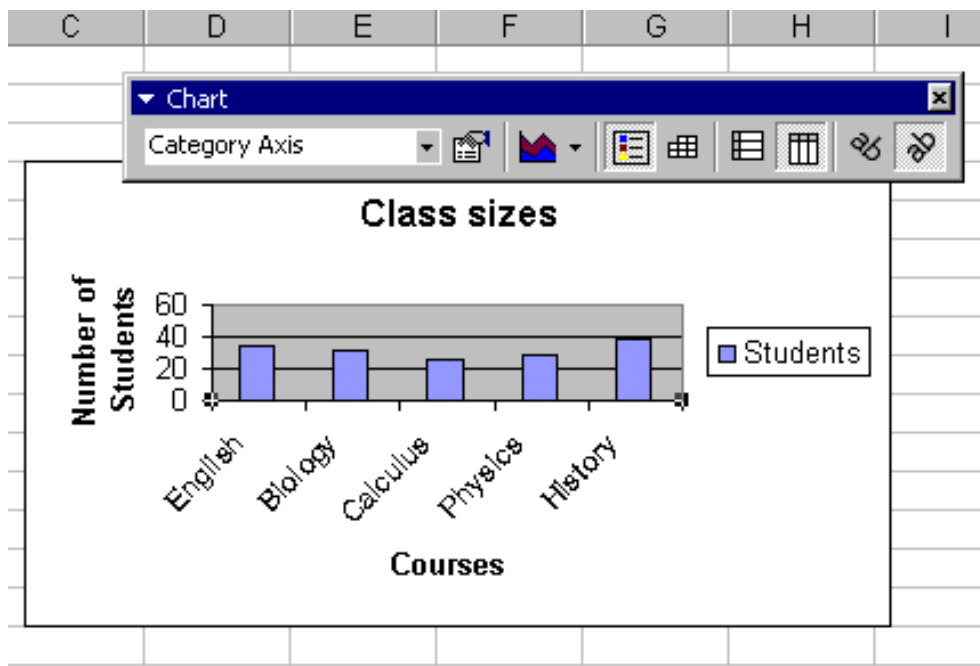
Chart Type - Click the arrowhead on the chart type button to select a different type of chart.

Legend Toggle - Show or hide the chart legend by clicking this toggle button.

Data Table view - Display the data table instead of the chart by clicking the Data Table toggle button.

Display Data by Column or Row - Charts the data by columns or rows according to the data sheet.

Angle Text - Select the category or value axis and click the **Angle Downward** or **Angle Upward** button to angle the the selected by +/- 45 degrees.



Copying the Chart to Microsoft® Word

A finished chart can be copied into a Microsoft® Word document. Select the chart and click **Copy**. Open the destination document in Word and click **Paste**.

Making a Chart: An Exercise

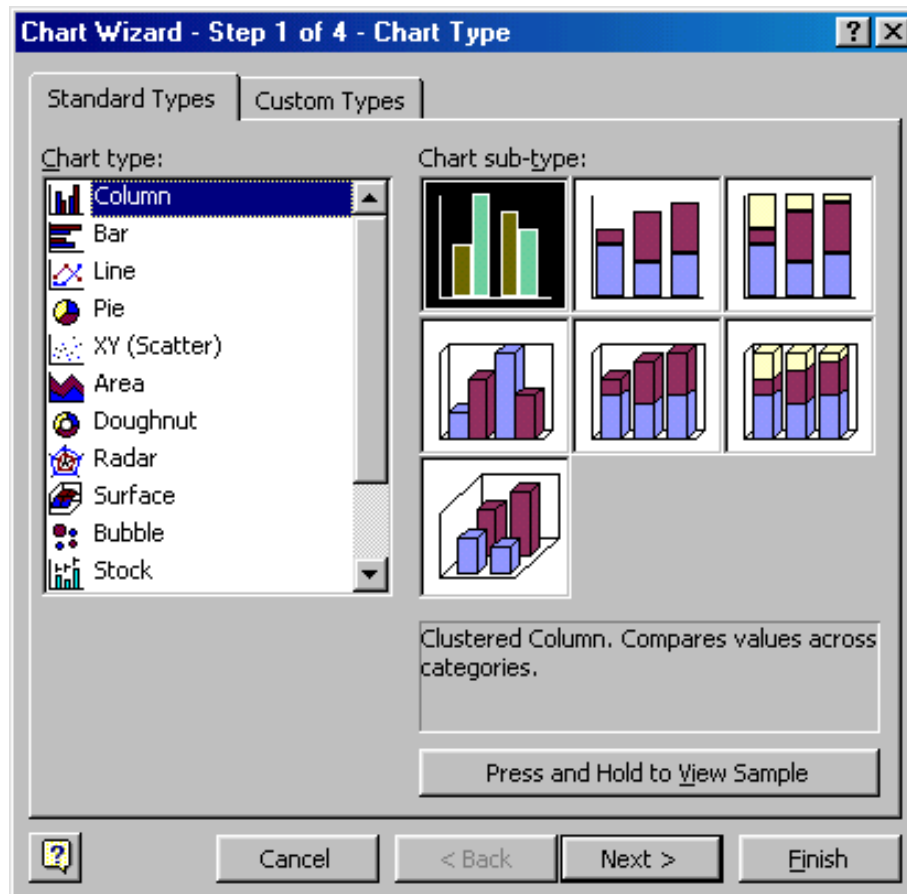
1. Enter the data into the worksheet and highlight all the cells that will be included in the chart including headers.

	A	B	C
1		Students	
2	English	34	
3	Biology	32	
4	Calculus	26	
5	Physics	28	
6	History	39	
7			

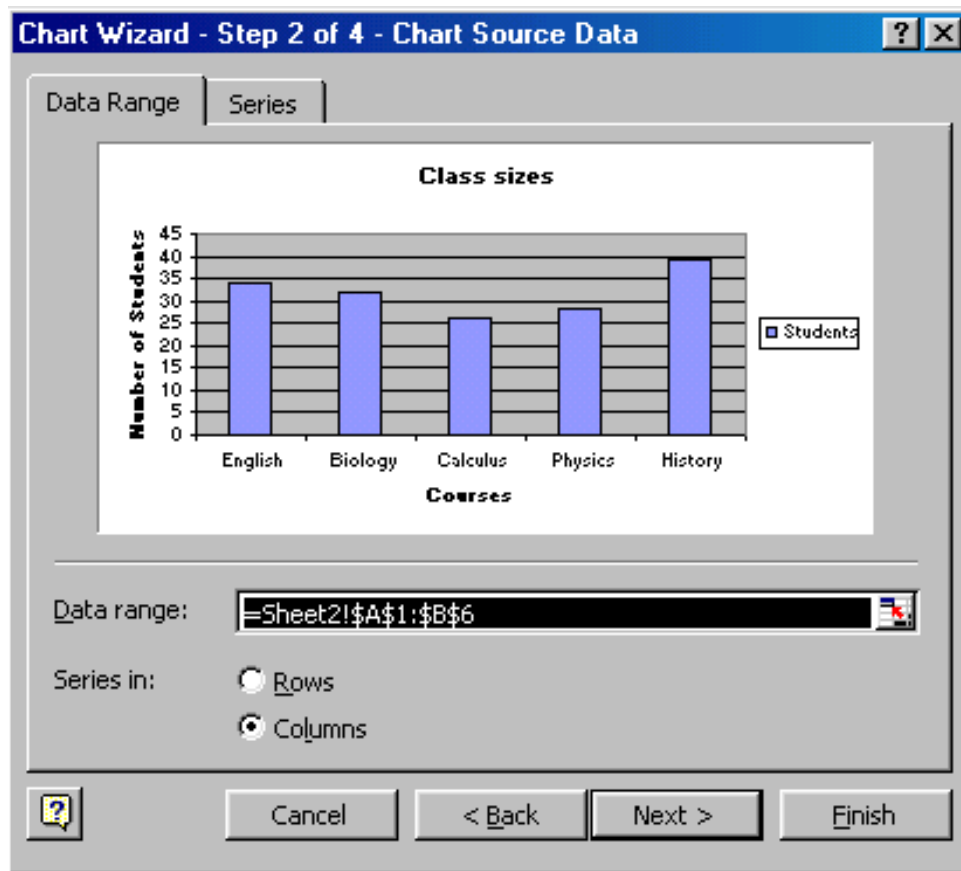
2. Click the Chart Wizard button on the standard toolbar to view the first **Chart Wizard** dialog box.



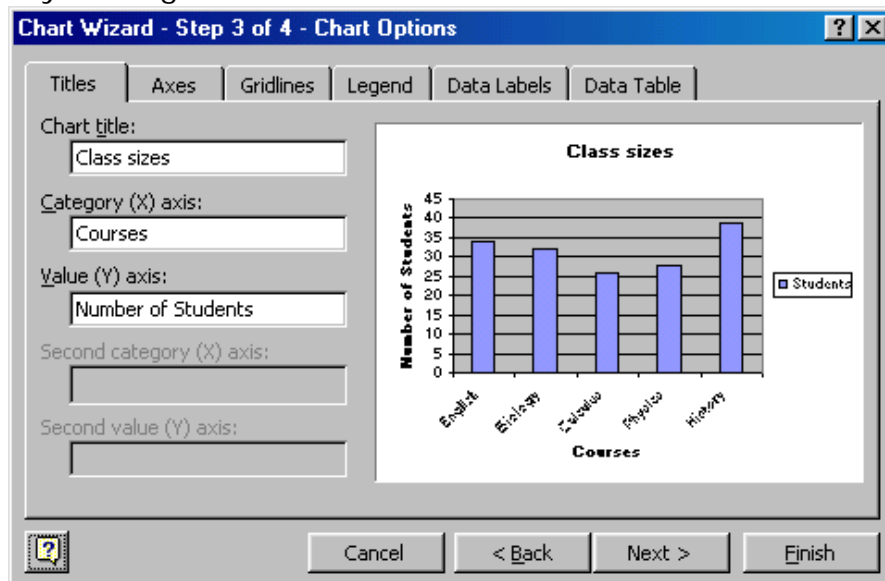
3. **Chart Type** - Choose the **Chart type** and the **Chart subtype** if necessary. Click **Next**.



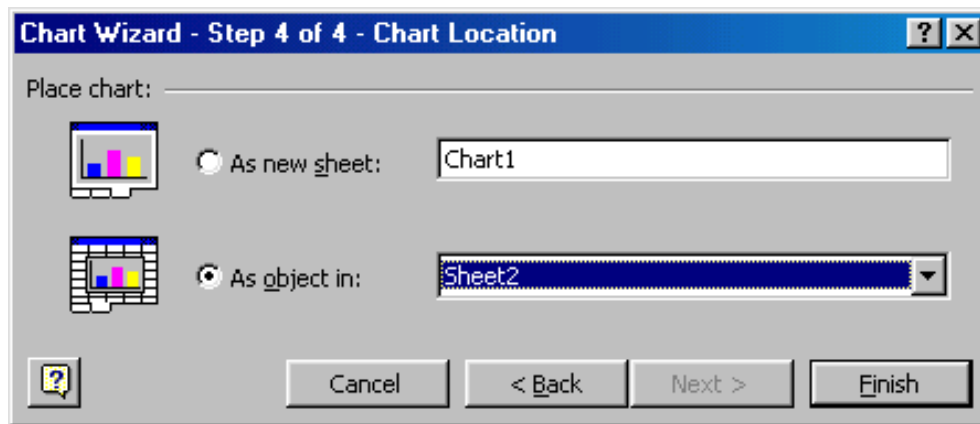
4. **Chart Source Data** - Select the data range (if different from the area highlighted in step 1) and click **Next**.



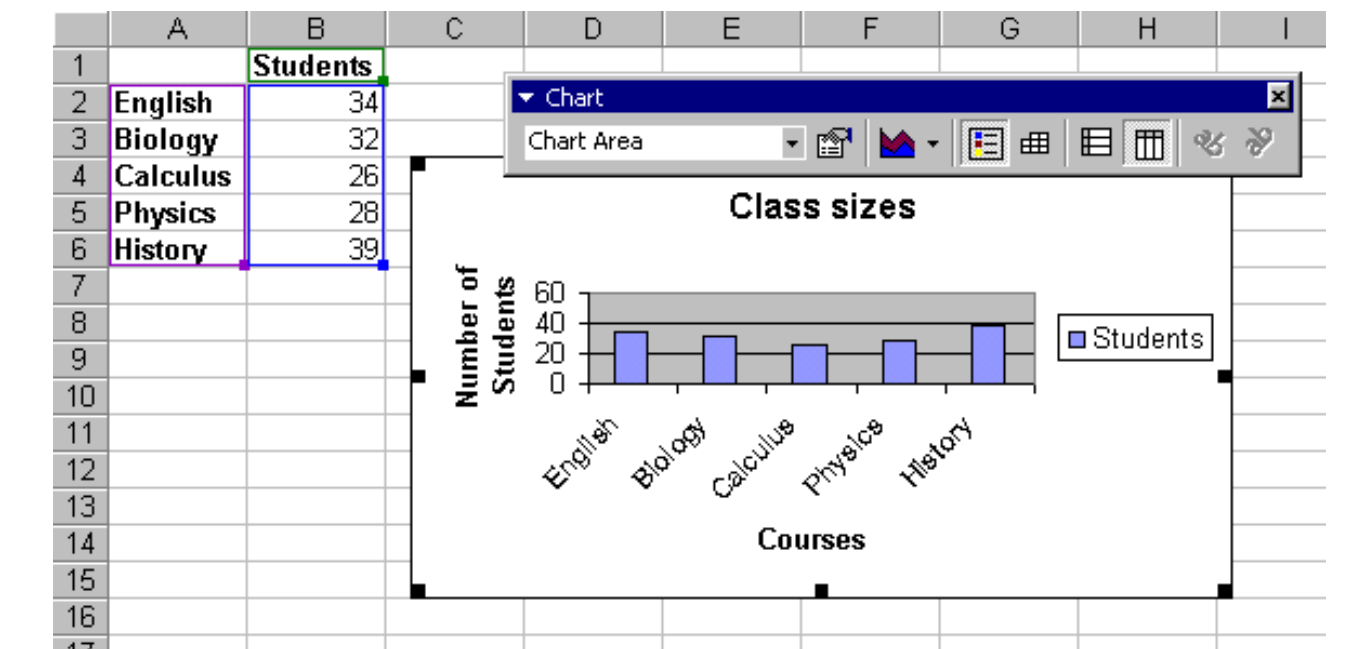
5. **Chart Options** - Enter the name of the chart and titles for the X- and Y-axes. Other options for the axes, grid lines, legend, data labels, and data table can be changed by clicking on the tabs. Press **Next** to move to the next set of options.



6. **Chart Location** - Click **As new sheet** if the chart should be placed on a new, blank worksheet or select **As object in** if the chart should be embedded in an existing sheet and select the worksheet from the drop-down menu.



7. Click **Finish** to create the chart.



Note that as you change the source data the chart will automatically update to reflect the new values (try this and see).

Printing the Worksheet

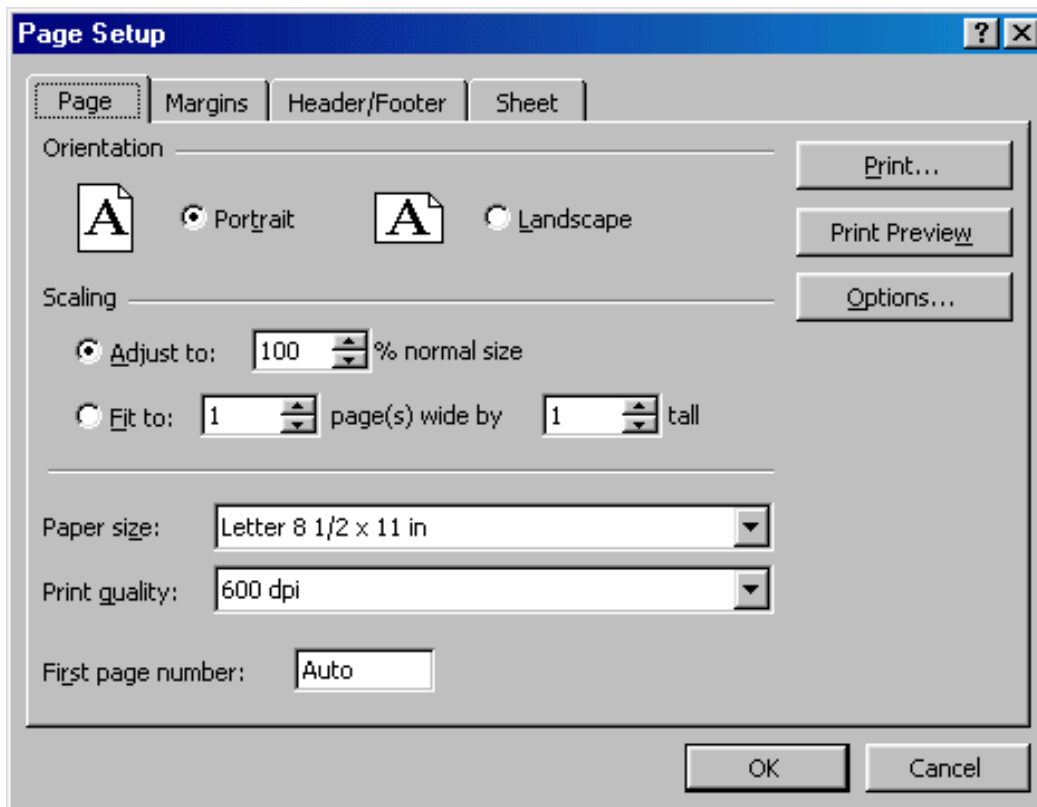
At some point, you will want print out your spreadsheet.

Page Setup

To print a worksheet, there are several options which control how the worksheet looks on the page. Before printing, it is a good idea to review things like the margins for a page to verify that the worksheet will print as intended. To do this, from the menu bar at the top of the screen choose File and then Page Setup... From here, options such as page orientation, paper size, print margins, and centering printed matter on the page are set.

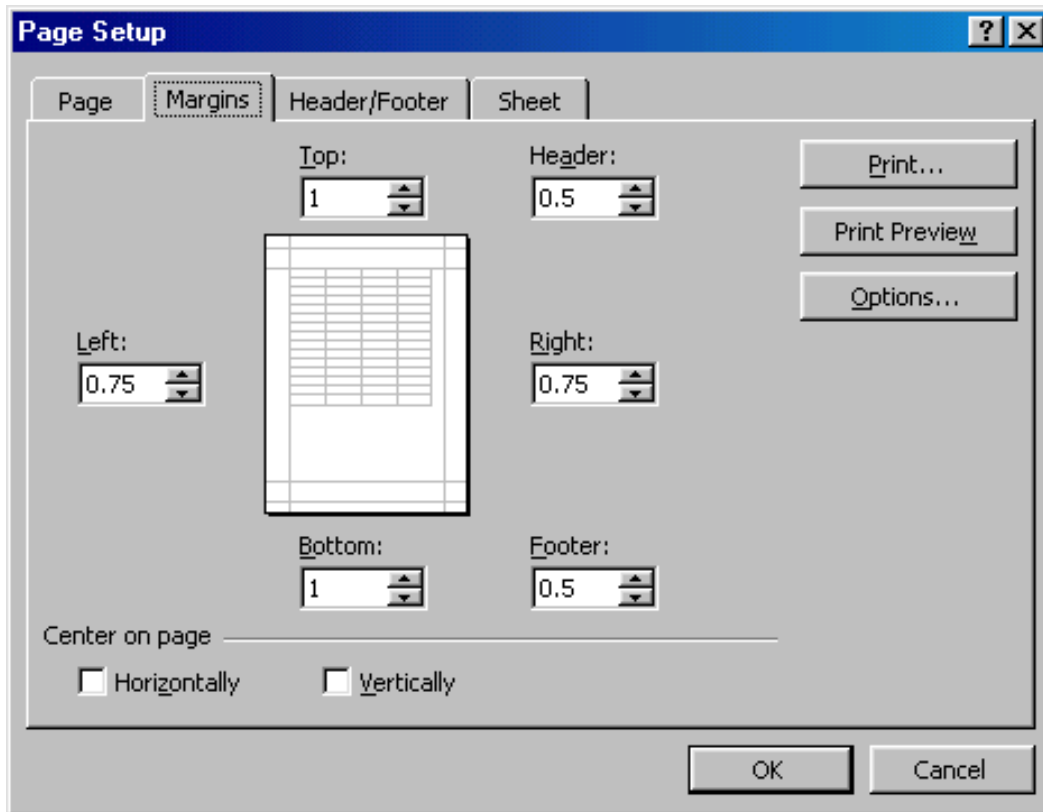
Page

Select the **Orientation** under the **Page** tab in the Page Setup window to make the page Landscape or Portrait. The size of the worksheet on the page can also be formatting under **Scaling**. To force a worksheet to print only one page wide so all the columns appear on the same page, select **Fit to 1 page(s) wide**.



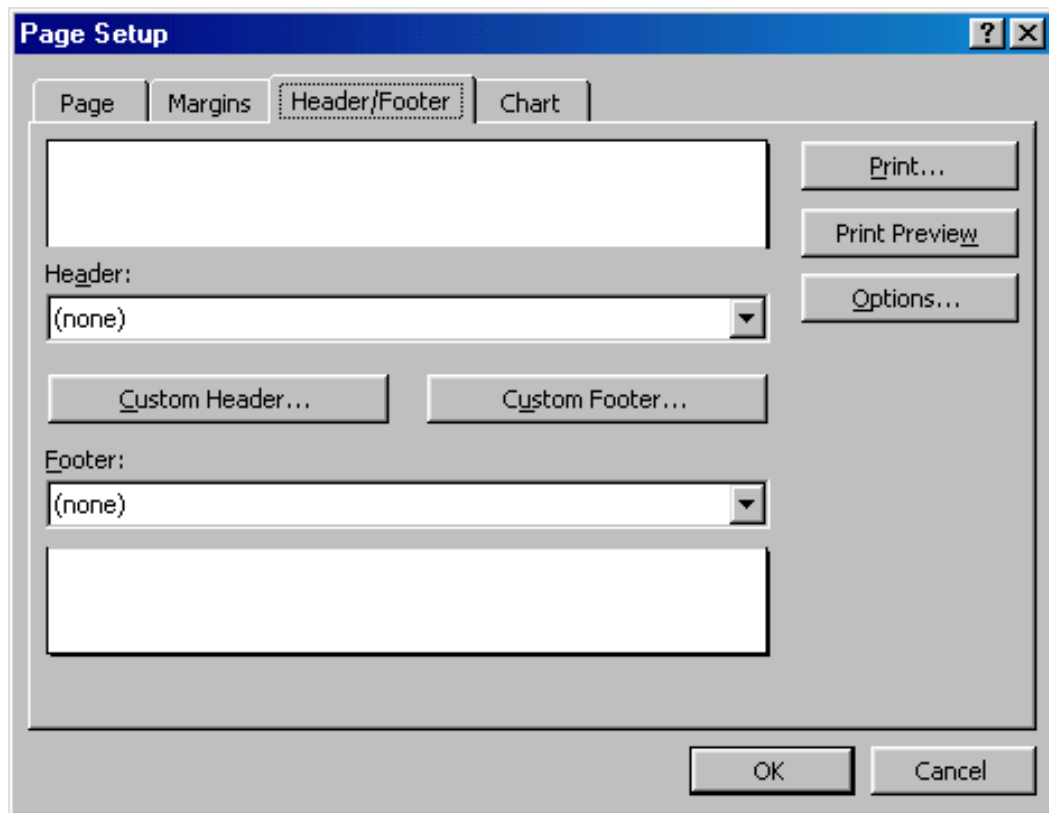
Margins

Change the top, bottom, left, and right margins under the **Margins** tab. Enter values in the header and footer fields to indicate how far from the edge of the page this text should appear. Check the boxes for centering horizontally or vertically on the page.

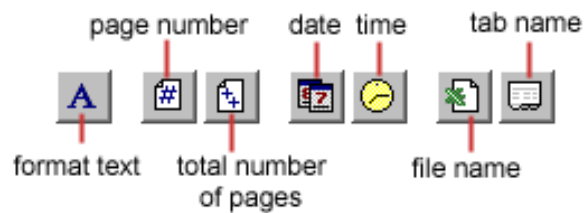


Header/Footer

Add preset headers and footers to the page by clicking the drop-down menus under the Header/Footer tab.



To modify a preset header or footer, or to make your own, click the **Custom Header** and **Custom Footer** buttons. A new window will open allowing you to enter text in the left, center, or right on the page.



Format Text - Click this button after highlighting the text to change the font, size, and style.

Page Number - Insert the page number of each page.

Total Number of Pages - Use this feature along with the page number to create strings such as "page 1 of 15".

Date - Add the current date.

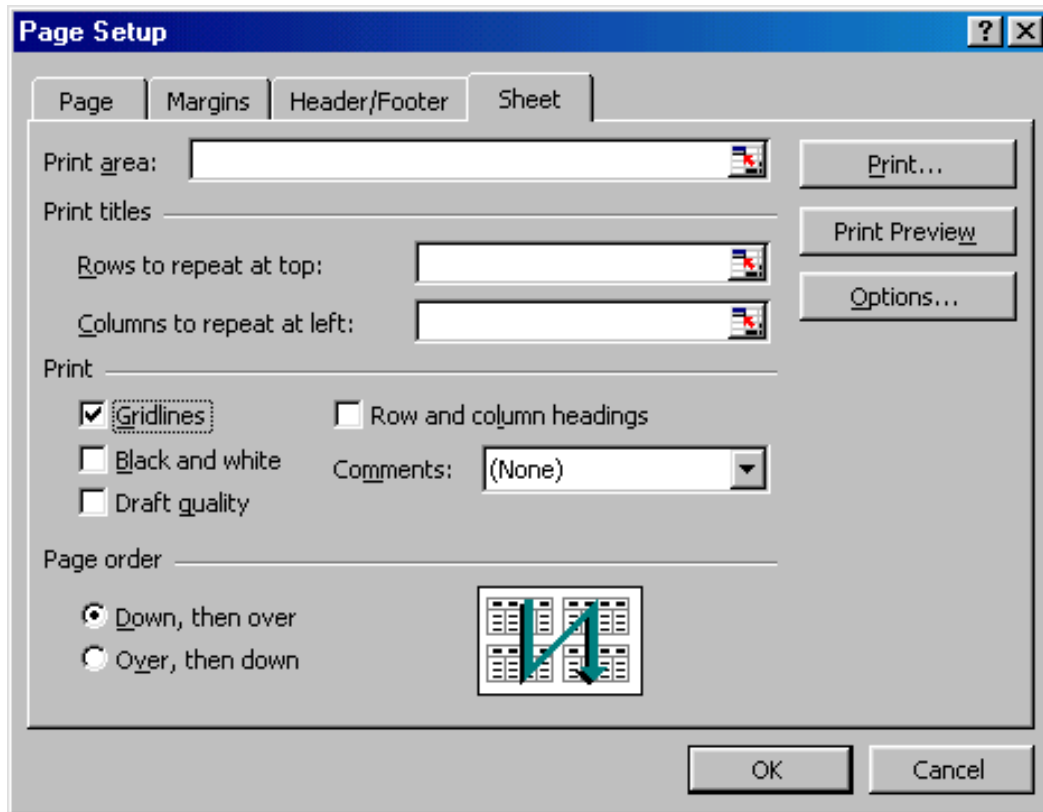
Time - Add the current time.

File Name - Add the name of the workbook file.

Tab Name - Add the name of the worksheet's tab.

Sheet

Check **Gridlines** if you want the gridlines dividing the cells to be printed on the page. If the worksheet is several pages long and only the first page includes titles for the columns, select **Rows to repeat at top** to choose a title row that will be printed at the top of each page.



Print Preview

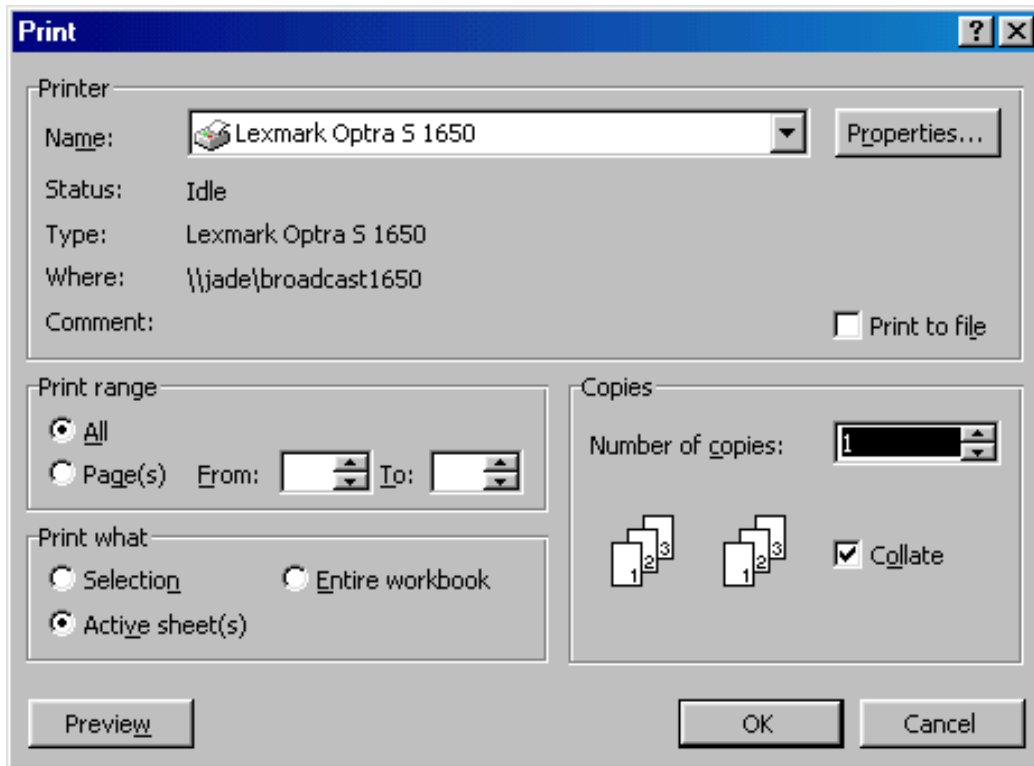
It is a good idea to always preview before you print so that you can make any adjustments before printing and save yourself repeated trips to the printer. To preview what you're about to print, from the menu bar at the top of the screen, choose File and then Print Preview. You can click the mouse button to magnify the area around the cursor and click again to return to full page view.

Make page layout modifications as needed by clicking the **Page Setup** button. Click **Close** to return to the worksheet or **Print** to continue printing.

Printing

You might notice that you can switch to Print Preview mode from Page Setup mode and vice versa. Page Setup and Print Preview modes are available to ease the task of setting up for printing. Once the worksheet has been prepared for printing, it can be printed by clicking File from the menu bar at the top of the screen and then Print...

To print the worksheet, select **File|Print** from the menu bar.



Print Range - Select either all pages or a range of pages to print.

Print What - Select selection of cells highlighted on the worksheet, the active worksheet, or all the worksheets in the entire workbook.

Copies - Choose the number of copies that should be printed. Check the **Collate** box if the pages should remain in order.

Click **OK** to print.

Saving the Worksheet

You should save your work frequently. If you have a power outage or some other problem, you can start working again from your last saved version.

When you create a new worksheet and save it for the first time, you are always asked for a name to assign to the worksheet. From the File option on the menu bar at the top of the screen, click Save. If the worksheet is new, a dialog box will appear asking for a name and location to save the worksheet.

If the worksheet you are working on has been previously saved, clicking Save from the File menu option will save a new copy of the worksheet overwriting the previous version.

If you would like to save an existing worksheet to another name, thus keeping the original version in its original condition, from the menu bar at the top of the screen, click File and then Save As... A dialog box will appear asking for a name and location to save the worksheet.

Keyboard Shortcuts

Keyboard shortcuts can save time and the effort of switching from the keyboard to the mouse to execute simple commands. Print this list of Excel keyboard shortcuts and keep it by your computer for a quick reference. The most powerful shortcut is **F1: Help**.

Note: A plus sign indicates that the keys need to be pressed at the same time.

Action	Keystroke
Document Actions	
Open a file	CTRL+O
New file	CTRL+N
Save As	F12
Save	CTRL+S
Print	CTRL+P
Find	CTRL+F
Replace	CTRL+H
Go to	F5
Cursor Movement	
One cell up	up arrow
One cell down	down arrow
One cell right	Tab
One cell left	SHIFT+Tab
Top of worksheet (cell A1)	CTRL+Home
End of worksheet (last cell with data)	CTRL+End
End of row	Home
End of column	CTRL+left arrow
Move to next worksheet	CTRL+PageDown
Formulas	
Apply AutoSum	ALT+=
Current date	CTRL+;
Current time	CTRL+:
Spelling	F7

Action	Keystroke
Selecting Cells	
All cells left of current cell	SHIFT+left arrow
All cells right of current cell	SHIFT+right arrow
Entire column	CTRL+Spacebar
Entire row	SHIFT+Spacebar
Entire worksheet	CTRL+A
Text Style	
Bold	CTRL+B
Italics	CTRL+I
Underline	CTRL+U
Strikethrough	CTRL+5
Formatting	
Edit active cell	F2
Format as currency with 2 decimal places	SHIFT+CTRL+\$
Format as percent with no decimal places	SHIFT+CTRL+%
Cut	CTRL+X
Copy	CTRL+C
Paste	CTRL+V
Undo	CTRL+Z
Redo	CTRL+Y
Format cells dialog box	CTRL+1

References

- 1) James, Brad. The University of South Dakota, 2004.
- 2) Garrison, Dr. Sharon H. Study Finances, 2005.
- 3) Brown, Jane. Dynamic Zone FX , 2005.
- 4) Florida Gulf Coast University, 2005.