

# 4 INTRODUCTION TO THE *EXCEL* SPREADSHEET

## Preparing a Gradebook

### LEARNING OUTCOMES

This tutorial will help you understand what a spreadsheet is and where a spreadsheet might come in useful for classroom management. Specifically you will learn about the following topics.

- Understanding the basic concepts of a spreadsheet, including:
  - the idea of templates
  - cells, rows and columns
  - cell coordinates
  - entering data into a spreadsheet cell
- Setting up labels, including:
  - setting column widths
  - aligning data in cells
  - entering column and row labels
- Creating and copying formulas
- Making changes in a spreadsheet
  - inserting rows and columns
  - deleting rows and columns
- Producing a printed copy of the contents of a spreadsheet document
- Saving a backup copy of your work
- Appreciating the power of spreadsheet templates

**A caveat before you begin:** You'll find it easiest to use the tutorial if you follow the directions carefully. On computers there are always other ways of doing things, but if you wander off on your own be sure you know your way back!

## 4.1 GETTING STARTED

### Showing the Full menus and organizing the Toolbars

In case you're using a computer in a lab or some computer other than your own, you should set the options to *Always show full menus*, *Show the Standard and formatting toolbars on two rows*, *List font names in their own font*, and *Show ScreenTips on toolbars*. You may recall doing this at the beginning of all the previous lessons. If the computer you're using doesn't already have these settings, here's what you do.

Open **Microsoft Excel** if you have not already done so (it's probably in your **Start menu > All Programs > Spreadsheets**), then in the **Tools** menu, select **Customize...**, and in the dialog box that pops up, select the **Options** tab (Fig. 4.1)

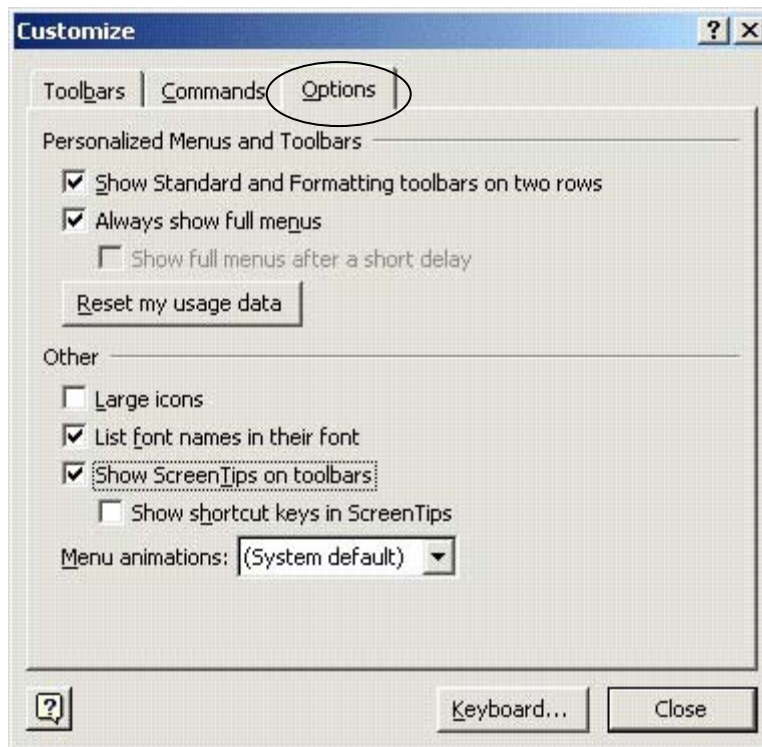


Fig. 4.1 The Customize dialog box

Make sure there is a **check mark** next to the item to **Always show full menus**

While you're at it, check the box next to **Show Standard and Formatting toolbars on two rows**, **List font names in their font**, and **Show ScreenTips on toolbars**

Click the **Close** button when you're ready

### Some background

Fig. 4.2 illustrates a typical spreadsheet for keeping track of student grades.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	GRADE REPORT														Lookup Range	Lookup Grade
2															59%	F
3	Class: Grade 4														60%	D
4	Semester: 1														70%	C
5	Year: 2002														80%	B
6															90%	A
7				A1	A2	A3	A4	A5	TOTAL	PCNT	GRADE				1%	A
8																
9			MAX	20	20	30	100	20	190	100%						
10																
11	LAST NAME	FIRST NAME														
13	Gasdick	Barbara		12	15	20	82	13	142	75%	C					
14	Molovinsky	Lemuel		15	15	18	67	15	130	68%	D					
15	Shamey	Don		13	14	25	75	18	145	76%	C					
16	Keefe	Kathleen		18	16	24	78	17	153	81%	B					
17	DeBacco	Ron		17	17	24	90	16	164	86%	B					
18	DeBacco	Jane		20	18	28	92	16	174	92%	A					
19	Shamey	Susan		13	13	30	85	15	156	82%	B					
20	Poole	Lucy		15	14	28	69	19	145	76%	C					
21	Giorgio	Augie		15	20	27	80	20	162	85%	B					
22	Giorgio	Anne		10	20	26	87	17	160	84%	B					
23	Mitnik	Theresa		16	19	29	79	14	157	83%	B					
24	Brown	Lyn		15	18	21	80	18	152	80%	B					
25	Potochar	Charlene		16	16	22	84	20	158	83%	B					
26	Bond	Patrick		19	19	26	92	20	176	93%	A					
27	Bond	Andrew		19	20	25	95	19	178	94%	A					
29		Average Score		16	17	25	82	17	157	83%						
30		Max score		20	20	30	95	20	178	94%						
31		Min score		10	13	18	67	13	130	68%						
32																

Fig. 4.2 Gradebook for a 4th Grade class

As illustrated in Fig. 4.2, the leftmost column and the topmost row often are reserved for descriptive labels that identify the value stored in each of the cells in the grid. The rightmost column and lower rows of a set of figures are often set aside for row and column totals respectively.

In 1978, Dan Bricklin, a young graduate student at the Harvard School of Business, developed a program called *Visicalc* which simulated a worksheet. It was the first electronic spreadsheet, a prototype of the many varieties of spreadsheets available today.

The *Excel* spreadsheet is considerably more powerful than *Visicalc*, able to handle much larger sets of numerical data at greater speeds. Like *Visicalc*, however, it goes beyond the traditional manual worksheet in so far as it is programmable. You can build instructions into an electronic spreadsheet to do relatively complex mathematical calculation and analysis. You also can build instructions into the spreadsheet to carry out humdrum, repetitive calculations—the kind of calculations which could take hours, even days, to complete manually but which, when done electronically, take a matter of seconds.

The *Excel* screen acts as a window onto a large grid of rows and columns into which data is entered, usually from the keyboard. You can build formulas into selected cells which automatically carry out calculations on designated sets of data. You'll learn how to do that in this lesson and the next.

The spreadsheet is most used for business accounting and data analysis. In K-12 schools, the spreadsheet comes in handy as a tool for keeping grades, but it is also used for creating charts and graphs of all kinds, as well as for data analysis related to class projects where numbers need to be organized, managed, and analyzed. It also is an excellent tool for helping students learn math concepts and has many other applications with students across the curriculum. The Skills Consolidation section at the end of the chapter will give you the opportunity to brainstorm with your classmates in order to come up with a list of such applications.

But first you need to learn more about spreadsheets and how they work.

### *Practice makes perfect*

As with the word processor, the best way to learn about the spreadsheet is to build a spreadsheet document and work with it. So here goes.

You should see a new *Excel* spreadsheet document titled Book1 (or some such default name).

**Close the Task Pane** since you won't need it for this lesson

It is always a good idea to immediately give a different name to a new document since the default *Office* name is nondescript. You want to be able to tell what each document contains when you look at the list of documents on your disk

The outline version of the document you are about to create will be a template for a gradebook.<sup>1</sup>

Put your **Data Disk** in the disk drive (floppy drive, zip drive, CD-RW drive, depending on where you are storing your files, unless you are saving your files on the hard drive on your own computer at home)

Select **Save As** from the **File** menu and, in the Save As dialog box, switch to the **disk drive** that contains your Data Disk

In the **Save As** dialog box, click on the **New folder** icon and name the new folder **Spreadsheets**

Type **Grades Template** as the document name for the new spreadsheet and click on the **Save** button

You should now be looking at a screen with the name of your document (Grades Template) at the top of a blank worksheet ready for you to insert your data.

## 4.2 HELPFUL HINTS WHILE USING THE SPREADSHEET

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<sup>1</sup> A template is an outline or form which can be used over and over as a layout when carrying out other projects that require the same basic document format. Here you are going to build a spreadsheet template to simulate an empty gradebook. Once you have created the template, you will keep it as a template on your disk for future use. You will be able to use this template from semester to semester to build the electronic gradebooks for all your classes.

### A spreadsheet is a grid divided into columns and rows

The intersection of a column and row is referred to as a cell (Fig. 4.3).

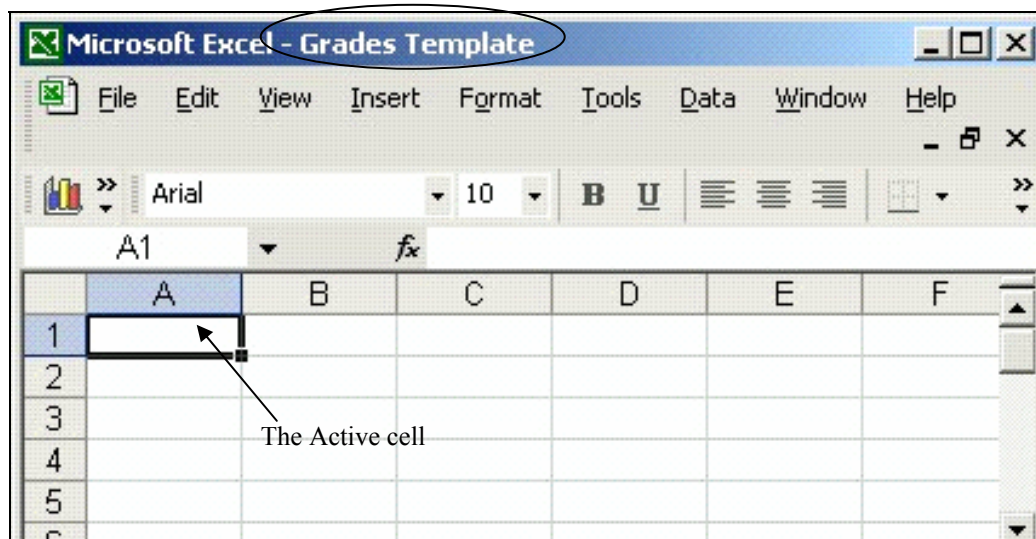


Fig. 4.3 Think of the spreadsheet as a grid divided into rows and columns

Right now, cell A1 is selected in the top left-hand corner of the spreadsheet.

Type the number **2002** in cell **A1** so you have some data in the spreadsheet for what follows

The cells are where information, in the form of a label, number or formula for calculation, will be entered. Labels are made up of text that describes the numbers in the columns and rows. Formulas are mathematical expressions built into certain cells that instruct the computer to carry out calculations on specified sets of numbers in the rows and columns. As you go on with the tutorial, these concepts will become clearer to you.

### Moving around in the spreadsheet

The second column in Table 4.1 lists the effect of pressing the keys listed in the first column.

Keys Pressed	Effect
Tab	Moves selection to the right to next cell in same row
Shift-Tab	Moves selection to the left to previous cell in same row
Arrow keys	Move selection one cell in any direction
Shift-Enter	Moves selection up to previous cell in same column
Enter	Moves selection down to next cell in same column
Scroll bars	Scroll vertically and horizontally through the spreadsheet
Accept button (✓)	Accepts data in cell but does <u>not</u> move to another cell
Cancel button (X)	Cancels entry in cell

Table 4.1 Cell selection commands

Check each one now—this will help you follow later directions

There are 65536 rows and 256 columns in the *Excel* spreadsheet. That means there are over 16 million cells into which you can store data! That should be enough for any purposes we might

have in mind! Usually you'll use the mouse to select the cell you want to work in. Just click on the cell to select it. Once in a particular cell, use the commands in Table 4.1 to proceed to other related cells.

Practice now by moving around the spreadsheet. After you have located several cells, end up by clicking on cell A1 to make it the current or active cell.

### Identifying the active cell's coordinates

Look in the top left hand corner of the *Excel* screen (Fig. 4.4) to see which cell (the active cell) you are in at any point in time.

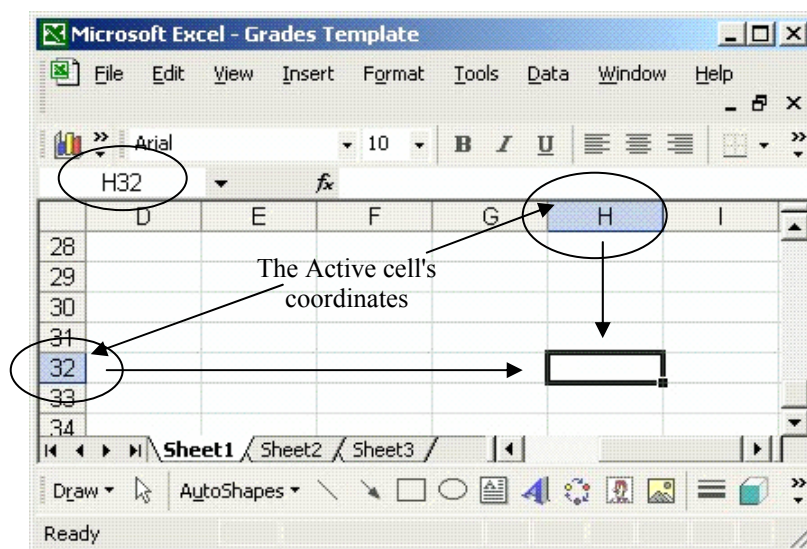


Fig. 4.4 Identifying the address of the cell you are working in

Click on any cell now and look at the cell's coordinates in the top left corner of the screen

Each cell address (a location in the spreadsheet) begins with a letter to indicate the column, followed by a number to indicate the row. For example, H32 identifies the cell at the intersection of column H, row 32 (Fig. 4.4)

### Selecting a range (group) of cells

Table 4.2 lists the methods for selecting a group or range of cells.

Task	Method
To select a <b>block of cells</b>	Drag <b>diagonally</b> from top left corner of the block of cells down to the lower right corner
To select an entire <b>row</b> of cells (horizontally from left to right)	Click on the <b>number</b> (the <b>row label</b> ) on the left hand side of the spreadsheet
To select an entire <b>column</b> of cells (vertically, from top to bottom)	Click in the <b>letter(s)</b> of the alphabet (the <b>column label</b> ) at the top of the column
To select <b>several rows or columns</b>	Drag across the <b>row or column headings</b>

Table 4.2 Selecting a range (group) of cells

Once again, take a few minutes now to try each of these methods for selecting groups of cells.

### Location of the active (selected) cell after entering data into a cell



When you type the data for a cell, the data first appears in the Entry bar at the top of the screen (Fig. 4.5).

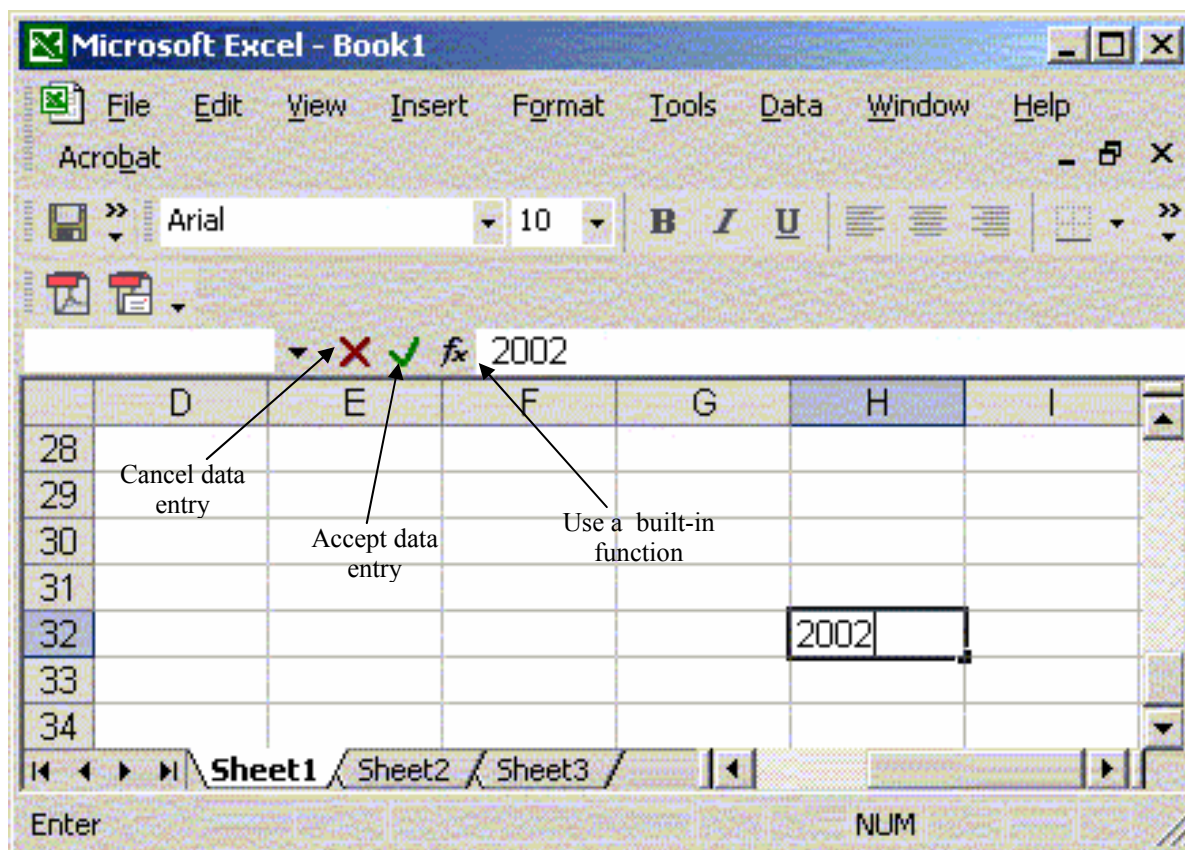


Fig. 4.5 The spreadsheet Entry bar

See how this works for yourself now.

Click on any cell and type the number **2002**

Look at the Entry bar above the spreadsheet window. The data is displayed there while you

1. check that it is correct before copying it to the active (selected) cell;
2. make up your mind whether it should be entered into the spreadsheet at all;
3. decide which cell you would like to be the active cell next after the value has been copied to the currently active cell.

You may still decide not to enter the data into the spreadsheet, in which case you would click on the Cancel box (X) in the Entry bar (Fig. 4.5) and start over. If, on the other hand, the data is correct, you would click the Accept button (✓), which keeps the cell you are working in as the active cell.

Click the **Accept** button (✓) now

Notice that the data is immediately copied to the selected (active) cell.

Alternatively, you may want to proceed to the cell immediately to the right of the active cell into which the number you just typed will go. Or you may want to proceed to the cell just below the active cell, or the cell just above the active cell, and so on.

A short while back you practiced moving around the spreadsheet using the commands listed in Table 4.1 on page 104. This table also lists the key(s) to press to tell *Excel* which cell to go to after you accept the data you have typed into the Entry bar.

Practice now by making the cell in which you just typed **2002** the active cell (by clicking on it)

Then press each of the keys or key combinations in Table 4.1 (p. 104) and verify the result of the action in the spreadsheet each time

### Blanking out a cell or cells in the spreadsheet

The quickest way to blank out cells is to use the Clear option from the Edit menu.

Select the cell holding the data **2002** then, from the **Edit** menu, select **Clear > All**

Let's do that another, simpler, way. First you need to bring back the data you just deleted.

Hit **Ctrl-z**

Now, with the cell still selected, hit the **Del(ete)** key on the keyboard

This saves you having to use the mouse and menus. To do the same to a group of cells you would just drag across the cells to select them—they will become highlighted. Then select Clear from the Edit menu or hit the Del(ete) key as before.

Practice now by entering **3 or 4 numbers** into adjacent cells in the spreadsheet

Select all (**Ctrl-a**) and use the **Clear** command or the **Del(ete)** key to remove them in one go


Remember that you can undo the Clear operation (or any other Edit operation) by immediately selecting Undo Clear from the Edit menu (or press ctrl-z).

### Editing the data in the Entry bar

While you are typing in data in the Entry bar you can edit it as if you are using *Word*. So everything you learned in Lessons 1 and 2 will apply.

### Editing data after it has been entered into a cell

If you have left the cell where you have an error and want to make a correction or change, move back to the cell in question by selecting (clicking on) it.

The data in that cell will be displayed in the Entry bar at the top of the spreadsheet. Click in the Entry bar (the cursor will show where you clicked on the text) and then just go ahead and make any changes you want. Replace the old entry by clicking the Accept button () or by selecting another cell in the spreadsheet.

## 4.3 SETTING UP LABELS FOR YOUR GRADEBOOK TEMPLATE



When you have completed this section and the next section (Sections 4.3 and 4.4) your gradebook should look like Fig. 4.6.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2	GRADE REPORT													
3														
4	Class:													
5	Semester:													
6	Year:													
7														
8				A1	A2	A3	A4	A5	TOTAL	PCNT	GRADE			
9														
10			MAX	0	0	0	0	0	0					
11														
12	LAST NAME	FIRST NAME												
13														
14									0	#DIV/0!				
15									0	#DIV/0!				
16									0	#DIV/0!				
17									0	#DIV/0!				
18									0	#DIV/0!				
19									0	#DIV/0!				
20									0	#DIV/0!				
21									0	#DIV/0!				
22									0	#DIV/0!				
23									0	#DIV/0!				

Fig. 4.6 Completed Gradebook Template

The steps that follow will help you achieve this goal. Follow them carefully.

Select cell **A2** and type **GRADE REPORT**

Check the data in the **Entry bar** to make sure you typed the label correctly; correct any errors

Click the **Accept** button (✓) when you are sure all is well (or press one of the other keys which accept data into the spreadsheet—arrow keys, Enter/Enter key, Tab key)

This is an example of a label—which is any text you use to describe the data that is in a spreadsheet. All the column and row headings are labels also.

You need to widen the A column to allow for longer student last names.

From the **Format** menu select **Column/Width...**

Type the number **15** in the dialog box, then click on **OK**

While you're at it, click anywhere in the **B** column (first name) and adjust the width to **12**

Later in this section you'll practice adjusting other column widths.

Select cell **A4**

Type the label **Class:** (note the colon) and press **Enter** to move the cell pointer to cell **A5**

Type the label **Semester:** and press **Enter** to move the cell pointer to cell **A6**

Finally type the label **Year:** and click on the **Accept** button (✓) in the **Entry bar**

At this point you should be thinking about saving the work you have completed thus far! Since you have already named the document (Grades Template), you can use a quick keyboard shortcut.

Press **Ctrl-s** to save your work to this point

### Aligning data in spreadsheet cells

The gradebook will look best if the three labels you just entered into the spreadsheet were right aligned in their respective cells. Right aligned means that the label is aligned to the right side of the cell. Unless you tell *Excel* otherwise, the system will left align any data that is regular text (letters of the alphabet, for example). Likewise, the system will right align any data that is made up of numbers. This makes sense if you look at Fig. 4.7.

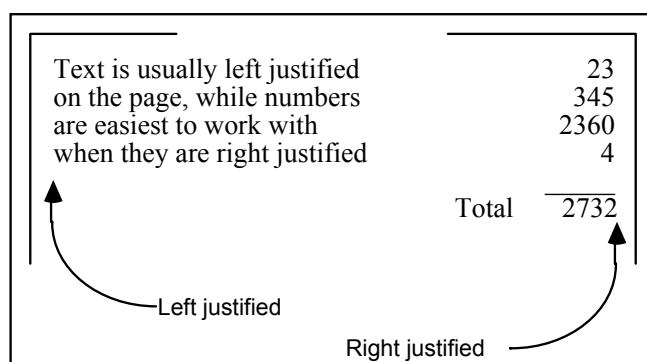


Fig. 4.7 Text is left aligned; numbers are right aligned

However, sometimes text looks best when it is right aligned in the cell, as should be the case with the labels you just entered into cells A4, A5, and A6. Here is how you right align the text in these cells.

Position the spreadsheet cursor on cell **A4**

Hold down the mouse button and drag down to cell **A6**, so that **all three cells** are selected (cell **A4** will still be selected even though it is not highlighted—it has the heavier border which also indicates selection in the spreadsheet)

In the **Format** tool bar click on the **Right Alignment** button

This will right align the cells that you have selected (A4 through A6). Check this on the screen before you go on.

Press **Ctrl-s** to save your work so far (this is a good habit to get into!)


### Entering the column and row labels

Now you will enter the labels for each of the columns that eventually will contain the scores for assignments you might give your students during the course of a school session.

Select cell **D8** and enter the grade label **A1** (short for **Assignment 1**)

Check that you have typed the label correctly, then press the **Tab** key to move to the next cell across and enter the assignment label **A2**

Do the same thing three more times, using the labels **A3**, **A4**, and **A5** (Your last entry should be in cell **H8**)


Click the **Accept** button () next to the entry bar at the top of the screen

These labels might represent homeworks or quizzes for a unit or for a whole semester, depending on how many assignments you might assess for grading purposes.


When you use this Grades Template document for an actual gradebook, you will edit these column labels so that they contain appropriate titles relating to the actual assignments that will be stored in the respective columns. There is, of course, room in the gradebook for you to include as many assignments as you want.

Once you have entered all five of the assignment labels, press the **right arrow** key twice; this should bring you to cell **J8**

Type **TOTAL** then press the **Tab** key **2** times to move to cell **L8**


Type **PCNT** then press the **Tab** key **2** times to move to cell **N8**, then type **GRADE** and click the **Accept** button ()

Now you will enter the row label for the **Maximum Scores**.

Select cell **C10**, type **MAX** (this row will be used in due course to keep a record of the maximum score for each assignment, test, and so forth), then click the **Accept** button ()

Finally, you need to enter the column labels for the First and Last names.

Select cell **A12** and type **LAST NAME**, then click the **Tab** key to go to cell **B12**

Type **FIRST NAME**, then click the **Accept** button () and press **Ctrl-s** again to save your work so far

### Entering "dummy" scores

For the sake of the template you will enter a set of "dummy" maximum scores (zeroes). Later in the tutorial you will edit these Maximum Scores to reflect maximum scores for *actual* assignments.

Move to cell **D10** and enter the number **0 (zero)**

Enter a **0 (zero)** for the Maximum Score into each of the remaining assignment columns (**E10** through **H10**)

### Adjusting the width of columns

You will notice that the numbers are not quite lined up under the labels in the assignment columns. Recall that in *Excel* the labels (text in general) are aligned on the left of the column while numbers are always aligned on the right (check Fig. 4.7 above if you're still confused about this).

To improve the appearance to your gradebook you probably want your column labels to be more in line with your entries. You already practiced one way of doing this: namely, to right align the labels. Another way is to reduce the width of the columns containing scores. They need be no wider than the width of the column labels. By default *Excel* makes all the columns about an inch wide (8.43 is the *Excel* default value for the column width). Let's change the width of columns C through N so they are only as wide as necessary.

Use the horizontal scroll bar at the bottom of the spreadsheet window to scroll the gradebook over until **Column C** is at the **left edge** of the spreadsheet

Use the mouse pointer on the column header "**C**" at the top of the column (Fig. 4.8)

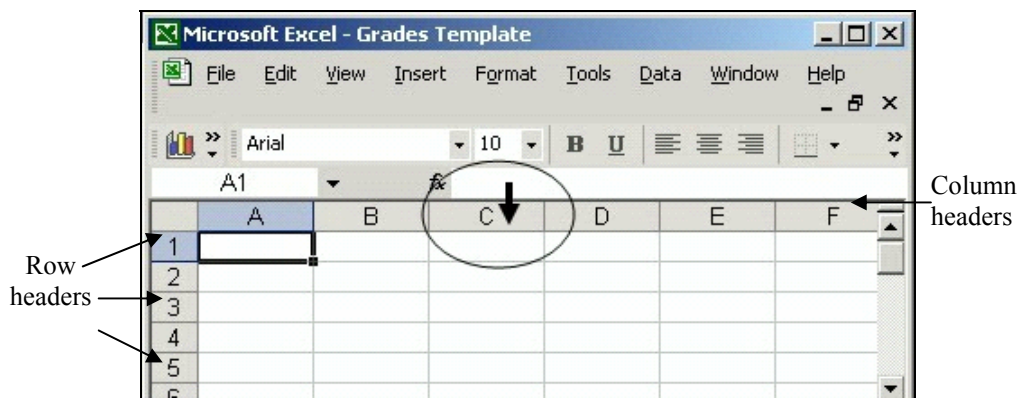


Fig. 4.8 The Column (letters of the alphabet) and Row (numbers) headers

Hold down the mouse button, and keep it down, while you drag across the screen to the right as far as **Column H**

When you have columns **C through H** selected, let go of the mouse button

All six columns (C through H) should be highlighted.

From the **Format** menu select **Column/Width...**

This will bring up the Column Width dialog box.

Type **4**, and click on **OK**, then click anywhere to deselect the columns

Now use the **horizontal scroll bar** if necessary to scroll the spreadsheet to **the right** until you can see column **A** again

Another way to change Column Widths is to drag with the mouse. Let's try this.

Position the mouse pointer in the headers between column B and column C so the pointer becomes a crosshair (Fig. 4.9)

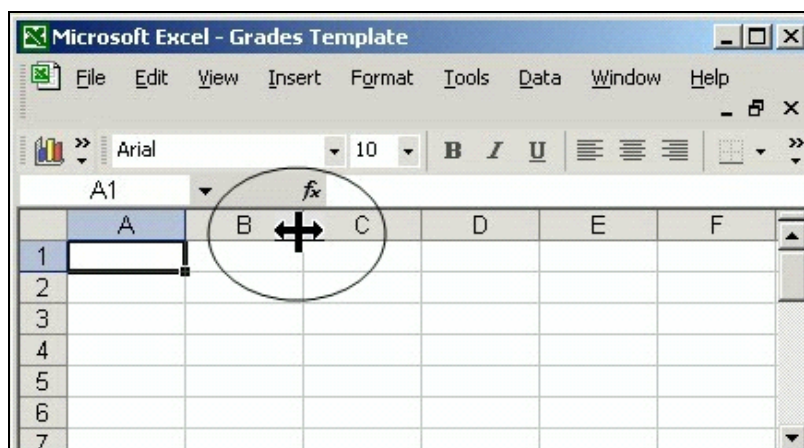


Fig. 4.9 Adjusting column width using the mouse

Now just drag left or right and notice the **small box** that tells you the exact column width

You can simultaneously change the widths of several columns, as long as you want them all to be the same width, by selecting (highlighting) them all first and then dragging in this way.

Try this for yourself now, and then hit **Ctrl-z** to restore the columns to their previous width

### Changing the alignment of the column labels

It would also be a good idea to change the alignment of the column labels and make them all center aligned.

Position the mouse over cell **D8**, then hold down the mouse button, and drag across to cell **H8** before letting go of the mouse button

All the column labels for the 5 assignments should now be highlighted.

In the **Format** tool bar click on the **Center Alignment** button

Other columns in your spreadsheet are also wider than necessary. Your tasks now are as follows:

**Reduce the width** of the columns listed in **Table 4.3** to the column width indicated

Column	Width
I, K, & M	1
J and N	8
L	10

Table 4.3

**Change the alignment** of the labels for columns **J**, **L**, and **N** to **Center Aligned**

Press **Ctrl-s** again to save your work when you have completed these tasks



## 4.4 CREATING AND COPYING FORMULAS

Functions and Formulas are powerful tools in spreadsheets which can save you hours of work.

Functions are routines built into the *Excel* spreadsheet. Formulas, on the other hand, are defined by the user, and may include the built-in functions. Both functions and formulas accomplish the same task: they tell *Excel* to do some kind of calculation for you.

For example, at the end of a semester you will want to calculate a total point value, and probably a percentage, for each student. To do this you can program the spreadsheet to do the work on the values in appropriate cells. You can have the spreadsheet add up the numbers in a whole range of cells, or have it tell you the average score in a range of cells, and so on. You can also have the system copy a formula into other cells. Let's try a few things along these lines now.

### Creating the formula

Let's enter a formula and see what it does.

Select cell **J10**

Type **=SUM(D10:H10)** then click the **Accept** button (✓)

The "=" symbol at the beginning is a clue to the system that what follows is a **formula**. So remember this:

**ALL SPREADSHEET FORMULAS BEGIN WITH THE "=" SIGN.**

The formula **=SUM(D10:H10)** tells *Excel* to sum (add together) the scores entered in cells **D10** through **H10** and store the result in cell **J10**, J10 being the selected cell in which you want the formula to do its job. **SUM** is one of many *Excel* built-in functions. It automatically carries out the series of additions to produce the required result.

We'll look at the built-in functions in a moment.

Notice the **0 (zero)** that now appears in cell J10. This number is the sum of the zeroes you typed in cells D10 through H10.

In a short while you will have an opportunity to test whether the formula is correct. You will be entering into the spreadsheet a maximum score for real assignments along with a set of scores for a roster of students.

For now, if you typed in the formula correctly and clicked the Accept button (✓) you should see that J10 contains the sum of all the maximum scores (which for the time being is 0 (zero), of course).

Press **Ctrl-s** again to save your work so far

### Copying and pasting formulas

Soon you will be entering a set of data for several students. But first you must complete the Grades Template by creating a formula that will produce a total or sum of the eventual scores for each student.

Before you carry out the exercise, here is a description of what is involved. Fig. 4.10 on the next page illustrates the process.

You are going to copy the formula from cell **J10** to the relevant cells in the same **TOTAL** column. You will start by copying the formula to the clipboard. Then you will paste it into the first of the cells where you want the formula duplicated. Finally you will tell *Excel* to "fill down" a copy of the formula to the remainder of the relevant cells in the column—one for each student in the roster.

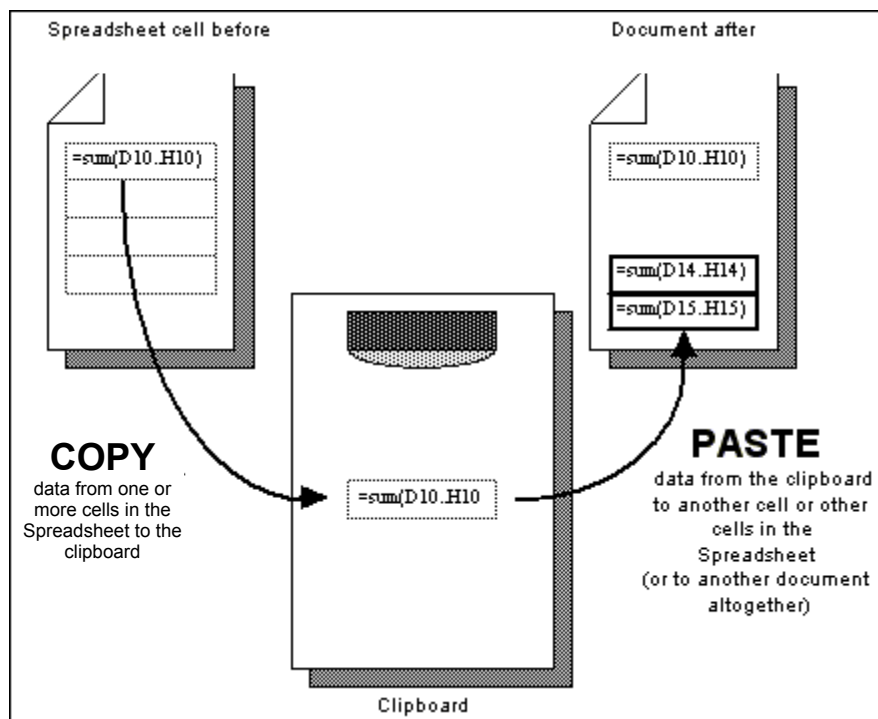


Fig. 4.10 Copying and Pasting

### *Copying the formula...*

Select cell **J10** if it is not still selected from the previous exercise

Press **Ctrl-c** for copy (or, from the **Edit** menu select **Copy**)

Cell J10 will now have a blinking border indicating that this is the cell from which the data has been copied. The formula in cell J10 has been copied to the clipboard in the computer's primary memory. Let's take a look at the clipboard now. It's useful to know how to check the clipboard's contents.

From the **Edit** menu, select **Office Clipboard...**

Think of the clipboard as a temporary holding area for a single set of data. Once something is on the clipboard it can be pasted anywhere else—in this spreadsheet, or in another spreadsheet, or into some other document.

### *Pasting the formula...*

Row 14 is where you will enter the first student's name and scores when you create an actual gradebook after you have saved this template. So you are going to paste the formula you just copied (you copied it from cell J10) into cell J14.

Select cell **J14**

Press **Ctrl-v** (this is the short cut command for selecting **Paste** from the **Edit** menu)

Look at cell J14. You should see the value 0 (zero) stored there. Now look at the data in the Entry bar at the top of the spreadsheet. Interesting! The formula is different from the one you copied from cell J10.

Check this out—click on cell **J10** again

Notice that the range of cells is **D10 through H10**.



This is because you have not yet entered any scores. Later, when you *do* enter the scores, the current total for each student will appear in the **TOTAL** column.

Press **Ctrl-s** again

### Setting up the Percentage formula

The next formula you need will go in the **PCNT** column (column L) and will calculate the percentage for each student. The formula will tell *Excel* to divide the Total Points earned by a particular student by the Total of all the Maximum Scores for each assignment.

Select cell **L14**, since this is the cell in the **PCNT** column for the first student

The formula you want will divide the value in cell **J14** (which is the **Total** points for the first student) by the value in cell **J10** (which is the **Total** maximum score possible).

Type the formula **=J14/J10** and press **Enter**

### Error messages are sometimes OK

Hmmm... The entry **#DIV/0!** is displayed in cell L14. This is an error message warning you that the formula in cell L14 is telling *Excel* to divide by zero (the current value in J10)—an illegal operation because it is undefined in math.

In one sense, you don't need to worry about this for now. You will eventually have a value other than zero in cell J10 when you put actual Maximum scores into the Gradebook and this will take care of the **#DIV/0!** message. But the error message, because it does not use the word "error" in the message, might be disconcerting to someone who does not understand what is going on. This might be the case if, for example, you shared a template with a colleague at your own or another school.

### Using Logical functions

*Excel* has a useful built-in function for dealing with errors such as this. It's the logical IF function. The whole function looks like this: **=IF(Logic expression, Value if True, Value if False)**. Actually, *Excel* has over 100 functions divided into nine categories. Let's look at the built-in functions now so that you can know how to find them when you need them.

From the **Insert** menu select **Function...**

The Insert Function dialog box appears on the screen (Fig. 4.12).

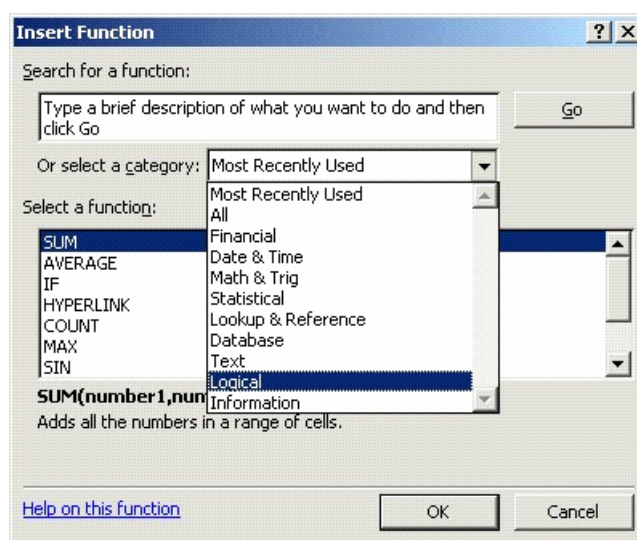


Fig. 4.12 Insert Function dialog box

Click on the **Logical** category in the **Function category:** drop down menu and look at the set of 6 **Logical** functions which appear in the new dialog box (Fig. 4.13)

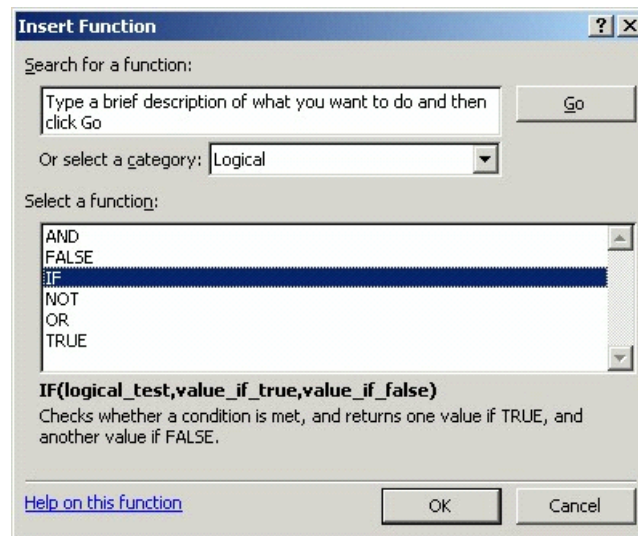


Fig. 4.13 The Logical functions

Notice the IF logical function—the third one listed in the Function Name: area of the dialog box.

**Double click** to select the **IF** Function now, and notice that the **components** of the IF function are displayed in the next dialog box (Fig. 4.14)

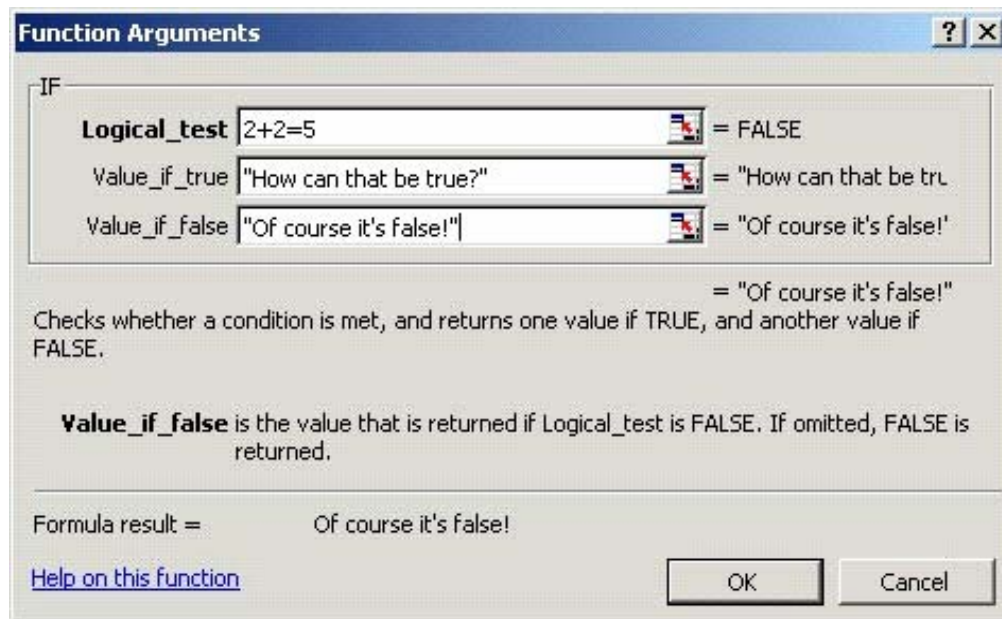


Fig. 4.14 The Function Arguments dialog box

The Logical test part of the expression is a statement which the spreadsheet will evaluate as either true or false. For example  $2+2=5$  will be evaluated as false;  $2+2=4$  will be evaluated as true. The second part of the Logical IF expression (value\_if\_true) is what you want the spreadsheet to put in the cell if the Logical expression is true. The third part of the Logical IF



expression (value\_if\_false) is what you want the spreadsheet to put in the cell if the Logical expression is false.

Try the following example for practice. It will be easier to begin with if you just type in the formula yourself instead of using the built-in function provided by *Excel*. Built-in functions are really useful when you know what you're doing, as you will soon enough. But let's keep it simple for now.

Close the **Function Arguments** dialog box by clicking on the **Cancel** button

Click in cell **A30** and type the formula:

**=IF(2+2=5,"How can that be True!","Of course it's False!")**

Click on the check mark (✓) to accept the formula into cell **A30**

We know that  $2+2=5$  is False, so the result that will be displayed in cell **A30** will be "Of course it's False!". Notice, by the way, that you can have text as the result; it doesn't have to be a number.

Select **Clear** from the **Edit** menu, or hit **Del(ete)** to remove the formula from cell **A30**

*Back to the Division by zero problem*

OK, in cell L14 you want to tell *Excel* that *if the value in cell J10 is zero (0), it should put a phrase such as "Div/0 error" in cell L14*. This will better explain what is going on. It will also remind you that those Maximum Scores need to be updated before the spreadsheet will work with an actual class of students. You will also tell *Excel* in cell L14 what to do *if the value in cell J10 is other than zero (0)*— which it will be if there are Maximum Scores other than zero. In this case, you will tell *Excel* to *go ahead and calculate the percentage for the student*.

Now, how would you write that as a formula? If you think you can figure it out (and you'll impress your instructor no end if you can!), write down the correct formula in the box below:

The answer is....(drum roll...)

**=IF(J10=0,"Div/0 error",J14/J10)**

Go ahead and type this formula into cell **L14** now

### **Absolute references**

You need to make one small change to the formula in cell L14 before you copy it to each of the cells from L15 through L23. This is because part of the formula needs to be an Absolute Reference.

Look at the formula again:

**=IF(J10=0," Div/0 error",J14/J10)**

Cell J10 contains the total of the maximum scores. The percentage for *every* student is calculated by using the value in this *specific* location. So the reference to this cell *must not change* when the formula is copied to the other cells in column J. This is why it is called an Absolute Reference—

it must not change; it must *always* reference cell J10. The value in J14, on the other hand, is relative to the student data in row 14. This reference (to cell J14) will change relative to each student.

Does that make sense? Read the previous paragraph over again if you need to. The fact is that you must tell *Excel* that you want any references to J10 in the formula specified for cell L14 to be Absolute, otherwise the formula will not copy correctly to the other cells in column J.

Follow these steps to do this.

**Select cell L14**

Look at the Entry bar. You should see the formula =IF(J10=0,-Div/0 error",J14/J10).

Position the cursor immediately after the first parenthesis in the **Entry bar**

Type a **dollar sign (\$)** before the letter **J**, and another **dollar sign (\$)** before the number **10** (so the formula will now be =IF(**\$J\$10**=0,"Div/0 error",J14/J10))

Look at the formula again. Do you see the second reference to cell J10 at the other end of the formula (J14/J10)? You're going to need \$ signs there, too.

Go ahead and fill them in (J14/**\$J\$10**) just as you did at the beginning of the formula

The \$ signs tell *Excel* to treat the reference to column J and row 10 as Absolute when copying the formula to other cells. The reference to J14, on the other hand, will be Relative and will therefore change relative to whichever cell it is copied to, so there's no need for dollar signs here. Remember:

A dollar sign (\$) before each part of a spreadsheet cell address tells *Excel* to treat the reference to the cell as an absolute (unchanging) reference.

Phew! That's the tough part over with.

Click on **Accept** (✓) to accept the formula, then press **Ctrl-s** to save the change

Now that you have edited the formula, you want to copy it to the other cells in the PCNT column.

Cell **L14** should still be selected, so use the mouse to drag down from cell **L14** to cell **L23**, then from the **Edit** menu select **Fill/Down**

Voilà! All the appropriate cells have been set to calculate the percentage for every student once you have entered a set of scores for each student. Right now, remember, you have the "Div/0 error" message in each cell because you are telling *Excel* to divide by zero. As you know, this problem will be overcome when you enter an actual set of maximum scores into row 10.

Press **Ctrl-s** again to save your work so far

Notice that you are doing all the hard work up front. Once you have built the template, using it as a gradebook will be easy—as you will see in a moment. You have a few more tasks to complete before the Gradebook is ready, however.

### Setting the Cell Attribute for the PCNT column

When you divide one number by another the result is usually a fraction. Thus the eventual percentage for each student won't look like percentages at all. Instead of, say, 85%, the computer will display 0.85. It would be best to display the percentages as whole numbers (no fractions) with a % sign after them. So you must add this feature to the Gradebook template.

Follow these steps to format (select attributes for) the values in the PCNT column so they will eventually display as recognizable percentages.

If necessary, drag the mouse from cell **L14** to cell **L23** and, in the **Format** menu, select **Cells...**

In the **Format cells** dialog box, from the **Category** menu select **Percentage**

Then click on **OK** because the number of places after the decimal point (called Precision) is set at the default of two (2)

That's it. Later, when you add students and their scores to your roster you will see all the percentages displayed with the % sign. You are now ready to save your template for the last time (ctrl-S).

### Checking out the formulas

It is useful for you to know how to check out the formulas in the spreadsheet. Like everything else, this is easy enough to do when you know how. Follow these steps to do this.

From the **Tools** menu select **Options...**, then in the **Options** dialog box (Fig. 4.15) select the **View** tab

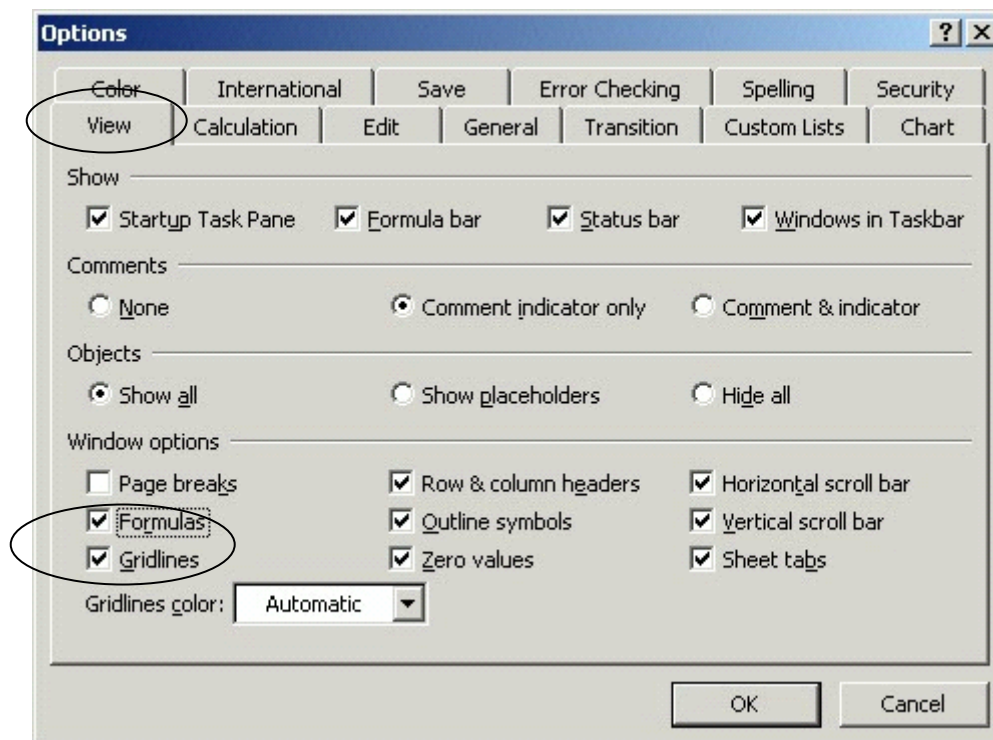


Fig. 4.15 Showing or not showing formulas in the Options dialog box

In the **Window options** section, put a **check mark** in the box next to **Formulas**, and click **OK**

This will display all the formulas in your spreadsheet. *Excel* widens the columns so you can see the whole of each formula.

Scroll over if necessary to check out the formulas displayed in columns **J** and **L**

After you have verified that the formulas are stored correctly relative to each of the appropriate cells, you should reset the display so you can see the values in the cells.

From the **Tools** menu select **Options**, make sure you have the View tab selected, then click in the box next to **Formulas** to deselect it, and click on **OK**

Notice that the formulas are hidden once again and the columns are restored to their original width.

The last summary column in the spreadsheet (column N) is for the final letter grade. For the purposes of this tutorial, you will enter the grade yourself based on the totals, averages, and other factors that you consider significant in assessing the quality of your students' work. Thus, no formula will be supplied for this column at this time. Later, in Lesson 4, you will learn how to create a Lookup table so that *Excel* can calculate each student's grade and automatically enter it into the spreadsheet. This will simplify your work still more.

## 4.5 ENTERING NAMES AND SCORES FOR EACH STUDENT

### Changing the name of the template document

Now that the template is safely saved on disk, you can start to use it to build specific gradebooks for particular classes.

As you can see, the template is still on the computer screen after you have saved a copy of it on your disk. Now you are going to fill it out with student names and scores. Thus, the template will no longer be a template; it will be an actual grade roster. Therefore, the first thing you must do is change its name, so that when you save the document it will not overwrite the template that you want to keep for future use. It is always a good idea to do this straight away because you might forget to do it later.

Up until now you have been working with the document that you originally called "Grades Template." Let's say you are a 4th Grade teacher, and the year is 2002. A good document name for this gradebook would be Grade4 2002.

You probably remember how to change a document name from the previous two tutorials. But in case you don't...

Select **Save As** from the **File** menu and type the name **Grade4 2002**, then click on **Save**

The new document name will appear at the top of the screen. You should start by filling in the specific class and semester details for the new gradebook.

In cell **B4** type **Grade 4**, hit the **Enter** key, type **1** for the semester, hit **Enter** again, then type **2002** for the year and click on **Accept** (✓)

### Entering the student names

Now select cell **A14** (this is where the first student's last name will go)

Type a student's **Last Name** and hit the **Tab** key to move to cell **B14**

Type the **student's First Name**

Hit **Enter**, then the left arrow key, to move to cell **A15**, and do the same for the next student

Repeat these steps until you have a roster of **10** students. Notice how the names are all lined up on the left of the column (text is normally left aligned). It doesn't matter if your names are not in alphabetical order at this time since *Excel* lets you sort them any time you like, as you will learn later in Lesson 4.

### Entering the scores for each student

Your next step will be to enter scores for these students. But before you do this you will need to decide what kind of scores they will be—Homeworks, Tests, Quizzes, and so forth.

Select cell **D8**, and type a brief label in the **Entry bar**, such as **HW1**, or **Test1**, and press the **Tab** key

Do the same for each of the four other labels for the **scores** columns. Next you must decide what maximum scores you want for each assignment.

Select cell **D10**

Type a **maximum score** for the assignment or test recorded in this column (column **D**)— a maximum score is the highest possible score that can be achieved for the assignment or test (such as 20 out of 20, or 100 out of a possible 100, and so on)

Move to each of the four other **maximum score** cells (**E10** through **H10**) and enter appropriate maximum scores

Now look across to column **L**

Notice that those warning messages in column **L** have gone. This is because you are no longer telling *Excel* to divide by zero ().

Take a look at cell **J10** and notice that it now has a value other than 0 (zero) in it

Next, select **D14**

This is the first cell in the first column of scores for your students. Type a score for each student (press **Enter** after each score because you want to go down to cell **D23**). Remember that the score should be within the Maximum Score range for that HW, Test, Worksheet, or whatever.

Now enter scores for each student in each of the remaining four Assignment categories. If you move across to columns **J** and **L**, you should notice how the Totals and Percentages are all kept up to date as you enter each score and the percentages *look like* percentages! If the columns are filled with ##### signs, this is because the column is not wide enough to show the data. Go



ahead and make the columns wider if you need to. Remember about those ##### signs if you ever see them in a cell. They're not a problem. They're just an alert to you that you need to make the column wider to fit the size of the data.

The formulas are the most powerful aspect of spreadsheets. When the spreadsheet does the math for you, you begin to appreciate the power of those formulas that you have built into the gradebook template. You don't need a calculator any more. The spreadsheet *is* your calculator and it will save you a significant amount of time.

Once again, you must save your work (press **Ctrl-s**)

Everything will be saved under the new name (**Grade4 2002**) on your Data Disk.

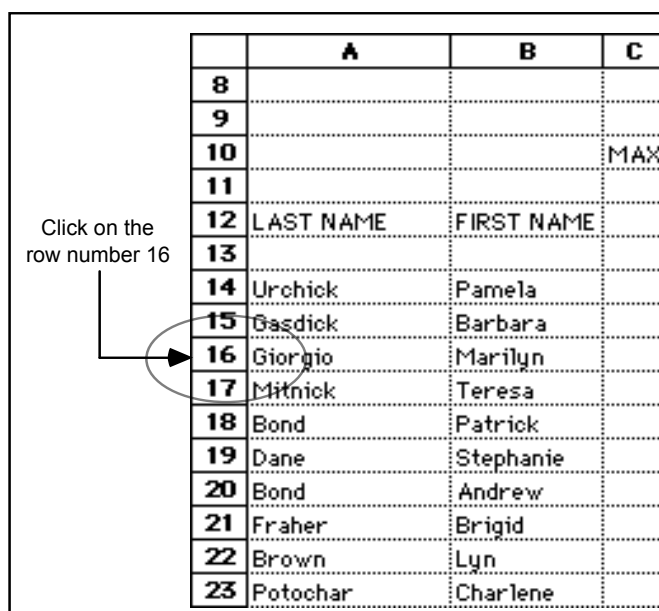
## 4.6 MAKING CHANGES TO YOUR GRADEBOOK

Now that your gradebook is complete and saved on your disk, this does not mean that you cannot make alterations to it. Perhaps a new student needs to be entered onto your roster, or you have accidentally overlooked an assignment and want to enter it into your gradebook, or you decide to add an extra assignment or test to your normal schedule. This can all be done with little effort on your part.

### Adding a student to the roster (Inserting rows)

A new student can be added by inserting a row. To insert a **row** you would select the location ahead of which you want to place the new row or rows (say before **Row 16**). *Excel* inserts a new row immediately ahead of the row you have selected. Follow these steps to try this now.

Select row **16** by clicking in the row label (the number **16** at the left edge of the spreadsheet—Fig. 4.16)



	A	B	C
8			
9			
10			MAX
11			
12	LAST NAME	FIRST NAME	
13			
14	Urchick	Pamela	
15	Gasdick	Barbara	
16	Giorgio	Marilyn	
17	Mitnick	Teresa	
18	Bond	Patrick	
19	Dane	Stephanie	
20	Bond	Andrew	
21	Fraher	Brigid	
22	Brown	Lyn	
23	Potochar	Charlene	

Fig. 4.16 Selecting a row

Row 16 will become highlighted on the screen.

From the **Insert** menu select **Rows**

You should now see a new empty row. If you inserted the row in the wrong place, remember that you can undo what you just did by selecting Undo Insert from the Edit menu.

Now you must fill the new row with data as in the rest of the spreadsheet.

Make cell **A16** the active cell now and fill out a name and a set of scores

You will also need to copy the math formulas from cells J10 and L14 to the respective cells in the TOTAL and PCNT columns.

Move, first, to cell **J10** and press **Ctrl-c** (the shortcut for the **Copy** command)

Move to cell **J16** and press **ctrl-v** (or select **Paste** from the **Edit** menu)

Now follow the same procedure to copy the formula from cell **L14** to cell **L16**. After you have copied the formulas you should check to see that the results in the various cells make sense. Mistakes are always possible.

<b>NEVER ASSUME THAT THE COMPUTER IS GIVING YOU THE CORRECT DATA. IT'S ONLY AS GOOD AS THE PERSON WHO PROGRAMMED IT—AND THAT PERSON IS HUMAN!</b>
-----------------------------------------------------------------------------------------------------------------------------------------------------------

### Inserting columns

To insert a new column, you will select where you want to insert the column—say between columns F and G. *Excel* will insert the new column(s) to the left of the column you select.

Select **column G** by clicking in the column label (the letter "**G**" at the top of column G in the spreadsheet)

Column G will become highlighted.

From the **Insert** menu select **Columns**

*Excel* inserts an empty column to allow you to enter a new set of data. The column width is set to be the same as the column next to which it is inserted.

Again you will need to fill in a column label in cell G8, a maximum score for that assignment (in cell G10), and a set of actual scores, one for each student in the class. Notice that the column label you enter in cell G8 is right aligned since you set this attribute across the cells from D8 to H8. Notice, also, once more that all your totals and percentages are updated to reflect the new set of scores.

### Deleting (cutting) rows and columns

Here are the steps to delete rows or columns from a spreadsheet.

Select a row or column, or a set of rows or columns, by highlighting them, then, from the **Edit** menu select **Delete**

No need to practice this now. Just remember where to find this section if you ever need to delete rows or columns from a spreadsheet.

The beauty of an electronic spreadsheet such as *Excel* is that, even when you add or delete rows or columns, the system automatically updates the formulas where appropriate to match the new state of the data. If you make changes like this that you want to keep, you must save your work once again. Do this now.

Save your **Grade 4 2002** gradebook document

## 4.7 PRINTING YOUR GRADEBOOK

You are now going to print a "hard copy" of your gradebook. Unless you decide otherwise, *Excel* will print the page in the Portrait orientation (Fig. 4.17).

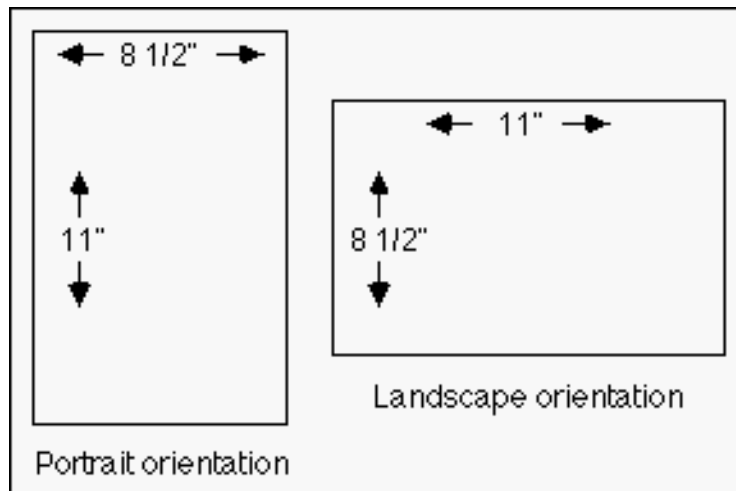


Fig. 4.17 Portrait and Landscape page orientation

If your gradebook is too wide to fit on the 8.5 inch width of standard paper, you can print the gradebook sideways (Landscape orientation).

From the **File** menu, select **Page Setup** to bring up the dialog box (Fig. 4.18), and make sure you have the **Page** tab selected

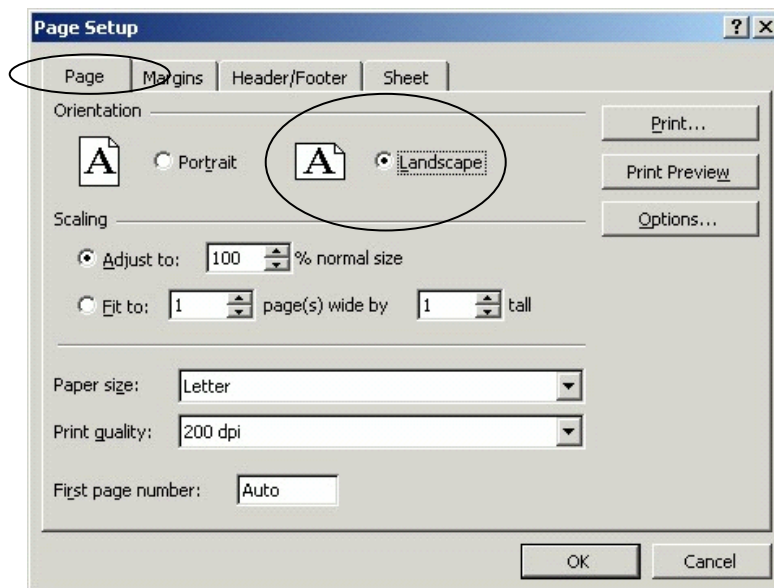


Fig. 4.18 Page Setup dialog box

Click on the radio button next to **Landscape**, then click on **OK**

In the Page Setup dialog box you can also tell *Excel* to print or not to print gridlines, row and column headings and so forth. You can thus still make changes to the appearance of your spreadsheet on the printed page.

From the **File** menu select **Page Setup** again, and click on the **Sheet** tab, then remove the checkmark in the box next to **Row and Column Headings** (if necessary) and **Gridlines** (again, if necessary)

This is to tell *Excel* you do *not* want those headings in the first printout.

Now, in the **Page Setup** dialog box, click on the **Print...** button to bring up the **Print** dialog box (Fig. 4.19)

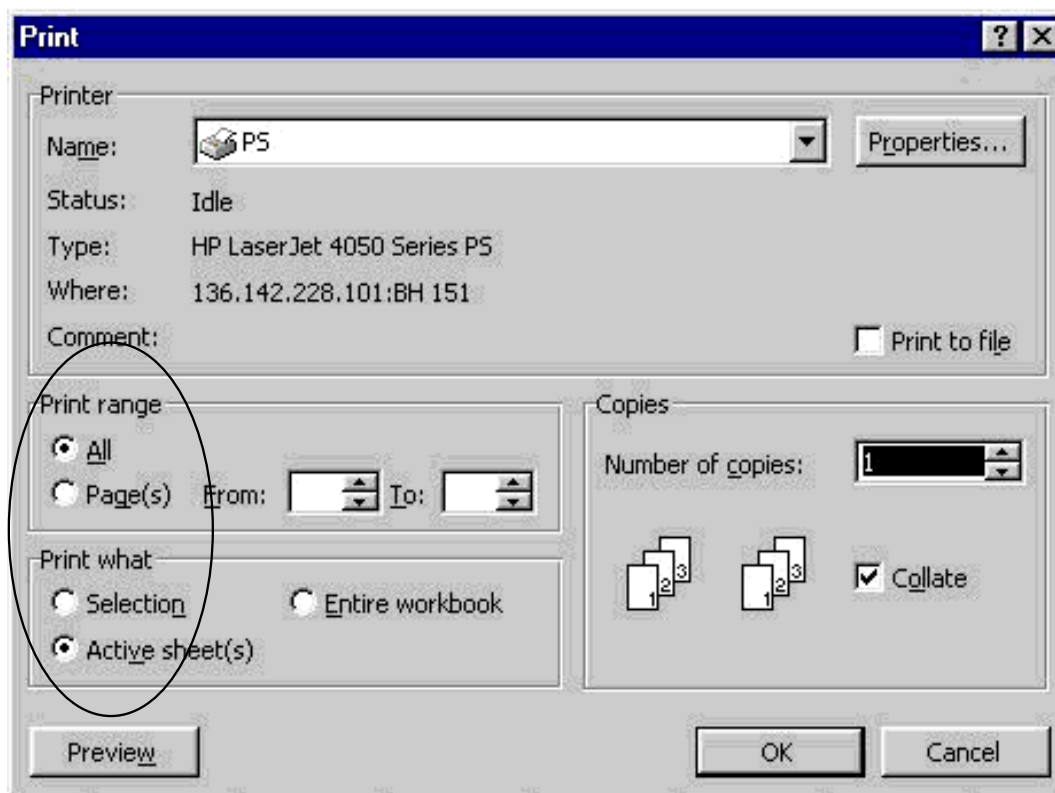


Fig. 4.19 The Print dialog box

In the print dialog box, you can choose the number of copies you would like. As a rule, it is best to have the computer print only one copy unless you have a high speed printer, since it is easier to make multiple copies by using a photocopier. Also, if you have a dot matrix, daisy wheel, or ink jet printer, select *draft quality* the first time or two, so you don't waste ink (this is not an option with laser printers since laser printers always print best quality).

Another tip, if you have control over your own printer, is to recycle once used paper (clean on one side) for draft copies. You might even start collecting this, instead of throwing it away. Help save the planet!

For **Print Range** in the Print dialog box the radio button for **All** is selected by default. If you look a little lower in the dialog box (in the **Print what** section) you'll see that the radio button for **Active sheet(s)** is also selected by default. These are the appropriate settings for this tutorial. We'll check out other options in Lesson 5.

Finally, click on **OK** to print your document

The printer will print your Grade 4 2002 gradebook so you can hand it in to your instructor.

## 4.8 SAVING A BACKUP COPY OF YOUR WORK

Your last task before completing this session at the computer is to make a backup of your spreadsheets on another disk. There are a couple of ways to do this and if you already know how to backup your work to your *Data Backup* disk, go ahead and do so. Otherwise complete the following directions.

The Grades Template and Grade4 2002 spreadsheets are saved on your *Data Disk*, which is in the disk drive.

Close the **Excel** spreadsheet program

**Close** or **minimize** any other windows that may be open on your desktop to make it easier for you to see what you're doing

**Double click** to **open** the **My Computer** icon, then **double click** to **open** the disk drive where you have your **Data Disk**

Now drag the folder **Spreadsheets** from your **Data Disk** to the Desktop and drop it there

Watch while Windows makes a copy of your documents on to the desktop, then close the Window on your **Data Disk**

Remove your **Data Disk** from the disk drive, replace it with your **Data Backup** disk and **double click** to **open** the disk drive

Now drag the **Spreadsheets** folder from the desktop to your **Data Backup** disk

## 4.9 A WORD ABOUT TEMPLATES AND STATIONERY DOCUMENTS

In the first two lessons, and in this lesson, you have been introduced to the concept and importance of templates. So much of a professional's work is based on standard forms of one kind or another. There are simply dozens of such forms that you either generate yourself or that are generated for you by administrators. They may be ditto masters, grade sheets, attendance registers, sign-up sheets, course schedules, syllabi, correspondence, you name it.

You should think "Template" whenever you use Microsoft *Office*. "How can I leverage the effort I'm putting into creating this document? Are there parts of it that are common to other documents I have to produce? Is there a template here that I should be saving as a separate document for future use?"

*Office* uses the term "Stationery" to describe documents that act as templates for word processing, database, spreadsheet, or Presentation applications. A selection of some two dozen "starter" documents are supplied with the software. Over the course of your career you will undoubtedly develop your own set of stationery documents or templates.

The rationale behind templates is personal productivity, where time and ideas are at a premium. Templates are a powerful way of capturing the free flow of ideas in the form of electronic documents which enhance the quality and efficiency of our work.



## LOOKING BACK

As you must be aware, there is still a great deal to learn about the *Excel* spreadsheet, but you are on your way.

This should be enough to give you ideas about using the *Excel* spreadsheet to keep records of numerical data. Apart from finding out what a spreadsheet is, you have learned how to build a spreadsheet template, including labels and formulas. This included basic layout operations such as expanding the width of selected columns and aligning cells. You also learned how to copy formulas to other cells in the spreadsheet.

You then learned how to change the name of the spreadsheet so that the template could be kept unaltered for later use.

After you filled out the gradebook and saved the set of data for a class, you practiced making changes such as adding or deleting rows and columns, and changing the value format for certain cells to percentages.

Finally, you learned how to print out the entire spreadsheet. This latter function is not something you would do as a matter of course. You might well, however, print out charts based on a spreadsheet in order to include them in a report that you have developed using the word processor. You'll learn how to do this in Lesson 6.

## LOOKING FORWARD

The next spreadsheet tutorial will help you learn other important aspects of working with spreadsheets, such as using the Lookup function and creating charts of various kinds.

You are probably becoming familiar by now with the environment called Microsoft *Office*. As you have no doubt noticed, skills learned using the word processor carry over into the use of the spreadsheet or the database. This is the most important advantage of an integrated software package such as *Office*. It means that the learning curve is less steep.

You will find that completing the remainder of these tutorials will not be nearly as tough. If you found the first three lessons easy, so much the better.

## SKILL CONSOLIDATION

Complete as many of these exercises as you can to reinforce what you have learned in Lesson 4.

1. Update Grade4 2002 by adding an extra column for another assignment, quiz, project, or test score and hand in your printout of the new spreadsheet.
2. Add two students, along with their scores for all assignment categories, to the gradebook that you created using this tutorial. Copy the formulas where necessary.
3. Add an extra column for another assignment (HW, Test, etc.), add a student, and update the summary (totals, percentage) columns where appropriate. Update the calendar data in the top left corner of the spreadsheet for a class taking place in the Fall semester, session 1, 2002.
4. Design and create a spreadsheet to handle an income statement for your personal checking account. The income statement will span one full year, from January to December. The leftmost column will contain a list of items that you typically purchase during the course of a month. Then the column headers across the spreadsheet will refer to months in the year. The numbers in the cells will be the financial amounts that you spent on each item per month. Then you will include totals at the bottom of each column (a tally for the month) and totals for each item at the end of each quarter/year. This could become an ambitious group project

if you were to add extra features such as weekly data with break points (sub totals) and so forth—very useful, too.

5. Get together with one other classmate and brainstorm for ideas about using the *Excel* spreadsheet with students K-12. List at least 10 suggestions and describe briefly (a sentence or two) how you would use each of them in a subject area and age group of your choice. Specify the subject area and age group for each idea.