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5 MORE ON THE USE OF THE SPREADSHEET
Making changes to existing spreadsheets

LEARNING OUTCOMES

In Lesson 4 you created a grade sheet for a class of 4th graders based on a template you had put together at the beginning of the same lesson. You learned that you can easily adapt a template for use with other classes that you might teach. You learned about the organization of spreadsheets. You learned about rows and columns, and the cells at the intersection of those rows and columns. You learned how to select cells and how to address cells using row and column coordinates. You learned how to enter formulas into certain cells in order to have *Excel* do calculations for you--totals and percentages in particular.

You filled the rows and columns with labels and grades. You had a first introduction to the idea that a spreadsheet can be a powerful tool for handling numeric data that requires mathematical or statistical processing.

In this tutorial you will have the opportunity to reinforce what you learned in Lesson 4. At the same time you will learn how to maintain a spreadsheet. This you will do by making enhancements to the spreadsheet you created in Lesson 4.

You will also learn about some of the logical processing capabilities of spreadsheets, capabilities which enable you to give an "intelligent" flavor to the applications that you build. In particular, you will learn about the following features of the *Excel* spreadsheet.

- Recapitulation and Reinforcement

- Updating an existing spreadsheet
- More changes to the look of the spreadsheet
- Using the LOOKUP function
- Creating charts based on spreadsheet data
- Printing the updated spreadsheet
- Making a backup copy of your documents

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!

5.1 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. 5.1)

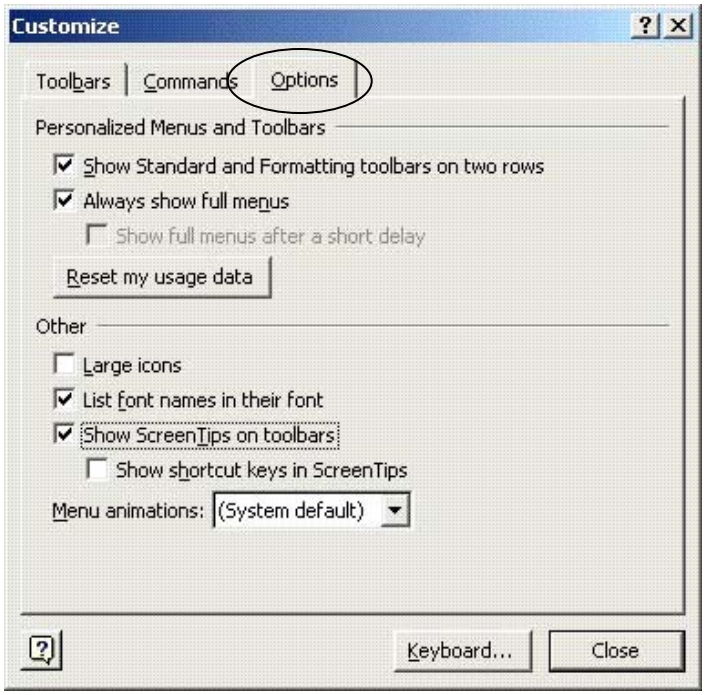

Fig. 5.1 The Customize dialog box

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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

You're going to work with a Gradebook very similar to the one you created in Lesson 4. But for the sake of uniformity, and to avoid confusion, you're going to use documents specially prepared for use with this lesson. As an exercise at the end of the tutorial you will have the opportunity to incorporate these changes into your own gradebook documents (Grade4 2002 and Grades Template) which you created when you completed Lesson 4.

You are going to make some improvements to the layout of the Gradebook, after which you will learn about the LOOKUP function as an introduction to the logic capability of *Excel*. At the end of the lesson you will learn how to create and modify charts of various kinds.

Open Microsoft ***Excel*** then put your **Work Disk** in the disk drive

Have your Data and Data Backup disks handy, of course, so that you won't forget to make a backup copy of all your work when you're done. You are going to update two documents:

- a gradebook template (called Grades Template, and stored in the Templates folder on your Work Disk);
- and an actual gradebook filled with data (this document has the name Gradebook and is stored in the Other folder also on your Work Disk).

You will work on the Gradebook document first.

By now you should know the steps to open a document, so go ahead and **Open** the document **Gradebook** from the **Other** folder on your **Work Disk**

5.2 RECAPITULATION AND REINFORCEMENT

Lesson 4 has Tables of the most useful *Excel* spreadsheet commands. You might like to put a marker at the relevant pages (pp. 93 and 94) for easy reference while you follow along in this tutorial. Alternatively, you can use the chart that is included at the end of this text (inside back cover). The following sections give you an opportunity to refresh your memory of the basic spreadsheet skills you learned in Lesson 4.

Moving from cell to cell in the spreadsheet

In *Excel* spreadsheet terminology the cell that is selected (surrounded by a heavier border) is called the current (or active) cell.

Take a moment now to reacquaint yourself with the methods for changing the position of the currently active cell. The **arrow keys** move the current cell to the adjacent cell left, right, above, or below the current cell.

Press all four of the arrow keys a few times, and watch how the current cell moves around

The **TAB key (forward)** and the **Shift-TAB command (back)** also move the cursor to the adjacent cell, but only in a **horizontal** (right or left) direction—try these two commands now.

The **RETURN key (forward)** and the **Shift-RETURN command (back)** also move the cursor to the adjacent cell, but only in a **vertical** (up or down) direction—try these two commands now

Use the **scroll bars** when you want to move around the spreadsheet without changing the location of the current cell—try this, too

More cell selection commands

Selecting sets of cells in the spreadsheet

You often may want to highlight all the cells in the spreadsheet --in order to change a font, or copy the data to another document, for example. Here's how you do this.

Click in the **empty box** above the **Row headers** and to the left of the **Column headers** (Fig. 5.2)

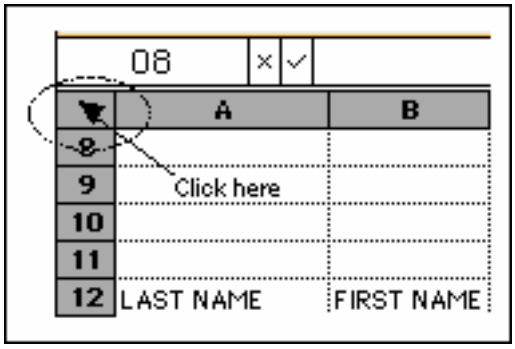

Fig. 5.2 Selecting an entire spreadsheet

The entire spreadsheet is now highlighted. However, perhaps you want to select only the cells that you're working in. There are a couple of ways to do this.

Click anywhere to **de-select** the selected cells

For example, use the mouse to drag diagonally down from cell **A1** to cell **N23**

That's one way.

Click anywhere to **de-select** the selected cells

Now, click in cell **A1**, hold down the **Shift** key, and click in cell **N23**

The same set of cells is selected. The Shift key is very useful for selecting a range of *cells* in *Excel*, or a range of *text* in *Word*, or even a range of *slides* in *PowerPoint*, which you'll learn about soon enough.

Going to a specific cell anywhere in your spreadsheet

If you are working in a large spreadsheet (consisting of thousands of cells) and you know the approximate coordinates of a cell you want to find, it is sometimes quicker to let *Excel* find the cell for you. The following steps will make the current cell the one that intersects Column AJ and Row 423, a location deep inside the spreadsheet and a long way from the first cell, cell A1.

From the **Edit** menu select **Go To**..., or press **Ctrl-g**

Type **AJ423** (you can use upper case (AJ) or lower case (aj) for the column coordinate)--and click on **OK**, then check that cell AJ423 has been selected

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Check now to see that cell AJ423 is highlighted. Remember that the first (alphabetic) coordinate (AJ) is always the column; the second (numerical) coordinate is always the Row.

Press **Ctrl-g** again, type **A1**, and click on **OK**

You are now back at the first cell. You could use the various movement options you read about at the beginning of this Reinforcement section. Some would be considerably slower than others, which is why you should take the time to familiarize yourself with *all* the different methods for moving around the spreadsheet, especially if you become a regular user of the spreadsheet.

5.3 UPDATING AN EXISTING SPREADSHEET

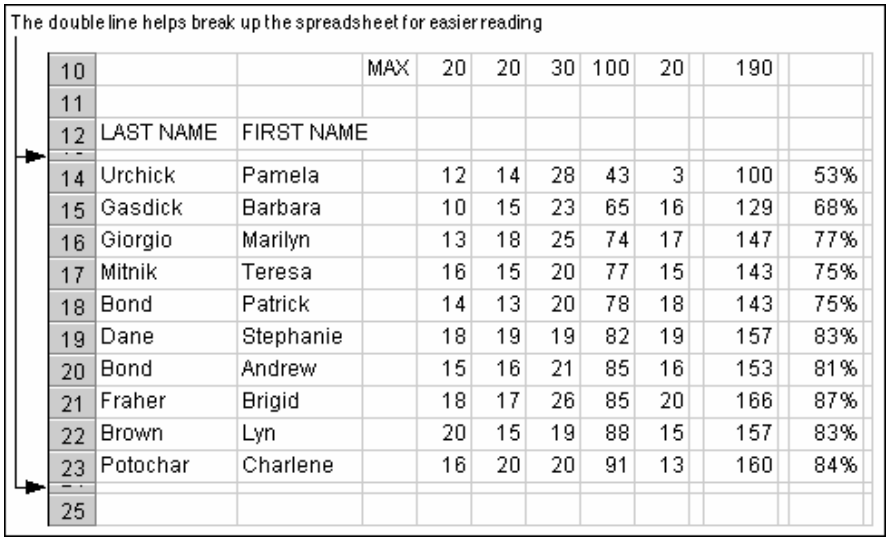
The Gradebook document would benefit from some cosmetic changes, such as the following.

1. There should be double lines to set off different parts of the spreadsheet. It is often useful to include double lines between headers and the data, and before summary totals.
2. It would be useful to include more formulas to increase the information content of the spreadsheet. For example, an average for each of the sets of grades so that you and your students can see where they stand in relation to the rest of the class on any particular assignment or test. A highest score and lowest score for each set of grades would also be useful.
3. It would be a good idea to lock cells containing data that you consider especially important to prevent you or someone else accidentally destroying the cell contents. It takes time to put together spreadsheet templates and other documents. Some cells will contain functions that were tricky to figure out. Locking them will make it difficult to lose your work.
4. Finally, *Excel* can do some of the thinking for you if you include a LOOKUP Table to figure out the grades for your students based on their percentage score at the end of a reporting period.

Let's deal with these problems one at a time. In this section you'll learn how to handle the first three improvements. Using the LOOKUP function will be dealt with later in this lesson.

Dividing up the spreadsheet to make it easier to read

After you have fixed change #1, the Gradebook document will look similar to Fig. 5.3.



10			MAX	20	20	30	100	20	190	
11										
12	LAST NAME	FIRST NAME								
14	Urchick	Pamela		12	14	28	43	3	100	53%
15	Gasdick	Barbara		10	15	23	65	16	129	68%
16	Giorgio	Marilyn		13	18	25	74	17	147	77%
17	Mitnik	Teresa		16	15	20	77	15	143	75%
18	Bond	Patrick		14	13	20	78	18	143	75%
19	Dane	Stephanie		18	19	19	82	19	157	83%
20	Bond	Andrew		15	16	21	85	16	153	81%
21	Fraher	Brigid		18	17	26	85	20	166	87%
22	Brown	Lyn		20	15	19	88	15	157	83%
23	Potochar	Charlene		16	20	20	91	13	160	84%
25										

Fig. 5.3 Gradebook after update #1

Breaks between sections of a spreadsheet help the eye locate important data when scanning the page, whether on screen or on paper. In *Excel*, the easiest way to do this is to insert an extra row or column at the point where you want to create a division between different parts of the spreadsheet, and reduce the width of the row or column so it appears as a double line. Follow these steps to update the spreadsheet along the lines of Fig. 5.3.

On the left edge of the screen, click on **Row 13** to select the entire empty row

Now you want to reduce the row height so it looks like a double line dividing Rows 12 and 14.

From the **Format** menu select **Row/Height...**, then in the **Row/Height** dialog box type the number **4.5** to replace the default height, and click **OK**

You need to create a similar dividing line after Row 23, which holds the data for the last student in the roster. This is because you are shortly going to include new formulas in Rows 25 through 27.

Reduce the height of **Row 24** in the same way as you did Row 13, then **Save** the changes you have made

There are a couple of other ways to change the height of a row or the width of a column.

One way is to position the mouse on the line between the row or column headers at the point where you want to change the height or width. The mouse changes to a cross hair with arrows. Then hold down the mouse button and drag to change the height or width of a row or column respectively. A small box appears when you do this (try it for yourself) which tells you the height you are selecting. You already learned in Lesson 4 how to do this for column width.

Another way is to right click in a cell in the row or column whose height or width you want to change. In the pop up menu you would select to adjust row height or column width, and proceed from there. Very simple.

Adding formulas to the spreadsheet

Excel comes with many built-in functions for the spreadsheet. There are ten categories of functions, including Math & Trig functions, Statistical functions, Logical functions, and Financial functions, among others. These functions allow the spreadsheet to be tailored to meet the needs of myriad numerical data applications from Accounting to Zoological research.

From the **Insert** menu select **Function...** or click on the **Insert Function (*fx*)** icon in the **data entry** bar (Fig. 5.4) to take a look at the functions you can use

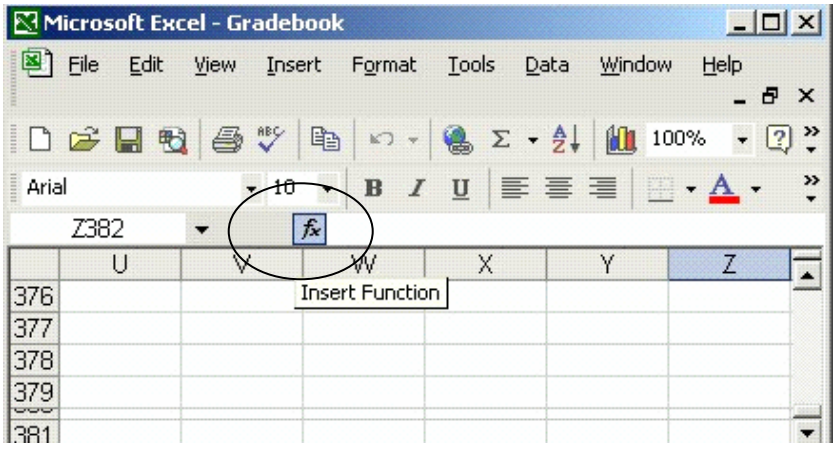


Fig. 5.4 Insert Function (*fx)* icon in the data entry bar

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Excel displays a dialog box showing a listing of these functions (Fig. 5.5).

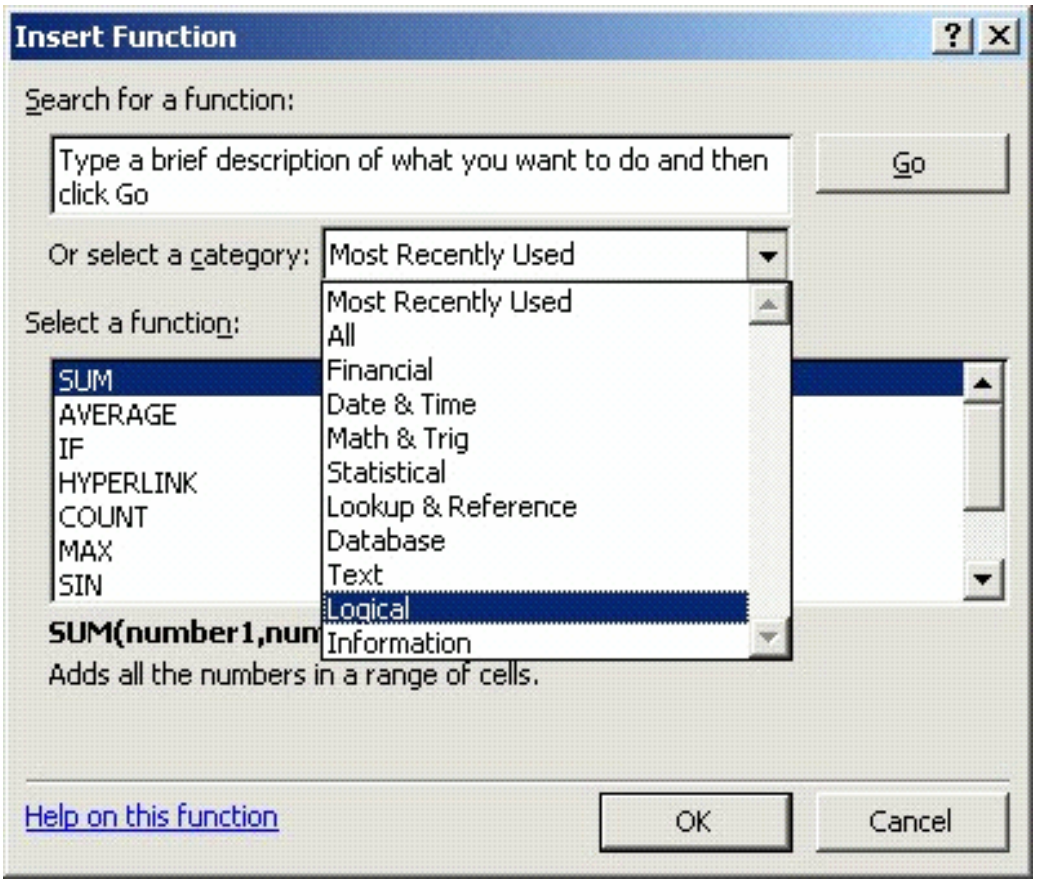

Fig. 5.5 The Insert Function dialog box

Click to pull down the **menu of categories**, then select the **All** option in the menu

Scan through the list of over 200 built-in functions in the **Select a Function** scroll box

Depending on your math, computing, statistics, or accounting background, you might recognize many of them.

Click on the **Cancel** button to close the **Insert Function** dialog box

Experience is the best way to learn how they work. In Lesson 4 you already learned to use the *Sum* function, and also you created your own formula to calculate the *Percentage* for each student.

Calculating an average for each of the grade columns
Next, you are going to add three new functions to the Gradebook: the *Average*, the *Max*, and the *Min* functions. You want the value representing the average of the scores in a column to appear in a cell in Row 25 at the bottom of each of the columns where you want to calculate an average.

Fig. 5.6 illustrates how your spreadsheet will look after you have inserted the formulas in the appropriate cells.

			A1	A2	A3	A4	A5
		MAX	20	20	30	100	20
LAST NAME	FIRST NAME						
Urchick	Pamela		12	14	28	97	3
Gasdick	Barbara		10	15	23	65	16
Giorgio	Marilyn		13	18	25	74	17
Mitnick	Teresa		16	15	20	32	15
Bond	Patrick		14	13	20	78	18
Dane	Stephanie		18	19	19	65	19
Bond	Andrew		15	16	21	85	16
Fraher	Brigid		18	17	26	95	20
Brown	Lyn		20	15	19	73	15
Potochar	Charlene		16	20	20	91	13
	Average		15.2	16.2	22.1	75.5	15.2
	Max score		20	20	28	97	20
	Min score		10	13	19	32	3

Fig. 5.6 Average scores for each column

Notice in Fig. 5.6 that the last cell in the column of first names has the row label *Average*. You need to do the same in your Gradebook.

> Select cell **B25**, type the label **Average**, and press **Tab** twice to move to cell **D25**

A word about automatic calculation

When **Auto**matic **Calc**ulation is switched on, *Excel* immediately carries out any calculations that are necessary when you make any changes to the data in the spreadsheet. So you don't have to remember to do this yourself. Whenever your spreadsheet is small (like the Gradebook document) you will hardly be aware that *Excel* is working for you like this. If your spreadsheet were large, however, you might want to wait till you tell *Excel* to recalculate all the formulas, because of the time it can take to carry out this task.

> From the **Tools** menu select **Options...** then, in the **Options** dialog box, click on the **Calculation** tab (Fig. 5.7)

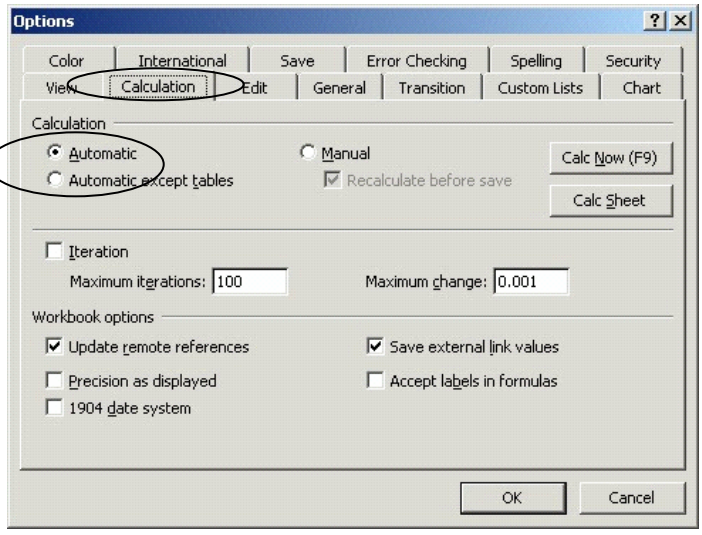

Fig. 5.7 Automatic Calculation

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Check to see that the radio button next to **Automatic** is selected (indicating that **Automatic Calculation** is already selected)

If not, click on the radio button next to **Automatic** and click **OK**

Back to the task at hand
The average is computed by adding (SUMming) the set of scores for an assignment or test, and then dividing by the number of scores in the set. You *could* put together this function yourself, of course. If you know what it would be for the first column of scores, write it in the box below.

It would look something like this: **=SUM(D14:D23)/10**. But since *Excel* has a built in Average function, you may as well use it. Here is the complete set of steps to include the Average function in your spreadsheet.

Make sure cell **D25** is still selected (the cell under the first column of scores), then from the **Insert** menu select **Function...**

Select the **Statistical** category, then select the **AVERAGE** function from the list of Statistical functions and click **OK**

Excel pastes the function into the data entry bar towards the top of the spreadsheet window and then selects the cells in the column above the cell in which you want to put the average function. It also presents a new dialog box (Fig. 5.8).

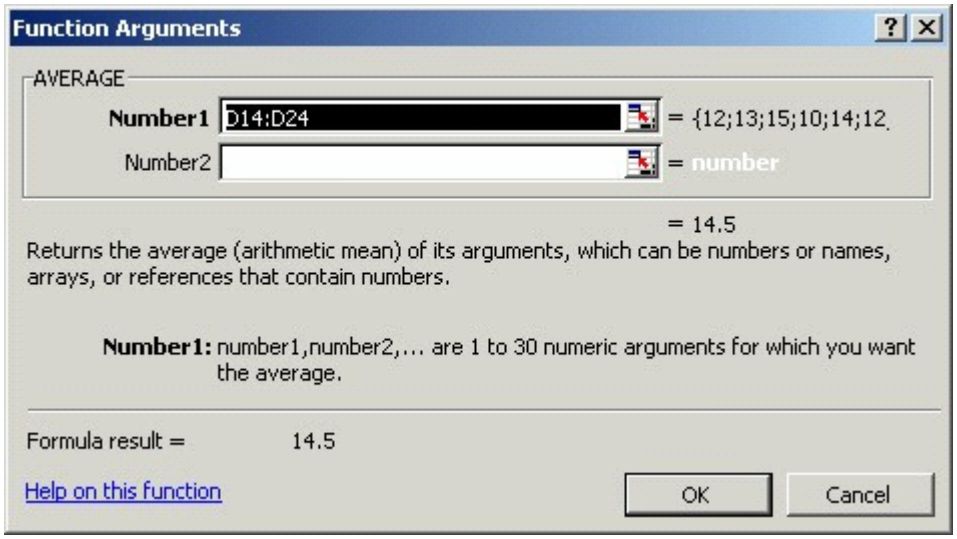

Fig. 5.8 The function is first pasted into the Entry bar

This Function Arguments dialog box selects the set of cells above the cell containing the new formula, explains what the *Average* function does, and asks you to confirm the formula by clicking the OK button. At this stage, you can change any of the cell addresses in the data entry box.

Notice that *Excel* has included cell D24 (an empty cell) as part of the set of cells to be averaged. This will not affect the result because *Excel* assumes that an empty cell is not to be included in the calculation of the function's result.

The formula in the Data Entry bar towards the top of the spreadsheet window should read =AVERAGE(D14:D24). Is this the exact wording of the formula on your screen?

If it is, click **OK**; if it is not, correct it, then click on **OK**

Now look at cell **D25**. It should contain the average for the scores in Column D. There are three problems that can occur:

1. If you see a series of pound signs (#######...) this indicates that you need to widen the column a little so there is enough space for the average score. Either use the Format Column/Width... option, or drag with the mouse to make the column wider. If you don't see the pound signs (#######...), all well and good.

2. If a Bad Formula prompt pops up on the screen, check the formula in the entry bar again, compare it to the Average formula above, and make any corrections.

3. If the values being averaged have no decimal places, then the default number of decimal places will be zero (0). But it would be useful to show at least one decimal place. Here are the steps to change the precision of a decimal number.

   From the **Format** menu select **Cells...**, then in the **Format Cells** dialog box (Fig. 5.9) select the **Number** category, and set the number of decimal places (also called precision) to **1** and click on **OK**

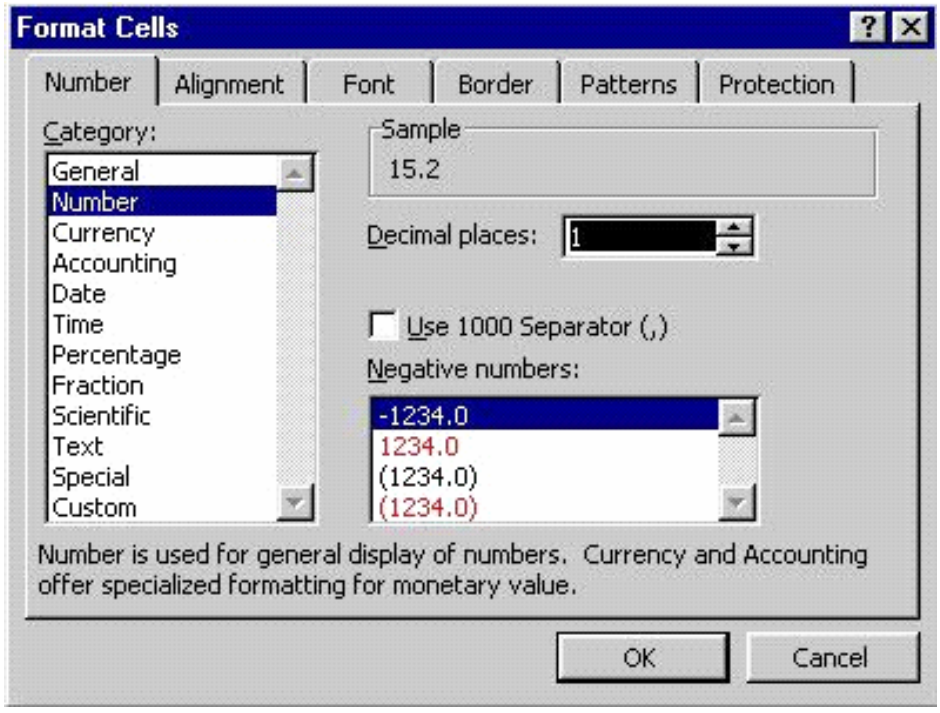

Fig. 5.9 Changing the precision of a decimal in the Format cells dialog box

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Assuming all is well, your next task will be to copy this formula into the adjacent cells to the right under the other columns of scores (cells E25 through H25).

Cell **D25** should still be selected

Use the mouse to point at cell **D25**, then hold down the mouse button and drag across to **Column H** (so cells D25, E25, F25, G25, and H25 will all be selected) then from the **Edit** menu select **Fill/Right...**

That's all there is to it. Adjust the column widths if you see pound signs (#) instead of averages. It's all good practice.

Time to save all that hard work (**Ctrl-s)**

Displaying the Highest and Lowest scores for each column of scores

Now that you know how to use the Function... option from the Insert menu, and in particular since you just used it to put the Average function in your spreadsheet, you can complete the exercise that follows. You might find it best to read over the directions before carrying them out, since they're a bit tricky at first.

Put a heading in cell **B26** (**Max score**) and in cell **B27** (**Min score**)

Put the **Max** function in cell **D26** (listed as **Max( )** in the **Statistical** category in the **Insert Function** dialog box)—this function is used to find the highest score for each set of scores

Drag down with the mouse to select cells **D14 through D23**, the cells you want included as arguments in the Max function (**D14:D23**), and click **OK**

In cell **D27** put the **Min** function (listed as **Min( )** in the **Statistical** category in the **Insert Function** dialog box) and drag with the mouse to select cells **D14** thru **D23** once again, then click **OK**

Just as you did when you worked on the Average function, copy the new **Max** and **Min functions** across to the corresponding cells under columns **E thru H** using the **Fill/Right...** option in the **Edit** menu

When you're done, your spreadsheet should resemble that illustrated in Fig. 5.10 on the next page.

Locking (protecting) important cells

Excel allows you to protect the contents of a cell by locking or protecting it. This means that neither you nor anyone else will be able to change the contents unless you remove the protection. This feature is useful to prevent accidental loss of data, and will also help prevent others from interfering with the data you have collected.

Since all the data in a Gradebook are important, it would be a good idea to protect everything. The process to do this is the same as if you were protecting a single cell, or a few cells, except that you select every cell.

Press **Ctrl-a** to **Select All** the cells in the spreadsheet

From the **Tools** menu select **Protection/Protect sheet...**, then click on **OK** in the dialog box that pops up on the screen

GRADE REPORT										
Class:	Grade 4									
Semester:	1									
Year:	2000									
			A1	A2	A3	A4	A5	TOTAL	PCNT	GRADE
		MAX	20	20	30	100	20	190		
LAST NAME	FIRST NAME									
Urchick	Pamela		12	14	28	97	3	154	81%	
Gasdick	Barbara		10	15	23	65	16	129	68%	
Giorgio	Marilyn		13	18	25	74	17	147	77%	
Mitnick	Teresa		16	15	20	32	15	98	52%	
Bond	Patrick		14	13	20	78	18	143	75%	
Dane	Stephanie		18	19	19	65	19	140	74%	
Bond	Andrew		15	16	21	85	16	153	81%	
Fraher	Brigid		18	17	26	95	20	176	93%	
Brown	Lyn		20	15	19	73	15	142	75%	
Potochar	Charlene		16	20	20	91	13	160	84%	
	Average		15.2	16.2	22.1	75.5	15.2			
	Max Score		20	20	28	97	20			
	Min Score		10	13	19	32	3			

Fig. 5.10 The Gradebook document after adding the functions (your data may be different)

Notice that you have the option to include a password to remove protection (unlock the locked cells). Now all the cells in the Gradebook are unable to be changed unless you select Unlock Cells from the Option menu. If you wanted to lock just certain cells you would first select the cell or cells and turn on the Protection tool for just that cell or those cells.

If you try to change a locked cell, you will get a warning dialog box (Fig. 5.11) telling you that you can't change anything unless you first remove the protection.

Fig. 5.11 Protection warning dialog box

For this reason, later in this tutorial, when you get this warning message, you will need to remove the protection on cells in order to make updates.

Time to save the changes you have made to the Gradebook (**ctrl-s**). This should be becoming instinctive for you by now.

Dividing the spreadsheet into panes

Often a spreadsheet, or any type of *Excel* document for that matter, will be too long or too wide to view all at once on the screen. *Excel* has a useful feature called panes.

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You can split any window horizontally or vertically into sections. This will allow you, while working or scrolling in one section, to keep the other section(s) fixed in place.

To see how this works, from the **Window** menu select **Split...**

Excel immediately divides up the worksheet into four sections, using a vertical and a horizontal split bar (Fig. 5.12).

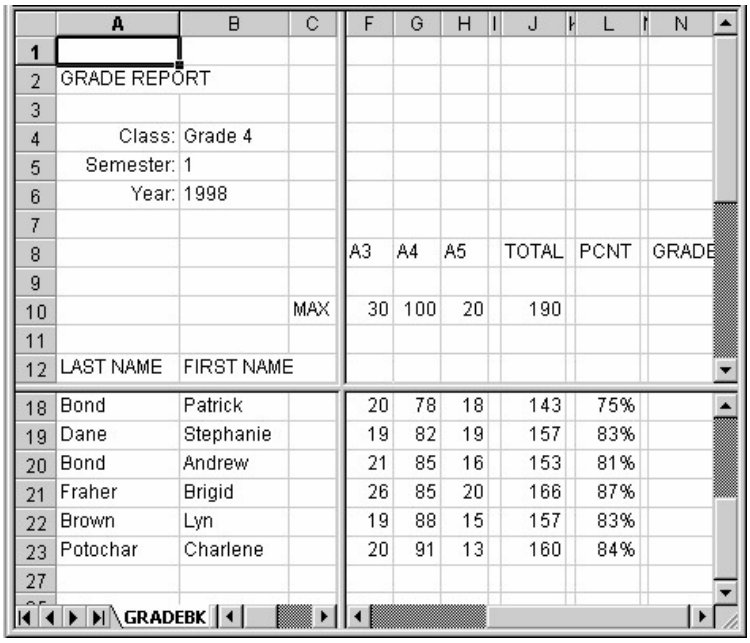

Fig. 5.12 *Excel*'s vertical and horizontal split bars

You can change the position of the split bars by positioning the mouse arrow on a split bar and drag across or down the screen.

Try this for practice— position the mouse arrow on either the vertical or horizontal **split bar** (you'll get a **cross-hair cursor**) and hold down the button while you drag across or down the screen

Notice how easy it is to compare different parts of a spreadsheet in this way. The pane or splitting screen feature is available in all *Excel* applications, but you probably will find that you use it most frequently while working with spreadsheets, especially large ones. *Removing panes*

From the **Window** menu select **Remove Split**

Your spreadsheet should be restored to its original format.

5.4 MORE CHANGES TO THE APPEARANCE OF THE GRADEBOOK SPREADSHEET

In Lesson 4 you learned how to change the size of columns and rows. Now you are going to remove the grid lines, and put borders around some cells.

Putting a border around a cell or set of cells

You may want to put a box around the Class info in cells A4 through B6. This will make the information stand out in a report. Let's try this now.

Drag across **cells A4 through B6** to select the set of **Class info**

The cells of the spreadsheet are still protected, and you'll have to unprotect them before you can make any changes to the cells.

From the **Tools** menu, select **Protection/Unprotect sheet**, then from the **Format** menu select **Cells...** to bring up the **Format Cells** dialog box

Click on the **Border** tab in the dialog box (Fig. 5.13)

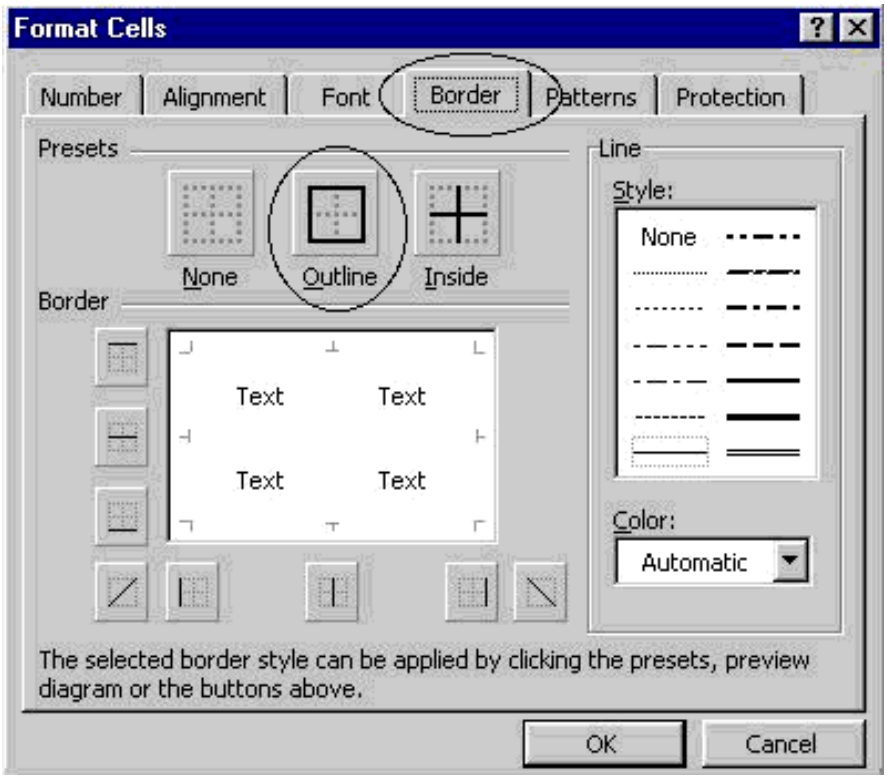

Fig. 5.13 *Excel*'s Outline feature for cell borders

As you can see, the Border dialog box gives you various options.

Click on the **Outline** preset icon and click on **OK**, then from the **Tools** menu select **Protection/Protect Sheet...** and click **OK** to restore protection to the sheet's cells

As you can see, the Class Info now has a border around it, setting it off nicely (Fig. 5.14).

2	GRADE REPORT	
3		
4	Class:	Grade 4
5	Semester:	1
6	Year:	2000
7		
8		

Fig. 5.14 Spreadsheet with added features

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Removing grid lines and column and row headers

Grid lines and column and row headers are essential when developing a spreadsheet or when one is updating the data. But for reporting purposes it may look better, perhaps even easier to read, if they are removed. Try this for yourself.

> From the **Tools** menu select **Options...** to see the **Options** dialog box (Fig. 5.15) and click on the **View** tab to select the View options

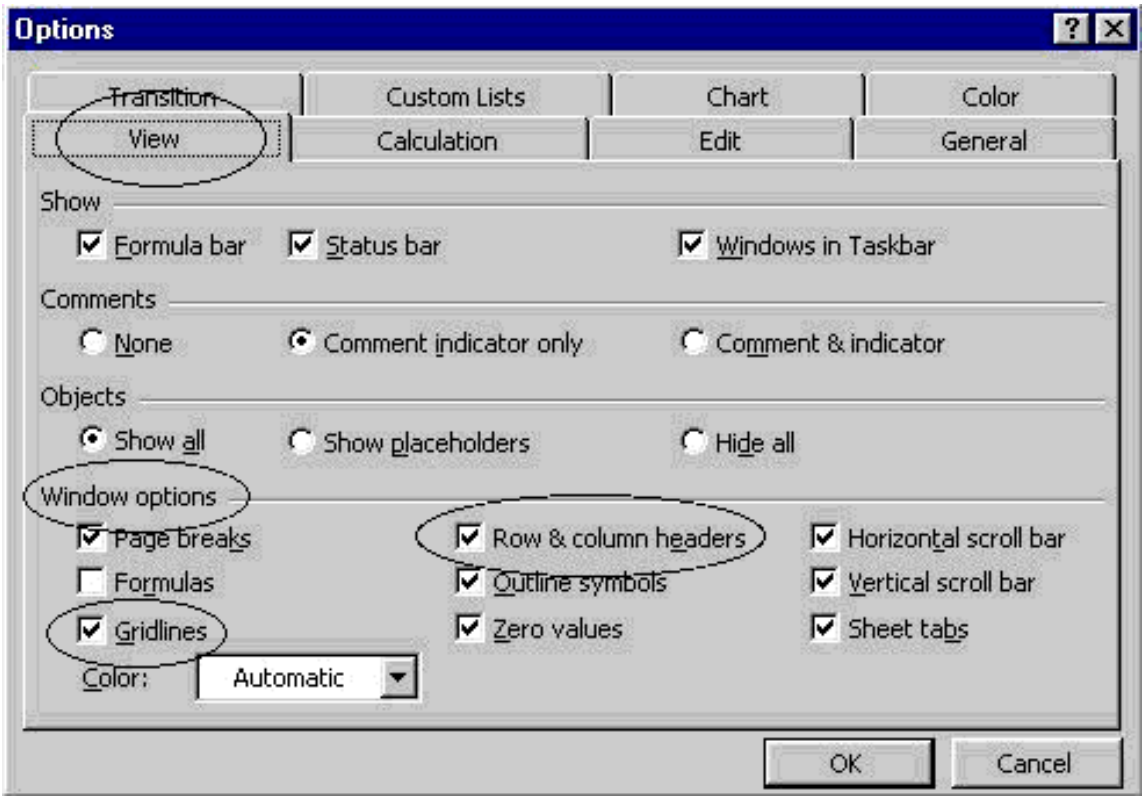

Fig. 5.15 The Options dialog box

> In the **Window** options section of the dialog box, remove the **check mark** in the boxes next to **Gridlines**, and **Row & column headers**, then click on **OK**

The spreadsheet now looks quite different, as you can see.

Practice makes perfect

> Open the **Templates** folder on your **Work Disk** and load the **Grades Template** document onto the Desktop

Now you're going to go ahead and make the same changes to the Grades template that you just made to the Gradebook document. You'll update the Grades Template, except you won't transfer any of the actual data from the Gradebook document to the Grades Template spreadsheet—you'll just update the functions and other formatting features in the same way as you did with the Gradebook document.

What you're doing is making sure that the Grades Template spreadsheet has the same format and functions as the Gradebook document so that you can use it with other classes you may have in the future.

The directions following Fig. 5.16 will help you in this reinforcement task. Hint: Use *Copy* and *Paste* to complete many of the tasks.

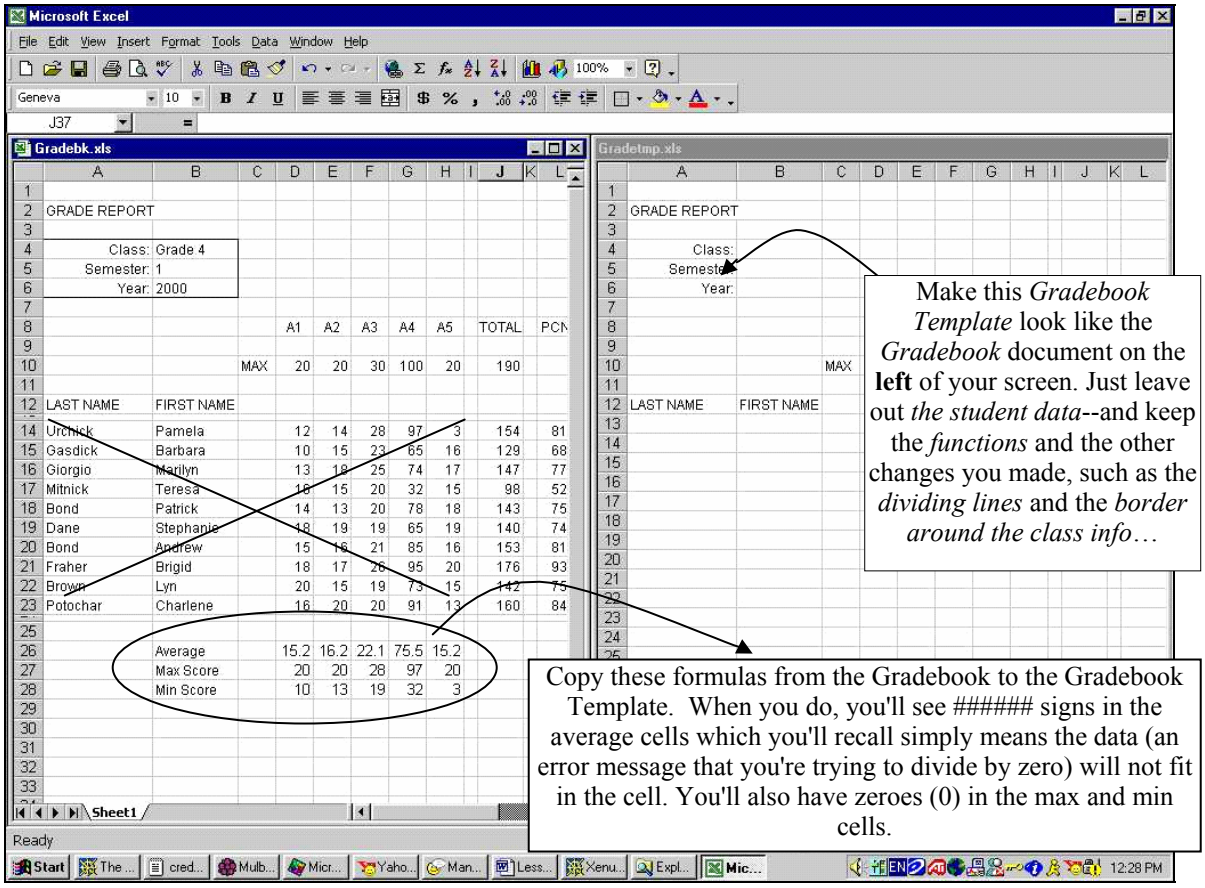

Fig. 5.16 Tiling the spreadsheet windows

1. As illustrated in Fig. 5.16 above, tile the two spreadsheets so you can see them side by side on the screen. Here's how to do this.

   From the **Window** menu select **Arrange...**

   The **Tiled** option is selected by default, so click on **OK**

2. It will be easier to complete these tasks if you bring back the *gridlines* and the *column and row headers* in the Gradebook document.

   Click anywhere on the **Gradebook** window to make sure the **Gradebook** is the **active** window

   From the **Tools** menu select **Options...**, then in the **Options** dialog box click on the **View** tab

   In the **Window options** section put the **check mark** back in the boxes next to **Gridlines** and **Row & column headers**, then click on **OK**

3. If necessary, step again through the section you have just completed (**5.4 MORE CHANGES TO THE LOOK OF THE SPREADSHEET**) completing the same tasks in the **Grades Template** document that you just completed for the **Gradebook** document.

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Be sure to save the **Grades Template** when you have finished making the changes.

> When you have finished updating the **Grades Template**, from the **index** in the **Window** menu select the document **Gradebook** so as to make this once again the current document on the Desktop

It might be a good idea to take a break at this point in the tutorial. If you are unable to finish everything in one sitting, you should save the *Gradebook* and the *Grades Template* documents on your **Data** disk and your **Data Backup** disk before shutting down the computer. You should know how to do this by now, but if you need help with this task, the directions are at the end of the lesson.

TIME FOR A BREAK?

FEEL FREE TO TAKE ONE…

THIS MIGHT BE ENOUGH FOR ONE DAY!

5.5 USING THE LOOKUP FUNCTION

The concept of the LOOKUP function

The spreadsheet LOOKUP function is a little tricky to understand, so stand up, step back from the keyboard for a while and stretch some of those muscles that are stiff from sitting through the first part of this tutorial. When you are ready, read quietly through this section to understand how the LOOKUP function works.

The LOOKUP function is a simple logic tool that you can use to automatically assign grades to your students based on the numbers in the Percentage column of your spreadsheet (column **L**).

You are probably aware by now that if you have the automatic calculation option selected, *Excel* carries out function-based calculations as you make changes in a spreadsheet. Thus, once you have programmed *Excel* to LOOKUP the grades, the system will automatically update each student's Letter Grade, along with Totals and Percentages, even as you enter new scores for assignments, homework, tests, and so forth.

Thus, with no effort on your part, you will be able to keep students informed at any time during the semester as to exactly what grade they currently carry for the class.

Such information is invaluable. *Knowledge is power*. When a student is aware of an inadequate grade early on, extra effort can be applied to improve the situation before it is too late. It is surprising how often students are unaware of how they stand with regard to their progress through a course. The teacher who fails to provide adequate feedback when directing students in their pursuit of academic objectives deserves at least some of the blame if students do not progress as well as they should. When students are kept apprised at all times of where they stand they tend to take more responsibility for the outcomes of their efforts--or lack of them.

Fig. 5.17 illustrates the LOOKUP Table that will be the outcome of this exercise.

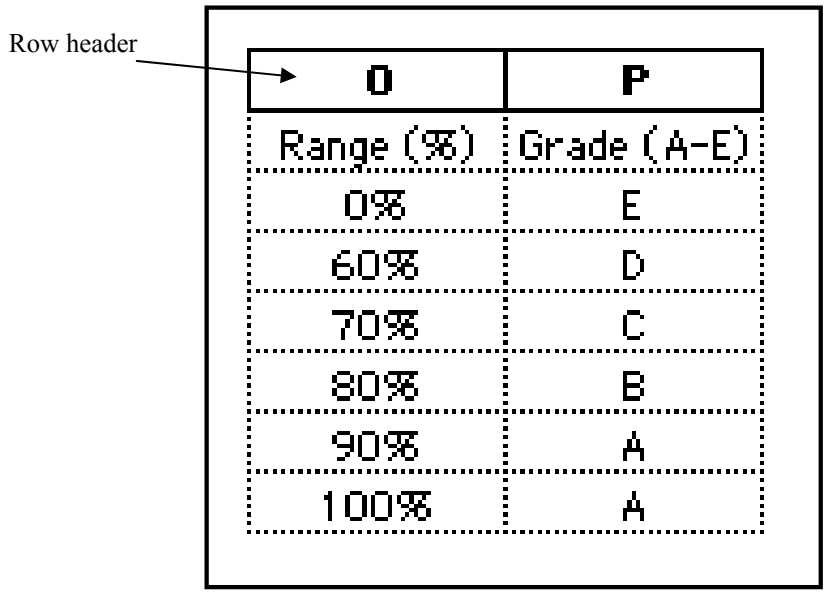

Fig. 5.17 LOOKUP table

You are going to tell *Excel* to compare a student's percentage with the range of values in the first column of the table. These are control percentages. *Excel* will search through this first column, looking for the highest value (percentage) that is *less than or equal to* the student's percentage. Once that value is located in the first column, the function will assign the student the letter grade that is adjacent to it in the second column.

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Does that make sense? An example will help. Suppose the student's percentage is 87%. Well, in the table above the *highest* value in the first column that is still *less than or equal to* 87% is 80%, is it not? 70%, 60%, and 0% are less than or equal to 87%, but they are not the *highest* value that is less than or equal to 87%. So 80% is the value that *Excel* will select from the Range column in its LOOKUP of the table. The letter grade from the corresponding cell in the second column--in this case a "B"--will then be posted to the **GRADE** column of the gradebook proper.

Once you understand the concept of "the highest value less than or equal to another number", the rest is easy. Here are a few student percentages to try for yourself. Complete the exercise that follows.

From Fig. 5.17, column 1,

what is the highest value less than or equal to 45%? _____
what is the highest value less than or equal to 67%? _____
what is the highest value less than or equal to 59%? _____
what is the highest value less than or equal to 100%? _____

The answers are in the footnote at the bottom of the page.[1]

There are two parts to incorporating the *Excel* LOOKUP function into your Gradebook. First you must build the LOOKUP Table into the spreadsheet. Second you must enter into the appropriate cells the LOOKUP function that will instruct *Excel* to carry out the LOOKUP operation.

Building the LOOKUP Table

You'll need both the **Gradebook** and the **Grades Template** spreadsheets open to complete the remainder of this tutorial, so if these documents are not on the desktop, open them both from the **Work Disk** before proceeding

Next, from the **Window** menu select the **Gradebook** document if it is not already the active window on the screen

Since all the cells are protected in the Gradebook document, you'll need to unlock them first in order to make changes.

From the **Tools** menu select **Protection/Unprotect sheet...**

Now, let's build the Lookup table that's illustrated in Fig. 5.17. The first column of the LOOKUP Table (the lookup vector) has a set of numbers which *Excel* calls the *lookup_vector*. A vector is just another name for a single column of numbers. This is the set of values against which *Excel* compares the data from a selected cell in the Gradebook.

Let's create this column (vector) of the LOOKUP table first.

Select cell **O1** and type the column header **Range (%)** then press **Enter** to move down to cell **O2**

Type **0** (the number zero (0) that is) in cell **O2** and press **Enter** to move down to cell **O3**

Type **0.6** (this is equivalent to 60% in mathematical terms) and press **Enter** again to select cell **O4**

---

[1] 0%, 60%, 0%, 100%

Type **0.7** and press **Enter** to make **O5** the current cell, then type **0.8** and press **Enter** once more

Type **0.9** in cell **O6** and press **Enter** to make **O7** the current cell, then type **1** (this is equivalent to 100% in mathematical terms) and click on the **Accept** (✓) button

Now you must change the cell attributes of this first column of the table so as to display the numbers in percent form (with the percent (%) symbol). You did this before in Lesson 4, so the following is just a reminder of how to do this.

Drag down to highlight **all 6** of the scale values from cell **O2** to cell **O7**

In the **Format** tool bar click on the **% (Percent)** symbol to change the format of the decimal numbers to percentages

That completes the first column of the table. Now for the second column with the letter grades--what *Excel* calls the result vector. These are the values which *Excel* returns to the gradebook cell in which is the formula which calls the LOOKUP function.

Select cell **P1** and type the header **Grade (A-E)**, then press **Enter** to move down to cell **P2**

Type the letter **E** (or whatever you would use for a failing grade) and press **Enter** to go to cell **P3**

Type a **D** and move down to cell **P4**, then type a **C** and move down to cell **P5**

Type a **B** and move on down to cell **P6**, then type an **A** and move down to cell **P7**

Finally type an **A** again in cell **P7** and click on the **Accept** (✓) **button**

The table is now almost ready for use. A couple of cosmetic adjustments will improve its appearance.

Select columns **O** and **P** by dragging across the letters **O** and **P** at the top of the columns

In the **Format** *toolbar* select **Center** alignment, then in the **Format** *menu* select **Column/Width** and make the width **10**

Your LOOKUP Table should now look like Fig. 5.17 above. When you are done, don't forget to save all your hard work before proceeding with the tutorial.

Using the clipboard to copy cells from one document to another

Now that you have completed the task of building the LOOKUP Table in the Gradebook document you should update the template document Grades Template along the same lines. The easiest way to do this is to copy the relevant cells from the Gradebook document into the Grades Template document using Copy and Paste.

First you must copy the relevant cells (those used for the LOOKUP Table) from the Gradebook document to the clipboard. Here are the steps.

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Select cell **O1** and drag down diagonally across the **LOOKUP Table** to cell **P7**

Press **Ctrl-c** to copy the **LOOKUP Table** to the clipboard

Now you must switch to the Grades Template document.

Select **Grades Template** from the list in the **Window** menu to make it the active document on the Desktop (or click on the **Grades Template window** on your screen)

Click on cell **O1** to make it the current cell

Press **Ctrl-v** to paste the **LOOKUP Table** from the clipboard to the **Grades Template**

Notice that the width of columns O and P in the **Grades Template** is the default width of 13, which is wider than you need for the table.

In the **Grades Template** window, change the width of columns **O** and **P** to **9**, then save your work (**Ctrl-s**) once more

Entering the LOOKUP function into the spreadsheet

Recall that the LOOKUP function instructs *Excel* to look up a table that you have built and come back with a corresponding result to store in the spreadsheet proper. Still confused? Maybe the following will help you figure it out.

The LOOKUP function has the following parts to it:

=LOOKUP(lookup _value,lookup_vector,result_vector)

Let us examine each part of this function in order to understand how it works.

- As you know, the "=" symbol at the start of the function simply tells *Excel* that a function is in the cell, as opposed to regular data such as numbers or labels.
- The word **LOOKUP** tells *Excel* the task it has to carry out (look something up in a list).
- **lookup_value**, **lookup_vector**, and **result_vector** are variables (control values) that *Excel* uses when it is looking up the table:
  - the **lookup_value** is either a number or text (such as a person's name); this **value** will be the "key" that *Excel* will use as it searches through the cells in the **lookup_vector** or column;
  - the **lookup_vector** is the column of cells that *Excel* has to check in its lookup of the table (column O in Fig. 5.16);
  - the **result_vector** is the column of cells in which *Excel* will find the result of the LOOKUP operation.

Still confused? Maybe an example will help you understand how the Lookup function works. It will be easiest for you to follow the next exercise if you have an actual gradebook to work with.

Begin by switching back to the **Gradebook document** on the Desktop (use the **Window** menu for this or click on the Gradebook document on your screen)

As you follow along, make sure you have the LOOKUP Table (columns **O** and **P**) showing on the screen, as well as the last two columns of the gradebook document (columns **L** and **N**) containing the PCNT and GRADE data.

Scroll over as far as necessary until you have columns **L through P** showing on the screen with the top of the LOOKUP Table (**Row 1**) at the top of the screen

Select cell **N14**

This is the first cell in the GRADE column. You want *Excel* to use the LOOKUP function to figure out the letter grades for each student and display it in this column (Column N). So this is where the LOOKUP function must go.

From the **Insert** menu select **Function...** or click on the **Insert Function** icon (***fx***) in the **data entry** bar towards the top of the spreadsheet window

In the **Insert Function** dialog box select the **Lookup & Reference** category, then scroll down and click on **LOOKUP** in the **Select a Function:** scroll box, and click on **OK**

This brings up the *Select Arguments* dialog box (Fig. 5.18).

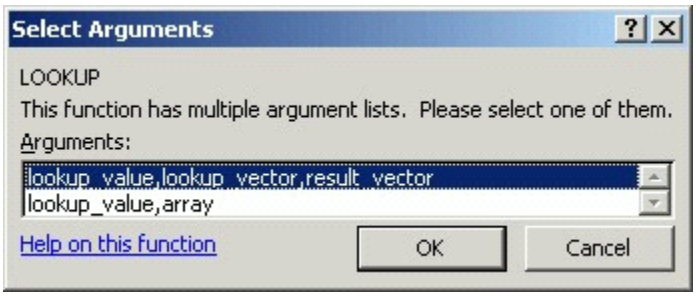

Fig. 5.18 The Select Arguments dialog box

The first set of arguments (**lookup_value, lookup_vector, result_vector**) is what we want, and it's already selected by default, so click on **OK**

The entry bar now contains the basic LOOKUP function, ready for you to add the three (3) arguments for the LOOKUP function—the lookup_value, the lookup_vector, and the result_vector. *Excel* also presents a dialog box for you to enter these arguments.

Entering the lookup_value in the dialog box

Notice that the cursor is positioned for you to enter the first parameter of the LOOKUP function (the lookup_value). You must select the cell which contains this lookup_value. Cell L14 contains the Percentage for the first student. Well, each student's Percentage will determine the grade, so the percentage is what we want *Excel* to use to find the letter grade from the Lookup Table.

Click on cell **L14**

Excel enters this cell's coordinates as the first of the LOOKUP parameters, the *lookup_value*. You are telling *Excel* that it must use this first student's percentage as the value to check against the first column of the LOOKUP Table (O2 through O7).

Entering in the lookup_vector

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Cells O2 through O7 are the lookup_vector for the LOOKUP Table.

> Click in the **second** data entry box in the **LOOKUP dialog box**, the lookup_vector entry area, so you can enter the cells which contain the **lookup_vector**
>
> Use the mouse to drag down **from cell O2 to cell O7** in the spreadsheet

Notice that *Excel* fills in the second of the LOOKUP parameters, the lookup_vector. Check this in the Data entry bar, too.

Entering the result_vector
Cells P2 through P7 are the result_vector for the LOOKUP Table.

> Click in the third box in the LOOKUP dialog box so you can specify the cells that contain the **result_vector**
>
> Now drag down **from cell P2 to cell P7** in the spreadsheet

Notice, once again, that *Excel* fills in the third of the LOOKUP parameters, the result_vector.

> Check the data entry bar to see that the LOOKUP function is now complete
>
> Finally, click on **OK**

Applying the function
Excel will look for "the highest value in cells O2 through O7 that is less than or equal to the student's percentage".

> Take a look at cell **N14** now and see if it contains the correct grade according to the value in cell **L14** (the percentage for this first student)

So, once the LOOKUP function has located the correct cell in column 1 of the Lookup Table (the Range column), all that remains is for *Excel* to make a note of the letter grade that is in the corresponding cell in column 2 of the table (the Grade column), and copy of that grade into cell N14.

Copying the LOOKUP function into the rest of the GRADE column
The first student's grade is taken care of. Now you must copy this function from cell N14 down to all the other cells in the GRADE column (column N).

If you want to try and do this on your own (you will need to understand the concept of Absolute and Relative references!), go ahead. If you are successful you can skip the rest of this sub-section. If you need help, read on to follow the steps to Fill down the LOOKUP function to the remaining cells in column N.

First you must make a small change to the function itself. You also need to put your thinking cap on, because if this is the first time you've used a Lookup function, it can get mighty confusing.

You may recall learning about Relative and Absolute cell references in Lesson 4. The function =LOOKUP(L14,O2:O7,P2:P7) will work fine for the first student, but if you copy it to the other cells as is, *Excel* will assume that *all* the cell references in the function are relative to the cell into which they are being copied, and will therefore adjust them accordingly.

But the references to the LOOKUP Table (O2:O7 and P2:P7) are *absolute* references--they must not change) because the LOOKUP Table will always be found in these particular cells.

So you must tell *Excel* to leave these LOOKUP Table references unchanged when copying the LOOKUP function into the other cells in column N. The reference to the lookup_value (cell

L14 for the first student), is relative, and should change for each student. So the reference for the second student will be L15, and so on.

Here is a reminder of the steps to tell *Excel* to treat certain cell references as Absolute References.

Click on cell **N14**

The LOOKUP function is spelled out in full in the Data Entry bar at the top of the screen.

Click immediately before the reference to **cell O2** in the function in the **Data entry bar** at the top of the spreadsheet

Now put a dollar (**$**) sign in front of every reference (rows *and* columns) to the LOOKUP Table (8 $ signs in all) as illustrated in Fig. 5.19

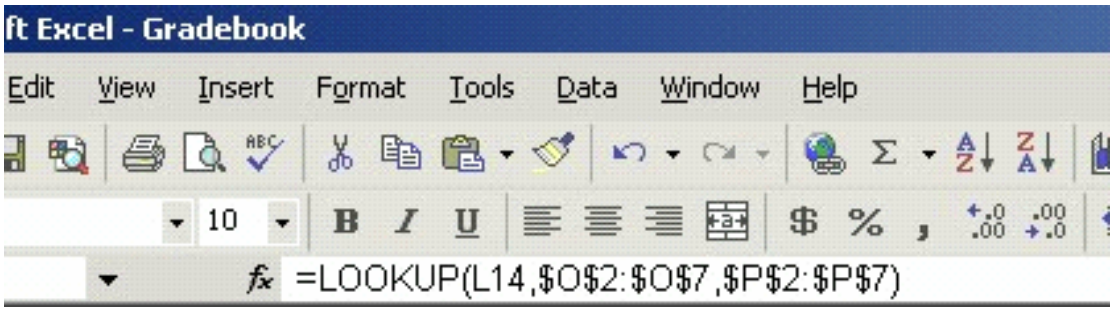

Fig. 5.19 Absolute references are preceded by dollar ($) signs

This will ensure that this part of the function will remain unchanged ("absolute") when you copy it shortly into the other cells in column N.

Click the **Accept button** (✓) to accept the LOOKUP function into cell **N14**

Here now are the steps to copy the function from cell N14 by **Fill**ing **Down** into the remaining cells of the GRADE column (Column N).

Make sure the current cell is still cell **N14**

Drag down **column N** from cell **N14** to the **last cell in the column** that contains a percentage (cell **N23**)

From the **Edit** menu select **Fill/Down...**

Excel now takes a moment to complete the copy operation, which includes figuring out the grade for each student based on the function that is now embedded in each cell of the GRADE column. And you should see the correct letter grade for each student in column N.

While you have the cells in **column N** highlighted, **center** the grades in the column

Protect all the cells in your spreadsheet (**Tools** menu) since you don't want to lose all your hard work

Save the **Gradebook** document once again (**Ctrl-s**)

If you need to think about this a little more, go carefully back over what you have just done. Once you have a clear idea of how the LOOKUP function works, you and your students will be able to apply it in myriad situations when you build spreadsheets of your own.

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Practice makes perfect

Your task now is to switch to the Grades Template document again, and add the LOOKUP function there, too. Since you do not have any data in the template (or at least you shouldn't have!), your LOOKUP function will produce a column of meaningless grades (all E's!) in the GRADE column, just as was the case when you built a function into the PCNT column of the template document when you were working on Lesson 4. This is no problem, because the data will be relevant when you use the spreadsheet with an actual class and enter meaningful sets of scores.

You either can add the functions to the Grades Template document the long way, by repeating all the steps you just carried out for the Gradebook document, or you can use the Copy (ctrl-c) function as you did a short while ago to copy the LOOKUP Table from the one document to the other.

> Don't forget to **save** the changes you have made to the **Grades Template** spreadsheet

5.6 CREATING CHARTS BASED ON THE SPREADSHEET DATA

The concept of using charts

A spreadsheet user can benefit from charts based on the numbers stored in its rows and columns of cells. Charts enable the user to visualize the data. "A picture," as you know, "is worth a thousand words." By the same token, a well-designed chart can help you make sense of a thousand numbers. Charts are also useful to increase the impact of any oral or written presentation.

For this exercise you'll open a new spreadsheet document so you can practice creating charts.

> Open the document **Charts** which is in the **Other** folder on your **Work Disk**

Your spreadsheet should look like Fig. 5.20.

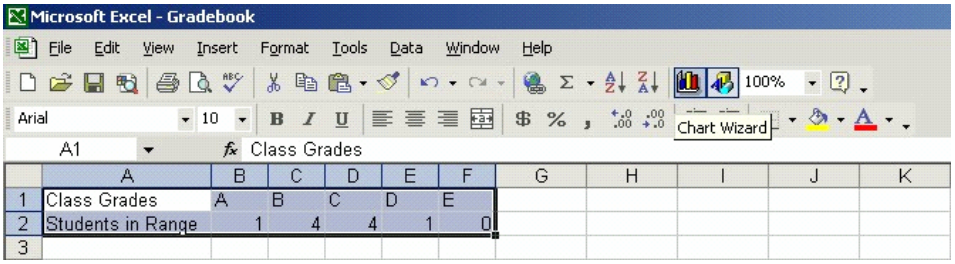

Fig. 5.20 Data for Charts document

The *Excel* charting capability

Charts are easy to create using the *Excel* spreadsheet. You may create a chart from information gathered from most any spreadsheet. There are dozens of different types of charts that you can create.

Creating a bar chart

The values represented in a chart are called a data series. In the chart you are about to create, the number of students in the various grade ranges will be represented by bars. The chart may have a title and a legend which has the names related to the data series.

Most charts, except pie charts, have axes which are the perpendicular lines along which the data is plotted or displayed. The Y axis is the vertical axis, which shows the number of students in each grade range. The X axis is the horizontal axis, which shows the grade range. First you have to designate the part of the spreadsheet that you want included in the chart. This is called the chart range.

Select by dragging and highlighting from cell **A1** through **F2**, then click in the **Standard** tool bar on the **Chart Wizard** button (Fig. 5.21)

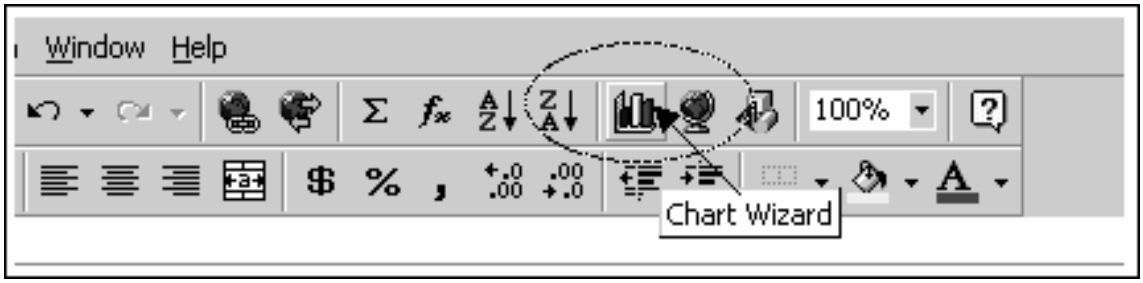

Fig. 5.21 The Chart Wizard button in the Standard tool bar

The Chart Wizard dialog box is displayed (Fig. 5.22).

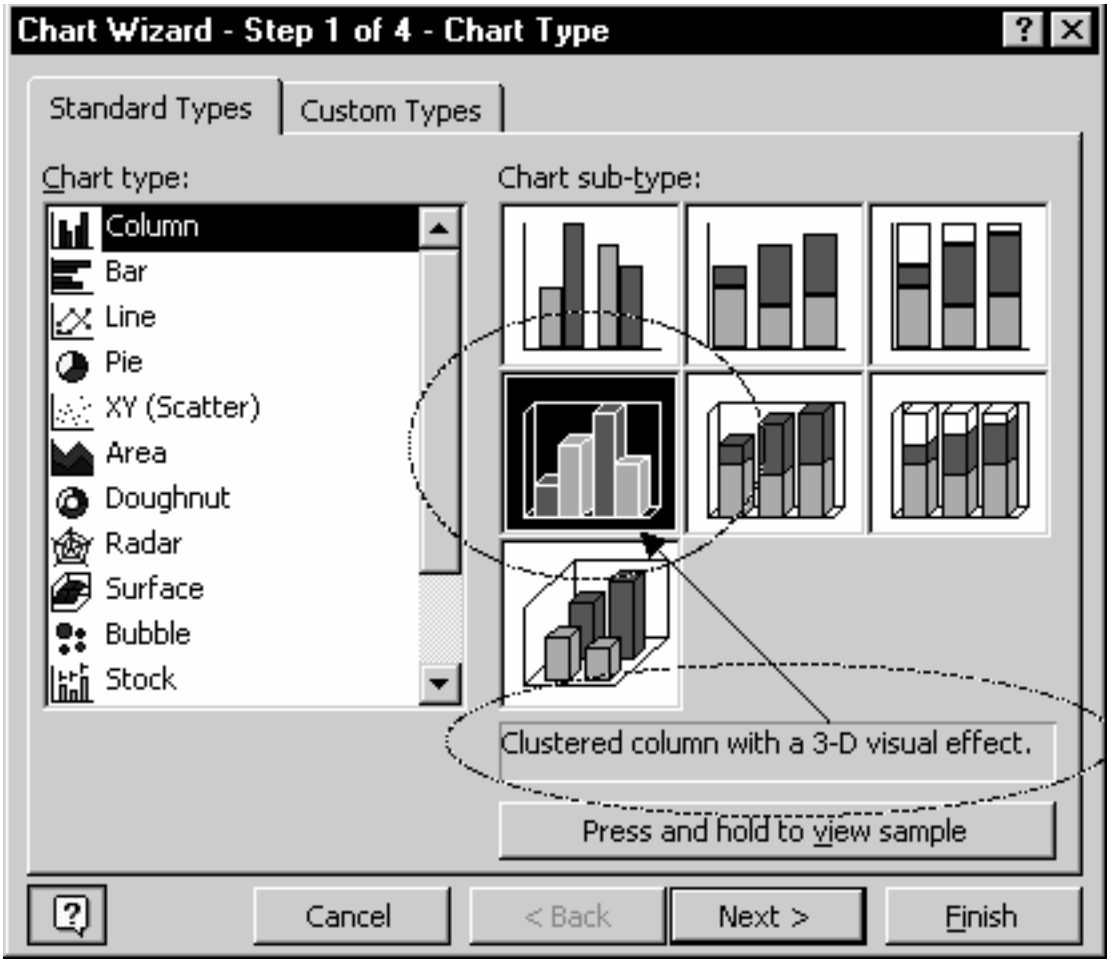

Fig. 5.22 The Chart Wizard dialog box

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Take a few moments to look over the variety of charts and options that *Excel* offers.

Click on several of the **chart types** (Bar, Line, Pie, etc.)

To see how a chart will eventually look, click on the button that tells you to "**Press and hold to view sample**"

When you have checked out several of the chart types, select the first ***Chart type:*** called a ***Column*** chart

In the **Chart sub-type** section of the dialog box, click on the **fourth** of the seven samples (the **clustered column with a 3-D visual effect**—see Fig. 5.22 above), then click on the **Next>** button

Step 2 in the Chart Wizard prompts you for the *Data Range* (the set of cells that contain the data you want to use for the chart). You have already selected the data range by dragging across the set of cells containing the data for the chart.

Click on the **Next>** button

Step 3 allows you to enter a title for the chart, as well as descriptions for each axis of the chart. These are your next tasks.

For the **chart title** enter: **Grades for Semester 1, Grade 4**

In the **X axis** box enter: **Grades**

In the **Z axis** box (it's a 3-D chart) enter: **Number of Students**

Click on **Next>** to proceed to **Step 4** of the Chart Wizard

Finally, click on the **Finish** button to accept the default of saving the chart as part of the **Charts** worksheet

Immediately *Excel* creates the chart (Fig. 5.23) and displays it on the screen.

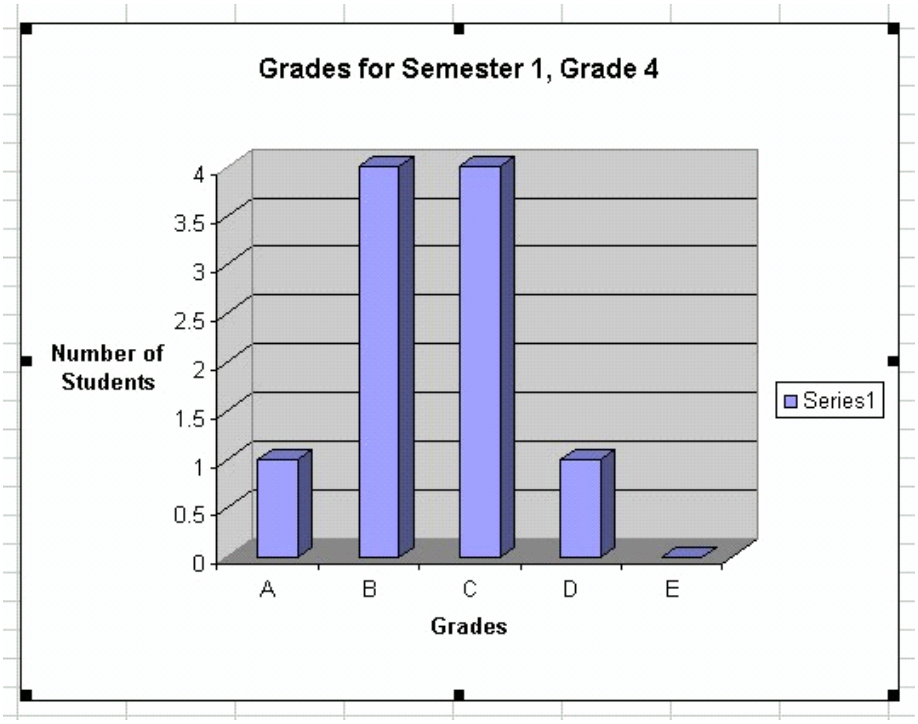

Fig. 5.23 Completed Bar Chart

You can easily make changes to the chart if you want. Try this now.

Slide the **Chart toolbar** off to the side if it's sitting on top of your chart

Right click on any piece of the chart (title, any other text, the bars, the chart background, the gridlines, the chart area as a whole, the legend, the axis numbers or letters)

Notice the handles that immediately appear around the object you've selected. Also notice that each part of the chart has different options in its pop up menu.

Select an option from the **menu** that pops up and interact with the dialog box to change fonts, colors and so forth

Try several variations on the look and feel of the chart—experiment; you can always undo anything you don't like

When you're done practicing, **save** a copy of the **bar chart** (use **Save As**) with the name **Bar Chart**

Creating a pie chart

Left click near the edge of the **Bar chart** to select it, then from the **Edit** menu select **Cut** (**Ctrl-x**) or hit the **Del(ete)** key

Creating a pie chart will be straightforward if you just successfully completed the bar chart. You will use the same set of data for the next exercise.

Drag again from cell **A1** through **F2**

In the **Standard** tool bar click on the **Chart Wizard** button again

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Select **Pie** for the **Chart type:** in the Chart Wizard dialog box

Now select the **Second** of the Pie chart sub-types (Fig. 5.24), and click on **Next>**

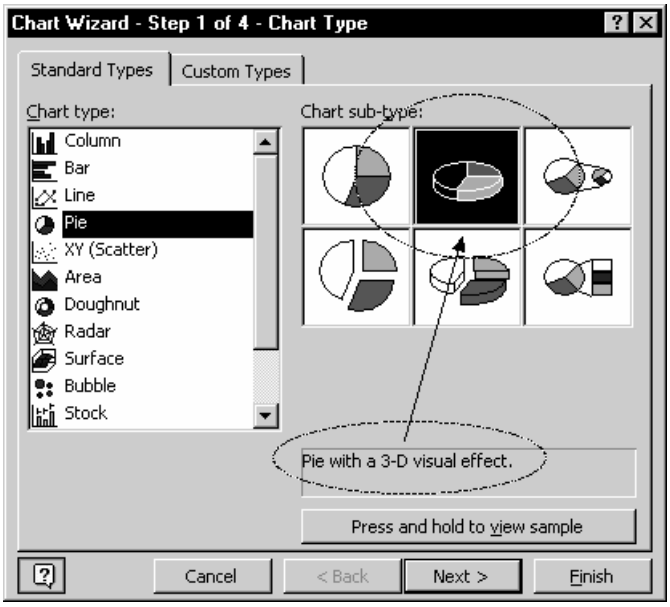

Fig. 5.24 Pie Chart sub-types

You already selected the **chart source data** so click on **Next>** again

Enter the chart title: **Class Grades** and click on **Next>**

There's nothing to change in Step 4, since you want the chart to be saved with the spreadsheet.

Click on **Finish** and click in cell **A1** to clean up the screen

If all went well, your pie chart is completed and should like the one in Fig. 5.25.

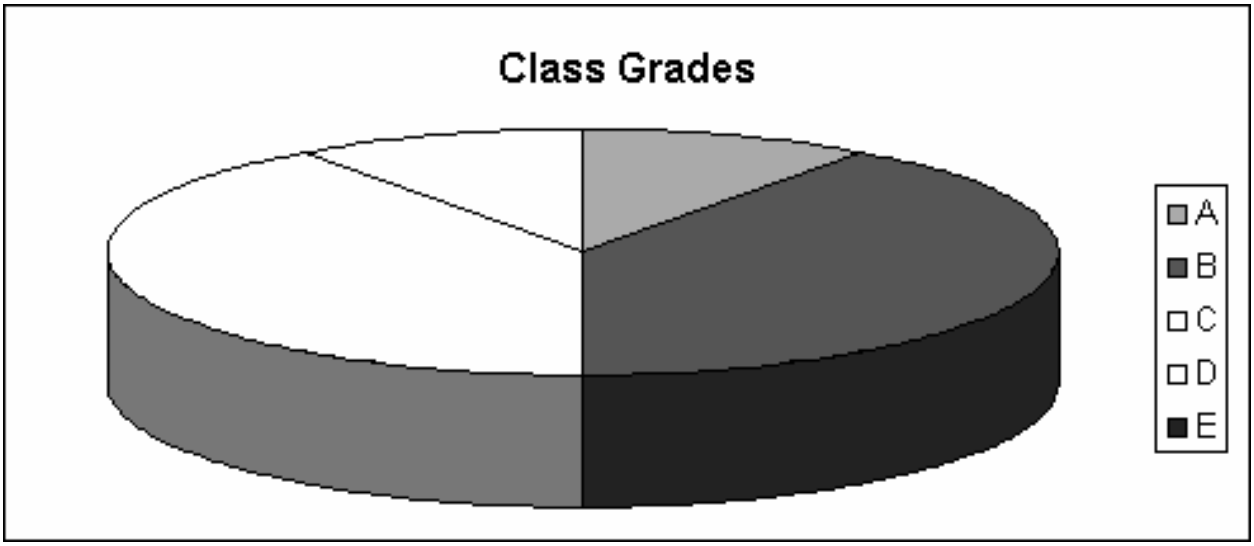

Fig. 5.25 Completed Pie Chart of grade range

As before with the bar chart, **right click** on any part of the chart and try some different fonts or colors and so forth.

When you're done experimenting, save a copy of the pie chart with the name **Pie Chart**, then close the spreadsheet by selecting **Close** from the **File** menu

5.7 PRINTING THE UPDATED SPREADSHEET

Selecting a section of the spreadsheet for printing

From the **Window** menu select the spreadsheet document **Gradebook**

You're going to print out the gradebook twice. When you first print out your Gradebook, you do not want the LOOKUP Table to appear on the printed report. You want to print only that block of cells that contains the data pertaining to student grades for the semester. This includes columns A through N and Rows 1 through 27. The steps that follow will show you how to select just this block of cells for printing.

Make sure the printer is turned on, and the paper set up correctly

Next you must select (highlight) the range of cells that you want to print.

Drag down diagonally from cell **A1** to cell **N27** (this will include the Average, Max Score, and Min Score summary lines at the bottom of the Gradebook), but not the cells with the LOOKUP table

From the File menu select Page Setup and make sure you have the option for **Landscape** orientation selected for the spreadsheet and click **OK**

From the **File** menu select **Print**

Your spreadsheet has just one page. Here are the steps to print just that section of the spreadsheet that you have selected.

In the **Print what** section, click on the radio button next to **Selection**

If you wanted to check on how many pages there are in a spreadsheet before printing, you would select Page View from the Window menu, and zoom out as you did earlier in this tutorial by clicking the zoom tool in the Standard toolbar. This will enable you to figure how many pages you need to select in the Print dialog box.

Notice also that in the Print dialog box you can opt to Preview the worksheet before printing.

Click on **Preview** now

The printed spreadsheet will look better if you remove column and row headers as well as the cell gridlines.

Click on **Setup...** at the top of the **Preview** window, then click on the **Sheet** tab

Click to remove the **check mark** from the boxes next to **Gridlines** and **Row and column headers**, then click on **OK**

Notice how different the spreadsheet looks without the gridlines.

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Save your gradebook one more time, then click on the **Print** button at the top of the **Preview** window to print out a hardcopy of your gradebook

Now **print** a second copy of the Gradebook document, but this time **include** the **Lookup Table**, along with the **gridlines** and **row and column headers**

If you are completing the lesson for a class at school, hand in **both copies** of the spreadsheet to your instructor

5.8 MAKING A BACKUP COPY OF YOUR DOCUMENTS

Your last task before completing this session at the computer is to make a backup of your documents on your *Work Disk Backup*. The Gradebook and Grades Template spreadsheet documents are saved on your *Work 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 that contains your **Work Disk**

Drag the **Other** folder from your **Work Disk** to the Desktop and drop it there, then drag the **Templates** folder to the desktop and drop it there

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

Remove your **Work Disk** from the disk drive, replace it with your **Work Disk Backup** and **double click** on the disk drive icon

Now drag the **Other** folder and the **Templates** folder from the desktop to your **Work Disk Backup**

LOOKING BACK

Most people take advantage of only a fraction of the functionality of computer software. This tutorial, and the others that you have worked your way through thus far, have introduced you to a wider range of features of *Excel* than most *Excel* users are aware of. However, you still cannot consider yourself an expert, even though you are becoming a sophisticated user. To become an expert you must first of all use the software, taking advantage of the features you have learned so that you don't forget them. You also might study the User's Guide that Microsoft provides along with the *Excel* software.

Expertise is ephemeral. "Use it, or lose it," as they say.

LOOKING FORWARD

An exhortation

Lessons 7 and 8 will help you learn to use the *Access* database application. But before learning this new Office application, it will be good to return to Microsoft *Word* in order to learn how to use the mail merge feature of the word processor. This will be the subject of Lesson 6.

If you have completed all the tutorials in this book up to this point, you have spent a considerable amount of time at the computer. This is the only way to master the machine. Yet it is not enough. You must be prepared to strike out on your own, creating documents using the productivity tools you are learning in these tutorials to meet your needs both in and out of the classroom.

Deep, assimilated learning only takes place once you are working independently, because to do this you have to show that you have *understood* everything you have learned. Understanding leads to transference and acquisition of skills. Tutorials will open the doors to knowledge, and hold your hand while you make those first steps toward the acquisition of specific skills. But you must have the desire to let go of the hand that guides you. *Without* this desire, the exercises that you are following will be wasted and yield no fruit. *With* this desire, you will be motivated to *understand* what you are learning so that you can apply it to new situations in your own professional experience.

SKILL CONSOLIDATION

Complete these exercises to reinforce what you have learned in Lesson 5.

1. List at least 5 applications, other than those presented in these tutorials, for which you think you would use the *Excel* spreadsheet in a classroom environment.
2. Either alone, or with a group, develop templates for each of the five spreadsheets identified in exercise 1. This could be an excellent class project. Each team would develop a different set of templates. Then all groups would present their results for review by everyone else in the class, and the complete set of templates could be made available on disk for everyone to take away from the course.
3. Load the Gradebook document to the Desktop.
    - Add the function to calculate the average score for each of the tests, quizzes, homeworks, etc.
      The system will add up all the scores and divide by the number of cells that contain scores to arrive at the average. You should use the copy function to duplicate the functions across the spreadsheet.
    - Save the updated document
    - Print out only the columns that contain the student names and the final totals and percentages (so you will need to temporarily delete the columns in between--don't save this document!)
4. Load the Gradebook document onto the Desktop.
    - Add a new column for another set of scores
    - Add a new row for another student
    - Update the functions where necessary
    - Sort the student records based on the First and Last Name columns
    - Save the updated document

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5. Create a line chart based on a set of values for populations in several cities in the U.S. Generate a Bar chart from the data. Research the populations on the web at http://geography.miningco.com/science/geography/msub24.htm
6. Create a pie chart based on a set of values for the amount of rainfall for each of any ten cities world wide. Research the rainfall data at the following web address: http://www.worldclimate.com/